

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD									
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.								
BOREHOLE NO.		DBH-35	LOCATION	Near ADMN Bldg	TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		12.00	CO-ORDINATES E	1094	DRILLING METHOD		ROTARY				
GROUND WATER TABLE		1.60	CO-ORDINATES N	436	CASING DEPTH, m		6.00				
START DATE		15-02-2023	GROUND ELEVATION	275.209	CORE DIAMETER		54 mm				
END DATE		16-02-2023	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE	SAMPLE TYPE	SPT N-VALUE				ROCK CORE			
				N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %	
0.5		0.00m to 0.30m, Filled up soil	DS-1								
1.0		0.30m to 12.00m, Yellowish brown silty clay of low plasticity									
1.5			SPT-1	3	3	5	8				
2.0											
2.5											
3.0			UDS-1								
3.5											
4.0											
4.5			SPT-2	6	7	8	15				
5.0											
5.5											
6.0			SPT-3	7	9	12	21				
6.5											
7.0											
7.5			SPT-4	4	5	7	12				
8.0											
8.5											
9.0			SPT-5	8	10	12	22				
9.5											
10.0											
10.5			SPT-6	5	7	7	14				
11.0											
11.5											
12.0				SPT-7	8	9	9	18			

MK M.K. SOIL TESTING LABORATORY PRIVATE LIMITED		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD								
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.							
BOREHOLE NO.		DBH-36	LOCATION	Construction Power	TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		10.00	CO-ORDINATES E	1638	DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.65	CO-ORDINATES N	625	CASING DEPTH, m		6.00			
START DATE		15-02-2023	GROUND ELEVATION	275.087	CORE DIAMETER		54 mm			
END DATE		15-02-2023	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE		SAMPLE TYPE	SPT N-VALUE				ROCK CORE	
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY
0.5		0.00m to 0.35m, Filled up soil		DS-1						
1.0		0.35m to 10.00m, Yellowish brown silty clay of low plasticity								
1.5	UDS-1									
2.0										
2.5										
3.0	SPT-1			6	6	8	14			
3.5										
4.0										
4.5	SPT-2			5	7	10	17			
5.0										
5.5										
6.0	SPT-3			6	10	12	22			
6.5										
7.0										
7.5	SPT-4			12	14	16	30			
8.0										
8.5										
9.0	SPT-5			10	17	18	35			
9.5										
10.0	SPT-6			15	20	30	50			

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD									
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.								
BOREHOLE NO.		DBH-37	LOCATION	CONV 39	TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		15.00	CO-ORDINATES E	1635.173	DRILLING METHOD		ROTARY				
GROUND WATER TABLE		2.60	CO-ORDINATES N	1362.642	CASING DEPTH, m		6.00				
START DATE		28-02-2023	GROUND ELEVATION	277.37	CORE DIAMETER		54 mm				
END DATE		28-02-2023	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE		SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 1.10m, Filled up soil		DS-1							
1.0											
1.5		1.10m to 13.50m, Yellowish brown silty clay of low plasticity with intermittent small fraction of gravels		SPT-1	5	5	6	11			
2.0											
2.5											
3.0				SPT-2	4	6	6	12			
3.5											
4.0											
4.5				SPT-3	6	7	8	15			
5.0											
5.5											
6.0				SPT-4	7	9	12	21			
6.5											
7.0											
7.5				SPT-5	8	12	15	27			
8.0											
8.5											
9.0				SPT-6	10	15	18	33			
9.5											
10.0											
10.5				SPT-7	20	38	50 (5cm)	REF			
11.0											
11.5											
12.0				SPT-8	50 (14cm)	-	-	REF			
12.5											
13.0											
13.5				SPT-9	50 (7cm)	-	-	REF			
14.0		13.50m to 15.00m, Yellowish brown highly weathered and very poor silty sandstone		CR-1						21.00	0.00
14.5											
15.0											

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD													
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.												
BOREHOLE NO.		DBH-38		LOCATION		CONV 39		TYPE OF RIG		HYDRAULIC					
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		1610		DRILLING METHOD		ROTARY					
GROUND WATER TABLE		3.10		CO-ORDINATES N		1359		CASING DEPTH, m		6.00					
START DATE		26-02-2023		GROUND ELEVATION		276.719		CORE DIAMETER		54 mm					
END DATE		26-02-2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm					
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE				
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %		
0.5		0.00m to 0.80m, Filled up soil				DS-1									
1.0															
1.5		0.80m to 2.50m, Yellowish brown silty clay of intermediate plasticity				SPT-1	4	4	6	10					
2.0						UDS-1									
2.5															
3.0		2.50m to 15.00m, Yellowish brown silty clay of low plasticity with intermittent traces of gravels				SPT-2	5	6	6	12					
3.5															
4.0															
4.5						SPT-3	7	8	8	16					
5.0															
5.5															
6.0						SPT-4	8	9	10	19					
6.5															
7.0															
7.5						SPT-5	7	10	9	19					
8.0															
8.5															
9.0						SPT-6	8	10	11	21					
9.5															
10.0															
10.5						SPT-7	9	12	14	26					
11.0															
11.5															
12.0						SPT-8	10	14	16	30					
12.5															
13.0															
13.5						SPT-9	50 (6cm)	-	-	REF					
14.0															
14.5															
15.0						SPT-10	50 (4cm)	-	-	REF					

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD									
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.								
BOREHOLE NO.		DBH-39	LOCATION	CONV 39	TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		15.00	CO-ORDINATES E	1519	DRILLING METHOD		ROTARY				
GROUND WATER TABLE		3.20	CO-ORDINATES N	1361	CASING DEPTH, m		6.00				
START DATE		24-02-2023	GROUND ELEVATION	276.847	CORE DIAMETER		54 mm				
END DATE		24-02-2023	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE		SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.85m, Filled up soil		DS-1							
1.0											
1.5		0.85m to 2.00m, Yellowish brown silty clay of intermediate plasticity		SPT-1	4	4	5	9			
2.0											
2.5		2.00m to 15.00m, Yellowish brown silty clay of low plasticity with intermittent traces of gravels									
3.0				SPT-2	5	6	6	12			
3.5											
4.0											
4.5				SPT-3	6	7	6	13			
5.0											
5.5											
6.0				SPT-4	7	9	10	19			
6.5											
7.0											
7.5				SPT-5	12	16	22	38			
8.0											
8.5											
9.0				SPT-6	50 (3cm)	-	-	REF			
9.5											
10.0											
10.5				SPT-7	50 (11cm)	-	-	REF			
11.0											
11.5											
12.0	SPT-8	50 (8cm)	-	-	REF						
12.5											
13.0											
13.5	SPT-9	50 (9cm)	-	-	REF						
14.0											
14.5											
15.0				SPT-10	50 (14cm)	-	-	REF			

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		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-40		LOCATION		TP		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		1407		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.45		CO-ORDINATES N		1201		CASING DEPTH, m		2.50			
START DATE		27/01/2023		GROUND ELEVATION		276.87		CORE DIAMETER		54 mm			
END DATE		27/01/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.65m, Filled up soil				DS							
1.0		0.65m to 4.50m, Yellowish brown silty clay of low plasticity with gravels											
1.5						SPT	8	6	9	15			
2.0													
2.5													
3.0						SPT	4	4	6	10			
3.5													
4.0													
4.5						SPT	7	8	15	23			
5.0		4.50m to 7.50m, Reddish brown clayey sand of medium plasticity with gravels											
5.5													
6.0						SPT	22	39	49	88			
6.5													
7.0													
7.5						SPT	18	42	50(3cm)	REF			
8.0		7.50m to 9.00m, Greyish brown clayey sand of medium plasticity with gravels											
8.5													
9.0	SPT	15	50(4cm)	-	REF								
9.5		9.00m to 15.00m, Highly weathered Very poor reddish brown silty sandstone				CR						24.00	0.00
10.0													
10.5													
11.0						CR						29.00	0.00
11.5													
12.0													
12.5						CR						36.00	0.00
13.0													
13.5													
14.0						CR						36.00	0.00
14.5													
15.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD														
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.													
BOREHOLE NO.		DBH-41		LOCATION		TP		TYPE OF RIG		HYDRAULIC						
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		1403		DRILLING METHOD		ROTARY						
GROUND WATER TABLE		2.10		CO-ORDINATES N		1297		CASING DEPTH, m		6.00						
START DATE		01-03-2023		GROUND ELEVATION		276.926		CORE DIAMETER		54 mm						
END DATE		01-03-2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm						
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE					
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %			
0.5		0.00m to 1.10m, Filled up soil				DS-1										
1.0																
1.5		1.10m to 6.50m, Yellowish brown silty clay of intermediate plasticity				SPT-1	2	3	4	7						
2.0																
2.5																
3.0									SPT-2	4	4	6	10			
3.5																
4.0																
4.5									SPT-3	6	8	8	16			
5.0																
5.5																
6.0									SPT-4	8	10	12	22			
6.5																
7.0		6.50m to 15.50m, Yellowish brown clayey sand of high plasticity														
7.5									SPT-5	26	35	41	76			
8.0																
8.5																
9.0									SPT-6	25	38	50 (5cm)	REF			
9.5																
10.0																
10.5									SPT-7	33	50 (5cm)	-	REF			
11.0																
11.5																
12.0									SPT-8	45	50 (10cm)	-	REF			
12.5																
13.0																
13.5									SPT-9	50 (10cm)	-	-	REF			
14.0																
14.5																
15.0									SPT-10	50 (8cm)	-	-	REF			

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD									
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.								
BOREHOLE NO.		DBH-42	LOCATION	Stacker	TYPE OF RIG	HYDRAULIC					
BOREHOLE DEPTH, m		15.00	CO-ORDINATES E	910	DRILLING METHOD	ROTARY					
GROUND WATER TABLE		1.98	CO-ORDINATES N	1271	CASING DEPTH, m	2.50					
START DATE		14/01/2023	GROUND ELEVATION	277.151	CORE DIAMETER	54 mm					
END DATE		14/01/2023	CIRCULATION FLUID	WATER	DIAMETER OF HOLE	150 mm					
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE		SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
		0.00m to 0.19m, Filled up soil									
0.5		0.19m to 4.50m, Greyish brown clayey sand of medium plasticity with gravels		DS							
1.0											
1.5				UDS							
2.0											
2.5											
3.0				SPT	7	9	13	22			
3.5											
4.0											
4.5				SPT	10	13	17	30			
5.0					4.50m to 9.50m, Yellowish brown silty clay of low plasticity with gravels						
5.5											
6.0	SPT	13	16				18	34			
6.5											
7.0											
7.5	SPT	11	20				29	49			
8.0											
8.5											
9.0	SPT	10	22				32	54			
9.5											
10.0		9.00m to 15.00m, Highly to moderately weathered, Very poor to poor brownish sandstone with thin bands of siltstones		CR						43.00	0.00
10.5											
11.0				CR						45.00	27.00
11.5											
12.0											
12.5				CR						55.00	9.00
13.0											
13.5											
14.0				CR						67.00	34.00
14.5											
15.0											

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD												
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.											
BOREHOLE NO.		DBH-43		LOCATION		Stacker		TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		913		DRILLING METHOD		ROTARY				
GROUND WATER TABLE		1.70		CO-ORDINATES N		1201		CASING DEPTH, m		2.50				
START DATE		09/01/2023		GROUND ELEVATION		276.262		CORE DIAMETER		54 mm				
END DATE		10/01/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE			
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %	
0.5		0.00m to 0.35m, Filled up soil				DS								
1.0		0.35m to 7.50m, Yellowish brown silty clay of low plasticity with gravels												
1.5						SPT	6	5	5	10				
2.0						UDS								
2.5														
3.0						SPT	7	8	9	17				
3.5														
4.0														
4.5						SPT	5	16	18	34				
5.0														
5.5														
6.0						SPT	13	17	21	38				
6.5														
7.0														
7.5						SPT	16	50(6cm)	-	REF				
8.0						7.50m to 15.00m, Highly to moderately weathered Very poor yellowish brown silty sandstone				CR				
8.5														
9.0														
9.5		CR											53.00	0.00
10.0														
10.5														
11.0		CR											36.00	0.00
11.5														
12.0														
12.5		CR											39.00	8.00
13.0														
13.5														
14.0														
14.5														
15.0														

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-44		LOCATION		Stacker		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		1025		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.60		CO-ORDINATES N		1358		CASING DEPTH, m		2.50			
START DATE		14/02/2023		GROUND ELEVATION		277.5		CORE DIAMETER		54 mm			
END DATE		15/02/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 1.10m, Filled up soil				DS							
1.0													
1.5		1.10m to 4.50m, Yellowish brown clayey sand of medium plasticity with gravels				SPT	4	6	8	14			
2.0													
2.5													
3.0						SPT	9	13	18	31			
3.5													
4.0													
4.5						SPT	50(13cm)	-	-	REF			
5.0		4.50m to 7.50m, Highly weathered Very poor yellowish brown silty sandstone				CR					30.00	0.00	
5.5													
6.0													
6.5						CR						31.00	14.00
7.0		7.50m to 9.00m, Reddish brown silty sand, non-plastic with gravels											
7.5													
8.0													
8.5													
9.0						SPT	50(15cm)	-	-	REF			
9.5		9.00m to 10.50m, Highly weathered poor yellowish brown silty sandstone				CR					45.00	30.00	
10.0													
10.5													
11.0		10.50m to 12.00m, Reddish brown silty sand, non-plastic with gravels											
11.5													
12.0						SPT	50(14cm)	-	-	REF			
12.5		12.00m to 15.00m, Highly weathered Very poor greyish brown silty sandstone				CR					43.00	9.00	
13.0													
13.5													
14.0						CR						48.00	0.00
14.5													
15.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-45		LOCATION		Stacker		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		1168		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.76		CO-ORDINATES N		1358		CASING DEPTH, m		2.50			
START DATE		16-02-2023		GROUND ELEVATION		277.286		CORE DIAMETER		54 mm			
END DATE		17-02-2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE			SAMPLE TYPE	SPT N-VALUE				ROCK CORE			
						N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %	
0.5		0.00m to 1.50m, Filled up soil			DS-1								
1.0													
1.5					SPT-1	3	5	9	14				
2.0		1.50m to 4.50m, Reddish brown silty sand, non-plastic											
2.5													
3.0					SPT-2	5	8	13	21				
3.5													
4.0													
4.5					SPT-3	50 (13cm)	-	-	REF				
5.0		4.50m to 15.00m, Reddish brown highly weathered and very poor to poor silty sandstone			CR						43.00	7.00	
5.5													
6.0													
6.5					CR						37.00	7.00	
7.0													
7.5													
8.0					CR						53.00	21.00	
8.5													
9.0													
9.5					CR						47.00	25.00	
10.0													
10.5													
11.0					CR						51.00	19.00	
11.5													
12.0													
12.5					CR						41.00	36.00	
13.0													
13.5													
14.0							45.00	45.00					
14.5													
15.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD										
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.									
BOREHOLE NO.		DBH-46		LOCATION	Stacker	TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E	1052.484	DRILLING METHOD	ROTARY					
GROUND WATER TABLE		1.40		CO-ORDINATES N	1261.144	CASING DEPTH, m	2.50					
START DATE		18/01/2023		GROUND ELEVATION	277.004	CORE DIAMETER	54 mm					
END DATE		23/01/2023		CIRCULATION FLUID	WATER	DIAMETER OF HOLE	150 mm					
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE			SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
						N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 2.00m, Filled up soil			DS							
1.0												
1.5					DS							
2.0												
2.5		2.00m to 6.50m, Yellowish brown clayey sand of medium plasticity with small fraction of gravels										
3.0					SPT	3	4	6	10			
3.5												
4.0												
4.5					SPT	5	6	6	12			
5.0												
5.5												
6.0					SPT	10	12	13	25			
6.5												
7.0		6.50m to 13.50m, Highly to moderately weathered Very poor to poor yellowish brown silty sandstone			CR						39.00	0.00
7.5												
8.0					CR						26.00	0.00
8.5												
9.0												
9.5					CR						39.00	16.00
10.0												
10.5												
11.0					CR						53.00	30.00
11.5												
12.0												
12.5	CR							42.00	15.00			
13.0												
13.5												
14.0		13.50m to 15.00m, Greyish silty sand, non-plastic with gravels										
14.5												
15.0					SPT	50(5cm)	-	-	REF			

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-47		LOCATION		Stacker		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		1167.799		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.40		CO-ORDINATES N		1259.899		CASING DEPTH, m		2.50			
START DATE		19/01/2023		GROUND ELEVATION		276.939		CORE DIAMETER		54 mm			
END DATE		24/01/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 1.00m, Filled up soil				DS							
1.0													
1.5		1.00m to 6.00m, Yellowish brown silty sand, non-plastic with gravels				DS							
2.0													
2.5													
3.0						SPT	2	3	5	8			
3.5													
4.0													
4.5						SPT	5	6	7	13			
5.0													
5.5													
6.0		6.00m to 10.50m, Greyish brown silty clay of low plasticity with gravels				SPT	6	8	12	20			
6.5													
7.0													
7.5	SPT					11	17	22	39				
8.0													
8.5													
9.0	SPT					11	20	26	46				
9.5													
10.0													
10.5						SPT	13	22	37	59			
11.0		10.50m to 12.00m, Yellowish brown silty clay of low plasticity with gravels											
11.5													
12.0						SPT	18	32	40	72			
12.5						CR						48.00	0.00
13.0		12.00m to 15.00m, Highly weathered Very poor yellowish brown silty sandstone				CR						35.00	0.00
13.5													
14.0													
14.5													
15.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD												
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.											
BOREHOLE NO.		DBH-49		LOCATION		Stacker		TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		972.844		DRILLING METHOD		ROTARY				
GROUND WATER TABLE		1.50		CO-ORDINATES N		1259.896		CASING DEPTH, m		2.50				
START DATE		18/01/2023		GROUND ELEVATION		276.964		CORE DIAMETER		54 mm				
END DATE		23/01/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE			
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %	
0.5		0.00m to 2.00m, Filled up soil				DS								
1.0														
1.5						DS								
2.0														
2.5		2.00m to 6.50m Yellowish brown clayey sand												
3.0						SPT	6	9	16	25				
3.5														
4.0														
4.5						SPT	9	13	14	27				
5.0														
5.5														
6.0						SPT	10	18	20	38				
6.5														
7.0		6.50m to 10.50m, Highly weathered ,very poor yellowish brown silty sandstone				CR						94.00	0.00	
7.5														
8.0						CR							42.00	0.00
8.5														
9.0														
9.5						SPT/CR	21	28	38	66			54.00	11.00
10.0														
10.5														
11.0						SPT/CR	18	50 (3cm)		REF			50.00	13.00
11.5														
12.0														
12.5						SPT/CR	50 (13cm)			REF			31.00	17.00
13.0														
13.5														
14.0		13.50m to 15.00m , Highly weathered ,poor yellowish brown siltstone				CR						46.00	28.00	
14.5														
15.0														

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD												
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.											
BOREHOLE NO.		DBH-50		LOCATION		Stacker		TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		972.828		DRILLING METHOD		ROTARY				
GROUND WATER TABLE		1.30		CO-ORDINATES N		1184.637		CASING DEPTH, m		2.50				
START DATE		25/01/2023		GROUND ELEVATION		276.264		CORE DIAMETER		54 mm				
END DATE		30/01/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE			
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %	
0.5		0.00m to 0.45m ,Filled up soil				DS								
1.0		0.45m to 3.50m, Yellowish brown silty clay of high plasticity												
1.5						SPT	10	10	10	20				
2.0														
2.5														
3.0						UDS								
3.5						SPT	9	11	18	29				
4.0		3.50m to 4.50m , Yellowish brown clayey sand												
4.5						SPT	12	16	22	38				
5.0		4.50m to 15.00m , Highly to moderately weathered ,very poor yellowish brown silty sand stone				CR						56.00	10.00	
5.5														
6.0														
6.5						CR							39.00	10.00
7.0														
7.5														
8.0						CR							47.00	10.00
8.5														
9.0														
9.5						CR							48.00	19.00
10.0														
10.5														
11.0						CR							43.00	0.00
11.5														
12.0														
12.5		CR							43.00	7.00				
13.0														
13.5														
14.0		CR							45.00	15.00				
14.5														
15.0														

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-51		LOCATION		Stacker		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		972.828		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.40		CO-ORDINATES N		1184.64		CASING DEPTH, m		2.50			
START DATE		24/01/2023		GROUND ELEVATION		276.264		CORE DIAMETER		54 mm			
END DATE		25/01/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.40m ,Filled up soil				DS							
1.0	0.40m to 5.00m, Yellowish brown clayey sand of high plasticity												
1.5						SPT	8	11	15	26			
2.0													
2.5													
3.0						SPT	10	13	18	31			
3.5													
4.0													
4.5						SPT	11	15	22	37			
5.0													
5.5		5.00m to 10.50m , Highly to moderately weathered ,very poor yellowish brown silty sand stone					CR						51.00
6.0													
6.5					CR						42.00	7.00	
7.0													
7.5													
8.0					CR						36.00	24.00	
8.5													
9.0													
9.5					SPT/CR	50 (14cm)			REF		41.00	22.00	
10.0													
10.5													
11.0	10.50m to 12.00m , Highly weathered , poor brownish gray silty sand stone					SPT/CR	50 (9cm)			REF		45.00	42.00
11.5													
12.0	12.0m to 15.00m, Slightly weathered , very poor brownish red silty sandstone					CR						46.00	46.00
12.5													
13.0													
13.5													
14.0						CR						79.00	21.00
14.5													
15.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-52		LOCATION		Stacker		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		1241.014		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		3.00		CO-ORDINATES N		1188.314		CASING DEPTH, m		2.50			
START DATE		25/01/2023		GROUND ELEVATION		276.3		CORE DIAMETER		54 mm			
END DATE		27/01/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.45m ,Filled up soil				DS							
1.0		0.45m to 2.50m , Reddish brown silty sand non-plastic											
1.5						SPT	5	5	7	12			
2.0													
2.5						UDS							
3.0		2.50m to 4.50m , Grayish brown clayey sand of high plasticity				SPT	5	6	10	16			
3.5													
4.0													
4.5						SPT	5	7	12	19			
5.0		4.50m to 7.50m , Yellowish brown silty clay of low plasticity											
5.5													
6.0						SPT	8	14	21	35			
6.5													
7.0													
7.5						SPT	10	16	23	39			
8.0		7.50m to 12.00m , Reddish brown clayey sand of medium plasticity with fraction of gravels											
8.5													
9.0						SPT	12	18	25	43			
9.5													
10.0													
10.5						SPT	25	50 (13cm)		REF			
11.0													
11.5													
12.0						SPT	27	50 (11cm)		REF			
12.5		12.00m to 15.00m , Highly weathered, very poor yellowish brown silty sandstone				CR					41.00	0.00	
13.0													
13.5													
14.0						SPT/CR	50 (13cm)			REF		16.00	10.00
14.5													
15.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD												
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.											
BOREHOLE NO.		DBH-53		LOCATION		Stacker		TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		1135.509		DRILLING METHOD		ROTARY				
GROUND WATER TABLE		1.40		CO-ORDINATES N		1187.785		CASING DEPTH, m		2.50				
START DATE		24/01/2023		GROUND ELEVATION		276.057		CORE DIAMETER		54 mm				
END DATE		25/01/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE			
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %	
0.5		0.00m to 0.45m ,Filled up soil				DS								
1.0	0.45m to 7.50m, Yellowish brown silty sand non-plastic with traces of gravels													
1.5						SPT	2	3	3	6				
2.0														
2.5														
3.0						SPT	3	6	9	15				
3.5														
4.0														
4.5						SPT	3	4	7	11				
5.0														
5.5														
6.0						SPT	10	14	19	33				
6.5														
7.0														
7.5						SPT	18	25	36	61				
8.0	7.50m to 15.00m , Highly to moderately weathered , very poor to poor yellowish brown silty sandstone					CR						44.00	0.00	
8.5														
9.0														
9.5						CR							48.00	0.00
10.0														
10.5														
11.0						CR							54.00	0.00
11.5														
12.0														
12.5						CR							44.00	26.00
13.0														
13.5														
14.0														
14.5														
15.0														

MK M K SOIL TESTING LABORATORY PRIVATE LIMITED		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD									
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.								
BOREHOLE NO.		DBH-54	LOCATION	Lime Handeling	TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		12.00	CO-ORDINATES E	1063	DRILLING METHOD		ROTARY				
GROUND WATER TABLE		1.60	CO-ORDINATES N	1118	CASING DEPTH, m		2.50				
START DATE		05/01/2023	GROUND ELEVATION	276.313	CORE DIAMETER		54 mm				
END DATE		05/01/2023	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE		SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m, Filled up soil		DS							
1.0		0.50m to 7.50, Greyish brown clayey sand of medium plasticity with gravels									
1.5				UDS							
2.0											
2.5											
3.0				SPT	7	8	10	18			
3.5											
4.0											
4.5				SPT	7	9	12	21			
5.0											
5.5											
6.0				SPT	6	8	11	19			
6.5											
7.0											
7.5				SPT	12	21	26	47			
8.0		7.50m to 12.00m, Highly to slightly weathered, very poor to poor yellowish brown sandstone		CR						43.00	0.00
8.5											
9.0											
9.5				CR						63.00	7.00
10.0											
10.5											
11.0				CR						74.00	37.00
11.5											
12.0											

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-55		LOCATION		Lime Handeling		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		12.00		CO-ORDINATES E		1002		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		2.50		CO-ORDINATES N		1118		CASING DEPTH, m		2.50			
START DATE		04/01/2023		GROUND ELEVATION		276.526		CORE DIAMETER		54 mm			
END DATE		04/01/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m, Filled up soil				DS							
1.0		0.50m to 5.00m, Yellowish brownish clayey sand of medium plasticity with gravels											
1.5						UDS/SPT	3	2	6	8			
2.0													
2.5													
3.0						SPT	3	5	7	12			
3.5													
4.0													
4.5						SPT	11	15	21	36			
5.0													
5.5		5.00m to 7.50m, Greyish brown silty sand, non-plastic with gravels											
6.0						SPT	14	20	28	48			
6.5													
7.0													
7.5		SPT	50(11cm)	-	-	REF							
8.0		7.50m to 12.00m, Highly to moderately weathered, very poor greyish brown sandstone				CR					61.00	22.00	
8.5													
9.0													
9.5						CR						39.00	18.00
10.0													
10.5													
11.0						CR						35.00	0.00
11.5													
12.0													

MK M.K. SOIL TESTING LABORATORY PRIVATE LIMITED		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD										
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.									
BOREHOLE NO.		DBH-56		LOCATION		Lime Handling		TYPE OF RIG		HYDRAULIC		
BOREHOLE DEPTH, m		12.00		CO-ORDINATES E		1181		DRILLING METHOD		ROTARY		
GROUND WATER TABLE		1.45		CO-ORDINATES N		1118		CASING DEPTH, m		2.50		
START DATE		16/01/2023		GROUND ELEVATION		276.432		CORE DIAMETER		54 mm		
END DATE		17/01/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm		
DEPTH	VISUAL DESCRIPTION OF SOIL SAMPLE			SAMPLE TYPE	SPT N-VALUE				ROCK CORE			
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %	
		0.00m to 0.25m , Filled up soil										
0.5		0.25 to 6.00m , Yellowish brown silty sand non-plastic			DS							
1.0												
1.5					SPT	5	6	6	12			
2.0												
2.5												
3.0					SPT	6	7	13	20			
3.5												
4.0												
4.5					SPT	8	12	12	24			
5.0												
5.5												
6.0		SPT	18	22	28	50						
6.5		6.00m to 12.00m , Yellowish brown clayey sand of high plasticity with traces of gravels										
7.0												
7.5					SPT	19	25	32	57			
8.0												
8.5												
9.0					SPT	16	22	50 (2cm)	REF			
9.5												
10.0												
10.5					SPT	50 (6cm)			REF			
11.0												
11.5												
12.0		SPT	50 (8cm)			REF						

MK M.K. SOIL TESTING LABORATORY PRIVATE LIMITED		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-57		LOCATION		Lime Handeling		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		12.00		CO-ORDINATES E		1298		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.83		CO-ORDINATES N		1115		CASING DEPTH, m		2.50			
START DATE		20/01/2023		GROUND ELEVATION		276.623		CORE DIAMETER		54 mm			
END DATE		23/01/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.15m , Filled up soil				DS							
1.0		0.15m to 4.50m , Grayish brown clayey sand of high plasticity with traces of gravels											
1.5						SPT	4	6	8	14			
2.0													
2.5													
3.0						SPT	3	6	8	14			
3.5													
4.0													
4.5													
5.0		4.50m to 10.50m , Yellowish brown silty sand non-plastic											
5.5													
6.0						SPT	30	45	50 (4cm)	REF			
6.5													
7.0													
7.5						SPT	35	50 (5cm)		REF			
8.0													
8.5													
9.0						SPT	50 (10cm)			REF			
9.5													
10.0													
10.5						SPT CR	50 (4cm)			REF			
11.0		10.50m to 12.00m , Yellowish brown highly weathered very poor silty sandstone									44.00	12.00	
11.5													
12.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD												
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.											
BOREHOLE NO.		DBH-58		LOCATION		Clarifier		TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		1068		DRILLING METHOD		ROTARY				
GROUND WATER TABLE		1.40		CO-ORDINATES N		895		CASING DEPTH, m		2.50				
START DATE		04/02/2023		GROUND ELEVATION		276.654		CORE DIAMETER		54 mm				
END DATE		06/02/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE			
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %	
		0.00m to 0.20m , Filled up soil												
0.5		0.20m to 4.50m , Yellowish brown clayey sand of high plasticity with traces of gravels				DS								
1.0														
1.5						SPT	3	5	5	10				
2.0														
2.5														
3.0						SPT	2	2	2	4				
3.5														
4.0														
4.5						SPT	3	4	6	10				
5.0														
5.5														
6.0		SPT	5	5	9	14								
6.5														
7.0														
7.5		SPT	3	10	18	28								
8.0														
8.5														
9.0		SPT	12	28	38	66								
9.5														
10.0														
10.5		SPT	21	38	46	84								
11.0														
11.5														
12.0		SPT	16	38	50 (4cm)	REF								
12.5														
13.0														
13.5		SPT	18	50 (7cm)		REF								
14.0														
14.5														
15.0		SPT	50 (8cm)			REF								

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-59		LOCATION		FGD U#5 <th colspan="2">TYPE OF RIG</th> <td colspan="2">HYDRAULIC</td>		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		849.209		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		2.10		CO-ORDINATES N		1338.408		CASING DEPTH, m		2.50			
START DATE		01-03-2023		GROUND ELEVATION		277.286		CORE DIAMETER		54 mm			
END DATE		02-03-2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m, Filled up soil				DS-1							
1.0		0.50m to 3.50m, Yellowish brown silty clay of low plasticity											
1.5						SPT-1	6	9	9	18			
2.0													
2.5													
3.0						SPT-2	8	8	18	26			
3.5													
4.0		3.50m to 4.50m, Yellowish brown clayey sand of medium plasticity with traces of gravels											
4.5		SPT-3	7	17	19	36							
5.0		4.50m to 7.50m, Brownish highly weathered and very poor sand stone				CR						42.00	11.00
5.5													
6.0													
6.5						CR						37.00	0.00
7.0													
7.5													
8.0		7.50m to 12.00m, Brownish slightly weathered and very poor sand stone				CR						75.00	77.00
8.5													
9.0													
9.5						CR						58.00	13.00
10.0													
10.5													
11.0													
11.5													
12.0													
12.5	12.00m to 20.00m, Brownish slightly weathered and very poor to fair silt stone				CR						70.00	17.00	
13.0													
13.5													
14.0					CR						81.00	9.00	
14.5													
15.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD										
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.									
BOREHOLE NO.		DBH-59	LOCATION	FGD U#5	TYPE OF RIG		HYDRAULIC					
BOREHOLE DEPTH, m		20.00	CO-ORDINATES E	849.209	DRILLING METHOD		ROTARY					
GROUND WATER TABLE		2.10	CO-ORDINATES N	1338.408	CASING DEPTH, m		2.50					
START DATE		01-03-2023	GROUND ELEVATION	277.286	CORE DIAMETER		54 mm					
END DATE		02-03-2023	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm					
DEPTH	VISUAL DESCRIPTION OF SOIL SAMPLE			SAMPLE TYPE	SPT N-VALUE				ROCK CORE			
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %	
15.5		12.00m to 20.00m, Brownish slightly weathered and very poor to fair silt stone			CR						95.00	57.00
16.0												
16.5												
17.0					CR						71.00	39.00
17.5												
18.0												
18.5					CR						95.00	55.00
19.0												
19.5												
20.0					CR						84.00	58.00

MK M.K. SOIL TESTING LABORATORY PRIVATE LIMITED		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-64		LOCATION		Pipe Trestle		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		10.00		CO-ORDINATES E		392		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		9.30		CO-ORDINATES N		1673		CASING DEPTH, m		6.00			
START DATE		25-02-2023		GROUND ELEVATION		281.18		CORE DIAMETER		54 mm			
END DATE		25-02-2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.30m, Filled up soil				DS-1							
1.0		0.30m to 5.00m, Yellowish brown clayey sand of medium plasticity with intermittent traces of gravels											
1.5						SPT-1	3	5	7	12			
2.0													
2.5													
3.0						SPT-2	4	7	11	18			
3.5													
4.0													
4.5	SPT-3					7	12	13	25				
5.0		5.00m to 10.00m, Yellowish brown silty sand, non-plastic											
5.5													
6.0						SPT-4	50 (7cm)	-	-	REF			
6.5													
7.0													
7.5						SPT-5	50 (2cm)	-	-	REF			
8.0													
8.5													
9.0						SPT-6	50 (3cm)	-	-	REF			
9.5													
10.0						SPT-7	50 (2cm)	-	-	REF			

M.K. SOIL TESTING LABORATORY PRIVATE LIMITED 		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD									
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.								
BOREHOLE NO.		DBH-65	LOCATION	Ash Trestle	TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		10.00	CO-ORDINATES E	454	DRILLING METHOD		ROTARY				
GROUND WATER TABLE		9.00	CO-ORDINATES N	1622	CASING DEPTH, m		6.00				
START DATE		26-02-2023	GROUND ELEVATION	281.212	CORE DIAMETER		54 mm				
END DATE		26-02-2023	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE		SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.45m, Filled up soil		DS-1							
1.0		0.45m to 10.00m, Yellowish brown silty sand, non-plastic with small fraction of gravels									
1.5				SPT-1	11	33	40	73			
2.0											
2.5											
3.0				SPT-2	44	50 (6cm)	-	REF			
3.5											
4.0											
4.5				SPT-3	50 (3cm)	-	-	REF			
5.0											
5.5											
6.0				SPT-4	50 (12cm)	-	-	REF			
6.5											
7.0											
7.5				SPT-5	50 (8cm)	-	-	REF			
8.0											
8.5											
9.0				SPT-6	50 (9cm)	-	-	REF			
9.5											
10.0				SPT-7	50 (5cm)	-	-	REF			

M.K. SOIL TESTING LABORATORY PRIVATE LIMITED 		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD												
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.											
BOREHOLE NO.		DBH-66		LOCATION		Ash Trestle		TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		10.00		CO-ORDINATES E		507.288		DRILLING METHOD		ROTARY				
GROUND WATER TABLE		3.30		CO-ORDINATES N		1465.29		CASING DEPTH, m		2.50				
START DATE		24-02-2023		GROUND ELEVATION		281.916		CORE DIAMETER		54 mm				
END DATE		25-02-2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE			
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %	
0.5		0.00m to 0.80m, Filled up soil				DS-1								
1.0														
1.5		0.80m to 5.00m, Yellowish brown clayey sand of high plasticity				SPT-1	4	6	8	14				
2.0														
2.5														
3.0						SPT-2	7	8	11	19				
3.5														
4.0														
4.5						SPT-3	10	14	18	32				
5.0														
5.5		5.00m to 10.00m, Yellowish brown silty clay of intermediate plasticity												
6.0						SPT-4	9	13	20	33				
6.5														
7.0														
7.5						SPT-5	12	16	23	39				
8.0														
8.5														
9.0						SPT-6	10	15	29	44				
9.5														
10.0						SPT-7	50 (4cm)	-	-	REF				

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD														
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.													
BOREHOLE NO.		DBH-67		LOCATION		Ash Trestle		TYPE OF RIG		HYDRAULIC						
BOREHOLE DEPTH, m		10.00		CO-ORDINATES E		566		DRILLING METHOD		ROTARY						
GROUND WATER TABLE		3.10		CO-ORDINATES N		1393		CASING DEPTH, m		2.50						
START DATE		28-02-2023		GROUND ELEVATION		281.825		CORE DIAMETER		54 mm						
END DATE		28-02-2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm						
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE					
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %			
0.5		0.00m to 1.00m, Filled up soil				DS-1										
1.0																
1.5		1.00m to 3.50m, Yellowish brown clayey sand of high plasticity				SPT-1	6	9	13	22						
2.0																
2.5																
3.0									SPT-2	5	11	14	25			
3.5																
4.0																
4.5		3.50m to 9.00m, Yellowish brown silty clay of intermediate plasticity				SPT-3	10	50 (10cm)	-	REF						
5.0																
5.5																
6.0									SPT-4	10	16	23	39			
6.5																
7.0																
7.5									SPT-5	12	22	27	49			
8.0																
8.5																
9.0									SPT-6	50 (8cm)	-	-	REF			
9.5		9.00m to 10.00m, Reddish brown slightly weathered and fair sand stone				CR-1						76.00	73.00			
10.0																

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-69		LOCATION		GT U#6		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		459.56		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.20		CO-ORDINATES N		1153.69		CASING DEPTH, m		2.50			
START DATE		12/12/2022		GROUND ELEVATION		275.309		CORE DIAMETER		54 mm			
END DATE		12/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m, Filled up soil				DS							
1.0		0.50m to 5.00m, Yellowish brownish silty clay of low plasticity with gravels											
1.5						SPT	2	3	3	6			
2.0													
2.5													
3.0						SPT	1	2	2	4			
3.5													
4.0													
4.5						SPT	3	5	7	12			
5.0													
5.5		5.00m to 7.50m, Greyish brown silty clay of intermediate plasticity with gravels											
6.0						SPT	5	7	7	14			
6.5													
7.0													
7.5		SPT	12	20	32	52							
8.0		7.50m to 9.50m, Yellowish brownish clayey sand of high plasticity with gravels											
8.5													
9.0						SPT	13	22	35	57			
9.5													
10.0		9.50m to 10.50m, Yellowish brownish silty sand, non-plastic with gravels											
10.5						SPT	15	25	40	65			
11.0		10.50m to 12.00m, Highly to moderately weathered, very poor yellowish brown sandstone				CR						35.00	0.00
11.5													
12.0													
12.5						CR						68.00	21.00
13.0		12.00m to 15.00m, Slightly weathered, fair sandstone with thin bands of shales and siltstone											
13.5													
14.0													
14.5						CR						83.00	74.00
15.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD										
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.									
BOREHOLE NO.		DBH-70		LOCATION	GT U#6	TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E	440.56	DRILLING METHOD		ROTARY				
GROUND WATER TABLE		2.20		CO-ORDINATES N	1103.2	CASING DEPTH, m		2.00				
START DATE		21/12/2022		GROUND ELEVATION	276.195	CORE DIAMETER		54 mm				
END DATE		22/12/2022		CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE			SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
						N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m, Filled up soil			DS							
1.0		0.50m to 9.00m, Yellowish brown clayey sand of high plasticity with gravels										
1.5					SPT	4	6	6	12			
2.0												
2.5												
3.0					SPT	6	3	1	4			
3.5												
4.0												
4.5					SPT	6	7	9	16			
5.0												
5.5												
6.0					SPT	4	4	4	8			
6.5												
7.0												
7.5					SPT	18	29	40	69			
8.0												
8.5												
9.0					SPT	50(12cm)	-	-	REF			
9.5		9.00m to 12.00m, Greyish brown silty sand, non-plastic with gravels										
10.0												
10.5					SPT	50(5cm)	-	-	REF			
11.0												
11.5												
12.0					SPT	30	50(2cm)	-	REF			
12.5		12.00m to 15.00m, Slighly weathered, very poor reddish brown sandstone			CR						69.92	0.00
13.0												
13.5												
14.0					CR						72.00	24.00
14.5												
15.0												

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD									
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.								
BOREHOLE NO.		DBH-71	LOCATION	GT U#5	TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		15.00	CO-ORDINATES E	457	DRILLING METHOD		ROTARY				
GROUND WATER TABLE		1.80	CO-ORDINATES N	1305	CASING DEPTH, m		2.00				
START DATE		01/12/2022	GROUND ELEVATION	276.52	CORE DIAMETER		54 mm				
END DATE		05/12/2022	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE		SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 1.30m, Filled up soil		DS							
1.0				UDS/SPT	3	4	6	10			
1.5											
2.0		1.30m to 2.60m, Yellowish brown silty sand, non-plastic with gravels									
2.5				SPT	6	8	10	18			
3.0											
3.5		2.60m to 4.00m, Yellowish brown silty clay of low plasticity									
4.0				SPT	8	12	18	30			
4.5											
5.0		4.00m to 7.00m, Yellowish brown clayey sand of high plasticity									
5.5				SPT	12	22	32	54			
6.0											
6.5											
7.0				SPT/DS	50(8cm)	-	-	REF			
7.5				CR						8.00	0.00
8.0		7.00m to 11.50m, Completely to highly weathered, very poor yellowish brown to greyish sandstone with no intact pieces									
8.5											
9.0				SPT/CR	37	50(10cm)	-	REF		8.00	0.00
9.5											
10.0											
10.5				CR						39.00	8.00
11.0		11.50m to 15.00m, Highly weathered, poor to very poor yellowish brown sand stone with thin bands of shales observed and siltstone									
11.5											
12.0				CR						21.00	0.00
12.5											
13.0											
13.5				CR						45.00	26.00
14.0											
14.5											
15.0				CR						50.00	24.00

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD									
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.								
BOREHOLE NO.		DBH-72	LOCATION	TG U#5	TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		15.00	CO-ORDINATES E	487	DRILLING METHOD		ROTARY				
GROUND WATER TABLE		1.70	CO-ORDINATES N	1300	CASING DEPTH, m		2.50				
START DATE		01/12/2022	GROUND ELEVATION	276.578	CORE DIAMETER		54 mm				
END DATE		02/12/2022	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE		SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		Filled up soil		DS							
1.0		0.50m to 1.55m, Yellowish brown poorly graded silty sand, non-plastic		SPT	6	6	9	15			
1.5											
2.0		1.55m to 5.50m, Yellowish brown silty clay of low plasticity									
2.5				SPT	15	14	20	34			
3.0											
3.5											
4.0				SPT	9	21	50	71			
4.5											
5.0											
5.5				SPT	50(10cm)	-	-	REF			
6.0	5.50m to 7.05m, Greyish brown poorly graded silty sand, non-plastic with traces of gravels										
6.5											
7.0			SPT	50(5cm)	-	-	REF				
7.5		7.05m to 8.50m, Highly weathered, very poor, brownish to whitish sandstone		SPT/CR	50(11cm)	-	-	REF		25.33	0.00
8.0											
8.5											
9.0		8.50m to 11.50m, Yellowish brown to greyish clayey sand of high plasticity									
9.5											
10.0				SPT	50(9cm)	-	-	REF			
10.5											
11.0											
11.5				SPT	50(8cm)	-	-	REF			
12.0		11.50m to 15.00m, Moderately weathered to slightly weathered, very poor to good, greyish brown sandstone with thin bands of shales		CR						68.00	19.33
12.5											
13.0											
13.5				CR						84.00	38.66
14.0											
14.5											
15.0				CR						84.00	76.00

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD													
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.												
BOREHOLE NO.		DBH-73		LOCATION		TG U#5		TYPE OF RIG		HYDRAULIC					
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		500		DRILLING METHOD		ROTARY					
GROUND WATER TABLE		1.40		CO-ORDINATES N		1270		CASING DEPTH, m		2.50					
START DATE		03/12/2022		GROUND ELEVATION		275.292		CORE DIAMETER		54 mm					
END DATE		07/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm					
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE				
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %		
0.5		0.00m to 0.50m, Filled up soil				DS									
1.0		0.50m to 2.00m, Yellowish brown clayey sand of high plasticity with small fraction of gravels													
1.5						SPT	5	5	7	12					
2.0															
2.5		2.00m to 13.50m, Yellowish brown silty clay of intermediate plasticity with small fraction of gravels													
3.0						SPT/UDS	7	9	14	23					
3.5															
4.0															
4.5						SPT	15	25	30	55					
5.0															
5.5															
6.0						SPT	50(9cm)	-	-	REF					
6.5															
7.0															
7.5						SPT	30	50(13cm)	-	REF					
8.0															
8.5															
9.0						SPT	50(11cm)	-	-	REF					
9.5															
10.0															
10.5						SPT	50(10cm)	-	-	REF					
11.0															
11.5															
12.0						SPT	50(8cm)	-	-	REF					
12.5															
13.0															
13.5		SPT	50(9cm)	-	-	REF									
14.0		13.50m to 15.00m, Highly weathered, very poor yellowish brown sandstone				CR						28.00	0.00		
14.5															
15.0															

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-73		LOCATION		TG U#5		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		500		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.40		CO-ORDINATES N		1270		CASING DEPTH, m		2.50			
START DATE		03/12/2022		GROUND ELEVATION		275.292		CORE DIAMETER		54 mm			
END DATE		07/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
		15.00m to 20.00m, Highly to slightly weathered, very poor yellowish brown sandstone				CR						71.00	9.00
15.5						CR						48.00	0.00
16.0													
16.5													
17.0													
17.5													
18.0													
18.5													
19.0													
19.5													
20.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD										
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.									
BOREHOLE NO.		DBH-74		LOCATION		TG U#5		TYPE OF RIG		HYDRAULIC		
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		482		DRILLING METHOD		ROTARY		
GROUND WATER TABLE		1.30		CO-ORDINATES N		1275		CASING DEPTH, m		2.00		
START DATE		07/12/2022		GROUND ELEVATION		276.101		CORE DIAMETER		54 mm		
END DATE		08/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm		
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE			SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
						N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		Filled up soil			DS							
1.0		0.50m to 6.00m, Yellowish brown to greyish silty clay of intermediate plasticity with gravels										
1.5					SPT/UDS	5	6	8	14			
2.0												
2.5												
3.0					SPT	10	12	12	24			
3.5												
4.0												
4.5					SPT	11	20	29	49			
5.0												
5.5												
6.0					SPT	18	50(12cm)	-	REF			
6.5		6.00m to 9.00m, Yellowish brown to whitish silty clay of intermediate plasticity with gravels										
7.0												
7.5					SPT	15	22	35	57			
8.0												
8.5												
9.0					SPT	18	25	40	65			
9.5		9.00m to 9.50m, Yellowish brown silty sand, non-plastic										
10.0		9.50m to 10.50m, Highly weathered, very poor greyish brown sandstone			CR/SPT	50(10cm)			REF		16.00	0.00
10.5												
11.0		10.50m to 12.00m, Yellowish brown silty sand, non-plastic with gravels										
11.5												
12.0					SPT	50(13cm)	-	-	REF			
12.5		12.13m to 13.50m, Highly weathered, very poor yellowish brown sandstone			CR						31.00	0.00
13.0												
13.5												
14.0		13.50m to 15.00m, Highly weathered, poor yellowish brown sandstone			CR						42.00	28.00
14.5												
15.0												

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-75		LOCATION		TG U#6		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		492		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		2.50		CO-ORDINATES N		1104		CASING DEPTH, m		2.50			
START DATE		12/12/2022		GROUND ELEVATION		276.231		CORE DIAMETER		54 mm			
END DATE		13/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		Filled up soil				DS							
1.0		0.50m to 7.50m, Yellowish greyish to brownish silty clay of intermediate plasticity with gravels											
1.5						SPT	8	7	9	16			
2.0													
2.5													
3.0						SPT	3	2	2	4			
3.5													
4.0													
4.5						SPT	5	6	11	17			
5.0													
5.5													
6.0						SPT	10	20	34	54			
6.5													
7.0													
7.5						SPT	50(13cm)	-	-	REF			
8.0		7.50m to 10.50m, Yellowish greyish to brownish silty sand, non-plastic with gravels											
8.5													
9.0						SPT	50(7cm)	-	-	REF			
9.5													
10.0													
10.5						SPT	50(12cm)	-	-	REF			
11.0		10.50m to 12.00m, Highly weathered, very poor yellowish brown sandstone				CR					38.00	20.00	
11.5													
12.0													
12.5		12.00m to 15.00m, Moderately weathered, very poor to poor reddish brown sandstone				CR					52.00	50.00	
13.0													
13.5													
14.0						CR					68.00	40.00	
14.5													
15.0													

MK M.K. SOIL TESTING LABORATORY PRIVATE LIMITED		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD								
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.							
BOREHOLE NO.		DBH-75	LOCATION	TG U#6	TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00	CO-ORDINATES E	492	DRILLING METHOD		ROTARY			
GROUND WATER TABLE		2.50	CO-ORDINATES N	1104	CASING DEPTH, m		2.50			
START DATE		12/12/2022	GROUND ELEVATION	276.231	CORE DIAMETER		54 mm			
END DATE		13/12/2022	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE	SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
				N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
15.5		15.00m to 16.50m, Highly weathered, very poor reddish brown sandstone	CR						50.00	9.00
16.0										
16.5										
17.0		16.50m to 20.00m, slightly to fresh weathered, poor to excellent reddish brown sandstone	CR						54.00	32.00
17.5										
18.0										
18.5			CR						74.00	48.00
19.0										
19.5										
20.0			CR						94.00	92.00

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-76		LOCATION		TG U#6		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		477		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		3.60		CO-ORDINATES N		1077		CASING DEPTH, m		2.50			
START DATE		12/12/2022		GROUND ELEVATION		276.543		CORE DIAMETER		54 mm			
END DATE		15/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m, Filled up soil				DS							
1.0		0.50m to 1.50m, Silty sand Non-plastic											
1.5						SPT	6	7	9	16			
2.0		1.50m to 3.50, Grayish brown silty clay of intermediate plasticity											
2.5													
3.0						SPT	4	5	7	12			
3.5													
4.0		3.50m to 9.50m, Yellowish brown silty clay of intermediate plasticity											
4.5						SPT	4	4	7	11			
5.0													
5.5													
6.0						SPT	6	6	8	14			
6.5													
7.0													
7.5						SPT	11	13	18	31			
8.0													
8.5													
9.0						SPT	10	20	35	55			
9.5													
10.0		9.50m to 15.00m, Highly to moderately weathered, very poor sandstone with shale bands				CR						33.00	0.00
10.5													
11.0						CR						46.00	15.00
11.5													
12.0													
12.5						CR						59.00	20.00
13.0													
13.5													
14.0						CR						59.00	7.00
14.5													
15.0													

M.K. SOIL TESTING LABORATORY PRIVATE LIMITED MK		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD												
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.											
BOREHOLE NO.		DBH-76		LOCATION		TG U#6		TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		477		DRILLING METHOD		ROTARY				
GROUND WATER TABLE		3.60		CO-ORDINATES N		1077		CASING DEPTH, m		2.50				
START DATE		12/12/2022		GROUND ELEVATION		276.543		CORE DIAMETER		54 mm				
END DATE		15/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE			
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %	
		15.00m to 20.00m , Higly to slightly weathered, very poor to fair yellowish brown sandstone				CR						72.00	48.00	
						CR							64.00	56.00
							</							

M.K. SOIL TESTING LABORATORY PRIVATE LIMITED MK		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD												
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.											
BOREHOLE NO.		DBH-77		LOCATION		DG U#6		TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		10.00		CO-ORDINATES E		463		DRILLING METHOD		ROTARY				
GROUND WATER TABLE		1.90		CO-ORDINATES N		1361		CASING DEPTH, m		2.50				
START DATE		05/12/2022		GROUND ELEVATION		276.051		CORE DIAMETER		54 mm				
END DATE		06/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE			
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %	
0.5		0.00m to 0.50m, Filled up soil				DS								
1.0		0.50m to 1.95m, Yellowish brown silty sand ,Non-plastic												
1.5						SPT/UDS	7	6	7	13				
2.0		1.95m to 6.00m, Yellowish brown clayey sand of high plasticity with small fraction of gravels												
2.5														
3.0						SPT	30	50(10cm)	-	REF				
3.5														
4.0														
4.5						SPT	50 (5cm)	-	-	REF				
5.0														
5.5														
6.0						SPT	50 (6cm)	-	-	REF				
6.5						SPT/CR	50 (2cm)	-	-	REF	-	4.00	0.00	
7.0		6.00m to 7.50m, Completely weathered, very poor brownish sandstone fragments												
7.5														
8.0						SPT/CR	50 (4cm)	-	-	REF	-	4.00	0.00	
8.5														
9.0														
9.5		9.00m to 10.00m, Slightly weathered, very poor sandstone				CR					82.00	34.00		
10.0														

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD									
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.								
BOREHOLE NO.		DBH-78		LOCATION	Service Building		TYPE OF RIG		HYDRAULIC		
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E	513		DRILLING METHOD		ROTARY		
GROUND WATER TABLE		1.40		CO-ORDINATES N	1343		CASING DEPTH, m		2.00		
START DATE		07/12/2022		GROUND ELEVATION	276.352		CORE DIAMETER		54 mm		
END DATE		08/12/2022		CIRCULATION FLUID	WATER		DIAMETER OF HOLE		150 mm		
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE			SAMPLE TYPE	SPT N-VALUE				ROCK CORE	
						N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY
0.5		0.00m to 0.50m, Filled up soil			DS						
1.0		1.00m to 4.00m, Yellowish brown silty clay of intermediate plasticity			SPT	9	13	16	29		
1.5											
2.0											
2.5					SPT/UDS	10	17	29	46		
3.0											
3.5											
4.0					SPT	23	50(2cm)	-	REF		
4.5		4.00m to 5.50m, Yellowish brown silty sand Non-plastic									
5.0											
5.5					SPT	37	50(8cm)	-	REF		
6.0		5.50m to 7.00m, Yellowish brown clayey sand of high plasticity									
6.5											
7.0					SPT	35	50(8cm)	-	REF		
7.5		7.00m to 15.00m, Highly to slightly weathered, very poor to excellent yellowish brown sandstone with shale content			CR					42.00	0.00
8.0											
8.5											
9.0					CR					84.00	36.00
9.5											
10.0											
10.5					CR					62.00	8.00
11.0											
11.5											
12.0					CR					53.00	9.00
12.5											
13.0											
13.5	CR					74.00	51.00				
14.0											
14.5											
15.0							84.00	76.00			

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-79		LOCATION		TG U#5		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		520		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.60		CO-ORDINATES N		1300		CASING DEPTH, m		2.00			
START DATE		09/12/2022		GROUND ELEVATION		276.302		CORE DIAMETER		54 mm			
END DATE		10/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m, Filled up soil				DS							
1.0		0.50m to 3.00m ,Yellowish brown silty clay of low plasticity with fraction of gravels											
1.5						SPT	5	9	12	21			
2.0													
2.5													
3.0						SPT	10	50(1cm)	-	REF			
3.5		3.00m to 6.00m Yellowish brown clayey sand											
4.0													
4.5						SPT	25	50(10cm)	-	REF			
5.0													
5.5													
6.0		SPT	30	50(8cm)	-	REF							
6.5		CR						28.00	0.00				
7.0													
7.5													
8.0		CR						18.00	8.00				
8.5													
9.0													
9.5	CR						44.00	30.00					
10.0													
10.5		6.00m to 15.00m , Highly to moderately weathered, very poor to poor brown sandstone				CR					50.00	34.00	
11.0													
11.5													
12.0													
12.5	CR										60.00	26.00	
13.0													
13.5													
14.0							56.00	31.00					
14.5													
15.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-80		LOCATION		TG U#5		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		520		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.20		CO-ORDINATES N		1240		CASING DEPTH, m		2.50			
START DATE		15/12/2022		GROUND ELEVATION		276.093		CORE DIAMETER		54 mm			
END DATE		16/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m, Filled up soil				DS							
1.0		0.50m to 6.50m, Yellowish brown silty clay of intermediate plasticity											
1.5						SPT	7	10	15	25			
2.0													
2.5													
3.0						SPT	12	15	19	34			
3.5													
4.0													
4.5						SPT	11	17	23	40			
5.0													
5.5													
6.0						SPT	13	18	35	53			
6.5													
7.0		6.50m to 13.50m, Highly to moderately weathered, very poor to fair brown sandstone				CR						57.00	12.00
7.5													
8.0						CR						60.00	58.00
8.5													
9.0													
9.5						CR						48.00	9.00
10.0													
10.5													
11.0						CR						57.00	34.00
11.5													
12.0													
12.5						CR						43.00	0.00
13.0													
13.5		13.50m to 20.00m, slightly weathered, poor brown sandstone				CR					62.00	39.00	
14.0													
14.5													
15.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD										
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.									
BOREHOLE NO.		DBH-80	LOCATION	TG U#5	TYPE OF RIG		HYDRAULIC					
BOREHOLE DEPTH, m		20.00	CO-ORDINATES E	520	DRILLING METHOD		ROTARY					
GROUND WATER TABLE		1.20	CO-ORDINATES N	1240	CASING DEPTH, m		2.50					
START DATE		15/12/2022	GROUND ELEVATION	276.093	CORE DIAMETER		54 mm					
END DATE		16/12/2022	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm					
DEPTH	VISUAL DESCRIPTION OF SOIL SAMPLE			SAMPLE TYPE	SPT N-VALUE				ROCK CORE			
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %	
15.5		13.50m to 20.00m, Highly to slightly weathered, very poor to poor brown sandstone			CR						48.00	44.00
16.0												
16.5												
17.0					CR						30.00	18.00
17.5												
18.0												
18.5					CR						52.00	48.00
19.0												
19.5												
20.0					CR						86.00	33.00

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD												
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.											
BOREHOLE NO.		DBH-81		LOCATION		TG U#6 <th colspan="2">TYPE OF RIG</th> <td colspan="2">HYDRAULIC</td>		TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		520		DRILLING METHOD		ROTARY				
GROUND WATER TABLE		2.97		CO-ORDINATES N		1162		CASING DEPTH, m		2.50				
START DATE		23/12/2022		GROUND ELEVATION		276.688		CORE DIAMETER		54 mm				
END DATE		24/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE			
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %	
0.5		0.00m to 0.50m, Filled up soil				DS								
1.0		0.50m to 12.50m, Yellowish brownish clayey sand of high plasticity with gravels												
1.5						SPT	2	3	3	6				
2.0														
2.5														
3.0						SPT	2	3	5	8				
3.5														
4.0														
4.5						SPT	3	4	6	10				
5.0														
5.5														
6.0						SPT	5	7	8	15				
6.5														
7.0														
7.5						SPT	15	50(13cm)	-	REF				
8.0														
8.5														
9.0						SPT	18	50(7cm)	-	REF				
9.5														
10.0														
10.5						SPT	20	50(5cm)	-	REF				
11.0														
11.5														
12.0						SPT	25	50(2cm)	-	REF				
12.5	SPT/CR	40	50(2cm)	-	REF			39.00	0.00					
13.0	12.00m to 15.00m, Highly to moderately weathered, very poor greyish sandstone													
13.5														
14.0		CR						51.00	13.00					
14.5														
15.0														

MK M.K. SOIL TESTING LABORATORY PRIVATE LIMITED		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-81		LOCATION		TG U#6		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		520		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		2.97		CO-ORDINATES N		1162		CASING DEPTH, m		2.50			
START DATE		23/12/2022		GROUND ELEVATION		276.688		CORE DIAMETER		54 mm			
END DATE		24/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
		15.00m to 20.00m, Slightly weathered, very poor to fair greyish brown sandstone				CR						71.00	22.00
15.5													
16.0													
16.5													
17.0													
17.5													
18.0													
18.5													
19.0													
19.5													
20.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-82		LOCATION		TG U#6		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		484		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.00		CO-ORDINATES N		1174		CASING DEPTH, m		2.50			
START DATE		08/12/2022		GROUND ELEVATION		276.774		CORE DIAMETER		54 mm			
END DATE		11/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m, Filled up soil				DS							
1.0		0.50m to 4.50m, Yellowish brown clayey sand of medium plasticity											
1.5						SPT	3	3	4	7			
2.0													
2.5													
3.0						SPT	4	4	5	9			
3.5													
4.0													
4.5						SPT	5	6	6	12			
5.0		4.50m to 6.50m, Yellowish brownish silty clay of intermediate plasticity with small fraction of gravels											
5.5													
6.0						SPT	6	8	10	18			
6.5													
7.0		6.50m to 10.50m, Yellowish greyish silty clay of intermediate plasticity with small fraction of gravels											
7.5						SPT	10	14	20	34			
8.0													
8.5													
9.0						SPT	12	18	32	50			
9.5													
10.0													
10.5						SPT	12	50(11cm)	-	REF			
11.0		10.50m to 20.00m, Highly to moderately weathered, very poor to poor yellowish brown silty sandstone				CR						34.00	15.00
11.5													
12.0													
12.5						CR						42.00	18.00
13.0													
13.5													
14.0						CR						66.00	28.00
14.5													
15.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD									
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.								
BOREHOLE NO.		DBH-82	LOCATION	TG U#6	TYPE OF RIG	HYDRAULIC					
BOREHOLE DEPTH, m		20.00	CO-ORDINATES E	484	DRILLING METHOD	ROTARY					
GROUND WATER TABLE		1.00	CO-ORDINATES N	1174	CASING DEPTH, m	2.50					
START DATE		08/12/2022	GROUND ELEVATION	276.774	CORE DIAMETER	54 mm					
END DATE		11/12/2022	CIRCULATION FLUID	WATER	DIAMETER OF HOLE	150 mm					
DEPTH	VISUAL DESCRIPTION OF SOIL SAMPLE			SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
15.5	11.00m to 20.00m, Slightly weathered, very poor to fair yellowish brown silty sandstone			CR						84.00	66.00
16.0				CR						68.00	59.00
16.5											
17.0											
17.5				CR						78.00	65.00
18.0											
18.5											
19.0				CR						88.00	7.50
19.5											
20.0											

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD												
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.											
BOREHOLE NO.		DBH-83		LOCATION		TG U#6		TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		512		DRILLING METHOD		ROTARY				
GROUND WATER TABLE		1.95		CO-ORDINATES N		1058		CASING DEPTH, m		2.00				
START DATE		17/12/2022		GROUND ELEVATION		276.756		CORE DIAMETER		54 mm				
END DATE		19/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE			
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %	
0.5		0.00m to 0.50m,Filled up soil				DS								
1.0		0.50m to 3.00m, Yellowish brown clayey sand of high plasticity												
1.5						SPT	1	2	2	4				
2.0														
2.5														
3.0		3.00m to 7.50m, Yellowish brown silty sand, non-plastic				SPT	1	2	3	5				
3.5														
4.0														
4.5						SPT	1	2	4	6				
5.0														
5.5														
6.0						SPT	5	7	11	18				
6.5														
7.0														
7.5						SPT	15	24	42	66				
8.0		7.50m to 9.00m, Yellowish brown silty clay of intermediate plasticity with small fraction of gravels												
8.5														
9.0						SPT	15	50(2cm)	-	REF				
9.5		9.00m to 20.00m, Highly to slightly weathered, very poor to good greyish brown silty sandstone				CR						41.00	9.00	
10.0														
10.5														
11.0						CR							70.00	40.00
11.5														
12.0														
12.5						CR							76.00	52.00
13.0														
13.5														
14.0							CR							77.00
14.5														
15.0														

MK M.K. SOIL TESTING LABORATORY PRIVATE LIMITED		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD								
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.							
BOREHOLE NO.		DBH-83	LOCATION	TG U#6	TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00	CO-ORDINATES E	512	DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.95	CO-ORDINATES N	1058	CASING DEPTH, m		2.00			
START DATE		17/12/2022	GROUND ELEVATION	276.756	CORE DIAMETER		54 mm			
END DATE		19/12/2022	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE		SAMPLE TYPE	SPT N-VALUE				ROCK CORE	
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY
		9.50m to 20.00m, Moderately to slightly weathered, good to fair greyish brown silty sandstone	CR						82.00	76.00
			CR						71.00	69.00
			CR						50.00	50.00
			CR						58.00	56.00
									</	

MK MK SOIL TESTING LABORATORY PRIVATE LIMITED		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-84		LOCATION		TG U#6		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		525		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		2.90		CO-ORDINATES N		1081		CASING DEPTH, m		2.50			
START DATE		15/12/2022		GROUND ELEVATION		276.332		CORE DIAMETER		54 mm			
END DATE		16/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m, Filled up soil				DS							
1.0		0.50m to 4.50m, Brownish silty sand, non-plastic with gravels											
1.5						SPT	3	3	5	8			
2.0													
2.5													
3.0						SPT	5	5	9	14			
3.5													
4.0													
4.5						SPT	8	9	11	20			
5.0		4.50m to 9.50m, Yellowish brownish clayey sand of medium plasticity											
5.5													
6.0						SPT	9	12	17	29			
6.5													
7.0													
7.5						SPT	10	14	19	33			
8.0													
8.5													
9.0		SPT	9	15	22	37							
9.5		9.50m to 20.00m, Highly to moderately weathered, very poor to poor reddish brown silty sandstone											
10.0	CR											32.00	11.00
10.5													
11.0	CR											50.00	16.00
11.5													
12.0													
12.5	CR											64.00	30.00
13.0													
13.5													
14.0													
14.5													
15.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD										
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.									
BOREHOLE NO.		DBH-84	LOCATION	TG U#6	TYPE OF RIG		HYDRAULIC					
BOREHOLE DEPTH, m		20.00	CO-ORDINATES E	525	DRILLING METHOD		ROTARY					
GROUND WATER TABLE		2.90	CO-ORDINATES N	1081	CASING DEPTH, m		2.50					
START DATE		15/12/2022	GROUND ELEVATION	276.332	CORE DIAMETER		54 mm					
END DATE		16/12/2022	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm					
DEPTH	VISUAL DESCRIPTION OF SOIL SAMPLE			SAMPLE TYPE	SPT N-VALUE				ROCK CORE			
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %	
15.5		9.50m to 20.00m, Moderately to fresh weathered, very poor to fair reddish brown silty sandstone			CR						44.00	10.00
16.0												
16.5												
17.0					CR						54.00	18.00
17.5												
18.0												
18.5					CR						61.00	27.00
19.0												
19.5												
20.0				CR						100.0	52.00	

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD										
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.									
BOREHOLE NO.		DBH-85		LOCATION	SWAS Room		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E	542		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		3.10		CO-ORDINATES N	1185		CASING DEPTH, m		2.50			
START DATE		23/12/2022		GROUND ELEVATION	276.113		CORE DIAMETER		54 mm			
END DATE		24/12/2022		CIRCULATION FLUID	WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE			SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
						N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m, Filled up soil			DS							
1.0		0.50m to 9.00m, Greyish brown silty clay of intermediate plasticity with gravels										
1.5					SPT	2	2	4	6			
2.0												
2.5												
3.0					SPT	3	3	4	7			
3.5												
4.0												
4.5					SPT	4	5	5	10			
5.0												
5.5												
6.0					SPT	10	14	21	35			
6.5												
7.0												
7.5					SPT	40	50(10cm)	-	REF			
8.0												
8.5												
9.0					SPT	50(10cm)	-	-	REF			
9.5		9.00m to 10.50m, Highly weathered, very poor greyish brown silty sandstone			CR						50.00	0.00
10.0												
10.5												
11.0		10.50m to 12.00m, Highly weathered, very poor brownish sandstone			SPT/CR	50(7cm)	-	-	REF		37.00	0.00
11.5												
12.0												
12.5		12.00m to 20.00m, Highly to moderately weathered, very poor brownish silty sandstone			CR						54.00	19.00
13.0												
13.5												
14.0					CR						34.00	0.00
14.5												
15.0												

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-85		LOCATION		SWAS Room		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		542		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		3.10		CO-ORDINATES N		1185		CASING DEPTH, m		2.50			
START DATE		23/12/2022		GROUND ELEVATION		276.113		CORE DIAMETER		54 mm			
END DATE		24/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
		12.00m to 20.00m, Highly to freshly weathered, very poor to excellent brownish silty sandstone				CR						24.00	14.00
						CR						42.00	24.00
												63.00	58.00
		</											

M.K. SOIL TESTING LABORATORY PRIVATE LIMITED MK		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-86		LOCATION		Boiler U#5		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		533		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.65		CO-ORDINATES N		1267		CASING DEPTH, m		2.50			
START DATE		17/12/2022		GROUND ELEVATION		276.035		CORE DIAMETER		54 mm			
END DATE		19/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m, Filled up soil				DS							
1.0		0.50m to 5.00m, Yellowish brownish clayey sand of high plasticity with gravels											
1.5						SPT	6	7	11	18			
2.0													
2.5													
3.0						SPT	8	10	16	26			
3.5													
4.0													
4.5						SPT	15	22	35	57			
5.0		5.00m to 9.00m, Moderately to slightly weathered, very poor to poor reddish brown sandstone				CR						87.00	49.00
5.5													
6.0													
6.5	CR											80.00	56.00
7.0													
7.5													
8.0	CR											61.00	23.00
8.5													
9.0		9.00m to 15.00m, Slightly to freshly weathered, very poor to fair, reddish brown silty sandstone				CR						74.00	44.00
9.5													
10.0													
10.5													
11.0	CR											82.00	57.00
11.5													
12.0													
12.5	CR											100.0	62.00
13.0													
13.5													
14.0	CR											44.00	7.00
14.5													
15.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD												
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.											
BOREHOLE NO.		DBH-87		LOCATION		Boiler U#5		TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		534		DRILLING METHOD		ROTARY				
GROUND WATER TABLE		1.75		CO-ORDINATES N		1320		CASING DEPTH, m		2.00				
START DATE		09/12/2022		GROUND ELEVATION		276.29		CORE DIAMETER		54 mm				
END DATE		10/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE			
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %	
0.5		0.00m to 0.50m, Filled up soil				DS								
1.0		0.50m to 4.50m, Greyish brown clayey sand of high plasticity with gravels												
1.5						SPT	6	10	18	28				
2.0														
2.5														
3.0						SPT	14	30	50(3cm)	REF				
3.5														
4.0														
4.5						SPT	41	50(2cm)	-	REF				
5.0		4.50m to 6.00m, Highly weathered, very poor greyish brown sandstone with thin bands of shales and siltstone				SPT/CR	50(3cm)	-	-	REF		40.00	0.00	
5.5														
6.0		6.00m to 15.00m, Moderately to slightly weathered, very poor to good, reddish brown silty sandstone				CR						52.00	12.00	
6.5														
7.0														
7.5														
8.0						CR							71.00	11.00
8.5														
9.0														
9.5						CR							62.00	36.00
10.0														
10.5														
11.0						CR							65.00	42.00
11.5														
12.0														
12.5	CR							62.00	18.00					
13.0														
13.5														
14.0								88.00	83.00					
14.5														
15.0														

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD										
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.									
BOREHOLE NO.		DBH-88		LOCATION	Boiler U#5		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E	598		DRILLING METHOD	ROTARY				
GROUND WATER TABLE		1.30		CO-ORDINATES N	1337		CASING DEPTH, m	2.50				
START DATE		28/12/2022		GROUND ELEVATION	276.371		CORE DIAMETER	54 mm				
END DATE		30/12/2022		CIRCULATION FLUID	WATER		DIAMETER OF HOLE	150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE			SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
						N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.65m, Filled up soil			DS							
1.0		0.65m to 4.50m, Greyish brown clayey sand of high plasticity with gravels										
1.5					SPT	6	9	20	29			
2.0												
2.5												
3.0					SPT	13	24	50	74			
3.5												
4.0												
4.5					SPT	50(8cm)	-	-	REF			
5.0		4.50m to 6.00m, Greyish brown silty clay of intermediate plasticity with gravels										
5.5												
6.0					SPT	50(9cm)	-	-	REF			
6.5		6.00m to 10.50m, Highly to moderately weathered, very poor to poor greyish brown sandstone with thin bands of shales and siltstone			CR						45.00	17.00
7.0												
7.5												
8.0					CR						46.00	32.00
8.5												
9.0												
9.5								63.00	29.00			
10.0												
10.5												
11.0		10.50m to 13.50m, Highly to moderately weathered, poor yellowish brown silty sandstone			CR						54.00	38.00
11.5												
12.0												
12.5					CR						48.00	26.00
13.0												
13.5												
14.0		13.50m to 15.00m, Mmoderately weathered, very poor greyish brown sandstone with thin bands of shales and siltstone			CR						54.00	23.00
14.5												
15.0												

MK M K SOIL TESTING LABORATORY PRIVATE LIMITED		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-89		LOCATION		Boiler U#5		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		558		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		0.80		CO-ORDINATES N		1258		CASING DEPTH, m		2.50			
START DATE		20/12/2022		GROUND ELEVATION		275.921		CORE DIAMETER		54 mm			
END DATE		21/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.75m, Filled up soil				DS							
1.0						0.75m to 4.50m, Yellowish brownish silty clay of intermediate plasticity				SPT	7	13	16
1.5													
2.0													
2.5		SPT	10	14	18					32			
3.0													
3.5													
4.0		SPT	20	9	37					46			
4.5													
5.0		4.50m to 15.00m, Moderately to freshly weathered, poor to excellent, reddish brown silty sandstone				CR						89.00	47.00
5.5													
6.0						CR						48.00	46.00
6.5													
7.0													
7.5						CR						72.00	38.00
8.0													
8.5													
9.0						CR						75.00	40.00
9.5													
10.0													
10.5						CR						80.00	62.00
11.0													
11.5													
12.0						CR						61.00	44.00
12.5													
13.0													
13.5	CR						72.00	41.00					
14.0													
14.5													
15.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-90		LOCATION		Boiler U#5		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		578.203		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.10		CO-ORDINATES N		1232.029		CASING DEPTH, m		2.50			
START DATE		04/01/2023		GROUND ELEVATION		276.858		CORE DIAMETER		54 mm			
END DATE		09/01/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m, Filled up soil				DS							
1.0		0.50m to 6.00m, Yellowish brownish poorly graded silty sand, non-plastic with gravels											
1.5						SPT	9	18	20	38			
2.0													
2.5													
3.0						SPT	4	5	10	15			
3.5													
4.0													
4.5						SPT	6	12	16	28			
5.0													
5.5													
6.0						SPT	30	50(4cm)	-	REF			
6.5		6.00m to 7.50m, Yellowish brownish clayey sand of medium plasticity with gravels											
7.0													
7.5						SPT	50(6cm)	-	-	REF			
8.0		7.50m to 15.00m, Highly to slightly weathered, very poor to fair, yellowish brown silty sandstone				CR						42.00	23.00
8.5													
9.0													
9.5						CR						48.00	34.00
10.0													
10.5													
11.0						CR						73.00	73.00
11.5													
12.0													
12.5						CR						64.00	54.00
13.0													
13.5													
14.0							60.00	31.00					
14.5													
15.0													

MK M.K. SOIL TESTING LABORATORY PRIVATE LIMITED		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-90		LOCATION		Boiler U#5		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		578.203		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.10		CO-ORDINATES N		1232.029		CASING DEPTH, m		2.50			
START DATE		04/01/2023		GROUND ELEVATION		276.858		CORE DIAMETER		54 mm			
END DATE		09/01/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
		15.00m to 20.00m, Moderately to freshly weathered, poor to excellent, reddish brown silty sandstone				CR						66.00	48.00
15.5													
16.0													
16.5													
17.0													
17.5													
18.0													
18.5													
19.0													
19.5													
20.0											96.00	94.00	

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-91		LOCATION	Boiler U#5		TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E	605		DRILLING METHOD		ROTARY				
GROUND WATER TABLE		1.80		CO-ORDINATES N	1315		CASING DEPTH, m		2.50				
START DATE		31/12/2022		GROUND ELEVATION	276.318		CORE DIAMETER		54 mm				
END DATE		03/01/2023		CIRCULATION FLUID	WATER		DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE			SAMPLE TYPE	SPT N-VALUE				ROCK CORE			
						N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %	
0.5		0.00m to 0.95m, Filled up soil			DS								
1.0													
1.5		0.95m to 3.00m, Greyish brown clayey sand of medium plasticity with traces of gravels			UDS								
2.0													
2.5													
3.0					SPT	7	12	20	32				
3.5		3.00m to 4.50m, Greyish brown silty clay of intermediate plasticity with gravels											
4.0													
4.5					SPT	35	50 (7cm)		REF				
5.0		4.50m to 6.00m, Yellowish brown silty clay of high plasticity with gravels											
5.5													
6.0					SPT	22	50 (10cm)		REF				
6.5		6.00m to 8.00m, Yellowish brown silty clay of intermediate plasticity with gravels											
7.0													
7.5					SPT	25	50 (8cm)		REF				
8.0		7.50m to 15.50m, Moderately weathered, very poor to good, yellowish brown sandstone with thin bands of shales and siltstone			CR						68.00	0.00	
8.5													
9.0													
9.5					CR						69.00	41.00	
10.0													
10.5													
11.0					CR						76.00	22.00	
11.5													
12.0													
12.5					CR						84.00	62.00	
13.0													
13.5													
14.0					CR						85.00	22.00	
14.5													
15.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-91		LOCATION		Boiler U#5		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		605		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.80		CO-ORDINATES N		1315		CASING DEPTH, m		2.50			
START DATE		31/12/2022		GROUND ELEVATION		276.318		CORE DIAMETER		54 mm			
END DATE		03/01/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
15.5		7.50m to 15.50m, Moderately weathered, very poor to good, yellowish brown sandstone with thin bands of shales and siltstone				CR						86.00	76.00
16.0													
16.5		15.50m to 20.00m, Slightly to freshly weathered, fair to good, greyish brown sandstone				CR						82.00	70.00
17.0													
17.5													
18.0													
18.5						CR						96.00	82.00
19.0													
19.5													
20.0						CR							80.00

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD												
		PROJECT TITLE		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-92		LOCATION		Boiler U#5 <th colspan="2">TYPE OF RIG</th> <td colspan="2">HYDRAULIC</td>		TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		643.406		DRILLING METHOD		ROTARY				
GROUND WATER TABLE		1.95		CO-ORDINATES N		1314.31		CASING DEPTH, m		6.00				
START DATE		28/02/2023		GROUND ELEVATION		276.301		CORE DIAMETER		54 mm				
END DATE		28/02/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE			
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %	
0.5		0.00m to 0.45m, Filled up soil				DS-1								
1.0		0.45m to 12.50m, Yellowish brown silty clay of low plasticity												
1.5						SPT-1	6	8	10	18				
2.0														
2.5														
3.0						SPT-2	9	9	11	20				
3.5														
4.0														
4.5						UDS-1								
5.0														
5.5														
6.0						SPT-3	6	7	6	13				
6.5														
7.0														
7.5						SPT-4	3	8	10	18				
8.0														
8.5														
9.0						SPT-5	8	10	29	39				
9.5														
10.0														
10.5						SPT-6	50 (5cm)			REF				
11.0														
11.5														
12.0						SPT-7	10	16	22	38				
12.5														
13.0		12.50m to 15.00m, Greyish brown slightly weathered and poor to very poor silty sandstone				SPT-8/CR	50 (3cm)			REF		80.00	13.00	
13.5														
14.0						CR						73.00	53.00	
14.5														
15.0														

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-93		LOCATION		Boiler U#5		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		630		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.95		CO-ORDINATES N		1126		CASING DEPTH, m		2.60			
START DATE		11/01/2023		GROUND ELEVATION		276.156		CORE DIAMETER		54 mm			
END DATE		12/01/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.48m , Filled up soil				DS							
1.0		0.48m to 5.00m , Yellowish brown clayey sand of medium plasticity with traces of gravels											
1.5						UDS							
2.0													
2.5													
3.0						SPT	8	15	22	37			
3.5													
4.0													
4.5						SPT	12	19	18	37			
5.0													
5.5		5.00m to 20.00m , Highly to moderately weathered very poor to poor silty sandstone				CR						40.00	0.00
6.0						CR						42.00	20.00
6.5													
7.0													
7.5													
8.0						CR						36.00	27.00
8.5													
9.0													
9.5						CR						64.00	44.00
10.0													
10.5													
11.0						CR						50.00	38.00
11.5													
12.0													
12.5						CR						55.00	33.00
13.0													
13.5													
14.0							67.00	28.00					
14.5													
15.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-93		LOCATION		Boiler U#5		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		630		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.95		CO-ORDINATES N		1126		CASING DEPTH, m		2.60			
START DATE		11/01/2023		GROUND ELEVATION		276.156		CORE DIAMETER		54 mm			
END DATE		12/01/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
		5.00m to 20.00m , Highly to freshly weathered very poor to excellent silty sandstone				CR						56.00	53.00
15.5													
16.0													
16.5													
17.0						CR						63.00	23.00
17.5													
18.0													
18.5						CR						49.00	7.00
19.0													
19.5													
20.0			CR						100.0	90.00			

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-94		LOCATION		Boiler U#5		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		577		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		3.50		CO-ORDINATES N		1294		CASING DEPTH, m		2.50			
START DATE		22/12/2022		GROUND ELEVATION		276.49		CORE DIAMETER		54 mm			
END DATE		27/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.56m, Filled up soil				DS							
1.0		0.56m to 3.00m, Yellowish brown poorly graded silty sand, non-plastic with traces of gravels											
1.5						SPT	7	9	11	20			
2.0													
2.5													
3.0						SPT	11	17	25	42			
3.5		3.00m to 5.00m, Yellowish brown clayey sand of medium plasticity with small fraction of gravels											
4.0													
4.5						SPT	15	22	30	52			
5.0													
5.5		5.00m to 10.50m, Highly to slightly weathered, very poor to good yellowish brown sandstone				CR					52.00	9.60	
6.0													
6.5						CR					48.00	30.00	
7.0													
7.5													
8.0						CR					62.00	24.00	
8.5													
9.0													
9.5						CR					78.00	62.00	
10.0													
10.5													
11.0		10.50m to 12.00m, Moderately weathered, fair yellowish brown silty sandstone				CR					65.00	53.00	
11.5													
12.0													
12.5		12.00m to 13.50m, Slightly weathered, good reddish brown sandstone				CR					85.00	82.00	
13.0													
13.5													
14.0		13.50m to 20.00m, Slightly weathered, good yellowish brown silty sandstone				CR					90.00	85.00	
14.5													
15.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-94		LOCATION		Boiler U#5		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		577		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		3.50		CO-ORDINATES N		1294		CASING DEPTH, m		2.50			
START DATE		22/12/2022		GROUND ELEVATION		276.49		CORE DIAMETER		54 mm			
END DATE		27/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
		13.50m to 20.00m, Slightly weathered, poor to good yellowish brown silty sandstone				CR						90.00	87.00
15.5						CR						78.00	64.00
16.0													
16.5													
17.0													
17.5													
18.0													
18.5						CR						76.00	48.00
19.0													
19.5													
20.0		CR						84.00	78.00				

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD												
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.											
BOREHOLE NO.		DBH-95		LOCATION		Boiler U#5		TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		664.502		DRILLING METHOD		ROTARY				
GROUND WATER TABLE		1.70		CO-ORDINATES N		1270.63		CASING DEPTH, m		2.50				
START DATE		30/01/2023		GROUND ELEVATION		276.226		CORE DIAMETER		54 mm				
END DATE		01/02/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE			
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %	
0.5		0.00m to 0.45m ,Filled up soil				DS								
1.0		0.45m to 6.00m , Yellowish brown silty sand with traces of gravels non-plastic												
1.5						UDS								
2.0														
2.5														
3.0						SPT	5	6	9	15				
3.5														
4.0														
4.5						SPT	9	14	21	35				
5.0														
5.5														
6.0						SPT	15	50 (13cm)		REF				
6.5		6.00m to 7.50m , Yellowish gray silty clay of intermediate plasticity												
7.0														
7.5						SPT	50 (14cm)			REF				
8.0		7.50m to 20.00m , Moderately to slightly weathered, very poor to good sandstone with thin bands of siltstones				CR						52.00	0.00	
8.5														
9.0														
9.5						CR							72.00	43.00
10.0														
10.5														
11.0						CR							67.00	59.00
11.5														
12.0														
12.5						CR							71.00	70.00
13.0														
13.5														
14.0						CR							86.00	78.00
14.5														
15.0														

MK M.K. SOIL TESTING LABORATORY PRIVATE LIMITED		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD												
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.											
BOREHOLE NO.		DBH-95		LOCATION		Boiler U#5		TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		664.502		DRILLING METHOD		ROTARY				
GROUND WATER TABLE		1.70		CO-ORDINATES N		1270.63		CASING DEPTH, m		2.50				
START DATE		30/01/2023		GROUND ELEVATION		276.226		CORE DIAMETER		54 mm				
END DATE		01/02/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE			
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %	
		7.50m to 20.00m , Moderately to slightly weathered, very poor to good sandstone with thin bands of siltstones				CR						95.00	93.00	
						CR							77.00	66.00
						CR							97.00	88.00
						CR							100.0	100.0

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.									
BOREHOLE NO.		DBH-96		LOCATION		Boiler U#6		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		588		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		2.85		CO-ORDINATES N		1188		CASING DEPTH, m		2.50			
START DATE		27/12/2022		GROUND ELEVATION		276.518		CORE DIAMETER		54 mm			
END DATE		28/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.45m, Filled up soil				DS							
1.0		0.45m to 4.50m, Greyish brown silty sand, non-plastic											
1.5						SPT	4	3	3	6			
2.0													
2.5													
3.0						SPT	4	3	14	17			
3.5													
4.0													
4.5						SPT	4	8	11	19			
5.0		4.50m to 6.50m, Yellowish brown clayey sand of medium plasticity											
5.5													
6.0						SPT	19	14	19	33			
6.5													
7.0		6.50m to 9.50m, Moderately weathered, very poor yellowish brown silty sandstone and its fragments				CR						52.00	0.00
7.5													
8.0						SPT	18	40	48	88			
8.5													
9.0						SPT	20	42	50	92			
9.5													
10.0		9.50m to 12.50m, Moderately to slightly weathered, very poor to fair yellowish brown sandstone with thin bands of shales and siltstone				CR						84.00	0.00
10.5													
11.0						CR						61.00	24.00
11.5													
12.0													
12.5		CR						80.00	64.00				
13.0		12.50m to 20.00m, Moderately weathered, poor yellowish brown silty sandstone											
13.5													
14.0													
14.5													
15.0						CR						68.00	36.00

MK M.K. SOIL TESTING LABORATORY PRIVATE LIMITED		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD												
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.											
BOREHOLE NO.		DBH-96		LOCATION		Boiler U#6		TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		588		DRILLING METHOD		ROTARY				
GROUND WATER TABLE		2.85		CO-ORDINATES N		1188		CASING DEPTH, m		2.50				
START DATE		27/12/2022		GROUND ELEVATION		276.518		CORE DIAMETER		54 mm				
END DATE		28/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE			
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %	
	15.5	12.50m to 20.00m, Moderately to slightly weathered, poor to good, yellowish brown silty sandstone				CR						58.00	36.00	
	16.0													
	16.5													
	17.0													
	17.5													
	18.0													
	18.5													
	19.0													
	19.5													
	20.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-97		LOCATION		Boiler U#6		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		646		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		2.90		CO-ORDINATES N		1176		CASING DEPTH, m		2.50			
START DATE		19/12/2022		GROUND ELEVATION		276.435		CORE DIAMETER		54 mm			
END DATE		20/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m, Filled up soil				DS							
1.0		0.50m to 3.00m , Yellowish brown silty sand of high plasticity with fraction of gravels											
1.5						SPT	8	12	17	29			
2.0													
2.5													
3.0						SPT	7	13	20	33			
3.5		3.00m to 9.50m, Grayish brown sandy clay of intermediate plasticity high plasticity with traces of gravels											
4.0													
4.5						SPT	10	16	23	39			
5.0													
5.5													
6.0						SPT	13	19	26	45			
6.5													
7.0													
7.5						SPT	17	28	38	66			
8.0													
8.5													
9.0						SPT	25	32	48	80			
9.5													
10.0		9.50m to 20.00m,Highly to slightly weathered , very poor to fair reddish brown silty sandstone				CR						89.00	66.00
10.5													
11.0						CR						29.00	15.00
11.5													
12.0													
12.5						CR						66.00	14.00
13.0													
13.5													
14.0						CR						48.00	14.00
14.5													
15.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-97		LOCATION		Boiler U#6		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		646		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		2.90		CO-ORDINATES N		1176		CASING DEPTH, m		2.50			
START DATE		19/12/2022		GROUND ELEVATION		276.435		CORE DIAMETER		54 mm			
END DATE		20/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
		9.50m to 20.00m,Highly to freshly weathered, very poor to poor reddish brown silty sandstone				CR						84.00	11.00
15.5													
16.0													
16.5													
17.0													
17.5													
18.0													
18.5													
19.0													
19.5													
20.0													
						CR						100.0	20.00

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-98		LOCATION		Boiler U#6		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		645		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		2.23		CO-ORDINATES N		1138		CASING DEPTH, m		2.50			
START DATE		16/12/2022		GROUND ELEVATION		276.434		CORE DIAMETER		54 mm			
END DATE		17/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m, Filled up soil				DS							
1.0	0.50m to 6.00m, Yellowish brown silty clay of intermediate plasticity					SPT	4	5	11	16			
1.5													
2.0													
2.5						SPT	4	1	3	4			
3.0													
3.5													
4.0						SPT	8	10	14	24			
4.5													
5.0													
5.5						SPT	8	15	24	39			
6.0													
6.5	6.00m to 10.50m , Yellowish brown clayey sand,Non-plastic												
7.0						SPT	14	18	26	44			
7.5													
8.0													
8.5						SPT	20	50 (12cm)		REF			
9.0													
9.5													
10.0						SPT	32	50 (10cm)		REF			
10.5													
11.0	10.00m to 20.00m, Highly to moderately weathered, very poor to poor, reddish brown sand stone					CR						68.00	17.00
11.5													
12.0						CR						59.00	39.00
12.5													
13.0													
13.5						CR						53.00	36.00
14.0													
14.5													
15.0						CR						48.00	42.00

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD								
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.							
BOREHOLE NO.		DBH-98	LOCATION	Boiler U#6	TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00	CO-ORDINATES E	645	DRILLING METHOD		ROTARY			
GROUND WATER TABLE		2.23	CO-ORDINATES N	1138	CASING DEPTH, m		2.50			
START DATE		16/12/2022	GROUND ELEVATION	276.434	CORE DIAMETER		54 mm			
END DATE		17/12/2022	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE		SAMPLE TYPE	SPT N-VALUE				ROCK CORE	
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY
		10.00m to 20.00m, Moderately to slightly weathered, poor to fair, reddish brown sand stone								
15.5			CR						78.00	61.00
16.0										
16.5										
17.0										
17.5										
18.0									73.00	62.00
18.5										
19.0										
19.5									58.00	35.00
20.0										

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD												
		PROJECT TITLE		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-99		LOCATION		Boiler U#6		TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		655.926		DRILLING METHOD		ROTARY				
GROUND WATER TABLE		2.10		CO-ORDINATES N		1079.738		CASING DEPTH, m		2.50				
START DATE		28/12/2022		GROUND ELEVATION		276.11		CORE DIAMETER		54 mm				
END DATE		29/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE			
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %	
0.5		0.00m to 0.80m, Filled up soil				DS								
1.0														
1.5		0.80m to 6.00m , Yellowish brown poorly graded silty sand , Non-plastic				SPT	2	2	4	6				
2.0														
2.5														
3.0						SPT/UDS	3	2	5	7				
3.5														
4.0														
4.5						SPT	6	8	10	18				
5.0						UDS/DS								
5.5														
6.0						SPT	13	28	30	58				
6.5		6.00m to 6.50m, Yellowish brown clayey sand of high plasticity												
7.0		6.50m to 7.00m , Completely weathered, very poor silty sand stone				CR					0.00	0.00		
7.5		7.00m to 7.50m, Yellowish brown poorly graded silty sand,Non-plastic				SPT	50 (7cm)			REF				
8.0		7.50m to 20.00m, Highly to slightly weathered, poor to fair yellowish brown silty sand stone				CR					47.00	38.00		
8.5														
9.0														
9.5						CR							74.00	58.00
10.0														
10.5														
11.0						CR							64.00	59.00
11.5														
12.0														
12.5						CR							42.00	34.00
13.0														
13.5														
14.0														
14.5														
15.0														
15.5														
16.0														
16.5														
17.0														
17.5														
18.0														
18.5														
19.0														
19.5														
20.0														

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.									
BOREHOLE NO.		DBH-99		LOCATION		Boiler U#6		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		655.926		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		2.10		CO-ORDINATES N		1079.738		CASING DEPTH, m		2.50			
START DATE		28/12/2022		GROUND ELEVATION		276.11		CORE DIAMETER		54 mm			
END DATE		29/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
		7.50m to 20.00m, Highly to moderately weathered, very poor to fair yellowish brown silty sand stone				CR						51.00	29.00
15.5													
16.0													
16.5													
17.0													
17.5													
18.0													
18.5													
19.0													
19.5													
20.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-100		LOCATION		Boiler U#6		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		630		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		2.28		CO-ORDINATES N		1092		CASING DEPTH, m		2.50			
START DATE		26/12/2022		GROUND ELEVATION		276.099		CORE DIAMETER		54 mm			
END DATE		27/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m, Filled up soil				DS							
1.0		0.50m to 2.00m, Grayish brown silty clay of intermediate plasticity											
1.5						SPT	1	2	4	6			
2.0						UDS/DS							
2.5		2.00m to 4.50m, Grayish brown clayey sand of high plasticity with fraction of gravels											
3.0						SPT	2	3	4	7			
3.5						UDS/DS							
4.0													
4.5						SPT	5	8	7	15			
5.0		4.50m to 6.00m, Grayish brown silty clay of intermediate plasticity											
5.5													
6.0						SPT	15	22	35	57			
6.5		6.00m to 6.50m, Yellowish brown clayey sand of high plasticity with gravels											
7.0		6.50m to 20.00m, Highly to slightly weathered, very poor to fair, yellowish brown silty sandstone				CR						47.00	10.00
7.5													
8.0						CR						42.00	0.00
8.5													
9.0													
9.5						CR						54.00	22.00
10.0													
10.5													
11.0						CR						67.00	25.00
11.5													
12.0													
12.5						CR						77.00	62.00
13.0													
13.5													
14.0							42.00	26.00					
14.5													
15.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD									
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.								
BOREHOLE NO.		DBH-100	LOCATION	Boiler U#6	TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		20.00	CO-ORDINATES E	630	DRILLING METHOD		ROTARY				
GROUND WATER TABLE		2.28	CO-ORDINATES N	1092	CASING DEPTH, m		2.50				
START DATE		26/12/2022	GROUND ELEVATION	276.099	CORE DIAMETER		54 mm				
END DATE		27/12/2022	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm				
DEPTH	VISUAL DESCRIPTION OF SOIL SAMPLE			SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
15.5		6.50m to 20.00m, Highly to moderately weathered, very poor yellowish brown silty sandstone			CR					59.00	41.00
16.0					CR					39.00	0.00
16.5											
17.0											
17.5											
18.0											
18.5					CR					50.00	0.00
19.0											
19.5											
20.0					CR					64.00	0.00

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-101		LOCATION		Boiler U#6		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		602		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		2.90		CO-ORDINATES N		1153		CASING DEPTH, m		2.50			
START DATE		21/12/2022		GROUND ELEVATION		276.504		CORE DIAMETER		54 mm			
END DATE		23/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m, Filled up soil				DS							
1.0		0.50m to 7.00m, Yellowish brown clayey sand of high plasticity with fraction of gravels				SPT	3	2	3	5			
1.5													
2.0													
2.5						SPT	2	2	3	5			
3.0													
3.5													
4.0						SPT	5	6	8	14			
4.5													
5.0													
5.5						SPT	6	10	10	20			
6.0													
6.5													
7.0						SPT	18	26	38	64			
7.5		7.00m to 10.00m, Grayish brown silty clay of intermediate plasticity											
8.0													
8.5						SPT	22	26	45	71			
9.0													
9.5													
10.0		SPT CR	40	50 (4cm)		REF				65.00	24.00		
10.5		10.00m to 20.00m, Highly to slightly weathered, very poor to poor reddish brown silty sandstone											
11.0													
11.5													
12.0						CR						45.00	15.00
12.5													
13.0													
13.5						CR						55.00	8.00
14.0													
14.5													
15.0			CR							82.00	48.00		

MK M.K. SOIL TESTING LABORATORY PRIVATE LIMITED		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD												
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.											
BOREHOLE NO.		DBH-101		LOCATION		Boiler U#6		TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		602		DRILLING METHOD		ROTARY				
GROUND WATER TABLE		2.90		CO-ORDINATES N		1153		CASING DEPTH, m		2.50				
START DATE		21/12/2022		GROUND ELEVATION		276.504		CORE DIAMETER		54 mm				
END DATE		23/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE			
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %	
		10.00m to 20.00m, Highly to slightly weathered, very poor to poor reddish brown silty sandstone												
15.5														
16.0						CR							77.00	10.00
16.5														
17.0														
17.5						CR							68.00	26.00
18.0														
18.5														
19.0														
19.5						CR							65.00	52.00
20.0														

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD										
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.									
BOREHOLE NO.		DBH-102		LOCATION	Boiler U#6		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		25.00		CO-ORDINATES E	561		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		5.50		CO-ORDINATES N	1067		CASING DEPTH, m		2.50			
START DATE		20/12/2022		GROUND ELEVATION	276.208		CORE DIAMETER		54 mm			
END DATE		22/12/2022		CIRCULATION FLUID	WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE			SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
						N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m, Filled up soil			DS							
1.0		0.50m to 8.50m, Yellowish brown clayey sand of high plasticity with traces gravels			SPT	2	3	3	6			
1.5												
2.0												
2.5					SPT	4	4	6	10			
3.0												
3.5												
4.0					SPT	4	7	8	15			
4.5												
5.0												
5.5					SPT	11	15	15	30			
6.0												
6.5												
7.0					SPT	13	18	25	43			
7.5												
8.0												
8.5												
9.0		8.50m to 25.00m, Highly to slightly weathered, very poor to fair reddish brown silty sandstone			CR						36.00	0.00
9.5												
10.0												
10.5					CR						34.00	15.00
11.0												
11.5												
12.0					CR						66.00	53.00
12.5												
13.0												
13.5												
14.0												
14.5												
15.0												
					CR						76.00	66.00

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD									
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.								
BOREHOLE NO.		DBH-102	LOCATION	Boiler U#6	TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		25.00	CO-ORDINATES E	561	DRILLING METHOD		ROTARY				
GROUND WATER TABLE		5.50	CO-ORDINATES N	1067	CASING DEPTH, m		2.50				
START DATE		20/12/2022	GROUND ELEVATION	276.208	CORE DIAMETER		54 mm				
END DATE		22/12/2022	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE		SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
		8.50m to 25.00m, Highly to slightly weathered, very poor to fair reddish brown silty sandstone									
15.5											
16.0											
16.5	CR									75.00	14.00
17.0											
17.5											
18.0	CR									84.00	59.00
18.5											
19.0											
19.5	CR									80.00	76.00
20.0											
20.5											
21.0	CR									94.00	90.00
21.5											
22.0											
22.5	CR									86.00	72.00
23.0											
23.5											
24.0	CR									70.00	66.00
24.5											
25.0											

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-103		LOCATION		Boiler U#6		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		612.382		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		2.80		CO-ORDINATES N		1081.891		CASING DEPTH, m		2.50			
START DATE		23/12/2022		GROUND ELEVATION		276.201		CORE DIAMETER		54 mm			
END DATE		24/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m, Filled up soil				DS							
1.0		0.50m to 8.00m, Yellowish brown silty clay of intermediate plasticity											
1.5						SPT	1	2	3	5			
2.0						UDS/DS							
2.5													
3.0						SPT	3	3	5	8			
3.5													
4.0													
4.5						SPT	5	7	6	13			
5.0													
5.5													
6.0						SPT	6	7	10	17			
6.5													
7.0													
7.5						SPT	10	12	18	30			
8.0													
8.5		8.00m to 20.00m, Highly to moderately weathered, very poor to poor reddish brown silty sandstone				CR						11.00	0.00
9.0													
9.5						CR						52.00	40.00
10.0													
10.5													
11.0						CR						34.00	22.00
11.5													
12.0													
12.5						CR						48.00	30.00
13.0													
13.5													
14.0													
14.5													
15.0													

MK M.K. SOIL TESTING LABORATORY PRIVATE LIMITED		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD								
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.							
BOREHOLE NO.		DBH-103	LOCATION	Boiler U#6	TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00	CO-ORDINATES E	612.382	DRILLING METHOD		ROTARY			
GROUND WATER TABLE		2.80	CO-ORDINATES N	1081.891	CASING DEPTH, m		2.50			
START DATE		23/12/2022	GROUND ELEVATION	276.201	CORE DIAMETER		54 mm			
END DATE		24/12/2022	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE		SAMPLE TYPE	SPT N-VALUE				ROCK CORE	
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY
		8.00m to 20.00m, Highly to moderately weathered, very poor to fair reddish brown silty sandstone and fragments								
15.5										
16.0										
16.5			SPT	40	50 (6cm)		REF			
17.0			CR/SPT	50 (5cm)			REF		22.00	12.00
17.5										
18.0										
18.5			CR						30.00	23.00
19.0										
19.5										
20.0		CR						70.00	56.00	

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD									
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.								
BOREHOLE NO.		DBH-104	LOCATION	ESP U#6	TYPE OF RIG	HYDRAULIC					
BOREHOLE DEPTH, m		15.00	CO-ORDINATES E	691.156	DRILLING METHOD	ROTARY					
GROUND WATER TABLE		3.00	CO-ORDINATES N	1175.773	CASING DEPTH, m	2.50					
START DATE		26/12/2022	GROUND ELEVATION	276.363	CORE DIAMETER	54 mm					
END DATE		27/12/2022	CIRCULATION FLUID	WATER	DIAMETER OF HOLE	150 mm					
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE		SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 2.0m, Filled up soil	DS								
1.0											
1.5			SPT	3	4	5	9				
2.0											
2.5		2.00m to 6.50m, Yellowish brown clayey sand of high plasticity									
3.0			SPT	2	2	4	6				
3.5			UDS/DS								
4.0											
4.5			SPT	5	6	8	14				
5.0											
5.5											
6.0			SPT	10	13	14	27				
6.5											
7.0		6.50m to 15.00m, Moderately to slightly weathered, very poor to fair yellowish brown silty sandstone	CR						72.00	15.00	
7.5											
8.0			CR						73.00	20.00	
8.5											
9.0											
9.5			CR						64.00	24.00	
10.0											
10.5											
11.0			CR						65.00	15.00	
11.5											
12.0											
12.5			CR						74.00	8.00	
13.0											
13.5											
14.0			CR					69.00	59.00		
14.5											
15.0											

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD													
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.												
BOREHOLE NO.		DBH-105		LOCATION		ESP U#6		TYPE OF RIG		HYDRAULIC					
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		695.541		DRILLING METHOD		ROTARY					
GROUND WATER TABLE		1.90		CO-ORDINATES N		1079.826		CASING DEPTH, m		2.60					
START DATE		11/01/2023		GROUND ELEVATION		276.181		CORE DIAMETER		54 mm					
END DATE		13/01/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm					
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE				
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %		
0.5		0.00m to 0.70m, Filled up soil				DS									
1.0															
1.5		0.70m to 6.50m , Yellowish brown silty clay of low plasticity				SPT	2	3	3	6					
2.0															
2.5															
3.0						SPT	2	3	5	8					
3.5															
4.0															
4.5						SPT	5	6	7	13					
5.0															
5.5															
6.0						SPT	7	10	15	25					
6.5															
7.0		6.50m to 20.00m , Highly to moderately weathered, poor to good, grayish brown sandstone with thin bands of siltstones				CR						56.00	11.00		
7.5															
8.0						CR								46.00	31.00
8.5															
9.0															
9.5						CR								55.00	27.00
10.0															
10.5															
11.0						CR								46.00	40.00
11.5															
12.0															
12.5		CR								64.00	45.00				
13.0															
13.5															
14.0		CR								59.80	44.37				
14.5															
15.0															

M.K. SOIL TESTING LABORATORY PRIVATE LIMITED MK		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-105		LOCATION		ESP U#6		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		695.541		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.90		CO-ORDINATES N		1079.826		CASING DEPTH, m		2.60			
START DATE		11/01/2023		GROUND ELEVATION		276.181		CORE DIAMETER		54 mm			
END DATE		13/01/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
		6.50m to 20.00m , Moderately to freshly weathered, very poor to fair greyish brown sandstone with thin bands of siltstone				CR						64.30	49.87
15.5													
16.0													
16.5													
17.0													
17.5													
18.0													
18.5													
19.0													
19.5													
20.0											100.0	60.00	

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-106		LOCATION		ESP U#6		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		700		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		2.40		CO-ORDINATES N		1100		CASING DEPTH, m		2.50			
START DATE		14/12/2022		GROUND ELEVATION		276.731		CORE DIAMETER		54 mm			
END DATE		15/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m, Filled up soil				DS							
1.0		0.50m to 2.00m, Yellowish brown silty clay of low plasticity											
1.5						SPT	2	3	4	7			
2.0													
2.5		2.00m to 7.50, Yellowish brown silty clay of intermediate plasticity											
3.0						SPT	5	4	5	9			
3.5						UDS/DS							
4.0													
4.5						SPT	4	6	7	13			
5.0													
5.5													
6.0						SPT	5	9	13	22			
6.5													
7.0													
7.5						SPT	17	22	29	51			
8.0		7.50mm to 10.50m, Yellowish brown clayey sand Non-plastic											
8.5													
9.0						SPT	24	50 (12cm)		REF			
9.5													
10.0													
10.5						SPT	28	50 (4cm)		REF			
11.0		10.50m to 15.00m, Highly to slightly weathered, very poor to poor reddish brown silty sandstone				CR						72.00	39.00
11.5													
12.0													
12.5						CR						42.00	14.00
13.0													
13.5													
14.0						CR						50.00	18.00
14.5													
15.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD										
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.									
BOREHOLE NO.		DBH-107		LOCATION	ESP U#6		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E	751		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		3.00		CO-ORDINATES N	1172		CASING DEPTH, m		2.50			
START DATE		23/12/2022		GROUND ELEVATION	276.183		CORE DIAMETER		54 mm			
END DATE		24/12/2022		CIRCULATION FLUID	WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE			SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
						N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m, Filled up soil			DS							
1.0		0.50m to 3.00m , Reddish brown silty sand ,Non-plastic										
1.5					SPT	5	5	5	10			
2.0												
2.5												
3.0					SPT	4	5	6	11			
3.5		3.00m to 9.50m , Reddish brown clayey sand of high plasticity										
4.0												
4.5					SPT	4	5	6	11			
5.0												
5.5												
6.0					SPT	11	13	12	25			
6.5												
7.0												
7.5					SPT	10	17	24	41			
8.0												
8.5												
9.0					SPT	9	19	27	46			
9.5												
10.0		9.50m to 15.00m,Highly to moderately weathered, very poor to poor brown silty sandstone			CR						48.00	31.00
10.5												
11.0					CR						60.00	28.00
11.5												
12.0												
12.5					CR						32.00	10.00
13.0												
13.5												
14.0					CR						30.00	0.00
14.5												
15.0												

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD									
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.								
BOREHOLE NO.		DBH-108	LOCATION	ESP U#6	TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		15.00	CO-ORDINATES E	727.562	DRILLING METHOD		ROTARY				
GROUND WATER TABLE		1.70	CO-ORDINATES N	1207.899	CASING DEPTH, m		2.50				
START DATE		09/02/2023	GROUND ELEVATION	276.426	CORE DIAMETER		54 mm				
END DATE		10/02/2023	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE		SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
		0.00m to 0.33m , Filled up soil									
0.5		0.33m to 3.00mm , Reddish brown clayey sand of medium plasticity		DS							
1.0											
1.5				SPT	4	6	7	13			
2.0											
2.5											
3.0		3.00m to 4.50m , Yellowish brown silty clay of low plasticity		SPT	6	9	15	24			
3.5											
4.0											
4.5				SPT	11	25	50 (10CM)	REF			
5.0		4.50m to 5.00m , Yellowish brown silty clay of intermediate plasticity									
5.5		5.00m to 15.00m , Highly to freshly weathered, very poor to good yellowish brown sandstone with thin bands of siltstone		CR						52.00	22.00
6.0				CR						60.00	53.00
6.5											
7.0											
7.5											
8.0				CR						45.00	31.00
8.5											
9.0											
9.5				CR						92.00	68.00
10.0											
10.5											
11.0				CR						86.00	76.00
11.5											
12.0											
12.5				CR						71.00	50.00
13.0											
13.5											
14.0							73.00	52.00			
14.5											
15.0											

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD									
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.								
BOREHOLE NO.		DBH-109	LOCATION	ESP U#6	TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		20.00	CO-ORDINATES E	743.81	DRILLING METHOD		ROTARY				
GROUND WATER TABLE		1.60	CO-ORDINATES N	1071.501	CASING DEPTH, m		2.50				
START DATE		30/12/2022	GROUND ELEVATION	276.413	CORE DIAMETER		54 mm				
END DATE		02/01/2023	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE		SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m, Filled up soil		DS							
1.0		0.50m to 3.00m, Brown clay of high plasticity		UDS							
1.5											
2.0											
2.5											
3.0				SPT	3	4	3	7			
3.5		3.00m to 5.00m, Yellowish brown silty clay of low plasticity									
4.0											
4.5				SPT	4	4	6	10			
5.0											
5.5		5.00m to 6.50m, Highly weathered, very poor brown silty sandstone		CR						26.00	0.00
6.0											
6.5											
7.0		6.50m to 11.00m, Yellowish clayey sand of high plasticity with fraction of gravels									
7.5				SPT	4	5	7	12			
8.0											
8.5											
9.0				SPT	11	16	20	36			
9.5											
10.0											
10.5				SPT	50 (13cm)			REF			
11.0											
11.5		11.00m to 20.00m, Highly to moderately weathered, very poor to poor, reddish brown silty sandstone		CR						36.00	0.00
12.0											
12.5				CR						40.00	0.00
13.0											
13.5											
14.0				CR						48.00	37.00
14.5											
15.0											

MK M.K. SOIL TESTING LABORATORY PRIVATE LIMITED		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-109		LOCATION		ESP U#6		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		743.81		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.60		CO-ORDINATES N		1071.501		CASING DEPTH, m		2.50			
START DATE		30/12/2022		GROUND ELEVATION		276.413		CORE DIAMETER		54 mm			
END DATE		02/01/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
		11.00m to 20.00m,Highly to moderately weathered, very poor reddish brown silty sandstone				CR						56.00	30.00
15.5													
16.0													
16.5													
17.0													
17.5													
18.0													
18.5													
19.0													
19.5													
20.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD													
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.												
BOREHOLE NO.		DBH-110		LOCATION		ESP U#5		TYPE OF RIG		HYDRAULIC					
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		719.201		DRILLING METHOD		ROTARY					
GROUND WATER TABLE		1.69		CO-ORDINATES N		1324.12		CASING DEPTH, m		6.00					
START DATE		23/02/2023		GROUND ELEVATION		276.109		CORE DIAMETER		54 mm					
END DATE		24/02/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm					
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE				
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %		
0.5		0.00m to 0.68m, Filled up soil				DS-1									
1.0						0.68m to 2.00m, Yellowish brown clayey sand of medium plasticity				SPT-1	9	12	16	28	
1.5		2.00m to 5.00m, Yellowish brown silty clay of intermediate plasticity with small fraction of gravels													
2.0															
2.5															
3.0															
3.5															
4.0															
4.5															
5.0															
5.5		5.00m to 15.00m, Yellowish brown moderately to slightly weathered and good to fair silty sandstone				SPT-3/CR-1	50 (2cm)			REF		52.00	33.00		
6.0															
6.5														72.00	46.00
7.0															
7.5															
8.0														88.00	63.00
8.5															
9.0															
9.5														91.00	73.00
10.0															
10.5															
11.0														80.00	78.00
11.5															
12.0															
12.5														61.00	34.00
13.0															
13.5															
14.0										83.00	59.00				
14.5															
15.0															

MK M.K. SOIL TESTING LABORATORY PRIVATE LIMITED		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-111		LOCATION		ESP U#5		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		685		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.95		CO-ORDINATES N		1237		CASING DEPTH, m		2.50			
START DATE		06/02/2023		GROUND ELEVATION		276.419		CORE DIAMETER		54 mm			
END DATE		07/02/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.40m , Filled up soil				DS							
1.0		0.40m to 4.50m , Yellowish brown sandy clay of low plasticity				UDS							
1.5													
2.0													
2.5													
3.0						SPT	10	15	22	37			
3.5													
4.0													
4.5						SPT	18	50 (9cm)		REF			
5.0		4.50m to 15.00m, Slightly weathered, poor to fair, yellowish brown sandstone with thin bands of siltstone				CR					88.00	37.00	
5.5													
6.0						CR						89.00	47.00
6.5													
7.0						CR						77.00	72.00
7.5													
8.0						CR						86.00	69.00
8.5													
9.0						CR						90.00	37.00
9.5													
10.0	CR						76.00	54.00					
10.5													
11.0	CR						76.00	68.00					
11.5													
12.0													
12.5													
13.0													
13.5													
14.0													
14.5													
15.0													

MK M.K. SOIL TESTING LABORATORY PRIVATE LIMITED		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD									
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.								
BOREHOLE NO.		DBH-112	LOCATION	Absorber U#6	TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		20.00	CO-ORDINATES E	862.841	DRILLING METHOD		ROTARY				
GROUND WATER TABLE		2.10	CO-ORDINATES N	1125.722	CASING DEPTH, m		2.50				
START DATE		09/01/2023	GROUND ELEVATION	276.382	CORE DIAMETER		54 mm				
END DATE		10/01/2023	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE		SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.65m , Filled up soil		DS							
1.0		0.65m to 7.50m , Yellowish brown clayey sand of medium plasticity with traces of gravels									
1.5				SPT	5	6	6	12			
2.0											
2.5											
3.0				SPT	5	7	11	18			
3.5											
4.0				UDS							
4.5				SPT	6	10	14	24			
5.0											
5.5											
6.0				SPT	10	19	17	36			
6.5											
7.0											
7.5				SPT	14	50 (9cm)		REF			
8.0		7.50m to 20.00m , Highly to slightly weathered, very poor to poor, yellowish brown silty sandstone		CR						52.00	0.00
8.5											
9.0											
9.5				CR						68.00	34.00
10.0											
10.5											
11.0				CR						82.00	30.00
11.5											
12.0											
12.5				CR						49.00	13.00
13.0											
13.5											
14.0				CR						45.00	45.00
14.5											
15.0											

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD									
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.								
BOREHOLE NO.		DBH-112	LOCATION	Absorber U#6	TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		20.00	CO-ORDINATES E	862.841	DRILLING METHOD		ROTARY				
GROUND WATER TABLE		2.10	CO-ORDINATES N	1125.722	CASING DEPTH, m		2.50				
START DATE		09/01/2023	GROUND ELEVATION	276.382	CORE DIAMETER		54 mm				
END DATE		10/01/2023	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm				
DEPTH	VISUAL DESCRIPTION OF SOIL SAMPLE			SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
15.5	8.50m to 20.00m ,Highly to moderately weathered, poor to very poor, yellowish brown silty sandstone			CR						37.00	13.00
16.0											
16.5											
17.0				CR						39.00	0.00
17.5											
18.0											
18.5				CR						55.00	15.00
19.0											
19.5											
20.0				CR						14.00	0.00

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD									
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.								
BOREHOLE NO.		DBH-113	LOCATION	Absorber U#6	TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		15.00	CO-ORDINATES E	865	DRILLING METHOD		ROTARY				
GROUND WATER TABLE		1.95	CO-ORDINATES N	1228	CASING DEPTH, m		2.50				
START DATE		14/02/2023	GROUND ELEVATION	276.422	CORE DIAMETER		54 mm				
END DATE		15/02/2023	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE		SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.65m , Filled up soil		DS							
1.0		0.65m to 4.50m , Grayish brown silty sand with traces of gravels non-plastic									
1.5				SPT	5	6	6	12			
2.0											
2.5											
3.0				SPT	6	7	8	15			
3.5											
4.0											
4.5				SPT	7	8	10	18			
5.0		4.50m to 8.00m , Grayish brown sandy clay of low plasticity with traces of gravels									
5.5											
6.0				SPT	10	15	20	35			
6.5											
7.0											
7.5				SPT	9	12	19	31			
8.0											
8.5					8.00m to 13.50m , Highly to moderately weathered, poor to very poor, yellowish brown sand stone with thin bands of shales and siltstone		CR				
9.0	CR									32.00	0.00
9.5											
10.0											
10.5											
11.0	CR									62.00	50.00
11.5											
12.0											
12.5	SPT /CR	50 (14cm)						REF		58.00	0.00
13.0											
13.5		13.50m to 15.00m , Freshly weathered, poor yellowish browns and stone with thin bands of shales and siltstone		CR						98.00	31.00
14.0											
14.5											
15.0											

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD									
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.								
BOREHOLE NO.		DBH-114	LOCATION	Chimney	TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		20.00	CO-ORDINATES E	855	DRILLING METHOD		ROTARY				
GROUND WATER TABLE		2.40	CO-ORDINATES N	1174	CASING DEPTH, m		2.50				
START DATE		09/02/2023	GROUND ELEVATION	276.474	CORE DIAMETER		54 mm				
END DATE		12/02/2023	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE		SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 1.30m ,Filled up soil		DS							
1.0											
1.5				SPT	3	4	6	10			
2.0		1.30m to 8.00m ,Yellowish brown clayey sand of high plasticity with traces of gravels		UDS							
2.5											
3.0				SPT	6	8	8	16			
3.5											
4.0											
4.5				SPT	7	9	10	19			
5.0											
5.5											
6.0				SPT	10	16	20	36			
6.5											
7.0											
7.5				SPT	25	50 (13cm)		REF			
8.0		7.50m to 9.00m, Moderately weathered, very poor yellowish brown silty sandstone		SPT/CR	50 (9cm)		REF		56.00	0.00	
8.5											
9.0											
9.5		9.00m to 20.00m , Highly to slightly weathered, very poor to fair, yellowish brown sand stone with thin bands of shales and siltstone		CR						62.00	23.00
10.0											
10.5											
11.0	CR								44.00	0.00	
11.5											
12.0											
12.5	CR								80.00	36.00	
13.0											
13.5											
14.0	CR						86.00	70.00			
14.5											
15.0											

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-114		LOCATION		Chimney		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		855		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		2.40		CO-ORDINATES N		1174		CASING DEPTH, m		2.50			
START DATE		09/02/2023		GROUND ELEVATION		276.474		CORE DIAMETER		54 mm			
END DATE		12/02/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH	VISUAL DESCRIPTION OF SOIL SAMPLE			SAMPLE TYPE	SPT N-VALUE				ROCK CORE				
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %		
15.5	9.50m to 20.00m , Moderately to freshly weathered, very poor to fair yellowish brown sand stone with thin bands of shales and siltstone			CR						93.00	30.00		
16.0				CR							74.00	66.00	
16.5													
17.0				CR							68.00	8.00	
17.5													
18.0				CR								98.00	0.00
18.5													
19.0				CR									
19.5													
20.0				CR									

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD									
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.								
BOREHOLE NO.		DBH-115	LOCATION	ID Fan U#5	TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		15.00	CO-ORDINATES E	781.832	DRILLING METHOD		ROTARY				
GROUND WATER TABLE		2.10	CO-ORDINATES N	1224.487	CASING DEPTH, m		2.50				
START DATE		11/02/2023	GROUND ELEVATION	276.512	CORE DIAMETER		54 mm				
END DATE		13/02/2023	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE		SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.45m , Filled up soil		DS							
1.0		0.45m to 7.50m , Grayish brown silty sand non-plastic									
1.5				SPT	4	4	5	9			
2.0											
2.5											
3.0				UDS							
3.5											
4.0											
4.5				SPT	7	8	9	17			
5.0											
5.5											
6.0				SPT	5	8	12	20			
6.5											
7.0											
7.5				SPT	11	22	23	45			
8.0		7.50m to 9.00m , Grayish brown silty clay of low plasticity with fraction of gravels									
8.5											
9.0				SPT	12	20	21	41			
9.5		9.00m to 10.50m , Grayish brown silty clay of intermediate plasticity with traces of gravels									
10.0											
10.5				SPT	50 (6cm)			REF			
11.0		10.50m to 15.00m , Moderately to freshly weathered, poor to fair, yellowish brown silty sandstone		CR				REF		95.00	46.00
11.5											
12.0											
12.5				CR						64.00	64.00
13.0											
13.5											
14.0				CR						92.00	47.00
14.5											
15.0											

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD												
		PROJECT TITLE		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-116		LOCATION		ID Fan U#5		TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		978.402		DRILLING METHOD		ROTARY				
GROUND WATER TABLE		1.85		CO-ORDINATES N		1245.108		CASING DEPTH, m		6.00				
START DATE		15/02/2023		GROUND ELEVATION		276.321		CORE DIAMETER		54 mm				
END DATE		16/02/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE			
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %	
0.5		0.00m to 0.45m, Filled up soil				DS-1								
1.0		0.45m to 8.00m, Yellowish brown silty clay of low plasticity												
1.5						SPT-1	3	3	5	8				
2.0														
2.5														
3.0						UDS-1								
3.5														
4.0														
4.5						SPT-2	5	7	9	16				
5.0														
5.5														
6.0						SPT-3	50 (3cm)			REF				
6.5														
7.0														
7.5						SPT-4	10	11	15	26				
8.0														
8.5		8.00m to 11.00m, Yellowish brown moderately to slightly weathered and very poor sandstone				CR-1						81.00	15.00	
9.0														
9.5						CR-2							64.00	25.00
10.0														
10.5														
11.0		11.00m to 13.50m, Yellowish brown silty clay of low plasticity				CR-3/SPT-5	30	50 (10cm)		REF		37.00	0.00	
11.5														
12.0														
12.5														
13.0														
13.5		13.50m to 15.00m, Yellowish brown fresh and good sandstone				SPT-6	50 (14cm)			REF				
14.0												97.00	89.00	
14.5														
15.0														

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD														
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.													
BOREHOLE NO.		DBH-117		LOCATION		ID Fan U#5 <th colspan="2">TYPE OF RIG</th> <td colspan="2">HYDRAULIC</td>		TYPE OF RIG		HYDRAULIC						
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		791		DRILLING METHOD		ROTARY						
GROUND WATER TABLE		1.65		CO-ORDINATES N		1300		CASING DEPTH, m		2.50						
START DATE		17/02/23		GROUND ELEVATION		276.305		CORE DIAMETER		54 mm						
END DATE		20/02/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm						
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE					
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %			
0.5		0.00 to 0.50m ,Filled up soil				DS-1										
1.0		0.50m to 2.00m , Yellowish brown clayey sand of intermediate plasticity														
1.5						SPT-1	6	6	8	14						
2.0																
2.5		2.00m to 3.50m , Yellowish brown silty clay of intermediate plasticity														
3.0						UDS-1										
3.5																
4.0		3.50m to 6.00m ,Yellowish brown silty clay of low plasticity														
4.5						SPT-2	5	8	10	18						
5.0																
5.5																
6.0						SPT-3	6	9	11	20						
6.5																
7.0		6.50m to 7.50m , Grayish brown moderately weathered and very poor sand stone				SPT-4/CR-1	50 (1cm)	-	-	REF		55.00	14.00			
7.5																
8.0		7.50m to 9.00m ,Grayish brown moderately weathered and poor silty sand stone				CR-2						60.00	36.00			
8.5																
9.0																
9.5		9.00m to 10.50m , Yellowish brown highly weathered and very poor silt stone				CR-3						47.00	17.00			
10.0																
10.5																
11.0		10.50m to 15.00m ,Grayish brown highly weathered poor to very poor sand stone				CR-4						41.00	0.00			
11.5																
12.0																
12.5						CR-5									49.00	26.00
13.0																
13.5																
14.0	CR-6/SPT				19	50 (4cn)	-	REF		42.00	23.00					
14.5																
15.0																

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-118		LOCATION		Trestle		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		649		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.86		CO-ORDINATES N		1358		CASING DEPTH, m		6.00			
START DATE		25/02/2023		GROUND ELEVATION		276.508		CORE DIAMETER		54 mm			
END DATE		27/02/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.45m, Filled up soil				DS-1							
1.0		0.45m to 3.00m, Yellowish brown silty gravel, non-plastic				SPT-1	50 (6cm)			REF			
1.5													
2.0													
2.5													
3.0						SPT-2	50 (10cm)			REF			
3.5		3.00m to 6.00m, Yellowish brown highly weathered and very poor siltstone				CR-1						41.00	0.00
4.0													
4.5													
5.0						SPT-3/ CR-2	50 (9cm)			REF		53.00	7.00
5.5													
6.0		6.00m to 7.50m, Yellowish brown silty gravel, non-plastic											
6.5													
7.0													
7.5			SPT-4	50 (4cm)			REF						
8.0		7.50m to 15.00m, Greyish brown highly to moderately and very poor to poor siltstone				CR-3						53.00	24.00
8.5													
9.0													
9.5						CR-4						37.00	0.00
10.0													
10.5													
11.0						CR-5						61.00	43.00
11.5													
12.0													
12.5						CR-6						73.00	28.00
13.0													
13.5													
14.0		CR-7						56.00	32.00				
14.5													
15.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-119		LOCATION		CHP Pump House		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		716		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.65		CO-ORDINATES N		1348		CASING DEPTH, m		3.50			
START DATE		25/02/2023		GROUND ELEVATION		276.085		CORE DIAMETER		54 mm			
END DATE		25/02/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.45m , Filledup soil				DS-1							
1.0		0.45m to 3.50m , Yellowish brown silty clay of intermediate plasticity											
1.5						SPT-1	15	18	19	37			
2.0													
2.5													
3.0						SPT-2	16	20	25	45			
3.5													
4.0		3.50m to 4.50, Yellowish brown completely weathered and very poor silty sand stone				CR-1						28.00	0.00
4.5		4.50m to 6.00m , Yellowish brown moderately weathered and very poor silt stone				CR-2						71.00	15.00
5.0	6.00m to 15.00m , Grayish brown slightly weatherd and fair to poor silt stone												
5.5													
6.0													
6.5													
7.0													
7.5					SPT-3	13	20	20	40				
8.0													
8.5					CR-3							98.00	49.00
9.0													
9.5					CR-4							89.00	39.00
10.0													
10.5													
11.0		CR-5							99.00	79.00			
11.5													
12.0													
12.5		CR-6							82.00	33.00			
13.0													
13.5													
14.0									93.00	29.00			
14.5													
15.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-120		LOCATION		Trestle		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		793		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.89		CO-ORDINATES N		1356		CASING DEPTH, m		6.00			
START DATE		23/02/2023		GROUND ELEVATION		276.282		CORE DIAMETER		54 mm			
END DATE		23/02/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.40m, Filled up soil				DS-1							
1.0		0.40m to 3.50m , Yellowish brown clayey sand of intermediate plasticity											
1.5						SPT-1	6	8	9	17			
2.0													
2.5													
3.0						SPT-2	5	9	11	20			
3.5													
4.0		3.50m to 6.00m , Yellowish brown poorly graded silty sand non-plastic											
4.5						SPT-3	50 (4cm)			REF			
5.0													
5.5													
6.0						SPT-4	50 (3cm)			REF			
6.5		6.00m to 10.50m , Yellowish brown highly weathered very poor sand stone				CR-1						41.00	0.00
7.0													
7.5													
8.0						CR-2						49.00	15.00
8.5													
9.0													
9.5						CR-3						40.00	0.00
10.0													
10.5													
11.0						CR-4						57.00	7.00
11.5		10.50m to 14.00m , Yellowish brown slightly weathered very poor sand stone				SPT-5/CR-5	48	50 (4cm)		REF		51.00	9.00
12.0													
12.5													
13.0													
13.5													
14.0		14.00m to 15.00m , Yellowish brown slightly weathered very poor silt stone				CR-6						68.00	15.00
14.5													
15.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-121		LOCATION		FGD U#5		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		799		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.95		CO-ORDINATES N		1325		CASING DEPTH, m		3.50			
START DATE		20/02/2023		GROUND ELEVATION		276.152		CORE DIAMETER		54 mm			
END DATE		21/02/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m , Filled up soil				DS-1							
1.0		0.50m to 2.00m , Yellowish brown silty sand with traces of gravels ,Non-elastic				SPT-1	6	8	8	16			
1.5													
2.0													
2.5		2.00m to 3.50m Yellowish brown clayey sand of inmediate plasticity with traces of gravels											
3.0						UDS-1							
3.5													
4.0		3.50m to 5.00m , Yellowish brown silty sand with traces of gravels ,Non-elastic											
4.5						SPT-2	7	9	11	20			
5.0													
5.5		5.00m to 6.50m , Grayish brown moderately weathered poor silty sand stone				CR-1					60.00	0.00	
6.0													
6.5													
7.0		6.50m to 7.50m, Brown silty sand , non-plastic											
7.5						SPT-3	30	50 (3cm)		REF			
8.0		7.50m to 13.00m , Yellowish brown moderately and weathered fair to poor silt stone				CR-2					67.00	31.00	
8.5													
9.0													
9.5						CR-3					73.00	61.00	
10.0													
10.5													
11.0						CR-4					80.00	69.00	
11.5													
12.0													
12.5						CR-5					85.00	73.00	
13.0													
13.5													
14.0	13.00m to 15.00m , Yellowish brown fresh and good silt stone					CR-6					97.00	79.00	
14.5													
15.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-122		LOCATION		FGD U#5		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		860		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.95		CO-ORDINATES N		1231		CASING DEPTH, m		3.50			
START DATE		02/03/2023		GROUND ELEVATION		276.381		CORE DIAMETER		54 mm			
END DATE		03/03/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m , Filled up soil				DS-1							
1.0		0.50m to 8.00m , Yellowish brown clayey sand of intermediate plasticity											
1.5						SPT-1	5	5	9	14			
2.0													
2.5													
3.0						SPT-2	4	10	13	23			
3.5													
4.0													
4.5						UDS-1							
5.0													
5.5													
6.0						SPT-3	9	11	15	26			
6.5													
7.0													
7.5						SPT-4	8	18	28	46			
8.0													
8.5		8.00m to 9.00m, Yellowish brown fresh and very poor sand stone				CR-1						100.0	21.00
9.0		9.00m to 12.00m, Yellowish brown slightly weathered and poor to very poor sand stone				CR-2						89.00	24.00
9.5						CR-3						83.00	27.00
10.0													
10.5													
11.0		CR-4							99.00	55.00			
11.5			12.00m to 13.50m, Yellowish brown fresh and fair sand stone										
12.0													
12.5		13.50m to 16.50m, Yellowish brown fresh and good sand stone	CR-5							90.00	77.00		
13.0													
13.5													
14.0													
14.5													
15.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD								
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.							
BOREHOLE NO.		DBH-122	LOCATION	FGD U#5	TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00	CO-ORDINATES E	860	DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.95	CO-ORDINATES N	1231	CASING DEPTH, m		3.50			
START DATE		02/03/2023	GROUND ELEVATION	276.381	CORE DIAMETER		54 mm			
END DATE		03/03/2023	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE	SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
				N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
15.5		13.50m to 16.50m, Yellowish brown fresh and good sand stone	CR-6						94.00	80.00
16.0										
16.5										
17.0		16.50m to 19.50 , yellowish brown slightly weathered poor to very poor sand stone	CR-7						78.00	21.00
17.5										
18.0										
18.5										
19.0										
19.5										
20.0										
		19.50m to 20.00m , Yellowish brown fresh and excellent sand stone	CR-9						100.0	100.0

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD									
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.								
BOREHOLE NO.		DBH-123	LOCATION	Coal Settling Pond	TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		10.00	CO-ORDINATES E	968	DRILLING METHOD		ROTARY				
GROUND WATER TABLE		2.50	CO-ORDINATES N	1167	CASING DEPTH, m		2.50				
START DATE		05/01/2023	GROUND ELEVATION	276.265	CORE DIAMETER		54 mm				
END DATE		05/01/2023	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE		SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m, Filled up soil		DS							
1.0		0.50 to 3.00m, Yellowish brown poorly graded silty sand non-plastic									
1.5				SPT	9	15	20	35			
2.0											
2.5											
3.0		3.00m to 4.50m, Yellowish brown clayey sand of high plasticity with fraction of gravels		SPT	8	25	50 (5cm)	REF			
3.5											
4.0											
4.5	SPT			20	50 (3cm)		REF				
5.0		4.50m to 6.00m, Yellowish brown silty sand ,Non-plastic									
5.5											
6.0	SPT			50 (7cm)			REF				
6.5	CR								31.00	0.00	
7.0		6.00m to 10.00m, Highly to moderately weathered, very poor yellowish brown silty sandstone									
7.5											
8.0				CR						29.00	0.00
8.5											
9.0											
9.5				CR						57.00	0.00
10.0											

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MK M.K. SOIL TESTING LABORATORY PRIVATE LIMITED		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD												
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.											
BOREHOLE NO.		DBH-125		LOCATION		Railway Crossing		TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		12.00		CO-ORDINATES E		82.081		DRILLING METHOD		ROTARY				
GROUND WATER TABLE		1.50		CO-ORDINATES N		2047.125		CASING DEPTH, m		6.00				
START DATE		02/03/2023		GROUND ELEVATION		276.81		CORE DIAMETER		54 mm				
END DATE		02/03/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE			
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %	
0.5		0.00m to 0.50m , Filled up soil				DS-1								
1.0		0.50m to 12.00m , Yellowish brown silty sand non-plastic												
1.5						SPT-1	17	21	23	44				
2.0														
2.5														
3.0						SPT-2	19	26	31	57				
3.5														
4.0														
4.5						SPT-3	47	50 (11cm)		REF				
5.0														
5.5														
6.0						SPT-4	50 (9cm)			REF				
6.5														
7.0														
7.5						SPT-5	50 (6cm)			REF				
8.0														
8.5														
9.0						SPT-6	50 (7cm)			REF				
9.5														
10.0														
10.5						SPT-7	50 (3cm)			REF				
11.0														
11.5														
12.0						SPT-8	50 (14cm)			REF				

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-126		LOCATION		Railway Crossing		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		12.00		CO-ORDINATES E		164		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.65		CO-ORDINATES N		1996		CASING DEPTH, m		6.00			
START DATE		26/02/2023		GROUND ELEVATION		278.308		CORE DIAMETER		54 mm			
END DATE		26/02/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m , Filled up soil				DS-1							
1.0		0.50m to 7.00m , Yellowish brown silty clay of intermediate plasticity with intermittent races of gravelas											
1.5						SPT-1	12	17	23	40			
2.0													
2.5													
3.0						SPT-2	15	19	26	45			
3.5													
4.0													
4.5						SPT-3	20	27	31	58			
5.0													
5.5													
6.0						SPT-4	26	33	39	72			
6.5													
7.0													
7.5		7.00m to 12.00m , Yellowish brown clayey sand of high plasticity				SPT-5	48	50 (3cm)		REF			
8.0													
8.5													
9.0						SPT-6	46	50 (3cm)		REF			
9.5													
10.0													
10.5						SPT-7	50 (12cm)			REF			
11.0													
11.5													
12.0						SPT-8	50 (6cm)			REF			

MK M.K. SOIL TESTING LABORATORY PRIVATE LIMITED		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD									
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.								
BOREHOLE NO.		DBH-127	LOCATION	Railway Crossing	TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		12.00	CO-ORDINATES E	200	DRILLING METHOD		ROTARY				
GROUND WATER TABLE		NMW	CO-ORDINATES N	1966	CASING DEPTH, m		2.50				
START DATE		14/02/2023	GROUND ELEVATION	276.283	CORE DIAMETER		54 mm				
END DATE		14/02/2023	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE		SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m , Filled up soil		DS							
1.0		0.50m to 3.00m , Yellowish brown silty sand non-plastic									
1.5				SPT	10	11	13	24			
2.0											
2.5											
3.0				SPT	12	19	21	40			
3.5		3.00m to 12.00m , Yellowish white silty sand of high plasticity									
4.0											
4.5				SPT	13	21	24	45			
5.0											
5.5											
6.0				SPT	36	50 (5cm)		REF			
6.5											
7.0											
7.5				SPT	45	50 (3cm)		REF			
8.0											
8.5											
9.0				SPT	50 (10cm)			REF			
9.5											
10.0											
10.5				SPT	50 (8cm)			REF			
11.0											
11.5											
12.0											
				SPT	50 (6cm)			REF			

MK M.K. SOIL TESTING LABORATORY PRIVATE LIMITED		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-128		LOCATION		Ash Silo		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		353		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		9.00		CO-ORDINATES N		1684		CASING DEPTH, m		6.00			
START DATE		24/02/2023		GROUND ELEVATION		281.169		CORE DIAMETER		54 mm			
END DATE		24/02/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.20m , Filled up soil				DS-1							
1.0		0.20m to 4.50m , Yellowish brown clayey sand of high plasticity											
1.5						SPT-1	4	5	7	12			
2.0													
2.5													
3.0						SPT-2	15	27	34	61			
3.5													
4.0													
4.5			SPT-3	27	50 (4cm)		REF						
5.0		4.50m to 15.00m , Yellowish brown highly weathered and poor to very poor silty sand stone				CR						29.00	0.00
5.5													
6.0													
6.5						CR						43.00	21.00
7.0													
7.5													
8.0						CR						45.00	13.00
8.5													
9.0													
9.5						CR						40.00	31.00
10.0													
10.5													
11.0						CR						21.00	0.00
11.5													
12.0													
12.5	CR						41.00	25.00					
13.0													
13.5													
14.0													
14.5													
15.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD									
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.								
BOREHOLE NO.		DBH-129	LOCATION	Utility Bldg.	TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		10.00	CO-ORDINATES E	398	DRILLING METHOD		ROTARY				
GROUND WATER TABLE		9.00	CO-ORDINATES N	1726	CASING DEPTH, m		6.00				
START DATE		25/02/2023	GROUND ELEVATION	281.081	CORE DIAMETER		54 mm				
END DATE		25/02/2023	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE		SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.25m , Filled up soil		DS-1							
1.0		0.25m to 2.00m , Yellowish brown poorly graded silty sand non-plastic									
1.5				SPT-1	2	3	3	6			
2.0											
2.5		2.00m to 3.50m , Yellowish brown silty sand , non-plastic									
3.0				SPT-2	4	8	17	25			
3.5											
4.0											
4.5		3.50m to 8.00m ,Yellowish brown silty clay of low plasticity		SPT-3	18	29	43	72			
5.0											
5.5											
6.0				SPT-4	31	50 (4cm)		REF			
6.5											
7.0											
7.5				SPT-5	50 (13cm)			REF			
8.0											
8.5		8.00m to 10.00m , Yellowish brown poorly graded silty sand non-plastic									
9.0				SPT-6	50 (2cm)			REF			
9.5											
10.0				SPT-7	50 (4cm)			REF			

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-131		LOCATION		CT-02		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		404		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.86		CO-ORDINATES N		862		CASING DEPTH, m		6.00			
START DATE		05/03/2023		GROUND ELEVATION		270.302		CORE DIAMETER		54 mm			
END DATE		05/03/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m , Filled up soil				DS-1							
1.0		0.50m to 5.00m, Yellowish brown clayey sand of intermediate plasticity				SPT-1	4	6	8	14			
1.5													
2.0													
2.5													
3.0						SPT-2	3	6	7	13			
3.5													
4.0													
4.5						SPT-3	4	7	9	16			
5.0													
5.5		5.00m to 10.50m , Yellowish brown silty sand , non-plastic											
6.0						SPT-4	8	13	14	27			
6.5													
7.0													
7.5						SPT-5	50 (13cm)			REF			
8.0													
8.5													
9.0						SPT-6	50 (2cm)			REF			
9.5													
10.0													
10.5					SPT-7	50 (5cm)			REF				
11.0		10.50m to 13.50m , Yellowish brown highly weathered and very poor silty sand stone				SPT-8/CR-1	50 (6cm)			REF		28.00	23.00
11.5													
12.0													
12.5						SPT-9/CR-2	51 (8cm)			REF		26.00	7.00
13.0													
13.5													
14.0		13.50m to 19.50m, Yellowish brown silty sand , non-plastic											
14.5													
15.0						SPT-10	50 (8cm)			REF			

MK M K SOIL TESTING LABORATORY PRIVATE LIMITED		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD									
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.								
BOREHOLE NO.		DBH-131	LOCATION	CT-02	TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		20.00	CO-ORDINATES E	404	DRILLING METHOD		ROTARY				
GROUND WATER TABLE		1.86	CO-ORDINATES N	862	CASING DEPTH, m		6.00				
START DATE		05/03/2023	GROUND ELEVATION	270.302	CORE DIAMETER		54 mm				
END DATE		05/03/2023	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE		SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
15.5		13.50m to 19.50m, Yellowish brown silty sand , non-plastic									
16.0				SPT-11	50 (4cm)			REF			
16.5											
17.0											
17.5											
18.0				SPT-12	50 (7cm)			REF			
18.5											
19.0											
19.5				SPT-13	50 (3cm)			REF			
20.0		19.50m to 20.00m , Grayish brown fresh and fair silty sand stone		CR-3					93.00	66.00	

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-132		LOCATION		Crusher House		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		1409.775		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		2.10		CO-ORDINATES N		1353.691		CASING DEPTH, m		6.00			
START DATE		27/02/2023		GROUND ELEVATION		277.235		CORE DIAMETER		54 mm			
END DATE		27/02/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.85m , Filled up soil				DS-1							
1.0													
1.5		0.85m to 9.00m, Yellowish brown silty clay of low plasticity				UDS-1							
2.0													
2.5													
3.0						SPT-1	2	3	7	10			
3.5													
4.0													
4.5						SPT-2	2	2	4	6			
5.0													
5.5													
6.0						SPT-3	7	7	8	15			
6.5													
7.0													
7.5						SPT-4	4	6	7	13			
8.0													
8.5													
9.0						SPT-5	50 (10cm)			REF			
9.5		9.00m to 10.50m, Reddish brown highly weathered and very poor sand stone				CR-1					36.00	0.00	
10.0													
10.5													
11.0		10.50m to 20.00m, Yellowish brown silty clay of inermediate plasticity											
11.5													
12.0						SPT-6	50 (6cm)			REF			
12.5													
13.0													
13.5						SPT-7	50 (8cm)			REF			
14.0													
14.5													
15.0						SPT-8	50 (4cm)			REF			

MK M.K. SOIL TESTING LABORATORY PRIVATE LIMITED		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD									
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.								
BOREHOLE NO.		DBH-132	LOCATION	Crusher House	TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		20.00	CO-ORDINATES E	1409.775	DRILLING METHOD		ROTARY				
GROUND WATER TABLE		2.10	CO-ORDINATES N	1353.691	CASING DEPTH, m		6.00				
START DATE		27/02/2023	GROUND ELEVATION	277.235	CORE DIAMETER		54 mm				
END DATE		27/02/2023	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE			SAMPLE TYPE	SPT N-VALUE				ROCK CORE	
						N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY
		10.50m to 20.00m, Yellowish brown silty clay of inermediate plasticity									
15.5											
16.0											
16.5			SPT-9	50 (5cm)			REF				
17.0											
17.5											
18.0			SPT-10	50 (4cm)			REF				
18.5											
19.0											
19.5			SPT-11	50 (5cm)			REF				
20.0		SPT-12	50 (4cm)			REF					

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD										
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.									
BOREHOLE NO.		DBH-133	LOCATION	MCC CHP	TYPE OF RIG		HYDRAULIC					
BOREHOLE DEPTH, m		15.00	CO-ORDINATES E	1298.691	DRILLING METHOD		ROTARY					
GROUND WATER TABLE		3.10	CO-ORDINATES N	1426.882	CASING DEPTH, m		6.00					
START DATE		23/02/2023	GROUND ELEVATION	281.201	CORE DIAMETER		54 mm					
END DATE		23/02/2023	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm					
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE		SAMPLE TYPE	SPT N-VALUE				ROCK CORE			
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %	
0.5		0.00m to 1.20m , Filled up soil		DS-1								
1.0												
1.5		1.20m to 5.00m, Yellowish brown clayey sand of intermediate plasticity whit gravwls		SPT-1	3	4	4	8				
2.0												
2.5												
3.0				SPT-2	6	7	8	15				
3.5												
4.0												
4.5				SPT-3	5	5	7	12				
5.0												
5.5		5.00m to 15.00m, Yellowish brown clayey sand of intermediate plasticity										
6.0				SPT-4	5	9	7	16				
6.5												
7.0												
7.5				SPT-5	6	7	8	15				
8.0												
8.5												
9.0				SPT-6	41	50 (8cm)		REF				
9.5												
10.0												
10.5				SPT-7	50 (13cm)			REF				
11.0												
11.5												
12.0				SPT-8	50 (12cm)			REF				
12.5												
13.0												
13.5				SPT-9	50 (8cm)			REF				
14.0												
14.5												
15.0				SPT-10	50 (6cm)			REF				

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD										
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.									
BOREHOLE NO.		DBH-134	LOCATION	TP	TYPE OF RIG		HYDRAULIC					
BOREHOLE DEPTH, m		15.00	CO-ORDINATES E	1400	DRILLING METHOD		ROTARY					
GROUND WATER TABLE		3.10	CO-ORDINATES N	1455	CASING DEPTH, m		6.00					
START DATE		22/02/2023	GROUND ELEVATION	276.588	CORE DIAMETER		54 mm					
END DATE		22/02/2023	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm					
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE		SAMPLE TYPE	SPT N-VALUE				ROCK CORE			
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %	
0.5		0.00m to 1.25m , Filled up soil		DS-1								
1.0												
1.5		1.25m to 6.50m , Yellowish brown silty clay of intermediate plasticity		SPT-1	3	5	6	11				
2.0												
2.5												
3.0				SPT-2	6	8	7	15				
3.5												
4.0				UDS-1								
4.5				SPT-3	6	8	10	18				
5.0												
5.5												
6.0				SPT-4	10	9	11	20				
6.5												
7.0		6.50m to 8.00m , Reddish brown silty sand , non-plastic										
7.5				SPT-5	9	10	12	22				
8.0												
8.5		8.00m to 9.00m , Yellowish brown highly weathered and very poor silty sand stone		CR-1						34.00	0.00	
9.0												
9.5		9.00m to 15.00m, Yellowish brown silty sand, non-plastic										
10.0												
10.5				SPT-6	50 (10cm)			REF				
11.0												
11.5												
12.0				SPT-7	50 (12cm)			REF				
12.5												
13.0												
13.5				SPT-8	50 (8cm)			REF				
14.0												
14.5												
15.0				SPT-9	17	50 (10cm)		REF				

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD									
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.								
BOREHOLE NO.		DBH-135	LOCATION	H2 Plant	TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		10.00	CO-ORDINATES E	1432	DRILLING METHOD		ROTARY				
GROUND WATER TABLE		2.10	CO-ORDINATES N	1637	CASING DEPTH, m		6.00				
START DATE		27/02/2023	GROUND ELEVATION	282.132	CORE DIAMETER		54 mm				
END DATE		28/02/2023	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE		SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m , Filled up soil		DS-1							
1.0		0.50m to 10.00m, Yellowish brown silty clay of low plasticity									
1.5				SPT-1	5	6	7	13			
2.0											
2.5											
3.0				SPT-2	10	13	17	30			
3.5											
4.0											
4.5				SPT-3	39	50 (6cm)		REF			
5.0											
5.5											
6.0				SPT-4	47	50 (12cm)		REF			
6.5											
7.0											
7.5				SPT-5	50 (3cm)			REF			
8.0											
8.5											
9.0				SPT-6	50 (5cm)			REF			
9.5											
10.0				SPT-7	50 (6cm)			REF			

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD									
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.								
BOREHOLE NO.		DBH-136	LOCATION	CASPH	TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		15.00	CO-ORDINATES E	794	DRILLING METHOD		ROTARY				
GROUND WATER TABLE		2.10	CO-ORDINATES N	994	CASING DEPTH, m		3.50				
START DATE		22/02/2023	GROUND ELEVATION	276.195	CORE DIAMETER		54 mm				
END DATE		23/02/2023	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE		SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.78m , Filled up soil		DS-1							
1.0											
1.5		0.78m to 5.00m , Grayish brown silty clay of low plasticity		SPT-1	2	3	5	8			
2.0											
2.5											
3.0				SPT-2	5	6	6	12			
3.5											
4.0											
4.5				UDS-1							
5.0				SPT-3	6	7	8	15			
5.5		5.00m to 13.50 , Yellowish brown silty clay of intermediate plasticity with traces of gravels									
6.0				SPT-4	8	10	11	21			
6.5											
7.0											
7.5				SPT-5	10	13	14	27			
8.0											
8.5											
9.0				SPT-6	7	10	17	27			
9.5											
10.0											
10.5				SPT-7	12	19	22	41			
11.0											
11.5											
12.0				SPT-8	14	17	27	44			
12.5											
13.0											
13.5		SPT-9	15	50 (7cm)	-	REF					
14.0		13.50m to 15.00m , Reddish brown slightly weathered poor silty sand stone		CR						86.00	47.00
14.5											
15.0											

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD												
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.											
BOREHOLE NO.		DBH-137		LOCATION		DM Tank		TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		1064		DRILLING METHOD		ROTARY				
GROUND WATER TABLE		1.95		CO-ORDINATES N		831		CASING DEPTH, m		2.50				
START DATE		01/02/2023		GROUND ELEVATION		276.332		CORE DIAMETER		54 mm				
END DATE		04/02/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE			
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %	
0.5		0.00m to 0.35m , Filled up soil				DS								
1.0		0.35m to 9.00m , Yellowish brown silty sand with traces of gravels non-plastic												
1.5						SPT	3	4	6	10				
2.0														
2.5														
3.0						SPT	5	5	7	12				
3.5														
4.0														
4.5						SPT	4	5	8	13				
5.0														
5.5														
6.0						SPT	6	10	13	23				
6.5														
7.0														
7.5						SPT	32	37	47	84				
8.0														
8.5														
9.0	SPT	36	50 (6cm)		REF									
9.5		9.00m to 15.00m , Yellowish brown sandy clay of intermediate plasticity with traces of gravels												
10.0														
10.5						SPT	50 (12cm)		REF					
11.0														
11.5														
12.0						SPT	50 (11cm)		REF					
12.5														
13.0														
13.5						SPT	50 (10cm)		REF					
14.0														
14.5														
15.0	SPT	50 (6cm)		REF										

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-138		LOCATION		ID Fan U#6 <th colspan="2">TYPE OF RIG</th> <td colspan="2">HYDRAULIC</td>		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		783		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.50		CO-ORDINATES N		1165		CASING DEPTH, m		2.50			
START DATE		31/12/2022		GROUND ELEVATION		276.116		CORE DIAMETER		54 mm			
END DATE		02/01/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m, Filled up soil				DS							
1.0		0.50m to 5.00m, Yellowish brown clayey sand of high plasticity											
1.5						SPT	3	4	5	9			
2.0													
2.5													
3.0						SPT	3	4	6	10			
3.5													
4.0													
4.5						SPT	5	6	8	14			
5.0		5.00m to 7.50m, Yellowish brown silty sand ,Non plastic											
5.5													
6.0	SPT					6	7	11	18				
6.5													
7.0													
7.5	SPT	8	20	31	51								
8.0		7.50m to 9.50, Brown clayey sand of high plasticity											
8.5													
9.0						SPT	15	24	35	59			
9.5													
10.0		9.50m to 15.00, Moderately to slightly weathered, very poor to poor brown silty sandstone				CR						82.00	30.00
10.5													
11.0						CR						62.00	15.00
11.5													
12.0													
12.5						CR						66.00	20.00
13.0													
13.5													
14.0						CR						77.00	18.00
14.5													
15.0													

MK MK SOIL TESTING LABORATORY PRIVATE LIMITED		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-139		LOCATION		ID Fan U#6 <th colspan="2">TYPE OF RIG</th> <td colspan="2">HYDRAULIC</td>		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		803.759		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		2.30		CO-ORDINATES N		1113.309		CASING DEPTH, m		2.50			
START DATE		26/12/2022		GROUND ELEVATION		275.689		CORE DIAMETER		54 mm			
END DATE		30/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m, Filled up soil				DS							
1.0		0.50m to 7.50m , Yellowish brown clayey sand of high plasticity											
1.5						SPT	3	2	3	5			
2.0													
2.5													
3.0						SPT	3	4	4	8			
3.5													
4.0													
4.5						SPT	8	8	10	18			
5.0													
5.5													
6.0						SPT	50 (14cm)			REF			
6.5													
7.0													
7.5						SPT	23 50 (7cm)	50 (8cm)		REF REF			45.00
8.0		7.50m to 20.00m , Highly to slightly weathered, very poor to poor greyish brown silty sandstone with fragments				SPT/CR	50 (9cm)			REF		48.00	0.00
8.5													
9.0													
9.5						SPT/CR				REF		24.00	10.00
10.0													
10.5													
11.0						CR						63.00	19.00
11.5													
12.0													
12.5	CR						72.00	39.00					
13.0													
13.5													
14.0													
14.5													
15.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD												
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.											
BOREHOLE NO.		DBH-139		LOCATION		ID Fan U#6		TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		803.759		DRILLING METHOD		ROTARY				
GROUND WATER TABLE		2.30		CO-ORDINATES N		1113.309		CASING DEPTH, m		2.50				
START DATE		26/12/2022		GROUND ELEVATION		275.689		CORE DIAMETER		54 mm				
END DATE		30/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm				
DEPTH	VISUAL DESCRIPTION OF SOIL SAMPLE					SAMPLE TYPE	SPT N-VALUE				ROCK CORE			
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %	
15.5	7.50m to 20.00m , Highly to slightly weathered, very poor to poor greyish brown silty sandstone with fragments					CR						66.00	42.00	
16.0						CR						39.00	18.00	
16.5														
17.0														
17.5														
18.0														
18.5													71.00	8.00
19.0														
19.5														
20.0														88.00

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-140		LOCATION		FGD Area U#6 <th colspan="2">TYPE OF RIG</th> <td colspan="2">HYDRAULIC</td>		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		865		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.20		CO-ORDINATES N		1089		CASING DEPTH, m		2.50			
START DATE		03/01/2023		GROUND ELEVATION		276.156		CORE DIAMETER		54 mm			
END DATE		04/01/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m, Filled up soil				DS							
1.0		0.50m to 9.00m , Yellowish brown clayey sand of high plasticity											
1.5						SPT	2	1	1	2			
2.0													
2.5						UDS							
3.0						SPT	5	4	8	12			
3.5													
4.0													
4.5						SPT	9	9	15	24			
5.0													
5.5													
6.0						SPT	50 (8cm)			REF			
6.5													
7.0													
7.5						SPT	15	22	30	52			
8.0													
8.5													
9.0						SPT	50 (12cm)			REF			
9.5		9.00m to 10.50m, Yellowish brown silty sand ,Non-plastic											
10.0													
10.5						SPT	50 (13cm)			REF			
11.0		10.50m to 15.50m , Highly weathered, very poor yellowish brown shale siltstone				CR						30.00	0.00
11.5													
12.0													
12.5						CR						40.00	0.00
13.0													
13.5													
14.0						CR						47.00	7.00
14.5													
15.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD										
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.									
BOREHOLE NO.		DBH-140	LOCATION	FGD Area U#6	TYPE OF RIG		HYDRAULIC					
BOREHOLE DEPTH, m		20.00	CO-ORDINATES E	865	DRILLING METHOD		ROTARY					
GROUND WATER TABLE		1.20	CO-ORDINATES N	1089	CASING DEPTH, m		2.50					
START DATE		03/01/2023	GROUND ELEVATION	276.156	CORE DIAMETER		54 mm					
END DATE		04/01/2023	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm					
DEPTH	VISUAL DESCRIPTION OF SOIL SAMPLE			SAMPLE TYPE	SPT N-VALUE				ROCK CORE			
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %	
15.5		15.50m to 20.00m, Moderately to slightly weathered, very poor to poor greyish brown silty sandstone			CR						44.00	0.00
16.0												
16.5												
17.0					CR						56.00	21.00
17.5												
18.0												
18.5					CR						66.00	0.00
19.0												
19.5												
20.0					CR					84.00	50.00	

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD									
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.								
BOREHOLE NO.		DBH-141	LOCATION	Pipe Trestle Near Chimney	TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		20.00	CO-ORDINATES E	819	DRILLING METHOD		ROTARY				
GROUND WATER TABLE		1.82	CO-ORDINATES N	1160	CASING DEPTH, m		2.50				
START DATE		02/01/2023	GROUND ELEVATION	276.208	CORE DIAMETER		54 mm				
END DATE		05/01/2023	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE		SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m, Filled up soil		DS							
1.0		0.50m to 3.50m, Yellowish brown silty clay of intermediate plasticity									
1.5				SPT	3	3	4	7			
2.0											
2.5											
3.0				SPT	3	3	4	7			
3.5				UDS							
4.0		3.50m to 8.00m, Yellowish brown clayey sand of high plasticity									
4.5				SPT	4	6	6	12			
5.0											
5.5											
6.0				SPT	8	13	21	34			
6.5											
7.0											
7.5				SPT	16	20	30	50			
8.0											
8.5					CR						93.00
9.0		8.00m to 12.00m , Moderately to freshly weathered, very poor to poor yellowish brown silty sandstone									
9.5				CR						70.00	42.00
10.0											
10.5											
11.0				CR						55.00	32.00
11.5											
12.0		12.00m to 20.00m , Highly weathered, very poor to poor yellowish brown silty sandstone		CR						44.00	0.00
12.5											
13.0											
13.5											
14.0				CR						43.00	27.00
14.5											
15.0											

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-141		LOCATION		Pipe Trestle Near Chimney		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		20.00		CO-ORDINATES E		819		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.82		CO-ORDINATES N		1160		CASING DEPTH, m		2.50			
START DATE		02/01/2023		GROUND ELEVATION		276.208		CORE DIAMETER		54 mm			
END DATE		05/01/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH	VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE			
						N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %	
15.5	12.00m to 20.00m, Moderately weathered, very poor to poor yellowish brown silty sandstone				CR						57.00	33.00	
16.0					CR						58.00	10.00	
16.5													
17.0													
17.5													
18.0													
18.5												62.00	20.00
19.0													
19.5													
20.0												70.00	0.00

M.K. SOIL TESTING LABORATORY PRIVATE LIMITED MK		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD									
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.								
BOREHOLE NO.		DBH-142	LOCATION	Switchyard	TYPE OF RIG			HYDRAULIC			
BOREHOLE DEPTH, m		10.00	CO-ORDINATES E	364	DRILLING METHOD			ROTARY			
GROUND WATER TABLE		2.15	CO-ORDINATES N	1351	CASING DEPTH, m			2.00			
START DATE		06/12/2022	GROUND ELEVATION	276.351	CORE DIAMETER			54 mm			
END DATE		07/12/2022	CIRCULATION FLUID	WATER	DIAMETER OF HOLE			150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE		SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m, Filled up soil		DS							
1.0		0.50m to 7.00m, Grayish brown silty sand with gravels ,non-plastic									
1.5				SPT	9	11	21	32			
2.0											
2.5				SPT	9	15	24	39			
3.0											
3.5											
4.0				SPT	10	15	20	35			
4.5											
5.0											
5.5				SPT	14	26	38	64			
6.0											
6.5											
7.0											
7.5		7.00m to 8.50m , Highly weathered, very poor yellowish brown silty sandstone		SPT/CR	50 (2cm)			REF		13.00	0.00
8.0											
8.5		8.50m to 10.00 , Highly weathered, very poor yellowish brown ilty sandstone		SPT/CR	50 (4cm)			REF		23.00	8.00
9.0											
9.5											
10.0											

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD								
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.							
BOREHOLE NO.		DBH-143	LOCATION	Switchyard	TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		10.00	CO-ORDINATES E	266	DRILLING METHOD		ROTARY			
GROUND WATER TABLE		NMW	CO-ORDINATES N	1332	CASING DEPTH, m		2.50			
START DATE		08/02/203	GROUND ELEVATION	274.809	CORE DIAMETER		54 mm			
END DATE		09/02/2023	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE	SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
				N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
		0.00m to 0.20m ,Filled up soil								
0.5		0.20m to 7.50m , Yellowish brown silty clay of intermediate plasticity with traces of gravels	DS							
1.0										
1.5			SPT	4	6	7	13			
2.0			UDS							
2.5										
3.0			SPT	5	7	9	16			
3.5			UDS							
4.0										
4.5			SPT	10	13	15	28			
5.0			UDS							
5.5										
6.0			SPT	11	13	17	30			
6.5										
7.0										
7.5			SPT	8	22	35	57			
8.0		7.50m to 10.00m ,Yellowish brown clayey sand of high plasticity								
8.5										
9.0			SPT	16	34	50 (8cm)	REF			
9.5										
10.0			SPT	35	50 (5cm)		REF			

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD									
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.								
BOREHOLE NO.		DBH-144	LOCATION	Switchyard	TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		10.00	CO-ORDINATES E	323	DRILLING METHOD		ROTARY				
GROUND WATER TABLE		2.10	CO-ORDINATES N	1292	CASING DEPTH, m		2.50				
START DATE		03/12/2022	GROUND ELEVATION	276.476	CORE DIAMETER		54 mm				
END DATE		06/12/2022	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE		SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m, Filled up soil		DS							
1.0		0.50m to 3.00m, Greyish brown poorly graded silty sand									
1.5				SPT	6	9	12	21			
2.0											
2.5											
3.0		3.00m to 9.00m , Yellowish brown silty clay of low plasticity		SPT	6	10	11	21			
3.5											
4.0											
4.5	SPT			19	50 (9cm)		REF				
5.0											
5.5											
6.0	SPT			50 (7cm)			REF				
6.5											
7.0											
7.5	SPT			20	50 (10cm)		REF				
8.0											
8.5											
9.0				SPT	50 (11cm)			REF			
9.5		9.00m to 10.00m , Highly weathered, very poor brown silty sandstone		CR						36.00	0.00
10.0											

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD									
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.								
BOREHOLE NO.		DBH-145	LOCATION	Switchyard	TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		10.00	CO-ORDINATES E	121	DRILLING METHOD		ROTARY				
GROUND WATER TABLE		NMW	CO-ORDINATES N	1280	CASING DEPTH, m		2.50				
START DATE		10/02/2023	GROUND ELEVATION	274.356	CORE DIAMETER		54 mm				
END DATE		10/02/2023	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE		SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m , Filled up soil		DS							
1.0		0.50m to 4.50m , Grayish brown silty clay of intermediate plasticity with fraction of gravels									
1.5				SPT	6	9	10	19			
2.0											
2.5											
3.0				SPT	8	11	12	23			
3.5											
4.0											
4.5				SPT	10	13	15	28			
5.0		4.50m to 9.00m , Yellowish brown silty sand with fraction of gravels non-plastic									
5.5											
6.0				SPT	14	16	21	37			
6.5											
7.0											
7.5				SPT	12	19	26	45			
8.0											
8.5											
9.0				SPT	21	34	50 (3cm)	REF			
9.5		9.00m to 10.00m , Slightly weathered, very poor yellowish brown silty sandstone		CR						75.00	0.00
10.0											

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-146		LOCATION		Switchyard		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		10.00		CO-ORDINATES E		365		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.85		CO-ORDINATES N		1233		CASING DEPTH, m		2.50			
START DATE		03/12/2022		GROUND ELEVATION		276.112		CORE DIAMETER		54 mm			
END DATE		06/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m, Filled up soil				DS							
1.0		0.50m to 3.00m, Yellowish brown silty sand Non-plastic											
1.5						SPT	8	9	11	20			
2.0						UDS/DS							
2.5													
3.0						SPT	12	29	46	75			
3.5		3.00m to 9.00m, Yellowish brown silty clay of intermediate plasticity with fraction of gravels											
4.0													
4.5						SPT	10	15	22	37			
5.0													
5.5													
6.0						SPT	50 (8cm)			REF			
6.5													
7.0													
7.5						SPT	20	50 (4cm)		REF			
8.0													
8.5													
9.0						SPT	50 (6cm)			REF			
9.5		9.00m to 10.00m, Highly weathered, very poor greyish brown silty sandstone with fragments				SPT/CR	10	50 (12cm)		REF		28.00	0.00
10.0													

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD										
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.									
BOREHOLE NO.		DBH-147		LOCATION		Switchyard		TYPE OF RIG		HYDRAULIC		
BOREHOLE DEPTH, m		12.00		CO-ORDINATES E		284		DRILLING METHOD		ROTARY		
GROUND WATER TABLE		NMW		CO-ORDINATES N		1235		CASING DEPTH, m		2.50		
START DATE		11/02/2023		GROUND ELEVATION		273.282		CORE DIAMETER		54 mm		
END DATE		12/02/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm		
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE			SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
						N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 1.00m , Filled up soil			DS							
1.0												
1.5		1.00m to 1.50m , Yellowish brown clayey sand			SPT CR	34	39	50 (3cm)	REF			
2.0		1.50m to 12.00m , Highly to moderately weathered, very poor to poor, greyish brown sandstone with thin bands of siltstone									34.00	10.00
2.5												
3.0												
3.5											22.00	12.00
4.0												
4.5												
5.0											39.00	30.00
5.5												
6.0												
6.5											36.00	30.00
7.0												
7.5												
8.0											44.00	33.00
8.5												
9.0												
9.5							58.00	48.00				
10.0												
10.5												
11.0							47.00	30.00				
11.5												
12.0												

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-148		LOCATION		Switchyard		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		15.00		CO-ORDINATES E		358		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.40		CO-ORDINATES N		1125		CASING DEPTH, m		3.50			
START DATE		03/03/2023		GROUND ELEVATION		272.78		CORE DIAMETER		54 mm			
END DATE		03/03/2023		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m , Filled up soil				DS-1							
1.0		0.50m to 6.00m , Yellowish brown silty sand non-plastic											
1.5						SPT-1	18	21	26	47			
2.0													
2.5													
3.0						SPT-2	15	32	40	72			
3.5													
4.0													
4.5						SPT-3	38	39	48	87			
5.0													
5.5													
6.0						SPT-4	50 (8cm)			REF			
6.5		6.00m to 7.50m , Yellowish brown moderately weathered and very poor sandstone				CR						53.00	15.00
7.0													
7.5		7.50m to 9.00m ,Yellowish brown highly weathered and very poor sandstone				CR						48.00	7.00
8.0													
8.5		9.00m to 10.50m , Yellowish brown moderately weathered and poor sandstone				CR						52.00	30.00
9.0													
9.5		10.50m to 12.00m, Yellowish brown highly weathered and very poor sandstone				CR						45.00	20.00
10.0													
10.5		12.00m to 15.00m, Yellowish brown moderately weathered and very poor sandstone				CR						55.00	22.00
11.0													
11.5						CR						52.00	16.00
12.0													
12.5													
13.0													
13.5													
14.0													
14.5													
15.0													

MK M.K. SOIL TESTING LABORATORY PRIVATE LIMITED		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD								
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.							
BOREHOLE NO.		DBH-149	LOCATION	Switchyard	TYPE OF RIG	HYDRAULIC				
BOREHOLE DEPTH, m		15.00	CO-ORDINATES E	264	DRILLING METHOD	ROTARY				
GROUND WATER TABLE		1.40	CO-ORDINATES N	1145	CASING DEPTH, m	2.50				
START DATE		12/02/2023	GROUND ELEVATION	273.751	CORE DIAMETER	54 mm				
END DATE		13/02/2023	CIRCULATION FLUID	WATER	DIAMETER OF HOLE	150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE	SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
				N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 3.00m , Yellowish brown sandy clay of low plasticity	DS							
1.0										
1.5			SPT	15	19	28	47			
2.0			UDS							
2.5										
3.0			SPT	33	50 (4cm)		REF			
3.5		3.00m to 15.00m , Highly to moderately weathered, very poor to poor yellowish brown silty sandstone	CR						37.00	16.00
4.0										
4.5										
5.0			CR						36.00	8.00
5.5										
6.0										
6.5			CR						43.00	0.00
7.0										
7.5										
8.0			CR						53.00	0.00
8.5										
9.0										
9.5			CR						41.00	0.00
10.0										
10.5										
11.0			CR						44.00	27.00
11.5										
12.0										
12.5			CR						43.00	19.00
13.0										
13.5										
14.0			CR						56.00	26.00
14.5										
15.0										

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD									
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.								
BOREHOLE NO.		DBH-150	LOCATION	GT U#6	TYPE OF RIG		HYDRAULIC				
BOREHOLE DEPTH, m		15.00	CO-ORDINATES E	400	DRILLING METHOD		ROTARY				
GROUND WATER TABLE		0.50	CO-ORDINATES N	1155	CASING DEPTH, m		2.50				
START DATE		08/12/2022	GROUND ELEVATION	276.102	CORE DIAMETER		54 mm				
END DATE		09/12/2022	CIRCULATION FLUID	WATER	DIAMETER OF HOLE		150 mm				
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE		SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
					N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m, Filled up soil		DS							
1.0		0.50m to 9.00m, Yellowish brown clayey sand of intermediate plasticity									
1.5				SPT	6	8	8	16			
2.0											
2.5											
3.0				SPT	8	9	13	22			
3.5											
4.0											
4.5				SPT	9	11	14	25			
5.0											
5.5											
6.0				SPT	20	50 (7cm)		REF			
6.5											
7.0											
7.5				SPT	18	29	40	69			
8.0											
8.5											
9.0				SPT	50 (12cm)			REF			
9.5		9.00m to 10.50m, Highly weathered, very poor yellowish brown silty sandstone		SPT/CR	24	50 (7cm)		REF		15.00	0.00
10.0											
10.5		10.50m to 15.00m, Highly weathered,very poor yellowish brown silty sandstone with crushed rock and fragments		SPT/CR	30	50 (2cm)		REF		21.00	0.00
11.0											
11.5											
12.0											
12.5				CR						35.00	16.00
13.0											
13.5											
14.0				SPT/CR	15	50 (6cm)		REF		31.00	0.00
14.5											
15.0											

		M.K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD											
		PROJECT TITLE	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.										
BOREHOLE NO.		DBH-151		LOCATION		GT U#5		TYPE OF RIG		HYDRAULIC			
BOREHOLE DEPTH, m		12.00		CO-ORDINATES E		397		DRILLING METHOD		ROTARY			
GROUND WATER TABLE		1.90		CO-ORDINATES N		1247		CASING DEPTH, m		2.50			
START DATE		01/12/2022		GROUND ELEVATION		277.028		CORE DIAMETER		54 mm			
END DATE		02/12/2022		CIRCULATION FLUID		WATER		DIAMETER OF HOLE		150 mm			
DEPTH		VISUAL DESCRIPTION OF SOIL SAMPLE				SAMPLE TYPE	SPT N-VALUE				ROCK CORE		
							N1	N2	N3	N	CORE LENGTH cm	CORE RECOVERY	RQD, %
0.5		0.00m to 0.50m, Filled up soil				DS							
1.0		0.50m to 5.00m, Yellowish brown silty clay of low plasticity											
1.5						SPT	6	6	8	14			
2.0						UDS/DS							
2.5						SPT	5	8	10	18			
3.0													
3.5													
4.0						SPT	9	12	13	25			
4.5													
5.0													
5.5		5.00m to 10.00m , Yellowish brown silty clay of intermediate plasticity				SPT	28	50 (9cm)		REF			
6.0													
6.5													
7.0						SPT	29	50 (7cm)		REF			
7.5													
8.0													
8.5						SPT	50 (5cm)			REF			
9.0													
9.5													
10.0		10.00m to 12.00m , Highly weathered, very poor yellowish brown weak sandstone with thin bands of shale and siltstone with fragments				SPT CR	32	50 (8cm)		REF		10.66	0.00
10.5													
11.0													
11.5													
12.0						SPT/CR	50 (5cm)			REF		24.00	0.00

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Sheet No.

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk Dens. gms/cc	Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results					After. Limits			IS SL Classi	Grain Size				Test Method
									Pc/Pn kg/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	%	%		Gravl %	Sand %	Silt %	Clay %	
BH01	SPT01	1.00	Brownish grey, silty sand.														SM	78 22(Silt+Clay)				*See the Note
BH02	SPT01	1.00	Brownish grey, silty sand with traces of calcareous nodules and clay binders.														SM	65 35(Silt+Clay)				Do
BH03	UDS01	2.00	Yellowish grey, silty clay/clayey silt with sand mixture.							TRSH-UU 3.0 1.496 2.0 1.403 1.0 1.387	1.43	0	30	13			CL	47 42 11				Do
BH03	UDS02	4.00	Yellowish grey, silty sand with clay binders.		2.04	1.79	13 S 14 DR			DRSH-CU 0.5 0.471 1.0 0.766 2.0 1.492	0.11	35					SM	68 32(Silt+Clay)				Do
BH04	UDS01	2.00	Greyish brown, silty clay/clayey silt with sand mixture and kankars.			2.65											CL	35 48 17				Do
BH04	SPT03	5.00	Brownish grey, silty sand.														SM	79 21(Silt+Clay)				Do
BH05	UDS01	2.00	Light brownish grey, silty clay with sand mixture.		2.15	1.85	16 S 16 T 14 C	0.434		TRSH-UU 3.0 1.189 2.0 1.084 1.0 1.076 UNCONFD 0.0 1.153 0.0 0.967 0.0 0.892 REMOULD 0.0 0.879 0.0 0.692 0.0 0.505	1.12	0	36	17			CI	46 39 15				Do

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk		Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results				Atter. Limits				IS		Grain Size				Test Method
				Dens. gms/cc						Pe/sqcm	kg/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	SL %	Classificatio	Gravl %	Sand %	Silt %	Clay %		
BH05	UDS02	4.00	Yellowish grey, silty sand with clay binders.							DRSH-CU				0.23	35				SM			66	34(Silt+Clay)	Do
						0.5				0.589														
						1.0				0.907														
						2.0				1.620														
BH06	UDS01	1.00	Yellowish grey, silty sand with clay binders.	1.97		1.74		13 S 13 DR		DRSH-CU				0.19	34				SM			68	32(Silt+Clay)	Do
						0.5				0.531														
						1.0				0.864														
						2.0				1.545														
BH06	UDS02	3.00	Brownish grey, silty clay/clayey silt.				2.72		0.612	UNCONFD				0.28	0	32	15		CL		25	62	13	Do
						0.0				0.328														
						0.0				0.280														
						0.0				0.257														
						REMOULD				0.19	0													
						0.0				0.222														
						0.0				0.196														
						0.0				0.171														
BH06	UDS03	5.00	Yellowish grey, silty clay/clayey silt with sand mixture							UNCONFD				0.32	0	35	21	15	CI		29	57	14	Do
						0.0				0.583														
						0.0				0.233														
						0.0				0.155														
						REMOULD				0.24	0													
						0.0				0.463														
						0.0				0.161														
						0.0				0.119														
BH07	UDS01	2.00	Yellowish grey, silty clay/clayey silt with sand mixture & kankars.							TRSH-UU				0.94	9	31	12		CL		40	45	15	Do
						3.0				1.649														
						2.0				1.388														
						1.0				1.298														
						UNCONFD				1.06	0													
						0.0				1.217														
						0.0				1.038														
						0.0				0.951														
						REMOULD				0.85	0													
						0.0				0.994														
						0.0				0.845														
						0.0				0.724														

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk		Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results					Atter. Limits			IS			Grain Size					Test Method
				Dens. gms/cc	Per/Ph kg/sqcm					Frictn Deg.	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	SL %	Classificatio	Gravl %	Sand %	Silt %	Clay %						
										DRSH-CU					21											
										0.5	0.601															
										1.0	0.788															
										2.0	1.171															
BH07	UDS02	4.00	Light grey, silty clay/ clayey silt with traces of sand mixture.	2.09	1.18			19 S 16 T 20 C	0.504		TRSH-UU	0.32	0	31	15		CL			29	55	16		Do		
										3.0	0.346															
										2.0	0.312															
										1.0	0.289															
BH07	UDS03	6.00	Yellowish grey, silty clay/ clayey silt with sand mixture								UNCONFD	0.56	0	30	13		CL			46	42	12		Do		
										0.0	0.597															
										0.0	0.657															
										0.0	0.445															
										REMOULD		0.41	0													
										0.0	0.431															
										0.0	0.498															
										0.0	0.301															
BH08	UDS01	1.00	Brownish grey, silty sand with clay mixture.								DRSH-CU	0.10	34				SM		71	29(Silt+Clay)				Do		
										0.5	0.437															
										1.0	0.774															
										2.0	1.512															
BH08	UDS02	3.00	Brownish grey, silty clay with sand mixture.	1.95	1.68			15 S 16 T 18 C	0.505		TRSH-UU	0.30	0	32	15	11	CL		31	48	21		Do			
										3.0	0.301															
										2.0	0.295															
										1.0	0.291															
BH08	UDS03	5.00	Yellowish grey, silty clay/ clayey silt with sand mixture.								UNCONFD	0.49	0	34	16		CL		33	51	16		Do			
										0.0	0.630															
										0.0	0.599															
										0.0	0.251															
										REMOULD		0.37	0													
										0.0	0.482															
										0.0	0.472															
										0.0	0.167															

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk		Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results					Atter. Limits			IS		Grain Size					Test Method
				Dens. gms/cc						Pc/Ph kg/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	SL %	Classificatio	Gravl %	Sand %	Silt %	Clay %				
BH09	UDS01	2.00	Brownish grey, silty clay/clayey silt with sand mixture.	1.97	1.66	1.66	2.63	20 S 19 T		TRSH-UU 3.0 2.0 1.0	0.861 0.692 0.552	0.33	8	22	12		CL		55	31	14		Do		
BH09	UDS02	4.00	Yellowish brown, silty clay/clayey silt with sand mixture.							UNCONFD 0.0 0.0 0.0 REMOULD 0.0 0.0 0.0 DRSH-CU 0.5 1.0 2.0	0.475 0.437 0.456 0.312 0.303 0.302 0.633 0.851 1.268	0.45	0	27	12		CL		26	61	13		Do		
BH09	UDS03	6.00	Yellowish grey, clayey silt with sand mixture.							TRSH-UU 3.0 2.0 1.0	1.101 0.995 0.869	0.68	6	32	13		CL		25	63	12		Do		
BH09	SPT05	8.50	Greyish yellow, silty sand.														SM		74	26(Silt+Clay)			Do		
BH10	UDS01	2.00	Brownish grey, silty clay/clayey silt with sand mixture.				2.65			UNCONFD 0.0 0.0 0.0 REMOULD 0.0 0.0 0.0	0.340 0.487 0.566 0.240 0.342 0.410	0.46	0	28	13		CL		44	36	20		Do		
BH10	UDS02	4.00	Brownish grey, silty clay/clayey silt with sand mixture.							TRSH-UU 3.0 2.0 1.0	1.102 0.971 0.821	0.61	7	33	12		CL		45	40	15		Do		

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk Dens.		Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results				After Limits			IS SL Classi	Grain Size				Test Method
				gms/cc	gms/cc					Pc/Pn kg/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	% fctatio		Gravl %	Sand %	Silt %	Clay %	
BH10	UDS03	6.00	Yellowish grey clayey silt with sand mixture	2.14	1.85	1.85		16 S 15 T 14 C	0.463	TRSH-UU 3.0 1.815 2.0 1.644 1.0 1.574		1.27	6	36	13	10	CI	25	64	11		Do
BH11	UDS02	3.00	Brownish grey, clayey silt with sand mixture.							TRSH-UU 3.0 0.353 2.0 0.337 1.0 0.325		0.34	0	25	12		CL	60	27	13		Do
BH11	UDS03	5.00	Yellowish grey, clayey silt with sand mixture.							DRSH-CU 0.5 0.564 1.0 0.842 2.0 1.320		0.33	27				CL**	25	75(Silt+Clay)			Do
BH12	UDS01	2.00	Brownish grey, silty clay/clayey silt with sand mixture.	2.00	1.70	1.70	2.57	20 S 18 T 20 C	0.545	TRSH-UU 3.0 1.061 2.0 0.812 1.0 0.664		0.38	10	34	17		CL	28	61	11		Do
BH12	UDS02	4.00	Light grey, clayey silt with sand mixture.							UNCONF 0.0 0.324 0.0 0.364 0.0 0.324 REMOULD 0.0 0.220 0.0 0.243 0.0 0.222		0.33	0	27	15		CL	38	54	8		Do
BH12	UDS03	6.00	Yellowish grey, silty sand with clay binders.	2.02	1.81	1.81		12 S 12 DR		DRSH-CU 0.5 0.623 1.0 0.986 2.0 1.713		0.26	36				SM	61	39(Silt+Clay)			Do
BH13	UDS01	2.00	Brownish grey, silty clay with traces of kankars.	2.10	1.82	1.82		16 S 16 T		UNCONF 0.0 0.770 0.0 0.804 0.0 0.736		0.77	0	32	15		CL	29	55	16		Do

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk		Dry Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results				Atter. Limits			IS		Grain Size				Test Method
				Dens. gms/cc	Dens. gms/cc				Pe/Ph kg/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	SL %	Classi	Gravl %	Sand %	Silt %	Clay %		
									REMOULD				0.61			0						
									0.0 0.604													
									0.0 0.644													
									0.0 0.590													
BH13	UDS02	4.00	Brownish grey, silty clay with sand mixture.						TRSH-UU		0.31	13	28	23	13	CL			33	51	16	Do
									3.0 1.208													
									2.0 1.112													
									1.0 0.633													
BH14	UDS02	4.00	Yellowish grey, silty clay/clayey silt with steel grey spot.		2.13	1.83	2.65	17 S 17 T 15 C	0.493		0.86	3	33	11		CL			33	55	12	Do
									3.0 1.060													
									2.0 1.037													
									1.0 0.946													
BH15	UDS01	2.00	Yellowish grey, silty clay with sand mixture.						TRSH-UU		0.94	0	28	11		CL			47	41	12	Do
									3.0 0.969													
									2.0 0.935													
									1.0 0.912													
									UNCONF		0.48	0										
									0.0 0.459													
									0.0 0.479													
									0.0 0.509													
									REMOULD		0.40	0										
									0.0 0.360													
									0.0 0.378													
									0.0 0.408													
BH15	UDS02	4.00	Light grey, silty clay/clayey silt with sand mixture.		1.94	1.66		17 S 17 DR			0.45	22				CL**			27	73(Silt+clay)		Do
									DRSH-CU													
									0.5 0.652													
									1.0 0.855													
									2.0 1.263													
BH16	SPT01	1.00	Brownish grey, silty clay/clayey silt with sand mixture & calcareous nodules.													CL**	7	18	75(Silt+Clay)			Do

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk		Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results					Atter. Limits			IS				Grain Size				Test Method
				Dens. gms/cc	Ratio					Pe/Ph kg/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	SL %	Classificatio	Gravl %	Sand %	Silt %	Clay %					
BH17	UDS01	2.00	Brownish grey, clayey silty sand.							DRSH-CU					0.27	35		SM				68	23	9		Do
										0.5	0.621															
										1.0	0.977															
										2.0	1.681															
BH17	UDS02	4.00	Deep grey/light grey, silty clay/ clayey silt with sand mixture.							UNCONFD					0.22	0	25	13	CL			42	45	13		Do
										0.0	0.220															
										0.0	0.240															
										0.0	0.219															
										REMOULD					0.13	0										
										0.0	0.141															
										0.0	0.147															
										0.0	0.128															
BH17	UDS03	6.00	Brownish grey, silty clay/clayey silt with sand mixture.	1.95		1.63		20 S 20 T 19 C	0.542	TRSH-UU					0.49	5	25	13	CL			28	57	15		Do
										3.0	0.821															
										2.0	0.711															
										1.0	0.632															
BH18	UDS01	1.00	Brownish grey, silty clay with sand mixture.							DRSH-CU					0.41	17		CL**				23	77(Silt+Clay)			Do
										0.5	0.549															
										1.0	0.737															
										2.0	1.021															
BH18	UDS02	3.00	Yellowish brown, silty sand with clay binders & kankars.							DRSH-CU					0.11	34		SM				83	17(Silt+Clay)			Do
										0.5	0.451															
										1.0	0.788															
										2.0	1.459															
BH18	UDS04	7.00	Brownish grey, silty clay/clayey silt with sand mixture.	2.02		1.70	2.66	18 S 19 T 21 C	0.555	TRSH-UU					0.95	5	29	16	CL			35	45	20		Do
										3.0	1.321															
										2.0	1.189															
										1.0	1.122															
										UNCONFD					1.02	0										
										0.0	1.025															
										0.0	1.033															
										0.0	1.015															
										REMOULD					0.73	0										
										0.0	0.726															
										0.0	0.736															
										0.0	0.728															

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk		Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results				Atter. Limits			IS		Grain Size				Test Method
				Dens. gms/cc						Pc/Ph kg/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	SL %	Classificatio	Gravl %	Sand %	Silt %	Clay %		
BH19	UDS01	2.00	Greyish brown, silty sand with clay binders.							DRSH-CU 0.5 1.0 2.0	0.466 0.781 1.415	0.15	32				SM		75	25(Silt+Clay)		Do	
BH19	UDS02	4.00	Brownish grey clayey siltwith sand mixture							UNCONFD 0.0 0.0 0.0 0.0 REMOULD 0.0 0.0 0.0	0.791 0.665 0.535 0.613 0.511 0.419	0.66	0	26	12		CL		58	28	14	Do	
BH19	UDS03	6.00	Yellowish brown clayey silt with traces of sand mixture							TRSH-UU 3.0 2.0 1.0	0.423 0.407 0.392	0.41	0	27	12		CL		43	44	13	Do	
BH20	UDS02	4.00	Yellowish grey, clayey silt with sand mixture.			2.10	1.82	2.64	15 S 15 T 11 C	0.360		0.49	0	23	13		CL		65	23	12	Do	
BH20	UDS03	6.00	Yellowish grey, silty clay/clayey silt with sand mixture.							UNCONFD 0.0 0.0 0.0 0.0 REMOULD 0.0 0.0 0.0	0.331 0.322 0.319 0.211 0.209 0.209	0.32	0	32	15	12	CL		25	52	23	Do	
BH21	UDS01	2.00	Brownish grey, clayey silt with sand mixture.														CL**		19	81(Silt+Clay)		Do	

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk Dens.		Dry Dens.	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results					After. Limits			IS SL Classi	Grain Size				Test Method
				gms/cc	gms/cc					Pc/Pn kg/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	%	ficatio		Gravl %	Sand %	Silt %	Clay %	
BH21	UDS02	4.00	Brownish grey, clayey silt with sand mixture.							DRSH-CU 0.5 1.0 2.0	0.18 0.462 0.794 1.358	0.18	31				CL**			55	29	16	Do
BH21	UDS03	6.00	Brownish grey, clayey silt with sand mixture.														CL**		40	60	(Silt+Clay)		Do
BH22	SPT01	1.00	Brownish grey, silty sand.														SM-SP		91	9	(Silt+Clay)		Do
BH23	SPT03	3.75	Brownish grey, silty sand.														SM		73	27	(Silt+Clay)		Do
BH24	UDS01	2.00	Yellowish grey, silty clay/clayey silt with sand mixture.	2.16		1.89	2.63	14 S 14 T 13 C	0.379	TRSH-UU 3.0 2.0 1.0	1.099 1.014 0.959	0.83	4	37	18	15	CI		49	40	11		Do
BH25	SPT01	1.00	Brownish grey, silty clay/clayey silt with sand mixture.											32	13		CL						
BH26	UDS01	2.00	Brownish grey, silty clay/clayey silt with sand mixture, rusty spot & steel grev spot	2.06		1.75		18 S 17 DR		DRSH-CU 0.5 1.0 2.0	0.44 0.551 0.819 1.051	0.44	18				CL**		45	55	(Silt+Clay)		Do
BH27	UDS01	1.00	Brownish grey, silty clay/clayey silt with sand mixture.							DRSH-CU 0.5 1.0 2.0	0.29 0.605 0.783 1.403	0.29	29				CL**		25	75	(Silt+Clay)		Do

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk		Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results					Atter. Limits			IS		Grain Size				Test Method
				Dens. gms/cc						Pe/Ph kg/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	SL %	Classificatio	Gravl %	Sand %	Silt %	Clay %			
BH28	DS01	0.50	Brownish grey, silty clay/clayey silt with traces of sand mixture.												28	12		CL						
BH29	SPT01	1.80	Brownish grey, silty sand.															SM-SP	91	9	9(Silt+Clay)			Do
BH30	SPT01	1.00	Brownish grey, silty sand with traces of kankars.															SP	98	2	2(Silt+Clay)			Do
BH30	UDS01	1.90	Brownish grey, silty clay/clayey silt.	2.03	1.79			14 S 14 T		UNCONFD 0.0 0.0 0.0 REMOULD 0.0 0.0 0.0		1.58	0	46	26		CI	9	81	10				Do
BH30	SPT02	2.50	Brownish grey, silty clay/clayey silt with traces of sand mixture.												35	14		CL						Do
BH31	SPT01	1.90	Yellowish brown, silty clay/clayey silt with sand mixture & steel grey patches.												33	12		CL	28	61	11			Do
BH32	UDS01	1.00	Brownish grey, silty clay/clayey silt with sand mixture & kankars.							TRSH-UU 3.0 2.0 1.0		0.37	4	28	13		CL	47	39	14				Do
BH32	UDS02	3.00	Greyish yellow, silty clay/clayey silt with sand mixture.	2.03	1.77			16 S 15 T		UNCONFD 0.0 0.0 0.0		1.58	0	30	14		CL	30	54	16				Do

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk Dens. gms/cc	Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results				Atter. Limits			IS		Grain Size				Test Method
									Pc/Pn kg/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	SL %	Classificatio	Gravl %	Sand %	Silt %	Clay %		
					REMOULD				1.39	0												
					0.0	1.220																
					0.0	1.347																
					0.0	1.605																
BH33	UDS02	4.00	Brownish grey, silty clay with sand mixture of kankars	2.13	1.83		17 S 16 T 16 C	0.490	TRSH-UU 3.0 0.604 2.0 0.540 1.0 0.407 UNCONFD	0.29	5	0	26	12		CL		56	27	17	Do	
									0.0 0.475 0.0 0.572 0.0 0.631 REMOULD	0.55		0										
									0.0 0.312 0.0 0.390 0.0 0.480	0.39		0										
BH33	SPT04	7.00	Light grey, silty sand.													SM		72	28(Silt+Clay)		Do	
BH34	UDS01	2.00	Brownish grey, silty clay with traces of kankars.						UNCONFD 0.0 1.156 0.0 0.871 0.0 0.594 REMOULD	0.87	0		40	14		CI					Do	
									0.0 0.948 0.0 0.689 0.0 0.483	0.70		0										
BH34	UDS03	6.00	Brownish grey, clayey silt with sand mixture.	2.11	1.80	2.65	17 S 17 T 17 C	0.481	TRSH-UU 3.0 0.625 2.0 0.509 1.0 0.485	0.35	4		31	12		CL		50	38	12	Do	
BH35	UDS01	2.00	Brownish grey, clayey silt with sand mixture.	2.14	1.83		16 S 17 T 16 C	0.456	TRSH-UU 3.0 0.641 2.0 0.607 1.0 0.561	0.60	0		31	11		CL		52	35	13	Do	

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk Dens. gms/cc	Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results					Atter. Limits			IS		Grain Size					Test Method
									Pc/Pn kg/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	SL %	Classi	Gravl %	Sand %	Silt %	Clay %				
BH35	UDS02	4.00	Yellowish grey, clayey silt with sand mixture.		UNCONFD					0.56	0	0	27	11		CL							Do	
					0.0	0.510																		
					0.0	0.623																		
					0.5	0.555																		
					REMOULD					0.31	0													
					0.0	0.368																		
					0.0	0.139																		
					0.0	0.421																		
BH35	UDS03	6.00	Brownish grey, clayey silt with sand mixture.													CL**			49	40	11		Do	
BH36	UDS02	3.00	Yellowish grey, clayey silt with kankars and sand mixtures.		TRSH-UU					0.63	0		30	14	12	CL							Do	
					3.0	0.675																		
					2.0	0.629																		
					1.0	0.573																		
BH36	UDS03	5.00	Yellowish grey, clayey silt with sand mixture			2.62		0.401		1.12	0		35	16		CL			33	57	10		Do	
					UNCONFD																			
					0.0	0.628																		
					0.0	1.209																		
					0.0	1.529																		
					REMOULD					0.78	0													
					0.0	0.456																		
					0.0	0.875																		
					0.0	1.011																		
					DRSH-CU					0.44	23													
					0.5	0.655																		
					1.0	0.871																		
					2.0	1.302																		
BH36	SPT04	7.00	Yellowish grey, silty clay/clayey silt with sand mixture.										36	15		CI							Do	
BH37	UDS03	6.00	Brownish grey, silty sand with clay binders and mica.		DRSH-CU					0.21	25					SM			61	26	13		Do	
					0.5	0.430																		
					1.0	0.701																		
					2.0	1.136																		

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk Dens. gms/cc	Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results					Atter. Limits			IS		Grain Size				Test Method
									Pc/Ph kg/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	SL %	Classificatio	Gravl %	Sand %	Silt %	Clay %			
BH38	UDS03	6.00	Brownish grey, clayey silt with sand mixture.													CL**		39	46	15	Do		
BH38	SPT05	8.30	Brownish grey, silty sand with clay binders.													SM	71	29(Silt+Clay)			Do		
BH39	SPT01	1.00	Brownish grey, silty clay/clayey silt with sand mixture.											22	10		CL				Do		
BH39	UDS01	2.00	Brownish grey, clayey silt/silty clay with sand mixture			2.65					TRSH-UU	1.09	0	32	13	12	CL	47	39	14	Do		
										3.0	1.146												
										2.0	1.084												
										1.0	1.029												
BH40	SPT01	1.00	Yellowish brown, silty clay/clayey silt with sand mixture.											24	12		CL				Do		
BH40	UDS01	2.00	Brownish grey, silty clay/clayey silt with steel grey spot and sand mixture.	2.09	1.81		15 S 16 T 14 C	0.429		TRSH-UU	0.52	5	32	15	12	CL	44	43	13		Do		
										3.0	0.849												
										2.0	0.757												
										1.0	0.667												
										UNCONFD	0.57	0											
										0.0	0.663												
										0.0	0.489												
										0.0	0.562												
										REMOULD	0.47	0											
										0.0	0.506												
										0.0	0.471												
										0.0	0.437												
BH40	SPT02	2.70	Yellowish grey, clayey silt/silty clay.													CL**	18	66	16		Do		
BH40	SPT03	3.40	Brownish grey, silty clay/clayey silt with traces of sand mixture.											33	15		CL				Do		

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk		Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results					Atter. Limits			IS		Grain Size				Test Method
				Dens. gms/cc						Pc/Ph kg/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	SL %	Classificatio	Gravl %	Sand %	Silt %	Clay %			
BH41	SPT01	1.00	Brownish grey, silty sand.														SM-SP			94	6(Silt+Clay)			Do
BH42	UDS02	3.00	Yellowish brown, silty sand with clay binders.	2.01	1.75			15 S 15 DR		DRSH-CU 0.5 1.0 2.0	0.462 0.774 1.410	0.15	32				SM			74	26(Silt+Clay)			Do
BH42	SPT03	5.00	Brownish grey, silty sand with traces of clay binders.														SM			61	39(Silt+Clay)			Do
BH43	SPT01	1.00	Brownish grey, clayey silt/silty clay with sand mixture											26	12		CL							Do
BH43	UDS01	2.00	Brownish grey, silty clay/clayey silt with sand mixture & traces of grey patches.						0.386	TRSH-UU 3.0 2.0 1.0 UNCONFD	0.763 0.714 0.648	0.71	0	30	12		CL			40	48	12		Do
										0.0 0.0 0.0 0.0	0.625 0.619 0.622	0.62	0											
										REMOULD 0.0 0.0 0.0	0.595 0.592 0.587	0.59	0											
BH43	SPT02	3.00	Yellowish grey, silty clay/clayey silt with sand mixture & steel grey patches.											24	11		CL							Do
BH43	SPT03	4.00	Brownish grey, silty clay/clayey silt with traces of sand mixture.											26	12		CL							Do

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk		Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results					Atter. Limits			IS		Grain Size				Test Method
				Dens. gms/cc	Dens. gms/cc					Pe/Ph kg/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	SL %	Classificatio	Gravl %	Sand %	Silt %	Clay %			
BH44	UDS01	2.00	Brownish grey, silty clay/clayey silt with sand mixture.	2.09	1.84			12 S 14 T		TRSH-UU	0.40	0		29	13		CL		52	35	13	Do		

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk		Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results					After Limits			IS			Grain Size				Test Method
				Dens. gms/cc	Dens. gms/cc					Pc/Pn kg/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	SL %	Classi	fiatio	Gravl %	Sand %	Silt %	Clay %			
BH46	UDS01	1.00	Brownish grey, silty clay/clayey silt with sand mixture and kankars.	2.07	1.74			15 S 19 T 16 C	0.441	TRSH-UU 3.0 2.0 1.0 UNCONFD 0.0 0.0 0.0 REMOULD 0.0 0.0 0.0	0.516 0.502 0.345 0.410 0.424 0.401 0.269 0.290 0.297	0.26	5	26	11		CL		44	42	14	Do			
BH46	UDS02	3.00	Greyish yellow, silty clay/clayey silt with sand mixture and kankars.							UNCONFD 0.0 0.0 0.0 REMOULD 0.0 0.0 0.0	0.469 0.462 0.456 0.312 0.292 0.290	0.46	0	31	14	11	CL		35	51	14	Do			
BH47	UDS01	1.00	Light grey, silty clay/ clayey silt with traces of sand mixture.	2.10	1.83			15 S 15 T		TRSH-UU 3.0 2.0 1.0	0.471 0.459 0.437	0.46	0	27	12		CL		56	33	11	Do			
BH47	SPT02	4.00	Brownish grey silty clay/clayey silt with traces of sand mixture.											34	15		CL								
BH47	SPT03	5.50	Brownish grey, silty clay/ clayey silt with sand mixture.														CL**		47	44	9	Do			
BH48	SPT01	2.00	Brownish grey silty clay/clayey silt with sand mixture.											21	11		CL								

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk Dens. gms/cc	Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results				After. Limits			IS		Grain Size				Test Method
									Pc/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	SL %	Classificatio	Gravl %	Sand %	Silt %	Clay %		
BH48	UDS02	3.00	Brownish grey, silty clay/clayey silt with sand mixture.						TRSH-UU	0.22	9	28	12		CL		51	37	12	Do		
									3.0	0.765												
									2.0	0.628												
									1.0	0.414												
BH48	UDS03	5.00	Brownish grey, silty clay/clayey silt with sand & kankars.	2.11	1.84	2.65	15 S 15 T		UNCONFD	0.64	0	31	13		CL		55	30	15	Do		
									0.0	0.661												
									0.0	0.638												
									0.0	0.622												
									REMOULD	0.45	0											
									0.0	0.481												
									0.0	0.458												
									0.0	0.435												
BH49	SPT01	1.00	Yellowish grey clayey silt/silty clay with sand mixture									28	12		CL					Do		
BH49	UDS01	2.00	Brownish grey silty clay/clayey silt with sand mixture, traces of calcarious nodules & kankars.					0.354	TRSH-UU	1.08	6	31	12		CL		53	33	14	Do		
									3.0	1.535												
									2.0	1.387												
									1.0	1.315												
									UNCONFD	1.13	0											
									0.0	1.147												
									0.0	1.167												
									0.0	1.103												
									REMOULD	0.89	0											
									0.0	0.892												
									0.0	0.942												
									0.0	0.844												
BH49	UDS02	4.00	Yellowish brown, silty clay/clayey silt with sand mixture & traces of calcarious nodules.	2.06	1.78		16 S 15 T		UNCONFD	0.34	0	29	11		CL		45	43	12	Do		
									0.0	0.261												
									0.0	0.359												
									0.0	0.407												
									REMOULD	0.28	0											
									0.0	0.205												
									0.0	0.282												
									0.0	0.359												

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk Dens.		Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results				After Limits			IS SL Classi	Grain Size				Test Method
				gms/cc	gms/cc					Pc/Pn kg/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	Shrinkage %		Gravl %	Sand %	Silt %	Clay %	
BH49	SPT03	5.00	Yellowish brown, silty clay/clayey silt with sand mixture.											32	14		CL					Do
BH50	UDS01	2.00	Brownish grey silty clay/clayey silt with sand mixture & kankars.	2.67	0.540					TRSH-UU				0.74	7		12	CL	51	38	11	Do
										3.0	1.273											
										2.0	1.022											
										1.0	1.014											
BH50	SPT02	3.00	Brownish grey, silty clay/clayey silt with sand mixture.											31	12		CL					Do
BH50	UDS02	4.00	Light grey, silty sand with clay binders.							DRSH-CU				0.26	36		SM	74	26(Silt+Clay)			Do
										0.5	0.612											
										1.0	1.007											
										2.0	1.702											
BH51	UDS01	2.00	Brownish grey, silty sand with traces of calcareous nodules & clay binders.			1.90	1.68	14 S 13 DR		DRSH-CU				0.18	37		SM	66	34(Silt+Clay)			Do
										0.5	0.550											
										1.0	0.952											
										2.0	1.692											
BH52	UDS02	4.00	Brownish grey, clayey silt with black spot.							UNCONFD				0.67	0	31	11	CI				Do
										0.0	0.671											
										0.0	0.665											
										0.0	0.661											
BH52	UDS03	6.00	Brownish grey, clayey silt with black spot.			2.09	1.79	17 S 17 T 15 C	0.516	REMOULD				0.48	0							Do
										0.0	0.488											
										0.0	0.471											
										0.0	0.470											
BH52	UDS03	6.00	Brownish grey, clayey silt with black spot.							TRSH-UU				0.55	3	25	11	CL	22	59	19	Do
										3.0	0.757											
										2.0	0.726											
										1.0	0.625											
										UNCONFD				0.63	0							
										0.0	0.615											
										0.0	0.648											
										0.0	0.640											

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk		Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results					Atter. Limits			IS		Grain Size				Test Method				
				Dens. gms/cc	Pe/Ph kg/sqcm					Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	SL %	Classificatio	Gravl %	Sand %	Silt %	Clay %								
BH52	UDS04	8.00	yellowish grey clayey silt with sand mixture	REMOULD		0.46		0																				
				UNCONFD	0.50																		0	28	14	CL		
																											0.0	0.510
																											0.0	0.476
																											0.0	0.537
BH53	SPT07	8.00	Brownish grey, silty sand.	REMOULD		0.35	0																					
				0.0	0.357																							
																						0.0	0.330					
																						0.0	0.371					
																						BH54	UDS01	1.00	Deep grey, silty clay/clayey silt with laminated sand.	TRSH-UU		0.16
0.904	3.0	0.524																										
			2.0	0.407																								
			1.0	0.291																								
			BH54	UDS03	5.00	Yellowish brown, silty sand with clay binders.	DRSH-CU		0.15	35																		
0.5	0.502																											
		1.0					0.859																					
		2.0					1.539																					
		BH55					UDS01	1.00														brownish grey silty clay with traces of sand mixture	TRSH-UU		1.05			14
0.428	3.0		2.329																									
				2.0	1.932																							
				1.0	1.694																							
				UNCONFD		1.86			0																			
0.0	2.123																											
		0.0	1.557																									
		0.0	1.902																									
REMOULD		1.54	0																									
0.0	1.765																											
																				0.0	1.284							
0.0		1.569																										

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk		Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results					Atter. Limits			IS		Grain Size					Test Method
				Dens. gms/cc						Per/Ph kg/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	SL %	Classificatio	Gravl %	Sand %	Silt %	Clay %				
BH55	SPT01	2.00	Brownish grey, silty clay/clayey silt.											36	17	CI								Do	
BH55	SPT02	4.00	Brownish grey, silty clay/clayey silt with calcareous noudules & sand mixture.													CL**	23	28	49	(Silt+Clay)				Do	
BH55	UDS03	5.00	Brownish grey, silty clay/clayey silt with traces of sand mixture & kankars.	2.04	1.79			15 S 14 T 16 C	0.504	TRSH-UU 3.0 1.550 2.0 1.317 1.0 1.208 UNCONFD 0.0 1.425 0.0 1.370 0.0 1.204 REMOULD 0.0 1.110 0.0 1.085 0.0 0.938	0.87	8	34	17	CL		17	78	5				Do		
BH56	SPT01	2.00	Yellowish brown, clayey silt with sand mixture.													CL**		58	42	(Silt+Clay)				Do	
BH57	SPT01	2.00	Yellowish grey, clayey silt with sand mixture.													CL**		60	30	10				Do	
BH58	UDS01	1.00	Greish brown, silty sand with clay binders.	2.08	1.81			14 S 15 DR		DRSH-CU 0.5 0.627 1.0 0.966 2.0 1.641	0.29	34			SM		75	19	6				Do		
BH59	SPT01	2.00	Brownish grey, silty sand											NP		SM**							Do		
BH60	SPT01	2.00	Light grey, silty sand.													SM		86	14	(Silt+Clay)				Do	

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk		Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results				Atter. Limits			IS		Grain Size				Test Method
				Dens. gms/cc						Pc/Ph kg/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	SL %	Classificatio	Gravl %	Sand %	Silt %	Clay %		
BH61	UDS01	4.00	Yellowish grey, silty sand													SM		88	12(Silt+Clay)		Do		
BH62	UDS02	3.00	Yellowish brown clayey silt with traces of sand mixture	2.08		1.78	2.61	17 S 17 T 17 C	0.520	TRSH-UU 3.0 0.742 2.0 0.686 1.0 0.641 UNCONFD 0.0 0.389 0.0 0.412 0.0 0.428 REMOULD 0.0 0.295 0.0 0.313 0.0 0.324		0.55	3	28	14		CL		32	51	17	Do	
BH62	SPT03	6.00	Brownish grey, silty clay/clayey silt.												31	16		CL				Do	
BH62	UDS04	7.00	Brownish grey, silty clay/clayey silt.							UNCONFD 0.0 0.812 0.0 0.805 0.0 0.801 REMOULD 0.0 0.605 0.0 0.591 0.0 0.580		0.81	0	33	14	11	CL		47	35	18	Do	
BH62	SPT05	10.00	Brownish grey, silty sand												NP		SM**					Do	
BH63	UDS01	2.00	Greyish brown, silty sand with clay binders.							DRSH-CU 0.5 0.810 1.0 1.040 2.0 1.757		0.45	33				SM		66	34(Silt+Clay)		Do	

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk Dens. gms/cc	Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results					Atter. Limits			IS			Grain Size				Test Method
									Pc/Pn kg/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	SL %	Classificatio	Gravl %	Sand %	Silt %	Clay %				
BH63	UDS02	4.00	Brownish grey silty clay with traces of sand mixture						UNCONFD	0.57	0	35	14			CL		17	64	19		Do		
					0.0	0.546																		
					0.0	0.606																		
					0.0	0.575																		
					REMOULD					0.39	0													
					0.0	0.359																		
					0.0	0.424																		
					0.0	0.401																		
BH63	UDS03	6.00	Yellowish grey, siltyclay/clayey silt with sand mixture.						TRSH-UU	0.30	9	39	16			CI		25	62	13		Do		
					3.0	0.822																		
					2.0	0.799																		
					1.0	0.482																		
BH64	UDS01	2.00	Yellowish grey, silty sand with traces of clay binders.						DRSH-CU	0.14	34					SM		82	18(Silt+Clay)			Do		
					0.5	0.477																		
					1.0	0.815																		
					2.0	1.501																		
BH64	UDS02	4.00	Brownish grey, silty clay/clayey silt with traces of calcareous noduls and sand mixture.						UNCONFD	0.33	0	32	16			CL		30	59	11		Do		
					0.0	0.236																		
					0.0	0.376																		
					0.0	0.401																		
					REMOULD					0.26	0													
					0.0	0.186																		
					0.0	0.299																		
					0.0	0.310																		
BH64	UDS03	6.00	Brownish grey, silty clay/clayey silt with sand mixture.						TRSH-UU	0.86	14	42	16			CI		19	65	16		Do		
					3.0	2.183																		
					2.0	1.664																		
					1.0	1.547																		
					UNCONFD					1.54	0													
					0.0	1.426																		
					0.0	1.887																		
					0.0	1.311																		
					REMOULD					1.26	0													
					0.0	1.159																		
					0.0	1.557																		
					0.0	1.070																		

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk Dens. gms/cc	Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results				Atter. Limits			IS		Grain Size			Test Method
									Pc/Pn kg/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	SL %	Classificatio	Gravl %	Sand %	Silt %	Clay %	
BH64	SPT05	8.50	Brownish grey, silty clay/clayey silt with traces of sand mixture.											38	13		CI			Do	
BH65	UDS02	4.00	Brownish grey, silty clay/clayey silt with sand mixture and traces of calcareous nodules.	2.09	1.77	2.66	18 S 18 T			TRSH-UU 3.0 0.686 2.0 0.652 1.0 0.419		0.28	7	36	15	11	CI	32	53	15	Do
BH65	UDS03	6.00	Brownish grey, silty clay/clayey silt with traces of kankars and sand mixture.							UNCONFD 0.0 0.351 0.0 0.515 0.0 0.463 REMOULD 0.0 0.269 0.0 0.381 0.0 0.318		0.44	0	35	17		CL	28	56	16	Do
BH66	UDS02	4.00	Brownish grey, silty clay/clayey silt with sand mixture.	1.92	1.66		15 S 16 T			TRSH-UU 3.0 1.421 2.0 1.231 1.0 1.011 UNCONFD 0.0 0.471 0.0 0.462 0.0 0.451 REMOULD 0.0 0.269 0.0 0.256 0.0 0.261		0.67	10	29	20		CL	49	40	11	Do
BH66	SPT03	5.00	Brownish grey, silty clay/clayey silt with traces of sand mixture.									0.46	0								Do
BH66	UDS03	6.00	brownish grey, silty clay/clayey silt with traces of fine sand mixture.							DRSH-CU 0.5 0.574 1.0 0.934 2.0 1.373		0.35	27	26	13		CL**	23	77(Silt+Clay)		Do

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk		Dry Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results					Atter. Limits			IS		Grain Size					Test Method
				Dens. gms/cc	Dens. gms/cc				Pe/Ph kg/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	SL %	Classi ficatio	Gravl %	Sand %	Silt %	Clay %				
BH66	UDS04	8.00	Brownish grey, silty sand with clay binders.						DRSH-CU	0.11	35					SM		68	32(Silt+Clay)		Do			
									0.5	0.461														
									1.0	0.811														
									2.0	1.516														
BH67	UDS01	1.00	Yellowish grey, clayey silt with sand mixtures.	2.09	1.78		17 S 17 T 17 C	0.469	TRSH-UU	0.42	0	32	13		CL		37	50	13		Do			
									3.0	0.425														
									2.0	0.425														
									1.0	0.403														
									UNCONFD	0.35	0													
									0.0	0.322														
									0.0	0.371														
									0.0	0.357														
									REMOULD	0.23	0													
									0.0	0.212														
									0.0	0.254														
									0.0	0.231														
BH67	UDS02	3.00	Brownish grey silty clay with traces of calcareous nodules and sand mixtures.						UNCONFD	0.36	0	32	11		CL		48	35	17		Do			
									0.0	0.322														
									0.0	0.431														
									0.0	0.351														
									REMOULD	0.25	0													
									0.0	0.214														
									0.0	0.295														
									0.0	0.241														
BH67	UDS03	5.00	Brownish grey, clayey silt with sand mixtures.			2.62						29	14		CL		52	38	10		Do			
BH68	UDS01	2.00	Deep grey, silty sand with clay binders.						DRSH-CU	0.23	33				SM		58	42(Silt+Clay)			Do			
									0.5	0.554														
									1.0	0.879														
									2.0	1.533														
BH68	SPT02	3.00	Brownish grey, silty clay/clayey silt.									36	17		CI						Do			

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk		Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results				Atter. Limits			IS		Grain Size				Test Method
				Dens. gms/cc	Dens. gms/cc					Pc/Ph kg/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	SL %	Classificatio	Gravl %	Sand %	Silt %	Clay %		
BH68	UDS03	6.00	Brownish grey, silty clay with kankars	2.08	1.74			19 S 19 T 22 C	0.549	TRSH-UU	0.40	0	30	15		CL		29	61	10	Do		

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk Dens.		Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results					Atter. Limits			IS			Grain Size					Test Method
				Dens. gms/cc	Pc/Pn kg/sqcm					Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	SL %	Classi fication	Gravl %	Sand %	Silt %	Clay %						
						REMOULD					1.02		0													
						0.0					1.052															
						0.0					1.043															
						0.0					0.978															
BH69	UDS03	6.00	Brownish grey, silty clay/clayey silt with sand mixture.												32	13		CL		46	38	16		Do		
BH70	UDS01	2.00	Brownish grey, silty clay/clayey silt with traces of sand mixture and kankars.												25	12	11	CL		56	33	11		Do		

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk		Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results					Atter. Limits			IS		Grain Size					Test Method
				Dens. gms/cc	Dens. gms/cc					Pc/Ph kg/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	SL %	Classificatio	Gravl %	Sand %	Silt %	Clay %				
BH71	UDS02	4.00	Brownish grey, silty clay/clayey silt with sand mixture.	2.03	1.77	2.69	15 S			UNCONFD	0.95	0													
										0.0	1.067														
										0.0	0.994														
										0.0	0.816														
										REMOULD		0.73	0												
BH71	UDS03	6.00	Light grey, silty clay/clayey silt with calcareous nodules.							TRSH-UU		0.96	0												
										3.0	1.048														
										2.0	0.924														
										1.0	0.912														
										UNCONFD		0.91	0												
BH71	SPT04	7.00	Brownish grey, silty clay/clayey silt with traces of sand mixture.							0.0	0.889														
										0.0	0.967														
										0.0	0.886														
										REMOULD		0.73	0												
										0.0	0.707														
BH72	UDS01	2.00	Brownish grey, silty clay/clayey silt with sand mixture.			2.65		0.472		TRSH-UU		0.46	0												
										3.0	0.482														
										2.0	0.459														
										1.0	0.437														
										UNCONFD		0.45	0												
BH72	UDS01	2.00	Brownish grey, silty clay/clayey silt with sand mixture.							0.0	0.441														
										0.0	0.473														
BH72	UDS01	2.00	Brownish grey, silty clay/clayey silt with sand mixture.							0.0	0.450														
										0.0	0.450														

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk Dens.		Dry Dens.	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results				Atter. Limits			IS SL Classi	Grain Size				Test Method
										Pc/Pn	Shear	Cohesn	Frictn	LL	PL	%		Gravl	Sand	Silt	Clay	
				gms/cc	gms/cc	gms/cc				kg/sqcm	kg/sqcm	kg/sqcm	Deg.	%	%	%		%	%	%	%	
										REMOULD		0.31	0									
										0.0	0.288											
										0.0	0.318											
										0.0	0.326											
BH72	SPT03	5.00	Brownish grey, silty clay/ clayey silt with sand mixture.						0.591	UNCONF	0.51	0		31	13		CL**	36	47	17		Do
										0.0	0.519											
										0.0	0.506											
										0.0	0.499											
BH72	UDS04	8.00	Brownish grey, silty clay/ clayey silt with sand mixture.							REMOULD	0.30	0					CL	40	42	18		Do
										0.0	0.311											
										0.0	0.295											
										0.0	0.292											
BH73	UDS02	4.00	Deep grey, silty clay/ clayey silt with sand mixture.	2.13	1.89			12 S 12 T		TRSH-UU	0.34	7		20	11		CL	50	41	9		Do
										3.0	0.812											
										2.0	0.664											
										1.0	0.532											
										UNCONF	0.52	0										
										0.0	0.529											
										0.0	0.580											
										0.0	0.473											
										REMOULD	0.35	0										
										0.0	0.355											
										0.0	0.378											
										0.0	0.328											
BH73	SPT04	7.00	Brownish grey, silty sand with clay binders.														SM	66	34(Silt+Clay)			Do

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk		Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results					After. Limits			IS			Grain Size				Test Method																																										
				Dens. gms/cc						Pc/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	SL %	Classificatio	Gravl %	Sand %	Silt %	Clay %																																														
BH74	UDS01	2.00	Brownish grey, silty clay/clayey silt with sand mixture.	2.07	1.76	2.62	17 S 18 T 19 C	0.532	TRSH-UU	0.24	0	26	12	CL	42	46	12	Do																																																	
																							3.0	0.249	0.11	0	0.0	0.102	0.0	0.112	0.0	0.123	0.07	0	0.0	0.067	0.0	0.075	0.0	0.082																											
																							2.0	0.244																																											
																							1.0	0.237																																											
BH74	UDS02	4.00	Brownish grey, silty clay/clayey silt with kankars.						UNCONFD	0.79	0	31	14	CL	42	47	11	Do																																																	
																							0.0	0.795	0.63	0	0.0	0.636	0.0	0.629	0.0	0.628																																			
																							0.0	0.785																																											
																							0.0	0.785																																											
																							BH75	UDS01	2.00	Brownish grey, silty clay/clayey silt with kankars and sand mixture.	2.10	1.81		16 S 16 T 16 C	0.442	TRSH-UU	0.39	0	27	12	CL	63	26	11	Do																										
																																														3.0	0.437	0.41	0	0.0	0.380	0.0	0.401	0.0	0.417	0.28	0	0.0	0.288	0.0	0.286	0.0	0.282				
																																														2.0	0.403																				
																																														1.0	0.341																				
																																														UNCONFD					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
																																														0.0	0.380																				
																																														0.0	0.401																				
																																														0.0	0.417																				
REMOULD					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																																															
0.0	0.288																																																																		
0.0	0.286																																																																		
0.0	0.282																																																																		

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk		Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results					Atter. Limits			IS		Grain Size				Test Method
				Dens. gms/cc						Pc/Ph kg/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	SL %	Classi ficatio	Gravl %	Sand %	Silt %	Clay %			
BH75	UDS02	4.00	Brownish grey, clayey silt with traces of sand mixture.							DRSH-CU		0.32	22					CL**					Do	
						0.5					0.521													
						1.0					0.724													
						2.0					1.131													
BH76	SPT01	1.00	Brownish grey, silty clay/clayey silt with traces of sand mixture.											32	12			CL						
BH76	UDS02	4.00	Brownish grey, silty clay/clayey silt with sand mixture & kankars.				2.66					0.44	0	30	14	14	CL			41	47	12	Do	
						UNCONFD					0.530													
						0.0					0.369													
						0.0					0.435													
						REMOULD						0.27	0											
						0.0					0.356													
						0.0					0.253													
						0.0					0.201													
BH76	UDS03	6.00	Brownish grey, silty clay/clayey silt with rock dust and sand mixture.			2.07		17 S 18 T 18 C	0.447		TRSH-UU		0					CL**		39	49	12	Do	
						1.76					3.0	0.252												
											2.0	0.221												
											1.0	0.213												
											UNCONFD		0											
											0.0	0.240												
											0.0	0.269												
											0.0	0.249												
											REMOULD		0											
											0.0	0.102												
											0.0	0.120												
											0.0	0.106												
BH77	UDS01	2.00	Greyish brown, silty clay/clayey silt with fine sand mixture.								UNCONFD		0	31	13			CL		36	50	14	Do	
											0.0	0.415												
											0.0	0.395												
											0.0	0.391												

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk Dens. gms/cc	Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results					Atter. Limits			IS		Grain Size				Test Method
									Pc/Pn kg/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	SL %	Classificatio	Gravl %	Sand %	Silt %	Clay %			
					REMOULD					0.32	0												
					0.0					0.324													
					0.0					0.320													
					0.0					0.319													
BH77	UDS02	4.00	Brownish grey, silty clay/clayey silt with sand mixture.	2.03	1.78		13 S 14 T 15 C	0.471	TRSH-UU	0.66	5						CL**	51	41	8	Do		
									3.0	1.010													
									2.0	0.915													
									0.0	0.822													
BH77	UDS03	6.00	Brownish grey, clayey silt with sand.						UNCONFD	0.20	0			28	15		CL	55	38	7	Do		
									0.0	0.193													
									0.0	0.205													
									0.0	0.215													
									REMOULD	0.13	0												
									0.0	0.134													
									0.0	0.137													
									0.0	0.143													
BH78	UDS01	2.00	Deep grey, silty clay/ clayey silt with sand mixture & black spot.					0.426	TRSH-UU	0.16	6						CL**	50	40	10	Do		
									3.0	0.524													
									2.0	0.407													
									1.0	0.291													
BH78	SPT03	5.00	Brownish grey. Silty sand with kankars and clay binders.														SM	2	53	45(Silt+Clay)	Do		
BH79	UDS01	2.00	Brownish grey, silty sand with clay binders and calcareous nodules.	1.71	1.52		14 S 12 DR		DRSH-CU	0.27	30						SM	67	33(Silt+Clay)		Do		
									0.5	0.520													
									1.0	0.925													
									2.0	1.422													
BH80	UDS01	2.00	Yellowish grey, silty sand.						DRSH-CU	0.21	35						SM**						
									0.5	0.569													
									1.0	0.912													
									2.0	1.625													

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk		Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results					Atter. Limits			IS		Grain Size				Test Method
				Dens. gms/cc	Dens. gms/cc					Pc/Pn kg/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	SL %	Classificatio	Gravl %	Sand %	Silt %	Clay %			
BH80	UDS02	4.00	Brownish grey silty sand with traces of clay binders.	1.71	1.52			12 S 12 DR		DRSH-CU 0.5 1.0 2.0	0.16 0.569 0.958 1.774	39					SM			75	25(Silt+Clay)	Do		
BH80	UDS04	8.00	Deep grey, silty clay/clayey silt with sand mixture.				2.65		0.509	TRSH-UU 3.0 2.0 1.0 UNCONFD 0.0 0.0 0.0 REMOULD 0.0 0.0 0.0	0.48 1.030 0.874 0.711 0.31 0.293 0.326 0.320 0.26 0.262 0.261 0.255	8	29	12		CL		43	39	18	Do			
BH81	SPT01	1.00	Greish brown, silty clay/clayey silt with sand mixture.											26	13		CL					Do		
BH81	SPT02	3.00	Brownish grey, silty sand.														SM		87	13(Silt+Clay)		Do		
BH81	SPT08	9.00	Brownish grey, silty sand.														SM		82	18(Silt+Clay)		Do		
BH82	SPT01	1.00	Greyish brown, clayey silt with sand mixture.				2.61										CL**		60	26	14	Do		
BH82	SPT02	2.50	Brownish grey, silty sand.														SM		80	20(Silt+Clay)		Do		

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk		Dry	Spec.	Nat.	Void	Strength Test Results					Atter. Limits			IS		Grain Size					Test Method	
				Dens. gms/cc	Dens. gms/cc					Pc/Ph kg/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	SL %	Classificatio	Gravl %	Sand %	Silt %	Clay %					
BH83	SPT01	1.00	Reddish brown, silty clay/clayey silt with sand mixture.												26	12		CL							Do	
BH83	SPT02	2.00	Brownish grey, silty sand.															SM				83	17	(Silt+Clay)	Do	
BH84	UDS01	2.00	Brownish grey, silty clay/clayey silt with calcareous nodules.	2.06	1.82	1.82	2.64	12 S 13 T 14 C	0.444	TRSH-UU 3.0 2.063 2.0 1.745 1.0 1.432 UNCONFD 0.0 1.629 0.0 1.130 0.0 1.107 REMOULD 0.0 1.333 0.0 0.928 0.0 0.934		0.87	14	0		35	16		CL				43	48	9	Do
BH84	SPT02	3.00	Brownish grey, silty clay/clayey silt with sand mixture and calcareous nodules.															CL**			6	14	80	(Silt+Clay)	Do	
BH85	SPT01	1.00	Brownish grey, clayey silty sand with brick bats(may befilled up soil).																		18	36	46	(Silt+Clay)	Do	
BH85	UDS01	2.00	Deep grey, silty clay/clayey silt with sand mixture & traces of calcareous nodules & kankars.							UNCONFD 0.0 0.591 0.0 0.795 0.0 0.658 REMOULD 0.0 0.450 0.0 0.597 0.0 0.498		0.68	0	0		34	17		CL				38	45	17	Do

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk		Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results					Atter. Limits			IS		Grain Size				Test Method
				Dens. gms/cc						Pc/Ph kg/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	SL %	Classificatio	Gravl %	Sand %	Silt %	Clay %			
BH86	UDS02	3.00	Brownish grey, silty clay/clayey silt with sand mixture and decompose rock fragments.	2.08	1.87	0.442	2.62	11 S 11 T 12 C	0.442	TRSH-UU	0.33	18	36	15		Cl		57	37	6	Do			
				3.0	1.768																			
				2.0	1.317																			
				1.0	0.897																			
				UNCONFD								1.66	0											
			0.0	1.591																				
			0.0	1.631																				
			0.0	1.766																				
			REMOULD								1.35	0												
			0.0	1.295																				
			0.0	1.342																				
			0.0	1.438																				
BH86	UDS03	5.00	Light brownish grey, silty sand with clay binders and steel grey spot.							DRSH-CU	0.15	36				SM**				Do				
										0.5	0.513													
										1.0	0.877													
										2.0	1.612													
BH87	UDS01	1.00	Brownish grey, silty clay with traces of calcareous nodules.				2.60			UNCONFD	1.04	0	41	14	11	Cl	50	37	13	Do				
										0.0	0.869													
										0.0	1.188													
										0.0	1.072													
										REMOULD	0.66	0												
										0.0	0.512													
										0.0	0.781													
										0.0	0.679													
BH87	UDS02	3.00	Light grey, clayey silt with traces of calcareous nodules.	2.14	1.88			14 S 14 T 15 DR		TRSH-UU	1.24	10				CL**	55	45(Silt+Clay)		Do				
										3.0	2.227													
										2.0	1.807													
										1.0	1.785													
										DRSH-CU	0.32	31												
										0.5	0.625													
										1.0	0.921													
										2.0	1.533													

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk		Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results					Atter. Limits			IS		Grain Size				Test Method
				Dens. gms/cc	Dens. gms/cc					Pc/Ph kg/sqcm	TRSH-UU	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	SL %	Classificatio	Gravl %	Sand %	Silt %	Clay %		
BH88	UDS01	2.00	Brownish grey, silty clay/clayey silt with sand mixture.				2.66		0.480				0.65	10	33	19	18	CL		50	44	6	Do	
										3.0	1.401													
										2.0	1.211													
										1.0	0.985													
										UNCONFD			0.71	0										
										0.0	0.715													
										0.0	0.710													
										0.0	0.708													
										REMOULD			0.57	0										
										0.0	0.582													
										0.0	0.576													
										0.0	0.559													
BH89	SPT01	2.00	Brownish grey, clayey silty sand.												NP			SM		67	33(Silt+Clay)		Do	
BH90	DS01	0.30	Greyish yellow, silty sand with decomposed rock fragments.															SM		87	13(Silt+Clay)		Do	
BH91	DS01	0.30	Brownish grey, silty sand with decomposed rock fragments.															SM		82	18(Silt+Clay)		Do	
BH92	DS01	0.30	Greyish yellow, silty sand with decomposed rock fragments.															SM		80	20(Silt+Clay)		Do	
BH93	SPT01	1.00	Brownish grey, silty sand.															SM		88	12(Silt+Clay)		Do	
BH94	SPT02	3.00	Brownish grey, silty sand.												NP			SM**						
BH95	DS01	0.50	Yellowish brown, silty sand.															SM		73	27(Silt+Clay)		Do	

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk Dens.		Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results					Atter. Limits			IS		Grain Size					Test Method
				Dens. gms/cc						Per/Ph kg/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	SL %	Classificatio	Gravl %	Sand %	Silt %	Clay %				
BH96	DS01	0.50	Brownish grey, silty sand														SM		78	22	(Silt+Clay)	Do			
BH97	UDS01	1.00	Brownish grey, clayey silt with san mixture.											28	13		CL		57	32	11	Do			
BH98	SPT01	1.00	Brownish grey, silty sand.														SM-SP		95	5	(Silt+Clay)	Do			
BH99	UDS02	3.00	Brownish grey, silty clay/clayey silt with traces of sand mixture.	2.05		1.74		18 S 18 DR		DRSH-CU 0.5 0.356 1.0 0.503 2.0 0.899		0.16	20				CL**		43	57	(Silt+Clay)	Do			
BH100	SPT01	1.00	Brownish grey, silty sand with gravels.														SM	26	47	27	(Silt+Clay)	Do			
BH101	UDS02	4.00	Brownish grey, silty clay/clayey silt with sand mixture.	1.94		1.65	2.67	17 S 17 T 18 C	0.516	TRSH-UU 3.0 0.602 2.0 0.578 1.0 0.524 UNCONFD 0.0 0.474 0.0 0.537 0.0 0.544 REMOULD 0.0 0.300 0.0 0.353 0.0 0.361		0.57	0				CL		26	63	11	Do			
BH103	SPT01	1.00	Brownish grey, silty clay clayey silt.				2.66										CL**		4	82	14	Do			
BH103	SPT02	3.00	Brownish grey, silty sand.														SM		83	17	(Silt+Clay)	Do			

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk		Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results					Atter. Limits			IS		Grain Size				Test Method
				Dens. gms/cc	Dens. gms/cc					Pe/Pn kg/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	LL %	PL %	SL %	Classificatio	Gravl %	Sand %	Silt %	Clay %			
BH104	UDS01	2.00	Brownish grey, silty clay/clayey silt with sand mixture and kankars.	2.06	1.81	2.64	14 S	14 T 13 C	0.452	TRSH-UU	0.75	0	34	17	17	CL		48	44	8	Do			
										3.0	0.822													
										2.0	0.709													
										1.0	0.709													
										UNCONFD	0.70	0												
										0.0	0.689													
										0.0	0.731													
										0.0	0.702													
										REMOULD	0.54	0												
										0.0	0.507													
									0.0	0.565														
									0.0	0.547														
BH104	SPT02	3.00	Brownish grey, silty sand.													SM	77	23(Silt+Clay)		Do				
TP04	UDS01	1.00	Brownish grey, silty sand with clay binders.	1.97	1.82			9 S								SM**					Do			
TP05	UDS03	3.00	Brownish grey, clayey silt with sand mixture.	2.00	1.89			10 S								CL**					Do			
TP09	UDS03	3.00	Brownish grey clayey silt/silty clay with sand mixture & kankars.	2.15	1.89			13 S								CL**					Do			
TP10	UDS01	1.00	Brownish grey, silty clay/clayey silt with sand mixture & kankars	1.99	1.80			11 S								CL**					Do			

LABORATORY ROCK TEST RESULTS

BH No.	Run No.	Depth (M)	Description	Density (gm/cc)		Water Content (%)	Porosity %	Specific Gravity	Crushing Strength/ Unconfined Compressive strength (kg/sqcm)		Coefficient of softening		Point Load Strength Index (kg/sqcm)	Slake Durability Index %	Hardness (based on Mohr Scale)	Soundness (% Loss)	Young's Modulus (kg/sqcm)	Impact Value (%)	Test Method
				Bulk	Dry				Dry	Saturated									
1	8	7.75-8.50	Highly to moderately weathered, brownish, grey, fine to medium grained, moderately fractured sandstone.	--	--	--	--	2.530	51	15	0.29	--	--	--	--	--	--	--	Do
2	15	14.50-15.25	Highly weathered, brownish grey to light blackish grey, fine grained, highly fractured interbedded sandstone & shale.	--	--	--	--	--	--	--	--	--	0.92	--	--	--	--	--	Do
2	19	17.50-18.25	Highly weathered, greyish brown to brownish grey, fine grained, moderately fractured interbedded sandstone & shale.	2.060	1.954	5.443	10.636	2.187	91	32	0.35	--	--	--	Soft	26.22	--	--	Do
3	4	8.00-8.75	Completely to highly weathered, light grey to brownish grey, fine grained, highly to moderately fractured interbedded sandstone - shale.	--	--	--	--	--	--	--	--	--	0.94	--	Medium Soft	22.74	--	--	Do
3	15	16.25-17.00	Moderately weathered, fresh, greyish brown to light grey, fine grained, moderately to slightly fractured interbedded sandstone - shale.	--	--	--	--	--	64	25	0.39	--	--	--	--	--	--	--	Do
4	22	21.00-22.50	Slightly weathered to fresh, greyish brown to brownish grey, fine grained, moderately fractured interbedded sandstone - shale.	2.186	2.007	8.905	17.876	--	106	9	0.09	--	--	73.09	--	--	--	--	Do
5	16	17.25-18.00	Moderately weathered, greyish brown to brownish grey, fine grained, moderately fractured sandstone.	2.048	1.951	4.978	9.710	2.570	58	12	0.21	--	--	--	Medium Soft	19.88	--	59.62	Do
6	5	9.75-10.50	Moderately weathered, brownish grey, fine grained, highly to moderately fractured interbedded sandstone - shale.	--	--	--	--	--	49	10	0.20	--	--	12.27	--	--	1206	--	Do
7	6	13.00-13.75	Moderately weathered, light brownish grey, fine grained, moderately fractured sandstone.	2.033	1.960	3.725	7.301	--	--	--	--	--	0.82	42.40	--	--	--	--	Do
7	10	16.00-16.75	Slightly weathered, greyish brown to brownish grey, fine grained, moderately to slightly fractured sandstone.	--	--	--	--	2.570	--	--	--	--	--	--	--	--	--	--	Do
8	10	15.00-15.75	Moderately weathered, greyish brown to light brownish grey, fine to medium grained, moderately to slightly fractured sandstone.	--	--	--	--	--	79	16	0.20	--	--	--	Moderately Strong	15.97	--	--	Do

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BH No.	Run No.	Depth (M)	Description	Density (gm/cc)		Water Content (%)	Porosity %	Specific Gravity	Crushing Strength/ Unconfined Compressive strength (kg/sqcm)		Coefficient of softening	Point Load Strength Index (kg/sqcm)	Slake Durability Index %	Hardness (based on Mohr Scale)	Soundness (% Loss)	Young's Modulus (kg/sqcm)	Impact Value (%)	Test Method
				Bulk	Dry				Dry	Saturated								
9	2	9.75-10.50	Highly weathered, greyish yellow, medium to fine grained, highly to moderately fractured sandstone.	2.150	1.965	9.454	18.575	2.570	--	--	--	0.96	--	--	--	--	--	Do
9	8	14.25-15.00	Moderately weathered, greyish yellow, medium to fine grained, highly to moderately fractured sandstone.	--	--	--	--	--	--	--	--	--	42.52	--	--	--	--	Do
10	3	10.00-10.75	Moderately weathered, brownish grey to greyish brown, fine grained sandstone.	1.978	1.889	4.665	8.815	--	52	14	0.27	--	--	--	--	--	--	Do
11	2	8.75-9.50	Highly weathered, greyish yellow, coarse to medium grained, highly fractured sandstone.	--	--	--	--	--	--	--	--	0.93	--	--	--	--	--	Do
11	11	15.50-16.25	Moderately weathered, greyish yellow, coarse to medium grained, highly fractured sandstone.	2.087	1.944	7.337	14.268	2.268	100	29	0.29	--	32.68	Medium Soft	23.54	--	--	Do
12	7	12.00-12.75	Highly weathered, light brownish grey, fine grained, highly to moderately fractured sandstone.	--	--	--	--	--	--	--	--	1.06	--	--	--	--	--	Do
12	12	15.75-16.50	Highly weathered, light brownish grey, fine grained, highly to moderately fractured sandstone.	--	--	--	--	--	--	13	--	--	29.25	--	--	61.25	--	Do
13	5	10.50-11.25	Highly weathered, greyish yellow, coarse to medium grained, highly fractured sandstone.	--	--	--	--	--	--	--	--	0.89	--	--	--	64.33	--	Do
13	9	13.50-14.25	Moderately weathered, greyish yellow to grey, medium grained, moderately fractured sandstone.	2.257	2.075	8.777	18.215	--	56	15	0.27	--	0.00	--	36.95	881	--	Do
14	15	17.00-17.75	Moderately weathered, brownish grey to blackish grey, fine grained, highly to moderately fractured interbedded sandstone - shale.	--	--	--	--	--	49	--	--	--	--	--	--	--	--	Do
15	20	19.25-20.00	Slightly weathered, greyish yellow to grey, medium to fine grained, moderately to slightly fractured sandstone.	--	--	--	--	2.521	--	--	--	--	2.03	--	--	--	--	Do
16	14	11.75-12.50	Highly weathered, greyish brown to brownish grey, fine grained, highly to moderately fractured sandstone.	--	--	--	--	--	--	16	--	--	--	--	--	--	--	Do
17	2	8.50-9.75	Moderately weathered, brownish grey to greyish brown, fine grained, moderately to slightly fractured sandstone.	--	--	--	--	--	42	11	0.26	--	--	--	--	--	--	Do

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BH No.	Run No.	Depth (M)	Description	Density (gm/cc)		Water Content (%)	Porosity %	Specific Gravity	Crushing Strength/Unconfined Compressive strength (kg/sqcm)		Coefficient of softening	Point Load Strength Index (kg/sqcm)	Slake Durability Index %	Hardness (based on Mohr Scale)	Soundness (%) Loss	Young's Modulus (kg/sqcm)	Impact Value (%)	Test Method
				Bulk	Dry				Dry	Saturated								
18	16	22.00-22.75	Highly weathered, greyish yellow, medium to fine grained, highly fractured sandstone.	2.130	1.996	6.725	13.422	--	--	--	--	0.82	--	Medium Soft	29.45	--	--	Do
19	4	11.75-12.50	Highly weathered, brownish grey to light grey, fine grained, highly to moderately fractured sandstone.	--	--	--	--	--	--	--	--	0.88	--	--	--	--	--	Do
19	13	19.25-20.75	Fresh, brownish grey to light grey, fine grained, highly to moderately fractured sandstone.	--	--	--	--	2.170	55	10	0.18	--	14.17	--	--	--	66.33	Do
20	6	12.00-12.75	Highly weathered, light brownish grey, coarse grained, highly fractured sandstone.	--	--	--	--	--	--	15	--	--	--	--	--	--	--	Do
21	8	13.75-14.50	Moderately weathered, yellowish grey, fine grained, moderately to slightly fractured sandstone.	2.045	1.944	5.236	10.176	--	--	11	--	--	--	--	--	--	--	Do
22	5	6.75-7.50	Moderately weathered, greyish brown to light grey, fine grained, moderately to slightly fractured sandstone.	2.032	1.882	7.991	15.037	2.215	30	8	0.27	--	19.72	--	--	--	--	Do
23	7	8.50-9.75	Moderately weathered, brownish grey, fine grained, highly to moderately fractured sandstone.	--	--	--	--	--	42	11	0.26	--	--	Medium Soft	35.2	--	--	Do
24	3	7.00-7.75	Moderately weathered, greyish brown to brownish grey, fine grained, highly to moderately fractured sandstone.	--	--	--	--	--	--	--	--	--	0.18	--	--	--	--	Do
24	12	14.50-15.75	Moderately weathered, greyish brown to brownish grey, fine grained, highly to moderately fractured sandstone.	--	--	--	--	--	35	10	0.29	--	--	--	--	--	--	Do
25	8	9.75-10.50	Moderately weathered, brownish grey, fine grained, moderately fractured interbedded sandstone - shale.	1.986	1.844	7.721	14.234	--	45	9	0.20	--	21.87	--	--	1365	--	Do
26	5	6.75-7.50	Highly weathered, brownish grey, fine grained, highly fractured sandstone.	--	--	--	--	--	--	--	--	0.97	--	--	32.14	--	62.33	Do
26	13	12.75-13.50	Slightly weathered, brownish grey to light grey, fine grained, moderately to slightly fractured sandstone.	2.022	1.885	7.244	13.656	--	395	47	0.12	--	27.88	Soft	--	--	--	Do
27	10	8.75-9.50	Moderately weathered, greyish brown to brownish grey, fine grained, highly to moderately fractured sandstone.	--	--	--	--	--	205	41	0.20	--	--	--	17.59	--	--	Do

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BH No.	Run No.	Depth (M)	Description	Density (gm/cc)		Water Content (%)	Porosity %	Specific Gravity	Crushing Strength/ Unconfined Compressive strength (kg/sqcm)		Coefficient of softening	Point Load Strength Index (kg/sqcm)	Slake Durability Index %	Hardness (based on Mohr Scale)	Soundness (%) Loss	Young's Modulus (kg/sqcm)	Impact Value (%)	Test Method
				Bulk	Dry				Dry	Saturated								
28	17	14.00-14.75	Slightly weathered, brownish grey to yellowish brown, fine to medium grained, highly to moderately fractured interbedded sandstone - shale.	2.082	1.947	6.963	13.554	2.252	95	27	0.28	--	10.22	--	--	--	--	Do
29	3	3.50-4.25	Highly weathered, brownish grey, medium grained, slightly fractured interbedded sandstone - shale.	--	--	--	--	--	320	--	--	--	--	--	--	--	--	Do
30	14	12.75-13.50	Slightly weathered, yellowish brown to brownish grey, fine grained, highly to moderately fractured interbedded sandstone - shale.	2.147	2.051	4.702	9.641	--	--	45	--	--	--	Medium Soft	24.76	--	--	Do
31	3	4.75-5.50	Moderately weathered, yellowish brown to brownish grey, fine to medium grained, slightly fractured sandstone.	--	--	--	--	--	295	52	0.18	--	53.09	--	--	--	--	Do
32	9	11.50-12.25	Moderately weathered, yellowish grey to light yellowish grey, medium grained, moderately fractured sandstone.	2.678	2.663	0.551	1.468	2.703	441	62	0.14	--	--	--	--	1066	--	Do
33	3	9.00-9.75	Highly weathered, brownish grey to greyish brown, fine grained, moderately fractured sandstone.	--	--	--	--	--	41	--	--	--	--	Medium Soft	24.33	--	--	Do
33	10	14.25-15.00	Moderately weathered, brownish grey to greyish brown, fine grained, moderately fractured sandstone.	--	--	--	--	--	52	16	0.31	--	13.58	--	--	--	--	Do
34	9	14.75-15.50	Moderately weathered, brownish grey to greyish brown, fine grained, highly to moderately fractured sandstone.	--	--	--	--	2.560	63	21	0.33	--	--	--	--	1854	--	Do
35	2	7.50-8.25	Highly weathered, greyish yellow to light grey, medium to coarse grained, highly to moderately fractured sandstone.	2.704	2.681	0.852	2.283	--	296	101	0.34	--	--	--	--	--	--	Do
35	8	12.00-12.75	Moderately weathered, greyish yellow to light grey, medium to coarse grained, highly to moderately fractured sandstone.	--	--	--	--	--	--	--	--	1.00	--	Medium Soft	21.55	--	--	Do
36	6	12.00-12.75	Moderately weathered, yellowish grey, fine grained, moderately to slightly fractured sandstone.	--	--	--	--	2.236	--	--	--	--	7.40	--	--	--	--	Do
37	11	18.00-18.75	Moderately weathered, yellowish grey, coarse to medium grained, moderately fractured sandstone.	2.640	2.497	5.701	14.236	--	212	156	0.74	--	--	--	--	--	--	Do

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BH No.	Run No.	Depth (M)	Description	Density (gm/cc)		Water Content (%)	Porosity %	Specific Gravity	Crushing Strength/ Unconfined Compressive strength (kg/sqcm)		Coefficient of softening	Point Load Strength Index (kg/sqcm)	Slake Durability Index %	Hardness (based on Mohr Scale)	Soundness (% Loss)	Young's Modulus (kg/sqcm)	Impact Value (%)	Test Method
				Bulk	Dry				Dry	Saturated								
38	8	13.75-14.50	Moderately weathered, yellowish brown to brownish grey, medium to fine grained, slightly fractured sandstone.	--	--	--	--	--	74	26	0.35	--	--	--	27.32	--	61.87	Do
39	3	5.00-5.75	Highly weathered, brownish grey, fine grained, highly to moderately fractured interbedded sandstone - shale.	--	--	--	--	--	--	--	--	1.02	--	--	--	--	--	Do
39	24	23.00-24.50	Slightly weathered, yellowish brown to brownish grey, fine to medium grained, moderately slightly fractured interbedded sandstone - shale.	1.962	1.926	1.862	3.587	1.998	78	26	0.33	--	--	Medium Soft	29.78	--	--	Do
40	5	7.00-7.75	Moderately weathered, brownish grey, fine grained, highly to moderately fractured interbedded sandstone - shale.	--	--	--	--	--	--	19	--	--	--	--	--	--	57.23	Do
41	6	7.00-7.75	Highly weathered, brownish grey, fine grained, highly fractured interbedded sandstone - shale.	2.199	2.074	5.983	12.411	2.368	--	--	--	--	25.66	--	--	--	--	Do
41	22	19.00-19.75	Slightly weathered, light brownish grey, fine grained, moderately fractured interbedded sandstone - shale.	--	--	--	--	--	62	21	0.34	--	--	--	--	1801	--	Do
42	6	10.25-11.75	Highly weathered, brownish grey to light blackish grey, fine grained, highly fractured interbedded sandstone - shale.	--	--	--	--	--	--	--	--	0.98	--	Medium Soft	27.32	--	--	Do
42	20	20.75-21.50	Slightly weathered, brownish grey to light blackish grey, fine grained, highly fractured interbedded sandstone - shale.	--	--	--	--	--	75	--	--	--	--	--	--	--	--	Do
43	14	15.75-16.50	Moderately weathered, brownish grey to yellowish brown, fine grained, moderately fractured interbedded sandstone - shale.	1.979	1.890	4.706	8.894	2.074	90	26	0.29	--	8.52	--	--	--	--	Do
44	7	10.50-11.25	Highly to moderately weathered, greyish yellow, coarse to medium grained, highly to moderately fractured sandstone.	--	--	--	--	--	56	15	0.27	--	--	--	22.59	--	--	Do
45	8	12.75-13.50	Highly weathered, light yellowish grey to light grey, medium to fine grained, highly fractured interbedded sandstone - shale.	--	--	--	--	--	--	18	--	--	--	--	--	--	--	Do
46	4	8.75-9.50	Highly weathered, greyish yellow, medium grained, highly fractured sandstone.	--	--	--	--	--	--	--	--	0.91	--	--	--	--	63.59	Do

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BH No.	Run No.	Depth (M)	Description	Density (gm/cc)		Water Content (%)	Porosity %	Specific Gravity	Crushing Strength/Unconfined Compressive strength (kg/sqcm)		Coefficient of softening	Point Load Strength Index (kg/sqcm)	Slake Durability Index %	Hardness (based on Mohr Scale)	Soundness (% Loss)	Young's Modulus (kg/sqcm)	Impact Value (%)	Test Method
				Bulk	Dry				Dry	Saturated								
46	16	17.75-18.50	Moderately weathered, greyish yellow to light grey, medium grained, moderately fractured sandstone.	2.015	1.922	4.812	9.250	2.118	39	8	0.21	--	--	Medium Soft	31.48	1710	--	Do
47	5	9.00-9.75	Highly weathered, greyish yellow, coarse to medium grained, highly to moderately fractured sandstone.	--	--	--	--	--	32	11	0.34	--	--	--	--	--	--	Do
48	2	7.75-8.50	Highly weathered, greyish brown to light grey, coarse to medium grained, highly fractured sandstone.	--	--	--	--	--	--	--	--	27.18	--	--	--	--	--	Do
48	8	12.25-13.00	Moderately weathered, greyish brown to light grey, coarse to medium grained, highly fractured sandstone.	--	--	--	--	2.236	41	--	--	--	--	--	29.97	--	--	Do
49	3	7.50-8.25	Highly weathered, light yellowish grey to grey, coarse to medium grained, highly fractured sandstone.	--	--	--	--	--	--	101	--	--	--	--	--	--	--	Do
50	4	7.25-8.00	Moderately weathered, greyish yellow, medium grained, highly to moderately fractured sandstone.	2.635	2.606	1.108	2.886	2.683	259	92	0.36	--	95.89	--	--	2015	--	Do
51	11	11.00-11.75	Moderately weathered, greyish yellow, medium grained, moderately fractured interbedded sandstone - shale.	--	--	--	--	--	106	52	0.49	--	--	Medium Soft	21.47	--	53.62	Do
52	8	16.25-17.00	Highly weathered, greyish yellow to yellowish brown, medium to fine grained, moderately fractured sandstone.	--	--	--	--	--	78	--	--	--	0.00	--	--	--	--	Do
52	14	20.75-21.50	Slightly weathered, yellowish brown to yellowish grey, fine grained, slightly fractured sandstone.	--	--	--	--	--	85	19	0.22	--	--	--	--	--	--	Do
53	4	12.75-13.50	Highly weathered, brownish grey to greyish brown, fine grained, fractured sandstone.	--	--	--	--	--	27	--	--	--	--	--	--	--	--	Do
54	7	13.50-14.25	Highly weathered, yellowish grey, medium to fine grained sandstone.	--	--	--	--	--	--	--	--	0.95	--	--	--	--	--	Do
54	14	18.75-19.50	Highly weathered, yellowish grey, medium to fine grained sandstone.	--	--	--	--	--	--	--	--	0.99	--	Medium Soft	25.62	--	--	Do
55	6	12.25-13.00	Highly weathered, yellowish grey, medium to fine grained sandstone.	2.047	2.031	0.784	1.592	2.064	--	37	--	--	52.18	--	--	--	--	Do
56	3	7.50-8.25	Highly weathered, yellowish grey, medium to fine grained sandstone.	2.093	1.895	10.473	19.846	2.570	--	--	--	0.92	--	Medium Soft	20.74	--	--	Do

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BH No.	Run No.	Depth (M)	Description	Density (gm/cc)		Water Content (%)	Porosity %	Specific Gravity	Crushing Strength/ Unconfined Compressive strength (kg/sqcm)		Coefficient of softening	Point Load Strength Index (kg/sqcm)	Slake Durability Index %	Hardness (based on Mohr Scale)	Soundness (%) Loss	Young's Modulus (kg/sqcm)	Impact Value (%)	Test Method
				Bulk	Dry				Dry	Saturated								
56	15	16.50-17.25	Moderately weathered, yellowish grey, medium to fine grained sandstone.	--	--	--	--	--	--	11	--	--	--	Medium Soft	--	--	--	Do
57	7	11.00-11.75	Highly weathered, yellowish grey, medium to fine grained sandstone.	2.192	1.969	11.302	22.260	--	40	--	--	--	--	--	--	--	--	Do
58	6	11.25-12.00	Highly weathered, greyish brown to yellowish brown, fine grained, highly to moderately fractured sandstone.	--	--	--	--	--	--	10	--	--	--	--	--	--	--	Do
58	16	18.75-19.00	Moderately weathered, greyish brown to yellowish brown, fine grained, highly to moderately fractured sandstone.	--	--	--	--	--	45	--	--	--	--	Medium Soft	30.25	--	--	Do
59	12	12.50-13.25	Highly weathered, light grey to yellowish grey, medium to fine grained, fractured sandstone.	2.123	1.923	10.432	20.058	2.590	--	9	--	--	--	--	--	--	--	Do
60	17	16.25-17.00	Moderately weathered, yellowish grey, medium to fine grained sandstone.	--	--	--	--	--	62	13	0.21	--	6.25	--	--	2104	--	Do
61	4	8.50-9.25	Highly weathered, yellowish grey to light grey, medium to fine grained sandstone.	--	--	--	--	--	--	--	--	0.94	--	--	--	--	57.22	Do
61	13	15.25-16.00	Highly weathered, yellowish grey to light grey, medium to fine grained sandstone.	--	--	--	--	--	75	--	--	--	--	--	--	--	--	Do
62	7	17.00-17.75	Moderately weathered, greyish yellow, coarse to medium grained, highly to moderately, fractured sandstone.	2.110	1.885	11.933	22.493	2.432	69	22	0.32	--	5.55	Medium Soft	17.63	--	--	Do
63	11	15.75-16.50	Moderately weathered, brownish yellow, fine to medium grained, highly fractured sandstone.	--	--	--	--	--	--	--	--	0.82	--	--	--	--	--	Do
64	9	15.50-16.25	Moderately weathered, deep greyish yellow to brownish yellow, fine to medium grained, highly fractured sandstone.	--	--	--	--	--	--	--	--	0.97	--	--	--	--	--	Do
65	6	12.00-12.75	Highly weathered, whitish grey to yellowish brown, medium grained, highly to moderately fractured sandstone.	--	--	--	--	--	55	21	0.38	--	--	Medium Soft	34.58	--	--	Do
66	12	18.00-18.75	Highly to moderately weathered, whitish yellow to yellowish grey, medium to fine grained, highly fractured interbedded sandstone - shale.	2.098	2.003	4.758	9.531	--	--	--	--	1.01	--	--	--	--	--	Do
67	10	14.25-15.00	Moderately weathered, yellowish brown, medium grained, moderately fractured sandstone.	2.149	1.952	10.066	19.651	--	--	--	--	--	--	--	--	--	--	Do

Rock-3973M / Page 8

BH No.	Run No.	Depth (M)	Description	Density (gm/cc)		Water Content (%)	Porosity %	Specific Gravity	Crushing Strength/ Unconfined Compressive strength (kg/sqcm)		Coefficient of softening	Point Load Strength Index (kg/sqcm)	Slake Durability Index %	Hardness (based on Mohr Scale)	Soundness (% Loss	Young's Modulus (kg/sqcm)	Impact Value (%)	Test Method
				Bulk	Dry				Dry	Saturated								
68	6	13.25-14.00	Highly to moderately weathered, brownish yellow, medium grained, highly to moderately fractured sandstone. moderately fractured sandstone.	--	--	--	--	--	--	--	--	0.95	21.55	--	--	--	62.25	Do
68	21	24.50-25.00	Moderately weathered, brownish yellow, fine grained, highly fractured interbedded sandstone - shale.	2.008	1.938	3.622	7.020	--	--	--	--	0.92	--	--	--	--	--	Do
69	5	11.75-12.50	Highly weathered, whitish yellow to brownish yellow, medium grained, highly fractured sandstone.	--	--	--	--	--	--	--	--	0.93	--	--	--	--	--	Do
69	12	17.00-17.75	Moderately weathered, greyish yellow, fine to medium grained, moderately fractured sandstone.	1.945	1.875	3.738	7.010	2.016	62	--	--	--	15.66	Medium Soft	29.13	--	--	Do
70	8	13.75-14.50	Moderately weathered, light grey to greyish yellow, medium grained, highly to moderately fractured interbedded sandstone - shale.	--	--	--	--	--	--	--	--	0.96	--	--	--	--	--	Do
71	12	17.00-17.75	Moderately weathered, yellowish brown to yellowish grey, medium grained, moderately fractured sandstone.	2.026	1.924	5.253	10.109	--	56	12	0.21	--	--	--	--	1459	--	Do
72	14	19.25-20.00	Moderately weathered, yellowish grey, fine grained, moderately fractured sandstone.	--	--	--	--	--	71	26	0.37	--	--	--	--	--	--	Do
73	4	12.50-13.25	Highly weathered, greyish yellow to yellowish brown, medium grained, highly fractured sandstone.	--	--	--	--	--	--	--	--	0.99	--	Medium Soft	27.39	--	--	Do
74	8	12.00-12.75	Slightly weathered, light yellowish grey to grey, medium grained, moderately to slightly fractured sandstone.	2.209	2.108	4.800	10.119	2.346	54	15	0.28	--	19.45	--	--	--	--	Do
75	10	14.25-15.00	Moderately weathered, light yellowish grey to greyish yellow, medium grained, highly to moderately fractured sandstone.	--	--	--	--	--	--	--	--	0.98	--	--	--	--	--	Do
75	13	16.50-17.75	Slightly weathered, light yellowish grey to greyish yellow, medium grained, highly to moderately fractured sandstone.	2.007	1.925	4.255	8.192	--	62	21	0.34	--	--	--	--	--	--	Do
76	16	19.00-19.50	Highly weathered, brownish yellow, coarse grained, highly fractured sandstone.	--	--	--	--	--	--	--	--	0.85	--	--	--	--	--	Do

Rock-3973M / Page 9

BH No.	Run No.	Depth (M)	Description	Density (gm/cc)		Water Content (%)	Porosity %	Specific Gravity	Crushing Strength/ Unconfined Compressive strength (kg/sqcm)		Coefficient of softening	Point Load Strength Index (kg/sqcm)	Slake Durability Index %	Hardness (based on Mohr Scale)	Soundness (% Loss)	Young's Modulus (kg/sqcm)	Impact Value (%)	Test Method
				Bulk	Dry				Dry	Saturated								
77	9	14.25-15.00	Highly weathered, light whitish yellow to brownish yellow, medium to coarse grained, fully fractured sandstone.	2.042	1.980	3.122	6.180	2.110	--	--	--	--	16.25	--	--	--	--	Do
79	5	8.00-8.75	Highly weathered, light grey, coarse grained, medium fractured sandstone.	--	--	--	--	--	--	--	--	0.99	--	--	--	--	55.12	Do
80	2	13.25-14.00	Highly weathered, brownish grey, fine grained, moderately fractured sandstone.	2.004	1.902	5.326	10.132	2.117	--	--	--	1.00	6.23	--	20.11	--	--	Do
80	10	19.25-20.00	Moderately weathered, brownish grey, fine grained, moderately fractured sandstone.	--	--	--	--	--	75	24	0.32	--	--	--	--	974	--	Do
81	2	10.25-11.00	Highly weathered, light yellowish grey, medium grained, highly fractured sandstone.	--	--	--	--	--	--	--	--	0.88	--	--	--	--	--	Do
81	7	14.00-14.75	Moderately weathered, yellowish grey to light pinkish grey, medium to coarse grained, highly to moderately fractured sandstone.	1.934	1.893	2.175	4.116	1.974	69	24	0.35	--	10.11	Soft	24.32	--	--	Do
82	8	8.00-8.75	Highly weathered, yellowish grey, coarse to medium grained, highly fractured sandstone.	--	--	--	--	--	--	15	--	--	--	--	--	--	--	Do
83	4	4.50-5.25	Highly weathered, yellowish grey, coarse grained sandstone.	--	--	--	--	--	45	--	--	--	--	--	--	--	--	Do
83	10	9.00-9.75	Moderately weathered, yellowish grey, coarse to medium grained sandstone.	1.938	1.883	2.922	5.503	--	54	12	0.22	--	0.42	Medium Soft	29.74	--	--	Do
84	3	5.50-6.25	Highly weathered, yellowish grey, coarse to medium grained fractured sandstone.	--	--	--	--	--	--	--	--	0.87	--	--	--	--	--	Do
84	14	13.75-14.50	Moderately weathered / fresh, yellowish grey, coarse to medium grained fractured sandstone.	2.048	1.930	6.113	11.796	2.188	--	14	--	--	5.62	--	--	--	--	Do
85	7	8.75-9.50	Highly weathered, whitish grey to yellowish grey, fine grained sandstone.	--	--	--	--	--	--	11	--	--	--	--	--	--	--	Do
86	4	8.50-9.25	Highly weathered, yellowish brown to brownish grey, fine to medium grained, moderately fractured sandstone.	1.865	1.853	0.624	1.157	--	49	16	0.33	--	--	Medium Soft	27.49	2051	53.47	Do
87	17	16.50-17.25	Slightly weathered, yellowish grey to brownish grey, fine grained, moderately fractured sandstone.	--	--	--	--	--	88	31	0.35	--	--	Medium Soft	--	1941	--	Do

Rock-3973M / Page 10

BH No.	Run No.	Depth (M)	Description	Density (gm/cc)		Water Content (%)	Porosity %	Specific Gravity	Crushing Strength/Unconfined Compressive strength (kg/sqcm)		Coefficient of softening	Point Load Strength Index (kg/sqcm)	Slake Durability Index %	Hardness (based on Mohr Scale)	Soundness (%) Loss	Young's Modulus (kg/sqcm)	Impact Value (%)	Test Method
				Bulk	Dry				Dry	Saturated								
88	4	7.75-8.50	Highly to moderately weathered, yellowish brown, fine grained moderately fractured interbedded sandstone - shale.	--	--	--	--	--	64	--	--	--	--	--	--	--	--	Do
89	13	16.75-17.50	Highly weathered, yellowish grey, medium to fine grained, fractured sandstone.	1.873	1.754	6.796	11.918	2.590	--	--	--	0.94	--	--	--	--	--	Do
93	24	18.75-19.50	Highly weathered, yellowish grey, medium grained sandstone.	--	--	--	--	--	--	--	--	0.91	--	--	--	--	64.21	Do
94	17	15.50-16.25	Highly weathered, yellowish grey to deep grey, medium to fine grained, fractured sandstone / shale.	--	--	--	--	--	--	--	--	0.90	--	Medium Soft	20.15	--	--	Do
95	11	8.50-9.25	Highly to moderately weathered, deep grey to yellowish grey, medium to fine grained fractured interbedded sandstone - shale.	2.168	2.089	3.798	7.934	--	--	--	--	0.85	--	--	--	--	--	Do
96	24	19.00-20.00	Highly weathered, yellowish grey, medium to fine grained sandstone.	--	--	--	--	2.530	--	--	--	1.05	--	--	--	--	--	Do
97	16	15.25-16.00	Highly weathered, yellowish grey to light grey, medium to fine grained sandstone.	--	--	--	--	--	82	33	0.40	--	--	--	--	--	--	Do
98	4	5.25-6.00	Highly weathered, brownish grey, fine grained, moderately fractured sandstone.	--	--	--	--	--	--	--	--	0.91	--	--	--	--	--	Do
98	9	9.00-9.75	Highly weathered, brownish grey, fine grained, moderately fractured sandstone.	1.967	1.895	3.769	7.143	2.041	--	13	--	--	0.10	Soft	32.17	--	--	Do
99	10	12.25-13.00	Highly to moderately weathered, yellowish brown to deep grey, medium to fine grained, fractured sandstone.	--	--	--	--	--	74	--	--	--	--	--	--	--	--	Do
100	8	7.25-8.00	Highly weathered, yellowish brown, coarse to medium grained, moderately fractured sandstone.	--	--	--	--	--	--	--	--	1.15	--	--	--	--	--	Do
101	7	11.50-12.25	Highly weathered, reddish brown, fine grained, moderately fractured sandstone.	1.914	1.850	3.429	6.345	2.152	60	--	--	--	1.25	Medium Soft	28.65	--	59.78	Do
102	9	10.75-11.50	Completely to highly weathered, yellowish grey to yellowish brown, medium to fine grained, fractured sandstone.	--	--	--	--	--	--	--	--	1.04	--	--	--	--	--	Do
104	13	13.00-13.75	Highly to moderately weathered, light blackish grey, fine grained, moderately fractured interbedded sandstone - shale.	2.093	2.040	2.555	5.213	--	65	12	0.18	--	4.99	Moderately Hard	22.42	1352	--	Do

[illegible]

[illegible]

[illegible]

PROJECT :	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.																TERMINATION DEPTH, m =								12.00				GROUND WATER TABLE, m =								3.9																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
DEPTH (m)	FROM	TO	SAMPLE TYPE	SPT - N Value	INSITU BULK UNIT WT (gm/cm ³)	INSITU DRY UNIT WEIGHT (gm/cm ³)	INSITU WATER CONTENT (%)	SIEVE ANALYSIS						TYPE OF SHEAR TEST	COHESION C, kg/cm ²	ANGLE OF INT. FRICTION, Φ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm ²	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm ²	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm ²	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm ²	MODULUS OF ELASTICITY, kg/cm ²	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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Job No.: MK/01/03-23

 M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD		APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-06																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
		PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.		TERMINATION DEPTH, m =										10.00		GROUND WATER TABLE, m =				2.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
DEPTH (m)		SIEVE ANALYSIS				INSITU WATER CONTENT (%)		% GRAVEL		% COARSE		MED.		FINE		% SILT & CLAY		LIQUID LIMIT (%)		PLASTIC LIMIT (%)		PLASTICITY INDEX, IP		I.S. CLASSIFICATION		TYPE OF SHEAR TEST		COHESION C, kg/cm2		ANGLE OF INT. FRICTION, ϕ (°)		COMPRESSION INDEX, Cc		SPECIFIC GRAVITY, G		SHRINKAGE LIMIT, %		FREE SWELL INDEX, %		SWELLING PRESSURE, kg/cm2		CORE RECOVERY (%)		ROCK QUALITY DESIGNATION (%)		POINT LOAD STRENGTH, kg/cm2		UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2		UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2		MODULUS OF ELASTICITY, kg/cm2		WATER ABSORPTION (%)		POROSITY (%)		SLAKE DURABILITY INDEX, %		HARDNESS		IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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Job No.: MK/01/03-23

M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD			APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-08																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.																		TERMINATION DEPTH, m =		15.00		GROUND WATER TABLE, m =				2.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
DEPTH (m)	FROM	TO	SAMPLE TYPE	SPT - N Value	INSTU BULK UNIT WT (gm/cm3)	INSTU DRY UNIT WEIGHT (gm/cm3)	INSTU WATER CONTENT (%)	SIEVE ANALYSIS				% SILT & CLAY	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX, IP	I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, Φ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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Job No.: MK/01/03-23

PROJECT :		APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-10																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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DEPTH (m)	FROM	TO	SAMPLE TYPE	SPT - N Value	INSITU BULK UNIT WT (gm/cm3)	INSITU DRY UNIT WEIGHT (gm/cm3)	INSITU WATER CONTENT (%)	SIEVE ANALYSIS				% GRAVEL	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX, IP	I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, Φ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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Job No.: MK/01/03-23

Job No.: MK/01/03-23

PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.																	TERMINATION DEPTH, m =		15.00		GROUND WATER TABLE, m =					2.5		
DEPTH (m)																														
FROM	TO	SIEVE ANALYSIS				INSITU WATER CONTENT (%)	SAMPLE TYPE	SPT - N Value	INSITU BULK UNIT Wt (gm/cm3)	INSITU DRY UNIT WEIGHT (gm/cm3)	FILLED UP	TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, ϕ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)
		% GRAVEL	COARSE	MED.	FINE																									
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3.00	3.45	SPT-2	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50	4.95	SPT-3	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	6.45	SPT-4	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7.50	7.95	SPT-5	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	9.45	SPT-6	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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10.50	10.69	SPT-7	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	12.03	SPT-8	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12.03	13.50	CR-2	-	1.89	1.87	1.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50	15.00	CR-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-18																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.																TERMINATION DEPTH, m =				15.00		GROUND WATER TABLE, m =				15.00																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
DEPTH (m)		SIEVE ANALYSIS										INSITU WATER CONTENT (%)		INSITU DRY UNIT WEIGHT (gm/cm3)		INSITU BULK UNIT WFT (gm/cm3)		SPT - N Value		SAMPLE TYPE		FILLED UP										CORE RECOVERY (%)		ROCK QUALITY DESIGNATION (%)		POINT LOAD STRENGTH, kg/cm2		UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2		UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2		MODULUS OF ELASTICITY, kg/cm2		WATER ABSORPTION (%)		POROSITY (%)		SLAKE DURABILITY INDEX, %		HARDNESS		IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.															15.00		GROUND WATER TABLE, m =					14.9																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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FROM	TO	SIEVE ANALYSIS		FILLED UP SOIL										SPT - N Value	SAMPLE TYPE	IMPACT VALUE (%)	HARDNESS	SLAKE DURABILITY INDEX, %	POROSITY (%)	WATER ABSORPTION (%)	MODULUS OF ELASTICITY, kg/cm2	STRENGTH (NMC), kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	POINT LOAD STRENGTH, kg/cm2	ROCK QUALITY DESIGNATION (%)	CORE RECOVERY (%)	SWELLING PRESSURE, kg/cm2	FREE SWELL INDEX, %	SHRINKAGE LIMIT, %	SPECIFIC GRAVITY, G	COMPRESSION INDEX, Cc	ANGLE OF INT. FRICTION, ϕ (°)	COHESION C, kg/cm2	TYPE OF SHEAR TEST	I.S. CLASSIFICATION	PLASTICITY INDEX, IP	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	INSITU WATER CONTENT (%)	% GRAVEL	COARSE	MED.	FINE	% SILT & CLAY	% SAND																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						

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Job No.: MK/01/03-23

M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-22																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.																				15.00		GROUND WATER TABLE, m =				2.45																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
DEPTH (m)		SIEVE ANALYSIS						FILLED UP SOIL										TERMINATION DEPTH, m =										15.00				GROUND WATER TABLE, m =				2.45																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
		COARSE		MED.		% SAND		% SILT & CLAY		LIQUID LIMIT (%)		PLASTIC LIMIT (%)		PLASTICITY INDEX, IP		I.S. CLASSIFICATION		TYPE OF SHEAR TEST		COHESION C, kg/cm2		ANGLE OF INT. FRICTION, ϕ (°)		COMPRESSION INDEX, Cc		SPECIFIC GRAVITY, G		SHRINKAGE LIMIT, %		FREE SWELL INDEX, %		SWELLING PRESSURE, kg/cm2		CORE RECOVERY (%)		ROCK QUALITY DESIGNATION (%)		POINT LOAD STRENGTH, kg/cm2		UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2		UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2		MODULUS OF ELASTICITY, kg/cm2		WATER ABSORPTION (%)		POROSITY (%)		SLAKE DURABILITY INDEX, %		HARDNESS		IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
FROM		TO		SPT - N Value		INSITU BULK UNIT WT (gm/cm3)		INSITU DRY UNIT WEIGHT (gm/cm3)		INSITU WATER CONTENT (%)		% GRAVEL		COARSE		MED.		% SAND		% SILT & CLAY		LIQUID LIMIT (%)		PLASTIC LIMIT (%)		PLASTICITY INDEX, IP		I.S. CLASSIFICATION		TYPE OF SHEAR TEST		COHESION C, kg/cm2		ANGLE OF INT. FRICTION, ϕ (°)		COMPRESSION INDEX, Cc		SPECIFIC GRAVITY, G		SHRINKAGE LIMIT, %		FREE SWELL INDEX, %		SWELLING PRESSURE, kg/cm2		CORE RECOVERY (%)		ROCK QUALITY DESIGNATION (%)		POINT LOAD STRENGTH, kg/cm2		UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2		UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2		MODULUS OF ELASTICITY, kg/cm2		WATER ABSORPTION (%)		POROSITY (%)		SLAKE DURABILITY INDEX, %		HARDNESS		IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-23																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.															TERMINATION DEPTH, m =					15.00					GROUND WATER TABLE, m =																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
DEPTH (m)		SIEVE ANALYSIS					FILLED UP SOIL					PLASTIC LIMIT (%)		PLASTICITY INDEX, IP		I.S. CLASSIFICATION		TYPE OF SHEAR TEST		COHESION C, kg/cm2		ANGLE OF INT. FRICTION, ϕ (°)		COMPRESSION INDEX, Cc		SPECIFIC GRAVITY, G		SHRINKAGE LIMIT, %		FREE SWELL INDEX, %		SWELLING PRESSURE, kg/cm2		CORE RECOVERY (%)		ROCK QUALITY DESIGNATION (%)		POINT LOAD STRENGTH, kg/cm2		UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2		UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2		MODULUS OF ELASTICITY, kg/cm2		WATER ABSORPTION (%)		POROSITY (%)		SLAKE DURABILITY INDEX, %		HARDNESS		IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
		% GRAVEL		% COARSE		% MED.		% FINE		% SILT & CLAY		LIQUID LIMIT (%)		PLASTIC LIMIT (%)		Non-Plastic		SM		DST		0.00		27		0.082		2.63		-		0		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-	

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M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD																																	
APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-25																																	
PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.														TERMINATION DEPTH, m =				15.00		GROUND WATER TABLE, m =											
DEPTH (m)		SIEVE ANALYSIS				FILLED UP SOIL				INSITU WATER CONTENT (%)	INSITU DRY UNIT WEIGHT (gm/cm3)	INSITU BULK UNIT WT (gm/cm3)	SPT - N Value	SAMPLE TYPE	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, ϕ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)		
		% SAND		MED.	FINE	% SILT & CLAY	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX, IP																							I.S. CLASSIFICATION	TYPE OF SHEAR TEST
FROM	TO	0.00	0.50							DS	-	-	-	-	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
1.50	1.95	-	-	-	-	-	-	-	-	-	-	6	SPT-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	3.29	-	0	2	19	18	61 (47.14)	29	15	14	CL	0.22	7	-	-	2.64	13.60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50	4.95	-	6	4	7	46	37	28	15	13	SC	-	-	-	-	2.63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	6.45	-	-	-	-	-	-	-	-	-	-	15	SPT-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	7.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	47.00	0.00	-	-	-	-	-	-	-	-	-	-	-
7.50	9.00	-	-	-	-	-	-	0.65	-	-	-	-	-	-	-	-	-	1.85	-	-	43.00	8.00	-	10.60	-	-	6.94	16.72	-	-	-	-	-
9.00	10.50	-	-	-	-	-	-	0.88	-	-	-	-	-	-	-	-	-	-	-	38.00	38.00	-	18.20	-	-	-	3.53	6.86	-	-	-	-	-
10.50	12.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	66.00	42.00	-	-	-	-	-	-	-	-	-	-	-	-
12.00	13.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	56.00	20.00	-	-	-	-	-	-	-	-	-	-	-	-
13.50	15.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63.00	0.00	-	-	-	-	-	-	-	-	-	-	-	-

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PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.															12.00		GROUND WATER TABLE, m =															
DEPTH (m)		SIEVE ANALYSIS															TERMINATION DEPTH, m =						12.00						GROUND WATER TABLE, m =					
FROM	TO	SIEVE ANALYSIS				INSITU WATER CONTENT (%)	SPT - N Value	INSITU BULK UNIT WT (gm/cm3)	INSITU DRY UNIT WEIGHT (gm/cm3)	TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, Φ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)						
		% GRAVEL	COARSE	MED.	FINE																								% SILT & CLAY	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX, IP	I.S. CLASSIFICATION	
0.00	0.50	DS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
1.50	1.95	SPT-1	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
3.00	3.45	SPT-2	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
4.50	4.95	SPT-3	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
6.00	6.45	SPT-4	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
6.50	6.75	UDS/ DS-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
7.50	7.95	SPT-5	44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
9.00	9.45	SPT-6	82	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
10.50	10.85	SPT-7	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
12.00	12.23	SPT-8	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						

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M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD		APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-31																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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DEPTH (m)		SIEVE ANALYSIS				INSITU WATER CONTENT (%)				TYPE OF SHEAR TEST				COHESION C, kg/cm2				ANGLE OF INT. FRICTION, ϕ (°)				COMPRESSION INDEX, Cc				SPECIFIC GRAVITY, G				SHRINKAGE LIMIT, %				FREE SWELL INDEX, %				SWELLING PRESSURE, kg/cm2				CORE RECOVERY (%)				ROCK QUALITY DESIGNATION (%)				POINT LOAD STRENGTH, kg/cm2				UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2				UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2				MODULUS OF ELASTICITY, kg/cm2				WATER ABSORPTION (%)				POROSITY (%)				SLAKE DURABILITY INDEX, %				HARDNESS				IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													

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Job No.: MK/01/03-23

M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD		APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-34																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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DEPTH (m)	TO	SIEVE ANALYSIS		% SILT & CLAY		LIQUID LIMIT (%)		PLASTIC LIMIT (%)		PLASTICITY INDEX, IP		I.S. CLASSIFICATION		TYPE OF SHEAR TEST		COHESION C, kg/cm2		ANGLE OF INT. FRICTION, ϕ (°)		COMPRESSION INDEX, Cc		SPECIFIC GRAVITY, G		SHRINKAGE LIMIT, %		FREE SWELL INDEX, %		SWELLING PRESSURE, kg/cm2		CORE RECOVERY (%)		ROCK QUALITY DESIGNATION (%)		POINT LOAD STRENGTH, kg/cm2		UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2		UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2		MODULUS OF ELASTICITY, kg/cm2		WATER ABSORPTION (%)		POROSITY (%)		SLAKE DURABILITY INDEX, %		HARDNESS		IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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FROM	TO	SAMPLE TYPE		SPT - N Value		INSITU BULK UNIT WIT (gm/cm3)		INSITU DRY UNIT WEIGHT (gm/cm3)		INSITU WATER CONTENT (%)		% GRAVEL		COARSE		MED.		FINE		% SILT & CLAY		LIQUID LIMIT (%)		PLASTIC LIMIT (%)		PLASTICITY INDEX, IP		I.S. CLASSIFICATION		TYPE OF SHEAR TEST		COHESION C, kg/cm2		ANGLE OF INT. FRICTION, ϕ (°)		COMPRESSION INDEX, Cc		SPECIFIC GRAVITY, G		SHRINKAGE LIMIT, %		FREE SWELL INDEX, %		SWELLING PRESSURE, kg/cm2		CORE RECOVERY (%)		ROCK QUALITY DESIGNATION (%)		POINT LOAD STRENGTH, kg/cm2		UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2		UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2		MODULUS OF ELASTICITY, kg/cm2		WATER ABSORPTION (%)		POROSITY (%)		SLAKE DURABILITY INDEX, %		HARDNESS		IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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PROJECT :		APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-36																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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Job No.: MK/01/03-23

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PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.															TERMINATION DEPTH, m =				15.00		GROUND WATER TABLE, m =				3.00																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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DEPTH (m)	FROM	TO	SIEVE ANALYSIS										INSITU WATER CONTENT (%)	INSITU BULK UNIT WT (gm/cm3)	INSITU DRY UNIT WEIGHT (gm/cm3)	TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, ϕ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
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PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.														15.00		GROUND WATER TABLE, m =				2.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
DEPTH (m)		FILLED UP														POINT LOAD STRENGTH, kg/cm2		UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2		UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2		MODULUS OF ELASTICITY, kg/cm2		WATER ABSORPTION (%)		POROSITY (%)		SLAKE DURABILITY INDEX, %		HARDNESS		IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
FROM		TO		SIEVE ANALYSIS				INSITU WATER CONTENT (%)		INSITU BULK UNIT WT (gm/cm3)		INSITU DRY UNIT WEIGHT (gm/cm3)		TYPE OF SHEAR TEST		COHESION C, kg/cm2		ANGLE OF INT. FRICTION, ϕ (°)		COMPRESSION INDEX, Cc		SPECIFIC GRAVITY, G		SHRINKAGE LIMIT, %		FREE SWELL INDEX, %		SWELLING PRESSURE, kg/cm2		CORE RECOVERY (%)		ROCK QUALITY DESIGNATION (%)		POINT LOAD STRENGTH, kg/cm2		UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2		UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2		MODULUS OF ELASTICITY, kg/cm2		WATER ABSORPTION (%)		POROSITY (%)		SLAKE DURABILITY INDEX, %		HARDNESS		IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													

M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD

APPENDIX-4: SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-42

Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.

1-800-CPCG

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M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
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PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.																15.00		GROUND WATER TABLE, m =																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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PROJECT :		APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-49																	GROUND WATER TABLE, m =		15.00		15.00		15.00													
Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.																																						
DEPTH (m)	FROM	TO	SAMPLE TYPE	SPT - N Value	INSITU BULK UNIT WT (gm/cm ³)	INSITU DRY UNIT WEIGHT (gm/cm ³)	INSITU WATER CONTENT (%)	SIEVE ANALYSIS				FILLED UP SOIL	I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm ²	ANGLE OF INT. FRICTION, ϕ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm ²	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm ²	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm ²	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm ²	MODULUS OF ELASTICITY, kg/cm ²	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)						
								% GRAVEL	COARSE	MED.	% SILT & CLAY																						LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX, IP			
0.00	0.50	DS-1	-	-	-	-	-	-	RCC, PCC, BAALT BOULDER, COAL ROCKS FILLED UP				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
1.50	1.95	DS-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
3.00	3.45	SPT-1	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
4.50	4.95	SPT-2	27	-	-	-	-	-	2	1	18	34	45	30	16	14	SC	-	-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
6.00	6.45	SPT-3	38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
6.00	7.50	CR-1	-	-	-	-	-	-	Weathered Sandstone				-	-	-	-	-	1.87	-	-	-	94.00	0.00	-	-	-	-	-	-	-	-	-	2.00	-	-	-		
7.50	9.00	CR-2	-	-	-	-	-	-	Weathered Sandstone				-	-	-	-	-	-	-	-	-	42.00	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
9.00	10.50	CR-3	-	-	-	-	0.84	-	Weathered Sandstone				-	-	-	-	-	-	-	-	-	54.00	11.00	-	27.10	-	-	-	-	-	-	-	-	-	-	-	-	-
10.50	10.95	SPT-4	66	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
10.50	12.00	CR-4	-	-	-	-	-	-	Weathered Sandstone				-	-	-	-	-	-	-	-	-	50.00	13.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
12.00	12.18	SPT-5	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
12.00	13.50	CR-5	-	2.03	2.02	0.68	-	Weathered Sandstone				-	-	-	-	-	-	-	-	-	-	31.00	17.00	-	10.40	-	-	-	7.77	15.72	-	-	-	-	-	-	-	
13.50	13.63	SPT-6	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
13.50	15.00	CR-6	-	-	-	-	-	Weathered Sandstone				-	-	-	-	-	-	-	-	-	-	46.00	28.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD																								
APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-50																								
PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.															TERMINATION DEPTH, m =					GROUND WATER TABLE, m =		
																	15.00							
		</																						

Job No.: MK/01/03-23

M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD																															
APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-53																															
PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.												TERMINATION DEPTH, m =		15.00		GROUND WATER TABLE, m =													
DEPTH (m)		SIEVE ANALYSIS						INSITU WATER CONTENT (%)	INSITU BULK UNIT WT (gm/cm3)	INSITU DRY UNIT WEIGHT (gm/cm3)	FILLED UP SOIL	I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, ϕ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)	
		% GRAVEL	% COARSE	MED.	FINE	% SILT & CLAY	% SAND																								
FROM	TO	0.00	0.50	DS	-	-	-	-	-	-	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	1.95	SPT-1	6	-	-	-	-	-	-	-	SM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	3.30	SPT-2	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50	4.95	SPT-3	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	6.45	SPT-4	33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7.50	7.95	SPT-5	61	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7.50	9.00	CR-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	44.00	0.00	-	-	-	-	-	-	-	-	-	-
9.00	10.50	CR-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.95	-	-	48.00	0.00	4.80	-	-	-	-	-	-	2.00	-	-
10.50	12.00	CR-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	54.00	0.00	3.00	-	-	-	-	-	-	11.66	-	-
12.00	13.50	CR-4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	44.00	26.00	-	-	-	-	-	-	-	-	-	-
13.50	15.00	CR-5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	70.00	50.00	-	-	-	-	-	-	-	-	-	-

M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-54																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.																				TERMINATION DEPTH, m =		12.00		GROUND WATER TABLE, m =				11.50																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
DEPTH (m)	FROM	TO	SAMPLE TYPE	SPT - N Value	INSITU BULK UNIT WIT (gm/cm ³)	INSITU DRY UNIT WEIGHT (gm/cm ³)	INSITU WATER CONTENT (%)	SIEVE ANALYSIS					LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX, IP	I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm ²	ANGLE OF INT. FRICTION, Φ (°)	COMPRESSION INDEX, C _c	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm ²	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm ²	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm ²	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm ²	MODULUS OF ELASTICITY, kg/cm ²	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.																12.00		GROUND WATER TABLE, m =																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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FROM	TO	SAMPLE TYPE	SPT - N Value	INSITU BULK UNIT WT (gm/cm3)	INSITU DRY UNIT WEIGHT (gm/cm3)	INSITU WATER CONTENT (%)	SIEVE ANALYSIS					I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, ϕ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
							% GRAVEL	COARSE	MED.	FINE	% SILT & CLAY																					PLASTIC LIMIT (%)	PLASTICITY INDEX, IP																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
0.00	0.50	DS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Job No.: MK/01/03-23

PROJECT :		APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-57																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.		TERMINATION DEPTH, m =										12.00			GROUND WATER TABLE, m =																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
DEPTH (m)		SIEVE ANALYSIS										FILLED UP SOIL										INSITU WATER CONTENT (%)			INSITU BULK UNIT WGT (gm/cm ³)			INSITU DRY UNIT WEIGHT (gm/cm ³)			SPT - N Value			SAMPLE TYPE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
FROM	TO	% GRAVEL				MED.				% SILT & CLAY		LIQUID LIMIT (%)			PLASTIC LIMIT (%)			PLASTICITY INDEX, IP			I.S. CLASSIFICATION			TYPE OF SHEAR TEST			COHESION C, kg/cm ²			ANGLE OF INT. FRICTION, Φ (°)			COMPRESSION INDEX, Cc			SPECIFIC GRAVITY, G			SHRINKAGE LIMIT, %			FREE SWELL INDEX, %			SWELLING PRESSURE, kg/cm ²			CORE RECOVERY (%)			ROCK QUALITY DESIGNATION (%)			POINT LOAD STRENGTH, kg/cm ²			UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm ²			UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm ²			MODULUS OF ELASTICITY, kg/cm ²			WATER ABSORPTION (%)			POROSITY (%)			SLAKE DURABILITY INDEX, %			HARDNESS			IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.														15.00		GROUND WATER TABLE, m =													
DEPTH (m)		SIEVE ANALYSIS						FILLED UP SOIL						TERMINATION DEPTH, m =						GROUND WATER TABLE, m =											
FROM	TO	% SAND				% SILT & CLAY		LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX, IP	I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, ϕ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)	
		COARSE	MED.	FINE	% GRAVEL																										
0.00	0.50	DS	-	-	-	-	-	-	-	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	1.95	SPT-1	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	3.45	SPT-2	4	-	-	-	-	-	-	SC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50	4.95	SPT-3	10	-	-	-	-	-	-	SM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	6.45	SPT-4	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7.50	7.95	SPT-5	28	-	-	-	-	-	-	CI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	9.45	SPT-6	66	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10.50	10.95	SPT-7	84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	12.34	SPT-8	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50	13.72	SPT-9	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	15.08	SPT-10	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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[illegible]

					M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD							
APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-64												
PROJECT :			Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.				TERMINATION DEPTH, m =		10.00	GROUND WATER TABLE, m =		
24/PS-HQ			9.50									

DEPTH (m)	FROM	TO	SAMPLE TYPE	SPT - N Value	INSITU BULK UNIT WT (gm/cm3)	INSITU DRY UNIT WEIGHT (gm/cm3)	INSITU WATER CONTENT (%)	SIEVE ANALYSIS						TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, Φ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)			
								% GRAVEL	COARSE	MED.	FINE	% SILT & CLAY	LIQUID LIMIT (%)																				PLASTIC LIMIT (%)	PLASTICITY INDEX, IP	I.S. CLASSIFICATION
0.00	0.50	DS	-	-	-	-	-	0	2	29	41	28	28	14	14	SC	-	-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
1.50	1.95	SPT-1	12	-	-	-	-	3	2	21	30	44	27	13	14	SC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
3.00	3.45	SPT-2	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
4.50	4.95	SPT-3	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
6.00	6.07	SPT-4	REF	-	-	-	-	0	0	56	25	19	Non-plastic			SM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
7.50	7.52	SPT-5	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
9.00	9.03	SPT-6	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
10.00	10.02	SPT-7	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

					M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD				
APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-65									
PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.			TERMINATION DEPTH, m =		10.00	GROUND WATER TABLE, m =	
9.5									

DEPTH (m)	FROM	TO	SAMPLE TYPE	SPT - N Value	INSITU BULK UNIT WT (gm/cm3)	INSITU DRY UNIT WEIGHT (gm/cm3)	INSITU WATER CONTENT (%)	SIEVE ANALYSIS					LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX, IP	I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, ϕ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)		
								% GRAVEL	COARSE	MED.	FINE	% SILT & CLAY																									
0.00	0.50	DS	-	-	-	-	-	-	3	2	26	37	32	Non-plastic	SM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1.50	1.95	SPT-1	73	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3.00	3.21	SPT-2	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
4.50	4.63	SPT-3	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
6.00	6.12	SPT-4	REF	-	-	-	-	-	9	5	30	40	16	Non-plastic	SM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7.50	7.58	SPT-5	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
9.00	90.50	SPT-6	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
10.00	10.20	SPT-7	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

					M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD				
APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-66									
PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.				TERMINATION DEPTH, m =		10.00	GROUND WATER TABLE, m =
3.50									

DEPTH (m)	FROM	TO	SAMPLE TYPE	SPT - N Value	INSITU BULK UNIT WT (gm/cm3)	INSITU DRY UNIT WEIGHT (gm/cm3)	INSITU WATER CONTENT (%)	SIEVE ANALYSIS				FILLED UP	I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, ϕ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)
								% GRAVEL	COARSE	MED.	FINE	% SILT & CLAY																				
0.00	0.50	DS		-	-	-	-	0	0	9	57	34	29	14	15	SC	-	-	-	10	-	-	-	-	-	-	-	-	-	-	-	-
1.50	1.95	SPT-1		18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	3.30	SPT-2		19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50	4.95	SPT-3		32	-	-	-	0	0	3	63	34	39	18	21	SC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	6.95	SPT-4		33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7.50	7.95	SPT-5		39	-	-	-	0	0	1	2	97	49	24	25	CI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	9.08	SPT-6		44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	10.00	SPT-7	REF		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

					M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD				
APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-67									
PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.				TERMINATION DEPTH, m =		10.00	GROUND WATER TABLE, m =
3.5									

DEPTH (m)	FROM	TO	SAMPLE TYPE	SPT - N Value	INSITU BULK UNIT WT (gm/cm ³)	INSITU DRY UNIT WEIGHT (gm/cm ³)	INSITU WATER CONTENT (%)	SIEVE ANALYSIS				LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX, IP	I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm ²	ANGLE OF INT. FRICTION, Φ (°)	COMPRESSION INDEX, C _c	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm ²	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm ²	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm ²	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm ²	MODULUS OF ELASTICITY, kg/cm ²	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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3.00	3.30	SPT-2	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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7.50	7.95	SPT-5	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.														15.00		GROUND WATER TABLE, m =				15.00																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-69																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
DEPTH (m)	FROM	TO	SAMPLE TYPE	SPT - N Value	INSITU BULK UNIT WT (gm/cm3)	INSITU DRY UNIT WEIGHT (gm/cm3)	INSITU WATER CONTENT (%)	SIEVE ANALYSIS					% GRAVEL	COARSE	MED.	FINE	% SILT & CLAY	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX, IP	I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, ϕ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.															15.00		GROUND WATER TABLE, m =					14.50											
DEPTH (m)																																			
FROM	TO	SAMPLE TYPE	SPT - N Value	INSITU BULK UNIT WT (gm/cm ³)	INSITU DRY UNIT WEIGHT (gm/cm ³)	INSITU WATER CONTENT (%)	SIEVE ANALYSIS				FILLED UP	PLASTICITY INDEX, IP	I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm ²	ANGLE OF INT. FRICTION, Φ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm ²	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm ²	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm ²	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm ²	MODULUS OF ELASTICITY, kg/cm ²	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)			
							% GRAVEL	COARSE	MED.	FINE																							% SILT & CLAY	LIQUID LIMIT (%)	PLASTIC LIMIT (%)
0.00	0.50	DS	-	-	-	-	-	-	-	-	-	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
1.00	1.45	SPT-1	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2.50	2.95	SPT-2	18	-	-	-	-	0	1	20	26	53	33	17	16	CL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
4.00	4.45	SPT-3	30	-	-	-	-	0	3	26	28	43	32	16	16	SC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
5.50	5.95	SPT-4	54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
7.00	7.08	SPT-5	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
7.00	8.50	CR-1	-	1.91	1.84	3.68	Weathered SAND STONE				-	-	-	-	-	-	-	-	-	-	-	8.00	0.00	1.2	-	-	-	6.78	12.54	-	-	-	-		
8.50	8.58	SPT-6	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
8.50	10.00	CR-2	-	-	-	-	Weathered SAND STONE				-	-	-	-	-	-	-	-	-	-	-	8.00	0.00	-	-	-	-	-	-	-	-	-	-		
10.00	10.25	SPT-8	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
10.00	11.50	CR-3	-	-	-	-	Weathered SAND STONE				-	-	-	-	-	-	-	-	-	-	-	39.00	8.00	-	-	-	-	-	-	-	-	-	-	-	
11.50	13.00	CR-4	-	-	-	-	Weathered SAND STONE				-	-	-	-	-	-	-	-	-	-	-	21.00	0.00	-	-	-	-	-	-	-	-	-	-	-	
13.00	14.50	CR-5	-	-	-	-	Weathered SAND STONE				-	-	-	-	-	-	-	-	-	-	-	45.00	26.00	-	-	-	-	-	-	-	-	-	-	-	-
14.50	15.00	CR-6	-	-	-	-	Weathered SAND STONE				-	-	-	-	-	-	-	-	-	-	-	50.00	24.00	-	-	-	-	-	-	-	-	-	-	-	-

M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD

APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-71

24/PS-HQ-CPC

Job No.: MK/01/03-23

PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.															20.00		GROUND WATER TABLE, m =																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
DEPTH (m)		SIEVE ANALYSIS															TERMINATION DEPTH, m =					GROUND WATER TABLE, m =																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
FROM	TO	SAMPLE TYPE	SPT - N Value	INSITU BULK UNIT WT (gm/cm3)	INSITU DRY UNIT WEIGHT (gm/cm3)	INSITU WATER CONTENT (%)	FILLED UP										I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, ϕ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
							% GRAVEL	COARSE	MED.	FINE	% SILT & CLAY	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX, IP																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.															15.00		GROUND WATER TABLE, m =																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-74																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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FROM	TO	% SAND				LIQUID LIMIT (%)				PLASTICITY INDEX, IP				I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, Φ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD																																						
APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-77																																						
PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.																		TERMINATION DEPTH, m =				10.00		GROUND WATER TABLE, m =					14.5							
DEPTH (m)	FROM	TO	SAMPLE TYPE	SPT - N Value	INSITU BULK UNIT WIT (gm/cm3)	INSITU DRY UNIT WEIGHT (gm/cm3)	INSITU WATER CONTENT (%)	SIEVE ANALYSIS				LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX, IP	I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, Φ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)				
								% GRAVEL	COARSE	MED.	FINE																								% SILT & CLAY			
0.00	0.05	DS		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
1.50	1.95	SPT-1	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
1.50	1.95	UDS/D S-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
3.00	3.25	SPT -2	REF	-	-	-	-	12	5	28	25	30	33	16	17	SC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
4.50	4.55	SPT -3	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
6.00	6.06	SPT -4	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
6.00	7.50	CR-1	-	-	-	-	-	Weathered SAND STONE				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
7.50	7.52	SPT-5	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
7.50	9.00	CR-2	-	-	-	-	-	Weathered SAND STONE				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
9.00	9.04	SPT-6	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
9.00	10.50	CR-3	-	-	2.00	1.94	3.32	Weathered SAND STONE				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
9.00	10.50	CR-3	-	-	2.06	2.03	1.40	Weathered SAND STONE				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.														TERMINATION DEPTH, m =		15.00		GROUND WATER TABLE, m =					15.00									
DEPTH (m)																																		
FROM	TO	SIEVE ANALYSIS					INSITU WATER CONTENT (%)	SPT - N Value	INSITU BULK UNIT WT (gm/cm3)	INSITU DRY UNIT WEIGHT (gm/cm3)	FILLED UP	I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, ϕ ($^{\circ}$)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)			
		% GRAVEL	COARSE	MED.	% SAND	% SILT & CLAY																										LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX, IP
0.00	0.50	DS	-	-	-	-	-	-	-	-	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
1.00	1.45	SPT-1	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2.50	2.95	SPT-2	46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2.50	2.60	UDS/D S-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
4.00	4.17	SPT-3	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
5.50	5.73	SPT-4	REF	-	0	2	63	35	39	20	19	SC	-	-	-	-	2.65	-	10	-	-	-	-	-	-	-	-	-	-	-	-	-		
7.00	7.23	SPT-5	REF	-	0	1	60	39	40	21	19	SC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
7.00	8.50	CR-1	-	1.94	1.86	4.07	Weathered SAND STONE					-	-	-	-	-	-	-	-	-	42.00	0.00	6.0	-	-	6.84	12.79	-	-	-	-	-		
8.50	10.00	CR-2	-	-	-	3.15	Weathered SAND STONE					-	-	-	-	-	-	-	-	-	84.00	36.00	-	-	-	-	-	-	-	-	-	-	-	
10.00	11.50	CR-3	-	-	-	-	Weathered SAND STONE					-	-	-	-	-	-	-	-	-	62.00	8.00	-	-	-	-	-	-	-	-	-	-	-	
11.50	13.00	CR-4	-	-	-	-	Weathered SAND STONE					-	-	-	-	-	-	-	-	-	53.00	9.00	-	-	-	-	-	-	-	-	-	-	-	
13.00	14.50	CR-5	-	-	-	-	Weathered SAND STONE					-	-	-	-	-	-	-	-	-	74.00	51.00	-	-	-	-	-	-	-	-	-	-	-	-
14.50	15.00	CR-6	-	-	-	-	Weathered SAND STONE					-	-	-	-	-	-	-	-	-	84.00	76.00	-	-	-	-	-	-	-	-	-	-	-	-

M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-79																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.														15.00				GROUND WATER TABLE, m =																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
DEPTH (m)		SIEVE ANALYSIS										TERMINATION DEPTH, m =																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
		% GRAVEL				% SILT & CLAY				LIQUID LIMIT (%)				PLASTIC LIMIT (%)				PLASTICITY INDEX, IP				I.S. CLASSIFICATION				TYPE OF SHEAR TEST				COHESION C, kg/cm2				ANGLE OF INT. FRICTION, ϕ (°)				COMPRESSION INDEX, Cc				SPECIFIC GRAVITY, G				SHRINKAGE LIMIT, %				FREE SWELL INDEX, %				SWELLING PRESSURE, kg/cm2				CORE RECOVERY (%)				ROCK QUALITY DESIGNATION (%)				POINT LOAD STRENGTH, kg/cm2				UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2				UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2				MODULUS OF ELASTICITY, kg/cm2				WATER ABSORPTION (%)				POROSITY (%)				SLAKE DURABILITY INDEX, %				HARDNESS				IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
FROM		TO		SPT - N Value		INSITU BULK UNIT WT (gm/cm3)		INSITU DRY UNIT WEIGHT (gm/cm3)		INSITU WATER CONTENT (%)		% GRAVEL		COARSE		MED.		FINE		% SILT & CLAY		LIQUID LIMIT (%)		PLASTIC LIMIT (%)		PLASTICITY INDEX, IP		I.S. CLASSIFICATION		TYPE OF SHEAR TEST		COHESION C, kg/cm2		ANGLE OF INT. FRICTION, ϕ (°)		COMPRESSION INDEX, Cc		SPECIFIC GRAVITY, G		SHRINKAGE LIMIT, %		FREE SWELL INDEX, %		SWELLING PRESSURE, kg/cm2		CORE RECOVERY (%)		ROCK QUALITY DESIGNATION (%)		POINT LOAD STRENGTH, kg/cm2		UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2		UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2		MODULUS OF ELASTICITY, kg/cm2		WATER ABSORPTION (%)		POROSITY (%)		SLAKE DURABILITY INDEX, %		HARDNESS		IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD

APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-81

Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.

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GROUNDWATER TABLE 3-1

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DEPTH (m)		SAMPLE TYPE	SPT - N Value	INSITU BULK UNIT WT (gm/cm3)	INSITU DRY UNIT WEIGHT (gm/cm3)	INSITU WATER CONTENT (%)	SIEVE ANALYSIS						TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, ϕ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)				
							% GRAVEL				% SILT & CLAY																					LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX, IP	I.S. CLASSIFICATION
							FROM	TO	COARSE	MED.	FINE	% SAND																							

0.00	0.50	DS	-	-	-	-	FILLED UP						FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
1.50	1.95	SPT-1	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
3.00	3.45	SPT-2	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
4.50	4.95	SPT-3	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
6.00	6.45	SPT-4	15	-	-	-	2	1	2	58	37	37	17	20	SC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
7.50	7.78	SPT-5	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
9.00	9.22	SPT-6	REF	-	-	-	2	3	1	55	39	36	19	17	SC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
10.50	10.70	SPT-7	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
12.00	12.18	SPT-8	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
12.00	13.50	CR-1	-	-	-	-	Weathered SAND STONE						-	-	-	-	-	-	-	-	39.00	0.00	-	-	-	-	-	-	-	-	-	-				
13.50	13.67	SPT-9	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
13.50	15.00	CR-2	-	2.09	2.02	3.58	Weathered SAND STONE						-	-	-	1.98	-	-	-	-	51.00	13.00	11.1	-	-	8.26	16.73	-	-	-	-	-	-			
15.00	16.50	CR-3	-	-	-	-	Weathered SAND STONE						-	-	-	-	-	-	-	-	71.00	22.00	-	-	-	-	-	-	-	-	2	-	-	-		
16.50	18.00	CR-4	-	-	-	-	Weathered SAND STONE						-	-	-	-	-	-	-	-	74.00	55.00	-	-	-	-	-	-	-	51.60	-	-	-	-		
18.00	19.50	CR-5	-	-	-	-	Weathered SAND STONE						-	-	-	-	-	-	-	-	84.00	44.00	-	-	-	-	-	-	-	-	-	-	-	-	-	
19.50	20.00	CR-6	-	-	-	-	Weathered SAND STONE						-	-	-	-	-	-	-	-	88.00	68.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-

[illegible]

[illegible]

[illegible]

[illegible]

PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.														TERMINATION DEPTH, m =		15.00		GROUND WATER TABLE, m =					15															
DEPTH (m)																																								
FROM	TO	SIEVE ANALYSIS				INSITU WATER CONTENT (%)	% GRAVEL	COARSE	MED.	% SAND	% SILT & CLAY	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX, IP	I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, ϕ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)						
		FILLED UP																																						
0.00	0.50	DS	-	-	-	-	-	-	-	-	-	-	-	-	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
1.50	1.95	SPT-1	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
3.00	3.33	SPT-2	REF	-	-	-	15	13	11	20	41	35	17	18	SC	-	-	-	-	-	-	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
4.50	4.67	SPT-3	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
4.50	6.00	CR-1	-	-	-	-	Weathered SAND STONE				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
6.00	6.13	SPT-4	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
6.00	7.50	CR-2	-	1.98	1.92	3.21	Weathered SAND STONE				-	-	-	-	-	-	-	-	-	-	-	-	-	52.00	12.00	11.7	-	-	5.71	11.01	-	-	-	-	-	-				
7.50	9.00	CR-3	-	2.06	2.04	0.93	Weathered SAND STONE				-	-	-	-	-	-	-	-	-	-	-	-	-	71.00	11.00	-	-	33.8	1.55	3.19	-	-	-	-	-	-	-			
9.00	10.50	CR-4	-	-	-	-	Weathered SAND STONE				-	-	-	-	-	-	-	-	-	-	-	-	-	62.00	36.00	-	-	-	-	-	-	-	-	-	-	-	-	-		
10.50	12.00	CR-5	-	-	-	-	Weathered SAND STONE				-	-	-	-	-	-	-	-	-	-	-	-	-	65.00	42.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
12.00	13.50	CR-6	-	-	-	-	Weathered SAND STONE				-	-	-	-	-	-	-	-	-	-	-	-	-	62.00	18.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50	15.00	CR-7	-	-	-	-	Weathered SAND STONE				-	-	-	-	-	-	-	-	-	-	-	-	-	88.00	83.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD		APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-88																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
		PROJECT :	Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.																		TERMINATION DEPTH, m =		15.00	GROUND WATER TABLE, m =			15.00																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
DEPTH (m)		SIEVE ANALYSIS				INSITU WATER CONTENT (%)	INSITU DRY UNIT WEIGHT (gm/cm3)	INSITU BULK UNIT WT (gm/cm3)	SPT - N Value	SAMPLE TYPE	FD	FILLED UP				I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, ϕ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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Job No.: MK/01/03-23

DEPTH (m)		FROM		TO	SAMPLE TYPE	SPT - N Value	INSITU BULK UNIT WT (gm/cm3)	INSITU DRY UNIT WEIGHT (gm/cm3)	INSITU WATER CONTENT (%)	SIEVE ANALYSIS				LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX, IP	I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, Φ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD

APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-91

PROJECT :

Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.

DEPTH (m)

FROM

TO

SAMPLE TYPE

SPT - N Value

INSITU BULK UNIT WT (gm/cm3)

INSITU DRY UNIT WEIGHT (gm/cm3)

INSITU WATER CONTENT (%)

SIEVE ANALYSIS

COARSE

MED.

FINE

% GRAVEL

% SILT & CLAY

FILLED UP SOIL

PLASTIC LIMIT (%)

PLASTICITY INDEX, IP

I.S. CLASSIFICATION

TYPE OF SHEAR TEST

COHESION C, kg/cm2

ANGLE OF INT. FRICTION, Φ (°)

COMPRESSION INDEX, Cc

SPECIFIC GRAVITY, G

SHRINKAGE LIMIT, %

FREE SWELL INDEX, %

SWELLING PRESSURE, kg/cm2

CORE RECOVERY (%)

ROCK QUALITY DESIGNATION (%)

POINT LOAD STRENGTH, kg/cm2

UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2

UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2

MODULUS OF ELASTICITY, kg/cm2

WATER ABSORPTION (%)

POROSITY (%)

SLAKE DURABILITY INDEX, %

HARDNESS

IMPACT VALUE (%)

20.00

GROUND WATER TABLE, m =

14.50

Job No.: MK/01/03-23

PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.														TERMINATION DEPTH, m =		20.00		GROUND WATER TABLE, m =					14.15																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
		APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-93																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
DEPTH (m)	FROM TO	SAMPLE TYPE	SPT - N Value	INSTITU BULK UNIT WT (gm/cm3)	INSTITU DRY UNIT WEIGHT (gm/cm3)	INSTITU WATER CONTENT (%)	SIEVE ANALYSIS					LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX, IP	I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, Φ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD																																	
APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-97																																	
PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.																TERMINATION DEPTH, m =		20.00		GROUND WATER TABLE, m =				20.00							
DEPTH (m)		SIEVE ANALYSIS				INSITU WATER CONTENT (%)	SPT - N Value	INSITU BULK UNIT WT (gm/cm3)	INSITU DRY UNIT WEIGHT (gm/cm3)	FILLED UP SOIL	I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, ϕ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)			
		COARSE	MED.	FINE	% SILT & CLAY																										LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX, IP
FROM	TO																																
0.00	0.05	DS	-	-	-	-	-	-	-	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
1.50	1.95	SPT-1	29	-	-	-	-	-	-	SC	-	-	-	-	-	-	-	20	-	-	-	-	-	-	-	-	-	-	-	-	-		
3.00	3.45	SPT-2	33	-	-	-	-	-	-	CI	-	-	-	-	-	-	-	30	-	-	-	-	-	-	-	-	-	-	-	-	-		
4.50	4.95	SPT -3	39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
6.00	6.45	SPT-4	45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
7.50	7.95	SPT-5	66	-	-	-	-	-	-	CI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
9.00	9.45	SPT-6	80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
9.00	10.50	CR-1	-	1.87	1.82	2.94	-	Weathered SAND STONE				-	-	-	-	-	-	-	-	89.00	66.00	-	49.5	-	-	4.90	8.92	-	-	-	-	-	
10.50	12.00	CR-2	-	-	-	-	-	Weathered SAND STONE				-	-	-	-	-	-	-	-	29.00	15.00	-	-	-	-	-	-	-	-	-	-	-	-
12.00	13.50	CR-3	-	-	-	2.82	-	Weathered SAND STONE				-	-	-	-	-	-	-	-	66.00	14.00	-	-	-	-	-	-	-	-	-	-	-	-
13.50	15.00	CR-4	-	-	-	-	-	Weathered SAND STONE				-	-	-	-	-	-	-	-	48.00	14.00	-	-	-	-	-	-	-	-	-	-	-	-
15.00	16.50	CR-5	-	-	-	-	-	Weathered SAND STONE				-	-	-	-	-	-	-	-	84.00	11.00	-	-	-	-	-	-	-	-	-	-	-	-
16.50	18.00	CR-6	-	1.93	1.85	4.10	-	Weathered SAND STONE				-	-	-	-	-	-	-	-	71.00	41.00	-	33.5	-	-	5641	5.17	9.57	-	-	-	-	-
18.00	19.50	CR-7	-	-	-	-	-	Weathered SAND STONE				-	-	-	-	-	-	-	-	48.00	0.00	-	-	-	-	-	-	-	-	-	-	-	-
19.50	20.00	CR-8	-	-	-	-	-	Weathered SAND STONE				-	-	-	-	-	-	-	-	100.0	20.00	-	-	-	-	-	-	-	-	-	-	-	-

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PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.																			GROUND WATER TABLE, m =										20.00		Q-CPC																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
DEPTH (m)		SIEVE ANALYSIS										FILLED UP SOIL			INSITU WATER CONTENT (%)			SPT - N Value			INSITU BULK UNIT WT (gm/cm3)		INSITU DRY UNIT WEIGHT (gm/cm3)		INSITU WATER CONTENT (%)			% GRAVEL			MED.			% SILT & CLAY			LIQUID LIMIT (%)			PLASTIC LIMIT (%)			PLASTICITY INDEX, IP			I.S. CLASSIFICATION			TYPE OF SHEAR TEST			COHESION C, kg/cm2			ANGLE OF INT. FRICTION, Φ (°)			COMPRESSION INDEX, Cc			SPECIFIC GRAVITY, G			SHRINKAGE LIMIT, %			FREE SWELL INDEX, %			SWELLING PRESSURE, kg/cm2			CORE RECOVERY (%)			ROCK QUALITY DESIGNATION (%)			POINT LOAD STRENGTH, kg/cm2			UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2			UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2			MODULUS OF ELASTICITY, kg/cm2			WATER ABSORPTION (%)			POROSITY (%)			SLAKE DURABILITY INDEX, %			HARDNESS			IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
FROM	TO	SAMPLE TYPE			SPT - N Value			INSITU BULK UNIT WT (gm/cm3)			INSITU DRY UNIT WEIGHT (gm/cm3)			INSITU WATER CONTENT (%)			% GRAVEL			MED.			% SILT & CLAY			LIQUID LIMIT (%)			PLASTIC LIMIT (%)			PLASTICITY INDEX, IP			I.S. CLASSIFICATION			TYPE OF SHEAR TEST			COHESION C, kg/cm2			ANGLE OF INT. FRICTION, Φ (°)			COMPRESSION INDEX, Cc			SPECIFIC GRAVITY, G			SHRINKAGE LIMIT, %			FREE SWELL INDEX, %			SWELLING PRESSURE, kg/cm2			CORE RECOVERY (%)			ROCK QUALITY DESIGNATION (%)			POINT LOAD STRENGTH, kg/cm2			UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2			UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2			MODULUS OF ELASTICITY, kg/cm2			WATER ABSORPTION (%)			POROSITY (%)			SLAKE DURABILITY INDEX, %			HARDNESS			IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.																		20.00		GROUND WATER TABLE, m =					20.00	
DEPTH (m)		TERMINATION DEPTH, m =																		20.00		GROUND WATER TABLE, m =					20.00	

M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-101																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.																		TERMINATION DEPTH, m =				20.00		GROUND WATER TABLE, m =				21.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
DEPTH (m)		SIEVE ANALYSIS										INSITU WATER CONTENT (%)		INSITU BULK UNIT WT (gm/cm3)		INSITU DRY UNIT WEIGHT (gm/cm3)		SAMPLE TYPE	SPT - N Value	INSITU BULK UNIT WT (gm/cm3)		I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, ϕ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
		% GRAVEL	COARSE	MED.	% SAND	% SILT & CLAY	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX, IP	FD																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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APPENDIX-4: SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-102

Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.

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PROJECT :			APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-103																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.			TERMINATION DEPTH, m =												20.00		GROUND WATER TABLE, m =																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
DEPTH (m)			SAMPLE TYPE	SPT - N Value	INSITU BULK UNIT WFT (gm/cm ³)	INSITU DRY UNIT WEIGHT (gm/cm ³)	INSITU WATER CONTENT (%)	SIEVE ANALYSIS				FILLED UP SOIL				PLASTICITY INDEX, IP	I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm ²	ANGLE OF INT. FRICTION, Φ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm ²	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm ²	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm ²	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm ²	MODULUS OF ELASTICITY, kg/cm ²	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.														15.00		GROUND WATER TABLE, m =					3.45																						
		APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-104																																											
DEPTH (m)	FROM	TO	SAMPLE TYPE	SPT - N Value	INSITU BULK UNIT Wt (gm/cm ³)	INSITU DRY UNIT WEIGHT (gm/cm ³)	INSITU WATER CONTENT (%)	SIEVE ANALYSIS				LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX, IP	I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm ²	ANGLE OF INT. FRICTION, ϕ (°)	COMPRESSION INDEX, C _c	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm ²	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm ²	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm ²	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm ²	MODULUS OF ELASTICITY, kg/cm ²	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)											
								% GRAVEL	COARSE	MED.	% SAND																								% SILT & CLAY										
0.00	0.50	DS	-	-	-	-	-	FILLED UP SOIL				-	-	-	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
1.50	1.95	SPT-1	9	-	-	-	-	FILLED UP SOIL				-	-	-	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
3.00	3.45	SPT-2	6	-	-	-	-	0	1	16	40	43 (29,14)	32	16	16	SC	-	-	-	2.63	12.90	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
3.50	3.20	UDS/D S-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
4.50	4.58	SPT -3	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
6.00	6.45	SPT-4	27	-	-	-	-	0	0	18	34	48	34	18	16	SC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
6.00	7.50	CR-1	-	-	-	-	3.09	Weathered SAND STONE				-	-	-	-	-	-	-	-	1.97	-	-	-	72.00	15.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
7.50	9.00	CR-2	-	-	-	-	2.86	Weathered SAND STONE				-	-	-	-	-	-	-	-	-	-	-	-	73.00	20.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
9.00	10.50	CR-3	-	-	-	-	1.88	Weathered SAND STONE				-	-	-	-	-	-	-	-	-	-	-	-	64.00	24.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
10.00	12.00	CR-4	-	-	1.96	1.89	3.53	Weathered SAND STONE				-	-	-	-	-	-	-	-	-	-	-	-	65.00	15.00	9.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
12.00	13.50	CR-5	-	-	-	-	-	Weathered SAND STONE				-	-	-	-	-	-	-	-	-	-	-	-	74.00	8.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
13.50	15.00	CR-6	-	-	-	-	-	Weathered SAND STONE				-	-	-	-	-	-	-	-	-	-	-	-	69.00	59.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

PROJECT :		APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-105														GROUND WATER TABLE, m =		20.00		1-5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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DEPTH (m)	FROM	TO	SAMPLE TYPE	SPT - N Value	INSITU BULK UNIT WT (gm/cm3)	INSITU DRY UNIT WEIGHT (gm/cm3)	INSITU WATER CONTENT (%)	SIEVE ANALYSIS				LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX, IP	I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, Φ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.															20.00		GROUND WATER TABLE, m =					15.50																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-109																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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		% GRAVEL				MED.				% SILT & CLAY		LIQUID LIMIT (%)				PLASTIC LIMIT (%)				PLASTICITY INDEX, IP				I.S. CLASSIFICATION		TYPE OF SHEAR TEST		COHESION C, kg/cm2		ANGLE OF INT. FRICTION, Φ (°)		COMPRESSION INDEX, Cc		SPECIFIC GRAVITY, G		SHRINKAGE LIMIT, %		FREE SWELL INDEX, %		SWELLING PRESSURE, kg/cm2		CORE RECOVERY (%)		ROCK QUALITY DESIGNATION (%)		POINT LOAD STRENGTH, kg/cm2		UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2		UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2		MODULUS OF ELASTICITY, kg/cm2		WATER ABSORPTION (%)		POROSITY (%)		SLAKE DURABILITY INDEX, %		HARDNESS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
FROM	TO	COARSE		FINE		% SILT & CLAY		LIQUID LIMIT (%)		PLASTIC LIMIT (%)		PLASTICITY INDEX, IP		I.S. CLASSIFICATION		TYPE OF SHEAR TEST		COHESION C, kg/cm2		ANGLE OF INT. FRICTION, Φ (°)		COMPRESSION INDEX, Cc		SPECIFIC GRAVITY, G		SHRINKAGE LIMIT, %		FREE SWELL INDEX, %		SWELLING PRESSURE, kg/cm2		CORE RECOVERY (%)		ROCK QUALITY DESIGNATION (%)		POINT LOAD STRENGTH, kg/cm2		UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2		UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2		MODULUS OF ELASTICITY, kg/cm2		WATER ABSORPTION (%)		POROSITY (%)		SLAKE DURABILITY INDEX, %		HARDNESS		IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD

24/PS-HQ-CPC

PROJECT :

Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.

APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-110

DEPTH (m)	FROM	TO	SAMPLE TYPE	SPT - N Value	INSITU BULK UNIT WT (gm/cm ³)	INSITU DRY UNIT WEIGHT (gm/cm ³)	INSITU WATER CONTENT (%)	SIEVE ANALYSIS				LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX, IP	I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm ²	ANGLE OF INT. FRICTION, Φ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm ²	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm ²	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm ²	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm ²	MODULUS OF ELASTICITY, kg/cm ²	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)
								% GRVEL	COARSE	MED.	% SILT & CLAY																							

PROJECT :		APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-111																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.		TERMINATION DEPTH, m =										15.00		GROUND WATER TABLE, m =		14.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
DEPTH (m)	FROM	TO	SAMPLE TYPE	SPT - N Value	INSITU BULK UNIT WT (gm/cm ³)	INSITU DRY UNIT WEIGHT (gm/cm ³)	INSITU WATER CONTENT (%)	SIEVE ANALYSIS				% SILT & CLAY	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX, IP	I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm ²	ANGLE OF INT. FRICTION, ϕ (°)	COMPRESSION INDEX, C _c	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm ²	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm ²	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm ²	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm ²	MODULUS OF ELASTICITY, kg/cm ²	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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 M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD		APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-114																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
		PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.												TERMINATION DEPTH, m =		20.00		GROUND WATER TABLE, m =				2.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
DEPTH (m)		FROM		TO		SIEVE ANALYSIS				FILLED UP SOIL				PLASTICITY INDEX, IP		I.S. CLASSIFICATION		TYPE OF SHEAR TEST		COHESION C, kg/cm2		ANGLE OF INT. FRICTION, ϕ (°)		COMPRESSION INDEX, Cc		SPECIFIC GRAVITY, G		SHRINKAGE LIMIT, %		FREE SWELL INDEX, %		SWELLING PRESSURE, kg/cm2		CORE RECOVERY (%)		ROCK QUALITY DESIGNATION (%)		POINT LOAD STRENGTH, kg/cm2		UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2		UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2		MODULUS OF ELASTICITY, kg/cm2		WATER ABSORPTION (%)		POROSITY (%)		SLAKE DURABILITY INDEX, %		HARDNESS		IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-115																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.																TERMINATION DEPTH, m =		15.00		GROUND WATER TABLE, m =				20.00																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
DEPTH (m)		SIEVE ANALYSIS				FILLED UP SOIL										INSITU WATER CONTENT (%)		INSITU DRY UNIT WEIGHT (gm/cm3)		INSITU BULK UNIT WT (gm/cm3)		SPT - N Value		SAMPLE TYPE		SPT - N Value		UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2		UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2		MODULUS OF ELASTICITY, kg/cm2		WATER ABSORPTION (%)		POROSITY (%)		SLAKE DURABILITY INDEX, %		HARDNESS		IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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PROJECT :		APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-116																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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DEPTH (m)	TO FROM	SAMPLE TYPE	SPT - N Value	INSITU BULK UNIT WT (gm/cm3)	INSITU DRY UNIT WEIGHT (gm/cm3)	INSITU WATER CONTENT (%)	SIEVE ANALYSIS					LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX, IP	I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, Φ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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PROJECT :		APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-118																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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FROM		TO		SAMPLE TYPE		SPT - N Value		INSITU BULK UNIT WT (gm/cm3)		INSITU DRY UNIT WEIGHT (gm/cm3)		INSITU WATER CONTENT (%)		SIEVE ANALYSIS				% GRAVEL		% SILT & CLAY		LIQUID LIMIT (%)		PLASTIC LIMIT (%)		PLASTICITY INDEX, IP		I.S. CLASSIFICATION		TYPE OF SHEAR TEST		COHESION C, kg/cm2		ANGLE OF INT. FRICTION, ϕ (°)		COMPRESSION INDEX, C _c		SPECIFIC GRAVITY, G		SHRINKAGE LIMIT, %		FREE SWELL INDEX, %		SWELLING PRESSURE, kg/cm2		CORE RECOVERY (%)		ROCK QUALITY DESIGNATION (%)		POINT LOAD STRENGTH, kg/cm2		UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2		UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2		MODULUS OF ELASTICITY, kg/cm2		WATER ABSORPTION (%)		POROSITY (%)		SLAKE DURABILITY INDEX, %		HARDNESS		IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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DEPTH (m)		FROM		TO	SAMPLE TYPE	SPT - N Value	INSITU BULK UNIT Wt (gm/cm3)	INSITU DRY UNIT WEIGHT (gm/cm3)	INSITU WATER CONTENT (%)	SIEVE ANALYSIS				LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX, IP	I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, Φ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-121																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.												TERMINATION DEPTH, m =		15.00		GROUND WATER TABLE, m =				14.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
DEPTH (m)		SIEVE ANALYSIS										INSITU WATER CONTENT (%)	INSITU BULK UNIT WT (gm/cm3)	INSITU DRY UNIT WEIGHT (gm/cm3)	TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, ϕ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.														20.00		GROUND WATER TABLE, m =					14.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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FROM	TO	SAMPLE TYPE	SPT - N Value	INSITU BULK UNIT WT (gm/cm3)	INSITU DRY UNIT WEIGHT (gm/cm3)	INSITU WATER CONTENT (%)	SIEVE ANALYSIS					LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX, IP	I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, ϕ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-123																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.																TERMINATION DEPTH, m =				10.00		GROUND WATER TABLE, m =				2.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
DEPTH (m)		SIEVE ANALYSIS						INSITU WATER CONTENT (%)	INSITU BULK UNIT WT (gm/cm3)	INSITU DRY UNIT WEIGHT (gm/cm3)	TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, Φ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.												TERMINATION DEPTH, m =		15.00		GROUND WATER TABLE, m =					9.45																																																																																																																																																																																																																																																																																																																																																																																																																																												
DEPTH (m)		SIEVE ANALYSIS												FILLED UP SOIL												INSITU WATER CONTENT (%)		INSITU BULK UNIT WT (gm/cm ³)		INSITU DRY UNIT WEIGHT (gm/cm ³)		UNSATURATED COMPRESSION STRENGTH (kg/cm ²)		UNSATURATED COMPRESSION STRENGTH (kg/cm ²)		MODULUS OF ELASTICITY, kg/cm ²		WATER ABSORPTION (%)		POROSITY (%)		SLAKE DURABILITY INDEX, %		HARDNESS		IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																					
FROM		GRAVEL		COARSE		MED.		FINE		% SILT & CLAY		LIQUID LIMIT (%)		PLASTIC LIMIT (%)		PLASTICITY INDEX, IP		I.S. CLASSIFICATION		TYPE OF SHEAR TEST		COHESION C, kg/cm ²		ANGLE OF INT. FRICTION, Φ (°)		COMPRESSION INDEX, Cc		SPECIFIC GRAVITY, G		SHRINKAGE LIMIT, %		FREE SWELL INDEX, %		SWELLING PRESSURE, kg/cm ²		CORE RECOVERY (%)		ROCK QUALITY DESIGNATION (%)		POINT LOAD STRENGTH, kg/cm ²		UNSATURATED COMPRESSION STRENGTH (kg/cm ²)		UNSATURATED COMPRESSION STRENGTH (kg/cm ²)		MODULUS OF ELASTICITY, kg/cm ²		WATER ABSORPTION (%)		POROSITY (%)		SLAKE DURABILITY INDEX, %		HARDNESS		IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																											
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SAMPLE TYPE		SPT - N Value		1.62		1.61		0.54		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE		Weathered SAND STONE</	

APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-129

Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.

[illegible]

PROJECT :		APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-131																																
Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.		TERMINATION DEPTH, m =										20.00					GROUND WATER TABLE, m =																	
14.6																																		
DEPTH (m)	FROM	TO	SAMPLE TYPE	SPT - N Value	INSTTU BULK UNIT WFT (gm/cm ³)	INSTTU DRY UNIT WEIGHT (gm/cm ³)	INSTTU WATER CONTENT (%)	SIEVE ANALYSIS					COHESION C, kg/cm ²	ANGLE OF INT. FRICTION, Φ (°)	COMPRESSION INDEX, C _c	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm ²	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm ²	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm ²	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm ²	MODULUS OF ELASTICITY, kg/cm ²	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)				
								% GRAVEL	% COARSE	% MED.	% FINE	% SILT & CLAY																			Filled up soil			
0.00	0.50	DS	-	-	-	-	-	-	0	1	25	28	46	29	13	16	SC	-	-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	
1.50	1.95	SPT-1	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3.00	3.45	SPT-2	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
4.50	4.95	SPT-4	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
6.00	6.95	SPT-4	27	-	-	-	-	-	0	1	48	26	25	Non-plastic			SM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
7.50	7.63	SPT-5	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
9.00	9.02	SPT-6	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
10.50	10.55	SPT-7	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
10.50	12.00	CR-1	-	-	-	-	0.53	Weathered SAND STONE					-	-	-	1.99	-	-	-	28.00	23.00	-	-	-	-	-	-	-	-	-	2	-	-	
10.50	12.00	CR-1	-	1.83	1.82	0.35	Weathered SAND STONE					-	-	-	-	-	-	-	-	-	28.00	23.00	16.9	-	-	-	-	-	-	-	-	-	-	-
12.00	13.50	CR-2	-	2.02	2.01	0.57	Weathered SAND STONE					-	-	-	-	-	-	-	-	-	26.00	7.00	-	-	10.9	-	6.25	12.59	-	-	-	-	-	-
13.50	13.58	SPT-9	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
15.00	15.08	SPT-10	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
16.00	16.54	SPT-11	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
18.00	18.07	SPT-12	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
19.50	19.63	SPT-13	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
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M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD

APPENDIX-4: SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-132

Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.

TERMINATION DEPTH, m =	20.00	GROUND WATER TABLE, m =	36

3-C

[illegible]

Job No.: MK/01/03-23

[illegible]

DEPTH (m)		SAMPLE TYPE	SPT - N Value	INSITU BULK UNIT WT (gm/cm3)	INSITU DRY UNIT WEIGHT (gm/cm3)	INSITU WATER CONTENT (%)	SIEVE ANALYSIS				LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX, IP	I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, Φ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD

APPENDIX-4: SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-136

Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III., Shaktinagar.

29 CPC

2

GROUND WATER TABLE, m =

TERMINATION DEPTH, m =

[illegible]

[illegible]

Job No.: MK/01/03-23

M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD

APPENDIX-4: SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-139

Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.

GROUND WATER TABLE, m =

2

[illegible]

PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.															TERMINATION DEPTH, m =		20.00		GROUND WATER TABLE, m =					
DEPTH (m)																										

PROJECT :		APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-141																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.		TERMINATION DEPTH, m =										20.00		GROUND WATER TABLE, m =																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
DEPTH (m)	FROM	TO	SAMPLE TYPE	SPT - N Value	INSITU BULK UNIT WT (gm/cm3)	INSITU DRY UNIT WEIGHT (gm/cm3)	INSITU WATER CONTENT (%)	SIEVE ANALYSIS				% SILT & CLAY	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX, IP	I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, ϕ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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DEPTH (m)		FROM	TO	SAMPLE TYPE	SPT - N Value	INSTU BULK UNIT WT (gm/cm3)	INSTU DRY UNIT WEIGHT (gm/cm3)	INSTU WATER CONTENT (%)	SIEVE ANALYSIS				% GRAVEL	COARSE	MED.	FINE	% SILT & CLAY	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX, IP	I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, Φ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)
									% SAND																															
PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.																																						
APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-143																																								
M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD																																								

[illegible]

APPENDIX-4: SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-145

[illegible]

[illegible]

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Q-C

[illegible]

Job No.: MK/01/03-23

M. K. SOIL TESTING LABORATORY PVT. LTD., AHMEDABAD																															
APPENDIX-4 : SUMMARY OF LAB. TEST RESULTS - BORE HOLE NO.: DBH-149																															
PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.														TERMINATION DEPTH, m =					15.00			GROUND WATER TABLE, m =							
DEPTH (m)		SIEVE ANALYSIS				INSITU WATER CONTENT (%)	INSITU DRY UNIT WEIGHT (gm/cm3)	INSITU BULK UNIT WT (gm/cm3)	SPT - N Value	SAMPLE TYPE	I.S. CLASSIFICATION	TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, Φ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)	
		% GRAVEL	COARSE	MED.	FINE																										% SILT & CLAY
FROM	TO	0.00	0.50	DS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1.50	1.95	SPT-1	47	-	-	-	-	-	-	CL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2.00	2.40	UDS/ DS-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3.00	3.19	SPT-2	REF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3.00	4.50	CR-1	-	-	-	-	-	-	-	Weathered Sandstone				-	-	-	-	-	-	37.00	16.00	-	-	-	-	-	-	-	-	-	
4.50	6.00	CR-2	-	-	-	-	-	-	-	Weathered Sandstone				-	-	-	-	-	-	36.00	8.00	-	-	-	-	-	-	-	-	-	-
6.00	7.50	CR-3	-	-	-	-	-	-	-	Weathered Sandstone				-	-	-	-	-	-	43.00	0.00	-	-	-	-	-	-	-	-	-	-
7.50	9.00	CR-4	-	-	-	-	-	-	-	Weathered Sandstone				-	-	-	-	-	-	53.00	0.00	-	-	-	-	-	-	-	-	-	-
9.00	10.50	CR-5	-	-	-	-	-	-	-	Weathered Sandstone				-	-	-	-	-	-	41.00	0.00	-	-	-	-	-	-	-	-	-	-
10.50	12.00	CR-6	-	-	-	-	-	-	-	Weathered Sandstone				-	-	-	-	-	-	44.00	27.00	-	-	-	-	-	-	-	-	-	-
12.00	13.50	CR-7	-	-	-	-	-	-	-	Weathered Sandstone				-	-	-	-	-	-	43.00	19.00	-	-	-	-	-	-	-	-	-	-
13.50	15.00	CR-8	-	-	-	-	-	-	-	Weathered Sandstone				-	-	-	-	-	-	56.00	26.00	7.70	-	-	-	-	-	-	-	-	4.00

PROJECT :		Geotechnical Investigation work for Plant Area and Ash Pipeline Corridor including Nala Crossing for Singrauli Super Thermal Power Project, Stage III, Shaktinagar.															TERMINATION DEPTH, m =		15.00		GROUND WATER TABLE, m =					0.00																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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FROM	TO	SAMPLE TYPE	SPT - N Value	INSITU BULK UNIT WT (gm/cm3)	INSITU DRY UNIT WEIGHT (gm/cm3)	INSITU WATER CONTENT (%)	FILLED UP SOIL										TYPE OF SHEAR TEST	COHESION C, kg/cm2	ANGLE OF INT. FRICTION, Φ (°)	COMPRESSION INDEX, Cc	SPECIFIC GRAVITY, G	SHRINKAGE LIMIT, %	FREE SWELL INDEX, %	SWELLING PRESSURE, kg/cm2	CORE RECOVERY (%)	ROCK QUALITY DESIGNATION (%)	POINT LOAD STRENGTH, kg/cm2	UNCONFINED COMPRESSION STRENGTH (Saturated), kg/cm2	UNCONFINED COMPRESSION STRENGTH (NMC), kg/cm2	MODULUS OF ELASTICITY, kg/cm2	WATER ABSORPTION (%)	POROSITY (%)	SLAKE DURABILITY INDEX, %	HARDNESS	IMPACT VALUE (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
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[illegible]

INTERPRETATION:

ERT observations were taken on 31(thirty one) locations distributed over the different building and structure positions as given in the work schedule of the Client and for direction of observations also followed the same work schedule.

The summarized result of the resistivity measurements along with the co-ordinates and the RL at different locations are given in the following table.

ERT No	East	North	Elevation (m)	Average Apparent Resistivity in Ohm m
1	470	2047	292.715	177.340
2	553	1945	293.253	100.573
3	463	1906	293.149	165.012
4	382	1867	284.395	95.541
5	385	1957	285.424	86.754
6	321	2035	281.486	113.767
7	269	1896	277.896	58.191
8	351	1687	280.890	35.200
9	350	1441	276.500	20.817
10	493	1383	280.724	49.269
11	750	1441	281.625	58.093
12	1302	1438	280.923	26.157
13	756	1304	276.240	33.974
14	665	1261	276.553	25.490
15	671	1361	276.377	34.268
16	705	1102	275.720	44.253
17	625	1101	277.322	16.274
18	587	1233	276.235	15.335
19	452	1175	275.495	28.078
20	427	1266	276.524	26.662
21	305	1123	268.709	14.692
22	399	972	272.506	29.164
23	476	873	271.349	28.191
24	610	830	267.818	15.173
25	606	940	276.311	38.228
26	919	817	276.379	41.981
27	1014	764	276.834	44.602
28	1129	1060	275.368	23.234
29	755	1160	277.622	23.732
30	824	1124	276.131	34.391
31	633	1034	275.878	29.950

APPARENT RESISTIVITY VALUES**ERT No. 01**

SI No.	S (M)	Apparent Resistivity (ohm-m)			
		(N - S)	(E - W)	(NE - SW)	(NW - SE)
1	0.50	133.963	134.591	132.550	133.806
2	1.00	202.312	201.684	194.144	200.113
3	2.00	254.461	265.142	264.514	258.859
4	3.00	218.648	226.188	226.187	221.475
5	4.00	189.872	186.981	191.128	191.002
6	5.00	191.474	186.290	186.290	188.490
7	6.00	178.316	182.651	174.923	177.562
8	7.00	155.256	156.355	155.256	158.555
9	8.00	141.747	145.014	141.747	144.260
10	10.00	101.785	97.388	101.157	101.471

ERT No. 02

SI No.	S (M)	Apparent Resistivity (ohm-m)			
		(N - S)	(E - W)	(NE - SW)	(NW - SE)
1	0.50	138.989	139.46	138.361	138.361
2	1.00	125.345	127.858	128.173	125.660
3	2.00	113.094	117.491	118.748	120.005
4	3.00	96.035	97.071	95.846	96.223
5	4.00	88.213	86.453	85.197	85.071
6	5.00	84.663	84.349	83.720	82.935
7	6.00	85.387	82.560	82.371	85.387
8	7.00	87.304	87.084	84.445	90.162
9	8.00	90.225	91.230	88.215	92.989
10	10.00	92.361	94.874	93.303	97.701

ERT No. 03

SI No.	S (M)	Apparent Resistivity (ohm-m)			
		(N - S)	(E - W)	(NE - SW)	(NW - SE)
1	0.50	132.236	132.236	132.550	131.922
2	1.00	164.300	162.729	161.472	163.043
3	2.00	177.180	175.923	181.578	188.490
4	3.00	183.777	191.317	197.914	206.395
5	4.00	175.547	176.803	174.039	173.787
6	5.00	171.054	173.096	169.326	171.525
7	6.00	156.450	158.712	158.712	162.670
8	7.00	157.235	160.973	156.575	157.235
9	8.00	155.067	158.334	160.847	160.094
10	10.00	154.563	160.218	157.391	157.077

ERT No. 04

SI No.	S (M)	Apparent Resistivity (ohm-m)			
		(N - S)	(E - W)	(NE - SW)	(NW - SE)
1	0.50	77.111	77.268	76.169	77.268
2	1.00	89.846	88.590	87.019	87.333
3	2.00	102.412	105.554	109.323	99.899
4	3.00	100.653	99.522	100.370	101.595
5	4.00	98.643	97.637	99.024	98.517
6	5.00	101.941	98.957	102.255	101.313
7	6.00	100.467	102.352	100.467	100.656
8	7.00	96.980	95.880	92.582	91.042
9	8.00	96.508	92.487	90.979	96.005
10	10.00	96.759	93.617	100.843	95.816

ERT No. 05

SI No.	S (M)	Apparent Resistivity (ohm-m)			
		(N - S)	(E - W)	(NE - SW)	(NW - SE)
1	0.50	65.332	65.961	65.332	65.961
2	1.00	79.479	81.993	83.249	83.877
3	2.00	79.417	80.359	78.348	79.416
4	3.00	87.364	85.102	84.066	80.390
5	4.00	86.956	88.213	87.207	85.448
6	5.00	88.904	92.202	90.789	91.103
7	6.00	94.812	98.017	94.812	100.467
8	7.00	97.200	102.257	104.896	105.776
9	8.00	93.241	95.754	99.776	90.225
10	10.00	80.423	84.821	87.649	83.564

ERT No. 06

SI No.	S (M)	Apparent Resistivity (ohm-m)			
		(N - S)	(E - W)	(NE - SW)	(NW - SE)
1	0.50	126.896	127.995	129.095	128.466
2	1.00	151.106	148.278	151.420	145.137
3	2.00	155.818	163.358	155.190	162.729
4	3.00	164.834	164.080	162.006	163.137
5	4.00	128.172	125.911	123.523	128.675
6	5.00	102.726	99.899	103.355	103.826
7	6.00	86.707	88.215	94.247	83.502
8	7.00	75.428	78.727	84.665	83.125
9	8.00	68.611	71.375	75.648	73.386
10	10.00	62.831	67.857	70.370	70.370

ERT No. 07

SI No.	S (M)	Apparent Resistivity (ohm-m)			
		(N - S)	(E - W)	(NE - SW)	(NW - SE)
1	0.50	45.230	45.387	46.015	44.445
2	1.00	50.169	50.326	50.672	50.169
3	2.00	65.531	65.594	64.651	66.850
4	3.00	62.955	63.143	64.274	60.410
5	4.00	62.201	62.704	63.332	64.212
6	5.00	63.301	66.314	68.013	62.358
7	6.00	62.391	63.899	64.465	64.465
8	7.00	59.595	60.694	61.794	56.296
9	8.00	56.547	59.312	56.296	54.788
10	10.00	47.436	49.007	51.206	51.206

ERT No. 08

SI No.	S (M)	Apparent Resistivity (ohm-m)			
		(N - S)	(E - W)	(NE - SW)	(NW - SE)
1	0.50	51.512	51.983	50.727	51.983
2	1.00	35.529	35.436	35.813	35.435
3	2.00	30.095	30.912	30.283	30.283
4	3.00	31.100	30.440	31.288	31.571
5	4.00	30.786	30.032	31.540	30.912
6	5.00	30.158	31.100	30.943	31.100
7	6.00	31.478	30.347	33.363	32.421
8	7.00	32.766	38.264	33.645	32.986
9	8.00	34.179	35.185	35.185	34.180
10	10.00	39.897	41.468	41.153	40.525

ERT No. 09

SI No.	S (M)	Apparent Resistivity (ohm-m)			
		(N - S)	(E - W)	(NE - SW)	(NW - SE)
1	0.50	30.310	30.247	30.09	30.671
2	1.00	30.000	30.063	30.095	30.158
3	2.00	24.755	25.006	25.320	25.445
4	3.00	21.298	21.581	21.770	21.958
5	4.00	17.843	17.969	17.340	17.592
6	5.00	18.534	18.848	19.634	19.791
7	6.00	17.529	18.472	19.414	19.037
8	7.00	16.273	16.713	17.372	16.712
9	8.00	14.827	15.833	16.838	15.833
10	10.00	11.937	12.880	13.194	13.508

ERT No. 10

SI No.	S (M)	Apparent Resistivity (ohm-m)			
		(N - S)	(E - W)	(NE - SW)	(NW - SE)
1	0.50	50.570	50.256	49.627	49.941
2	1.00	43.069	43.069	42.787	42.598
3	2.00	51.708	51.897	52.337	52.713
4	3.00	51.834	52.117	52.868	52.305
5	4.00	56.295	56.546	57.928	58.934
6	5.00	50.892	51.834	52.776	53.562
7	6.00	54.663	55.605	56.359	57.490
8	7.00	45.741	46.181	47.500	48.819
9	8.00	38.201	38.201	40.463	41.217
10	10.00	41.153	41.782	43.667	45.238

ERT No. 11

SI No.	S (M)	Apparent Resistivity (ohm-m)			
		(N - S)	(E - W)	(NE - SW)	(NW - SE)
1	0.50	250.049	250.023	250.808	251.122
2	1.00	147.65	146.393	147.021	148.592
3	2.00	35.373	35.247	35.058	35.247
4	3.00	20.544	21.204	20.733	21.016
5	4.00	20.356	20.105	19.728	19.979
6	5.00	20.105	20.262	19.948	20.419
7	6.00	21.676	22.430	22.996	24.127
8	7.00	18.252	17.372	19.351	19.351
9	8.00	20.106	21.111	20.859	19.854
10	10.00	24.189	25.446	24.503	25.132

ERT No. 12

SI No.	S (M)	Apparent Resistivity (ohm-m)			
		(N - S)	(E - W)	(NE - SW)	(NW - SE)
1	0.50	14.982	14.997	14.982	14.966
2	1.00	19.665	19.728	19.665	19.822
3	2.00	25.006	25.194	25.194	25.320
4	3.00	27.331	27.613	27.613	27.990
5	4.00	30.535	31.037	31.289	32.168
6	5.00	30.629	31.100	30.629	30.943
7	6.00	27.897	28.274	28.274	28.651
8	7.00	28.368	29.467	30.127	30.787
9	8.00	25.635	26.891	27.896	28.902
10	10.00	24.189	26.074	27.645	28.587

ERT No. 13

SI No.	S (M)	Apparent Resistivity (ohm-m)			
		(N - S)	(E - W)	(NE - SW)	(NW - SE)
1	0.50	95.800	95.957	96.114	96.585
2	1.00	46.808	47.122	47.122	47.436
3	2.00	27.833	27.896	28.210	28.084
4	3.00	25.540	25.728	25.917	26.482
5	4.00	27.896	28.147	28.524	28.273
6	5.00	27.802	29.058	28.273	28.744
7	6.00	19.980	20.922	20.734	20.545
8	7.00	22.210	23.310	23.090	21.990
9	8.00	21.613	23.121	22.619	22.116
10	10.00	19.477	22.304	19.791	19.791

ERT No. 14

SI No.	S (M)	Apparent Resistivity (ohm-m)			
		(N - S)	(E - W)	(NE - SW)	(NW - SE)
1	0.50	52.768	53.239	53.711	53.554
2	1.00	41.153	41.153	41.467	41.153
3	2.00	16.523	16.649	16.712	16.775
4	3.00	21.299	21.581	21.864	21.675
5	4.00	20.984	21.738	21.487	21.487
6	5.00	20.576	21.519	19.634	20.890
7	6.00	19.226	20.357	21.111	20.168
8	7.00	20.011	20.671	21.331	20.671
9	8.00	19.854	21.110	20.357	20.357
10	10.00	16.963	18.534	19.791	19.477

ERT No. 15

SI No.	S (M)	Apparent Resistivity (ohm-m)			
		(N - S)	(E - W)	(NE - SW)	(NW - SE)
1	0.50	132.079	131.922	131.607	131.607
2	1.00	26.922	27.047	27.236	27.205
3	2.00	19.853	20.482	20.545	20.293
4	3.00	22.806	22.524	22.901	22.618
5	4.00	22.493	23.875	22.241	23.372
6	5.00	24.032	25.131	25.132	24.817
7	6.00	23.938	25.635	26.389	25.069
8	7.00	20.451	21.770	21.991	21.771
9	8.00	21.362	22.116	22.116	21.362
10	10.00	23.875	24.503	24.818	24.818

ERT No. 16

SI No.	S (M)	Apparent Resistivity (ohm-m)			
		(N - S)	(E - W)	(NE - SW)	(NW - SE)
1	0.50	221.597	219.869	219.241	219.87
2	1.00	73.510	73.824	74.453	74.453
3	2.00	26.199	26.702	26.890	27.079
4	3.00	20.827	21.110	20.733	20.544
5	4.00	19.476	19.853	20.356	20.105
6	5.00	16.492	17.278	17.906	19.220
7	6.00	14.890	16.021	16.210	16.587
8	7.00	12.314	13.194	14.073	13.414
9	8.00	15.079	15.079	15.833	16.335
10	10.00	17.592	19.163	18.848	17.906

ERT No. 17

SI No.	S (M)	Apparent Resistivity (ohm-m)			
		(N - S)	(E - W)	(NE - SW)	(NW - SE)
1	0.50	10.459	10.396	10.600	10.647
2	1.00	14.827	15.016	14.858	15.047
3	2.00	12.754	13.382	13.382	13.822
4	3.00	17.812	17.152	18.660	18.566
5	4.00	18.346	19.100	19.999	20.482
6	5.00	16.806	15.864	17.749	18.691
7	6.00	16.587	17.718	18.472	19.980
8	7.00	15.613	16.712	17.812	16.932
9	8.00	15.079	16.587	16.335	17.089
10	10.00	16.650	17.906	18.22	18.848

ERT No. 18

SI No.	S (M)	Apparent Resistivity (ohm-m)			
		(N - S)	(E - W)	(NE - SW)	(NW - SE)
1	0.50	18.358	18.343	18.468	18.374
2	1.00	17.937	18.126	18.157	18.032
3	2.00	17.026	17.403	17.341	17.152
4	3.00	14.890	15.267	15.361	15.361
5	4.00	13.822	14.953	15.455	14.450
6	5.00	12.880	13.194	13.665	12.723
7	6.00	12.817	14.136	14.890	13.759
8	7.00	12.534	13.414	14.294	15.173
9	8.00	12.565	13.319	14.325	14.827
10	10.00	14.136	14.450	16.021	16.021

ERT No. 19

SI No.	S (M)	Apparent Resistivity (ohm-m)			
		(N - S)	(E - W)	(NE - SW)	(NW - SE)
1	0.50	81.037	82.137	81.666	81.666
2	1.00	31.006	31.006	31.194	31.069
3	2.00	26.828	27.519	27.142	27.833
4	3.00	26.482	26.576	26.388	27.236
5	4.00	20.608	20.231	20.607	20.733
6	5.00	18.534	18.691	19.005	19.634
7	6.00	19.037	19.980	17.529	18.283
8	7.00	18.912	20.451	18.032	19.131
9	8.00	17.843	19.100	17.592	16.084
10	10.00	19.163	18.848	19.791	18.534

ERT No. 20

SI No.	S (M)	Apparent Resistivity (ohm-m)			
		(N - S)	(E - W)	(NE - SW)	(NW - SE)
1	0.50	41.775	41.775	42.246	43.188
2	1.00	35.813	35.875	35.906	35.813
3	2.00	29.215	29.467	30.032	30.095
4	3.00	26.294	26.671	25.351	26.011
5	4.00	24.755	24.503	24.126	24.880
6	5.00	23.247	23.718	23.875	24.189
7	6.00	23.184	22.053	22.242	22.807
8	7.00	20.891	22.210	22.430	21.331
9	8.00	20.357	22.870	19.351	20.357
10	10.00	18.848	21.048	19.163	18.534

ERT No. 21

SI No.	S (M)	Apparent Resistivity (ohm-m)			
		(N - S)	(E - W)	(NE - SW)	(NW - SE)
1	0.50	12.673	12.720	12.752	12.814
2	1.00	13.256	13.257	13.350	13.194
3	2.00	13.822	14.010	13.947	14.387
4	3.00	13.759	14.230	13.759	14.984
5	4.00	14.073	14.450	14.827	15.204
6	5.00	13.822	15.079	15.550	14.764
7	6.00	13.759	14.890	15.644	15.267
8	7.00	15.393	13.854	15.173	16.932
9	8.00	15.330	16.838	15.079	15.079
10	10.00	16.335	16.964	17.906	18.534

ERT No. 22

SI No.	S (M)	Apparent Resistivity (ohm-m)			
		(N - S)	(E - W)	(NE - SW)	(NW - SE)
1	0.50	40.99	41.147	41.461	41.461
2	1.00	45.519	45.551	45.205	45.268
3	2.00	40.462	40.525	41.341	40.776
4	3.00	31.288	32.043	32.231	31.760
5	4.00	26.011	26.136	26.388	25.508
6	5.00	23.246	24.346	24.189	23.404
7	6.00	21.299	20.168	19.791	22.242
8	7.00	20.011	17.372	16.932	18.252
9	8.00	18.095	20.105	21.864	19.603
10	10.00	21.676	22.933	25.446	24.504

ERT No. 23

SI No.	S (M)	Apparent Resistivity (ohm-m)			
		(N - S)	(E - W)	(NE - SW)	(NW - SE)
1	0.50	27.813	27.923	27.892	27.735
2	1.00	26.231	26.451	26.451	26.419
3	2.00	24.063	25.006	24.377	24.440
4	3.00	25.446	26.199	26.671	26.011
5	4.00	26.513	27.519	28.398	27.770
6	5.00	27.645	27.802	28.744	28.587
7	6.00	28.651	26.766	29.970	30.347
8	7.00	29.027	27.708	27.928	31.007
9	8.00	29.656	30.912	31.164	30.159
10	10.00	31.729	32.986	33.614	33.928

ERT No. 24

SI No.	S (M)	Apparent Resistivity (ohm-m)			
		(N - S)	(E - W)	(NE - SW)	(NW - SE)
1	0.50	12.846	12.83	12.878	12.815
2	1.00	13.005	13.225	13.068	13.382
3	2.00	12.942	13.507	13.256	13.633
4	3.00	12.439	13.853	13.288	13.759
5	4.00	13.571	15.079	14.199	15.204
6	5.00	14.922	16.492	15.864	16.492
7	6.00	15.079	15.267	16.021	16.021
8	7.00	15.613	16.493	16.492	17.812
9	8.00	16.587	17.341	17.843	18.095
10	10.00	18.220	18.848	19.477	19.163

ERT No. 25

SI No.	S (M)	Apparent Resistivity (ohm-m)			
		(N - S)	(E - W)	(NE - SW)	(NW - SE)
1	0.50	130.882	130.822	131.607	131.45
2	1.00	55.195	54.787	55.290	55.133
3	2.00	37.886	37.509	37.572	37.572
4	3.00	23.561	24.126	24.220	23.843
5	4.00	21.738	21.362	22.367	22.241
6	5.00	23.404	23.718	24.032	24.189
7	6.00	24.692	24.881	25.446	25.635
8	7.00	21.990	21.991	21.991	21.991
9	8.00	20.105	20.357	21.362	21.865
10	10.00	19.791	19.477	22.304	20.734

ERT No. 26

SI No.	S (M)	Apparent Resistivity (ohm-m)			
		(N - S)	(E - W)	(NE - SW)	(NW - SE)
1	0.50	71.143	70.829	71.614	70.515
2	1.00	84.820	82.307	85.448	81.364
3	2.00	70.620	70.746	70.494	69.678
4	3.00	42.409	42.410	41.561	43.635
5	4.00	32.294	32.545	32.545	34.053
6	5.00	29.844	30.629	30.315	31.100
7	6.00	26.954	26.766	26.766	28.085
8	7.00	23.530	24.189	21.991	24.849
9	8.00	20.357	20.357	21.613	18.597
10	10.00	17.906	17.906	17.592	18.848

ERT No. 27

SI No.	S (M)	Apparent Resistivity (ohm-m)			
		(N - S)	(E - W)	(NE - SW)	(NW - SE)
1	0.50	167.101	166.472	166.473	166.787
2	1.00	122.518	124.717	124.089	125.660
3	2.00	45.739	46.368	45.991	45.676
4	3.00	25.634	26.199	26.482	26.482
5	4.00	16.964	18.220	18.723	19.100
6	5.00	15.393	16.649	17.435	18.063
7	6.00	10.555	9.424	10.932	11.874
8	7.00	11.215	12.314	12.974	12.534
9	8.00	11.811	12.314	12.566	13.319
10	10.00	11.309	12.880	12.879	12.251

ERT No. 28

SI No.	S (M)	Apparent Resistivity (ohm-m)			
		(N - S)	(E - W)	(NE - SW)	(NW - SE)
1	0.50	78.210	78.996	77.582	78.525
2	1.00	30.221	31.320	30.660	30.817
3	2.00	15.581	16.209	16.021	16.461
4	3.00	17.058	16.492	16.681	15.927
5	4.00	14.073	15.204	14.073	15.456
6	5.00	12.565	14.136	11.937	12.880
7	6.00	13.005	15.079	14.702	15.833
8	7.00	13.414	12.974	14.294	13.414
9	8.00	12.817	15.330	14.325	13.822
10	10.00	19.163	20.419	21.676	21.990

ERT No. 29

SI No.	S (M)	Apparent Resistivity (ohm-m)			
		(N - S)	(E - W)	(NE - SW)	(NW - SE)
1	0.50	51.983	52.297	51.512	51.983
2	1.00	70.683	71.940	71.311	72.254
3	2.00	26.199	26.639	26.513	26.827
4	3.00	14.230	14.702	15.133	15.173
5	4.00	11.434	11.686	12.314	12.314
6	5.00	10.838	11.152	12.094	11.466
7	6.00	10.178	11.497	13.005	12.251
8	7.00	11.215	14.074	12.974	13.414
9	8.00	11.309	12.817	12.314	12.566
10	10.00	12.566	11.623	11.937	12.880

ERT No. 30

SI No.	S (M)	Apparent Resistivity (ohm-m)			
		(N - S)	(E - W)	(NE - SW)	(NW - SE)
1	0.50	27.106	27.075	27.075	27.09
2	1.00	36.190	36.127	36.095	36.189
3	2.00	38.765	39.142	38.954	38.639
4	3.00	37.886	37.320	37.698	37.980
5	4.00	37.949	38.200	38.200	38.702
6	5.00	36.284	36.598	36.598	36.284
7	6.00	34.306	34.683	35.248	34.871
8	7.00	32.326	33.206	32.546	33.206
9	8.00	30.661	31.163	31.415	31.666
10	10.00	29.215	31.415	30.787	30.786

ERT No. 31

SI No.	S (M)	Apparent Resistivity (ohm-m)			
		(N - S)	(E - W)	(NE - SW)	(NW - SE)
1	0.50	87.162	87.633	87.948	87.476
2	1.00	21.770	21.958	22.115	22.116
3	2.00	22.681	22.806	23.058	22.995
4	3.00	19.979	20.921	20.922	21.204
5	4.00	20.607	21.362	21.613	21.864
6	5.00	21.676	22.461	22.461	23.404
7	6.00	27.520	28.462	28.839	29.405
8	7.00	26.389	27.488	28.807	28.807
9	8.00	22.116	23.372	24.378	24.378
10	10.00	21.362	22.304	23.247	22.933

8. Summary of results of Electrical Resistivity Test is given below:

DER T No.	East	North	Elevation(m)	Average Apparent Resistivity in ohm.meter
1	231	1260	273.468	16.62
2	318	1325	276.470	15.64
3	271	1165	273.110	20.04
4	341	1242	276.567	17.13
5	437	1137	276.223	27.03
6	433	1320	276.354	23.03
7	498	1063	276.235	26.06
8	484	1250	276.232	23.99
9	580	1320	276.210	22.34
10	576	1192	276.187	20.56
11	600	1092	276.461	15.32
12	680	1060	275.730	25.34
13	680	1210	276.335	24.37
14	680	1330	276.197	23.16
15	765	1056	275.681	31.67
16	834	1167	276.236	28.41
17	861	1318	276.468	25.74
18	929	1325	276.513	24.32
19	941	1189	276.166	23.09
20	1010	1045	275.476	21.65
21	1390	1330	276.138	19.87
22	413	981	271.577	18.63
23	485	807	270.160	21.45
24	775	780	276.073	23.23
25	830	880	276.058	24.94
26	700	990	275.850	25.88
27	980	930	275.468	26.17
28	1069	770	275.308	24.55
29	1190	620	275.759	22.59
30	1590	1370	277.213	21.33
31	1405	1230	277.58	20.47

258720/2024/PS-HQ-CPC

Project: Detailed Geotech. Inv. Work for Singrauli STPP, Stage –III (2 x 660MW).



Job No. : 3973M

Sheet No.

10. CROSS HOLE SHEAR TESTS

REPORT ON
CROSS HOLE SHEAR TEST FOR
DETAILED GEOTECHNICAL INVESTIGATION WORK
FOR MAIN PLANT & OFFSITE, ASH DYKE AREA AND PIPE LINE
CORRIDOR FOR SINGRAULI SUPER THERMAL POWER PROJECT
STAGE –III (2 X 660MW) AT SINGRAULI, UP

1. INTRODUCTION

M/s. NTPC Limited has proposed the detailed geotechnical investigation work for Singrauli Super Thermal Power Project Stage–III (2 X 660MW) at Singrauli, UP. For designing of various Foundation Structures coming under this project, it was necessary to conduct a Geotechnical Investigation Work to obtain engineering properties of the underlying soil and the job was awarded to **M/s. C. E. Testing Company Pvt. Ltd., Kolkata**. This present report presents the findings of Cross Hole Tests (conducted during the month of July' 2017)

2. SCOPE OF WORK

The Cross Hole Tests were conducted at six (06) locations down to a depth of about 14 meters. One source hole and two Receiver holes at a distance of 3 meter were used.

3. PURPOSE OF INVESTIGATIONS

The aim of the investigation was to determine the soil parameters. The Cross Hole Tests were conducted to determine dynamic soil properties.

4. GENERAL SITE DESCRIPTION

The test was conducted between one Source and two Receiver holes. The holes were drilled down to a depth of maximum 15meter.

5. CROSS HOLE SEISMIC TEST

5.1. LOCATION

Six cross hole tests were conducted. The test locations are given below.

CHST No.	Co-ordinates		GL (M)
	East	North	
CHST-1	490	1140	276.010
CHST-2	490	1295	276.480
CHST-3	575	1308	276.190
CHST-4	570	1235	276.256
CHST-5	784	1298	276.320
CHST-6	845	1119	276.240

5.2. EQUIPMENT AND ACCESSORIES

Following equipment and accessories were used:

1. Seismograph : PASI model 16S24-U
Signal enhancement type fully digital 24 channel seismograph,
2. Geophones : Moving-coil type digital grade vertical & Horizontal geophones, natural frequency 10 Hertz.
3. Cable : Geophone spread cables, 10m spacing, water proof joints, made in Italy

5.2.1. Energy Source:

Shear Wave Hammer was used for generating waves in the Source borehole. The hammer generates waves in both the directions i.e. Up and Down, resulting in polarized energy.



5.2.2. Down Hole Sensors:

Orthogonal down hole sensors were used to receive the waves in two Receiver holes. The sensors have two Horizontal components and one Vertical component Geophones, encased in a steel tube and having water tight arrangement. The sensors were lowered at the same depth as the Hammer in the Source hole, and tube attached to them was inflated so as to make them fixed with the borehole wall.

5.2.3. Seismograph:

PASI 16S 24-U Seismograph was used to record field data. The seismograph has the signal enhancement or stacking capability. The seismograph records the arrival of seismic waves through 24 channels. The seismic waves detected by each geophone are displayed simultaneously on the screen.



5.3 SEISMIC CROSS HOLE TEST

The Seismic Cross Hole Test consists of generation of horizontally traveling P and S waves at a particular level in one borehole (Source hole) and recording their arrivals at same level in one or two nearby boreholes (Receiver holes).

5.4 CROSS HOLE SHEAR TEST DATA INTERPRETATION

5.4.1. DATA PROCESSING

The data is stored in the hard disk of the Seismograph at the time of data acquisition. The data was transferred to the computer for further processing.

The processing involves picking the first arrivals. In case of noisy data there are intermediate steps of data processing using filtering, amplitude corrections etc.

5.4.2. PICKING OF FIRST ARRIVALS

The picking was done manually to see arrival of P and S waves on the respective Geophones. The time of travel from Source to Receiver hole is used to determine the velocities of P & Shear waves, as distance between the boreholes is known.

5.4.3. VELOCITY CALCULATION

Velocity calculation was done using the time derives as above and the distance between the two Receiver holes from the Source hole.

5.5. CALCULATION OF SOIL PARAMETERS:

The dynamic soil parameters are calculated from seismic wave and the bulk density of the corresponding of the subsurface strata. The calculations are based on IS Code 13372 (Part-2).

The Poisson's Ratio is determined directly from the compressional (P) wave and shear (S) wave data. It is expressed by the ratio of transverse strain to longitudinal strain. Its dynamic determination is expressed as:

$$\sigma = (m^2 - 2) / [2 * (m^2 - 1)] \text{ where } m = V_p / V_s$$

Young's Modulus E is the uni-axial stress-strain ratio. Its dynamic value is expressed by the following equation:

$$E = \rho V_p^2 (1 + \sigma) (1 - 2\sigma) / (1 - \sigma)$$

The shear Modulus G is the stress-strain ratio for simple shear. Its dynamic value is obtained by the following:

$$G = E / 2 (1 + \sigma) = \rho V_s^2$$

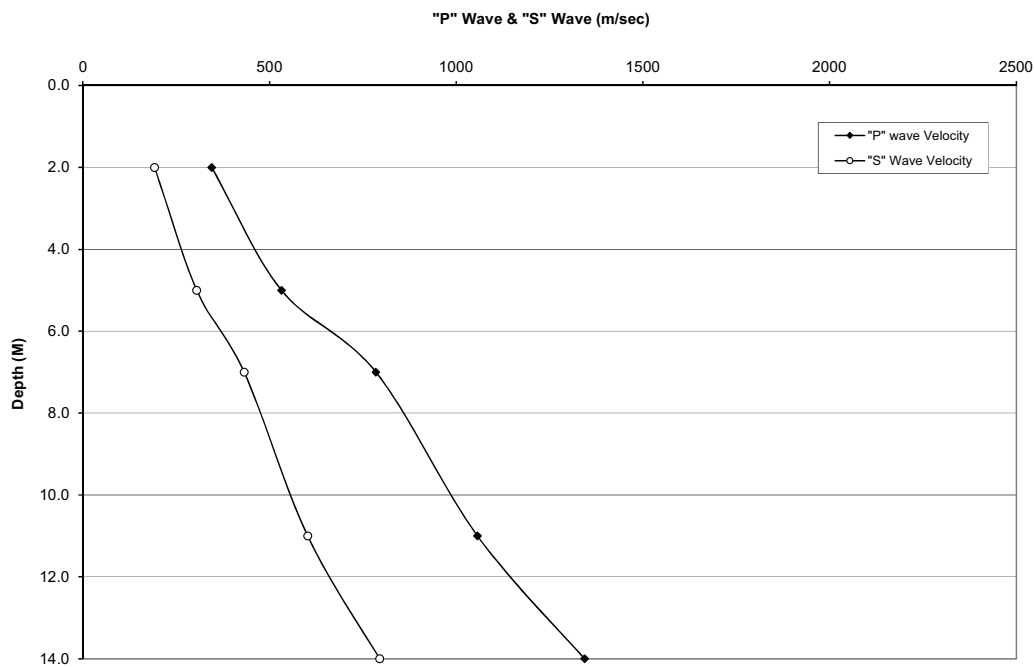
Where ρ is mass density in $\text{kN.s}^2/\text{m}^4$, σ is Poisson's ratio and V_p is P-wave velocity in m/sec , **E & G** are in kN/m^2 .

The test results are presented afterwards in a tabular form.

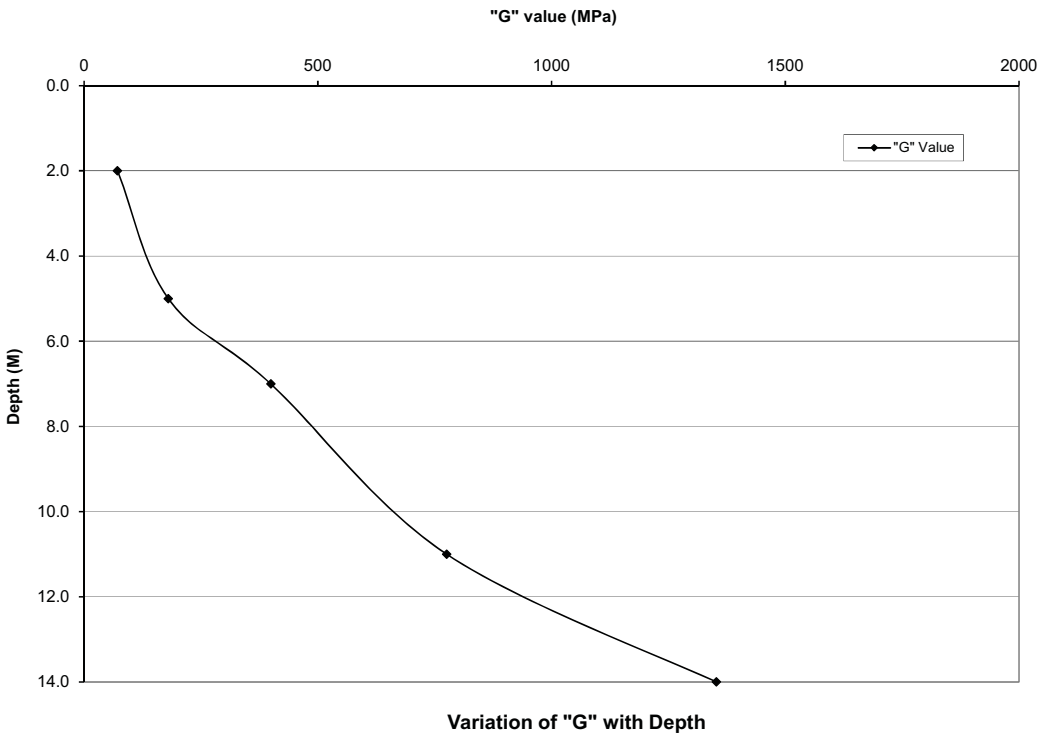
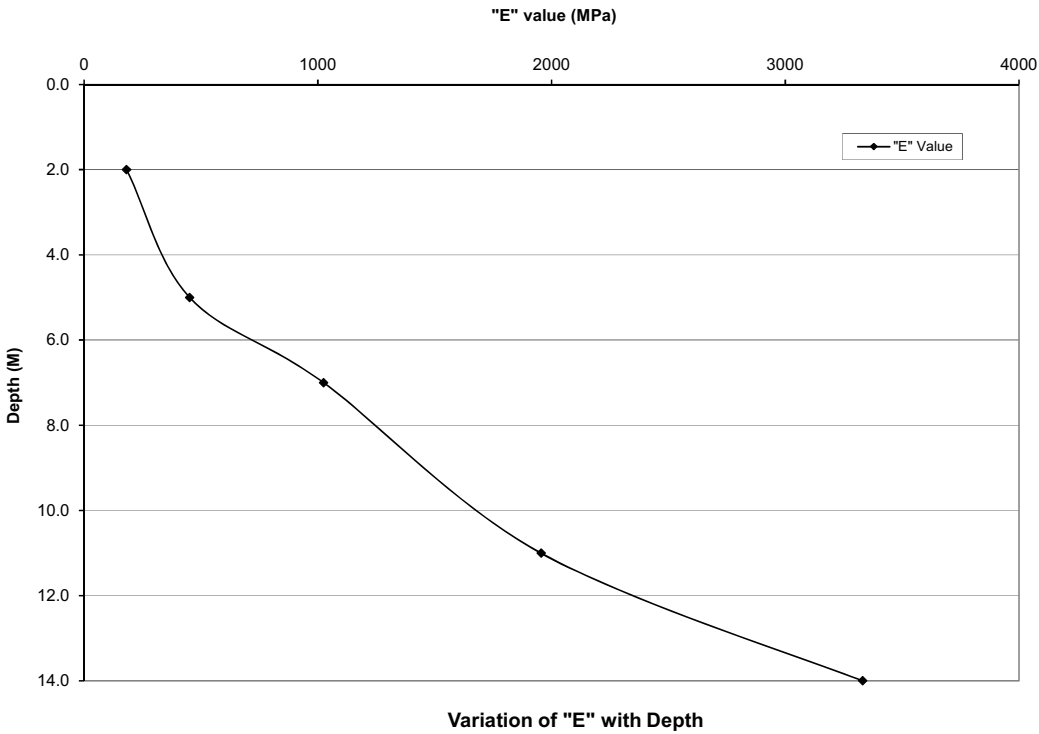


TEST RESULTS

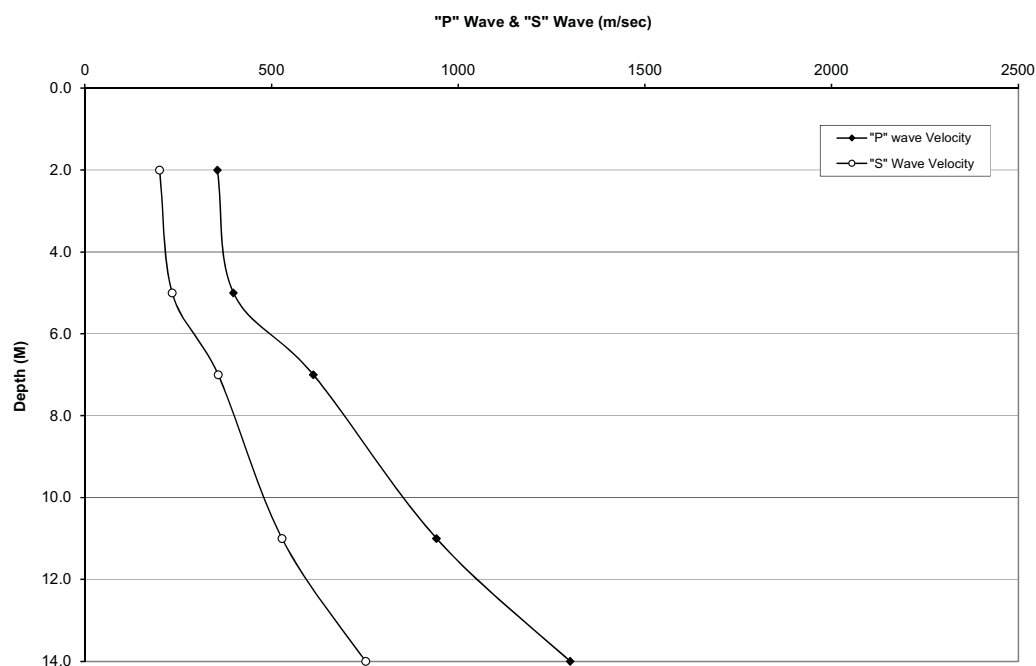
Cross Hole Shear Test Results - 1									
Calculated Values of Dynamic Parameters									
Depth (M)	V _p (m/s)	V _s (m/s)	Mass Density (kN.s ² /m ⁴)	m = V _p /V _s	Poisson Ratio, σ	Young's Modulus (kN/m ²)	Young's Modulus (MPa)	Shear Modulus (kN/m ²)	Shear Modulus (MPa)
BGL									
2.0	345	192	1.94	1.80	0.276	182160	182.16	71398	71.40
5.0	532	305	1.94	1.74	0.255	452299	452.30	180171	180.17
7.0	785	432	2.14	1.82	0.283	1024955	1024.95	399501	399.50
11.0	1057	602	2.14	1.76	0.260	1954906	1954.91	775788	775.79
14.0	1344	795	2.14	1.69	0.231	3330701	3330.70	1352959	1352.96



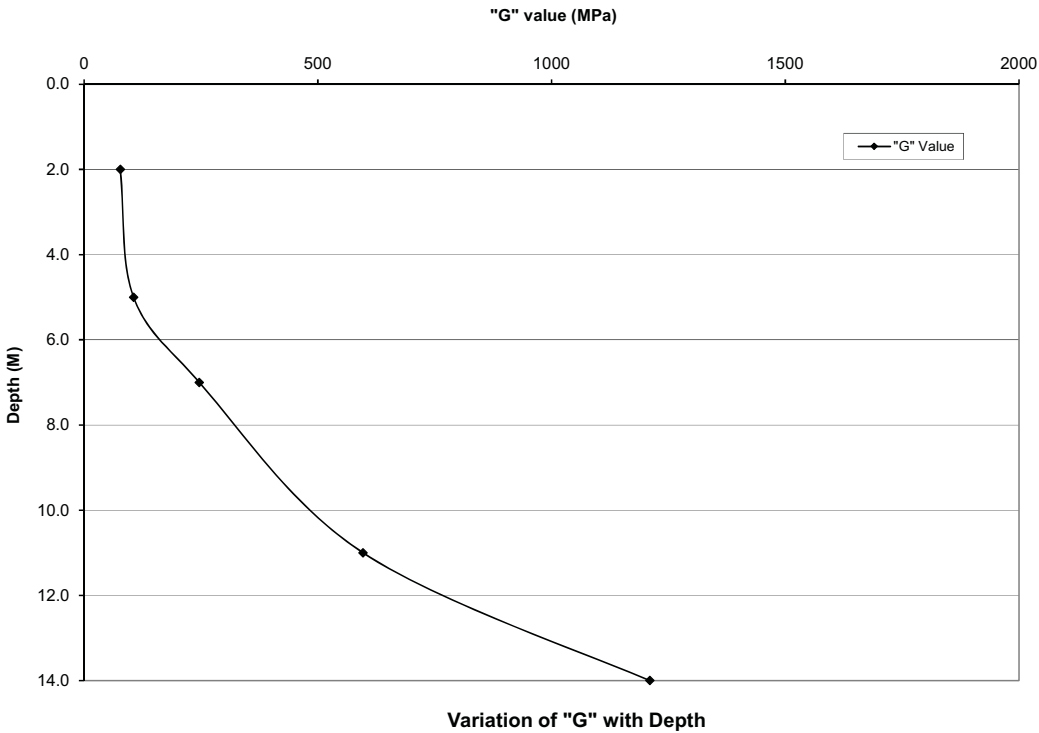
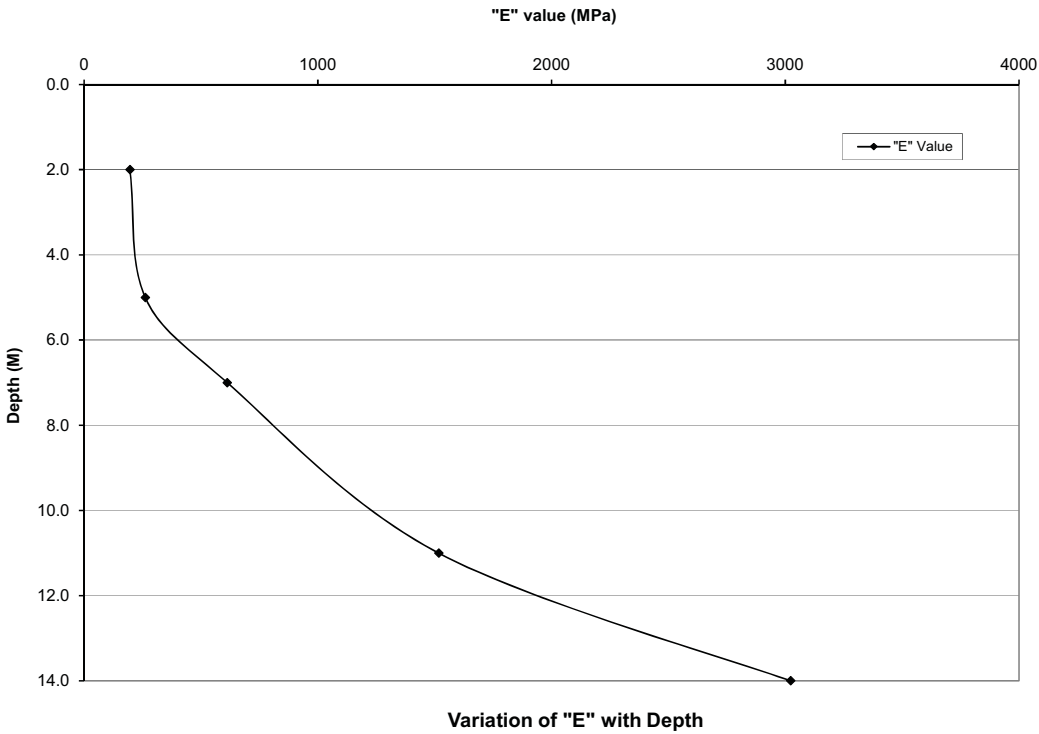
Variation of "P" & "S" wave Velocity with Depth



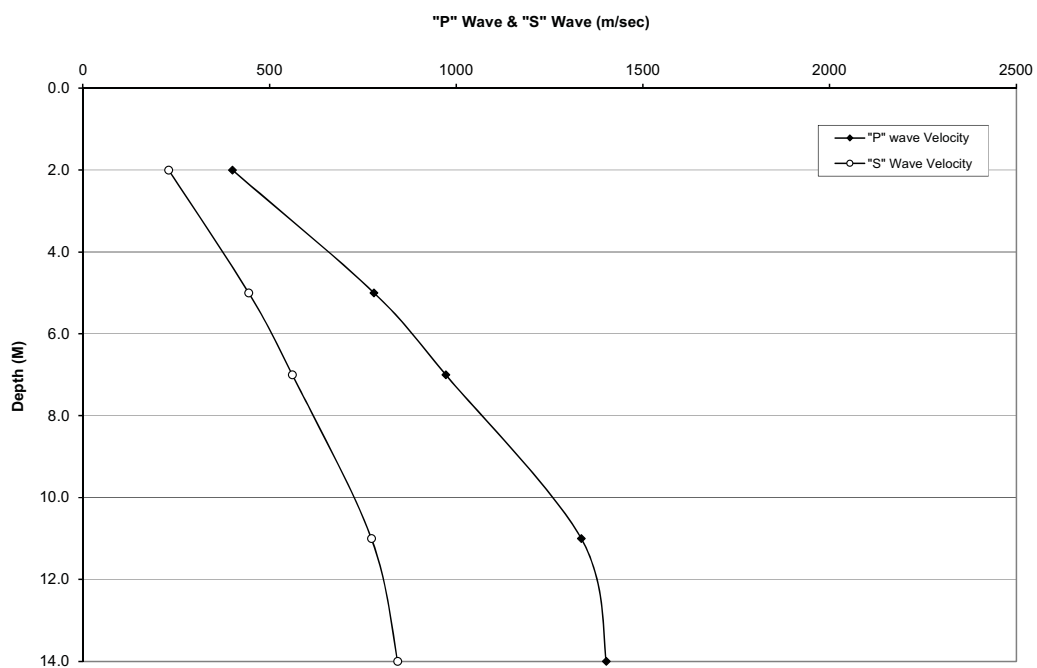
Cross Hole Shear Test Results - 2									
Calculated Values of Dynamic Parameters									
Depth (M)	Vp (m/s)	Vs (m/s)	Mass Density (kN.s ² /m ⁴)	m = Vp/Vs	Poisson Ratio, σ	Young's Modulus (kN/m ²)	Young's Modulus (MPa)	Shear Modulus (kN/m ²)	Shear Modulus (MPa)
BGL									
2.0	355	200	1.94	1.78	0.268	196393	196.39	77472	77.47
5.0	398	234	1.94	1.70	0.236	262128	262.13	106051	106.05
7.0	612	357	1.94	1.71	0.242	613210	613.21	246843	246.84
11.0	942	528	2.14	1.78	0.271	1516975	1516.97	596785	596.79
14.0	1300	752	2.14	1.73	0.249	3022892	3022.89	1210559	1210.56

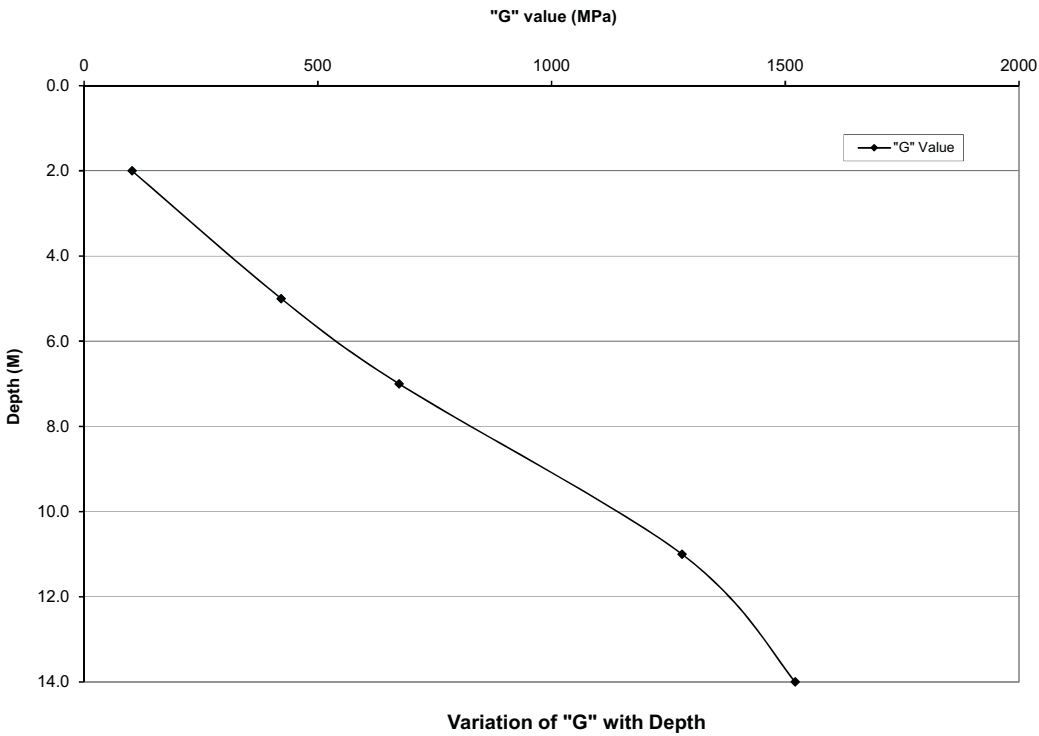
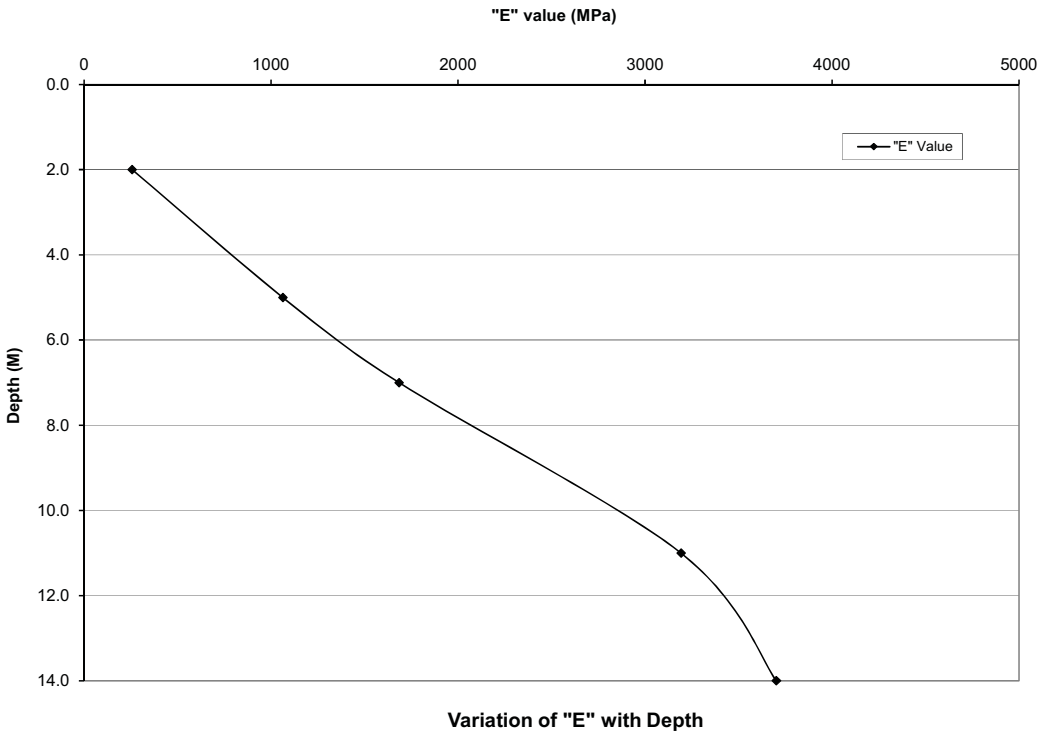


Variation of "P" & "S" wave Velocity with Depth

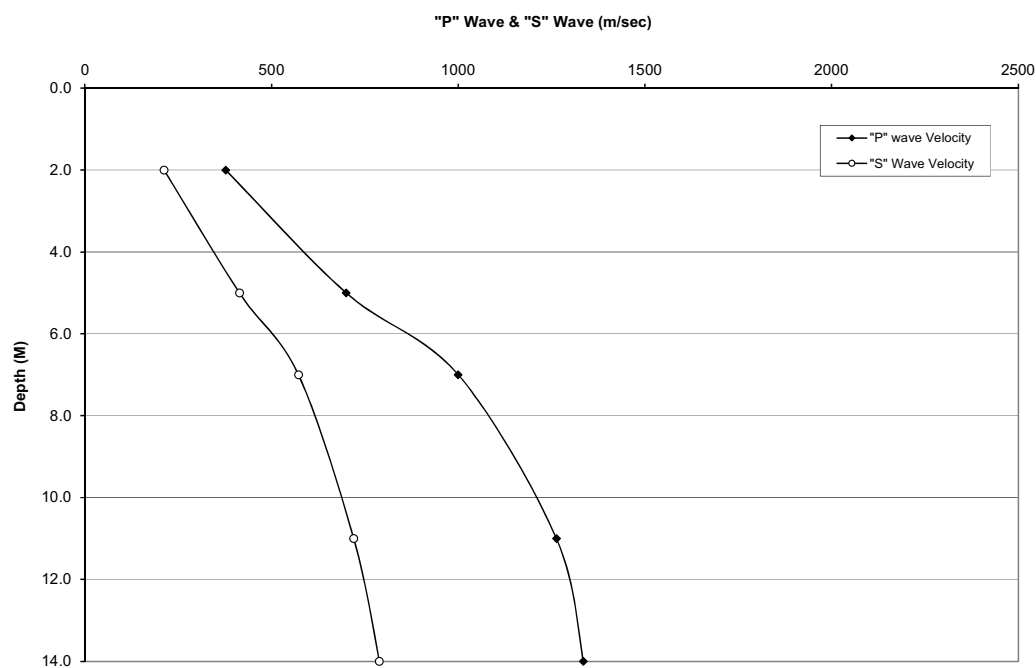


Cross Hole Shear Test Results - 3									
Calculated Values of Dynamic Parameters									
Depth (M)	V _p (m/s)	V _s (m/s)	Mass Density (kN.s ² /m ⁴)	m = V _p /V _s	Poisson Ratio, σ	Young's Modulus (kN/m ²)	Young's Modulus (MPa)	Shear Modulus (kN/m ²)	Shear Modulus (MPa)
BGL									
2.0	401	230	1.94	1.74	0.255	257139	257.14	102457	102.46
5.0	780	444	2.14	1.76	0.260	1063727	1063.73	422004	422.00
7.0	972	561	2.14	1.73	0.250	1684619	1684.62	673715	673.71
11.0	1335	773	2.14	1.73	0.248	3192191	3192.19	1279114	1279.11
14.0	1402	843	2.14	1.66	0.217	3702346	3702.35	1521267	1521.27

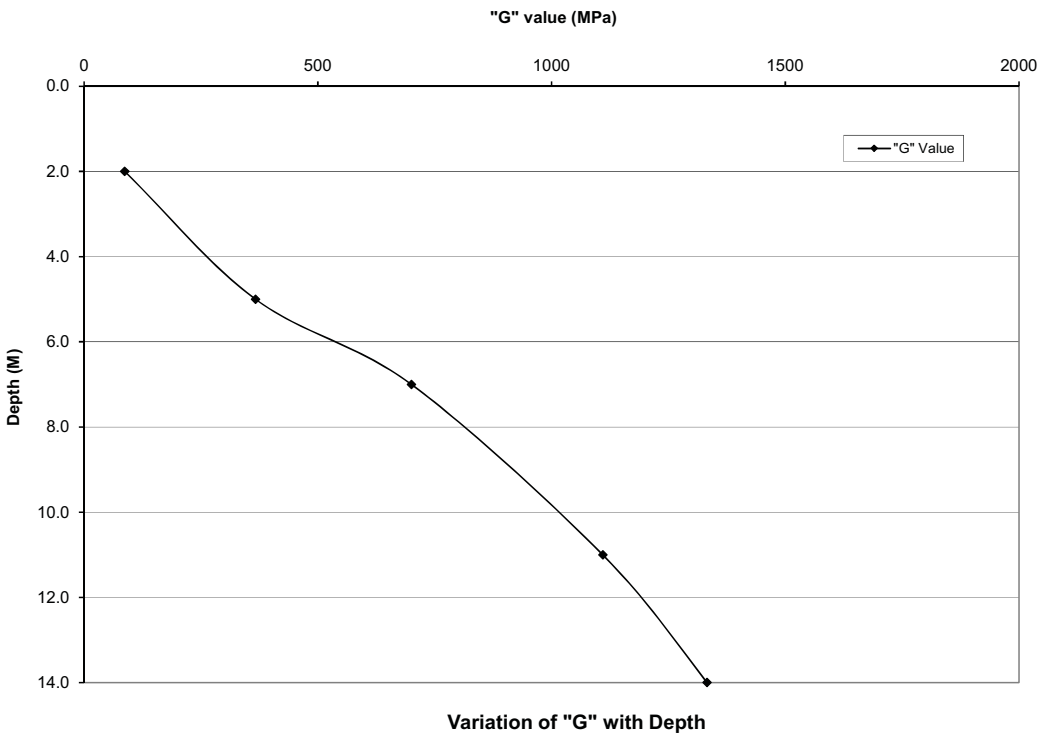
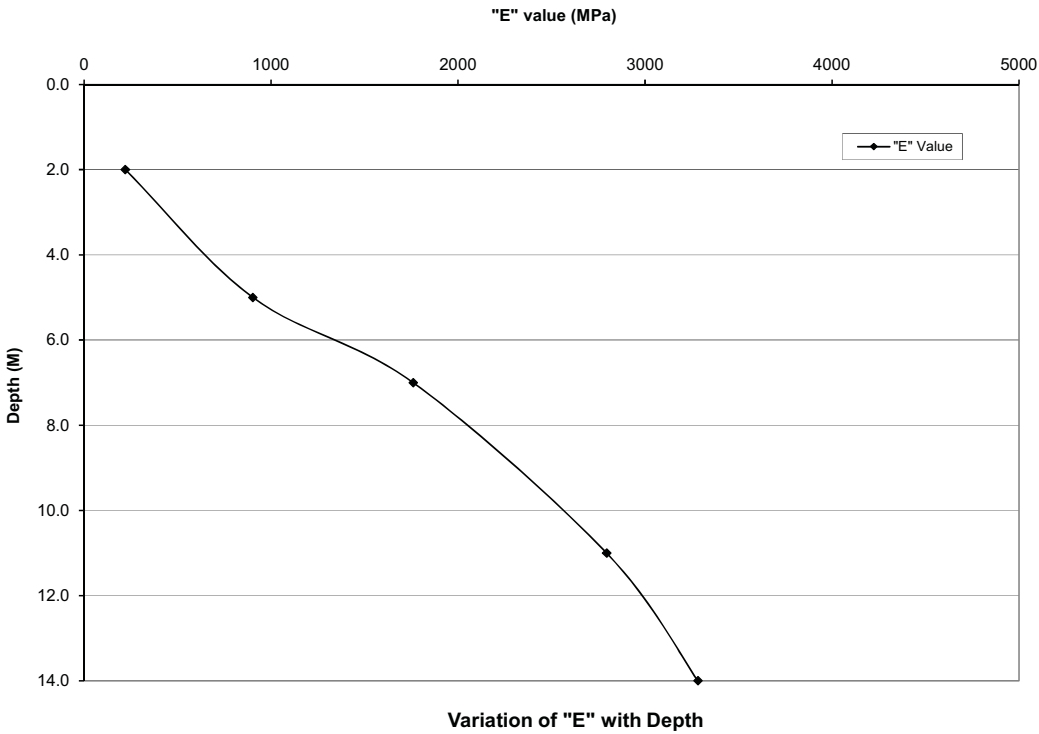




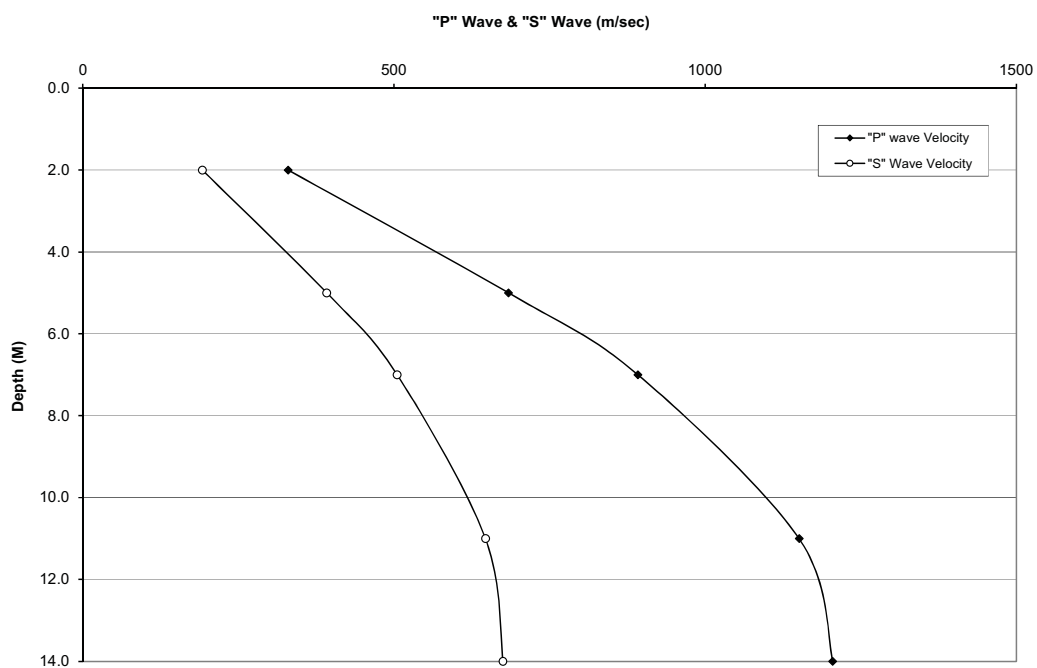
Cross Hole Shear Test Results - 4									
Calculated Values of Dynamic Parameters									
Depth (M)	V _p (m/s)	V _s (m/s)	Mass Density (kN.s ² /m ⁴)	m = V _p /V _s	Poisson Ratio, σ	Young's Modulus (kN/m ²)	Young's Modulus (MPa)	Shear Modulus (kN/m ²)	Shear Modulus (MPa)
BGL									
2.0	377	212	1.94	1.78	0.269	220887	220.89	87048	87.05
5.0	700	414	2.14	1.69	0.231	903329	903.33	366903	366.90
7.0	1000	572	2.14	1.75	0.257	1760587	1760.59	700394	700.39
11.0	1263	720	2.14	1.75	0.259	2794908	2794.91	1109725	1109.72
14.0	1335	789	2.14	1.69	0.232	3282504	3282.50	1332614	1332.61



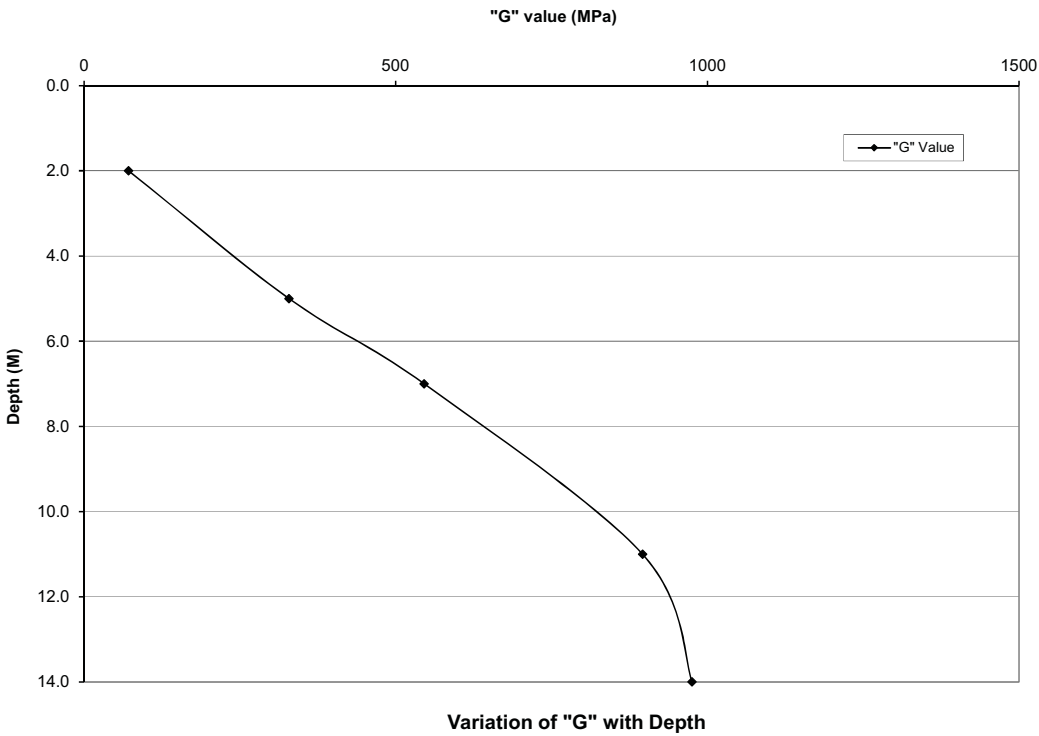
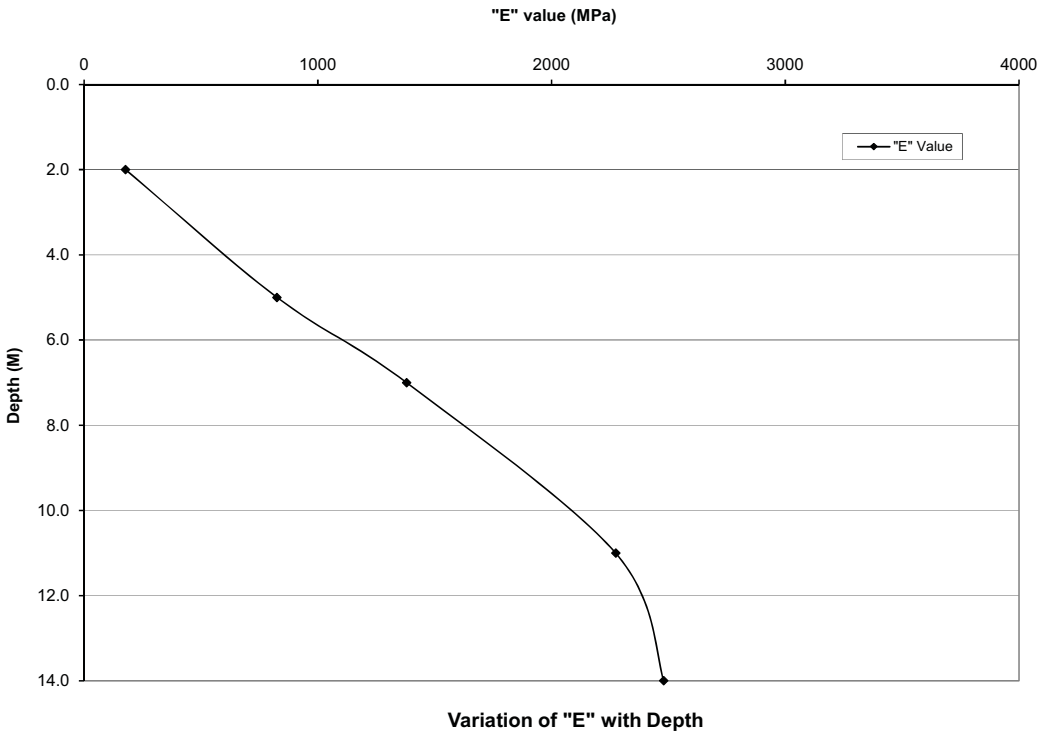
Variation of "P" & "S" wave Velocity with Depth



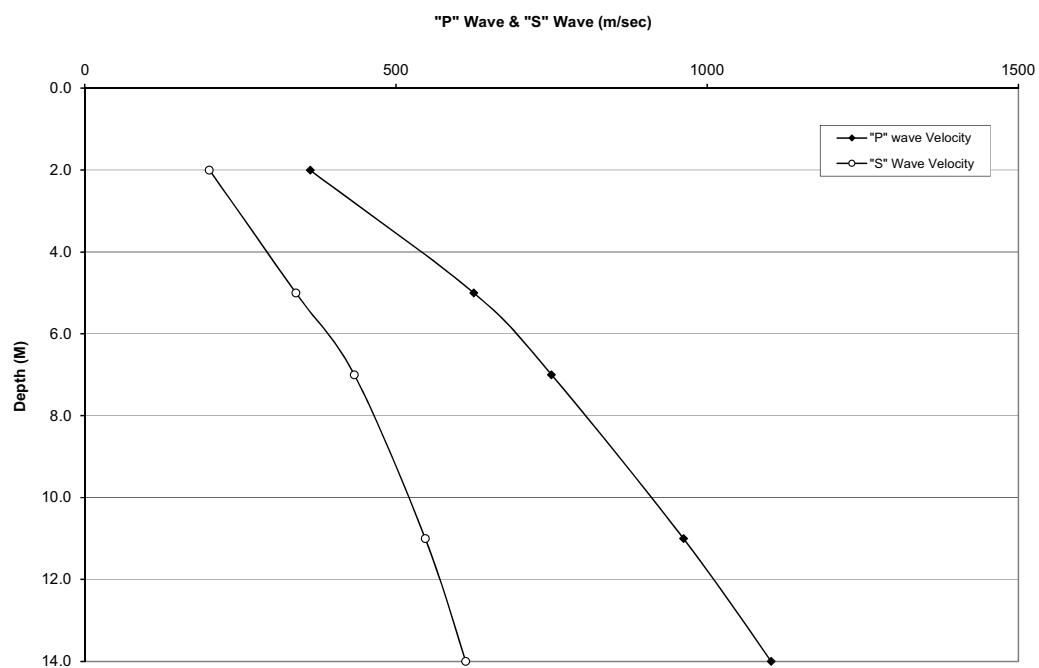
Cross Hole Shear Test Results - 5									
Calculated Values of Dynamic Parameters									
Depth (M)	V _p (m/s)	V _s (m/s)	Mass Density (kN.s ² /m ⁴)	m = V _p /V _s	Poisson Ratio, σ	Young's Modulus (kN/m ²)	Young's Modulus (MPa)	Shear Modulus (kN/m ²)	Shear Modulus (MPa)
BGL									
2.0	330	192	1.94	1.72	0.244	177657	177.66	71398	71.40
5.0	684	392	2.14	1.74	0.255	825954	825.95	328944	328.94
7.0	892	505	2.14	1.77	0.264	1380257	1380.26	545925	545.93
11.0	1151	647	2.14	1.78	0.269	2274365	2274.37	896105	896.10
14.0	1205	675	2.14	1.79	0.271	2480035	2480.04	975344	975.34



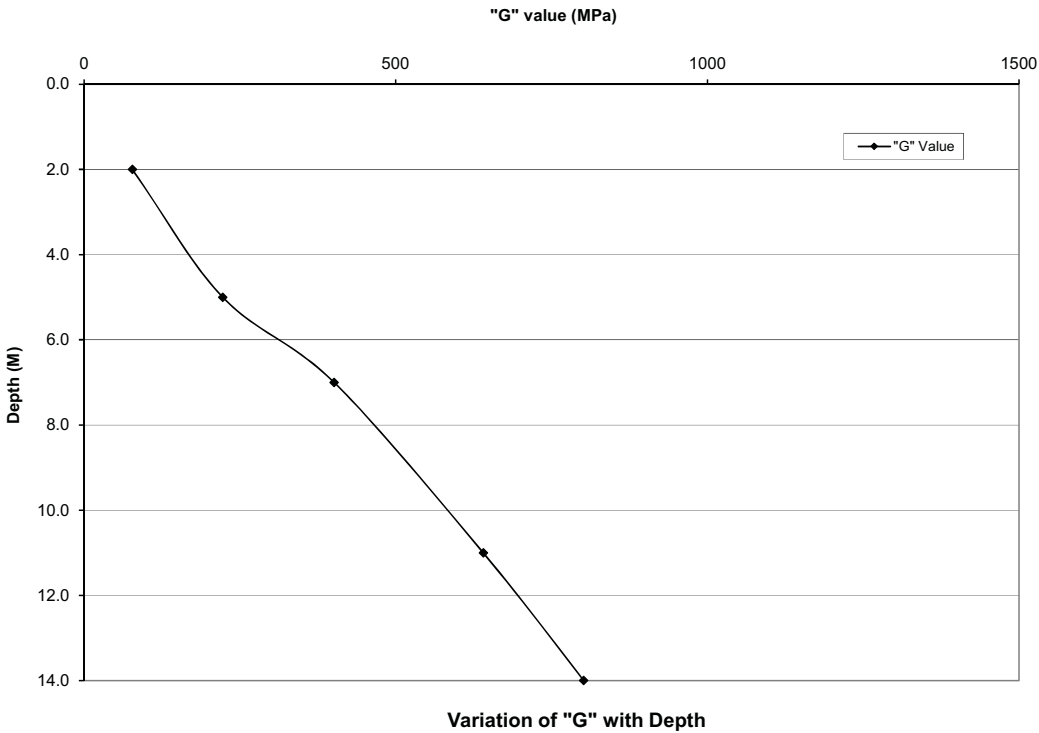
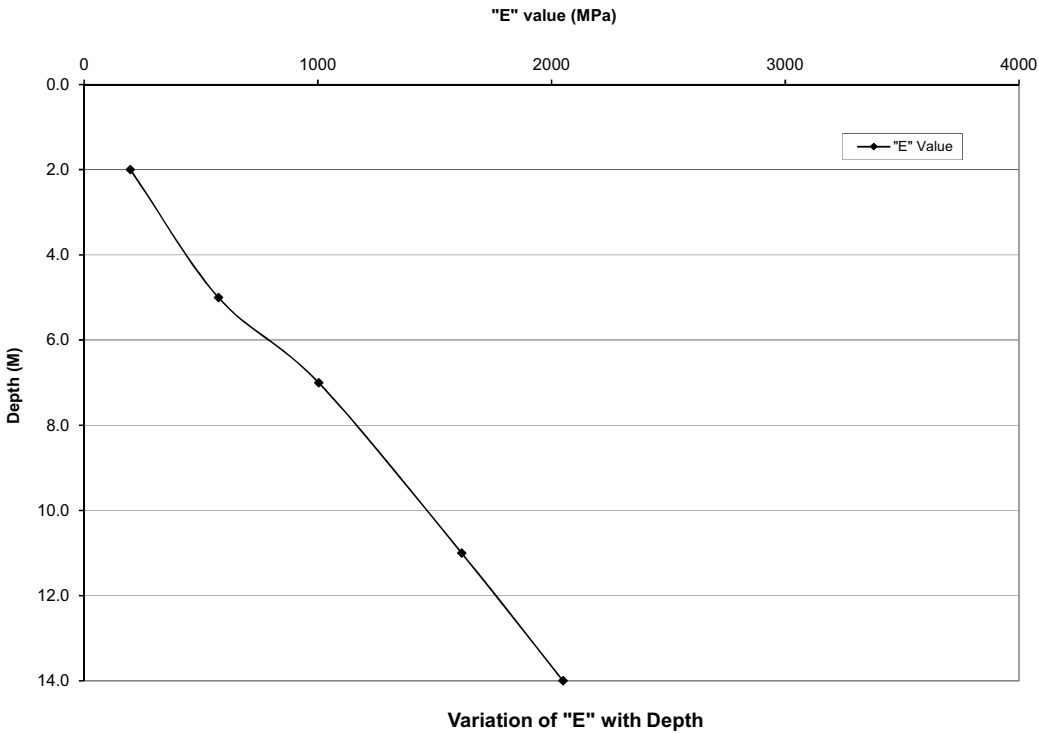
Variation of "P" & "S" wave Velocity with Depth



Cross Hole Shear Test Results - 6									
Calculated Values of Dynamic Parameters									
Depth (M)	V _p (m/s)	V _s (m/s)	Mass Density (kN.s ² /m ⁴)	m = V _p /V _s	Poisson Ratio, σ	Young's Modulus (kN/m ²)	Young's Modulus (MPa)	Shear Modulus (kN/m ²)	Shear Modulus (MPa)
BGL									
2.0	362	200	1.94	1.81	0.280	198379	198.38	77472	77.47
5.0	625	339	1.94	1.84	0.292	574960	574.96	222579	222.58
7.0	750	433	2.14	1.73	0.250	1003399	1003.40	401353	401.35
11.0	962	547	2.14	1.76	0.261	1615497	1615.50	640509	640.51
14.0	1103	612	2.14	1.80	0.278	2048705	2048.70	801776	801.78



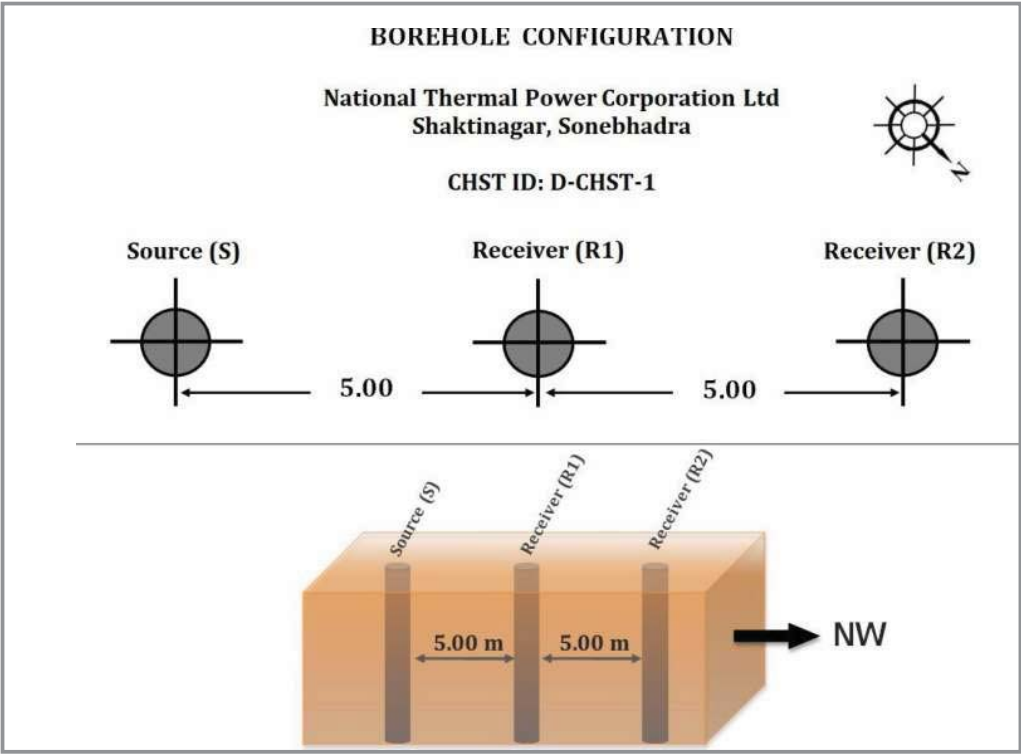
Variation of "P" & "S" wave Velocity with Depth



APPENDIX – 11

Crosshole Seismic Test

CHST ID- D-CHST-1: (N: 1085, E: 495)

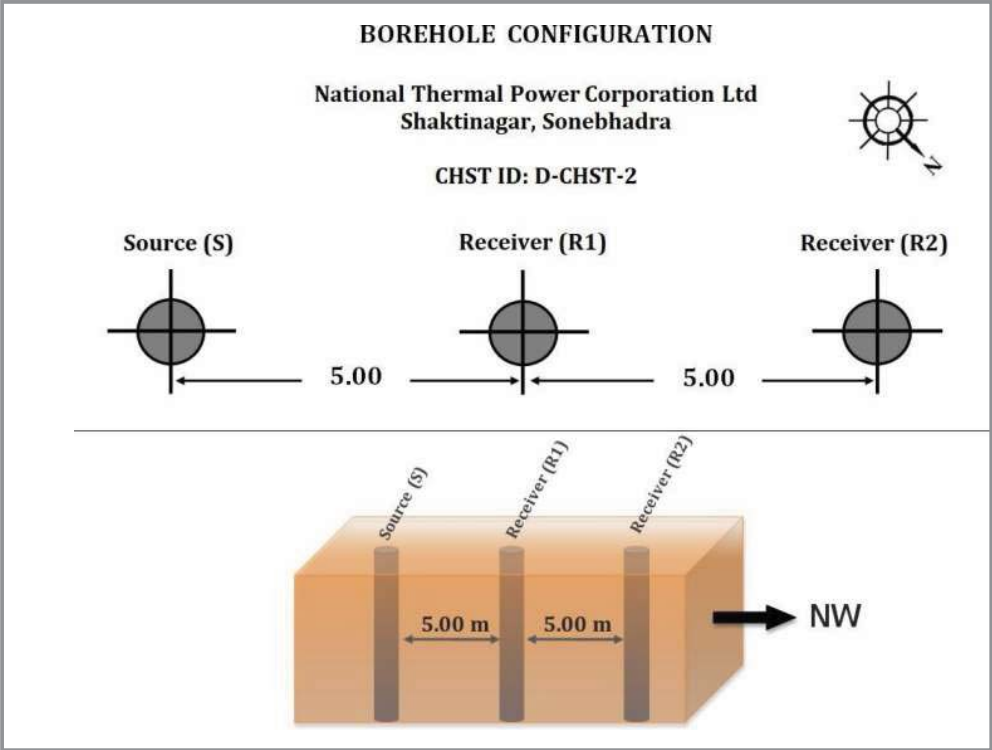


CROSSHOLE SEISMIC SURVEY									
Computed values of Elastic Parameters									
CHST ID:	D-CHST-1	Location: NTPC, Shaktinagar, Sonebhadra, U.P.							
Depth BGL	Average Vp	Average Vs	Density (ρ)	Poisson's Ratio (μ)	Young's Modulus (E)	Shear Modulus (G)	Bulk Modulus (K)		
	(m/S)	(m/S)	(kg/m3)						
(m)					(KN/m2)	(KN/m2)	(KN/m2)		
2.0	381.09	155.10	1800	0.400733	121308.21	43301.69	203673.05		
6.0	607.68	263.36	1800	0.384374	345656.81	124842.28	498239.85		
10.0	1193.01	616.43	1900	0.317887	1902962.79	721974.68	1741563.24		
12.0	1287.24	678.09	1900	0.307960	2285361.45	873635.93	1983405.94		
15.0	1662.57	884.18	1900	0.302817	3870340.53	1485373.38	3271367.35		

Table 1: Recorded Seismic velocities and computed dynamic parameters

Crosshole Seismic Test

CHST ID- D-CHST-2: (N: 1231, E: 495)

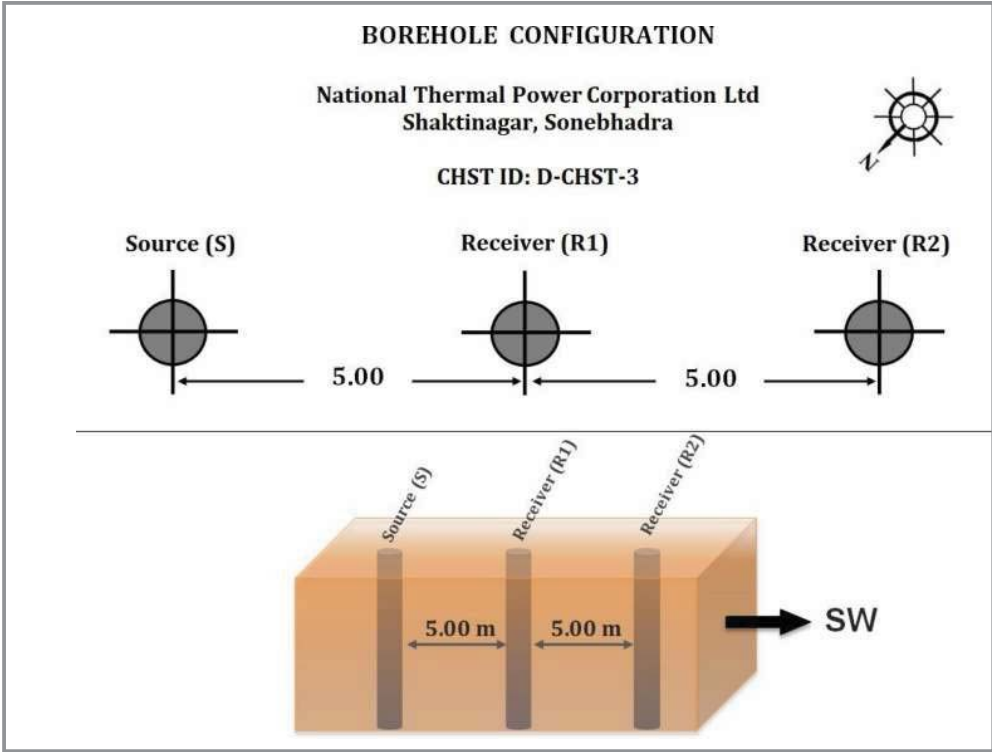


CROSSHOLE SEISMIC SURVEY									
Computed values of Elastic Parameters									
CHST ID:	D-CHST-2	Location: NTPC, Shaktinagar, Sonebhadra, U.P.							
Depth BGL	Average Vp	Average Vs	Density (ρ)	Poisson's Ratio (μ)	Young's Modulus (E)	Shear Modulus (G)	Bulk Modulus (K)		
	(m/S)	(m/S)	(kg/m3)						
(m)					(KN/m2)	(KN/m2)	(KN/m2)		
2.0	472.31	202.07	1800	0.387976	204020.05	73495.53	303536.20		
6.0	655.59	284.62	1800	0.383869	403582.62	145816.75	579206.84		
10.0	909.03	409.45	1800	0.372738	828508.39	301772.30	1085039.80		
12.0	1174.24	544.04	1800	0.363334	1452659.21	532759.83	1771544.60		
15.0	1545.05	812.91	1900	0.308610	3286061.83	1255554.66	2861570.07		

Table 3: Recorded Seismic velocities and computed dynamic parameters

Crosshole Seismic Test

CHST ID- D-CHST-3: (N: 1080.701, E: 583.266)

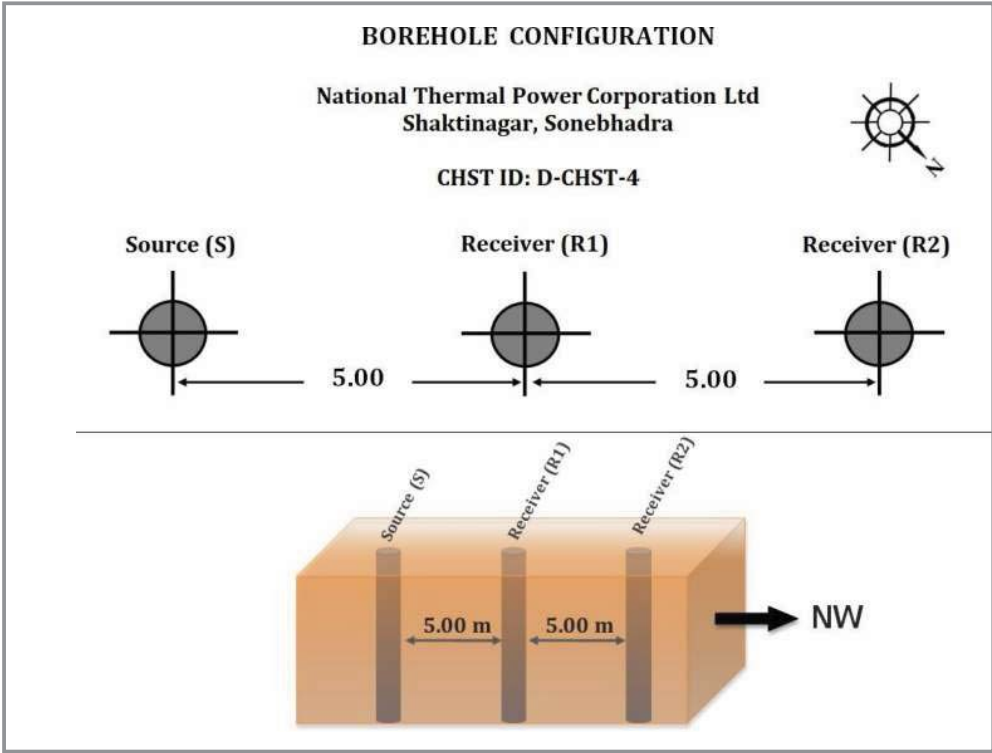


CROSSHOLE SEISMIC SURVEY									
Computed values of Elastic Parameters									
CHST ID:	D-CHST-3	Location: NTPC, Shaktinagar, Sonebhadra, U.P.							
Depth BGL	Average Vp	Average Vs	Density (ρ)	Poisson's Ratio (μ)	Young's Modulus (E)	Shear Modulus (G)	Bulk Modulus (K)		
	(m/S)	(m/S)	(kg/m3)		(KN/m2)	(KN/m2)	(KN/m2)	(KN/m2)	(KN/m2)
2.0	455.75	190.09	1800	0.394699	181421.33	65039.61	287146.85		
6.0	672.17	296.95	1800	0.378749	437686.04	158725.83	601623.64		
10.0	1027.82	524.90	1900	0.323589	1385753.94	523483.55	1309208.30		
12.0	1303.29	683.85	1900	0.310041	2328033.04	888534.73	2042570.04		
15.0	1698.60	914.70	1900	0.295793	4119782.33	1589676.35	3362420.00		

Table 5: Recorded Seismic velocities and computed dynamic parameters

Crosshole Seismic Test

CHST ID- D-CHST-4



CROSSHOLE SEISMIC SURVEY									
Computed values of Elastic Parameters									
CHST ID:	D-CHST-4	Location: NTPC, Shaktinagar, Sonebhadra, U.P.							
Depth BGL	Average Vp	Average Vs	Density (ρ)	Poisson's Ratio (μ)	Young's Modulus (E)	Shear Modulus (G)	Bulk Modulus (K)		
	(m/S)	(m/S)	(kg/m3)						
(m)					(KN/m2)	(KN/m2)	(KN/m2)		
2.0	398.80	160.96	1800	0.402700	130829.80	46634.98	224101.04		
6.0	574.35	253.68	1800	0.378814	319437.70	115837.83	439322.53		
10.0	1027.59	525.54	1900	0.322902	1388403.97	524757.03	1306623.02		
12.0	1197.33	628.63	1900	0.309723	1966755.91	750829.12	1722710.41		
15.0	1704.89	920.95	1900	0.293991	4170447.24	1611467.10	3373997.78		

Table 7: Recorded Seismic velocities and computed dynamic parameters

Project: Detailed Geotech. Inv. Work for Singrauli STPP, Stage –III (2 x 660MW).**Job No. : 3973M****Sheet No.****SWELLING CHARACTERISTICS**

Location	Sample No.	Depth (m)	Description	Free Swell Index %	Swelling Pressure (kg/sqcm)	Water Content %
BH-04	UDS-01	2.00-2.45	Greyish brown, silty clay/clayey silt with sand mixture and kankars.	10.11	0.02	12.66
BH-06	UDS-02	3.00-3.45	Brownish grey, silty clay/clayey silt.	9.55	0.02	15.91
BH-10	UDS-03	6.00-6.45	Yellowish grey clayey silt with sand mixture.	14.29	0.00	15.12
BH-12	UDS-01	2.00-2.45	Brownish grey, silty clay/ clayey silt with sand mixture.	13.51	0.02	18.36
BH-14	UDS-02	4.00-4.45	Yellowish grey, sily clay/clayey silt with steel grey spot.	15.00	0.02	14.16
BH-18	UDS-04	7.00-7.45	Brownish grey, silty clay/clayey silt with sand mixture.	7.25	0.03	12.11
BH-20	UDS-02	4.00-4.45	Yellowish grey, clayey silt with sand mixture.	0.00	0.00	10.4
BH-24	UDS-01	2.00-2.45	Yellowish grey, silty clay/clayey silt with sand mixture.	10.53	0.04	12.48
BH-30	UDS-01	1.90-2.25	Brownish grey, silty clay/ clayey silt.	8.33	0.24	20.44
BH-40	UDS-01	2.00-2.45	Brownish grey, silty clay/clayey silt with steel grey spot and sand mixture.	17.07	0.015	12.03
BH-43	UDS-01	2.00-2.45	Brownish grey, silty clay/clayey silt with sand mixture & traces of grey patches.	20.51	0.00	13.79
BH-45	UDS-02	3.00-3.45	Brownish grey, silty clay/clayey silt with sand miixture.	14.25	0.01	12.55
BH-50	UDS-01	2.00-2.45	Brownish grey silty clay/clayey silt with sand mixture & kankars.	10.53	0.02	13.60
BH-55	UDS-01	1.00-1.45	Brownish grey silty claywith traces of sand mixture.	20.51	0.14	13.68
BH-66	UDS-02	4.00-4.45	Brownish grey, silty clay/clayey silt with sand mixture.	2.48	0.06	10.64
BH-67	UDS-01	1.00-1.45	Yellowish grey, clayey silt with sand mixtues.	12.82	0.00	14.83
BH-68	UDS-04	8.00-8.45	Brownish grey silty claywith calcarious nodules.	5.00	0.00	13.48

Project: Detailed Geotech. Inv. Work for Singrauli STPP, Stage –III (2 x 660MW).

Job No. : 3973M
Sheet No.
SWELLING CHARACTERISTICS

Location	Sample No.	Depth (m)	Description	Free Swell Index %	Swelling Pressure (kg/sqcm)	Water Content %
BH-70	UDS-03	6.00-6.45	Brownish grey clayey silt/ silty clay with sand mixture.	5.00	0.10	13.42
BH-73	UDS-02	4.00-4.45	Deep grey, silty clay/ clayey silt with sand mixture.	5.00	0.10	14.97
BH-76	UDS-03	4.00-4.45	Brownish grey, silty clay/ clayey silt with rock dust and sand mixture.	10.26	0.01	13.93
BH-80	UDS-04	8.00-8.45	Deep grey, silty clay/clayey silt with sand mixture.	7.55	0.00	12.95
BH-104	UDS-01	2.00-2.45	Brownish grey, silty clay/ clayey silt with sand mixture and kankars.	4.76	0.02	13.95

PS-HQ-CPC		TECHNICAL REQUIREMENTS		एनटीपीसी NTPC	
D-1-12(D)		Annexure- (D)			
		CRITERIA FOR WIND RESISTANT DESIGN OF STRUCTURES AND EQUIPMENT All structures shall be designed for wind forces in accordance with IS:875 (Part-3) and as specified in this document. See Annexure – B for site specific information. Along wind forces shall generally be computed by the Peak (i.e. 3 second gust) Wind Speed method as defined in the standard. Along wind forces on slender and wind sensitive structures and structural elements shall also be computed, for dynamic effects, using the Gust Factor or Gust Effectiveness Factor Method as defined in the standard. The structures shall be designed for the higher of the forces obtained from Gust Factor method and the Peak Wind Speed method. Analysis for dynamic effects of wind must be undertaken for any structure which has a height to minimum lateral dimension ratio greater than “5” and/or if the fundamental frequency of the structure is less than 1 Hz. Susceptibility of structures to across-wind forces, galloping, flutter, ovaling etc. should be examined and designed/detailed accordingly following the recommendations of IS:875(Part-3) and other relevant Indian standards. It should be estimated if size and relative position of other structures are likely to enhance the wind loading on the structure under consideration. Enhancement factor, if necessary, shall suitably be estimated and applied to the wind loading to account for the interference effects. Damping in Structures The damping factor (as a percentage of critical damping) to be adopted shall not be more than as indicated below for: a) Welded steel structures : 1.0% b) Bolted steel structures/RCC structures : 2.0% c) Prestressed concrete structures : 1.6% d) Steel stacks : As per IS:6533 & CICIN Model Code whichever is more critical.			
SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION-VI, PART-B		SUB-SECTION-D-1-12(D) CIVIL WORKS WIND DESIGN CRITERIA	
				PAGE 1 OF 2	

CLAUSE NO.	TECHNICAL REQUIREMENTS			
	<u>ANNEXURE-B</u> <u>SITE SPECIFIC DESIGN PARAMETERS</u> The various design parameters, as defined in IS: 875 (Part-3), to be adopted for the project site shall be as follows: a) The basic wind speed “Vb” at ten meters above the mean ground level : 47 meters/second b) The risk coefficient “K1” : 1.07 c) Category of terrain : Category-2			
SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION-VI, PART-B	SUB-SECTION-D-1-12(D) CIVIL WORKS WIND DESIGN CRITERIA	PAGE 2 OF 2	

CLAUSE NO.	TECHNICAL REQUIREMENTS			
SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION-VI, PART-B	SUB-SECTION-D-1-12(D) CIVIL WORKS WIND DESIGN CRITERIA	PAGE 3 OF 2	

PS-HQ-CPC		TECHNICAL REQUIREMENTS		एनटीपीसी NTPC	
D-1-12(E)		Annexure-(E)			
		CRITERIA FOR EARTHQUAKE RESISTANT DESIGN OF STRUCTURES AND EQUIPMENT			
		All structures and equipment shall be designed for seismic forces adopting the site specific seismic information provided in this document and using the other provisions in accordance with IS:1893 (Part 1 to Part 4). Pending finalization of Part 5 of IS:1893, provisions of part 1 shall be read along with the relevant clauses of IS:1893:1984, for embankments.			
		A site specific seismic study has been conducted for the project site. The peak ground horizontal acceleration for the project site, the site specific acceleration spectral coefficients (in units of gravity acceleration ‘g’) in the horizontal direction for the various damping values and the multiplying factor (to be used over the spectral coefficients) for evaluating the design acceleration spectra are as given at Appendix-I.			
		Vertical acceleration spectral values shall be taken as 2/3rd of the corresponding horizontal values.			
		The site specific design acceleration spectra shall be used in place of the response acceleration spectra, given at figure-2 in IS:1893 (Part 1) and Annex B of IS:1893 (Part 4). The site specific acceleration spectra along with multiplying factors specified in Appendix-I includes the effect of the seismic environment of the site, the importance factor related to the structures and the response reduction factor. Hence, the design spectra do not require any further consideration of the zone factor (Z), the importance factor (I) and response reduction factor (R) as used in the IS:1893 (Part 1 to Part 4).			
		Damping in Structures			
		The damping factor (as a percentage of critical damping) to be adopted shall not be more than as indicated below for:			
		a) Steel structures : 2%			
		b) Reinforced Concrete Structures : 5%			
		c) Reinforced Concrete Stacks : 3%			
		d) Steel stacks : 2%			
SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION-VI, PART-B		SUB-SECTION-D-1-12(E) CIVIL WORKS SEISMIC DESIGN CRITERIA	
				PAGE 1 OF 8	

CLAUSE NO.	TECHNICAL REQUIREMENTS	एनटीपीसी NTPC		
	Method of Analysis Since most structures in a power plant are irregular in shape and have irregular distribution of mass and stiffness, dynamic analysis for obtaining the design seismic forces shall be carried out using the response spectrum method. The number of vibration modes used in the analysis should be such that the sum total of modal masses of all modes considered is at least 90 percent of the total seismic mass and shall also meet requirements of IS:1893 (Part 1). Modal combination of the peak response quantities shall be performed as per Complete Quadratic Combination (CQC) method or by an acceptable alternative as per IS:1893 (Part 1). In general, seismic analysis shall be performed for the three orthogonal (two principal horizontal and one vertical) components of earthquake motion. The seismic response from the three components shall be combined as specified in IS:1893. The spectral acceleration coefficient shall get restricted to the peak spectral value if the fundamental natural period of the structure falls to the left of the peak in the spectral acceleration curve. For buildings, if the design base shear (V_B) obtained from modal combination is less than the base shear ($\bar{V}_B$) computed using the approximate fundamental period (T_a) given in IS:1893:Part 1 and using site specific acceleration spectra with appropriate multiplying factor, the response quantities (e.g. member forces, displacements, storey forces, storey shears and base reactions) shall be enhanced in the ratio of $\bar{V}_B / V_B$. However, no reduction is permitted if $\bar{V}_B$ is less than V_B. Design/Detailing for Ductility for Structures The site specific design acceleration spectra is a reduced spectra and has an in-built allowance for ductility. Structures shall be engineered and detailed in accordance with relevant Indian/International standards to achieve ductility.			
SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION-VI, PART-B	SUB-SECTION-D-1-12(E) CIVIL WORKS SEISMIC DESIGN CRITERIA	PAGE 2 OF 8	

CLAUSE NO.	TECHNICAL REQUIREMENTS			
	<u>APPENDIX-I</u> <u>SITE SPECIFIC SEISMIC PARAMETERS FOR DESIGN OF STRUCTURES AND EQUIPMENT</u> The various site specific seismic parameters for the project site shall be as follows: 1) Peak ground horizontal acceleration (MCE) : 0.18 g 2) Multiplying factor to be applied to the site specific horizontal acceleration spectral coefficients (in units of gravity acceleration 'g') to obtain the design acceleration spectra a) for special moment resisting steel frames designed and detailed as per IS:800 : 0.045 b) For special concentrically braced steel frames designed and detailed as per IS:800 : 0.034 c) For special moment resisting RC frames designed and detailed as per IS:456 and IS:13920 : 0.027 d) for RCC chimney, RCC Natural Draft Cooling Tower : 0.09 e) for Liquid retaining tanks : 0.054 f) for Steel chimney, Absorber Tower, Vessels : 0.068 g) for design of structures not covered under 2 (a) to 2 (f) above and under 3 below, in general (excluding special structure/ configuration/materials) : 0.045 3) Multiplying factor to be applied to the site specific horizontal acceleration spectral coefficients (in units of gravity acceleration 'g') for design of equipment and structures where inelastic action is not relevant or not permitted : 0.09 Note: g = Acceleration due to gravity The horizontal seismic acceleration spectral coefficients are furnished in subsequent pages.			
SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION-VI, PART-B	SUB-SECTION-D-1-12(E) CIVIL WORKS SEISMIC DESIGN CRITERIA	PAGE 3 OF 8	

CLAUSE NO.

TECHNICAL REQUIREMENTS



APPENDIX – I

HORIZONTAL SEISMIC ACCELERATION SPECTRAL COEFFICIENTS
(In units of 'g')

Time Period (Sec)	Damping Factor (as a percentage of critical damping)		
	2%	3%	5%
0.000	1.000	1.000	1.000
0.030	1.000	1.000	1.000
0.040	1.368	1.289	1.226
0.050	1.743	1.570	1.435
0.060	2.126	1.844	1.632
0.070	2.514	2.113	1.820
0.080	2.907	2.378	2.001
0.090	3.305	2.638	2.174
0.100	3.706	2.895	2.342
0.110	4.111	3.150	2.506
0.108	4.030	3.099	2.473
0.110	4.111	3.150	2.506
0.115	4.315	3.276	2.586
0.120	4.520	3.401	2.665
0.125	4.520	3.526	2.743
0.130	4.520	3.650	2.820
0.135	4.520	3.650	2.820
0.140	4.520	3.650	2.820
0.145	4.520	3.650	2.820
0.150	4.520	3.650	2.820
0.200	4.520	3.650	2.820
0.250	4.520	3.650	2.820
0.300	4.520	3.650	2.820
0.350	4.520	3.650	2.820
0.370	4.397	3.650	2.820
0.410	3.968	3.383	2.820
0.430	3.784	3.226	2.753
0.450	3.616	3.082	2.631
0.520	3.129	2.667	2.277
0.555	2.932	2.499	2.133
0.560	2.905	2.477	2.114

SINGRAULI SUPER THERMAL POWER
PROJECT STAGE-III (2X800 MW)
EPC PACKAGE

TECHNICAL SPECIFICATIONS
SECTION-VI, PART-B

SUB-SECTION-D-1-12(E)
CIVIL WORKS
SEISMIC DESIGN
CRITERIA

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CLAUSE NO.

TECHNICAL REQUIREMENTS



APPENDIX – I

HORIZONTAL SEISMIC ACCELERATION SPECTRAL COEFFICIENTS
(In units of 'g')

Time Period (Sec)	Damping Factor (as a percentage of critical damping)		
	2%	3%	5%
0.565	2.880	2.455	2.096
0.570	2.854	2.433	2.077
0.575	2.830	2.412	2.059
0.580	2.805	2.391	2.041
0.585	2.781	2.371	2.024
0.590	2.758	2.351	2.007
0.595	2.734	2.331	1.990
0.600	2.712	2.312	1.973
0.650	2.503	2.134	1.822
0.700	2.324	1.981	1.691
0.750	2.169	1.849	1.579
0.800	2.034	1.734	1.480
0.850	1.914	1.632	1.393
0.900	1.808	1.541	1.316
0.950	1.713	1.460	1.246
1.000	1.627	1.387	1.184
1.050	1.550	1.321	1.128
1.100	1.479	1.261	1.076
1.150	1.415	1.206	1.030
1.200	1.356	1.156	0.987
1.250	1.302	1.110	0.947
1.300	1.252	1.067	0.911
1.350	1.205	1.027	0.877
1.400	1.162	0.991	0.846
1.450	1.122	0.957	0.817
1.500	1.085	0.925	0.789
1.550	1.050	0.895	0.764
1.600	1.017	0.867	0.740
1.650	0.986	0.841	0.718
1.700	0.957	0.816	0.696
1.750	0.930	0.793	0.677
1.800	0.904	0.771	0.658
1.850	0.879	0.750	0.640

SINGRAULI SUPER THERMAL POWER
PROJECT STAGE-III (2X800 MW)
EPC PACKAGE

TECHNICAL SPECIFICATIONS
SECTION-VI, PART-B

SUB-SECTION-D-1-12(E)
CIVIL WORKS
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CLAUSE NO.

TECHNICAL REQUIREMENTS



APPENDIX – I

HORIZONTAL SEISMIC ACCELERATION SPECTRAL COEFFICIENTS
(In units of 'g')

Time Period (Sec)	Damping Factor (as a percentage of critical damping)		
	2%	3%	5%
1.900	0.856	0.730	0.623
1.950	0.834	0.711	0.607
2.000	0.814	0.694	0.592
2.050	0.794	0.677	0.578
2.100	0.775	0.660	0.564
2.150	0.757	0.645	0.551
2.200	0.740	0.630	0.538
2.250	0.723	0.616	0.526
2.300	0.707	0.603	0.515
2.350	0.692	0.590	0.504
2.400	0.678	0.578	0.493
2.450	0.664	0.566	0.483
2.500	0.651	0.555	0.474
2.550	0.638	0.544	0.464
2.600	0.626	0.533	0.455
2.650	0.614	0.523	0.447
2.700	0.603	0.514	0.439
2.750	0.592	0.504	0.431
2.800	0.581	0.495	0.423
2.850	0.571	0.487	0.415
2.900	0.561	0.478	0.408
2.950	0.552	0.470	0.401
3.000	0.542	0.462	0.395
3.050	0.533	0.455	0.388
3.100	0.525	0.447	0.382
3.150	0.517	0.440	0.376
3.200	0.508	0.433	0.370
3.250	0.501	0.427	0.364
3.300	0.493	0.420	0.359
3.350	0.486	0.414	0.353
3.400	0.479	0.408	0.348
3.450	0.465	0.402	0.343
3.500	0.452	0.396	0.338

SINGRAULI SUPER THERMAL POWER
PROJECT STAGE-III (2X800 MW)
EPC PACKAGE

TECHNICAL SPECIFICATIONS
SECTION-VI, PART-B

SUB-SECTION-D-1-12(E)
CIVIL WORKS
SEISMIC DESIGN
CRITERIA

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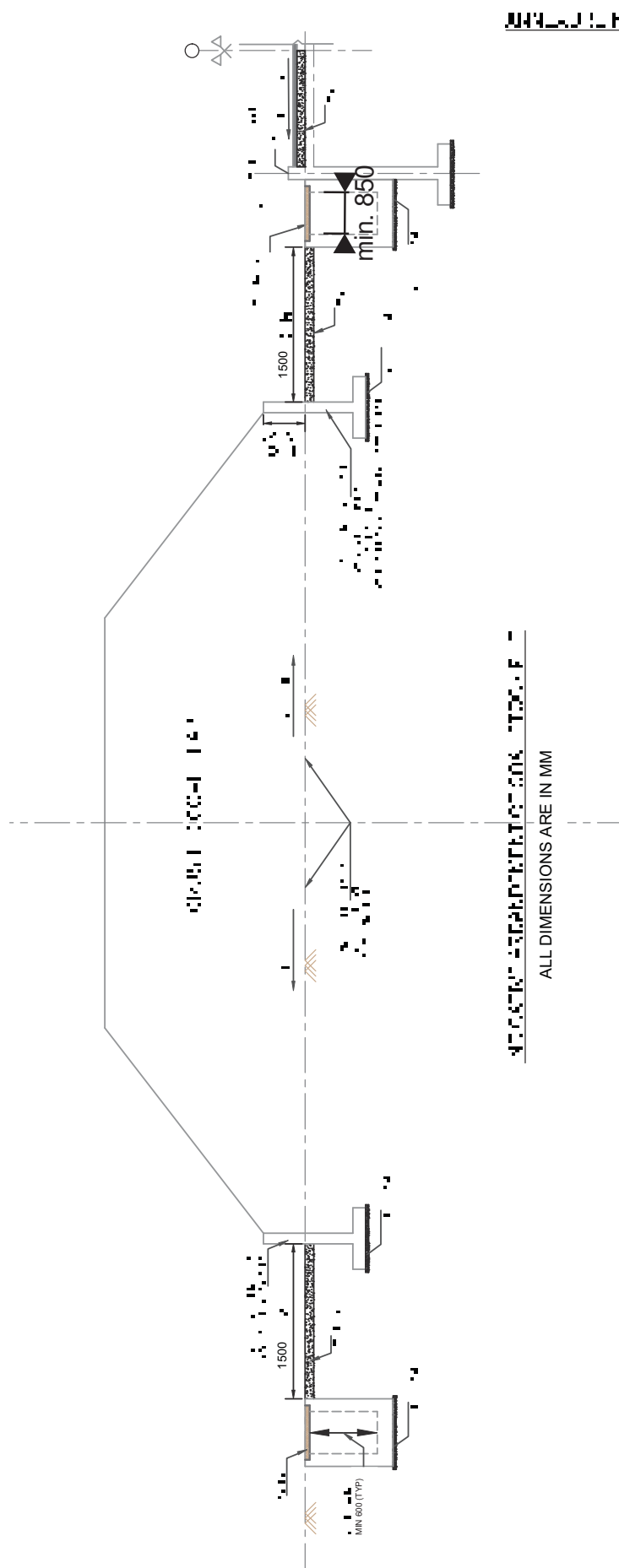
CLAUSE NO.	TECHNICAL REQUIREMENTS	एनटीपीसी NTPC		
SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION-VI, PART-B	SUB-SECTION-D-1-12(E) CIVIL WORKS SEISMIC DESIGN CRITERIA	PAGE 7 OF 8	

CLAUSE NO.	TECHNICAL REQUIREMENTS	एनटीपीसी NTPC		
D-1-12(F)	Annexure-(F) QA REQUIREMENT All Civil, Structural and Architectural construction work at the project shall be executed strictly in accordance with the Quality Assurance guidelines specified in separate part of the Specification.			
SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION-VI, PART-B	SUB-SECTION-D-1-12(F) CIVIL WORKS QA REQUIREMENT	PAGE 1 OF 1	

CLAUSE NO.	TECHNICAL REQUIREMENT														
D-1-12(G)	एनडीपीसी NTPC Specification For High Performance Moisture Compatible Corrosion Resistant Coating System a) Providing & applying High Performance Moisture Compatible Corrosion Resistant Coating System manufactured as per technical specifications of Central Electrochemical Research Institute, Karaikudi, (C.S.I.R. affiliate Institute), Tamil Nadu, Pin - 630 006. b) The coating system shall be water compatible, compatible for applying in wet conditions also and shall be tolerant to under-prepared surfaces and existing residual tar / paint. The system shall also be quick curing so as to be suitable for application during shut downs. The coating material shall be stored in the manner as per recommendations of the manufacturer until ready for use. The coating material shall be used within the manufacturer's written recommended shelf life. c) The coating system shall conform to the following : PROPERTIES OF PAINT <table data-bbox="500 1060 1408 1633"> <tr> <td>Base</td><td>High Performance Moisture Compatible Corrosion Resistant Coating System CECRI know-how system</td></tr> <tr> <td>Volume Solids</td><td>70%</td></tr> <tr> <td>Specific Gravity (ASTM-D-1475)</td><td>1.25 ± 0.1</td></tr> <tr> <td>Dry Film Thickness (ASTM-D-1186)</td><td>160 ± 10 µm per coat</td></tr> <tr> <td>Coverage</td><td>4 - 4.5 sq.m/ ltr</td></tr> <tr> <td>Touch Dry</td><td>2 Hours</td></tr> <tr> <td>Recoating</td><td>24 Hours</td></tr> </table>	Base	High Performance Moisture Compatible Corrosion Resistant Coating System CECRI know-how system	Volume Solids	70%	Specific Gravity (ASTM-D-1475)	1.25 ± 0.1	Dry Film Thickness (ASTM-D-1186)	160 ± 10 µm per coat	Coverage	4 - 4.5 sq.m/ ltr	Touch Dry	2 Hours	Recoating	24 Hours
Base	High Performance Moisture Compatible Corrosion Resistant Coating System CECRI know-how system														
Volume Solids	70%														
Specific Gravity (ASTM-D-1475)	1.25 ± 0.1														
Dry Film Thickness (ASTM-D-1186)	160 ± 10 µm per coat														
Coverage	4 - 4.5 sq.m/ ltr														
Touch Dry	2 Hours														
Recoating	24 Hours														
SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III(2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION-VI, PART B SUB SECTION D-1-12(G) High Performance Moisture Compatible Corrosion Resistant Coating System Page 1 of 2														

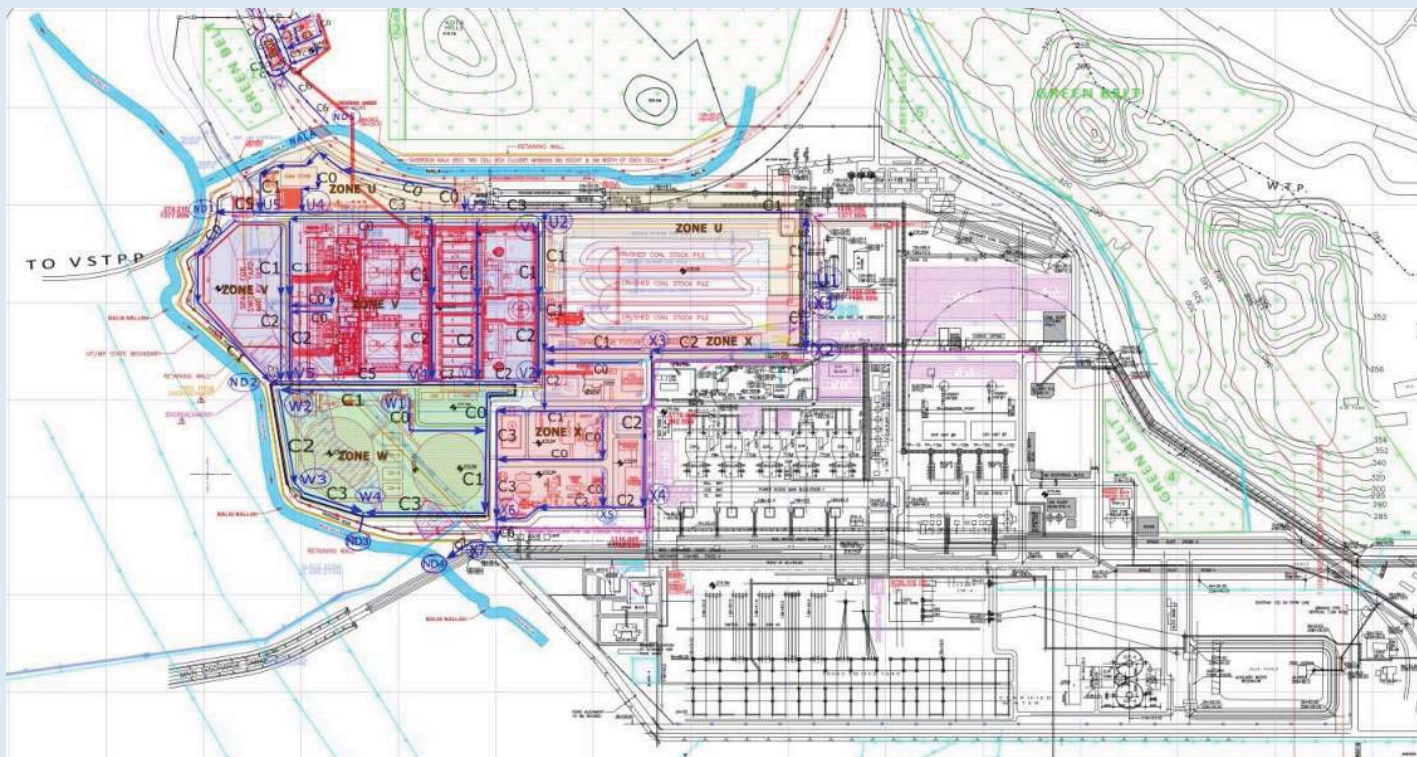
CLAUSE NO.	TECHNICAL REQUIREMENT				
	PROPERTIES OF COATING				
	Salt Spray (ASTM-B 117)		2000 Hours		
	Resistance to sea water (Carried out upto 6 months)		Passes		
	Coating Resistance (Carried out upto 6 months)		10 ⁹ Ω. cm ²		
	Adhesion (ASTM-D 4541)		4.5 N/mm Sq		
	Flexibility (ASTM-D-522)		1/8" passes		
	Elongation		33%		
	Impact (ASTM G 14–04)		45 cm passes		
	d) Paint material & its application method shall be obtained from any manufacturer who has been granted License by CECRI, Karaikudi for technical know how for High Performance Moisture Compatible Corrosion Resistant Coating System . The application method of coating shall be got duly approved from CECRI, Karaikudi.				
	SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III(2X800 MW) EPC PACKAGE			TECHNICAL SPECIFICATIONS SECTION-VI, PART B	SUB SECTION D-1-12(G) High Performance Moisture Compatible Corrosion Resistant Coating System

ANNEXURE H



AREA DRAINAGE STUDY FOR SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW)

Sponsor: SINGRAULI SUPER THERMAL POWER PLANT, NTPC LTD.



Submitted by

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Dr. U.C. Chaube, Ex Emeritus Fellow, IIT Roorkee (Consultant)



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**AREA DRAINAGE STUDY FOR SINGRAULI SUPER
THERMAL POWER PROJECT STAGE-III (2X800 MW)**

Final Report

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Submitted to

Sponsor: Singrauli Super Thermal Power Plant, Ntpc Ltd.

Submitted by

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EXECUTIVE SUMMARY

BACKGROUND OF STUDY:

NTPC is operating Singrauli STPP, a coal-based power plant of 2000 MW capacity (Stage-I: 5×200 MW and Stage-II: 2×500 MW) at Shakti Nagar, Sonebhadra district of Uttar Pradesh state. It is located on the northern bank of Rihand reservoir and close to the state boundary of Madhya Pradesh.

Now NTPC is developing Stage-III (2×800 MW) as an extended project (Brownfield) of Singrauli STPP. The proposed units under Stage III are to be established within the land already acquired during Stage-I&II of the project. In order to provide drainage in the stage III plant area, M/s NTPC Limited has issued a letter of Award dated 26.04.2023 to the Indian Institute of Technology Roorkee (IIT Roorkee) to carry out Area Drainage Study.

The site visit was conducted from 24th to 28 May 2023. The IIT Roorkee team along with the NTPC Engineers visited the existing drain network of Stage I and Stage II plants, outfalls of the existing drains, diversion nala, Balia nala, the site for the proposed Stage III plant, and other relevant features. Information regarding drains was collected and discussions were held with NTPC project Engineers. Visual observations are presented through photographs with explanatory note(Annexure-I). Excellent cooperation was received from NTPC.

IIT Roorkee has been earlier involved in water-related studies of Singrauli STPP and other thermal power plants in the region. Relevant data from NTPC documents and earlier study reports of IIT Roorkee were compiled.

STUDY AREA CHARACTERISTICS:

The total area of stage III project including the green belt is 120.6 hectares (298 acre) out of which the stage III plant area is 80.13 ha (198 acre) and the green belt area (existing and additional) is 40.47 ha (100 acre). The Stage III is in the pre-construction phase. Existing buildings in stage III area are being dismantled and the land is being developed for putting up the infrastructure facilities required for the stage III project.

Topography and natural drainage in the vicinity area were analysed. Singrauli STPS is located in hilly terrain with the RL of plant area varying between 268 to 285 m above mean sea level. The plant area is surrounded by hills of 360 m on the northern side while Govind Ballabh Pant Sagar exists in the south-eastern side. The natural drainage in the vicinity area can be divided into three distinct units, northern and southern drainage basins separated by a crescent shape ridge from east to west in an accurate manner and a large water body within the study area (part of Rihand reservoir).Balia nala and Motwani Nala are the two main nalas

of Southern side drainage region. The Singrauli SSTPS lies in the catchment of Balia nala and therefore characteristics of this nala are important for this study. Balia nala defines the border of Uttar Pradesh and Madhya Pradesh in the vicinity of Singrauli SSTPS. Balia nala carries storm runoff from the plant area and the township. **The carrying capacity of existing drains, outfalls, and the Balia nala should be maintained by repairing and removing weed, debris, by desilting the drains, and by bank stabilization of nala bank, and giving aesthetic look.**

The natural drains follow a specific path as per the elevations and terrain of the land. In an earlier study by IIT Roorkee (Ref IIT Roorkee report 2019).), contour maps have been analysed for the preparation of a drainage density map. The drainage density of the region in year 2014 was 0.52/km (up to order 3) while in the year 2017, it reduced to 0.06/km, which indicates that **the conversion or burial of drains has taken place due to industrialization and urbanization. It also indicates that the water-carrying capacity of natural drains is reduced.**

- i. The proposed project area experiences a semi-arid climate characterized by hot summer, pleasant cold winter, and general dryness throughout the years, except during monsoon season. High temperature (around 44.8 °C) occurs during the month of April and lowest temperature(around 8°C) occurs during the month of January(ref: Final EIA Report (September 2019) of Singrauli STPP Stage III (2x800MW) by Vimta Labs, Hyderabad)

DEM STUDY:

Digital Elevation Model (DEM) of the study area has been carried out. It is the digital representation (digital map) of the ground elevation data in meters. ArcGIS software has been used for the preparation of the DEM. Contour map of the study area was provided by the NTPC Ltd. Singrauli. The Study area was divided into eight parts, and DEM maps were prepared separately for each part. The Eight parts are, Green belt-1, Green belt-2, Green belt-3, Green belt-4, Green belt-5, Hill Green Belt, Southern Green Belt, and vicinity of Plant boundary. Referring to maps of DEM study in Chapter 3, range of elevations in different parts are:

Area	Range of elevations	Reference figure
Green belt-1	273.5 m to 282 m	Figure 3.2
Green belt-2	278.4 m to 386.5 m	Figure 3.3

Green belt-3	278 m to 309.5 m	Figure 3.4
Green belt-4	276.5 m to 294.8 m	Figure 3.5
Green belt-5	288.9 m to 372.2	Figure 3.6
Hill Green Belt	280.5 m to 380.5 m	Figure 3.7
Southern Green Belt	265.2 m to 276 m	Figure 3.7
Stage III plant area	272.9 m and 292.4 m	Pl see note below
	Finished Grade Level(FGL) (276 m and 275.5m)	

Note: Referring to Figures 3.1a and 3.1 b, it is important to note that the topography within the boundary of the stage III plant is as per the contour map obtained from NTPC Ltd. The land within the boundary of the stage III plant has already been leveled and FGLs are 276m and 275.5 m.

DESIGN STORM SCENARIOS

In the present study, design storms of various return periods has been analysed for (i) planning of drainage in the stage III plant area and for (ii) hydrologic study of realigned diversion nala (Jogia and Jwalamukhi nala) catchment.

Based on daily rainfall data at Shaktinagar (Dudhi station), Sonebhadra district(U.P.) from 1990 to 2022 (33 years), 1-Day annual maximum rainfall series was constructed and EV Type I probability distribution was applied to obtain 1 day rainfall of 25, 50 and 100 year return period. These were converted to 24-hour values. In addition, Isopluvial maps given in the Flood Estimation Report of Central Water Commission(CWC 1987) were referred to obtain 24-hour rainfall of 25, 50, and 100-year return period. It is recommended that the 24-hour storm rainfall values obtained from frequency analysis of 33 years of rainfall data at Shaktinagar be used in the further analysis as the station is close to the study area and data of recent period (1990 to 2022) and of sufficient length (33 years) have been used in the frequency analysis. Rainfall intensity and time distribution of storm rainfall were estimated.

As per NTPC norms storm rainfall of 50 year return period shall be used for estimation of flood of 50-year return period. Details are given in the next chapter.

FLOOD ESTIMATION, AND CAPACITY OF REALIGNED DIVERSION NALA

In the present study, flood of various return period shave been estimated for a) checking the discharge capacity of realigned diversion nala and b) for working out specific discharge(litres per second per hectare) for sizing of internal drains in the Stage III plant area . A flood

of 100 year return period has been adopted for checking the discharge capacity of realigned diversion nala and specific discharge(litres per second per hectare) for sizing of internal drains in the Stage III plant area is based on 50 year flood .

The catchment area at upstream point of diversion nala consists of the upper hilly region of Jogia nala. In the absence of observed flood discharge data, physiographic parameters of the Jogia nala catchment have been estimated using DEM analysis.

Following three methods have been adopted for flood estimation:

Method I: Rational Method for Small Catchments as recommended in *Report No RBF-16 'Flood Estimation Methods for Catchments Less Than 25 km² in Area' prepared by Research, Design & Standards Organization(RDSO) of Indian Railway, Government of India*

Method-II: Regional Flood Frequency Model as recommended in Manual on Estimation of Design Flood of CWC(2001)

Method III-Synthetic Unit Hydrograph approach given in Flood Estimation Report for Sone Subzone (1d) of Central Water Commission (CWC1987)

Flood Estimates using the Rational Formula and Regional Flood Frequency model are of similar magnitude where as SUH model provides significantly higher estimate It is recommended to use flood estimate using Rational Formula as catchment size is very small for which rational formula is more appropriate.

Discharge Capacity of Realigned Diversion nala consists of two cell box of RCC each having dimension of 8 m height and 5 m width. The 8m height is proposed to match the top level of existing nala. Depth of flow is assumed to be 2m in the cell box. Discharge capacity of realigned nala (two RCC cell boxes)has been estimated using the slope area method. The Discharge capacity of two cell boxes (29.2 m³/second) is significantly higher than the 100 year discharge of nala catchment(13.4 m³/second).

Specific discharge(litres per second per hectare) for sizing of internal drains in the Stage III plant area may be based on 50 year flood. The 50 year flood in Jogia nala has been estimated (using Rational formula) is 11.69 m³per second for catchment area of 0.48km².This is equivalent to 24.354 m³per second per km² or 0.2435 m³per second per hectare. **The specific discharge of 0.2435 m³per second per hectare may be adopted for sizing of internal drains in the plant area.**

DRAINAGE PLAN FOR STAGE III PLANT

The drainage plan consists of

- a) Zoning of the facilities and land area of stage III to carry runoff to outfalls on Balia nala considering the existing drainage.
- b) Relocation/dismantling of some of the existing out falls on Balia nala taking into consideration the drainage plan for stage III
- c) Layout of the internal drains for proposed stage III plant area taking into consideration the existing drains inside the stage I & II plant area.
- d) Checking the flood discharge capacity of realigned diversion nala(two cell boxes) on north side of Track Hopper of stage III plant .
- e) Sizing of the internal drains in stage III plant area

The stage III plant components have been located at 276 m and 275.5m ground formation levels by NTPC to economize the cost of earth work. Due consideration has been given to the existing slope of land towards Balia nala in deciding the layout of internal drainage.

At present, the storm runoff from entire stage I and stage II plant area is carried to eight out falls through trunk drains. Outfalls D1to D4 are located on Balia nala . After the outfall D4, the Balia nala merges into Rihand reservoir. Storm runoff from Outfalls D5 to D8 flows into Rihand reservoir.

Partitioning of area and provision of separate outfalls for different zones helps in reducing size of drains and hence cost of land. The stage III plant area is partitioned into the five drainage zones each having its own outfall (ND1, ND2, ND3, ND4,ND5).

The layout and capacity of the drains serving the township area and some of the stage I and stage III components (D5 to D8)shall remain as such without any change. However, there is an urgent need to improve maintenance(particularly removal of weeds and garbage) of these drains and the related outfalls.

Design of Channel Sections: Internal drains in various zones are designed considering specific discharge of 0.24354 cumec/ha(corresponding to 50 year return period). Rectangular lined channel section is proposed. A resistance formula proposed by Robert Manning for uniform flow has ben used to work out required bed width and depth of flow in various channel segments.

In order to economize the cost and area occupied by drains, a suitable number of channel segments have been considered. A unit length of approximately 200 m has been considered

for a channel segment and its own contributing catchment is taken to be about 4 hectare (200m× 200m). Thus first channel segment of approximate 200 m length (named C1) receives runoff from 4 hectare area and subsequent channels C2,C3 and so on receive total runoff from 8 ha,12 ha etc.

Invert level of channels lying on longest flow path have been estimated to lay the main drain on desired slope and to adjust layout of the lateral channels at junctions. Invert level of the end channels connecting to outfalls (ND1,ND2,ND3,ND4)on Balia nala have been kept below road level and above HFL in the nala. Plant layout map shows that elevation of the roads is at or above 275.5m. Invert level of the end channel(in zone Y) connecting to outfall ND5 on north side diversion nala is sufficiently higher than bed level of the diversion nala .

The bed level of Balia nala all along the boundary of the plant area is significantly lower than FGL of the stage III plant area. Even when there is large back water effect in Balia nala due to FRL/MWL in the Rihand reservoir, the outfalls would continue to function under free flow condition.

The original MDDL, FRL and MWL in Rihand reservoir were 236.22m(775ft), 268.224(880ft) and 271.52m(890.8ft). Considering safety of Rihand dam, these have been revised. Revised FRL is 265.18m (IIT Roorkee (2019): Carrying Capacity of Singrauli Region Considering Physical, Ecological, and Social Environment in the Context of Proposed Singrauli Thermal Power Plant; sponsored by NTPC).

Vertical falls in channels have been provided at suitable locations(one in V zone,one in W zone and two in X zone) so that FSL in the drain is below FGL and free board is available. Crest weir type of vertical fall are proposed considering high discharge.

Lateral channels at junction point with the main drain (on longest path) have invert level of end node equal to or higher than the invert level of end node of the channel segment on main drain.

Outfalls: At out falls ND1,ND2,ND3 ,ND4 and ND5, there is a drop to the receiving nala(Balia nala for ND1,ND2,ND3 ,ND4 and diversion nala for ND5). These drops shall be negotiated with stepped fall along with energy dissipation blocks. The design of fall should be based on a recent topographic survey of the Balia nala, diversion nala and vicinity.

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

NTPC is operating Singrauli Super Thermal Power Project (SSTPP), a coal-based power plant of 2000 MW capacity at Shakti Nagar, in Sonebhadra district of Uttar Pradesh state. It consists of Stage-I (5×200 MW) & Stage-II (2×500 MW). The last unit of Stage-I was commissioned in June 1984, i.e. about 32 years back, and hence its units have already completed their design life. NTPC has proposed to put up new units with super-critical technology which would be commissioned before Stage-I units are phased out. NTPC is developing Stage III (2×800 MW) project as an extended project (Brownfield) of Singrauli STPP. It is a base load project.

Thus, the present status of all three Stages is as follows:

Stage-I: 5×200 MW under commercial operation (shall be decommissioned after commissioning of the Stage III project)

Stage-II: 2×500 MW under commercial operation

Stage-III: 2×800 MW present proposal(land is under development)

The total capacity of SSTPP after expansion will be 3600 MW.

Stormwater drainage networks in stage I and stage II plant area are in the operation stage. Planning of drainage in the stage III project should take into consideration the existing drainage in the stage I and stage II area, and the project should not adversely affect the drainage of the adjoining areas.

In order to provide drainage in the stage III area, M/s NTPC Limited has issued a Purchase Order(vide P.O. number 5500042451-002-1035 dated 26.04.2023) to the Indian Institute of Technology Roorkee to carry out Area Drainage Study of Stage-III (2×800 MW) of the Singrauli Super Thermal Power Project in the state of Uttar Pradesh.

1.2 LOCATION AND ENVIRONMENTAL SETTING OF THE PROJECT

Singrauli STPP is located on the northern bank of Rihand reservoir near Shakti Nagar in the district Sonebhadra of Uttar Pradesh. It is close to the state boundary of Madhya Pradesh. Nearby Railway stations are Shaktinagar and Renukoot located at about 3 km and 60 km, respectively. Mirzapur station is approximately 200 km away from the project site. The

project is approachable from Renukoot-Singrauli road through an approach road, and also via Waidhan in Madhya Pradesh (about 8 km from Waidhan). The nearest airport is Varanasi located at a distance of approximately 260 km from the project site.

The proposed units under Stage III are to be established within the land already acquired during Stage-I&II of the project. The water requirement of the proposed Stage III will be met from the discharge channel of Stage-II. The basic environmental setting of the proposed site is given in Table 1.1. Figure 1.1 shows the national, state, and district-level reference to the location of Singrauli STPP. Figure 1.2 is the vicinity map of the Singrauli STPP (Stages-I, II&III) and other thermal power plants around the Rihand reservoir.

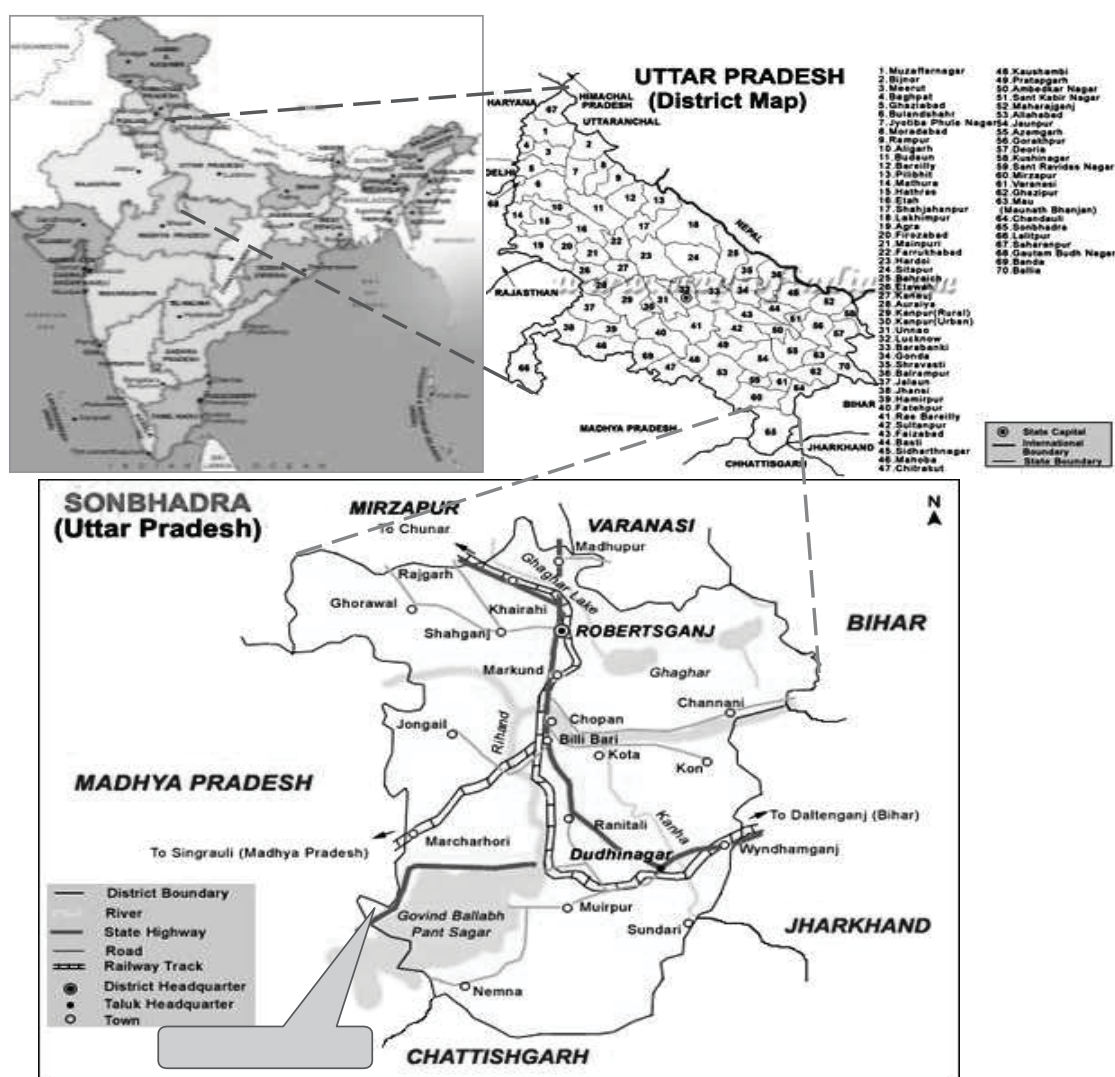


Figure 1.1 National, state, and district level reference to the location of Singrauli STPP

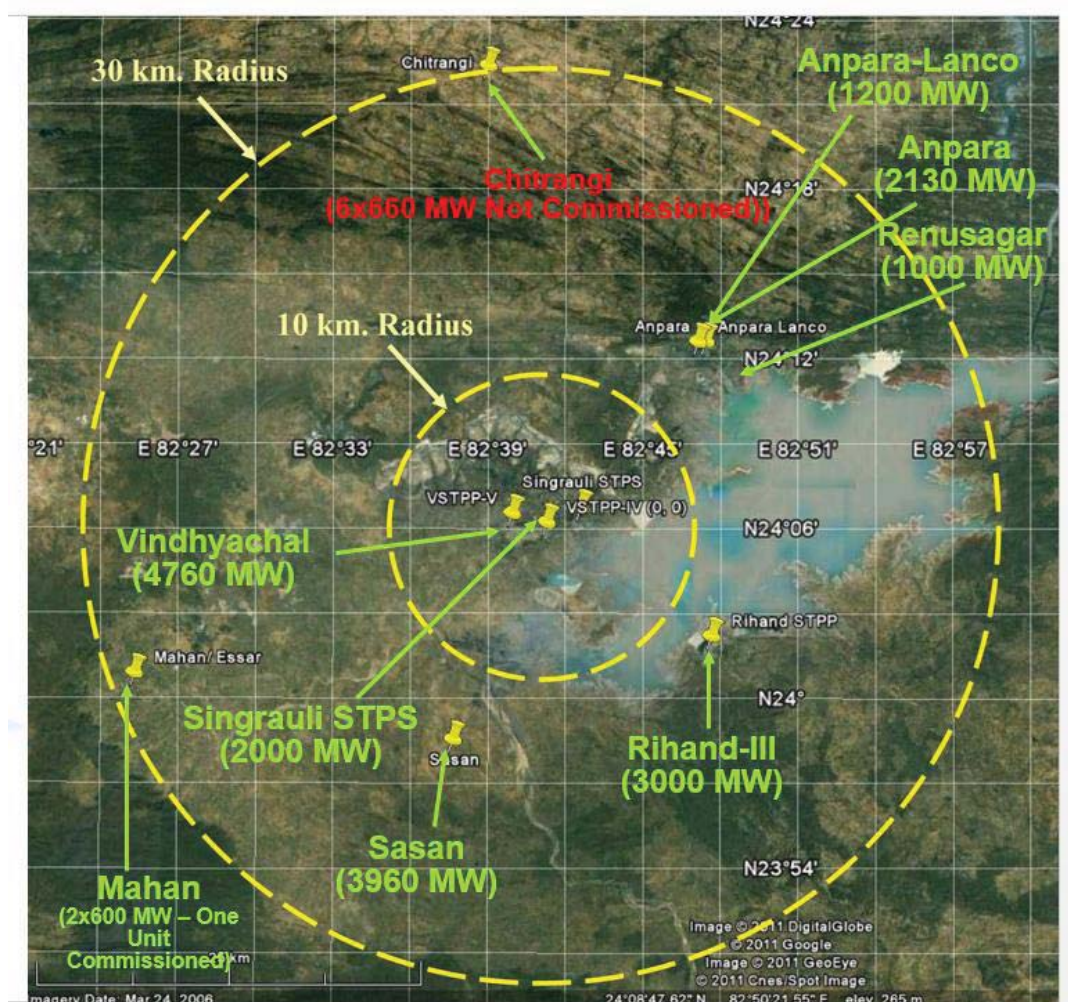


Figure 1.2 Vicinity map of the Singrauli STPP (Stages-I, II&III) and other Thermal Power Plants

Table 1.1: Environmental Setting of the Proposed Plant Site

Sl. No.	Particulars	Details
1	Plant location	Town: ShaktiNagar; Tehsil: Dudhi; District: Sonebhadra; State: Uttar Pradesh
2	Toposheet No.	63 L/12, L/16
3	Climatic conditions at IMD station, Sidhi	
a)	Max/Min temperature	44.8°C; 8°C
b)	Annual rainfall (total)	1234.6 mm
c)	The predominant annual wind direction	West
4	Stage III Plant site elevation above MSL	275.5m and 276 m
5	Plant site topography	Plain with hillocks
6	Present land use at site	Industrial use
7	Nearest highway	NH-75

8	Nearest railway station	Shaktinagar (3 km)
9	Nearest Airport	Varanasi(260 km,North)
10	Nearest town/City	Waidhan(8 km, West)
	Nearest village	Kota(0.1 km)
11	Nearest major water body	GovindBallabh Pant Sagar (1.5 km)
12	Water source for the project	GovindBallabh Pant Sagar (1.5 km)
13	Protected area	Nil, No protected areas as per Wildlife Protection Act, 1972 within 15 km radius of study area
14	Reserved/Protected forests	Dudhichua PF(3.5 km), Mehrauli PF (4.6 km)
15	List of thermal power plants in vicinity	Thermal power plants within 10 km radius: Vindhyachal (4760 MW), Singrauli(2000 MW)
16	Coalmines in vicinity	Bina(5kmNE), Kakri(7.6kmNE), Khadia(2.0kmN), Budhichua(3.6kmNW), Nigahi(7.8kmNW)
17	Seismicity	Seismic Zone-II as per IS 1893 (Part I): 2002
18	Interstate boundary	Interstate boundary of Uttar Pradesh-Madhya Pradesh

Note: All distances mentioned are aerial distances.

1.3 SCOPE OF WORK

As per the Terms of Reference stated in the Purchase Order of NTPC(P.O. 5500042451-002-1035 dated 26.04.2023), the scope of the present study is as given below:

1. Study of existing natural drainage pattern/system, available information in the form of reports, literature, satellite imageries, etc having a bearing on the stormwater drainage system of the Plant and its adjoining areas. The study shall include a review of topographical features of the proposed site and its surrounding area.
2. Review and analysis of rainfall information to arrive at design storm scenarios.
3. Review and analysis of relevant Survey of India Topographical Sheets, topographic survey, and satellite imageries.
4. Estimation of flood hydrographs considering historical as well as design rainfall to suggest a complete scheme for stormwater drainage of the site and its adjoining area including diversion of nallas/streams, if any.
5. Estimation and routing of design flood hydrograph through the drainage system of concerned catchments considering appropriate boundary conditions including pre-construction scenario as well as a post-construction scenario for suggesting remedial measures for the site.
6. Suggesting the final disposal point for the stormwater from the site and the size of the disposal drain.
7. Assessment of external catchment areas towards the plant boundary and its discharge of surface run-off from this area for sizing of the drains.

8. Working out any additional measures for the protection of the plant against flooding.
9. Site visit for an acquaintance of prevailing conditions and collection of available data at the site.
10. Visit to NTPC Corporate Engineering Office/site office of NTPC for discussions regarding the studies.

1.4 SITE VISIT

The site visit was conducted from 24th to 28 May 2023. The IIT Roorkee team along with the NTPC Engineers visited the existing drain network of Stage I and Stage plants, outfalls of the existing drains, diversion nala, Balia nala, the proposed site for the Stage III plant, and other relevant features. Information regarding drains was collected and discussions were held with NTPC project Engineers. Reconnaissance survey of the existing drains was carried out. Visual observations are depicted in the photo graphs accompanied with a brief note(Annexure-I) . Approx longitude, latitude and altitude, date and time of the visual observation are indicated in the photographs. Excellent cooperation was received from NTPC.

1.5 COMPILATION OF DATA AND LITERATURE

1.5.1 IIT Roorkee Reports

IIT Roorkee has been involved (in consultancy mode) in water-related studies of Singrauli STPP and other thermal power plants in the region.

- i. IIT Roorkee (2019): Hydrogeological Study for Singrauli STPP, Stage III (2×800 MW); sponsored by NTPC
- ii. IIT Roorkee (2019): Carrying Capacity of Singrauli Region Considering Physical, Ecological, and Social Environment in the Context of Proposed Singrauli Thermal Power Plant; sponsored by NTPC
- iii. IIT Roorkee (2011), “Restoration of MDDL of Rihand Reservoir to the designed level (775 ft), its Implication on the Existing Power Plants vis-à-vis Additional Water Availability,” CEA sponsored study.
- iv. IIT Roorkee (2006), “Hydrology and Impact of Ash Pond Leachate for Sasan Ultra Mega Power Project,” Department of WRD&M, IIT Roorkee, June 2006

1.5.2 NTPC Reports

- i. NTPC: Technical Diary of Singrauli STPP (15 pages).
- ii. Singrauli STPP Stage III (2x660MW), Feasibility Report, March 2017 Doc No: 1150-999-NOG-J-001 R.

- iii. Final EIA Report (September 2019) of Singrauli STPP Stage III (2x800MW) by Vimta Labs, Hyderabad,

CHAPTER 2

STUDY AREA CHARACTERISTICS

2.1 LAYOUT PLAN OF SINGRAULI SUPER THERMAL POWER PLANT

The integrated layout plan of the Singrauli STPP (Stage I, Stage II, township, ash pond, vicinity area) is shown in Figure 2.1. Stage III is proposed to be located on the west of Stage I. The main powerhouse (278.5 m long and 42.0 m wide) is expanding from east to west. The ash slurry ash water pump house is kept towards the east of the main plant. The layout plan of Stage I, II, and Stage III plants is shown in Figure 2.2.

The total area of Singrauli STPP is 4491 acres. Out of this land, about 298 acres (120.6 ha) will be required for Stage III as per details given below in Table 2.1.

Table 2.1 Area of Stage III plant and green belt

Sl. No.	Items	Area in acres	Area in hectares
1	Stage III Plant area	198	80.13
2	Required green belt area as per EC condition(40%)	79.2	32.05
3	Area already provided for green belt	65	26.31
4	Additional area for green belt proposed	35	14.16
5	Total green belt area including addl green belt	100	40.47
6	Total area of stage III project including green belt	298	120.6

Stage III is in the pre-construction phase. The land is being developed for putting up the infrastructure facilities required for Stage III project.

Singrauli STPS, Stage-I and II are operating with a once-through cooling system (OTC) with water drawn from Rihand reservoir. Stage III will have two air-cooled condensers (ACC). Water for the existing Singrauli Stage I and Stage II is presently being drawn from Rihand Reservoir in an open cycle CW system. Drawl of make-up water for STPP stage III is proposed to be from the hot water discharge channel of Stage II.

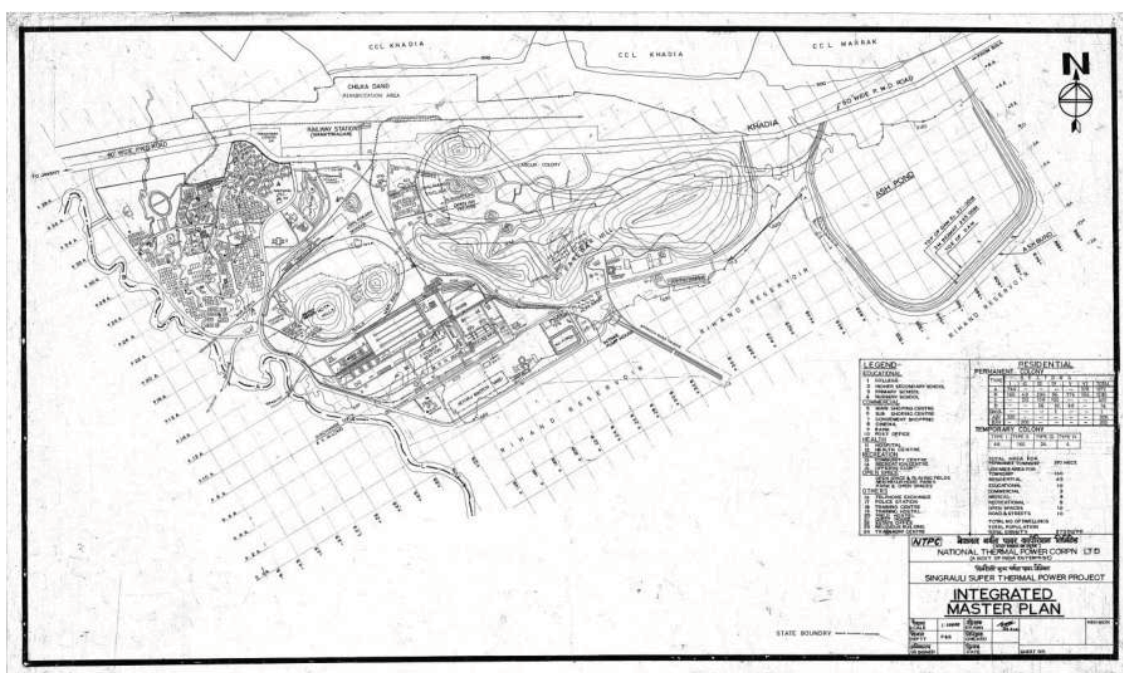


Figure 2.1 Integrated master plan of Singrauli STPP

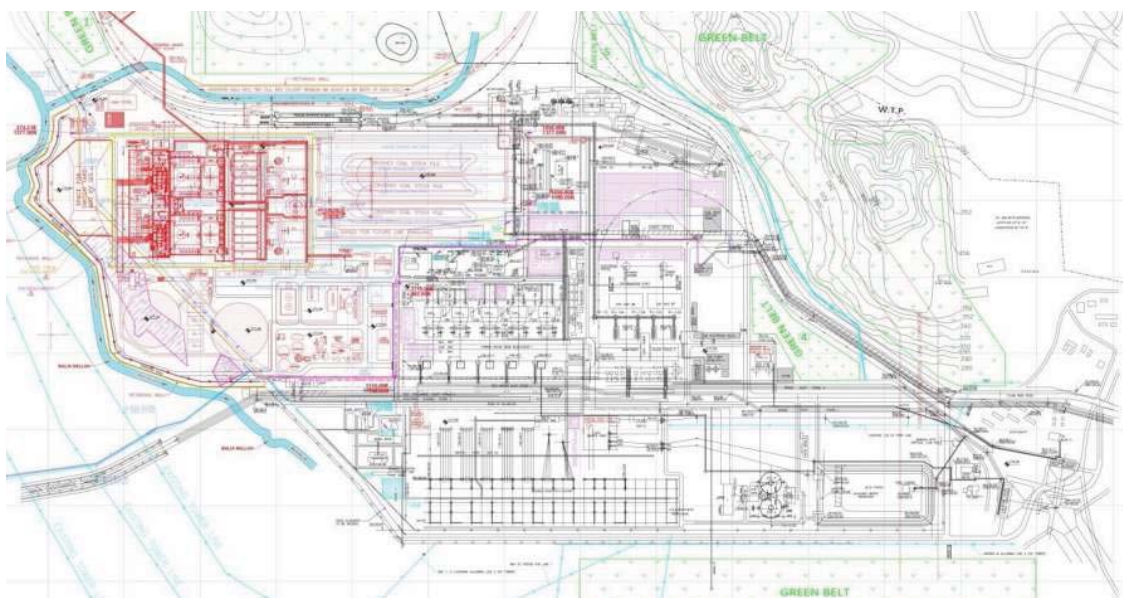


Figure 2.2 Layout plan of stage I,II (marked in black) and stage III(marked in red) of Singrauli STPP

2.2 TOPOGRAPHY AND NATURAL DRAINAGE IN THE VICINITY AREA

Topography: Singrauli STPS is located in a hilly terrain with the RL of plant area varying between 275m to 285 m above mean sea level. The plant area is surrounded by hills of 360 m in the northern side while Govind Ballabh Pant Sagar exists in the south-eastern side.

The township is located in the north-west direction at an elevation ranging from 280m to 300 m. Digital Elevation Model(DEM) study of the study area is given in chapter 3.

Natural Drainage: The vicinity area can be divided into three distinct units, northern and southern drainage basins separated by a crescent shape ridge from east to west in an accurate manner and a large water body within the study area (part of Rihand reservoir). Figure 2.3 shows natural drainage within a 10 km radius area of the Singrauli SSTPS.

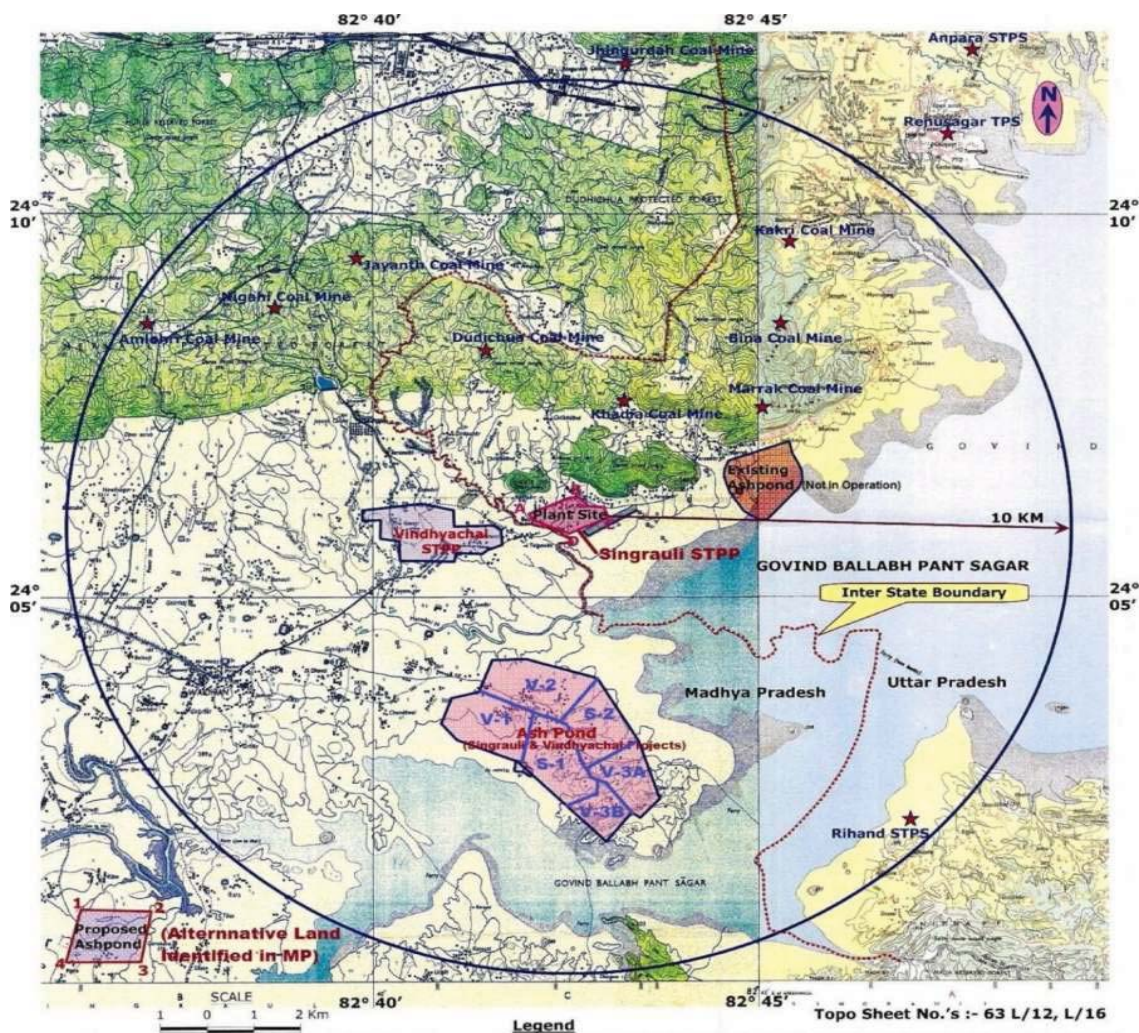


Figure 2.3: Natural Drainage within 10 Km radius Area

Northern Side Drainage in Vicinity

The northern drainage consists of several streamlets starting from the north side of the Dudhichua, Bina (Extn.), Nigahi, Amlohri. These ultimately join the Bijul nalla which ultimately joins the Sone river as one of its tributaries. The northern side natural drainage is not relevant to the present study

Southern Side Drainage in Vicinity

The southern and eastern drainage regions contain several streamlets which start at the southern escarpments of sandstone formations and form streams. All these nallas drain into Govind Ballabh Pant Sagar (Rihand Reservoir). The drainage of Khadia is controlled by Senduri and Hadwarianalla which are tributaries of Ballianalla. The runoff from the northern part of Bina (Extn.) and the southern part of Dudhichua flows into Ballianalla.

Balia nala defines the border of Uttar Pradesh and Madhya Pradesh in the vicinity of Singrauli SSTPS. Figure 2.4 shows a photographic view of Balia Nala near the Singrauli SSTPS

Balia Nala carries storm runoff from the plant area and the township. The carrying capacity of the Balia Nala should be maintained by removing weed growth, bank stabilization, and providing an aesthetic look.



Figure 2.4 Ballia Nalla defines the state border of M.P and U.P. (in front of NTPC Singrauli)



Figure 2.5 Ash slurry flowing into Balia nala due to leakage in the ash slurry pipe –view from road bridge on nala

Motwani Nala is also part of the southern side natural drainage in the vicinity but it is not relevant for the present study as the Singrauli SSTPS lies in the catchment of Balia Nala only.

Reduction in Drainage Density

The natural drains follow a specific path as per the elevations and terrain of the land. In an earlier study by IIT Roorkee(Ref IIT Roorkee report 2019).), contour maps have been analyzed for the preparation of the drainage density map. Drainage density is defined as

$$Stream\ Density = \frac{Stream\ Length}{Area}$$

The drainage density of the region in the year 2014 was 0.52/km (up to order 3) while in the year 2017, it reduced to 0.06/km, which indicates that **the conversion or burial of drains has taken place due to industrialization and urbanization. It also indicates that the water-carrying capacity of natural drains is reduced.**

2.3 LAND USE PATTERN IN THE VICINITY OF STAGE III PLANT

The main focus of the present study is on drainage study within the stage III plant area and vicinity. The land use within 0 km to 3 km and 3 km to 7 km of the plant is shown in Table 2.2. The most important land use between 0 km to 7 km is urban area, Rihand reservoir area, and area under non-agricultural use.

Table 2.2 Land use pattern in the vicinity of stage III plant(unit hectare)

Sl. No.	Particulars of land use	0-3 km	3-7 km
1	Urban area	2136.69	6264.39
2	Rihand reservoir area	481.26	3850.06
3	Unirrigated agricultural land	0	2065.18
4	Area under non-agricultural use	154.66	1562.92
5	Forest area	0	118.32
6	Irrigated agricultural land	2	20.16
7	Barren land	0	0
8	Pasture and other grazing land	0	0
9	Culturable wasteland	0	0
10	Fallow land	0	0
	Total geographical area within radius	2749.27	13881.03

2.4 METEOROLOGY

Data for meteorological factors like precipitation, temperature, and wind velocity have been taken from <https://www.worldweatheronline.com> online for two locations in the study area, i.e. Singrauli in Madhya Pradesh and Renukoot in Uttar Pradesh. The proposed project area experiences a semi-arid climate characterized by hot summer, pleasant cold winter, and general dryness throughout the years, except during monsoon season. High temperature (around 43.0 °C) occurs during the month of April and the lowest temperature (around 12°C) occurs during the month of January.

The annual rainfall at Singrauli (MP) is around 1170 mm. The total number of rainy days in a year is 128 in Singrauli. Wind velocity is higher during the pre-monsoon period than that during the post-monsoon period. The maximum wind velocity of 16.2 kmph was observed during the month of July-August, and a minimum of 8.3 kmph during the month of December. The relative humidity is generally low throughout the year, except during monsoon months when relative humidity is close to 76% in Singrauli. The summer months are generally the driest months of the year with relative humidity as low as 15% in Singrauli.

CHAPTER 3
DIGITAL ELEVATION MODEL STUDY

3.1 INTRODUCTION

The digital elevation model (DEM) is the digital representation (digital map) of the ground elevation data in meters. This digital map, a type of Digital Terrain Model (DTM), is raster data meaning that it is made up of equally sized grid cells, each with a unique elevation. The projection and datum for a DEM may vary. In the present study, Polyconic coordinates (meters) have been used to geo-referencing all maps. The following data have been used for the DEM study:

1. The contour map in AutoCAD was obtained from NTPC Singrauli Super Thermal Power at 1 m intervals.
2. Geographic referencing points: These have been extracted from the features common in the toposheet, and google earth.
3. Survey of India Toposheet (1: 50000 scale): Toposheet No. 63 L/12 of the year 1976.
4. Plant layout map showing the location of the Singrauli Super Thermal Power Station components.

3.2 PROCEDURE FOR DIGITAL ELEVATION MODEL (DEM)

ArcGIS software has been used for the preparation of the DEM from the contour map obtained from NTPC Ltd. The Green belt boundary, plant boundary, and stream layers were overlaid over the DEM data to create the final maps. The DEM of the study area with all layers has been shown in Figure 3.1a, and variation in elevation from 271 m to 420 m is depicted through different colors. The DEM of the study area is also shown in a monochromatic color scheme in Figure 3.1b. The Study area was divided into eight parts, and DEM maps were prepared separately for each part. The eight parts are Green belt-1, Green belt-2, Green belt-3, Green belt-4, Green belt-5, Hill Green Belt, Southern Green Belt, and the vicinity of the Plant boundary.

Referring to Figures 3.1a and 3.1 b, it is important to note that the topography within the boundary of the stage III plant is as per the contour map obtained from NTPC Ltd. The land within the boundary of the stage III plant has already been leveled and FGLs are 276m and 275.5 m.

The location of green belts is shown in Figure 2.2 of Chapter 2.

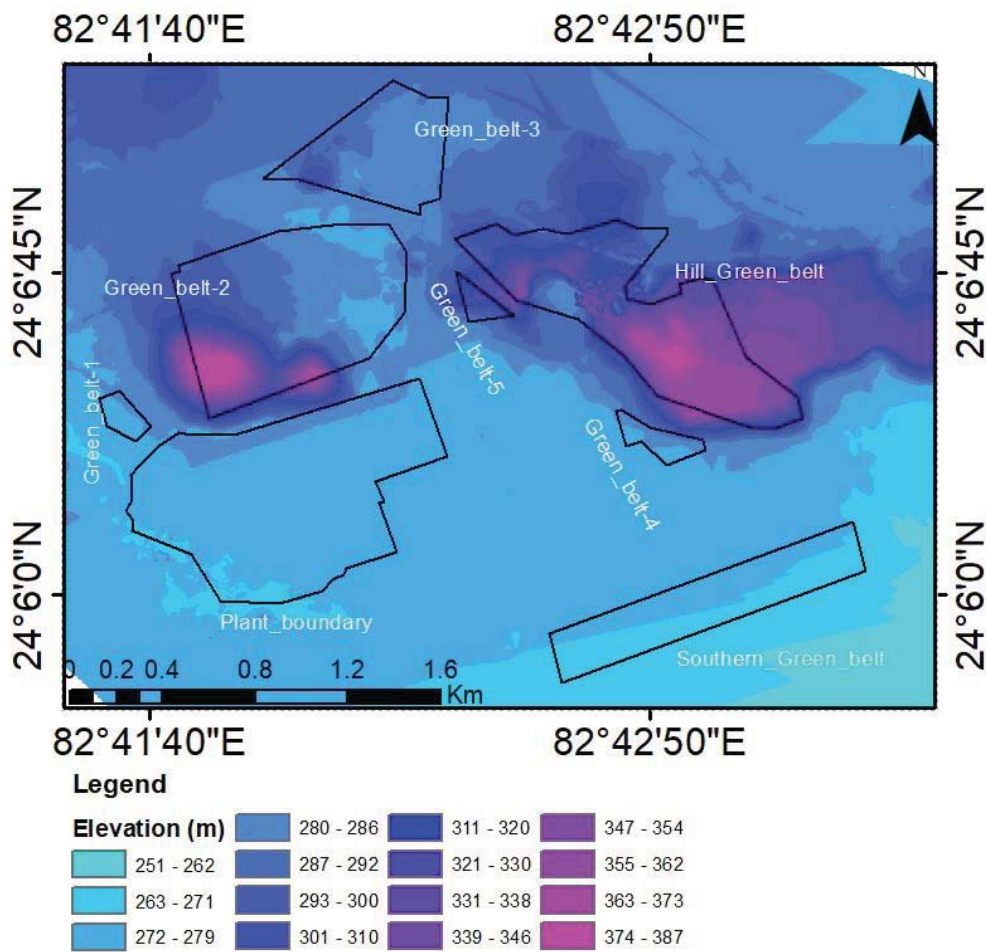


Figure 3.1a DEM colour map of the study

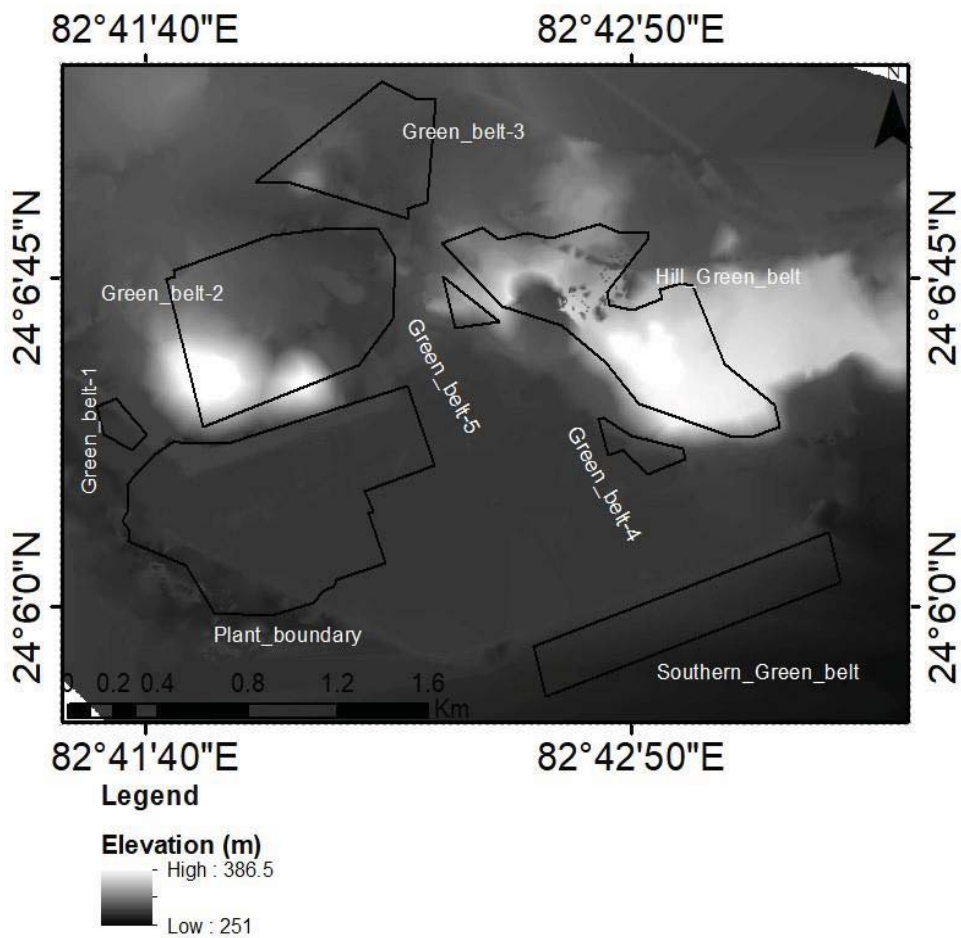


Figure 3.1b DEM – monochrome map of the study area

3.3 DEM OF GREEN BELTS

The topography of the green belt areas based on the DEM study is discussed below

3.3.1 DEM of the Green belt-1

Figure 3.2 shows the Digital elevation model map for the western part of the Singrauli Super Thermal Power Project. The Elevation varies from 288 m to 301 m in this part. The higher elevation is generally in the North-Eastern region. The southern part shows a lower elevation along the boundary. Stream has also been shown in the map, which shows the flow of runoff from north-eastern to the west into the green belt-1 area.

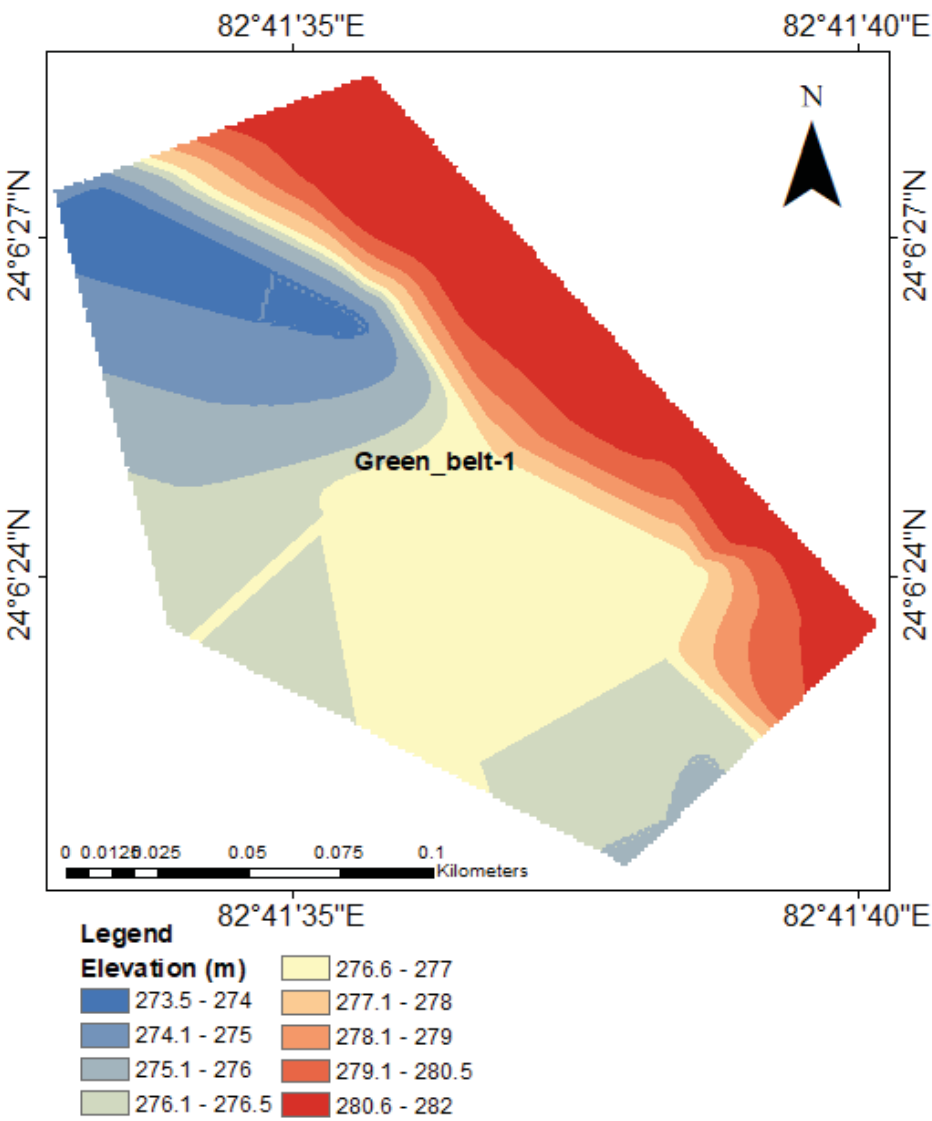


Figure 3.2 DEM map of the green belt-1

3.3.2 DEM of the Green belt-2

Figure 3.3 show the west-central part of the Singrauli Super Thermal Power Project. The elevation varies from 282 m to 420 m. The southern part of the map shows the Nalla stream. The South-western part has a higher elevation as compared to the other part.

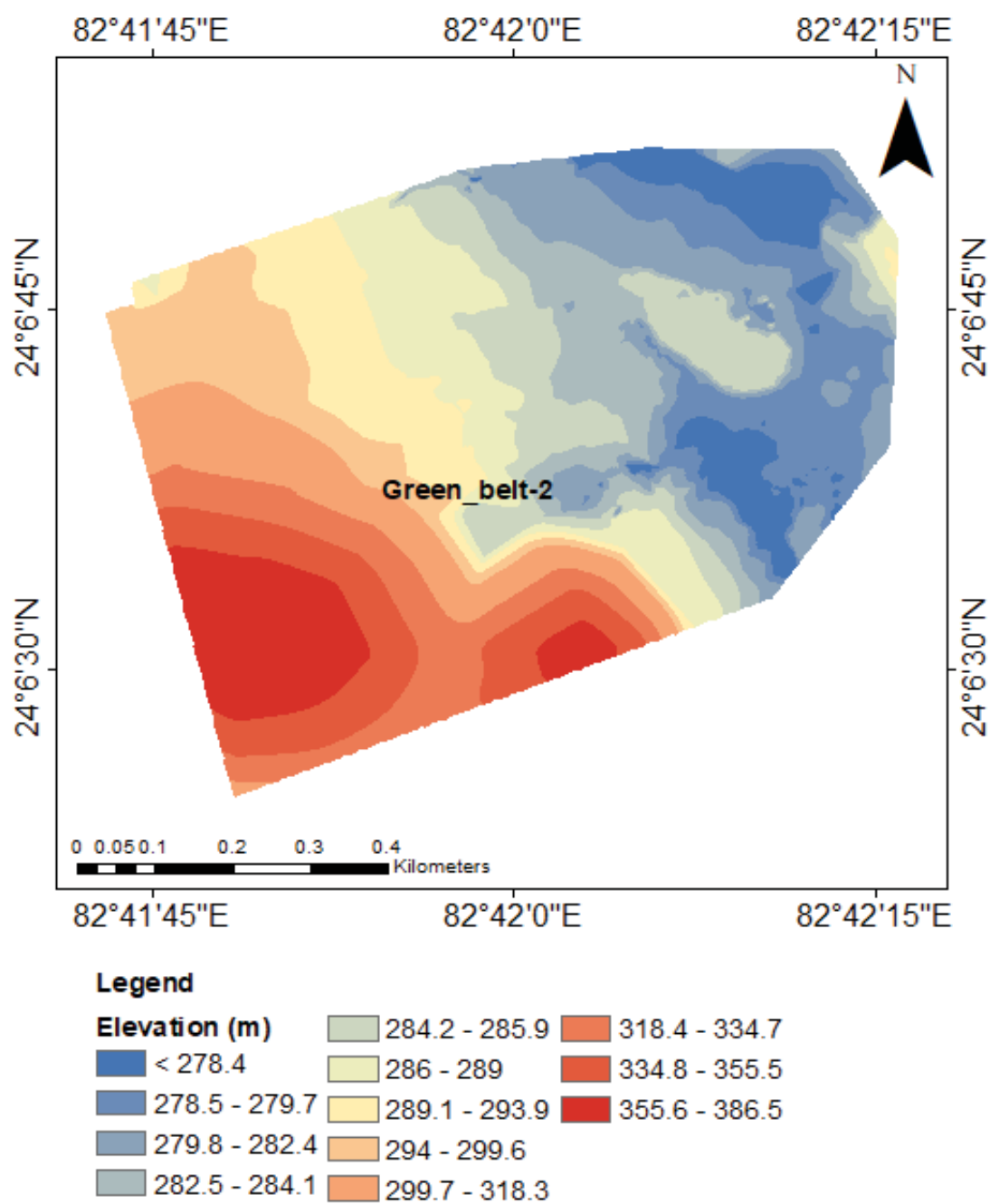


Figure 3.3 DEM map of the green belt-2

3.3.3 DEM of Green belt-3

This area is the northern part of the Singrauli Super Thermal Power Project. It has a small nalla flowing from north to south in the western part, and in the eastern part, the major drainage channel flows from north to south. The elevation in this region varies from 289 m to 321 m. Figure 3.4 show the DEM map for this area. The southern part shows a lower elevation along the boundary.

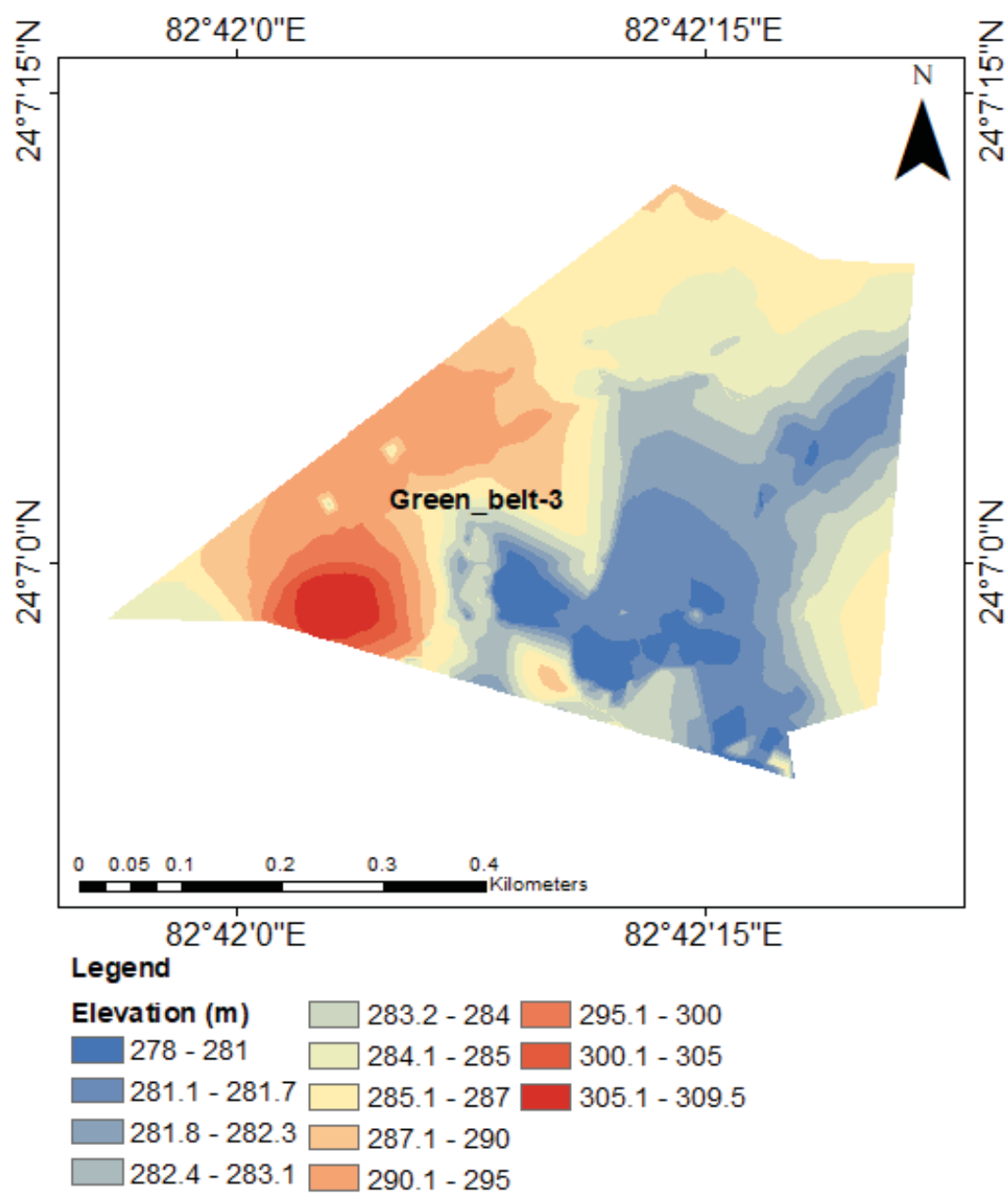


Figure 3.4 DEM map of the green belt-3

3.3.4 DEM of Green Belt 4

Green belt-4 covers a very small area of the plant. It lies the central part of the Singrauli Super Thermal Power Project. The elevation in this region varies from 284 m to 375 m. The northeastern part shows higher elevation as compared to the southern part. The stream is in the south, and the direction of flow in the Nala is from west to south. Figure 3.4 show the DEM map for this area.

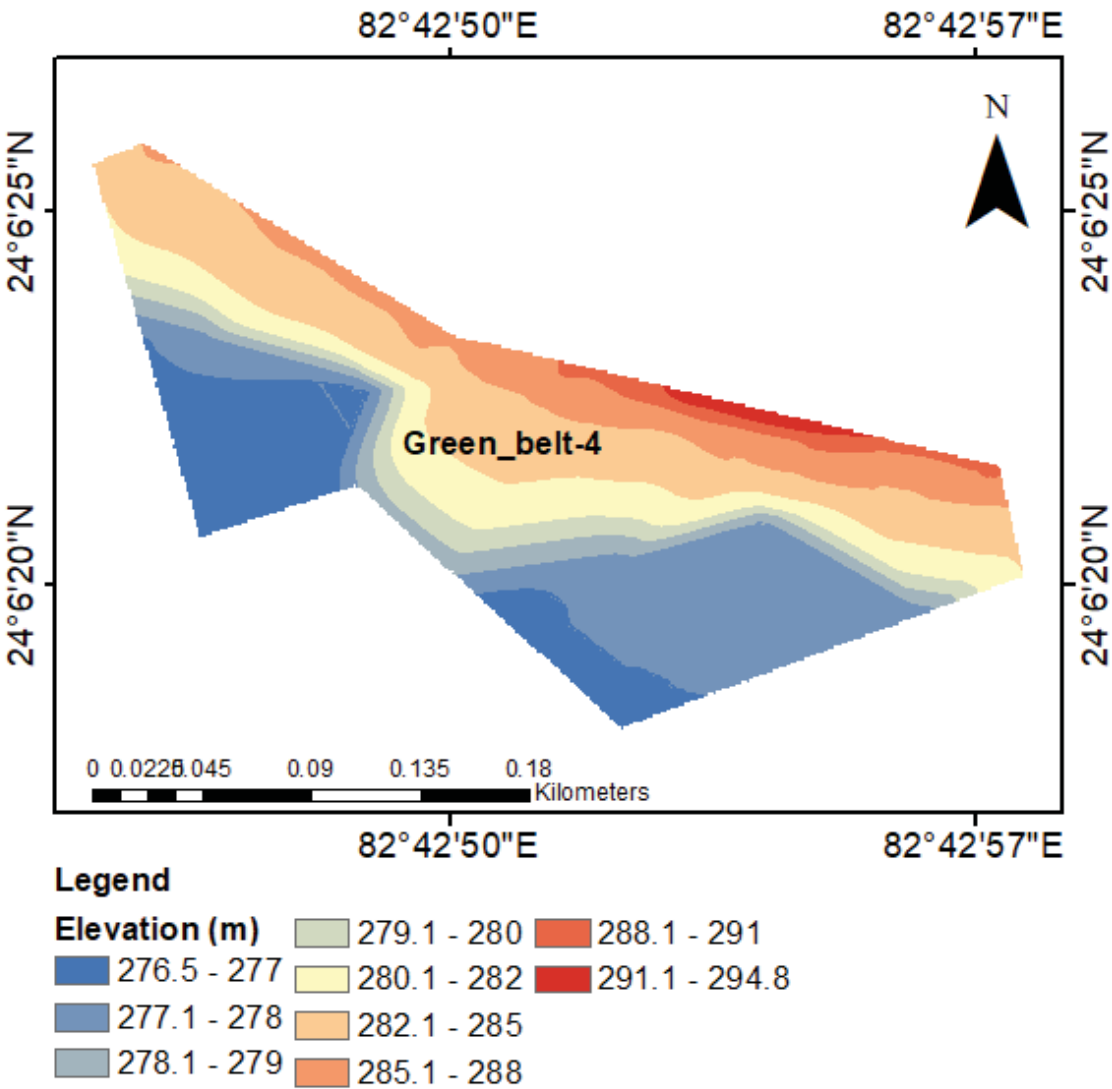


Figure 3.5 DEM map of the green belt-4

3.3.5 DEM of Green belt-5

Green belt-5 lies in the central part of the plant. The elevation in this region varies from 296 m to 356 m. The eastern part shows higher elevation as compared to the southwestern part. Further, this area doesn't contain any nala for the safe removal of excess water. Figure 3.5 shows the DEM map for this area.

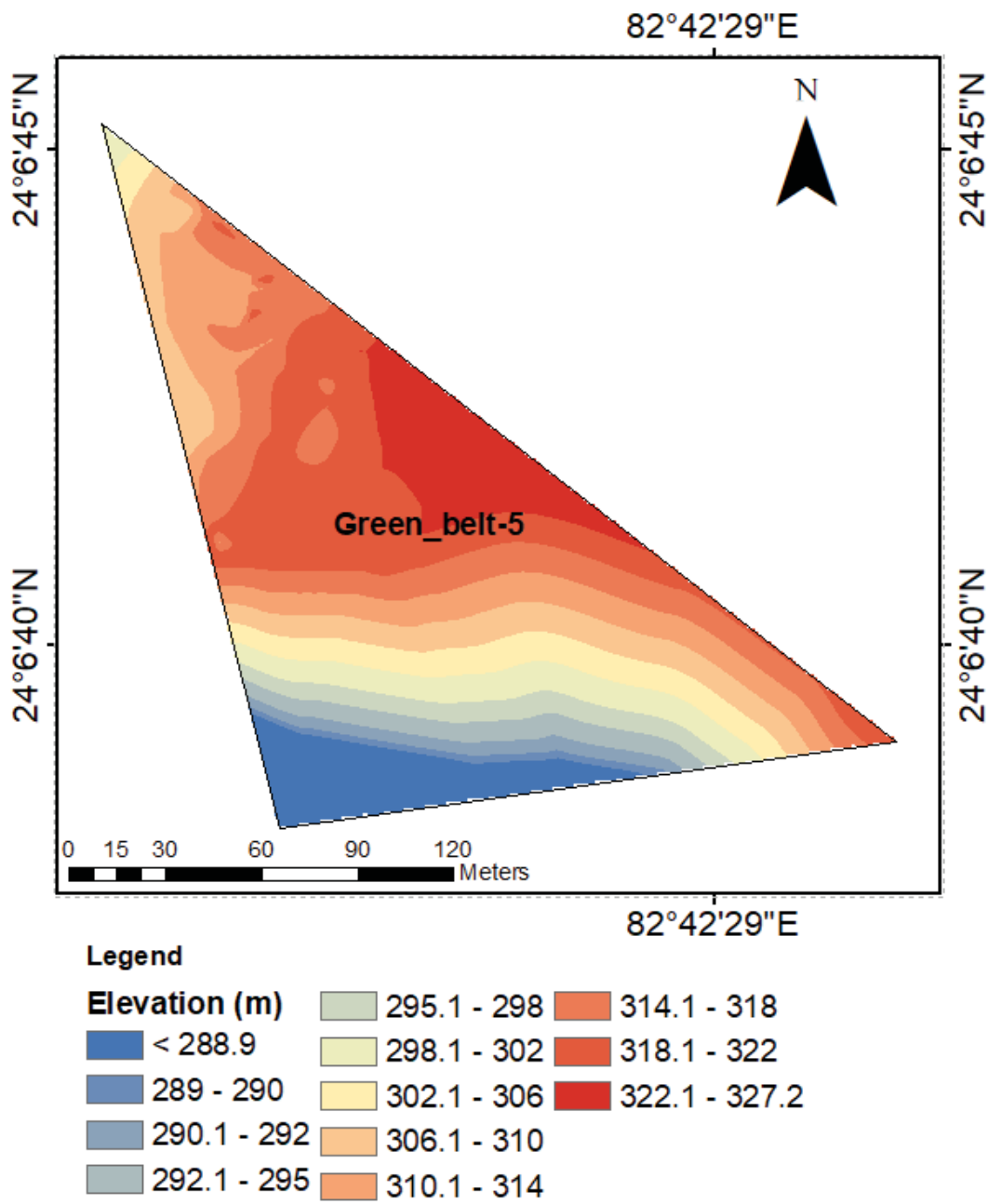


Figure 3.6 DEM map of the green belt-5.

3.3.6 DEM of Hill_Green belt

This area is the northern part of the Singrauli Super Thermal Power Project. It has a small nalla flowing from west to east in the northern part. The elevation in this region varies from 283 m to 385 m. Central part of this area has a higher elevation as compared to the other part of this area. Figure 3.6 shows the DEM map for this area.

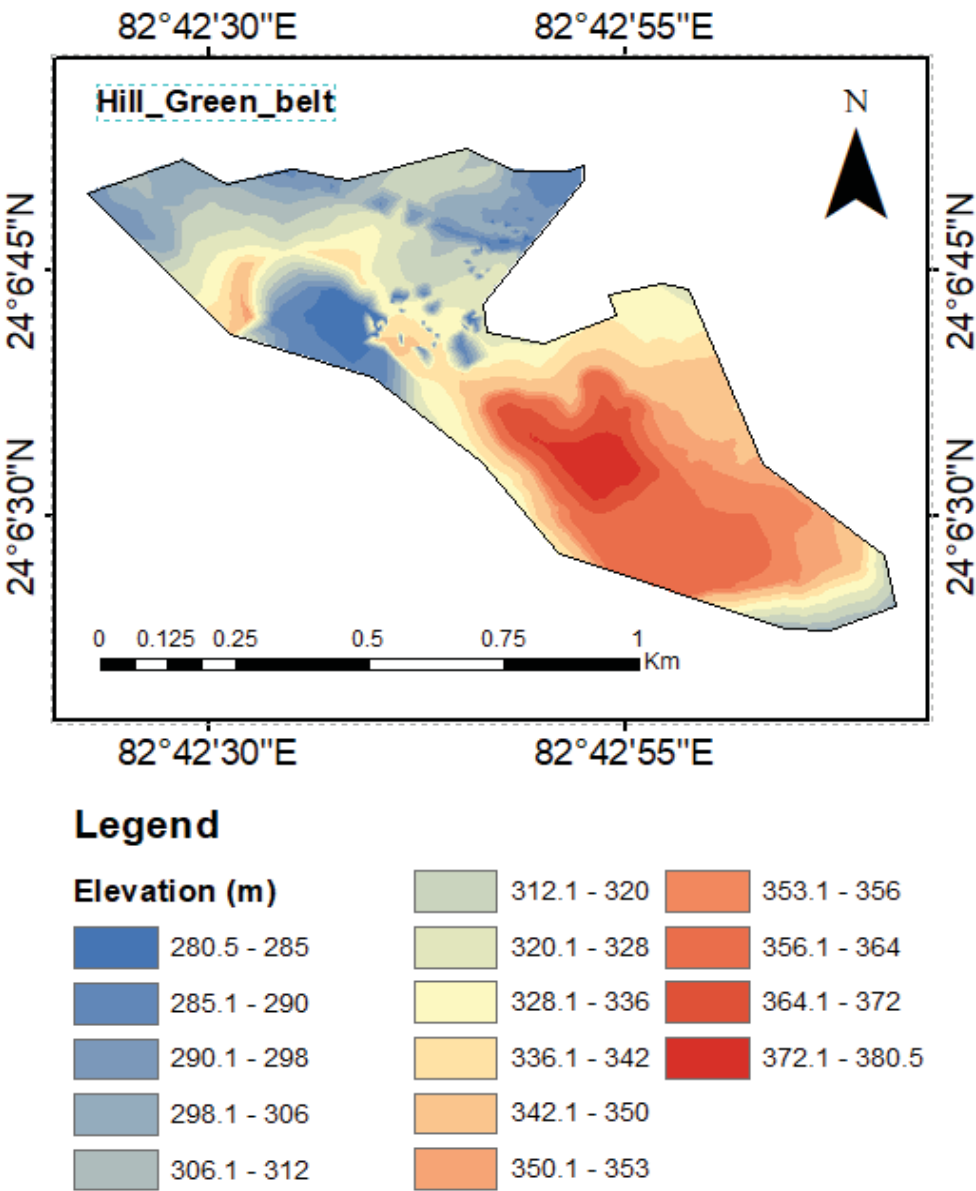


Figure 3.7 DEM map of the hill_green belt

3.3.7 DEM of Southern_Green belt

This area is the southern part of the Singrauli Super Thermal Power Project. It has a small nalla flowing from north to south in the southern part. The elevation in this region varies from 271 m to 331 m. Figure 3.6 shows the DEM map for this area.

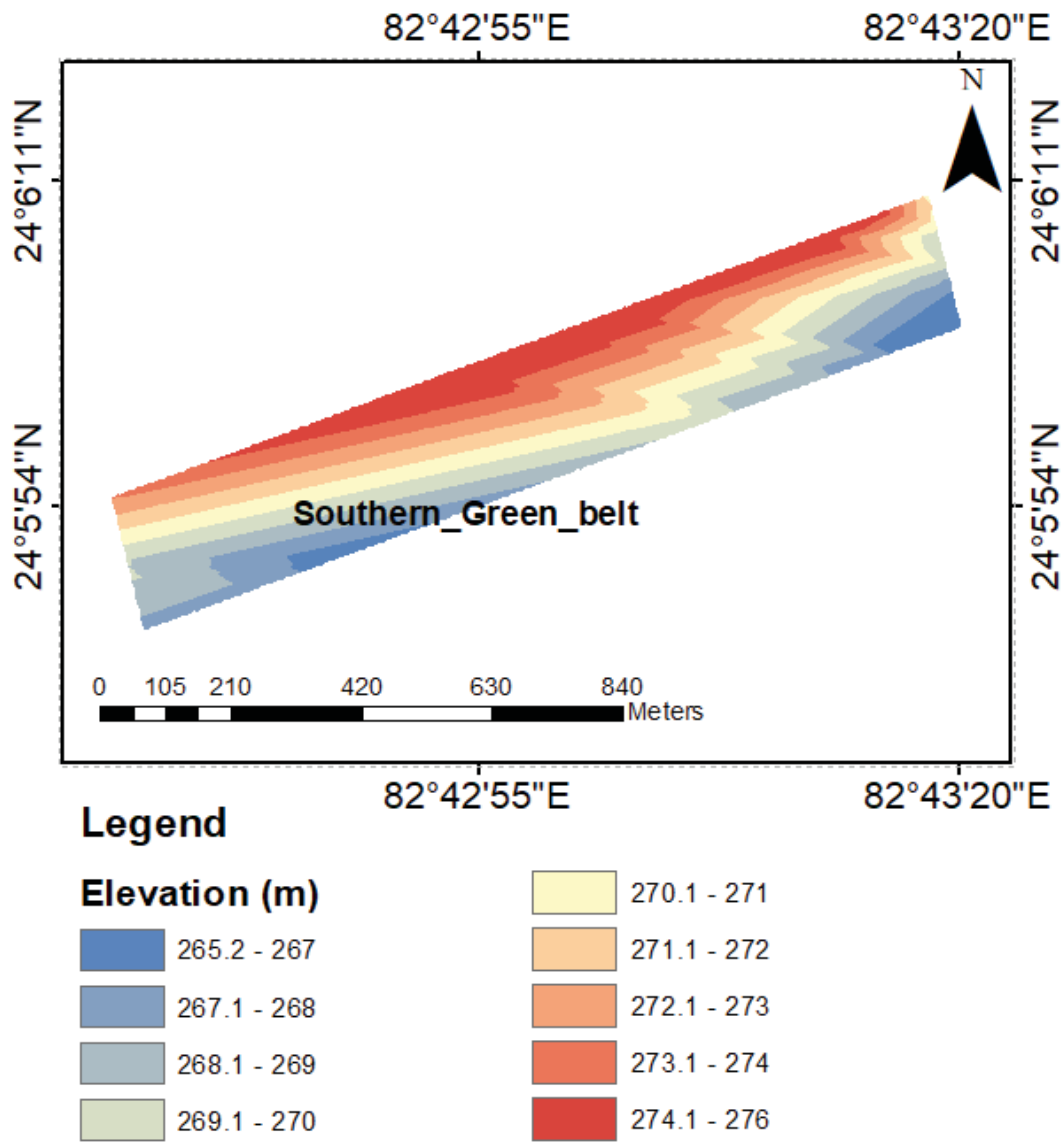


Figure 3.8 DEM map of the southern_green belt

3.4 DEM MAP OF PLANT BOUNDARY VICINITY

The DEM of the plant boundary vicinity is given in Figure 3.9. It is important to note that the topography depicted in the figure is based on a contour map of the area depicting pre-project conditions and the land is already leveled now.

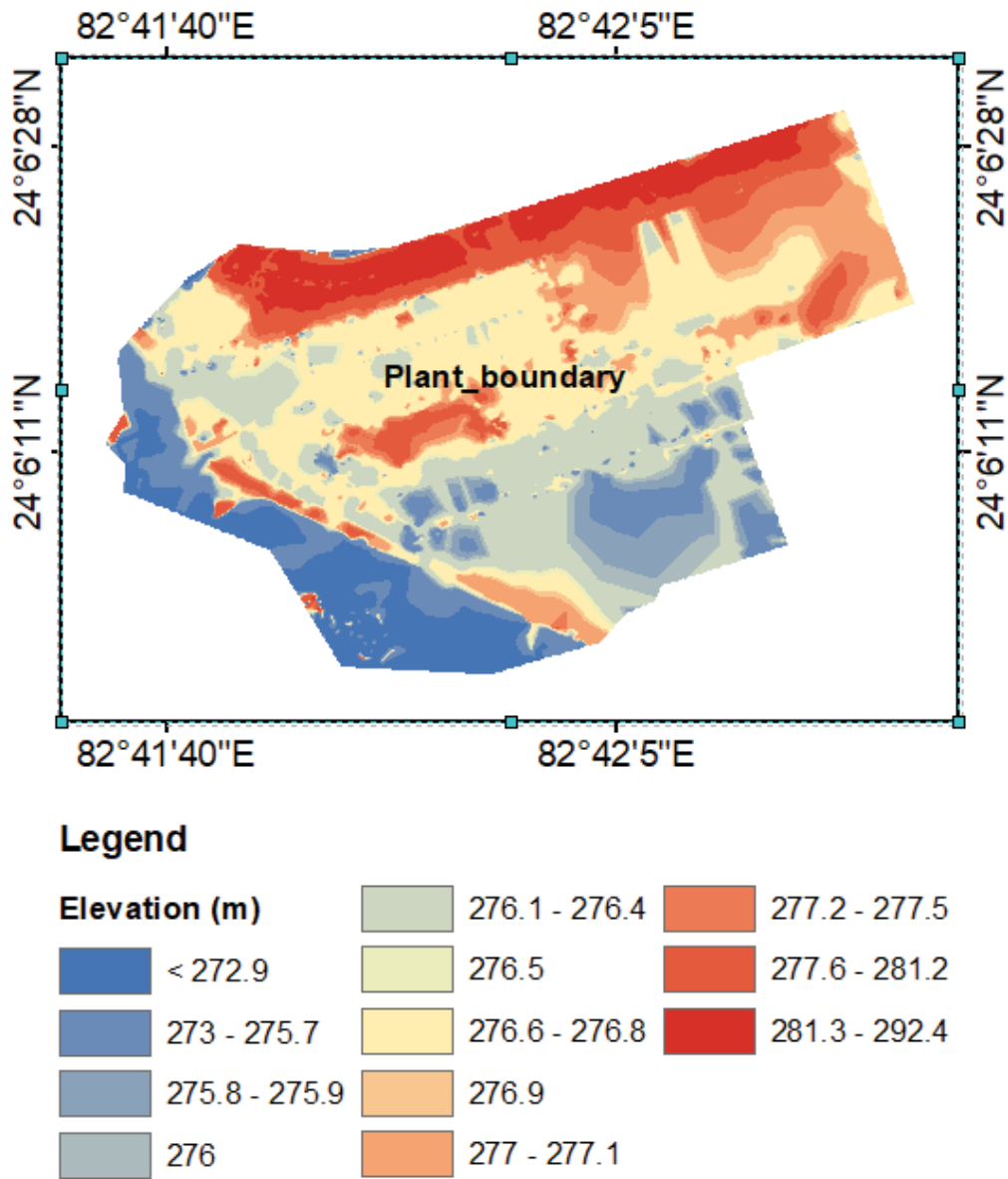


Figure 3.9 DEM map of the plant boundary

The entire land within the plant boundary is already leveled and the Finished Grade Level (FGL) in the stage III plant is 276m and 275.5m.

CHAPTER 4

DESIGN STORM SCENARIOS OF VARIOUS RETURN PERIODS

In the present study, design storms of various return periods have been estimated for (i) planning of drainage in the stage III plant area and (ii) hydrologic study of realigned diversion nala (Jogia and Jwalamukhi nala) catchment. This chapter covers the estimation of storm rainfall of various return periods and the time distribution of storm rainfall.

4.1 FREQUENCY ANALYSIS OF 1-DAY ANNUAL MAXIMUM RAINFALL

Daily rainfall data are available at Shaktinagar(Dudhi station) in Sonebhadra district(U.P.) for recent 33 years period from 1990 to 2022 . 1-Day annual maximum rainfall series was constructed (table 4.1a).The series is arranged in descending order as shown in table 4.1b. EV Type I probability distribution was applied. Figure 4.1 shows graphical frequency analysis of 1-Day annual maximum rainfall at Shaktinagar. The results obtained are given below in Table 4.1c. 1-Day rainfall has been converted to 24 hr rainfall using a factor of 1.15 (as per CWC report 1987).

Table 4.1a: 1-Day Maximum Rainfall in Shakti Nagar(1990 to 2022)

Sl. No.	Year	Date	1_Day Max. Rainfall (mm)
1	1990	14-Aug-90	59.23
2	1991	23-Jul-91	75.09
3	1992	10-Sep-92	51.12
4	1993	15-Sep-93	78.87
5	1994	18-Jun-94	79.77
6	1995	10-Nov-95	64.24
7	1996	11-Jul-96	41.67
8	1997	28-Jun-97	65.17
9	1998	19-Oct-98	41.08
10	1999	11-Jul-99	93.01
11	2000	2-Sep-00	110.11
12	2001	31-Aug-01	76.81
13	2002	6-Aug-02	47.73
14	2003	11-Aug-03	41.72
15	2004	9-Aug-04	55.26

16	2005	19-Aug-05	65.54
17	2006	19-Aug-06	79.80
18	2007	9-Sep-07	35.88
19	2008	15-Jun-08	38.52
20	2009	7-Sep-09	43.73
21	2010	13-Jul-10	36.70
22	2011	25-Sep-11	77.86
23	2012	16-Sep-12	57.93
24	2013	21-Jul-13	74.59
25	2014	12-Aug-14	68.85
26	2015	17-Aug-15	50.04
27	2016	12-Aug-16	110.96
28	2017	27-Jul-17	85.06
29	2018	3-Aug-18	76.62
30	2019	8-Jul-19	59.75
31	2020	12-Aug-20	63.90
32	2021	17-Jun-21	59.89
33	2022	25-Aug-22	50.70

Table 4.1b: 1-Day Maximum Rainfall arranged in Descending order

Descending Order	Rank (m)	m/(n+1)	Return Period (Years)
110.96	1	0.03	33.00
110.11	2	0.06	16.50
93.01	3	0.09	11.00
85.06	4	0.12	8.25
79.80	5	0.15	6.60
79.77	6	0.18	5.50
78.87	7	0.21	4.71
77.86	8	0.24	4.13
76.81	9	0.27	3.67
76.62	10	0.30	3.30
75.09	11	0.33	3.00
74.59	12	0.36	2.75
68.85	13	0.39	2.54
65.54	14	0.42	2.36
65.17	15	0.45	2.20

64.24	16	0.48	2.06
63.90	17	0.52	1.94
59.89	18	0.55	1.83
59.75	19	0.58	1.74
59.23	20	0.61	1.65
57.93	21	0.64	1.57
55.26	22	0.67	1.50
51.12	23	0.70	1.43
50.70	24	0.73	1.38
50.04	25	0.76	1.32
47.73	26	0.79	1.27
43.73	27	0.82	1.22
41.72	28	0.85	1.18
41.67	29	0.88	1.14
41.08	30	0.91	1.10
38.52	31	0.94	1.06
36.70	32	0.97	1.03
35.88	33	1.00	1.00

Table 4.1c: One-day rainfall (mm) and 24-hour rainfall of various return periods

Station	Return period (Years)					
	2	5	10	25	50	100
1-Day rainfall at Shakti Nagar (mm)	59.19	79.32	94.55	114.68	129.91	145.14
24 hr. rainfall (mm)	68.07	91.22	108.73	131.88	149.39	166.91

Figure 4.1 Weibull Distribution of 1-Day maximum rainfall at Shakti Nagar

4.2 REGIONAL RAINFALL FREQUENCY ANALYSIS

Regional rainfall frequency analysis is based on the following report of the Central Water Commission:

CWC (1987): Flood Estimation Report for Sone Subzone-1(d); publication number 33/88(Design Office Report number S/15/1987) of Central Water Commission, New Delhi (August, 1987).

The study area lies in Sone Sub Zone-1(d) defined by Central Water Commission(CWC) in its report.

India Meteorological Department (IMD) has conducted a detailed rainfall study for Sone Sub Zone-1(d) (CWC 1987) utilizing the data of 14 self-recording rain gauge stations and 22 ordinary rain gauge stations maintained departmentally. In addition, data from 112 ordinary rain gages of state government departments and 26 self-recording rain gages maintained by Indian Railways in their 8 bridge catchments were also used.

The annual maximum series of 1-day rainfall was formed for all the ordinary raingauge stations using records of 50 to 80 years. These annual extreme value series were subjected to frequency analysis using Gumbel's extreme value probability distribution and 1-day rainfall estimates corresponding to 25, 50, and 100 years return period were computed. The daily values of 25 years, 50 years, and 100 years rainfall estimates were converted to 24-hour rainfall estimates using a factor of 1.15. These 24-hour rainfall estimates for all the stations in the sub-zone were plotted on base maps and isopluvial maps of 25 years, 50 years, and 100 years return periods were drawn.

4.3 RECOMMENDATION

Isopluvial maps for 24-hour rainfall of 25, 50, and 100 year return periods are given in the CWC report(1987). The 24 hr rainfall of various return periods at Shaktinagar are shown in Table 4.1b. 24-hour rainfall of 25-year, 50-years, and 100-year return period near Rihand reservoir as per isopluvial maps of CWC(1987) is similar to 24-hour rainfall estimates as per frequency analysis of 33years data at Shaktinagar as shown in Table 4.2 below.

Table 4.2: 24-hour rainfall of various return periods as per Shaktinagar data and as per CWC maps

Return period	Based on 33 years of recent data at Shaktinagar	Based on CWC maps
25-year return period	131.88 mm	150 mm
50-year return period	149.39 mm	170 mm
100-year return period	166.91 mm	200 mm

It is recommended that the 24-hour storm rainfall values obtained from frequency analysis of 33 years of rainfall data at Shaktinagar be used in the further analysis as the station is close to the study area and data of recent period (1990 to 2022) and of sufficient length (33 years) have been used in the frequency analysis.

4.4 DESIGN STORM SCENARIOS

Conversion of 24-hour Rainfall into Short Duration Rainfall

The ratios of 50-year rainfall of short durations of 1 hr, 3 hr, 6 hr, 9 hr, 12 hr, 15 hr, 18 hr and 24 hr (as per CWC report 1987) with respect to 24 hr rainfall are given in the table below. It is assumed that these ratios for 50-year rainfall (as per CWC 1987) are applicable to storm rainfall of other return periods also.

Table 4.3 Average ratio (t hr rainfall/24 hr point rainfall) for various durations

Storm duration (hrs)	1	3	6	9	12	15	18	24
Ratio	0.2	0.34	0.54	0.67	0.77	0.85	0.91	1.0

Conversion of Point to Areal Rainfall

The hourly rainfall data of 8 bridge catchments were used to find the ratios for different duration of storms and for different sizes of catchments. Detailed procedure is given in CWC (1987). The area reduction factors (ARF) for different catchment areas and for different duration of storms (1 hr, 3 hr, 6 hr, 12 hr, and 24 hr duration) are given in Table 4.4 below:

Table 4.4 Point areal rainfall ratios (percentages)

Area (Sq. km)	Area Reduction Factor (%)				
	1 hour	3 hour	6 hour	12 hour	24 hour
50	80	88	93	93	97
100	73	82	88	90	95
150	68	77	84	89	93
200	64	74	82	87	92
250	61	72	80	86	91

4.5 RAINFALL INTENSITY

Design rainfall intensity (expressed as mm per hour) is required for the estimation of flood discharge using the Rational Formula. The 24-hour rainfall of 100 year return period is 166.91 mm say 167 mm.

Conversion of 24-hour Rainfall into 1-hour rainfall= $0.2 \times 167 = 33.4$ mm

Applying the area reduction factor (Table 4.4) the rainfall intensity is $=0.8 \times 33.4 = 26.72$ mm per hour. Thus rainfall intensity corresponding to 100 year return period is 26.72 mm/hour say 27 mm/hour.

4.6 TIME DISTRIBUTION OF INPUT STORMS

About 1994 rain storm events of various durations up to 24 hours occurring in various parts of the sub-zone have been analysed by Central Water Commission (CWC, 1987) based on 147 station year data. Rain storms selected at each station were grouped under the 5 categories (2-3 hrs, 4-6 hrs, 7-12 hrs, 13-18 hrs, 19-24 hrs) and plotted on different graphs as dimensionless curves with a cumulative percentage of the total rainfall versus percentage of storm rainfall. Thus, time distribution graphs were prepared for each station and for each duration, and were then examined. The average time distribution curves for various durations were drawn for each station. The average curves for each of the stations thus obtained were plotted on a single graph and a single average curve for the sub-zone as a whole was drawn for each of five different durations.

Hourly time distribution coefficients of areal rainfall for design storm durations of 1 to 6 hours have been read from these curves and are given in Table 4.5 below:

Table 4.5 Hourly time distribution coefficients

Storm Duration (hr)	Distribution coefficients up to the hour					
	1 hr	2 hr	3 hr	4 hr	5 hr	6 hr
1	1.0					
2	0.68	1.0				
3	0.45	0.85	1.0			
4	0.35	0.68	0.88	1.0		
5	0.3	0.65	0.75	0.92	1.0	
6	0.2	0.5	0.67	0.84	0.95	1.0

Design Loss Rate

Direct surface runoff is due to excess rainfall after infiltration and other abstractions like evaporation, depression storage, etc. from the storm rainfall. A constant loss rate (ϕ -index) is normally assumed for a storm event even though the loss rates in a catchment, a complex phenomenon, vary due to variations in soil conditions, soil covers complex, and topography along with temporal and spatial variations in storm rainfall.

Based on the study of 134 flood events in the bridge catchments in the sub-zone, Central Water Commission (CWC, 1987) has recommended design loss rate (ϕ -index) may be taken as 2.5 mm per hour.

CHAPTER 5

FLOOD ESTIMATION, SPECIFIC DISCHARGE, AND CAPACITY OF REALIGNED DIVERSION NALA

5.1 GENERAL

In the present study, flood estimation is required for a) checking the discharge capacity of realigned diversion nala, and b) working out specific discharge (liters per second per hectare) for sizing internal drains in the Stage III plant area.

The following recommendation is made :

A flood of 100-year return period may be adopted for checking the discharge capacity of realigned diversion nala and specific discharge (liters per second per hectare) for sizing of internal drains in the Stage III plant area may be based on 50-year flood .

Catchment area at the upstream point of nala diversion

The catchment area at the upstream point of nala diversion consists of the upper hilly region of Jogia nala. The boundary of the catchment has been marked based on Digital Elevation Model (DEM) using SRTM data. DEM was used to delineate the streams. Catchment of Jogia nala upto the entry point of the diversion nala has been considered (figure 5.1). DEM is used to delineate the watershed of chosen catchment. Its properties (area, length of nala, slope, elevation at the farthest point from outlet and at the outlet) have been calculated using delineated watershed through SWAT software.

Catchment area(A)= 0.48km²

Length of nala= 0.854 km

Max elevation=284 m

Min elevation=275 m

Slope=1.05% i.e. 1.05m per 100-meter length of Nala

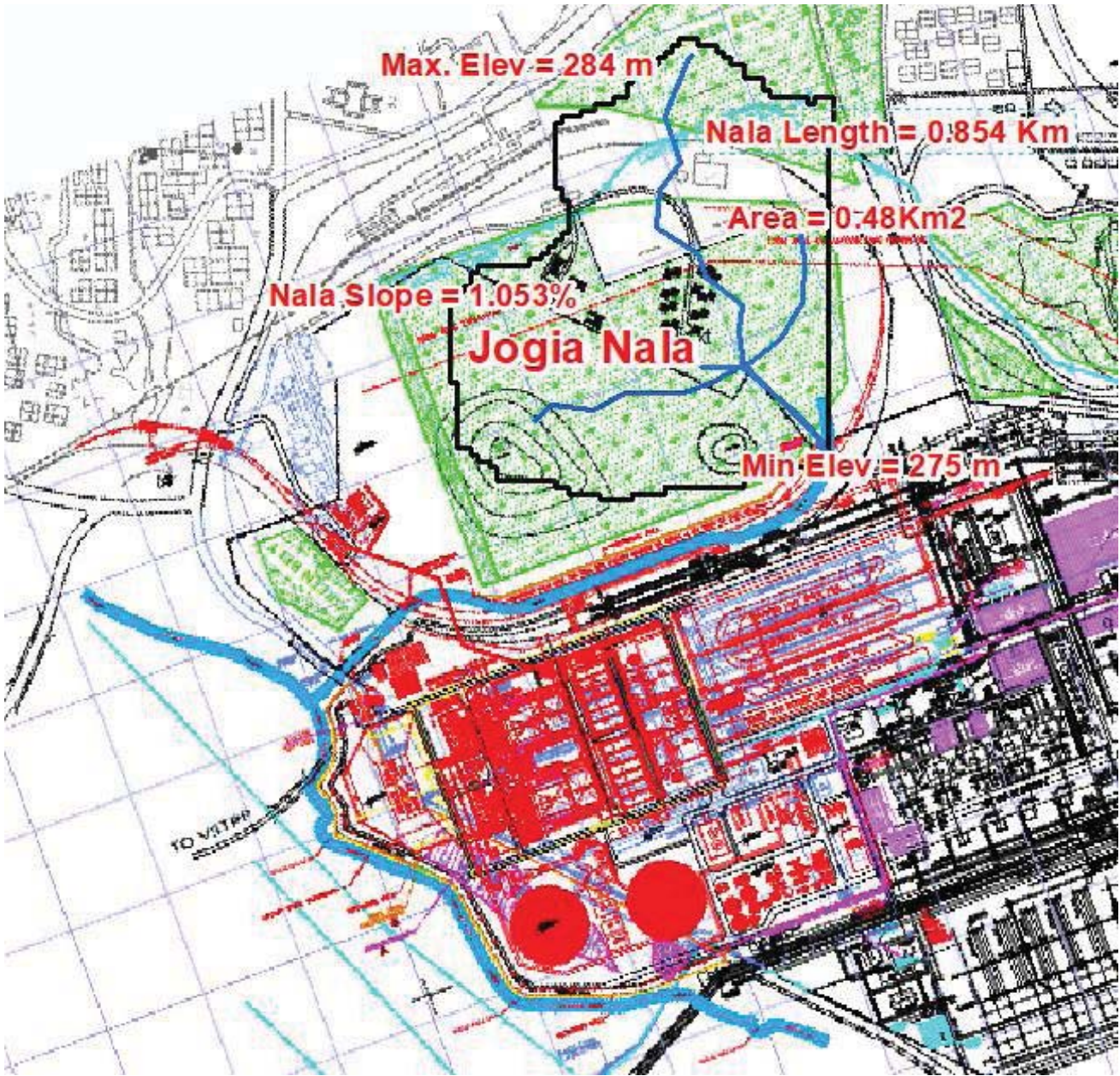


Figure 5.1 The Jogia nala catchment and physiographic parameters.

5.2 METHODS FOR FLOOD ESTIMATION

The following three methods have been adopted for flood estimation:

The method I: Rational Method for Small Catchments

Method-II: Regional Flood Frequency Model of CWC(CWC 1994)

Method III-SUH Approach of CWC Report(CWC1987)

5.2.1 Method I: Rational Method for Small Catchments

For catchments of an area less than 25 km^2 , the method given in the following document is recommended by Central Water Commission (CWC 1994).

Report No RBF-16 'Flood Estimation Methods for Catchments Less Than 25 km^2 in Area' prepared by Research, Design & Standards Organization(RDSO) of Indian Railway, Government of India

This report explains the modified rational method for the estimation of flood for catchments of an area less than 25 km^2 . The Rational equation is the simplest method to determine peak discharge from drainage basin runoff. It is the most common method used for sizing sewer systems. The Rational Equation in metric units is given below.

$$Q=0.278CIA$$

Where, Q = Peak discharge, cubic meter per second; C= Rational method runoff coefficient; I = Rainfall intensity(mm/hour) during the time of concentration; A = Drainage area(km^2)

Time of concentration (t_c) is the time required for the most distant part of the catchment to contribute to the outflow. The time of concentration has been taken from the Bransby-Williams formula as suggested in RBF-16.

$$t_c=0.615L/(A^{0.1}S^{0.2})$$

where,

t_c =time of concentration (hrs); L=main stream length(km); S=mean slope of mainstream (%); A=catchment area(km^2)

The Runoff coefficient (C): It is a function of the soil type, drainage basin slope, and land cover and may be taken from the formula given in table 5.1 below:

Table 5.1: Formula to obtain Runoff coefficient C

Sl. No	Description of catchment	Formula for C
1	Sandy soil/sandy loam/arid areas	$C=0.249(R.F)^{0.2}$
2	Alluvium/silty loam/coastal areas	$C=0.332(R.F)^{0.2}$
3	Red soil/clayey loam/grey or brown alluvium/cultivated plains/tall crops/ wooden areas	$C=0.415(R.F)^{0.2}$
4	Black cotton/clayey soil/lightly covered, lightly wooded/plain and barren/ sub montane and plateau	$C=0.456(R.F)^{0.2}$
5	Hilly soils/plateau and barren	$C=0.498(R.F)^{0.2}$

The Jogianala catchment characteristic is Hilly soils/plateau and barren. From the table, C for such catchment is

$$C=0.498(R.F)^{0.2}$$

where, R =T year 24-hour point rainfall(cm) and F=area reduction factor depending upon catchment area and duration of rainfall.

24 Hr Rainfall: Design storms of return periods corresponding to 25 years, 50 years, and 100 years, are discussed in Chapter 4.

Table 5.2: Rational Method for Flood Estimation

	25 year	50 year	100 year
Catchment area (km ²)	0.48	0.48	0.48
24 hr rainfall (R) in cm	13.2	14.9	16.7
Length (km)	0.854	0.854	0.854
Slope (S)(%)(9.9 m/km=0.0099 m/m =0.99%)	1.05	1.05	1.05
Area reduction factor for rainfall(F)	0.8	0.8	0.8
Runoff Coefficient $C=0.498(RxF)^{0.2}$	0.798	0.817	0.836
Design duration (hours)=time of concentration $t_c=0.615L/(A^{0.1}S^{0.2})$ $=0.615 \times 0.854 / (0.48^{0.1} \times 1.05^{0.2}) = 0.55986$ hr say 1 hours	1	1	1
Storm rainfall (cm)during design duration(1hr)= Average ratio (t hr rainfall/24 hr point rainfall from table 4.3 in chapter 4) $\times$ 24 hr rainfall ==0.2 $\times$ 24 hr rainfall	2.64	2.98	3.34
Rainfall Intensity(I) during 1 hr duration of rainfall in mm/hr	26.4	29.8	33.4
Flood Estimate method-I Rational Formula $Q=0.278CIA$ (m ³ /sec)	10.11	11.69	13.4

5.2.2 Method-II: Regional Flood Frequency Model of CWC

The study area lies in the hilly region of the Sone Sub Zone(1d) defined by the Central Water Commission. Manual on Estimation of Design Flood for this subzone (CWC, 2001) provides a regional flood frequency model which is based on multiple regression correlation of flood peaks with physiographic parameters and 24-hour point rainfall of T year return period. The proposed relationships for the hilly region of the subzone are:

for return period of 25 year: $Q_{25} = 5.61 (A)^{0.708} (S)^{0.465} (R_{25})^{0.178}$

for a return period of 50 year: $Q_{50} = 6.214 (A)^{0.70} (S)^{0.484} (R_{50})^{0.202}$

for return period of 100 year: $Q_{100} = 10.437 (A)^{0.67} (S)^{0.396} (R_{100})^{0.145}$

where,

A: catchment area in km^2 ; S: equivalent slope in m/km

R_T : 24-hour point rainfall in cm corresponding to T yr return period

Data for the catchment of diversion nala(Jogia and Jwalamukhi nala catchment)

$A=0.48 \text{ km}^2$; $S=10.5 \text{ m/km}$; $R_{25}=3.3 \text{ cm}$; $R_{50}=3.725 \text{ cm}$ and $R_{100}=4.18 \text{ cm}$

25 year flood $Q_{25} =12.32 \text{ m}^3/\text{sec}$

50 year flood $Q_{50} =15.12 \text{ m}^3/\text{sec}$

100 year flood $Q_{100} =19.81 \text{ m}^3/\text{sec}$

5.2.3 Method III-SUH Approach of CWC Report

The catchment area at the point of diversion consists of the upper hilly region of Jogia Nala. In the absence of site-specific data, a synthetic unit hydrograph can be derived using the physiological characteristics of the diversion nala catchment (CWC report (1987) .

A Digital Elevation study was carried out to estimate the Physiographic Parameters of the Nala Catchment. Figure

- i) Catchment area (A)= 0.48 km^2

- ii) Length of the longest stream (L)= 0.854 km
- iii) Length of the longest stream from a point opposite to CG of the catchment to the point of study (Lc)= 0.46 km
- iv) Equivalent slope (S)=0.5m/km

CWC report for Sone subzone 1(d) has recommended the following relationships to estimate the parameters of 1 hr SUH for the hilly region of the subzone.

$$t_p = 0.314(L.S^{-0.5})^{1.012} = 0.314(0.854 \times 10.5^{-0.5})^{1.012}$$

$$= 0.0816 \text{ hour}$$

$$q_p = 1.644(t_p)^{-0.965} = 1.644 \times 11.306077 = 18.455 \text{ m}^3/\text{sec}/\text{km}^2$$

Therefore peak flood of 1 hour SUH for the catchment is

$$Q_p = q_p \times A = 18.455 \times 0.48 = 8.86 \text{ m}^3/\text{sec}$$

For the application of SUH, the SUH ordinates need to be estimated, and then the convolution with design rainfall increments in 1-hour time intervals is to be carried out. A simplified approach is followed for assessing the magnitude of T year flood as below:

The average ratio of 1 hr rainfall/24 hr point rainfall (from Table 4.3 in Chapter 4) is 0.2 and the average loss rate (ϕ -index) is 2.5 mm per hour(chapter 4).

25-year storm rainfall of 1 hr (time of concentration)duration = 2.64 cm and excess rainfall =2.39cm

50-year storm rainfall of 1 hr (time of concentration)duration = 2.98 cm and excess rainfall =2.73cm

100-year storm rainfall of 1 hr (time of concentration)duration = 3.34 cm and excess rainfall =3.09cm

so

$$25 \text{ year flood} = 8.86 \times 2.39 = 21.1 \text{ m}^3/\text{sec}$$

$$50 \text{ year flood} = 8.86 \times 2.73 = 24.2 \text{ m}^3/\text{sec}$$

$$100 \text{ year flood} = 8.86 \times 3.09 = 27.4 \text{ m}^3/\text{sec}$$

5.2.4 Recommendation

Flood Estimates using the Rational Formula and Regional Flood Frequency model are of similar magnitude where as the SUH model provides significantly higher estimate as shown in Table 5.3. It is recommended to use flood estimate using Rational Formula as catchment size is very small for which rational formula is more appropriate as recommended by Central Water Commission (CWC 1994) and by *Research, Design & Standards Organization (RDSO) of Indian Railway, Government of India* (Report RBF 16).

Table 5.3: Flood Estimation in Diversion nala catchment

Method	25 year flood	50 year flood	100 year flood
method-I Rational Formula $Q=0.278CIA$ (m³/sec)	10.11	11.69	13.4
method-II Regional Flood Frequency Model of CWC	12.32	15.12	19.81
method-III SUH Model of CWC	21.1	24.2	27.4

5.3 DISCHARGE CAPACITY OF REALIGNED DIVERSION NALA

Realigned Diversion nala will consist of two cell boxes of RCC each having dimensions of 8 m height and 5 m width. A retaining wall shall be constructed for the stability of the right bank. The discharge capacity of realigned nala (two RCC cell boxes) has been estimated using the slope area method. Velocity (V) has been estimated by Manning's equation

$$V(\text{m/s}) = \frac{1}{n} \times R^{2/3} \times S^{1/2}$$

$$Q(\text{m}^3/\text{s}) = A \times V$$

n: Manning roughness coefficient assumed to be 0.016 for concrete lined channel. However since the RCC channel shall be carrying storm runoff from hilly soil barren land (and perhaps debris) roughness of the RCC channel would increase . Roughness is assumed to be 0.03

R: hydraulic mean depth (=A/P)

A (m²): Cross section area

P (m): perimeter

S (m/m) : surface water slope assumed to be same as river bed slope

The Jogia nala is in the hilly catchment and has a slope of 1.05% i.e. 1.05m per 100m. It is a steep slope. For the rectangular cell, slope of 1:600 is assumed so that flow velocity is sufficient not to cause silting in the cell box and also does not cause erosion of the bed and bank.

Q: discharge (m^3/s)

For one cell box of rectangular section, the depth of flow is assumed to be 2m

$$A = B \times D = 5 \times 2 = 10 \text{m}^2$$

$$P = B + 2D = 5 + 2 \times 2 = 9 \text{m}$$

$$R = A/P = 10/9 = 1.111$$

$$V = (1/0.03) 1.111^{0.666} \times (0.00167)^{0.5}$$

$$= 33.33 \times 1.073 \times 0.0409 = 1.462 \text{m/sec}$$

So discharge carried by one cell box = $1.46 \times 10 = 14.6 \text{ m}^3/\text{second}$

And the discharge capacity of two cell box is $29.2 \text{ m}^3/\text{second}$

Conclusion: The Discharge capacity of two cell boxes($29.2 \text{ m}^3/\text{second}$) is significantly higher than the 100 year discharge ($13.4 \text{ m}^3/\text{second}$)of nala catchment. May be the purpose is to keep one cell in operation while the other cell is under maintenance.

5.4 SPECIFIC DISCHARGE FOR INTERNAL DRAINS IN STAGE III PLANT AREA :

Specific discharge(liters per second per hectare) for sizing of internal drains in the Stage III plant area may be based on the 50-year flood.

It is recommended to use flood estimate using Rational Formula as catchment size is very small for which rational formula is more appropriate as recommended by Central Water Commission (CWC 1994) and by *Research, Design & Standards Organization(RDSO) of Indian Railway, Government of India* (Report RBF 16).

As recommended in section 5.2 (Table 5.3) 50-year flood using the Rational formula is 11.69 m^3 per second for a catchment area of 0.48 km^2 . This is equivalent to 24.354 m^3 per second per km^2 or 0.2435 m^3 per second per hectare.

The specific discharge of 0.2435 m^3 per second per hectare may be adopted for the sizing of internal drains in the plant area.

CHAPTER 6

DRAINAGE PLAN FOR STAGE III PLANT

6.1 GENERAL

The drainage plan consists of

- a) Zoning of the facilities of the stage III plant for internal drainage to related outfalls on Balia nala.
- b) Relocation/dismantling of some of the existing outfalls on Balia Nala taking into consideration the drainage plan for stage III.
- c) Layout of the internal drains for the proposed stage III plant area taking into consideration the existing drains inside the stage I & II plant area.
- d) Checking the flood discharge capacity of realigned diversion nala (two-cell box type of RCC drain) on the north side of the Track Hopper of the stage III plant(see Chapter 5).
- e) Sizing of the internal drains in the stage III plant area based on hydraulic considerations.

6.2 LAYOUT OF STAGE I, II, AND III PLANTS

The total area of Singrauli STPP (including existing and additional green belt, township, etc.) is 4491 acres. Out of this land, about 298 acres (120.6 ha) will be required for Stage III expansion. The stage III plant will occupy 198 acres (80.13 ha) and about 100 acres (40.47 ha) is the green belt area including the additional green belt. Details are given below in Table 6.1.

Table 6.1 Area of Stage III plant and green belt

Sl. No.	Item	Area in acres	Area in hectares
1	Stage III Plant area	198	80.13
2	Required green belt area as per EC condition(40%)	79.2	32.05
3	The area already provided for green belt	65	26.31
4	Additional area for green belt proposed	35	14.16
5	Total green belt area including additional green belt	100	40.47
6	Total area of stage III project including green belt	298	120.6

The plant facilities for Stage III (198 acres or 80.13 ha) would be accommodated within the land available for the existing Stage I & II plants.

The stage III plant components have been located at 276 m and 275.5m ground formation levels by NTPC to economize the cost of earthwork. Due consideration has been given to the existing slope of land towards Balia Nala in deciding the layout of internal drainage.

Various facilities (components) in the proposed Stage III and existing Stage I and Stage II are shown in figure 6.1.

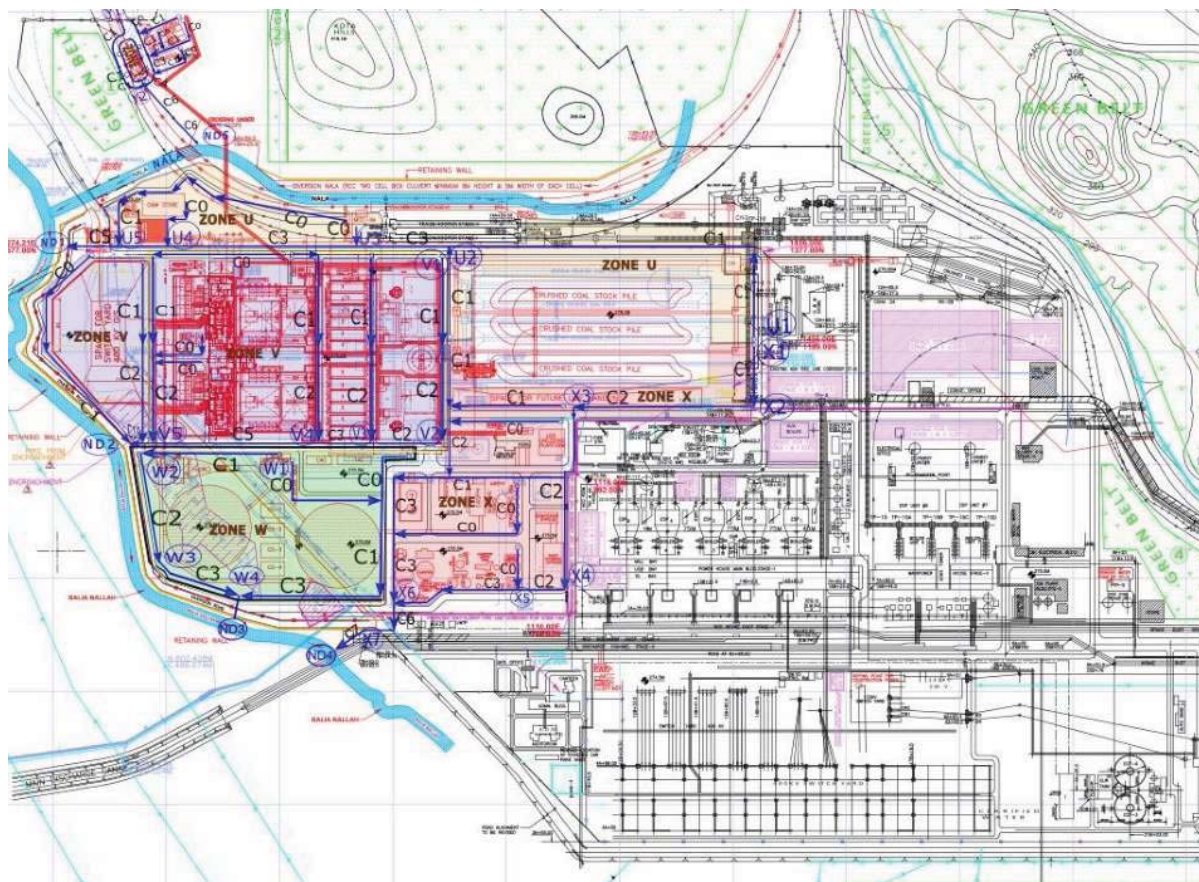


Figure 6.1 Layout plan of Stages I, II (marked in black), and Stage III (marked in red) of Singrauli STPP

6.3 THE DIVERSION NALA:

The Jogia nala and Jwalamukhi nala join to form Diversion nala that flows in east- west direction and it is located on the northern side of the existing Track Hopper of stage II plant. It takes U turn on the west side and then joins Balia nala which flows into the Rihand reservoir.

Proposed Relocation of Diversion nala: The Diversion nalla in the vicinity of the Track Hopper of Stage I and II plants shall be shifted and shall be realigned parallel to the existing nala to create space for the Track Hopper of Stage III plant. The right bank of the existing diversion nala consists of vertical rock and the nala section is deep.

As per the drawing provided by NTPC, the realigned Diversion nala will consist of two cell boxes of RCC each having dimensions of 8 m height and 5 m width. A retaining wall shall be constructed for the stability of the right bank. T8-meter height refers to the height of the retaining wall (depth of nala bed from natural right bank level).

6.4 THE EXISTING DRAINS AND OUTFALLS

At present, the storm runoff from the entire stage I and stage II plant area is carried to 8 outfalls. Table 6.2 shows the existing facilities from where runoff is carried to the existing eight outfalls. Invert level of the existing drains at outfall location are also indicated in the table.

Outfalls D1 to D4 are located on Balia nala. After the outfall D4, the Balia nala merges into Rihand Reservoir. Storm runoff from outfalls D5 to D8 flows into Rihand Reservoir. Figure 6.2 shows the layout of existing drains and the 8 outfalls.

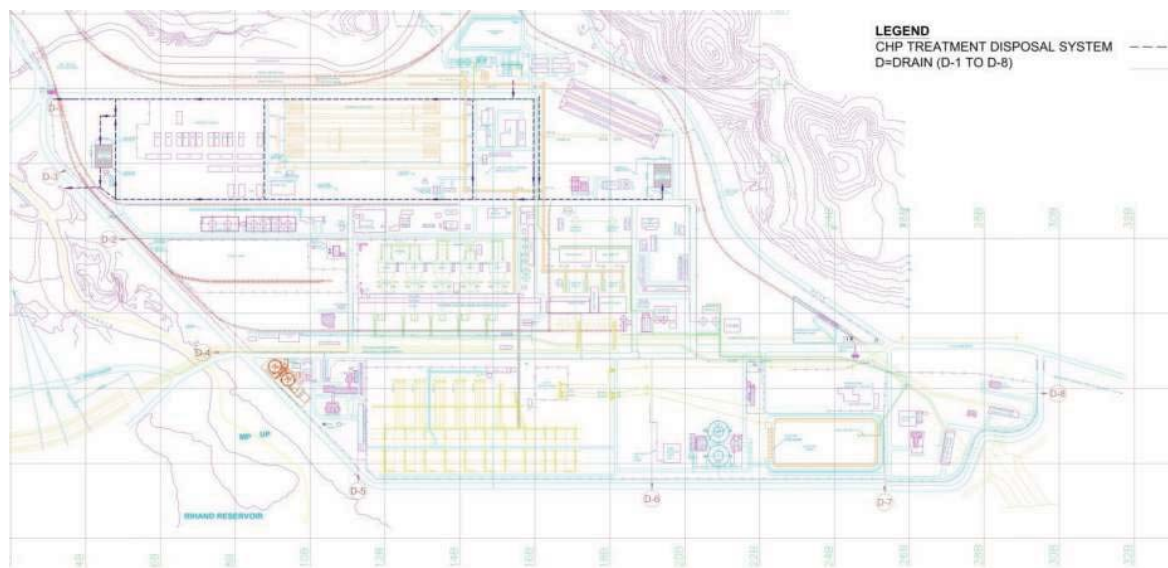


Figure 6.2 Existing drains and eight outfalls (D1 to D8)

Table 6.2 Runoff contributing area of existing drains

No.	Existing Project facilities	Drain	Invert level at outfall	Outfall(ref figure 6.2)	Location of outfall
1	Area between track hoppers and Central stores, area between track hoppers and CHP area, space for truck parking, CR house ST-I, CR house ST-II,O&M store	D1	273.65	D1	Adjacent to Balia nala
2	The effluent of existing CSSP, part of central stores area south of CHP	D3	273.8	D3	Adjacent to Balia nala
3	Steelyard, FD tank stage I and Stage II, Fire station, ash sump, ASG room, auxiliary boiler	D2	274.16,274.16	D2	Adjacent to Balia nala
4	Power house main building stage I, area north of hot water discharge channel	D4	273.76,273.76	D4	Adjacent to Balia nala
5	ADM building, open space ,part of switch yard area	D5	273.67,273, 273.58	D5	Rihand reservoir
6	Switch yard, main power house stage II, open land in vicinity of LWTP,CCF3,CCF4,effluent of LWTP	D6	272.8,273.5,	D6	Rihand reservoir
7	Open land in vicinity of auxiliary pond	D7	273(approx.)	D7	Rihand reservoir
8	Kota basti, Area in vicinity of CW pump house and Forebay of intake pump house	D8	273(approx.)	D8	Rihand reservoir

6.5 DRAINAGE ZONES FOR STAGE III PLANT

Partitioning of area and provision of separate outfalls for different zones helps in reducing the size of drains and hence cost of land. Some of the existing facilities of stages I and II (such as central stores, existing CSSP, rail tracks, steel yard etc.) in the land allocated for stage III shall be dismantled and new facilities as required for stage III shall be constructed. It is possible to incorporate some part of the existing drains into drainage plan of stage III plant.

Considering these aspects, the stage III plant area is partitioned into the following five zones as given in Table 6.3 and Figure 6.3.

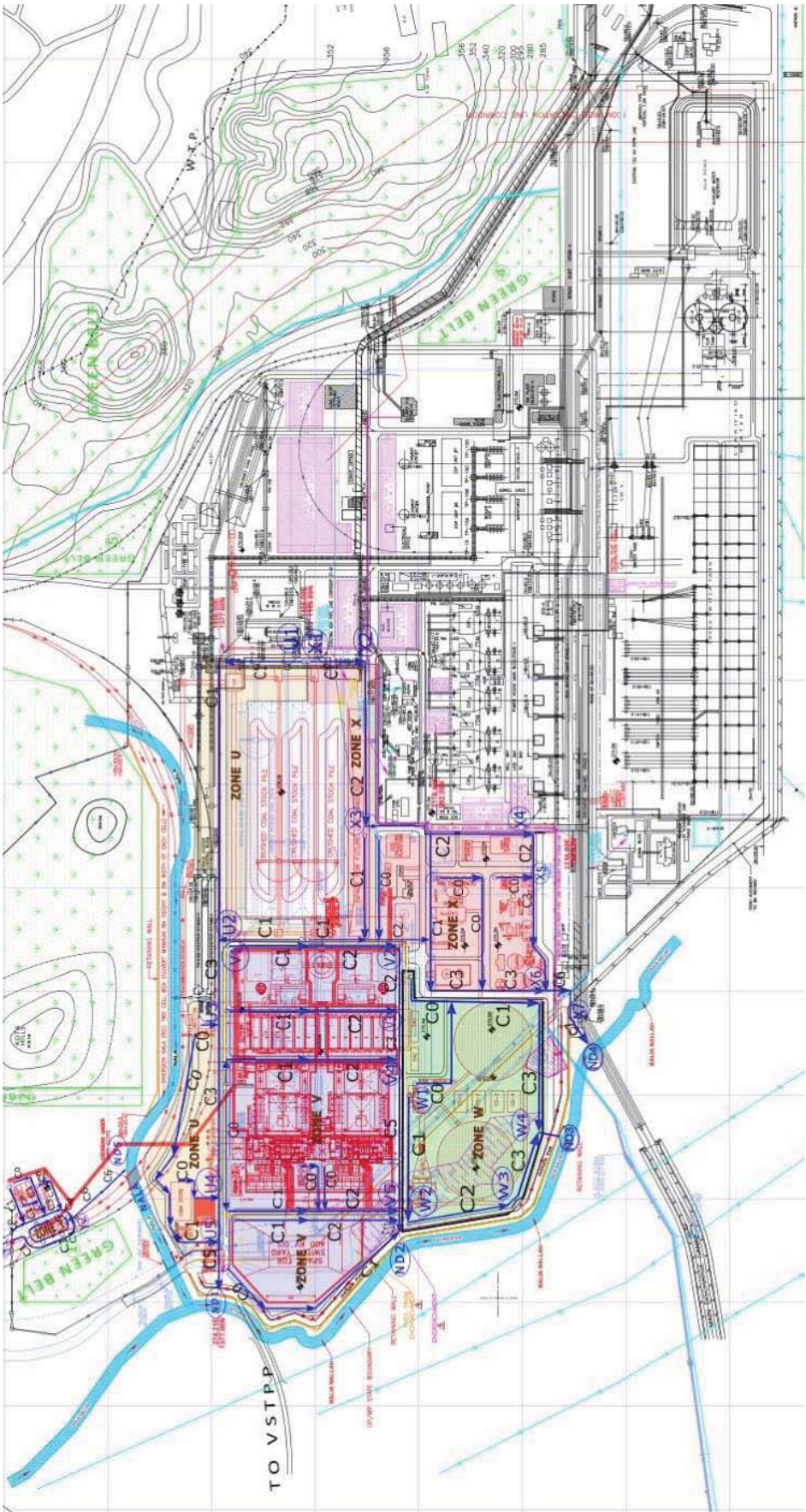


Figure 6.3 Stage III plant area partitioned into five zones

Table 6.3: Partition of Stage III Project Area into Drainage Zones

Zone	Project Facilities	Outfall Location	Invert level of the drain at outfall*	Natural Drain	Remark
U	Area between track hoppers and stage III plant, area between track hoppers and CHP , Safety park, O&M store, construction offices area in vicinity of CHP carrying storm runoff (excluding coal slurry and its effluent from CSSP)	ND1	274	Balia nala	Size of drain D1 is not changed. existing outfall D1 is dismantled and new outfall ND1 is created
V	Switch yard and main plant area of stage III project	ND2	273	Balia nala	Existing outfall D3 and trunk drain D3 shall be dismantled.
W	SWGR room, CAC,CT area, CS1,CS2,CS3,CS4,	ND3	273	Balia nala	There are no existing drain in this zone
X	Space for future lime handling(near CHP)) and part of CHP (excluding coal slurry effluent), area of BASPH, Clarifiers, settling tanks, clarifiers, gypsum storage etc	ND4	272.3	Balia nala	Outfall ND4 is adjacent to existing outfall ED4
Y	Ash silos, utility building, MCC Silo, Bagging plant, XEMR etc	ND5	277 (approx)	Diversio n nala in north	

Note: * see also Figure 6.3 and see table 6.10 for the invert level at outfalls

6.6 PROPOSED DRAINAGE SCHEME FOR STAGE III PLANT

Following drainage scheme is proposed.

- i) Drain going to existing outfall D1 is retained throughout its length and extended upto the location of new outfall ND1(zone U in figure 6.3).
- ii) The area occupied by CHP of stage I shall be utilized for creating CHP facility of stage III. Drains within CHP area shall carry coal slurry to new coal slurry settling pond(CSSP) and effluent shall be processed and recycled for use.
- iii) For the main plant area and switch yard, drains and new outfall ND2 are proposed(zone V). Drain and the existing outfall D3 lying within the stage 3 main plant shall be removed. However part of this drain in CHP area (zone U)) may be retained to function as storm water drain in place of coal slurry effluent carrying drain.
- iv) The drain and the existing outfall D2 in CT area((CS1 to CS4) shall be removed. New drains and new outfall ND3 are proposed to carry runoff from CT area(zone W in figure 6.3).
- v) New drains and new outfall ND4 (adjacent to existing outfall D4) are proposed to carry runoff from part of CHP area and area of BASPH, Clarifiers, settling tanks etc
- vi) Storm runoff from CHP vicinity area shall be carried by storm water drains partly to outfall ND1 and partly to ND4.
- vii) The layout and capacity of the drains serving the township area and some of the stage I and stage III components (D5 to D8)shall remain as such without any change. However, there is an urgent need to improve maintenance(particularly removal of weeds and garbage) of these drains and the related outfalls. Table 6.3 shows proposed modification in existing drainage network.
- viii) No change is proposed in the drainage network ending with outfalls D5, D6, D7, D8 as it is not affected by the location of Stage III project as shown in figure 6.2.

6.7 DESIGN DISCHARGE

6.7.1 Design Considerations

The drainage layout has been planned based on the following considerations:

- (i) Return period of **50 years** has been considered in drainage design.

- (ii) Bed slope of drains is kept such that flow is carried with sufficient velocity so that silting does not occur in channels and also so that channel invert levels are not in deep cutting.
- (iii) Concrete channels of rectangular shape are proposed for the drains.
- (iv) Minimum width of drains is kept near about 0.7 m considering convenience of construction.
- (v) Vertical falls shall be provided to negotiate difference if any in formation levels of various components and at the outfall locations.
- (vi) Channel slope, length, bed width are worked out such that capacity utilization in each of the channel segment (ratio of discharge contributed by connecting sub-catchments to the channel carrying capacity) is near to 1.0. However, in few channel segments this requirement may have to be compromised based on flow hydraulics and drainage layout considerations.

6.7.2 Design Discharge for Internal Drainage

The topography of project site is plain. The land use and topography in the project area will get modified with implementation of stage III project. However, the net effect of changes in land use, land cover and topography in post project condition shall be negligible. Part of the area such as road, main plant area, etc. will become less pervious. This will cause more storm runoff. On the other hand, infiltration in the open land and green belt area shall increase and hence storm runoff shall reduce. The flood generated by storm rainfall is expected to be same as for pre project condition.

The procedure for estimation of design flood has been explained in chapter 5. Specific discharge has been estimated as in section 5.4 of chapter 5. Internal drains in various zones are designed considering specific discharge of 0.24354 cumec/ha (corresponding to 50 year return period).

6.8 CARRYING CAPACITY AND DESIGN OF CHANNEL SECTIONS

6.8.1 Channel Sections

Manning's roughness coefficient(n) is taken as 0.016 for concrete channel.

Bed slope: Bed slope of 1:1000 has been considered for internal drainage channels. However, the end channels connecting to outfall in each zone can be laid at steeper slope as sufficient natural gradient is available.. The bed level of Balia nala all along the boundary of

the plant area is significantly lower than FGL of the stage III plant area. Even when there is large back water effect in Balia nala due to FRL/MWL in the Rihand reservoir, the outfalls would continue to function under free flow condition.

As per original design, the Minimum draw down level (MDDL), FRL and MWL in Rihand reservoir were 236.22m(775ft), 268.224(880ft) and 271.52m(890.8ft). Considering safety these have been revised. Revised FRL is 265.18m and Minimum draw down level (MDDL) is 252.98m(830ft)(Ref: IITR(2019) study sponsored by NTPC))

Depth of flow in a channel section: a resistance formula proposed by Robert Manning for uniform flow in open channel is used.

$$V(m/s) = \frac{1}{n} \times R^{2/3} \times S^{1/2}; R = A/P$$

$$Q = A \times V$$

where:

- V is the velocity (m/s),
- S is the slope of channel = h_L/L
- R is hydraulic mean depth (=A/P)
- A is cross section area (m^2)
- P is perimeter (m) and,
- n is Manning's roughness coefficient (=0.016 for concrete lined channel).
- Q is the discharge (m^3/sec)

For rectangular section:

$$A = B \times D$$

$$P = B + 2D$$

$$R = A/P = (B \times D)/(B + 2D)$$

$$\text{and section factor } \frac{Q n}{\sqrt{S}} = A R^{2/3} = \frac{(B \times D)^{5/3}}{(B + 2D)^{2/3}}$$

For given Q, n, and s, the width and depth of the channel are adjusted so that above equation is satisfied. Depth of flow is constrained by the invert level of outfall and the FGL of the

contributing catchment area. To carry maximum flow through a given cross section area, depth of flow (D) should be near about half of the width (B) of section.

6.8.2 Carrying Capacity of Channel Segments

It is not necessary that a long drain should have same discharge carrying capacity over its length to carry the discharge generated from its catchment. In order to economize the cost and area occupied by drains, a suitable number of channel segments may be considered. A unit length of approximately 200 m has been considered for a channel segment and its own contributing catchment is taken to be about 4 hectare (200m× 200m). Thus first channel segment of approximate 200 m length (named C1) receives runoff from 4 hectare area. And subsequent channels C2,C3 and so on receive total runoff from 8 ha,12 ha etc. Discharge contributed by catchment of a channel segment is added to the capacity of its upstream channel segment (s) to estimate carrying capacity of the particular channel segment. Drainage map of entire area is presented in Figure 6.4. Figures 6.5 to Figure 6.9 show the layout of drains in U,V,W ,X,Y zones. Drains are numbered as C0,C1,C2 etc Size of the rectangular drains(bed width(B) and depth of flow(D) with specific identification number are worked out such that following equation is nearly satisfied. Width of channel C0,C1,C2 is kept as 0.7m

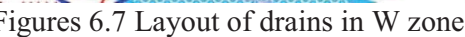
considering the construction feasibility . section factor $\frac{Q_n}{\sqrt{S}} = AR^{2/3} = \frac{(B \times D)^{5/3}}{(B + 2D)^{2/3}}$

Table 6.4 shows the size of drains.

Table 6.4: Design of Channel Sections

Sl. No.	Channel Name	Catchment Area(ha)	Carrying Capacity	Manning (n)	Slope	Section factor (Qn/(S) ^{1/2})	Bed Width	Depth (m)
1	C1	4	0.974	0.016	0.001	0.493	0.70	0.25
2	C2	8	1.948	0.016	0.001	0.986	0.70	0.25
3	C3	12	2.922	0.016	0.001	1.478	0.90	0.45
4	C4	16	3.896	0.016	0.001	1.971	1.35	0.70
5	C5	20	4.870	0.016	0.001	2.464	1.80	1.00
6	C6	24	5.844	0.016	0.001	2.957	2.30	1.30
7	C7	28	6.818	0.016	0.001	3.450	3.50	1.50
8	C8	32	7.792	0.016	0.001	3.942	4.00	1.80
9	C9	36	8.766	0.016	0.001	4.435	4.50	2.10
10	C10	40	9.740	0.016	0.002	3.485	3.50	1.70
11	C0	1	0.244	0.016	0.001	0.123	0.70	0.20







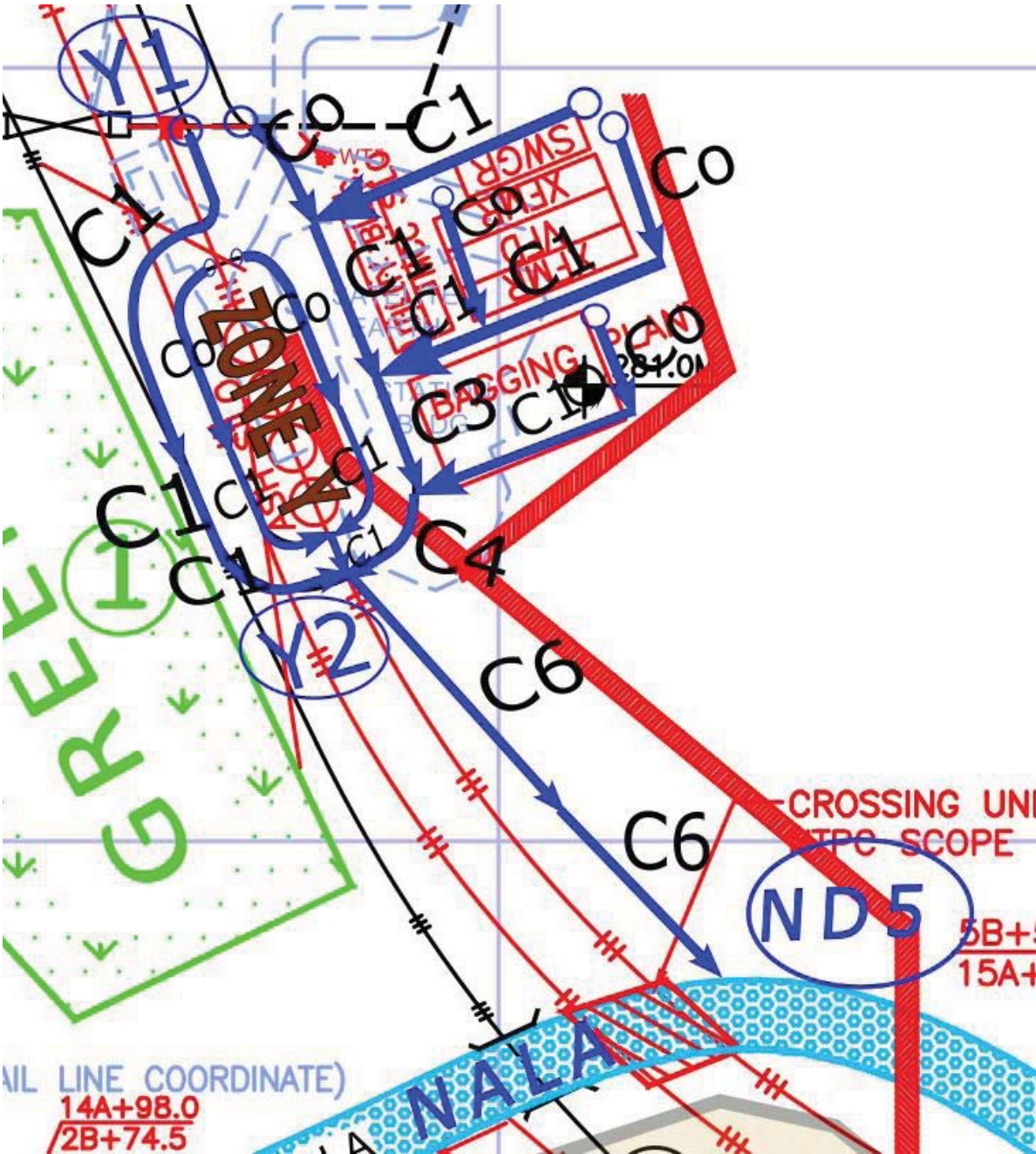


Figure 6.9 Layout of drains in Y zone

6.9 INVERT LEVEL OF CHANNELS LYING ON LONGEST FLOW PATH

Longest flow path is the path followed by gravity flow from farthest point of drain to outfall. Invert levels of channel segments lying on the longest path will help to lay the main drain on desired slope and to adjust layout of the lateral channels at junctions. Lateral channels at junction point with the main drain (on longest path) shall have invert level of end node equal to or higher than the invert level of end node of the channel segment on main drain. Longest flow path in the four zones (U,V,W,X) are shown in figures 6.5 to figure 6.8.

Longest path in zone U: u1-u2-u3-u4-ND1

Longest path in zone V: v1-v2-v3-v4-v5-ND2

Longest path in zone W: w1-w2-w3-w4-ND3

Longest path in zone X: x1-x2-x3-x4-x5-x6-x7-ND4

Longest path in zone Y: y1-y2-ND5

Tables 6.5 to 6.9 show the channel segments along the longest path the and computation of invert levels in the different channel segments.

The invert level of the end channels connecting to new outfalls (ND1,ND2,ND3,ND4)on Balia nala should be below road level and should be above HFL in the Balia nala. The plant layout map shows that elevation of the roads is at or above 275.5m amsl. The high flood level in Balia Nala is near about FSL/MWL of Rihand reservoir.

The bed level of Balia Nala all along the boundary of the plant area is significantly lower than FGL of the stage III plant area. Even when there is a large backwater effect in Balia Nala due to FRL/MWL in the Rihand reservoir, the outfalls would continue to function under free flow conditions.

Table 6 .5: Invert Levels of Channel along Longest Flow Path (Main Drain) in U Zone

Channel segment along longest path	Referen ce to channel section in table 6.4	Lengt h (m)	Slope	Drop in bed level (m)	Invert Level(m)		FGL of surrounding area (m)	Depth of flow in Channel (m)	FSL of flow at end node (m)
					Initial node	End node			
U1-U2	C2	500	0,001	0.5	275.25	274.75	276.0	0.25	275.0
U2-U3	C3	100	0.001	0.1	274.75	274.65	276.0	0.45	275.1
U3-U4	C3	350	0.001	0.35	274.65	274.3	276.0	0.45	274.75
U4-U5	C4	100	0.001	0.1	274.3	204.2	276.0	0.7	274.9
U5-ND1	C5	200	0.001	0.2	274.2	274.0	276.0	1.0	275.0

Table 6 .6: Invert Levels of Channel along Longest Flow Path (Main Drain) in V Zone

Channel segment along the longest path	Referen ce to the channel section in Table 6.4	Lengt h (m)	Slope	Drop in bed level (m)	Invert Level (m)		FGL of the surrou nding area (m)	Depth of flow in Channel (m)	FSL of flow at end node (m)
					Initial node	End node			
V1-V2	C1	370	0.001	0.37	275.25	274.88	276.0	0.25	275.13
V2-V3	C2	125	0.001	0.125	274.88	274.755	276.0	0.25	275.005
V3-V4	C3	110	0.001	0.11	274.755	274.645	276.0	0.45	275.095
V4-V5	C5	325	0.001	0.325	274.645	274.32	276.0	1.0	275.32
DROP of 1 m at V5									
V5-ND2	C10	80	0.002	0.16	273.32	273.16	276.0	1.7	274.86

Table 6 .7: Invert Levels of Channel along Longest Flow Path (Main Drain) in W Zone

Channel segment along longest path	Referen ce to channel section in table 6.4	Lengt h (m)	Slope	Drop in bed level (m)	Invert Level(m)		FGL of surrou nding area (m)	Depth of flow in Channel (m)	FSL of flow at end node (m)
					Initial node	End node			
W1-W2	C1	325	0.001	0.325	274.75	274.425	275.5	0.25	274.675
W2-W3	C2	250	0.001	0.25	274.425	274.175	275.5	0.25	274.425
W3-W4	C3	200	0.001	0.2	274.175	273.975	275.5	0.45	274.425
DROP OF 1 m at W4									
W4-ND3	C6	50	0.001	0.05	272.975	272.925	275.5	1.3	274.225

Table 6 .8: Invert Levels of Channel along Longest Flow Path (Main Drain) in X Zone

Channel segment along longest path	Referen ce to channel section in table 6.4	Lengt h (m)	Slope	Drop in bed level (m)	Invert Level(m)		FGL of surround ing area (m)	Depth of flow in Channel (m)	FSL of flow at end node (m)
					Initial node	End node			
X1-X2	C1	150	0.001	0.15	275.25	275.1	276	0.25	275.35
X2-X3	C2	375	0.001	0.375	275.1	274.725	276	0.25	274.975

DROP OF 0.5 m at X3(FGL changes from 276 to 275.5)									
X3-X4	C2	400	0.001	0.4	274.22 5	273.82 5	275.5	0.25	274.075
X4-X5	C2	100	0.001	0.1	273.82 5	273.72 5	275.5	0.25	273.975
X5-X6	C3	250	0.001	0.25	273.72	273.47	275.5	0.45	273.92
DROP of 1m at X6									
X6-X7	C6	100	0.001	0.1	272.47	272.37	275.5	1.3	273.67
X7-ND4	C7	100	0.001	0.1	272.37	272.27	275.5	1.5	273.77

Table 6 .9: Invert Levels of Channel along Longest Flow Path (Main Drain) in Y Zone

Channel segment along longest path	Reference to channel section in Table 6.4	Length (m)	Slope	Drop in bed level (m)	Invert Level(m)		FGL of surrounding area (m)	Depth of flow in Channel (m)	FSL of flow at end node (m)
					Initial node	End node			
Y1-Y2	C1	180	0.001	0.18	279.2 5	279.07	280.0	0.25	279.5
DROP of 2m at Y2									
Y2-ND5	C6	120	0.001	0.12	277.0 7	276.95	279.0	1.3	278.25

6.10 VERTICAL FALLS

Invert levels of channel segments on longest path in each zone have been worked out in the previous section. Vertical drop in invert level have been provided at suitable locations as shown in the tables. Well type fall (also called cylinder fall) is suitable and economical for large height fall and small discharge. The water is dropped into a well over a crest from where it emerges near the bottom dissipating its energy in turbulence inside the well. For low height fall and large discharge, crest weir over full width of channel is suitable. Location and size of vertical falls in all zones are given in Table 6.10.

Table 6.10 Location and Size of Falls in all Zones

Zone	Channel segment	Channel size	Location in figure	Drop Height (m)	Discharge (cumec)	Fall type	Width(m)
V	V4-V5	C5	V5	1	4.87	Crest weir	3.5
W	W3-W4	C3	W4	1	2.922	Crest weir	0.9
X	X2-X3	C2	X3	0.5	1.948	Crest weir	0.7

X	X5-X6	C3	X6	1	2.922	Crest weir	0.9
Y	Y1-Y2	C1	Y2	2	0.974	Well type	0.7

Lateral channels at junction point with the main drain (on longest path) have invert level of end node equal to or higher than the invert level of end node of the channel segment on main drain. The channels are designed with longitudinal slope as 1:1000. Since level difference is small less than 1 m, there is no need for vertical falls for lateral channels.

6.11 OUTFALLS

The invert level of the end channel connected with the outfall ND1,ND2,ND3, ND4 and ND5 in zone U, V, W, X, Y have been worked out in section 6.9. At these outfalls, there is large drop to the receiving nala. Such drop has to be negotiated through stepped falls along with energy dissipation blocks. The design of the stepped fall should be based on a recent topographic survey of the Balia nala, diversion nala and vicinity.

Table 6.11 Location and Size of Outfalls in all Zones

Zone	Outfall	Invert level at outfall(m)	Approx Bed level of Balia nala [#] (m)	Approx Drop Height (m)	Connecting channel	Discharge (cumec)	Fall type	Width (m)
U	ND1	274.0	260.0	14m	C5	4.87	Stepped	1.8
V	ND2	274.16	260.0	14 m	C10	9.74	Stepped	3.5
W	ND3	273.925	260.0	14 m	C6	5.844	Stepped	2.3
X	ND4	273.27	260.0	14 m	C7	6.818	Stepped	3.5
Y	ND5	276.95	274.0	3m	C6	5.844	stepped	2.3

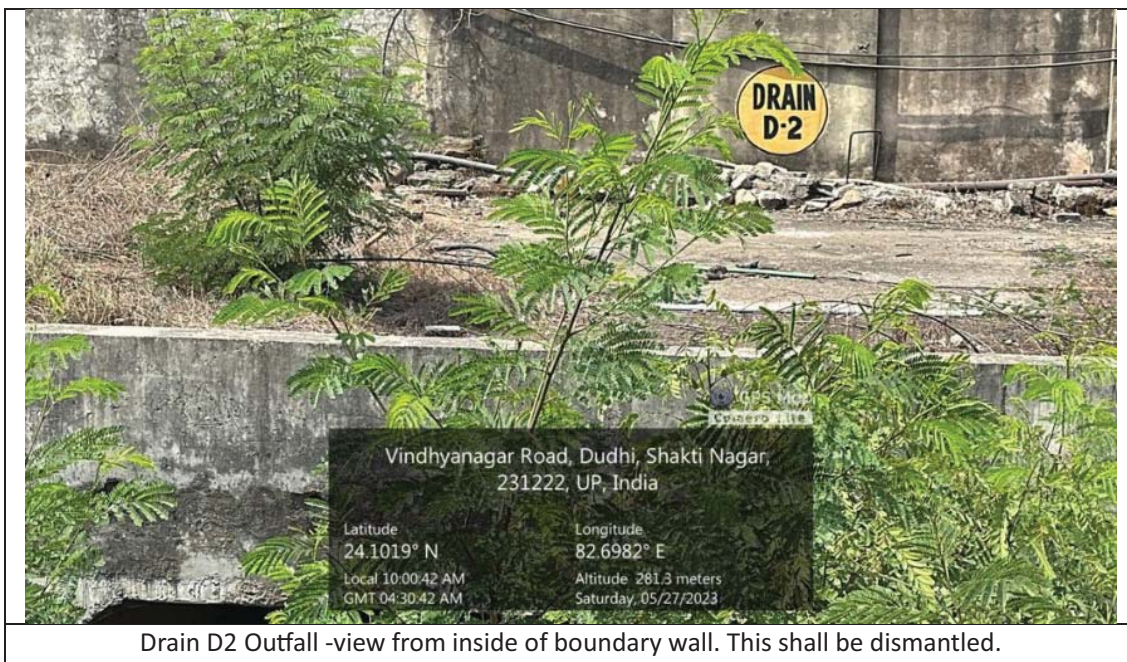
Note: # assumed bed level of Balia nala and diversion nala at the location of outfalls are 260.0m and 274.0 m respectively.

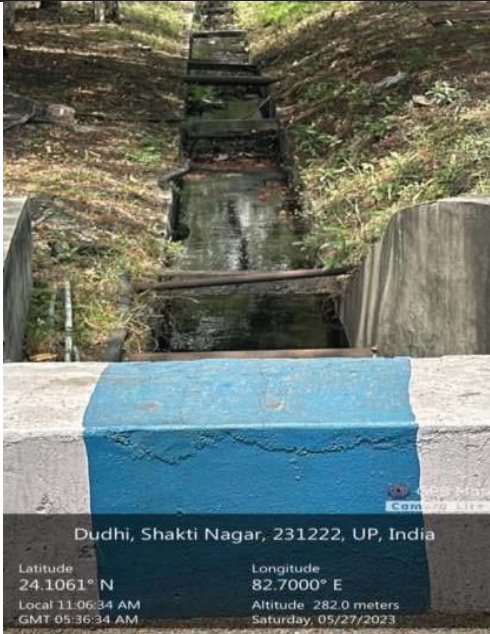
ANNEXURE-I

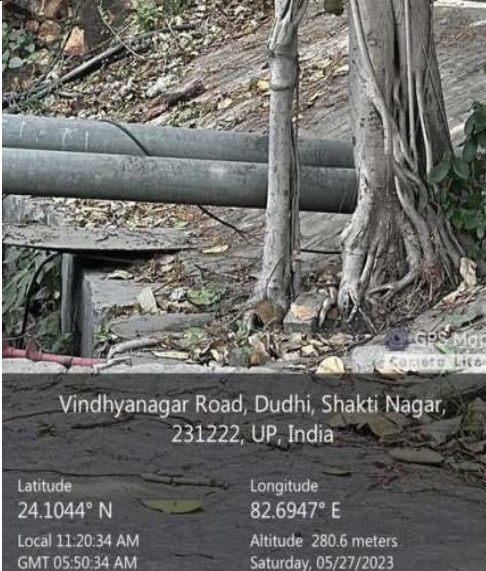
Reconnaissance survey of existing drains in the plant area of Singrauli STPS stage I and II was carried out during field visit on 27th May, 2023 . Visual observations have been depicted in the photo graphs given below. A brief explanation is also given for each photograph . Approx longitude, latitude and altitude, date and time of the visual observation as observed through GPS are indicated in the photographs.

 Dudhi, Shakti Nagar, 231222, UP, India Latitude 24.0994° N Longitude 82.7050° E Local 09:33:40 AM Altitude: 279.1 meters GMT 04:03:40 AM Saturday, 05/27/2023	 Dudhi, Shakti Nagar, 231222, UP, India Latitude 24.0994° N Longitude 82.7050° E Local 09:33:54 AM Altitude: 279.5 meters GMT 04:03:54 AM Saturday, 05/27/2023
D5 Main Drain. This shall remain for drainage of stage I & II plant area	D5 Main Drain. This shall remain for drainage of stage I & II area

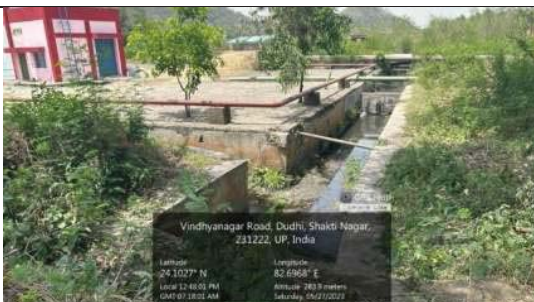
 Dudhi, Shakti Nagar, 231222, UP, India Latitude 24.1010° N Longitude 82.7042° E Local 09:39:24 AM Altitude 278.6 meters GMT 04:09:24 AM Saturday, 05/27/2023	 Dudhi, Shakti Nagar, 231222, UP, India Latitude 24.1036° N Longitude 82.7033° E Local 09:55:06 AM Altitude 282.0 meters GMT 04:25:06 AM Saturday, 05/27/2023
D4 Drain inside plant area. This shall remain for drainage of stage I & II area	Drain D4 Near the fire station. This shall remain for drainage of stage I & II area
 Dudhi, Shakti Nagar, 231222, UP, India Latitude 24.1035° N Longitude 82.7032° E Local 09:47:10 AM Altitude 280.5 meters GMT 04:17:10 AM Saturday, 05/27/2023	
D2-D4 Drain Junction in side plant area. This shall be dismantled	

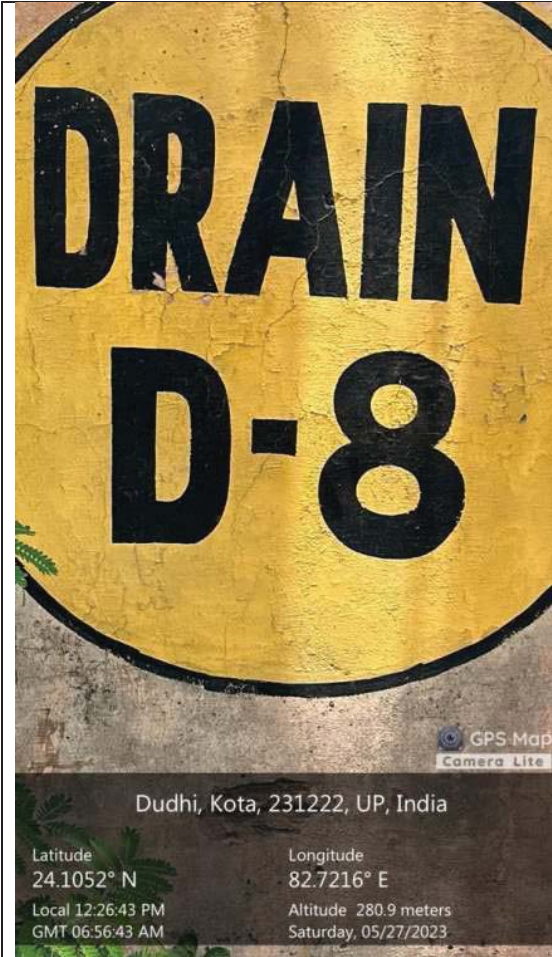
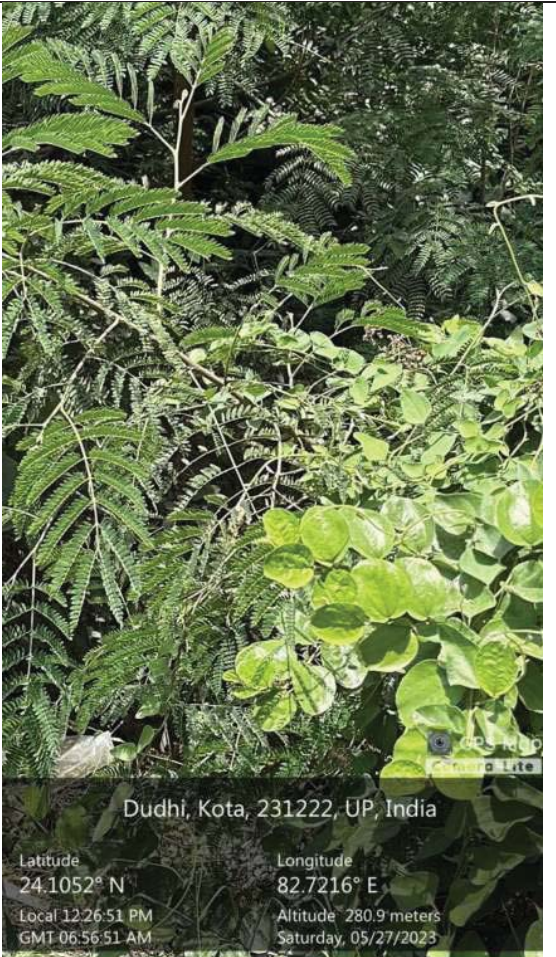


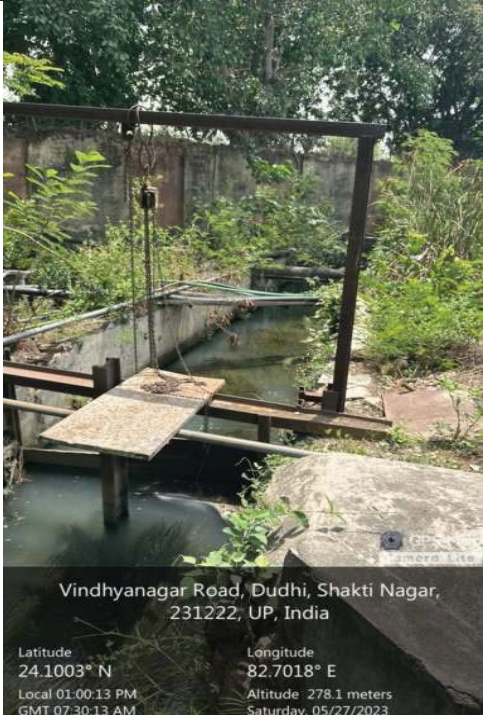
 Dudhi, Shakti Nagar, 231222, UP, India Latitude: 24.1028° N Longitude: 82.6979° E Local 10:14:29 AM Altitude: 280.7 meters GMT 04:44:29 AM Saturday, 05/27/2023	 Dudhi, Shakti Nagar, 231222, UP, India Latitude: 24.1027° N Longitude: 82.6976° E Local 10:17:30 AM Altitude: 280.6 meters GMT 04:47:30 AM Saturday, 05/27/2023
Drain D3 inside plant area. This shall be dismantled	Drain D3 inside plant area. This shall be dismantled
 Dudhi, Shakti Nagar, 231222, UP, India Latitude: 24.1061° N Longitude: 82.7000° E Local 11:06:34 AM Altitude: 282.0 meters GMT 05:36:34 AM Saturday, 05/27/2023	 Dudhi, Shakti Nagar, 231222, UP, India Latitude: 24.1061° N Longitude: 82.7000° E Local 11:06:52 AM Altitude: 282.8 meters GMT 05:36:52 AM Saturday, 05/27/2023
Drain D1 near Central Store . This shall be retained and extended upto new outfall	Drain D1 near Central Store. This shall be retained and extended upto new outfall

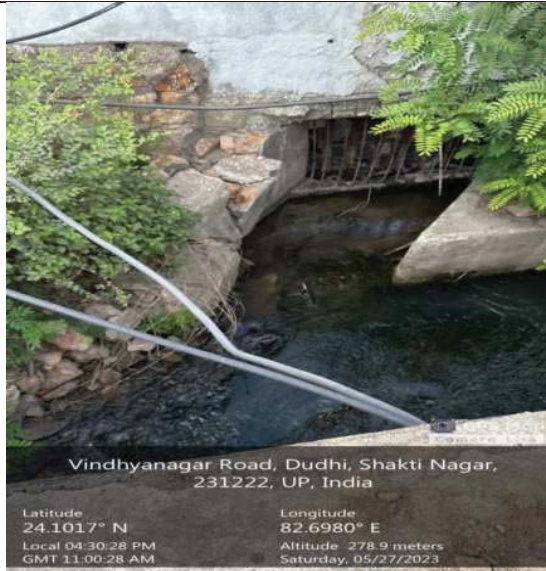
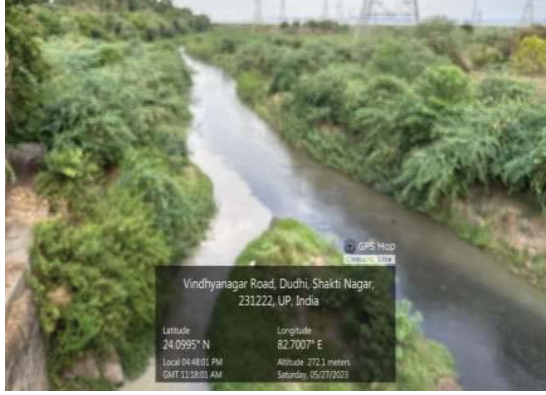
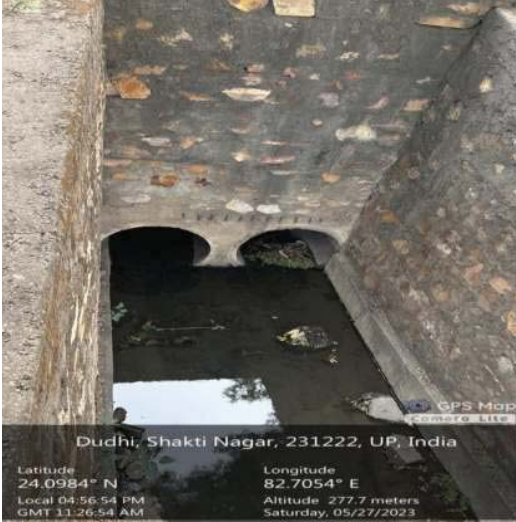
 Vindhyanagar Road, Dudhi, Shakti Nagar, 231222, UP, India Latitude: 24.1044° N Longitude: 82.6947° E Local 11:20:34 AM Altitude: 280.6 meters GMT 05:50:34 AM Saturday, 05/27/2023	 Vindhyanagar Road, Dudhi, Shakti Nagar, 231222, UP, India Latitude: 24.1044° N Longitude: 82.6947° E Local 11:20:34 AM Altitude: 280.6 meters GMT 05:50:34 AM Saturday, 05/27/2023
Outfall Drain D1 near BHEL gate-view from inside boundary wall	Outfall Drain D1 near BHEL gate-view from inside boundary wall
 Vindhyanagar Road, Dudhi, Shakti Nagar, 231222, UP, India Latitude: 24.1053° N Longitude: 82.6941° E Local 11:26:26 AM Altitude: 279.4 meters GMT 06:55:53 AM Saturday, 05/27/2023	 Dudhi, Shakti Nagar, 231222, UP, India Latitude: 24.1061° N Longitude: 82.6990° E Local 11:36:26 AM Altitude: 282.8 meters GMT 06:06:26 AM Saturday, 05/27/2023
Diversion nala north of Track hoppers of stage I and II. This shall be shifted up to create space for track hopper of stage III to be realigned	Track hopper stage 1

 Dudhi, Shakti Nagar, 231222, UP, India Latitude 24.1006° N Longitude 82.7131° E Local 12:05:05 PM Altitude 277.8 meters GMT 06:35:05 AM Saturday, 05/27/2023	 Dudhi, Shakti Nagar, 231222, UP, India Latitude 24.1007° N Longitude 82.7131° E Local 12:05:16 PM Altitude 277.7 meters GMT 06:35:16 AM Saturday, 05/27/2023
Outfall Drain D6 into Rihand Reservoir-view from inside of boundary wall. This shall be retained for drainage of stage I&II area	Outfall Drain D6 into Rihand Reservoir-view from inside of boundary wall. This shall be retained for drainage of stage I&II area
 Dudhi, Shakti Nagar, 231222, UP, India Latitude 24.1007° N Longitude 82.7132° E Local 12:05:05 PM Altitude 278.4 meters GMT 06:35:05 AM Saturday, 05/27/2023	 Dudhi, Shakti Nagar, 231222, UP, India Latitude 24.1025° N Longitude 82.7187° E Local 12:13:28 PM Altitude 278.8 meters GMT 06:43:28 AM Saturday, 05/27/2023
LWTP and Storm Drain 6 to Reservoir. This shall be retained for drainage of stage I&II area	Outfall Drain D7. This shall be retained for drainage of stage I&II area

 Dudhi, Kota, 231222, UP, India Latitude 24.1026° N Longitude 82.7187° E Local 12:14:01 PM Altitude 279.6 meters GMT 06:44:01 AM Saturday, 05/27/2023	 Dudhi, Shakti Nagar, 231222, UP, India Latitude 24.1025° N Longitude 82.7187° E Local 12:13:36 PM Altitude 278.7 meters GMT 06:43:36 AM Saturday, 05/27/2023
Outfall Drain D7. This shall be retained for drainage of stage I&II area	Outfall Drain D7. This shall be retained for drainage of stage I&II area
 Vindhyanager Road, Dudhi, Shakti Nagar, 231222, UP, India Latitude 24.1027° N Longitude 82.6968° E Local 12:48:01 PM Altitude 283.9 meters GMT 07:18:01 AM Saturday, 05/27/2023	 Dudhi, Shakti Nagar, 231222, UP, India Latitude 24.1003° N Longitude 82.7018° E Local 12:50:11 PM Altitude 277.7 meters GMT 07:20:11 AM Saturday, 05/27/2023
D1 Joining D3 near LWTP-10 near boundary wall	Outfall drain D4-from inside boundary wall. This shall be retained for drainage of stage I&II area

 Dudhi, Kota, 231222, UP, India Latitude 24.1052° N Longitude 82.7216° E Local 12:26:43 PM Altitude 280.9 meters GMT 06:56:43 AM Saturday, 05/27/2023	 Dudhi, Kota, 231222, UP, India Latitude 24.1052° N Longitude 82.7216° E Local 12:26:51 PM Altitude 280.9 meters GMT 06:56:51 AM Saturday, 05/27/2023
Drain D8 outfall into Rihand Reservoir. This shall be retained for drainage of stage I&II area	Drain D8 outfall into Rihand Reservoir. This shall be retained for drainage of stage I&II area
 Vindhyanager Road, Dudhi, Shakti Nagar, 231222, UP, India Latitude 24.1025° N Longitude 82.6966° E Local 12:45:00 PM Altitude 280.3 meters GMT 07:13:30 AM Saturday, 05/27/2023	 Vindhyanager Road, Dudhi, Shakti Nagar, 231222, UP, India Latitude 24.1025° N Longitude 82.6966° E Local 12:45:00 PM Altitude 280.3 meters GMT 07:13:30 AM Saturday, 05/27/2023
Drain D3- view from outside of boundary wall. This shall be dismantled	Drain D3- view from outside of boundary wall. This shall be dismantled

	 Vindhyanagar Road, Dudhi, Shakti Nagar, 231222, UP, India Latitude 24.1003° N Longitude 82.7018° E Local 01:00:13 PM Altitude 278.1 meters GMT 07:30:13 AM Saturday, 05/27/2023
Outfall drain D4- view from outside of boundary wall	Outfall drain D4- view from outside of boundary wall
 Vindhyanagar Road, Dudhi, Shakti Nagar, 231222, UP, India Latitude 24.1040° N Longitude 82.6945° E Local 04:04:20 PM Altitude 282.7 meters GMT 10:34:20 AM Saturday, 05/27/2023	 Vindhyanagar Road, Dudhi, Shakti Nagar, 231222, UP, India Latitude 24.1024° N Longitude 82.6963° E Local 04:24:44 PM Altitude 282.2 meters GMT 10:54:44 AM Saturday, 05/27/2023
Outfall of Drain D1 near BHEL GateView from outside of boundary wall	Outfall D3- view from outside of boundary wall

	 Vindhyanagar Road, Dudhi, Shakti Nagar, 231222, UP, India Latitude 24.1017° N Longitude 82.6980° E Local 04:30:28 PM Altitude 278.9 meters GMT 11:00:28 AM Saturday, 05/27/2023
Outfall D4 on to Balia nala. View from outside of boundary wall	Outfall D2-view from outside of boundary wall
	 Vindhyanagar Road, Dudhi, Shakti Nagar, 231222, UP, India Latitude 24.0995° N Longitude 82.7007° E Local 04:48:01 PM Altitude 272.1 meters GMT 11:18:01 AM Saturday, 05/27/2023
Balia nala u/s view from road bridge.	Balia nala d/s view from road bridge
 Dudhi, Shakti Nagar, 231222, UP, India Latitude 24.0984° N Longitude 82.7054° E Local 04:56:54 PM Altitude 277.7 meters GMT 11:26:54 AM Saturday, 05/27/2023	
Outfall D5 View from outside boundary wall	

A Report

On Scanning of underground facilities by Ground penetrating Radar (GPR) for SINGRAULI-III

Client Name: NTPC Limited (SINGRAULI SUPER THERMAL POWER STATION)

Work Order No. 5500041640-002-1004 Dated: 15/11/2022

NIT No. 9900248964/002/1004 Dated 11.11.2022

Done By:
Quantum Integrated Technical Solutions
Faridabad

Regd. Office: B-91, 2nd floor, Greenfield's colony
Faridabad, Haryana - 121010
Email: info@qitsolutions.in



Signature	QiT Solutions Representative	
	Pramod Kumar 9319378872	Quantum Integrated Technical Solutions  Proprietor

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4. Study Areas with Remarks

5. PDF Reports

1. Standard Methodology of Ground Penetrating Radar (GPR): including

Underground Utility Survey and Cable & Pipe locator.

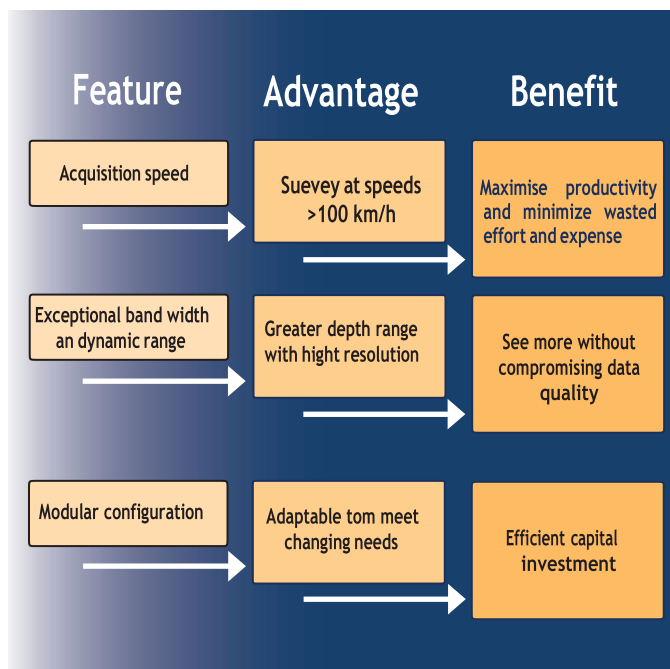
For doing GPR survey or we can say underground utility survey based on two different technologies or combinations of technologies, where we need to use one most important equipment as GPR (Ground Penetrating Radar) and second is Cable & Pipe Locator. So which equipment we will use on site and how do we do it on ground: we trying to explain here to give some brief idea about it.

1.1 CrossOver1760 Impulse Radar Sweden Ground Penetrating Radar

We use advance technologies for **Ground Penetrating Radar (GPR)** to have **dual Frequencies** to detect and map all of the information from Sub-surface. Deliverables include AutoCAD drawings of underground cables and pipes networks and detailed reports.

- GPR Principle & Its applications
- Technical Limitations of Ground Penetrating Radar

We use CrossOver1760 Impulse Radar Sweden, a special GPR to get good accuracy and capable to penetrate in even wet Soil.



CrossOver benefits

Real-Time-Sampling (RTS) based GPR antenna designs have much better performance (increased dynamic range, sensitivity and depth penetration) than conventional GPR antenna designs. Impulse Radar's revolutionary dual-channel GPR antenna design takes it to the next level. The unique range of dual-channel solutions reduces the need for investments in multiple single-channel antennas to achieve the same objectives. Whilst the high-speed performance increase sees productivity.

An Android-driven user interface offers flexibility in your choice of the acquisition and control.

ImpulseRadar CrossOver C01760 Antenna

Frequency: LF: 170 MHz | HF: 600 MHz

Dimensions: 695 x 445 x 205 mm

Weight: 9.5 kg (including battery)

Depth range: down to 10m*



- **GPR PRINCIPLE: -**

Ground Penetrating Radar or GPR is an electromagnetic geophysical method for high resolution detection, imaging and mapping of subsurface soils. The GPR uses high-frequency-pulsed electromagnetic waves (10 to 1000 MHz) to acquire subsurface Information about all metallic and non-metallic utilities. The electromagnetic wave is radiated from a transmitting antenna, travels through the material at a velocity which is determined primarily by the *permittivity* of the material. If the wave hits a buried object that has different electrical properties from the surrounding medium, then part of the energy is “reflected” back to the surface, while part of its energy continues to travel downward. The wave that is reflected back to the surface is captured by a receive antenna, and recorded on a digital storage device as a hyperbola sign.

Features:

- Easy-to-use flexible GPR solution
- Flexible GPR configuration for a wide range of applications
- Well designed
- In-the-field processing and interpretation
- No wire is needed for any connection between antenna and display

1.2 Leica DD120 Cable and Pipe Locator

Handheld multi-frequency underground service locator

The Leica DD100 Series cable locators feature advanced automatic controls making the DD100 Series easy-to-use, requiring minimal user experience. Avoiding underground cables and pipes is a major concern on construction sites. Therefore, detecting the position of buried cables and pipes before excavation work can help prevent operator injury, asset damage and any subsequent costs.

PIN POINT THE UNDERGROUND UTILITY: Figure. Pin pointing underground utility Set the locator sensitivity to approximately 50%. NOTE: it may be necessary to adjust the sensitivity level throughout the pinpointing to keep the bar graph on scale.

INDUCTIVE Method:

An inductive search procedure is a more certain technique for locating unknown lines. This type of search requires a transmitter and locator and two people. This type of search is referred to as

a 'two person sweep'. Before starting the sweep, define the area of search and the probable direction of lines crossing the area. Ensure the transmitter is switched on in induction mode. The first person operates the transmitter and the second person operates the locator. The transmitter induces a signal onto lines as it passes over them and the lines are then detected with the locator at a suitable distance away from the transmitter. A suitable distance is around 15 meters – although this will depend upon the transmitter used and the level of induction power used.

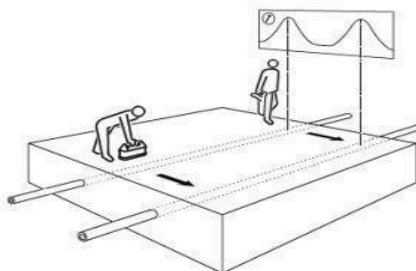


Figure. Inductive search

Hold the transmitter with its length aligned with the assumed direction of any lines. The second person holds the locator at the start of the area to be searched and with the locator antennae at right angles to the probable direction of the buried lines. Set the locator sensitivity level as high as possible without the locator picking up any airborne signals directly from the transmitter. When the transmitter and locator are in line both operators start to move forward in parallel. The operator with the locator sweeps it backwards and forwards, keeping the locator vertical, as they proceed in parallel with the transmitter. This method allows for misalignment of the transmitter, locator and buried line. The transmitter applies the strongest signal to the lines directly below it, which are then located with the locator. Move the transmitter from side to side to establish the highest signal which indicates that the transmitter is also directly above the line(s). Mark the ground at the point of each peak signal detected with the locator. Repeat the search along any other possible paths of lines. Once the positions of any lines have been marked, reverse positions, place the transmitter over and along each line in turn, and trace the line out of the search area.

Another Cable Avoidance Tool:- The Leica DD100 Series cable locators feature advanced automatic controls making the DD100 Series easy-to-use, requiring minimal user experience. Avoiding underground cables and pipes is a major concern on construction sites. Therefore, detecting the position of buried cables and pipes before excavation work can help

prevent operator injury, asset damage risks and any subsequent costs. Use the DD100 Series cable locators in conjunction with a [DA220 signal transmitter](#) and/or the Digi system accessories to achieve improved accuracy and application scope.

2. GPR FIELD WORK

- **Equipment Positioning:** Equipment can be carried in a vehicle with antenna towed behind, or by pushing the wheel cart by man for operations in narrow areas with obstacles. The light portable system allows use even in very narrow or inaccessible terrains.
- **Grid Marking:** Prior to survey grid is marked on the ground along the survey lines. As explained earlier, GPR produces a cross section of subsurface along the survey lines. In case of utility detection, all the lines crossing the survey line are detected during the pass. To detect all the utilities running in any possible direction, therefore, survey is performed in grid pattern. The grid spacing is carefully chosen based on expected size of anomaly (in case of localized targets), congestion (in case of utility detection) and resolution required.

- **Signal Penetration Depth**

The penetration depth of GPR signal depends primarily on two factors:

1. **Conductivity of soil**
2. **Frequency of antenna**

Based on standard equations for propagation of EM waves (skin depth), signal attenuates fast when the ground is conductive, hence reducing the penetration depth of GPR signal. The stratification and top surface also become important in estimating the penetration depth. High contrast interfaces reflect significant amount of energy, hence reducing effective depth of penetration. The moisture level in top soil is mainly responsible for conductivity, and should be carefully considered before embarking on a detailed GPR investigation plan.

The other factor that controls penetration is frequency of EM signal used for GPR survey. Low frequency EM waves travel to greater depths than high frequency EM waves. The resolution however is lesser in case of low frequency waves. The frequency used is also of importance since the resolution of the system and the rate of signal attenuation is proportional to the frequency of the GPR system.

- **GPR data processing**

All the collected scan profiles are processed to enhance its clarity and accuracy, using Cross Point software. The raw data were processed to get the accurate noise free profiles. Data processing focuses on the highlighted areas: data editing, basic processing, advanced processing, and for visualization/interpretation processing. Processing Parameter such as Wavelet filter, Background noise removal, Band-pass Filter etc. were done.

- **Interpretation and Presentation of Results**

GPR results are interpreted by recognizing diagnostic reflection patterns on the radar-grams.

Targets are recognized and classified with reference to the objectives of the survey.

The final GPR interpretation generally leads to a conceptual model of the site conditions (geologic, cultural, etc.). A conceptual model is a simplified characterization of a site that incorporates all the essential features of the physical system under study.

- **Process of Survey**

Whole above process required total 4 numbers of process as below;

Step D – In this step we should have general idea about utilities and we should have drawing from dpt.

Step C – This is very important step to have QLA, to have all visual manholes, lines and landmarks

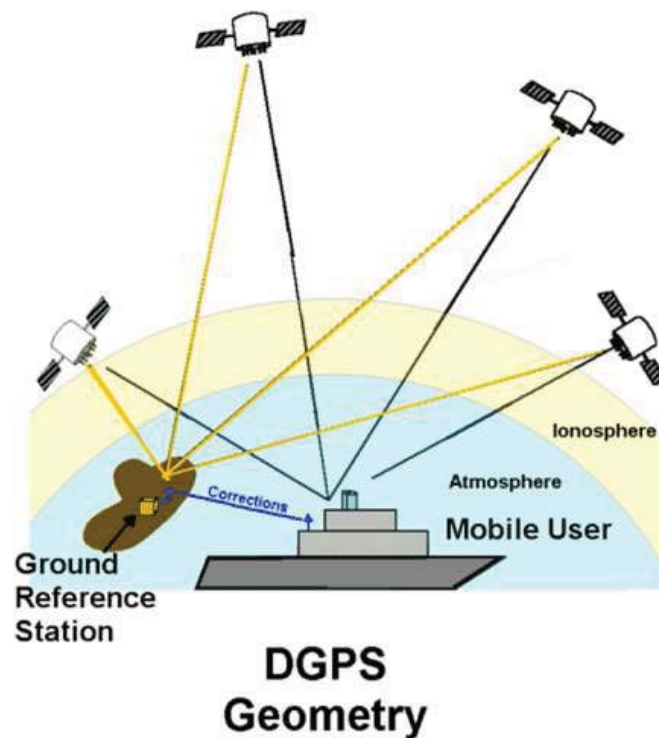
Quality B – In this Quality control, we have to use GPR and Locator to have all the data including QLA process

Quality A – This is final step to make drawing to have all the details from above steps and quality.

So, we should always follow these processes to get maximum accuracy on the ground.

3. DGPS Use for pinpoint the location as per plant grid

DGPS (Differential GPS) is essentially a system **to provide positional corrections to GPS signals**. DGPS uses a fixed, known position to adjust real time GPS signals to eliminate pseudo range errors. An important point to note is that DGPS corrections improve the accuracy of position data only.



The principle behind DGPS is to **use the reference location of the base receiver to correct for the error position of the unknown rover position**. Since the base station is fixed, we can use the difference between the measurement of the base and the rover receivers to create an error correction vector.

A Differential Global Positioning System (DGPS) is an enhancement to the Global Positioning System (GPS) which provides **improved location accuracy**, in the range of operations of each system, from the 15-meter nominal GPS accuracy to about 1–3 cm in case of the best implementations of DGPS.

4. Study Areas with Remarks

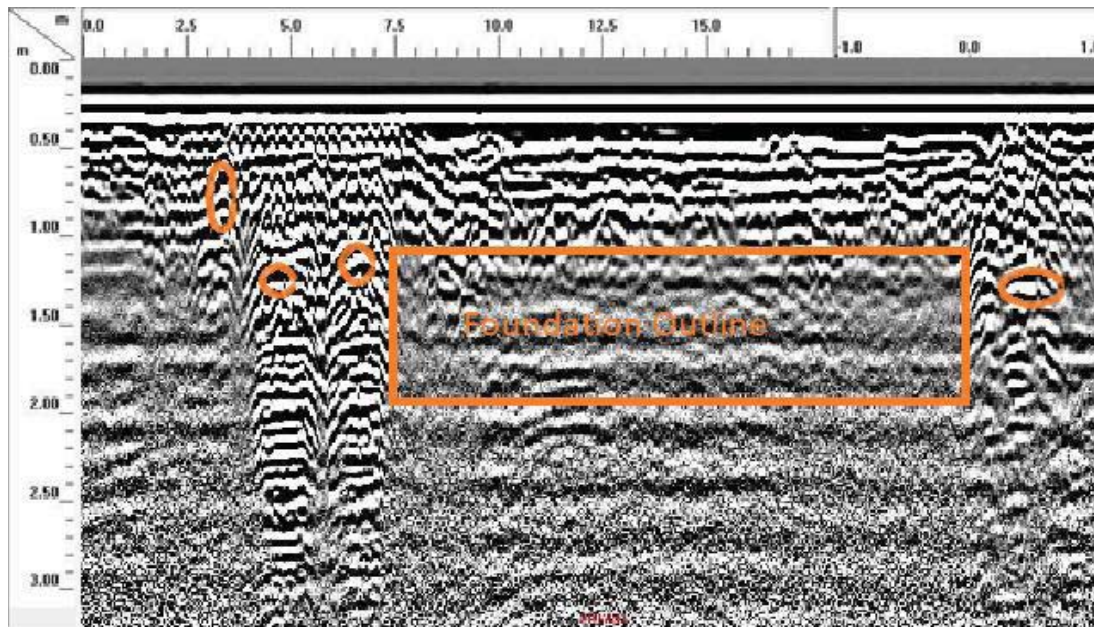
Total 9 Sites have been covered for GPR survey as below;

- Site - 1 Central Stores Gate Front side Area
- Site - 2 Central Stores Gate Back Side Area
- Site - 3 Central Stores Machinery Area
- Site - 4 Light Diesel Oil Pump House
- Site - 5 Main Road Culvert Area No.02
- Site - 6 Nearby Canteen Area
- Site - 7 Water Sump & Pump House Area
- Site - 8 BHEL Gate Railway Crossing Area
- Site - 9 IT Complex Area

We have been covered total area in term to get better results with accuracy. We have taken the data with every corner of building to the get foundation depth and its dimensions. We detected multiple lines as Power cables, water lines, Sewer lines etc.

So further we will explain the remarks/findings based on every sites.

Site - 1 Central Stores Gate Front side Area

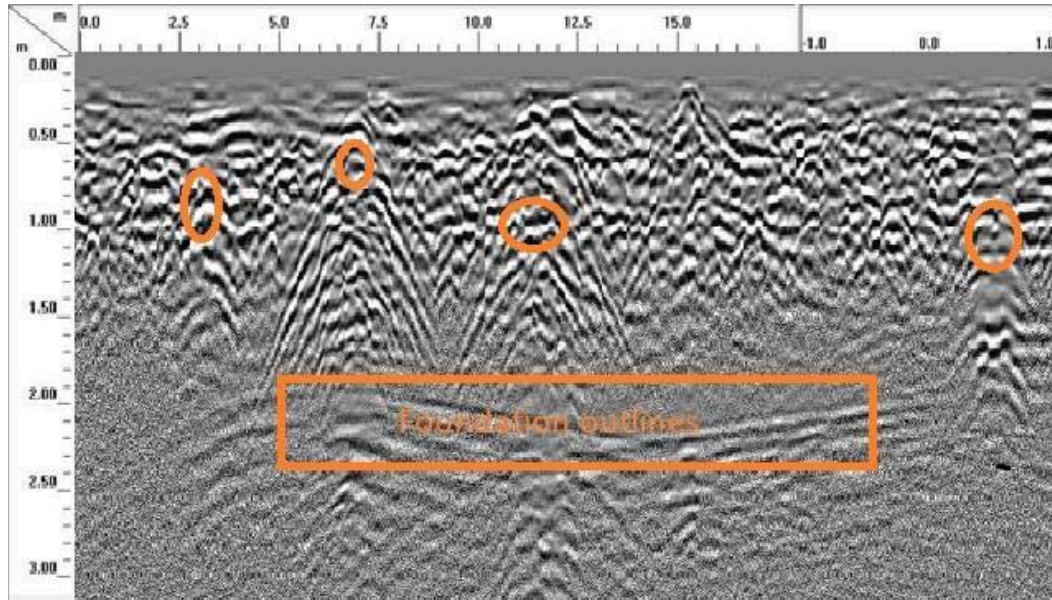


Raw Data Sample

Remarks:

- I. Foundation depth from Shed no. B-1 building up to Shed no. B8 were detected approximately 1.56 meter and dimension of the same buildings were found approximately 1.5m × 1.2m.
- II. Foundation depth of building GAS ward and Transformer Oil central store were detected approximately 1.45 meter and foundations Dimension of the same buildings were found approximately 1.40m × 1.0m.
- III. Metallic line and Power cable detected, crossing from Central store main gate having depth 0.8 M and 0.6 M respectively.
- IV. Two Power cables detected, crossing from Security room to Shed no B-1 having depth 0.50 Meter and 0.10 M.
- V. Two Water lines detected, passing parallel with Shed no B-1 with depth of 0.50 M.
- VI. Two Water lines detected, passing parallel in between Shed no B-2 and shed no 3 with depth of 0.20 M & 0.30M respectively.
- VII. One Metal lines, passing in between Shed no. B- 4 to Shed no B – 5 having depth of 0.45 M.
- VIII. One Metal and Fire hydrant detected passing to the boundary wall behind the Transformer Oil room and Gas ward building having depth 0.70 M and 0.30 M respectively.

Site - 2 Central Stores Gate Back Side Area

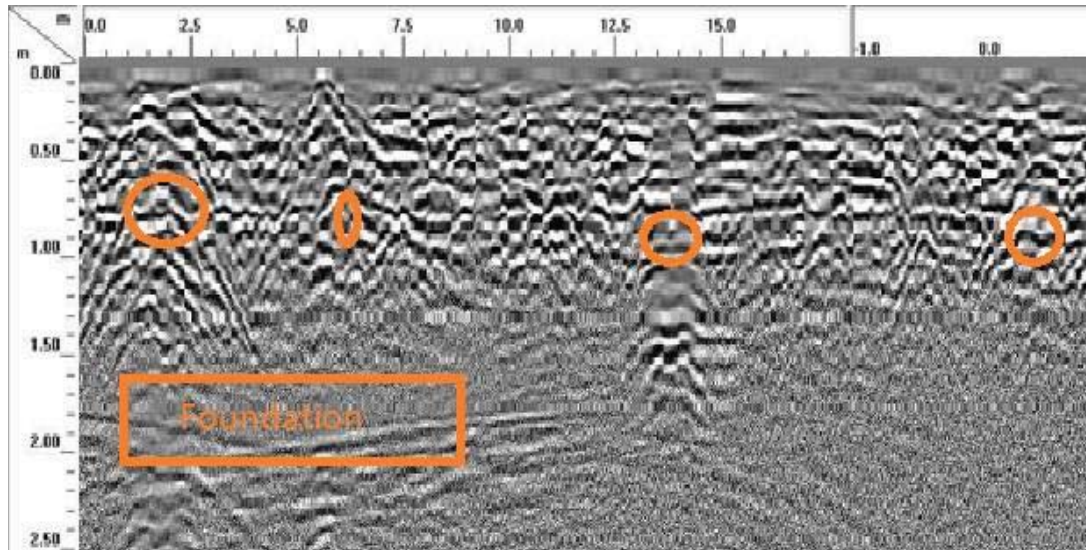


Raw Data Sample

Remarks:

- i. Foundation depth of Shed no. C - 1 to Shed no. C - 4 were detected approximately 1.65 meter and dimension of the same buildings were found approximately 1.6 m × 1.3m respectively.
- ii. Metal and Power cable detected at the left side of main gate and right side of the building shed no. C – 1 at the depth of approximately 0.9 M and 0.85 M respectively.
- iii. Power Cable and Fire hydrant line was detected, which is running in front of shed no C 1 – 4 at the depth of approximately 1.20 M and 0.30 M respectively.
- iv. Sewer Line detected, running parallel to shed no C 1-4 at the depth of approximately 2.9 M.
- v. One fire hydrant line detected which running parallel to shed no. C 1-4 at the depth of approximately 0.35 M.
- vi. Two water pipe lines detected at crossing the road in front of shed no. C-2 at the depth of approximately 0.35 M & 0.25 M respectively.
- vii. One metal line detected at crossing the road in front of shed no. C-2 at the depth of approximately 0.45 M.

Site - 3 Central Stores Machinery Area

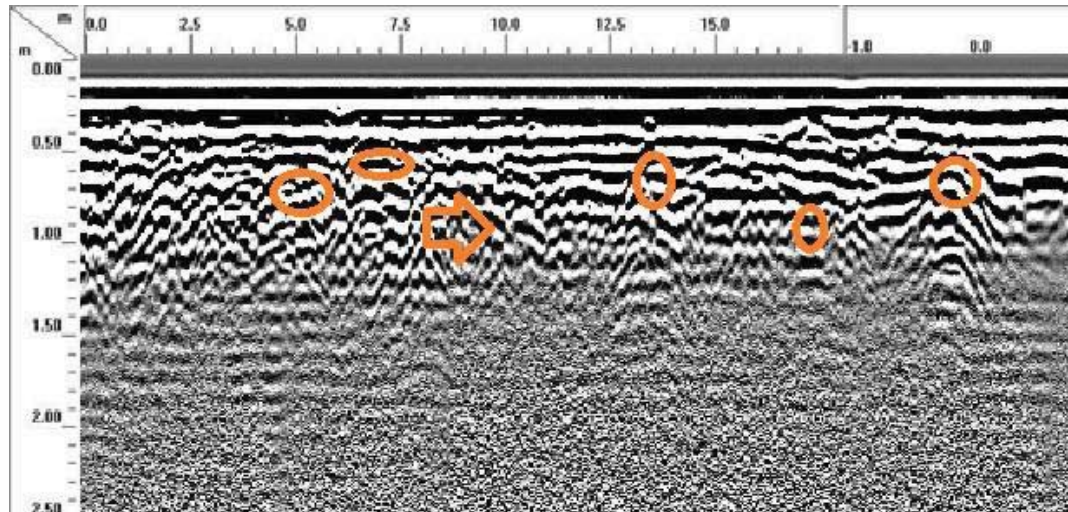


Raw Data Sample

Remarks;

- I. Foundation depth of two buildings adjacent to boundary wall were detected approximately 1.65 meter and dimension of the same buildings were found approximately 1.6 m × 1.2m.
- II. Foundation depth of three buildings adjacent to entry gate were detected approximately 1.55 meter and dimension of the same buildings were found approximately 1.5 m × 1.2m.
- III. Metal lines was detected, which running parallel to both entry gate at the depth of approximately 0.78 m.
- IV. Power cable and Metal line were detected at the out side Central stores Machinery Area adjacent to Nala at the depth of approximately 0.68 m and 0.80 Meter respectively.

Site - 4 Light Diesel Oil Pump House

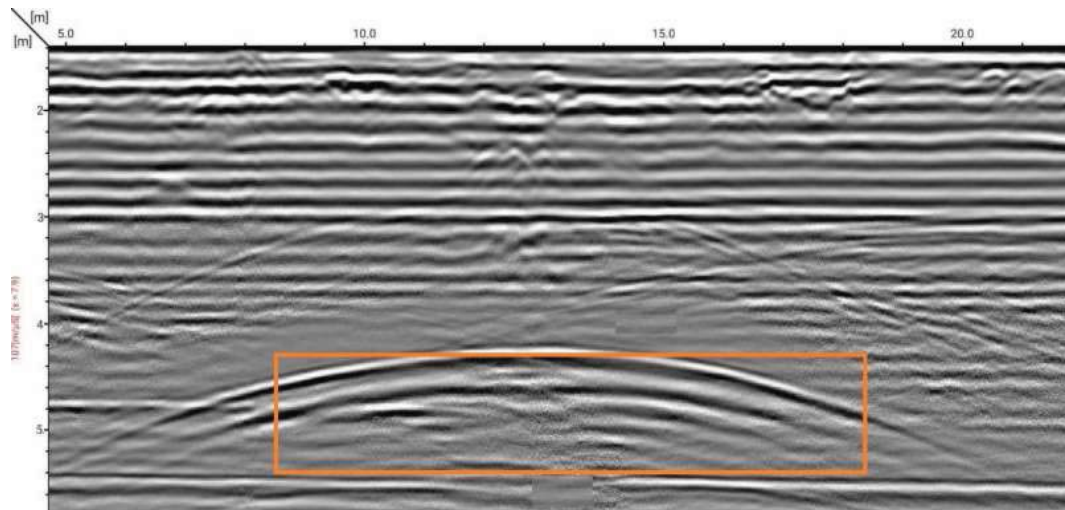


Raw Data Sample

Remarks;

- i. Power cable and Metal line detected, crossing the road at the depth of approximately 1.50 m and 0.70 m respectively starting from the left side of the drawing from the culvert.
- ii. Power cable and Metal line detected, crossing the road at the depth of approximately 1.20 m and 1.10 m respectively starting from the left side the drawing from the culvert at the distance of 20M on the left side.
- iii. Two metal and two power cables detected crossing the road the right side of culvert at the depth of approximately 1.00 m, 1.50 m, 0.40 m & 0.40 Respectively.

Site - 5 Main Road Culvert Area No.02

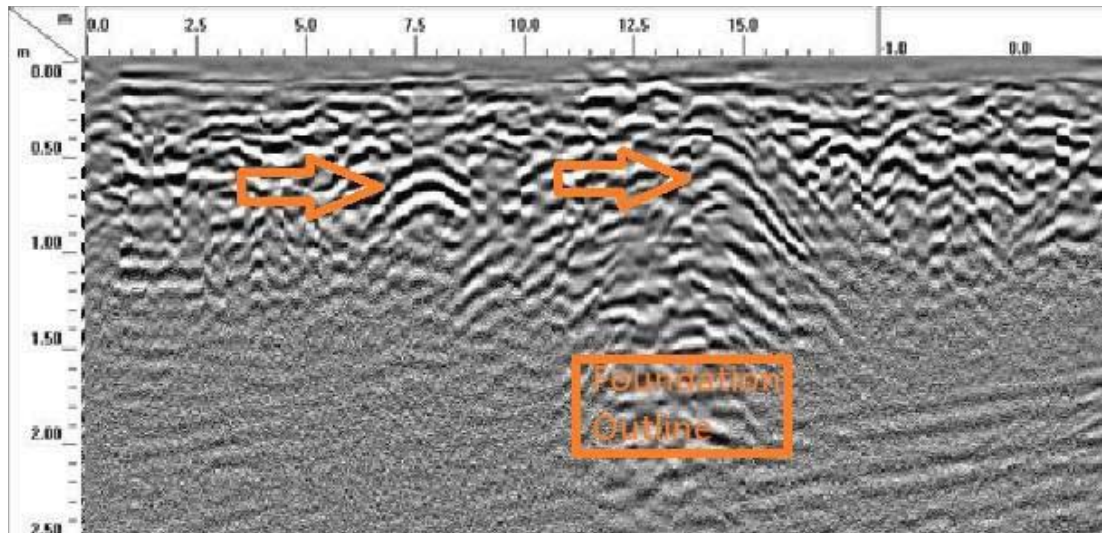


Raw Data Sample

Remarks;

- I. Foundation depth of Water Tank was detected approximately 6 -7 meter and dimension of the same Water Tank was found approximately 6 m × 2.5 m.
- II. Power cable was detected at near by kachha road at the depth of approximately 0.77 m.
- III. One metal line was detected near water tank at the depth of approximately 0.50 m.
- IV. Sewer line was crossing below first culvert at the depth of approximately 3.50 m.

Site - 6 Nearby Canteen Area

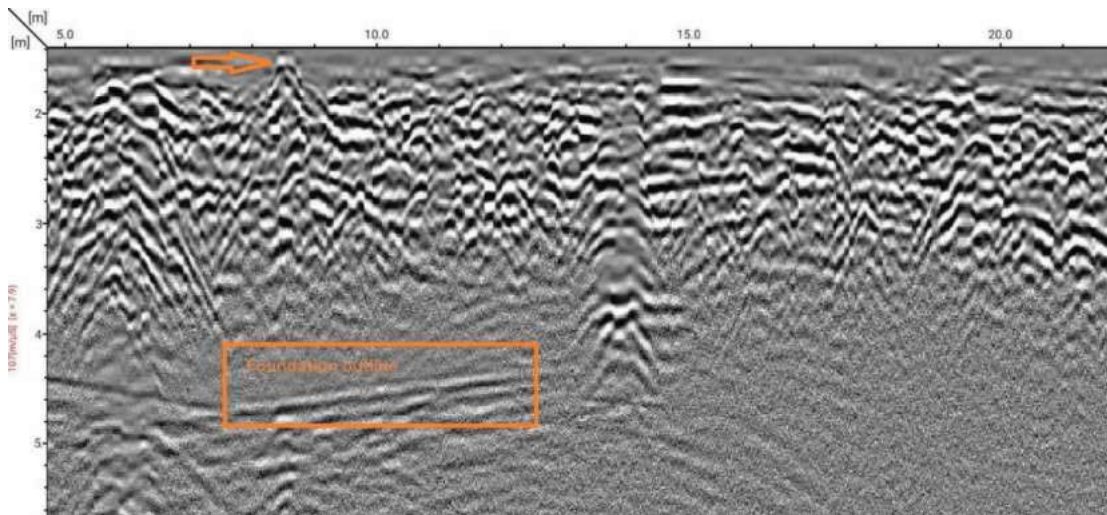


Raw Data Sample

Remarks:

- i. Foundation depth of left side Teen shed near water tank gate were detected approximately 1.65 meter and dimension of the same buildings were found approximately 1.6 m $\times$ 1.1 m.
- ii. Foundation depth of right-side Teen shed near water tank gate were detected approximately 1.0 meter and dimension of the same buildings were found approximately 1.5 m $\times$ 1.0 m.
- iii. Foundation depth of two Teen shed near security room gate were detected approximately 1.4 meter and dimension of the same buildings were found approximately 1.4 m $\times$ 1.0 m.
- iv. Metal and power cable detected which is crossing the kachha road near security room at the depth of approximately 1.10 m and 1.10 m respectively.

Site - 7 Water Sump & Pump House Area

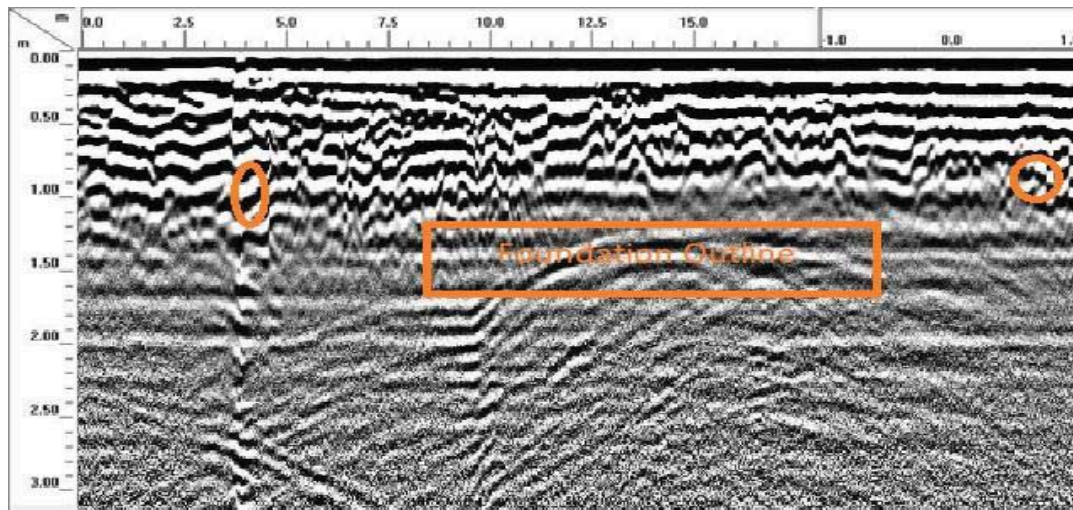


Raw Data Sample

Remarks:

- I. Foundation depth of both Pump oil Tank were detected approximately 2.2 meter and dimension of the same buildings were found approximately 2.2 m × 1.5 m.
- II. Foundation depth of Pump house were detected approximately 4.2 meter and dimension of the same buildings were found approximately 4.2 m × 1.2 m.
- III. Two metal lines and Two power cables were detected at just outside of Pump House at the depth of approximately 1.50 m, 0.50 m, 0.45 m & 0.80 m Respectively.
- IV. One Power cable, running parallel to the road with open drain and crossing through the Pump house with variable depth approximately 0.50m to 0.90 m.
- V. One metal line, crossing though the pump house with the depth of approximately 0.80 m.

Site – 8 BHEL Gate Railway Crossing Area

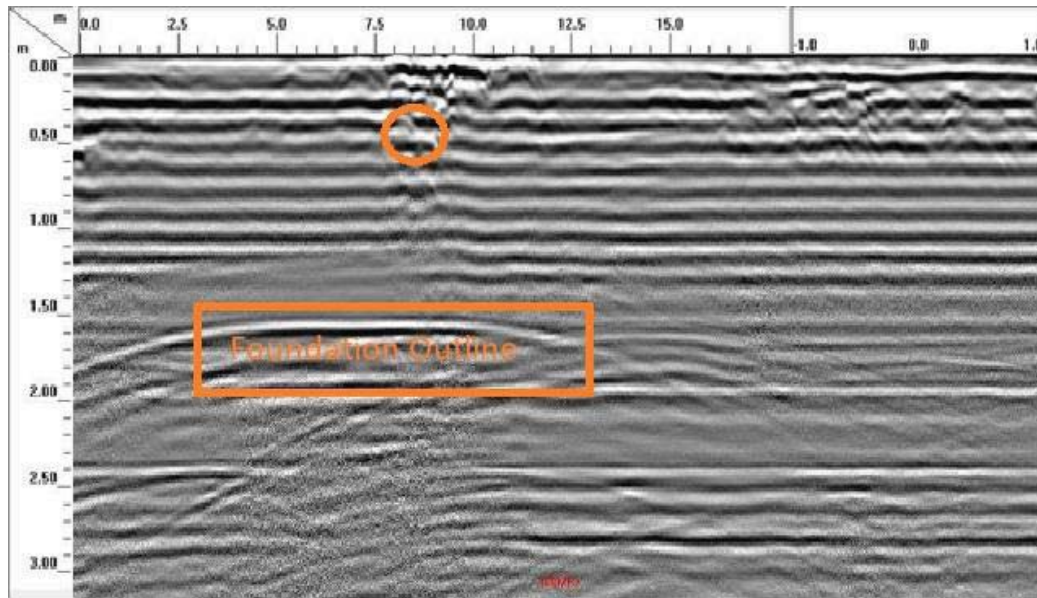


Raw Data Sample

Remarks:

- i. Foundation depth of Bhel Gate detected approximately 1.0 meter and dimension of the same gate pillars were found approximately 1.0 m × 0.8 m.
- ii. Foundation depth of Security room were detected approximately 1.45 meter and dimension of the same building were found approximately 1.45 m × 1.0 m.
- iii. Three power cables detected inside the Bhel Gate which is crossing the road in front of security room at the depth of approximately 0.60 m, 0.60 m, & 0.50 m respectively.
- iv. One water line and power cable were running parallel out side the Bhel gate at the depth of approximately 1.05 m & .70 m respectively.

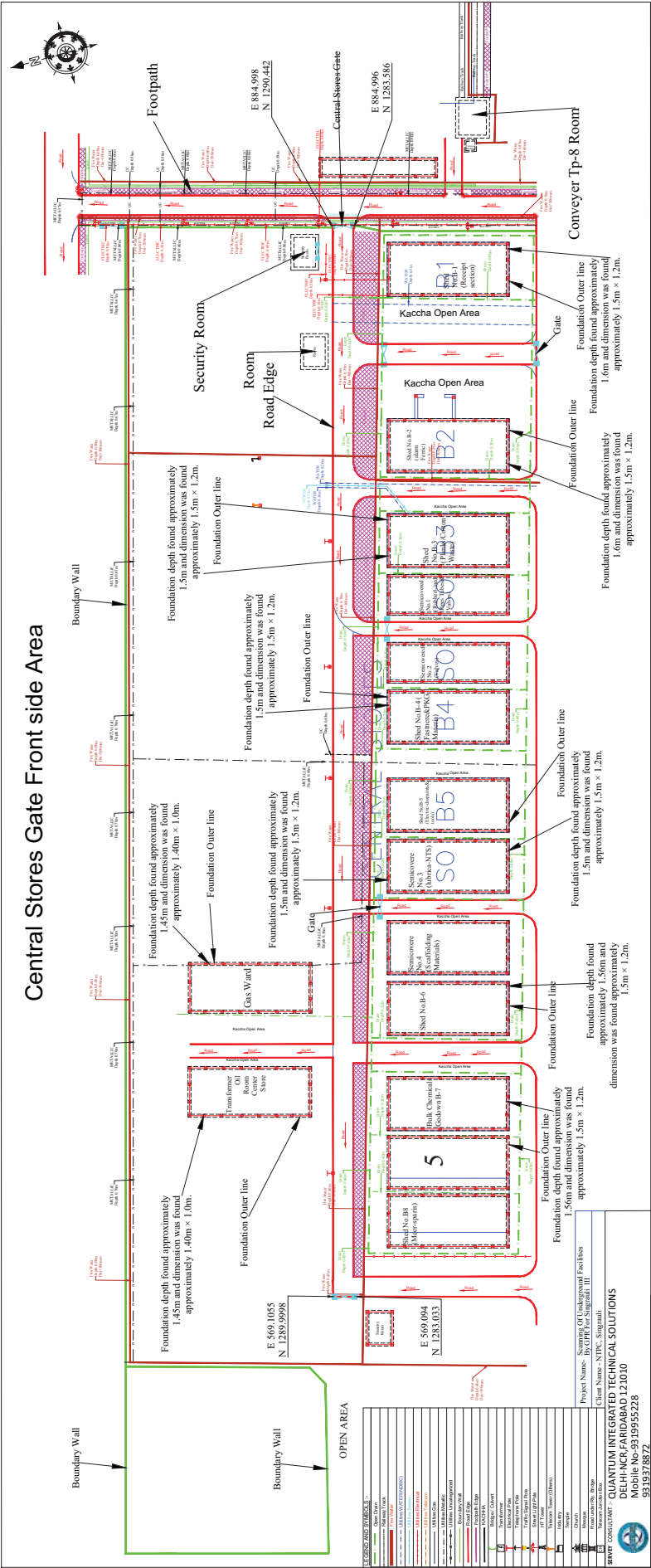
Site - 9 IT Complex Area

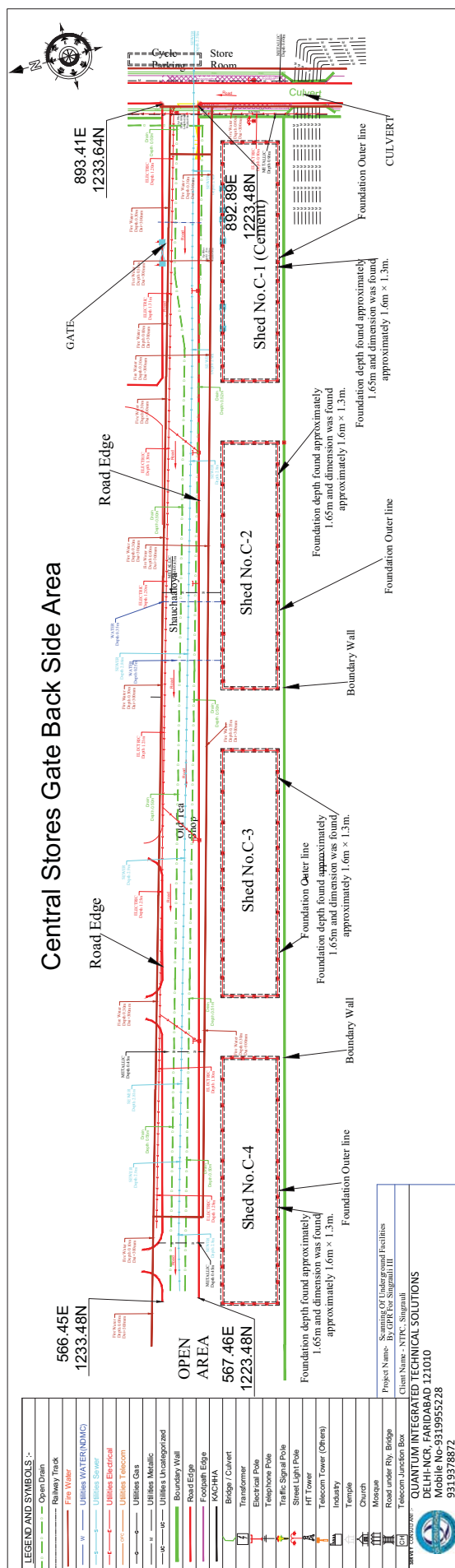


Raw Data Sample

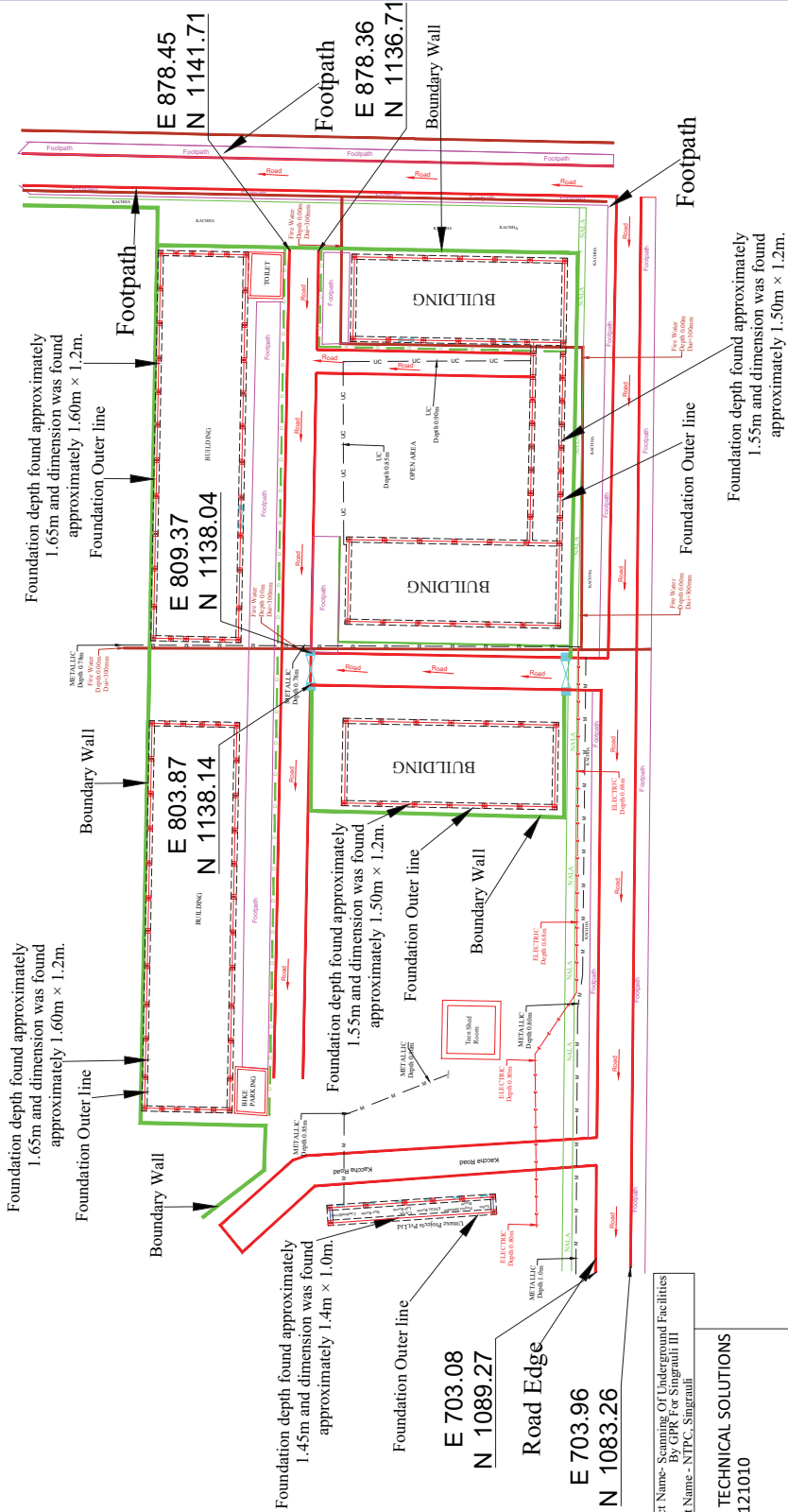
Remarks;

- I. Foundation depth of Indention Tower were detected approximately 1.35 meter.
- II. Foundation depth of building in front of Indention Tower were detected approximately 1.45 meter and dimension of the same building was found approximately 1.40 m × 1.1 m.
- III. Foundation depth of Tower Pillar were detected approximately 2.80 meter and dimension of the same building was found approximately 2.80 m × 2.3 m.





Central Stores Machinery Area



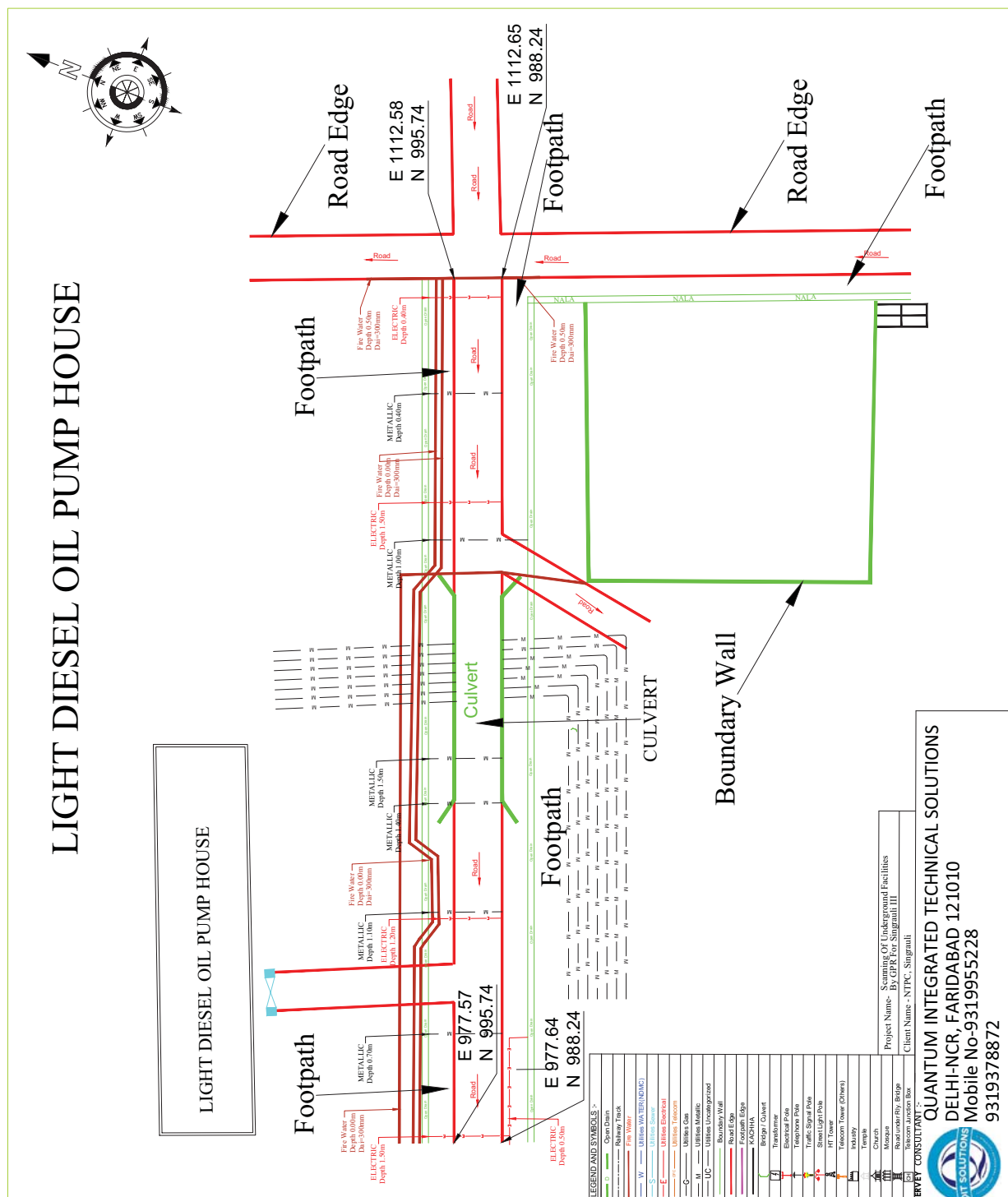
LEGEND AND SYMBOLS :-	
	Open Drain
	Railway Track
	Fire Water
	Utilities WATER (NDMC)
	Utilities Sewer
	Utilities Electrical
	Utilities Telecom
	Utilities Gas
	Utilities Metallic
	Utilities Uncategorized
	Boundary Wall
	Road Edge
	Footpath Edge
	KACHHA
	Bridge / Culvert
	Transformer
	Electrical Pole
	Telephone Pole
	Traffic Signal Pole
	Street Light Pole
	HT Tower
	Telecom Tower (Others)
	Industry
	Temple
	Church
	Mosque
	Road under Rly. Bridge
	Telecom Junction Box

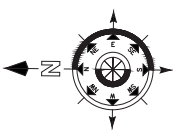
Project Name- Scanning Of Underground Facilities
By GPR For Singrauli III
Client Name - NTPC, Singrauli

SURVEY CONSULTANT :-

QUANTUM INTEGRATED TECHNICAL SOLUTIONS
DELHI-NCR, FARIDABAD 121010
Mobile No-9319955228
9319378872



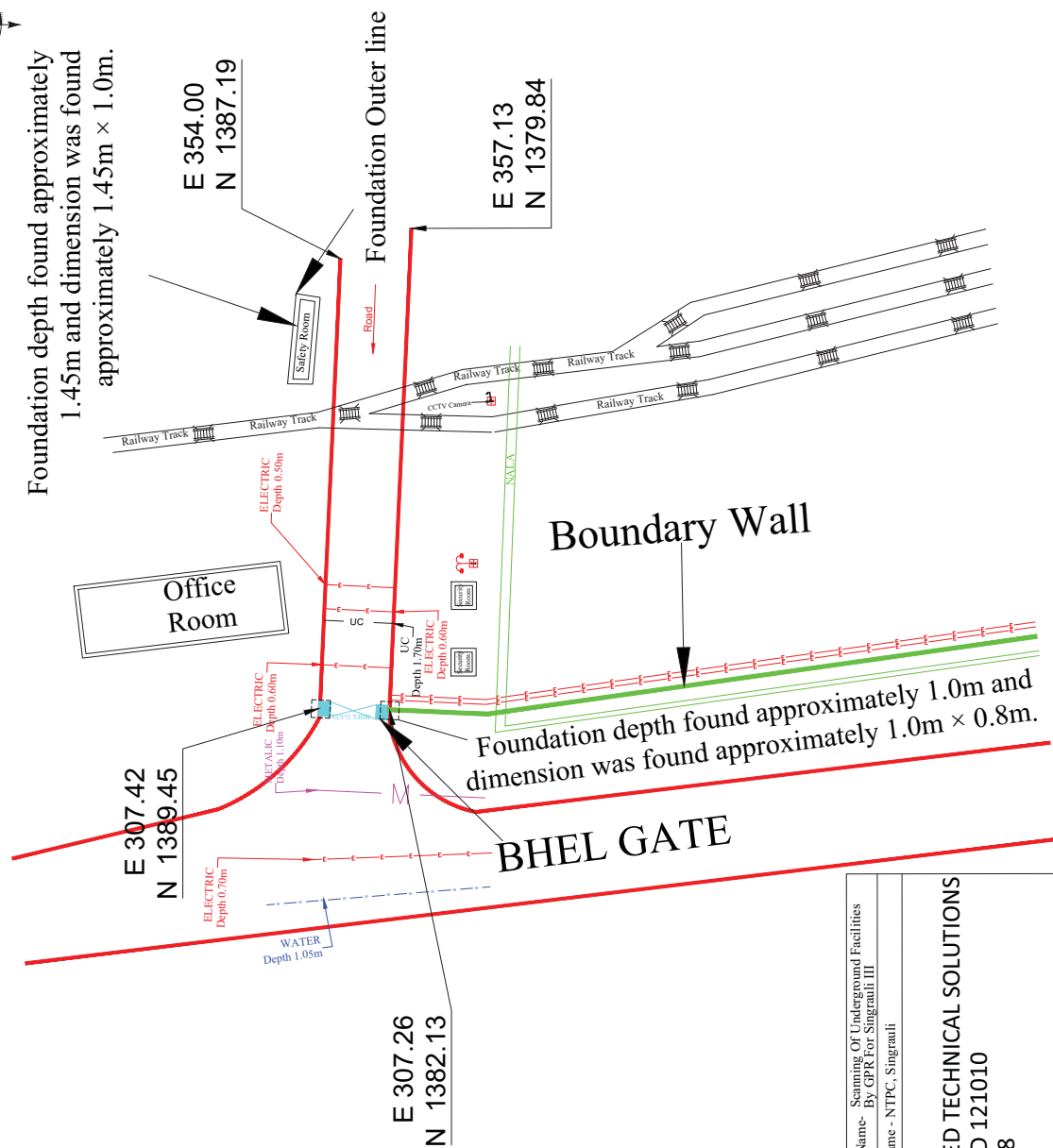








Foundation depth found approximately 1.45m and dimension was found approximately $1.45\text{m} \times 1.0\text{m}$.



LEGEND AND SYMBOLS :-	
	Open Drain
	Railway Track
	Fire Water
	Utilities WATER(NDMC)
	Utilities Sewer
	Utilities Electrical
	Utilities Telecom
	Utilities Gas
	Utilities Metallic
	Utilities Uncategorized
	Boundary Wall
	Road Edge
	Footpath Edge
	KACHHA
	Bridge / Culvert
	Transformer
	Electrical Pole
	Telephone Pole
	Traffic Signal Pole
	Street Light Pole
	HT Tower
	Telecom Tower (Others)
	Industry
	Temple
	Church
	Mosque
	Road under Rly. Bridge
	Telecom Junction Box

SURVEY CONSULTANT :-

QUANTUM INTEGRATED TECHNICAL SOLUTIONS

DELHI-NCR, FARIDABAD 121010

Mobile No-9319955228

9319378872



IT COMPLEX AREA

Foundation depth found approximately 2.80m and dimension was found approximately 2.80m x 2.30m.

Foundation depth found approximately 1.45m and dimension was found approximately 1.4m x 1.1m.

Foundation depth found approximately 1.35m

LEGEND AND SYMBOLS :-	
	Open Drain
	Railway Track
	Fire Water
	Water
	Utilities Water (N/M/C)
	Utilities Sewer
	Utilities Electrical
	Utilities Telecom
	Utilities Gas
	Utilities M
	Utilities UC
	Utilities Uncategorised
	Boundary Wall
	Road Edge
	Footpath Edge
	KACHHA
	Bridge / Culvert
	Transformer
	Electrical Pole
	Telephone Pole
	Traffic Signal Pole
	Street Light Pole
	HT Tower
	Telecom Tower (Others)
	Industry
	Temple
	Church
	Mosque
	Road order Rly. Bridge
	Telecom Junction Box

Project Name - Scanning Of Underground Facilities
By GPR For Singrauli III

Client Name - NTPC, Singrauli

Foundation depth found approximately 2.80m and dimension was found approximately 2.80m x 2.30m.

Foundation depth found approximately 1.45m and dimension was found approximately 1.4m x 1.1m.

Foundation depth found approximately 1.35m

SERVEY CONSULTANT :-	
	QUANTUM INTEGRATED TECHNICAL SOLUTIONS DELHI-NCR, FARIDABAD 121010 Mobile No-9319955228 9319378872

SERVEY CONSULTANT :-

QUANTUM INTEGRATED TECHNICAL SOLUTIONS

DELHI-NCR, FARIDABAD 121010

Mobile No-9319955228

9319378872

Project Name-	Scanning Of Underground Facilities

Client Name - NTPC. Singrauli

EPC Package for Singrauli STPP Stage III (2x800 MW)
Pre-Bid Clarification

S No.	Section	BID SPECIFICATION Sub-Section	Page No. 13 OF 19	Clause No. 7.00.00	SPECIFICATION REQUIREMENT	Pre-Bid Queries/ Clarifications	Reply
1	V/B				Each motor/heater feeder shall consist of MPCB/MCCB (with S/C release only), Power contactor & intelligent motor controller (IMC) to ensure Type-2 Co-ordination.....	Drive pertaining to soot blower are fractional KW drive, so pls. allow Non-IMC feeders for these loads as huge no. of IMC are required to feed these loads. Many heater feeders are thermotatically controlled & in that case only supply feeder is provided from LT switchgear without having any contactor so in that case IMC is not applicable. Also in the case of heater, being controlled from PLC/DDC/MIS, contactor is required in LT switchgear heater feeder but still no OLR is applicable so kindly allow Non-IMC feeders for heater feeder having contactor.	1. Bidder proposal for non IMC feeders in soot blower MCC is acceptable. 2. Bidder proposal for non IMC module for supply feeder for heater is acceptable. 3. Bidder proposal is not acceptable. Specification cl. No. 7.00.00 Sub Section B-06 Section-VI Part-B to be followed.
2	SECTION – VI, PART-F	SUB-SECTION-VI	17 OF 39	1.20.00	MANDATORY SPARES – 1. Auxiliary Steam Pressure Reducing & Desuperheating System A. High Capacity PROS System (MS) 1. Steam pressure reducing cum desuperheating valves 1.1. Steam 2 nos. 1.2. Dnc 2 nos. 1.3. Body seat rings 2 nos. for each type, size and rating of valves 1.4. Gland packings 4 nos. for each type, size and rating of valves 1.5. Gasket 4 nos. B. Low Capacity PROS System (CRH) 1. Steam pressure reducing valve 1.1. Steam 4 nos. 1.2. Dnc 2 nos. for each type, size and rating of valves 1.3. Body seat rings 2 nos. for each type, size and rating of valves 1.4. Gland packings 4 nos. 1.5. Pressure seal ring 2 nos. 1.6. Gaskets 2 nos.	We understand that the quantity specified against heading 1.20.00(A)(1) & 1.20.00(B)(1) is a "necological error and mandatory spares are required only for the parts listed under s.no. 1.20.00(A)(1) & 1.20.00(B)(1) 1.1 to 1.6) of the main AMROS valve in line with other NTPC projects. NTPC to confirm.	1. Bidder's understanding is not correct. Specification requirement is clear in this regard. Bidder to comply the technical specification requirement.
3	SECTION-VI, PART-B	SUB-SECTION-D-1-5, CIVIL WORKS SALIENT FEATURES AND DESIGN CONCEPT	28 of 127	5.07.00	Complete sewerage system including Sewage Treatment Plant for facilities within the plant is in bidder's 1. Alternatively, kindly confirm if bidder may provide a Centralized Sewage Treatment Plant for facilities within scope. Bidder shall provide 'De-centralized Sewage Treatment' units. The capacity of the Decentralized Sewage Treatment plant shall be as per the design requirements, subject to minimum combined sewerage treatment plant. This is in line with recent PATRATU project amendment. Kindly confirm acceptance. 2. Please note that CI pipes are available in higher sizes i.e. 80 NB and above. Being very small capacity STP requirement, the sewage shall be pumped/ fed through gravity as per site requirement & the pipe size are expected to be less than 80 NB. In view of above, the pipe material of HDPE/ PVC may pl. be allowed. This is as accepted/ approved by W/S-NTPC, in PATRATU project. 3. Treated sewage water (after tertiary treatment) shall be used for horticulture purpose in nearby area of respective STP only. However, if this is not to be utilized for horticulture purposes, the treated sewage water shall be disposed to the environmental norms w.r.t. Sewage Discharge) shall be fed to storm water drain. Phase 1 & 2 shall be provided as per 20m along the length of collection points, and at every change of alignment, gradient or diameter of a sewer pipeline. This shall be as per IS 4111. Sewage pump stations shall be provided as per IS 4111. Bidder shall have to provide complete arrangement for sewage disposal up to the sewage treatment STP's. plant including pumping facilities.	"1. Bidder's proposal is not acceptable. Bidder to follow technical specification. 2. Bidder's proposal is not acceptable. However, if diameter of pipe required during detailed engineering is less than 80 NB, HDPE/ PVC pipe may be considered for lower diameters on case to case basis. 3. Collection/ storage of effluent treated sewage after tertiary treatment is not in Bidder's scope. 4. Bidder's understanding is correct. 5. Manual electrically operated control system is envisaged."	1. Bidder's proposal is not acceptable. Bidder to follow technical specification. 2. Bidder's proposal is not acceptable. However, if diameter of pipe required during detailed engineering is less than 80 NB, HDPE/ PVC pipe may be considered for lower diameters on case to case basis. 3. Collection/ storage of effluent treated sewage after tertiary treatment is not in Bidder's scope. 4. Bidder's understanding is correct. 5. Manual electrically operated control system is envisaged."
4	SECTION-VI, PART-B	SUB-SECTION A - 11 CONDENSATE POLISHING UNIT	05 of 16	4.05.00 , Sr. No. 13	Operating pressure for service vessels shall be normal operating pressure of condensate extraction pump. Service vessel design pressure shall be equal to shut off pressure of condensate extraction pump plus 5% margin.	Please note that the operating pressure for service vessels shall be normal operating pressure of condensate extraction pump which is much below the shut off head of condensate extraction pump and hence Service vessel design pressure shall be equal to shut off pressure of condensate extraction pump. Customer is requested to kindly accept the same.	Bidder's request reviewed and not accepted. Bidder to comply Technical Specification requirements.
5	SECTION-VI, PART-A	SUB-SECTION IIA- 20 CONDENSATE POLISHING UNIT	1 of 12	2.04.00 b)	One (1) set of regeneration facilities consisting of Resin separation vessel, Calton/Anion regeneration vessel(s), Resin make-up hopper, Mixed resin storage vessels (1 nos) etc.	Customer to please note that there is ambiguity regarding regeneration vessels requirement mentioned in different clauses of the specification and tender P&ID: Bidder understands that one (1) set of Resin Separation & Calton Regeneration Vessel, Anion Resin Regeneration Vessel & Mixed Resin storage vessel (2 Nos.) to be considered. The regeneration vessels are supplier specific and hence the vessel name shall be as per supplier recommendation. Kindly confirm bidder's understanding.	Bidder's understanding is not correct. P & ID is indicative w.r.t nos of vessels, Bidder to supply One (1) number MRSV inline with Clause 2.04.00(b) of Sub-Section IIA-20, Part-A Section-VI.
	SECTION-VI, PART-B	SUB-SECTION A - 20 CONDENSATE POLISHING UNIT	5 of 16	4.06.00 a)	One (1) common facility for regeneration of the ion exchange resins from the condensate polishing unit of the turbo-generator units shall be provided utilizing three (3) tank concepts and consisting of: 1) Resin Separation & Calton Regeneration Vessel (1 sets), 2) Anion Resin Regeneration Vessel (1 sets), 3) Mixed Resin storage vessel (1 sets).		
	SECTION – VI, PART-E	LIST OF TENDER DRAWINGS			As per P&ID it is indicated One (1) set of regeneration facilities consisting of Resin separation vessel and Calton regeneration vessel, Anion regeneration vessel, Mixed resin storage vessels-I (1 no) & Mixed resin storage vessels-II (1 no) .		

EPC Package for Singrauli STPP Stage III (2x800 MW)

Pre-Bid Clarification

S No	BID SPECIFICATION			SPECIFICATION REQUIREMENT	Pre-Bid Queries/ Clarifications	Reply
	Section	Sub-Section	Page No.			
6	V/IA	I	7 of 9	4.08.00	All the plant layouts shall be made in computerized 3D modelling system as detailed in Part C of the Technical Specification.	It is clarified that for Steam generator & auxiliaries, • 3D Plant review model of boiler reflecting "as de-signed" conditions will be delivered at the end of the project • 3D model will be utilized to develop plant layouts and for interference checking internally, however, finalized drawings will be completed using Auto CAD • Major equipment & sub system of the boiler will be covered in the plant modeling. • 3-D modeling will be started after completion of engineering only & not connected to any contract schedule. • Review model only will be submitted Further, P&IDs will be created as per BHEL's standard practice.
7	V/IC	GTR	15 of 119	8.03.04, a(i)	All the plant layouts shall be made in computerized 3D modelling system. The Employer reserves the right to review the 3D model at different stages during the progress of engineering. The layout drawings submitted for Employer's review shall be fully dimensioned and extracted from 3D model after interference check.	

EPC Package for Singrauli STPP Stage-III (2x800 MW)

S No	BID SPECIFICATION				SPECIFICATION REQUIREMENT	Pre-Bid Queries/ Clarifications	Reply
	Section	Sub-Section	Page No.	Clause No.			
1	VI A	IV	32 OF 76	1.03.03 (vii)	<u>(vii) Waste Water:</u> The Contractor guarantees that the maximum purge flow rate to waste water treatment system from FGD system for 2x800 MW units shall be less than 20m ³ /s averaged over a 24 hour period for the range of specified coal(s).	As CW blow down water is specified to be utilised as FGD process water, 20 m ³ /hr is too less for both 2x800MW units. Bidder recommends atleast 15 m ³ /hr waste water purge flow per unit (total 30 m ³ /hr), otherwise accumulation of high TDS/chloride content in the recirculated slurry will impact FGD performance. NTPC is requested to review the clarification and provide necessary amendments.	Bidder has incorrectly quoted the specification requirement. The guaranteed value requirement for waste water is 20m ³ /hr and not 20 m ³ /s. Bidder's proposal is not acceptable. Bidder to comply technical specification requirement.
2	VI A	IV	22 OF 76	1.01.07.02	<u>Station Auxiliary Power Consumption:</u> FGD System: i. Limestone Gravimetric feeder, Wet ball mill and their integral Auxiliaries ii. Vacuum Belt Filter, Vacuum Pump and its integral auxiliaries	Please note that Limestone grinding system and Gypsum dewatering system are meant for batch operation, Bidder calculates duty factors based on loads at guarantee point conditions and, accordingly guaranteed auxiliary power will be furnished.	The formulation of duty factors for limestone grinding system and gypsum dewatering system shall be finalised during detail engineering and shall consider correction of the Auxiliary Power Consumption values measured during the Performance Guarantee Test to the guaranteed conditions.
3	VI B	A-05	4 of 29	3.01.00 (5)	Maximum flue gas velocity through the Absorber (m/sec: Not more than 4 m/s at Design Point)Conditions (not applicable for bubbling type absorber)	Gas Velocity inside the Absorber are design specific parameter and as per DCFs FGD standard design practice, maximum flue gas velocity through the Absorber is maintained at 4.5m/s. Bidder request NTPC to review and kindly accept inline with bubbling type absorber.	Vendor proposal is not acceptable. Vendor approval is project and package specific. Bidder to follow NTPC technical specification requirement.
4	VI B	A-01	27 OF 92	1.05.21.01	<u>7. SO2 Removal Efficiency-</u> Guarantee Point: To be worked out by the Bidder to achieve SO2 emission in the chimney to less than 60 mg/Nm3 (6% O2 dry basis). Design Point: To be worked out by the Bidder to achieve SO2 emission in the chimney to less than 80 mg/Nm3 (6% O2 dry basis)	Bidder proposed the following Outlet SO2 limits 1.Guarantee Point : 80mg/Nm3 (6%O2 dry basis) 2.Design Point : 90 mg/Nm3(6% O2 dry basis) This SO2 emission limits are below the Emission norms and it will ensure optimized FGD design. Bidder request NTPC to review and kindly accept the proposal.	Bidder's proposal is not acceptable. Specification requirement is clear in this regard. Bidder to comply technical specification requirement.
5	VI A	IIA-04	4 OF 7	4.01.12	All Slurry re-circulating slurry pumps & Oxidation Blowers shall be installed in a shed provided with roof sheeting to be provided by the Contractor as per specifications specified elsewhere The civil works for FGD system shall comprise of civil, structural and architectural works below and above ground level of FGD control room building, slurry re-circulating pumps & oxidation blowers building...	The referred clauses are contradictory. Bidder understands & considers that Slurry re-circulating slurry pumps & Oxidation blowers shall be installed in a shed only as Section-VI, Part-A Sub-section-IIA-04 page 4of 7 clause 4.01.12 and inline with all ongoing NTPC FGD contracts. Bidder request NTPC to review and confirm.	Bidder understanding is correct. Bidder to refer amendment S/no D1-33.
6	VI B	D-1-5	26 of 127	5.06.01	Scheme of FGD milling system: Limestone slurry pumps		
7	VI E					As per Section-VI, Part-A Sub-section-IIA-04 page 2 of 7, Clause no 3.01.04, 2X100% limestone slurry.....(total 4 nos.of pumps for 2X800MW) is indicated. However, in this scheme one extra pump is indicated.Bidder understands that specification write-up prevails over the schemes. accordingly total 4 nos.of pumps for 2X800MW will be considered. Bidder request NTPC to review and confirm.	Bidder to refer revised P&ID issued as an Amendment at SG.42

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8	V I E				Scheme of FGD-Absorber system/ Scheme of FGD milling system/ Scheme of Gypsum Dewatering system: 1. Gypsum bleed pump 2. Limestone slurry pump 3. Mill circuit pumps 4. Filtrate water pump 5. Secondary H.C feed pump 6. Waste water pump 7. Process water pump 8. ME wash water pump 9. Cake wash water pumps 10. Belt-filterwash water pumps. Scheme of FGD-Absorber system: Note 6- All instruments in slurry lines shall be provided isolation valves and diaphragm. Scheme of FGD-Absorber system & Scheme of Gypsum Dewatering system	PT/PI are indicated at each pump discharge lines in the referred schemes. Since these pumps are all 2x100% configuration and pump discharge lines are connected to one common header, PT and PI will be provided on common discharge pipe only but not on individual discharge pipes. Bidder request NTPC to review and confirm.	Bidder's proposal is not acceptable. Bidder shall comply to technical specification.
9	V I E				Scheme of FGD-Absorber system: Note 6- All instruments in slurry lines shall be provided isolation valves and diaphragm.	Bidder does not recommend valves in the impulse lines of slurry pipes in order to keep the stub length as minimum as possible and to prevent slurry settlement/blockage issues. Bidder request NTPC to review and confirm.	Bidder's proposal is not acceptable. Bidder shall comply to technical specification.
10	V I E				Scheme of FGD-Absorber system & Scheme of Gypsum Dewatering system	At the common discharge line of Filtrate water pumps, Valve station and instruments are repeatedly indicated in both the schemes of absorber system and Gypsum dewatering system. Bidder understand that one set of instruments and a valve station are only to be provided. Bidder request NTPC to review and confirm.	Bidder to refer revised P&ID issued as an Amendment at SG.43
11	V I E				Scheme of FGD-Absorber system	Control valves are not required in Gypsum bleed pumps discharge and recirculation lines as there is no control signal for them. Bidder provides on/off type valves only. Bidder request NTPC to review and confirm.	Bidder to refer to the amendment no SG.14 and SG.41 to the technical specifications regarding the Gypsum bleed pumps recirculation valves. Bidder's proposal with regard to discharge valves of Gypsum bleed pumps is not acceptable. Bidder to comply with the technical specification requirement.
12	V I F	SUB-SECTION-VI CHAPTER-01	23 OF 39	1.22.10	Mandatory Spares: Slurry Valves: 2 Nos. each type and size	Since the size & cost of the Recirculation slurry pump suction and discharge valves are very high (around 1400mm), 2 sets of Valve internals and soft parts only will be provided as mandatory spares instead of complete valves. Bidder request NTPC to review and confirm.	Bidder's proposal is not acceptable. Specification requirement is clear in this regard. Bidder to comply technical specification requirement.
13	V I B	SUB-SECTION-A-05 (FGD)	15 OF 29	6.06.01	For tank volume calculation, solid concentration (by weight) in the slurry shall be considered not more than 20% or actual required whichever is lower.	As per Bidder's technology, 30% wt slurry is stored in the Limestone slurry storage tank. Hence tank volume will be calculated based on 30% wt concentration. Bidder request NTPC to review and confirm.	Specification requirement is clear in this regard. Bidder to comply technical specification requirement.
14	V I B	SUB-SECTION-A-05 (FGD)	11 OF 29	5.06.11	The complete absorber vessel (absorber oxidation tank, absorber tower & absorber outlet duct upto absorber outlet flange) shall be made of clad sheet of C276 / Alloy 59 (minimum 2 mm thickness) by explosion bonding or hot rolling, having minimum 7 mm thick carbon steel as base material.	Glass flake lining is adequate to take care of corrosion & abrasion inside the Absorber, which is used globally & proven in many FGD plants. In case of maintenance, it is easy to carry out the repair works for glass flake lining. This will reduce the capital expenditure and also reduce imports. Bidder requests NTPC to review and accept 3mm thick vinyl ester based glass flake lining for absorber.	Bidder's proposal is not acceptable. Specification requirement is clear in this regard. Bidder to comply technical specification requirement.
15	V I B	SUB-SECTION-A-05 (FGD)	5 OF 29	3.02.04	The duct from Absorber outlet to bypass duct & duct after by pass damper/gate to chimney inlet shall be made of clad sheet of minimum 2 mm thickness of either Titanium (Grade 2 as per ASME SB265) or C-276 over 7 mm thick (minimum) mild steel base metal.	Glass flake lining is adequate to take care of corrosion & abrasion inside the Absorber outlet duct, which is used globally & proven in many FGD plants. In case of maintenance, it is easy to carry out the repair works for glass flake lining. This will reduce the capital expenditure considerably and also reduce imports. Bidder requests NTPC to review and accept 2mm thick vinyl ester based glass flake lining for absorber outlet duct.	Bidder's proposal is not acceptable. Specification requirement is clear in this regard. Bidder to comply technical specification requirement.

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16	VI A	IIA-04	2 of 7	3.01.00	The contractors scope shall include a common limestone grinding system for the two units with an interconnection from existing Stage-II & III system	The bidder understands that the common limestone grinding system applicable for Stage III (2x800 MW) is required to be interconnected with the existing Stage I and II limestone grinding systems. The bidder requested NTPC to provide the necessary drawings of the existing Stage I and II limestone grinding systems, with connection details and terminal points. The bidder also requested NTPC to clarify whether the limestone grinding system applicable for Stage III (2X800 MW) will be used to supply limestone slurry to the existing Stage I and II systems and vice versa.	Bidder to refer amendment no SG.11 in this regard.
17	Section-VI, Part A	Sub-Section- IIA-04 FGD System	Page 3 & 4 of 7	4.01.04	MotORIZED isolation gates at Absorber gas inlet, Absorber gas outlet along with 2x100 seal air fans for each gate and 2x100 heaters for absorber outlet gate & bypass gate . A bi-plane bypass damper along with 2x100 seal air & 2x100 heaters shall also be provided in the bypass duct.	Bidder understands that in the FGD Bypass Duct, only Quick Opening Bi-plane Damper is required, and Guillotine Gate is not applicable in the FGD Bypass Duct. This is in-line with tender P&ID. Please confirm bidder's understanding. Also, it shall be noted that as per the technical specification- Section-VI, Part B, Sub-Section- A-05 (FGD), Clause no: 3.03.01 & 3.03.02 (Page 5 of 29), in the FGD Bypass duct, Bypass Damper is only applicable & Bypass Gate is not applicable. In recent projects like NTPC Talcher Stage-III (2x660 MW), NTPC Lara Stage-II (2x800 MW) & SCCL (1x800 MW), FGD Bypass Gate was not appli-cable.	Bidder to refer amendment no SG.13 in this regard.
18	Section-VI, Part A	Sub-Section- II A-01 (SG & Auxiliaries including ESP)	Page 27 of 28	5.00.00	5.00.00. Provision for CO2 to Methanol in Singrauli STPP Stage-III 2 x 800 MW Project Provisions shall be given in both the units. The tap-off duct portion shall be provided with necessary isolation gates in each tap-off. These Gates are to be made of Carbon steel with C276 cladding of sheet of minimum thickness 1.6 mm along with 2x100 % Seal Air fans. Also, seals to be made of Alloy C-276 or better material. Blanking plates shall also be provided in each tap-off duct after isolation gates.	We understand that only Inlet tap-off duct with Gate (for CO2 to Methanol system) is required, and Outlet tap-off duct (with Gate) is not required as in recent projects like NTPC Talcher Stage-III (2x660 MW), NTPC Lara Stage-II (2x800 MW), SCCL (1x800 MW) project. Please confirm.	Bidder to refer amendment no SG.8 in this regard.
19	Section-VI, Part F	Sub-Section- VI (Mandatory Spares) Chapter-01 SG & Auxiliaries	Page 19 of 39	1.22.02	1.22.02. Gates in Flue Gas System of Air Flue Gas path of Boiler including FGD. 1. Seals: 1 set of each type and size (Set means complete replacement for one gate) 2. Actuator: 1 no. of each type	Clause no: 1.22.02 is coming under clause no: 1.22.00 FGD system in the Mandatory Spares List. However, in clause 1.22.02, it is mentioned as "Gates in Flue Gas System of Air Flue Gas path of Boiler including FGD". Please inform whether under clause 1.22.02 (which is coming under clause 1.22.00 FGD System), Seals and actuators for only FGD Gates are required to be considered (OR) whether Seals and actuators for complete flue gas system (i.e. from Flue Gas APH Inlet Gate till ID Fan Outlet Gate + FGD) require to be considered? Please clarify.	This clause is applicable for Gates in Flue Gas System of Air & Flue gas path of Boiler including FGD. Bidder to refer amendment no SG.20 in this regard.
20	Section-VI, Part F	Sub-Section- VI (Mandatory Spares) Chapter-01 SG & Auxiliaries	Page 19 of 39	1.22.02	1.22.02. Gates in Flue Gas System of Air Flue Gas path of Boiler including FGD 2. Actuator: 1 no. of each type	Already, Electrical Actuators (complete + its components) are considered under Clause No: 2.08.00 Electrical Actuators (coming under 2.00.00 Control and Instrumentation section of Mandatory Spares List). Therefore, bidder would like to inform that mandatory spares items for Electrical Actuators will be considered under any 1 of these clauses only (repetition of same spares under different clauses will be avoided, and project cost can be reduced). Please confirm.	For Electrical actuators, mandatory spares are to be provided as per Clause No: 2.08.00 Electrical Actuators.

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21	Part-E (Tender Drawings), Section-VI	Scheme of FGD-Absorber System (Drg. No: 1150-001-POM-A-022 Rev. No. A)	-	-		For FGD Inlet Guillotine Gate's Seal Air System, Temperature Transmitter (TT), Flow Switch (FS), Temperature Switch (TS), and Pressure Transmitter (PT) are shown in the Scheme of FGD- Absorber System drawing.	Please note that FGD Inlet Guillotine Gate does not require any Seal Air Heaters (as per technical specification). Temperature Transmitter (TT), Temperature Switch (TS) and Flow Switch (FS) are applicable only when Seal Air Heater is applicable (as in the case of FGD Outlet Guillotine Gate & FGD Bypass Damper). However, for FGD Inlet Guillotine Gate, seal air heater is not applicable and hence, Temperature Transmitter (TT), Temperature Switch (TS) and Flow Switch (FS) are not applicable. Only Pressure Transmitter (PT) is applicable for FGD Inlet Guillotine Gate (similar to ID Fan Outlet Guillotine Gates). Please confirm our understanding.	Bidder to refer amendment no SG.41 in this regard.
22	Part-E (Tender Drawings), Section-VI	Scheme of Air & Flue Gas Path with Instrumentation P&ID (With Tri-sector AH) (Drg. No: 1150-001-POM-A-018b, Sheet 1 of 2, Rev. A)	-	-		Scheme of Air & Flue Gas Path with Instrumentation P&ID shows SCR reactor along with SCR Inlet Gate, SCR Outlet Gate, Economizer Bypass Gate & Economizer Bypass Control Damper.	This same point was already agreed for NTPC Talcher Stage-III (2x660 MW), NTPC Lara Stage-II (2x800 MW) & previous tender for NTPC Singrauli Stage-III (2x800 MW) project also. Please note that as per Clause No: 2.16.05A in Section VI, Part A, Sub Section-II A-01, Page 16 of 28, "Provision for Future Installation of SCR System" is mentioned. However, the tender P&ID (Scheme of Air & Flue Gas Path with Instrumentation) indicates SCR reactor along with SCR Inlet Gate, SCR Outlet Gate, Economizer Bypass Gate & Economizer Bypass Control Damper. The Scheme of Air & Flue Gas Path with Instrumentation P&ID is contradicting with Clause No: 2.16.05A (Provision for Future Installation of SCR System) with respect to the scope of the above referred SCR & Economizer Bypass Gates & Dampers (required for SCR system). Bidder understands that SCR Inlet Gate, SCR Outlet Gate, Economizer Bypass Gate & Economizer Bypass Control Damper are not required at present, and these will be part of future SCR only as per Clause No: 2.16.05A in Section VI, Part A, Sub Section-II A-01, Page 16 of 28, "Provision for Future Installation of SCR System". Please clarify and confirm bidder's understanding.	Bidder to refer revised P&IDs issued as an Amendment at SG.39 and SG.40
23	Section-VI, Part B	Sub-Section- A-02 (SG & Auxiliaries including ESP)	Page 57 of 67	22.01.02		Leak tightness testing of dampers for each type and size of damper at shop to demonstrate the guaranteed gas tightness efficiency (on flow).	Leak tightness testing will be conducted for 1 number of each type and size of Gate & Biplane Damper, irrespective of Sub-vendor/ Sub-supplier.	Bidder's proposal is not acceptable. Specification requirement is clear in this regard. Bidder to comply technical specification requirement.
24	SECTION – VI, PART-F	SUB-SECTION-VI CHAPTER -01	PAGE 5 OF 39	1.05.00 Fans A, ID Fans SI no: 9.2		ID Fans: Hydraulic servomotor Seal ring kit(complete)	In latest design Axial Reaction Fans offered by Bidder for FD, ID & PA Fan application in all the super-critical 660 MW, 800 MW TPP's of NTPC, loose spare items (like seal kit etc.) are not applicable for Hydraulic adjusting device (HAD) because the same cannot be replaced or serviced at project site as it requires special skill set/ equipment for dis-assembly, re-assembly, static / dynamic testing of HAD. Spare HAD shall be used in case of any repair/ replacement and HAD servicing shall be done only at bidder's vendor works after replacing damaged parts. For this requirement, two no's HAD spare for each application are already applicable for ID & PA Fans. NTPC is requested to note the same and delete this spare loose item requirement. These spares are not applicable in all the super-critical 660 MW, 800 MW projects of NTPC including Patratu 3x800 MW TPP.	Bidder to provide the equivalent item in case of non applicability in provided system/equipment. Further, Bidder to refer clause 13.00.00 of sub section VI, Part A, Section VI of Technical Specifications. The specifications requirements are clear and bidder to comply the same.
25	SECTION – VI, PART-F	SUB-SECTION-VI CHAPTER -01	PAGE 6 OF 39	1.05.00 Fans B, FD Fans SI no: 8.0		FD Fans: Hydraulic servomotor Seal ring kit(complete)		
26	SECTION – VI, PART-F	SUB-SECTION-VI CHAPTER -01	PAGE 7 OF 39	1.05.00 Fans C, PA Fans SI no: 8.0		PA Fans :Hydraulic servomotor Seal ring kit(complete)		