TENDER SPECIFICATION
BHEL PSSR SCT 1823

FOR

CIVIL AND ARCHITECTURAL WORKS OF THE NON-PLANT STRUCTURES / BUILDINGS

AT

2 X 660 MW

UDANGUDI SUPERCRITICAL THERMAL POWER STATION, STAGE - I, KALLAMOLI VILLAGE, THIRUCHENDUR TALUK, TUTICORIN DISTRICT, TAMILNADU

(for BHEL internal ref: Non plant civil Part 2)

VOLUME –I BOOK – I

TECHNOCOMMERCIAL BID - Consists of Book- I & Book- II

Book- I Consists of

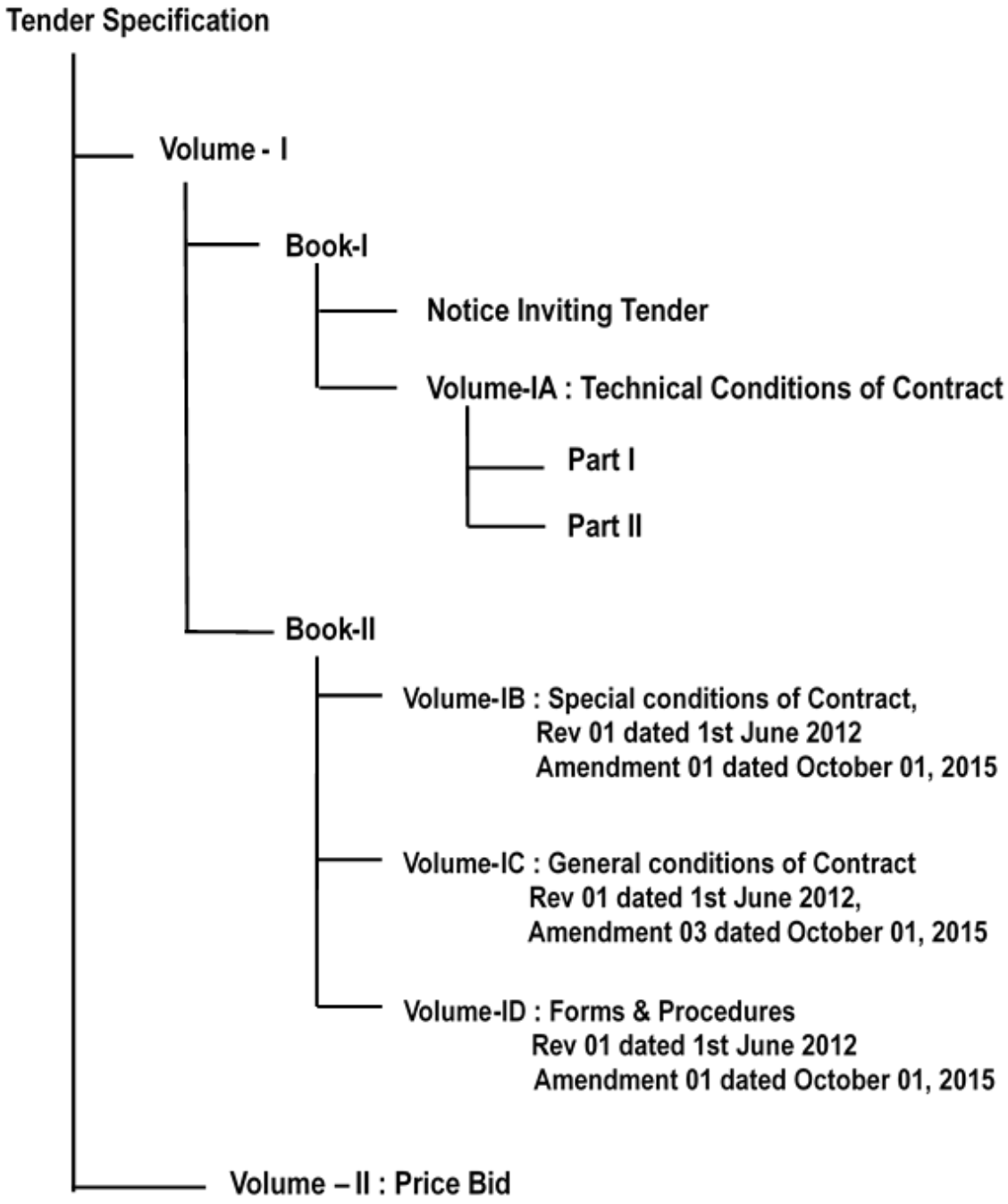
- **Notice Inviting Tender**
- **Volume-IA: Technical Conditions of Contract**

Book-II consists of

- **Volume-IB : Special conditions of Contract,**
  Rev 01 dated 1st June 2012
  Amendment 01 dated 1st October, 2015
- **Volume-IC : General conditions of Contract**
  Rev 01 dated 1st June 2012,
  Amendment 03 dated 1st October, 2015
- **Volume-ID : Forms & Procedures**
  Rev 01 dated 1st June 2012
  Amendment 01 dated 1st October, 2015

BHARAT HEAVY ELECTRICALS LIMITED
(A Government of India Undertaking)
Power Sector – Southern Region
690, Anna Salai, Nandanam, Chennai – 600 035

TENDER SPECIFICATION CONSISTS OF



NOTICE INVITING TENDER

Bharat Heavy Electricals Limited

Tender Specification No.: BHEL PSSR SCT 1823

Ref: BHEL PSSR SCT 1823 **Date: Mar 23, 2019**

NOTICE INVITING TENDER (NIT)

Submission only through E-Procurement Portal

https://www.bhel.abcprocure.com

Note: Bidder may download Tender Documents from web sites

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To

Dear Sir / Madam

Sub: NOTICE INVITING TENDER

Online Sealed offers in two part bid system are invited from reputed & experienced bidders (meeting PRE QUALIFICATION CRITERIA as mentioned in Annexure-I) **through E-Procurement Portal https://www.bhel.abcprocure.com only**, for the subject job by the undersigned on the behalf of BHARAT HEAVY ELECTRICALS LIMITED as per the tender document. Following points relevant to the tender may please be noted and complied with.

This tender shall be under category of National Competitive Bidding (NCB).

1.0 **Salient Features of NIT**

Sl. No	ISSUE	DESCRIPTION	
i	TENDER NUMBER	**BHEL PSSR SCT 1823**	
ii	Broad Scope of job	Civil and Architectural Works of the Non-Plant Structures / Buildings at 2x660 MW, Udangudi Supercritical Thermal Power Station, Stage -I, Kallamoli Village, Thiruchendur Taluk, Tuticorin District, Tamilnadu	
iii	**DETAILS OF TENDER DOCUMENT**		
A	Volume-IA	Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc	Applicable
B	Volume-IB	Special Conditions of Contract (SCC) Rev. 01 Dt. 01 Jun 2012 Amendment 01 dated October 01, 2015	Applicable
C	Volume-IC	General Conditions of Contract (GCC) Rev. 01 Dt. 01 Jun 2012 Amendment 03 dated October 01, 2015	Applicable

D	Volume-ID	Forms and Procedures Rev. 01 Dt. 01 Jun 2012 Amendment 01 dated October 01, 2015	Applicable
E	Volume-II	Price Schedule (Absolute value).	Applicable
iv	Issue of Tender Documents	1. This is an E-tender floated online through our E-Procurement Portal **https://www.bhel.abcprocure.com** 2. Sale Start: **Mar 25, 2019** 3. From BHEL website (www.bhel.com → Tender Notifications): Tender documents for bidder's reference can be downloaded from this website till due date of submission.	Applicable
v	Due Date & Time of Offer Submission	**Date : Apr 15, 2019, Time : 15:00 Hrs** The bidder should submit their offer online in e-Procurement portal at **https://www.bhel.abcprocure.com** Offers are invited in two-parts only. Bidders are requested to upload their offer well in advance in order to avoid last minute congestion at this website. Hard copy bid or bids through E-mail / fax shall not be accepted.	Applicable
vi	Opening of Tender	**Date : Apr 15, 2019, Time :15.30 Hrs** Notes: (1) In case the due date of opening of tender becomes a non-working day, tenders shall be opened on next working day at the same time. (2) Bidder may depute representative to witness the opening of tender	Applicable
vii	EMD Amount	**Rs 63,30,000/-** (Rupees sixty three lakhs thirty thousand only) - Refer Volume-I A Part-II Chapter-1 of Technical Conditions of Contract (Volume-I Book-I) for mode of payment of Earnest Money Deposit (EMD) - EMD Exemption for MSEs is not applicable for this tender. - One time EMD not applicable for this tender.	Applicable
viii	Cost of Tender	Rs 2000/- (Rupees Two thousand only)	Applicable

<table>
<tr><td>ix</td><td>Last Date For Seeking Clarification</td><td>Bidders may submit their queries in https://www.bhel.abcprocure.com at least 7 days before the due date of offer submission or two days before the scheduled date of pre-bid meeting whichever is earlier along with soft version also, addressing to undersigned & to others as per contact address given above.</td><td>Applicable</td></tr>
<tr><td>x</td><td>Schedule of Pre Bid Discussion (PBD)</td><td>Date: Apr 04, 2019, Time 11.00AM
at BHEL:PSSR:Chennai-35</td><td>Applicable</td></tr>
<tr><td>xi</td><td>Integrity Pact & Details of Independent External Monitor (IEM)</td><td>Integrity Pact (IP)
a) IP is a tool to ensure that activities and transactions between the company and its Bidders / Contractors are handled in a fair, transparent and corruption free manner. Following Independent External Monitors (IEMs) on the present panel have been appointed by BHEL with the approval of CVC to oversee implementation of IP in BHEL.
<table>
<tr><td>Shri D.R.S Chaudhary,
IAS (Retd.)
E-1/164 Arera Colony,
Bhopal 462016
Madya Pradhesh
E mail:
dilip.chaudhary@icloud.com</td><td>Mrs. Pravin Tripathi,
IA & AS (Retd.)
D-243, Anupam Gardens,
Lane IB, Neb Sarai,
Sainik Farms,
New Delhi – 110 068
E mail:
pravin.tripathi@gmail.com</td></tr>
</table>
b) The IP as per format given at Volume-I A Part-II Chapter-1 of Technical Conditions of Contract (Refer Volume-I Book-I) of this tender is to be submitted (duly signed by the authorized signatory) along with Techno Commercial Bid. Only those bidders who have entered into such an IP with BHEL would be competent to participate in the bidding. In other words, entering into this pact would be a preliminary qualification.
Please refer section- 8 of the IP (refer the format given at Volume 1D Formats of this tender) for Role and Responsibilities of IEMs. In case of any</td><td>Applicable</td></tr>
</table>

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<tr>
<td></td>
<td></td>
<td>complaint arising out of the tendering process, the matter may be referred to the IEM mentioned in the tender.

Note: No routine correspondence shall be addressed to the IEM (Phone / Post / E mail) regarding the clarifications, time extensions or any other administrative queries, etc. on the tender issued. shall be posted in https://www.bhel.abcprocure.com. Any other queries may be addressed directly to the tender issuing (Procurement) department as mentioned below:
<table>
<tr><td>Name</td><td>Shri.S.P.Sethuraman</td><td>Shri. Sandipan Biswas</td></tr>
<tr><td>Dept</td><td>Sub Contracts</td><td>Sub Contracts</td></tr>
<tr><td>Phone</td><td>+91 44 24330209, +91 44 28286764</td><td>+91 44 28286757</td></tr>
<tr><td>E mail</td><td>Sethu_sp@bhel.in</td><td>bsandipan@bhel.in</td></tr>
</table>
</td>
<td></td>
</tr>
<tr>
<td>xii</td>
<td>Latest updates</td>
<td>Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc to Tender Specifications will be hosted in BHEL webpage (www.bhel.com → Tender Notifications), and portal https://www.bhel.abcprocure.com. Bidders to keep themselves updated with all such information. This also form part of tender hence the same shall be enclosed with their offer.</td>
<td></td>
</tr>
</table>

2.0 The offer shall be submitted as per the instructions of tender document and as detailed in this NIT. Bidders to note specifically that all pages of tender document, including these NIT pages of this particular tender together with subsequent correspondences shall be submitted by them, duly signed & stamped on each page, as part of offer. **Rates / Price including discounts / rebates, if any, mentioned anywhere / in any form in the techno-commercial offer other than the Price Bid, shall not be entertained.**

3.0 Unless specifically stated otherwise, bidder shall remit cost of tender inline with mode of payment applicable to EMD as mentioned in Vol-1A Part-II Chapter-1 of Technical Conditions of Contract (Volume-I, Book-I) under the heading 'Modes of deposit of EMD'.

4.0 Unless specifically stated otherwise, bidder shall deposit **Earnest Money Deposit (EMD) as mentioned in Volume IA, Part-II, Chapter-1** of Technical Conditions of Contract (Volume-I Book-I). Please note that 'One Time EMD' shall not be considered. For mode of payment of EMD, bidder shall refer Vol-1A Part-II Chapter-1 of Technical Conditions of Contract (Volume-I Book-I). **It is to be noted that proof of remittance for EMD shall be made available at BHEL PSSR Office prior to tender opening. One time EMD is not applicable.**

5.0 **Procedure for Submission of Tenders**: This is an E-tender floated online through our E-Procurement portal https://www.bhel.abcprocure.com. The bidder should respond by submitting their offer online only in our e-Procurement portal at https://www.bhel.abcprocure.com. Hard copy bid or bids through email/ fax shall not be accepted.

I. Pre-requisite for Offer Submission:-

The process of utilizing e-procurement necessitates usage of DSC (Digital Signature Certificate) (Class 3- SHA2- 2048 BIT- SIGNING & ENCRYPTION) and you are requested to procure the same immediately, if not presently available with you.

The Tenderer should own and use the Digital Signature Certificate (Class 3 – SHA2 – 2048 BIT – Signing & Encryption) (DSC) issued on behalf of their / his - firm/organization/company/proprietor. Tenderer to register with E-Procurement Portal https://www.bhel.abcprocure.com with their DSC.

Please note that only with DSC, you will be able to login the e-procurement secured site and take part in the tendering process.

The contact details of the DSC Certifying Authority may be obtained from **"Bidder Manual**", as available in https://www.bhel.abcprocure.com.

II. Digital Signing of e-Tender

Tenders shall be uploaded with all relevant documents in .pdf / zip format. The relevant tender documents should be uploaded by an authorized person having Class 3- SHA2- 2048 BIT- SIGNING & ENCRYPTION digital signature certificate (DSC).

i) The Requirement:

a. A PC with Internet connectivity.

b. DSC (Digital Signature Certificate) (Class 3- SHA2- 2048 BIT- SIGNING & ENCRYPTION)

III. Details of **E-procurement service Provider-:**

The contact details of the service provider are given below:
e-Procurement Technologies Limited (abcProcure),
B-704 / 705, Wall Street - II, Opp. Orient Club,
Nr. Gujarat College, Ellis Bridge,
Ahmedabad - 380 006, Gujarat (India)

Timing:
Monday to Friday: Indian Standard Time (+5:30 GMT):10:00 AM - 07:00 PM
Saturday : Indian Standard Time (+5:30 GMT): 10:00 AM - 04:00 PM

Contact: +91 79 68136819 / 809 / 862 / 867 / 823 / 872 / 842

E-Mail: bhel.support@abcprocure.com

Further contact details can be obtained by visiting the following webpage:
https://www.bhel.abcprocure.com/EPROC/contactus

IV. Documents Comprising the e-Tender

The tender shall be submitted online - ONLY EXCEPT TENDER FEE & EMD (in physical form) as mentioned below:

i) Technical Tender (Un priced Tender)

Bidders shall furnish the following information along with technical bid (preferably in pdf format):

i). Tender Cost and Earnest Money Deposit (EMD) furnished in accordance with **Clause 3.0 & 4.0. of NIT.**

ii). All Technical details (eg. Eligibility Criteria requested, Technical Conditions of Contract) should be attached in e-tendering module **(As detailed in Clause 6.0 below),** failing which the tender stands invalid & may be REJECTED.

ii) Price Bid:

a. Prices are to be quoted as per the Price Bid format attached online on E-tender portal.

b. The price should be quoted for the accounting unit indicated in the e-tender document.

c. The item description, Quantity and Unit of measurement, as mentioned in Price bid uploaded by BHEL and subsequent revisions issued by BHEL, shall be binding on the bidder.

Note:

i). It is the responsibility of tenderer to go through the Tender document to ensure furnishing all required documents in addition to above, if any.

Any deviation would result in REJECTION of tender and would not be considered at a later stage at any cost by BHEL.

ii). A person signing (manually or digitally) the tender form or any documents forming part of the contract on behalf of another shall be deemed to warrantee that he has authority to bind such other persons and if, on enquiry, it appears that the persons so signing had no authority to do so, the purchaser may, without prejudice to other civil and criminal remedies, cancel the contract and hold the signatory liable for all cost and damages.

iii). A tender, which does not fulfil any of the above requirements and / or gives evasive information / reply against any such requirement, shall be liable to be ignored and rejected.

iv). In case offer is sent through hard copy / fax / telex / cable / electronically in place of e-tender, same shall not be considered.

v). **Vendors are also requested to go through** Bidder Manual for BHEL Bidders **available on https://www.bhel.abcprocure.com**

V. DO NOT'S (Don'ts)

Bidders are requested NOT to submit the hard copy of the Bid. In case offer is sent through hard copy / fax / telex / cable / electronically in place of e-tender, the same shall not be considered.

6.0 **DOCUMENTS TO BE UPLOADED & MODALITY OF UPLOADING in E-PROCUREMENT PORTAL https://www.bhel.abcprocure.com SHALL BE AS DETAILED BELOW:**

Sl. No	Description	Remarks
	Techno-Commercial Bid CONTAINING THE FOLLOWING:-	
i.	Covering letter / Offer forwarding letter of Tenderer.	To be uploaded under the form Techno-commercial Bid.
ii.	Duly filled-in `No Deviation Certificate' as per prescribed format to be placed after document under Sl. No (i) above. **Note:** 1. In case of any deviation, the same should be submitted separately for technical & commercial parts, indicating respective clauses of tender against which deviation is taken by bidder. The list of such deviation shall be attached along with document under Sl. No (i) above. It shall be specifically noted that deviation recorded elsewhere shall not be entertained.	

	2. BHEL reserves the right to accept / reject the deviations without assigning any reasons, and BHEL decision is final and binding. (i) In case of acceptance of the deviations, appropriate loading shall be done by BHEL (ii) In case of unacceptable deviations, BHEL reserves the right to reject the tender.	To be uploaded under the form Techno-commercial Bid.
iii.	Supporting documents / annexure / schedules / drawing etc as required in line with Pre-Qualification criteria. (Technical & Financial) As detailed in Clause No. 25 of NIT, It shall be specifically noted that all documents as per above shall be indexed properly and credential certificates issued by clients shall distinctly bear the name of organization, contact phone no, FAX no, etc.	
iv.	All Amendments / Correspondences / Corrigenda / Clarifications / Changes / Errata etc pertinent to this NIT.	
v.	Integrity Pact Agreement (Duly signed by the authorized signatory) (As applicable)	
vi.	Duly filled-in annexures, formats etc as required under this Tender Specification / NIT	
vii.	Notice inviting Tender (NIT)	
viii.	Volume – I A : Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc	
ix.	Volume – I B : Special Conditions of Contract (SCC)	
x.	Volume – I C : General Conditions of Contract (GCC)	
xi.	Volume – I D : Forms & Procedures	
xii.	Volume – II (UNPRICED – without disclosing rates/price, but mentioning only 'QUOTED' or 'UNQUOTED' against each item	
xiii.	Any other details preferred by bidder with proper indexing.	

Caution to Bidders:-

The duly signed & stamped copies of Volume – I Book I & Volume I Book-II are to be attached in their respective sections. For any further queries, refer "Bidder Manual for BHEL Bidders" available at **https://www.bhel.abcprocure.com**

	PRICE BID shall be as mentioned below:	
	Price / Total Amount corresponding to the total works as specified in 'Part-C: Bill of Quantities' in Volume II – PRICE BID (latest Revision) shall be quoted in the Price Bid Form available in e-Procurement portal. Bidders to note that documents uploaded under the form Price Bid shall be considered for commercial evaluation of offer only if they are in above format	To be uploaded under the form Price Bid. Refer "Bidder Manual for BHEL Bidders" available at **https://bhel.abcprocure.com**

SPECIAL NOTE:

i) All documents / annexures submitted with the offer shall be properly attached / entered / uploaded in the respective sections. BHEL shall not be responsible for any missing documents.

ii) Your offer & documents submitted along with offer shall be signed & stamped in each page by your authorized representative. No overwriting / correction in tender documents by bidders shall be allowed. However, if correction is unavoidable, the same may be signed by authorized signatory.

7.0 Deviation with respect to tender clauses and additional clauses / suggestions / in Techno-commercial bid / Price bid shall NOT be considered by BHEL. Bidders are requested to positively comply with the same.

8.0 BHEL reserves the right to accept or reject any or all Offers without assigning any reasons thereof. BHEL also reserves the right to cancel the Tender wholly or partly without assigning any reason thereof. Also BHEL shall not entertain any correspondence from bidders in this matter (except for the refund of EMD).

9.0 **ASSESSMENT OF CAPACITY OF BIDDERS:**

Bidder's capacity for executing the job under tender shall be assessed 'LOAD' wise and 'PERFORMANCE' wise as per the following:

I. LOAD: Load takes into consideration ALL the contracts of the Bidder under execution with BHEL Regions, irrespective of whether they are similar to the tendered scope or not. The cut off month for reckoning 'Load' shall be the third month preceding the month corresponding to the 'latest date of bid submission', in the following manner –

(**Note**: For example, if latest bid submission is in Jan 2017, then the 'load' shall be calculated up to and inclusive of Oct 2016)

Total number of Packages in hand = Load (P)

Where 'P' is the sum of all unit wise identified packages (refer table-1) under execution with BHEL Regions as of the cut off month defined above, including packages yet to be commenced, excepting packages which are on LONG HOLD

II. PERFORMANCE: Here 'Monthly Performance' of the bidder for all the packages (under execution/ executed during the 'Period of Assessment' in all Power Sector Regions of BHEL) **SIMILAR** to the packages covered under the tendered scope, excepting packages not commenced shall be taken into consideration. The 'Period of Assessment' shall be 6 months preceding and including the cut off month. The cut off month for reckoning 'Period of Assessment' shall be the third month preceding the month corresponding to 'latest date of bid submission', in the following manner:

(Note: For example, if 'latest date of bid submission' is in Jan 2017, then the 'performance' shall be assessed for a 'six months' period up to and inclusive of Oct 2016 (i.e. from May 2016 to Oct 2016), for all the unit wise identified packages (refer Table I)

i). Calculation of Overall 'Performance Rating' for 'Similar Package / Packages' for the tendered scope under execution at Power Sector Regions for the 'Period of Assessment

This shall be obtained by summing up the 'Monthly Performance Evaluation' scores obtained by the bidder in all Regions for all the similar Package / packages', divided by the total number of Package months for which evaluation should have been done, as per procedure below:

a) P_1, P_2, P_3, P_4, P_5 , …. P_N etc. be the packages (under execution / executed during the 'Period of Assessment' in all Regions of BHEL) **SIMILAR** to the packages covered under the tendered scope, excepting packages not commenced. Total number of similar packages for all Regions = $\mathbf{P_T}$ (i.e. $P_T = P_1 + P_2 + P_3 + P_4 + \ldots P_N$)

b) Number of Months 'T_1' for which 'Monthly Performance Evaluation' as per relevant formats, should have been done in the 'Period of Assessment' for the corresponding similar package P_1. Similarly T_2 for package P_2, T_3 for package P_3, etc. for the tendered scope. Now calculate cumulative total months '$\mathbf{T_T}$' for total similar Packages '$\mathbf{P_T}$' for all Regions (i.e. $\mathbf{T_T} = T_1 + T_2 + T_3 + T_4 + ..T_N$)

c) Sum 'S_1 'of 'Monthly Performance Evaluation' Scores (S_{1-1}, S_{1-2}, S_{1-3}, S_{1-4}, S_{1-5}…. S_{1-T1}) for similar package P1, for the 'period of assessment' 'T_1' (i.e. $S_1 = S_{1-1} + S_{1-2} + S_{1-3} + S_{1-4} + S_{1-5} + \ldots S_{1-T1}$). Similarly, S_2 for package P_2 for period T_2, S_3 for package P_3 for period T_3 etc. for the tendered scope for all Regions. Now calculate cumulative sum 'S_T' of 'Monthly Performance Evaluation' Scores for total similar Packages '$\mathbf{P_T}$' for all Regions (i.e. 'S_T' = $S_1 + S_2 + S_3 + S_4 + S_5 + \ldots S_N$.)

d) **Overall Performance Rating 'R_{BHEL}' for the Similar Package / Packages** (under execution / executed during the 'Period of Assessment') in all the Power Sector Regions of BHEL

$$= \frac{\text{Aggregate of Performance scores for all similar packages in all the Regions}}{\text{Aggregate of months for each of the similar packages for which performance should have been evaluated in all the Regions.}}$$

$$= \frac{S_T}{T_T}$$

e) **Bidders to note that the risk of non-evaluation or non-availability of the 'Monthly Performance Evaluation' reports as per relevant formats is to be borne by the Bidder.**

f) **Table showing methodology for calculating 'a', 'b' and 'c' above**

Sl. No	**Item Description**	**Details for all Regions**							**Total**
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)
1	Similar Packages for all Regions → (under execution/ executed during period of assessment)	P_1	P_2	P_3	P_4	P_5	…	P_N	Total No of similar packages for all Regions = $\mathbf{P_T}$ ie Sum (Σ) of columns (iii) to (ix)

Sl. No	Item Description	Details for all Regions							Total
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)
2	Number of Months for which 'Monthly Performance Evaluation' as per relevant formats should have been done in the 'period of assessment for corresponding similar Package (as in row 1)	T_1	T_2	T_3	T_4	T_5	…	T_N	Sum (Σ) of columns (iii) to (ix) = $\mathbf{T_T}$
3	Monthly performance scores for the corresponding period (as in Row 2)	S_{1-1}, S_{1-2}, S_{1-3}, S_{1-4}, … S_{1-T1}	S_{2-1}, S_{2-2}, S_{2-3}, S_{2-4}, … S_{2-T2}	S_{3-1}, S_{3-2}, S_{3-3}, S_{3-4}, … S_{3-T3}	S_{4-1}, S_{4-2}, S_{4-3}, S_{4-4}, … S_{4-T4}	S_{5-1}, S_{5-2}, S_{5-3}, S_{5-4}, … S_{5-T5}	.. … … … …	S_{N-1}, S_{N-2}, S_{N-3}, S_{N-4}, … S_{N-TN}	---
4	Sum of Monthly Performance scores of the corresponding Package for the corresponding period (as in row-3)	S_1	S_2	S_3	S_4	S_5	…	S_N	Sum (Σ) of columns (iii) to (ix) = $\mathbf{S_T}$

ii.) <u>Calculation of Overall 'Performance Rating' (R_{BHEL}) in case at least six evaluation scores for 'similar Package / Packages' for the tendered scope ARE NOT AVAILABLE during the 'Period of Assessment'.</u>

This shall be obtained by summing up the 'Monthly Performance Evaluation' scores obtained by the bidder in all Regions for ALL the packages, divided by the total number of Package months for which evaluation should have been done. '$\mathbf{R_{BHEL}}$' shall be calculated subject to availability of 'performance scores' for at least six 'package months' in the order of precedence below:

a) 'Period of Assessment' i.e. six months preceding and including the cut-off month

b) 12 months preceding and including the cut-off month
c) 24 months preceding and including the cut-off month
d) 36 months preceding and including the cut-off month

In case, '$\mathbf{R_{BHEL}}$' cannot be calculated as above, then Bidder shall be treated as 'NEW VENDOR'. Further eligibility and qualification of this bidder shall be as per definition of 'NEW VENDOR' described in 'Explanatory Notes'.

iii) Factor "L" assigned based on Overall Performance Rating (R_{BHEL}) at Power Sector Regions,:

Sl. No.	Overall Performance Rating (R_{BHEL})	Corresponding value of 'L'
1	=60	NA
2	> 60 and ≤ 65	0.4
3	> 65 and ≤ 70	0.35
4	> 70 and ≤ 75	0.25
5	> 75 and < 80	0.2
6	≥ 80	NA

III. Assessment of Capacity of Bidder':

'Assessment of Capacity of Bidder' is based on the Maximum number of packages for which a vendor is eligible, considering the performance scores of similar packages, as below:

Max number of packages P_{Max}= (R_{BHEL}- 60) divided by corresponding value of 'L' i.e. (R_{BHEL}- 60)/L

Note:

i. In case the value of P_{Max} results in a fraction, the value of P_{Max} is to be rounded off to next whole number.
ii. For R_{BHEL} = 60, P_{Max} = '1'
iii. For R_{BHEL} ≥ 80, there will be no upper limit on P_{Max}

The Bidder shall be considered 'Qualified' as per 'Assessment of Capacity of Bidder' for the subject Tender if P ≤ P_{Max}

(Where P is calculated as per clause 'I' above.)

IV. Explanatory note:

i). Similar package means Boiler or ESP or Piping or Turbine or Civil or Structure or Electrical or C&I etc. at the individual level irrespective of rating of Plant and irrespective of whether the subject tender is a single package or as part of combined / composite packages. Normally Boiler, ESP, Piping, Turbine, Electrical, C&I, Civil, Structure

etc. is considered individual level of package. For example, in case the tendered scope is a Boiler Vertical Package comprising of Boiler, ESP and Power Cycle Piping (i.e. the 'identified packages as per Table-1 below), the 'PERFORMANCE' part against Sl. No. II above, needs to be evaluated considering all the identified packages (i.e. Boiler, ESP and Power Cycle Piping) and finally the Bidder's capacity to execute the tendered scope is assessed in line with III above.

ii). Identified Packages (Unit wise)

Table-1

Civil	Electrical & CI	Mechanical
i). Enabling works ii). Pile and Pile Caps iii). Civil Works including foundations iv). Structural Steel Fabrication & Erection v). Chimney vi). Cooling Tower vii). Others (Civil)	i). Electrical ii). CI iii). Others (Elec & CI)	i). Boiler & Aux (All types including CW Piping if applicable) ii). Power Cycle Piping / Critical Piping iii). ESP iv). LP Piping v). Steam Turbine Generator set & Aux vi). Gas Turbine Generator set & Aux vii). Hydro Turbine Generator set & Aux viii). Turbo Blower (including Steam Turbine) ix). Material Management x). Others (Mechanical)

iii). Bidders who have not been evaluated for at least six package months in the last 36 months preceding and including the Cut-off month in the online BHEL system for contractor performance evaluation in BHEL PS Regions, shall be considered "NEW VENDOR".

A 'NEW VENDOR' shall be considered qualified subject to satisfying all other tender conditions

A 'NEW VENDOR' if awarded a job (of package / packages identified under this clause) shall be tagged as "FIRST TIMER" on the date of first LOI from BHEL.

The "FIRST TIMER" tag shall remain till completion of all the contracts against which vendor has been tagged as First Timer or availability of 6 evaluation scores within last 36 months preceding and including the

Cut-off month in the online BHEL system for contractor performance evaluation in BHEL PS Regions.

A Bidder shall not be eligible for the next job as long as the Bidder is tagged as "FIRST TIMER" excepting for the Tenders which have been opened on or before the date of the bidder being tagged as 'FIRST TIMER'.

After removal of 'FIRST TIMER' tag, the Bidder shall be considered 'QUALIFIED' for the future tenders subject to satisfying all other tender conditions including 'Assessment of Capacity of Bidders'.

iv). Consequent upon applying the criteria of 'Assessment of Capacity of Bidders' detailed above on all the bidders qualified against Technical and Financial Qualification criteria, if the number of qualified bidders reduces to less than four, then for further processing of the Tender, BHEL at its discretion reserves the right to also consider the bidders who are "not qualified" as per criteria of 'Assessment of Capacity of Bidders' and for this, procedure described in following three options shall be followed:

a) All the bidders having Overall Performance Rating ('R_{BHEL}') ≥60 shall be considered qualified against criteria of 'Assessment of Capacity of Bidders'.

b) If even after using option "a", the number of qualified bidders remains less than four, then in addition to bidders considered as per option "a", "First timer" bidders having average of available performance scores ≥60 upto and including the Cut Off month shall also be considered qualified against criteria of 'Assessment of Capacity of Bidders'.

c) If even after using option "a" and "b", the number of qualified bidders remains less than four, then in addition to bidders considered as per option "a" and "b", "First timer" bidders for whom no performance score is available in the system upto and including the Cut Off month, shall also be considered qualified against criteria of 'Assessment of Capacity of Bidders'.

Note: - In case, the number of bidders qualified against Technical and Financial Qualification criteria itself is less than four, then all bidders (a)- having Overall Performance Rating ('R_{BHEL}') ≥60, (b)- First timer" bidders having average of available performance scores ≥60 upto and including the Cut Off month, (c)- "First timer" bidders for whom no performance score is available in the system upto and including the Cut Off month, shall be

considered qualified against criteria of 'Assessment of Capacity of Bidders' for further processing of tender.

v). 'Under execution' shall mean works in progress as per the following:

(a). Up to execution of 90% of anticipated Contract Value in case of Civil, MM, Structural and Turbo Blower Packages

(b). Up to Steam Blowing in case of Boiler / ESP / Piping Packages

(c). Up to Synchronization in all Balance Packages

Note: - BHEL at its discretion can extend (or reduce in exceptional cases in line with Contract conditions) the period defined against (a), (b) and (c) above, depending upon the balance scope of work to be completed.

vi). Contractor shall provide the latest contact details i.e. mail-ID and Correspondence Address to SCT Department, so that same can be entered in the Contractor Performance Evaluation System, and in case of any change / discrepancy same shall be informed immediately. Login Details for viewing scores in Contractor Performance Evaluation System shall be provided to the Contractor by SCT Department.

vii). Performance Evaluation for Activity Month shall be completed in Evaluation Month (i.e. month next to Activity Month) or in rare cases in Post Evaluation Month (i.e. month next to Evaluation Month) after approval from Competent Authority. In case scores are not acceptable, Contractor can submit Review Request to GM Site / GM Project latest by 25th of Evaluation Month or 3 days after approval of score, whichever is later. However, acceptance / rejection of 'Review Request' solely depends on the discretion of GM Site / GM Project. After acceptance of Review Request, evaluation score shall be reviewed at site and the score after completion of review process shall be acceptable and binding on the contractor.

viii. Project on Hold due to reasons not attributable to bidder -

a. **Short hold:** Evaluation shall not be applicable for this period, however loading will be considered.

b. **Long hold:** Short hold for continuous six months and beyond or hold on account of Force Majeure shall be considered as Long Hold. Evaluation as well as Loading shall not be considered for this period.

10.0 Performance evaluation in Clause 9 above is applicable to Prime bidder and consortium partner (or Technical tie up partner) for their respective scope of work.

11.0 Since the job shall be executed at site, bidders must visit site / work area and study the job content, facilities available, availability of materials, prevailing site conditions including law & order situation, applicable wage structure, wage rules, etc. before quoting for this tender. They may also consult this office before submitting their offers, for any clarifications regarding scope of work, facilities available at sites or on terms and conditions.

12.0 For any clarification on the tender document, the bidder may seek the same in writing or through e-mail, as per specified format, within the scheduled date for seeking clarification, from the office of the undersigned. BHEL shall not be responsible for receipt of queries after due date of seeking clarification due to postal delay or any other delays. Any clarification / query received after last date for seeking clarification may not be normally entertained by BHEL and no time extension will be given.

13.0 BHEL may decide holding pre-bid discussion [PBD] with all intending bidders as per date indicated in the NIT. The bidder shall ensure participation for the same at the appointed time, date and place as may be decided by BHEL. Bidders shall plan their visit accordingly. The outcome of pre-bid discussion (PBD) shall also form part of tender.

14.0 In the event of any conflict between requirement of any clause of this specification / documents / drawings / data sheets etc or requirements of different codes / standards specified, the same to be brought to the knowledge of BHEL in writing for clarification before due date of seeking clarification (whichever is applicable), otherwise, interpretation by BHEL shall prevail. Any typing error/missing pages / other clerical errors in the tender documents, noticed must be pointed out before pre-bid meeting / submission of offer, else BHEL's interpretation shall prevail.

15.0 Unless specifically mentioned otherwise, bidder's quoted price shall deemed to be in compliance with tender including PBD.

16.0 Bidders shall submit Integrity Pact Agreement (Duly signed by authorized signatory who signs in the offer), **if applicable**, along with techno-commercial bid. This pact shall be considered as a preliminary qualification for further participation. **The names and other details of Independent External Monitor (IEM) for the subject tender is as given at point (1) above.**

17.0 The Bidder has to satisfy the Pre-Qualifying Requirements stipulated for this Tender in order to be qualified. The Price Bids of only those bidders will be opened who will be qualified for the subject job on the basis of satisfying the pre-qualification criteria specified in this NIT as per Annexure-1 (as applicable) past performance etc. and date of opening of price bids shall be

intimated to only such bidders. BHEL reserves the right NOT to consider offers of parties under HOLD.

18.0 In case BHEL decides on a `Public Opening', the date & time of opening of the sealed PRICE BID shall be intimated to the qualified bidders and in such a case, bidder may depute one authorised representative to witness the price bid opening. BHEL reserves the right to open 'in-camera' the 'PRICE BID' of any or all Unsuccessful / Disqualified bidders under intimation to the respective bidders.

19.0 Validity of the offer shall be for **six months** from the latest due date of offer submission (including extension, if any) unless specified otherwise.

20.0 BHEL reserves the right to go for Reverse Auction (RA) (Guidelines as available on www.bhel.com) instead of opening the sealed envelope price bid, submitted by the bidder. This will be decided after techno-commercial evaluation. Bidders to give their acceptance with the offer for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids, in case BHEL decides to go for RA.

Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit 'Process compliance form' (to the designated service provider) as well as 'Online sealed bid' in the Reverse Auction. Non-submission of 'Process compliance form' or 'Online sealed bid' by the agreed bidder(s) will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines for suspension of business dealings with suppliers/ contractors (as available on www.bhel.com).

The bidders have to necessarily submit online sealed bid less than or equal to their envelope sealed price bid already submitted to BHEL along with the offer. **The envelope sealed price bid of successful L1 bidder in RA, if conducted, shall also be opened after RA and the order will be placed on lower of the two bids (RA closing price & envelope sealed price) thus obtained. The bidder having submitted this offer specifically agrees to this condition and undertakes to execute the contract on thus awarded rates.**

If it is found that L1 bidder has quoted higher in online sealed bid in comparison to envelope sealed bid for any item(s), the bidder will be issued a warning letter to this effect. However, if the same bidder again defaults on this count in any subsequent tender in the unit, it will be considered as fraud and will invite action by BHEL as per extant guidelines for suspension of business dealings with suppliers/ contractors (as available on www.bhel.com).

21.0 On submission of offer, further consideration will be subject to compliance to tender & qualifying requirement and customer's acceptance, as applicable.

22.0 In case the bidder is an "Indian Agent of Foreign Principals", 'Agency agreement has to be submitted along with Bid, detailing the role of the agent along with the terms of payment for agency commission in INR, along with supporting documents.

23.0 Void

24.0 The bidders shall not enter into any undisclosed M.O.U. or any understanding amongst themselves with respect to tender.

25.0 The bidder shall submit documents in support of possession of 'Qualifying Requirements' duly self-certified and stamped by the authorized signatory, indexed and properly linked in the format for PQR. In case BHEL requires any other documents / proofs, these shall be submitted immediately.

26.0 The bidder may have to produce original document for verification if so decided by BHEL.

27.0 The offers of the bidders who are under suspension as also the offer of the bidders, who engage the services of the banned firms, shall be rejected. The list of banned firms is available on BHEL web site "http://www.bhel.com → tender notification".

28.0 It may be noted that guidelines / rules in respect of 'Suspension of Business dealings' available on BHEL web site "http://www.bhel.com → Supplier Registration", 'Vendor evaluation format', Quality, Safey & HSE guidelines', etc. may undergo change from time to time and the latest one shall be followed.

29.0 The Bidder along with its associate / collaborators / sub-contractors / sub-vendors / consultants / service providers shall strictly adhere to BHEL Fraud Prevention Policy displayed on BHEL website http://www.bhel.com and shall immediately bring to the notice of BHEL Management about any fraud or suspected fraud as soon as it comes to their notice.

30.0 Integrity commitment, performance of the contract and punitive action thereof:

30.1 Commitment by BHEL:

BHEL commits to take all measures necessary to prevent corruption in connection with the tender process and execution of the contract. BHEL will during the tender process treat all Bidder(s) in a transparent and fair manner, and with equity.

30.2 Commitment by Bidder / Supplier / Contractor:

30.2.1 The bidder / supplier / contractor commit to take all measures to prevent corruption and will not directly or indirectly influence any decision or benefit

which he is not legally entitled to nor will act or omit in any manner which tantamount to an offence punishable under any provision of the Indian Penal Code, 1860 or any other law in force in India.

30.2.2 The bidder / supplier / contractor will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract and shall adhere to relevant guidelines issued from time to time by Govt. of India/ BHEL.

30.2.3 The bidder / supplier / contractor will perform / execute the contract as per the contract terms & conditions and will not default without any reasonable cause, which causes loss of business / money / reputation, to BHEL.

30.3 If any bidder / supplier / contractor during pre-tendering / tendering / post tendering / award / execution / post-execution stage indulges in mal-practices, cheating, bribery, fraud or and other misconduct or formation of cartel so as to influence the bidding process or influence the price or acts or omits in any manner which tantamount to an offence punishable under any provision of the Indian Penal Code, 1860 or any other law in force in India, then, action may be taken against such bidder / supplier / contractor as per extant guidelines of the company available on http://www.bhel.com and / or under applicable legal provisions.

31.0 Bid should be free from correction, overwriting, using corrective fluid, etc. Any interlineation, cutting, erasure or overwriting shall be valid only if they are attested under full signature(s) of person(s) signing the bid else bid shall be liable for rejection.

All overwriting / cutting, etc will be numbered by bid opening officials and announced during bid opening.

32.0 For this procurement, Public Procurement (Preference to Make in India), Order 2017 dated June 15, 2017 and May 28, 2018 and subsequent Orders issued by the respective Nodal Ministry shall be applicable even if issued after issue of this NIT but before finalization of contract / PO / WO against this NIT.

In the event of any Nodal Ministry prescribing higher or lower percentage of purchase preference and / or local content in respect of this procurement, same shall be applicable.

33.0 **Order of Precedence:**

In the event of any ambiguity or conflict between the Tender Documents, the order of precedence shall be in the order below:

a. Amendments / Clarifications / Corrigenda / Errata etc. issued in respect of the tender documents by BHEL

b. Notice Inviting Tender (NIT)
c. Price Bid
d. Technical Conditions of Contract (TCC)—Volume-1A
e. Special Conditions of Contract (SCC) —Volume-1B,
   Rev. 01 Dt. 01 Jun 2012, Amendment 01 dated October 01, 2015
f. General Conditions of Contract (GCC) —Volume-1C
   Rev.01 Dt. 01 Jun 2012; Amendment 03 dated October 01, 2015
g. Forms and Procedures —Volume-1D
   Rev. 01 Dt. 01 Jun 2012, Amendment 01 dated October 01, 2015

For and on behalf of BHARAT HEAVY ELECTRICALS LTD

Additional General Manager / SCT

Enclosure

1. Annexure-1: Pre Qualifying criteria.
2. Annexure-2: Check List.
3. Annexure-3: Not applicable.
4. Annexure-4: Annexure to Pre-Qualifying Criteria.
5. Annexure-5: Tender Schedule.
6. Annexure-6: Declaration for Reverse Auction
7. Other documents as per this NIT.

ANNEXURE - 1

PRE QUALIFYING CRITERIA

JOB	Civil and Architectural Works of the Non-Plant Structures / Buildings at 2x660 MW, Udangudi Supercritical Thermal Power Station, Stage - I, Kallamoli Village, Thiruchendur Taluk, Tuticorin District, Tamilnadu
Tender No.	BHEL PSSR SCT 1823

Sl. No.	PRE QUALIFICATION CRITERIA	Bidders claim in respect of fulfilling the PQR Criteria	
		Name and Description of qualifying criteria	Page no of supporting document. Bidder must fill up this column as per applicability
A	**Submission of Integrity Pact duly signed (if applicable)** (**Note**: To be submitted by Prime Bidder & Consortium / Technical Tie up partner jointly in case Consortium bidding is permitted, otherwise by the sole bidder)	Applicable	
B	**Technical** Refer Annexure 3	Applicable	To be filled in Annexure-4
C: C-1	**FINANCIAL** **Turnover** Bidders must have achieved an average annual financial turnover (Audited) of Rs.15,99,00,000.00 (Rs. Fifteen crores ninety-nine lakhs) or more over last three Financial Years (FY) i.e, 2015-16, 2016-17 and 2017-18.	Applicable	To be filled in Annexure-4
C-2	**Networth** Net worth of the Bidder based on the latest Audited Accounts as furnished for 'C-1' above should be positive	Applicable	To be filled in Annexure-4

C-3	**Profit** Bidder must have earned profit in any one of the three Financial Years as applicable in the last three Financial Years defined in 'C-1 above based on latest Audited Accounts.	Applicable	To be filled in Annexure-4
C-4	Bidder must not be under Bankruptcy Code Proceedings (IBC) by NCLT or under Liquidation / BIFR, which will render him ineligible for participation in this tender, and shall submit undertaking to this effect.	Applicable	Undertaking to be enclosed with the offer
D	Assessment of Capacity of Bidder to execute the work as per Sl. No 9 of NIT (if applicable)	Applicable	BY BHEL
E	**Approval of Customer (if applicable)** **Note:** Names of bidders who stand qualified after compliance of criteria A to D shall be forwarded to customer for their approval.	**Applicable**	BY BHEL
F	**Price Bid Opening** **Note:** Price Bids of only those bidders shall be opened who stand qualified after compliance of criteria A to E	Applicable	BY BHEL
G	Consortium criteria (if applicable)	Not Applicable	

Explanatory Notes for the PQR (unless otherwise specified in the PQR):

1. Bidder to submit Audited Balance Sheet and Profit and Loss Account for the respective years as indicated against C-1 above along with all annexures
2. In case audited Financial statements have not been submitted for all the three years as indicated against C-1 above, then the applicable audited statements submitted by the bidders against the requisite three years, will be averaged for three years i.e., total divided by three.
3. If Financial Statements are not required to be audited statutorily, then instead of audited financial statements are required to be certified by Chartered Accountant.
4. C-2:-NETWORTH: Shall be calculated based on the latest Audited Accounts as furnished for C-1 above. Net worth = Paid up share capital* + Reserves. (Net worth is required to be evaluated in case of companies). Note:- (* : Share Capital OR Partnership Capital OR Proprietor Capital as the case may be)

	5. C-3:- PROFIT: Shall be PBT earned during any one year of last three financial years as in 'C-1' above. 6. For evaluation of PQR, the credentials of the Bidder alone, and not that of the Group Company shall be considered. Also refer Annexure-3 for further clarity. 7. Completion date for achievement of the technical criteria specified in the Common QR should be in the last 7 years ending on the 'latest date of Bid Submission' of Tender irrespective of date of the start of work. 8. Boiler means HRSG or WHRB or any other types of Steam Generator. 9. Power Cycle piping means Main Steam, Hot Reheat, Cold Reheat, HP Bypass. 10. For the purpose of evaluation of the PQR, one MW shall be considered equivalent to 3.5 TPH where ever rating of HRSG / BOILER is mentioned in MW. Similarly, where ever rating of Gas Turbine is mentioned in terms of Frame size, ISO rating of the same in terms of MW shall be considered for evaluation. 11. Scope for Capital overhaul of STG shall cover Bearing Inspection work and overhauling of all cylinders of the Turbine. 12. In case the Experience/PO/WO certificate enclosed by bidders do not have separate break up of prices for the E&C portion for Electrical and C&I works (i.e. the certificates enclosed are for composite order for supply and erection of Electrical and C&I and other works if any), then value of Erection & Commissioning for the Electrical and C&I portion shall be considered as 15% of the price for supply & erection of Electrical and C&I.

Note to Bidder:

a) Authenticity of Credentials submitted by the Bidder against 'Pre-Qualifying Criteria' shall be verified from the Issuing Authority, by BHEL. In case, any credential(s) is / are found to be unauthentic, offer of the bidder is liable to be rejected. BHEL reserves the Right to Initiate any further action as per the "Guidelines for Suspension of Business Dealings with Suppliers / Contractors" (Published in http://www.bhel.com/vender_registration/vender.php) and "Fraud Prevention Policy" (Published in http://www.bhel.com/home.php) as applicable.

b) Bidder shall submit pre-qualification criteria format (Refer Annexure-4), duly filled-in, specifying respective annexure number against each criteria and furnish relevant document inclusive of work order and work completion certificate etc. In the respective annexures in their offer.

c) **Regarding Technical PQR:**

No consortium bid is allowed for this tender. However, after successful execution of one work with a consortium partner under direct orders of BHEL, the prime bidder of such work where a consortium partner was engaged for works similar to the works of this tender, shall be eligible for becoming 'standalone' bidder for this tender.

ANNEXURE - 2

CHECK LIST

NOTE: - Tenderers are required to either fill in or submit separately the following details. No column should be left blank.

1	Name and Address of the Tenderer					
2	Details about type of the Firm / Company					
3a	Details of Contact person for this Tender: Name : Mr. / Ms. Designation: Telephone No: Mobile No: Fax No: E-mail ID:					
3b	Details of alternate Contact person for this Tender: Name : Mr. / Ms. Designation: Telephone No: Mobile No: Fax No: E-mail ID:					
4	EMD DETAILS (Remittance of EMD should be in line with Mode of Deposit as detailed in Volume-1A, Part-II, Chapter-1 of Technical Conditions of Contract (Volume-I Book-I)	Sl. No	Ref No.	Detail	Amount	Remarks
5	Validity of Offer	To be valid for six months from due date				
					Applicability (By BHEL)	**Bidder Reply**
6	Whether the format for compliance with **PRE QUALIFICATION CRITERIA (ANNEXURE-I & ANNEXURE-IV)** is understood and filled with proper supporting documents referenced in the specified format				Applicable	Yes / No
7	Submission of Copy of Balance sheet and Audited profit and Loss Account for the last three years				Applicable	Yes / No
8	Submission of Copy of PAN Card				Applicable	Yes / No

9	Whether all pages of the offer documents are signed by the person authorized to sign this offer	Applicable	Yes / No
10	Whether all pages of the Tender documents including annexures, appendices etc., are read understood and signed	Applicable	Yes / No
11	Submission of Integrity Pact	Applicable	Yes / No
12	Submission of Declaration by Authorized Signatory	Applicable	Yes / No
13	Submission of No Deviation Certificate	Applicable	Yes / No
14	Submission of Declaration confirming knowledge about Site Conditions	Applicable	Yes / No
15	Submission of Declaration for relation in BHEL	Applicable	Yes / No
16	Submission of Non-Disclosure Certificate	Applicable	Yes / No
17	Submission of Copy Bank Account Details for E-Payment	Applicable	Yes / No
18	Submission of Capacity Evaluation of Bidder for current Tender	Applicable	Yes / No
19	Submission of Tie Ups / Consortium Agreement are submitted as per format	Not Applicable	Yes / No
20	Submission of Power of Attorney for Submission of Tender / Signing Contract Agreement	Applicable	Yes / No
21	Submission of Analysis of Unit rates	Applicable	Yes / No
22	Submission of Unquoted price bid	Applicable	Yes / No
23	Tabular column showing Category- wise, month wise, man power deployment sub package wise planned for the execution of the scope of works. Data on categories of labour like fitters, gas-cutters, welders, riggers, bar benders, carpenters, khalasis, crane-operators, electricians, and helpers shall be shown in detail. Data shall be split up under the work areas like Civil, Architectural works- building wise, roads, drains, other civil works etc.	Applicable	Yes / No
24	Declaration by bidder for price opening through reverse auction (Refer Annexure-6 of Notice Inviting Tender)	Applicable	Yes / No
25	Copy of Organization Chart	Applicable	Yes / No
26	Copy of Registration/ Incorporation certificate, Partnership Deed (Certified by Notary Public) as applicable for firm	Applicable	Yes / No

NOTE :

1. STRIKE OFF 'YES' OR 'NO', AS APPLICABLE.
2. TENDER NOT ACCOMPANIED BY THE PRESCRIBED ABOVE APPLICABLE DOCUMENTS ARE LIABLE TO BE SUMMARILY REJECTED.

3. For Sl. No. 11 to 21 above, the formats are available in “Volume ID of Volume-I Book-II – Forms and Procedures” of this tender specification.

DATE:

AUTHORISED SIGNATORY
(With Name, Designation and Company seal)

ANNEXURE- 3

PRE QUALIFICATION CRITERIA – Technical

B **Technical PQR**

Bidder should satisfy both the clauses B.1 and B.2 mentioned below:

B.1 The Bidder should have executed any one of the following (B.1.1 to B.1.3) in the last seven years from the latest date of Bid Submission:

B.1.1 One (1) similar work of value not less than Rs.42.60 crores

B.1.2 Two (2) similar works each of value not less than Rs.26.65 crores

B.1.3 Three (3) similar works each of value not less than Rs.21.30 crores

B.2 The bidder should have executed any one of the following (B.2.1 to B.2.2) in the last seven years from the latest date of bid submission.

B.2.1 Executed at least 8,360cu m of RCC within a period of twelve consecutive months in one running / completed contract.

B.2.2 Executed at least 12,540cu m of RCC within a common period of twelve consecutive months in cumulative of two running / completed contracts.

Note to B (Technical PQR):

Note for B.1

a) "Similar" work means 'Piling or Civil or Structure or 'Civil and Structural works' or RCC Chimney or RCC Cooling Tower or RCC Silo or Mill Bunker or any combination of these.

b) The value of work will be updated with indices for "All India Average Consumer Price index for industrial workers" and "Monthly Whole Sale Price Index for All Commodities" with base month as per last month of work execution and indexed up to three (3) months prior to the month of latest due date of bid submission as per the following formula.

$$P = R + 0.425 \times R \times \frac{(X_N - X_0)}{X_0} + 0.425 \times R \times \frac{(Y_N - Y_0)}{Y_0}$$

Where,

P = Updated value of work

R = Value of executed work

X_N = All India Average Consumer Price index for industrial workers for the month, three months prior to the month of latest due date of bid submission (eg. If latest bid submission date is 03-Apr-17, then bid submission month shall be reckoned as April '17 and index for Jan '17 shall be considered).

X_0 = All India Average Consumer Price index for industrial workers for last month of work execution

Y_N = Monthly Whole Sale Price Index for All Commodities for the month, three months prior to the month of latest due date of bid submission

Y_0 = Monthly Whole Sale Price Index for All Commodities for last month of work execution (eg. If latest bid submission date is 03-Apr-17, then bid submission month shall be reckoned as April '17 and index for Jan '17 shall be considered).

Note for B.2

a) No consortium bid is allowed for this tender. However, after successful execution of one work with a consortium partner under direct orders of BHEL, the prime bidder of such work where a consortium partner was engaged for works similar to the works of this tender, shall be eligible for becoming 'standalone' bidder for this tender.

Note for B.1 and B.2

a) The term "Executed" in PQR B.1 and B.2 above means, the bidder should have achieved the criteria specified even if the contract has not been completed or closed.

ANNEXURE - 4

Additional Format to be submitted by Bidders separately as "Annexure to Pre-Qualifying Criteria". Non submission of this additional format will make the bid liable for rejection

Name of the Bidder: M/s……...

Sl. No.	PQR Ref	PQR (Reproduced from Annexure – 1 and 3)	Qualifying Experience	Work order Ref with page no in Offer for supporting documents	Completion certificate ref for the referred Work with page no in Offer for supporting documents	Details of work with Project, Unit, Quantity / rating & Period	Remarks
1	**B. Technical**	B.1 The Bidder should have executed any one of the following (B.1.1 to B.1.3) in the last seven years from the latest date of Bid Submission: B.1.1 One (1) similar work of value not less than Rs.42.60 crores B.1.2 Two (2) similar works each of value not less than Rs.26.65 crores B.1.3 Three (3) similar works each of value not less than Rs.21.30 crores B.2 The bidder should have executed any one of the following (B.2.1 to B.2.2) in					

Sl. No.	PQR Ref	PQR (Reproduced from Annexure – 1 and 3)	Qualifying Experience	Work order Ref with page no in Offer for supporting documents	Completion certificate ref for the referred Work with page no in Offer for supporting documents	Details of work with Project, Unit, Quantity / rating & Period	Remarks
		the last seven years from the latest date of bid submission. B.2.1 Executed at least 8,360cu m of RCC within a period of twelve consecutive months in one running / completed contract. B.2.2 Executed at least 12,540cu m of RCC within a common period of twelve consecutive months in cumulative of two running / completed contracts.					
2	**Financial** C1	**Turnover** Bidders must have achieved an average annual financial turnover (Audited) of Rs.15,99,00,000.00 (Rs. Fifteen crores ninety-nine lakhs) or more over last three Financial Years (FY) i.e, 2015-16, 2016-17 and 2017-18.					

Sl. No.	PQR Ref	PQR (Reproduced from Annexure – 1 and 3)	Qualifying Experience	Work order Ref with page no in Offer for supporting documents	Completion certificate ref for the referred Work with page no in Offer for supporting documents	Details of work with Project, Unit, Quantity / rating & Period	Remarks
3	Financial C2	**Networth** Net worth of the Bidder based on the latest Audited Accounts as furnished for 'C-1' above should be positive.					
4	Financial C3	**Profit** Bidder must have earned profit in any one of the three Financial Years as applicable in the last three Financial Years defined in 'C-1 above based on latest Audited Accounts.					
	Financial C4	Bidder must not be under Bankruptcy Code Proceedings (IBC) by NCLT or under Liquidation / BIFR, which will render him ineligible for participation in this tender, and shall submit undertaking to this effect.					

Non submission of this additional format will make the bid liable for rejection.

Note: Indicate the page number in the respective columns for the enclosed PQR supporting documents in the offer

ANNEXURE-5

Tender Schedule

Description	Schedule	Remarks
Technical Bid Opening	As mentioned in Notice Inviting Tender.	
Communication from BHEL for Clarifications, if any, required by BHEL	Within three days from tender opening date	
Last date for Bidders to submit the clarifications / documents required	Within five days from tender opening date	Bidders to note that their competent representative to be readily available in this week for offering clarifications / submitting the further documents, if any, required.
If Reverse Auction is applicable, then the tentative date for conducting Reverse Auction	Twelfth day from tender opening date	Exact date of reverse auction shall be informed to the bidders through BHEL's reverse auction agency. Bidders to note that their competent representative to be readily available at one day notice for Reverse Auction.

Note:

1. Bidders to note that the above schedule should be adhered to and no further extension will be given. To adhere to the schedule indicated below, Bidders should ensure the adequacy of the documents submitted in their offer, with proper validation.

Annexure 6

DECLARATION BY BIDDER FOR PRICE OPENING THROUGH REVERSE AUCTION

(To be typed and submitted in the Letter Head of the Company / Firm of Bidder)

To,

(Write Name & Address of Officer of BHEL inviting the Tender)

Dear Sir,

Sub : Declaration by Bidder for Price opening through Reverse Auction

Ref : 1) NIT / Tender Specification No: ……,
2) Participation in the Reverse Auction

We have studied and understood the clauses of Reverse auction published in the tender specification.

Strike out either (1) or (2) of the following whichever is not applicable.

1. I / We, hereby declare that I / we **shall be** participating in the Reverse Auction in case BHEL opts for opening the price bid through Reverse auction.

2. I / We, hereby declare that I / we **shall not be** participating in the Reverse Auction in case BHEL opts for opening the price bid through Reverse auction.

Yours faithfully,

Date: (Signature, Date & Seal of Authorized Signatory of the Bidder)

VOLUME – IA
Part I & II

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Bharat Heavy Electricals Limited

CONTENTS

VOLUME - IA PART – I CHAPTER – I

PROJECT INFORMATION

UDANGUDI SUPERCRITICAL TPS UNITS- 1 & 2 (2 x 660 MW) is being set up by TAMILNADU GENERATION AND DISTRIBUTION CORPORATION at a site in Kallamoli village of Tiruchendur Taluk, Tuticorin District., Tamilnadu, India. The information given here in under is for general guidance and shall not be contractually binding on BHEL / Owner. All relevant site data / information as may be necessary shall have to be obtained / collected by the Bidder.

1.1	Name of the Project	Udangudi Thermal Power Station
1.2	Station Capacity	2 X 660 MW
1.3	Owner	Tamilnadu Generation and distribution Corporation Limited(TANGEDCO)
1.4	Site Location	Kallamoli-628203,Thiruchedur Taluk, Tuticorin District, TamilNadu
1.5	Nearest Village	Udangudi
1.6	Nearest Town	Tuticorin at 41 km
1.7	Nearest Railway Station	Thiruchendur at 12 km
1.8	Nearest Airport	Tuticorin Domestic AirPort at 41 km
1.9	Nearest Seaport	Tuticorin Port at 45 km
1.10	Nearest Road access	ECR Connecting Tuticorin and Kanyakumai – State highway -176
2.0	Meteorological Condition	
2.1	Climate	Tropical, very dry and hot summer, dry and cold winter and good rain-fall in monsoon accompanied with strong wind
2.2	Site Elevation	(+)varying from +0.6m to 2.8 meter above Mean Sea Level
2.3	Ambient Temperature	
a.	Annual Maximum Mean Temperature	41°C
b.	Annual Minimum Mean Temperature	22.3°C
c.	Dry bulb Temperature(DBT) for Design Purpose	Max 41°C & Min 17°C
2.4	Relative Humidity for Design purpose	Max 84% & Min 62%
2.5	Annual Rainfall	Max 718.2mm & Min 384.4mm

2.6	Basic Design Wind Pressure	Design wind speed is 39 m/sec as per IS: 875 Part III Mean Wind Speed (max): 20.6 km/h as per IS: 875 (Latest Edition)
2.7	Seismic zone	Zone: II as defined in IS:1893-2002
2.8	High Flood Level	High Flood Level for site: RL 2.450 m
3.0	Tide Levels The recorded tide levels with respect to the chart Datum (CD)near the identified intake point are as follows:	
	Mean high water- Spring	CD + 0.99 m
	Mean high water- Neap	CD + 0.71 m
	Mean low water- Neap	CD + 0.55 m
	Mean low water- Spring	CD + 0.29 m
	Mean sea lavel	CD + 0.64 m
	Highest High tide level	CD + 1.026 m
	Lowest Low tide level	CD + 0.11 m

VOLUME-IA PART-I CHAPTER – II
SCOPE OF WORKS

The scope of work shall comprise but not limited to the following:

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

1.2.1 The scope of works covers Civil and Architectural works of the Non-plant structures / buildings, including supply of all materials (excluding the materials supplied by BHEL free of cost), labour, tools and plants. The list of buildings / structures in each package is mentioned below. However, the scope of work is indicative only, but not limited to the those mentioned below:

Civil & Architectural works of

- Aux boiler (including Chimney stack foundation, Aux BFP & Aux. FD fan foundation, paving, MCC Building)
- Workshop building
- Chemical lab building/house
- Hydrogen plant
- Gas cylinder shed
- Weigh bridge & control room
- Permanent store including open area paving & fencing
- CST Tank & PH
- Any Other miscellaneous buildings/ structure
- Roads, Road Culvert, drains of respective area / package
- Pipe & cable Rack/ pipe pedestals/inter plant cable trench /Road culvert / PIPE encasing, Sewage-Septic tank & soak pit, manholes (Partial)
- Levelling & Grading / backfilling of the respective area up to FGL.

Note: The above provided list for Package A and Package B is indicative and only for the bidder's guideline. **Any other building / structure / foundation not mentioned above, but required for completion of the scope of work in total, deemed to have been included in the bidder scope under this contract.** Such work will be executed under this contract by bidder as per the direction of Engineer in charge. If any item of work not available in the rate schedule of this contract, the rate will be fixed in line with clause 2.15.7 of GCC.

1.2.2 BHEL shall provide Cement and reinforcement steel for civil works only for incorporation in the permanent works as free supply. **Though Major scope**

of Structural fabrication and erection works is in BHEL's scope, depending upon requirement at site, bidder may be required to carry out minor structural fabrication & erection works i.e. supporting structure for false ceiling etc., Structural steel for such works shall be supplied by BHEL as a free issue and fabrication & erection of the same may be operated under the relevant items of Bill of Quantity (BOQ) and as per tender terms & conditions. Embedment's / inserts required for the works in general shall be supplied by the bidder and payment shall be made as per corresponding item in BOQ. If BHEL provides structural steel for embedment's / inserts from scraps (if available), payment shall be made as per corresponding item in BOQ.

1.2.3 The works to be performed under this contract consist of providing all labour, supervision, material, scaffolding, construction equipment's, tools and plants, temporary works, supplies including POL, transportation and all incidental items not shown or specified but reasonably implied or necessary for the proper completion of work in all respects. Testing of all materials, concrete, earthwork other allied works, preparation of bar bending schedules on the basis of construction drawings, etc. are included on the rates of items of work.

1.2.4 The area of work shall be cleared of all vegetation, rubbish and other objectionable matters. The materials removed shall be burnt or otherwise disposed of as directed by The Engineer-in-Charge. No separate payment for these operations shall be made. The cost of all these operations shall be deemed to have been included in the unit rates rendered for the different items under bill of quantities.

1.2.5 All the works areas shall be adequately illuminated to the satisfaction of the Engineer-in-Charge when the work is in progress during the night shifts.

1.2.6 The unit rates shall include all material equipment, fixtures, labour construction plant, temporary works and everything whether of permanent or temporary nature necessary for the completion of job in all respects.

1.2.7 The unit rates for various items of BOQ shall be in accordance with all the relevant stipulations mentioned in technical specifications (with respect to items under execution) and nothing extra over BOQ rates shall be payable.

1.2.8 Drawings showing enough details for the construction as per the specification shall be furnished to the contractor in a phased manner.

1.2.9 The bidder should fully apprise himself of the prevailing conditions at the proposed site, climatic conditions including monsoon pattern, local conditions, soil strata and site specific parameters and shall include for all such conditions and contingent measures in the bid, including those which may have not been specifically brought out in the specifications.

1.2.10 **The quantities given in the Volume-II (Price Bid) are approximate and these are subject to change as per site conditions.**

Note:
FOR FURTHER DETAILED SCOPE OF WORKS, REFER RELEVANT CHAPTERS IN THIS BOOK

VOLUME- I A PART-I CHAPTER – III
FACILITIES IN THE SCOPE OF CONTRACTOR / BHEL
(SCOPE MATRIX)

Sl. No	Description	Scope to be taken care by		Remarks
		BHEL	Bidder	
1.3.1	**PART I**			
1.3.1.1	**ESTABLISHMENT**			
1.3.1.1.1	**FOR CONSTRUCTION PURPOSE:**			
1.3.1.1.1.1	Open space for office	Yes		Free
1.3.1.1.1.2	Open space for storage	Yes		Free
1.3.1.1.1.3	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	
1.3.1.1.1.4	Bidder's all office equipment, office / store / canteen consumables		Yes	
1.3.1.1.1.5	Canteen facilities for the bidder's staff, supervisors and engineers etc.		Yes	
1.3.1.1.1.6	Firefighting equipment like buckets, extinguishers etc.		Yes	
1.3.1.1.1.7	Fencing of storage area, office, canteen etc. of the bidder		Yes	
1.3.1.1.2	**FOR LIVING PURPOSES OF THE BIDDER**			
1.3.1.1.2.1	Open space		Yes	
1.3.1.1.2.2	Living accommodation		Yes	
1.3.1.2	**ELECTRICITY**			
1.3.1.2.1	**Electricity of Voltage 415 / 440 V For construction purposes**			
1.3.1.2.1.1	Single point source	Yes		Chargeable. Refer clause 1.3.4
1.3.1.2.1.2	Further distribution for the work to be done which include supply of materials and execution		Yes	
1.3.1.2.2	Electricity for the office, stores, canteen etc. of the bidder which include:		Yes	
1.3.1.2.2.1	Distribution from single point including supply of materials and service		Yes	

Sl. No	Description	Scope to be taken care by		Remarks
		BHEL	Bidder	
1.3.1.2.2.2	Supply, installation and connection of material of energy meter including operation and maintenance		Yes	Calibration certificate to be provided
1.3.1.2.2.3	Duties and deposits including statutory clearances for the above		Yes	
1.3.1.2.2.4	Demobilization of the facilities after completion of works		Yes	
1.3.1.2.3	Electricity for living accommodation of the bidder's staff, engineers, supervisors etc. on the above lines.(in case BHEL provides this facility, the scope should be given without ambiguity)		Yes	
1.3.1.3	**WATER SUPPLY**			
1.3.1.3.1	**For construction purposes:**			
1.3.1.3.1.1	Making the water available at single point		Yes	
1.3.1.3.1.2	Further distribution as per the requirement of work including supply of materials and execution		Yes	
1.3.1.3.2	**Water supply for bidder's office, stores, canteen etc.**			
1.3.1.3.2.1	Making the water available at single point		Yes	
1.3.1.3.2.2	Further distribution as per the requirement of work including supply of materials and execution		Yes	
1.3.1.4	**LIGHTING**			
1.3.1.4.1	For construction work (supply of all the necessary materials) At office storage area At the preassembly area At the construction site /area		Yes	
1.3.1.4.2	For construction work (Execution of the lighting work / arrangements) At office storage area At the preassembly area At the construction site / area		Yes	

Sl. No	Description	Scope to be taken care by		Remarks
		BHEL	Bidder	
1.3.1.5	**COMMUNICATION FACILITIES for site operations of the bidder**	-		
1.3.1.5.1	Telephone, Fax, internet, intranet, email etc.		Yes	
1.3.1.6	**COMPRESSED AIR SUPPLY**			
1.3.1.6.1	Supply of Compressor and all other equipment required for compressor & compressed air system including pipes, valves, storage systems etc.	-	Yes	
1.3.1.6.2	Installation of above system and operation & maintenance of the same	-	Yes	
1.3.1.6.3	Supply of the all the consumables for the above system during the contract period		Yes	

Sl. No	Description PART II	Scope to be taken care by		Remarks
		BHEL	Bidder	
	CONSTRUCTION FACILITIES			
1.3.2.1.0	**Engineering works for construction**			
1.3.2.1.1	Providing the construction drawings for all the equipments covered under this scope	Yes		
1.3.2.1.2	Drawings for construction methods		Yes	In consultation with BHEL
1.3.2.1.3	As-built drawings – wherever deviations observed and executed and also based on the decisions taken at site- example – routing of small bore pipes	Yes	Yes	”
1.3.2.1.4	Shipping lists etc for reference and planning the activities	Yes	Yes	”
1.3.2.1.5	Preparation of site construction schedules and other input requirements		Yes	”
1.3.2.1.6	Review of performance and revision of site construction schedules in order to achieve the end dates and other commitments		Yes	
1.3.2.1.7	Weekly construction schedules based on Sl No 1.3.2.1.5		Yes	

Sl. No	Description PART II	Scope to be taken care by		Remarks
		BHEL	Bidder	
1.3.2.1.8	Daily construction / work plan based on Sl No 1.3. 2.1.7		Yes	For daily monitoring meeting at site
1.3.2.1.9	Periodic visit of the senior official of the bidder to site to review the progress so that works are completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two months.		Yes	
1.3.2.1.10	Preparation of preassembly bay		Yes	
1.3.2.1.11	Laying of racks for gantry crane if provided by BHEL or brought by the contractor / bidder himself			**Not applicable**

1.3.3 **LAND FOR SITE OFFICE:**

1.3.3.1 Minimum Open space as made available by customer will be provided at free of charges to the contractor, for construction of temporary office shed, fabrication yard and storage area at the job site, contractor's stores shed(s). Location and area requirement for office/storage shed shall be discussed and mutually agreed to. Availability of land within plant boundary is very limited and the contractor has to plan and use the existing land considering the use of land by other Civil / mechanical / electrical contractors and the storage of plant machineries and materials. The existing land shall be shared by all erections agencies. Land will be allocated with certain time frame and to the extent available / considered necessary, and will be reviewed by BHEL depending upon the area availability. Area within plant premises for batching plant, office, storage area etc. for construction purpose shall be provided as per availability free of cost. The contractor will be responsible for handing back all lands, as handed over to him by BHEL.

1.3.3.2 BHEL shall not provide to the contractor any residential accommodation to any of his staff and the contractor has to make his own arrangements. Contractor has to make his own arrangements for labour colony.

1.3.4 **ELECTRICITY**:

1.3.4.1 Construction power will be provided to the contractor at one point within plant area by BHEL on chargeable basis at the applicable rate of TANGEDCO under LT tariff VI at the nearest substation. The present LT tariff VI rate of TANGEDCO is

Consumption charges at Rs.12.00 per unit

Low Power Factor (LPF) charges

Electricity Tax on total amount

Any other miscellaneous charges charged by M/s TANGEDCO pertaining to construction power supply.

The TANGEDCO tariff and tax may vary from time to time and the same is applicable for the bidder. The required Energy meter for measuring the consumption shall be provided and installed by the contractor. Any dispute regarding consumption, the BHEL engineer's decision is final. The contractor shall make his own arrangement for further distribution with necessary isolator / LCB etc.

1.3.4.2 The required energy meter for measuring power consumption will be provided BHEL. The energy meter shall be installed and taken care by the contractor.

1.3.4.3 Provision of distribution of electrical power from the given single common point to the required places with proper distribution boards, approved cables and cable laying including supply of all materials like cables, switch boards, pipes etc., observing the safety rules laid down by electrical authority of the State / BHEL / their customer with appropriate statutory requirements shall be the responsibility of the tenderer / contractor.

1.3.4.4 Necessary "Capacitor Banks" to improve the Power factor to a minimum of 0.9 shall be provided by the contractor at his cost. Penalty if any levied by customer on this account will be recovered from contractor's bills.

1.3.4.5 Any duty, deposit involved in getting the Electricity shall be borne by the bidder. As regards to contractor's office shed also, all such expenditure shall be borne by the contractor.

1.3.4.6 BHEL is not responsible for any loss or damage to the contractor's equipment as a result of variations in voltage / frequency or interruptions in power supply.

1.3.4.7 POSSESSION OF GENERATORS

As there are bound to be interruptions in regular power supply, power cut/ load shedding in any construction sites, suitable extension of time, if found necessary only be given and contractor is not entitled for any compensation. It shall be the responsibility of the tenderer / contractor to provide, and maintain the complete installation on the load side of the supply with due regard to safety requirements at site. It shall be responsibility of the contractor to have adequate diesel generator set(s) to get urgent and important work to go on without interruptions. The

consumables required to operate the generators are to be provided by tenderers. This may also be noted while quoting.

1.3.5 **CONSTRUCTION WATER**

The contractor, at his own cost shall make his own arrangements of water suitable for construction purpose.

1.3.6 **DRINKING WATER**

Bidder shall provide drinking water at the work spot at their cost.

1.3.7 CONSUMABLES:

All the shims, gaskets and packing, which go finally as part of equipment, shall be supplied by BHEL free of cost. All consumables, like gas, electrodes, chemicals, lubricants etc. required for the scope of work, shall be arranged by the contractor at his cost unless otherwise specifically mentioned in the contract.

In the event of failure of contractor to bring necessary and sufficient consumables, BHEL may arrange for the same at the risk and cost of the contractor. The entire cost towards this along-with overhead shall be paid by the contractor or deducted from the contractor's bills.

1.3.8 **MATERIAL SUPPLY:**

1.3.8.1 **BHEL shall provide Cement, reinforcement steel for civil works only for incorporation in the permanent work AS FREE SUPPLY. BHEL shall provide structural steel as specified in clause 1.2.2 in chapter II.** The contractor shall in no case be entitled for any compensation or damages on account of any delay in supply or non-supply thereof for all or any such material.

1.3.8.2 Supply / providing aggregate and all other materials required for the work are in the scope of the contractor.

Fine aggregate source shall be manufactured crushed stone sand or rock sand (M-sand), excluding fines which are by products / rejects of coarse aggregate production. The crushed stone sand shall be graded from fine to coarse with the coarse sizes predominating to give maximum density.

The amount of fine particles as ascertained by the laboratory sedimentation method shall not exceed 10% for crushed stone ~~nor 4% for natural sand~~. The amount of material passing a 75 micron sieve (IS test sieve) shall not exceed the following limits:-

a) Crushed stone sand concrete subject to abrasion 1% by weight

b) All other concrete 3% by weight .

There shall be no clay or fine silt present. The amount of hollow shells like to form voids or remain partially unfilled and present in material retained on a IS 2.36 mm sieve, determined by direct visual separation, shall not exceed 3% by weight of the entire sample. Fine aggregate shall not contain appreciable amounts of flaky and/or elongated particles. The water absorption of fine aggregate, determined in accordance with BS 812 shall not exceed 2.0% by weight. Fine aggregate subjected to five cycles of the soundness test, specified in IS:2386 (Part-5), shall not show a loss exceeding 10% when sodium sulphate solution is used and 15% when magnesium sulphate solution is used, except where approved otherwise. Tests are to be executed in accordance with IS:2386. The grading of fine aggregate for concrete work shall comply with the requirements of IS:383. The grading of the aggregates should be such as to produce a concrete of the specified proportions which will work readily into position without segregation and without the use of an excessive water content. The grading should be controlled throughout the work so that it conforms closely to that used for the preliminary tests. A check on the moisture content of sand should be made at least once a day before concreting. The amount of water to be added to the concrete mix should be adjusted accordingly. Any washing, screening, classifying and other operations on the fine aggregate required to meet this specification shall be done by the Contractor. Washing is required if the content of salt adhering to the aggregate is found to be unacceptably high.

1.3.8.3 Regarding supply of cement, the cement shall be provided normally in bulkers and shall be unloaded in the silos (2 No.s minimum each of 100MT capacity per 30 cu m batching plant) to be installed by the bidder nearer to their batching plants. This is only minimum requirement and the No. of cement silos shall be increased based on the site requirement. Carrying out design mix required for the scope of work providing all materials except cement is in the scope of bidder. Only cement for the design mix shall be provided by BHEL free of cost. On advance request of the bidder, the cement shall be supplied in Bags for other than RCC works like masonry, flooring works etc. Advance request for supply of cement in bags shall be minimum two months.

1.3.8.4 In case, cement is issued through bulkers being supplied from manufacturer /stockiest, the same shall be emptied in cement silos of batching plant and necessary assistance shall be provided by contractor. Contractor to note that batching plant being established at site shall have cement silos of minimum capacity 100 MT each.

1.3.8.5 The reinforcement steel material will be issued from BHEL stores, within the plant premises. Collection and transporting to the place of work is in contractor's scope without any extra cost to BHEL. The steel will be issued

to the agency in standard lengths. In some instances, for 8mm, 10mm &12mm dia reinforcement steel will be supplied in coil form. No extra claims will be entertained against issue of Non-standard lengths of steel and de coiling of 8mm, 10mm &12mm dia Steel.

- If any matching sections of steel are not available with BHEL, contractor may arrange these sections on certification of BHEL and the landing cost of sections to site will be reimbursed based on the prevailing rate at SAIL at the time of procurement at the nearest SAIL outlet with the freight charges against supporting document.
- Bidder to note that steel materials required for Embedment's, inserts, MS Grating, Galvanized Grating, GI Handrail, Stainless Steel Handrail, Stop Lock Gate, Stationery Screen, fasteners like MS / HT / HSFG bolts / nuts, lock nuts, washers and foundation bolts other than those supplied by BHEL, shall be supplied by the bidder.
- However, Bidder shall use the scrap materials available with BHEL or with the respective bidders, for their use in the permanent works as embedment/inserts etc. after necessary store issue formalities, if taken from BHEL and shall be accounted for monthly reconciliation, if it belongs to the bidder's scrap materials.

1.3.9 LIGHTING FACILITY

Adequate lighting facilities such as flood lamps, hand lamps and area lighting shall be arranged by the contractor at the site of construction, pre assembly yard and contractor's material storage area etc. at his cost.

1.3.10 BLASTING

If required, at any stage of construction, blasting is to carried out by the contractor, then contractor should produce documentary evidence of valid blasting license for Tamil Nadu State (or) should produce documents for having tie-up with agency who is possessing valid blasting license for Tamil Nadu State.

1.3.11 DEWATERING

Contractor shall ensure at all times that his work area & approach / access roads are free from accumulation of water, so that the materials are safe and the erection / progress schedule are not affected. No separate claim in this regard shall be admitted by BHEL. No separate payments for dewatering of subsoil, surface water or catchments water, if required, at any time during execution of the work including monsoon period shall be considered by BHEL.

1.3.12 BID DRAWINGS

Bid drawings published in this tender specification are for information and this may get revised during execution.

VOLUME-IA PART-I CHAPTER – IV

T&Ps and MMEs TO BE DEPLOYED BY CONTRACTOR

1.4.1 The following Tools & Plants (T&P) shall be arranged by the Contractor for execution of items mentioned in Chapter IX of Technical Conditions of Contract of this tender within the quoted rate.

Sl. No	**T & P details**	**Tentative Mobilizing time from the date of start of work**
A	**Major T&P**	
A.1	2 No.s excavator equivalent to capacity of Pocklain CK90	1 No. within 30 days, balance as per site requirement.
A.2	1 No.s automatic concrete batching plant with printing facility (30 cu m/hr) – and DG backup. With minimum 2 No.s of silo (100MT each)	1 No. within 45 days
A.3	1 No Truck mounted concrete mixer Cu m pump along with placing boom minimum 36 m high [Concrete boom placer (36m)]	1 No. within 45 days
A.4	1 No Concrete Pump (Min 30 cu m/hr capacity) N.B. – Concrete pump can be replaced by providing additional concrete boom placer of adequate capacity with prior approval of Engineer In-Charge.	1 No. within 45 days
A.5	6 No.s transit mixer (5/6 cu m. capacity) including standby 1 No.	2 No.s within 45 days, balance as per site requirement.
B	**Other T&Ps**	
B.1	3 No.s Back hoe loader like JCB	1 No. within 30 days, balance as per site requirement.
B.2	5 No.s dumper (Min 15 cu m each)	2 No.s within 20 days, balance as per site requirement.
B.3	2 No.s diesel driven Mixer machine of 0.5 cu m capacity	as per site requirement.
B.4	3 No.s self-priming dewatering pump 5 HP (diesel)	Within 20 days.
B.5	3 No.s self-priming dewatering pump 5 HP (electric)	Within 30 days
B.6	5 No.s reinforcement bending machine	2 No.s within 30 days, balance as per site requirement.

Sl. No	**T & P details**	**Tentative Mobilizing time from the date of start of work**
B.7	5 No.s reinforcement cutting machine	2 No.s within 30 days, balance as per site requirement
B.8	MS scaffolding pipe	as per site requirement.
B.9	2 No.s power driven earth rammer (Roller Type 1/2 T)	as per site requirement.
B.10	2 No.s curing pump – 1.5 / 2 HP (pump for curing at heights)	Within 60 days.
B.11	1 No. vibro earth compactor or Vibromax or equivalent	as per site requirement.
B.12	2 No.s building hoist	as per site requirement.
B.13	Civil laboratory equipment's with temporary building one AC lab size 4.5m X 6m and 1 non AC lab 4.5 m x 4.5 m.	Within 45 days.
B.14	2 No total station with adequate arrangement for Surveyors.	2 No. Within 15 days.
B.15	3 No.s auto level & staff + 2 no's as required	2 No.s Within 15 days, balance as per requirement.
B.16	100 No.s concrete cube moulds	100 No.s within 30 days
B.17	Adequate No. of small trucks 2T/5T for shifting of reinforcement / cement / shuttering etc. within site	As per site requirement.
B.18	2 No.s drinking water tank – 5000 lit.	As per site requirement.
B.19	2 No.s mobile toilet blocks for labour use.	As per site requirement.
B.20	1 No. truck mounted 125 kVA DG set	1 No. within 30 days
B.21	Construction power cable	As per site Requirement
B.22	Construction water Pipeline	As per site Requirement
B.23	Concrete vibrator with adequate needle (Minimum 10 nos diesel / power)	5 No.s (at least 3 No.s diesel driven) within 45 Days, balance as per site requirement.
B.24	Portable fire extinguishers as below: Soda acid – 5 sets. Dry chemical powder – 5 sets CO_2 – 5 sets. Water & sand bucket (4 buckets in one stand) – 5 sets. Fire hose with nozzle (50 m length) – 5 sets.	25% within 30 days, balance progressively within 90 days.

Sl. No	T & P details	Tentative Mobilizing time from the date of start of work
B.25	1 No. compression testing machine (200 T cap)	1 No. within 30 days

1.4.2 T&Ps and the mobilization schedule shown in the above mentioned list is tentative requirement considering parallel working. However, Mobilization schedule and quantity / numbers of T&Ps, and period of deployment as mutually agreed at site for major T&Ps, have to be adhered to. Numbers / time of requirement will be reviewed time to time at site and contractor will provide required T&Ps / equipments to ensure completion of entire work within schedule / target date of completion without any additional financial implication to BHEL. Vendor will give advance intimation and certification regarding capacity etc. prior to dispatch of heavy equipment's. Also on completion of the respective activity, demobilization of T&P in total or in part can be done with the due approval of engineer in charge. Retaining of the T&Ps during the contract period will be mutually agreed in line with construction requirement.

1.4.3 In the event of need of change of type of any of major T&Ps, approval shall be taken from BHEL Engineer in-charge prior to mobilization. The decision of Number of T&P required due to replacing the enlisted T&Ps as per above table, shall be taken after analyzing the production capacity and suitability of both the T&Ps.

1.4.4 Mobilization of concrete boom placer in place of concrete pump will be allowed based on site requirement of BHEL.

1.4.5 In the event of non-mobilization of any T&P by the Contractor and as a result progress of work suffered, BHEL reserves the right to engage required T&P in line with Special Conditions of Contract clause no 4.2.1.7..

1.4.6 The area and infrastructure development of the work area are to be carried out by the customer. However, in construction projects of this magnitude, all the areas / approaches may not be ready. In such cases consolidation of ground and arrangement of sleepers / sand bag filling etc. for safe operation / movement of equipment including cranes / trailers etc. shall be the responsibility of the contractor at his cost. No compensation on this account shall be payable.

1.4.7 In case the contractor fails to provide any T&P which is in the scope of contractor and if BHEL provides such T&P or higher capacity T&P available with BHEL, hire charges prevailing (as per BHEL norms) as on that day will be recovered from the contractor as per the prevailing BHEL Corporate hire charges (may vary from time to time). Corresponding pages of Corporate hire charges are enclosed in Chapter 11 of part II of Technical Conditions of Contract (Volume-I Book-I) (Please note that these charges are as valid up to

May 31, 2019 and may get revised further). This may get revised further as per the BHEL corporate guidelines. However, prevailing rates as on date of execution may be applicable

1.4.8 If deployed, the age of the contractor deployed cranes upto 150 MT should be within 15 years as on date of deployment. Contractor has to provide documentary proof for the age of the crane at the time of deployment to the BHEL Engineer.

1.4.9 Crane operators deployed by the contractor shall be tested by BHEL before he is allowed to operate the cranes.

VOLUME-IA PART-I CHAPTER - V

T&Ps & MMEs TO BE DEPLOYED BY BHEL ON SHARING BASIS

1.5.1 BHEL shall not provide any T&Ps on free of charges.

VOLUME-IA PART-I CHAPTER - VI
TIME SCHEDULE

1.6.1. TIME SCHEDULE

1.6.1.1. The entire work as detailed in the Tender Specification shall be completed within **24 (twenty-four) months** from the date of commencement of work at site.

1.6.1.2. The work shall be commenced on the mutually agreed date between the bidder and BHEL engineer. The scope of work under this contract is deemed to be completed only when so certified by the site Engineer. The decision of BHEL in this regard shall be final and binding on the contractor.

1.6.1.3. During the total period of contract, the contractor has to carry out the activities in a phased manner as required by BHEL and the program of milestone events. The work fronts for construction will get released progressively during the course of execution at site. The required documents / drawings for construction will be progressively issued to the contractor during the course of execution at site

1.6.1.4. The contractor is required to refer "Form 15: Monthly Performance Evaluation of Contractor" for all the instructions to be taken immediately after receipt of LOI. Please note that the Form -15 in the Volume 1D - Forms and Procedures is revised. For details please refer Sl. No.17 of Part-II, Chapter-1 of Technical Conditions of Contract (VOLUME-IA PART- II) of this booklet

1.6.2. CONTRACT PERIOD

The contract period for completion of entire work under scope shall be **24 (Twenty-four) months** from the "COMMENCEMENT OF CONTRACT PERIOD" as specified earlier for completion of the entire work.

1.6.3. COMMENCEMENT OF CONTRACT PERIOD

The date of commencement of contract period shall be the mutually agreed date between the bidder and BHEL engineer to start the work. In case of discrepancy, the decision of BHEL engineer is final.

1.6.4. MOBILISATION

1.6.4.1. The contractor has to augment his resources in such a manner that following completion schedules are achieved:

Sl. No	Area	Completion from the date of commencement of work
1	Auxiliary Boiler equipment foundations	Progressively by 10th Month

Sl. No	Area	Completion from the date of commencement of work
2	Condensate Storage tank	Progressively by 10th Month
3	Chemical Lab Building – Clearance for E&C	Progressively by 12th Month
4	Permanent Store Building	Progressively by 15th Month
5	CST Pump House	Progressively by 16th Month
6	Workshop building	Progressively by 16th Month
7	Hydrogen Generation plant	Progressively by 17th Month
8	Pipe rack / Cable rack	Progressively by 20th Month
9	Roads & Drains, Sewage – septic tank, & soak pit	Progressively by 20th Month
10	Complete readiness of the other buildings/ structures	Progressively by 22nd Month
11	Material Reconciliation	Progressively 23rd Month
12	Finishing works & submission of Final Bill	24th Month

Work commencement will be tentatively in Apr 2019.

1.6.4.2. In order to meet the above schedule in general, and any other intermediate targets set, to meet customer / project schedule requirements, Contractor shall arrange and augment all necessary resources from time to time on the instructions of BHEL Engineer.

1.6.4.3. The above schedule is tentative. In case the activities in the schedule are to be advanced, the related civil/ structural activities in the scope of the contractor are to be advanced to meet the project requirement. No extra payment whatsoever shall be paid on this account.

1.6.4.4. The above schedule is for entire completion and handing over the structure/ Building to BHEL. The foundations, pedestals, floors, etc., required for the mechanical equipment erection / structural erection shall be handed over to BHEL progressively within the scheduled period given in the above table, as per the BHEL site requirement.

1.6.4.5. The left out minor finishing works shall also be completed and handed over to BHEL within the contract period.

1.6.4.6. The above time allowed for completion of work including Sundays and Holidays is from the date of commencement of work. Detailed program to be prepared by the bidder taking in to consideration of the COMPLETION SCHEDULES / site decision on drawings flow (latest) and submitted for BHEL's approval.

1.6.4.7. **Intermediate Milestones:**

M1 and M2 shall be the intermediate milestones for this work.

Sl. No	Description	Completion month from the contractual date of start of the work	Intermediate Milestone
1	Auxiliary Boiler equipment foundations	Progressively by 10th Month	M1
2	CST Pump House	Progressively by 16th Month	M2

Note: For Penalty for Intermediate Milestones, please refer Sl. No.:7, Part-II, Chapter-1 of Technical Conditions of Contract (Volume 1A of Volume-I Book-I)

1.6.4.8. SUBMISSION OF L3 SCHEDULE

The contractor shall submit a detailed area / structure wise L3 schedule within 15 days in consultation with BHEL based on the tentative schedule provided as per the clause1.6.4.1. The detailed L3 schedule shall be approved by BHEL and same shall be implemented. Contractor shall submit L3 schedule in MS Projects to meet the agreed project schedule covering various mile stone activities and their split up details such as construction, procurement of materials, execution activities. This schedule shall also clearly indicate the interface facilities / inputs to be provided by BHEL / Customer and the dates by which such facilities / inputs are required. The schedule shall be acceptable to BHEL for meeting their milestone targets / schedule.

1.6.5 GUARANTEE PERIOD

Guarantee period of **Twelve** months shall commence from the date of completion of the whole work as certified by the BHEL Engineer.

VOLUME-IA PART-I CHAPTER - VII
TERMS OF PAYMENT

1.7.0 TERMS OF PAYMENT

1.7.1 Secured Advance

Not applicable

1.7.2 Advance for Mobilization

Interest bearing advance for Mobilization, limited to 5% of the contract value will be paid against submission of bank guarantee of at least 110% of the advance valid for the contract period, which will be recovered from the first running bill onwards. The advance for mobilization shall be paid as mentioned below.

1.7.2.1 2% of contract value after receipt of initial Security Deposit (SD) and additional security deposit as applicable if any, as per relevant clauses in the GCC / TCC along with unqualified acceptance of detailed letter of intent.

1.7.2.2 1.5 % of the contract value at the end of second month from date of fax LOI on completion of site Mobilization of Machinery & T&P as given below and on certification by site in-charge for compliance, provided Security Deposit as per relevant clauses of GCC / TCC is furnished.

a) Back hoe loader like JCB – 2 No.s
b) Excavator equivalent to capacity of Pocklain CK90– 1 No.
c) Batching Plant – 30 cu m /hr. capacity – 1 No. with 2 No.s of silo (100MT each)
d) Transit mixers –2 No.s
e) Concrete boom placer – 1 No.

1.7.2.3 1.5% of contract value on completion of site Mobilization of Machinery & T&P as given below in addition to the above, and on certification by site in-charge for compliance.

a) Back hoe loader like JCB – 1 No.
b) excavator equivalent to capacity of Pocklain CK90– 1 No.
c) Transit mixers – 2 No.s
d) Concrete Pump – 1 No.

Note: Concrete pump can be replaced by concrete boom placer with due approval of Engineer In- Charge.

1.7.2.4 Payment of the advance as specified herein and recovery of the advance will be as per clause 2.13 of GCC. Option of availing the interest bearing mobilization advance is left with the contractor.

1.7.3 Interim Payment

Interim bills in the form of monthly running bills prepared by the contractor shall be based on the quantities executed and measured.

1.7.3.1 95% item rate shall be released after completion of works certification by Engineer in charge.

1.7.3.2 5% of the item rate shall be released after submission of the quality check formats as per the quality plan for the quantum of work billed and duly certified by engineer.

Note: BHEL Site Engineer, at discretion, may operate the part rate of the items in line with the BHEL GCC clause 2.23.1.V (Refer Volume 1 Book 2)

1.7.4 Royalty / Seigniorage Charges

Royalty / seigniorage charges for excavation, inside / outside the plant boundary, as applicable as per Govt. of Tamil Nadu shall be payable by the contractor and proof of payment shall be submitted to BHEL.

1.7.5 Method of Measurement

Mode of measurement shall be as per relevant clauses of technical specification of this tender. In case the same is not available the relevant IS 1200 in conjunction of IS code 3385 shall be adopted. In case the same is also not available, the standard procedure adopted in CPWD shall be adopted. In case the same is also not available in CPWD, the measurement of the work done will be based on the mutual agreement between BHEL and contractor. In all the above cases, the interpretation of BHEL will be final and binding to the contractor.

Notes to Chapter VII - Terms of payment:

For PVC, ORC, RA Bill payment, compensation for Quantity variation, Retention amount and Performance Security Deposit, please refer Part-II, Chapter-1: Corrections / Revisions in Special Conditions of Contract, General Conditions of Contract and Forms & Procedures of Technical Conditions of Contract (Volume-I Book-I).

VOLUME-IA PART-I CHAPTER - VIII
TAXES AND OTHER DUTIES

1.8.1 Goods and service Tax (GST) & Cess

1.8.1.1 The successful bidder shall furnish proof of GST registration with GSTN Portal in the State in which the Project is being executed, covering the services under this contract. Registration should also bear endorsement for the premises from where the billing shall be done by the successful bidder on BHEL for this project/ work.

1.8.1.2 Contractor's price / rates shall be exclusive of GST & Cess (if applicable) (herein after termed as GST). Contractor shall submit to BHEL the GST compliant tax invoice/debit note/revised tax invoice on the basis of which BHEL will claim the input tax credit in its return. Since this is a works contract, the applicable rate shall be @ 18% GST, as applicable presently.

1.8.1.3 Bidder shall note that the GST Tax Invoice complying with GST Invoice Rules wherein the 'Bill To' details will be as below:

BHEL GSTN - 33AAACB4146P2ZL
NAME - BHARAT HEAVY ELECTRICALS LIMITED
ADDRESS - BHEL Site Office
2X660MW Udangudi Thermal Power Project
Kallamoli village, Tiruchendur Taluk,
Tuticorin District., Tamilnadu-628203

1.8.1.4 GST charged in the tax invoice / debit note / revised tax invoice by the contractor shall be released separately to the contractor only after contractor files the outward supply details in GSTR-1 on GSTN portal and input tax credit of such invoice is matched with corresponding details of outward supply of the contractor and has paid the GST at the time of filing the monthly return.

1.8.1.5 In case BHEL has to incur any liability (like interest / penalty etc.) due to denial / reversal / delay of input tax credit in respect of the invoice submitted by the contractor, for the reasons attributable to the contractor, the same shall be recovered from the contractor.

1.8.1.6 Further, in case BHEL is deprived of the Input tax credit due to any reason attributable to contractor, the same shall not be paid or Recovered if already paid to the contractor.

1.8.1.7 Tax invoice / debit Note / revised tax invoice shall contain all such particulars as prescribed in GST law and comply to the timelines for issue of the same.

Invoices shall be submitted on time to the concerned BHEL Engineer In Charge.

1.8.1.8 TDS under GST (if / as & when applicable) shall be deducted at prevailing rates on gross invoice value from the running bills.

1.8.1.9 E-way bills / Transit passes / Road Permits, if required for materials / T&P etc., bought into the project site is to be arranged by the Contractor only.

1.8.1.10 BHEL shall not reimburse any amounts towards any interest / penalty etc., incurred by contractor. Any additional claim at a later date due to issues such as wrong rates / wrong classification by contractor shall not be paid by BHEL.

1.8.2 All taxes and duty other than GST & Cess

The contractor shall pay all (except the specific exclusion viz GST & Cess) taxes, fees, license charges, deposits, duties, tools, royalty, commissions, Stamp Duties, or other charges / levies, which may be levied on the input goods & services consumed and output goods & services delivered in course of his operations in executing the contract and the same shall not be reimbursed by BHEL. In case BHEL is forced to pay any of such taxes, BHEL shall have the right to recover the same from his bills or otherwise as deemed fit.

1.8.3 Statutory Variations

Statutory variations are applicable under the GST Acts, against production of proof. The changes implemented by the Central / State Government during the tenure of the contract viz. increase / decrease in the rate of taxes, applicability, etc. and its impact on upward revision / downward revision are to be suitably paid/ adjusted from the date of respective variation. The bidder shall give the benefit of downward revision in favour of BHEL. No other variations shall be allowed during the tenure of the contract.

1.8.4 New Taxes / Levies –

In case Government imposes any new levy / tax after submission of bid during the tenure of the contract, BHEL shall reimburse the same at actual on submission of documentary proof of payment subject to the satisfaction of BHEL that such new levy / tax is applicable to this contract.

1.8.5 Direct Tax

BHEL shall not be liable towards Income Tax of whatever nature including variations thereof arising out of this contract as well as tax liability of the bidder and their personnel. Deduction of tax at source at the prevailing rates shall be effected by BHEL before release of payment as a statutory obligation, unless exemption certificate is produced by the bidder. TDS certificate will be issued by BHEL as per the provisions of Income Tax Act.

VOLUME-IA PART-I CHAPTER IX
BILL OF QUANTITY

1.9.1 Bill of Quantity (BOQ)

As mentioned in the Price Bid

Note to BOQ:

1. The quantity indicated in the BOQ / Price bid Part-C is approximate only and is liable for variation. Payment will be as per actual quantity executed as certified by BHEL Engineer.

2. Bidders shall quote 'Total Amount' in the format for Price Bid available in the E-procurement portal.

   Bidders may also quote 'Total Amount' in the format given in Part -B of this document (Optional).

   Any other entry elsewhere in the price bid shall be treated as Null and Void.

3. The above mentioned 'Total amount' is for the entire Bill of Quantity (BOQ) given in Part -C of the Price Bid.
4. The quantities given in the price bid are tentative and may change to any extent (both in plus side and minus side). The derived item rates (as mentioned above) for individual items shall remain firm irrespective of any variations in the individual quantities. No compensation becomes payable in case the variation of the final executed contract value is within the limit of Minus (-) 30% of awarded contract value.
5. BHEL has pre-fixed the weightages for the amount of individual items of Bill of Quantity with respect to the 'Total Amount' in Part-C.
6. Based on the pre-fixed weightages, the amount for the individual items of the Bill of Quantity shall be arrived at. This amount shall be rounded off to the nearest rupee.
7. Based on the quantities of individual item and the amount arrived in Sl. No: 6 above, unit rate of individual items shall be derived. This unit rate shall be rounded off to four decimal places.
8. Bidders to note that this is an item rate contract. Payment shall be made for the actual quantities of work executed at the unit rate arrived at as per Sl No.7 above.

VOLUME-IA PART-I CHAPTER -X
GENERAL

The scope of the work will comprise of but not limited to the following:

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

1.10.1 Contractors are requested to furnish the following documents at PSSR-HQ, Chennai immediately after release of Letter of Intent (L.O.I)

i) Security Deposit and Additional Security Deposit

ii) Un Qualified Acceptance for Detailed L.O.I. / work order

iii) Rs 100 /- Stamp Paper for Preparation of Contract agreement.

1.10.2 Contractors are requested to furnish the Proof of Documents for the following at PSSR-Site

i) Provident Fund (PF) Registration Number.

ii) Labour License Number.

iii) Workmen Insurance Policy Number.

1.10.3 **In addition to the clause 2.8 of General Conditions of Contract (Volume-1C of Book-II) the contractor shall comply with the following:**

1.10.3.1 BOCW Act & BOCW Welfare Cess Act

1.10.3.1.1 The Contractor should register their Establishment under BOCW Act 1996 read with rules 1998 by submitting Form I (Application for Registration of Establishment) and Form IV (Notice of Commencement / Completion of Building Other Construction Work) to the respective Labour Authorities i.e.,

a) Assistant Labour Commissioner (Central) in respect of the project premises which is under the purview of Central Govt.–NTPC, NTPL etc.

b) Appropriate state authorities in respect of the project premises which is under the purview of State Govt.

1.10.3.1.2 The Contractor should comply with the provisions of BOCW Welfare Cess Act 1996 in respect of the work awarded to them by BHEL.

1.10.3.1.3 The contractor should ensure compliance regarding Registration of Building Workers as Beneficiaries, Hours of work, welfare measures and other conditions of service with particular reference to Safety and Health measures like Safety Officers, safety committee, issue of Personal protective equipments, canteen, rest-room, drinking water, Toilets, ambulance, first aid centre etc

1.10.3.1.4 The contractor irrespective of their nature of work and manpower (Civil, Mechanical, Electrical works etc) should register their establishment under BOCW Act 1996 and comply with BOCW Welfare Cess Act 1996.

1.10.3.1.5 Contractor shall make remittance of thee BOCW cess as per the Act **in consultation with BHEL** as per the rates in force (presently 1%) BHEL shall reimburse the same upon production of documentary evidence. However, BHEL shall not reimburse the Fee paid towards registration of Beneficiaries and Contribution of Beneficiaries remitted.

1.10.3.1.6 Non- compliance to provisions of the BOCW Act and BOCW welfare Cess Act is not acceptable. BHEL reserves the right to withhold any sum it deems fit. Only upon total compliance to the BOCW Act and also discharge of total payment of Cess under the BOCW Cess act by the contractor, BHEL shall consider refund of the amounts.

1.10.3.2 **Provident Fund**

1.10.3.2.1 The contractor is required to extent the benefit of Provident Fund to the labour employed by you in connection with this contract as per the Employees Provident Fund and Miscellaneous Provisions Act 1952. For due implementation of the same, you are hereby required to get yourself registered with the Provident Fund authorities for the purpose of reconciliation of PF dues and furnish to us the code number allotted to you by the Provident Fund authorities within one month from the date of issue of this letter of intent. Incase you are exempted from such remittance an attested copy of authority for such exemption is to be furnished. Please note that in the event of your failure to comply with the provisions of said Act, if recoveries therefore are enforced from payments due to us by the customer or paid to statutory authorities by us, such amount will be recovered from payments due to you.

1.10.3.2.2 The final bill amount would be released only on production of clearance certificate from PF / ESI and labour authorities as applicable.

1.10.3.3 **Other Statutory Requirements**

1.10.3.3.1 The Contractor shall submit a copy of Labour License obtained from the Licensing Officer (Form VI) u/r25 read with u/s 12 of Contract Labour (R&A) Act 1970 & rules and Valid WC Insurance copy or ESI Code (if applicable) and PF code no alongwith the first running bill.

1.10.3.3.2 The contactor shall submit monthly running bills along with the copies of monthly wages (of the preceding month) u/r78(1)(a)(1) of Contract Labour Rules, copies of monthly return of PF contribution with remittance Challans under Employees Provident Fund Act 1952 and copy of renewed WC Insurance policy or copies of monthly return of ESI contribution with Challans under ESI Act 1948 (if applicable) in respect of the workmen engaged by them.

1.10.3.3.3 The Contractor should ensure compliance of Sec 21 of Contract Labour (R&A) Act 1970 regarding responsibility for payment of Wages. Incase of "Non-compliance of Sec 21 or non-payment of wages" to the workmen before the expiry of wage period by the contactor, BHEL will reserve its right to pay the workmen under the orders of Appropriate authority at the risk and cost of the Contractor.

1.10.3.3.4 The Contractor shall submit copies of Final Settlement statement of disbursal of retrenchment benefits on retrenchment of each workmen under I D Act 1948, copies of Form 6-A (Annual Return of PF Contribution) along with copies of PF Contribution Card of each member under PF Act and copies of monthly return on ESI Contribution – Form 6 under ESI Act1948 (If applicable) to BHEL along with the Final Bill.

1.10.3.3.5 In case of any dispute pending before the appropriate authority under I D act 1948, WC Act 1923 or ESI Act 1948 and PF Act 1952, BHEL reserve the right to hold such amounts from the final bills of the Contractor which will be released on submission of proof of settlement of issues from the appropriate authority under the act.

1.10.3.3.6 In case of any dispute prolonged / pending before the authority for the reasons not attributable to the contractor, BHEL reserves the right to release the final bill of the contractor on submission of Indemnity bond by the contractor indemnifying BHEL against any claims that may arise at a later date without prejudice to the rights of BHEL.

1.10.3.4 **Deployment of Skilled / Semi-Skilled Tradesmen**

The following clause is applicable incase the contract value / contract price is Rs. Five crores and above.

The contractor shall, at all stages of work deploy skilled / semi-skilled tradesmen who are qualified and possess certificate in particular trade from CPWD Training Institute / Industrial Training. Institute / National Institute of Construction Management and Research (NICMAR), National Academy of Construction, CIDC or any similar reputed and recognized Institute managed / certified by State / Central Government. The number of such qualified tradesmen shall not be less than 20% of total skilled / semi-skilled workers required in each trade at any stage of work. The contractor shall submit number of man days required in respect of each trade, its scheduling and the list of qualified tradesmen along with requisite certificate from recognized Institute to Engineer-in-Charge for approval. Notwithstanding such approval, if the tradesmen are found to have inadequate skill to execute the work of respective trade, the contractor shall substitute such tradesmen within two days of written notice from Engineer-in-Charge. Failure on the part of contractor to obtain

approval of Engineer-in-Charge or failure to deploy qualified tradesmen will attract a compensation to be paid by contractor at the rate of Rs. 100 per such tradesman per day. Decision of Engineer-in-Charge as to whether particular tradesman possesses requisite skill and amount of compensation in case of default shall be final and binding.

1.10.4 **GENERAL**

1.10.4.1 **Site Visit by the Bidder**

1.10.4.1.1 The bidder shall, prior to submitting his tender for the work, visit and examine the site of works and its surroundings at his own expense, and obtain and ascertain for himself on his own responsibility all information that may be necessary for preparing his tender and entering into a contract, and take the same into account in the quoted contract price for the work.

1.10.4.1.2 The bidder should note that information, if any, in regard to the local conditions, as contained in these tender documents, has been given to tenderer merely for guidance and is not warranted to be complete.

1.10.4.1.3 The bidder shall satisfy themselves about the following factors:

(i) Site conditions including access to the site, existing and required roads and other means of transport/communication for use by him in connection with the work including diverting and re-routing of services.

(ii) Requirement and availability of land and other facilities of his enabling works, establishment of his nursery, office, stores etc.

(iii) Ground conditions including those bearing upon transportation, disposal, handling and storage of materials required for the work or obtained therefrom.

(iv) Source and extent of availability of suitable materials, including water etc., and labour (skilled and unskilled) required for work, and laws and regulations governing their use and employment.

(v) Geological, meteorological, topographical and other general features of the site and its surroundings as are pertaining to and needed for the performance of the work.

(vi) The limit and extent of surface and subsurface water to be encountered during the performance of the work, and the requirement of drainage and pumping.

(vii) The type of equipment and facilities needed, for and in the performance of the work.

(viii) The extent of lead and lift required for the work in complete form over the entire duration of the contract, and

(ix) All other information pertaining to and needed for the work including information as to the risks, contingencies and other circumstances which may influence or affect the work or the cost thereof under this contract.

1.10.4.2 The bidder and any of his personnel or agents will be granted permission by the Site-In-Charge or his authorized nominee, on receipt of formal application in respect thereof a week in advance of the proposed date of inspection of site, to enter upon his premises and lands for purpose of such inspection, but only on the express condition that the tenderer (and his personnel and agents) will relieve and indemnify the Employer (and his personnel and agents) from and against all liability in respect thereof and will be responsible for personal injury (whether fatal or otherwise), loss of or damage to property and any other loss, damage, costs and expenses however caused which, but for the exercise of such permission, would not have arisen.

1.10.4.3 The work shall be executed under the usual conditions existing in major power plant construction, without affecting power plant construction and in conjunction with other numerous operations and contracting agencies at site. The contractor and his personnel shall co-operate with the personnel of other agencies, co-ordinate his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.

1.10.4.4 All the work shall be carried out as per instructions of BHEL engineer. BHEL engineer's decision regarding the correctness of the work and method of working shall be final and binding on the contractor.

1.10.4.5 The terminal points decided by BHEL are final and binding on the contractor for deciding the scope of work and effecting the payment for the work done up to the terminals.

1.10.4.6 Contractor shall erect all items / materials etc. as per sequence prescribed by BHEL at site. BHEL engineer depending upon the availability of materials / work fronts etc will decide the sequence of erection / commissioning methodology. No claims for extra payment from the contractor will be entertained on the grounds of deviation from the methods of erection / commissioning adopted in erection / commissioning of similar job or for any reasons whatsoever.

1.10.4.7 If required by BHEL, the contractor shall change the sequence of his operation so that work on priority sectors can be completed within the projects schedule. The contractor shall afford maximum assistance to BHEL in this connection without causing delay to agreed completion date.

1.10.4.8 The contractor at his cost shall arrange necessary security measures for adequate protection of his machinery, equipment, tools, materials etc. BHEL shall not be responsible for any loss or damage to the contractor's construction equipment and materials.

1.10.4.9 The Contractor may have to execute work in such a place and condition where other agencies also will be under such circumstances. However, completion time for erection agreed will be subject to the condition that contractor's work is not hampered by the agencies.

1.10.4.10 Contractor has to work in close co-ordination with other erection agency at site. BHEL engineer will co-ordinate area clearance. In a project of such magnitude, it is possible that the area clearance may be less / more at a particular given time. Activities and erection program have to be planned in such a way that the milestones are achieved as per schedule / plans. Contractor shall arrange & augment the resources accordingly.

1.10.4.11 The contractor must obtain the signature and permission of the security personnel of the BHEL / Owner for bringing any of their materials inside the site premises. Without the Entry Gate Pass these materials will not be allowed to be taken outside.

1.10.4.12 Contractor shall remove all scrap materials periodically generated from his working area in and around power station and collect the same at one place earmarked for the same. Load of scraps is to be shifted to a place earmarked by BHEL. Failure to collect the scrap is likely to lead to accidents and as such BHEL reserves the right to collect and remove the scrap at contractor's risk and cost if there is any failure on the part of contractor in this respect.

1.10.4.13 The contractor shall ensure that his premises are always kept clean and tidy to the extent possible. Any untidiness noted on the part of the contractor shall be brought to the attention of the contractor's site representative who shall take immediate action to clean the surroundings to the satisfaction of the Engineer-in-Charge.

1.10.4.14 The contractor is strictly prohibited from using BHEL's regular components like angles, channels, beams, plates, pipe / tubes, and handrails etc for any temporary supporting or scaffolding works. Contractor shall arrange himself all such materials. In case of such misuse of BHEL materials, a sum as determined by BHEL engineer will be recovered from the contractor's bill. The decision of BHEL engineer is final and binding on the contractor.

1.10.4.15 The contractor will be responsible for the safe custody and proper accounting of all materials in connection with the work. If the contractor has drawn materials in excess of design requirements, recoveries will be

effected for such excess drawls at the rate prescribed by manufacturing units.

1.10.4.16 No member of the already erected structure / platform, pipes, grills, platform, other component and auxiliaries should be cut without specific approval of BHEL engineer.

1.10.4.17 Contractors shall ensure that all their Staff / Employees are exposed to periodical training programme conducted by qualified agencies / personnel on ISO 9001 – 2015 Standards.

1.10.4.18 For other agencies, such as Boiler, ESP, Turbine, Electrical, instrumentation, insulation etc., to commence their work from / on the equipments coming under this scope, Contractor has to clear the front, expeditiously and promptly as instructed by BHEL Engineer. Some time it may be required to re-schedule the activities to enable other agencies to commence / continue the work so as to keep the overall project schedule.

1.10.4.19 Crane operators deployed by the contractor shall be tested by BHEL before he is allowed to operate the cranes.

1.10.4.20 For the purpose of planning, contractor shall furnish the estimated requirement of power (month wise) for execution of work in terms of maximum kW demand.

1.10.4.21 It is the responsibility of the contractor to do the alignment, checking, etc. if necessary, repeatedly to satisfy BHEL Engineer / Owner Engineers with all the necessary tools and tackles, manpower etc. without any extra cost. The alignment will be completed only when jointly certified so, by the BHEL Engineer & Owner. Also the contractor should ensure that the alignment is not disturbed afterwards.

1.10.4.22 All the necessary certificates and licenses required to carry out this scope of work are to be arranged by the contractor then and there at his cost.

1.10.4.23 The contractor is strictly prohibited from using BHEL's regular components like angles, channels, beams, plates, pipe / tubes, and handrails etc. for any temporary supporting or scaffolding works or as bed for pre-assembly works. Contractor shall arrange himself all such materials. In case of such misuse of BHEL materials, a sum as determined by BHEL engineer will be recovered from the contractor's bill. The decision of BHEL engineer is final and binding on the contractor.

1.10.4.24 Upon completion of daily work, the contractor shall remove from the vicinity of work all scrap packing materials, rubbish, unused and other materials and deposit them in places to be specified by BHEL Engineer.

1.10.4.25 On completion of work, all the temporary buildings, structures, pipe lines, cables etc. constructed by him shall be dismantled and leveled and debris shall be removed as per instructions of BHEL by the contractor at his cost.

In the event of his failure to do so, the expenditure towards clearance of the same will be recovered from the contractor. The decision of BHEL Engineer in this regard is final.

1.10.4.26 Contractor shall retain all T&P / Testing instrument / Material handling equipments etc. at site as per advice of BHEL engineer and same shall be taken out from site only after getting the clearances from engineer in charge.

1.10.4.27 **Site Inspection:**

1.10.4.27.1 The Owner or his authorized agents may inspect various stages of work during the currency of the contract awarded to him. The contractor shall make necessary arrangements for such inspection and carry out the rectification pointed out by the Owner or his authorized agents without any extra cost to the Owner or his authorized agents. No cost whatsoever such duplication of inspection of work be entertained.

1.10.4.27.2 BHEL / Owner will have full power and authority to inspect the works at any time, either on the site or at the contractor's premises. The contractor shall arrange every facility and assistance to carry out such inspection. On no account will the contractor be allowed to proceed with work of any type unless such work has been inspected and entries are made in the site inspection register by Owner / BHEL.

1.10.4.27.3 The contractor shall maintain at site a joint protocol for recording actual measurement of work carried out at site, inspection and witnessing of various tests conducted by the contractor.

1.10.4.27.4 Field Quality Assurance (FQA) Formats:-

It is the responsibility of the contractor to collect and fill up the relevant FQA log sheets of BHEL and present the same to BHEL after carrying out the necessary checks as per the log sheets and obtaining the signature of BHEL and Owner as token of their acceptance. Payment to the contractor will be linked with the submission of these FQA log sheets.

1.10.4.27.5 Site testing wherever required shall be carried out for all items / materials installed by the contractor to ensure proper installation and functioning in accordance with drawings, specifications and manufacturer's recommendations.

1.10.4.27.6 Contractor shall, transport all materials to site and unload at site / working area for inspection and checking. All material handling equipment required shall be arranged by the contractor.

1.10.4.28 **DOCUMENTATION**

1.10.4.28.1 **The following are records to be maintained at site:**

1.10.4.28.1.1 Record of Quantity of FREE / Chargeable items issued by BHEL must be maintained during contract execution. Also reconciliation statement to be prepared at regular intervals.

1.10.4.28.1.2 The under mentioned Records / Log-books / Registers as applicable are to be maintained.

a) Hindrance Register.
b) Site Order Book.
c) Test Check of measurements.
d) Cement Supply and Consumption Daily Register
e) Steel supply and monthly reconciliation statement
f) Records of Test reports of Field tests.
g) Records of manufacture's test certificates.
h) Records of disposal of scraps generated during and after the work completion.

1.10.4.28.1.3 Other documents as specified in of Chapter – XI of Technical Conditions of Contract (VOLUME-IA PART- I)

VOLUME-IA PART-I CHAPTER - XI

PROGRESS OF WORK

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

1.11.1 Refer forms F -14 to F-18 of volume I D (Forms & Procedure) of volume -I book-II. Plan and review will be done as per the formats. Please note that Form F-14 and F-15 are revised and published in this booklet (Volume I Book I)

1.11.2 Contractor is required to draw mutually agreed monthly construction / erection programs in consultation with BHEL well in advance. Contractor shall ensure achievement of agreed program and shall also timely arrange additional resources considered necessary at no extra cost to BHEL.

1.11.3 Progress review meetings will be held at site during which actual progress during the week vis-a-vis scheduled program shall be discussed for actions to be taken for achieving targets. Contractor shall also present the program for subsequent week. The contractor shall constantly update / revise his work program to meet the overall requirement. All quality problems shall also be discussed during above review meetings. Necessary preventive and corrective action shall be discussed and decided upon in such review meetings and shall be implemented by the contractor in time bound manner so as to eliminate the cause of nonconformities.

1.11.4 The contractor shall submit daily, weekly and monthly progress reports, manpower reports, materials reports, consumables (gases / electrodes) report, cranes availability report and other reports as per Performa considered necessary by the Engineer. The periodicity of the reports will be decided by BHEL Engineer at site.

1.11.5 The contractor shall submit weekly / fortnightly / monthly statement report regarding consumption of all consumables for cost analysis purposes.

1.11.6 The manpower reports shall clearly indicate the manpower deployed, category wise specifying also the activities in which they are engaged.

1.11.7 The monthly report as a booklet shall be submitted at the end of every month and shall contain the following details :-

a. Progress photographs in colour.

b. Erection progress in terms of tonnage, welding joints, radiography, stress relieving, etc., completed as relevant to the respective work areas against planned.

c. Site Organization chart of engineers & supervisors as on the last day of the month with further mobilization plan

d. Category- wise man hours engaged during the previous month under the categories like fitters, welders, riggers, khalasis, grinder-men, gas-cutters, electricians, crane operators, security, helpers etc. Data shall be split up under the work areas like Civil, Architectural works- building wise, roads, drains, other civil works etc.

e. Consumables report giving consumption of all types of gases and electrodes during the previous month.

f. Availability report of cranes / T & Ps

g. Safety implementation report in the format

h. Pending material and any other inputs required from BHEL for activities planned during the subsequent month.

1.11.8 During the course of construction, if the progress is found unsatisfactory, or if the target dates fixed from time to time for every milestone are to be advanced, or in the opinion of BHEL, if it is found that the skilled workmen like fitters, operators, technicians etc employed are not sufficient BHEL will induct required additional workmen to improve the progress and recover all charges incurred on this account including all expenses together with BHEL overheads from contractor's bills.

1.11.9 It is the responsibility of the contractor to provide all relevant information on a regular basis regarding construction progress, labour availability, equipment deployment, testing, etc.

1.11.10 The progress reports shall indicate the progress achieved against plan, indicating reasons for delays, if any. The report shall also give remedial actions which the contractor intends to make good the slippage or lost time so that further works can proceed as per the original plan the slippages do not accumulate and affect the overall programme.

1.11.11 The contractor to reflect actual progress achieved during the month and will be submitted to BHEL, so that slippages can be observed and necessary action taken in order to ensure that the situation does not get out of control will update the construction schedule forming part of this contract each month.

1.11.12 The contractor shall submit a report of any damage, shortage, discrepancy etc., every week detailing in this regard.

VOLUME-IA PART-I CHAPTER -XII

MATERIAL HANDLING, TRANSPORTATION AND SITE STORAGE

The scope of the work will comprise of but not limited to the following:

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

1.12.1 The BHEL's storage yard is located within the plant boundary. All materials have to be transported from storage yard to construction area by the contractor at his own cost.

1.12.2 Open land as available shall be provided by BHEL on free of cost basis. Contractor shall maintain one centralized fenced store cum fabrication yard. Hard surfacing of this yard and all round drain shall be carried out by the contractor at his own cost within the quoted rate. The contractor shall make complete arrangement of necessary security personnel, to safeguard all such materials in his custody. Materials issued will be used only for construction of permanent work. The contractor shall take care of material issued by BHEL and shall protect the same from theft, damage and weathering.

1.12.3 The contractor shall construct waterproof cement store (capacity 400MT) for initial period for storing and stacking of cement, CGI/ asbestos roofing (slope) with brick masonry wall, PCC flooring. Materials required for the same shall be provided by contractor at his own cost. Cement has to be kept over wooden raised platform. Stacking of cement is to be done as per IS codes with proper illumination and locking arrangements.

1.12.4 Clotting of cement and excessive rusting of steel must be avoided. In case, due to any cause attributable to the contractor, rusting of steel for BHEL issued steel occur rendering the same unusable, then such quantity of cement steel shall be recovered from the interim payment at the penal rate specified in the tender.

1.12.5 The system for receipt, storage & issue of materials shall be available with vendors for easy traceability.

1.12.6 Periodic audit of system of purchasing, storing and issue, etc. will have to be carried out by the vendors. BHEL will also audit the same.

1.12.7 The contractor shall maintain proper store account for all the BHEL issued materials and shall give three copies of once in two months computerized reconciliation statement of such account to the BHEL.

1.12.8 Materials shall be stacked neatly, preserved and stored in the contractor's shed / work area in an orderly manner. In case it is necessary to shift and re-stack the materials kept at work area / site to enable other agencies to carry out their work, same shall be done by the contractor at no extra cost.

1.12.9 All TMT shall be stacked over sleeper's diameter wise.

1.12.10 All structural steel (issued for insert / embedment) shall be stacked plate size wise and thickness wise beams, channels and angles shall be stacked separately on sleepers.

1.12.11 Materials shall not under any circumstances taken out of the project site unless otherwise permitted by BHEL.

1.12.12 Excessive rusting of steel must be avoided. In case, due to any cause attributable to the contractor, rusting of steel for BHEL issued steel occur rendering the same unusable, then such quantity of steel shall be recovered from the interim payment at the penal rate specified in the tender.

1.12.13 Materials shall not under any circumstances taken out of the project site unless otherwise permitted by BHEL.

1.12.14 Sometimes it may become necessary for the contractor to handle certain unrequired components in order to take out the required materials. The contractor has to take this contingency also into account. No extra payment is payable for such contingencies.

1.12.15 The materials from the storage yard shall be moved in sequence to the actual site of erection / location at the appropriate time as per the direction of BHEL Engineer so as to avoid damage / loss of such equipment at site.

1.12.16 Contractor shall plan and transport materials from storage yard to construction site in such a manner and sequence that material accumulation at site does not lead to congestion at site of work.

1.12.17 Also refer clause 1.13.1.1 in Chapter XIII on cement unloading.

VOLUME-IA PART - I CHAPTER – XIII
ACCOUNTING OF MATERIALS ISSUE

1.13 ACCOUNTING OF MATERIALS ISSUE

The Cement and steel material issued to the contractor by BHEL will be accounted as follows:

1.13.1 CEMENT

1.13.1.1 ISSUE OF CEMENT

1.13.1.1.1 The cement issued by the BHEL shall be properly accounted (issue and reconciliation) and issue shall be based on the Unit weight as indicated in the IS specifications.

1.13.1.1.2 Cement as received from the manufacturer / stockiest will be issued **free of cost** to the contractor. The cement shall be provided normally in bulkers and shall be unloaded in the silos to be installed by the contractor nearer to their batching plants. Minimum requirement of silos shall be 2 Nos of 100MT each per batching plant and the No of silos shall be increased based on the site requirement. Unloading arrangements shall be provided by the contractor.

1.13.1.1.3 Contractor is responsible for unloading the cement as soon as the arrival of cement, either in silo, if received in bulker or in the weather proof cement storage sheds, if received bags. Bagged cement shall be stored in a weatherproof sheds having dense impervious bituminous or concrete floors which shall be kept swept clean at all times. The storage arrangements shall be fully completed and approved by the owner before any cement is delivered to site. The construction of cement storage sheds as per the requirement of BHEL, unloading of cement bags, stacking properly in the storage sheds, removal of the sheds after the completion of the work is in the scope of contractor. Though the cement is unloaded directly at the contractor storage shed, it will be deemed to be considered that the cement was issued from BHEL stores. Necessary documents are to be submitted by the contractor to the BHEL stores for having received cement.

1.13.1.1.4 On advance request of the contractor, the cement shall be supplied in 50kg tamper proof sealed Bags for other than RCC works like masonry, flooring works etc. The theoretical weight of each bag of cement for issued purposes will be considered as 50 kg, the contractor shall be accountable for the cement issued to him on this notional weight only. No claim whatsoever will be entertained because of difference between theoretical and actual weight of the bags of cement. The empty cement bags duly

accounted for against issue shall be the property of the contractor and the same shall be disposed by the contractor as per statutory regulation prevailing in the project. The empty cement bags duly accounted for against issue shall be the property of the contractor and the same shall be disposed by the contractor as per statutory regulation prevailing in the project.

1.13.1.1.5 The contractor shall submit to the engineer, a statement indicating estimated quantity of cement required during a quarter, at least two months in advance of the quarter. In addition, the contractor shall also furnish the estimated requirement of cement during a month by the third week of the previous month indicating his requirement.

1.13.1.1.6 The contractor shall satisfy himself of the quality and quantity of supplied cement at the time of taking delivery from BHEL stores. No claims whatsoever will be entertained by BHEL because of quality or quantity after the materials are taken by the contractor from BHEL stores

1.13.1.1.7 Contractor is responsible for sampling and testing of cement as per Indian Standard / Specification / approved quality plan in the testing laboratory established by the contractor.

1.13.1.1.8 Contractor is responsible for carrying out design mix as per IS 456/10262 Latest revision and specification, using the cement provided by BHEL and submit the design mix proportions for the approval of BHEL / Owner (TANGEDCO). The design / trial mix shall be carried out time to time on change of brand / type of cement supplied by BHEL and suitable adjustments on the quantity of ingredients (sand, aggregates, admixture) of the concrete to get the required workability and durability, shall be the responsibility of the contractor without any extra cost to BHEL.

1.13.1.1.9 Following shall be limit for the maximum quantity of BHEL issue materials that would be with the contractor at any point of time when work is in progress (excluding what has already been incorporated in the works).

Sl. No.	ISSUE OF MATERIALS	MAX. QUANTITY IN CONTRACTOR'S STORE
1.	Cement	Requirement of one month

1.13.1.2 **RETURN OF CEMENT**

1.13.1.2.1 Untampered cement bags remaining unused and in perfectly good condition at the time of completion or termination of the contract shall be returned promptly, (within 15 days from assessment) if BHEL / Engineer is satisfied of the physical condition of the cement. Return of such cement to the project stores / place as identified within the project area by Engineer / BHEL will not be entitled to handling and incidental charges.

untampered and good condition cement bags will be taken back on weighment basis.

1.13.1.2.2 Cement unloaded in the silos shall be returned on weighment basis, only when the cement is unloaded in the silo 30days before.

1.13.1.2.3 Sweep cement will not be taken back by BHEL

1.13.1.3 CEMENT CONSUMPTION AND WASTAGE

The theoretical consumption of cement shall be based on the following.

i. For design mix concrete as per approved design mix.

ii. For nominal mix concrete work, as per minimum cement as specified or as approved by Engineer-in-charge.

For item of works, where volume mix is permitted in writing by the BHEL, for masonry works, plaster other miscellaneous items, the cement consumption shall be governed by the "Statement of Cement Consumption" attached to the Delhi schedule of Rates of CPWD-DSR-LATEST REVISION unless otherwise specified in the specifications or the drawing of contract or mutually agreed by Engineer-in-charge and contractor.

Actual consumption = Issue – Surplus / unused quantity of cement returned in good condition by contractor to store.

1.13.1.4 CEMENT WASTAGE

Allowable wastage: One and half percent (+1.5%) of theoretical consumption of cement unless specified otherwise in the technical specification.

1.13.1.5 Basis of issue & recovery rate

For any material issued by BHEL to the contractor free of cost, and which is not accounted by the contractor to BHEL, then recovery for such material shall be effected at penal rates.

Sl. No.	Cement consumption	Basis of issue & recovery rate
C-1	Theoretical consumption (without considering any wastage or loss).	Free
C-2	Actual consumption being Limited to one and half percent (+1.5%) of aforesaid theoretical consumption towards allowable wastage.	Free
C-3	Actual consumption beyond one and half percent (+1.5%) of above (C-1).	Penal rate

1.13.2 **STEEL MATERIAL**

1.13.2.1 **ISSUE OF STEEL**

1.13.2.1.1 The steel shall be issued to the contractor on the following basis:

Sl.No..	Description	Basis
(a)	Structural Steel	Weighment basis (Unit – MT)
(b)	Reinforcement Steel and Earthing rod (MS round).	Weighment basis(Unit – MT)

1.13.2.1.2 All the steel (structural, reinforcement, earthing MS rod,) issued by the BHEL shall be properly accounted for. The total quantity of steel required for the work will be calculated from the approved Bar Bending schedule, fabrication drawings, approved laps, chairs and lugs. The measurement for payment as well as for accounting (issue, return of materials and reconciliation) shall be based on the sectional weights as indicated in the following IS standards. No rolling tolerance shall be accepted in any case for issue, **return of materials**, reconciliation and payment purposes.

IS: 808-1964 Beams, Channels and Angles

IS: 1730-1961 Plates, Sheets and Strips / Flats

IS: 1732-1971 Rounds including deformed high yield strength bars.

In case any such sectional weights are not available in the above documents, the manufacturer recommendation shall be binding.

1.13.2.1.3 The steel issued to the contractor shall be mainly in standard length and sections as received from the supplier. However, the contractor shall be bound to accept the steel in length as available in the project stores no claims for extra payment because of issue of non-standard length will be entertained.

1.13.2.1.4 The contractor shall satisfy himself of the quality and quantity of the materials at the time of taking delivery from BHEL stores. No claims whatsoever will be entertained by BHEL because of quality or quantity after the materials are taken by the contractor from BHEL stores.

1.13.2.1.5 The contractor shall submit to the engineer, a statement indicating estimated quantity of steel required during a quarter, at least two months in advance of the quarter. In addition, the contractor shall also furnish the estimated requirement of steel during a month by the third week of the previous month indicating his requirement.

1.13.2.1.6 Following shall be limit for the maximum quantity of BHEL issue materials that would be with the contractor at any point of time when work is in progress (excluding what has already been incorporated in the works).

SL. No.	ISSUE OF MATERIALS	MAX. QTY IN CONTRACTOR'S STORE.
1	Reinforcement Steel & Earthing rod MS round.	Requirement of one month
2	Structural Steel	-do-

Contractors to ensure that no lamination materials are taken over by them from BHEL.

Fabrication wastage, if any due to above, shall not be compensated by BHEL.

1.13.2.1.7 Bidder to note that steel materials required for washers and foundation bolts, embedded items other than those supplied by BHEL, etc shall be supplied by the bidder. However, Bidder may use the scrap materials (if available in BHEL stores) for their use in the permanent works as embedment / inserts etc. after necessary store issue formalities and shall be accounted for monthly reconciliation.

1.13.2.2 **RETURN OF STEEL MATERIALS**

a) All surplus steel and all wastage materials will be taken back on weighment basis.

b) Surplus, unused and untampered steel shall be sorted section-wise and returned separately for a place directed by BHEL / Engineer within the project area. Return of such materials will not be entitled to any handling and incidental charges.

c) All wastage / scrap (including melting scrap, wastage, and unusable scrap) shall be promptly returned to the stores and a receipt obtained for material accounting purposes. Return of such material will not be entitled to any transportation and incidental charge.

1.13.2.2.1 SCRAP & SERVICEABLE MATERAILS:

a) All Structural steel of length above 2 metre except M.S. Plate shall be considered as serviceable materials provided the materials is in good and acceptable condition. Structural steel in length less than 2 metre shall be treated as scrap.

b) Plates having both sides greater than 1 metre OR if any side is less than 1 metre but greater than 0.5 metre and the total area is equal or greater than 2 sq.metre shall be considered as serviceable.

c) All pipes measuring 2 metre and above in length shall be treated as serviceable materials provided they are in good and acceptable condition. Pipe in less than 2 metre length shall be treated as scrap.

d) All TMT measuring 3 metre and above in length shall be treated as serviceable materials provided they are in good and acceptable condition. TMT in less than 3 metre length shall be treated as scrap.

1.13.2.2.2 STEEL CONSUMPTION AND WASTAGE

1.13.2.2.2.1 REINFORCEMENT AND EARTHING ROD MS ROUND STEEL CONSUMPTION AND WASTAGE.

a) CONSUMPTION.

The theoretical consumption of various sections and / or diameter of reinforcement and earthing rod steel shall be based on approved construction drawing and bar bending schedule. Weight shall be calculated considering the sectional weights as per Indian standards. No extra cost shall be payable to the contractor for any deviation in weights for the different procedures adopted for issue and calculation of the theoretical consumption including rolling tolerances.

- Actual consumption = Issue – Surplus.
- Surplus = Un-tampered and unused quantity of steel and serviceable materials as stipulated under clause "Scrap and Serviceable Materials (Refer Clause 1.13.2.2.1 above)" returned by the contractor to BHEL store along with relevant documents.
- Wastage = Actual consumption – Theoretical consumption.

b) WASTAGE:

ALLOWABLE WASTAGE: (+3%) of the theoretical consumption shall be considered as allowable wastage. Invisible wastage (max limit to 0.5%), if any, shall be considered to be included in the specified 3 % allowable wastage.

c) BASIS OF ISSUE & RECOVERY RATE

Sl. No.	**REINFORCEMENT STEEL & EARTHING ROD MS ROUND**	**BASIS OF ISSUE & RECOVERY RATE.**
R-1	Theoretical consumption (without considering wastage and scrap or loss)	Free
R-2	Wastage limited to plus THREE percent (+3%) of aforesaid theoretical consumption (R-1) towards allowable wastage (cut pieces plus scrap to be returned to BHEL).	Free

Sl. No.	REINFORCEMENT STEEL & EARTHING ROD MS ROUND	BASIS OF ISSUE & RECOVERY RATE.
R-3	Wastage beyond THREE percent (+3%) of the theoretical consumption above (R-1).	Penal Rate

1.13.2.2.2.2 STRUCTURAL STEEL, (ROLLED SECTION, PLATES ETC.) CONSUMPTION & WASTAGE.

a) CONSUMPTION: -

The theoretical consumption of various sections shall be based on approved drawings. Weights shall be calculated considering the sectional weights as per Indian standard. No extra shall payable to the contractor for any deviation in weights for the two different procedures adopted for issue and calculation of the theoretical consumption including rolling tolerances.

- Actual consumption = Issue – Surplus.
- Surplus = Un-tampered and unused quantity of steel and serviceable materials as stipulated under clause "Scrap and Serviceable Materials (Refer Clause 1.13.2.2.1 above)" returned by the contractor to BHEL store along-with relevant documents.
- Wastage = Actual consumption – Theoretical consumption.

b) WASTAGE

ALLOWABLE WASTAGE: - 4% (FOUR percent) of the theoretical consumption shall be considered. Wastage shall be considered as cut pieces and scrap material, measured as per actual weightment basis. Invisible wastage (max limit to 0.5%), if any, shall be considered to be included in the specified 4 % allowable wastage.

c) BASIS OF ISSUE & RECOVERY RATE

Sl. No.	CONSUMPTION OF STRUCTURAL STEEL (Rolled Section, Plates & SS liner)	BASIS OF ISSUE & RECOVERY RATE
S-1	Theoretical consumption (without Considering any wastage, scrap or loss) as per spec. & drawing.	Free
S-2	Wastage limited to plus Four percent (+4%) of the aforesaid theoretical consumption (S-1) towards allowable wastage.	Free

Sl. No.	CONSUMPTION OF STRUCTURAL STEEL (Rolled Section, Plates & SS liner)	BASIS OF ISSUE & RECOVERY RATE
S-3	Wastage beyond Four percent (4%) of the aforesaid theoretical consumption (S-1).	Penal Rate

1.13.2.2.3 RECONCILIATION OF MATERIALS

a) The contractor shall submit a reconciliation statement of steel issued to him and steel procured by him with each RA Bill.

b) At the time of submission of bills, the contractor shall properly account for the material issued to him as specified herein to the satisfaction of BHEL certifying that the balance materials are available with contractor's custody at site.

c) At the time of submission of bills by the contractor, if it is noticed by BHEL that the wastage is high and calls recovery at the penal rate, then, BHEL will proceed for recovery for the excess wastage as per penal recovery rates as specified.

d) The reference drawings for actual material consumption to be used for the purpose of reconciliation shall be drawings prepared by the BHEL and drawings approved by BHEL for fabrication works and such other drawings approved by BHEL. This shall also include the bar bending schedule prepared by the contractor and approve by BHEL.

1.13.3 **RECOVERY OF MATERIAL**

If wastage exceeds the specified limit, the recovery of excess wastage shall be made from monthly RA Bill at the Penal Rate mentioned below.

PENAL RATE OF MATERIALS

Reinforcement Steel	Cold rolled steel, high strength deformed bar or mild steel round bars including earthing rod MS round.	Rs. 49,823/- per MT plus GST
Structural Steel	MS plates, MS flats, rolled steel joists, channels, and angles, MS pipes, chequered plates etc in sizes and lengths as available	Rs. 55,808/- per MT plus GST
Cement	Cement (OPC / PPC / PSC)	Rs. 4,266/- per MT plus GST

VOLUME-IA PART – II CHAPTER 1

CORRECTIONS / REVISIONS IN SPECIAL CONDITIONS OF CONTRACT, GENERAL CONDITIONS OF CONTRACT AND FORMS & PROCEDURES

Sl. No.: 1

Clause 4.1.11 of SCC is deleted.

Sl. No.: 2:

OCCUPATIONAL HEALTH, SAFETY & ENVIRONMENT MANAGEMENT/ QUALITY ASSURANCE PROGRAMME

The following clauses in Occupational Health, Safety & Environment Management / Quality Assurance Programme published in Chapter-IX of Special Conditions of Contract (Volume I Book-II) is revised as under.

Chapter IX Clause 9.1 is modified as below:

Contractor will comply with HSE (Health, Safety & Environment) requirements of BHEL as per the "HSE Plan for Site Operations by Subcontractor" (Document No. HSEP: 14 Rev00) enclosed.

Chapter IX Clause 9.1.1 to 9.1.25 stands deleted.

Chapter IX Clause 9.2 to 9.62 stands deleted.

Sl. No.: 3:

Clause No. 10.5 on RA Bill Payments, in Special Conditions of Contract (SCC), Volume-IB, Book-II, is revised as under:

The payment for running bills will normally be released within 30 days of submission of running bill complete in all respects with all documents. It is the responsibility of the contractor to make his own arrangements for making timely payments towards labour wages, statutory payments, outstanding dues etc., and other dues in the meanwhile.

Sl. No.: 4

The EARNEST MONEY DEPOSIT (EMD) clause 1.9 published in General Conditions of Contract (Volume I Book-II) is revised as under.

1.9 **EARNEST MONEY DEPOSIT**

1.9.1 Every tenderer must furnish the prescribed amount of Earnest Money Deposit (EMD) in the manner described herein.

i) Electronic Fund Transfer credited in BHEL account (before tender opening)

ii) Earnest Money Deposit (EMD) shall also be paid directly to BHEL-PSSR through Online EMD payment portal, before tender opening, by following these steps.

1. Visit www.onlinesbi.com -> Go to State Bank Collect (In the tab section)
2. Click Check box to proceed for payment -> Click on Proceed
3. Under State of Corporate/Institution -> Select Tamilnadu
4. Under Type of Corporate/Institution -> Select PSU – Public Sector Undertaking ->Go
5. Under PSU – Public Sector Undertaking Name -> Select BHEL PSSR CHENNAI and Submit
6. Under Select Payment Category ->Choose SCT TENDER EMD and TENDER FEES]

iii) Banker's cheque or Pay order or Demand Draft in favour of 'Bharat Heavy Electricals Limited' (along with offer) and payable at 'BHEL-PSSR, EVR Periyar Building, 690, Anna Salai, Nandanam, Chennai – 600035'

iv) Fixed Deposit Receipt (FDR) issued by Scheduled Banks/ Public Financial Institutions as defined in the Companies Act (FDR should be in the name of the Contractor, a/c BHEL).

Note:

a) In addition to above, the EMD amount in excess of Rs. Two Lakh may be accepted in the form of Bank Guarantee from Scheduled bank (Explanatory statement: EMD upto Rs. 2 Lakhs can be submitted in any of the form as in (i) to (iv) above and remaining amount over and above Rs. 2 Lakhs by way of BG). The Bank Guarantee in such cases shall be valid for at least six months from the scheduled due date of tender submission mentioned in the Notice Inviting Tender. Proforma of BG for EMD enclosed.

b) Date of Expiry of Claim shall be minimum of 60 days after the validity of Bank Guarantee.

c) Proforma for Bank Guarantee for EMD is enclosed with this Tender.

Bank Details for the purpose of Taking EMD BG

Name and Address of Beneficiary:	Bharat Heavy Electricals Ltd. No.690, EVR Periyar Building, Anna Salai, Nandhanam, Chennai - 600035
Name of Bank of Client :	State Bank of India

Bank Branch Address:	SBI Saidapet Branch, No.690, EVR Periyar Building, Anna Salai, Nandanam, Chennai - 600035
IFSC Code :	SBIN0000912
Account No. :	10610819499

Details for SFMS (Structured Financial Messaging System) transmission of BG

Bank and Branch	SBI TFCPC Branch
Branch Code	5056
IFSC Code	SBIN0005056

1.9.2 EMD shall not carry any interest.

1.9.3 EMD by the Tenderer will be forfeited as per NIT Conditions, if:

i) After opening the tender and within the offer validity period, the Tenderer revokes his tender or makes any modification in his tender which is not acceptable to BHEL.

ii) The Contractor fails to deposit the required Security deposit or commence the work within the period as per LOI/Contract

1.9.4 EMD given by all unsuccessful tenderers will be refunded normally within 15 days of award of work.

1.9.5 EMD of successful tenderer will be retained as part of Security Deposit.

1.9.6 EMD by the tenderer shall be withheld in case any action on the tenderer is envisaged under the provisions of extant" Guidelines on Suspension of Business dealings with suppliers/contactors" and forfeited / released based on the action determined under these guidelines.

Sl. No.: 5

SECURITY DEPOSIT The SECURITY DEPOSIT (SD) clause 1.10 published in General Conditions of Contract (Volume I Book-II) is revised as under.

1.10 **Security Deposit:**

1.10.1 Upon acceptance of Tender, the successful Tenderer should deposit the required amount of Security Deposit for satisfactory completion of work, as given below:

1.10.2 The total amount of Security Deposit will be 5% of the contract value. EMD of the successful tenderer shall be converted and adjusted towards the required amount of Security Deposit.

1.10.3 The security Deposit should be furnished before start of the work by the contractor.

1.10.4 Modes of deposit:

1.10.4.1 The balance amount to make up the required Security Deposit of 5% of the contract value may be furnished in any one of the following forms

1 Cash (as permissible under the extant Income Tax Act)

2 Local cheques of Scheduled Banks (subject to realization) / Pay Order / Demand Draft / Electronic Fund Transfer in favour of BHEL

3 Bank Guarantee from Scheduled Banks / Public Financial Institutions as defined in the Companies Act. The Bank Guarantee format for Security Deposit shall be in the prescribed formats.

4 Fixed Deposit Receipt issued by Scheduled Banks / Public Financial Institutions as defined in the Companies Act. The FDR should be in the name of the contractor, A/C BHEL, duly discharged on the back.

5 Securities available from Indian Post offices such as National Savings Certificates, Kisan Vikas Patras etc. (Certificates should be held in the name of Contractor furnishing the security and duly endorsed/ hypothecated/ pledged, as applicable, in favour of BHEL and discharged on the back)

(Note: BHEL will not be liable or responsible in any manner for the collection of interest or renewal of the documents or in any other matter connected therewith)

1.10.5 At least 50% of the Security Deposit including the EMD should be deposited in any form as prescribed before start of the work and the balance 50% of the Security Deposit will be recovered by deducting 10% of the gross amount progressively from each running bills of the contractor till the total amount of the required Security Deposit is collected.

1.10.6 The recoveries made from running bills (cash deduction towards balance SD amount) will be released against submission of equivalent Bank Guarantee in the prescribed formats, but only once, before completion of work.

1.10.7 The Security Deposit shall not carry any interest.

1.10.8 If the value of work done at any time exceeds the contract value, the amount of Security Deposit shall be correspondingly enhanced and the excess Security Deposit due the enhancement shall be immediately deposited by the Contractor or recovered from payment/s due to the Contractor.

1.10.9 The validity of Bank Guarantees towards Security Deposit shall be initially upto the completion period as stipulated in the Letter of Intent / Award + 3

months, and the same shall be kept valid by proper renewal till the acceptance of Final Bills of the Contractor, by BHEL

1.10.10 BHEL reserves the right of forfeiture of Security Deposit in addition to other claims and penalties in the event of the Contractor's failure to fulfill any of the contractual obligations or in the event of termination of contract as per terms and conditions of contract. BHEL reserves the right to set off the Security Deposit against any claims of other contracts with BHEL.

1.10.11 **Penalty for Delayed Remittance of Security Deposit**

If the contractor fails to furnish SD before start of work, in line with 1.10.3 above, Simple Interest against delayed remittance of the Security Deposit shall be deducted from the sub-contractor at the rate of SBI PLR + 2% on the value of 50% SD of the contract, for the delayed period (i.e., period between start of work and date of remittance of Initial SD, i.e., atleast 50% of SD). In case, the delayed period has different SBI PLR rates, Simple Interest shall be calculated based on different rates by considering the corresponding time period. On similar lines Penalty shall be levied for delayed remittance of Additional Security Deposit (if applicable).

Note: - Bank details & SFMS details provided above in Sl. No. 04 Earnest Money Deposit) may be used for the purpose of arranging Bank Guarantees towards Security Deposit / Additional Security Deposit also.

Sl. No: 6

Clause 2.7.2 and 2.7.3 in GCC regarding Rights of BHEL is revised as under:

2.7.2.

2.7.2.1 To terminate the contract or withdraw portion of work and get it done through other agency, at the risk and cost of the contractor after due notice of a period of 14 days' by BHEL in any of the following cases:

i) Contractor's poor progress of the work vis-à-vis execution timeline as stipulated in the Contract, backlog attributable to contractor including unexecuted portion of work does not appear to be executable within balance available period considering its performance of execution.

ii) Withdrawal from or abandonment of the work by contractor before completion of the work as per contract.

iii) Non-completion of work by the Contractor within scheduled completion period as per Contract or as extended from time to time, for the reasons attributable to the contractor.

iv) Termination of Contract on account of any other reason (s) attributable to Contractor.

v) Assignment, transfer, subletting of Contract without BHEL's written permission.

vi) Non-compliance to any contractual condition or any other default attributable to Contractor.

Risk & Cost Amount against Balance Work:

Risk & Cost amount against balance work shall be calculated as follows: Risk & Cost Amount= [(A-B) + (A x H/100)]

Where,

A= Value of Balance scope of Work (*) as per rates of new contract

B= Value of Balance scope of Work (*) as per rates of old contract being paid to the contractor at the time of termination of contract i.e., inclusive of PVC & ORC, if any.

H = Overhead Factor to be taken as 5

In case (A-B) is less than 0 (zero), value of (A-B) shall be taken as 0 (zero).

* Balance scope of work (in case of termination of contract):

Difference of Contract Quantities and Executed Quantities as on the date of issue of Letter for

'Termination of Contract', shall be taken as balance scope of Work for calculating risk & cost amount. Contract quantities are the quantities as per original contract. If, Contract has been amended,

quantities as per amended Contract shall be considered as Contract Quantities.

Items for which total quantities to be executed have exceeded the Contract Quantities based on drawings issued to contractor from time to time till issue of Termination letter, then for these items

total Quantities as per issued drawings would be deemed to be contract quantities.

Substitute / extra items whose rates have already been approved would form part of contract quantities for this purpose. Substitute/ extra items which have been executed but rates have not been approved, would also form part of contract quantities for this purpose and rates of such items shall be determined in line with contractual provisions.

However, increase in quantities on account of additional scope in new tender shall not be considered for this purpose.

NOTE: Incase portion of work is being withdrawn at risk & cost of contractor instead of termination of contract, contract quantities pertaining to portion of work withdrawn shall be considered as 'Balance scope of work' for calculating Risk & Cost amount.

LD against delay in executed work in case of Termination of Contract:

LD against delay in executed work shall be calculated in line with LD clause no. 2.7.9 of GCC, for the delay attributable to contractor. For limiting the maximum value of LD, contract value shall be taken as Executed Value of work till termination of contract.

Method for calculation of "LD against delay in executed work in case of termination of contract" is given below.

i). Let the time period from scheduled date of start of work till termination of contract excluding the period of Hold (if any) not attributable to contractor = T1

ii). Let the value of executed work till the time of termination of contract= X

iii). Let the Total Executable Value of work for which inputs/fronts were made available to contractor and were planned for execution till termination of contract = Y

iv). Delay in executed work attributable to contractor i.e. T2=[1-(X/Y)] x T1

v). LD shall be calculated in line with LD clause (clause 2.7.9) of the Contract for the delay attributable to contractor taking "X" as Contract Value and "T2" as period of delay attributable to contractor.

2.7.2.2 In case Contractor fails to deploy the resources as per requirement, BHEL can deploy own / hired / otherwise arranged resources at the risk and cost of the contractor and recover the expenses incurred from the dues payable to contractor. Recoveries shall be actual expenses incurred plus 5% overheads or as defined in TCC.

2.7.3 **Recoveries arising out of Risk & Cost and LD or any other recoveries due from Contractor**

Following sequence shall be applicable for recoveries from contractor:

a) Dues available in the form of Bills payable to contractor, SD, BGs against the same contract.

b) Demand notice for deposit of balance recovery amount shall be sent to contractor, if funds are insufficient to effect complete recovery against dues indicated in (a) above.

c) If contractor fails to deposit the balance amount to be recovered within the period as prescribed in demand notice, following action shall be taken for balance recovery:

i) Dues payable to contractor against other contracts in the same Region shall be considered for recovery.

ii) If recovery cannot be made out of dues payable to the contractor as above, balance amount to be recovered, shall be informed to other Regions / Units for making recovery from the Unpaid Bills / Running Bills / SD /BGs /Final Bills of contractor.

iii) In-case recoveries are not possible with any of the above available options, Legal action shall be initiated for recovery against contractor.

Sl. No.: 7

In addition to clause 2.7.9 of General Conditions of Contract (GCC), a New clause 2.7.9.1 is added as below.

2.7.9.1 Penalty for Intermediate Milestones

2.7.9.1.1 M1 and M2 shall be intermediate Milestones for each unit of this work.

2.7.9.1.2 In case of slippage of these identified Intermediate Milestones, Delay Analysis shall be carried out on achievement of each of these two Intermediate Milestones in reference to Form 14.

2.7.9.1.3 Incase delay in achieving M1 milestone is solely attributable to the contractor,0.5% per week of executable contract value* limited to Maximum 2% of executable contract value will be withheld.

2.7.9.1.4 Incase delay in achieving M2 milestone is solely attributable to the contractor,0.5% per week of executable contract value* limited to maximum 3% of executable contract value will be withheld.

2.7.9.1.5 Amount already withheld, if any, against slippage of M1 milestone, shall be released only if there is no delay attributable to contractor in achievement of M2 milestone.

2.7.9.1.6 Amount required to be withheld on account of slippage of identified intermediate milestone(s) shall be withheld out of respective milestone payment and balance amount (if any) shall be withheld @10% of RA Bill amount from subsequent RA bills.

2.7.9.1.7 Final deduction towards LD (if applicable), on account of delay attributable to contractor shall be based on final delay analysis on completion / closure

of contract. Withheld amount, if any due to slippage of intermediate milestones shall be adjusted against LD or released as the case may be.

2.7.9.1.8 In case of termination of contract due to any reason attributable to contractor before completion of work, the amount already withheld against slippage of intermediate milestones shall not be released and be converted in to recovery.

Note: * Executable contract value-value of work for which inputs/fronts were made available to contractor and were scheduled for execution till the date of achievement of that milestone.

SL No: 8

OVERRUN COMPENSATION (ORC)

The **OVERRUN COMPENSATION (ORC)** clause 2.12 published in General Conditions of Contract (Volume I Book-II) is revised as under.

2.12 **OVERRUN COMPENSATION (ORC)**

2.12.1 **ORC during original contract period:** No ORC shall be applicable during the original contract period.

2.12.2 **ORC during extended period for the reasons solely attributable to contractor:** No ORC shall be applicable during the extended period granted for the reasons solely attributable to contractor and work executed during this period shall be paid as per original contract rates.

2.12.3 **ORC during extended period for the reasons not attributable to contractor:** ORC shall be payable as per following procedure:

2.12.3.1 For initial period of twelve months of extended period, ORC rate applicable over executed value shall be 5%. For every subsequent period of twelve months, ORC rate shall be further increased by 5% over the previous rate. For example, ORC rates applicable for initial period of 12 months and subsequent period of 12 months are given below.

Sl. No.	Extended Period for the reasons attributable to BHEL	ORC rate applicable over executed value
1	First 12 months	5%
2	13^{th}-24^{th} month and so on	10.25% {[(1.05 x 1.05)-1] x 100}

This process of increasing ORC rate for each subsequent period of 12 months shall continue till applicability of ORC.

2.12.3.2 On completion of original contract period as well as on completion of each subsequent period of twelve months i.e. at the time of change in applicable ORC rate, Delay Analysis shall be carried out and percentage shortfall attributable to both BHEL & Contractor shall be calculated.

2.12.3.3 For the purpose of calculation of ORC, executed value of work in the month shall be divided in Part-1 and Part-2 in proportion of percentage shortfall attributable to BHEL and contractor respectively, based on the last delay analysis as worked out in 2.12.3.2.

ORC shall be payable only on Part-1 and no ORC shall be payable on Part-2.

Value of Part-1 shall be further limited to the value of actual inputs provided by BHEL i.e. "Plan - Shortfall attributable to BHEL" for the month, as per Form-14 for calculation of ORC.

2.12.3.4 Payment of ORC amount shall be further regulated as follows:

(i) 50% of the ORC is allocated for deployment of matching resources (with weightages) agreed as per the joint programme drawn vide 2.11.4. ORC Payment against resources shall be calculated in proportion to percentage of resources actually deployed w.r.t. planned resources, as per Form-14.

(ii) 50% of ORC is allocated for achieving of planned progress agreed as per the joint programme drawn vide 2.11.4. ORC Payment shall be reduced in proportion to percentage shortfall attributable to contractor w.r.t.–"Plan - Shortfall attributable to BHEL" for the month, as per Form-14.

2.12.3.5 The maximum amount of ORC payable for the month shall be limited to Rs. 5,00,000/-.

2.12.3.6 In case, there is no shortfall attributable to contractor for the month and also contractor has deployed the resources as agreed in Form-14 but ORC amount payable for the month worked out as per procedure mentioned in clause 2.12.3.3, 2.12.3.4 and 2.12.3.5, is less than Rs.1,00,000/-, then ORC amount payable for the month shall be Rs.1,00,000/- otherwise ORC amount payable for the month shall remain same.

2.12.3.7 In case execution is on HOLD (Other than Force Majeure), ORC shall be payable as per following:

i). Contractor has not been permitted by BHEL to de-mobilize

a) ORC amount of Rs. 1,00,000/- per month shall be applicable during the period of HOLD provided resources as planned are deployed (not demobilized) during the period of hold.

b) Subsequent to lifting of HOLD, Period of HOLD shall not be excluded in calculation of period for deciding applicable ORC rate as per clause 2.12.3.1.

ii). Contractor has been permitted to demobilize and to remobilize after lifting of HOLD

a) No ORC shall be payable to contractor for the period of HOLD.

b) Subsequent to lifting of HOLD, Period of HOLD shall not be excluded in calculation of period for deciding applicable ORC rate as per clause 2.12.3.1.

2.12.3.8 In case Force Majeure is invoked:

i). No ORC shall be applicable during the period of Force Majeure.

ii). Subsequent to revocation of Force Majeure, period of Force Majeure shall be excluded in calculation of period for deciding applicable ORC rate as per clause 2.12.3.1.

2.12.4 Applicability of ORC: ORC shall not be applicable for following activities.

(i) Area cleaning, removal of temporary structures and return of scrap.

(ii) Punch list points / pending points liquidation pending due to reasons attributable to contractor

(iii) Submission of "As built Drawing"

(iv) Material Reconciliation

(v) Completion of Contract Closure formalities like HR Clearance / No dues from various dept./ Statutory Authorities etc.

2.12.5 Total Over Run Compensation shall be limited to 10% of the cumulatively executed contract value till the month (excluding Taxes and Duties if payable extra). For this purpose, executed contract value excludes PVC, ORC and Extra / Supplementary Works.

Sl. No.: 9

Clauses 2.13.1, 2.13.6 & 2.13.7 in GCC on Interest Bearing Recoverable Advances,

7.1 Clauses 2.13.1,2.13.6 & 2.13.7 in GCC is revised as under:

7.1.1 Clause 2.13.1 in GCC is revised as "Normally no advance payment shall be payable to the contractor. Mobilization advance payment in exceptional circumstances shall be interest bearing and secured through a Bank Guarantee and shall be limited to a maximum of 5% of contract value. This 'Interest Bearing Recoverable Advance' shall be payable in not less than two installments with any of the installment not exceeding 60% of the total eligible advance".

7.1.2 Clause 2.13.6 in GCC is revised as "The rate of interest applicable for the above advances shall be the Base rate of State Bank of India prevailing at the time of disbursement of the advance + 6%, and such rate will remain fixed till the total advance amount is recovered".

7.1.3 Clause 2.13.7 in GCC is revised as "Unadjusted amount of advances paid shall not exceed 5% of the total contract value at any point of time. Recovery of advances shall be made progressively from each Running Bill such that the advance amounts paid along with the interest is fully recovered by the time the contractor's billing reaches 90% of contract value."

Sl. No.: 10

Clause 2.14.1 on Quantity Variation in General Conditions of Contract (GCC), Volume-IC, Book-II, is revised as under:

2.14.1 The quantities given in the contract are tentative and may change to any extent (both in plus side and minus side). The quoted rates for individual items shall remain firm irrespective of any variations in the individual quantities. No compensation becomes payable in case the variation of the final executed contract value is within the limit of Minus (-) 30% of awarded contract value."

Sl No: 11

PRICE VARIATION COMPENSATION (PVC)

The PRICE VARIATION COMPENSATION (PVC) clause 2.17 published in General Conditions of Contract (Volume I Book-II) is revised as under.

2.17 **PRICE VARIATION COMPENSATION**

2.17.1 In order to take care of variation in cost of execution of work on either side, due to variation in the index of LABOUR, HIGH SPEED DIESEL OIL, WELDING ROD, CEMENT, STEEL, MATERIALS, Price Variation Formula as described herein shall be applicable (only for works executed during extended period, if any, subject to other conditions as described in this section).

2.17.2 **85%** component of executed Contract Value shall be considered for PVC calculations and remaining 15% shall be treated as fixed component. The basis for calculation of price variation in each category, their component, Base Index, shall be as under:

Sl. No.	CATEGORY	BASE INDEX	PERCENTAGE COMPONENT ('K')				
			CIVIL PACKAGES (See Note A/B/C)			MECHANICAL PACKAGES	Electrical, C&I, Material Management / Handling and other labour oriented packages
			A	**B****	**C**		
i)	LABOUR (ALL CATEGORIES)	'MONTHLY ALL-INDIA AVERAGE CONSUMER PRICE INDEX NUMBERS FOR INDUSTRIAL WORKERS' published by Labour Bureau, Ministry of Labour and Employment, Government of India. (Website: labourbureau.nic.in)	**40**	**25**	**30**	**65**	**80**
ii)	HIGH SPEED DIESEL OIL	Name of Commodity: HSD Commodity code: 1202000005 (**See Note E**)	**5**	**3**	**5**	**5**	**5**
iii)	WELDING ROD	Name of Commodity: MANUFACTURE OF BASIC METALS Commodity code:1314000000 (**See Note E**)				**15**	
iv)	CEMENT	Name of Commodity: ORDINARY PORTLAND CEMENT Commodity code: 1313050003 (**See Note E**)		**20**	**30**		
v)	STEEL (Structural and Reinforcement Steel)	Name of Commodity: MILD STEEL: LONG PRODUCTS Commodity code: 1314040000 (**See Note E**)		**25**			
vi)	ALL OTHER MATERIALS (Other than Cement & Steel)	Name of Commodity: ALL COMMODITIES Commodity code: 1000000000 (**See Note E**)	**40**	**12**	**20**		

Note: A) Cement & Steel: Free Issue (BHEL Scope)

B) Cement & Steel: In Contractor Scope

C) Cement in Contractor Scope, and Steel is Free Issue (BHEL Scope)

D) For Composite packages (i.e. Civil + Mechanical + Electrical and / or CI or Civil + Mechanical or Mechanical + Electrical and / or CI), the Component ('K') for various categories shall be as per respective packages as above

E) As per the 'MONTHLY WHOLE SALE PRICE INDEX' for the respective Commodity and Type, published by Office of Economic Adviser, Ministry of Commerce and Industry, Government of India. (Website: http://www.eaindustry.nic.in/download_data_0405.asp). Revisions in the index or commodity will be re adjusted accordingly.

2.17.3 Void

2.17.4 Payment / recovery due to variation in index shall be determined on the basis of the following notional formula in respect of the identified component ('K') viz LABOUR, HIGH SPEED DIESEL OIL, WELDING ROD, CEMENT, STEEL, MATERIALS.

$$P = K \times R \times \frac{(X_N - Xo)}{Xo}$$

Where

P = Amount to be paid/recovered due to variation in the Index for Labour, High Speed Diesel Oil, Welding Rod, Cement, Steel and Materials

K = Percentage component ('K') applicable for Labour, High Speed Diesel Oil, Welding Rod, Cement, Steel and Materials

R = Value of work done for the billing month (Excluding Taxes and Duties if payable extra)

XN = Revised Index for Labour, High Speed Diesel Oil, Welding Rod, Cement, Steel and Materials for the billing month under consideration

Xo = Index for Labour, High Speed Diesel Oil, Welding Rod, Cement, Steel and Materials as on the Base date.

2.17.5 **Base date shall be the calendar month of the schedule completion date (i.e. Actual Start date + Scheduled Contractual Completion period as per Letter of Intent / award and / or work order).**

2.17.6 PVC shall not be payable for the ORC amount, Supplementary / Additional Items, Extra works. However, PVC will be payable for items executed under quantity variation of BOQ items under originally awarded contract.

2.17.7 The contractor shall furnish necessary monthly bulletins in support of the requisite indices from the relevant websites along with his Bills.

2.17.8 The contractor will be required to raise the bills for price variation payments on a monthly basis along with the running bills irrespective of the fact whether any increase / decrease in the index for relevant categories has taken place or not. In case there is delay in publication of bulletins (final figure), the provisional values as published can be considered for payments and arrears shall be paid/recovered on getting the final values.

2.17.9 PVC shall be applicable only, during extended period of contract (if any) after the scheduled completion period and for the portion of work delayed / backlog for the reasons not attributable to the contractor.

2.17.10 However, the total Quantum of Price Variation Amount payable / recoverable shall be regulated as follows:

i) For the portion of shortfall/backlog not attributable to contractor, PVC shall be worked out on the basis of indices applicable for the respective month in which work is done. Base index shall be applicable as defined in clause 2.17.5

ii) In case of Force Majeure, the PVC shall be regulated as per (a) or (b) below.

a) Force Majeure is invoked before "Base Date" / "revised base date" (as explained below) OR immediately after "base date" / "revised base date" in continuation (i.e. during the period when PVC is not applicable):

1. Base date shall be revised: Revised Base date = Previous base date + duration of Force Majeure.

   No PVC will be applicable for the work done till revised base date.

2. PVC will be applicable for the work done after "base date"/" revised date" as the case may be (during extended period when delay is not attributable to contractor). PVC shall be worked out on the basis of indices applicable for the respective month in which work is done with base index as on "base date"/ "revised base date" as the case may be.

b) Force Majeure is invoked after "base date"/ "revised base date" as the case may be (during extended period when delay is not attributable to contractor).

1. PVC shall be applicable for the work done after revocation of Force Majeure.

2. PVC for the work done after revocation of Force Majeure shall be worked out on the basis of indices applicable for the respective month on which work is done excluding the effect of change in indices during total period of Force Majeure(s) invoked after "base date" / "revised base date" as the case may be. Base index shall be taken as on "base date" / "revised base date" as the case may be.

iii) The total amount of PVC shall not exceed 15% of the cumulatively executed contract value. Executed Contract value for this purpose is

exclusive of PVC, ORC, Supplementary / Additional items and Extra works except items due to quantity variation.

Sl. No.: 12

Clause 2.21 on Arbitration in General Conditions of Contract (GCC), Volume-IC, Book-II, is revised as under:

2.21 ARBITRATION & CONCILIATION

2.21.1 ARBITRATION:

2.21.1.1 Except as provided elsewhere in this Contract, in case Parties are unable to reach amicable settlement (whether by Conciliation to be conducted as provided in Clause 2.21.2 herein below or otherwise) in respect of any dispute or difference; arising out of the formation, breach, termination, validity or execution of the Contract; or, the respective rights and liabilities of the Parties; or, in relation to interpretation of any provision of the Contract; or. in any manner touching upon the Contract (hereinafter referred to as the 'Dispute'), then, either Party may, commence arbitration in respect of such Dispute by issuance of a notice in terms of section 21 of the Arbitration & Conciliation Act, 1996 (hereinafter referred to as the 'Notice'). The Notice shall contain the particulars of all claims to be referred to arbitration in sufficient detail and shall also indicate the monetary amount of such claim. The arbitration shall be conducted by a sole arbitrator to be appointed by the Head of the BHEL Power Sector Region issuing the Contract within 60 days of receipt of the complete Notice. The language of arbitration shall be English.

The Arbitrator shall pass a reasoned award.

Subject as aforesaid, the provisions of Arbitration and Conciliation Act 1996 (India) or statutory modifications or re-enactments thereof and the rules made thereunder as in force from time to time shall apply to the arbitration proceedings under this clause. The seat of arbitration shall be Chennai (the place from where the contract is Issued). The Contract shall be governed by and be construed as per provisions of the laws of India. Subject to this provision 2.21.1.1 regarding ARBITRATION, the principal civil court exercising ordinary civil jurisdiction over the area where the seat of arbitration is located shall have exclusive jurisdiction over any DISPUTE to the exclusion of any other court.

2.21.1.2 In case of Contract with Public Sector Enterprise (PSE) or a Government Department, the following shall be applicable:

In the event of any dispute or difference relating to the interpretation and application of the provisions of commercial contract(s) between Central

Public Sector Enterprises (CPSEs) / Port Trusts inter se and also between CPSEs and Government Departments / Organizations (excluding disputes concerning Railways, Income Tax, Customs & Excise Departments), such dispute or difference shall be taken up by either party for resolution through AMRCD (Administrative Mechanism for Resolution of CPSEs Disputes) as mentioned in DPE OM No. 4(1)/2013-DPE(GM)/FTS-1835 dated 22-05-2018 as amended from time to time.

2.21.1.3 The cost of arbitration shall initially be borne equally by the Parties subject to the final allocation thereof as per the award / order passed by the Arbitrator.

2.21.1.4 Notwithstanding the existence of any dispute or differences and/or reference for the arbitration, the Contractor shall proceed with and continue without hindrance the performance of its obligations under this Contract with due diligence and expedition in a professional manner unless the dispute inter-alia relates to cancellation, termination or short-closure of the Contract by BHEL.

2.21.2 CONCILIATION:

If at any time (whether before, during or after the arbitral or judicial proceedings), any Disputes (which term shall mean and include any dispute, difference, question or disagreement arising in connection with construction, meaning, operation, effect, interpretation or breach of the agreement, contract), which the Parties are unable to settle mutually, arise inter-se the Parties, the same may, be referred by either party to Conciliation to be conducted through Independent Experts Committee (IEC) to be appointed by competent authority of BHEL from the BHEL Panel of Conciliators.

Notes:

1. No serving or a retired employee of BHEL / Administrative Ministry of BHEL shall be included in the BHEL Panel of Conciliators.
2. Any other person(s) can be appointed as Conciliator(s) who is / are mutually agreeable to both the parties from outside the BHEL Panel of Conciliators.

The proceedings of Conciliation shall broadly be governed by Part-III of the Arbitration and Conciliation Act 1996 or any statutory modification thereof and as provided in Procedure 2.3 to Forms and Procedures. The Procedure 2.3 together with its Formats will be treated as if the same is part and parcel hereof and shall be as effectual as if set out herein in this Tender specification.

The Contractor hereby agrees that BHEL may make any amendments or modifications to the provisions stipulated in the Procedure 2.3 to Forms and Procedures from time to time and confirms that it shall be bound by such amended or modified provisions of the Procedure 2.3 with effect from the date as intimated by BHEL to it.

Note: Procedure 2.3 that forms the part of Forms and Procedures is published as Chapter 11 in Volume 1A Part II of this booklet (Volume-I Book-I).

2.21.3 NO INTEREST PAYABLE TO CONTRACTOR

Notwithstanding anything to the contrary contained in any other document comprising in the Contract, no interest shall be payable by BHEL to Contractor on any moneys or balances including but not limited to the Security Deposit, EMD, Retention Money, RA Bills or the Final Bill, or any amount withheld and / or appropriated by BHEL etc., which becomes or as the case may be, is adjudged to be due from BHEL to Contractor whether under the Contract or otherwise.

Sl. No.: 13

Procedure 2.3 that forms the part of the "forms and Procedures (Volume 1 Book 2)" is published as chapter 11 in Volume 1A Part II of this booklet (Volume-I Book-I).

Sl. No.: 14

Clause 2.22 in GCC regarding Retention Amount is revised as under:

2.22 Performance Security Deposit

2.22.1 After award of work, before commencement of work at site Vendor shall submit 5% of the contract value towards Performance Security Deposit, in the form of (a) or (b) below.

(a) CASH (DD/ Online payment), 5% of the contract Value towards Performance Security Deposit, before commencing the contract

(or)

(b) Recovery 5% from Each Running Bill towards Performance security deposit.

(Note: Subcontractor has to choose either Option (a) or (b) before issue of Detailed LOI).

(c) However, Performance Security Deposit on part of PVC will be recovered at the rate of 5% from every running bill towards performance security deposit.

2.22.2 Refund of Performance Security Deposit:

a) 50% of Performance Security Deposit shall be released along with the final bill.

b) Balance 50% will be released after completion of Performance Guarantee Period (i.e., after expiry of Guarantee period), provided all the defects noticed during the guarantee period have been rectified to the satisfaction of BHEL Site Engineer/ BHEL Construction Manager, and after deducting all expenses/ other amounts due to BHEL under the contract/ other contracts entered into by BHEL with them. This portion of Performance Security Deposit, amount can be released on commencement of the Guarantee Period, on submission of equivalent Bank Guarantee.

Sl. No.: 15

The chapter Reverse auction procedure published in 'Forms and Procedures' of Volume I Book-II stands deleted. Reverse Auction Guidelines available in the website http://www.bhel.com shall be applicable.

Sl. No.: 16

Existing format on Monthly Plan & Review with Contractor, as available in Form No F-14 of Volume ID Forms and procedure stands Deleted. Form No.- F-14 (Rev 01) is enclosed.

Sl. No.: 17

Existing format on Monthly Performance Evaluation of Contractor, as available in Form No F-15 of Volume ID Forms and procedure stands Deleted. Form No.- F-15 (Rev 02) is enclosed.

Sl. No.: 18

Existing format for Integrity Pact, as available in Volume ID Forms and procedure stands Deleted. Revised Format is enclosed as Chapter 9 of TCC (Volume-1 Book-1).

CHAPTER 2 to 10

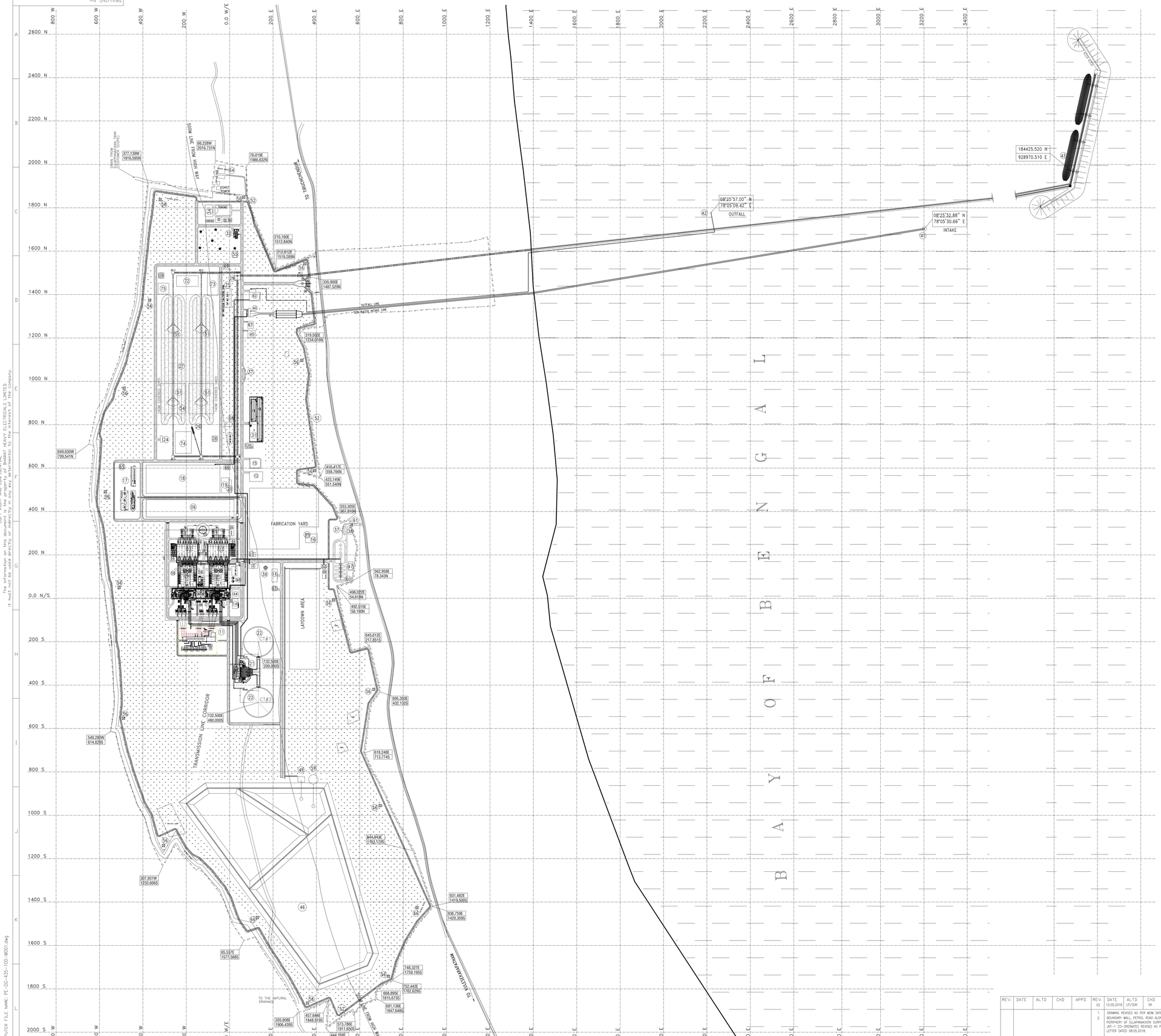
In next 1373 pages as below

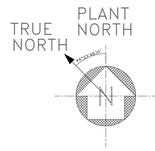
Plot plan	01 pages
Bore log data	160 pages
Technical Specifications	1099 pages
Integrity pact	05 pages
Revised forms – Form 14 and Form 15	15 pages
Procedure 2.3 of Arbitration & Conciliation	10 pages
Health, Safety and Environment Plan for Site Operation By Subcontractors" (Doc. No. HSEP:14 Rev 00),	72 pages
Hire charges on issue of capital tools & Plants (Only corresponding charges)	08 pages
Proforma of Bank Guarantee for Earnest Money	03 pages

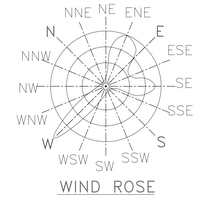
DRAWING No. PE-DG-435-100-M001

FIRST ANGLE PROJECTION | ALL DIMENSIONS ARE IN MM

CUSTOMER'S DRAWING No.







NOTES:–

1. ALL DIMENSIONS ARE IN MM & LEVELS IN METERS.
2. ALL COORDINATES ARE IN METRES UNLESS OTHERWISE SPECIFIED.
3. EL 0.0M CORRESPONDS TO RL(+)3.80M WHICH IS FINISHED FLOOR LEVEL (FFL) OF TG BUILDING.
4. FGL OF BOP AREA SHALL BE RL(+)3.3M.
5. LOCATION/SIZE OF BOP FACILITIES IS TENTATIVE ONLY.
6. CO-ORDINATE SYSTEM AS PER SURVEY DRAWING (REV-5 DATED 09.05.18):–

CO-ORDINATES	MCP-1	SCP-1	PLANT 0,0 AS PER SURVEY	CONSTRUCTION 0,0 (GRID A1)
EAST	363.531	412.087	0.00	(–)26.8132
NORTH	1724.658	1445.005	0.00	149.9623

LEGENDS:–

	PLANT PROPERTY LINE
	PLANT BOUNDARY WALL (COMPOUND WALL)
SHOULDER LINE PAVEMENT LINE	ROADS (DOUBLE LANE)
	ROADS (SINGLE LANE)
	GREEN BELT
	PIPE RACK
	SEA WATER
	PIPE SLEEPER

REFERENCE DRAWING:–

1. CUSTOMER PLOT No. : 00–1115112–G–001
1. SURVEY DWG. No. : SUV/2018/4115/Features & Spot level

LIST OF BUILDINGS/FACILITIES:–

Nos.	DESCRIPTION
01	POWER HOUSE BUILDING
02	STEAM GENERATOR
03	ELECTROSTATIC PRECIPITATOR
04	ESP ELECTRICAL BUILDING
05	CHIMNEY
06	FGD AREA
07	TRANSFORMER AREA
08	EMERGENCY DG BUILDING
09	ASH CONVEYING AIR COMPRESSOR HOUSE
10	AHS SEA WATER TANK AND BA SLURRY PUMP HOUSE
11	GIS SWITCH YARD AREA
12	ETP
13	WORKSHOP
14	COMPRESSOR HOUSE
15	STP
16	HYDROGEN GENERATION CUM STORAGE PLANT
17	FUEL OIL AREA
18	DESAL & DM PLANT
19	DESALINATED WATER STORAGE TANK
20	DESALINATED WATER PUMP HOUSE
21	CW PUMP HOUSE
22	NATURAL DRAFT COOLING TOWER
23	AUXILARY BOILER
24	BULDOZER SHED AND REPAIR SHOP
25	COAL HANDLING MCC & CONTROL ROOM
26	EMERGENCY RECLAIMING HOPPER
27	COAL STORAGE AREA
28	COAL RUNOFF POND
29	CRUSHER HOUSE
30	AHP MCC BUILDING
31	PERMANENT STORES
32	FIRE STATION
33	CANTEEN & DORMITORY
34	ADMIN. BUILDING
35	GAS CYLINDER SHED
36	MAIN GATE AND SECURITY OFFICE
37	WEIGH BRIDGE
38	GUARD HOUSE
39	SERVICE & POTABLE WATER OVERHEAD STORAGE TANK
40	SEA WATER INTAKE PUMP HOUSE
41	SEA WATER INTAKE
42	SEA WATER OUTFALL
43	COAL JETTY
44	SERVICE BUILDING
45	ELETRO CHLORINATION BUILDING
46	ASH POND
47	SILO UTILITY BUILDING
48	CONDENSATE STORAGE TANK
49	ASH WATER RECOVERY PUMP HOUSE
50	FLY ASH SLURRY PUMP HOUSE
51	STACKER CUM RECLAIMER
52	COMPOUND WALL
53	DISPENSERY
54	COVERED STOCK PILE
55	CANTEEN
56	WATCH TOWER
57	POST OFFICE & BANK
58	MILL REJECT SILO
59	CLARIFOCULATTOR NEAR ASH DYKE
60	FLY ASH SILO
61	MATERIAL GATE
62	SEA WATER OUTFALL STORAGE TANK AND PUMPHOUSE
63	CHEMICAL LAB
64	EXISTING 110Kv SUBSTATION
65	DIESEL BUNK
66	CPU REGENERATION
67	BRINE WATER TANK & HORIZONTAL PUMP
68	DUST SUPPRESSION PUMP HOUSE+OVERHEAD TANK
69	COMPRESSOR HOUSE FOR DE SYSTEM
70	BUFFER HOPPER TOWER
71	VACCUM PUMP HOUSE UNIT 1 & 2
72	STORAGE YARD FOR STACKER RECLAIMER–1 (SIZE 50MX100M)
73	STORAGE YARD FOR STACKER RECLAIMER–2 (SIZE 50MX100M)
74	STORAGE YARD FOR CHP (SIZE 75MX100M)
75	CHP UTILITY BUILDING

REV.	DATE	ALTD	CHD	APPD

REV.	DATE	ALTD	CHD	APPD
02	10.05.2018	LP/SDK	SK	JJ

1. DRAWING REVISED AS PER MOM DATED 27.4.18, BOUNDARY WALL, PETROL ROAD ALONG WESTERN PERIPHERY OF ELLAPPANACKEN SURPLUS ROUTE & JNT–1 CO–ORDINATES REVISED AS PER CUSTOMER LETTER DATED 08.05.2018.
2.

REV.	DATE	ALTD	CHD	APPD
01	13.04.18	LP SG/–	SK SG/–	JJ SG/–

1. DRAWING REVISED AS PER CUSTOMER'S COMMENT.

JOB NO. 435
STATUS CONTRACT
DISTRIBUTION

PROJECT: 2X660 MW UDANGUDI SUPERCRITICAL TPS, STAGE–I

CUSTOMER: TAMILNADU GENERATION AND DISTRIBUTION CORPORATION LIMITED (TANGEDCO)

CONSULTANT: DESEIN PRIVATE LIMITED
DESEIN HOUSE, NEW DELHI

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA

DEPT CODE	NAME	SIGN	DATE
DRN	SDK	SG/–	19.02.2018
M DESN	LP	SG/–	19.02.2018
CHD	SK	SG/–	19.02.2018
APPD	JJ	SG/–	19.02.2018

TITLE: PLOT PLAN

DEPT. SCALE 1:6000 DRAWING NO. PE–DG–435–100–M001
SIGN
SHEET 1 1 OF REV. 02

SIZE–A0

COMPUTER FILE NAME: PE–DG–435–100–M001.dwg

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 07/03/2018	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. 1

Co-ordinates E=-209 N=1891

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	7
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	1

Commencement Date : 02/03/2018
Completion Date : 03/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 0.750 M.
Water Struck At :
Standing Water Level : 0.95 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Soft, light grey, clayey silt with kankar & conch.		1 1 1 — 2	DS-1 WS-1 SPT-1	0.50 0.95 1.00-1.45
			*UDS-1	2.00-2.45
2.80m.				
Medium dense, light grey, sandy silt / silty sand. Observed kankar & conch.		4 5 6 — 11	SPT-2	3.00-3.45
3.90m.				
Very dense, light grey, silty sand with decomposed rock.		53 47 — >100 5.0 cm Pentn. 100 4.0 cm Pentn. Refusa	*UDS-2 SPT-3 *SPT-4	4.00-4.15 4.25-4.45 4.60-4.64
4.75m.		100 — Refusal 2.0 cm Penth.	*SPT-5	4.75-4.77 4.75
Highly weathered, light to blackish grey, coarse grained, medium to highly fractured rock.		NX rotary drilling from 4.75m to 15.00m	R1 R2	CR=27% RQD=Nil 5.50 CR=34% RQD=28% 6.25
6.25m.				
Completely to highly weathered, light to blackish grey, coarse grained, medium to highly fractured rock.		Refusal 52 3.0 cm Penth.	R3 *SPT-6 R4 R5 R6 R7 *SPT-7 R8	CR=18% RQD=Nil 7.00-7.03 7.00 CR=21% RQD=20% 7.75 CR=23% RQD=Nil 8.50 CR=25% RQD=Nil 9.25 CR=14% RQD=Nil 10.00-10.02 10.00 CR=22% RQD=Nil
10.75m.				10.75
Highly weathered, whitish grey, fine to coarse grained, highly fractured rock.			R9 R10 R11	CR=26% RQD=Nil 11.50 CR=36% RQD=Nil 12.25 CR=28% RQD=Nil
13.00m.				13.00
Highly weathered, light brownish grey, fine grained, fractured rock.			R12	CR=39% RQD=24%
13.75m.				13.75
Moderately weathered, light grey, fine grained, highly fractured rock. N.B. - '*' means sample could not be recovered / sample slip. 15.00m.			R13 R14	CR=42% RQD=Nil 14.50 CR=44% RQD=Nil 15.00

BH-1/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 07/03/2018	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. 2

Co-ordinates E=−54 N=1784

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	8	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	8
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 28/02/2018
Completion Date : 02/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 0.578 M.
Water Struck At :
Standing Water Level : 0.60 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Very soft, light grey, clayey silt with high % of sand mixture.		1 0 1 (1)	DS−1	0.50
			SPT−1	1.00−1.45
			*UDS−1	2.00−2.45
2.90m.		18 24 36 (60)	SPT−2	3.00−3.45
Very dense, light grey, silty sand. Observed decomposed rock.		44 66 (>100) 7.0 cm Pentn.	*UDS−2	4.00−4.05
			SPT−3	4.10−4.32
		100 3.0 cm Pentn. Refusal	*SPT−4	4.40−4.43
4.50m.		100 Refusal 4.0 cm Pentn.	*SPT−5	4.50−4.54 4.50
Highly weathered, light grey, coarse grained, moderately fractured rock.		NX rotary drilling from 4.50m to 15.00m	R1	CR=21% RQD=Nil 5.25
5.25m.			R2	CR=32% RQD=Nil 6.00
Highly weathered, light grey, coarse grained, moderately fractured rock.			R3	CR=35% RQD=Nil 6.75
			R4	CR=29% RQD=Nil 7.50
7.50m.			R5	CR=21% RQD=Nil 8.25
Highly weathered, light grey, coarse grained, moderately fractured rock.			R6	CR=13% RQD=Nil
8.25m.		50 Refusal 4.0 cm Pentn.	*SPT−6	9.00−9.04 9.00
Completely weathered, light grey, coarse grained, highly fractured rock			R7	CR=15% RQD=Nil
		52 Refusal 3.0 cm Pentn.	*SPT−7	9.75−9.78 9.75
			R8	CR=11% RQD=Nil
10.50m.		54 Refusal 2.0 cm Pentn.	*SPT−8	10.50−10.52 10.50
Slightly weathered, whitish grey, fine grained, fractured rock.			R9	CR=73% RQD=34% 11.25
			R10	CR=71% RQD=23% 12.00
12.00m.			R11	CR=31% RQD=Nil 12.75
Highly weathered, light brownish grey, medium grained, highly fractured rock.			R12	CR=23% RQD=Nil 13.50
12.75m.			R13	CR=22% RQD=Nil 14.25
Highly weathered, light brownish grey, medium grained, highly fractured rock.			R14	CR=22% RQD=Nil 15.05
N.B. − '*' means sample could not be recovered.				
15.05m.				

BH−2/Sheet−1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 17/04/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. 3

Co-ordinates E=105 N=1820

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	2
		Water Sample (WS)	0

Commencement Date : 03/04/2018
Completion Date : 04/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.884 M.
Water Struck At :
Standing Water Level : 2.25 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Medium, light grey, clayey silt / silty clay. Observed conch.			DS-1	0.50
1.00m.		3 5 7 (12)	SPT-1	1.00-1.45
			UDS-1	2.05-2.50
Loose, light whitish grey, clayey silty sand / silty sand. Observed conch pcs.		2 2 3 (5)	SPT-2	2.50-2.95
			DS-2	3.50
		3 4 6 (10)	SPT-3	4.00-4.45
5.00m.				
Very dense, light whitish grey, silty sand with decomposed rock.		62 (>100) 8.0 cm Pentn. 100 2.0 cm Pentn. Refusal	*UDS-2	5.00-5.30
			SPT-4	5.40-5.48
			*SPT-5	5.60-5.62
5.75m.		00 Refusal	*SPT-6	5.75-5.77
		2.0 cm Pentn.	R1	CR=27% RQD=Nil 6.50
		NX rotary drilling from 5.75m to 15.00m	R2	CR=29% RQD=Nil 7.25
			R3	CR=28% RQD=Nil 8.00
			R4	CR=31% RQD=Nil 8.75
Highly weathered, light grey, coarse grained, fractured rock.			R5	CR=27% RQD=Nil 9.50
			R6	CR=33% RQD=Nil 10.25
			R7	CR=29% RQD=Nil 11.00
			R8	CR=30% RQD=Nil 11.75
11.75m.			R9	CR=35% RQD=Nil 12.50
Highly to moderately weathered, light whitish grey, medium grained, fractured rock.			R10	CR=36% RQD=Nil 13.25
			R11	CR=38% RQD=Nil 14.00
N.B. - '*' means sample could not be recovered / sample slip. 15.00m.			R12	CR=42% RQD=Nil 15.00

BH-3/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 15/03/2018	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. 4

Co-ordinates E=−183 N=1702

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	7
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 04/03/2018
Completion Date : 05/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 0.793 m.
Water Struck At :
Standing Water Level : 1.18 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Very soft, light grey, clayey silt with conch pcs. & sand mixture.		1 0 1 (1)	DS−1	0.50
			SPT−1	1.00−1.45
			*UDS−1	2.00−2.45
		1 1 1 (2)	SPT−2	2.60−3.05
			*UDS−2	3.50−3.95
4.00m.				
Very dense, light grey, sandy silt with decomposed rock.		14 30 56 ≥100 10.0 cm Pentn.	SPT−3	4.15−4.55
		100 5.0 cm Pentn. Refusal	*SPT−4	4.70−4.75
4.80m.		100 Refusal	*SPT−5	4.80−4.82 4.80
		2.0 cm Pentn.	R1	CR=37% RQD=Nil 5.55
		NX rotary drilling from 4.80m to 15.00m	R2	CR=26% RQD=Nil 6.30
Highly weathered, light grey, medium to coarse grained, moderately fractured rock.			R3	CR=29% RQD=16% 7.05
			R4	CR=31% RQD=14% 7.80
			R5	CR=29% RQD=Nil 8.55
8.55m.				
Completely weathered, light grey, coarse grained, highly fractured rock.		50 Refusal	R6	CR=8% RQD=Nil
		3.0 cm Pentn.	*SPT−6	9.30−9.33 9.30
		Refusal	R7	CR=10% RQD=Nil
10.05m.				
Moderately weathered, light brownish grey, fine grained, moderately fractured rock.		52 4.0 cm Pentn.	*SPT−7	10.05−10.09 10.05
			R8	CR=48% RQD=Nil 10.80
10.80m.				
Slightly weathered, light brownish grey, fine grained, moderately to highly fractured rock.			R9	CR=66% RQD=Nil 11.55
			R10	CR=61% RQD=26% 12.30
12.30m.				
			R11	CR=43% RQD=Nil 13.05
Moderately weathered, light brownish grey, fine grained, moderately to highly fractured rock.			R12	CR=51% RQD=Nil 13.80
			R13	CR=47% RQD=Nil 14.55
N.B. − '*' means sample could not be recovered.			R14	CR=51% RQD=Nil 15.00
15.00m.				

BH−4/Sheet−1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 06/04/2018	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. 5

Co-ordinates E=−190 N=1626

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	7
Vane (V)		Disturbed (DS)	2
		Water Sample (WS)	0

Commencement Date : 31/03/2018
Completion Date : 01/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 2.218 M.
Water Struck At :
Standing Water Level : 2.35 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
			DS−1	0.50
		6		
		2 3 3	SPT−1	1.00−1.45
Soft/medium, light whitish grey, clayey silt. Observed conch pcs.				
			UDS−1	2.05−2.50
		3		
		1 1 2	SPT−2	2.50−2.95
			DS−2	3.50
4.00m.				
		6		
		2 3 3	SPT−3	4.00−4.45
Loose to medium dense, light whitish grey, clayey silty sand. Observed conch pcs.				
			*UDS−2	5.00−5.45
		22		
		5 9 13	SPT−4	5.60−6.05
6.20m.		70 10.0 cm Pentn. >100	SPT−5	6.20−6.30
Very dense, light whitish grey, silty sand with decomposed rock.		100 2.0 cm Pentn. Refusal	*SPT−6	6.40−6.42
6.50m.		100 Refusal	*SPT−7	6.50−6.52
		2.0 cm Pentn.	R1	CR=30% RQD=Nil
		NX rotary drilling from 6.50m to 15.00m		6.50 / 7.25
			R2	CR=27% RQD=Nil
Highly weathered, light grey, coarse to medium grained, fractured rock.				8.00
			R3	CR=29% RQD=Nil
				8.75
			R4	CR=28% RQD=Nil
9.50m.				9.50
			R5	CR=25% RQD=Nil
Highly weathered, light grey, coarse to medium grained, fractured rock.				10.25
			R6	CR=25% RQD=Nil
11.00m.				11.00
			R7	CR=45% RQD=Nil
Moderately weathered, light whitish grey with pink spots, medium grained, fractured rock.				11.75
			R8	CR=47% RQD=Nil
12.50m.				12.50
			R9	CR=56% RQD=Nil
				13.25
Moderately weathered, light whitish grey with pink spots, medium grained, fractured rock.			R10	CR=54% RQD=Nil
				14.00
N.B. − '*' means sample could not be recovered / sample slip.			R11	CR=55% RQD=Nil
15.00m.				15.00

BH−5/Sheet−1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 06/04/2018	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. 6

Co-ordinates E=-263 N=1614

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	8	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	8
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 30/03/2018
Completion Date : 30/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 0.925 M.
Water Struck At :
Standing Water Level : 1.55 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Soft, light grey, silty clay. Observed kankar & mica.		1 1 2 — 3	DS-1	0.50
			SPT-1	1.00-1.45
2.00m.				
Loose to medium dense, light to brownish grey, silty sand. Observed conch pcs. & clay binder.		1 2 3 — 5	UDS-1	2.00-2.45
			SPT-2	2.55-3.00
			*UDS-2	3.50-3.95
		3 4 7 — 11	SPT-3	4.00-4.45
4.50m.				
Very dense, brownish grey, silty sand with kankar, mica & conch pcs. Observed decomposed rock.		15 35/5.0 cm Pentn. — >100	SPT-4	4.60-4.95
		100/4.0 cm Pentn. Refusal	*SPT-5	5.00-5.04
5.10m.		100/3.0 cm Pentn. Refusal	*SPT-6	5.10-5.13 5.10
			R1	CR=18% RQD=Nil
Completely to highly weathered, brownish grey, medium to coarse grained, highly fractured rock.		52/2.0 cm Penth. — Refusal	*SPT-7	5.75-5.77 5.75
			R2	CR=18% RQD=Nil
		Refusal	*SPT-8	6.50-6.53 6.50
		53/3.0 cm Penth.	R3	CR=24% RQD=Nil
7.25m.				7.25
Highly weathered, brownish grey, coarse grained, highly fractured rock.		NX rotary drilling from 5.10m to 15.00m	R4	CR=26% RQD=Nil
8.00m.				8.00
			R5	CR=26% RQD=Nil
				8.75
Highly weathered, light to brownish grey, medium to fine grained, highly fractured rock.			R6	CR=29% RQD=Nil
				9.50
			R7	CR=39% RQD=16%
				10.25
			R8	CR=37% RQD=32%
11.00m.				11.00
Highly weathered, light grey, medium grained, highly fractured rock.			R9	CR=26% RQD=23%
11.75m.				11.75
Highly weathered, light to brownish grey, medium to fine grained, highly fractured rock.			R10	CR=25% RQD=Nil
12.50m.				12.50
			R11	CR=26% RQD=Nil
				13.25
Highly weathered, light to brownish grey, medium to fine grained, highly fractured rock.			R12	CR=29% RQD=Nil
				14.00
			R13	CR=25% RQD=Nil
N.B. - '*' means sample could not be recovered / sample slip. 15.00m.				15.00

BH-6/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.				CETEST
Job No : 4115	Created by : SKD	Created on : 15/03/2018	Sheet No:	

BORE LOG DATA SHEET

BORE HOLE NO. 7 | Co-ordinates E=−407 N=1564

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	8	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	8
		Disturbed (DS)	2
Vane (V)		Water Sample (WS)	0

Commencement Date : 05/03/2018
Completion Date : 06/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 0.784 M.
Water Struck At :
Standing Water Level : 0.82 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Very soft to soft, light grey, clayey silt with conch. Obs. sand mixture.		1 0 1 (1)	DS−1	0.50
			SPT−1	1.00−1.45
			*UDS−1	2.00−2.45
		1 1 1 (2)	SPT−2	2.55−3.00
3.30m.				
Very dense, light grey, sandy silt / silty sand. Observed kankar & rock pcs.		15 28 57, >100 (11.0 cm Pentn.)	*UDS−2	3.50−3.70
		100 3.0 cm Pentn. Refusal	SPT−3	3.90−4.31
			*SPT−4	4.40−4.43
4.50m.		Refusal	*SPT−5	4.50−4.52 4.50
Moderately weathered, deep grey, medium grained, highly fractured rock.		100 2.0 cm Pentn.	R1	CR=42% RQD=Nil 5.25
5.25m.		NX rotary drilling from 4.50m to 15.00m	R2	CR=45% RQD=Nil 6.00
Moderately weathered, light grey, coarse grained, fractured rock.			R3	CR=38% RQD=Nil 6.75
6.00m.				
Highly weathered, deep grey, fine grained, highly fractured rock.			R4	CR=15% RQD=Nil
6.75m.		Refusal		
Completely to highly weathered, light grey, coarse grained, moderately fractured rock.		51 3.0 cm Pentn.	*SPT−6	7.50−7.53 7.50
			R5	CR=27% RQD=Nil 8.25
			R6	CR=22% RQD=Nil 9.00
9.00m.				
Highly weathered, light grey, coarse grained, moderately fractured rock.			R7	CR=28% RQD=Nil 9.75
			R8	CR=36% RQD=Nil 10.50
10.50m.				
Highly/moderately weathered, light brownish grey, fine grained, moderately fractured rock.			R9	CR=44% RQD=21% 11.25
			R10	CR=34% RQD=18% 12.00
			R11	CR=29% RQD=Nil 12.75
12.75m.				
Completely weathered, light brownish grey, fine grained, moderately fractured rock.			R12	CR=7% RQD=Nil
13.50m.		50 Refusal	*SPT−7	13.50−13.54 13.50
Completely weathered, light grey, fully decomposed rock.		4.0 cm Pentn.	R13	CR=Nil RQD=Nil
14.25m.		52 Refusal	DS−2	
Highly weathered, light grey, fine grained, highly fractured rock.		3.0 cm Pentn.	*SPT−8	14.25−14.28 14.25
15.00m.			R14	CR=24% RQD=Nil 15.00

N.B. − '*' means sample could not be recovered / sample slip.

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.				CETEST
Job No : 4115	Created by : SKD	Created on : 12/03/2018	Sheet No:	

BORE LOG DATA SHEET

BORE HOLE NO. 8

Co-ordinates E=388 N=1462

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 28/02/2018
Completion Date : 02/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.893 M.
Water Struck At :
Standing Water Level : 1.60 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Very stiff, light grey, clayey silt. Observed mica & conch pcs.		5 10 11 (21)	DS-1	0.50
			SPT-1	1.00-1.45
			*UDS-1	2.00-2.45
2.50m.				
Soft, light grey, clayey silt. Observed conch pcs. & sand mixture.		2 2 2 (4)	SPT-2	3.00-3.45
3.60m.				
Medium dense, light grey, silty sand. Observed kankar & conch pcs.		3 4 9 (13)	UDS-2	4.00-4.45
			SPT-3	4.50-4.95
5.00m.				
Very dense, light grey, silty sand. Observed kankar & conch pcs.		100 (>100) 13.0 cm Pentn.	SPT-4	5.30-5.43
		100 2.0 cm Pentn. Refusal	*SPT-5	5.50-5.52
5.70m.		100 3.0 cm Pentn.	*SPT-6	5.70-5.73
Highly to moderately weathered, light to blackish grey, medium grained, partly fractured rock.		NX rotary drilling from 5.70m to 15.00m	R1	CR=34% RQD=Nil (5.70-6.20)
			R2	CR=42% RQD=40% (6.20-6.95)
6.95m.				
Completely/highly weathered, light to blackish grey, medium grained, partly fractured rock.			R3	CR=22% RQD=Nil (6.95-7.70)
			R4	CR=20% RQD=Nil (7.70-8.50)
8.50m.				
Highly weathered, light to blackish grey, medium grained, partly fractured rock.			R5	CR=29% RQD=Nil (8.50-9.25)
			R6	CR=40% RQD=Nil (9.25-10.00)
10.00m.				
Highly to moderately weathered, brownish grey to greyish brown, medium grained, moderately fractured rock.			R7	CR=44% RQD=21% (10.00-10.75)
			R8	CR=46% RQD=23% (10.75-11.50)
			R9	CR=34% RQD=Nil (11.50-12.25)
12.25m.				
Highly weathered, whitish grey to light grey, fine grained rock.			R10	CR=38% RQD=Nil (12.25-13.00)
			R11	CR=27% RQD=Nil (13.00-13.75)
			R12	CR=38% RQD=25% (13.75-14.50)
14.50m.				
Moderately weathered, light grey, fine grained rock.			R13	CR=58% RQD=55% (14.50-15.00)
15.00m.				

N.B. - '*' means sample could not be recovered / sample slip.

BH-8/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 26/03/2018	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. 9

Co-ordinates E=116 N=1395

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	7
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 16/03/2018
Completion Date : 17/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.858 M.
Water Struck At :
Standing Water Level : 0.82 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium, light grey, clayey silt with sand mixture. Observed conch.		2 2 3 — 5	DS-1	0.50
1.45m.			SPT-1	1.00-1.45
Soft, light grey, clayey silt with sand mixture. Observed conch.		1 1 2 — 3	*UDS-1	2.00-2.45
			SPT-2	2.60-3.05
4.00m.			*UDS-2	3.50-3.95
Medium dense, light grey, silty sand. Observed kankar & conch.		6 8 15 — 23	SPT-3	4.15-4.60
			*UDS-3	5.00-5.45
		8 8 9 — 17	SPT-4	5.60-6.05
6.10m.		34 66 4.0 cm Pentn. >100	SPT-5	6.20-6.45
Very dense, light grey, silty sand with rock pcs.		100 2.0 cm Pentn. Refusa	*SPT-6	6.55-6.57
6.65m.		Refusal	*SPT-7	6.65-6.68
		100 3.0 cm Pentn.	R1	CR=27% RQD=Nil 6.65-7.50
		NX rotary drilling from 6.65m to 15.00m	R2	CR=24% RQD=Nil 7.50-8.25
			R3	CR=31% RQD=Nil 8.25-9.00
Highly weathered, light grey, medium to coarse grained, moderately fractured rock.			R4	CR=33% RQD=Nil 9.00-9.75
			R5	CR=39% RQD=21% 9.75-10.50
			R6	CR=28% RQD=Nil 10.50-11.25
12.00m.			R7	CR=33% RQD=19% 11.25-12.00
Highly weathered, light brownish grey, fine grained, moderately fractured rock.			R8	CR=36% RQD=Nil 12.00-12.75
13.50m.			R9	CR=38% RQD=Nil 12.75-13.50
Highly/moderately weathered, light grey, coarse grained, highly fractured rock.			R10	CR=49% RQD=Nil 13.50-14.25
15.00m.			R11	CR=36% RQD=Nil 14.25-15.00

N.B. – '*' means sample could not be recovered.

BH-9/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 26/03/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. 10

Co-ordinates E=93 N=1330

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 17/03/2018
Completion Date : 20/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.712 M.
Water Struck At :
Standing Water Level : 1.60 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Very stiff, clayey silt with sand mixture. Observed conch pcs.		15 20 9 (29)	DS-1	0.50
			SPT-1	1.00-1.45
2.00m. Very loose, light grey, silty sand. Observed kankar & conch.		1 1 2 (3)	*UDS-1	2.00-2.45
			SPT-2	2.60-3.05
3.95m. Loose to medium dense, light grey, silty sand. Observed kankar & conch.		1 2 4 (6)	*UDS-2	3.50-3.95
			SPT-3	4.10-4.55
4.60m. Very dense, light grey, silty sand with rock pcs.		21 36 43 >100 9.0 cm Pentn.	SPT-4	4.80-5.19
		100 2.0 cm Pentn. Refusal	*SPT-5	5.30-5.32
5.40m. Highly weathered, light grey, medium to coarse grained, highly fractured rock.		00 2.0 cm Pentn. Refusal	*SPT-6	5.40-5.42
		NX rotary drilling from 5.40m to 20.00m	R1	CR=21% RQD=Nil
7.00m. Highly weathered, light grey, coarse grained, moderately fractured rock.			R2	CR=23% RQD=Nil
			R3	CR=24% RQD=Nil
8.50m.			R4	CR=21% RQD=Nil
Highly weathered, light grey, coarse grained, moderately fractured rock.			R5	CR=26% RQD=Nil
			R6	CR=27% RQD=Nil
			R7	CR=25% RQD=Nil
11.50m. Highly weathered, light grey, fine to coarse grained, highly fractured rock.			R8	CR=24% RQD=Nil
12.25m.			R9	CR=29% RQD=Nil
			R10	CR=52% RQD=20%
Highly to moderately weathered, light grey, fine to medium grained, highly to moderately fractured rock.			R11	CR=44% RQD=15%
			R12	CR=39% RQD=Nil
			R13	CR=37% RQD=Nil
			R14	CR=43% RQD=Nil
			R15	CR=40% RQD=Nil
			R16	CR=45% RQD=Nil
			R17	CR=44% RQD=Nil
18.25m.			R18	CR=28% RQD=Nil
Highly weathered, light grey, fine grained, highly fractured rock.			R19	CR=26% RQD=Nil
N.B. - '*' means sample could not be recovered / sample slip. 20.00m.				

6.25 7.00 7.75 8.50 9.25 10.00 10.75 11.50 12.25 13.00 13.75 14.50 15.25 16.00 16.75 17.50 18.25 19.00 20.00

BH-10/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kalla...			GEOTEST
Job No : 4115	Created by : SKD	Created on : 31/03/2018	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. 11

Co-ordinates E=276 N=1327

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	9	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	9
Vane (V)		Disturbed (DS)	2
		Water Sample (WS)	1

Commencement Date : 23/03/2018
Completion Date : 25/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.886 M.
Water Struck At :
Standing Water Level : 0.82 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Loose / medium dense, light whitish grey, silty sand. Observed conch pcs.		3 5 8 — 13	DS-1	0.50
			WS-1	0.82
			SPT-1	1.00-1.45
			*UDS-1	2.00-2.45
		1 2 2 — 4	SPT-2	2.50-2.95
			DS-2	3.50
4.00m.		100 10.0 cm Pentn. — >100	SPT-3	4.00-4.10
Very dense, light whitish grey, silty sand with decomposed rock. Observed conch pcs.		100 2.0 cm Pentn. Refusal	*SPT-4	4.20-4.22
		100 2.0 cm Pentn. Refusal	*SPT-5	4.50-4.52
4.75m.		100 2.0 cm Pentn. — Refusal	*SPT-6	4.75-4.77 4.75
			R1	CR=28% RQD=Nil 5.50
		NX rotary drilling from 4.75m to 15.00m	R2	CR=30% RQD=Nil 6.25
			R3	CR=36% RQD=24% 7.00
Highly weathered, light grey, coarse to medium grained, fractured rock.			R4	CR=35% RQD=Nil 7.75
			R5	CR=35% RQD=Nil 8.50
			R6	CR=37% RQD=Nil 9.25
9.25m.			R7	CR=18% RQD=Nil
		50 2.0 cm Pentn. — Refusal	*SPT-7	10.00-10.02 10.00
Completely/highly weathered, light grey, coarse to medium grained, fractured rock.			R8	CR=20% RQD=Nil
		53 2.0 cm Pentn. — Refusal	*SPT-8	10.75-10.77 10.75
			R9	CR=24% RQD=Nil 11.50
			R10	CR=20% RQD=Nil
12.25m.		55 2.0 cm Pentn. — Refusal	*SPT-9	12.25-12.27 12.25
			R11	CR=32% RQD=Nil 13.00
Highly weathered, light whitish grey, medium grained, fractured rock.			R12	CR=25% RQD=Nil 13.75
			R13	CR=26% RQD=Nil 14.50
N.B. - '*' means sample could not be recovered / sample slip.			R14	CR=40% RQD=Nil
15.00m.				15.00

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kalla...			GEOTEST
Job No : 4115	Created by : SKD	Created on : 26/03/2018	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. 12

Co-ordinates E=97 N=1276

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	8	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	8
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 16/03/2018
Completion Date : 17/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.104 M.
Water Struck At :
Standing Water Level : 1.36 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium, brownish grey, clayey silt. Observed kankar & conch pcs.		1 2 2 (4)	DS-1	0.50
			SPT-1	1.00-1.45
		2 3 5 (8)	*UDS-1	2.00-2.45
			SPT-2	2.55-3.00
3.00m.				
Light grey, silty sand. Observed kankar & conch.		8 12 80 (>100)	UDS-2	3.50-3.95
4.00m.				
Very dense, brownish grey, silty sand. Observed kankar, conch pcs. & decomposed rock.		10.0 cm Pentn.	SPT-3	4.00-4.40
		100 4.0 cm Pentn. Refusal	*SPT-4	4.60-4.64
4.80m.		100 3.0 cm Pentn. Refusal	*SPT-5	4.80-4.83
		50 Refusal	R1	CR=13%/RQD=0
Completely weathered, brownish grey, medium to coarse grained, moderately fractured rock.		2.0 cm Penth.	*SPT-6	5.50-5.52
		Refusal	R2	CR=24%/RQD=0
		55	*SPT-7	6.25-6.27
		2.0 cm Penth.	R3	CR=14%/RQD=0
7.00m.		Refusal	*SPT-8	7.00-7.03
		53	R4	CR=26% RQD=Nil
		3.0 cm Penth.	R5	CR=27% RQD=Nil
		NX rotary drilling from 4.80m to 15.00m	R6	CR=25% RQD=Nil
Highly weathered, brownish grey, medium to coarse grained, moderately farctured rock.			R7	CR=33% RQD=15%
			R8	CR=24% RQD=Nil
			R9	CR=27% RQD=13%
11.50m.			R10	CR=29% RQD=Nil
Highly weathered, whitish grey to brownish grey, medium to fine grained, moderately fractured rock.			R11	CR=36% RQD=Nil
			R12	CR=34% RQD=17%
			R13	CR=36% RQD=Nil
15.00m.			R14	CR=34% RQD=Nil

4.80 5.50 6.25 7.00 7.75 8.50 9.25 10.00 10.75 11.50 12.25 13.00 13.75 14.50 15.00

N.B. – '*' means sample could not be recovered.

BH-12/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 26/03/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. 13

Co-ordinates E=102 N=1230

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 17/03/2018
Completion Date : 18/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.094 M.
Water Struck At :
Standing Water Level : 1.32 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Soft to medium, light grey, clayey silt with kankar, conch & sand mixture.		1 1 2 (3)	DS-1	0.50
			SPT-1	1.00-1.45
2.00m. Very loose, light grey, silty sand. Observed kankar & conch.		1 0 2 (2)	*UDS-1	2.00-2.45
			SPT-2	2.55-3.00
3.50m. Very dense, brownish grey, medium grained, silty sand with mica & conch pcs. Observed decomposed rock.		15 26 59 >100 (10.0 cm Pentn.)	*UDS-2	3.50-3.60
			SPT-3	4.00-4.40
		100 10.0 cm Pentn. >100	SPT-4	4.70-4.80
5.00m.		100 Refusal 2.0 cm Pentn.	*SPT-5	5.00-5.02
			R1	CR=13%/RQD=0
Completely to highly weathered, brownish grey, medium to coarse grained, moderately fractured rock.		52 Refusal 2.0 cm Pentn.	*SPT-6	5.75-5.77
		NX rotary drilling from 5.00m to 15.00m	R2	CR=24% RQD=Nil
			R3	CR=26% RQD=Nil
			R4	CR=24% RQD=Nil
8.00m.			R5	CR=25% RQD=Nil
Highly weathered, brownish grey, medium to fine grained, moderately fractured rock.			R6	CR=25% RQD=Nil
			R7	CR=26% RQD=Nil
			R8	CR=23% RQD=Nil
			R9	CR=22% RQD=Nil
12.50m.			R10	CR=24% RQD=Nil
Highly weathered, brownish grey, medium to fine grained, moderately fractured rock.			R11	CR=28% RQD=Nil
			R12	CR=26% RQD=Nil
15.00m.			R13	CR=28% RQD=Nil

5.00 6.50 7.25 8.00 8.75 9.50 10.25 11.00 11.75 12.50 13.25 14.00 15.00

N.B. – '*' means sample could not be recovered / sample slip.

BH-13/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 26/03/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. 14

Co-ordinates E=116 N=1177

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 18/03/2018
Completion Date : 19/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.093 M.
Water Struck At :
Standing Water Level : 1.20 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Soft, light grey, clayey silt with sand / clayey silty sand. Observed kankar & conch.		2 / 1 0 2	DS-1	0.50
2.00m.			SPT-1	1.00-1.45
Soft to medium brownish grey, clayey silt with sand / clayey silty sand. Observed kankar, conch pcs. & clay binder.		7 / 3 3 4	*UDS-1	2.00-2.45
			SPT-2	2.50-2.95
		11 / 3 5 6	UDS-2	3.50-3.95
4.50m.			SPT-3	4.00-4.45
Very dense, brownish grey, silty sand with conch pcs.		30 70 10.0 cm Pentn. >100 Refusal	SPT-4	4.60-4.85
5.00m.		52 4.0 cm Penetn.	*SPT-5	5.00-5.04
		NX rotary drilling from 5.00m to 15.00m	R1	CR=21% RQD=Nil (5.00-5.75)
Highly weathered, brownish grey, medium to coarse grained, moderately fractured rock.			R2	CR=22% RQD=Nil (5.75-6.50)
			R3	CR=24% RQD=Nil (6.50-7.25)
			R4	CR=26% RQD=Nil (7.25-8.00)
8.00m.			R5	CR=25% RQD=Nil (8.00-8.75)
Highly weathered, brownish grey, medium to fine grained, moderately fractured rock.			R6	CR=22% RQD=Nil (8.75-9.50)
			R7	CR=24% RQD=Nil (9.50-10.25)
10.25m.			R8	CR=29% RQD=Nil (10.25-11.00)
Highly weathered, brownish grey, medium to fine grained, moderately fractured rock.			R9	CR=28% RQD=Nil (11.00-11.75)
11.75m.			R10	CR=22% RQD=Nil (11.75-12.50)
Highly weathered, brownish grey, medium to fine grained, moderately fractured rock.			R11	CR=21% RQD=Nil (12.50-13.25)
13.25m.			R12	CR=34% RQD=Nil (13.25-14.00)
Highly weathered, brownish grey, medium to fine grained, moderately fractured rock.			R13	CR=28% RQD=Nil (14.00-15.00)
15.00m.				

N.B. - '*' means sample could not be recovered / sample slip.

BH-14/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.				CETEST
Job No : 4115	Created by : SKD	Created on : 07/03/2018	Sheet No:	

BORE LOG DATA SHEET

BORE HOLE NO. 15 | Co-ordinates E=332 N=1174

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	10	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	10
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 01/03/2018
Completion Date : 02/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.237 M.
Water Struck At :
Standing Water Level : 0.70 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
			DS-1	0.50
		0		
		0 0 0	SPT-1	1.00-1.45
Very loose, light grey, clayey silty sand. Observed conch pieces.			UDS-1	2.00-2.45
		4		
		0 1 3	SPT-2	3.00-3.45
3.50m.				
Very dense, light grey, silty sand with decomposed rock.		100 >100	SPT-3	3.70-3.82
		12.0 cm Pentn.	*SPT-4	4.00-4.02
4.20m.		100 2.0 cm Pentn. Refusal	*SPT-5	4.20-4.22 4.20
		100 Refusal	R1	CR=13% RQD=Nil
		2.0 cm Pentn.		
		Refusal	*SPT-6	4.95-4.97 4.95
Completely to highly weathered, light grey, coarse grained, moderately fractured rock.		50	R2	CR=9% RQD=Nil
		2.0 cm Pentn.		
		Refusal	*SPT-7	5.70-5.72 5.70
		50	R3	CR=24% RQD=Nil
		2.0 cm Pentn.		6.45
6.45m.		NX rotary drilling from 4.20m to 15.00m	R4	CR=30% RQD=16%
				7.20
Highly weathered, light grey, coarse grained, moderately fractured rock.			R5	CR=28% RQD=Nil
				7.95
7.95m.			R6	CR=13% RQD=Nil
		Refusal		
		50	*SPT-8	8.70-8.73 8.70
		3.0 cm Pentn.	R7	CR=20% RQD=Nil
Completely weathered, light grey, coarse grained, moderately fractured rock.				9.45
			R8	CR=18% RQD=Nil
		Refusal		
		50	*SPT-9	10.20-10.22 10.20
		2.0 cm Pentn.	R9	CR=Nil RQD=Nil
		Refusal		
10.95m.		50	*SPT-10	10.95-10.97 10.95
Highly weathered, whitish grey, fine to coarse grained, moderately fractured rock.		2.0 cm Pentn.	R10	CR=25% RQD=18%
11.70m.				11.70
			R11	CR=46% RQD=24%
				12.45
			R12	CR=31% RQD=30%
Highly to moderately weathered, whitish grey, fine to coarse grained, moderately to highly fractured rock.				13.20
			R13	CR=32% RQD=Nil
				13.95
			R14	CR=39% RQD=Nil
N.B. - '*' means sample could not be recovered / sample slip.			R15	CR=46% 14.70 RQD=Nil 15.00
15.00m.				

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 26/03/2018	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. 16

Co-ordinates E=122 N=1118

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	10	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	10
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 19/03/2018
Completion Date : 20/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.106 m.
Water Struck At :
Standing Water Level : 1.50 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Soft, light grey, clayey silt with sand / clayey silty sand. Observed kankar & conch.		2 1 0 2	DS-1 SPT-1	0.50 1.00-1.45
2.55m.		6	*UDS-1	2.00-2.45
Loose to medium dense, brownish grey, silty sand. Observed kankar, conch pcs. & clay binder.		2 3 3	SPT-2	2.55-3.00
		11	UDS-2	3.50-3.95
		4 5 6	SPT-3	4.00-4.45
4.55m.		45 55 5.0 cm Pentn. >100	SPT-4	4.60-4.80
Very dense, brownish grey, silty sand with mica & conch pcs.		100 4.0 cm Pentn. Refusal	*SPT-5	4.90-4.94
5.00m.		100 3.0 cm Pentn. Refusal	*SPT-6	5.00-5.03 5.00
		Refusal	R1	CR=14%/RQD=0
		50	*SPT-7	5.75-5.78 5.75
		3.0 cm Pentn.	R2	CR=16%/RQD=0
		Refusal	*SPT-8	6.50-6.52 6.50
		50	R3	CR=15%/RQD=0
		2.0 cm Pentn.	*SPT-9	7.25-7.27 7.25
		Refusal	R4	CR=22%/RQD=0
		50		8.00
Completely to highly weathered, brownish grey to light grey, medium to coarse grained, moderately fractured rock.		2.0 cm Pentn.	R5	CR=17%/RQD=0
		Refusal	*SPT-10	8.75-8.78 8.75
		50	R6	CR=24% RQD=Nil
		3.0 cm Pentn.		9.50
		NX rotary drilling from 5.00m to 15.00m	R7	CR=22% RQD=Nil
				10.25
			R8	CR=25% RQD=Nil
11.00m.				11.00
Highly weathered, light grey, coarse grained, moderately fractured rock.			R9	CR=33% RQD=Nil
11.75m.				11.75
			R10	CR=36% RQD=15%
				12.50
			R11	CR=24% RQD=Nil
				13.25
Highly weathered, reddish brown, medium to fine grained, moderately fractured rock.			R12	CR=28% RQD=Nil
				14.00
			R13	CR=33% RQD=Nil
15.00m.				15.00

N.B. – '*' means sample could not be recovered / sample slip.

BH-16/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.				CETEST
Job No : 4115	Created by : SKD	Created on : 26/03/2018	Sheet No:	

BORE LOG DATA SHEET

BORE HOLE NO. 17 | Co-ordinates E=−525 N=1056

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	7
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 07/03/2018
Completion Date : 08/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.490 M.
Water Struck At :
Standing Water Level : 2.60 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Soft, light grey, clayey silt with sand mixture. Observed conch pcs.		2 2 3 (5)	DS-1	0.50
			SPT-1	1.00-1.45
			*UDS-1	2.00-2.45
3.10m. Medium dense, light grey, clayey silty sand Observed kankar & conch.		1 1 1 (2)	SPT-2	2.60-3.05
			*UDS-2	3.50-3.95
		6 6 7 (13)	SPT-3	4.10-4.55
			*UDS-3	5.00-5.45
6.10m. Very dense, light grey, sandy silt / silty sand with rock pcs. Observed kankar.		9 8 9 (17)	SPT-4	5.55-6.00
		100 9.0 cm Penetn. >100 Refusal	*SPT-5	6.40-6.49
		100 5.0 cm Penetn. Refusal	*SPT-6	6.60-6.65
6.70m. Highly weathered, deep grey, medium grained, highly fractured rock.		100 2.0 cm Penetn. Refusal	*SPT-7	6.70-6.72
7.45m. Highly weathered, light grey, coarse grained, medium to highly fractured rock.		NX rotary drilling from 6.70m to 15.00m	R1	CR=31% RQD=Nil 6.70-7.45
			R2	CR=23% RQD=Nil 7.45-8.20
8.95m. Highly weathered, light grey, coarse grained, medium to highly fractured rock.			R3	CR=24% RQD=Nil 8.20-8.95
			R4	CR=33% RQD=Nil 8.95-9.70
			R5	CR=26% RQD=Nil 9.70-10.45
11.20m. Highly weathered, light brownish grey, fine grained, fractured rock.			R6	CR=28% RQD=Nil 10.45-11.20
			R7	CR=26% RQD=Nil 11.20-11.95
13.45m. Highly weathered, light grey, fine grained, highly fractured rock.			R8	CR=39% RQD=31% 11.95-12.70
			R9	CR=36% RQD=Nil 12.70-13.45
14.20m. Highly weathered, light grey, fine grained, highly fractured rock. 15.00m.			R10	CR=24% RQD=Nil 13.45-14.20
			R11	CR=28% RQD=Nil 14.20-15.00

N.B. – '*' means sample could not be recovered / sample slip.

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.			CETEST
Job No : 4115	Created by : SKD	Created on : 07/03/2018	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. 18

Co-ordinates E=363 N=895

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 02/03/2018
Completion Date : 03/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.555 M.
Water Struck At :
Standing Water Level : 1.15 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium dense, light grey, silty sand. Observed mica, conch pcs. & clay binder.		6 6 7 (13)	DS-1	0.50
			SPT-1	1.00-1.45
			*UDS-1	2.00-2.45
2.70m.				
Very loose, light grey, silty sand. Observed conch pcs.		1 1 3 (4)	SPT-2	3.00-3.45
3.60m.				
Light grey, silty sand. Observed mica & conch pcs.			*UDS-2	4.00-4.45
4.80m.				
Very dense, light grey, silty sand. Observed kankar & decomposed rock.		00 (>100) 10.0 cm Pentn.	SPT-3	5.00-5.10
		100 3.0 cm Pentn. Refusa	*SPT-4	5.30-5.33
5.50m.		00 (Refusal) 2.0 cm Pentn.	*SPT-5	5.50-5.52
		NX rotary drilling from 5.50m to 15.00m	R1	CR=48% RQD=Nil (5.50 - 6.00)
Moderately to highly weathered, light to brownish grey, medium grained, fractured rock.			R2	CR=40% RQD=Nil (6.00 - 6.75)
			R3	CR=36% RQD=24% (6.75 - 7.50)
			R4	CR=32% RQD=Nil (7.50 - 8.25)
8.25m.			R5	CR=24% RQD=Nil (8.25 - 9.00)
			R6	CR=23% RQD=Nil (9.00 - 9.75)
			R7	CR=28% RQD=Nil (9.75 - 10.50)
Highly weathered, whitish grey to brownish grey, fine to medium grained, completely fractured rock.			R8	CR=25% RQD=Nil (10.50 - 11.25)
			R9	CR=31% RQD=Nil (11.25 - 12.00)
			R10	CR=22% RQD=Nil (12.00 - 12.75)
			R11	CR=22% RQD=Nil (12.75 - 13.50)
			R12	CR=23% RQD=Nil (13.50 - 14.25)
14.25m.			R13	CR=28% RQD=Nil (14.25 - 15.05)
Highly weathered, brownish grey, medium grained, completely fractured rock. 15.00m.				

N.B. - '*' means sample could not be recovered / sample slip.

BH-18/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 26/03/2018	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. 19

Co-ordinates E=129 N=784

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	7
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 20/03/2018
Completion Date : 21/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.051 M.
Water Struck At :
Standing Water Level : 1.45 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Very loose, light grey, silty sand. Observed kankar & conch.		1 1 1 (2)	DS-1	0.50
			SPT-1	1.00-1.45
2.00m. Loose to medium dense, brownish grey, silty sand. Observed kankar, conch pcs. & clay binder.		2 3 4 (7)	*UDS-1	2.00-2.45
			SPT-2	2.50-2.95
		5 7 9 (16)	UDS-2	3.50-3.95
			SPT-3	4.00-4.45
4.60m. Very dense, brownish grey, medium grained, silty sand with mica & conch pcs. Observed decomposed rock. 5.10m.		45 55 10.0 cm Pentn. >100	SPT-4	4.70-4.95
		100 4.0 cm Pentn. Refusal	*SPT-5	5.00-5.04
		100 3.0 cm Pentn. Refusal	*SPT-6	5.10-5.13
		Refusal	R1	CR=18%/RQD=0
			*SPT-7	5.75-5.77
Completely to highly weathered, brownish grey, medim to coarse grained, moderately fractured rock.		52 2.0 cm Penth. NX rotary drilling from 5.10m to 15.00m	R2	CR=22% RQD=Nil
			R3	CR=24% RQD=Nil
			R4	CR=21% RQD=Nil
8.00m. Highly weathered, whitish grey, fine grained, moderately fractured rock. 8.75m.			R5	CR=25% RQD=Nil
			R6	CR=27% RQD=Nil
			R7	CR=29% RQD=Nil
			R8	CR=26% RQD=Nil
Highly weathered, whitish grey to brownish grey, fine to medium grained, moderately fractured rock.			R9	CR=32% RQD=Nil
			R10	CR=33% RQD=Nil
			R11	CR=26% RQD=Nil
			R12	CR=31% RQD=Nil
15.00m.			R13	CR=29% RQD=Nil

5.10 6.50 7.25 8.00 8.75 9.50 10.25 11.00 11.75 12.50 13.25 14.00 15.00

N.B. - '*' means sample could not be recovered.

BH-19/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 15/03/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. 20

Co-ordinates E=-623 N=650

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	7
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 10/03/2018
Completion Date : 11/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 0.874 M.
Water Struck At :
Standing Water Level : 1.95 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Very soft, light grey, clayey silt with sand mxiture. Observed conch pcs.		1 0 1 — 1	DS-1	0.50
			SPT-1	1.00-1.45
			*UDS-1	2.00-2.45
2.50m.				
Medium dense, light grey, sandy silt. Observed kankar, conch & rock pcs.		5 8 11 — 19	SPT-2	2.55-3.00
3.40m.		100 Refusal 4.0 cm Pentn.	*SPT-3	3.40-3.44
Very dense, light grey, sandy silt / silty sand.		100 4.0 cm Pentn. Refusa	*SPT-4	3.60-3.64
3.75m. Observed kankar, conch & rock pcs.		100 Refusal 2.0 cm Pentn.	*SPT-5	3.75-3.77 3.75
Highly weathered, light grey, coarse grained, fractured rock.		NX rotary drilling from 3.75m to 15.00m	R1	CR=34% RQD=Nil 4.50
			R2	CR=28% RQD=Nil 5.25
5.25m.			R3	CR=31% RQD=Nil 6.00
Highly/moderately weathered, light grey, fine grained, moderately fractured rock.			R4	CR=42% RQD=19% 6.75
			R5	CR=36% RQD=Nil 7.50
7.50m.			R6	CR=29% RQD=Nil 8.25
Highly weathered, light grey, coarse to medium grained, fractured rock.			R7	CR=28% RQD=Nil 9.00
9.00m.			R8	CR=11% RQD=Nil
Completely weathered, light grey, medium grained, fractured rock.		Refusal		
9.75m.		52 2.0 cm Pentn.	*SPT-6	9.75-9.77 9.75
			R9	CR=21% RQD=Nil 10.50
		Refusal	R10	CR=19% RQD=Nil
		50 3.0 cm Pentn.	*SPT-7	11.25-11.28 11.25
Completely to highly weathered, light brownish grey, medium to fine grained, highly fractured rock.			R11	CR=24% RQD=Nil 12.00
			R12	CR=22% RQD=Nil 12.75
			R13	CR=31% RQD=Nil 13.50
			R14	CR=24% RQD=Nil 14.25
14.25m.			R15	CR=26% RQD=Nil 15.00
Highly weathered, light grey, medium grained, highly fractured rock. 15.00m.				

N.B. - '*' means sample could not be recovered / sample slip.

BH-20/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.			CETEST
Job No : 4115	Created by : SKD	Created on : 26/03/2018	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. 21

Co-ordinates E=121 N=663

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	8	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	8
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 21/03/2018
Completion Date : 22/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.369 M.
Water Struck At :
Standing Water Level : 1.93 m.

DESCRIPTION	SYMBOL	N-VALUE	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Medium dense, greyish brown, silty sand.		3 6 8 (14)	DS-1	0.50
			SPT-1	1.00-1.45
1.50m. Loose to medium dense, brownish grey, silty sand. Observed kankar, conch pcs. & clay binder.		2 3 4 (7)	*UDS-1	2.00-2.45
			SPT-2	2.55-3.00
			UDS-2	3.50-3.95
		3 5 6 (11)	SPT-3	4.00-4.45
5.00m. Very dense, brownish grey, medium grained, silty sand with mica & conch pcs. Observed decomposed rock.		12 32/5.0 cm 56 (>100) Pentn.	SPT-4	5.00-5.35
		100 4.0 cm Pentn. Refusal	*SPT-5	5.50-5.54
5.70m.		100 3.0 cm Pentn. Refusal	*SPT-6	5.70-5.73
		52 Refusal 2.0 cm Pentn.	R1	CR=17%/RQD=0
			*SPT-7 R2	6.40-6.42 CR=18%/RQD=0
		54 Refusal 3.0 cm Pentn.	*SPT-8 R3	7.00-7.03 CR=24% RQD=Nil
Completely to highly weathered, brownish grey, medium to fine grained, moderately fractured rock.		NX rotary drilling from 5.70m to 15.00m	R4	CR=22% RQD=Nil
			R5	CR=26% RQD=Nil
			R6	CR=25% RQD=Nil
			R7	CR=23% RQD=Nil
10.75m. Highly weathered, brownish grey, fine grained, moderately fractured rock.			R8	CR=26% RQD=Nil
11.50m. Highly weathered, light grey, medium to coarse grained, moderately fractured rock.			R9	CR=28% RQD=24%
			R10	CR=38% RQD=Nil
			R11	CR=36% RQD=Nil
			R12	CR=40% RQD=Nil
14.50m. Highly weathered, light grey, coarse grained, moderately fractured rock. 15.00m.			R13	CR=24% RQD=Nil

5.70 6.40 7.00 7.75 8.50 9.25 10.00 10.75 11.50 12.25 13.00 13.75 14.50 15.00

N.B. - '*' means sample could not be recovered.

BH-21/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.				CETEST
Job No : 4115	Created by : SKD	Created on : 06/04/2018	Sheet No:	

BORE LOG DATA SHEET

BORE HOLE NO. 22

Co-ordinates E=-318 N=586

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 30/03/2018
Completion Date : 31/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.581 M.
Water Struck At :
Standing Water Level : 2.80 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Very loose, light grey, sandy silt. Observed conch pcs.		2 1 2 (3)	DS-1	0.50
			SPT-1	1.00-1.45
			UDS-1	2.00-2.45
		1 1 1 (2)	SPT-2	2.50-2.95
3.45m.				
Loose, light grey, silty sand. Observed kankar & conch pcs.		2 2 3 (5)	*UDS-2	3.45-3.90
			SPT-3	4.05-4.50
5.05m.				
Very dense, light grey, silty sand with decomposed rock. Observed conch pcs.		6 24/70 (≥100) 6.0 cm Pentn.	SPT-4	5.05-5.41
		100/00 2.0 cm Pentn. Refusal	*SPT-5	5.55-5.57
5.70m.			*SPT-6	5.70-5.72
Highly weathered, deep grey, coarse grained, fractured rock. 6.00m.		NX rotary drilling from 5.70m to 15.00m	R1	CR=26%/RQD=0
			R2	CR=24% RQD=Nil
Highly weathered, deep grey, coarse grained, fractured rock.			R3	CR=28% RQD=Nil
7.50m.			R4	CR=34% RQD=Nil
Highly weathered, light grey, coarse to medium grained, fractured rock.			R5	CR=32% RQD=16%
9.00m.			R6	CR=22% RQD=Nil
Highly weathered, light grey, coarse to medium grained, fractured rock.			R7	CR=26% RQD=Nil
			R8	CR=25% RQD=Nil
			R9	CR=23% RQD=Nil
12.00m.			R10	CR=36% RQD=17%
Highly weathered, whitish grey, medium to fine grained, fractured rock.			R11	CR=28% RQD=Nil
13.50m.			R12	CR=21% RQD=Nil
Highly weathered, whitish grey, medium to fine grained, fractured rock.			R13	CR=32% RQD=Nil
14.25m.				
Highly weathered, whitish grey, fine grained, fractured rock. 15.00m.				

5.70 6.00 6.75 7.50 8.25 9.00 9.75 10.50 11.25 12.00 12.75 13.50 14.25 15.00

N.B. - '*' means sample could not be recovered / sample slip.

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 31/03/2018	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. 23

Co-ordinates E=−11 N=603

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	8	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	8
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 24/03/2018
Completion Date : 25/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.607 M.
Water Struck At :
Standing Water Level : 2.50 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Very loose, brownish grey, silty sand. Observed kankar, conch pcs. & clay binder.		2 3 5 (8)	DS−1	0.50
			SPT−1	1.00−1.45
			UDS−1	2.00−2.45
		1 2 3 (5)	SPT−2	2.50−2.95
3.70m.		10 42 48 >100	*UDS−2	3.50−3.60
Very dense, brownish grey, medium grained, silty sand with mica & conch pcs. Observed decomposed rock.		10.0 cm Pentn.	SPT−3	3.70−4.10
		42 50 5.0 cm Pentn. >100	SPT−4	4.30−4.50
		100 4.0 cm Pentn. Refusal	*SPT−5	4.70−4.74
5.00m.		100 4.0 cm Pentn. Refusal	*SPT−6	5.00−5.04
			R1	CR=17% RQD=Nil
Completely weathered, brownish grey, medium to coarse grained, moderately fractured rock.		Refusal	*SPT−7	5.75−5.77
		54 2.0 cm Pentn.	R2	CR=16% RQD=Nil
6.50m.		Refusal	*SPT−8	6.50−6.53
		58 3.0 cm Pentn.	R3	CR=26% RQD=Nil
		NX rotary drilling from 5.00m to 15.00m	R4	CR=30% RQD=Nil
Highly weathered, brownish grey, medium to coarse grained, moderately fractured rock.			R5	CR=31% RQD=Nil
			R6	CR=28% RQD=Nil
			R7	CR=27% RQD=Nil
			R8	CR=26% RQD=Nil
11.00m.			R9	CR=26% RQD=Nil
			R10	CR=30% RQD=13%
Highly weathered, deep grey, medium to fine grained, moderately fractured rock.			R11	CR=39% RQD=Nil
			R12	CR=32% RQD=Nil
N.B. − '*' means sample could not be recovered / sample slip.			R13	CR=31% RQD=Nil
15.00m.				

5.00
5.75
6.50
7.25
8.00
8.75
9.50
10.25
11.00
11.75
12.50
13.25
14.00
15.00

BH−23/Sheet−1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 31/03/2018	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. 24

Co-ordinates E=113.000 N=579.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 23/03/2018
Completion Date : 28/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.965 M.
Water Struck At :
Standing Water Level : 2.35 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium dense, greyish brown, silty sand.		3 4 10 (14)	DS-1	0.50
			SPT-1	1.00-1.45
1.50m.				
Loose to medium dense, brownish grey, silty sand. Observed kankar, conch pcs. & clay binder.		2 3 3 (6)	UDS-1	2.00-2.45
			SPT-2	2.50-2.95
		3 3 5 (8)	UDS-2	3.50-3.95
			SPT-3	4.00-4.45
5.10m.				
Very dense, brownish grey, medium grained, silty sand with conch pcs. Observed decomposed rock.		11 39/50 (>100) 10.0 cm Pentn. Refusal	SPT-4	5.10-5.50
		00 4.0 cm Penth. Refusal	*SPT-5	5.80-5.84
6.00m.		00 3.0 cm Penth.	*SPT-6	6.00-6.03
Highly weathered, brownish grey, medium to coarse grained, moderately fractured rock.		NX rotary drilling from 6.00m to 15.00m	R1	CR=22% RQD=Nil (6.00-6.75)
			R2	CR=24% RQD=Nil (6.75-7.50)
			R3	CR=21% RQD=Nil (7.50-8.25)
8.25m.				
Highly weathered, brownish grey, medium to coarse grained, moderately fractured rock.			R4	CR=28% RQD=Nil (8.25-9.00)
			R5	CR=30% RQD=Nil (9.00-9.75)
			R6	CR=27% RQD=Nil (9.75-10.50)
10.50m.				
Highly weathered, light to brownish grey, medium to fine grained, moderately fractured rock.			R7	CR=29% RQD=Nil (10.50-11.25)
			R8	CR=26% RQD=Nil (11.25-12.00)
			R9	CR=34% RQD=Nil (12.00-12.75)
			R10	CR=37% RQD=13% (12.75-13.50)
			R11	CR=38% RQD=Nil (13.50-14.25)
N.B. - '*' means sample could not be recovered / sample slip.			R12	CR=40% RQD=Nil (14.25-15.00)
15.00m.				

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Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 15/03/2018	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. 25

Co-ordinates E=315 N=564

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	11	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	11
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 03/03/2018
Completion Date : 05/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 0.723 M.
Water Struck At :
Standing Water Level : 0.90 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Very stiff, light grey, silty clay / clayey silt. Observed mica, conch pcs.		5 8 9 — 17	DS-1	0.50
			SPT-1	1.00-1.45
			UDS-1	2.00-2.45
2.50m.				
Medium dense, light grey, silty sand. Observed mica.		3 3 5 — 8	SPT-2	2.50-2.95
			*UDS-2	3.00-3.45
3.80m.				
Very dense, light grey, silty sand. Observed conch pcs.& decomposed rock.		00 — >100 (11.0 cm Pentn.)	SPT-3	4.00-4.11
		100 (4.0 cm Pentn.) Refusal	*SPT-4	4.30-4.34
4.50m.			*SPT-5	4.50-4.53
		00 (3.0 cm Pentn.) Refusal	R1	CR=24% RQD=Nil
		NX rotary drilling from 4.50m to 15.00m		5.00
			R2	CR=13% RQD=Nil
		50 (3.0 cm Pentn.) Refusal	*SPT-6	5.75-5.78
			R3	CR=14% RQD=Nil
		50 (2.0 cm Pentn.) Refusal	*SPT-7	6.50-6.52
			R4	CR=14% RQD=Nil
		50 (2.0 cm Pentn.) Refusal	*SPT-8	7.25-7.27
Completely to highly weathered, light to brownish grey, medium to coarse grained, completely fractured rock.			R5	CR=16% RQD=Nil
		50 (3.0 cm Pentn.) Refusal	*SPT-9	8.00-8.03
			R6	CR=24% RQD=Nil
				8.75
			R7	CR=17% RQD=Nil
		50 (2.0 cm Pentn.) Refusal	*SPT-10	9.50-9.52
			R8	CR=15% RQD=Nil
		50 (2.0 cm Pentn.) Refusal	*SPT-11	10.25-10.27
			R9	CR=22% RQD=Nil
11.00m.				11.00
Highly weathered, brownish grey, coarse grained, completely fractured rock.			R10	CR=32% RQD=Nil
11.75m.				11.75
			R11	CR=40% RQD=31%
				12.50
Highly weathered, whitish grey to brownish grey, fine to medium grained, moderately fractured rock.			R12	CR=28% RQD=Nil
				13.25
			R13	CR=30% RQD=15%
				14.00
N.B. - '*' means sample could not be recovered / sample slip.			R14	CR=34% RQD=Nil
15.00m.				15.00

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Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 31/03/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.26

Co-ordinates E=−22 N=523

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	9	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	9
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 25/03/2018
Completion Date : 26/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 2.140 M.
Water Struck At :
Standing Water Level : 2.25 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Medium dense, brownish grey, silty sand.		4 5 6 (11)	DS−1	0.50
			SPT−1	1.00−1.45
1.50m. Loose to medium dense, brownish grey, silty sand. Observed kankar, conch pcs. & clay binder.		1 1 2 (3)	UDS−1	2.00−2.45
			SPT−2	2.50−2.95
			UDS−2	3.50−3.95
		3 5 8 (13)	SPT−3	4.00−4.45
4.70m. Very dense, brownish grey, medium grained, silty sand with mica & conch pcs. Observed decomposed rock.		40 60 5.0 cm Pentn. >100	SPT−4	4.80−5.00
		100 4.0 cm Pentn. Refusa	*SPT−5	5.10−5.14
5.25m.		100 3.0 cm Pentn. Refusa	*SPT−6	5.25−5.28 (5.25)
			R1	CR=11%/RQD=0
		52 2.0 cm Pentn. Refusal	*SPT−7	6.00−6.02 (6.00)
			R2	CR=12%/RQD=0
		53 3.0 cm Pentn. Refusal	*SPT−8	6.75−6.78 (6.75)
			R3	CR=16%/RQD=0
		50 2.0 cm Pentn. Refusal	*SPT−9	7.50−7.52 (7.50)
Completely to highly weathered, brownish grey, medium to coarse grained, moderately fractured rock.		NX rotary drilling from 5.25m to 20.00m	R4	CR=27%/RQD=0
			R5	CR=25% RQD=Nil (8.25)
			R6	CR=28% RQD=Nil (9.00)
			R7	CR=21% RQD=Nil (9.75)
10.50m.			R8	CR=26% RQD=Nil (10.50)
Highly weathered, brownish grey, to deep grey, medium to coarse grained, moderately fractured rock.			R9	CR=31% RQD=Nil (11.25)
			R10	CR=39% RQD=17% (12.00)
			R11	CR=32% RQD=Nil (12.75)
			R12	CR=31% RQD=Nil (13.50)
			R13	CR=35% RQD=Nil (14.25)
			R14	CR=29% RQD=Nil (15.00)
15.75m. Highly weathered, deep grey, medium grained, moderately fractured rock.			R15	CR=23% RQD=Nil (15.75)
16.50m.			R16	CR=26% RQD=Nil (16.50)
Highly weathered, deep grey, medium grained, moderately fractured rock.			R17	CR=32% RQD=Nil (17.25)
			R18	CR=36% RQD=Nil (18.00)
			R19	CR=39% RQD=Nil (18.75)
N.B. − '*' means sample could not be recovered / sample slip.			R20	CR=34% RQD=Nil (19.50)
20.00m.				(20.00)

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Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 31/03/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.27

Co-ordinates E=-191 N=550

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	9	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	9
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	1

Commencement Date : 27/03/2018
Completion Date : 28/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 2.009 M.
Water Struck At :
Standing Water Level : 2.19 m.

DESCRIPTION	N-VALUE (EACH DIVN. = 15cm)	Ref. No	Depth (m)
0.00m. Medium dense, yellowish brown, silty sand.	3 6 8 (14)	DS-1	0.50
		SPT-1	1.00-1.45
2.00m. Soft to medium, light grey, clayey silt with sand mixture & traces of conch pcs.	1 2 2 (4)	WS-1	2.19
		UDS-1	2.00-2.45
		SPT-2	2.50-2.95
4.00m. Loose to medium dense, light grey, sandy silt / silty sand. Observed kankar & conch.	3 6 7 (13)	UDS-2	3.50-3.95
		SPT-3	4.00-4.45
5.10m. Very dense, brownish grey, silty sand with mica & conch pcs. Observed decomposed rock.	10 22 35 (57)	*UDS-3	5.00-5.08
	25 75 10.0 cm Pentn. >100	SPT-4	5.10-5.55
	100 4.0 cm Pentn. Refusa	SPT-5	5.70-5.95
6.10m.	100 4.0 cm Pentn. Refusa	*SPT-6	6.00-6.04
		*SPT-7 R1	6.10-6.14 CR=16%/RQD=0
	52 2.0 cm Pentn. Refusal	*SPT-8 R2	6.75-6.77 CR=18%/RQD=0
	53 Refusal 3.0 cm Pentn.	*SPT-9 R3	7.50-7.53 CR=24%/RQD=0
	NX rotary drilling from 6.10m to 20.00m	R4	CR=22% RQD=Nil
Completely to highly weathered, brownish grey, meidum to coarse grained, moderately fractured rock.		R5	CR=21% RQD=Nil
		R6	CR=25% RQD=Nil
		R7	CR=26% RQD=Nil
		R8	CR=22% RQD=Nil
		R9	CR=24% RQD=Nil
		R10	CR=25% RQD=Nil
13.50m. Highly weathered, light to yellowish grey, medium grained, moderately fractured rock.		R11	CR=23% RQD=Nil
		R12	CR=28% RQD=Nil
		R13	CR=24% RQD=Nil
		R14	CR=22% RQD=Nil
16.50m. Highly weathered, light to yellowish grey, medium grained, moderately fractured rock.		R15	CR=29% RQD=Nil
		R16	CR=33% RQD=Nil
		R17	CR=28% RQD=Nil
		R18	CR=26% RQD=Nil
N.B. - '*' means sample could not be recovered / sample slip. 20.00m.		R19	CR=34% RQD=Nil

6.10 6.75 7.50 8.25 9.00 9.75 10.50 11.25 12.00 12.75 13.50 14.25 15.00 15.75 16.50 17.25 18.00 18.75 19.50 20.00

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Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 06/04/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.28

Co-ordinates E=−489 N=536

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	1

Commencement Date : 31/03/2018
Completion Date : 01/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.408 M.
Water Struck At :
Standing Water Level : 2.40 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Loose, light grey, sandy silt / silty sand. Observed kankar & conch.		3 3 4 (7)	DS−1	0.50
			SPT−1	1.00−1.45
1.45m. Soft to medium, clayey silt with sand mixture & conch.		2 1 2 (3)	UDS−1	2.00−2.45
			WS−1	2.40
			SPT−2	2.50−2.95
		0 2 2 (4)	UDS−2	3.50−3.95
			SPT−3	4.00−4.45
4.50m. Very dense, brownish grey, medium grained, silty sand with kankar & conch pcs. Observed decomposed rock. 5.00m.		34 66 8.0 cm Pentn. >100	SPT−4	4.60−4.83
		100 3.0 cm Pentn. Refusa	*SPT−5	4.90−4.93
		00 Refusal	*SPT−6	5.00−5.02
		2.0 cm Pentn.	R1	CR=28% RQD=Nil (5.00–5.75)
		NX rotary drilling from 5.00m to 15.00m	R2	CR=26% RQD=20% (5.75–6.50)
			R3	CR=33% RQD=Nil (6.50–7.25)
Highly weathered, light to brownish grey, medium to coarse grained, completely fractured rock.			R4	CR=31% RQD=Nil (7.25–8.00)
			R5	CR=30% RQD=Nil (8.00–8.75)
			R6	CR=28% RQD=Nil (8.75–9.50)
			R7	CR=31% RQD=Nil (9.50–10.25)
11.00m. Highly/moderately weathered, whitish grey to brownish grey, medium grained rock.			R8	CR=28% RQD=Nil (10.25–11.00)
			R9	CR=31% RQD=Nil (11.00–11.75)
			R10	CR=30% RQD=Nil (11.75–12.50)
			R11	CR=32% RQD=Nil (12.50–13.25)
			R12	CR=44% RQD=15% (13.25–14.00)
15.00m.			R13	CR=32% RQD=Nil (14.00–15.00)

N.B. − '*' means sample could not be recovered / sample slip.

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 06/04/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.29

Co-ordinates E=−443 N=431

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 31/03/2018
Completion Date : 02/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.311 M.
Water Struck At :
Standing Water Level : 2.30 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Loose, light grey, silty sand. Observed kankar & conch pcs.		3 3 5 (8)	DS−1	0.50
			SPT−1	1.00−1.45
2.40m. Soft to medium, clayey silt with sand mixture & conch.		2 1 2 (3)	*UDS−1	2.00−2.45
			SPT−2	2.50−2.95
			UDS−2	3.45−3.90
3.95m. Very dense, light grey, silty sand with decomposed rock. Observed kankar & conch pcs.		5 16 79 ≥100 — 5.0 cm Pentn.	SPT−3	4.05−4.40
		100 2.0 cm Pentn. Refusal	SPT−4	4.80−4.82
5.00m.		100 2.0 cm Pentn. Refusal	SPT−5	5.00−5.02
Highly weathered, deep grey, medium to fine grained, fractured rock.		NX rotary drilling from 5.00m to 20.00m	R1 CR=28% RQD=Nil	5.00 – 5.75
			R2 CR=29% RQD=Nil	5.75 – 6.50
			R3 CR=28% RQD=Nil	6.50 – 7.25
7.25m.			R4 CR=30% RQD=Nil	7.25 – 8.00
Highly weathered, light grey, coarse grained, fractured rock.			R5 CR=32% RQD=Nil	8.00 – 8.75
			R6 CR=40% RQD=Nil	8.75 – 9.50
			R7 CR=30% RQD=Nil	9.50 – 10.25
10.25m.			R8 CR=34% RQD=Nil	10.25 – 11.00
Highly weathered, whitish grey, medium to fine grained, fractured rock.			R9 CR=29% RQD=Nil	11.00 – 11.75
			R10 CR=33% RQD=Nil	11.75 – 12.50
12.50m.			R11 CR=23% RQD=Nil	12.50 – 13.25
Highly weathered, brownish grey, coarse grained, moderately to highly fractured rock.			R12 CR=24% RQD=Nil	13.25 – 14.00
			R13 CR=28% RQD=Nil	14.00 – 14.75
14.75m. Highly weathered, light grey, coarse grained, fractured rock.			R14 CR=23% RQD=Nil	14.75 – 15.50
15.50m.			R15 CR=27% RQD=Nil	15.50 – 16.25
			R16 CR=32% RQD=Nil	16.25 – 17.00
Highly weathered, light grey, coarse to medium grained, fractured rock.			R17 CR=34% RQD=Nil	17.00 – 17.75
			R18 CR=37% RQD=Nil	17.75 – 18.50
			R19 CR=32% RQD=Nil	18.50 – 19.25
N.B. − '*' means sample could not be recovered / sample slip. 20.00m.			R20 CR=26% RQD=Nil	19.25 – 20.00

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Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 27/04/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.30

Co-ordinates E=552 N=331

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 22/04/2018
Completion Date : 23/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.892 M.
Water Struck At :
Standing Water Level : 2.95 m.

DESCRIPTION	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	Depth (m)
0.00m.			
Medium dense, brownish grey, silty sand. Observed kankar & conch pcs.	7 9 9 — 18	DS-1	0.50
		SPT-1	1.00-1.45
1.50m.			
Very loose, light grey, silty sand to sandy silt with conch pcs. Observed kankar & clay binder.	1 0 1 — 1	*UDS-1	2.00-2.45
		SPT-2	2.50-2.95
		UDS-2	3.50-3.95
3.90m.			
Very dense, light grey, silty sand with decomposed rock. Observed kankar & conch pcs.	14 38 48 — ≥100 (11.0 cm Pentn.)	SPT-3	4.00-4.41
	100 3.0 cm Pentn. Refusal	*SPT-4	4.80-4.83
5.00m.	Refusal	*SPT-5	5.00-5.02 5.00
	100 2.0 cm Pentn.	R1	CR=27% RQD=Nil 5.75
Highly to moderately weathered, brownish grey, coarse grained, fractured rock.	NX rotary drilling from 5.00m to 15.00m	R2	CR=40% RQD=Nil 6.50
		R3	CR=43% RQD=Nil 7.25
		R4	CR=49% RQD=Nil 8.00
8.00m.			
Completely/highly weathered, brownish grey, coarse grained, fractured rock.		R5	CR=25% RQD=Nil 8.75
	Refusal	R6	CR=15% RQD=Nil
9.50m.	50 2.0 cm Pentn.	SPT-6	9.50-9.52 9.50
		R7	CR=36% RQD=Nil 10.25
Highly weathered, whitish grey, medium to fine grained, fractured rock.		R8	CR=24% RQD=15% 11.00
		R9	CR=26% RQD=Nil 11.75
		R10	CR=25% RQD=Nil 12.50
12.50m.			
Highly weathered, whitish grey, medium to fine grained, fractured rock.		R11	CR=36% RQD=Nil 13.25
		R12	CR=32% RQD=Nil 14.00
N.B. – '*' means sample could not be recovered / sample slip.		R13	CR=34% RQD=Nil 15.00
15.00m.			

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Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 30/04/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.31

Co-ordinates E=−220 N=315

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	7
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 12/04/2018
Completion Date : 14/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 2.006 M.
Water Struck At :
Standing Water Level : 2.85 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Loose, brownish grey, silty sand to sandy silt. Observed kankar & conch pcs.		6 4 4 (8)	DS−1	0.50
1.50m. Very soft, light grey, clayey silt with sand mixture.		1 1 0 (1)	SPT−1	1.00−1.45
		1 1 2 (3)	*UDS−1	2.00−2.45
			SPT−2	2.50−2.95
			UDS−2	3.50−3.95
			SPT−3	4.00−4.45
4.90m. Very dense, light grey, silty sand with decomposed rock. Observed conch pcs.		12 25 63 (>100) 9.0 cm Pentn.	SPT−4	5.05−5.44
		100 3.0 cm Pentn. Refusa	*SPT−5	5.60−5.63
5.70m.		100 2.0 cm Pentn. Refusa	*SPT−6	5.70−5.72
		Refusal	R1 CR=19% RQD=0	5.70
		50 3.0 cm Penthn.	*SPT−7	6.00−6.03
Completely to highly weathered, light to brownish grey, medium to coarse grained, fractured rock.		NX rotary drilling from 5.70m to 20.00m	R2 CR=25% RQD=Nil	6.00
			R3 CR=22% RQD=Nil	6.75
			R4 CR=21% RQD=Nil	7.50
			R5 CR=22% RQD=Nil	8.25
			R6 CR=24% RQD=Nil	9.00
9.75m.			R7 CR=26% RQD=Nil	9.75
Highly weathered, light to brownish grey, medium to coarse grained, fractured rock.			R8 CR=27% RQD=Nil	10.50
			R9 CR=32% RQD=Nil	11.25
			R10 CR=26% RQD=Nil	12.00
			R11 CR=32% RQD=Nil	12.75
			R12 CR=32% RQD=Nil	13.50
15.00m.			R13 CR=28% RQD=Nil	14.25
Highly weathered, whitish grey, medium grained, completely fractured rock.			R14 CR=28% RQD=Nil	15.00
			R15 CR=34% RQD=Nil	15.75
			R16 CR=32% RQD=Nil	16.50
			R17 CR=35% RQD=Nil	17.25
			R18 CR=36% RQD=Nil	18.00
			R19 CR=33% RQD=Nil	18.75
N.B. − '*' means sample could not be recovered / sample slip.			R20 CR=40% RQD=Nil	19.50
20.00m.				20.00

BH−31/Sheet−1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 30/04/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.32

Co-ordinates E=−144 N=328

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 10/04/2018
Completion Date : 11/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 2.025 M.
Water Struck At :
Standing Water Level : 2.90 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium dense, light grey, silty sand. Observed kankar.		6 5 4 (9)	DS−1	0.50
			SPT−1	1.00−1.45
1.50m.				
Very soft, light grey, clayey silt with sand mixture.		1 1 1 (2)	*UDS−1	2.00−2.45
			SPT−2	2.55−3.00
4.00m.			UDS−2	3.50−3.95
Dense to very dense, deep grey, silty sand with mica, kankar & conch pcs. Observed decomposed rock.		7 9 16 (25)	SPT−3	4.00−4.45
		48 52 5.0 cm Pentn. >100	SPT−4	5.00−5.20
		100 4.0 cm Pentn. Refusal	*SPT−5	5.30−5.34
5.40m.		00 Refusal	*SPT−6	5.40−5.45
Highly weathered, brownish grey, medium to coarse grained, moderately fractured rock.		5.0 cm Pentn. NX rotary drilling from 5.40m to 20.00m	R1	CR=21%/RQD=0
			R2	CR=24% RQD=Nil
7.50m.			R3	CR=22% RQD=Nil
Highly weathered, brownish grey, medium to coarse grained, moderately fractured rock.			R4	CR=28% RQD=Nil
			R5	CR=31% RQD=Nil
9.75m.			R6	CR=28% RQD=Nil
Highly weathered, brownish grey, medium to coarse grained, moderately fractured rock.			R7	CR=24% RQD=Nil
11.25m.			R8	CR=25% RQD=Nil
Highly weathered, brownish grey, medium to coarse grained, moderately fractured rock.			R9	CR=30% RQD=Nil
			R10	CR=38% RQD=Nil
13.50m.			R11	CR=33% RQD=Nil
Highly weathered, brownish grey to light grey, medium to fine grained, moderately fractured rock.			R12	CR=27% RQD=Nil
			R13	CR=29% RQD=Nil
			R14	CR=32% RQD=Nil
			R15	CR=26% RQD=Nil
			R16	CR=34% RQD=Nil
			R17	CR=28% RQD=Nil
			R18	CR=32% RQD=Nil
			R19	CR=29% RQD=Nil
N.B. − '*' means sample could not be recovered / sample slip.			R20	CR=26% RQD=Nil
20.00m.				

5.40 6.00 6.75 7.50 8.25 9.00 9.75 10.50 11.25 12.00 12.75 13.50 14.25 15.00 15.75 16.50 17.25 18.00 18.75 19.50 20.00

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Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 30/04/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.33

Co-ordinates E=-142 N=301

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 11/04/2018
Completion Date : 12/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.989 M.
Water Struck At :
Standing Water Level : 2.88 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Loose, light grey, silty sand. Observed kankar.		5 6 4 (10)	DS-1	0.50
1.50m. Very soft, light grey, clayey silt with sand mixture.		1 2 2 (4)	SPT-1	1.00-1.45
			*UDS-1	2.00-2.45
			SPT-2	2.55-3.00
4.00m. Medium dense, brownish grey, silty sand with kankar & conch pcs.		7 10 12 (22)	UDS-2	3.50-3.95
4.70m. Very dense, brownish grey, silty sand with kankar & conch pcs.		44 56 10.0 cm Pentn. >100	SPT-3	4.05-4.50
5.20m. Highly weathered, brownish grey, medium to coarse grained, highly fractured rock.		100 3.0 cm Pentn. Refusal	SPT-4	4.70-4.95
7.50m. Highly weathered, brownish grey, medium to coarse grained, highly fractured rock.		100 2.0 cm Penth. Refusal	*SPT-5	5.10-5.13
9.00m. Highly weathered, brownish grey, medium to coarse grained, highly fractured rock.		NX rotary drilling from 5.20m to 20.00m	*SPT-6	5.20-5.22
10.50m. Highly weathered, light to brownish grey, medium to fine grained, fractured rock.			R1	CR=22% RQD=Nil (5.20-6.00)
16.50m. Highly weathered, light to brownish grey, medium to fine grained, fractured rock.			R2	CR=24% RQD=Nil (6.00-6.75)
17.25m. Highly weathered, light to brownish grey, medium to fine grained, fractured rock.			R3	CR=25% RQD=Nil (6.75-7.50)
N.B. - '*' means sample could not be recovered / sample slip. 20.00m.			R4	CR=28% RQD=Nil (7.50-8.25)
			R5	CR=26% RQD=Nil (8.25-9.00)
			R6	CR=22% RQD=Nil (9.00-9.75)
			R7	CR=24% RQD=Nil (9.75-10.50)
			R8	CR=28% RQD=Nil (10.50-11.25)
			R9	CR=26% RQD=Nil (11.25-12.00)
			R10	CR=26% RQD=Nil (12.00-12.75)
			R11	CR=29% RQD=Nil (12.75-13.50)
			R12	CR=30% RQD=Nil (13.50-14.25)
			R13	CR=32% RQD=Nil (14.25-15.00)
			R14	CR=27% RQD=Nil (15.00-15.75)
			R15	CR=26% RQD=Nil (15.75-16.50)
			R16	CR=25% RQD=Nil (16.50-17.25)
			R17	CR=28% RQD=Nil (17.25-18.00)
			R18	CR=37% RQD=Nil (18.00-18.75)
			R19	CR=30% RQD=Nil (18.75-19.50)
			R20	CR=36% RQD=Nil (19.50-20.00)

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Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 30/04/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.34

Co-ordinates E=−76 N=315

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	9	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	9
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 11/04/2018
Completion Date : 12/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.992 M.
Water Struck At :
Standing Water Level : 2.90 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Loose, light grey, silty sand. Observed kankar.		5 6 4 (10)	DS−1	0.50
			SPT−1	1.00−1.45
1.40m. Very soft, light grey, clayey silt with sand mixture.		1 2 2 (4)	*UDS−1	2.00−2.45
			SPT−2	2.55−3.00
			UDS−2	3.50−3.95
4.00m. Medium dense, brownish grey, silty sand with mica, kankar & conch pcs. Observed decomposed rock.		8 12 15 (27)	SPT−3	4.00−4.45
		40 60 5.0 cm Pentn. >100	SPT−4	4.80−5.00
4.80m.		100 4.0 cm Pentn. Refusal	*SPT−5	5.10−5.14
5.20m. Very dense, brownish grey, silty sand with mica, kankar & conch pcs. Observed decomposed rock.		100 4.0 cm Pentn. Refusal	*SPT−6	5.20−5.24
			R1	CR=12%/RQD=0
		52 2.0 cm Pentn. Refusal	*SPT−7	6.00−6.02
			R2	CR=15%/RQD=0
		54 3.0 cm Pentn. Refusal	*SPT−8	6.75−6.78
			R3	CR=18%/RQD=0
Completely to highly weathered, brownish grey, medium to coarse grained, highly fractured rock.		51 2.0 cm Pentn. Refusal	*SPT−9	7.50−7.52
			R4	CR=24%/RQD=0
		NX rotary drilling from 5.20m to 15.00m	R5	CR=26% RQD=Nil
			R6	CR=48% RQD=16%
9.75m. Highly weathered, brownish grey, coarse grained, highly fractured rock.			R7	CR=33% RQD=13%
10.50m. Highly weathered, light grey, medium to fine grained, moderately fractured rock.			R8	CR=34% RQD=16%
			R9	CR=40% RQD=16%
			R10	CR=36% RQD=28%
			R11	CR=34% RQD=Nil
			R12	CR=28% RQD=Nil
15.00m.			R13	CR=40% RQD=Nil

5.20 6.00 6.75 7.50 8.25 9.00 9.75 10.50 11.25 12.00 12.75 13.50 14.25 15.00

N.B. − '*' means sample could not be recovered / sample slip.

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Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 17/04/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.35

Co-ordinates E=−27 N=287

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	8	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	8
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 08/04/2018
Completion Date : 09/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.918 M.
Water Struck At :
Standing Water Level : 2.80 m.

DESCRIPTION	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	Depth (m)
0.00m. Loose, light brownish grey, sandy silt. Observed conch pcs.	6 5 5 (10)	DS−1	0.50
		SPT−1	1.00−1.45
1.40m. Very soft, light grey, clayey silt with sand mixture.	1 0 1 (1)	*UDS−1	2.00−2.45
		SPT−2	2.55−3.00
3.50m. Medium dense, light grey, silty sand with conch pcs. Observed kankar.	6 8 9 (17)	UDS−2	3.50−3.95
		SPT−3	4.00−4.45
4.80m. Very dense, light grey, silty sand. Observed conch pcs. & decomposed rock.	19 81 (>100) 10.0 cm Pentn.	*UDS−3	5.00−5.04
		SPT−4	5.10−5.35
	100 3.0 cm Pentn. Refusal	*SPT−5	5.40−5.43
5.50m. Completely weathered, light grey, coarse grained, highly fractured rock.	100 4.0 cm Pentn. Refusal	*SPT−6	5.50−5.54
		R1	CR=17%/RQD=0
	50 2.0 cm Pentn. Refusal	*SPT−7	6.25−6.27
		R2	CR=15%/RQD=0
7.00m. Highly weathered, light grey, coarse to medium grained, highly to moderately fractured rock.	50 3.0 cm Pentn.	*SPT−8	7.00−7.03
		R3	CR=21%/RQD=0
	NX rotary drilling from 5.50m to 20.00m	R4	CR=23% RQD=Nil
8.50m. Highly weathered, light grey, coarse to medium grained, highly to moderately fractured rock.		R5	CR=26% RQD=Nil
		R6	CR=31% RQD=Nil
		R7	CR=34% RQD=Nil
		R8	CR=31% RQD=Nil
11.50m. Highly weathered, light grey, coarse to medium grained, highly to moderately fractured rock.		R9	CR=29% RQD=Nil
		R10	CR=26% RQD=Nil
13.00m. Highly weathered, light grey, coarse to medium grained, highly to moderately fractured rock.		R11	CR=24% RQD=Nil
		R12	CR=23% RQD=Nil
14.50m. Highly weathered, light grey, fine grained, moderately fractured rock.		R13	CR=24% RQD=Nil
15.25m. Highly weathered, light grey, fine to medium grained, moderately fractured rock.		R14	CR=30% RQD=Nil
		R15	CR=26% RQD=18%
16.75m. Highly weathered, light grey, medium grained, moderately fractured rock.		R16	CR=24% RQD=Nil
17.50m. Highly weathered, light grey to deep grey, medium to fine grained, moderately fractured rock.		R17	CR=21% RQD=Nil
		R18	CR=24% RQD=Nil
		R19	CR=25% RQD=Nil
N.B. − '*' means sample could not be recovered / sample slip. 20.00m.			

5.50 6.25 7.00 7.75 8.50 9.25 10.00 10.75 11.50 12.25 13.00 13.75 14.50 15.25 16.00 16.75 17.50 18.25 19.00 20.00

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Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 30/04/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.36

Co-ordinates E=-171 N=287

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 22/04/2018
Completion Date : 23/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 2.049 M.
Water Struck At :
Standing Water Level : 2.75 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Loose, light grey, silty sand. Observed conch pcs.		8 5 4 (9)	DS-1	0.50
			SPT-1	1.00-1.45
1.50m. Very soft, light grey, clayey silt with sand mixture.		1 0 1 (1)	UDS-1	2.00-2.45
			SPT-2	2.55-3.00
3.50m. Loose to medium dense, light grey, sandy silt / silty sand. Observed kankar & conch.		1 2 2 (4)	*UDS-2	3.50-3.95
			SPT-3	4.00-4.45
4.50m. Very dense, silty sand with decomposed rock.		24 76 7.0 cm Pentn. >100	SPT-4	4.60-4.82
		100 3.0 cm Pentn. Refusa	*SPT-5	4.90-4.93
5.00m. Highly weathered, deep grey, coarse grained, moderately fractured rock.		Refusal	*SPT-6	5.00-5.02 5.00
5.75m. Highly weathered, deep grey, coarse grained, moderately fractured rock.		100 2.0 cm Pentn.	R1	CR=24% RQD=18% 5.75
		NX rotary drilling from 5.00m to 15.00m	R2	CR=26% RQD=Nil 6.50
7.25m. Highly weathered, light grey, coarse to medium grained, moderately fractured rock.			R3	CR=27% RQD=Nil 7.25
			R4	CR=29% RQD=Nil 8.00
			R5	CR=32% RQD=Nil 8.75
			R6	CR=33% RQD=Nil 9.50
10.25m. Highly weathered, light brownish grey, medium grained, moderately fractured rock.			R7	CR=29% RQD=Nil 10.25
			R8	CR=26% RQD=Nil 11.00
			R9	CR=31% RQD=Nil 11.75
			R10	CR=34% RQD=13% 12.50
13.25m. Highly weathered, light reddish brown, medium grained, highly to moderately fractured rock.			R11	CR=36% RQD=Nil 13.25
			R12	CR=26% RQD=Nil 14.00
15.00m.			R13	CR=28% RQD=Nil 15.00

N.B. - '*' means sample could not be recovered / sample slip.

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Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 30/04/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.37

Co-ordinates E=−201 N=266

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 11/04/2018
Completion Date : 12/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.823 M.
Water Struck At :
Standing Water Level : 2.88 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Medium dense, brownish grey, sandy silt with kankar. Observed conch pcs.		10 7 5 (12)	DS−1	0.50
			SPT−1	1.00−1.45
1.50m. Very soft to soft, light grey, clayey silt with sand mixture. Observed conch.		1 0 1 (1)	UDS−1	2.00−2.45
			SPT−2	2.50−2.95
		3 2 2 (4)	UDS−2	3.50−3.95
			SPT−3	4.00−4.45
4.90m. Very dense, light grey, silty sand with decomposed rock. Observed conch pcs.		12 17 71 (>100) 11.0 cm Pentn.	SPT−4	5.00−5.41
		100 2.0 cm Pentn. Refusal	*SPT−5	5.50−5.52
5.60m.		100 2.0 cm Pentn. Refusal	*SPT−6	5.60−5.62
Highly/moderately weathered, deep grey, coarse grained, fractured rock.		NX rotary drilling from 5.60m to 20.00m	R1	CR=45%/RQD=0
			R2	CR=34% RQD=Nil
			R3	CR=27% RQD=Nil
			R4	CR=31% RQD=Nil
			R5	CR=28% RQD=Nil
			R6	CR=33% RQD=Nil
			R7	CR=32% RQD=Nil
10.50m. Highly weathered, light grey, medium to fine grained, fractured rock.			R8	CR=29% RQD=Nil
			R9	CR=29% RQD=Nil
			R10	CR=27% RQD=Nil
12.75m. Highly/moderately weathered, light to whitish grey, medium to fine grained, fractured rock. Observed reddish brown spots.			R11	CR=41% RQD=Nil
			R12	CR=40% RQD=Nil
			R13	CR=34% RQD=14%
15.00m. Highly weathered, light to whitish grey, medium to fine grained, fractured rock. Observed reddish brown spots.			R14	CR=25% RQD=Nil
			R15	CR=33% RQD=Nil
			R16	CR=25% RQD=Nil
17.25m. Highly/moderately weathered, light to whitish grey, medium to fine grained, fractured rock. Observed reddish brown spots.			R17	CR=33% RQD=Nil
			R18	CR=34% RQD=Nil
			R19	CR=41% RQD=Nil
N.B. − '*' means sample could not be recovered / sample slip.			R20	CR=32% RQD=Nil
20.00m.				

5.60 6.00 6.75 7.50 8.25 9.00 9.75 10.50 11.25 12.00 12.75 13.50 14.25 15.00 15.75 16.50 17.25 18.00 18.75 19.50 20.00

BH−37/Sheet−1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 30/04/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.38

Co-ordinates E=−23 N=262

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 10/04/2018
Completion Date : 12/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.897 M.
Water Struck At :
Standing Water Level : 2.80 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Medium dense, light grey, silty sand. Observed conch pcs.		7 6 6 (12)	DS−1	0.50
			SPT−1	1.00−1.45
1.50m. Very soft to soft, light grey, clayey silt with sand mixture. Observed conch.		1 0 1 (1)	UDS−1	2.00−2.45
			SPT−2	2.50−2.95
		1 1 2 (3)	*UDS−2	3.50−3.95
			SPT−3	4.00−4.45
4.60m. Very dense, light grey, silty sand. Observed conch pcs. & decomposed rock. 5.20m.		21 79 6.0 cm Pentn. >100 100 4.0 cm Pentn. Refusa Refusal	SPT−4 *SPT−5 *SPT−6	4.80−5.01 5.10−5.14 5.20−5.23
		00 3.0 cm Pentn.	R1	CR=21%/RQD=0
		NX rotary drilling from 5.20m to 20.00m	R2	CR=22% RQD=Nil
Highly weathered, light grey, coarse grained, moderately fractured rock.			R3	CR=21% RQD=Nil
			R4	CR=22% RQD=20%
			R5	CR=25% RQD=Nil
			R6	CR=23% RQD=Nil
9.70m. Highly weathered, light grey, fine to medium grained, moderately to highly fractured rock.			R7	CR=24% RQD=Nil
			R8	CR=21% RQD=Nil
11.20m. Highly to moderately weathered, light grey, coarse grained, moderately fractured rock.			R9	CR=26% RQD=Nil
			R10	CR=39% RQD=Nil
			R11	CR=43% RQD=20%
			R12	CR=40% RQD=Nil
14.20m. Highly weathered, light brownish grey, fine grained, highly fractured rock.			R13	CR=26% RQD=Nil
			R14	CR=28% RQD=Nil
15.70m. Highly weathered, light brownish grey, fine grained, highly fractured rock.			R15	CR=22% RQD=Nil
16.45m. Highly weathered, light grey, fine to medium grained, highly fractured rock.			R16	CR=26% RQD=Nil
			R17	CR=27% RQD=Nil
17.95m. Highly weathered, light yellowish grey, medium grained, highly to moderately fractured rock.			R18	CR=22% RQD=Nil
			R19	CR=21% RQD=Nil
20.00m.			R20	CR=21% RQD=Nil

5.20 | 5.95 | 6.70 | 7.45 | 8.20 | 8.95 | 9.70 | 10.45 | 11.20 | 11.95 | 12.70 | 13.45 | 14.20 | 14.95 | 15.70 | 16.45 | 17.20 | 17.95 | 18.70 | 19.45 | 20.00

N.B. − '*' means sample could not be recovered / sample slip.

BH−38/Sheet−1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 17/04/2018 | Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.39

Co-ordinates E=15 N=231

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	8	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	8
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 10/04/2018
Completion Date : 10/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.902 M.
Water Struck At :
Standing Water Level : 2.85 m.

DESCRIPTION	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	Depth (m)
0.00m.			
Medium dense, light grey, silty sand. Observed kankar.	5 6 7 (13)	DS-1	0.50
		SPT-1	1.00-1.45
1.50m.			
Loose, brownish grey, silty sand with conch pcs. Observed kankar & clay binder.	2 2 3 (5)	*UDS-1	2.00-2.45
		SPT-2	2.55-3.00
		UDS-2	3.50-3.95
4.00m.	10 35 55/5.0 cm Pentn. (>100)	SPT-3	4.00-4.35
Very dense, brownish grey, silty sand with kankar, mica & conch pcs. Observed decomposed rock.	40 60 10.0 cm Pentn. >100	SPT-4	5.00-5.25
	100 4.0 cm Pentn. Refusal	*SPT-5	5.30-5.34
5.40m.	100 3.0 cm Pentn. Refusal	*SPT-6 R1	5.40-5.43 CR=16%/RQD=0
Completely to highly weathered, brownish grey to light grey, medium to coarse grained, highly fractured rock.	52/2.0 cm Pentn. Refusal	*SPT-7 R2	6.00-6.02 CR=18%/RQD=0
	55/3.0 cm Pentn. Refusal	*SPT-8 R3	6.75-6.78 CR=24%/RQD=0
7.50m.			
Highly weathered, light grey, coarse grained, highly fractured rock.	NX rotary drilling from 5.40m to 15.00m	R4	CR=33% RQD=Nil
8.25m.		R5	CR=35% RQD=Nil
		R6	CR=39% RQD=Nil
		R7	CR=32% RQD=Nil
		R8	CR=29% RQD=Nil
Highly weathered, brownish grey, medium to fine grained, moderately fractured rock.		R9	CR=26% RQD=Nil
		R10	CR=27% RQD=Nil
		R11	CR=28% RQD=Nil
		R12	CR=31% RQD=13%
15.00m.		R13	CR=26% RQD=Nil

5.40 | 6.00 | 6.75 | 7.50 | 8.25 | 9.00 | 9.75 | 10.50 | 11.25 | 12.00 | 12.75 | 13.50 | 14.25 | 15.00

N.B. – '*' means sample could not be recovered / sample slip.

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Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 17/04/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.40

Co-ordinates E=-47 N=230

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 07/04/2018
Completion Date : 08/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.947 M.
Water Struck At :
Standing Water Level : 2.85 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Medium dense, light grey, silty sand. Observed kankar.		7 7 9 (16)	DS-1	0.50
			SPT-1	1.00-1.45
1.50m. Loose to medium dense, brownish grey, silty sand with mica & conch pcs. Observed kankar & clay binder.		2 3 3 (6)	UDS-1	2.00-2.45
			SPT-2	2.55-3.00
			*UDS-2	3.50-3.95
		6 7 13 (20)	SPT-3	4.00-4.45
4.70m. Very dense, brownish grey, silty sand with kankar, mica & conch pcs. Observed decomposed rock.		18 35 53 (>100) 5.0 cm Pentn.	SPT-4	5.00-5.35
		100 4.0 cm Pentn. Refusa	*SPT-5	5.50-5.54
5.70m.		100 Refusal 4.0 cm Pentn.	*SPT-6	5.70-5.74
		NX rotary drilling from 5.70m to 20.00m	R1	CR=26% RQD=15% 5.70-6.50
			R2	CR=28% RQD=Nil 6.50-7.25
Highly weathered, brownish grey, medium to coarse grained, highly fractured rock.			R3	CR=33% RQD=Nil 7.25-8.00
			R4	CR=31% RQD=Nil 8.00-8.75
			R5	CR=26% RQD=Nil 8.75-9.50
			R6	CR=30% RQD=Nil 9.50-10.25
10.25m. Highly weathered, brownish grey, coarse grained, highly fractured rock.			R7	CR=24% RQD=Nil 10.25-11.00
11.00m.			R8	CR=33% RQD=Nil 11.00-11.75
			R9	CR=27% RQD=Nil 11.75-12.50
			R10	CR=33% RQD=Nil 12.50-13.25
			R11	CR=28% RQD=Nil 13.25-14.00
			R12	CR=26% RQD=Nil 14.00-14.75
Highly weathered, light to deep grey, medium to fine grained, highly fractured rock.			R13	CR=34% RQD=Nil 14.75-15.50
			R14	CR=26% RQD=Nil 15.50-16.25
			R15	CR=32% RQD=Nil 16.25-17.00
			R16	CR=26% RQD=Nil 17.00-17.75
			R17	CR=29% RQD=Nil 17.75-18.50
			R18	CR=26% RQD=Nil 18.50-19.25
N.B. - '*' means sample could not be recovered / sample slip.			R19	CR=30% RQD=Nil 19.25-20.00
20.00m.				

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Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 30/04/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.41

Co-ordinates E=−182 N=225

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	8	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	8
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 12/04/2018
Completion Date : 13/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.935 M.
Water Struck At :
Standing Water Level : 2.80 m.

DESCRIPTION	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	Depth (m)
0.00m. Medium dense, brownish grey to light grey, sandy silt with kankar. Observed conch pcs.	10 8 6 (14)	DS−1	0.50
		SPT−1	1.00−1.45
1.50m. Very soft, light grey, clayey silt with sand mixture. Observed conch.	1 1 0 (1)	*UDS−1	2.00−2.45
		SPT−2	2.50−2.95
		UDS−2	3.50−3.95
4.00m. Loose, light grey, silty sand. Observed kankar, conch pcs. & clay binder.	2 3 2 (5)	SPT−3	4.00−4.45
4.95m. Dense to very dense, light grey, silty sand with decomposed rock. Observed conch pcs.	3 16 39 (55)	SPT−4	5.00−5.45
	>100	SPT−5	6.15−6.36
	17 83 6.0 cm Pentn.	*SPT−6	6.60−6.63
	100 3.0 cm Pentn. Refusa	*SPT−7	6.80−6.82
6.80m. Highly weathered, light brownish grey, fine grained, moderately fractured rock.	100 2.0 cm Pentn. Refusa	R1	CR=17%/RQD=0 6.80
	Refusal	*SPT−8	7.50−7.52 7.50
	50 2.0 cm Pentn.	R2	CR=21%/RQD=0 8.25
	NX rotary drilling from 6.80m to 20.00m	R3	CR=22% RQD=Nil 9.00
		R4	CR=21% RQD=Nil 9.75
		R5	CR=23% RQD=Nil 10.50
10.50m. Highly weathered, light brownish grey, fine to medium grained, moderately to highly fractured rock.		R6	CR=26% RQD=Nil 11.25
		R7	CR=27% RQD=Nil 12.00
		R8	CR=31% RQD=Nil 12.75
12.75m. Highly weathered, light to brownish grey, medium to coarse grained, moderately fractured rock.		R9	CR=25% RQD=Nil 13.50
		R10	CR=28% RQD=Nil 14.25
		R11	CR=24% RQD=Nil 15.00
		R12	CR=26% RQD=Nil 15.75
16.50m. Highly weathered, light brownish grey, fine to medium grained, highly to moderately fractured rock.		R13	CR=25% RQD=Nil 16.50
		R14	CR=33% RQD=Nil 17.25
		R15	CR=27% RQD=Nil 18.00
		R16	CR=29% RQD=Nil 18.75
		R17	CR=36% RQD=Nil 19.50
		R18	CR=38% RQD=Nil 20.00
20.00m.			

N.B. − '*' means sample could not be recovered / sample slip.

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Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 30/04/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.42

Co-ordinates E=-253 N=230

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	1

Commencement Date : 16/04/2018
Completion Date : 16/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.765 M.
Water Struck At :
Standing Water Level : 2.77 m.

DESCRIPTION	SYMBOL	N-VALUE	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Loose, silty sand. Observed conch pcs.		8 6 4 (10)	DS-1	0.50
			SPT-1	1.00-1.45
1.50m. Very soft to soft, light grey, clayey silt with sand mixture. Observed conch.		1 0 1 (1)	UDS-1	2.00-2.45
			SPT-2	2.50-2.95
			WS-1	2.77
			*UDS-2	3.50-3.95
		1 1 1 (2)	SPT-3	4.05-4.50
4.90m. Very dense, light grey, silty sand with decomposed rock.		10 23 67 (>100) 12.0 cm Pentn.	SPT-4	5.05-5.47
		100 3.0 cm Pentn. Refusal	*SPT-5	5.65-5.68
5.75m.		Refusal	*SPT-6	5.75-5.77
		100 2.0 cm Pentn.	R1	CR=22%/RQD=0
		NX rotary drilling from 5.75m to 15.00m	R2	CR=23% RQD=Nil
Highly weathered, light grey, coarse to medium grained, highly to moderately fractured rock.			R3	CR=23% RQD=Nil
			R4	CR=24% RQD=Nil
			R5	CR=21% RQD=Nil
10.25m. Highly weathered, light whitish grey, medium grained, highly to moderately fractured rock.			R6	CR=23% RQD=Nil
			R7	CR=28% RQD=Nil
			R8	CR=36% RQD=Nil
			R9	CR=32% RQD=Nil
			R10	CR=40% RQD=Nil
			R11	CR=33% RQD=Nil
14.00m. Highly weathered, light whitish grey, medium grained, moderately fractured rock. 15.00m.			R12	CR=25% RQD=Nil

5.75 → 6.50 → 7.25 → 8.00 → 8.75 → 9.50 → 10.25 → 11.00 → 11.75 → 12.50 → 13.25 → 14.00 → 15.00

N.B. – '*' means sample could not be recovered / sample slip.

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Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 17/04/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.43

Co-ordinates E=-227 N=200

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 10/04/2018
Completion Date : 10/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.719 M.
Water Struck At :
Standing Water Level : 2.80 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium dense, brownish grey, sandy silt with kankar. Observed conch pcs.		9 7 5 (12)	DS-1	0.50
1.50m.			SPT-1	1.00-1.45
Very soft, light grey, clayey silt with sand mixture. Observed conch.		7 1 1 (2)	*UDS-1	2.00-2.45
			SPT-2	2.50-2.95
			UDS-2	3.50-3.95
		3 1 1 (2)	SPT-3	4.00-4.45
4.90m.		31 69 (>100) 2.0 cm Pentn.	SPT-4	5.05-5.22
Very dense, light grey, silty sand with decomposed rock. Observed conch 5.50m. pcs.		100 2.0 cm Pentn. Refusal	*SPT-5	5.40-5.42
		100 2.0 cm Pentn. Refusal	*SPT-6	5.50-5.52
		NX rotary drilling from 5.50m to 15.00m	R1	CR=27%/RQD=0
			R2	CR=25% RQD=Nil
			R3	CR=31% RQD=Nil
			R4	CR=31% RQD=Nil
Highly weathered, deep grey, coarse grained, fractured rock.			R5	CR=25% RQD=Nil
			R6	CR=31% RQD=Nil
10.75m.			R7	CR=29% RQD=Nil
Highly/moderately weathered, light grey, medium to fine grained, fractured rock.			R8	CR=41% RQD=Nil
			R9	CR=41% RQD=Nil
			R10	CR=32% RQD=Nil
			R11	CR=33% RQD=Nil
13.75m.			R12	CR=24% RQD=Nil
Highly weathered, light grey, medium to fine grained, fractured rock.			R13	CR=26% RQD=Nil
15.00m.				

5.50 6.25 7.00 7.75 8.50 9.25 10.00 10.75 11.50 12.25 13.00 13.75 14.50 15.00

N.B. - '*' means sample could not be recovered / sample slip.

BH-43/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 17/04/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.44

Co-ordinates E=−191 N=169

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 09/04/2018
Completion Date : 10/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.685 M.
Water Struck At :
Standing Water Level : 2.90 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium dense, brownish grey to light grey, sandy silt. Observed kankar & conch pcs.		15 14 11 (25)	DS−1	0.50
			SPT−1	1.00−1.45
1.60m.				
Very loose, light grey, silty sand. Observed kankar & conch.		1 1 0 (1)	*UDS−1	2.00−2.45
			SPT−2	2.50−2.95
		1 1 1 (2)	UDS−2	3.50−3.95
4.50m.			SPT−3	4.00−4.45
Very dense, light grey, silty sand with decomposed rock. Observed conch pcs.		7 27 66 (>100) 10.0 cm Pentn.	SPT−4	5.05−5.45
		100 2.0 cm Pentn. Refusal	*SPT−5	5.60−5.62
5.70m.		100 2.0 cm Pentn. Refusal	*SPT−6	5.70−5.72
		NX rotary drilling from 5.70m to 20.00m	R1	CR=40%/RQD=0
			R2	CR=27% RQD=Nil
			R3	CR=25% RQD=Nil
			R4	CR=28% RQD=Nil
Highly weathered, deep grey, coarse to medium grained, fractured rock.			R5	CR=21% RQD=Nil
			R6	CR=28% RQD=Nil
			R7	CR=27% RQD=Nil
			R8	CR=36% RQD=Nil
			R9	CR=33% RQD=Nil
12.00m.			R10	CR=23% RQD=Nil
Highly weathered, deep grey, medium grained, fractured rock.			R11	CR=21% RQD=Nil
14.25m.			R12	CR=21% RQD=Nil
			R13	CR=27% RQD=Nil
			R14	CR=24% RQD=Nil
Highly weathered, light to whitish grey, medium to fine grained, fractured rock. Observed reddish spots.			R15	CR=25% RQD=Nil
			R16	CR=26% RQD=Nil
			R17	CR=23% RQD=Nil
			R18	CR=27% RQD=16%
			R19	CR=23% RQD=Nil
N.B. − '*' means sample could not be recovered / sample slip.			R20	CR=26% RQD=Nil
20.00m.				

5.70 6.00 6.75 7.50 8.25 9.00 9.75 10.50 11.25 12.00 12.75 13.50 14.25 15.00 15.75 16.50 17.25 18.00 18.75 19.50 20.00

BH−44/Sheet−1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 27/04/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.45

Co-ordinates E=-83 N=200

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 17/04/2018
Completion Date : 17/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.859 M.
Water Struck At :
Standing Water Level : 2.8 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Loose, light grey, silty sand. Observed kankar & conch pcs.		7 5 4 (9)	DS-1	0.50
			SPT-1	1.00-1.45
1.60m. Very soft to soft, light grey, clayey silt with sand mixture. Observed conch.		1 0 1 (1)	UDS-1	2.00-2.45
			SPT-2	2.50-2.95
			*UDS-2	3.50-3.95
		2 2 1 (3)	SPT-3	4.05-4.50
4.70m. Very dense, light grey, silty sand with decomposed rock.		12 17 71 (>100) 4.0 cm Pentn.	SPT-4	5.00-5.34
		100 4.0 cm Pentn. Refusal	*SPT-5	5.50-5.54
5.60m. Highly weathered, whitish grey, coarse grained, highly to moderately fractured rock.		00 3.0 cm Pentn. Refusal	*SPT-6	5.60-5.63
6.25m.		NX rotary drilling from 5.60m to 15.00m	R1	CR=32% RQD=Nil 5.60-6.25
			R2	CR=39% RQD=Nil 6.25-7.00
Highly weathered, light grey, coarse to medium grained, moderately fractured rock.			R3	CR=28% RQD=Nil 7.00-7.75
			R4	CR=36% RQD=Nil 7.75-8.50
			R5	CR=29% RQD=Nil 8.50-9.25
			R6	CR=32% RQD=Nil 9.25-10.00
10.00m. Highly to moderately weathered, whitish grey, medium grained, highly to moderately fractured rock.			R7	CR=29% RQD=Nil 10.00-10.75
			R8	CR=36% RQD=Nil 10.75-11.50
			R9	CR=28% RQD=Nil 11.50-12.25
			R10	CR=48% RQD=Nil 12.25-13.00
13.00m. Highly/moderately weathered, light brownish grey, medium grained, moderately fractured rock.			R11	CR=49% RQD=Nil 13.00-13.75
			R12	CR=35% RQD=Nil 13.75-14.25
			R13	CR=36% RQD=Nil 14.25-15.00
N.B. - '*' means sample could not be recovered / sample slip. 15.00m.				

BH-45/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 17/04/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.46

Co-ordinates E=−11 N=200

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	11	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	11
Vane (V)		Disturbed (DS)	2
		Water Sample (WS)	0

Commencement Date : 03/04/2018
Completion Date : 05/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.925 M.
Water Struck At :
Standing Water Level : 2.65 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Medium dense, brownish grey, silty sand. Observed conch & clay binder.		11 7 4 (11)	DS−1	0.50
			SPT−1	1.00−1.45
2.00m. Very soft, light grey, clayey silt with sand mixture.		2 1 1 (2)	UDS−1	2.00−2.45
			SPT−2	2.50−2.95
			*UDS−2	3.50−3.95
4.40m. Very dense, light grey, silty sand. Observed conch & rock pcs.		1 1 2 (3)	SPT−3	4.05−4.50
		16 27 57 (>100) 11.0 cm Pentn.	*UDS−3	5.00−5.10
		100 3.0 cm Pentn. Refusal	SPT−4	5.40−5.81
6.00m. Completely weathered, light grey, coarse grained, highly fractured rock.		100 2.0 cm Pentn. Refusal	*SPT−5	5.90−5.93
			*SPT−6	6.00−6.02
			R1	CR=17%/RQD=0
6.75m. Highly weathered, light grey, coarse to medium grained, moderately fractured rock.		50 3.0 cm Pentn. Refusal	*SPT−7	6.75−6.78
			R2	CR=24%/RQD=0
		NX rotary drilling from 6.00m to 20.00m	R3	CR=27% RQD=Nil
			R4	CR=22% RQD=Nil
9.00m. Highly weathered, light grey, coarse to medium grained, moderately fractured rock.			R5	CR=26% RQD=Nil
			R6	CR=28% RQD=Nil
			R7	CR=29% RQD=Nil
11.25m. Highly weathered, light grey, fine to medium grained, highly to moderately fractured rock.			R8	CR=31% RQD=Nil
			R9	CR=34% RQD=Nil
			R10	CR=38% RQD=Nil
13.50m. Completely weathered, light grey, medium grained, highly fractured rock.			R11	CR=21% RQD=Nil
			R12	CR=14%/RQD=0
		50 3.0 cm Pentn. Refusal	*SPT−8	15.00−15.03
			R13	CR=15%/RQD=0
15.75m. Completely weathered, light grey, fine grained, fully decomposed & disintegrated rock particles collected as sludge sample.		50 3.0 cm Pentn. Refusal	*SPT−9	15.75−15.78
			R14	CR=7%/RQD=0
		50 2.0 cm Pentn. Refusal	*SPT−10	16.50−16.52
			R15/DS−2	CR=Nil
17.25m. Highly weathered, light whitish grey, medium to coarse grained, highly to moderately farctured rock. N.B. − '*' means sample could not be recovered / sample slip.		50 3.0 cm Pentn. Refusal	*SPT−11	17.25−17.28
			R16	CR=21%/RQD=0
			R17	CR=30% RQD=Nil
			R18	CR=21% RQD=Nil
20.00m.			R19	CR=24% RQD=Nil

6.00 7.50 8.25 9.00 9.75 10.50 11.25 12.00 12.75 13.50 14.25 15.00 15.75 16.50 17.25 18.00 18.75 19.50 20.00

BH−46/Sheet−1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 27/04/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.47

Co-ordinates E=107 N=206

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	9	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	9
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 19/04/2018
Completion Date : 20/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.777 M.
Water Struck At :
Standing Water Level : 2.78 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium dense, light grey, silty sand. Observed kankar & conch pcs.		10 6 5 (11)	DS-1	0.50
			SPT-1	1.00-1.45
1.50m.				
Very soft, light grey, clayey silt with high % of sand mixture.		0 0 1 (1)	UDS-1	2.00-2.45
			SPT-2	2.51-2.96
			*UDS-2	3.50-3.95
		1 1 1 (2)	SPT-3	4.05-4.50
4.50m.				
Very dense, light grey, silty sand with decomposed rock.		100 12.0 cm Pentn. >100 100 4.0 cm Pentn. Refusal Refusal	SPT-4 *SPT-5 *SPT-6	4.70-4.82 4.90-4.94 5.00-5.03 5.00
5.00m.				
		00 3.0 cm Pentn.	R1	CR=21% RQD=Nil 5.75
		NX rotary drilling from 5.00m to 15.00m	R2	CR=22% RQD=Nil 6.50
			R3	CR=21% RQD=Nil 7.25
Completely to highly weathered, light grey, medium to coarse grained, highly to moderately fractured rock.			R4	CR=11% RQD=Nil
		Refusal 50 3.0 cm Pentn. Refusal	*SPT-7 R5	8.00-8.03 8.00 CR=15% RQD=Nil
		50 4.0 cm Pentn. Refusal	*SPT-8 R6	8.75-8.79 8.75 CR=17% RQD=Nil
		50 2.0 cm Pentn.	*SPT-9 R7	9.50-9.52 9.50 CR=21% RQD=Nil
10.25m.				10.25
Highly weathered, light brownish grey, coarse grained, fractured rock.			R8	CR=23% RQD=Nil
11.00m.				11.00
Highly to moderately weathered, light brownish grey, coarse grained, fractured rock.			R9	CR=39% RQD=18% 11.75
			R10	CR=41% RQD=13% 12.50
12.50m.				
Highly weathered, light grey, coarse grained, moderately fractured rock.			R11	CR=25% RQD=Nil 13.25
13.25m.				
Highly weathered, light grey, coarse grained, moderately fractured rock.			R12	CR=26% RQD=Nil 14.00
14.00m.				
Highly weathered, light grey, medium grained, highly to moderately fractured rock.			R13	CR=32% RQD=Nil 15.00
N.B. - '*' means sample could not be recovered / sample slip. 15.00m.				

BH-47/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 17/04/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.48

Co-ordinates E=−47 N=169

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 05/04/2018
Completion Date : 06/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.863 M.
Water Struck At :
Standing Water Level : 2.78 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium dense, light grey, silty sand. Observed kankar & mica.		8 8 8 (16)	DS−1	0.50
1.50m.			SPT−1	1.00−1.45
Loose to medium dense, light grey, silty sand. Observed kankar & conch pcs.		3 3 4 (7)	UDS−1	2.00−2.45
			SPT−2	2.55−3.00
		7 8 10 (18)	*UDS−2	3.50−3.95
			SPT−3	4.00−4.45
4.60m.				
Very dense, light grey, silty sand with kankar, mica & conch pcs. Observed decomposed rock.		15 35 50 (≥100) 10.0 cm Pentn.	SPT−4	5.00−5.40
		100 4.0 cm Pentn. Refusal	*SPT−5	5.60−5.64
5.80m.		100 3.0 cm Pentn. Refusal	*SPT−6	5.80−5.83
		NX rotary drilling from 5.80m to 20.00m	R1	CR=30%/RQD=0 (5.80–6.50)
			R2	CR=36% RQD=Nil (6.50–7.25)
Highly/moderately weathered, brownish grey to light grey, medium to coarse grained, moderately fractured rock.			R3	CR=38% RQD=Nil (7.25–8.00)
			R4	CR=39% RQD=Nil (8.00–8.75)
			R5	CR=36% RQD=Nil (8.75–9.50)
			R6	CR=43% RQD=Nil (9.50–10.25)
			R7	CR=36% RQD=Nil (10.25–11.00)
11.00m.			R8	CR=35% RQD=Nil (11.00–11.75)
			R9	CR=34% RQD=Nil (11.75–12.50)
			R10	CR=38% RQD=Nil (12.50–13.25)
			R11	CR=34% RQD=Nil (13.25–14.00)
			R12	CR=30% RQD=Nil (14.00–14.75)
Highly weathered, light grey, medium to fine grained, highly fractured rock.			R13	CR=28% RQD=13% (14.75–15.50)
			R14	CR=29% RQD=Nil (15.50–16.25)
			R15	CR=38% RQD=Nil (16.25–17.00)
			R16	CR=40% RQD=Nil (17.00–17.75)
			R17	CR=40% RQD=Nil (17.75–18.50)
			R18	CR=38% RQD=Nil (18.50–19.25)
			R19	CR=40% RQD=Nil (19.25–20.00)
N.B. − '*' means sample could not be recovered / sample slip. 20.00m.				

BH−48/Sheet−1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 17/04/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.49

Co-ordinates E=−47 N=123

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	8	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	8
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 07/04/2018
Completion Date : 08/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.821 M.
Water Struck At :
Standing Water Level : 2.88 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium dense, light grey, silty sand. Observed kankar, mica & conch pcs.		7 8 8 — 16	DS−1	0.50
			SPT−1	1.00−1.45
1.60m.				
Loose to medium dense, light grey, silty sand with mica & conch pcs. Observed clay binder.		1 2 3 — 5	UDS−1	2.00−2.45
			SPT−2	2.50−2.95
		4 8 11 — 19	*UDS−2	3.50−3.95
			SPT−3	4.00−4.45
4.60m.				
Very dense, light grey, silty sand with mica & conch pcs. Observed decomposed rock.		45 55 — >100 (10.0 cm Pentn.)	SPT−4	5.00−5.25
		100 4.0 cm Pentn. Refusal	*SPT−5	5.50−5.54
5.60m.		100 3.0 cm Pentn. Refusal	*SPT−6	5.60−5.63
		100 Refusal	R1	CR=14%/RQD=0
Completely to highly weathered, light to brownish grey, medium to coarse grained, highly fractured rock.		2.0 cm Pentn.	*SPT−7	6.25−6.27
		100 Refusal	R2	CR=17%/RQD=0
		3.0 cm Pentn.	*SPT−8	7.00−7.03
			R3	CR=22%/RQD=0
7.75m.		NX rotary drilling from 5.60m to 20.00m		
			R4	CR=26% RQD=Nil
			R5	CR=29% RQD=Nil
Highly weathered, light to brownish grey, medium to coarse grained, highly fractured rock.			R6	CR=36% RQD=Nil
			R7	CR=28% RQD=Nil
			R8	CR=34% RQD=Nil
11.50m.			R9	CR=40% RQD=Nil
			R10	CR=38% RQD=Nil
			R11	CR=40% RQD=Nil
			R12	CR=26% RQD=Nil
			R13	CR=29% RQD=13%
Highly weathered, light grey, medium to fine grained, highly fractured rock.			R14	CR=33% RQD=Nil
			R15	CR=28% RQD=Nil
			R16	CR=30% RQD=15%
			R17	CR=36% RQD=Nil
			R18	CR=36% RQD=Nil
N.B. − '*' means sample could not be recovered / sample slip.			R19	CR=31% RQD=Nil
20.00m.				

5.60 | 6.25 | 7.00 | 7.75 | 8.50 | 9.25 | 10.00 | 10.75 | 11.50 | 12.25 | 13.00 | 13.75 | 14.50 | 15.25 | 16.00 | 16.75 | 17.50 | 18.25 | 19.00 | 20.00

BH−49/Sheet−1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 09/05/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.50

Co-ordinates E=-155 N=121

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 23/04/2018
Completion Date : 25/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.646 M.
Water Struck At :
Standing Water Level : 2.95 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Loose, light grey, silty sand with clay binder. Observed kankar & conch pcs.		4 5 4 (9)	DS-1	0.50
1.50m.			SPT-1	1.00-1.45
Soft to medium, light grey, clayey silt with sand mixture.		1 1 2 (3)	*UDS-1	2.00-2.45
			SPT-2	2.50-2.95
			*UDS-2	3.50-3.95
4.00m. Medium dense, light grey, clayey sandy silt with conch pcs.		8 10 13 (23)	SPT-3	4.00-4.45
4.70m.		30 70 5.0 cm Pentn. >100	SPT-4	4.70-4.90
Very dense, light grey, silty sand with decomposed rock. 5.10m.		100 4.0 cm Pentn. Refusal	*SPT-5	5.00-5.04
			*SPT-6	5.10-5.13
Highly weathered, light grey, coarse to medium grained, fractured rock. 6.50m.		100 3.0 cm Pentn.	R1	CR=22%/RQD=0
		NX rotary drilling from 5.10m to 40.00m	R2	CR=21% RQD=Nil
			R3	CR=26% RQD=Nil
Highly weathered, light grey, coarse to medium grained, fractured rock.			R4	CR=31% RQD=Nil
			R5	CR=29% RQD=16%
8.75m.			R6	CR=22% RQD=Nil
Highly weathered, light grey, coarse to medium grained, fractured rock.			R7	CR=26% RQD=Nil
			R8	CR=25% RQD=Nil
11.00m. Highly weathered, light grey, coarse to medium grained, fractured rock. 11.75m.			R9	CR=29% RQD=Nil
			R10	CR=40% RQD=Nil
			R11	CR=48% RQD=Nil
			R12	CR=52% RQD=Nil
			R13	CR=44% RQD=Nil
			R14	CR=40% RQD=Nil
Highly to moderately weathered, light whitish grey, medium grained, fractured rock.			R15	CR=39% RQD=Nil
			R16	CR=39% RQD=Nil
			R17	CR=30% RQD=Nil
			R18	CR=40% RQD=Nil
			R19	CR=31% RQD=Nil
20.10m.			R20	CR=33% RQD=Nil

5.10 5.75 6.50 7.25 8.00 8.75 9.50 10.25 11.00 11.75 12.50 13.25 14.00 14.75 15.50 16.25 17.00 17.75 18.50 19.25 20.00

BH-50/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 09/05/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.50

Co-ordinates E=-155 N=121

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 23/04/2018
Completion Date : 25/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.646 M.
Water Struck At :
Standing Water Level : 2.95 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
20.10m.			R21	CR=38% RQD=Nil — 20.75
			R22	CR=33% RQD=Nil — 21.50
			R23	CR=35% RQD=Nil — 22.25
			R24	CR=33% RQD=Nil — 23.00
			R25	CR=35% RQD=Nil — 23.75
			R26	CR=37% RQD=Nil — 24.50
			R27	CR=34% RQD=Nil — 25.25
Highly to moderately weathered, light whitish grey, medium grained, fractured rock.			R28	CR=36% RQD=Nil — 26.00
			R29	CR=33% RQD=Nil — 26.75
			R30	CR=34% RQD=Nil — 27.50
			R31	CR=30% RQD=Nil — 28.25
			R32	CR=28% RQD=Nil — 29.00
			R33	CR=32% RQD=Nil — 29.75
			R34	CR=35% RQD=Nil — 30.50
			R35	CR=37% RQD=Nil — 31.25
32.00m.			R36	CR=48% RQD=Nil — 32.00
			R37	CR=35% RQD=Nil — 32.75
			R38	CR=32% RQD=Nil — 33.50
			R39	CR=37% RQD=Nil — 34.25
			R40	CR=38% RQD=Nil — 35.00
Highly to moderately weathered, yellowish grey, medium grained, light fractured rock.			R41	CR=41% RQD=Nil — 35.75
			R42	CR=43% RQD=21% — 36.50
			R43	CR=45% RQD=20% — 37.25
			R44	CR=47% RQD=22% — 38.00
			R45	CR=49% RQD=Nil — 39.00
39.00m.			R46	CR=51% RQD=Nil — 40.00
Moderately weathered, yellowish grey, medium grained, light fractured rock. 40.00m.				

N.B. - '*' means sample could not be recovered / sample slip.

BH-50/Sheet-2

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 19/04/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.51

Co-ordinates E=-191 N=123

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	7
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 08/04/2018
Completion Date : 09/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.500 M.
Water Struck At :
Standing Water Level : 2.85 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Loose, brownish grey, silty sand with traces of kankar. Observed conch pcs. & clay binder.		8 6 3 (9)	DS-1	0.50
			SPT-1	1.00-1.45
1.55m. Soft to medium, light grey, clayey silt with sand mixture.		1 0 1 (1)	*UDS-1	2.00-2.45
			SPT-2	2.50-2.95
			UDS-2	3.50-3.95
Loose to medium dense, light grey, sandy silt / silty sand. Observed kankar & conch.		2 1 3 (4)	SPT-3	4.05-4.50
4.50m.		6 10 7 (17)	SPT-4	4.60-5.05
5.05m. Very dense, light grey, silty sand with decomposed rock. Observed conch pcs.		100 5.0 cm Pentn. Refusal	SPT-5	5.20-5.25
		100 2.0 cm Pentn. Refusal	*SPT-6	5.40-5.42
5.50m.		Refusal	*SPT-7	5.50-5.52
		100 2.0 cm Pentn.	R1	CR=34%/RQD=0
		NX rotary drilling from 5.50m to 20.00m	R2	CR=35% RQD=Nil
			R3	CR=41% RQD=Nil
Highly/moderately weathered, deep grey, coarse to medium grained, fractured rock.			R4	CR=29% RQD=Nil
			R5	CR=38% RQD=Nil
			R6	CR=36% RQD=Nil
			R7	CR=31% RQD=Nil
10.75m.			R8	CR=29% RQD=Nil
			R9	CR=29% RQD=Nil
			R10	CR=32% RQD=Nil
			R11	CR=29% RQD=Nil
			R12	CR=33% RQD=Nil
Highly to moderately weathered, whitish grey, medium to fine grained, fractured rock.			R13	CR=31% RQD=Nil
			R14	CR=28% RQD=Nil
			R15	CR=32% RQD=Nil
			R16	CR=34% RQD=Nil
			R17	CR=32% RQD=Nil
			R18	CR=37% RQD=Nil
N.B. - '*' means sample could not be recovered / sample slip.			R19	CR=42% RQD=Nil
20.00m.				

6.25 7.00 7.75 8.50 9.25 10.00 10.75 11.50 12.25 13.00 13.75 14.50 15.25 16.00 16.75 17.50 18.25 19.00 20.00

BH-51/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 03/05/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.52

Co-ordinates E=-227 N=116

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	10	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	10
Vane (V)		Disturbed (DS)	5
		Water Sample (WS)	0

Commencement Date : 21/04/2018
Completion Date : 23/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.543 M.
Water Struck At :
Standing Water Level : 2.90 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Medium dense, light grey, silty sand. Observed kankar.		4 6 5 (11)	DS-1	0.50
			SPT-1	1.00-1.45
1.50m. Loose, light to brownish grey, silty sand with conch pcs. Observed kankar & clay binder.		2 2 3 (5)	*UDS-1	2.00-2.45
			SPT-2	2.50-2.95
			*UDS-2	3.50-3.95
4.00m. Medium dense, light grey, silty sand with kankar & conch pcs. Observed decomposed rock.		7 10 12 (22)	SPT-3	4.00-4.45
		42 56 5.0 cm Pentn. >100	SPT-4	4.80-5.00
4.80m.		100 4.0 cm Pentn. Refusa	*SPT-5	5.10-5.14
5.20m. Very dense, light grey, silty sand with kankar & conch pcs. Observed decomposed rock.		100 3.0 cm Pentn. Refusa	*SPT-6	5.20-5.23
6.00m. Highly weathered, brownish grey, medium grained, highly fractured rock.		NX rotary drilling from 5.20m to 40.00m	R1	CR=24%/RQD=15% 5.20
			R2	CR=26% RQD=Nil 6.00
			R3	CR=35% RQD=Nil 6.75
			R4	CR=31% RQD=Nil 7.50
			R5	CR=32% RQD=Nil 8.25
			R6	CR=38% RQD=Nil 9.00
Highly weathered, brownish grey, medium to coarse grained, highly fractured rock.			R7	CR=40% RQD=Nil 9.75
			R8	CR=33% RQD=Nil 10.50
			R9	CR=32% RQD=Nil 11.25
			R10	CR=38% RQD=Nil 12.00
			R11	CR=33% RQD=Nil 12.75
13.50m. Highly weathered, light grey, medium to fine grained, highly fractured rock.			R12	CR=29% RQD=Nil 13.50
			R13	CR=35% RQD=20% 14.25
			R14	CR=26% RQD=Nil 15.00
15.75m. Highly weathered, light grey, medium to fine grained, highly fractured rock.			R15	CR=24% RQD=Nil 15.75
16.50m.			R16	CR=28% RQD=Nil 16.50
			R17	CR=33% RQD=Nil 17.25
Highly weathered, light grey, medium to fine grained, highly fractured rock.			R18	CR=30% RQD=Nil 18.00
			R19	CR=31% RQD=Nil 18.75
20.10m.			R20	CR=31% RQD=Nil 19.50

BH-52/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 03/05/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.52

Co-ordinates E=-227 N=116

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	10	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	10
Vane (V)		Disturbed (DS)	5
		Water Sample (WS)	0

Commencement Date : 21/04/2018
Completion Date : 23/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.543 M.
Water Struck At :
Standing Water Level : 2.90 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
20.10m.				20.25
			R21	CR=36% RQD=Nil
			R22	CR=27% RQD=Nil 21.00
			R23	CR=32% RQD=Nil 21.75
			R24	CR=33% RQD=Nil 22.50
Highly weathered, light grey, medium to fine grained, highly fractured rock.			R25	CR=34% RQD=Nil 23.25
			R26	CR=28% RQD=Nil 24.00
			R27	CR=26% RQD=Nil 24.75
			R28	CR=33% RQD=Nil 25.50
			R29	CR=34% RQD=Nil 26.25
27.00m.		>100		27.00
		35 65 10.0 cm Pentn.	R30/DS-2	CR=0/RQD=0
			SPT-7	27.75-28.00 27.75
		>100	R31/DS-3	CR=0/RQD=0
Completely weathered, brownish grey, medium grained, fully decomposed & disintegrated rock particles collected as sludge sample.		30 35 35 3.0 cm Pentn.	SPT-8	28.50-28.83 28.50
		>100	R32/DS-4	CR=0/RQD=0
		32 30 48 10.0 cm Pentn.	SPT-9	29.25-29.65 29.25
		Refusal	R33/DS-5	CR=0/RQD=0
			*SPT-10	30.00-30.03 30.00
		100	R34/DS-6	CR=0/RQD=0
30.75m.		3.0 cm Pentn.		30.75
			R35	CR=30% RQD=Nil
			R36	CR=38% RQD=18% 31.50
			R37	CR=40% RQD=Nil 32.25
			R38	CR=36% RQD=Nil 33.00
			R39	CR=33% RQD=Nil 33.75
Highly weathered, light grey, medium to fine grained, highly fractured rock.			R40	CR=31% RQD=Nil 34.50
			R41	CR=29% RQD=Nil 35.25
			R42	CR=26% RQD=Nil 36.00
			R43	CR=27% RQD=Nil 36.75
			R44	CR=35% RQD=Nil 37.50
			R45	CR=29% RQD=16% 38.25
			R46	CR=35% RQD=18% 39.00
N.B. - '*' means sample could not be recovered / sample slip. 40.00m.				40.00

BH-52/Sheet-2

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 19/04/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.53

Co-ordinates E=−191 N=78

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 05/04/2018
Completion Date : 07/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.552 M.
Water Struck At :
Standing Water Level : 2.77 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium dense, light grey, silty sand to sandy silt with conch pcs. Observed kankar & clay binder.		11 13 12 (25)	DS−1	0.50
			SPT−1	1.00−1.45
2.40m.			*UDS−1	2.00−2.45
Soft to medium, light grey, clayey silt with sand mixture.		0 1 0 (1)	SPT−2	2.50−2.95
			UDS−2	3.50−3.95
4.00m.		6 13 81 (>100)	SPT−3	4.05−4.45
Very dense, light grey, silty sand with decomposed rock.		10.0 cm Pentn.	*SPT−4	4.60−4.62
4.80m.		100 2.0 cm Pentn. Refusa Refusal	*SPT−5	4.80−4.82
Highly weathered, deep grey, coarse grained, fractured rock.		00 2.0 cm Penth. NX rotary drilling from 4.80m to 20.00m	R1	CR=24%/RQD=0
6.25m.			R2	CR=23% RQD=Nil
			R3	CR=28% RQD=Nil
Highly weathered, deep grey, coarse grained, fractured rock.			R4	CR=30% RQD=Nil
			R5	CR=38% RQD=Nil
			R6	CR=33% RQD=Nil
			R7	CR=38% RQD=Nil
10.00m.			R8	CR=29% RQD=Nil
Highly/moderately weathered, whitish grey to light grey, medium to fine grained, fractured rock.			R9	CR=27% RQD=Nil
			R10	CR=34% RQD=Nil
			R11	CR=42% RQD=Nil
			R12	CR=29% RQD=Nil
13.75m.			R13	CR=23% RQD=Nil
Highly weathered, light grey, fine grained, fractured rock.			R14	CR=32% RQD=Nil
14.50m.			R15	CR=29% RQD=Nil
Highly weathered, deep grey, coarse to medium grained, fractured rock.			R16	CR=29% RQD=Nil
16.75m.			R17	CR=24% RQD=Nil
Highly weathered, deep grey, coarse to medium grained, fractured rock.			R18	CR=25% RQD=Nil
			R19	CR=27% RQD=Nil
N.B. − '*' means sample could not be recovered / sample slip.			R20	CR=23% RQD=Nil
20.00m.				

4.80 5.50 6.25 7.00 7.75 8.50 9.25 10.00 10.75 11.50 12.25 13.00 13.75 14.50 15.25 16.00 16.75 17.50 18.25 19.00 20.00

BH−53/Sheet−1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 19/04/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.54

Co-ordinates E=−128 N=86

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	1

Commencement Date : 03/04/2018
Completion Date : 05/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.579 M.
Water Struck At :
Standing Water Level : 2.70 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Loose, brownish grey, clayey silty sand.		6 5 4 (9)	DS−1	0.50
			SPT−1	1.00−1.45
1.50m. Very loose, light grey, silty sand. Observed kankar & conch pcs.		0 1 1 (2)	*UDS−1	2.00−2.45
			SPT−2	2.50−2.95
			WS−1	2.70
			UDS−2	3.50−3.95
		1 2 2 (4)	SPT−3	4.00−4.45
5.00m. Very dense, light grey, silty sand with decomposed rock. Observed kankar & conch pcs.		16 84 (>100)	SPT−4	5.20−5.40
		100 4.0 cm Pentn. Refusal	*SPT−5	5.60−5.64
		5.0 cm Pentn. Refusal	*SPT−6	5.80−5.82
5.80m.		100 2.0 cm Pentn.	R1	CR=35%/RQD=0
		NX rotary drilling from 5.80m to 20.00m	R2	CR=34% RQD=Nil
Highly/moderately weathered, deep grey, coarse to medium grained, fractured rock.			R3	CR=28% RQD=Nil
			R4	CR=41% RQD=14%
			R5	CR=37% RQD=Nil
			R6	CR=32% RQD=Nil
			R7	CR=27% RQD=Nil
11.00m. Highly weathered, deep grey, medium grained, fractured rock.			R8	CR=24% RQD=Nil
11.75m. Highly to moderately weathered, whitish grey, fine to medium grained, fractured rock.			R9	CR=33% RQD=Nil
			R10	CR=34% RQD=Nil
			R11	CR=41% RQD=18%
14.00m. Highly weathered, light grey, coarse grained, fractured rock. Observed reddish brown spots.			R12	CR=27% RQD=Nil
			R13	CR=29% RQD=Nil
			R14	CR=28% RQD=Nil
			R15	CR=34% RQD=Nil
			R16	CR=36% RQD=Nil
			R17	CR=53% RQD=Nil
18.50m. Highly weathered, light grey, medium to fine grained, fractured rock.			R18	CR=37% RQD=Nil
N.B. − '*' means sample could not be recovered / sample slip. 20.00m.			R19	CR=38% RQD=13%

5.80 6.50 7.25 8.00 8.75 9.50 10.25 11.00 11.75 12.50 13.25 14.00 14.75 15.50 16.25 17.00 17.75 18.50 19.25 20.00

BH−54/Sheet−1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 19/04/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.55

Co-ordinates E=−83 N=94

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 03/04/2018
Completion Date : 05/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.704 m.
Water Struck At :
Standing Water Level : 2.80 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Medium dense, light grey, silty sand. Observed kankar & conch.		15 6 5 (11)	DS−1	0.50
			SPT−1	1.00−1.45
2.00m. Soft to medium, light grey, clayey silt with sand mixture.		1 2 3 (5)	UDS−1	2.00−2.45
			SPT−2	2.50−2.95
			*UDS−2	3.50−3.95
		2 3 3 (6)	SPT−3	4.00−4.45
4.60m. Very dense, light to brownish grey, silty sand with kankar, mica & conch pcs. Observed decomposed rock.		16 25 59 (>100)	SPT−4	5.00−5.35
		5.0 cm Pentn.	*SPT−5	5.50−5.54
5.70m.		100 4.0 cm Pentn. Refusal	*SPT−6	5.70−5.73
		Refusal	R1	CR=26%/RQD=0
		100 3.0 cm Pentn.	R2	CR=34% RQD=Nil
Highly weathered, brownish grey, medium to coarse grained, highly fractured rock.		NX rotary drilling from 5.70m to 20.00m	R3	CR=36% RQD=Nil
			R4	CR=30% RQD=Nil
			R5	CR=28% RQD=Nil
			R6	CR=26% RQD=Nil
10.25m. Highly to moderately weathered, brownish grey to light grey, medium to fine grained, highly fractured rock.			R7	CR=30% RQD=Nil
			R8	CR=32% RQD=Nil
			R9	CR=40% RQD=Nil
			R10	CR=43% RQD=Nil
			R11	CR=40% RQD=26%
			R12	CR=41% RQD=Nil
			R13	CR=38% RQD=Nil
			R14	CR=33% RQD=Nil
			R15	CR=34% RQD=Nil
			R16	CR=40% RQD=Nil
			R17	CR=42% RQD=15%
			R18	CR=48% RQD=Nil
			R19	CR=44% RQD=Nil
20.00m. N.B. − '*' means sample could not be recovered / sample slip.				

5.70 6.50 7.25 8.00 8.75 9.50 10.25 11.00 11.75 12.50 13.25 14.00 14.75 15.50 16.25 17.00 17.75 18.50 19.25 20.00

BH−55/Sheet−1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 09/05/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.56

Co-ordinates E=−47 N=78

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 25/04/2018
Completion Date : 26/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.709 M.
Water Struck At :
Standing Water Level : 2.85 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Medium dense, light grey, silty sand. Observed kankar.		5 7 6 (13)	DS−1	0.50
			SPT−1	1.00−1.45
2.45m. Loose to medium dense, brownish grey, clayey silty sand with kankar & conch pcs. Observed mica.		1 2 3 (5)	*UDS−1	2.00−2.45
			SPT−2	2.50−2.95
			*UDS−2	3.50−3.95
		5 6 8 (14)	SPT−3	4.00−4.45
4.60m. Very dense, light grey, silty sand with mica, kankar & conch pcs. Observed decomposed rock. 5.30m.		45 55 5.0 cm Pentn. >100 Refusal	SPT−4	4.70−4.90
		100 4.0 cm Pentn. Refusal	*SPT−5	5.10−5.14
			*SPT−6	5.30−5.33
		100 3.0 cm Pentn.	R1	CR=24%/RQD=0 (5.30−6.00)
			R2	CR=26% RQD=Nil (6.00−6.75)
Highly weathered, brownish grey, medium to coarse grained, highly fractured rock.		NX rotary drilling from 5.30m to 20.00m	R3	CR=24% RQD=Nil (6.75−7.50)
			R4	CR=26% RQD=Nil (7.50−8.25)
			R5	CR=22% RQD=Nil (8.25−9.00)
9.00m. Highly weathered, brownish grey, medium to coarse grained, highly fractured rock.			R6	CR=26% RQD=Nil (9.00−9.75)
			R7	CR=33% RQD=Nil (9.75−10.50)
10.50m. Highly weathered, light to brownish grey, medium to fine grained, highly fractured rock.			R8	CR=33% RQD=Nil (10.50−11.25)
			R9	CR=26% RQD=Nil (11.25−12.00)
			R10	CR=28% RQD=Nil (12.00−12.75)
			R11	CR=38% RQD=Nil (12.75−13.50)
			R12	CR=29% RQD=Nil (13.50−14.25)
			R13	CR=27% RQD=Nil (14.25−15.00)
			R14	CR=34% RQD=Nil (15.00−15.75)
			R15	CR=29% RQD=Nil (15.75−16.50)
			R16	CR=28% RQD=Nil (16.50−17.25)
17.25m. Highly weathered, light to brownish grey, medium to fine grained, highly fractured rock.			R17	CR=24% RQD=13% (17.25−18.00)
18.00m. Highly weathered, light to brownish grey, medium to fine grained, highly fractured rock.			R18	CR=28% RQD=13% (18.00−18.75)
			R19	CR=29% RQD=Nil (18.75−19.50)
N.B. − '*' means sample could not be recovered / sample slip. 20.00m.			R20	CR=30% RQD=16% (19.50−20.00)

BH−56/Sheet−1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 03/05/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.57

Co-ordinates E=−11 N=92

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	2
		Water Sample (WS)	0

Commencement Date : 19/04/2018
Completion Date : 21/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.789 M.
Water Struck At :
Standing Water Level : 2.95 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium dense, light grey, clayey sandy silt with conch pcs.		4 5 7 (12)	DS−1	0.50
			SPT−1	1.00−1.45
2.05m.				
Soft to medium, light grey, clayey silt with sand mixture.		1 2 3 (5)	UDS−1	2.05−2.50
			SPT−2	2.50−2.95
			DS−2	3.50
		1 2 2 (4)	SPT−3	4.00−4.45
4.90m.				
Very dense, light grey, silty sand with decomposed rock.		100 10.0 cm Pentn. >100 100 2.0 cm Pentn. Refusal Refusal	SPT−4 *SPT−5 *SPT−6	4.90−5.00 5.10−5.12 5.25−5.27
5.25m.				5.25
		100 2.0 cm Pentn.	R1	CR=27%/RQD=0
		NX rotary drilling from 5.25m to 40.00m	R2	CR=35% RQD=Nil 6.00
			R3	CR=30% RQD=Nil 6.75
			R4	CR=32% RQD=Nil 7.50
Highly weathered, light grey, coarse to medium grained, fractured rock.			R5	CR=29% RQD=Nil 8.25
			R6	CR=35% RQD=Nil 9.00
			R7	CR=33% RQD=Nil 9.75
			R8	CR=28% RQD=Nil 10.50
11.25m.				
Highly weathered, light grey, medium grained, fractured rock.			R9	CR=25% RQD=Nil 11.25
12.00m.				
			R10	CR=29% RQD=Nil 12.00
			R11	CR=32% RQD=Nil 12.75
			R12	CR=27% RQD=Nil 13.50
Highly weathered, light whitish grey, medium grained, fractured rock.			R13	CR=32% RQD=Nil 14.25
			R14	CR=30% RQD=Nil 15.00
			R15	CR=27% RQD=Nil 15.75
			R16	CR=28% RQD=Nil 16.50
17.25m.				
			R17	CR=25% RQD=Nil 17.25
			R18	CR=22% RQD=Nil 18.00
Highly weathered, light whitish grey, medium grained, fractured rock.			R19	CR=27% RQD=Nil 18.75
			R20	CR=23% RQD=Nil 19.50
20.10m.				

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Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 03/05/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.57

Co-ordinates E=−11 N=92

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	2
		Water Sample (WS)	0

Commencement Date : 19/04/2018
Completion Date : 21/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.789 M.
Water Struck At :
Standing Water Level : 2.95 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
20.10m.				
Highly weathered, light whitish grey, medium grained, fractured rock.			R21	CR=23% RQD=Nil
			R22	CR=25% RQD=Nil
			R23	CR=22% RQD=Nil
			R24	CR=25% RQD=Nil
			R25	CR=25% RQD=Nil
			R26	CR=23% RQD=Nil
			R27	CR=25% RQD=Nil
			R28	CR=26% RQD=Nil
			R29	CR=22% RQD=Nil
			R30	CR=22% RQD=Nil
			R31	CR=24% RQD=Nil
			R32	CR=23% RQD=Nil
			R33	CR=22% RQD=Nil
30.00m.			R34	CR=28% RQD=Nil
Highly weathered, light whitish grey, medium grained, fractured rock.			R35	CR=29% RQD=Nil
31.50m.			R36	CR=31% RQD=Nil
Highly weathered, light whitish grey to light yellowish grey, medium grained, fractured rock.			R37	CR=29% RQD=Nil
			R38	CR=32% RQD=Nil
			R39	CR=35% RQD=Nil
			R40	CR=34% RQD=Nil
			R41	CR=35% RQD=Nil
36.00m.			R42	CR=45% RQD=Nil
Moderately weathered, light yellowish grey, medium grained, fractured rock.			R43	CR=46% RQD=Nil
			R44	CR=47% RQD=Nil
38.25m.			R45	CR=70% RQD=20%
Slightly weathered, light yellowish grey, medium grained, light fractured rock. N.B. − '*' means sample could not be recovered / sample slip.			R46	CR=72% RQD=60%
40.00m.				

20.25 21.00 21.75 22.50 23.25 24.00 24.75 25.50 26.25 27.00 27.75 28.50 29.25 30.00 30.75 31.50 32.25 33.00 33.75 34.50 35.25 36.00 36.75 37.50 38.25 39.00 40.00

BH−57/Sheet−2

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.			CETEST
Job No : 4115	Created by : SKD	Created on : 03/05/2018	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.58

Co-ordinates E=27 N=97

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	7
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 12/04/2018
Completion Date : 13/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.729 M.
Water Struck At :
Standing Water Level : 2.90 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium dense, light grey, silty sand. Observed kankar & conch pcs.		8 6 5 (11)	DS-1	0.50
1.50m.			SPT-1	1.00-1.45
Very loose, light grey, clayey sandy silt. Observed kankar & conch pcs.		1 1 2 (3)	UDS-1	2.00-2.45
			SPT-2	2.50-2.95
		1 2 2 (4)	*UDS-2	3.50-3.95
			SPT-3	4.00-4.45
4.50m.		24 76 6.0 cm Pentn. >100	SPT-4	4.70-4.91
Very dense, light grey, silty sand with decomposed rock.		100 4.0 cm Pentn. Refusa	*SPT-5	5.00-5.04
5.10m.		100 3.0 cm Pentn. Refusa	*SPT-6	5.10-5.13 5.10
		Refusal	R1	CR=15%/RQD=0
		50	*SPT-7	6.00-6.02 6.00
Completely to highly weathered, deep to light grey, coarse to medium grained, moderately to highly fractured rock.		2.0 cm Pentn.	R2	CR=21%/RQD=0
		NX rotary drilling from 5.10m to 15.00m	R3	CR=28% RQD=16% 6.75
			R4	CR=23% RQD=Nil 7.50
8.25m.			R5	CR=29% RQD=16% 8.25
Highly weathered, deep to light grey, coarse to medium grained, moderately to highly fractured rock.			R6	CR=33% RQD=Nil 9.00
9.75m.			R7	CR=24% RQD=Nil 9.75
Highly weathered, deep to light grey, coarse to medium grained, moderately to highly fractured rock.			R8	CR=25% RQD=Nil 10.50
11.25m.			R9	CR=37% RQD=Nil 11.25
Highly weathered, whitish grey to light grey, coarse to medium grained, moderately to highly fractured rock.			R10	CR=34% RQD=Nil 12.00
12.75m.			R11	CR=21% RQD=Nil 12.75
Highly weathered, whitish grey to light grey, coarse to medium grained, moderately to highly fractured rock. 13.50m.			R12	CR=27% RQD=Nil 13.50
Highly weathered, whitish grey to light grey, coarse to medium grained, moderately to highly fractured rock. 15.00m.			R13	CR=33% RQD=Nil 14.25 15.00

N.B. - '*' means sample could not be recovered / sample slip.

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 09/05/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.59

Co-ordinates E=207 N=112

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	11	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	11
Vane (V)		Disturbed (DS)	2
		Water Sample (WS)	0

Commencement Date : 23/04/2018
Completion Date : 24/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.840 M.
Water Struck At :
Standing Water Level : 2.85 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium dense, light grey, silty sand. Observed kankar & conch pcs.		10 7 4 (11)	DS-1	0.50
			SPT-1	1.00-1.45
1.70m.				
Very soft, light grey, clayey silt with high % of sand mixture.		1 0 1 (1)	*UDS-1	2.00-2.45
			SPT-2	2.50-2.95
			*UDS-2	3.50-3.95
		1 2 2 (4)	SPT-3	4.05-4.50
4.50m.		100 12.0 cm Pentn. >100	SPT-4	4.70-4.82
Very dense, light grey, silty sand with decomposed rock.		100 4.0 cm Pentn. Refusal	*SPT-5	4.90-4.94
5.00m.		00 Refusal	*SPT-6	5.00-5.03 5.00
		3.0 cm Pentn.	R1	CR=23%/RQD=0
Highly weathered, light grey, coarse grained, moderately fractured rock.		NX rotary drilling from 5.00m to 15.00m	DS-2 R2	CR=21% RQD=Nil 5.75
6.50m.			R3	CR=11%/RQD=0 6.50
		50 Refusal	*SPT-7	7.25-7.28 7.25
		3.0 cm Pentn.	R4	CR=8%/RQD=0
		50 Refusal	*SPT-8	8.00-8.02 8.00
Completely to highly weathered, light grey, coarse to medium grained, moderately to highly fractured rock.		2.0 cm Pentn.	R5	CR=9%/RQD=0
		50 Refusal	*SPT-9	8.75-8.78 8.75
		3.0 cm Pentn.	R6/DS-2	CR=0/RQD=0
		50 Refusal	*SPT-10	9.50-9.53 9.50
		3.0 cm Pentn.	R7	CR=13%/RQD=0
		50 Refusal	*SPT-11	10.25-10.27 10.25
		2.0 cm Pentn.	R8	CR=21%/RQD=0
11.00m.				11.00
Highly weathered, light brownish grey, medium to coarse grained, moderately fractured rock.			R9	CR=22% RQD=Nil 11.75
12.50m.			R10	CR=26% RQD=Nil 12.50
Highly weathered, light grey, coarse grained, moderately fractured rock.			R11	CR=24% RQD=Nil 13.25
14.00m.			R12	CR=25% RQD=Nil 14.00
Highly weathered, light brownish grey, medium to fine grained, highly fractured rock.			R13	CR=28% RQD=Nil
15.00m.				15.00

N.B. - '*' means sample could not be recovered / sample slip.

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Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 09/05/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.60

Co-ordinates E=207 N=45

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	8	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	8
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 25/04/2018
Completion Date : 25/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.872 M.
Water Struck At :
Standing Water Level : 2.90 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium dense, light grey, silty sand. Observed kankar & conch pcs.		12 11 16 — 27	DS-1	0.50
			SPT-1	1.00-1.45
1.70m.				
Very soft, light grey, clayey silt with high % of sand mixture.		1 1 1 — 2	*UDS-1	2.00-2.45
			SPT-2	2.50-2.95
4.00m.		16 28 50 — >100	UDS-2	3.50-3.95
Very dense, light grey, silty sand. Observed decomposed rock.		100 4.0 cm Pentn. Refusal — 12.0 cm Pentn. Refusal	SPT-3	4.05-4.47
			*SPT-4	4.60-4.64
4.75m.			*SPT-5	4.75-4.78 4.75
		00 — 3.0 cm Pentn.	R1	CR=25%/RQD=0
		NX rotary drilling from 4.75m to 15.00m	R2	CR=24% RQD=Nil 5.50
			R3	CR=26% RQD=Nil 6.25
Completely/highly weathered, light grey, coarse grained, moderately to highly fractured rock.			R4	CR=21% RQD=Nil 7.00
			R5	CR=14%/RQD=0 7.75
		50 — Refusal	*SPT-6	8.50-8.53 8.50
		3.0 cm Pentn.	R6	CR=13%/RQD=0
		50 — Refusal	*SPT-7	9.25-9.27 9.25
		2.0 cm Pentn.	R7	CR=18%/RQD=0
10.00m.		50 — Refusal	*SPT-8	10.00-10.03 10.00
Highly weathered, deep grey, medium to coarse grained, highly to moderately fractured rock.		3.0 cm Pentn.	R8	CR=21%/RQD=0
			R9	CR=23% RQD=Nil 10.75
11.50m.			R10	CR=26% RQD=Nil 11.50
Highly weathered, light brownish grey, medium grained, moderately fractured rock.			R11	CR=27% RQD=Nil 12.25
			R12	CR=32% RQD=Nil 13.00
			R13	CR=33% RQD=Nil 13.75
14.50m.			R14	CR=32% RQD=Nil 14.50
Highly weathered, light reddish brown, medium grained, highly fractured rock. 15.00m.				15.00

N.B. - '*' means sample could not be recovered / sample slip.

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Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.				CETEST
Job No : 4115	Created by : SKD	Created on : 03/05/2018	Sheet No:	

BORE LOG DATA SHEET

BORE HOLE NO.61

Co-ordinates E = 34, N = 30

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 20/04/2018
Completion Date : 22/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.643 M.
Water Struck At :
Standing Water Level : 2.90 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Loose, light grey, silty sand.		8 6 4 (10)	DS-1	0.50
1.50m. Soft, light grey, clayey silt with sand / clayey silty sand. Observed conch pcs.		1 1 1 (2)	SPT-1	1.00-1.45
4.00m. Very dense, light grey, silty sand with decomposed rock.		19 81 (>100) 11.0 cm Pentn.	*UDS-1	2.00-2.45
4.50m. Highly weathered, light grey, medium grained, moderately fractured rock.		100 3.0 cm Pentn. Refusal	SPT-2	2.50-2.95
6.75m. Highly weathered, light grey, to deep grey, coarse grained, fractured rock.		100 2.0 cm Pentn. Refusal	UDS-2	3.50-3.95
10.50m. Highly weathered, deep grey, coarse grained, moderately fractured rock.		NX rotary drilling from 4.50m to 20.00m	SPT-3	4.00-4.26
11.25m. Highly weathered, deep grey, coarse grained, moderately fractured rock.			*SPT-4	4.40-4.43
12.75m. Highly weathered, light grey, medium grained, moderately fractured rock. Observed brownish patches.			*SPT-5	4.50-4.52
14.25m. Highly weathered, light grey, medium grained, highly to moderately fractured rock.			R1	CR=21%/RQD=0
17.25m. Highly weathered, whitish grey, medium grained, moderately fractured rock.			R2	CR=22% RQD=Nil
18.75m. Highly weathered, whitish grey, medium grained, moderately fractured rock.			R3	CR=24% RQD=Nil
N.B. - '*' means sample could not be recovered / sample slip. 20.00m.			R4	CR=25% RQD=Nil
			R5	CR=22% RQD=Nil
			R6	CR=21% RQD=Nil
			R7	CR=21% RQD=15%
			R8	CR=24% RQD=21%
			R9	CR=21% RQD=Nil
			R10	CR=26% RQD=Nil
			R11	CR=27% RQD=Nil
			R12	CR=35% RQD=Nil
			R13	CR=37% RQD=Nil
			R14	CR=21% RQD=Nil
			R15	CR=22% RQD=Nil
			R16	CR=24% RQD=Nil
			R17	CR=22% RQD=Nil
			R18	CR=21% RQD=Nil
			R19	CR=23% RQD=Nil
			R20	CR=29% RQD=Nil
			R21	CR=28% RQD=Nil

4.50 5.25 6.00 6.75 7.50 8.25 9.00 9.75 10.50 11.25 12.00 12.75 13.50 14.25 15.00 15.75 16.50 17.25 18.00 18.75 19.50 20.00

BH-61/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 03/05/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.62

Co-ordinates E=−25 N=53

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 18/04/2018
Completion Date : 20/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.723 M.
Water Struck At :
Standing Water Level : 2.95 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Medium dense, light whitish grey, silty sand. Observed conch pcs.		8 6 6 (12)	DS−1	0.50
			SPT−1	1.00−1.45
1.50m. Very loose, light grey, clayey sandy silt / clayey silty sand. Observed conch pcs. & traces of rock pcs.		1 1 1 (2)	*UDS−1	2.00−2.45
			SPT−2	2.50−2.95
			*UDS−2	3.50−3.95
4.50m. Very dense, light grey, silty sand with decomposed rock.		1 2 2 (4)	SPT−3	4.00−4.45
		17 83 12.0 cm Pentn. >100	SPT−4	4.90−5.17
		100 4.0 cm Pentn. Refusal	*SPT−5	5.30−5.34
5.40m. Highly weathered, light grey, coarse to medium grained, fractured rock.		Refusal 00 2.0 cm Pentn. NX rotary drilling from 5.40m to 20.00m	*SPT−6	5.40−5.42
			R1	CR=25%/RQD=0
			R2	CR=29% RQD=16%
			R3	CR=25% RQD=Nil
7.50m. Highly weathered, light grey, coarse to medium grained, fractured rock.			R4	CR=29% RQD=Nil
			R5	CR=32% RQD=Nil
9.00m. Highly weathered, light grey, coarse to medium grained, fractured rock.			R6	CR=22% RQD=Nil
			R7	CR=23% RQD=Nil
			R8	CR=24% RQD=Nil
			R9	CR=27% RQD=Nil
12.00m. Highly weathered, light grey to light whitish grey, coarse to medium grained, fractured rock.			R10	CR=25% RQD=Nil
			R11	CR=23% RQD=Nil
			R12	CR=24% RQD=Nil
			R13	CR=22% RQD=Nil
			R14	CR=23% RQD=Nil
			R15	CR=24% RQD=Nil
			R16	CR=22% RQD=Nil
			R17	CR=23% RQD=Nil
			R18	CR=25% RQD=Nil
			R19	CR=22% RQD=Nil
N.B. − '*' means sample could not be recovered / sample slip. 20.00m.			R20	CR=25% RQD=Nil

5.40 6.00 6.75 7.50 8.25 9.00 9.75 10.50 11.25 12.00 12.75 13.50 14.25 15.00 15.75 16.50 17.25 18.00 18.75 19.50 20.00

BH−62/Sheet−1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 03/05/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.63

Co-ordinates E=-83 N=53

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	2
		Water Sample (WS)	0

Commencement Date : 21/04/2018
Completion Date : 23/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.690 M.
Water Struck At :
Standing Water Level : 2.90 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium dense, light grey, clayey sandy silt / silty sand. Observed conch pcs. & traces of gravel.		3 6 7 (13)	DS-1	0.50
			SPT-1	1.00-1.45
1.65m.				
Very loose, light grey, silty sand with conch pcs. & traces of gravel.		1 1 2 (3)	*UDS-1	2.00-2.45
			SPT-2	2.50-2.95
			DS-2	3.50
		2 2 2 (4)	SPT-3	4.00-4.45
5.00m.				
Very dense, light grey, silty sand with decomposed rock.		100 15.0 cm Pentn. >100 100 3.0 cm Pentn. Refusa Refusal	SPT-4 *SPT-5 *SPT-6	5.00-5.15 5.30-5.33 5.50-5.52 5.50
5.50m.				
Highly weathered, light grey, coarse grained, fractured rock.		100 2.0 cm Pentn. NX rotary drilling from 5.50m to 40.00m	R1 R2 R3 R4 R5 R6 R7 R8 R9 R10 R11 R12 R13 R14 R15 R16 R17 R18 R19	CR=25%/RQD=0 CR=24% RQD=Nil CR=23% RQD=Nil CR=25% RQD=Nil CR=27% RQD=Nil CR=29% RQD=Nil CR=24% RQD=Nil CR=25% RQD=Nil CR=30% RQD=Nil CR=32% RQD=Nil CR=30% RQD=Nil CR=29% RQD=Nil CR=32% RQD=Nil CR=29% RQD=Nil CR=27% RQD=Nil CR=29% RQD=Nil CR=24% RQD=Nil CR=22% RQD=Nil CR=24% RQD=Nil
8.50m.				
Highly weathered, light grey, coarse grained, fractured rock.				
10.00m.				
Highly weathered, light grey, coarse grained, fractured rock.				
11.50m.				
Highly weathered, light grey to light whitish grey, coarse to medium grained, fractured rock.				
16.00m.				
Highly weathered, light whitish grey to light bluish grey, medium grained, fractured rock.				
17.50m.				
Highly weathered, light whitish grey to light bluish grey, medium grained, fractured rock.				
20.10m.				

6.25 7.00 7.75 8.50 9.25 10.00 10.75 11.50 12.25 13.00 13.75 14.50 15.25 16.00 16.75 17.50 18.25 19.00 19.75

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Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 03/05/2018	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.63

Co-ordinates E=−83 N=53

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	2
		Water Sample (WS)	0

Commencement Date : 21/04/2018
Completion Date : 23/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.690 M.
Water Struck At :
Standing Water Level : 2.90 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
20.10m.			R20	CR=23% RQD=Nil 20.50
Highly weathered, light whitish grey to light bluish grey, medium grained, fractured rock.			R21	CR=21% RQD=Nil 21.25
			R22	CR=22% RQD=Nil 22.00
			R23	CR=22% RQD=Nil 22.75
			R24	CR=23% RQD=Nil 23.50
			R25	CR=25% RQD=Nil 24.25
			R26	CR=26% RQD=Nil 25.00
			R27	CR=24% RQD=Nil 25.75
			R28	CR=25% RQD=Nil 26.50
26.50m.			R29	CR=30% RQD=Nil 27.25
Highly weathered, light whitish grey to light bluish grey, medium grained, fractured rock.			R30	CR=32% RQD=Nil 28.00
			R31	CR=35% RQD=Nil 28.75
			R32	CR=35% RQD=Nil 29.50
			R33	CR=37% RQD=Nil 30.25
			R34	CR=34% RQD=Nil 31.00
			R35	CR=32% RQD=Nil 31.75
			R36	CR=29% RQD=Nil 32.50
			R37	CR=32% RQD=Nil 33.25
			R38	CR=35% RQD=Nil 34.00
34.00m.			R39	CR=45% RQD=Nil 34.75
Moderately weathered, light yellowish grey, medium grained, light fractured rock.			R40	CR=47% RQD=26% 35.50
35.50m.			R41	CR=66% RQD=37% 36.25
Slightly weathered to fresh, light yellowish grey, medium grained, light fractured rock.			R42	CR=84% RQD=Nil 37.00
			R43	CR=82% RQD=36% 37.75
			R44	CR=80% RQD=44% 38.50
			R45	CR=82% RQD=53% 39.25
N.B. − '*' means sample could not be recovered / sample slip. 40.00m.			R46	CR=96% RQD=96% 40.00

BH−63/Sheet−2

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 19/04/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.64

Co-ordinates E=−119 N=53

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 03/04/2018
Completion Date : 04/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.565 M.
Water Struck At :
Standing Water Level : 2.75 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium dense, brownish grey to light grey, silty sand with kankar. Observed conch pcs. & clay binder.		11 13 9 — 22	DS−1	0.50
			SPT−1	1.00−1.45
2.50m.		0 1 2 — 3	*UDS−1	2.00−2.45
Very loose, light grey, silty sand. Observed conch pcs.			SPT−2	2.55−3.00
			UDS−2	3.50−3.95
4.00m. Medium dense, light grey, silty sand with decomposed rock. Observed kankar & conch pcs.		3 16 14 — 30	SPT−3	4.05−4.50
5.00m.		10 9 81 — >100		
Very dense, light grey, silty sand with decomposed rock. Observed kankar & conch pcs. 5.80m.		100 4.0 cm Pentn. Refusal	SPT−4	5.00−5.40
		10.0 cm Pentn.	*SPT−5	5.60−5.64
		100 2.0 cm Pentn. Refusal	*SPT−6	5.80−5.82
Highly weathered, deep grey, coarse to medium grained, fractured rock.		NX rotary drilling from 5.80m to 20.00m	R1	CR=28%/RQD=0
			R2	CR=34% RQD=Nil
			R3	CR=27% RQD=Nil
8.00m. Highly weathered, deep grey, coarse to medium grained, fractured rock. 8.75m.			R4	CR=23% RQD=Nil
			R5	CR=30% RQD=Nil
			R6	CR=31% RQD=Nil
			R7	CR=34% RQD=Nil
Highly weathered, deep grey, coarse to medium grained, fractured rock.			R8	CR=30% RQD=Nil
			R9	CR=33% RQD=Nil
			R10	CR=38% RQD=Nil
			R11	CR=33% RQD=Nil
			R12	CR=38% RQD=Nil
14.75m.			R13	CR=36% RQD=Nil
Highly to moderately weathered, light grey, medium to coarse grained, fractured rock.			R14	CR=38% RQD=Nil
			R15	CR=38% RQD=Nil
			R16	CR=37% RQD=Nil
			R17	CR=42% RQD=Nil
18.50m.			R18	CR=53% RQD=29%
Moderately weathered, light grey, medium to coarse grained, fractured rock.			R19	CR=54% RQD=Nil
N.B. − '*' means sample could not be recovered / sample slip.				
20.00m.				

6.50 7.25 8.00 8.75 9.50 10.25 11.00 11.75 12.50 13.25 14.00 14.75 15.50 16.25 17.00 17.75 18.50 19.25 20.00

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Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 19/04/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.65

Co-ordinates E=−173 N=53

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 05/04/2018
Completion Date : 06/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.505 M.
Water Struck At :
Standing Water Level : 2.75 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Loose to medium dense, light grey, sandy silt / silty sand. Observed kankar & conch.		9 / 7 4 5	DS−1	0.50
			SPT−1	1.00−1.45
1.45m. Very soft, light grey, clayey silt with sand mixture.		2 / 0 1 1	*UDS−1	2.00−2.45
			SPT−2	2.50−2.95
			UDS−2	3.40−3.85
		2 / 1 1 1	SPT−3	4.00−4.45
4.50m. Very dense, light grey, silty sand with decomposed rock. Observed kankar & conch pcs.		100 5.0 cm Pentn. Refusa	SPT−4	4.60−4.65
		100 2.0 cm Pentn. Refusa	*SPT−5	4.80−4.82
5.00m.		Refusal	*SPT−6	5.00−5.02
Highly weathered, deep grey, coarse grained, fractured rock.		100 2.0 cm Pentn. NX rotary drilling from 5.00m to 20.00m	R1	CR=29%/RQD=0
6.50m. Highly weathered, deep grey, coarse grained, fractured rock.			R2	CR=36% RQD=Nil
			R3	CR=25% RQD=Nil
8.00m. Highly weathered, deep grey, coarse grained, fractured rock.			R4	CR=24% RQD=Nil
			R5	CR=30% RQD=Nil
9.50m. Highly/moderately weathered, light to whitish grey, medium to fine grained, fractured rock.			R6	CR=29% RQD=Nil
			R7	CR=34% RQD=Nil
			R8	CR=28% RQD=Nil
			R9	CR=38% RQD=Nil
			R10	CR=32% RQD=Nil
			R11	CR=42% RQD=Nil
			R12	CR=44% RQD=Nil
			R13	CR=36% RQD=Nil
14.75m. Highly weathered, light to whitish grey, medium to fine grained, fractured rock.			R14	CR=25% RQD=Nil
15.50m.			R15	CR=26% RQD=Nil
			R16	CR=26% RQD=Nil
Highly to moderately weathered, light to whitish grey, medium to fine grained, fractured rock.			R17	CR=29% RQD=Nil
			R18	CR=34% RQD=Nil
			R19	CR=32% RQD=Nil
N.B. − '*' means sample could not be recovered / sample slip.			R20	CR=48% RQD=Nil
20.00m.				

5.00 5.75 6.50 7.25 8.00 8.75 9.50 10.25 11.00 11.75 12.50 13.25 14.00 14.75 15.50 16.25 17.00 17.75 18.50 19.25 20.00

BH−65/Sheet−1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 19/04/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.66

Co-ordinates E=-227 N=53

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	7
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 07/04/2018
Completion Date : 08/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.529 M.
Water Struck At :
Standing Water Level : 2.90 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Dense, brownish grey to light grey, silty sand to sandy silt with kankar. Observed conch pcs.		20 17 15 (32)	DS-1	0.50
			SPT-1	1.00-1.45
1.50m. Very soft, light grey, clayey silt with sand mixture.		1 0 1 (1)	*UDS-1	2.00-2.45
			SPT-2	2.50-2.95
			UDS-2	3.50-3.95
		4 2 1 (3)	SPT-3	4.05-4.50
4.55m. Very dense, light grey, silty sand with decomposed rock. Observed kankar & conch pcs.		14 13 34 (47)	SPT-4	4.60-5.05
		100 5.0 cm Pentn. Refusa	SPT-5	5.20-5.25
		100 2.0 cm Pentn. Refusa	*SPT-6	5.40-5.42
5.50m.		Refusal	*SPT-7	5.50-5.52
		100 2.0 cm Pentn.	R1	CR=32%/RQD=0
Highly weathered, deep to light grey, coarse grained, fractured rock.		NX rotary drilling from 5.50m to 20.00m	R2	CR=27% RQD=Nil
			R3	CR=33% RQD=Nil
			R4	CR=32% RQD=Nil
			R5	CR=37% RQD=Nil
			R6	CR=37% RQD=Nil
			R7	CR=40% RQD=Nil
11.50m. Highly weathered, whitish grey to light grey, medium to coarse grained, fractured rock.			R8	CR=32% RQD=Nil
			R9	CR=34% RQD=Nil
			R10	CR=29% RQD=Nil
			R11	CR=29% RQD=Nil
			R12	CR=36% RQD=Nil
			R13	CR=28% RQD=Nil
			R14	CR=38% RQD=Nil
			R15	CR=32% RQD=Nil
			R16	CR=34% RQD=Nil
			R17	CR=31% RQD=Nil
18.25m. Highly weathered, whitish grey to light grey, medium to coarse grained, fractured rock.			R18	CR=23% RQD=Nil
19.00m. Highly weathered, light grey, coarse grained, fractured rock.			R19	CR=30% RQD=Nil
N.B. - '*' means sample could not be recovered / sample slip. 20.00m.				

6.25 7.00 7.75 8.50 9.25 10.00 10.75 11.50 12.25 13.00 13.75 14.50 15.25 16.00 16.75 17.50 18.25 19.00 20.00

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Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 19/04/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.67

Co-ordinates E=-261 N=32

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 07/04/2018
Completion Date : 09/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground :
Water Struck At : 1.55 M
Standing Water Level : 2.78 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Very dense, brownish grey, silty sand with conch pcs. Observed kankar & clay binder.		30 53 13 (66)	DS-1	0.50
			SPT-1	1.00-1.45
1.50m. Very soft, light grey, clayey silt with sand mixture.		0 1 0 (1)	*UDS-1	2.00-2.45
			SPT-2	2.50-2.95
		1 1 3 (4)	UDS-2	3.50-3.95
			SPT-3	4.00-4.45
4.50m. Very dense, light grey, silty sand with decomposed rock. Observed conch pcs.		21 79 8.0 cm Pentn. >100	SPT-4	4.60-4.83
		100 2.0 cm Pentn. Refusal	*SPT-5	5.00-5.02
5.10m.		Refusal	*SPT-6	5.10-5.12
		100 2.0 cm Pentn.	R1	CR=42%/RQD=0
		NX rotary drilling from 5.10m to 20.00m	R2	CR=34% RQD=Nil
			R3	CR=29% RQD=Nil
Highly/moderately weathered, deep grey, coarse to medium grained, fractured rock.			R4	CR=36% RQD=Nil
			R5	CR=29% RQD=Nil
			R6	CR=41% RQD=Nil
			R7	CR=30% RQD=Nil
10.00m.			R8	CR=42% RQD=Nil
			R9	CR=33% RQD=Nil
			R10	CR=32% RQD=Nil
			R11	CR=38% RQD=Nil
Highly/moderately weathered, whitish grey to light grey, medium to fine grained, fractured rock.			R12	CR=32% RQD=Nil
			R13	CR=28% RQD=Nil
			R14	CR=29% RQD=Nil
			R15	CR=27% RQD=Nil
			R16	CR=31% RQD=Nil
16.75m.			R17	CR=24% RQD=Nil
Highly weathered, whitish grey to light grey, medium to fine grained, fractured rock.			R18	CR=27% RQD=Nil
17.50m.			R19	CR=28% RQD=Nil
Highly to moderately weathered, whitish grey to light grey, medium to fine grained, fractured rock.			R20	CR=42% RQD=11%
N.B. - '*' means sample could not be recovered / sample slip. 20.00m.				

5.10 5.50 6.25 7.00 7.75 8.50 9.25 10.00 10.75 11.50 12.25 13.00 13.75 14.50 15.25 16.00 16.75 17.50 18.25 19.00 20.00

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Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 09/05/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.68

Co-ordinates E=-191 N=25

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 24/04/2018
Completion Date : 29/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 2.122 M.
Water Struck At :
Standing Water Level : 2.93 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Medium dense, light grey, silty sand. Observed kankar.		4 5 7 (12)	DS-1	0.50
			SPT-1	1.00-1.45
1.50m. Very loose, light grey, clayey silty sand. Observed kankar & conch pcs.		1 1 2 (3)	*UDS-1	2.00-2.45
			SPT-2	2.55-3.00
			*UDS-2	3.50-3.95
4.00m. Medium dense, light grey, silty sand with kankar & conch pcs. Observed decomposed rock.		7 11 12 (23)	SPT-3	4.00-4.45
4.70m.		40 60 10.0 cm Pentn. >100	SPT-4	4.70-4.95
		100 4.0 cm Pentn. Refusal	*SPT-5	5.05-5.09
5.15m. Very dense, light grey, silty sand with kankar & conch pcs. Observed decomposed rock.		Refusal	*SPT-6	5.15-5.18
		100 3.0 cm Pentn. NX rotary drilling from 5.15m to 40.00m	R1	CR=23%/RQD=0 5.15-5.75
			R2	CR=21% RQD=Nil 5.75-6.50
			R3	CR=24% RQD=Nil 6.50-7.25
			R4	CR=25% RQD=Nil 7.25-8.00
			R5	CR=23% RQD=Nil 8.00-8.75
Highly weathered, light grey, coarse to medium grained, moderately fractured rock.			R6	CR=21% RQD=Nil 8.75-9.50
			R7	CR=24% RQD=Nil 9.50-10.25
			R8	CR=26% RQD=Nil 10.25-11.00
			R9	CR=22% RQD=Nil 11.00-11.75
			R10	CR=29% RQD=Nil 11.75-12.50
			R11	CR=22% RQD=Nil 12.50-13.25
13.25m. Highly weathered, light brownish grey, medium grained, fractured rock.			R12	CR=27% RQD=Nil 13.25-14.00
			R13	CR=26% RQD=Nil 14.00-14.75
15.50m. Highly weathered, light brownish grey, medium grained, fractured rock.			R14	CR=32% RQD=Nil 14.75-15.50
			R15	CR=24% RQD=Nil 15.50-16.25
17.00m. Highly weathered, light grey to greenish white, medium to fine grained, highly to moderately fractured rock.			R16	CR=27% RQD=Nil 16.25-17.00
			R17	CR=21% RQD=Nil 17.00-17.75
			R18	CR=22% RQD=Nil 17.75-18.50
			R19	CR=22% RQD=Nil 18.50-19.25
20.10m.			R20	CR=22% RQD=Nil 19.25-20.00

BH-68/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 09/05/2018	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.68

Co-ordinates E=-191 N=25

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 24/04/2018
Completion Date : 29/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 2.122 M.
Water Struck At :
Standing Water Level : 2.93 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
20.10m.				
Highly weathered, light grey to greenish white, medium to fine grained, highly to moderately fractured rock.			R21	CR=24% RQD=Nil 20.75
			R22	CR=22% RQD=Nil 21.50
			R23	CR=24% RQD=Nil 22.25
22.25m.			R24	CR=28% RQD=Nil 23.00
Highly weathered, light grey to greenish white, medium to fine grained, highly to moderately fractured rock.			R25	CR=29% RQD=Nil 23.75
			R26	CR=26% RQD=Nil 24.50
			R27	CR=34% RQD=Nil 25.25
			R28	CR=37% RQD=Nil 26.00
			R29	CR=29% RQD=Nil 26.75
			R30	CR=33% RQD=Nil 27.50
27.50m.			R31	CR=22% RQD=Nil 28.25
Highly weathered, light grey, medium grained, moderately fractured rock.			R32	CR=23% RQD=Nil 29.00
			R33	CR=24% RQD=Nil 29.75
			R34	CR=24% RQD=Nil 30.50
30.50m.			R35	CR=28% RQD=Nil 31.25
Highly weathered, light whitish grey, medium grained, moderately fractured rock.			R36	CR=22% RQD=Nil 32.00
31.25m.			R37	CR=23% RQD=Nil 32.75
Highly weathered, light whitish grey to light brownish grey, medium grained, moderately fractured rock.			R38	CR=26% RQD=Nil 33.50
32.75m.			R39	CR=33% RQD=24% 34.25
			R40	CR=35% RQD=Nil 35.00
			R41	CR=28% RQD=Nil 35.75
			R42	CR=37% RQD=Nil 36.50
Highly weathered, light whitish grey to light brownish grey, medium grained, moderately fractured rock.			R43	CR=29% RQD=Nil 37.25
			R44	CR=28% RQD=Nil 38.00
			R45	CR=30% RQD=Nil 38.75
			R46	CR=31% RQD=Nil 39.50
N.B. – '*' means sample could not be recovered / sample slip. 40.00m.			R47	CR=36% RQD=Nil 40.00

BH-68/Sheet-2

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 19/04/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.69

Co-ordinates E=−155 N=10

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	7
Vane (V)		Disturbed (DS)	2
		Water Sample (WS)	0

Commencement Date : 06/04/2018
Completion Date : 06/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 2.169 M.
Water Struck At :
Standing Water Level : 2.88 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Loose, light whitish grey, clayey sandy silt. Observed conch.		3 4 6 (10)	DS−1	0.50
			SPT−1	1.00−1.45
1.70m.				
Soft to medium, light grey, clayey silt with sand mixture.		2 2 2 (4)	UDS−1	2.05−2.50
			SPT−2	2.50−2.95
			DS−2	3.50
		2 2 3 (5)	SPT−3	4.00−4.45
			*UDS−2	5.00−5.45
		8 8 12 (20)	SPT−4	5.50−5.95
6.00m.				
Very dense, light whitish grey, silty sand with decomposed rock.		65 6.0 cm Pentn. Refusal	SPT−5	6.20−6.26
6.50m.		100 2.0 cm Pentn. Refusal	*SPT−6	6.40−6.42
			*SPT−7	6.50−6.52
		100 2.0 cm Pentn. NX rotary drilling from 6.50m to 20.00m	R1	CR=33%/RQD=0 6.50
Highly weathered, light whitish grey, coarse grained, fractured rock.			R2	CR=30% RQD=Nil 7.25
			R3	CR=32% RQD=Nil 8.00
			R4	CR=30% RQD=Nil 8.75
			R5	CR=33% RQD=Nil 9.50
10.25m.				
Highly weathered, light whitish grey to light brownish grey, medium grained, fractured rock.			R6	CR=32% RQD=Nil 10.25
			R7	CR=36% RQD=Nil 11.00
			R8	CR=35% RQD=Nil 11.75
			R9	CR=39% RQD=Nil 12.50
			R10	CR=28% RQD=Nil 13.25
			R11	CR=30% RQD=Nil 14.00
			R12	CR=32% RQD=Nil 14.75
			R13	CR=30% RQD=Nil 15.50
			R14	CR=28% RQD=Nil 16.25
			R15	CR=30% RQD=Nil 17.00
			R16	CR=28% RQD=Nil 17.75
			R17	CR=30% RQD=Nil 18.50
N.B. − '*' means sample could not be recovered / sample slip.			R18	CR=31% RQD=Nil 19.25
20.00m.				20.00

BH−69/Sheet−1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 19/04/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.70

Co-ordinates E=−119 N=0

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 05/04/2018
Completion Date : 05/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.640 M.
Water Struck At :
Standing Water Level : 2.60 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Soft to medium, light grey, clayey silt with sand mixture.		3 4 4 (8)	DS−1	0.50
			SPT−1	1.00−1.45
1.60m. Very loose, light whitish grey, clayey sandy silt / clayey silty sand. Observed conch.		0 1 1 (2)	*UDS−1	2.00−2.45
			SPT−2	2.55−3.00
			*UDS−2	3.50−3.60
3.60m. Very dense, light whitish grey, silty sand with decomposed rock.		70 8.0 cm Pentn. >100	SPT−3	3.80−3.88
		100 2.0 cm Pentn. Refusa	*SPT−4	3.95−3.97
4.10m.		Refusal	*SPT−5	4.10−4.12
		100 2.0 cm Pentn.	R1	CR=29%/RQD=0
		NX rotary drilling from 4.10m to 15.00m	R2	CR=32% RQD=Nil
			R3	CR=33% RQD=Nil
			R4	CR=32% RQD=Nil
Highly weathered, light grey, coarse grained, fractured rock.			R5	CR=36% RQD=16%
			R6	CR=28% RQD=Nil
			R7	CR=27% RQD=Nil
			R8	CR=30% RQD=Nil
10.00m. Highly weathered, light whitish grey, medium grained, fractured rock.			R9	CR=25% RQD=Nil
10.75m.			R10	CR=28% RQD=Nil
			R11	CR=29% RQD=Nil
Highly weathered, light whitish grey, medium grained, fractured rock.			R12	CR=28% RQD=Nil
			R13	CR=30% RQD=Nil
			R14	CR=30% RQD=Nil
15.00m.			R15	CR=35% RQD=Nil

4.10 / 4.75 / 5.50 / 6.25 / 7.00 / 7.75 / 8.50 / 9.25 / 10.00 / 10.75 / 11.50 / 12.25 / 13.00 / 13.75 / 14.50 / 15.00

N.B. − '*' means sample could not be recovered / sample slip.

BH−70/Sheet−1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 19/04/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.71

Co-ordinates E=−83 N=10

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	2
		Water Sample (WS)	0

Commencement Date : 04/04/2018
Completion Date : 06/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.658 M.
Water Struck At :
Standing Water Level : 2.85 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
		12	DS−1	0.50
		4 5 7	SPT−1	1.00−1.45
Soft to medium, light grey, clayey silt with sand mixture.		4	UDS−1	2.05−2.50
		2 2 2	SPT−2	2.50−2.95
			DS−2	3.50
		3		
		2 1 2	SPT−3	4.00−4.45
5.00m.				
Very dense, light whitish grey, silty sand with decomposed rock.		80 10.0 cm Pentn. >100 100 2.0 cm Pentn. Refusa Refusal	SPT−4 *SPT−5 *SPT−6	5.00−5.10 5.30−5.32 5.50−5.52
5.50m.				5.50
Highly weathered, light grey, coarse grained, fractured rock.		100 2.0 cm Pentn.	R1	CR=22%/RQD=0
7.00m.		NX rotary drilling from 5.50m to 20.00m	R2	CR=25% RQD=Nil
Highly weathered, light grey, coarse grained, fractured rock.			R3	CR=32% RQD=Nil
			R4	CR=30% RQD=Nil
			R5	CR=30% RQD=Nil
			R6	CR=32% RQD=Nil
10.00m.			R7	CR=30% RQD=Nil
			R8	CR=32% RQD=Nil
			R9	CR=28% RQD=Nil
			R10	CR=30% RQD=Nil
			R11	CR=33% RQD=Nil
			R12	CR=43% RQD=13%
Highly to moderately weathered, light whitish grey, medium grained, fractured rock.			R13	CR=42% RQD=Nil
			R14	CR=40% RQD=Nil
			R15	CR=40% RQD=Nil
			R16	CR=43% RQD=Nil
			R17	CR=30% RQD=Nil
			R18	CR=35% RQD=Nil
N.B. − '*' means sample could not be recovered / sample slip.			R19	CR=42% RQD=Nil
20.00m.				

6.25 7.00 7.75 8.50 9.25 10.00 10.75 11.50 12.25 13.00 13.75 14.50 15.25 16.00 16.75 17.50 18.25 19.00 20.00

BH−71/Sheet−1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 03/05/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.72

Co-ordinates E=-47 N=25

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	10	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	10
Vane (V)		Disturbed (DS)	6
		Water Sample (WS)	0

Commencement Date : 16/04/2018
Completion Date : 18/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.722 M.
Water Struck At :
Standing Water Level : 2.75 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Soft to medium, light grey, clayey silt with sand mixture.		4 6 6 (12)	DS-1	0.50
			SPT-1	1.00-1.45
		0 1 1 (2)	*UDS-1	2.00-2.45
			SPT-2	2.50-2.95
3.50m.			DS-2	3.50
Very loose, light grey, silty sand. Observed kankar & conch.		1 2 2 (4)	SPT-3	4.00-4.45
5.00m.		100 7.0 cm Pentn. Refusa	SPT-4	5.00-5.07
Very dense, light whitish grey, silty sand with decomposed rock.		100 2.0 cm Pentn. Refusa	*SPT-5	5.30-5.32
5.50m.		Refusal	*SPT-6	5.50-5.52
		00 2.0 cm Pentn.	R1	CR=29%/RQD=0
		NX rotary drilling from 5.50m to 40.00m	R2	CR=32% RQD=Nil
			R3	CR=28% RQD=Nil
			R4	CR=35% RQD=17%
Highly weathered, light grey, coarse grained, fractured rock.			R5	CR=38% RQD=15%
			R6	CR=32% RQD=Nil
			R7	CR=30% RQD=Nil
			R8	CR=28% RQD=Nil
12.25m.			R9	CR=27% RQD=Nil
Highly weathered, light yellowish brown to light whitish grey, coarse to medium grained, fractured rock.			R10	CR=30% RQD=16%
			R11	CR=33% RQD=Nil
			R12	CR=37% RQD=Nil
			R13	CR=32% RQD=Nil
			R14	CR=35% RQD=Nil
16.00m.			R15	CR=23% RQD=Nil
Highly weathered, light yellowish brown to light whitish grey, coarse to medium grained, fractured rock.			R16	CR=24% RQD=Nil
			R17	CR=25% RQD=Nil
18.25m.			R18	CR=27% RQD=Nil
Highly weathered, light yellowish brown to light whitish grey, coarse to medium grained, fractured rock.			R19	CR=29% RQD=Nil
19.75m.				
20.10m.				

6.25 7.00 7.75 8.50 9.25 10.00 10.75 11.50 12.25 13.00 13.75 14.50 15.25 16.00 16.75 17.50 18.25 19.00 19.75

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Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 03/05/2018 | Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.72

Co-ordinates E=−47 N=25

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	10	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	10
Vane (V)		Disturbed (DS)	6
		Water Sample (WS)	0

Commencement Date : 16/04/2018
Completion Date : 18/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.722 M.
Water Struck At :
Standing Water Level : 2.75 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
20.10m.			R20	CR=23% RQD=Nil 20.50
			R21	CR=25% RQD=Nil 21.25
			R22	CR=25% RQD=Nil 22.00
			R23	CR=22% RQD=Nil 22.75
Highly weathered, light yellowish brown to light whitish grey, coarse to medium grained, fractured rock.			R24	CR=23% RQD=Nil 23.50
			R25	CR=22% RQD=Nil 24.25
			R26	CR=23% RQD=Nil 25.00
			R27	CR=25% RQD=Nil 25.75
			R28	CR=23% RQD=Nil 26.50
			R29	CR=22% RQD=Nil 27.25
27.25m.			R30/DS−3	CR=0/RQD=0
		60 50 >100	SPT−7	28.00−28.15 28.00
Completely weathered, light grey / light whitish grey, medium grained, fully decomposed rock.		70 60 >100 5.0 cm Pentn.	R31/DS−4	CR=0/RQD=0
			SPT−8	28.75−28.95 28.75
		>100	R32/DS−5	CR=0/RQD=0
		40 52 40 5.0 cm Pentn.	SPT−9	29.50−29.70 29.50
30.25m.		Refusal	R33/DS−6	CR=0/RQD=0
Highly weathered, light whitish grey, medium grained, moderately fractured rock.		100 5.0 cm Pentn.	*SPT−10	30.25−30.30 30.25
31.00m.			R34	CR=23%/RQD=0 31.00
			R35	CR=28% RQD=Nil 31.75
Highly weathered, light whitish grey, medium grained, moderately fractured rock.			R36	CR=28% RQD=Nil 32.50
			R37	CR=30% RQD=Nil 33.25
33.25m.			R38	CR=24% RQD=Nil 34.00
Highly weathered, light whitish grey, medium grained, moderately fractured rock.			R39	CR=25% RQD=Nil 34.75
34.75m.			R40	CR=35% RQD=Nil 35.50
			R41	CR=37% RQD=Nil 36.25
Highly to moderately weathered, light whitish grey, medium grained, moderately fractured rock.			R42	CR=45% RQD=Nil 37.00
			R43	CR=43% RQD=Nil 37.75
37.75m.			R44	CR=80% RQD=58% 38.50
Slightly weathered, light whitish grey, medium grained, moderately fractured rock.			R45	CR=76% RQD=22% 39.25
N.B. − '*' means sample could not be recovered / sample slip. 40.00m.			R46	CR=80% RQD=Nil 40.00

BH−72/Sheet−2

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 09/05/2018 | Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.73

Co-ordinates E = 23, N = −8

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	7
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 26/04/2018
Completion Date : 27/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.692 M.
Water Struck At :
Standing Water Level : 2.90 m.

DESCRIPTION	N-VALUE (EACH DIVN. = 15cm)	Ref. No	Depth (m)
0.00m.			
Medium dense, brownish grey to light grey, silty sand. Observed kankar.	21 20 11 (31)	DS-1	0.50
1.50m.		SPT-1	1.00-1.45
Very loose, light grey, clayey silty sand with conch pcs. Observed kankar.	1 0 1 (1)	UDS-1	2.00-2.45
		SPT-2	2.50-2.95
4.05m.	9 25 66 (>100)	UDS-2	3.50-3.95
Very dense, light grey, silty sand with kankar, mica & conch pcs. Observed decomposed rock.	10.0 cm Pentn.	SPT-3	4.05-4.45
5.00m.	100 3.0 cm Pentn. Refusal	*SPT-4	4.80-4.83
	100 4.0 cm Pentn. Refusal	*SPT-5	5.00-5.04
		R1	CR=16%/RQD=0
Completely to highly weathered, light to brownish grey, medium to coarse grained, highly fractured rock.	53 3.0 cm Pentn. Refusal	*SPT-6	5.75-5.78
		R2	CR=18%/RQD=0
	55 (Refusal) 2.0 cm Pentn.	*SPT-7	6.50-6.52
		R3	CR=25% RQD=13%
7.25m.	NX rotary drilling from 5.00m to 15.00m	R4	CR=27% RQD=Nil
Highly weathered, light to brownish grey, medium to coarse grained, highly fractured rock.		R5	CR=26% RQD=Nil
		R6	CR=31% RQD=Nil
9.50m.		R7	CR=24% RQD=Nil
Highly weathered, light to brownish grey, medium to coarse grained, highly fractured rock.		R8	CR=26% RQD=Nil
11.75m.		R9	CR=24% RQD=Nil
Highly weathered, brownish grey to light grey, medium to fine grained, highly fractured rock.		R10	CR=22% RQD=Nil
		R11	CR=30% RQD=Nil
14.00m.		R12	CR=28% RQD=Nil
Highly weathered, light grey, fine grained, highly fractured rock.		R13	CR=24% RQD=Nil
15.00m.			

5.00 | 5.75 | 6.50 | 7.25 | 8.00 | 8.75 | 9.50 | 10.25 | 11.00 | 11.75 | 12.50 | 13.25 | 14.00 | 15.00

N.B. – '*' means sample could not be recovered / sample slip.

BH-73/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 09/05/2018 | Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.74

Co-ordinates E=166 N=141

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	7
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 26/04/2018
Completion Date : 26/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.797 M.
Water Struck At :
Standing Water Level : 2.80 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium dense, light grey, silty sand. Observed conch pcs.		8 12 15 (27)	DS-1	0.50
			SPT-1	1.00-1.45
1.75m.				
Very soft, light grey, clayey silt with high % of sand mixture.		1 0 1 (1)	*UDS-1	2.00-2.45
			SPT-2	2.50-2.95
		1 2 2 (4)	UDS-2	3.50-3.95
			SPT-3	4.00-4.45
4.60m.				
Very dense, light grey, silty sand. Observed decomposed rock.		21 79 4.0 cm Pentn. >100	SPT-4	5.00-5.19
		100 4.0 cm Pentn. Refusa	*SPT-5	5.35-5.39
5.45m.		100 2.0 cm Pentn. Refusa	*SPT-6	5.45-5.47
		Refusal	R1	CR=12%/RQD=0
			*SPT-7	6.00-6.03
		50 3.0 cm Pentn.	R2	CR=21%/RQD=0
Completely to highly weathered, light grey, coarse to medium grained, fractured rock.		NX rotary drilling from 5.45m to 15.00m	R3	CR=22% RQD=Nil
			R4	CR=24% RQD=Nil
			R5	CR=24% RQD=Nil
			R6	CR=21% RQD=Nil
9.75m.			R7	CR=22% RQD=Nil
Highly weathered, light grey, coarse grained, highly to moderately fractured rock.			R8	CR=21% RQD=Nil
			R9	CR=21% RQD=Nil
			R10	CR=22% RQD=Nil
12.75m.			R11	CR=32% RQD=Nil
Highly weathered, light grey, coarse grained, highly to moderately fractured rock. 13.50m.			R12	CR=24% RQD=Nil
Highly weathered, light reddish brown, medium grained, highly fractured rock. 15.00m.			R13	CR=25% RQD=Nil

6.45 6.00 6.75 7.50 8.25 9.00 9.75 10.50 11.25 12.00 12.75 13.50 14.25 15.00

N.B. – '*' means sample could not be recovered / sample slip.

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Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 03/05/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.75

Co-ordinates E=−227 N=−15

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 15/04/2018
Completion Date : 16/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.656 M.
Water Struck At :
Standing Water Level : 2.8 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Medium dense, light grey, silty sand. Observed conch.		9 9 16	DS−1	0.50
			SPT−1	1.00−1.45
1.60m. Very soft, light grey, clayey silt with sand / clayey sandy silt. Observed kankar & conch pcs.		1 0 1	*UDS−1	2.00−2.45
			SPT−2	2.50−2.95
		8 21 >100	UDS−2	3.50−3.95
4.00m. Very dense, light grey, silty sand with decomposed rock.		4.0 cm Pentn.	SPT−3	4.00−4.34
		100 3.0 cm Pentn. Refusal	*SPT−4	4.40−4.43
4.50m. Highly weathered, light grey, coarse grained, moderately fractured rock.		00 3.0 cm Pentn.	*SPT−5	4.50−4.53
		NX rotary drilling from 4.50m to 15.00m	R1	CR=26%/RQD=0
			R2	CR=20% RQD=Nil
			R3	CR=24% RQD=Nil
Completely to highly weathered, light grey, coarse to medium grained, moderately to highly fractured rock.			R4	CR=21% RQD=Nil
			R5	CR=22% RQD=Nil
			R6	CR=25% RQD=Nil
9.75m. Highly weathered, whitish grey, medium grained, moderately fractured rock.			R7	CR=21% RQD=Nil
			R8	CR=23% RQD=Nil
			R9	CR=21% RQD=Nil
12.00m. Highly weathered, light brownish grey, coarse to medium grained, moderately to highly fractured rock.			R10	CR=22% RQD=Nil
			R11	CR=23% RQD=Nil
			R12	CR=21% RQD=Nil
			R13	CR=22% RQD=Nil
15.00m.			R14	CR=23% RQD=Nil

4.50 5.25 6.00 6.75 7.50 8.25 9.00 9.75 10.50 11.25 12.00 12.75 13.50 14.25 15.00

N.B. − '*' means sample could not be recovered / sample slip.

BH−75/Sheet−1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.			CETEST
Job No : 4115	Created by : SKD	Created on : 03/05/2018	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.76

Co-ordinates E=-227 N=-64

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 17/04/2018
Completion Date : 18/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.637 M.
Water Struck At :
Standing Water Level : 2.83 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium dense, light grey, silty sand. Observed conch pcs.		9 7 5 — 12	DS-1	0.50
1.70m.			SPT-1	1.00-1.45
Very soft, light grey, clayey silt with sand / clayey silty sand with sand mixture. Observed conch.		1 0 1 — 1	*UDS-1	2.00-2.45
			SPT-2	2.50-2.95
4.00m.		13 87 — >100	UDS-2	3.50-3.95
Very dense, light grey, silty sand with decomposed rock.		100 6.0 cm Pentn.	SPT-3	4.00-4.21
4.40m.		100 4.0 cm Pentn. Refusal	*SPT-4	4.30-4.34
		Refusal	*SPT-5	4.40-4.43
Highly weathered, light brownish to light grey, coarse grained, fractured rock.		100 3.0 cm Pentn.	R1	CR=26%/RQD=0
6.50m.		NX rotary drilling from 4.40m to 20.00m	R2	CR=28% RQD=Nil
Highly weathered, light grey, medium grained, moderately fractured rock.			R3	CR=30% RQD=Nil
7.25m.			R4	CR=27% RQD=Nil
			R5	CR=21% RQD=Nil
Highly weathered, light grey, medium to coarse grained, moderately to highly fractured rock.			R6	CR=23% RQD=Nil
			R7	CR=25% RQD=Nil
			R8	CR=22% RQD=Nil
			R9	CR=21% RQD=Nil
11.00m.			R10	CR=24% RQD=Nil
Highly weathered, light grey, medium to coarse grained, fractured rock.			R11	CR=25% RQD=Nil
			R12	CR=23% RQD=13%
			R13	CR=24% RQD=Nil
			R14	CR=23% RQD=Nil
14.75m.			R15	CR=21% RQD=Nil
Highly weathered, light grey to light brownish grey, medium grained, fractured rock.			R16	CR=24% RQD=Nil
16.25m.			R17	CR=22% RQD=Nil
Highly weathered, light grey, fine to medium grained, highly fractured rock.			R18	CR=23% RQD=Nil
17.75m.			R19	CR=28% RQD=Nil
Highly weathered, light grey, fine to medium grained, highly fractured rock.			R20	CR=29% RQD=Nil
N.B. - '*' means sample could not be recovered / sample slip.			R21	CR=33% RQD=Nil
20.00m.				

4.40 5.00 5.75 6.50 7.25 8.00 8.75 9.50 10.25 11.00 11.75 12.50 13.25 14.00 14.75 15.50 16.25 17.00 17.75 18.50 19.25 20.00

BH-76/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 19/04/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.77

Co-ordinates E=−155 N=−60

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	2
		Water Sample (WS)	0

Commencement Date : 07/04/2018
Completion Date : 08/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.635 M.
Water Struck At :
Standing Water Level : 2.85 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Loose, light whitish grey, silty sand. Observed conch pcs.		3 4 5 (9)	DS−1	0.50
			SPT−1	1.00−1.45
			UDS−1	2.05−2.50
		2 2 3 (5)	SPT−2	2.50−2.95
			DS−2	3.50
		3 4 5 (9)	SPT−3	4.00−4.45
4.50m.				
Very dense, light whitish grey, silty sand with decomposed rock.		100 7.0 cm Pentn. Refusal	SPT−4	4.60−4.67
		100 2.0 cm Pentn. Refusal	*SPT−5	4.80−4.82
5.00m.		Refusal	*SPT−6	5.00−5.02
Highly weathered, light grey, coarse grained, fractured rock.		100 2.0 cm Pentn.	R1	CR=24% RQD=Nil
5.75m.		NX rotary drilling from 5.00m to 15.00m	R2	CR=27% RQD=Nil
Highly weathered, light grey, coarse to medium grained, fractured rock.			R3	CR=26% RQD=Nil
7.25m.			R4	CR=25% RQD=Nil
Highly weathered, light grey, coarse to medium grained, fractured rock.			R5	CR=26% RQD=Nil
8.00m.			R6	CR=28% RQD=Nil
			R7	CR=30% RQD=Nil
Highly weathered, light grey, coarse to medium grained, fractured rock.			R8	CR=32% RQD=Nil
			R9	CR=35% RQD=Nil
			R10	CR=33% RQD=Nil
			R11	CR=35% RQD=Nil
			R12	CR=39% RQD=Nil
			R13	CR=38% RQD=Nil
N.B. − '*' means sample could not be recovered / sample slip. 15.00m.				

5.00 5.75 6.50 7.25 8.00 8.75 9.50 10.25 11.00 11.75 12.50 13.25 14.00 15.00

BH−77/Sheet−1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 03/05/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.78

Co-ordinates E=−83 N=−58

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	2
		Water Sample (WS)	0

Commencement Date : 20/04/2018
Completion Date : 21/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.668 M.
Water Struck At :
Standing Water Level : 2.98 m.

DESCRIPTION	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	Depth (m)
0.00m.			
Medium dense, light grey, clayey sandy silt. Observed conch pcs.	6 7 8 (15)	DS−1	0.50
		SPT−1	1.00−1.45
1.50m.			
Soft, light grey, clayey silt with sand / clayey silty sand. Observed conch pcs.	1 1 1 (2)	*UDS−1	2.00−2.45
		SPT−2	2.50−2.95
		DS−2	3.50
4.00m.	4 6 11 (17)	SPT−3	4.00−4.45
Medium dense, light grey, clayey sandy silt. Observed conch pcs.		*UDS−2	4.50−4.70
5.50m.			
Very dense, light grey, silty sand with decomposed rock.	100 (>100)	SPT−4	5.50−5.65
	100 2.0 cm Pentn. Refusal	*SPT−5	5.80−5.82
6.00m.	Refusal	*SPT−6	6.00−6.02
	100 2.0 cm Pentn.	R1	CR=24%/RQD=0
Highly weathered, light grey, coarse to medium grained, fractured rock.	NX rotary drilling from 6.00m to 20.00m	R2	CR=27% RQD=Nil
		R3	CR=25% RQD=Nil
8.25m.		R4	CR=28% RQD=Nil
Highly weathered, light grey, coarse to medium grained, fractured rock.		R5	CR=29% RQD=Nil
9.75m.		R6	CR=23% RQD=Nil
Highly weathered, light grey, coarse to medium grained, fractured rock.		R7	CR=29% RQD=Nil
10.50m.		R8	CR=27% RQD=Nil
Highly weathered, light grey, coarse to medium grained, fractured rock.		R9	CR=29% RQD=Nil
12.00m.		R10	CR=27% RQD=Nil
Highly weathered, light whitish grey to light yellowish grey, medium grained, fractured rock.		R11	CR=25% RQD=Nil
13.50m.		R12	CR=22% RQD=Nil
		R13	CR=25% RQD=Nil
Highly weathered, light whitish grey to light yellowish grey, medium grained, fractured rock.		R14	CR=26% RQD=Nil
		R15	CR=21% RQD=Nil
		R16	CR=22% RQD=Nil
		R17	CR=21% RQD=Nil
		R18	CR=23% RQD=Nil
N.B. − '*' means sample could not be recovered / sample slip.		R19	CR=23% RQD=Nil
20.00m.			

6.00 6.75 7.50 8.25 9.00 9.75 10.50 11.25 12.00 12.75 13.50 14.25 15.00 15.75 16.50 17.25 18.00 18.75 19.50 20.00

BH−78/Sheet−1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 19/04/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.79

Co-ordinates E=-215 N=-178

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	2
		Water Sample (WS)	1

Commencement Date : 08/04/2018
Completion Date : 09/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.618 M.
Water Struck At :
Standing Water Level : 2.85 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Loose, whitish grey, clayey silty sand. Observed conch.		3 4 6 (10)	DS-1	0.50
			SPT-1	1.00-1.45
1.50m. Stiff to very stiff, light grey, clayey silt with sand mixture & conch pcs.			UDS-1	2.05-2.50
2.50m. Loose, light whitish grey, clayey silty sand. Observed conch.		1 1 2 (3)	SPT-2	2.50-2.95
			WS-1	2.85
			DS-2	3.50
4.00m. Loose to medium dense, light grey, sandy silt / silty sand. Observed kankar & conch.		3 4 4 (8)	SPT-3	4.00-4.45
4.60m. Very dense, light whitish grey, silty sand with decomposed rock.		80 7.0 cm Pentn. Refusal	SPT-4	4.60-4.67
		100 2.0 cm Pentn. Refusal	*SPT-5	4.85-4.87
5.10m.		Refusal	*SPT-6	5.10-5.12
Highly weathered, light grey, coarse to medium grained, fractured rock.		100 2.0 cm Pentn. NX rotary drilling from 5.10m to 15.00m	R1	CR=24% RQD=Nil (5.10-5.75)
			R2	CR=27% RQD=Nil (5.75-6.50)
			R3	CR=23% RQD=Nil (6.50-7.25)
7.25m. Highly weathered, light grey, coarse to medium grained, fractured rock.			R4	CR=26% RQD=Nil (7.25-8.00)
			R5	CR=28% RQD=Nil (8.00-8.75)
			R6	CR=30% RQD=Nil (8.75-9.50)
			R7	CR=32% RQD=Nil (9.50-10.25)
			R8	CR=30% RQD=Nil (10.25-11.00)
11.00m. Highly weathered, light grey, coarse to medium grained, fractured rock.			R9	CR=23% RQD=Nil (11.00-11.75)
			R10	CR=25% RQD=Nil (11.75-12.50)
			R11	CR=24% RQD=Nil (12.50-13.25)
			R12	CR=23% RQD=Nil (13.25-14.00)
N.B. - '*' means sample could not be recovered / sample slip. 15.00m.			R13	CR=23% RQD=Nil (14.00-15.00)

BH-79/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 03/05/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.80

Co-ordinates E=78 N=-113

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	2
		Water Sample (WS)	0

Commencement Date : 11/04/2018
Completion Date : 12/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.757 M.
Water Struck At :
Standing Water Level : 2.80 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Medium dense, light whitish grey, clayey sandy silt. Observed conch pcs.		3 6 6 (12)	DS-1	0.50
			SPT-1	1.00-1.45
1.60m. Loose, light whitish grey, clayey sandy silt / clayey silty sand. Observed conch pcs.		1 2 3 (5)	*UDS-1	2.00-2.45
			SPT-2	2.50-2.95
			DS-2	3.50
		1 2 2 (4)	SPT-3	4.00-4.45
		>100	*UDS-2	5.00-5.35
5.50m. Very dense, light whitish grey, silty sand with decomposed rock.		100 10.0 cm Pentn.	SPT-4	5.50-5.60
		100 2.0 cm Pentn. Refusal	*SPT-5	5.80-5.82
6.00m. Highly weathered, light grey, coarse grained, fractured rock.		Refusal	*SPT-6	6.00-6.02
6.75m. Highly weathered, light grey to light whitish grey, coarse to medium grained, fractured rock.		100 2.0 cm Pentn.	R1	CR=27%/RQD=0
		NX rotary drilling from 6.00m to 20.00m	R2	CR=25% RQD=Nil
			R3	CR=27% RQD=Nil
			R4	CR=26% RQD=Nil
			R5	CR=27% RQD=Nil
			R6	CR=28% RQD=Nil
			R7	CR=26% RQD=Nil
11.25m. Highly weathered, light brownish grey / light yellowish grey, medium grained, fractured rock.			R8	CR=28% RQD=Nil
			R9	CR=29% RQD=Nil
			R10	CR=32% RQD=Nil
			R11	CR=38% RQD=Nil
			R12	CR=35% RQD=Nil
			R13	CR=34% RQD=Nil
			R14	CR=37% RQD=Nil
			R15	CR=38% RQD=Nil
17.25m. Highly weathered, light brownish grey / light yellowish grey, medium grained, fractured rock.			R16	CR=24% RQD=Nil
			R17	CR=23% RQD=Nil
			R18	CR=24% RQD=Nil
N.B. – '*' means sample could not be recovered / sample slip. 20.00m.			R19	CR=25% RQD=Nil

6.00 6.75 7.50 8.25 9.00 9.75 10.50 11.25 12.00 12.75 13.50 14.25 15.00 15.75 16.50 17.25 18.00 18.75 19.50 20.00

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Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 10/05/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.81

Co-ordinates E=189 N=-125

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	2
		Water Sample (WS)	1

Commencement Date : 25/04/2018
Completion Date : 27/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.724 M.
Water Struck At :
Standing Water Level : 2.85 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Medium dense, light grey, clayey sandy silt conch pcs.		6 7 9 (16)	DS-1	0.50
			SPT-1	1.00-1.45
1.60m. Loose, light grey, clayey sandy silt with conch pcs		2 1 2 (3)	UDS-1	2.00-2.45
			SPT-2	2.50-2.95
			WS-1	2.85
			DS-2	3.50
		2 2 2 (4)	SPT-3	4.00-4.45
5.00m. Very dense, light grey, clayey sandy silt / silty sand with decomposed rock.		100 7.0 cm Pentn. Refusal	SPT-4	5.00-5.07
		100 3.0 cm Pentn. Refusal	*SPT-5	5.30-5.33
5.50m. Highly weathered, light grey, coarse grained, fractured rock.		Refusal 100 2.0 cm Pentn.	*SPT-6	5.50-5.52
7.00m. Highly weathered, light grey, coarse grained, fractured rock.		NX rotary drilling from 5.50m to 40.00m	R1	CR=26%/RQD=0
7.75m. Highly weathered, light grey, coarse grained, fractured rock.			R2	CR=28% RQD=Nil
			R3	CR=25% RQD=Nil
			R4	CR=27% RQD=Nil
			R5	CR=30% RQD=Nil
			R6	CR=31% RQD=Nil
10.75m. Highly weathered, light whitish grey to light yellowish brown, medium grained, fractured rock.			R7	CR=27% RQD=Nil
			R8	CR=29% RQD=Nil
12.25m. Highly weathered, light whitish grey to light yellowish brown, medium grained, fractured rock.			R9	CR=28% RQD=Nil
			R10	CR=22% RQD=Nil
13.75m. Highly weathered, light yellowish grey, medium grained, fractured rock.			R11	CR=21% RQD=Nil
			R12	CR=21% RQD=Nil
			R13	CR=22% RQD=Nil
			R14	CR=23% RQD=Nil
			R15	CR=22% RQD=Nil
			R16	CR=24% RQD=Nil
			R17	CR=26% RQD=Nil
18.25m. Highly weathered, light whitish grey to light bluish grey, medium grained, fractured rock.			R18	CR=25% RQD=Nil
			R19	CR=24% RQD=Nil
20.10m.				

5.50 6.25 7.00 7.75 8.50 9.25 10.00 10.75 11.50 12.25 13.00 13.75 14.50 15.25 16.00 16.75 17.50 18.25 19.00 19.75

BH-81/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 03/05/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.82

Co-ordinates E=137 N=-135

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 14/04/2018
Completion Date : 14/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.831 M.
Water Struck At :
Standing Water Level : 2.85 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Loose, light whitish grey, clayey sandy silt. Observed conch pcs.		3 4 4 (8)	DS-1	0.50
			SPT-1	1.00-1.45
1.70m.				
Loose, light whitish grey, clayey silty sand / clayey sandy silt. Observed conch.		2 2 3 (5)	*UDS-1	2.00-2.45
			SPT-2	2.50-2.95
		>100	*UDS-2	3.50-3.95
4.00m.		12 33/65 5.0 cm Pentn.	SPT-3	4.00-4.35
Very dense, light grey, silty sand with decomposed rock.		100 3.0 cm Pentn. Refusal	*SPT-4	4.60-4.63
4.80m.		Refusal	*SPT-5	4.80-4.82
		100 2.0 cm Pentn.	R1	CR=23%/RQD=0
Highly weathered, light grey, coarse grained, fractured rock.		NX rotary drilling from 4.80m to 20.00m	R2	CR=28% RQD=Nil
			R3	CR=22% RQD=Nil
			R4	CR=24% RQD=Nil
7.75m.			R5	CR=34% RQD=Nil
Highly weathered, light grey, coarse grained, fractured rock.			R6	CR=28% RQD=Nil
9.25m.			R7	CR=24% RQD=Nil
Highly weathered, light grey, coarse grained, fractured rock.			R8	CR=29% RQD=Nil
10.00m.			R9	CR=28% RQD=Nil
Highly weathered, light grey, coarse grained, fractured rock.			R10	CR=22% RQD=Nil
11.50m.			R11	CR=33% RQD=Nil
Highly weathered, light brownish grey, coarse grained, fractured rock.			R12	CR=28% RQD=Nil
12.25m.			R13	CR=23% RQD=Nil
Highly weathered, light brownish grey to grey, coarse to medium grained, fractured rock.			R14	CR=36% RQD=16%
13.75m.			R15	CR=27% RQD=Nil
Highly weathered, light brownish grey to grey, coarse to medium grained, fractured rock.			R16	CR=33% RQD=Nil
14.50m.			R17	CR=26% RQD=Nil
			R18	CR=29% RQD=Nil
Highly weathered, light brownish grey to grey, coarse to medium grained, fractured rock.			R19	CR=33% RQD=Nil
			R20	CR=28% RQD=Nil
N.B. - '*' means sample could not be recovered / sample slip.				
20.00m.				

4.80 5.50 6.25 7.00 7.75 8.50 9.25 10.00 10.75 11.50 12.25 13.00 13.75 14.50 15.25 16.00 16.75 17.50 18.25 19.00 20.00

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Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kalla...			GEOTEST
Job No : 4115	Created by : SKD	Created on : 19/04/2018	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.83

Co-ordinates E=−119 N=−164

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	2
		Water Sample (WS)	1

Commencement Date : 09/04/2018
Completion Date : 10/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.686 M.
Water Struck At :
Standing Water Level : 2.80 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium dense, light whitish grey, clayey silt with sand mixture. Observed conch.		3 6 6 (12)	DS−1	0.50
			SPT−1	1.00−1.45
1.45m.				
Stiff to very stiff, light grey, clayey silt with sand mixture & conch pcs.			UDS−1	2.05−2.50
2.50m.		1 2 2 (4)	SPT−2	2.50−2.95
			WS−1	2.80
Loose, light whitish grey, clayey silt with sand mixture & conch.			DS−2	3.50
		2 2 2 (4)	SPT−3	4.00−4.45
4.60m.		100 5.0 cm Pentn. Refusal	SPT−4	4.60−4.65
Very dense, light whitish grey, silty sand with decomposed rock. Observed conch. 5.00m.		100 2.0 cm Pentn. Refusal (Refusal)	*SPT−5	4.80−4.82
			*SPT−6	5.00−5.02
		100 2.0 cm Pentn.	R1	CR=24% RQD=Nil
		NX rotary drilling from 5.00m to 15.00m	R2	CR=27% RQD=Nil
Highly weathered, light grey, coarse to medium grained, fractured rock.			R3	CR=25% RQD=Nil
			R4	CR=25% RQD=Nil
8.00m.			R5	CR=27% RQD=Nil
Highly weathered, light grey, coarse to medium grained, fractured rock.			R6	CR=28% RQD=Nil
9.50m.			R7	CR=25% RQD=Nil
Highly weathered, light whitish grey, medium grained, fractured rock.			R8	CR=27% RQD=Nil
10.25m.			R9	CR=29% RQD=Nil
			R10	CR=32% RQD=Nil
Highly weathered, light whitish grey to light brownish grey, medium grained, fractured rock.			R11	CR=33% RQD=Nil
			R12	CR=35% RQD=Nil
N.B. − '*' means sample could not be recovered / sample slip.			R13	CR=30% RQD=Nil
15.00m.				

5.00 5.75 6.50 7.25 8.00 8.75 9.50 10.25 11.00 11.75 12.50 13.25 14.00 15.00

BH−83/Sheet−1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 22/05/2018 | Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.84

Co-ordinates E=−155 N=−210

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	2
		Water Sample (WS)	1

Commencement Date : 10/04/2018
Completion Date : 11/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.680 M.
Water Struck At :
Standing Water Level : 2.85 m.

DESCRIPTION	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	Depth (m)
0.00m. Medium dense, light whitish grey, silty sand. Observed conch pcs.	3 6 13	DS−1	0.50
		SPT−1	1.00−1.45
1.45m. Very loose, light whitish grey, clayey silt with sand mixture.		*UDS−1	2.00−2.45
	1 2 4	SPT−2	2.50−2.95
		WS−1	2.85
		DS−2	3.50
	2 2 4	SPT−3	4.00−4.45
4.80m. Very dense, light whitish grey, silty sand with decomposed rock.	100 8.0 cm Pentn. >100	SPT−4	4.80−4.88
	100 2.0 cm Pentn. Refusal	*SPT−5	5.00−5.02
5.25m. Highly weathered, light grey, coarse to medium grained, fractured rock.	Refusal	*SPT−6	5.25−5.27
	00 2.0 cm Pentn.	R1	CR=28% RQD=Nil 6.00
	NX rotary drilling from 5.25m to 15.00m	R2	CR=29% RQD=Nil 6.75
		R3	CR=28% RQD=Nil 7.50
7.50m. Highly weathered, light grey, coarse to medium grained, fractured rock.		R4	CR=24% RQD=Nil 8.25
8.25m. Highly weathered, light grey, coarse to medium grained, fractured rock.		R5	CR=27% RQD=Nil 9.00
		R6	CR=28% RQD=Nil 9.75
9.75m. Highly weathered, light grey, coarse to medium grained, fractured rock.		R7	CR=25% RQD=Nil 10.50
10.50m. Highly weathered, light grey, coarse to medium grained, fractured rock.		R8	CR=29% RQD=Nil 11.25
		R9	CR=26% RQD=Nil 12.00
		R10	CR=28% RQD=Nil 12.75
		R11	CR=29% RQD=Nil 13.50
		R12	CR=28% RQD=Nil 14.25
N.B. − '*' means sample could not be recovered / sample slip. 15.00m.		R13	CR=30% RQD=Nil 15.00

BH−84/Sheet−1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 10/05/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.85

Co-ordinates E=−135 N=−235

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 27/04/2018
Completion Date : 28/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.637 M.
Water Struck At :
Standing Water Level : 2.90 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Medium dense, light grey, silty sand. Observed kankar.		4 6 8 — 14	DS−1	0.50
			SPT−1	1.00−1.45
1.50m. Loose, brownish grey, silty sand. Observed kankar & conch pcs.		1 2 2 — 4	*UDS−1	2.00−2.45
			SPT−2	2.50−2.95
			*UDS−2	3.50−3.95
3.95m. Medium dense, brownish grey, silty sand. Observed kankar & conch pcs.		6 9 13 — 22	SPT−3	4.00−4.45
4.90m. Very dense, light grey, silty sand with kankar & conch pcs. Observed decomposed rock.		40 60 10.0 cm Pentn. >100	SPT−4	4.90−5.15
		100 3.0 cm Pentn. Refusal	*SPT−5	5.20−5.23
5.30m.		Refusal	*SPT−6	5.30−5.33
		00 3.0 cm Pentn.	R1	CR=22% RQD=Nil 6.00
6.00m. Highly weathered, brownish grey, medium to coarse grained, highly fractured rock.		NX rotary drilling from 5.30m to 15.00m	R2	CR=28% RQD=Nil 6.75
			R3	CR=26% RQD=Nil 7.50
			R4	CR=30% RQD=Nil 8.25
Highly weathered, brownish grey, medium to coarse grained, highly fractured rock.			R5	CR=31% RQD=Nil 9.00
			R6	CR=33% RQD=Nil 9.75
			R7	CR=26% RQD=Nil 10.50
			R8	CR=28% RQD=Nil 11.25
11.25m.			R9	CR=26% RQD=Nil 12.00
			R10	CR=30% RQD=Nil 12.75
Highly weathered, light grey, medium to fine grained, highly fractured rock.			R11	CR=33% RQD=Nil 13.50
			R12	CR=35% RQD=Nil 14.25
N.B. − '*' means sample could not be recovered / sample slip. 15.00m.			R13	CR=38% RQD=Nil 15.00

BH−85/Sheet−1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 10/05/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.86

Co-ordinates E=137 N=-203

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	7
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 26/04/2018
Completion Date : 27/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.749 M.
Water Struck At :
Standing Water Level : 3.10 m.

DESCRIPTION	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	Depth (m)
0.00m. Medium dense, brownish grey to light grey, sandy silt to silty sand. Observed kankar & conch pcs.	9 11 7 = 18	DS-1	0.50
		SPT-1	1.00-1.45
1.50m. Very loose, light grey, silty sand. Observed conch pcs., kankar & clay binder.	1 1 1 = 2	*UDS-1	2.00-2.45
		SPT-2	2.50-2.95
		UDS-2	3.50-3.95
3.90m. Very dense, light grey, silty sand with decomposed rock. Observed kankar & conch pcs.	14 26 60 = >100 10.0 cm Pentn.	SPT-3	4.05-4.45
	100 3.0 cm Pentn. Refusal	*SPT-4	4.80-4.83
5.00m. Highly weathered, deep to light grey, coarse to medium grained, fractured rock.	Refusal 100 2.0 cm Pentn. NX rotary drilling from 5.00m to 20.00m	*SPT-5	5.00-5.02
		R1	CR=28%/RQD=0
		R2	CR=31% RQD=Nil
		R3	CR=27% RQD=Nil
		R4	CR=32% RQD=Nil
8.00m. Completely/highly weathered, deep to light grey, coarse to medium grained, fractured rock.		R5	CR=25% RQD=Nil
	Refusal	R6	CR=19%/RQD=0
9.50m. Highly weathered, deep to light grey, coarse to medium grained, fractured rock.	50 2.0 cm Pentn.	*SPT-6	9.50-9.52
		R7	CR=27%/RQD=0
		R8	CR=27% RQD=Nil
11.00m. Completely/highly weathered, deep to light grey, coarse to medium grained, fractured rock.		R9	CR=25% RQD=Nil
	Refusal	R10	CR=19%/RQD=0
12.50m. Highly weathered, light grey, medium to coarse grained, fractured rock.	50 2.0 cm Pentn.	*SPT-7	12.50-12.52
		R11	CR=25%/RQD=0
		R12	CR=27% RQD=Nil
14.00m. Highly weathered, light grey, medium to coarse grained, fractured rock. Observed reddish spots.		R13	CR=23% RQD=Nil
		R14	CR=25% RQD=Nil
		R15	CR=21% RQD=Nil
16.25m. Highly weathered, light grey, coarse grained, highly fractured rock.		R16	CR=27% RQD=Nil
17.00m. Highly weathered, light to whitish grey, coarse to medium grained, highly to moderately fractured rock.		R17	CR=23% RQD=Nil
		R18	CR=24% RQD=Nil
18.50m. Highly weathered, light to whitish grey, coarse to medium grained, highly to moderately fractured rock.		R19	CR=27% RQD=Nil
20.00m.		R20	CR=28% RQD=Nil

5.00 5.75 6.50 7.25 8.00 8.75 9.50 10.25 11.00 11.75 12.50 13.25 14.00 14.75 15.50 16.25 17.00 17.75 18.50 19.25 20.00

N.B. - '*' means sample could not be recovered / sample slip.

BH-86/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 10/05/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.87

Co-ordinates E=137 N=-274

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	7
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 29/04/2018
Completion Date : 29/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.386 M.
Water Struck At :
Standing Water Level : 3.00 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Stiff to very stiff, light grey, clayey silt with sand mixture & conch pcs.		6 9 11 (20)	DS-1	0.50
2.00m.			SPT-1	1.00-1.45
Loose to medium dense, light grey, silty sand. Observed conch pcs., kankar & clay binder.		2 2 3 (5)	*UDS-1	2.00-2.45
			SPT-2	2.55-3.00
		5 4 8 (12)	*UDS-2	3.50-3.95
			SPT-3	4.00-4.45
4.60m.		100 5.0 cm Pentn. Refusal	SPT-4	4.70-4.75
Very dense, light grey, silty sand with conch pcs. Observed kankar & decomposed rock. 5.00m.		100 2.0 cm Pentn. Refusal	*SPT-5	4.90-4.92
			*SPT-6	5.00-5.02
		100 2.0 cm Pentn. Refusal	R1	CR=23% RQD=Nil (5.00-5.75)
		NX rotary drilling from 5.00m to 15.00m	R2	CR=21% RQD=Nil (5.75-6.50)
Highly weathered, deep grey, coarse grained, highly fractured rock.			R3	CR=23% RQD=Nil (6.50-7.25)
			R4	CR=21% RQD=Nil (7.25-8.00)
			R5	CR=29% RQD=Nil (8.00-8.75)
8.75m.			R6	CR=25% RQD=Nil (8.75-9.50)
Highly weathered, deep grey, medium grained, fractured rock.			R7	CR=32% RQD=Nil (9.50-10.25)
10.25m.			R8	CR=21% RQD=Nil (10.25-11.00)
Highly weathered, light grey, coarse grained, fractured rock. 11.00m.			R9	CR=35% RQD=Nil (11.00-11.75)
Highly weathered, light grey, medium grained, fractured rock. Observed reddish spots. 11.75m.			R10	CR=23% RQD=Nil (11.75-12.50)
			R11	CR=27% RQD=Nil (12.50-13.25)
Completely to highly weathered, light to whitish grey, medium grained, fractured rock. Observed reddish spots.			R12	CR=16% RQD=Nil (13.25-14.00)
		50 2.0 cm Pentn. Refusal	*SPT-7	14.00-14.02
N.B. - '*' means sample could not be recovered / sample slip. 15.00m.			R13	CR=22% RQD=Nil (14.00-15.00)

BH-87/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 10/05/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.88

Co-ordinates E=67 N=-275

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	2
		Water Sample (WS)	0

Commencement Date : 29/04/2018
Completion Date : 29/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.533 M.
Water Struck At :
Standing Water Level : 2.95 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Stiff to very stiff, light grey, clayey silt with sand mixture & conch pcs.		5 7 7 (14)	DS-1	0.50
			SPT-1	1.00-1.45
2.00m. Loose, light grey, clayey sandy silt. Observed conch pcs.		2 1 2 (3)	*UDS-1	2.00-2.45
			SPT-2	2.50-2.95
			DS-2	3.50
4.60m. Very dense, light grey, silty sand with decomposed rock.		2 2 2 (4)	SPT-3	4.00-4.45
		100 7.0 cm Pentn. Refusal	SPT-4	4.60-4.67
		100 3.0 cm Pentn. Refusal	*SPT-5	4.80-4.83
5.00m. Highly weathered, light grey, coarse grained, fractured rock.		Refusal	*SPT-6	5.00-5.02
5.75m.		100 2.0 cm Pentn.	R1	CR=27%/RQD=0 5.00
		NX rotary drilling from 5.00m to 20.00m	R2	CR=25% RQD=Nil 5.75
			R3	CR=22% RQD=Nil 6.50
Highly weathered, light grey, coarse grained, fractured rock.			R4	CR=23% RQD=Nil 7.25
			R5	CR=22% RQD=Nil 8.00
			R6	CR=22% RQD=Nil 8.75
9.50m. Highly weathered, light grey, coarse grained, fractured rock.			R7	CR=28% RQD=Nil 9.50
			R8	CR=29% RQD=Nil 10.25
			R9	CR=30% RQD=Nil 11.00
			R10	CR=32% RQD=Nil 11.75
			R11	CR=33% RQD=Nil 12.50
			R12	CR=37% RQD=Nil 13.25
14.00m. Highly weatherd, light yellowish grey to light grey, medium grained, fractured rock.			R13	CR=37% RQD=Nil 14.00
			R14	CR=39% RQD=Nil 14.75
			R15	CR=27% RQD=Nil 15.50
			R16	CR=26% RQD=Nil 16.25
			R17	CR=29% RQD=Nil 17.00
			R18	CR=30% RQD=Nil 17.75
			R19	CR=26% RQD=Nil 18.50
N.B. - '*' means sample could not be recovered / sample slip. 20.00m.			R20	CR=28% RQD=Nil 19.25 20.00

BH-88/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 15/03/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.89

Co-ordinates E=−533 N=−289

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	11	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	11
Vane (V)		Disturbed (DS)	2
		Water Sample (WS)	0

Commencement Date : 12/03/2018
Completion Date : 13/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 0.466 M.
Water Struck At :
Standing Water Level : 1.35 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Soft, light grey, clayey silt with sand mixture. Observed conch.		1 1 1 — 2	DS−1	0.55
			SPT−1	1.00−1.45
			*UDS−1	2.00−2.45
2.50m.		5 6 6 — 12	SPT−2	2.60−3.05
Medium dense, light grey, silty sand. Observed kankar & conch.			*UDS−2	3.50−3.95
		4 6 7 — 13	SPT−3	4.10−4.55
4.80m.		37 73 — >100 (8.0 cm Pentn.)	SPT−4	4.90−5.13
Very dense, light grey, sandy silt / silty sand with rock pcs. Observed kankar.		100 (3.0 cm Pentn. Refusal)	*SPT−5	5.20−5.23
5.30m.		00 — Refusal (2.0 cm Penth.)	*SPT−6	5.30−5.32 5.30
Highly weathered, light grey, medium grained, highly fractured rock.		NX rotary drilling from 5.30m to 15.00m	R1	CR=22% RQD=Nil 6.00
			R2	CR=21% RQD=Nil 6.75
			R3	CR=23% RQD=18% 7.50
7.50m.			R4	CR=29% RQD=Nil 8.25
Highly weathered, light brownish grey, medium to fine grained, highly fractured rock.			R5	CR=28% RQD=Nil 9.00
9.00m.			R6	CR=21% RQD=Nil 9.75
			R7	CR=25% RQD=Nil 10.50
			R8	CR=14% RQD=Nil
		50 — Refusal (2.0 cm Penth.)	*SPT−7	11.25−11.27 11.25
			R9	CR=12% RQD=Nil
		51 — Refusal (2.0 cm Penth.)	*SPT−8	12.00−12.02 12.00
Completely to highly weathered, light grey, fine grained, highly fractured rock.			R10	CR=Nil RQD=Nil
			DS−2	
		53 — Refusal (3.0 cm Penth.)	*SPT−9	12.75−12.78 12.75
			R11	CR=14% RQD=Nil
		50 — Refusal (3.0 cm Penth.)	*SPT−10	13.50−13.53 13.50
			R12	CR=18% RQD=Nil
		51 — Refusal (2.0 cm Penth.)	*SPT−11	14.25−14.27 14.25
N.B. − '*' means sample could not be recovered / sample slip.			R13	CR=21% RQD=Nil
15.00m.				15.00

BH−89/Sheet−1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 10/05/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.90

Co-ordinates E=133 N=-357

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	7
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 29/04/2018
Completion Date : 30/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.194 M.
Water Struck At :
Standing Water Level : 2.90 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Stiff to very stiff, light grey, clayey silt with sand mixture & conch pcs.		6 9 10 (19)	DS-1	0.50
			SPT-1	1.00-1.45
2.00m. Loose to medium dense, brownish grey, clayey silty sand. Observed kankar & conch pcs.		2 2 3 (5)	*UDS-1	2.00-2.45
			SPT-2	2.55-3.00
			*UDS-2	3.50-3.95
		7 10 10 (20)	SPT-3	4.00-4.45
4.80m. Very dense, light grey, silty sand with kankar & conch pcs. Observed decomposed rock.		35 65 5.0 cm Pentn. >100	SPT-4	4.80-5.00
		100 4.0 cm Pentn. Refusal	*SPT-5	5.10-5.14
5.20m.		100 3.0 cm Pentn. Refusal	*SPT-6	5.20-5.23
		Refusal	R1	CR=18%/RQD=0
Completely to highly weathered, brownish grey, medium to coarse grained, highly fractured rock.		52 2.0 cm Pentn.	*SPT-7	6.00-6.02
			R2	CR=22%/RQD=0
7.50m.		NX rotary drilling from 5.20m to 20.00m	R3	CR=24% RQD=Nil
			R4	CR=26% RQD=Nil
			R5	CR=30% RQD=Nil
			R6	CR=32% RQD=16%
			R7	CR=30% RQD=Nil
Highly weathered, brownish grey, medium to coarse grained, highly fractured rock.			R8	CR=33% RQD=Nil
			R9	CR=29% RQD=Nil
			R10	CR=36% RQD=Nil
			R11	CR=30% RQD=Nil
			R12	CR=32% RQD=Nil
			R13	CR=26% RQD=Nil
15.00m. Highly weathered, brownish grey, medium grained, highly fractured rock.			R14	CR=29% RQD=Nil
15.75m. Highly weathered, brownish grey to light grey, medium to fine grained, highly fractured rock.			R15	CR=24% RQD=Nil
16.50m.			R16	CR=38% RQD=16%
Highly weathered, brownish grey to light grey, medium to fine grained, highly fractured rock.			R17	CR=40% RQD=25%
			R18	CR=28% RQD=Nil
			R19	CR=36% RQD=Nil
N.B. - '*' means sample could not be recovered / sample slip.			R20	CR=34% RQD=Nil
20.00m.				

5.20 6.00 6.75 7.50 8.25 9.00 9.75 10.50 11.25 12.00 12.75 13.50 14.25 15.00 15.75 16.50 17.25 18.00 18.75 19.50 20.00

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Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 10/05/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.91

Co-ordinates E=137 N=-414

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	7
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 02/05/2018
Completion Date : 03/05/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 0.287 M.
Water Struck At :
Standing Water Level : 1.40 m.

DESCRIPTION	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	Depth (m)
0.00m. Soft to medium, light grey, clayey silt with sand mixture.	2 2 2 (4)	DS-1	0.50
		SPT-1	1.00-1.45
2.00m. Medium dense, light grey, clayey silty sand. Observed kankar & conch pcs.	3 8 9 (17)	*UDS-1	2.00-2.45
		SPT-2	2.55-3.00
3.60m. Very dense, brownish grey, silty sand with kankar & conch pcs. Observed decomposed rock. 4.00m.	45 55 5.0 cm Pentn. >100	SPT-3	3.60-3.80
	100 4.0 cm Pentn. Refusal	*SPT-4	3.90-3.94
	100 3.0 cm Pentn. Refusal	*SPT-5 R1	4.00-4.03 4.00
Completely to highly weathered, light to brownish grey, medium to coarse grained, highly fractured rock.	50 3.0 cm Pentn. Refusal	*SPT-6 R2	4.75-4.78 4.75
	52 2.0 cm Pentn. Refusal	*SPT-7 R3	5.50-5.52 5.50
	NX rotary drilling from 4.00m to 20.00m	R4	6.25
7.00m. Completely to highly weathered, light to brownish grey, medium to coarse grained, highly fractured rock.		R5	7.00
		R6	7.75
		R7	8.50
9.25m. Completely to highly weathered, light to brownish grey, medium to coarse grained, highly fractured rock. 10.00m.		R8	9.25
		R9	10.00
Completely to highly weathered, light to brownish grey, medium to coarse grained, highly fractured rock.		R10	10.75
		R11	11.50
		R12	12.25
13.00m. Highly weathered, light to deep grey, medium to fine grained, highly fractured rock.		R13	13.00
		R14	13.75
		R15	14.50
		R16	15.25
		R17	16.00
		R18	16.75
		R19	17.50
		R20	18.25
N.B. - '*' means sample could not be recovered / sample slip. 20.00m.		R21	19.00
			20.00

CR=17%/RQD=0
CR=12%/RQD=0
CR=22%/RQD=0
CR=24% RQD=Nil
CR=26% RQD=Nil
CR=29% RQD=Nil
CR=26% RQD=Nil
CR=22% RQD=Nil
CR=28% RQD=Nil
CR=31% RQD=Nil
CR=27% RQD=Nil
CR=28% RQD=Nil
CR=33% RQD=Nil
CR=35% RQD=Nil
CR=30% RQD=Nil
CR=36% RQD=Nil
CR=27% RQD=Nil
CR=26% RQD=Nil
CR=22% RQD=Nil
CR=38% RQD=Nil
CR=30% RQD=Nil

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Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 18/05/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.92

Co-ordinates E = 78, N = -448

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	4	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	4
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	1

Commencement Date : 30/04/2018
Completion Date : 02/05/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 0.281 M.
Water Struck At :
Standing Water Level : 1.40 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Loose, light whitish grey, clayey sandy silt. Observed conch pcs.		2 2 1 — 3	DS-1	0.50
			SPT-1	1.00-1.45
			WS-1	1.40
2.50m.		>100	*UDS-1	2.00-2.45
Very dense, light whitish grey, silty sand with decomposed rock.		40 65	SPT-2	2.50-2.80
		100 3.0 cm Pentn. Refusal	*SPT-3	3.50-3.53
4.10m.		Refusal	*SPT-4	4.10-4.12
		100 2.0 cm Pentn.	R1	CR=29%/RQD=0
		NX rotary drilling from 4.10m to 40.00m	R2	CR=30%/RQD=0
			R3	CR=27%/RQD=0
			R4	CR=29%/RQD=0
Highly weathered, light grey, coarse to medium grained, fractured rock.			R5	CR=27% RQD=Nil
			R6	CR=26% RQD=Nil
			R7	CR=28% RQD=Nil
			R8	CR=27% RQD=Nil
			R9	CR=26% RQD=Nil
			R10	CR=28% RQD=Nil
11.25m.			R11	CR=32% RQD=Nil
Highly weathered, light whitish grey, medium grained, fractured rock.			R12	CR=35% RQD=Nil
			R13	CR=37% RQD=Nil
			R14	CR=35% RQD=Nil
			R15	CR=32% RQD=Nil
			R16	CR=32% RQD=Nil
			R17	CR=34% RQD=Nil
			R18	CR=35% RQD=Nil
			R19	CR=37% RQD=Nil
			R20	CR=35% RQD=Nil
			R21	CR=32% RQD=Nil
			R22	CR=35% RQD=Nil
20.10m.			R23	CR=37% RQD=Nil

4.10, 4.50, 5.00, 5.50, 6.00, 6.75, 7.50, 8.25, 9.00, 9.75, 10.50, 11.25, 12.00, 12.75, 13.50, 14.25, 15.00, 15.75, 16.50, 17.25, 18.00, 18.75, 19.50

BH-92/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.			CETEST
Job No : 4115	Created by : SKD	Created on : 18/05/2018	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.92

Co-ordinates E = 78, N = −448

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	4	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	4
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	1

Commencement Date : 30/04/2018
Completion Date : 02/05/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 0.281 M.
Water Struck At :
Standing Water Level : 1.4 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
20.10m.				
Highly weathered, light whitish grey, medium grained, fractured rock.			R24 CR=38% RQD=Nil	20.25
			R25 CR=29% RQD=Nil	21.00
			R26 CR=32% RQD=Nil	21.75
			R27 CR=30% RQD=Nil	22.50
			R28 CR=28% RQD=Nil	23.25
			R29 CR=27% RQD=Nil	24.00
			R30 CR=29% RQD=Nil	24.75
			R31 CR=30% RQD=Nil	25.50
			R32 CR=36% RQD=Nil	26.25
			R33 CR=28% RQD=Nil	27.00
			R34 CR=32% RQD=Nil	27.75
			R35 CR=35% RQD=Nil	28.50
29.25m.			R36 CR=40% RQD=Nil	29.25
Highly to moderately weathered, light yellowish grey, medium to fine grained, light fractured rock.			R37 CR=42% RQD=Nil	30.00
			R38 CR=46% RQD=Nil	30.75
			R39 CR=45% RQD=Nil	31.50
			R40 CR=43% RQD=Nil	32.25
			R41 CR=40% RQD=Nil	33.00
			R42 CR=35% RQD=Nil	33.75
			R43 CR=37% RQD=Nil	34.50
			R44 CR=37% RQD=Nil	35.25
			R45 CR=42% RQD=Nil	36.00
			R46 CR=45% RQD=Nil	36.75
			R47 CR=45% RQD=Nil	37.50
38.25m.			R48 CR=62% RQD=49%	38.25
Slightly weathered, light yellowish grey, meidum to fine grained, light fractured rock. N.B. − '*' means sample could not be recovered / sample slip.			R49 CR=68% RQD=60%	39.00
40.00m.				40.00

BH−92/Sheet−2

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.				CETEST
Job No : 4115	Created by : SKD	Created on : 10/05/2018	Sheet No:	

BORE LOG DATA SHEET — BORE HOLE NO.93

Co-ordinates E=196 N=−448

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	4	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	4
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 03/05/2018
Completion Date : 03/05/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : −0.153 M.
Water Struck At :
Standing Water Level : 1.50 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Soft, light grey, clayey silt with sand mixture.		1 2 1	DS−1	0.50
		3	SPT−1	1.00−1.45
		60 42	*UDS−1	2.00−2.45
2.50m. Very dense, light whitish grey, silty sand with decomposed rock. 3.00m.		>100 5.0 cm Pentn. 100 2.0 cm Pentn. Refusal Refusal	SPT−2 *SPT−3 *SPT−4	2.50−2.70 2.80−2.82 3.00−3.02
		100 2.0 cm Pentn.	R1	CR=29%/RQD=0 3.00
		NX rotary drilling from 3.00m to 20.00m	R2	CR=27% RQD=Nil 3.75
			R3	CR=28% RQD=Nil 4.50
			R4	CR=30% RQD=Nil 5.25
			R5	CR=28% RQD=Nil 6.00
			R6	CR=29% RQD=Nil 6.75
Highly weathered, light grey, coarse to medium grained, fractured rock.			R7	CR=32% RQD=Nil 7.50
			R8	CR=33% RQD=Nil 8.25
			R9	CR=30% RQD=Nil 9.00
			R10	CR=32% RQD=Nil 9.75
			R11	CR=30% RQD=Nil 10.50
			R12	CR=32% RQD=Nil 11.25
			R13	CR=29% RQD=Nil 12.00
			R14	CR=32% RQD=Nil 12.75
13.50m.			R15	CR=35% RQD=12% 13.50
			R16	CR=35% RQD=Nil 14.25
			R17	CR=37% RQD=Nil 15.00
			R18	CR=40% RQD=21% 15.75
Highly weathered, light whitish grey to yellowish grey, medium grained, fractured rock.			R19	CR=38% RQD=Nil 16.50
			R20	CR=35% RQD=Nil 17.25
			R21	CR=31% RQD=Nil 18.00
			R22	CR=32% RQD=Nil 18.75
N.B. − '*' means sample could not be recovered / sample slip. 20.00m.			R23	CR=37% RQD=Nil 19.50 20.00

BH−93/Sheet−1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 15/03/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.94

Co-ordinates E=687 N=-396

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	10	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	10
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 03/03/2018
Completion Date : 05/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.098 M.
Water Struck At :
Standing Water Level : 1.10 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	Ref. No	Depth (m)
0.00m.				
Medium, light grey, clayey silt with sand mixture. Observed conch pcs.		4 4 2 — 6	DS-1	0.50
			SPT-1	1.00-1.45
2.30m.			*UDS-1	2.00-2.45
Very loose, light grey, clayey silty sand. Observed kankar, conch pcs.		0 1 1 — 2	SPT-2	2.50-2.95
3.80m.			*UDS-2	3.50-3.95
Very dense, light grey, sandy silt / silty sand.		00 — >100	SPT-3	4.00-4.14
		14.0 cm Pentn.	*SPT-4	4.30-4.32
4.50m.		100 2.0 cm Pentn. Refusal	*SPT-5	4.50-4.52 4.50
Highly weathered, light grey to whitish grey, coarse to fine grained, fractured rock.		00 — Refusal	R1	CR=26% RQD=16%
5.25m.		2.0 cm Pentn.		5.25
		NX rotary drilling from 4.50m to 15.00m	R2	CR=22% RQD=14%
				6.00
			R3	CR=14% RQD=Nil
		50 — Refusal	*SPT-6	6.75-6.77 6.75
		2.0 cm Pentn.	R4	CR=14% RQD=Nil
		50 — Refusal	*SPT-7	7.50-7.52 7.50
		2.0 cm Pentn.	R5	CR=18% RQD=14%
		50 — Refusal	*SPT-8	8.25-8.27 8.25
		2.0 cm Pentn.	R6	CR=22% RQD=Nil
Completely to highly weathered, light grey to whitish grey, coarse to fine grained, fractured rock.				9.00
			R7	CR=20% RQD=Nil
				9.75
			R8	CR=13% RQD=Nil
		50 — Refusal	*SPT-9	10.50-10.52 10.50
		2.0 cm Pentn.	R9	CR=14% RQD=Nil
		50 — Refusal	*SPT-10	11.25-11.27 11.25
		2.0 cm Pentn.	R10	CR=25% RQD=Nil
				12.00
			R11	CR=21% RQD=Nil
				12.75
			R12	CR=22% RQD=Nil
				13.50
			R13	CR=23% RQD=Nil
14.25m.				14.25
Highly weathered, light grey, fine grained, fractured rock.			R14	CR=32% RQD=19%
15.00m.				15.00

N.B. - '*' means sample could not be recovered / sample slip.

BH-94/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 19/03/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.95

Co-ordinates E=−473 N=−809

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	8	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	8
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 14/03/2018
Completion Date : 15/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.670 M.
Water Struck At :
Standing Water Level : 2.10 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium dense, light grey, silty sand. Observed kankar & conch.		3 5 7 — 12	DS−1	0.50
			SPT−1	1.00−1.45
2.55m.			*UDS−1	2.00−2.45
Dense, light grey, silty sand. Observed kankar & conch.		14 18 21 — 39	SPT−2	2.55−3.00
3.00m.			SPT−3	3.10−3.35
Very dense, light grey, silty sand with rock pcs.		32 68 10.0 cm Pentn. >100	*SPT−4	3.45−3.48
3.55m.		100 3.0 cm Pentn. Refusal	*SPT−5	3.55−3.57
Highly weathered, light grey, medium grained, highly fractured rock.		00 Refusal 2.0 cm Pentn.	R1	CR=25% RQD=Nil
4.25m.		NX rotary drilling from 3.55m to 15.00m	R2	CR=36% RQD=Nil
			R3	CR=37% RQD=Nil
Highly weathered, light brownish grey to light grey, medium to fine grained, fractured rock.			R4	CR=39% RQD=24%
			R5	CR=36% RQD=Nil
			R6	CR=40% RQD=Nil
8.00m.			R7	CR=22% RQD=Nil
Highly weathered, light brownish grey to light grey, medium to fine grained, fractured rock.			R8	CR=26% RQD=Nil
9.50m.			R9	CR=21% RQD=Nil
			R10	CR=17% RQD=Nil
		51 Refusal 2.0 cm Pentn.	*SPT−6	11.00−11.02
Completely to highly weathered, whitish grey, coarse grained, highly fractured rock.			R11	CR=25% RQD=Nil
			R12	CR=16% RQD=Nil
		50 Refusal 3.0 cm Pentn.	*SPT−7	12.50−12.53
			R13	CR=22% RQD=Nil
			R14	CR=18% RQD=Nil
14.00m.		52 Refusal 2.0 cm Pentn.	*SPT−8	14.00−14.02
Highly weathered, light grey, fine grained, highly fractured rock.			R15	CR=27% RQD=Nil
N.B. − '*' means sample could not be recovered / sample slip. 15.00m.				

4.25 | 5.00 | 5.75 | 6.50 | 7.25 | 8.00 | 8.75 | 9.50 | 10.25 | 11.00 | 11.75 | 12.50 | 13.25 | 14.00 | 15.00

BH−95/Sheet−1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 15/03/2018 | Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.96

Co-ordinates E=705 N=-881

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	9	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	9
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 05/03/2018
Completion Date : 06/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.761 M.
Water Struck At :
Standing Water Level : 1.65 m.

DESCRIPTION	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	Depth (m)
0.00m.			
Medium dense, light grey, silty sand. Observed conch pcs.	5 7 10 — 17	DS-1	0.50
		SPT-1	1.00-1.45
		*UDS-1	2.00-2.45
2.70m.			
Very loose, light grey, silty sand. Observed kankar, conch pcs.	0 1 1 — 2	SPT-2	3.00-3.45
3.60m.			
Very dense, light grey, silty sand with decomposed rock. Observed conch pcs.	100 — >100 (14.0 cm Pentn.)	SPT-3	4.00-4.14
	100 2.0 cm Pentn. Refusal	*SPT-4	4.35-4.37
4.50m.	100 Refusal 2.0 cm Pentn.	*SPT-5	4.50-4.52 4.50
		R1	CR=14% RQD=Nil
Completely weathered, light to deep grey, coarse grained, fractured rock.	50 Refusal 2.0 cm Pentn.	*SPT-6	5.25-5.27 5.25
		R2	CR=13% RQD=Nil
6.00m.	50 Refusal 3.0 cm Pentn.	*SPT-7	6.00-6.03 6.00
		R3	CR=38% RQD=25%
Highly weathered, light to deep grey, coarse grained, fractured rock.	NX rotary drilling from 4.50m to 15.00m	R4	6.75 CR=41% RQD=22%
7.50m.		R5	7.50 CR=22% RQD=Nil
Completely to highly weathered, light grey, coarse to medium grained, fractured rock.		R6	8.25 CR=26% RQD=Nil
		R7	9.00 CR=18% RQD=Nil
	50 Refusal 2.0 cm Pentn.	*SPT-8	9.75-9.77 9.75
		R8	CR=22% RQD=Nil
10.50m.		R9	10.50 CR=30% RQD=Nil
Highly to moderately weathered, light grey, medium grained, fractured rock.		R10	11.25 CR=46% RQD=Nil
		R11	12.00 CR=45% RQD=Nil
12.75m.		R12	12.75 CR=21% RQD=Nil
Completely/highly weathered, whitish grey, coarse to fine grained, fractured rock.		R13	13.50 CR=28% RQD=Nil
N.B. - '*' means sample could not be recovered / sample slip.		R14	14.25 CR=14% RQD=Nil
15.00m.	50 Refusal 2.0 cm Pentn.	*SPT-9	15.00-15.02 15.00

BH-96/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 19/03/2018 | Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.97

Co-ordinates E=-260 N=-1148

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 15/03/2018
Completion Date : 17/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 0.221 M.
Water Struck At :
Standing Water Level : 1.56 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Loose, light grey, silty sand. Observed kankar, conch pcs. & clay binder.		2 2 3 (5)	DS-1	0.50
			SPT-1	1.00-1.45
Very loose, light grey, silty sand. (Observed kankar, conch pcs. & clay binder.) 2.45m.		1 2 2 (4)	UDS-1	2.00-2.45
			SPT-2	2.50-2.95
3.00m. Very dense, light grey, silty sand with conch pcs. & decomposed rock. 3.50m.		100 9.0 cm Pentn. >100	SPT-3	3.10-3.19
		100 3.0 cm Pentn. Refusal	*SPT-4	3.30-3.33
		00 Refusal 2.0 cm Pentn.	*SPT-5	3.50-3.52
Completely weathered, light grey, coarse grained, fractured rock. 4.25m.		NX rotary drilling from 3.50m to 15.00m	R1	CR=20% RQD=Nil 4.25
			R2	CR=30% RQD=Nil 5.00
Highly weathered, deep to light grey, fine to coarse grained, fractured rock.			R3	CR=32% RQD=Nil 5.75
			R4	CR=28% RQD=Nil 6.50
			R5	CR=29% RQD=Nil 7.25
7.25m.			R6	CR=25% RQD=Nil 8.00
			R7	CR=24% RQD=Nil 8.75
			R8	CR=24% RQD=Nil 9.50
Completely to highly weathered, light to whitish grey, medium to coarse grained, moderately to highly fractured rock.		Refusal	R9	CR=18% RQD=Nil 10.25
		50 2.0 cm Pentn.	*SPT-6	10.25-10.27
			R10	CR=22% RQD=Nil 11.00
			R11	CR=24% RQD=Nil 11.75
			R12	CR=33% RQD=16% 12.50
			R13	CR=25% RQD=Nil 13.25
13.25m.			R14	CR=29% RQD=Nil 14.00
Highly weathered, light grey, medium grained, fractured rock.			R15	CR=36% RQD=Nil 15.00
N.B. - '*' means sample could not be recovered / sample slip. 15.00m.				

BH-97/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.				CETEST
Job No : 4115	Created by : SKD	Created on : 19/03/2018	Sheet No:	

BORE LOG DATA SHEET

BORE HOLE NO.98

Co-ordinates E=112 N=-1560

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 14/03/2018
Completion Date : 15/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 0.379 M.
Water Struck At :
Standing Water Level : 1.6 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Very loose, light grey, sandy silt / silty sand. Observed kankar, conch pcs., gravel & clay binder.		2 1 1 (2)	DS-1	0.50
			SPT-1	1.00-1.45
			UDS-1	2.00-2.45
		1 1 3 (4)	SPT-2	2.50-2.95
3.40m.				
Very dense, light grey, silty sand. Observed kankar, conch pcs. & decomposed rock.		100 9.0 cm Pentn. (>100)	*UDS-2	3.50-3.58
		100 2.0 cm Pentn. Refusal	SPT-3	3.90-3.99
			*SPT-4	4.20-4.22
4.50m.		Refusal	*SPT-5	4.50-4.52
		100 2.0 cm Pentn.	R1	CR=24% RQD=Nil (4.50-5.25)
Completely to highly weathered, light grey, coarse grained, fractured rock.		NX rotary drilling from 4.50m to 15.00m	R2	CR=20% RQD=Nil (5.25-6.00)
			R3	CR=21% RQD=Nil (6.00-6.75)
6.75m.			R4	CR=28% RQD=Nil (6.75-7.50)
Highly weathered, light to deep grey, medium to coarse grained, fractured rock.			R5	CR=28% RQD=Nil (7.50-8.25)
			R6	CR=29% RQD=Nil (8.25-9.00)
9.00m.			R7	CR=33% RQD=Nil (9.00-9.75)
Highly weathered, whitish grey to light grey, medium to coarse grained, fractured rock.			R8	CR=26% RQD=Nil (9.75-10.50)
			R9	CR=32% RQD=Nil (10.50-11.25)
11.25m.			R10	CR=22% RQD=Nil (11.25-12.00)
Highly weathered, whitish grey to light grey, medium to coarse grained, fractured rock.			R11	CR=28% RQD=Nil (12.00-12.75)
			R12	CR=25% RQD=Nil (12.75-13.50)
			R13	CR=28% RQD=Nil (13.50-14.25)
N.B. - '*' means sample could not be recovered / sample slip. 15.00m.			R14	CR=25% RQD=Nil (14.25-15.00)

BH-98/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.			CETEST
Job No : 4115	Created by : SKD	Created on : 15/03/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.99

Co-ordinates E=914 N=-1357

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	8	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	8
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 06/03/2018
Completion Date : 07/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.543 M.
Water Struck At :
Standing Water Level : 1.53 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Loose, light grey, silty sand. Observed conch pcs., kankar & clay binder.		3 4 6 — 10	DS-1	0.50
			SPT-1	1.00-1.45
2.40m.			UDS-1	2.00-2.45
Very loose, light grey, silty sand. Observed kankar.		0 1 2 — 3	SPT-2	2.50-2.95
			*UDS-2	3.50-3.95
		1 2 3 — 5	SPT-3	4.00-4.45
4.70m.				
Very dense, brownish grey to light grey, silty sand with mica. Observed gravel & decomposed rock.		100 — >100 (12.0 cm Pentn.)	SPT-4	5.00-5.12
		100 (2.0 cm Pentn. Refusal)	*SPT-5	5.30-5.32
5.50m.		00 — Refusal (3.0 cm Pentn.)	*SPT-6	5.50-5.53
		NX rotary drilling from 5.50m to 15.00m	R1	CR=28% RQD=Nil
			R2	CR=37% RQD=25%
			R3	CR=30% RQD=16%
			R4	CR=24% RQD=13%
Highly weathered, brownish grey to light grey, medium to coarse grained, moderately fractured rock.			R5	CR=37% RQD=17%
			R6	CR=32% RQD=13%
			R7	CR=34% RQD=26%
			R8	CR=33% RQD=Nil
			R9	CR=29% RQD=Nil
12.25m.			R10	CR=14% RQD=Nil
Completely to highly weathered, whitish grey to brownish grey, medium grained, lightly fractured rock.		50 — Refusal (3.0 cm Pentn.)	*SPT-7	13.00-13.03
			R11	CR=18% RQD=Nil
13.75m.		50 — Refusal (2.0 cm Pentn.)	*SPT-8	13.75-13.77
Moderately weathered, whitish grey to light grey, medium grained, moderately fractured rock.			R12	CR=46% RQD=17%
N.B. - '*' means sample could not be recovered / sample slip.			R13	CR=48% RQD=28%
15.00m.				

5.50
6.25
7.00
7.75
8.50
9.25
10.00
10.75
11.50
12.25
13.00
13.75
14.50
15.00

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 15/03/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.100

Co-ordinates E=748 N=-1746

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	1

Commencement Date : 07/03/2018
Completion Date : 08/03/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.073 m.
Water Struck At :
Standing Water Level : 1.92 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Loose, light grey, silty sand. Observed mica, clay binder & brownish spots.		6 5 3 (8)	DS-1	0.50
			SPT-1	1.00-1.45
			WS-1	1.92
			UDS-1	2.00-2.45
2.50m.		0 0 2 (2)	SPT-2	2.50-2.95
Very loose, light grey, silty sand. Observed clay binder with high % of conch pcs. & gravel.			*UDS-2	3.50-3.95
		0 0 1 (1)	SPT-3	4.05-4.50
4.70m.		100 >100 14.0 cm Pentn.	SPT-4	4.70-4.84
Very dense, light grey, silty sand with conch pcs. & decomposed rock. 5.00m.		00 Refusal 3.0 cm Pentn.	*SPT-5	5.00-5.03
		NX rotary drilling from 5.00m to 15.00m	R1	CR=24% RQD=14% (5.00-5.45)
			R2	CR=25% RQD=13% (5.45-6.20)
Completely/highly weathered, light grey, coarse grained, fractured rock.			R3	CR=24% RQD=Nil (6.20-6.95)
			R4	CR=28% RQD=Nil (6.95-7.70)
			R5	CR=20% RQD=Nil (7.70-8.45)
8.45m.			R6	CR=29% RQD=17% (8.45-9.20)
			R7	CR=28% RQD=16% (9.20-9.95)
			R8	CR=33% RQD=Nil (9.95-10.70)
Highly to moderately weathered, light to brownish grey, coarse grained, fractured rock.			R9	CR=38% RQD=Nil (10.70-11.45)
			R10	CR=39% RQD=Nil (11.45-12.20)
			R11	CR=32% RQD=13% (12.20-12.95)
			R12	CR=42% RQD=Nil (12.95-13.70)
			R13	CR=25% RQD=Nil (13.70-14.45)
N.B. - '*' means sample could not be recovered / sample slip. 15.00m.			R14	CR=27% RQD=Nil (14.45-15.00)

BH-100/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 04/05/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.101

Co-ordinates E=-106 N=333

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	10	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	10
Vane (V)		Disturbed (DS)	5
		Water Sample (WS)	0

Commencement Date : 17/04/2018
Completion Date : 20/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 2.003 M.
Water Struck At :
Standing Water Level : 2.85 m.

DESCRIPTION	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Medium dense, light grey, silty sand. Observed kankar.	6 5 5 (10)	DS-1	0.50
		SPT-1	1.00-1.45
1.50m. Loose to medium dense, brownish grey, silty sand with kankar & conch pcs. Observed clay binder.	2 2 3 (5)	*UDS-1	2.00-2.45
		SPT-2	2.50-2.95
		*UDS-2	3.00-3.45
	7 10 10 (20)	SPT-3	4.00-4.45
5.00m. Very dense, light grey, silty sand with kankar & conch pcs. Observed decomposed rock. 5.60m.	15 35 50 5.0 cm Pentn. >100	SPT-4	5.00-5.34
	100 3.0 cm Pentn. Refusal	*SPT-5	5.50-5.53
		*SPT-6	5.60-5.63
Highly weathered, brownish grey, medium to coarse grained, highly fractured rock.	100 3.0 cm Pentn. Refusal	R1	CR=22%/RQD=0
	NX rotary drilling from 5.60m to 40.00m	R2	CR=26% RQD=Nil
		R3	CR=22% RQD=Nil
8.50m. Highly weathered, brownish grey, medium to coarse grained, highly fractured rock.		R4	CR=24% RQD=Nil
		R5	CR=26% RQD=Nil
		R6	CR=28% RQD=Nil
		R7	CR=26% RQD=Nil
		R8	CR=28% RQD=Nil
12.25m. Highly weathered, brownish grey to deep grey, medium to fine grained, highly fractured rock.		R9	CR=29% RQD=Nil
		R10	CR=26% RQD=Nil
13.75m. Highly weathered, brownish grey to deep grey, medium to fine grained, highly fractured rock.		R11	CR=28% RQD=Nil
		R12	CR=24% RQD=Nil
		R13	CR=22% RQD=Nil
		R14	CR=25% RQD=Nil
		R15	CR=27% RQD=Nil
17.50m. Highly to moderately weathered, brownish grey to deep grey, medium to fine grained, highly fractured rock.		R16	CR=24% RQD=Nil
		R17	CR=28% RQD=Nil
		R18	CR=26% RQD=Nil
20.10m.		R19	CR=29% RQD=Nil

Depth (m): 5.60, 6.25, 7.00, 7.75, 8.50, 9.25, 10.00, 10.75, 11.50, 12.25, 13.00, 13.75, 14.50, 15.25, 16.00, 16.75, 17.50, 18.25, 19.00, 19.75

BH-101/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 04/05/2018	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.101

Co-ordinates E=-106 N=333

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	10	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	10
Vane (V)		Disturbed (DS)	5
		Water Sample (WS)	0

Commencement Date : 17/04/2018
Completion Date : 20/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 2.003 M.
Water Struck At :
Standing Water Level : 2.85 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
20.10m.			R20	CR=30% RQD=Nil 20.50
			R21	CR=28% RQD=Nil 21.25
			R22	CR=31% RQD=Nil 22.00
			R23	CR=36% RQD=Nil 22.75
Highly to moderately weathered, brownish grey to deep grey, medium to fine grained, highly fractured rock.			R24	CR=28% RQD=Nil 23.50
			R25	CR=31% RQD=17% 24.25
			R26	CR=38% RQD=16% 25.00
			R27	CR=38% RQD=17% 25.75
			R28	CR=40% RQD=Nil 26.50
			R29	CR=42% RQD=13% 27.25
27.25m.		45 55 >100 10.0 cm Pentn.	R30/DS-2	CR=0/RQD=0
			SPT-7	28.00-28.25 28.00
Completely weathered, brownish grey, medium grained, fully decomposed & disintegrated rock particles collected as sludge sample.		42 58 >100 5.0 cm Pentn.	R31/DS-3	CR=0/RQD=0
			SPT-8	28.75-28.95 28.75
			R32/DS-4	CR=0/RQD=0
		30 35 35 5.0 cm Pentn.	SPT-9	29.50-29.85 29.50
			R33/DS-5	CR=0/RQD=0
30.25m.		Refusal	*SPT-10	30.25-30.29 30.25
		100 4.0 cm Pentn.	R34	CR=38%/RQD=0
			R35	CR=37% RQD=Nil 31.00
			R36	CR=35% RQD=Nil 31.75
			R37	CR=40% RQD=Nil 32.50
			R38	CR=34% RQD=Nil 33.25
			R39	CR=40% RQD=Nil 34.00
Highly to moderately weathered, light to brownish grey, medium to fine grained, highly fractured rock.			R40	CR=33% RQD=Nil 34.75
			R41	CR=40% RQD=Nil 35.50
			R42	CR=33% RQD=Nil 36.25
			R43	CR=40% RQD=Nil 37.00
			R44	CR=38% RQD=13% 37.75
			R45	CR=36% RQD=Nil 38.50
N.B. - '*' means sample could not be recovered / sample slip.			R46	CR=45% RQD=Nil 39.25
40.00m.				40.00

BH-101/Sheet-2

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 04/05/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.102

Co-ordinates E=-119 N=311

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 13/04/2018
Completion Date : 16/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 2.017 M.
Water Struck At :
Standing Water Level : 2.85 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Medium dense, light grey, silty sand. Observed kankar.		5 6 5 (11)	DS-1	0.50
2.00m. Very soft, light grey, clayey silt with sand mixture.		2 2 4 (6)	SPT-1 *UDS-1 SPT-2	1.00-1.45 2.00-2.45 2.55-3.00
Medium dense, brownish grey, silty sand with kankar & conch. Observed clay binder. 3.95m.		7 10 12 (22)	UDS-2 SPT-3	3.50-3.95 4.00-4.45
4.50m. Dense to very dense, light grey, silty sand with mica, kankar & conch. Observed decomposed rock. 5.70m.		10 15 17 (32) 100 4.0 cm Pentn. Refusal Refusal	SPT-4 *SPT-5 *SPT-6	5.00-5.45 5.60-5.64 5.70-5.73
Highly weathered, brownish grey, medium grained, highly fractured rock. 6.50m.		00 3.0 cm Pentn.	R1	CR=31%/RQD=0
Highly weathered, brownish grey to light grey, medium to coarse grained, highly fractured rock. 8.00m.		NX rotary drilling from 5.70m to 40.00m	R2 R3 R4 R5 R6 R7 R8 R9 R10 R11 R12 R13 R14 R15 R16 R17 R18 R19	CR=25% RQD=Nil CR=24% RQD=Nil CR=26% RQD=Nil CR=34% RQD=Nil CR=25% RQD=Nil CR=29% RQD=Nil CR=24% RQD=Nil CR=26% RQD=Nil CR=33% RQD=Nil CR=29% RQD=Nil CR=38% RQD=Nil CR=31% RQD=Nil CR=40% RQD=Nil CR=37% RQD=Nil CR=33% RQD=Nil CR=31% RQD=Nil CR=29% RQD=Nil CR=30% RQD=Nil
Highly weathered, brownish grey to light grey, medium to coarse grained, highly fractured rock. 9.50m.				6.50, 7.25, 8.00, 8.75, 9.50
Highly weathered, brownish grey to light grey, medium to coarse grained, highly fractured rock. 11.75m.				10.25, 11.00, 11.75
Highly weathered, brownish grey to light grey, medium to coarse grained, highly fractured rock. 14.00m.				12.50, 13.25, 14.00
Highly weathered, light grey, medium to fine grained, highly fractured rock. 20.10m.				14.75, 15.50, 16.25, 17.00, 17.75, 18.50, 19.25, 20.00

BH-102/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 04/05/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.102

Co-ordinates E=-119 N=311

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 13/04/2018
Completion Date : 16/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 2.017 M.
Water Struck At :
Standing Water Level : 2.85 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	Ref. No	Depth (m)	
20.10m.			R20	CR=35% RQD=Nil	20.75
Highly weathered, light grey, medium to fine grained, highly fractured rock.			R21	CR=34% RQD=Nil	21.50
22.25m.			R22	CR=40% RQD=Nil	22.25
			R23	CR=38% RQD=Nil	23.00
			R24	CR=38% RQD=Nil	23.75
			R25	CR=34% RQD=Nil	24.50
			R26	CR=34% RQD=Nil	25.25
Highly weathered, light to brownish grey, fine to medium grained, moderately fractured rock.			R27	CR=36% RQD=Nil	26.00
			R28	CR=27% RQD=Nil	26.75
			R29	CR=30% RQD=Nil	27.50
			R30	CR=28% RQD=Nil	28.25
			R31	CR=33% RQD=Nil	29.00
			R32	CR=38% RQD=Nil	29.75
29.75m.			R33	CR=25% RQD=Nil	30.50
Highly weathered, light to brownish grey, fine to medium grained, moderately fractured rock.			R34	CR=22% RQD=Nil	31.25
31.25m.			R35	CR=22% RQD=Nil	32.00
Highly weathered, light to brownish grey, fine to medium grained, moderately fractured rock.			R36	CR=30% RQD=Nil	32.75
			R37	CR=26% RQD=Nil	33.50
33.50m.			R38	CR=24% RQD=Nil	34.25
Highly weathered, brownish grey, medium to fine grained, highly fractured rock.			R39	CR=21% RQD=Nil	35.00
			R40	CR=25% RQD=Nil	35.75
35.75m.			R41	CR=26% RQD=Nil	36.50
			R42	CR=28% RQD=Nil	37.25
Highly weathered, brownish grey, medium to fine grained, highly fractured rock.			R43	CR=26% RQD=Nil	38.00
			R44	CR=32% RQD=Nil	38.75
			R45	CR=36% RQD=Nil	39.50
N.B. – '*' means sample could not be recovered / sample slip.			R46	CR=38% RQD=Nil	40.00
40.00m.					

BH-102/Sheet-2

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 10/05/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.103

Co-ordinates E = 99, N = −399

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 30/04/2018
Completion Date : 30/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 0.231 M.
Water Struck At :
Standing Water Level : 1.40 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Stiff to very stiff, light grey, clayey silt with sand mixture & traces of gravel.		9 11 6 (17)	DS−1	0.50
			SPT−1	1.00−1.45
2.00m.				
Very loose, light grey, sandy silt to silty sand. Observed kankar & clay binder.		1 1 1 (2)	*UDS−1	2.00−2.45
			SPT−2	2.50−2.95
		>100	*UDS−2	3.20−3.28
3.40m.		54 46	SPT−3	3.50−3.78
Very dense, light grey, silty sand with decomposed rock. Observed kankar & conch pcs.		13.0 cm Pentn.	*SPT−4	3.90−3.93
4.00m.		100 3.0 cm Pentn. Refusal	*SPT−5	4.00−4.02 4.00
		100 2.0 cm Pentn. Refusal	R1	CR=24% RQD=Nil 4.75
		NX rotary drilling from 4.00m to 15.00m	R2	CR=14% RQD=Nil
Completely to highly weathered, deep to light grey, coarse grained, highly fractured rock.		Refusal	*SPT−6	5.50−5.52 5.50
		50	R3	CR=21% RQD=Nil 6.25
		2.0 cm Pentn.	R4	CR=21% RQD=Nil 7.00
6.25m.			R5	CR=27% RQD=Nil 7.75
Highly weathered, deep grey, medium grained, fractured rock.			R6	CR=32% RQD=Nil 8.50
7.00m.			R7	CR=29% RQD=Nil 9.25
Highly weathered, deep grey, medium grained, fractured rock.			R8	CR=24% RQD=Nil 10.00
8.50m.			R9	CR=24% RQD=Nil 10.75
Highly weathered, deep grey, medium grained, fractured rock.			R10	CR=24% RQD=Nil 11.50
9.25m.			R11	CR=21% RQD=Nil 12.25
Highly weathered, deep to whitish grey, medium grained, fractured rock.			R12	CR=28% RQD=Nil 13.00
12.25m.			R13	CR=34% RQD=Nil 13.75
Highly weathered, light grey, medium grained, highly fractured rock with reddish spots.			R14	CR=32% RQD=Nil 14.50
13.00m.			R15	CR=26% RQD=Nil 15.00
Highly weathered, whitish grey, medium grained, fractured rock.				
N.B. − '*' means sample could not be recovered / sample slip.				
15.00m.				

BH−103/Sheet−1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 10/05/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.104

Co-ordinates E=177 N=-409

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	7
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 02/05/2018
Completion Date : 02/05/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 0.117 M.
Water Struck At :
Standing Water Level : 1.40 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Stiff to very stiff, light grey, clayey silt with sand mixture & traces of gravel.		5 8 3 (11)	DS-1	0.50
			SPT-1	1.00-1.45
			*UDS-1	2.00-2.45
		2 1 1 (2)	SPT-2	2.55-3.00
3.20m.				
Very dense, light grey, silty sand with conch pcs. & decomposed rock. Observed kankar.		100 5.0 cm Pentn. Refusa	SPT-3	3.30-3.35
		100 2.0 cm Pentn. Refusa	*SPT-4	3.50-3.52
3.60m.		100 2.0 cm Pentn. Refusa	*SPT-5	3.60-3.62 3.60
			R1	CR=18%/RQD=0
		50 3.0 cm Pentn. Refusal	*SPT-6	4.25-4.28 4.25
		NX rotary drilling from 3.60m to 15.00m	R2	CR=22% RQD=Nil
Completely to highly weathered, deep to light grey, coarse grained, highly to moderately fractured rock.			R3	5.00 CR=22% RQD=Nil 5.75
		Refusal	R4	CR=19% RQD=Nil
6.50m.		50 2.0 cm Pentn.	*SPT-7	6.50-6.52 6.50
			R5	CR=31% RQD=Nil 7.25
Highly weathered, deep to light grey, coarse grained, highly to moderately fractured rock.			R6	CR=30% RQD=Nil 8.00
			R7	CR=32% RQD=Nil 8.75
			R8	CR=38% RQD=Nil 9.50
9.50m.				
Highly weathered, light grey, medium grained, moderately fractured rock.			R9	CR=28% RQD=Nil 10.25
10.25m.				
Highly weathered, light to whitish grey, medium grained, moderately to highly fractured rock.			R10	CR=23% RQD=Nil 11.00
11.00m.				
Highly weathered, light to whitish grey, medium grained, moderately to highly fractured rock.			R11	CR=29% RQD=Nil 11.75
			R12	CR=36% RQD=Nil 12.50
12.50m.				
Highly weathered, light to whitish grey, medium grained, moderately to highly fractured rock.			R13	CR=23% RQD=Nil 13.25
			R14	CR=23% RQD=Nil 14.00
14.00m.				
Highly weathered, whitish grey, medium grained, highly fractured rock.			R15	CR=35% RQD=Nil 15.00
N.B. - '*' means sample could not be recovered / sample slip. 15.00m.				

BH-104/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 04/05/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.105

Co-ordinates E=144 N=-98

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	2
		Water Sample (WS)	0

Commencement Date : 12/04/2018
Completion Date : 13/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.766 M.
Water Struck At :
Standing Water Level : 2.75 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Loose, light whitish grey, clayey sandy silt. Observed conch.		2 3 6 (9)	DS-1	0.50
			SPT-1	1.00-1.45
1.60m. Loose to medium dense, light whitish grey, clayey sandy silt. Observed conch pcs.		1 2 2 (4)	*UDS-1	2.00-2.45
			SPT-2	2.50-2.95
			DS-2	3.50
		3 5 21 (26)	SPT-3	4.00-4.45
4.50m. Very dense, light whitish grey, silty sand with decomposed rock.		100 5.0 cm Pentn. Refusal	*SPT-4	4.60-4.65
5.00m.		100 2.0 cm Pentn. Refusal	*SPT-5	4.80-4.82
			*SPT-6	5.00-5.02
		100 2.0 cm Pentn.	R1	CR=24%/RQD=0 (5.00-5.75)
Highly weathered, light grey, coarse grained, fractured rock.		NX rotary drilling from 5.00m to 20.00m	R2	CR=27% RQD=Nil (5.75-6.50)
			R3	CR=23% RQD=Nil (6.50-7.25)
			R4	CR=25% RQD=Nil (7.25-8.00)
8.00m. Highly weathered, light grey, coarse grained, fractured rock.			R5	CR=27% RQD=Nil (8.00-8.75)
			R6	CR=29% RQD=15% (8.75-9.50)
			R7	CR=27% RQD=Nil (9.50-10.25)
10.25m. Highly weathered, light grey, coarse grained, fractured rock.			R8	CR=24% RQD=Nil (10.25-11.00)
11.00m. Highly weathered, light grey, coarse grained, fractured rock.			R9	CR=27% RQD=Nil (11.00-11.75)
			R10	CR=30% RQD=Nil (11.75-12.50)
12.50m. Highly weathered, light brownish grey to light grey, medium grained, fractured rock.			R11	CR=32% RQD=Nil (12.50-13.25)
			R12	CR=26% RQD=Nil (13.25-14.00)
			R13	CR=38% RQD=38% (14.00-14.75)
			R14	CR=33% RQD=Nil (14.75-15.50)
			R15	CR=34% RQD=Nil (15.50-16.25)
			R16	CR=34% RQD=Nil (16.25-17.00)
			R17	CR=29% RQD=Nil (17.00-17.75)
			R18	CR=27% RQD=Nil (17.75-18.50)
			R19	CR=27% RQD=Nil (18.50-19.25)
N.B. - '*' means sample could not be recovered / sample slip. 20.00m.			R20	CR=34% RQD=Nil (19.25-20.00)

BH-105/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 04/05/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.106

Co-ordinates E = 91, N = -150

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	2
		Water Sample (WS)	0

Commencement Date : 15/04/2018
Completion Date : 16/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.670 M.
Water Struck At :
Standing Water Level : 2.9 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Medium dense, light whitish grey, clayey sandy silt. Observed conch.		3 5 6 (11)	DS-1	0.50
			SPT-1	1.00-1.45
1.60m. Loose, light whitish grey, clayey sandy silt. Observed conch.		1 2 2 (4)	UDS-1	2.05-2.50
			SPT-2	2.50-2.95
			DS-2	3.50
		2 2 3 (5)	SPT-3	4.00-4.45
4.90m. Very dense, light whitish grey, silty sand with decomposed rock.		100 10.0 cm Pentn. >100	SPT-4	4.90-5.00
		100 2.0 cm Pentn. Refusal	*SPT-5	5.20-5.22
5.50m. Highly weathered, light grey, coarse grained, fractured rock.		Refusal	*SPT-6	5.50-5.52
6.25m. Highly weathered, light grey, coarse to medium grained, fractured rock.		100 2.0 cm Pentn. NX rotary drilling from 5.50m to 20.00m	R1	CR=27%/RQD=0
			R2	CR=25% RQD=Nil
			R3	CR=28% RQD=Nil
			R4	CR=23% RQD=Nil
8.50m. Highly weathered, light grey, coarse to medium grained, fractured rock.			R5	CR=26% RQD=Nil
			R6	CR=30% RQD=Nil
10.00m. Highly/moderately weathered, light yellowish grey to light grey, medium grained, fractured rock.			R7	CR=37% RQD=Nil
			R8	CR=38% RQD=Nil
			R9	CR=32% RQD=Nil
			R10	CR=50% RQD=17%
			R11	CR=44% RQD=Nil
			R12	CR=37% RQD=Nil
			R13	CR=50% RQD=17%
			R14	CR=42% RQD=Nil
			R15	CR=28% RQD=Nil
			R16	CR=27% RQD=Nil
			R17	CR=29% RQD=Nil
			R18	CR=27% RQD=Nil
N.B. - '*' means sample could not be recovered / sample slip. 20.00m.			R19	CR=29% RQD=Nil

6.25 7.00 7.75 8.50 9.25 10.00 10.75 11.50 12.25 13.00 13.75 14.50 15.25 16.00 16.75 17.50 18.25 19.00 20.00

BH-106/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 10/05/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.107

Co-ordinates E=133 N=-468

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	7
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 03/05/2018
Completion Date : 03/05/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 0.353 M.
Water Struck At :
Standing Water Level : 1.50 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Soft to medium, light grey, clayey silt with sand mixture.		4 4 4 — 8	DS-1	0.50
			SPT-1	1.00-1.45
2.00m.				
Loose, light grey, clayey silty sand. Observed kankar & conch pcs.		3 3 4 — 7	*UDS-1	2.00-2.45
			SPT-2	2.50-2.95
3.20m.				
Vrey dense, light to brownish grey, silty sand with kankar & conch pcs. Observed decomposed rock.		37 65 10.0 cm Pentn. >100	SPT-3	3.20-3.45
		100 4.0 cm Pentn. Refusal	*SPT-4	3.60-3.64
3.70m.		100 3.0 cm Pentn. Refusal	*SPT-5	3.70-3.73 3.70
		NX rotary drilling from 3.70m to 15.00m	R1	CR=14% RQD=Nil
		52 3.0 cm Pentn. Refusal — Refusal	*SPT-6	4.50-4.53 4.50
			R2	CR=16% RQD=Nil
		54 2.0 cm Pentn.	*SPT-7	5.25-5.27 5.25
			R3	CR=24% RQD=Nil
			R4	CR=22% RQD=Nil 6.00
Completely to highly weathered, deep grey, medium to coarse grained, highly fractured rock.			R5	CR=21% RQD=Nil 6.75
			R6	CR=24% RQD=Nil 7.50
			R7	CR=22% RQD=Nil 8.25
9.00m.			R8	CR=29% RQD=Nil 9.00
Highly weathered, light brown, medium to fine grained, highly fractured rock.			R9	CR=26% RQD=Nil 9.75
			R10	CR=34% RQD=Nil 10.50
11.25m.			R11	CR=25% RQD=Nil 11.25
Highly weathered, light brown, medium to fine grained, highly fractured rock. 12.00m.			R12	CR=32% RQD=Nil 12.00
Highly weathered, light brown, medium to fine grained, highly fractured rock.			R13	CR=33% RQD=Nil 12.75
			R14	CR=28% RQD=Nil 13.50
N.B. - '*' means sample could not be recovered / sample slip. 15.00m.			R15	CR=31% RQD=Nil 14.25 15.00

BH-107/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 10/05/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.108

Co-ordinates E=170 N=-174

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	2
		Water Sample (WS)	0

Commencement Date : 28/04/2018
Completion Date : 28/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.799 M.
Water Struck At :
Standing Water Level : 2.95 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium dense, light grey, clayey sandy silt. Observed conch pcs.		6 7 8 (15)	DS-1	0.50
			SPT-1	1.00-1.45
1.60m.				
Loose to medium dense, light grey, clayey sandy silt. Observed conch pcs.		2 1 2 (3)	*UDS-1	2.00-2.45
			SPT-2	2.50-2.95
			DS-2	3.50
		2 2 9 (11)	SPT-3	4.00-4.45
4.60m.		100 6.0 cm Pentn. Refusa	SPT-4	4.60-4.66
Very dense, light grey, silty sand with decomposed rock.		100 3.0 cm Pentn. Refusal	*SPT-5	4.80-4.83
5.00m.			*SPT-6	5.00-5.02
Highly weathered, light grey, coarse grained, fractured rock.		100 2.0 cm Pentn.	R1	CR=28% RQD=Nil
5.75m.		NX rotary drilling from 5.00m to 15.00m	R2	CR=25% RQD=Nil
			R3	CR=27% RQD=Nil
			R4	CR=24% RQD=Nil
			R5	CR=25% RQD=Nil
			R6	CR=24% RQD=Nil
			R7	CR=27% RQD=Nil
Highly weathered, light grey to light whitish grey, coarse to medium grained, fractured rock.			R8	CR=23% RQD=Nil
			R9	CR=25% RQD=Nil
			R10	CR=22% RQD=Nil
			R11	CR=21% RQD=Nil
			R12	CR=23% RQD=Nil
			R13	CR=27% RQD=Nil
N.B. - '*' means sample could not be recovered / sample slip. 15.00m.				5.00 5.75 6.50 7.25 8.00 8.75 9.50 10.25 11.00 11.75 12.50 13.25 14.00 15.00

BH-108/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 10/05/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.109

Co-ordinates E=102 N=-183

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	8	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	8
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 27/04/2018
Completion Date : 28/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.633 M.
Water Struck At :
Standing Water Level : 2.85 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium dense, light grey, sandy silt. Observed conch pcs., kankar & clay binder.		9 8 11 — 19	DS-1	0.50
			SPT-1	1.00-1.45
1.50m.				
Very loose, light grey, silty sand to sandy silt. Observed conch pcs. & clay binder.		1 1 2 — 3	*UDS-1	2.00-2.45
			SPT-2	2.50-2.95
		Refusal		
		100 6.0 cm Pentn.	*UDS-2	3.50-3.95
4.00m.			SPT-3	4.05-4.11
Very dense, light grey, silty sand with conch pcs. & decomposed rock. Observed kankar.		100 2.0 cm Pentn. Refusa	*SPT-4	4.30-4.32
4.40m.		100 2.0 cm Pentn. Refusa	*SPT-5	4.40-4.42 4.40
Completely to highly weathered, deep grey, medium grained, highly to moderately fractured rock.		Refusal	R1	CR=18%/RQD=0
		50 2.0 cm Pentn.	*SPT-6	5.00-5.02 5.00
5.75m.		NX rotary drilling from 4.40m to 15.00m	R2	CR=27% RQD=Nil 5.75
			R3	CR=23% RQD=Nil 6.50
Completely/highly weathered, light grey, coarse grained, highly to moderately fractured rock.			R4	CR=25% RQD=Nil 7.25
			R5	CR=16% RQD=Nil
		Refusal		
		50 2.0 cm Pentn.	*SPT-7	8.00-8.02 8.00
		Refusal	R6	CR=18% RQD=Nil
8.75m.		50 2.0 cm Pentn.	*SPT-8	8.75-8.77 8.75
Highly weathered, light grey, coarse grained, highly to moderately fractured rock.			R7	CR=28% RQD=Nil 9.50
			R8	CR=27% RQD=Nil 10.25
10.25m.				
Highly weathered, light grey, coarse grained, moderately fractured rock.			R9	CR=21% RQD=Nil 11.00
11.00m.			R10	CR=29% RQD=Nil 11.75
Highly/moderately weathered, light to whitish grey, medium to fine grained, fractured rock.			R11	CR=41% RQD=Nil 12.50
			R12	CR=33% RQD=Nil 13.25
13.25m.			R13	CR=25% RQD=Nil 14.00
Highly weathered, light to whitish grey, medium to fine grained, fractured rock.			R14	CR=21% RQD=Nil 15.00
N.B. - '*' means sample could not be recovered / sample slip. 15.00m.				

BH-109/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 18/05/2018	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.110

Co-ordinates E=-301 N=511

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 04/05/2018
Completion Date : 04/05/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.847 M.
Water Struck At :
Standing Water Level : 2.9 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium dense, light grey, silty sand. Observed kankar.		5 8 9 (17)	DS-1	0.50
			SPT-1	1.00-1.45
1.50m.				
Loose to medium dense, brownish grey, silty sand with kankar & conch pcs. Observed clay binder.		2 3 3 (6)	*UDS-1	2.00-2.45
			SPT-2	2.55-3.00
		4 8 20 (28)	*UDS-2	3.50-3.95
			SPT-3	4.00-4.45
5.00m.				
Very dense, light grey, silty sand with kankar & conch pcs. Observed decomposed rock.		40 60 5.0 cm Pentn. >100	SPT-4	5.00-5.20
		100 4.0 cm Pentn. Refusal	*SPT-5	5.40-5.44
5.60m.			*SPT-6	5.60-5.63
		100 3.0 cm Pentn. Refusal	R1	CR=26%/RQD=0
Highly weathered, brownish grey, coarse grained, highly fractured rock.		NX rotary drilling from 5.60m to 15.00m	R2	CR=24% RQD=Nil
			R3	CR=27% RQD=16%
7.75m.			R4	CR=22% RQD=Nil
Highly weathered, brownish grey, coarse grained, highly fractured rock.			R5	CR=23% RQD=Nil
			R6	CR=24% RQD=Nil
			R7	CR=22% RQD=Nil
10.75m.			R8	CR=26% RQD=Nil
Highly weathered, brownish grey, coarse grained, highly fractured rock.			R9	CR=28% RQD=Nil
11.50m.			R10	CR=34% RQD=Nil
Highly weathered, light to brownish grey, fine to medium grained, moderately fractured rock.			R11	CR=28% RQD=Nil
			R12	CR=32% RQD=Nil
N.B. - '*' means sample could not be recovered / sample slip.			R13	CR=34% RQD=Nil
15.00m.				

5.60
6.25
7.00
7.75
8.50
9.25
10.00
10.75
11.50
12.25
13.00
13.75
14.50
15.00

BH-110/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 18/05/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.111

Co-ordinates E=-118 N=511

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 04/05/2018
Completion Date : 04/05/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.973 M.
Water Struck At :
Standing Water Level : 2.78 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium dense, light grey, clayey silty sand. Observed kankar.		4 7 6 (13)	DS-1	0.50
			SPT-1	1.00-1.45
1.50m.				
Loose to medium dense, brownish grey, silty sand with clay binder. Observed kankar & conch pcs.		2 1 3 (4)	*UDS-1	2.00-2.45
			SPT-2	2.55-3.00
			*UDS-2	3.50-3.95
		6 7 11 (18)	SPT-3	4.05-4.50
5.00m.				
Very dense, light grey, silty sand with kankar & conch pcs. Observed decomposed rock.		35 65 10.0 cm Pentn. >100 100 4.0 cm Pentn. Refusal Refusal	SPT-4 *SPT-5 *SPT-6	5.00-5.25 5.40-5.44 5.50-5.53
5.50m.				5.50
		00 3.0 cm Pentn. NX rotary drilling from 5.50m to 15.00m	R1	CR=22% RQD=Nil 6.25
			R2	CR=25% RQD=Nil 7.00
Highly weathered, brownish grey, medium to coarse grained, highly fractured rock.			R3	CR=21% RQD=Nil 7.75
			R4	CR=22% RQD=Nil 8.50
			R5	CR=24% RQD=Nil 9.25
9.25m.				
Highly weathered, brownish grey, medium to coarse grained, highly fractured rock.			R6	CR=26% RQD=Nil 10.00
			R7	CR=28% RQD=Nil 10.75
10.75m.				
Highly weathered, brownish grey, medium to fine grained, highly fractured rock.			R8	CR=22% RQD=Nil 11.50
			R9	CR=24% RQD=Nil 12.25
12.25m.				
Highly weathered, brownish grey, medium to fine grained, highly fractured rock.			R10	CR=26% RQD=Nil 13.00
			R11	CR=28% RQD=Nil 13.75
			R12	CR=30% RQD=Nil 14.50
N.B. - '*' means sample could not be recovered / sample slip.			R13	CR=32% RQD=Nil 15.00
15.00m.				

BH-111/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 18/05/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.112

Co-ordinates E=124 N=897

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	10	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	10
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 03/05/2018
Completion Date : 04/05/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.093 M.
Water Struck At :
Standing Water Level : 2.05 m.

DESCRIPTION	N-VALUE (EACH DIVN. = 15cm)	Ref. No	Depth (m)
0.00m. Very loose, light to brownish grey, sandy silt to silty sand. Observed kankar, conch pcs. & clay binder.	2 1 1 (2)	DS-1	0.50
		SPT-1	1.00-1.45
1.50m. Loose, light grey, silty sand. Observed kankar & conch pcs.	3 2 3 (5)	*UDS-1	2.00-2.45
		SPT-2	2.50-2.95
	28 72 (>100)	*UDS-2	3.50-3.95
3.90m. Very dense, light grey, silty sand with decomposed rock. Observed kankar & conch pcs.	6.0 cm Pentn.	SPT-3	4.00-4.21
	100 3.0 cm Pentn. Refusal	*SPT-4	4.30-4.33
4.40m.	Refusal	*SPT-5	4.40-4.42 4.40
	100 2.0 cm Pentn.	R1	CR=21%/RQD=0 5.00
Completely/highly weathered, deep to light grey, coarse grained, fractured rock.	NX rotary drilling from 4.40m to 15.00m	R2	CR=21% RQD=Nil 5.75
		R3	CR=23% RQD=Nil 6.50
		R4	CR=16% RQD=Nil
	Refusal		
7.25m.	53 3.0 cm Pentn.	*SPT-6	7.25-7.28 7.25
		R5	CR=21% RQD=Nil 8.00
	Refusal	R6	CR=14% RQD=Nil
	51 2.0 cm Pentn.	*SPT-7	8.75-8.77 8.75
Completely to highly weathered, light to brownish grey, coarse grained, highly to moderately fractured rock.		R7	CR=23% RQD=Nil 9.50
		R8	CR=19% RQD=Nil
	Refusal		
	55 2.0 cm Pentn.	*SPT-8	10.25-10.27 10.25
		R9	CR=21% RQD=Nil 11.00
		R10	CR=23% RQD=Nil 11.75
11.75m.		R11	CR=21% RQD=Nil 12.50
Completely/highly weathered, brownish grey, medium to fine grained, highly fractured rock.		R12	CR=25% RQD=Nil 13.25
		R13	CR=Nil RQD=Nil
	Refusal		
	52 3.0 cm Pentn.	*SPT-9	14.00-14.03 14.00
N.B. - '*' means sample could not be recovered / sample slip.		R14	CR=16% RQD=Nil
15.00m.	Refusal 51 2.0 cm Pentn.	*SPT-10	15.00-15.02 15.00

BH-112/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 18/05/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.113

Co-ordinates E=25 N=1586

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 05/05/2018
Completion Date : 05/05/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.890 M.
Water Struck At :
Standing Water Level : 2.80 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium dense, light whitish grey, clayey silty sand. Observed conch pcs.		5 6 7 (13)	DS-1	0.50
			SPT-1	1.00-1.45
1.60m.				
Loose, light whitish grey, clayey silty sand. Observed conch pcs.		2 1 2 (3)	*UDS-1	2.00-2.45
			SPT-2	2.50-2.95
		2 2 2 (4)	*UDS-2	3.50-3.95
			SPT-3	4.00-4.45
5.00m.				
Very dense, light grey, silty sand with decomposed rock.		100 10.0 cm Pentn. >100 100 3.0 cm Pentn. Refusal	SPT-4 *SPT-5	5.00-5.10 5.30-5.33
5.50m.		Refusal	*SPT-6	5.50-5.52 5.50
		00 2.0 cm Pentn.	R1	CR=27% RQD=Nil 6.25
Highly weathered, light grey, coarse grained, fractured rock.		NX rotary drilling from 5.50m to 15.00m	R2	CR=30% RQD=Nil 7.00
			R3	CR=28% RQD=Nil 7.75
7.75m.			R4	CR=23% RQD=Nil 8.50
			R5	CR=22% RQD=Nil 9.25
Highly weathered, light grey, coarse grained, fractured rock.			R6	CR=22% RQD=Nil 10.00
			R7	CR=23% RQD=Nil 10.75
			R8	CR=22% RQD=Nil 11.50
11.50m.			R9	CR=42% RQD=Nil 12.25
			R10	CR=45% RQD=Nil 13.00
Moderately weathered, yellowish grey, medium grained, light fractured rock.			R11	CR=43% RQD=22% 14.00
			R12	CR=45% RQD=Nil 15.00
N.B. - '*' means sample could not be recovered / sample slip. 15.00m.				

BH-113/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 18/05/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.114

Co-ordinates E=32 N=1684

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	2
		Water Sample (WS)	0

Commencement Date : 04/05/2018
Completion Date : 04/05/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.740 M.
Water Struck At :
Standing Water Level : 1.90 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium dense, whitish grey, clayey silty sand. Observed conch.		3 5 6 (11)	DS-1	0.50
			SPT-1	1.00-1.45
1.60m.				
			*UDS-1	2.00-2.45
		2 2 2 (4)	SPT-2	2.50-2.95
Loose, whitish grey, clayey silty sand. Observed conch pcs.			DS-2	3.50
		2 2 2 (4)	SPT-3	4.00-4.45
5.00m.				
Very dense, light grey, silty sand with decomposed rock.		43 68 5.0 cm Pentn. >100	SPT-4	5.00-5.20
		100 5.0 cm Pentn. Refusa	*SPT-5	5.30-5.35
5.50m.		Refusal	*SPT-6	5.50-5.52 5.50
		00	R1	CR=28% RQD=Nil 6.25
		2.0 cm Pentn.	R2	CR=27% RQD=Nil 7.00
		NX rotary drilling from 5.50m to 15.00m	R3	CR=30% RQD=Nil 7.75
			R4	CR=32% RQD=Nil 8.50
			R5	CR=30% RQD=Nil 9.25
			R6	CR=34% RQD=Nil 10.00
Highly to moderately weathered, light grey, coarse to medium grained, fractured rock.			R7	CR=30% RQD=Nil 10.75
			R8	CR=35% RQD=Nil 11.50
			R9	CR=37% RQD=Nil 12.25
			R10	CR=38% RQD=Nil 13.00
			R11	CR=42% RQD=Nil 14.00
			R12	CR=43% RQD=Nil 15.00
N.B. - '*' means sample could not be recovered / sample slip. 15.00m.				

BH-114/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 18/05/2018	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.118

Co-ordinates E=-377 N=276

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 11/05/2018
Completion Date : 11/05/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.539 M.
Water Struck At :
Standing Water Level : 2.93 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Stiff, light grey, clayey silt with sand mixture & conch pcs.		2 3 5 (8)	DS-1	0.50
			SPT-1	1.00-1.45
			*UDS-1	2.00-2.45
		1 2 8 (10)	SPT-2	2.50-2.95
3.00m.			SPT-3	3.20-3.29
Very dense, light grey, silty sand with decomposed rock. Observed kankar & conch pcs. 3.50m.		100 9.0 cm Pentn. >100 Refusal 100 2.0 cm Pentn. Refusa 100 2.0 cm Pentn.	*SPT-4 *SPT-5	3.40-3.42 3.50-3.52 3.50
		NX rotary drilling from 3.50m to 15.00m	R1	CR=29% RQD=Nil 4.25
			R2	CR=28% RQD=Nil 5.00
Highly weathered, deep grey, coarse grained, fractured rock.			R3	CR=27% RQD=Nil 5.75
			R4	CR=32% RQD=Nil 6.50
			R5	CR=28% RQD=Nil 7.25
7.25m.			R6	CR=24% RQD=Nil 8.00
Highly weathered, deep grey, coarse grained, fractured rock.			R7	CR=25% RQD=Nil 8.75
8.75m.			R8	CR=27% RQD=Nil 9.50
Highly weathered, whitish grey, medium to fine grained, fractured rock.			R9	CR=29% RQD=Nil 10.25
10.25m.			R10	CR=37% RQD=16% 11.00
Highly weathered, whitish grey, medium grained, completely fractured rock.			R11	CR=23% RQD=Nil 11.75
11.00m.			R12	CR=24% RQD=Nil 12.50
Highly weathered, whitish grey to reddish grey, medium grained, completely fractured rock.			R13	CR=22% RQD=Nil 13.25
			R14	CR=24% RQD=16% 14.00
N.B. - '*' means sample could not be recovered / sample slip. 15.00m.			R15	CR=21% RQD=Nil 15.00

BH-118/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 18/05/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.119

Co-ordinates E=—8 N=1743

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 10/05/2018
Completion Date : 11/05/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 0.889 M.
Water Struck At :
Standing Water Level : 3.10 m.

DESCRIPTION	SYMBOL	N—VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Loose, light grey, silty sand with kankar & conch pcs. Observed clay binder.		2 2 4 (6)	DS—1	0.50
			SPT—1	1.00—1.45
			*UDS—1	2.00—2.45
		2 3 5 (8)	SPT—2	2.55—3.00
			*UDS—2	3.50—3.95
4.00m.		24 35 42 (>100) 10.0 cm Pentn.	SPT—3	4.00—4.40
Very dense, light grey, silty sand with kankar & conch pcs.		100 4.0 cm Pentn. Refusal	*SPT—4	4.40—4.44
4.90m.		Refusal	*SPT—5	4.90—4.93
		100 3.0 cm Pentn.	R1	CR=21%/RQD=0
		NX rotary drilling from 4.90m to 15.00m	R2	CR=22% RQD=Nil
			R3	CR=24% RQD=Nil
Highly weathered, brownish grey, medium to coarse grained, highly fractured rock.			R4	CR=22% RQD=Nil
			R5	CR=24% RQD=Nil
			R6	CR=26% RQD=Nil
			R7	CR=24% RQD=Nil
10.00m.			R8	CR=22% RQD=Nil
Highly weathered, yellowish brown, medium to fine grained, highly to moderately fractured rock.			R9	CR=24% RQD=Nil
11.50m.			R10	CR=35% RQD=Nil
			R11	CR=32% RQD=Nil
Highly/moderately weathered, yellowish brown, medium to fine grained, highly to moderately fractured rock.			R12	CR=30% RQD=Nil
			R13	CR=42% RQD=30%
N.B. — '*' means sample could not be recovered / sample slip.			R14	CR=40% RQD=Nil
15.00m.				

4.90 / 5.50 / 6.25 / 7.00 / 7.75 / 8.50 / 9.25 / 10.00 / 10.75 / 11.50 / 12.25 / 13.00 / 13.75 / 14.50 / 15.00

BH—119/Sheet—1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 18/05/2018	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.120

Co-ordinates E= 98 N=-235

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 09/05/2018
Completion Date : 09/05/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.747 M.
Water Struck At :
Standing Water Level : 3.0 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium dense, light grey, silty sand. Observed kankar.		4 8 8 (16)	DS-1	0.50
			SPT-1	1.00-1.45
1.50m.				
Loose to medium dense, light grey, clayey silty sand. Observed kankar & conch pcs.		2 2 2 (4)	*UDS-1	2.00-2.45
			SPT-2	2.55-3.00
			UDS-2	3.50-3.95
		8 13 17 (30)	SPT-3	4.00-4.45
4.50m.				
Very dense, light grey, silty sand with conch pcs. & decomposed rock.		40 60 5.0 cm Pentn. >100 100 3.0 cm Pentn. Refusal Refusal	SPT-4 *SPT-5 *SPT-6	5.00-5.20 5.40-5.43 5.50-5.53 5.50
5.50m.		00 3.0 cm Pentn. NX rotary drilling from 5.50m to 15.00m	R1	CR=24% RQD=Nil 6.25
			R2	CR=22% RQD=Nil 7.00
			R3	CR=24% RQD=Nil 7.75
			R4	CR=26% RQD=Nil 8.50
Highly weathered, brownish grey, medium to coarse grained, highly fractured rock.			R5	CR=22% RQD=Nil 9.25
			R6	CR=28% RQD=Nil 10.00
			R7	CR=24% RQD=Nil 10.75
			R8	CR=25% RQD=Nil 11.50
			R9	CR=28% RQD=Nil 12.25
12.25m.				
Highly weathered, yellowish brown, medium grained, highly fractured rock.			R10	CR=24% RQD=Nil 13.00
13.00m.				
Highly weathered, yellowish brown, medium to fine grained, highly fractured rock.			R11	CR=29% RQD=Nil 13.75
			R12	CR=30% RQD=Nil 14.50
14.50m.				
Highly weathered, yellowish brown, fine grained, highly fractured rock. 15.00m.			R13	CR=25% RQD=Nil 15.00

N.B. - '*' means sample could not be recovered / sample slip.

BH-120/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 18/05/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.121

Co-ordinates E=173 N=-235

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 07/05/2018
Completion Date : 09/05/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.794 M.
Water Struck At :
Standing Water Level : 2.78 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium dense, brownish grey, silty sand to sandy silt. Observed kankar & conch pcs.		4 7 5 — 12	DS-1	0.50
			SPT-1	1.00-1.45
1.50m.				
Very loose, brownish grey, silty sand. Observed kankar, conch pcs. & clay binder.		3 2 2 — 4	*UDS-1	2.00-2.45
			SPT-2	2.50-2.95
3.50m.				
Medium dense, brownish grey, silty sand. Observed kankar, conch pcs. & clay binder.		7 9 11 — 20	*UDS-2	3.50-3.95
			SPT-3	4.00-4.45
4.80m.				
Very dense, light grey, silty sand with decomposed rock. Observed kankar & conch pcs.		100 8.0 cm Pentn. >100 100 3.0 cm Pentn. Refusal Refusal	SPT-4 *SPT-5 *SPT-6	4.90-4.98 5.20-5.23 5.40-5.42 5.40
5.40m.		00 2.0 cm Pentn.	R1	CR=21%/RQD=0
		NX rotary drilling from 5.40m to 15.00m	R2	CR=24% RQD=Nil
			R3	CR=21% RQD=Nil
Highly weathered, deep to light grey, coarse to medium grained, highly to moderately fractured rock.			R4	CR=25% RQD=Nil
			R5	CR=21% RQD=Nil
			R6	CR=25% RQD=Nil
9.75m.				
Highly weathered, deep to light grey, coarse to medium grained, highly to moderately fractured rock.			R7	CR=31% RQD=Nil
			R8	CR=29% RQD=Nil
11.25m.				
Highly weathered, light grey, medium to fine grained, highly fractured rock.			R9	CR=21% RQD=Nil
			R10	CR=21% RQD=Nil
			R11	CR=23% RQD=Nil
			R12	CR=21% RQD=Nil
14.25m.				
Highly weathered, light grey, fine grained, highly fractured rock.			R13	CR=28% RQD=Nil
15.00m.				

6.00 6.75 7.50 8.25 9.00 9.75 10.50 11.25 12.00 12.75 13.50 14.25 15.00

N.B. - '*' means sample could not be recovered / sample slip.

BH-121/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 18/05/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.122

Co-ordinates E = 83 N = - 502

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	8	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	8
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 08/05/2018
Completion Date : 08/05/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 0.325 M.
Water Struck At :
Standing Water Level : 1.52 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Soft to medium, light grey, clayey silt with sand mixture.		2 3 3 (6)	DS-1	0.50
			SPT-1	1.00-1.45
2.00m.				
Medium dense, light grey, clayey silty sand. Observed kankar & conch pcs.		3 5 6 (11)	*UDS-1	2.00-2.45
			SPT-2	2.55-3.00
3.40m.				
Very dense, light grey, silty sand with kankar & conch pcs. Observed decomposed rock.		40 60 5.0 cm Pentn. >100	SPT-3	3.40-3.60
		100 4.0 cm Pentn. Refusal	*SPT-4	3.80-3.84
4.00m.		100 3.0 cm Pentn. Refusal	*SPT-5	4.00-4.03 4.00
			R1	CR=16% RQD=Nil
		50 2.0 cm Pentn. Refusal	*SPT-6	4.75-4.77 4.75
			R2	CR=15% RQD=Nil
		50 2.0 cm Pentn. Refusal	*SPT-7	5.50-5.52 5.50
			R3	CR=18% RQD=Nil
		Refusal	*SPT-8	6.25-6.28 6.25
		50 3.0 cm Pentn.	R4	CR=22% RQD=Nil
Completely to highly weathered, brownish grey, medium to coarse grained, highly fractured rock.		NX rotary drilling from 4.00m to 15.00m	R5	7.00 CR=24% RQD=Nil
			R6	7.75 CR=22% RQD=Nil
			R7	8.50 CR=24% RQD=Nil
			R8	9.25 CR=25% RQD=Nil
10.00m.			R9	10.00 CR=22% RQD=Nil
			R10	10.75 CR=24% RQD=Nil
			R11	11.50 CR=22% RQD=Nil
Highly weathered, light to brownish grey, fine grained, highly fractured rock.			R12	12.25 CR=24% RQD=Nil
			R13	13.00 CR=26% RQD=Nil
			R14	13.75 CR=25% RQD=Nil
N.B. - '*' means sample could not be recovered / sample slip.			R15	14.50 CR=24% RQD=Nil
15.00m.				15.00

BH-122/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 18/05/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.123

Co-ordinates E=133 N=-534

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 08/05/2018
Completion Date : 08/05/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 0.525 M.
Water Struck At :
Standing Water Level : 1.55 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Soft to medium, light grey, clayey silt with sand mixture.		2 3 4 (7)	DS-1	0.50
			SPT-1	1.00-1.45
2.00m.				
Medium dense, light grey, clayey silty sand. Observed kankar & conch pcs.		3 5 5 (10)	*UDS-1	2.00-2.45
			SPT-2	2.50-2.95
3.50m.				
Very dense, light grey, silty sand with kankar & conch pcs. Observed decomposed rock.		35 65 10.0 cm Pentn. >100 100 4.0 cm Pentn. Refusal	SPT-3	3.70-3.95
			*SPT-4	4.10-4.14
4.20m.		Refusal	*SPT-5	4.20-4.23
		100 3.0 cm Pentn.	R1	CR=22%/RQD=0
		NX rotary drilling from 4.20m to 15.00m	R2	CR=24% RQD=Nil
			R3	CR=24% RQD=Nil
Highly weathered, brownish grey, medium to coarse grained, highly fractured rock.			R4	CR=26% RQD=Nil
			R5	CR=25% RQD=Nil
			R6	CR=27% RQD=Nil
			R7	CR=24% RQD=Nil
9.50m.			R8	CR=22% RQD=Nil
			R9	CR=24% RQD=Nil
			R10	CR=26% RQD=Nil
Highly weathered, light to brownish grey, fine to medium grained, highly fractured rock.			R11	CR=22% RQD=Nil
			R12	CR=24% RQD=13%
			R13	CR=24% RQD=Nil
			R14	CR=25% RQD=Nil
N.B. - '*' means sample could not be recovered / sample slip. 15.00m.				

4.20 5.00 5.75 6.50 7.25 8.00 8.75 9.50 10.25 11.00 11.75 12.50 13.25 14.00 15.00

BH-123/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 18/05/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.124

Co-ordinates E=177 N=-502

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 08/05/2018
Completion Date : 08/05/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 0.778 M.
Water Struck At :
Standing Water Level : 1.50 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Soft to medium, light grey, clayey silt with sand mixture.		2 4 4 (8)	DS-1	0.50
			SPT-1	1.00-1.45
2.00m.				
Medium dense, light grey, clayey silty sand. Observed kankar & conch pcs.		3 5 7 (12)	*UDS-1	2.00-2.45
			SPT-2	2.55-3.00
3.60m.				
Very dense, light grey, silty sand with kankar & conch pcs. Observed decomposed rock.		38 62 10.0 cm Pentn. >100 100 4.0 cm Pentn. Refusal Refusal	SPT-3 *SPT-4 *SPT-5	3.60-3.85 4.00-4.04 4.10-4.13
4.10m.				4.10
		00 3.0 cm Pentm.	R1	CR=22%/RQD=0
		NX rotary drilling from 4.10m to 15.00m		4.75
			R2	CR=21% RQD=Nil
				5.50
			R3	CR=24% RQD=Nil
				6.25
			R4	CR=22% RQD=Nil
				7.00
			R5	CR=22% RQD=Nil
				7.75
			R6	CR=25% RQD=Nil
				8.50
			R7	CR=24% RQD=Nil
				9.25
			R8	CR=22% RQD=Nil
10.00m.				10.00
			R9	CR=26% RQD=Nil
				10.75
			R10	CR=22% RQD=Nil
				11.50
			R11	CR=23% RQD=Nil
Highly weathered, light grey, medium to fine grained, highly fractured rock.				12.25
			R12	CR=22% RQD=Nil
				13.00
			R13	CR=25% RQD=Nil
				13.75
			R14	CR=27% RQD=Nil
N.B. - '*' means sample could not be recovered / sample slip.				14.50
15.00m.			R15	CR=22% RQD=Nil
				15.00

BH-124/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115 | Created by : SKD | Created on : 18/05/2018 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.125

Co-ordinates E = 59, N = -340

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	8	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	8
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 09/05/2018
Completion Date : 09/05/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 0.671 M.
Water Struck At :
Standing Water Level : 2.9 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Stiff to very stiff, light grey, clayey silt with sand mixture & conch pcs.		5 7 9 (16)	DS-1	0.50
			SPT-1	1.00-1.45
2.00m.				
Loose, brownish grey, silty sand. Observed kankar, conch pcs. & clay binder.		2 2 3 (5)	*UDS-1	2.00-2.45
			SPT-2	2.55-3.00
			*UDS-2	3.50-3.95
		5 8 7 (15)	SPT-3	4.00-4.45
4.70m.				
Very dense, light grey, silty sand with decomposed rock. Observed kankar & conch pcs.		35 65 10.0 cm Pentn. >100	SPT-4	4.80-5.05
		100 4.0 cm Pentn. Refusal	*SPT-5	5.30-5.34
5.50m.		Refusal	*SPT-6	5.50-5.53 5.50
Highly weathered, deep grey, medium grained, fractured rock.		100 3.0 cm Pentn.	R1	CR=22% RQD=Nil 6.25
		NX rotary drilling from 5.50m to 15.00m	R2	CR=23% RQD=Nil 7.00
7.00m.			R3	CR=24% RQD=Nil 7.75
			R4	CR=21% RQD=Nil 8.50
			R5	CR=27% RQD=Nil 9.25
Highly weathered, light to deep grey, coarse to medium grained, highly to moderately fractured rock.			R6	CR=21% RQD=Nil 10.00
			R7	CR=24% RQD=Nil 10.75
			R8	CR=23% RQD=Nil 11.50
			R9	CR=25% RQD=Nil 12.25
12.25m.			R10	CR=19% RQD=Nil
		50 Refusal	*SPT-7	13.00-13.02 13.00
Completely to highly weathered, whitish grey, fine to medium grained, fractured rock with reddish brown spots.		2.0 cm Pentn.	R11	CR=15% RQD=Nil
		50 Refusal	*SPT-8	13.75-13.77 13.75
		2.0 cm Pentn.	R12	CR=21% RQD=Nil 14.50
N.B. - '*' means sample could not be recovered / sample slip.			R13	CR=22% RQD=Nil 15.00
15.00m.				

BH-125/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 18/05/2018	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.126

Co-ordinates E=−208 N=−230

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 09/05/2018
Completion Date : 10/05/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.638 M.
Water Struck At :
Standing Water Level : 3.10 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium dense, light grey, silty sand. Observed kankar.		5 8 9 (17)	DS−1	0.50
			SPT−1	1.00−1.45
1.50m.				
Very loose, light grey, clayey silty sand. Observed kankar & conch pcs.		2 1 2 (3)	*UDS−1	2.00−2.45
			SPT−2	2.50−2.95
			*UDS−2	3.50−3.95
3.95m.				
Medium dense, light grey, clayey silty sand. Observed kankar & conch pcs.		4 8 10 (18)	SPT−3	4.00−4.45
4.70m.				
Very dense, light grey, silty sand with kankar & conch pcs. Observed decomposed rock.		25 40 35 5.0 cm Pentn. >100 100 4.0 cm Pentn. Refusal Refusal	SPT−4 *SPT−5 *SPT−6	4.70−5.05 5.20−5.24 5.30−5.33
5.30m.				5.30
		100 3.0 cm Pentn.	R1	CR=22% RQD=Nil 6.00
		NX rotary drilling from 5.30m to 15.00m	R2	CR=24% RQD=Nil 6.75
Highly weathered, deep grey, medium to coarse grained, highly fractured rock.			R3	CR=26% RQD=16% 7.50
			R4	CR=25% RQD=16% 8.25
8.25m.				
Highly weathered, deep grey, medium to coarse grained, highly fractured rock.			R5	CR=28% RQD=16% 9.00
			R6	CR=28% RQD=Nil 9.75
9.75m.				
Highly weathered, deep grey, medium to coarse grained, highly fractured rock.			R7	CR=24% RQD=Nil 10.50
			R8	CR=22% RQD=Nil 11.25
			R9	CR=24% RQD=Nil 12.00
12.00m.				
Highly weathered, deep grey, medium to coarse grained, highly fractured rock.			R10	CR=26% RQD=Nil 12.75
			R11	CR=28% RQD=Nil 13.50
			R12	CR=30% RQD=Nil 14.25
N.B. − '*' means sample could not be recovered / sample slip.			R13	CR=32% RQD=Nil 15.00
15.00m.				

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.				CETEST
Job No : 4115	Created by : SKD	Created on : 18/05/2018	Sheet No:	

BORE LOG DATA SHEET

BORE HOLE NO.127

Co-ordinates E=−346 N=1800

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	7
		Disturbed (DS)	1
Vane (V)		Water Sample (WS)	0

Commencement Date : 08/05/2018
Completion Date : 09/05/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.012 M.
Water Struck At :
Standing Water Level : 1.90 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Soft, brownish grey to light grey clayey silt with sand. Observed kankar & conch pcs.		3 2 2 (4)	DS−1	0.50
			SPT−1	1.00−1.45
			*UDS−1	2.00−2.45
		2 1 2 (3)	SPT−2	2.50−2.95
			*UDS−2	3.50−3.95
4.00m.				
Medium dense, light grey, silty sand with decomposed rock. Observed kankar & conch pcs.		8 7 11 (18)	SPT−3	4.05−4.50
5.00m.		100 8.0 cm Pentn. >100	SPT−4	5.00−5.08
Very dense, light grey, silty sand with decomposed rock. Observed kankar & conch pcs.		100 3.0 cm Pentn. Refusal	*SPT−5	5.30−5.33
5.50m.		Refusal	*SPT−6	5.50−5.52 5.50
		100 2.0 cm Pentn.	R1	CR=23% RQD=Nil 6.25
		NX rotary drilling from 5.50m to 15.00m	R2	CR=23% RQD=Nil 7.00
Completely to highly weathered, deep to light grey, medium to coarse grained, fractured rock.		Refusal	R3	CR=19% RQD=Nil
		52 2.0 cm Pentn.	*SPT−7	7.75−7.77 7.75
			R4	CR=21% RQD=Nil 8.50
			R5	CR=23% RQD=Nil 9.25
9.25m.				
Highly weathered, whitish grey to light grey, medium to coarse grained, highly fractured rock.			R6	CR=24% RQD=Nil 10.00
			R7	CR=21% RQD=Nil 10.75
10.75m.				
Highly weathered, whitish grey to light grey, medium to coarse grained, highly fractured rock.			R8	CR=28% RQD=Nil 11.50
			R9	CR=29% RQD=Nil 12.25
			R10	CR=27% RQD=Nil 13.00
13.00m.				
Highly weathered, whitish grey to light grey, medium to coarse grained, highly fractured rock.			R11	CR=21% RQD=Nil 13.75
			R12	CR=22% RQD=Nil 14.50
N.B. − '*' means sample could not be recovered / sample slip.			R13	CR=22% RQD=Nil 15.00
15.00m.				

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 23/05/2018	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.128 — Co-ordinates E=−423 N=1300

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	9	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	9
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 16/05/2018
Completion Date : 17/05/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.370 M.
Water Struck At :
Standing Water Level : 2.40 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Very loose, light to brownish grey, clayey silty sand. Observed conch pcs.		1 1 2 (3)	DS−1	0.50
			SPT−1	1.00−1.45
			*UDS−1	2.00−2.45
		2 2 2 (4)	SPT−2	2.50−2.95
2.95m.				
Loose, light to brownish grey, clayey silty sand. Observed conch pcs.		2 2 4 (6)	SPT−3	4.00−4.45
4.50m.				
Very dense, brownish grey to greyish brown, silty sand with mica & conch pcs. Observed decomposed rock.		45/100 10.0 cm Pentn.	SPT−4	5.00−5.25
		100/4.0 cm Pentn. Refusal	*SPT−5	5.40−5.44
5.50m.		100/2.0 cm Pentn. Refusal	*SPT−6	5.50−5.52 5.50
			R1	CR=14% RQD=Nil
		Refusal		
		50/3.0 cm Pentn.	*SPT−7	6.25−6.28 6.25
			R2	CR=21% RQD=Nil
		NX rotary drilling from 5.50m to 15.00m		7.00
			R3	CR=20% RQD=Nil
				7.75
			R4	CR=16% RQD=Nil
Completely to highly weathered, whitish grey to brownish grey, medium to coarse grained, highly fractured rock.		Refusal		
		50/2.0 cm Pentn.	*SPT−8	8.50−8.52 8.50
			R5	CR=24% RQD=Nil
				9.25
			R6	CR=21% RQD=Nil
				10.00
			R7	CR=22% RQD=Nil
				10.75
			R8	CR=21% RQD=Nil
11.50m.				11.50
			R9	CR=19% RQD=Nil
		Refusal		
		50/3.0 cm Pentn.	*SPT−9	12.25−12.28 12.25
			R10	CR=23% RQD=Nil
Completely/highly weathered, whitish grey to light grey, medium grained, fractured rock. Observed reddish spots.				13.00
			R11	CR=32% RQD=22%
				13.75
			R12	CR=23% RQD=Nil
N.B. − '*' means sample could not be recovered / sample slip.				14.50
15.00m.			R13	CR=20% RQD=Nil 15.00

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.				CETEST
Job No : 4115	Created by : SKD	Created on : 23/05/2018	Sheet No:	

BORE LOG DATA SHEET

BORE HOLE NO.129

Co-ordinates E=−567 N=884

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	7
		Disturbed (DS)	1
Vane (V)		Water Sample (WS)	0

Commencement Date : 16/05/2018
Completion Date : 17/05/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 2.529 M.
Water Struck At :
Standing Water Level : 2.80 m.

DESCRIPTION	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.			
Very loose, light grey, clayey silty sand. Observed kankar & conch pcs.	1 2 2 (4)	DS−1	0.50
		SPT−1	1.00−1.45
		*UDS−1	2.00−2.45
2.55m.	1 2 3 (5)	SPT−2	2.55−3.00
Loose, light grey, clayey silty sand. Observed kankar & conch pcs.		*UDS−2	3.50−3.95
	2 3 4 (7)	SPT−3	4.00−4.45
4.60m.	40 60 5.0 cm Pentn. >100	SPT−4	4.60−4.80
Very dense, brownish grey, silty sand with kankar & conch pcs. Observed decomposed rock. 5.00m.	100 4.0 cm Pentn. Refusal	*SPT−5	4.90−4.94
	100 3.0 cm Pentn. Refusal	*SPT−6	5.00−5.03 5.00
	Refusal	R1	CR=16%/RQD=0
	52 2.0 cm Pentn.	*SPT−7	5.75−5.77 5.75
		R2	CR=21%/RQD=0
	NX rotary drilling from 5.00m to 15.00m		6.50
		R3	CR=22% RQD=Nil
			7.25
		R4	CR=22% RQD=Nil
Completely to highly weathered, light to brownish grey, medium to coarse grained, highly fractured rock.			8.00
		R5	CR=24% RQD=Nil
			8.75
		R6	CR=22% RQD=Nil
			9.50
		R7	CR=21% RQD=Nil
			10.25
		R8	CR=22% RQD=Nil
11.00m.			11.00
		R9	CR=24% RQD=Nil
			11.75
		R10	CR=25% RQD=Nil
			12.50
Highly weathered, light grey, medium to fine grained, highly fractured rock.		R11	CR=28% RQD=Nil
			13.25
		R12	CR=24% RQD=Nil
			14.00
N.B. − '*' means sample could not be recovered / sample slip.		R13	CR=25% RQD=Nil
15.00m.			15.00

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 23/05/2018	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.130

Co-ordinates E=−600 N=373

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	7
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 17/05/2018
Completion Date : 18/05/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.626 M.
Water Struck At :
Standing Water Level : 2.20 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Very loose, brownish grey to steel grey, clayey silty sand. Observed conch pcs.		1 2 4	DS−1	0.50
			SPT−1	1.00−1.45
			UDS−1	2.00−2.45
2.50m.		2 3 5	SPT−2	2.50−2.95
Loose, brownish grey to steel grey, clayey silty sand. Observed conch pcs.				
3.70m.		58 >100	SPT−3	3.80−4.02
Very dense, light grey, medium grained, silty sand with conch pcs. Observed decomposed rock.		7.0 cm Pentn.	*SPT−4	4.20−4.23
4.40m.		100 3.0 cm Pentn. Refusal	*SPT−5	4.40−4.42 4.40
		100 2.0 cm Pentn. Refusal	R1	CR=18%/RQD=0
		Refusal	*SPT−6	5.00−5.02 5.00
		50 2.0 cm Pentn.	R2	CR=21% RQD=Nil
		NX rotary drilling from 4.40m to 15.00m		5.75
		Refusal	R3	CR=18% RQD=Nil
Completely to highly weathered, brownish grey to whitish grey, medium grained, fractured rock.		52 3.0 cm Pentn.	*SPT−7	6.50−6.53 6.50
			R4	CR=23% RQD=Nil
				7.25
			R5	CR=25% RQD=Nil
8.00m.				8.00
			R6	CR=23% RQD=Nil
				8.75
			R7	CR=22% RQD=Nil
				9.50
			R8	CR=25% RQD=Nil
				10.25
			R9	CR=27% RQD=Nil
				11.00
Highly weathered, light grey, medium grained, moderately fractured rock.			R10	CR=24% RQD=Nil
				11.75
			R11	CR=22% RQD=Nil
				12.50
			R12	CR=25% RQD=Nil
				13.25
			R13	CR=28% RQD=Nil
				14.00
			R14	CR=25% RQD=Nil
N.B. − '*' means sample could not be recovered / sample slip.				
15.00m.				15.00

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.				CETEST
Job No : 4115	Created by : SKD	Created on : 23/05/2018	Sheet No:	

BORE LOG DATA SHEET

BORE HOLE NO.131

Co-ordinates E=−539 N=−37

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
		Disturbed (DS)	1
Vane (V)		Water Sample (WS)	0

Commencement Date : 18/05/2018
Completion Date : 18/05/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.779 M.
Water Struck At :
Standing Water Level : 2.20 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m				
		4	DS−1	0.50
		1 2 2	SPT−1	1.00−1.45
Loose, light grey, clayey silty sand. Observed kankar & conch pcs.			*UDS−1	2.00−2.45
		7	SPT−2	2.50−2.95
		>100	*UDS−2	3.50−3.95
4.00m		35 65 10.0 cm Pentn.	SPT−3	4.00−4.25
Very dense, brownish grey, silty sand with kankar & conch pcs. Observed decomposed rock.		100 4.0 cm Pentn. Refusal	*SPT−4	4.40−4.44
4.50m		100 3.0 cm Pentn. Refusal	*SPT−5	4.50−4.53 4.50
		Refusal	R1	CR=16% RQD=Nil 5.25
		53 2.0 cm Pentn.	*SPT−6	5.25−5.27 5.25
			R2	CR=21% RQD=Nil 6.00
		NX rotary drilling from 4.50m to 15.00m	R3	CR=24% RQD=Nil 6.75
Completely to highly weathered, brownish grey to light grey, medium to coarse grained, highly fractured rock.			R4	CR=23% RQD=Nil 7.50
			R5	CR=24% RQD=Nil 8.25
8.25m			R6	CR=28% RQD=Nil 9.00
Highly weathered, brownish grey to light grey, medium to coarse grained, highly fractured rock.			R7	CR=30% RQD=Nil 9.75
9.75m			R8	CR=24% RQD=Nil 10.50
Highly weathered, brownish grey to light grey, medium to coarse grained, highly fractured rock.			R9	CR=24% RQD=Nil 11.25
11.25m			R10	CR=28% RQD=Nil 12.00
Highly weathered, brownish grey to light grey, medium to coarse grained, highly fractured rock.			R11	CR=26% RQD=Nil 12.75
			R12	CR=29% RQD=Nil 13.50
			R13	CR=30% RQD=Nil 14.25
14.25m			R14	CR=24% RQD=Nil 15.00
Highly weathered, light grey, coarse grained, highly fractured rock. 15.00m				

N.B. - '*' means sample could not be recovered / sample slip.

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.				CETEST
Job No : 4115	Created by : SKD	Created on : 23/05/2018	Sheet No:	

BORE LOG DATA SHEET

BORE HOLE NO.132

Co-ordinates E=−503 N=−482

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
		Disturbed (DS)	1
Vane (V)		Water Sample (WS)	0

Commencement Date : 17/05/2018
Completion Date : 17/05/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 0.775 M.
Water Struck At :
Standing Water Level : 3.00 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
			DS−1	0.50
		3		
		1 2 1	SPT−1	1.00−1.45
Loose, light grey, clayey silty sand. Observed kankar & conch pcs.			*UDS−1	2.00−2.45
		4		
		1 2 2	SPT−2	2.50−2.95
			*UDS−2	3.50−3.95
		8		
		3 3 5	SPT−3	4.00−4.45
4.50m.		100 10.0 cm Penth. >100	SPT−4	4.60−4.70
Very dense, brownish grey, silty sand with kankar & conch pcs. Observed decomposed rock. 4.90m.		100 4.0 cm Pentn. Refusal Refusal	*SPT−5	4.80−4.84
			*SPT−6	4.90−4.93 4.90
		100 3.0 cm Pentn. NX rotary drilling from 4.90m to 15.00m	R1	CR=22% RQD=Nil 5.60
			R2	CR=23% RQD=Nil 6.25
			R3	CR=24% RQD=Nil 7.00
			R4	CR=25% RQD=Nil 7.75
Highly weathered, brownish grey, medium to coarse grained, highly fractured rock.			R5	CR=22% RQD=Nil 8.50
			R6	CR=24% RQD=Nil 9.25
			R7	CR=22% RQD=Nil 10.00
			R8	CR=26% RQD=Nil 10.75
10.75m.			R9	CR=25% RQD=Nil 11.50
			R10	CR=22% RQD=Nil 12.25
Highly weathered, light grey, medium to fine grained, highly fractured rock.			R11	CR=24% RQD=Nil 13.00
			R12	CR=20% RQD=Nil 13.75
			R13	CR=24% RQD=Nil 14.50
N.B. − '*' means sample could not be recovered / sample slip. 15.00m.			R14	CR=26% RQD=Nil 15.00

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.				CETEST
Job No : 4115	Created by : SKD	Created on : 23/05/2018	Sheet No:	

BORE LOG DATA SHEET

BORE HOLE NO.133

Co-ordinates E=−399 N=−937

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 18/05/2018
Completion Date : 18/05/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.052 M.
Water Struck At :
Standing Water Level : 2.10 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Very loose, light grey, clayey silty sand. Observed conch pcs.		1 2 2 (4)	DS−1	0.50
			SPT−1	1.00−1.45
			*UDS−1	2.00−2.45
2.50m.		2 3 4 (7)	SPT−2	2.50−2.95
Loose, light grey, clayey silty sand. Observed conch pcs.				
3.90m.		25 35 40 (>100) 5.0 cm Pentn.	SPT−3	3.90−4.25
Very dense, brownish grey, silty sand with kankar & conch pcs. Observed decomposed rock.		100 4.0 cm Pentn. Refusal	*SPT−4	4.50−4.54
4.70m.		Refusal	*SPT−5	4.70−4.73
		100 3.0 cm Pentn.	R1	CR=22% RQD=Nil 4.70 – 5.50
		NX rotary drilling from 4.70m to 15.00m	R2	CR=24% RQD=Nil 5.50 – 6.25
			R3	CR=26% RQD=Nil 6.25 – 7.00
Highly weathered, brownish grey to light grey, medium to fine grained, highly fractured rock.			R4	CR=24% RQD=Nil 7.00 – 7.75
			R5	CR=21% RQD=Nil 7.75 – 8.50
			R6	CR=21% RQD=Nil 8.50 – 9.25
			R7	CR=24% RQD=Nil 9.25 – 10.00
10.75m.			R8	CR=26% RQD=Nil 10.00 – 10.75
Highly weathered, brownish grey to light grey, fine grained, highly fractured rock.			R9	CR=22% RQD=Nil 10.75 – 11.50
			R10	CR=25% RQD=Nil 11.50 – 12.25
			R11	CR=20% RQD=Nil 12.25 – 13.00
			R12	CR=21% RQD=Nil 13.00 – 13.75
13.75m.			R13	CR=28% RQD=Nil 13.75 – 14.50
Highly weathered, brownish grey to light grey, fine grained, highly fractured rock. N.B. − '*' means sample could not be recovered / sample slip. 15.00m.			R14	CR=32% RQD=Nil 14.50 – 15.00

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.			CETEST
Job No : 4115	Created by : SKD	Created on : 23/05/2018	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.134

Co-ordinates E=−80 N=−1264

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	7
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 18/05/2018
Completion Date : 19/05/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 0.372 M.
Water Struck At :
Standing Water Level : 2.25 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Very loose, brownish grey, clayey silty sand. Observed conch pcs.		1 1 1 (2)	DS−1	0.50
			SPT−1	1.00−1.45
			*UDS−1	2.00−2.45
		1 2 1 (3)	SPT−2	2.50−2.95
3.50m.				
Loose, brownish grey, clayey silty sand. Observed conch pcs.		2 3 5 (8)	UDS−2	3.50−3.95
			SPT−3	4.00−4.45
4.60m.				
Very dense, light grey, medium grained, silty sand with conch pcs. Observed decomposed rock.		100 12.0 cm Penth. >100	SPT−4	4.90−5.02
		100 3.0 cm Pentn. Refusal	*SPT−5	5.20−5.23
5.30m.		100 2.0 cm Pentn. Refusal	*SPT−6	5.30−5.32 5.30
		Refusal	R1	CR=18% RQD=Nil
		50	*SPT−7	6.00−6.02 6.00
		2.0 cm Pentn.	R2	CR=22% RQD=Nil 6.75
Completely to highly weathered, light to whitish grey, medium grained, completely fractured rock.		NX rotary drilling from 5.30m to 15.00m	R3	CR=24% RQD=Nil 7.50
			R4	CR=27% RQD=Nil 8.25
			R5	CR=23% RQD=Nil 9.00
9.00m.				
Highly weathered, light to whitish grey, medium grained, completely fractured rock.			R6	CR=26% RQD=Nil 9.75
			R7	CR=28% RQD=12% 10.50
10.50m.				
Highly weathered, brownish grey, medium grained, fractured rock.			R8	CR=24% RQD=Nil 11.25
11.25m.				
			R9	CR=29% RQD=Nil 12.00
			R10	CR=31% RQD=Nil 12.75
Highly weathered, brownish grey, medium grained, fractured rock.			R11	CR=27% RQD=Nil 13.50
			R12	CR=32% RQD=Nil 14.25
N.B. − '*' means sample could not be recovered / sample slip.			R13	CR=30% RQD=Nil 15.00
15.00m.				

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 23/05/2018	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.135

Co-ordinates E=241 N=-1704

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 19/05/2018
Completion Date : 19/05/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 0.887 M.
Water Struck At :
Standing Water Level : 1.90 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
			DS-1	0.50
		5		
		1 2 3	SPT-1	1.00-1.45
Loose, light grey, clayey silty sand. Observed kankar & ocnch pcs.			*UDS-1	2.00-2.45
		7		
		2 3 4	SPT-2	2.55-3.00
		>100		
3.80m.		32 68		
Very dense, light grey, silty sand with kankar & conch pcs. Observed decomposed rock.		10.0 cm Pentn.	SPT-3	3.80-4.05
		100 4.0 cm Pentn. Refusal	*SPT-4	4.20-4.24
4.30m.		Refusal	*SPT-5	4.30-4.33 4.30
		100	R1	CR=21% RQD=Nil 5.00
		3.0 cm Pentn.	R2	CR=22% RQD=Nil 5.75
		NX rotary drilling from 4.30m to 15.00m	R3	CR=24% RQD=Nil 6.50
			R4	CR=26% RQD=Nil 7.25
Highly weathered, brownish grey to light grey, medium to coarse grained, highly fractured rock.			R5	CR=22% RQD=Nil 8.00
			R6	CR=24% RQD=Nil 8.75
			R7	CR=24% RQD=Nil 9.50
			R8	CR=25% RQD=Nil 10.25
10.25m.			R9	CR=26% RQD=Nil 11.00
			R10	CR=24% RQD=Nil 11.75
			R11	CR=26% RQD=Nil 12.50
Highly weathered, light grey, medium to fine grained, highly fractured rock.			R12	CR=24% RQD=Nil 13.25
			R13	CR=28% RQD=Nil 14.00
N.B. - '*' means sample could not be recovered / sample slip.			R14	CR=25% RQD=Nil 15.00
15.00m.				

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli. CETEST

Job No : 4115	Created by : SKD	Created on : 23/05/2018	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.136

Co-ordinates E=377 N=276

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
		Disturbed (DS)	1
Vane (V)		Water Sample (WS)	0

Commencement Date : 20/05/2018
Completion Date : 20/05/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.948 M.
Water Struck At :
Standing Water Level : 3.20 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m				
Loose, light grey, clayey silty sand. Observed kankar.		3 4 6 (10)	DS-1	0.50
			SPT-1	1.00-1.45
			*UDS-1	2.00-2.45
		1 2 3 (5)	SPT-2	2.55-3.00
3.00m				
Medium dense, light grey, clayey silty sand. Observed kankar & conch pcs.			*UDS-2	3.50-3.95
		5 10 20 (30)	SPT-3	4.05-4.50
4.50m				
Dense to very dense, brownish grey, silty sand with kankar & conch pcs. Observed decomposed rock.		30 70 10.0 cm Pentn. >100 100 4.0 cm Pentn. Refusal Refusal	SPT-4 *SPT-5 *SPT-6	4.80-5.05 5.20-5.24 5.30-5.33
5.30m				5.30
Highly weathered, brownish grey to light grey, medium to coarse grained, highly to moderately fractured rock.		100 3.0 cm Pentn. NX rotary drilling from 5.30m to 15.00m	R1 R2 R3 R4 R5	CR=22% RQD=Nil 6.00 CR=24% RQD=Nil 6.75 CR=24% RQD=Nil 7.50 CR=26% RQD=Nil 8.25 CR=22% RQD=Nil 9.00
9.00m				
Highly weathered, brownish grey to light grey, medium to coarse grained, highly to moderately fractured rock.			R6 R7 R8	CR=26% RQD=Nil 9.75 CR=28% RQD=Nil 10.50 CR=32% RQD=Nil 11.25
11.25m				
Highly weathered, brownish grey to light grey, medium to coarse grained, highly to moderately fractured rock.			R9	CR=24% RQD=Nil 12.00
12.00m				
Highly weathered, brownish grey to light grey, medium to coarse grained, highly to moderately fractured rock.			R10 R11	CR=27% RQD=Nil 12.75 CR=30% RQD=Nil 13.50
13.50m				
Highly weathered, brownish grey to light grey, medium to coarse grained, highly to moderately fractured rock.			R12	CR=22% RQD=Nil 14.25
14.25m				
Highly weathered, brownish grey to light grey, medium to coarse grained, highly to moderately fractured rock.			R13	CR=34% RQD=Nil 15.00
15.00m				

N.B. - '*' means sample could not be recovered / sample slip.

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.				CETEST
Job No : 4115	Created by : SKD	Created on : 19/05/2018	Sheet No:	

BORE LOG DATA SHEET

BORE HOLE NO. PMT1 | Co-ordinates E=−171 N=315

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	0
Cone (Pc)		Penetrometer (SPT)	6
		Disturbed (DS)	3
Vane (V)		Water Sample (WS)	0

Commencement Date : 20/04/2018
Completion Date : 22/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 2.073 m.
Water Struck At :
Standing Water Level : Not found

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium dense, light grey, silty sand. Observed kankar.		5 6 5 (11)	DS−1	0.50
			SPT−1	1.00−1.45
1.50m.				
Very loose, light grey, silty sand with kankar & conch pcs. Observed clay binder.		1 2 2 (4)	DS−2	2.00
			SPT−2	2.50−2.95
			DS−3	3.50
4.00m.				
Medium dense, light grey, silty sand with kankar & conch pcs. Observed decomposed rock.		9 12 14 (26)	SPT−3	4.00−4.45
5.00m.		45 55 (>100) 10.0 cm Pentn.	SPT−4	5.00−5.25
Very dense, light grey, silty sand with kankar & conch pcs. Observed decomposed rock.		100 4.0 cm Pentn. Refusal	*SPT−5	5.40−5.44
5.50m.		Refusal	*SPT−6	5.50−5.53
		100 3.0 cm Pentn.		5.50
		NX rotary drilling from 5.50m to 25.50m	R1	CR=29% RQD=Nil
				6.50
			R2	CR=37% RQD=Nil
				7.50
			R3	CR=37% RQD=Nil
				8.50
Highly weathered, light to brownish grey, medium to coarse grained, highly fractured rock.			R4	CR=33% RQD=Nil
				9.50
			R5	CR=26% RQD=Nil
				10.50
			R6	CR=29% RQD=Nil
				11.50
			R7	CR=30% RQD=Nil
				12.50
12.50m.				
12.90m.				

BH−1/Sheet−1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.			CETEST
Job No : 4115	Created by : SKD	Created on : 19/05/2018	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. PMT1 | Co-ordinates E=−171 N=315

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	0
Cone (Pc)		Penetrometer (SPT)	6
		Disturbed (DS)	3
Vane (V)		Water Sample (WS)	0

Commencement Date : 20/04/2018
Completion Date : 22/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 2.073 m.
Water Struck At :
Standing Water Level : Not found

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
12.90m.			R8	CR=30% RQD=Nil
				13.50
			R9	CR=33% RQD=Nil
				14.50
			R10	CR=27% RQD=Nil
				15.50
Highly weathered, light to brownish grey, medium to fine grained, highly fractured rock.			R11	CR=28% RQD=Nil
				16.50
			R12	CR=26% RQD=Nil
				17.50
			R13	CR=28% RQD=Nil
				18.50
			R14	CR=24% RQD=Nil
19.50m.				19.50
			R15	CR=27% RQD=Nil
				20.50
			R16	CR=28% RQD=Nil
				21.50
Highly weathered, whitish grey, medium grained, highly to moderately fractured rock.			R17	CR=28% RQD=Nil
				22.50
			R18	CR=29% RQD=Nil
				23.50
			R19	CR=32% RQD=Nil
				24.50
			R20	CR=29% RQD=Nil
N.B. − '*' means sample could not be recovered / sample slip. 25.50m.				25.50

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.				CETEST
Job No : 4115	Created by : SKD	Created on : 19/05/2018	Sheet No:	

BORE LOG DATA SHEET

BORE HOLE NO. PMT2 Co-ordinates E=−119 N=123

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	4	Undisturbed (UDS)	0
Cone (Pc)		Penetrometer (SPT)	4
Vane (V)		Disturbed (DS)	4
		Water Sample (WS)	0

Commencement Date : 16/04/2018
Completion Date : 17/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.663 m.
Water Struck At :
Standing Water Level : Not found

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m				
Medium dense, brownish grey, silty sand to sandy silt. Observed kankar.		6 9 9 — 18	DS−1	0.50
			SPT−1	1.50−1.95
2.50m				
Very loose, light grey, silty sand. Observed mica, conch pcs. & clay binder.		0 0 1 — 1	DS−2	3.00
			SPT−2	3.50−3.95
4.50m			DS−3	4.50
Very dense, brownish grey, silty sand with conch pcs. Observed kankar & decomposed rock.		Refusal	DS−4	5.00
		100 / 4.0 cm Pentn.	*SPT−3	5.50−5.54
5.80m		Refusal	*SPT−4	5.80−5.83
		100 / 3.0 cm Pentn.	R1	CR=12% RQD=Nil — 5.80 / 6.80
		NX rotary drilling from 5.80m to 25.30m	R2	CR=15% RQD=Nil — 7.80
			R3	CR=16% RQD=Nil — 8.80
Completely weathered, brownish grey to light grey, medium grained, completely fractured rock.			R4	CR=15% RQD=Nil — 9.80
			R5	CR=12% RQD=Nil — 10.80
			R6	CR=14% RQD=Nil — 11.80
			R7	CR=13% RQD=Nil — 12.80
12.90m				

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.				CETEST
Job No : 4115	Created by : SKD	Created on : 19/05/2018	Sheet No:	

BORE LOG DATA SHEET

BORE HOLE NO. PMT2 Co-ordinates E=−119 N=123

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	4	Undisturbed (UDS)	0
Cone (Pc)		Penetrometer (SPT)	4
Vane (V)		Disturbed (DS)	4
		Water Sample (WS)	0

Commencement Date : 16/04/2018
Completion Date : 17/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.663 m.
Water Struck At :
Standing Water Level : Not found

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
12.90m				
Completely weathered, brownish grey to light grey, medium grained, completely fractured rock.			R8	CR=17% RQD=Nil ↓ 13.80
			R9	CR=17% RQD=Nil ↓ 14.80
14.80m				
			R10	CR=18% RQD=Nil ↓ 15.80
			R11	CR=15% RQD=Nil ↓ 16.80
Completely to highly weathered, whitish grey to light grey, medium grained, fractured rock.			R12	CR=20% RQD=12% ↓ 17.80
			R13	CR=32% RQD=Nil ↓ 18.80
			R14	CR=25% RQD=Nil ↓ 19.80
19.80m				
			R15	CR=29% RQD=Nil ↓ 20.80
HIghly weathered, whitish grey to light grey, medium grained, fractured rock.			R16	CR=33% RQD=Nil ↓ 21.80
			R17	CR=26% RQD=Nil ↓ 22.80
22.80m				
HIghly weathered, whitish grey to light grey, medium grained, fractured rock.			R18	CR=24% RQD=Nil ↓ 23.80
23.80m				
Highly weathered, light grey, medium grained, fractured rock.			R19	CR=28% RQD=Nil ↓
25.30m				25.30

N.B. − '*' means sample could not be recovered / sample slip.

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.				CETEST
Job No : 4115	Created by : SKD	Created on : 19/05/2018	Sheet No:	

BORE LOG DATA SHEET

BORE HOLE NO. PMT3 Co-ordinates E=−155 N=32

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	0
Cone (Pc)		Penetrometer (SPT)	6
		Disturbed (DS)	3
Vane (V)		Water Sample (WS)	0

Commencement Date : 18/04/2018
Completion Date : 19/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.591 m.
Water Struck At :
Standing Water Level : Not found

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Loose, light whitish grey, clayey sandy silt. Observed conch pcs.			DS−1	0.50
			DS−2	1.00
1.70m.		2 4 2 (6)	SPT−1	1.50−1.95
Very loose, light whitish grey, clayey silty sand. Observed conch pcs.		1 2 2 (4)	SPT−2	2.45−2.90
			DS−3	3.50
		1 1 2 (3)	SPT−3	4.00−4.45
4.60m.		100 5.0 cm Pentn. Refusal	SPT−4	4.60−4.65
Very dense, light whitish grey, silty sand with decomposed rock.		100 2.0 cm Pentn. Refusal	*SPT−5	4.80−4.82
5.20m.		Refusal	*SPT−6	5.20−5.22
		100 2.0 cm Pentn.	R1	CR=27% RQD=Nil 5.20 → 6.20
		NX rotary drilling from 5.20m to 25.20m	R2	CR=29% RQD=Nil 6.20 → 7.20
Highly weathered, light grey, coarse to medium grained, fractured rock.			R3	CR=32% RQD=14% 7.20 → 8.20
			R4	CR=33% RQD=Nil 8.20 → 9.20
9.20m.			R5	CR=34% RQD=20% 9.20 → 10.20
			R6	CR=35% RQD=Nil 10.20 → 11.20
Highly weathered, whitish grey, medium grained, moderately fractured rock.			R7	CR=35% RQD=Nil 11.20 → 12.20
12.90m.			R8	CR=40% RQD=Nil 12.20 →

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.				CETEST
Job No : 4115	Created by : SKD	Created on : 19/05/2018	Sheet No:	
BORE LOG DATA SHEET	BORE HOLE NO. PMT3	Co-ordinates	E=-155 N=32	

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	0
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	3
		Water Sample (WS)	0

Commencement Date : 18/04/2018
Completion Date : 19/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.591 m.
Water Struck At :
Standing Water Level : Not found

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
12.90m.				13.20
Highly weathered, whitish grey, medium grained, moderately fractured rock.			R9 CR=31% RQD=Nil	14.20
			R10 CR=33% RQD=Nil	15.20
15.20m.			R11 CR=40% RQD=Nil	16.20
Highly weathered, brownish grey to whitish grey, medium grained, fractured rock.			R12 CR=30% RQD=Nil	17.20
			R13 CR=30% RQD=Nil	18.20
			R14 CR=32% RQD=Nil	19.20
			R15 CR=30% RQD=Nil	20.20
20.20m.				
Highly weathered, brownish grey to whitish grey, medium grained, fractured rock.			R16 CR=25% RQD=Nil	21.20
21.20m.				
Highly weathered, brownish grey to whitish grey, medium grained, fractured rock.			R17 CR=33% RQD=Nil	22.20
			R18 CR=28% RQD=Nil	23.20
23.20m.				
Highly weathered, brownish grey to whitish grey, medium grained, fractured rock.			R19 CR=24% RQD=Nil	24.20
24.20m.				
Highly weathered, whitish grey, medium grained, completely fractured rock.			R20 CR=30% RQD=Nil	25.20
25.20m.				
N.B. – '*' means sample could not be recovered / sample slip.				

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.				CETEST
Job No : 4115	Created by : SKD	Created on : 04/05/2018	Sheet No:	

BORE LOG DATA SHEET

BORE HOLE NO. CST1 | Co-ordinates E=−220 N=287

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
		Disturbed (DS)	1
Vane (V)		Water Sample (WS)	0

Commencement Date : 13/04/2018
Completion Date : 15/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.768 m.
Water Struck At :
Standing Water Level : 2.9 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m				
Loose, brownish grey, silty sand. Observed kankar & conch.		9 5 4 (9)	DS−1	0.50
1.50m			SPT−1	1.00−1.45
Very loose, light grey, sandy silt. Observed conch pcs. & clay binder.		1 0 1 (1)	UDS−1	2.00−2.45
			SPT−2	2.50−2.95
			*UDS−2	3.50−3.95
		1 2 2 (4)	SPT−3	4.05−4.50
4.60m				
Very dense, light grey, silty sand with decomposed rock. Observed conch pcs.		11 23 66 (>100) 10.0 cm Pentn.	SPT−4	5.00−5.40
		100 5.0 cm Pentn. Refusal	*SPT−5	5.50−5.53
5.60m		Refusal	*SPT−6	5.60−5.62
Highly weathered, light grey, medium grained, highly to moderately fractured rock.		100 2.0 cm Pentn.	R1	CR=30% RQD=Nil
6.25m		NX rotary drilling from 5.60m to 27.00m	R2	CR=30% RQD=Nil
Highly weathered, light grey, coarse grained, moderately fractured rock.			R3	CR=29% RQD=Nil
			R4	CR=29% RQD=Nil
8.50m			R5	CR=33% RQD=Nil
Highly weathered, light grey, fine to medium grained, highly to moderately fractured rock.			R6	CR=30% RQD=Nil
			R7	CR=30% RQD=Nil
			R8	CR=28% RQD=Nil
11.50m			R9	CR=36% RQD=Nil
Highly weathered, light brownish grey, coarse to medium grained, highly to moderately fractured rock.			R10	CR=30% RQD=Nil
			R11	CR=33% RQD=Nil
13.60m				

5.60
6.25
7.00
7.75
8.50
9.25
10.00
10.75
11.50
12.25
13.00

BH−1/Sheet−1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.				CETEST
Job No : 4115	Created by : SKD	Created on : 04/05/2018	Sheet No:	

BORE LOG DATA SHEET

BORE HOLE NO. CST1 | Co-ordinates E=−220 N=287

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
		Disturbed (DS)	1
Vane (V)		Water Sample (WS)	0

Commencement Date : 13/04/2018
Completion Date : 15/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 1.768 m.
Water Struck At :
Standing Water Level : 2.9 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
13.60m.				13.75
			R12	CR=32% RQD=Nil
				14.50
			R13	CR=34% RQD=Nil
Highly weathered, light brownish grey, coarse to medium grained, highly to moderately fractured rock.				15.25
			R14	CR=33% RQD=Nil
				16.00
			R15	CR=28% RQD=Nil
				16.75
			R16	CR=34% RQD=Nil
17.50m.				17.50
			R17	CR=32% RQD=Nil
Highly weathered, light grey, fine grained, moderately fractured rock.				18.25
			R18	CR=31% RQD=Nil
19.00m.				19.00
			R19	CR=32% RQD=Nil
				19.75
			R20	CR=34% RQD=Nil
				20.50
Highly weathered, whitish grey, medium grained, moderately fractured rock.			R21	CR=35% RQD=Nil
				21.25
			R22	CR=37% RQD=Nil
				22.00
			R23	CR=39% RQD=Nil
				22.75
			R24	CR=38% RQD=Nil
23.50m.				23.50
			R25	CR=39% RQD=Nil
Highly to moderately weathered, whitish grey to greenish grey, medium grained, moderately to highly fractured rock.				24.25
			R26	CR=41% RQD=Nil
				25.00
			R27	CR=45% RQD=Nil
25.75m.				25.75
Moderately weathered, whitish grey, fine to medium grained, moderately fractured rock.			R28	CR=52% RQD=Nil
N.B. − '*' means sample could not be recovered / sample slip.				26.50
27.00m.			R29	CR=54% RQD=Nil
				27.00

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.				CETEST
Job No : 4115	Created by : SKD	Created on : 25/05/2018	Sheet No:	

BORE LOG DATA SHEET

BORE HOLE NO. CST2 | Co-ordinates E=−27 N=318

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	9	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	9
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 05/04/2018
Completion Date : 07/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 2.39 m.
Water Struck At :
Standing Water Level : 2.75 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Light grey, sandy silt. Observed conch.			DS−1	0.50
1.00m.		6 8 9 — 17	SPT−1	1.00−1.45
Medium dense, light brownish grey, sandy silt. Observed kankar & conch.				
1.80m.			*UDS−1	2.00−2.45
		1 0 1 — 1	SPT−2	2.55−3.00
Very loose, light grey, clayey sandy silt. Observed conch.			*UDS−2	3.50−3.95
		1 1 2 — 3	SPT−3	4.05−4.50
4.60m.				
Very dense, light grey, silty sand. Observed kankar, conch & rock pcs.		36 64 — >100	UDS−3	5.00−5.25
		5.0 cm Pentn.	SPT−4	5.35−5.55
		36 64 5.0 cm Pentn. >100	*SPT−5	5.65−5.68
5.75m.		100 3.0 cm Pentn. Refusal	*SPT−6	5.75−5.78 5.75
			R1	CR=18% RQD=Nil ↓
Completely weathered, light grey, coarse to medium grained, highly fractured rock.		50 Refusal	*SPT−7	6.50−6.52 6.50
		2.0 cm Pentn.	R2	CR=16% RQD=Nil ↓
7.25m.		50 Refusal	*SPT−8	7.25−7.28 7.25
		3.0 cm Pentn.	R3	CR=21% RQD=Nil ↓
		NX rotary drilling from 5.75m to 27.00m		8.00
Completely/highly weathered, light grey, medium grained, moderately fractured rock.			R4	CR=24% RQD=Nil ↓
				8.75
			R5	CR=21% RQD=Nil ↓
				9.50
			R6	CR=12% RQD=Nil ↓
10.25m.		50 Refusal	*SPT−9	10.25−10.28 10.25
		3.0 cm Pentn.	R7	CR=21% RQD=Nil ↓
Highly weathered, light grey, coarse to fine grained, highly to moderately fractured rock.				11.00
			R8	CR=24% RQD=Nil ↓
11.75m.				11.75
Highly weathered, light grey, fine grained, moderately fractured rock.			R9	CR=29% RQD=Nil ↓
12.50m.				12.50
Highly weathered, light grey, medium grained, moderately fractured rock.			R10	CR=33% RQD=Nil ↓
				13.25
13.75m.			R11	CR=37% RQD=Nil ↓

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.				CETEST
Job No : 4115	Created by : SKD	Created on : 25/05/2018	Sheet No:	

BORE LOG DATA SHEET

BORE HOLE NO. CST2 | Co-ordinates E=−27 N=318

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	9	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	9
		Disturbed (DS)	1
Vane (V)		Water Sample (WS)	0

Commencement Date : 05/04/2018
Completion Date : 07/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 2.39 m.
Water Struck At :
Standing Water Level : 2.75 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
				14.00
Highly weathered, light grey, medium grained, moderately fractured rock.			R12	CR=32% RQD=Nil
13.75m 14.00m				14.75
Highly weathered, light brownish grey, fine to medium grained, fractured rock.			R13	CR=29% RQD=Nil
15.50m				15.50
Highly weathered, light grey, fine grained, moderately fractured rock.			R14	CR=24% RQD=Nil
				16.25
			R15	CR=25% RQD=Nil
17.00m				17.00
Highly weathered, light grey, fine grained, moderately fractured rock.			R16	CR=27% RQD=Nil
				17.75
			R17	CR=34% RQD=13%
				18.50
			R18	CR=28% RQD=Nil
19.25m				19.25
Highly weathered, coarse to medium grained, moderately fractured rock.			R19	CR=26% RQD=Nil
				20.00
			R20	CR=31% RQD=Nil
20.75m				20.75
Highly weathered, whitish grey, medium to fine grained, highly to moderately fractured rock.			R21	CR=30% RQD=Nil
				21.50
			R22	CR=33% RQD=Nil
				22.25
			R23	CR=39% RQD=Nil
23.00m				23.00
			R24	CR=43% RQD=16%
				23.75
			R25	CR=48% RQD=Nil
				24.50
Highly/moderately weathered, whitish grey, fine grained, moderately fractured rock.			R26	CR=34% RQD=Nil
				25.25
			R27	CR=32% RQD=Nil
				26.00
			R28	CR=28% RQD=Nil
27.00m				27.00

N.B. – '*' means sample could not be recovered / sample slip.

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.				CETEST
Job No : 4115	Created by : SKD	Created on : 25/05/2018	Sheet No:	

BORE LOG DATA SHEET

BORE HOLE NO. CST3 | Co-ordinates E=−154 N=96

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
		Disturbed (DS)	1
Vane (V)		Water Sample (WS)	0

Commencement Date : 12/04/2018
Completion Date : 13/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 2.14 m.
Water Struck At :
Standing Water Level :

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium dense, light grey, silty sand. Observed kankar.		5 6 6 (12)	DS−1	0.50
1.50m.			SPT−1	1.00−1.45
Loose, light grey, silty sand with kankar & conch pcs. Observed clay binder.		2 2 2 (4)	*UDS−1	2.00−2.45
			SPT−2	2.50−2.95
			*UDS−2	3.50−3.95
4.00m.				
Medium dense, light grey, silty sand with kankar, mica & conch pcs. Observed decomposed rock.		8 11 13 (24)	SPT−3	4.00−4.45
4.70m.				
Very dense, light grey, silty sand with kankar, mica & conch pcs. 5.25m.		25 75 10.0 cm Pentn. >100 100 4.0 cm Pentn. Refusal Refusal	SPT−4 *SPT−5 *SPT−6	4.70−4.95 5.10−5.14 5.25−5.28 5.25
		100 3.0 cm Pentn.	R1	CR=21% RQD=Nil 6.25
		NX rotary drilling from 5.25m to 26.25m	R2	CR=24% RQD=Nil 7.25
			R3	CR=28% RQD=Nil 8.25
Highly weathered, light to brownish grey, medium to coarse grained, highly fractured rock.			R4	CR=24% RQD=Nil 9.25
			R5	CR=38% RQD=Nil 10.25
			R6	CR=25% RQD=Nil 11.25
11.25m.				
Highly weathered, light to brownish grey, medium to coarse grained, highly fractured rock.			R7	CR=34% RQD=Nil 12.25
			R8	CR=38% RQD=Nil 13.25
13.75m.			R9	CR=26% RQD=Nil

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.				CETEST
Job No : 4115	Created by : SKD	Created on : 25/05/2018	Sheet No:	

BORE LOG DATA SHEET

BORE HOLE NO. CST3 | Co-ordinates E=−154 N=96

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 12/04/2018
Completion Date : 13/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 2.14 m.
Water Struck At :
Standing Water Level :

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
13.75m. Highly weathered, light to brownish grey, medium to coarse grained, highly fractured rock. 14.25m.				14.25
Highly weathered, light to brownish grey, medium to coarse grained, highly fractured rock. 15.25m.			R10	CR=22% RQD=Nil 15.25
Highly weathered, brownish grey, coarse grained, highly fractured rock. 16.25m.			R11	CR=29% RQD=Nil 16.25
			R12	CR=32% RQD=Nil 17.25
Highly weathered, light grey, medium to fine grained, highly fractured rock.			R13	CR=34% RQD=Nil 18.25
			R14	CR=30% RQD=Nil 19.25
			R15	CR=29% RQD=Nil 20.25
20.25m. Highly weathered, light grey, medium to fine grained, highly fractured rock. 21.25m.			R16	CR=24% RQD=Nil 21.25
Highly weathered, light grey, medium to fine grained, highly fractured rock.			R17	CR=26% RQD=Nil 22.25
			R18	CR=29% RQD=Nil 23.25
23.25m. Highly weathered, light grey, medium to fine grained, highly fractured rock. 24.25m.			R19	CR=24% RQD=Nil 24.25
Highly weathered, light grey, medium to fine grained, highly fractured rock.			R20	CR=26% RQD=Nil 25.25
26.25m.			R21	CR=30% RQD=Nil 26.25

N.B. – '*' means sample could not be recovered / sample slip.

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.				CETEST
Job No : 4115	Created by : SKD	Created on : 25/05/2018	Sheet No:	

BORE LOG DATA SHEET

BORE HOLE NO. CST4 | Co-ordinates E=−11 N=126

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	8	Undisturbed (UDS)	0
Cone (Pc)		Penetrometer (SPT)	8
		Disturbed (DS)	3
Vane (V)		Water Sample (WS)	0

Commencement Date : 08/04/2018
Completion Date : 09/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 2.28 m.
Water Struck At :
Standing Water Level :

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m				
Medium dense, brownish grey, silty sand. Observed kankar & conch pcs.		7 11 10 (21)	DS−1	0.50
			SPT−1	1.00−1.45
1.60m			DS−2	2.00
Very loose, brownish grey to light grey, silty sand to sandy silt. Observed conch pcs. & clay binder.		1 1 2 (3)	SPT−2	2.50−2.95
			DS−3	3.50
		2 2 2 (4)	SPT−3	4.00−4.45
4.70m				
Very dense, light grey, silty sand with kankar & conch pcs. Observed decomposed rock.		45 55 10.0 cm Pentn. >100	SPT−4	5.00−5.25
		100 5.0 cm Pentn. Refusal	*SPT−5	5.40−5.45
5.60m		100 3.0 cm Pentn. Refusal	*SPT−6	5.60−5.63 **5.60**
			R1	CR=14% RQD=Nil
		Refusal 50 2.0 cm Pentn.	*SPT−7	6.60−6.62 **6.60**
			R2	CR=17% RQD=Nil
		Refusal 50 3.0 cm Pentn.	*SPT−8	7.60−7.63 **7.60**
			R3	CR=22% RQD=Nil
		NX rotary drilling from 5.60m to 26.60m		**8.60**
Completely to highly weathered, brownish grey to light grey, medium to coaerse grained, completely fractured rock.			R4	CR=24% RQD=Nil
				9.60
			R5	CR=26% RQD=Nil
				10.60
			R6	CR=21% RQD=Nil
				11.60
			R7	CR=25% RQD=Nil
12.60m				**12.60**
Highly weathered, brownish grey to light grey, medium to coarse grained, completely fractured rock.			R8	CR=28% RQD=Nil
13.75m				**13.60**

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.				CETEST
Job No : 4115	Created by : SKD	Created on : 25/05/2018	Sheet No:	

BORE LOG DATA SHEET

BORE HOLE NO. CST4 | Co-ordinates E=−11 N=126

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	8	Undisturbed (UDS)	0
Cone (Pc)		Penetrometer (SPT)	8
Vane (V)		Disturbed (DS)	3
		Water Sample (WS)	0

Commencement Date : 08/04/2018
Completion Date : 09/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 2.28 m.
Water Struck At :
Standing Water Level :

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
13.75m.				
Highly weathered, brownish grey to light grey, medium to coarse grained, completely fractured rock.			R9	CR=31% RQD=Nil
				14.60
			R10	CR=26% RQD=Nil
15.60m.				15.60
			R11	CR=35% RQD=Nil
				16.60
			R12	CR=29% RQD=13%
				17.60
			R13	CR=32% RQD=Nil
				18.60
			R14	CR=26% RQD=Nil
				19.60
			R15	CR=33% RQD=Nil
				20.60
Highly weathered, whitish grey to light grey, medium grained, fractured rock.			R16	CR=33% RQD=Nil
				21.60
			R17	CR=34% RQD=Nil
				22.60
			R18	CR=40% RQD=Nil
				23.60
			R19	CR=37% RQD=Nil
				24.60
			R20	CR=38% RQD=Nil
				25.60
			R21	CR=35% RQD=Nil
26.60m.				26.60

N.B. − '*' means sample could not be recovered / sample slip.

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.				CETEST
Job No : 4115	Created by : SKD	Created on : 25/05/2018	Sheet No:	

BORE LOG DATA SHEET

BORE HOLE NO. CST5 | Co-ordinates E=−226 N=28

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
		Disturbed (DS)	1
Vane (V)		Water Sample (WS)	0

Commencement Date : 15/04/2018
Completion Date : 16/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 2.14 m.
Water Struck At :
Standing Water Level : 2.2 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium dense, light grey, silty sand. Observed conch pcs.		8 6 4 (10)	DS−1	0.50
			SPT−1	1.00−1.45
1.70m.				
Very loose, light grey, clayey sandy silt. Observed kankar & conch pcs.		1 0 1 (1)	*UDS−1	2.00−2.45
			SPT−2	2.50−2.95
		19 81 (>100)	UDS−2	3.50−3.95
4.00m.				
Very dense, light grey, silty sand with decomposed rock.		9.0 cm Pentn.	SPT−3	4.00−4.24
		100 4.0 cm Pentn. Refusal	*SPT−4	4.40−4.44
4.50m.		Refusal	*SPT−5	4.50−4.53 4.50
		100 3.0 cm Pentn.	R1	CR=24% RQD=Nil ↓ 5.50
		NX rotary drilling from 4.50m to 26.50m	R2	CR=23% RQD=Nil ↓ 6.50
Highly weathered, light grey, coase to medium grained, moderately to highly fractured rock.			R3	CR=25% RQD=Nil ↓ 7.50
			R4	CR=22% RQD=Nil ↓ 8.50
			R5	CR=26% RQD=Nil ↓ 9.50
9.50m.				
			R6	CR=21% RQD=Nil ↓ 10.50
Highly weathered, whitish grey, medium grained, moderately fractured rock.			R7	CR=23% RQD=Nil ↓ 11.50
			R8	CR=22% RQD=Nil ↓ 12.50
12.50m.				
Highly weathered, light brownish grey, coarse to medium grained, moderately to highly fractured rock.			R9	CR=23% RQD=Nil ↓ 13.50
13.75m.				

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.			CETEST
Job No : 4115	Created by : SKD	Created on : 25/05/2018	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. CST5 | Co-ordinates E=−226 N=28

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 15/04/2018
Completion Date : 16/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 2.14 m.
Water Struck At :
Standing Water Level : 2.2 m.

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
13.75m.				
Highly weathered, light brownish grey, coarse to medium grained, moderately to highly fractured rock.			R10	CR=22% RQD=Nil ↓ 14.50
			R11	CR=24% RQD=Nil ↓ 15.50
			R12	CR=25% RQD=Nil ↓ 16.50
16.50m.				
Highly weathered, light grey, fine grained, highly fractured rock.			R13	CR=23% RQD=Nil ↓ 17.50
17.50m.				
			R14	CR=28% RQD=Nil ↓ 18.50
Highly weathered, light grey, fine grained, highly fractured rock.			R15	CR=29% RQD=Nil ↓ 19.50
			R16	CR=31% RQD=Nil ↓ 20.50
			R17	CR=31% RQD=Nil ↓ 21.50
21.50m.				
			R18	CR=32% RQD=Nil ↓ 22.50
			R19	CR=30% RQD=Nil ↓ 23.50
Highly weathered, whitish grey, fine grained, moderately fractured rock.			R20	CR=33% RQD=Nil ↓ 24.50
			R21	CR=36% RQD=Nil ↓ 25.50
			R22	CR=34% RQD=Nil ↓ 26.50
26.50m.				

N.B. – '*' means sample could not be recovered / sample slip.

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.				CETEST
Job No : 4115	Created by : SKD	Created on : 25/05/2018	Sheet No:	

BORE LOG DATA SHEET

BORE HOLE NO. CST6

Co-ordinates E=-19 N=28

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	6
		Disturbed (DS)	2
Vane (V)		Water Sample (WS)	0

Commencement Date : 17/04/2018
Completion Date : 18/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 2.26 m.
Water Struck At :
Standing Water Level :

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
Medium dense, light grey, clayey silty sand / clayey sandy silt. Observed conch.		5 6 7 (13)	DS-1	0.50
			SPT-1	1.00-1.45
1.60m.				
Loose, light whitish grey, clayey sandy silt. Observed conch pcs.		1 2 2 (4)	*UDS-1	2.00-2.45
			SPT-2	2.50-2.95
			DS-2	3.50
		1 2 3 (5)	SPT-3	4.00-4.45
5.00m.				
Very dense, light grey, silty sand with decomposed rock.		100 10.0 cm Pentn. >100	SPT-4	5.00-5.10
		100 3.0 cm Pentn. Refusal	*SPT-5	5.30-5.33
5.50m.		Refusal	*SPT-6	5.50-5.52 5.50
Highly weathered, light grey, coarse grained, fractured rock.		100 2.0 cm Pentn.	R1	CR=27% RQD=Nil 6.50
6.50m.		NX rotary drilling from 5.50m to 26.50m	R2	CR=25% RQD=Nil 7.50
			R3	CR=28% RQD=Nil 8.50
Highly weathered, light grey, coarse grained, fractured rock.			R4	CR=25% RQD=Nil 9.50
			R5	CR=26% RQD=Nil 10.50
			R6	CR=24% RQD=Nil 11.50
11.50m.				
Highly weathered, light grey, coarse grained, fractured rock.			R7	CR=27% RQD=Nil 12.50
12.50m.				
Highly weathered, light whitish grey, medium grained, fractured rock.			R8	CR=28% RQD=Nil 13.50
13.50m.				
13.75m.				

BH-6/Sheet-1

Project : Geotechnical Investigation Work for 2x660 MW Udangudi STPP at Kallamoli.				CETEST
Job No : 4115	Created by : SKD	Created on : 25/05/2018	Sheet No:	

BORE LOG DATA SHEET

BORE HOLE NO. CST6 | Co-ordinates E=−19 N=28

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	2
		Water Sample (WS)	0

Commencement Date : 17/04/2018
Completion Date : 18/04/2018
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 2.26 m.
Water Struck At :
Standing Water Level :

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm)	SAMPLES Ref. No	SAMPLES Depth (m)
13.75m.				
Highly weathered, light whitish grey to grey, medium grained, fractured rock.			R9	CR=25% RQD=Nil ↓ 14.50
			R10	CR=28% RQD=Nil ↓ 15.50
			R11	CR=24% RQD=Nil ↓ 16.50
16.50m.				
Slightly weathered, light whitish grey to grey, medium grained, fractured rock.			R12	CR=80% RQD=Nil ↓ 17.50
17.50m.				
Highly weathered, light whitish grey to grey, medium grained, fractured rock.			R13	CR=29% RQD=Nil ↓ 18.50
			R14	CR=30% RQD=Nil ↓ 19.50
			R15	CR=32% RQD=Nil ↓ 20.50
			R16	CR=27% RQD=Nil ↓ 21.50
21.50m.				
Highly weathered, light whitish grey to grey, medium grained, fractured rock.			R17	CR=24% RQD=Nil ↓ 22.50
			R18	CR=28% RQD=Nil ↓ 23.50
			R19	CR=25% RQD=Nil ↓ 24.50
24.50m.				
Highly weathered, light whitish grey to grey, medium grained, fractured rock.			R20	CR=30% RQD=Nil ↓ 25.50
			R21	CR=27% RQD=Nil ↓ 26.50
26.50m.				

N.B. − '*' means sample could not be recovered / sample slip.