

FINAL ESIA REPORT

FOR

THE PROPOSED 20''x76KM NATURAL GAS PIPELINE PROJECT

FROM

**AGPC FACILITY IN OHAJI/EGBEMA LGA, IMO STATE TO
INDORAMA COMPLEX IN ELEME LGA, RIVERS STATE**

BY

**INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED
INDORAMA COMPLEX, ELEME LGA,
RIVERS STATE, NIGERIA**

**FEDERAL MINISTRY OF ENVIRONMENT (FME_{nv})
APPROVED ESIA UPDATED WITH SECOND SEASON
BASELINE DATA FOR AfDB SUBMISSION**

**VOLUME II
ANNEXURES**

OCTOBER 2026

VOLUME II – ANNEXURES

Final ESIA for the Proposed 20" x 76 km Natural Gas Pipeline Project (AGPC Facility, Ohaji/Egbema LGA, Imo State to Indorama Complex, Eleme LGA, Rivers State)

LIST OF ANNEXURES

Annexure	Title	Page
Chapter 1 – Introduction		
Annexure 1.1	FMEEnv Approval of Terms of Reference (TOR)	3
Annexure 1.2	FMEEnv Feedback on Site Verification	4
Chapter 4 – Description of the Environment (Baseline)		
Annexure 4.1	Air Quality and Noise Results	5
Annexure 4.2	Geology Results (Resistivity Depth Profile Diagrams)	45
Annexure 4.3	Soil Quality Results	52
Annexure 4.4	Groundwater Quality Results / Stiff Diagrams	84
Annexure 4.5	Surface Water Quality Results	97
Annexure 4.6	Sediment Quality Results	99
Annexure 4.7	Vegetation Results (Trees, Shrubs and Herbaceous Plants)	102
Annexure 4.8	Ecosystem Services	121
Annexure 4.9	SIA/HIA Questionnaire	127
Annexure 4.10	Cultural Heritage	149
Annexure 4.11	Comprehensive Stakeholder Engagements Report	158
Annexure 4.12	Indorama Engagements with Stakeholders in Pipeline Host Communities and CSR Projects	239

Note: Annexures 4.1 and 4.3 to 4.7 have been updated (August 2026) with second-season (wet season) baseline data. Annexures supplied as signed or scanned PDFs (1.1, 1.2, 4.2, 4.8 to 4.12) are reproduced as page images.



FEDERAL MINISTRY OF ENVIRONMENT

Environment House

Independence Way South, Central Business District, Abuja - FCT.

Email: info@ead.gov.ng. www.ead.gov.ng, www.eia@ead.gov.ng

ENVIRONMENTAL ASSESSMENT DEPARTMENT

FMEEnv/EA/EIA/7236/Vol. 1/170

27th October 2023.

The Managing Director,
Indorama Eleme Fertilizer and Chemical Limited,
Indorama Complex,
East-West Expressway, Eleme,
Port Harcourt, Rivers State.

RE: SUBMISSION OF REVISED TERMS OF REFERENCE/SCOPE OF WORK FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) OF THE PROPOSED 76KM NATURAL GAS PIPELINE PROJECT FROM ANOH GAS MANIFOLD IN ASSA NORTH LGA, IMO STATE TO INDORAMA COMPLEX, ELEME LGA, RIVERS STATE.

Please refer to your letter with Ref. No. NGLine/ENV/FMEEnv/2023/03 dated 23rd October, 2023 on the above proposed project.

2. Following the conclusion of the evaluation of the documents submitted, I am directed to inform you that the documents are adjudged good. Accordingly, you can proceed to the next stage of the EIA process, which is Data gathering exercise. Please, you are to notify the Ministry in good time to enable adequate participation in the exercise.
3. You may wish to contact the under signed on 08037869670 or Ladula H. D (08020910889) to confirm the receipt of this letter and for any clarification please.
4. Thank you for your cooperation.


Engr. Gomwalk, Celestine W. G
For: Honourable Minister



FEDERAL MINISTRY OF ENVIRONMENT

Environment House

Independence Way South, Central Business District, Abuja - FCT.

Email: info@ead.gov.ng, www.ead.gov.ng, [www.eia@ead.gov.ng](mailto:eia@ead.gov.ng)

ENVIRONMENTAL ASSESSMENT DEPARTMENT

FMEnv/EA/EIA/7236/Vol. 1/68

12th October, 2023.

The Managing Director,
Indorama Eleme Fertilizer and Chemical Limited,
Indorama Complex,
East-West Expressway, Eleme,
Port Harcourt, Rivers State.

RE: ENVIRONMENTAL IMPACT ASSESSMENT (EIA) OF THE PROPOSED 76KM GAS PIPELINE FROM ANOH GAS MANIFOLD IN ASSA NORTH LGA, IMO STATE TO INDORAMA COMPLEX, ELEME LGA, RIVERS STATE.

Please refer to your letter with Reference Number: NGLine/ENV/FMEnv/2023/01 dated 25th August, 2023 on the above proposed project.

2. Following the conclusion of the Site Verification exercise, I am directed to inform you that the Ministry has placed the project in Category One(1) with One (1) season baseline data gathering exercise in line with Best Practices.
3. You are required to conduct a scoping workshop exercise involving relevant stakeholder. Regulators from the Federal Ministry of Environment, Rivers and Imo States Ministry of Environment shall participate in the exercise. Furthermore, you are requested to submit to the Ministry the report of the exercise incorporating significant issues raised during the scoping exercise.
4. Please note that the baseline data gathering and laboratory analysis exercises shall be witnessed by officials of the Ministry. Furthermore, the laboratory analysis of the samples collected should be carried out in FMEnv accredited Laboratory. Accordingly, you are to ensure full Quality Assurance/Quality Control (QA/QC) measures in line with standard practices and notify the Ministry in good time to enable adequate participation in these exercises.
5. The following should be forwarded to the Federal Ministry of Environment before the submission of the draft EIA report;
 - i. Evidence of laboratory accreditation with the Federal Ministry of Environment where the sample analysis shall be carried out.
 - ii. Chain of custody for the samples collected
 - iii. Certificate of sample analysis duly stamped and signed by the laboratory manager.
 - iv. Evidence of laboratory analysis witnessing by the Federal Ministry of Environment.
6. Upon completion of the EIA study, you are required to submit to the Ministry Five (5) hard and Two (2) electronic copies of the draft EIA report and also email a copy to eia@ead.gov.ng. And copyinfo@ead.gov.ng.
7. Thank you for your co-operation.

Dr. Musa gashau
For: Honourable Minister

ANNEXURE 4.1:

AIR/NOISE QUALITY RESULTS

DRY SEASON

10minutes Average Values - (ppm)															
AQ1															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.002	0.012	0.004	0.002	<0.001	<0.001	<0.001	0.096	0.063	0.020	61.2	1.3	NNE	27.4	74.5
10mins	0.000	0.013	0.002	0.003	<0.001	<0.001	<0.001	0.103	0.066	0.030	65.6	1.8	SE	29.3	75.4
10mins	0.002	0.014	0.002	0.012	<0.001	<0.001	<0.001	0.098	0.061	0.025	62.6	1.8	SE	29.3	69.8
10mins	0.000	0.012	0.004	0.002	<0.001	<0.001	<0.001	0.104	0.064	0.031	64.1	1.4	SSE	33.8	66.5
10mins	0.004	0.010	0.006	0.005	<0.001	<0.001	<0.001	0.094	0.062	0.025	61.2	1.3	SE	27.4	74.5
10mins	0.000	0.011	0.002	0.003	<0.001	<0.001	<0.001	0.097	0.061	0.032	62.6	1.8	SE	29.3	75.4
Avg (ppm)	0.001	0.012	0.003	0.005	<0.001	<0.001	<0.001	0.099	0.063	0.027	62.9	1.6		29.4	72.7
µg/M3	3.49	22.57	3.82	8.83	<0.001	<0.001	<0.001	98.67	62.83	27.17	62.9	1.6		29.4	72.7

AQ2															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.000	0.014	0.004	0.002	<0.001	<0.001	<0.001	0.097	0.060	0.027	63.2	1.7	SE	28.4	76.8
10mins	0.004	0.011	0.002	0.002	<0.001	<0.001	<0.001	0.099	0.062	0.026	64.2	1.9	ENE	27.4	75.8
10mins	0.000	0.019	0.000	0.022	<0.001	<0.001	<0.001	0.098	0.058	0.035	63.8	1.7	SSE	28.4	76.4
10mins	0.002	0.012	0.002	0.000	<0.001	<0.001	<0.001	0.105	0.063	0.031	62.5	1.3	SSW	29.6	76.7
10mins	0.000	0.011	0.004	0.002	<0.001	<0.001	<0.001	0.093	0.061	0.032	63.2	1.7	SSE	27.4	76.4
10mins	0.003	0.012	0.006	0.000	<0.001	<0.001	<0.001	0.102	0.061	0.031	62.5	1.2	SSE	31.8	67.8

Avg (ppm)	0.002	0.013	0.003	0.005	<0.001	<0.001	<0.001	0.099	0.061	0.030	63.2	1.6		28.8	75.0
µg/M3	3.93	24.77	3.44	9.16	<0.001	<0.001	<0.001	99.00	60.83	30.33	63.2	1.6		28.8	75.0

AQ3															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.002	0.013	0.004	0.002	BDL	BDL	BDL	0.082	0.053	0.029	52.1	1.8	ENE	30.7	70.4
10mins	0.000	0.016	0.006	0.003	BDL	BDL	BDL	0.089	0.056	0.033	50.9	1.4	SW	31.8	70.5
10mins	0.002	0.012	0.000	0.012	BDL	BDL	BDL	0.090	0.051	0.039	50.1	1.6	NNE	33.7	67.9
10mins	0.000	0.017	0.004	0.003	BDL	BDL	BDL	0.104	0.055	0.032	50.1	1.6	ENE	33.7	66.8
10mins	0.004	0.013	0.004	0.022	BDL	BDL	BDL	0.099	0.048	0.030	50.1	1.6	ENE	33.7	67.9
10mins	0.000	0.012	0.000	0.003	BDL	BDL	BDL	0.088	0.056	0.032	51.9	1.4	SW	30.8	70.5
Avg (ppm)	0.001	0.014	0.003	0.008	BDL	BDL	BDL	0.092	0.053	0.033	50.9	1.6		32.4	69.0
µg/M3	3.49	26.02	3.44	14.72	BDL	BDL	BDL	92.00	53.17	32.50	50.9	1.57		32.4	69.0

AQ4															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.002	0.011	0.000	0.004	<0.001	<0.001	<0.001	0.089	0.048	0.028	48.9	0.7	ENE	27.4	76.4
10mins	0.000	0.019	0.004	0.021	<0.001	<0.001	<0.001	0.086	0.049	0.031	53.3	2.6	SE	29.5	70.5
10mins	0.000	0.017	0.008	0.011	<0.001	<0.001	<0.001	0.099	0.053	0.033	48.3	1.4	SW	31.8	70.5
10mins	0.002	0.016	0.000	0.022	<0.001	<0.001	<0.001	0.105	0.053	0.032	54.3	1.6	NNW	30.6	73.6
10mins	0.000	0.012	0.005	0.000	<0.001	<0.001	<0.001	0.083	0.049	0.034	50.9	1.4	SW	31.3	70.5
10mins	0.004	0.017	0.004	0.000	<0.001	<0.001	<0.001	0.112	0.052	0.031	50.9	1.4	SW	31.8	70.5
Avg (ppm)	0.001	0.015	0.004	0.010	<0.001	<0.001	<0.001	0.096	0.051	0.032	51.1	1.5	0.0	30.4	72.0
µg/M3	3.49	28.84	4.01	18.98	<0.001	<0.001	<0.001	95.67	50.67	31.50	51.1	1.52		30.4	72.0

AQ5															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.000	0.018	0.002	0.004	<0.001	<0.001	<0.001	0.089	0.058	0.027	53.2	3.5	SE	28.4	72.6
10mins	0.004	0.012	0.005	0.006	<0.001	<0.001	<0.001	0.094	0.061	0.033	53.3	1.6	SSE	31.9	67.3
10mins	0.002	0.011	0.002	0.004	<0.001	<0.001	<0.001	0.104	0.066	0.036	48.3	3.5	SW	28.4	70.8
10mins	0.000	0.017	0.008	0.025	<0.001	<0.001	<0.001	0.103	0.071	0.032	51.3	2.6	NE	29.4	71.6
10mins	0.003	0.010	0.000	0.005	<0.001	<0.001	<0.001	0.099	0.068	0.031	50.9	2.6	N	29.4	70.1
10mins	0.000	0.016	0.005	0.005	<0.001	<0.001	<0.001	0.101	0.069	0.032	50.9	2.6	NNE	29.4	71.6
Avg (ppm)	0.002	0.014	0.004	0.008	<0.001	<0.001	<0.001	0.098	0.066	0.032	51.3	2.7		29.5	70.7
µg/M3	3.93	26.33	4.20	16.03	<0.001	<0.001	<0.001	98.33	65.50	31.83	51.3	2.7		29.5	70.7

AQ6															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.000	0.014	0.000	0.005	<0.001	<0.001	<0.001	0.092	0.063	0.032	53.8	1.8	NE	31.1	67.8
10mins	0.002	0.013	0.004	0.007	<0.001	<0.001	<0.001	0.100	0.064	0.030	50.2	1.6	ENE	28.6	69.6
10mins	0.002	0.017	0.006	0.000	<0.001	<0.001	<0.001	0.110	0.062	0.032	54.7	1.6	ENE	28.6	72.6
10mins	0.003	0.012	0.004	0.025	<0.001	<0.001	<0.001	0.090	0.061	0.034	50.7	1.6	ENE	30.1	69.8
10mins	0.000	0.013	0.002	0.005	<0.001	<0.001	<0.001	0.094	0.063	0.031	54.7	1.6	ENE	30.5	70.2
10mins	0.003	0.014	0.003	0.000	<0.001	<0.001	<0.001	0.108	0.062	0.032	50.2	2.5	SSE	31.2	69.4
Avg (ppm)	0.002	0.014	0.003	0.007	<0.001	<0.001	<0.001	0.099	0.063	0.032	52.4	1.8		30.0	69.9
µg/M3	4.36	26.02	3.63	13.74	<0.001	<0.001	<0.001	99.00	62.50	31.83	52.4	1.8		30.0	69.9

AQ7															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.002	0.016	0.002	0.002	<0.001	<0.001	<0.001	0.089	0.060	0.032	51.2	1.8	SSE	29.8	69.3
10mins	0.000	0.017	0.006	0.012	<0.001	<0.001	<0.001	0.102	0.066	0.034	51.2	1.8	SSE	30.6	69.3
10mins	0.000	0.016	0.000	0.001	<0.001	<0.001	<0.001	0.106	0.069	0.032	51.4	1.5	ENE	30.1	70.6
10mins	0.000	0.017	0.002	0.025	<0.001	<0.001	<0.001	0.100	0.062	0.033	50.2	1.8	SE	30.6	70.2
10mins	0.000	0.015	0.004	0.005	<0.001	<0.001	<0.001	0.094	0.063	0.031	50.4	1.8	SSE	30.6	69.9
10mins	0.003	0.012	0.002	0.004	<0.001	<0.001	<0.001	0.102	0.061	0.032	57.2	1.8	SSE	29.8	70.3
Avg (ppm)	0.001	0.016	0.003	0.008	<0.001	<0.001	<0.001	0.099	0.064	0.032	51.9	1.8		30.3	69.9
µg/M3	2.18	29.16	3.05	16.03	<0.001	<0.001	<0.001	98.83	63.50	32.33	51.9	1.8		30.3	69.9

AQ8															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.000	0.013	0.004	0.002	<0.001	<0.001	<0.001	0.090	0.061	0.032	53.6	1.8	S	29.8	70.3
10mins	0.002	0.018	0.000	0.001	<0.001	<0.001	<0.001	0.102	0.060	0.033	56.8	1.4	NNE	28.6	70.6
10mins	0.002	0.015	0.016	0.001	<0.001	<0.001	<0.001	0.110	0.061	0.032	51.2	1.2	NNE	28.6	72.2
10mins	0.002	0.011	0.000	0.025	<0.001	<0.001	<0.001	0.092	0.061	0.031	51.4	0.8	SE	30.4	67.3
10mins	0.000	0.014	0.000	0.006	<0.001	<0.001	<0.001	0.096	0.064	0.033	50.2	0.8	SE	29.8	71.2
10mins	0.003	0.016	0.012	0.002	<0.001	<0.001	<0.001	0.102	0.062	0.032	50.4	1.8	S	30.9	69.2
Avg (ppm)	0.002	0.015	0.005	0.006	<0.001	<0.001	<0.001	0.099	0.062	0.032	52.3	1.3		29.7	70.1
µg/M3	3.93	27.27	6.11	12.11	<0.001	<0.001	<0.001	98.67	61.50	32.17	52.3	1.30		29.7	70.1

AQ9															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.000	0.016	0.000	0.002	<0.001	<0.001	<0.001	0.084	0.053	0.030	54.5	1.3	SE	29.8	70.3
10mins	0.002	0.012	0.005	0.022	<0.001	<0.001	<0.001	0.089	0.051	0.035	54.9	1.4	SSE	30.4	70.4
10mins	0.000	0.016	0.008	0.004	<0.001	<0.001	<0.001	0.087	0.030	0.036	52.5	1.6	SE	29.8	71.3
10mins	0.004	0.012	0.005	0.012	<0.001	<0.001	<0.001	0.071	0.032	0.032	51.9	1.4	SSE	30.4	69.4
10mins	0.000	0.012	0.000	0.000	<0.001	<0.001	<0.001	0.069	0.033	0.032	52.5	1.2	SE	29.8	70.3
10mins	0.002	0.016	0.002	0.000	<0.001	<0.001	<0.001	0.072	0.031	0.031	56.9	1.9	NNE	31.9	69.6
Avg (ppm)	0.001	0.014	0.003	0.007	<0.001	<0.001	<0.001	0.079	0.038	0.033	53.9	1.5		30.4	70.2
µg/M3	3.49	26.33	3.82	13.09	<0.001	<0.001	<0.001	78.67	38.33	32.67	53.9	1.5		30.4	70.2

AQ10															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.000	0.009	0.005	0.004	<0.001	<0.001	<0.001	0.096	0.063	0.032	49.8	1.7	NE	30.7	69.8
10mins	0.002	0.011	0.005	0.000	<0.001	<0.001	<0.001	0.098	0.063	0.031	49.8	1.3	NNE	30.9	70.5
10mins	0.000	0.013	0.006	0.014	<0.001	<0.001	<0.001	0.089	0.064	0.031	49.8	1.3	NNE	30.9	70.5
10mins	0.003	0.016	0.000	0.004	<0.001	<0.001	<0.001	0.094	0.062	0.031	51.6	1.4	ENE	31.2	71.2
10mins	0.000	0.011	0.000	0.014	<0.001	<0.001	<0.001	0.097	0.063	0.033	49.8	1.3	NNE	30.9	70.5
10mins	0.002	0.016	0.003	0.000	<0.001	<0.001	<0.001	0.093	0.061	0.032	51.6	1.4	ENE	31.2	71.2
Avg (ppm)	0.001	0.013	0.003	0.006	<0.001	<0.001	<0.001	0.095	0.063	0.032	50.4	1.4	0.0	31.0	70.6
µg/M3	3.05	23.83	3.63	11.78	<0.001	<0.001	<0.001	94.50	62.67	31.67	50.4	1.4		31.0	70.6

AQ11															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.002	0.013	0.000	0.002	<0.001	<0.001	<0.001	0.119	0.061	0.037	49.8	1.8	SE	29.3	75.4
10mins	0.000	0.012	0.007	0.002	<0.001	<0.001	<0.001	0.121	0.063	0.035	51.6	1.3	NNE	27.4	74.5
10mins	0.002	0.011	0.012	0.006	<0.001	<0.001	<0.001	0.109	0.064	0.033	54.9	1.3	SE	27.4	70.6
10mins	0.004	0.012	0.000	0.022	<0.001	<0.001	<0.001	0.115	0.067	0.032	52.5	1.3	SE	27.4	74.5
10mins	0.002	0.016	0.008	0.012	<0.001	<0.001	<0.001	0.118	0.061	0.033	51.9	1.8	NE	29.3	75.4
10mins	0.000	0.017	0.000	0.002	<0.001	<0.001	<0.001	0.123	0.068	0.039	52.5	1.3	SE	27.4	74.5
Avg (ppm)	0.002	0.014	0.005	0.008	<0.001	<0.001	<0.001	0.118	0.064	0.035	52.2	1.5		28.0	74.2
µg/M3	4.36	25.39	5.15	15.05	<0.001	<0.001	<0.001	117.50	64.00	34.83	52.2	1.47		28.0	74.2

AQ12															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.002	0.022	0.002	0.001	<0.001	<0.001	<0.001	0.124	0.061	0.030	50.9	1.8	ENE	27.8	76.8
10mins	0.000	0.019	0.000	0.002	<0.001	<0.001	<0.001	0.119	0.066	0.031	52.5	1.7	SSE	28.4	76.4
10mins	0.002	0.015	0.002	0.004	<0.001	<0.001	<0.001	0.133	0.068	0.033	51.9	1.2	SSE	30.4	71.4
10mins	0.000	0.021	0.002	0.012	<0.001	<0.001	<0.001	0.122	0.071	0.037	52.7	1.7	SSE	27.4	76.4
10mins	0.004	0.017	0.028	0.022	<0.001	<0.001	<0.001	0.127	0.068	0.030	50.2	1.2	SSE	30.4	71.4
10mins	0.000	0.016	0.000	0.002	<0.001	<0.001	<0.001	0.117	0.066	0.037	49.2	1.7	ENE	29.4	73.4
Avg (ppm)	0.001	0.018	0.006	0.007	<0.001	<0.001	<0.001	0.124	0.067	0.033	51.2	1.6		29.0	74.3
µg/M3	3.49	34.49	6.49	14.07	<0.001	<0.001	<0.001	123.67	66.67	33.00	51.2	1.55		29.0	74.3

AQ13															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.002	0.018	0.000	0.001	<0.001	<0.001	<0.001	0.134	0.071	0.033	50.1	1.6	NNE	31.7	67.9
10mins	0.002	0.012	0.002	0.002	<0.001	<0.001	<0.001	0.139	0.073	0.034	52.1	1.8	ENE	30.7	70.4
10mins	0.000	0.017	0.000	0.002	<0.001	<0.001	<0.001	0.139	0.070	0.034	50.7	1.5	ENE	30.4	69.9
10mins	0.004	0.011	0.002	0.022	<0.001	<0.001	<0.001	0.140	0.073	0.037	52.1	1.8	ENE	30.7	70.4
10mins	0.000	0.012	0.002	0.003	<0.001	<0.001	<0.001	0.149	0.076	0.038	50.9	1.4	SW	31.8	70.5
10mins	0.000	0.017	0.028	0.021	<0.001	<0.001	<0.001	0.141	0.075	0.039	50.1	1.6	ENE	33.7	67.9
Avg (ppm)	0.001	0.015	0.006	0.009	<0.001	<0.001	<0.001	0.140	0.073	0.036	51.0	1.6		31.5	69.5
µg/M3	3.49	27.27	6.49	16.69	<0.001	<0.001	<0.001	140.33	73.00	35.83	51.0	1.62		31.5	69.5

AQ14															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.000	0.015	0.000	0.001	<0.001	<0.001	<0.001	0.144	0.071	0.033	53.2	2.7	NNW	29.4	72.5
10mins	0.002	0.017	0.002	0.002	<0.001	<0.001	<0.001	0.141	0.077	0.034	53.3	2.6	SE	29.5	72.5
10mins	0.002	0.011	0.012	0.024	<0.001	<0.001	<0.001	0.146	0.073	0.033	48.9	0.7	ENE	27.4	76.4
10mins	0.000	0.016	0.002	0.002	<0.001	<0.001	<0.001	0.145	0.073	0.032	50.3	1.6	NNW	31.6	73.6
10mins	0.000	0.016	0.022	0.012	<0.001	<0.001	<0.001	0.145	0.073	0.032	50.3	1.6	NNW	27.4	73.4
10mins	0.005	0.017	0.000	0.004	<0.001	<0.001	<0.001	0.146	0.073	0.033	52.3	0.7	ENE	27.4	76.4
Avg (ppm)	0.002	0.015	0.006	0.008	<0.001	<0.001	<0.001	0.145	0.073	0.033	51.4	1.7		28.8	74.1
µg/M3	3.93	28.84	7.25	14.72	<0.001	<0.001	<0.001	144.50	73.33	32.83	51.4	1.65		28.8	74.1

AQ15															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.000	0.019	0.000	0.002	<0.001	<0.001	<0.001	0.122	0.066	0.036	52.3	1.6	NE	27.8	70.6
10mins	0.000	0.018	0.002	0.004	<0.001	<0.001	<0.001	0.114	0.060	0.034	48.9	3.5	SSE	28.4	72.6
10mins	0.003	0.010	0.000	0.025	<0.001	<0.001	<0.001	0.126	0.061	0.037	50.3	2.6	NNE	29.4	69.8
10mins	0.006	0.012	0.015	0.012	<0.001	<0.001	<0.001	0.117	0.067	0.038	50.3	2.6	NE	30.7	68.1
10mins	0.000	0.016	0.005	0.004	<0.001	<0.001	<0.001	0.128	0.063	0.039	52.3	3.5	SSE	28.4	69.6
10mins	0.000	0.019	0.002	0.005	<0.001	<0.001	<0.001	0.121	0.066	0.033	52.9	1.2	SSE	30.4	68.6
Avg (ppm)	0.002	0.016	0.004	0.009	<0.001	<0.001	<0.001	0.121	0.064	0.036	51.2	2.5		29.2	69.9
µg/M3	3.93	29.47	4.58	17.01	<0.001	<0.001	<0.001	121.33	63.83	36.17	51.2	2.50		29.2	69.9

AQ16															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.002	0.015	0.004	0.004	<0.001	<0.001	<0.001	0.122	0.065	0.027	51.8	1.8	NE	30.1	67.8
10mins	0.000	0.014	0.000	0.002	<0.001	<0.001	<0.001	0.125	0.069	0.026	50.8	1.2	ENE	26.9	75.4
10mins	0.002	0.013	0.004	0.001	<0.001	<0.001	<0.001	0.131	0.067	0.028	54.7	1.6	ENE	30.1	69.8
10mins	0.002	0.017	0.004	0.023	<0.001	<0.001	<0.001	0.128	0.066	0.032	49.7	1.6	ENE	28.6	68.6
10mins	0.000	0.019	0.000	0.004	<0.001	<0.001	<0.001	0.123	0.063	0.027	51.8	1.8	NE	31.1	67.8
10mins	0.003	0.013	0.014	0.008	<0.001	<0.001	<0.001	0.125	0.069	0.029	50.7	1.6	ENE	30.8	68.7
Avg (ppm)	0.002	0.015	0.004	0.007	<0.001	<0.001	<0.001	0.126	0.067	0.028	51.6	1.6		29.6	69.7
µg/M3	3.93	28.53	4.96	13.74	<0.001	<0.001	<0.001	125.7	66.50	28.17	51.6	1.60		29.6	69.7

AQ17															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.000	0.017	0.000	0.001	<0.001	<0.001	<0.001	0.116	0.063	0.033	53.4	1.5	ENE	30.1	71.3
10mins	0.002	0.016	0.002	0.002	<0.001	<0.001	<0.001	0.119	0.060	0.032	49.2	1.8	SSE	29.8	69.3
10mins	0.003	0.015	0.002	0.012	<0.001	<0.001	<0.001	0.128	0.061	0.034	50.2	1.8	SSE	30.6	69.9
10mins	0.000	0.013	0.000	0.004	<0.001	<0.001	<0.001	0.134	0.063	0.039	53.4	1.5	NE	30.1	67.8
10mins	0.000	0.014	0.000	0.021	<0.001	<0.001	<0.001	0.138	0.065	0.038	51.4	1.5	NE	30.1	70.6
10mins	0.003	0.017	0.022	0.002	<0.001	<0.001	<0.001	0.136	0.067	0.034	54.2	1.8	SSE	30.6	69.9
Avg (ppm)	0.001	0.015	0.004	0.007	<0.001	<0.001	<0.001	0.129	0.063	0.035	52.0	1.7		30.2	69.8
µg/M3	3.49	28.84	4.96	13.74	<0.001	<0.001	<0.001	128.50	63.17	35.00	52.0	1.65		30.2	69.8

AQ18															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.000	0.012	0.000	0.001	<0.001	<0.001	<0.001	0.119	0.066	0.033	52.2	1.5	SSE	29.8	70.5
10mins	0.000	0.014	0.004	0.002	<0.001	<0.001	<0.001	0.116	0.061	0.035	53.6	1.8	S	30.9	68.9
10mins	0.002	0.014	0.014	0.012	<0.001	<0.001	<0.001	0.127	0.066	0.033	50.2	1.5	SE	30.2	68.4
10mins	0.002	0.015	0.000	0.021	<0.001	<0.001	<0.001	0.129	0.061	0.032	51.8	1.2	NNE	28.6	72.2
10mins	0.000	0.011	0.000	0.004	<0.001	<0.001	<0.001	0.121	0.063	0.038	53.7	0.9	SSE	29.5	70.2
10mins	0.002	0.019	0.014	0.011	<0.001	<0.001	<0.001	0.118	0.061	0.037	54.8	1.4	NNE	31.6	70.6
Avg (ppm)	0.001	0.014	0.005	0.009	<0.001	<0.001	<0.001	0.122	0.063	0.035	52.7	1.4		30.1	70.1
µg/M3	2.62	26.65	6.11	16.69	<0.001	<0.001	<0.001	121.67	63.00	34.67	52.7	1.38		30.1	70.1

AQ19															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.000	0.012	0.000	0.001	<0.001	<0.001	<0.001	0.124	0.070	0.033	47.6	1.8	SSE	29.5	73.5
10mins	0.000	0.011	0.012	0.002	<0.001	<0.001	<0.001	0.126	0.070	0.032	52.5	1.7	S	29.8	74.6
10mins	0.000	0.016	0.016	0.022	<0.001	<0.001	<0.001	0.129	0.073	0.033	52.5	1.3	SE	29.8	70.3
10mins	0.006	0.012	0.005	0.012	<0.001	<0.001	<0.001	0.121	0.071	0.033	51.9	1.4	SSE	30.4	70.4
10mins	0.000	0.016	0.000	0.003	<0.001	<0.001	<0.001	0.128	0.073	0.032	52.5	2.4	SE	29.8	71.3
10mins	0.002	0.026	0.002	0.011	<0.001	<0.001	<0.001	0.123	0.071	0.034	51.9	1.9	NNE	31.9	69.6
Avg (ppm)	0.001	0.016	0.006	0.009	<0.001	<0.001	<0.001	0.125	0.071	0.033	51.5	1.8		30.2	71.6
µg/M3	3.49	29.16	6.68	16.69	<0.001	<0.001	<0.001	125.17	71.33	32.83	51.5	1.75		30.2	71.6

AQ20															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.002	0.017	0.000	0.004	<0.001	<0.001	<0.001	0.121	0.063	0.032	49.8	1.3	NNE	30.9	70.5
10mins	0.000	0.013	0.016	0.001	<0.001	<0.001	<0.001	0.124	0.069	0.033	49.8	1.3	NNE	30.9	70.5
10mins	0.010	0.019	0.005	0.002	<0.001	<0.001	<0.001	0.131	0.068	0.030	51.6	1.4	ENE	31.2	69.2
10mins	0.000	0.012	0.005	0.014	<0.001	<0.001	<0.001	0.125	0.073	0.034	49.8	1.3	NNE	32.7	67.8
10mins	0.004	0.011	0.000	0.003	<0.001	<0.001	<0.001	0.134	0.065	0.039	51.6	1.4	ENE	31.2	71.2
10mins	0.000	0.019	0.000	0.021	<0.001	<0.001	<0.001	0.137	0.067	0.033	55.6	1.4	ENE	31.2	70.2
Avg (ppm)	0.003	0.015	0.004	0.008	<0.001	<0.001	<0.001	0.129	0.068	0.034	51.4	1.4		31.4	69.9
µg/M3	6.98	28.53	4.96	14.72	<0.001	<0.001	<0.001	128.67	67.50	33.50	51.4	1.4		31.4	69.9

AQ21															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.000	0.012	0.000	0.012	<0.001	<0.001	<0.001	0.093	0.043	0.038	52.6	1.6	SE	29.3	75.4
10mins	0.006	0.010	0.002	0.000	<0.001	<0.001	<0.001	0.075	0.028	0.035	51.4	1.8	SSE	29.3	75.4
10mins	0.000	0.012	0.016	0.002	<0.001	<0.001	<0.001	0.079	0.031	0.036	59.8	1.3	SSE	29.4	68.7
10mins	0.000	0.011	0.005	0.022	<0.001	<0.001	<0.001	0.072	0.028	0.032	51.2	1.3	SE	30.4	74.5
10mins	0.008	0.012	0.000	0.002	<0.001	<0.001	<0.001	0.068	0.022	0.034	52.3	1.3	SE	30.5	71.4
10mins	0.000	0.010	0.002	0.000	<0.001	<0.001	<0.001	0.067	0.023	0.032	50.8	1.3	SSE	30.4	70.5
Avg (ppm)	0.002	0.011	0.004	0.006	<0.001	<0.001	<0.001	0.076	0.029	0.035	53.0	1.4		29.9	72.7
µg/M3	6.11	21.00	4.77	12.43	<0.001	<0.001	<0.001	75.67	29.17	34.50	53.0	1.4		29.9	72.7

AQ22															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.000	0.012	0.000	0.002	<0.001	<0.001	<0.001	0.103	0.062	0.036	51.5	1.0	SSE	28.4	70.5
10mins	0.000	0.010	0.002	0.002	<0.001	<0.001	<0.001	0.092	0.058	0.033	53.2	1.7	SSE	28.4	76.4
10mins	0.003	0.012	0.016	0.002	<0.001	<0.001	<0.001	0.102	0.062	0.039	50.1	1.7	NE	28.4	70.3
10mins	0.000	0.021	0.005	0.012	<0.001	<0.001	<0.001	0.091	0.057	0.033	53.2	1.9	SS	27.4	76.4
10mins	0.006	0.013	0.000	0.000	<0.001	<0.001	<0.001	0.098	0.063	0.034	50.2	1.2	SE	30.4	71.4
10mins	0.000	0.015	0.002	0.022	<0.001	<0.001	<0.001	0.091	0.058	0.032	51.8	1.7	SSE	28.4	76.4
Avg (ppm)	0.002	0.014	0.004	0.007	<0.001	<0.001	<0.001	0.096	0.060	0.035	51.7	1.5		28.6	73.6
µg/M3	3.93	26.02	4.77	13.09	<0.001	<0.001	<0.001	96.17	60.00	34.50	51.7	1.53		28.6	73.6

AQ23															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.000	0.012	0.002	0.000	<0.001	<0.001	<0.001	0.095	0.059	0.032	50.1	1.6	NNE	30.4	70.2
10mins	0.000	0.012	0.000	0.022	<0.001	<0.001	<0.001	0.098	0.061	0.033	49.8	1.2	NNE	30.7	70.8
10mins	0.006	0.010	0.000	0.000	<0.001	<0.001	<0.001	0.091	0.066	0.031	48.9	1.6	NNE	31.6	67.9
10mins	0.002	0.016	0.015	0.022	<0.001	<0.001	<0.001	0.096	0.068	0.034	52.1	1.8	ENE	30.7	70.4
10mins	0.000	0.014	0.005	0.002	<0.001	<0.001	<0.001	0.092	0.063	0.033	50.7	1.5	ENE	30.4	69.9
10mins	0.005	0.011	0.000	0.002	<0.001	<0.001	<0.001	0.102	0.064	0.034	50.3	1.4	NE	30.4	71.6
Avg (ppm)	0.002	0.013	0.004	0.008	<0.001	<0.001	<0.001	0.096	0.064	0.033	50.3	1.5		30.7	70.1
µg/M3	5.67	23.51	4.20	15.70	<0.001	<0.001	<0.001	95.67	63.50	32.83	50.3	1.5		30.7	70.1

AQ24															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.000	0.013	0.000	0.004	<0.001	<0.001	<0.001	0.090	0.059	0.028	52.3	1.3	ENE	27.4	76.4
10mins	0.000	0.012	0.002	0.000	<0.001	<0.001	<0.001	0.091	0.063	0.025	53.3	2.6	SE	29.5	72.5
10mins	0.002	0.010	0.000	0.004	<0.001	<0.001	<0.001	0.095	0.064	0.028	50.9	1.4	SW	31.8	70.5
10mins	0.000	0.017	0.018	0.022	<0.001	<0.001	<0.001	0.104	0.067	0.034	50.9	1.4	SW	31.8	70.5
10mins	0.004	0.014	0.005	0.000	<0.001	<0.001	<0.001	0.103	0.065	0.035	50.9	1.4	SW	31.8	70.5
10mins	0.000	0.016	0.000	0.012	<0.001	<0.001	<0.001	0.097	0.065	0.029	49.8	1.6	NE	31.6	69.8
Avg (ppm)	0.001	0.014	0.004	0.007	<0.001	<0.001	<0.001	0.097	0.064	0.030	51.4	1.6		30.7	71.7
µg/M3	2.62	25.71	4.77	13.74	<0.001	<0.001	<0.001	96.67	63.83	29.83	51.4	1.6		30.7	71.7

AQ25															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.000	0.012	0.000	0.004	<0.001	<0.001	<0.001	0.090	0.064	0.033	48.9	2.6	NNE	29.4	71.6
10mins	0.000	0.013	0.003	0.005	<0.001	<0.001	<0.001	0.089	0.065	0.035	52.1	2.6	NNE	29.4	71.6
10mins	0.000	0.015	0.022	0.004	<0.001	<0.001	<0.001	0.099	0.064	0.032	50.7	3.5	SSE	28.4	76.6
10mins	0.006	0.010	0.000	0.025	<0.001	<0.001	<0.001	0.090	0.062	0.033	48.9	2.6	NNE	29.4	71.2
10mins	0.008	0.010	0.000	0.000	<0.001	<0.001	<0.001	0.096	0.067	0.032	52.1	2.6	NE	30.3	71.6
10mins	0.000	0.012	0.003	0.005	<0.001	<0.001	<0.001	0.090	0.068	0.034	50.7	1.3	NE	29.4	71.3
Avg (ppm)	0.002	0.012	0.005	0.007	<0.001	<0.001	<0.001	0.092	0.065	0.033	50.6	2.5		29.4	72.3
µg/M3	6.11	22.57	5.34	14.07	<0.001	<0.001	<0.001	92.33	65.00	33.17	50.6	2.5		29.4	72.3

AQ26															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.000	0.010	0.000	0.000	<0.001	<0.001	<0.001	0.096	0.063	0.032	50.8	1.2	ENE	30.7	68.1
10mins	0.002	0.012	0.004	0.002	<0.001	<0.001	<0.001	0.098	0.063	0.031	54.7	1.6	NE	29.4	71.6
10mins	0.004	0.017	0.002	0.000	<0.001	<0.001	<0.001	0.089	0.064	0.031	48.9	1.6	ENE	28.6	72.6
10mins	0.002	0.013	0.014	0.022	<0.001	<0.001	<0.001	0.097	0.063	0.034	52.1	1.6	ENE	28.6	72.6
10mins	0.000	0.016	0.004	0.012	<0.001	<0.001	<0.001	0.098	0.065	0.033	50.7	1.6	ENE	28.6	72.6
10mins	0.002	0.014	0.004	0.000	<0.001	<0.001	<0.001	0.094	0.062	0.031	54.7	1.6	ENE	28.6	72.6
Avg (ppm)	0.002	0.014	0.005	0.006	<0.001	<0.001	<0.001	0.095	0.063	0.032	52.0	1.5		29.1	71.7
µg/M3	4.36	25.71	5.34	11.78	<0.001	<0.001	<0.001	95.33	63.33	32.00	52.0	1.5		29.1	71.7

AQ27															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.000	0.014	0.002	0.000	<0.001	<0.001	<0.001	0.097	0.067	0.036	54.2	2.3	NE	29.6	69.2
10mins	0.004	0.012	0.000	0.012	<0.001	<0.001	<0.001	0.093	0.062	0.039	50.7	1.5	NE	30.1	68.3
10mins	0.000	0.011	0.000	0.000	<0.001	<0.001	<0.001	0.095	0.063	0.036	53.4	1.8	ENE	30.1	70.6
10mins	0.003	0.015	0.022	0.021	<0.001	<0.001	<0.001	0.097	0.062	0.031	50.4	1.8	SSE	30.6	69.9
10mins	0.000	0.017	0.002	0.014	<0.001	<0.001	<0.001	0.099	0.063	0.032	54.2	2.0	SE	30.6	70.2
10mins	0.003	0.015	0.000	0.002	<0.001	<0.001	<0.001	0.099	0.064	0.031	55.3	1.8	SE	30.6	69.9
Avg (ppm)	0.002	0.014	0.004	0.008	<0.001	<0.001	<0.001	0.097	0.064	0.034	53.0	1.9		30.3	69.7
µg/M3	4.36	26.33	4.96	16.03	<0.001	<0.001	<0.001	96.67	63.50	34.17	53.0	1.9		30.3	69.7

AQ28															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.000	0.014	0.000	0.002	<0.001	<0.001	<0.001	0.090	0.061	0.032	56.2	0.8	SE	31.2	71.2
10mins	0.002	0.013	0.000	0.014	<0.001	<0.001	<0.001	0.102	0.060	0.033	58.6	1.8	NNE	27.4	76.4
10mins	0.002	0.013	0.004	0.012	<0.001	<0.001	<0.001	0.110	0.061	0.032	58.6	1.8	S	29.8	70.3
10mins	0.000	0.015	0.000	0.022	<0.001	<0.001	<0.001	0.094	0.063	0.031	53.6	1.8	S	30.9	71.3
10mins	0.004	0.011	0.024	0.000	<0.001	<0.001	<0.001	0.099	0.062	0.032	52.8	1.4	NE	28.6	70.6
10mins	0.006	0.013	0.000	0.000	<0.001	<0.001	<0.001	0.092	0.061	0.031	51.8	1.4	NE	28.6	72.2
Avg (ppm)	0.002	0.013	0.005	0.008	<0.001	<0.001	<0.001	0.098	0.061	0.032	55.3	1.5		29.4	72.0
µg/M3	6.11	24.77	5.34	16.36	<0.001	<0.001	<0.001	97.83	61.33	31.83	55.3	1.5		29.4	72.0

AQ29															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.002	0.012	0.005	0.002	<0.001	<0.001	<0.001	0.102	0.066	0.034	51.9	1.4	SSE	30.4	70.4
10mins	0.000	0.016	0.000	0.000	<0.001	<0.001	<0.001	0.106	0.069	0.032	52.5	1.2	SE	29.8	71.3
10mins	0.002	0.014	0.000	0.012	<0.001	<0.001	<0.001	0.101	0.063	0.033	50.6	1.2	SE	29.8	70.3
10mins	0.000	0.013	0.015	0.000	<0.001	<0.001	<0.001	0.096	0.065	0.031	48.6	1.2	SE	29.8	70.3
10mins	0.004	0.015	0.000	0.022	<0.001	<0.001	<0.001	0.100	0.062	0.033	51.2	1.2	SE	30.2	69.8
10mins	0.002	0.012	0.005	0.002	<0.001	<0.001	<0.001	0.094	0.063	0.031	49.4	1.4	SSE	30.4	70.4
Avg (ppm)	0.002	0.014	0.004	0.006	<0.001	<0.001	<0.001	0.100	0.065	0.032	50.7	1.3		30.1	70.4
µg/M3	4.36	25.71	4.77	12.43	<0.001	<0.001	<0.001	99.83	64.67	32.33	50.7	1.3		30.1	70.4

AQ30															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.000	0.010	0.003	0.000	<0.001	<0.001	<0.001	0.100	0.064	0.030	50.6	1.3	NE	30.9	69.8
10mins	0.004	0.012	0.005	0.000	<0.001	<0.001	<0.001	0.098	0.066	0.032	48.3	1.3	NNE	29.4	70.5
10mins	0.002	0.010	0.002	0.024	<0.001	<0.001	<0.001	0.097	0.061	0.031	49.8	1.3	NNE	30.9	70.5
10mins	0.000	0.012	0.000	0.000	<0.001	<0.001	<0.001	0.110	0.062	0.032	51.6	1.4	ENE	31.2	71.2
10mins	0.000	0.010	0.015	0.000	<0.001	<0.001	<0.001	0.090	0.061	0.034	49.8	1.3	NNE	30.9	70.5
10mins	0.003	0.014	0.000	0.013	<0.001	<0.001	<0.001	0.094	0.063	0.031	51.6	1.4	ENE	31.2	71.2
Avg (ppm)	0.002	0.011	0.004	0.006	<0.001	<0.001	<0.001	0.098	0.063	0.032	50.3	1.3		30.8	70.6
µg/M3	3.93	21.32	4.77	12.11	<0.001	<0.001	<0.001	98.17	62.83	31.67	50.3	1.3		30.8	70.6

AQ31															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.000	0.018	0.002	0.000	<0.001	<0.001	<0.001	0.094	0.061	0.033	49.8	1.9	ENE	27.7	75.2
10mins	0.002	0.019	0.002	0.000	<0.001	<0.001	<0.001	0.104	0.066	0.036	51.6	1.8	SE	29.3	75.4
10mins	0.003	0.016	0.000	0.021	<0.001	<0.001	<0.001	0.095	0.063	0.032	49.8	0.8	NNE	28.2	74.2
10mins	0.004	0.014	0.012	0.000	<0.001	<0.001	<0.001	0.102	0.066	0.031	51.6	1.8	NE	29.3	75.4
10mins	0.000	0.012	0.000	0.022	<0.001	<0.001	<0.001	0.103	0.071	0.032	51.2	1.3	SE	27.4	74.5
10mins	0.002	0.013	0.002	0.000	<0.001	<0.001	<0.001	0.099	0.068	0.031	52.6	1.8	SE	29.3	75.4
Avg (ppm)	0.002	0.015	0.003	0.007	<0.001	<0.001	<0.001	0.100	0.066	0.033	51.1	1.57		28.5	75.0
µg/M3	4.80	28.84	3.44	14.07	<0.001	<0.001	<0.001	99.50	65.83	32.50	51.1	1.57		28.5	75.0

AQ32															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.000	0.016	0.000	0.000	<0.001	<0.001	<0.001	0.090	0.053	0.033	53.4	1.5	ENE	28.6	74.8
10mins	0.002	0.017	0.012	0.000	<0.001	<0.001	<0.001	0.090	0.051	0.035	49.8	1.3	SSW	29.6	76.7
10mins	0.000	0.014	0.000	0.026	<0.001	<0.001	<0.001	0.089	0.053	0.032	51.6	1.7	SSE	27.4	76.4
10mins	0.004	0.013	0.002	0.002	<0.001	<0.001	<0.001	0.089	0.053	0.032	51.2	1.2	SSE	30.4	71.4
10mins	0.000	0.016	0.012	0.012	<0.001	<0.001	<0.001	0.087	0.049	0.034	53.2	1.7	ENE	29.4	73.4
10mins	0.002	0.011	0.000	0.000	<0.001	<0.001	<0.001	0.087	0.052	0.031	54.2	1.2	SSE	30.6	70.2
Avg (ppm)	0.001	0.015	0.004	0.007	<0.001	<0.001	<0.001	0.089	0.052	0.033	52.2	1.43		29.3	73.8
µg/M3	3.49	27.27	4.96	13.09	<0.001	<0.001	<0.001	88.67	51.83	32.83	52.2	1.43		29.3	73.8

AQ33															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.000	0.016	0.003	0.000	<0.001	<0.001	<0.001	0.102	0.062	0.036	53.3	2.6	SE	29.5	72.5
10mins	0.002	0.014	0.000	0.002	<0.001	<0.001	<0.001	0.097	0.058	0.035	52.1	1.8	ENE	30.7	70.4
10mins	0.002	0.020	0.000	0.003	<0.001	<0.001	<0.001	0.098	0.063	0.031	50.9	1.4	SW	31.8	70.5
10mins	0.000	0.016	0.012	0.033	<0.001	<0.001	<0.001	0.097	0.061	0.032	50.9	1.4	SW	31.8	70.5
10mins	0.002	0.012	0.000	0.012	<0.001	<0.001	<0.001	0.098	0.062	0.032	50.7	1.5	ENE	30.4	76.9
10mins	0.004	0.011	0.012	0.003	<0.001	<0.001	<0.001	0.096	0.061	0.031	51.9	1.4	SW	30.8	70.5
Avg (ppm)	0.002	0.015	0.005	0.009	<0.001	<0.001	<0.001	0.098	0.061	0.033	51.6	1.68		30.8	71.9
µg/M3	4.36	27.90	5.15	17.34	<0.001	<0.001	<0.001	98.00	61.17	32.83	51.6	1.68		30.8	71.9

AQ34															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.002	0.018	0.000	0.004	<0.001	<0.001	<0.001	0.100	0.066	0.030	52.3	1.6	ENE	27.4	76.4
10mins	0.002	0.016	0.005	0.004	<0.001	<0.001	<0.001	0.098	0.061	0.033	54.7	1.4	NE	28.6	72.2
10mins	0.002	0.015	0.005	0.000	<0.001	<0.001	<0.001	0.099	0.064	0.031	53.3	2.6	SE	32.4	72.5
10mins	0.000	0.016	0.022	0.022	<0.001	<0.001	<0.001	0.098	0.062	0.032	54.3	1.6	NNW	27.4	73.4
10mins	0.002	0.014	0.000	0.014	<0.001	<0.001	<0.001	0.097	0.061	0.032	52.3	0.7	ENE	27.4	76.4
10mins	0.000	0.016	0.000	0.002	<0.001	<0.001	<0.001	0.095	0.058	0.033	45.9	1.6	NNW	31.6	73.6
Avg (ppm)	0.001	0.016	0.005	0.008	<0.001	<0.001	<0.001	0.098	0.062	0.032	52.1	1.58		29.1	74.1
µg/M3	3.49	29.78	6.11	15.05	<0.001	<0.001	<0.001	97.83	62.00	31.83	52.1	1.58		29.1	74.1

AQ35															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.000	0.017	0.003	0.004	<0.001	<0.001	<0.001	0.102	0.068	0.030	51.2	3.5	SSE	28.4	68.6
10mins	0.002	0.016	0.005	0.002	<0.001	<0.001	<0.001	0.099	0.063	0.032	68.8	2.6	NNE	29.4	71.6
10mins	0.003	0.012	0.005	0.012	<0.001	<0.001	<0.001	0.108	0.071	0.033	54.7	2.6	NE	30.7	68.1
10mins	0.000	0.016	0.002	0.024	<0.001	<0.001	<0.001	0.111	0.073	0.034	53.3	3.5	SSE	28.4	68.6
10mins	0.004	0.014	0.005	0.000	<0.001	<0.001	<0.001	0.108	0.065	0.039	54.3	2.6	SE	32.7	68.1
10mins	0.000	0.016	0.015	0.014	<0.001	<0.001	<0.001	0.104	0.067	0.033	56.2	3.5	SSE	30.4	68.6
Avg (ppm)	0.002	0.015	0.006	0.009	<0.001	<0.001	<0.001	0.105	0.068	0.034	56.4	3.05		30.0	68.9
µg/M3	3.93	28.53	6.68	18.32	<0.001	<0.001	<0.001	105.33	67.83	33.50	56.4	3.05		30.0	68.9

AQ36															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.000	0.016	0.000	0.004	<0.001	<0.001	<0.001	0.110	0.070	0.036	57.8	1.8	NE	30.1	67.8
10mins	0.002	0.017	0.013	0.000	<0.001	<0.001	<0.001	0.110	0.073	0.033	52.7	1.6	ENE	28.6	72.6
10mins	0.000	0.014	0.000	0.014	<0.001	<0.001	<0.001	0.110	0.071	0.035	49.8	1.8	NE	30.1	67.8
10mins	0.004	0.015	0.000	0.016	<0.001	<0.001	<0.001	0.113	0.073	0.036	50.8	1.8	NE	30.1	67.8
10mins	0.002	0.013	0.024	0.003	<0.001	<0.001	<0.001	0.113	0.073	0.036	50.7	1.6	ENE	30.8	68.7
10mins	0.002	0.015	0.004	0.004	<0.001	<0.001	<0.001	0.112	0.073	0.035	54.7	1.6	ENE	30.4	70.6
Avg (ppm)	0.002	0.015	0.007	0.007	<0.001	<0.001	<0.001	0.111	0.072	0.035	52.8	1.70		30.0	69.2
µg/M3	4.36	28.22	7.82	13.41	<0.001	<0.001	<0.001	111.33	72.17	35.17	52.8	1.70		30.0	69.2

AQ37															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.000	0.012	0.002	0.000	<0.001	<0.001	<0.001	0.100	0.061	0.035	56.2	1.5	ENE	28.7	70.6
10mins	0.000	0.010	0.000	0.002	<0.001	<0.001	<0.001	0.103	0.066	0.033	53.4	1.5	NE	29.8	67.8
10mins	0.000	0.014	0.000	0.012	<0.001	<0.001	<0.001	0.097	0.061	0.032	49.5	1.5	NE	30.1	67.8
10mins	0.003	0.015	0.022	0.023	<0.001	<0.001	<0.001	0.097	0.060	0.033	54.2	1.8	SSE	30.6	69.9
10mins	0.003	0.012	0.002	0.002	<0.001	<0.001	<0.001	0.097	0.061	0.032	49.9	1.8	SSE	29.8	70.3
10mins	0.002	0.011	0.004	0.012	<0.001	<0.001	<0.001	0.105	0.063	0.038	53.6	1.2	SE	30.2	69.3
Avg (ppm)	0.001	0.012	0.005	0.009	<0.001	<0.001	<0.001	0.100	0.062	0.034	52.8	1.55		29.9	69.3
µg/M3	3.49	23.20	5.73	16.69	<0.001	<0.001	<0.001	99.83	62.00	33.83	52.8	1.55		29.9	69.3

AQ38															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.004	0.011	0.000	0.000	<0.001	<0.001	<0.001	0.096	0.060	0.032	51.2	0.8	SE	31.6	70.2
10mins	0.003	0.014	0.024	0.012	<0.001	<0.001	<0.001	0.104	0.066	0.034	49.2	0.8	SE	31.2	71.2
10mins	0.000	0.012	0.000	0.024	<0.001	<0.001	<0.001	0.105	0.069	0.032	50.8	1.8	NE	30.1	67.8
10mins	0.000	0.014	0.000	0.002	<0.001	<0.001	<0.001	0.099	0.061	0.034	53.6	1.8	S	30.9	71.3
10mins	0.000	0.012	0.000	0.014	<0.001	<0.001	<0.001	0.106	0.063	0.039	53.7	0.9	SSE	29.5	70.2
10mins	0.002	0.012	0.004	0.000	<0.001	<0.001	<0.001	0.107	0.065	0.038	56.8	1.4	NNE	31.6	70.6
Avg (ppm)	0.002	0.013	0.005	0.009	<0.001	<0.001	<0.001	0.103	0.064	0.035	52.6	1.25		30.8	70.2
µg/M3	3.93	23.51	5.34	17.01	<0.001	<0.001	<0.001	102.83	64.00	34.83	52.6	1.25		30.8	70.2

AQC1															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.000	0.011	0.000	0.000	<0.001	<0.001	<0.001	0.109	0.067	0.038	52.5	1.2	S	29.8	74.6
10mins	0.002	0.011	0.005	0.024	<0.001	<0.001	<0.001	0.102	0.063	0.035	52.9	1.9	NNE	31.9	71.3
10mins	0.002	0.012	0.005	0.002	<0.001	<0.001	<0.001	0.098	0.064	0.030	51.9	1.4	SSE	30.4	70.4
10mins	0.003	0.012	0.014	0.012	<0.001	<0.001	<0.001	0.102	0.066	0.032	53.9	1.4	SSE	30.4	69.4
10mins	0.003	0.026	0.002	0.002	<0.001	<0.001	<0.001	0.104	0.063	0.037	53.7	1.9	NNE	31.9	69.6
10mins	0.000	0.012	0.000	0.002	<0.001	<0.001	<0.001	0.112	0.069	0.039	56.8	2.1	NW	30.2	70.1
Avg (ppm)	0.002	0.014	0.004	0.007	<0.001	<0.001	<0.001	0.105	0.065	0.035	53.6	1.65		30.8	70.9
µg/M3	4.36	26.33	4.96	13.74	<0.001	<0.001	<0.001	104.50	65.33	35.17	53.6	1.65		30.8	70.9

AQC2															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.003	0.016	0.000	0.002	<0.001	<0.001	<0.001	0.098	0.060	0.034	51.6	1.4	ENE	31.2	71.2
10mins	0.002	0.016	0.005	0.012	<0.001	<0.001	<0.001	0.098	0.061	0.033	53.7	1.4	ENE	31.2	71.2
10mins	0.004	0.016	0.014	0.002	<0.001	<0.001	<0.001	0.100	0.060	0.036	56.8	1.4	ENE	31.2	71.2
10mins	0.003	0.012	0.000	0.000	<0.001	<0.001	<0.001	0.102	0.061	0.037	55.6	1.4	ENE	31.2	70.2
10mins	0.000	0.011	0.014	0.024	<0.001	<0.001	<0.001	0.109	0.067	0.038	49.8	1.3	NE	30.9	68.5
10mins	0.000	0.011	0.002	0.002	<0.001	<0.001	<0.001	0.106	0.063	0.039	49.8	1.3	NNE	30.9	70.5
Avg (ppm)	0.002	0.014	0.006	0.007	<0.001	<0.001	<0.001	0.102	0.062	0.036	52.9	1.37		31.1	70.5
µg/M3	5.24	25.71	6.68	13.74	<0.001	<0.001	<0.001	102.17	62.00	36.17	52.9	1.37		31.1	70.5

WET SEASON

10minutes Average Values - (ppm)

AQ1															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.004	0.021	0.006	0.004	<0.001	<0.001	<0.001	0.073	0.041	0.025	63.4	1.5	SE	28.3	82.4
10mins	0.003	0.019	0.003	0.002	<0.001	<0.001	<0.001	0.069	0.038	0.023	67.2	1.9	SSW	28.2	82.6
10mins	0.005	0.015	0.001	0.009	<0.001	<0.001	<0.001	0.065	0.034	0.021	64.3	2	SSW	28.7	81.5
10mins	0.003	0.017	0.005	0.004	<0.001	<0.001	<0.001	0.067	0.036	0.025	62.8	1.6	SW	29.1	79.7
10mins	0.005	0.015	0.004	0.007	<0.001	<0.001	<0.001	0.068	0.035	0.022	58.9	1.7	SW	28.7	82.1
10mins	0.002	0.019	0.004	0.004	<0.001	<0.001	<0.001	0.062	0.031	0.02	63.6	1.8	SE	28.8	80.9
Avg (ppm)	0.004	0.018	0.004	0.005	BDL	BDL	BDL	0.067	0.036	0.023	63.4	1.8		28.6	81.5
µg/M3	9.60	33.23	4.39	9.82	BDL	BDL	BDL	67.33	35.83	22.67	63.4	1.8		28.6	81.5

AQ2															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.002	0.026	0.006	0.009	<0.001	<0.001	<0.001	0.059	0.029	0.019	66.2	1.7	SSW	27.8	84.6
10mins	0.007	0.021	0.005	0.007	<0.001	<0.001	<0.001	0.061	0.03	0.021	68.3	2.1	SW	27.9	84.6
10mins	0.001	0.024	0.002	0.009	<0.001	<0.001	<0.001	0.057	0.027	0.018	65.3	1.9	SW	28.6	85.0
10mins	0.004	0.017	0.004	0.005	<0.001	<0.001	<0.001	0.055	0.026	0.017	67.1	1.5	SE	29.7	79.2
10mins	0.001	0.022	0.003	0.003	<0.001	<0.001	<0.001	0.057	0.027	0.019	66.7	1.6	SW	31.7	77.1
10mins	0.003	0.020	0.008	0.006	<0.001	<0.001	<0.001	0.054	0.026	0.017	68.7	1.7	SW	32.3	75.5
Avg (ppm)	0.003	0.022	0.005	0.007	BDL	BDL	BDL	0.057	0.028	0.019	67.1	1.8		29.7	81.0
µg/M3	7.85	40.76	5.34	12.76	BDL	BDL	BDL	57.17	27.50	18.50	67.1	1.8		29.7	81.0

AQ3															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.003	0.017	0.002	0.009	<0.001	<0.001	<0.001	0.056	0.026	0.017	49.7	1.6	SW	29.2	79.3
10mins	0.001	0.019	0.005	0.008	<0.001	<0.001	<0.001	0.053	0.024	0.016	49.6	1.8	SSW	30.3	77.4
10mins	0.005	0.015	0.004	0.014	<0.001	<0.001	<0.001	0.057	0.027	0.019	50.2	1.7	SSW	30.7	77.1
10mins	0.003	0.016	0.005	0.017	<0.001	<0.001	<0.001	0.055	0.026	0.017	49.8	1.7	SE	31.2	75.3
10mins	0.001	0.018	0.005	0.023	<0.001	<0.001	<0.001	0.049	0.021	0.014	50.2	1.9	SSW	31.5	75
10mins	0.003	0.014	0.002	0.021	<0.001	<0.001	<0.001	0.053	0.024	0.016	49.9	1.6	SW	31.7	74.9
Avg (ppm)	0.003	0.017	0.004	0.015	BDL	BDL	BDL	0.054	0.025	0.017	49.9	1.7		30.8	76.5
µg/M3	6.98	31.04	4.39	30.10	BDL	BDL	BDL	53.83	24.67	16.50	49.9	1.72		30.8	76.5

AQ4															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.001	0.017	0.001	0.006	<0.001	<0.001	<0.001	0.051	0.022	0.015	47.7	1.2	SW	31.4	75.3
10mins	0.001	0.019	0.003	0.009	<0.001	<0.001	<0.001	0.045	0.017	0.01	49.6	1.7	SW	31.7	75.1
10mins	0.002	0.014	0.005	0.009	<0.001	<0.001	<0.001	0.043	0.015	0.009	49.1	1.5	SW	31.7	69.9
10mins	0.002	0.018	0.002	0.008	<0.001	<0.001	<0.001	0.048	0.019	0.012	49.5	1.7	SSW	31.6	75.1
10mins	0.004	0.015	0.002	0.007	<0.001	<0.001	<0.001	0.043	0.015	0.009	49.1	1.6	SSW	29.9	77.2
10mins	0.003	0.016	0.004	0.008	<0.001	<0.001	<0.001	0.045	0.017	0.01	49.4	1.6	SSW	29.9	77.2
Avg (ppm)	0.002	0.017	0.003	0.008	BDL	BDL	BDL	0.046	0.018	0.011	49.1	1.6	0.0	31.0	75.0
µg/M3	5.67	31.04	3.24	15.38	BDL	BDL	BDL	45.83	17.50	10.83	49.1	1.55		31.0	75.0

AQ5															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.001	0.021	0.001	0.014	<0.001	<0.001	<0.001	0.058	0.019	0.012	51.4	1.9	SW	29.6	77.9
10mins	0.003	0.023	0.003	0.014	<0.001	<0.001	<0.001	0.063	0.031	0.021	51.6	2.1	SW	29.6	77.9
10mins	0.001	0.019	0.002	0.011	<0.001	<0.001	<0.001	0.061	0.030	0.021	50.2	1.7	SW	29.7	77.6
10mins	0.002	0.021	0.006	0.013	<0.001	<0.001	<0.001	0.059	0.029	0.019	50.2	1.7	SW	30.1	76.3
10mins	0.003	0.018	0.005	0.009	<0.001	<0.001	<0.001	0.055	0.026	0.017	50.1	1.9	SW	30.1	76.3
10mins	0.003	0.022	0.007	0.010	<0.001	<0.001	<0.001	0.058	0.027	0.019	49.7	1.6	SW	30.2	76.3
Avg (ppm)	0.002	0.021	0.004	0.012	BDL	BDL	BDL	0.059	0.027	0.018	50.5	1.8		29.9	77.1
µg/M3	5.67	38.87	4.58	23.23	BDL	BDL	BDL	59.00	27.00	18.17	50.5	1.8		29.9	77.1

AQ6															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.001	0.018	0.002	0.021	<0.001	<0.001	<0.001	0.064	0.033	0.021	54.1	2.2	SSW	29.4	78.3
10mins	0.003	0.017	0.004	0.019	<0.001	<0.001	<0.001	0.062	0.031	0.020	51.2	2.1	SW	29.4	78.4
10mins	0.003	0.018	0.005	0.015	<0.001	<0.001	<0.001	0.053	0.024	0.016	53.7	1.9	SW	29.4	78.3
10mins	0.002	0.019	0.005	0.017	<0.001	<0.001	<0.001	0.049	0.021	0.014	54.2	1.9	SW	29.2	79.2
10mins	0.002	0.021	0.004	0.009	<0.001	<0.001	<0.001	0.055	0.026	0.017	54.2	1.6	SW	29.1	79.4
10mins	0.001	0.017	0.003	0.012	<0.001	<0.001	<0.001	0.062	0.031	0.020	53.3	1.7	SW	29.1	79.4
Avg (ppm)	0.002	0.018	0.004	0.016	BDL	BDL	BDL	0.058	0.028	0.018	53.5	1.9		29.3	78.8
µg/M3	5.24	34.49	4.39	30.43	BDL	BDL	BDL	57.50	27.67	18.00	53.5	1.9		29.3	78.8

AQ7															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.001	0.022	0.003	0.024	<0.001	<0.001	<0.001	0.047	0.018	0.011	50.5	2.1	SW	29.1	79.4
10mins	0.001	0.021	0.005	0.021	<0.001	<0.001	<0.001	0.045	0.017	0.010	50.3	1.9	SW	29.1	79.4
10mins	0.000	0.018	0.003	0.020	<0.001	<0.001	<0.001	0.044	0.016	0.009	50.6	1.7	SW	29.2	79.3
10mins	0.001	0.018	0.003	0.019	<0.001	<0.001	<0.001	0.041	0.013	0.007	49.7	1.9	SW	29.1	79.3
10mins	0.001	0.018	0.003	0.019	<0.001	<0.001	<0.001	0.047	0.018	0.011	50.1	1.6	SW	29.2	79.3
10mins	0.000	0.020	0.004	0.020	<0.001	<0.001	<0.001	0.043	0.015	0.009	50.4	1.7	SW	29.2	79.3
Avg (ppm)	0.001	0.020	0.004	0.021	BDL	BDL	BDL	0.045	0.016	0.010	50.3	1.8		29.2	79.3
µg/M3	1.75	36.68	4.01	40.24	BDL	BDL	BDL	44.50	16.17	9.50	50.3	1.8		29.2	79.3

AQ8															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.001	0.018	0.005	0.019	<0.001	<0.001	<0.001	0.075	0.044	0.028	54.1	2.1	SW	29.2	79.5
10mins	0.002	0.021	0.002	0.021	<0.001	<0.001	<0.001	0.069	0.038	0.023	54.7	1.9	SW	29.1	79.8
10mins	0.002	0.017	0.007	0.024	<0.001	<0.001	<0.001	0.078	0.047	0.03	54.5	1.6	SW	29.2	79.6
10mins	0.003	0.013	0.004	0.021	<0.001	<0.001	<0.001	0.067	0.036	0.025	52.8	1.1	SSW	29.2	79.6
10mins	0.001	0.015	0.002	0.024	<0.001	<0.001	<0.001	0.064	0.033	0.021	52.7	1.5	SSW	28.9	80.1
10mins	0.002	0.017	0.007	0.020	<0.001	<0.001	<0.001	0.069	0.038	0.023	52.5	1.3	SSW	29.1	80.0
Avg (ppm)	0.002	0.017	0.005	0.022	BDL	BDL	BDL	0.070	0.039	0.025	53.6	1.6		29.1	79.8
µg/M3	4.80	31.66	5.15	42.20	BDL	BDL	BDL	70.33	39.33	25.00	53.6	1.58		29.1	79.8

AQ9															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.001	0.019	0.004	0.023	<0.001	<0.001	<0.001	0.090	0.052	0.033	56.2	1.8	SSE	29	80
10mins	0.001	0.017	0.004	0.025	<0.001	<0.001	<0.001	0.085	0.050	0.032	56.7	1.7	SSW	29.1	80.0
10mins	0.001	0.017	0.006	0.019	<0.001	<0.001	<0.001	0.078	0.047	0.030	55.9	1.8	SW	29.1	80
10mins	0.000	0.015	0.004	0.019	<0.001	<0.001	<0.001	0.075	0.044	0.028	54.7	1.5	SW	29.1	79.9
10mins	0.000	0.017	0.004	0.021	<0.001	<0.001	<0.001	0.069	0.038	0.023	55.6	1.5	SW	29.1	79.9
10mins	0.000	0.018	0.006	0.017	<0.001	<0.001	<0.001	0.061	0.03	0.021	55.8	1.8	SW	28.9	80.0
Avg (ppm)	0.001	0.017	0.005	0.021	BDL	BDL	BDL	0.076	0.044	0.028	55.8	1.7		29.1	80.0
µg/M3	1.31	32.29	5.34	40.57	BDL	BDL	BDL	76.33	43.50	27.83	55.8	1.7		29.1	80.0

AQ10															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.002	0.014	0.006	0.004	<0.001	<0.001	<0.001	0.059	0.029	0.019	50.3	2.1	SW	29.0	80.1
10mins	0.000	0.012	0.005	0.000	<0.001	<0.001	<0.001	0.063	0.032	0.021	51.2	1.8	SW	29.0	80.1
10mins	0.001	0.014	0.004	0.014	<0.001	<0.001	<0.001	0.061	0.030	0.021	50.6	1.8	SW	28.7	80.3
10mins	0.001	0.013	0.004	0.004	<0.001	<0.001	<0.001	0.047	0.018	0.011	50.2	1.7	SW	28.8	80.3
10mins	0.002	0.015	0.005	0.014	<0.001	<0.001	<0.001	0.055	0.026	0.017	50.3	1.5	SW	28.7	80.3
10mins	0.001	0.018	0.005	0.000	<0.001	<0.001	<0.001	0.053	0.024	0.016	50.6	1.8	SW	28.7	80.3
Avg (ppm)	0.001	0.014	0.005	0.006	BDL	BDL	BDL	0.056	0.027	0.018	50.5	1.8	0.0	28.8	80.2
µg/M3	3.05	26.96	5.53	11.78	BDL	BDL	BDL	56.33	26.50	17.50	50.5	1.8		28.8	80.2

AQ11															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.001	0.017	0.004	0.002	<0.001	<0.001	<0.001	0.077	0.045	0.029	53.2	2.1	SW	28.7	80.4
10mins	0.002	0.017	0.004	0.002	<0.001	<0.001	<0.001	0.083	0.049	0.031	53.1	2.1	SW	28.6	80.4
10mins	0.002	0.017	0.007	0.006	<0.001	<0.001	<0.001	0.071	0.041	0.024	53.9	1.9	SW	28.7	80.4
10mins	0.002	0.019	0.005	0.022	<0.001	<0.001	<0.001	0.064	0.033	0.021	54.2	1.9	SW	28.9	80.3
10mins	0.002	0.018	0.004	0.012	<0.001	<0.001	<0.001	0.066	0.034	0.021	53.5	1.7	SW	28.8	80.4
10mins	0.003	0.019	0.005	0.002	<0.001	<0.001	<0.001	0.054	0.025	0.017	54.1	1.8	SW	28.8	80.4
Avg (ppm)	0.002	0.018	0.005	0.008	BDL	BDL	BDL	0.069	0.038	0.024	53.7	1.9		28.8	80.4
µg/M3	5.24	33.54	5.53	15.05	BDL	BDL	BDL	69.17	37.83	23.83	53.7	1.92		28.8	80.4

AQ12															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.004	0.027	0.022	0.024	<0.001	<0.001	<0.001	0.074	0.043	0.026	52.9	1.9	SSW	28.6	80.5
10mins	0.001	0.025	0.016	0.019	<0.001	<0.001	<0.001	0.072	0.041	0.024	53.1	1.8	SSW	28.6	80.5
10mins	0.003	0.029	0.015	0.017	<0.001	<0.001	<0.001	0.074	0.043	0.026	53.5	1.8	SSW	28.6	80.5
10mins	0.002	0.025	0.009	0.020	<0.001	<0.001	<0.001	0.077	0.045	0.029	53.2	2.0	SSW	28.7	80.4
10mins	0.002	0.026	0.008	0.025	<0.001	<0.001	<0.001	0.073	0.042	0.025	52.4	1.5	SW	28.6	80.5
10mins	0.001	0.023	0.012	0.023	<0.001	<0.001	<0.001	0.073	0.042	0.025	52.1	1.7	SW	28.7	80.4
Avg (ppm)	0.002	0.026	0.014	0.021	BDL	BDL	BDL	0.074	0.043	0.026	52.9	1.8		28.6	80.5
µg/M3	5.67	48.59	15.65	41.88	BDL	BDL	BDL	73.83	42.67	25.83	52.9	1.78		28.6	80.5

AQ13															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.000	0.024	0.003	0.023	<0.001	<0.001	<0.001	0.060	0.028	0.019	51.7	2.2	SSW	28.6	81
10mins	0.000	0.024	0.005	0.022	<0.001	<0.001	<0.001	0.055	0.026	0.017	51.5	2.4	SSW	28.6	81
10mins	0.001	0.021	0.003	0.023	<0.001	<0.001	<0.001	0.049	0.021	0.014	49.9	2.1	SSW	28.5	81
10mins	0.001	0.023	0.003	0.024	<0.001	<0.001	<0.001	0.051	0.022	0.015	51.3	1.9	SSW	28.5	81
10mins	0.001	0.022	0.003	0.021	<0.001	<0.001	<0.001	0.053	0.024	0.016	50.9	1.5	SSW	28.5	81
10mins	0.001	0.023	0.005	0.022	<0.001	<0.001	<0.001	0.047	0.018	0.011	50.5	1.7	SSW	28.5	81
Avg (ppm)	0.001	0.023	0.004	0.023	BDL	BDL	BDL	0.053	0.023	0.015	51.0	2.0		28.5	81.0
µg/M3	1.75	42.95	4.20	44.17	BDL	BDL	BDL	52.50	23.17	15.33	51.0	1.97		28.5	81.0

AQ14															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.003	0.018	0.011	0.024	<0.001	<0.001	<0.001	0.038	0.012	0.006	54.2	2.4	SW	28.5	81
10mins	0.001	0.018	0.013	0.024	<0.001	<0.001	<0.001	0.044	0.016	0.009	54.6	2.1	SW	28.5	81
10mins	0.000	0.017	0.011	0.022	<0.001	<0.001	<0.001	0.035	0.011	0.006	53.1	1.6	SW	28.5	81
10mins	0.001	0.018	0.009	0.023	<0.001	<0.001	<0.001	0.042	0.014	0.008	53.7	1.8	SW	28.6	81
10mins	0.001	0.015	0.017	0.020	<0.001	<0.001	<0.001	0.045	0.017	0.01	52.4	1.4	SW	28.6	80.5
10mins	0.001	0.017	0.015	0.021	<0.001	<0.001	<0.001	0.038	0.012	0.006	53.1	1.5	SW	28.6	80.5
Avg (ppm)	0.001	0.017	0.013	0.022	BDL	BDL	BDL	0.040	0.014	0.008	53.5	1.8		28.6	80.8
µg/M3	3.05	32.29	14.50	43.84	BDL	BDL	BDL	40.33	13.67	7.50	53.5	1.80		28.6	80.8

AQ15															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.004	0.022	0.009	0.027	<0.001	<0.001	<0.001	0.085	0.05	0.032	54.1	2.5	SW	28.5	81
10mins	0.003	0.020	0.010	0.025	<0.001	<0.001	<0.001	0.078	0.047	0.03	52.7	2.2	SW	28.5	81.0
10mins	0.004	0.023	0.009	0.023	<0.001	<0.001	<0.001	0.081	0.048	0.031	52.5	2.6	SW	28.5	81.0
10mins	0.002	0.019	0.011	0.023	<0.001	<0.001	<0.001	0.084	0.050	0.032	52.6	2.3	SW	28.4	81.5
10mins	0.002	0.021	0.012	0.026	<0.001	<0.001	<0.001	0.090	0.052	0.033	52.3	2.1	SW	28.4	81.5
10mins	0.002	0.020	0.009	0.024	<0.001	<0.001	<0.001	0.082	0.048	0.031	52.4	1.9	SW	28.4	81.5
Avg (ppm)	0.003	0.021	0.010	0.025	BDL	BDL	BDL	0.083	0.049	0.032	52.8	2.3		28.5	81.3
µg/M3	7.42	39.19	11.45	48.42	BDL	BDL	BDL	83.33	49.17	31.50	52.8	2.27		28.5	81.3

AQ16															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.003	0.022	0.011	0.025	<0.001	<0.001	<0.001	0.073	0.042	0.025	52.4	2.1	SW	28.4	82
10mins	0.003	0.019	0.014	0.022	<0.001	<0.001	<0.001	0.071	0.041	0.024	52.1	1.8	SW	28.4	82
10mins	0.001	0.020	0.012	0.024	<0.001	<0.001	<0.001	0.066	0.034	0.021	52.6	1.8	SW	28.5	81.5
10mins	0.001	0.021	0.009	0.022	<0.001	<0.001	<0.001	0.069	0.038	0.023	51.4	1.7	SW	28.5	81.5
10mins	0.001	0.023	0.013	0.021	<0.001	<0.001	<0.001	0.065	0.034	0.021	50.7	1.9	SW	28.5	81.5
10mins	0.000	0.018	0.009	0.022	<0.001	<0.001	<0.001	0.068	0.035	0.022	51.1	1.8	SW	28.5	81.5
Avg (ppm)	0.002	0.021	0.011	0.023	BDL	BDL	BDL	0.069	0.037	0.023	51.7	1.9		28.5	81.7
µg/M3	3.93	38.56	12.98	44.49	BDL	BDL	BDL	68.7	37.33	22.67	51.7	1.85		28.5	81.7

AQ17															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.001	0.021	0.009	0.018	<0.001	<0.001	<0.001	0.062	0.031	0.02	52.4	2.1	SSW	28.4	82
10mins	0.000	0.018	0.005	0.020	<0.001	<0.001	<0.001	0.067	0.036	0.025	51.7	2.5	SSW	28.3	82
10mins	0.001	0.020	0.007	0.022	<0.001	<0.001	<0.001	0.063	0.032	0.021	51.4	2.3	SW	28.3	82
10mins	0.001	0.017	0.007	0.019	<0.001	<0.001	<0.001	0.059	0.029	0.019	50.6	1.9	SW	28.4	82
10mins	0.002	0.021	0.009	0.020	<0.001	<0.001	<0.001	0.061	0.030	0.021	50.2	1.6	SW	28.3	82
10mins	0.001	0.019	0.011	0.019	<0.001	<0.001	<0.001	0.063	0.032	0.021	49.8	1.3	SW	28.4	82
Avg (ppm)	0.001	0.019	0.008	0.020	BDL	BDL	BDL	0.063	0.032	0.021	51.0	2.0		28.4	82.0
µg/M3	2.62	36.37	9.16	38.61	BDL	BDL	BDL	62.50	31.67	21.17	51.0	1.95		28.4	82.0

AQ18															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.001	0.008	0.011	0.023	<0.001	<0.001	<0.001	0.054	0.025	0.017	51.5	2.0	SW	28.2	82.5
10mins	0.001	0.008	0.013	0.021	<0.001	<0.001	<0.001	0.057	0.027	0.018	51.4	1.9	SW	28.2	82.5
10mins	0.000	0.009	0.009	0.024	<0.001	<0.001	<0.001	0.053	0.024	0.016	50.9	1.7	SW	28.2	82.5
10mins	0.000	0.005	0.010	0.019	<0.001	<0.001	<0.001	0.049	0.021	0.014	50.7	2.1	SW	28.2	82.5
10mins	0.001	0.007	0.007	0.017	<0.001	<0.001	<0.001	0.052	0.022	0.015	51.6	1.3	SW	28.3	82
10mins	0.001	0.009	0.009	0.017	<0.001	<0.001	<0.001	0.053	0.024	0.016	52.1	1.6	SW	28.3	82
Avg (ppm)	0.001	0.008	0.010	0.020	BDL	BDL	BDL	0.053	0.024	0.016	51.4	1.8		28.2	82.3
µg/M3	1.75	14.42	11.26	39.59	BDL	BDL	BDL	53.00	23.83	16.00	51.4	1.77		28.2	82.3

AQ19															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.002	0.021	0.009	0.017	<0.001	<0.001	<0.001	0.062	0.031	0.020	50.2	2.2	SW	28.2	82.5
10mins	0.003	0.014	0.011	0.014	<0.001	<0.001	<0.001	0.065	0.034	0.021	49.8	1.9	SW	28.1	83
10mins	0.002	0.011	0.008	0.015	<0.001	<0.001	<0.001	0.061	0.03	0.021	49.7	2.5	SSW	28.1	83
10mins	0.001	0.009	0.010	0.013	<0.001	<0.001	<0.001	0.063	0.031	0.020	50.1	1.7	SSW	28.2	82.5
10mins	0.001	0.011	0.009	0.011	<0.001	<0.001	<0.001	0.063	0.031	0.020	50.6	1.9	SW	28.2	82.5
10mins	0.000	0.016	0.007	0.013	<0.001	<0.001	<0.001	0.064	0.033	0.021	51.3	1.4	SW	28.2	82.5
Avg (ppm)	0.002	0.014	0.009	0.014	BDL	BDL	BDL	0.063	0.032	0.021	50.3	1.9		28.2	82.7
µg/M3	3.93	25.71	10.31	27.15	BDL	BDL	BDL	63.00	31.67	20.50	50.3	1.93		28.2	82.7

AQ20															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.003	0.021	0.013	0.016	<0.001	<0.001	<0.001	0.059	0.029	0.019	52.6	2.2	SW	28.1	83
10mins	0.001	0.023	0.013	0.015	<0.001	<0.001	<0.001	0.061	0.030	0.021	51.8	2.4	SW	28.1	83
10mins	0.000	0.017	0.014	0.017	<0.001	<0.001	<0.001	0.064	0.033	0.021	51.7	2.1	SW	28.1	83
10mins	0.002	0.016	0.012	0.017	<0.001	<0.001	<0.001	0.058	0.027	0.019	50.9	1.8	SW	28.1	83
10mins	0.000	0.017	0.009	0.016	<0.001	<0.001	<0.001	0.061	0.03	0.021	51.4	1.9	SW	28.1	83
10mins	0.001	0.015	0.011	0.015	<0.001	<0.001	<0.001	0.060	0.028	0.019	52.1	1.5	SW	28.1	83
Avg (ppm)	0.001	0.018	0.012	0.016	BDL	BDL	BDL	0.061	0.030	0.020	51.8	2.0		28.1	83.0
µg/M3	3.05	34.17	13.74	31.41	BDL	BDL	BDL	60.50	29.50	20.00	51.8	2.0		28.1	83.0

AQ21															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.002	0.017	0.009	0.014	<0.001	<0.001	<0.001	0.063	0.041	0.030	53.6	2.3	SSW	28	83.5
10mins	0.000	0.014	0.011	0.014	<0.001	<0.001	<0.001	0.057	0.038	0.027	52.4	2.6	SSW	27.8	84
10mins	0.001	0.016	0.007	0.011	<0.001	<0.001	<0.001	0.062	0.041	0.030	52.7	2.1	SSW	28	83.5
10mins	0.001	0.021	0.010	0.013	<0.001	<0.001	<0.001	0.059	0.038	0.027	51.8	2	SW	27.9	84
10mins	0.001	0.015	0.008	0.012	<0.001	<0.001	<0.001	0.057	0.038	0.027	52.1	1.8	SW	27.9	84
10mins	0.000	0.014	0.006	0.013	<0.001	<0.001	<0.001	0.058	0.038	0.027	51.5	1.5	SW	27.9	84
Avg (ppm)	0.001	0.016	0.009	0.013	BDL	BDL	BDL	0.059	0.039	0.028	52.4	2.1		27.9	83.8
µg/M3	2.18	30.41	9.73	25.19	BDL	BDL	BDL	59.33	39.00	28.00	52.4	2.1		27.9	83.8

AQ22															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.001	0.010	0.004	0.010	<0.001	<0.001	<0.001	0.054	0.025	0.017	50.4	1.6	SW	27.6	85.0
10mins	0.001	0.007	0.006	0.009	<0.001	<0.001	<0.001	0.051	0.022	0.015	50.7	1.4	SE	27.6	85.0
10mins	0.002	0.004	0.004	0.007	<0.001	<0.001	<0.001	0.053	0.024	0.016	50.5	1.5	SW	27.6	85.0
10mins	0.001	0.006	0.002	0.008	<0.001	<0.001	<0.001	0.053	0.024	0.016	50.3	1.6	SE	27.6	85.0
10mins	0.001	0.003	0.002	0.008	<0.001	<0.001	<0.001	0.049	0.021	0.014	50.1	1.4	SW	27.7	84.5
10mins	0.002	0.003	0.003	0.006	<0.001	<0.001	<0.001	0.047	0.018	0.011	49.8	1.2	SW	27.7	84.5
Avg (ppm)	0.001	0.006	0.004	0.008	BDL	BDL	BDL	0.051	0.022	0.015	50.3	1.5		27.6	84.8
µg/M3	3.49	10.35	4.01	15.70	BDL	BDL	BDL	51.17	22.33	14.83	50.3	1.45		27.6	84.8

AQ23															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.001	0.009	0.003	0.004	<0.001	<0.001	<0.001	0.048	0.018	0.012	49.7	1.1	SE	27.4	86.0
10mins	0.000	0.007	0.003	0.005	<0.001	<0.001	<0.001	0.051	0.022	0.015	49.3	0.9	SE	27.4	86.0
10mins	0.001	0.008	0.001	0.004	<0.001	<0.001	<0.001	0.052	0.022	0.015	49.6	1	SSW	27.3	86.5
10mins	0.001	0.010	0.004	0.003	<0.001	<0.001	<0.001	0.047	0.018	0.011	48.6	1.1	SSW	27.3	86.5
10mins	0.000	0.005	0.004	0.004	<0.001	<0.001	<0.001	0.048	0.019	0.012	48.9	0.8	SE	27.3	86.5
10mins	0.000	0.005	0.003	0.003	<0.001	<0.001	<0.001	0.051	0.022	0.015	49.5	0.7	SW	27.3	86.5
Avg (ppm)	0.001	0.007	0.003	0.004	BDL	BDL	BDL	0.050	0.020	0.013	49.3	0.9		27.3	86.3
µg/M3	1.31	13.79	3.44	7.52	BDL	BDL	BDL	49.50	20.17	13.33	49.3	0.9		27.3	86.3

AQ24															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.001	0.005	0.009	0.010	<0.001	<0.001	<0.001	0.049	0.021	0.014	51.6	1.2	SW	27.8	84.0
10mins	0.000	0.007	0.010	0.011	<0.001	<0.001	<0.001	0.053	0.024	0.016	50.9	1	SW	28.1	83
10mins	0.000	0.005	0.014	0.012	<0.001	<0.001	<0.001	0.047	0.018	0.011	51.3	1.3	SW	28.1	83
10mins	0.000	0.004	0.013	0.011	<0.001	<0.001	<0.001	0.048	0.019	0.012	50.7	1.1	SW	28.1	83
10mins	0.002	0.003	0.012	0.011	<0.001	<0.001	<0.001	0.049	0.021	0.014	49.8	1.2	SW	28.1	83
10mins	0.000	0.008	0.013	0.010	<0.001	<0.001	<0.001	0.046	0.017	0.010	50.2	1.1	SW	28.2	83
Avg (ppm)	0.001	0.005	0.012	0.011	BDL	BDL	BDL	0.049	0.020	0.013	50.8	1.2		28.1	83.2
µg/M3	1.31	10.03	13.55	21.27	BDL	BDL	BDL	48.67	20.00	12.83	50.8	1.2		28.1	83.2

AQ25															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.001	0.006	0.010	0.014	<0.001	<0.001	<0.001	0.062	0.031	0.020	49.6	1.7	SW	28.6	80.5
10mins	0.001	0.009	0.012	0.015	<0.001	<0.001	<0.001	0.060	0.028	0.019	49.9	1.9	SW	28.6	80.5
10mins	0.000	0.007	0.012	0.016	<0.001	<0.001	<0.001	0.059	0.029	0.019	50.1	1.5	SW	28.7	80.5
10mins	0.002	0.007	0.010	0.015	<0.001	<0.001	<0.001	0.060	0.028	0.019	49.4	1.3	SW	28.7	80.5
10mins	0.002	0.008	0.009	0.014	<0.001	<0.001	<0.001	0.061	0.03	0.020	49.8	1.6	SW	28.8	80.0
10mins	0.001	0.008	0.007	0.014	<0.001	<0.001	<0.001	0.059	0.029	0.019	49.7	1.1	SW	28.8	80.0
Avg (ppm)	0.001	0.008	0.010	0.015	BDL	BDL	BDL	0.060	0.029	0.019	49.8	1.5		28.7	80.3
µg/M3	3.05	14.11	11.45	28.79	BDL	BDL	BDL	60.17	29.17	19.33	49.8	1.5		28.7	80.3

AQ26															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.001	0.016	0.008	0.018	<0.001	<0.001	<0.001	0.052	0.022	0.015	51.4	1.5	SW	28.9	79.5
10mins	0.001	0.017	0.007	0.021	<0.001	<0.001	<0.001	0.050	0.021	0.015	52.6	1.7	SW	28.9	79.5
10mins	0.001	0.014	0.008	0.020	<0.001	<0.001	<0.001	0.053	0.024	0.016	52.1	1.3	SW	29.1	79.0
10mins	0.000	0.016	0.006	0.019	<0.001	<0.001	<0.001	0.047	0.018	0.011	51.8	1.6	SW	29.1	79.0
10mins	0.001	0.011	0.006	0.021	<0.001	<0.001	<0.001	0.050	0.021	0.016	51.4	1.4	SW	29.1	79.0
10mins	0.001	0.013	0.007	0.020	<0.001	<0.001	<0.001	0.049	0.021	0.014	51.1	1.1	SW	29.2	79.0
Avg (ppm)	0.001	0.015	0.007	0.020	BDL	BDL	BDL	0.050	0.021	0.015	51.7	1.4		29.1	79.2
µg/M3	2.18	27.27	8.02	38.93	BDL	BDL	BDL	50.17	21.17	14.50	51.7	1.4		29.1	79.2

AQ27															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.001	0.013	0.014	0.022	<0.001	<0.001	<0.001	0.069	0.038	0.023	53.6	1.7	SW	29.4	76.2
10mins	0.001	0.010	0.011	0.024	<0.001	<0.001	<0.001	0.065	0.034	0.021	52.8	1.5	SW	29.4	76.2
10mins	0.003	0.012	0.013	0.025	<0.001	<0.001	<0.001	0.067	0.036	0.025	53.1	2.1	SW	29.5	76.1
10mins	0.002	0.014	0.016	0.023	<0.001	<0.001	<0.001	0.058	0.027	0.019	52.1	1.7	SW	29.6	75.8
10mins	0.001	0.014	0.014	0.021	<0.001	<0.001	<0.001	0.063	0.032	0.021	52.1	1.4	SW	29.6	75.8
10mins	0.000	0.016	0.018	0.023	<0.001	<0.001	<0.001	0.054	0.025	0.017	51.4	1.9	SW	29.6	75.8
Avg (ppm)	0.001	0.013	0.014	0.023	BDL	BDL	BDL	0.063	0.032	0.021	52.5	1.7		29.5	76.0
µg/M3	3.49	24.77	16.41	45.15	BDL	BDL	BDL	62.67	32.00	21.00	52.5	1.7		29.5	76.0

AQ28															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.002	0.019	0.021	0.025	<0.001	<0.001	<0.001	0.060	0.028	0.019	52.8	1.9	SW	29.7	74.5
10mins	0.001	0.017	0.019	0.024	<0.001	<0.001	<0.001	0.058	0.027	0.019	52.4	1.2	SW	29.6	75.7
10mins	0.002	0.021	0.022	0.025	<0.001	<0.001	<0.001	0.061	0.030	0.020	52.7	1.6	SW	29.6	75.7
10mins	0.001	0.018	0.020	0.024	<0.001	<0.001	<0.001	0.057	0.027	0.019	51.9	1.5	SW	29.7	74.5
10mins	0.002	0.018	0.019	0.025	<0.001	<0.001	<0.001	0.058	0.027	0.019	51.6	1.3	SW	29.8	74.4
10mins	0.001	0.016	0.021	0.023	<0.001	<0.001	<0.001	0.057	0.027	0.019	52.1	1.7	SW	29.8	74.4
Avg (ppm)	0.002	0.018	0.020	0.024	BDL	BDL	BDL	0.059	0.028	0.019	52.3	1.5		29.7	74.9
µg/M3	3.93	34.17	23.28	47.77	BDL	BDL	BDL	58.50	27.67	19.17	52.3	1.5		29.7	74.9

AQ29															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.003	0.022	0.010	0.022	<0.001	<0.001	<0.001	0.065	0.034	0.021	50.7	1.6	SW	29.6	75.6
10mins	0.001	0.019	0.012	0.021	<0.001	<0.001	<0.001	0.063	0.032	0.020	50.9	1.1	SW	29.6	75.6
10mins	0.000	0.019	0.011	0.023	<0.001	<0.001	<0.001	0.062	0.031	0.021	51.5	1.4	SW	29.6	75.6
10mins	0.001	0.017	0.013	0.021	<0.001	<0.001	<0.001	0.059	0.029	0.019	50.3	1.5	SW	29.7	74.6
10mins	0.002	0.018	0.012	0.019	<0.001	<0.001	<0.001	0.052	0.022	0.015	50.5	1.8	SW	29.7	74.6
10mins	0.000	0.016	0.014	0.020	<0.001	<0.001	<0.001	0.061	0.03	0.019	50.4	1.3	SW	29.7	74.6
Avg (ppm)	0.001	0.019	0.012	0.021	BDL	BDL	BDL	0.060	0.030	0.019	50.7	1.5		29.7	75.1
µg/M3	3.05	34.80	13.74	41.22	BDL	BDL	BDL	60.33	29.67	19.17	50.7	1.5		29.7	75.1

AQ30															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.006	0.018	0.010	0.024	<0.001	<0.001	<0.001	0.069	0.038	0.023	49.8	2	SSW	29.8	74.1
10mins	0.004	0.021	0.008	0.027	<0.001	<0.001	<0.001	0.064	0.033	0.021	49.3	2.4	SSW	30.0	73.6
10mins	0.001	0.017	0.011	0.023	<0.001	<0.001	<0.001	0.058	0.027	0.019	50.1	1.9	SSW	30.0	73.6
10mins	0.002	0.022	0.009	0.021	<0.001	<0.001	<0.001	0.063	0.032	0.021	50.7	1.6	SSW	30.0	73.6
10mins	0.004	0.022	0.013	0.024	<0.001	<0.001	<0.001	0.065	0.034	0.022	50.1	1.6	SSW	30.0	73.6
10mins	0.002	0.019	0.011	0.022	<0.001	<0.001	<0.001	0.059	0.029	0.019	49.6	1.8	SW	30.0	73.6
Avg (ppm)	0.003	0.020	0.010	0.024	BDL	BDL	BDL	0.063	0.032	0.021	49.9	1.9		30.0	73.7
µg/M3	8.29	37.31	11.83	46.13	BDL	BDL	BDL	63.00	32.17	20.83	49.9	1.9		30.0	73.7

AQ31															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.002	0.015	0.006	0.021	<0.001	<0.001	<0.001	0.067	0.036	0.025	49.5	0.8	SW	30.4	72.7
10mins	0.001	0.013	0.006	0.019	<0.001	<0.001	<0.001	0.064	0.033	0.021	49.8	1.6	SW	30.5	72.9
10mins	0.000	0.013	0.007	0.022	<0.001	<0.001	<0.001	0.066	0.035	0.022	50.1	1.4	SW	30.4	72.7
10mins	0.000	0.014	0.005	0.020	<0.001	<0.001	<0.001	0.065	0.034	0.021	50.3	1.9	SW	30.3	72.7
10mins	0.001	0.016	0.006	0.023	<0.001	<0.001	<0.001	0.068	0.036	0.025	49.7	2.1	SW	30.4	72.7
10mins	0.001	0.014	0.004	0.021	<0.001	<0.001	<0.001	0.063	0.032	0.021	50.4	1.7	SW	30.4	72.7
Avg (ppm)	0.001	0.014	0.006	0.021	BDL	BDL	BDL	0.066	0.034	0.023	50.0	1.58		30.4	72.7
µg/M3	2.18	26.65	6.49	41.22	BDL	BDL	BDL	65.50	34.33	22.50	50.0	1.58		30.4	72.7

AQ32															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.003	0.021	0.018	0.017	<0.001	<0.001	<0.001	0.065	0.034	0.022	51.2	1.9	SSW	30.7	71.7
10mins	0.001	0.019	0.018	0.016	<0.001	<0.001	<0.001	0.063	0.032	0.021	51.5	1.6	SW	30.6	72.1
10mins	0.001	0.019	0.020	0.018	<0.001	<0.001	<0.001	0.063	0.032	0.021	51.8	2.0	SW	30.6	72.1
10mins	0.000	0.021	0.021	0.020	<0.001	<0.001	<0.001	0.061	0.03	0.02	50.7	1.3	SW	30.7	71.7
10mins	0.001	0.020	0.022	0.019	<0.001	<0.001	<0.001	0.067	0.035	0.022	50.9	1.7	SW	30.7	71.7
10mins	0.002	0.020	0.021	0.018	<0.001	<0.001	<0.001	0.065	0.034	0.021	51.3	1.5	SW	30.5	72.5
Avg (ppm)	0.001	0.020	0.020	0.018	BDL	BDL	BDL	0.064	0.033	0.021	51.2	1.67		30.6	72.0
µg/M3	3.49	37.62	22.90	35.33	BDL	BDL	BDL	64.00	32.83	21.17	51.2	1.67		30.6	72.0

AQ33															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.002	0.022	0.011	0.027	<0.001	<0.001	<0.001	0.056	0.026	0.017	51.4	1.5	SW	30.8	71.3
10mins	0.001	0.021	0.013	0.025	<0.001	<0.001	<0.001	0.053	0.024	0.016	51.6	1.7	SW	30.8	71.3
10mins	0.001	0.019	0.013	0.025	<0.001	<0.001	<0.001	0.055	0.026	0.017	50.8	1.1	SW	30.7	71.7
10mins	0.002	0.020	0.014	0.026	<0.001	<0.001	<0.001	0.053	0.024	0.016	50.6	1.8	SW	30.7	71.6
10mins	0.001	0.018	0.012	0.025	<0.001	<0.001	<0.001	0.047	0.018	0.011	49.7	2.1	SW	30.8	71.3
10mins	0.001	0.017	0.014	0.024	<0.001	<0.001	<0.001	0.049	0.021	0.014	50.3	1.9	SW	30.9	71.1
Avg (ppm)	0.001	0.020	0.013	0.025	BDL	BDL	BDL	0.052	0.023	0.015	50.7	1.68		30.8	71.4
µg/M3	3.49	36.68	14.69	49.73	BDL	BDL	BDL	52.17	23.17	15.17	50.7	1.68		30.8	71.4

AQ34															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.000	0.010	0.009	0.016	<0.001	<0.001	<0.001	0.073	0.042	0.025	51.5	1.7	SW	29.7	74.6
10mins	0.001	0.009	0.009	0.018	<0.001	<0.001	<0.001	0.068	0.036	0.023	51.3	1.6	SW	29.7	74.6
10mins	0.001	0.005	0.007	0.012	<0.001	<0.001	<0.001	0.071	0.041	0.024	51.4	1.3	SW	29.8	74.4
10mins	0.001	0.005	0.010	0.017	<0.001	<0.001	<0.001	0.065	0.034	0.021	50.7	2.3	SW	29.7	74.6
10mins	0.000	0.003	0.009	0.015	<0.001	<0.001	<0.001	0.069	0.038	0.023	50.7	1.5	SW	29.7	74.5
10mins	0.001	0.008	0.006	0.012	<0.001	<0.001	<0.001	0.066	0.035	0.021	49.8	1.1	SW	29.6	74.8
Avg (ppm)	0.001	0.007	0.008	0.015	BDL	BDL	BDL	0.069	0.038	0.023	50.9	1.58		29.7	74.6
µg/M3	1.75	12.54	9.54	29.45	BDL	BDL	BDL	68.67	37.67	22.83	50.9	1.58		29.7	74.6

AQ35															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.001	0.019	0.011	0.025	<0.001	<0.001	<0.001	0.054	0.025	0.017	55.4	2.6	SW	30.4	72.2
10mins	0.000	0.021	0.013	0.021	<0.001	<0.001	<0.001	0.052	0.022	0.015	54.8	2.3	SW	30.5	72.1
10mins	0.001	0.017	0.015	0.023	<0.001	<0.001	<0.001	0.057	0.027	0.018	54.7	2.1	SW	30.6	71.7
10mins	0.002	0.017	0.013	0.019	<0.001	<0.001	<0.001	0.059	0.029	0.019	53.5	2.8	SW	30.5	72.1
10mins	0.001	0.015	0.015	0.016	<0.001	<0.001	<0.001	0.053	0.024	0.016	53.6	2.1	SW	30.4	72.2
10mins	0.001	0.017	0.012	0.014	<0.001	<0.001	<0.001	0.061	0.03	0.02	55.4	2.4	SW	30.5	72.2
Avg (ppm)	0.001	0.018	0.013	0.020	BDL	BDL	BDL	0.056	0.026	0.018	54.6	2.38		30.5	72.1
µg/M3	2.62	33.23	15.08	38.61	BDL	BDL	BDL	56.00	26.17	17.50	54.6	2.38		30.5	72.1

AQ36															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.001	0.022	0.008	0.015	<0.001	<0.001	<0.001	0.089	0.051	0.033	56.3	2.1	SW	29.7	75
10mins	0.000	0.019	0.005	0.017	<0.001	<0.001	<0.001	0.077	0.045	0.029	55.2	2.4	SW	29.7	75
10mins	0.001	0.021	0.005	0.014	<0.001	<0.001	<0.001	0.083	0.049	0.031	53.4	1.9	SW	29.4	76.5
10mins	0.003	0.024	0.006	0.015	<0.001	<0.001	<0.001	0.075	0.044	0.026	52.8	2.3	SW	29.3	76.7
10mins	0.002	0.022	0.005	0.015	<0.001	<0.001	<0.001	0.069	0.038	0.023	53.1	1.4	SW	29.4	76.4
10mins	0.001	0.017	0.005	0.013	<0.001	<0.001	<0.001	0.074	0.043	0.026	53.7	1.6	SW	29.4	76.4
Avg (ppm)	0.001	0.021	0.006	0.015	BDL	BDL	BDL	0.078	0.045	0.028	54.1	1.95		29.5	76.0
µg/M3	3.49	39.19	6.49	29.12	BDL	BDL	BDL	77.83	45.00	28.00	54.1	1.95		29.5	76.0

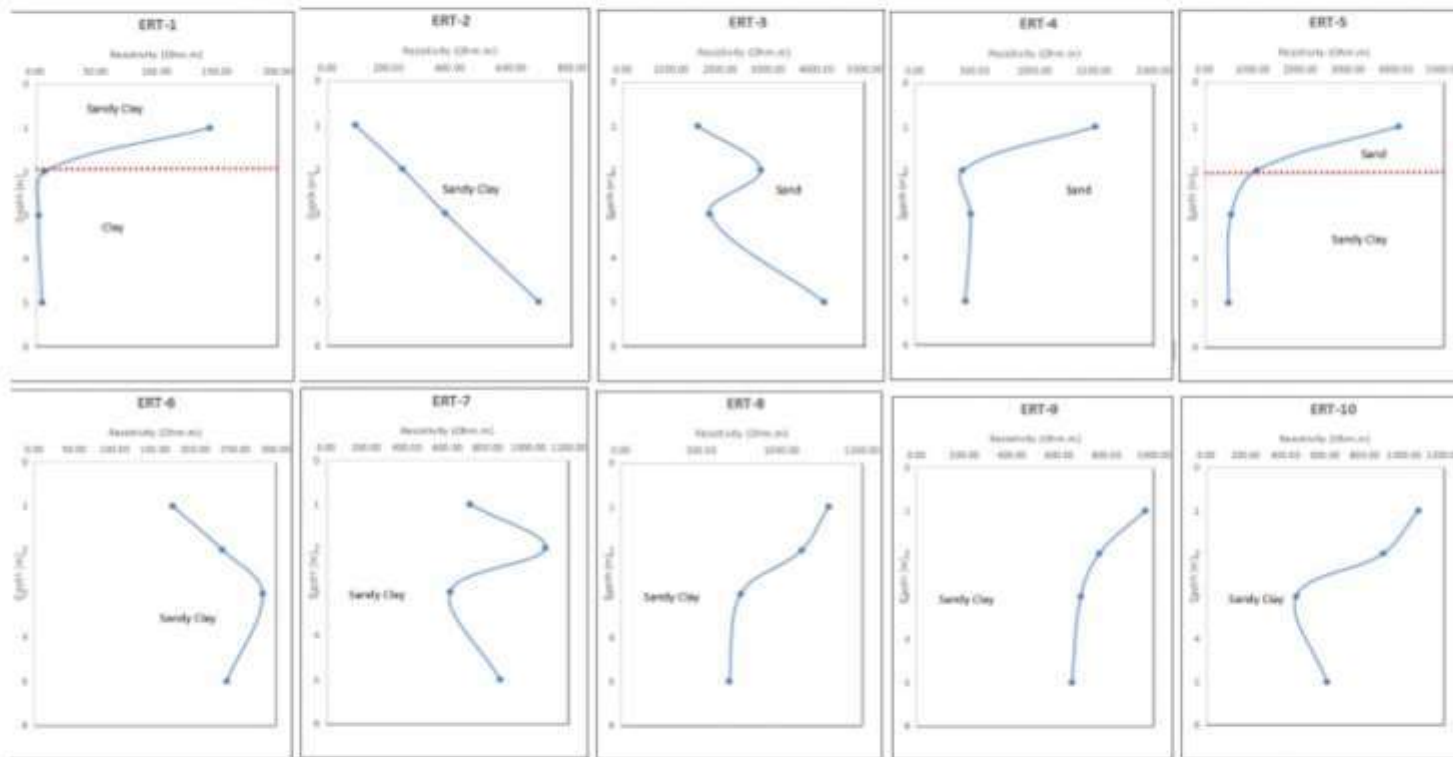
AQ37															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.003	0.016	0.009	0.022	<0.001	<0.001	<0.001	0.073	0.042	0.025	55.3	1.7	SW	29.2	79
10mins	0.002	0.014	0.012	0.019	<0.001	<0.001	<0.001	0.067	0.035	0.022	54.6	1.4	SW	28.6	80.5
10mins	0.001	0.015	0.011	0.021	<0.001	<0.001	<0.001	0.059	0.029	0.019	54.1	1.8	SW	28.6	80.5
10mins	0.002	0.017	0.014	0.020	<0.001	<0.001	<0.001	0.056	0.026	0.017	53.6	2.1	SW	28.5	80.9
10mins	0.000	0.013	0.014	0.017	<0.001	<0.001	<0.001	0.062	0.031	0.02	52.8	1.9	SW	28.4	81
10mins	0.001	0.016	0.011	0.017	<0.001	<0.001	<0.001	0.065	0.034	0.021	53.1	1.4	SW	28.4	81
Avg (ppm)	0.002	0.015	0.012	0.019	BDL	BDL	BDL	0.064	0.033	0.021	53.9	1.72		28.6	80.5
µg/M3	3.93	28.53	13.55	37.95	BDL	BDL	BDL	63.67	32.83	20.67	53.9	1.72		28.6	80.5

AQ38															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.006	0.018	0.024	0.021	<0.001	<0.001	<0.001	0.078	0.047	0.029	52.1	1.1	SSE	28.2	82.3
10mins	0.004	0.016	0.021	0.018	<0.001	<0.001	<0.001	0.074	0.043	0.026	51.4	1.3	SSW	28.2	82.3
10mins	0.002	0.016	0.018	0.022	<0.001	<0.001	<0.001	0.081	0.048	0.03	52.3	1.2	SSE	28.3	82.1
10mins	0.001	0.017	0.018	0.021	<0.001	<0.001	<0.001	0.069	0.038	0.023	52.2	1.5	SW	28.3	82.1
10mins	0.001	0.018	0.015	0.017	<0.001	<0.001	<0.001	0.055	0.026	0.017	52.3	1.5	SSE	28.2	82.4
10mins	0.000	0.015	0.012	0.017	<0.001	<0.001	<0.001	0.064	0.033	0.021	52.7	1.3	SSW	28.2	82.4
Avg (ppm)	0.002	0.017	0.018	0.019	BDL	BDL	BDL	0.070	0.039	0.024	52.2	1.32		28.2	82.3
µg/M3	6.11	31.35	20.61	37.95	BDL	BDL	BDL	70.17	39.17	24.33	52.2	1.32		28.2	82.3

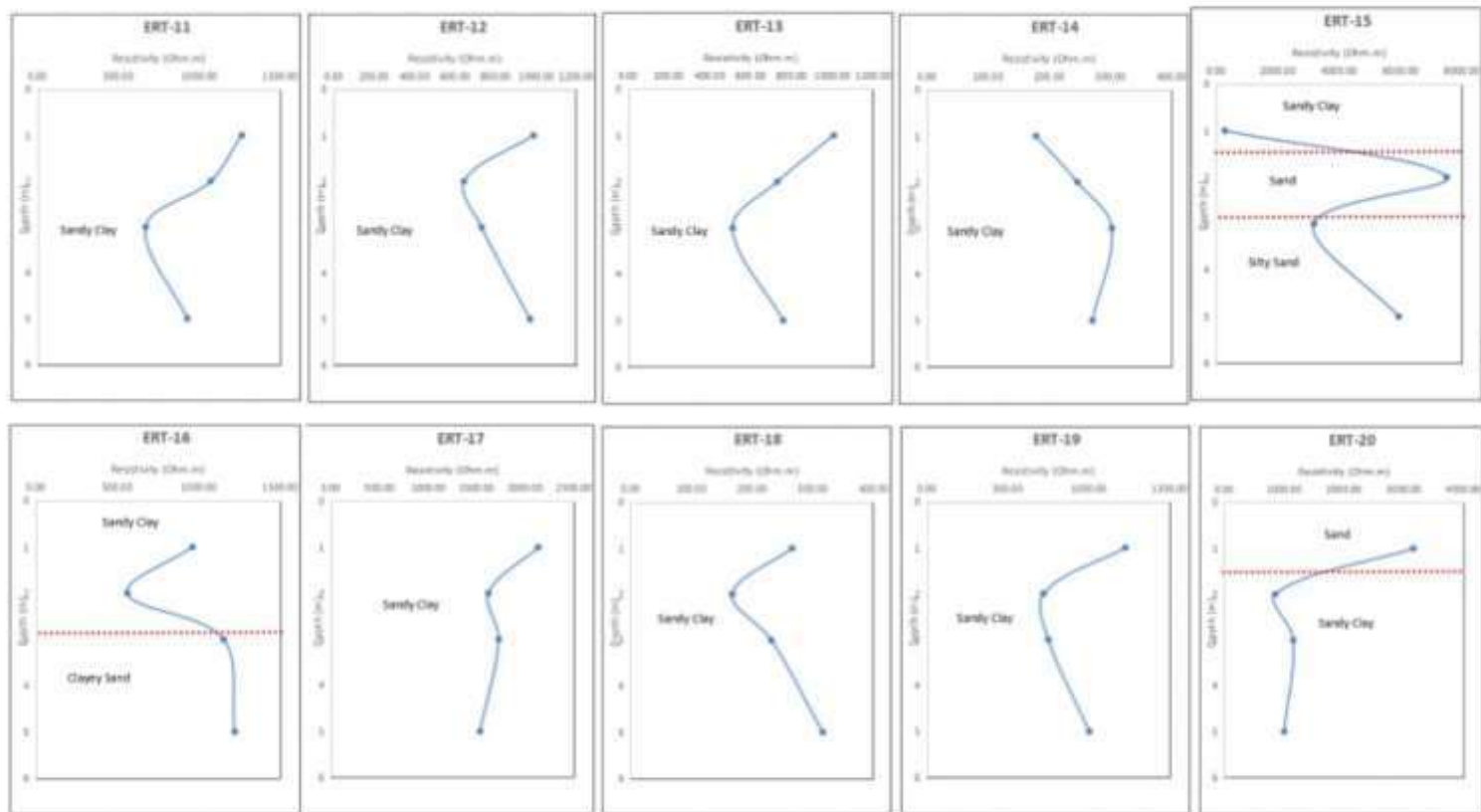
AQC1															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.005	0.018	0.010	0.019	<0.001	<0.001	<0.001	0.061	0.030	0.020	51.8	2.5	SW	27.7	85
10mins	0.003	0.016	0.014	0.021	<0.001	<0.001	<0.001	0.069	0.038	0.023	51.3	3.1	SE	27.7	85.0
10mins	0.000	0.013	0.016	0.023	<0.001	<0.001	<0.001	0.071	0.041	0.024	52.5	2.3	SE	27.6	85.0
10mins	0.001	0.015	0.015	0.018	<0.001	<0.001	<0.001	0.063	0.032	0.021	53.7	1.8	SW	27.5	85.5
10mins	0.002	0.017	0.013	0.022	<0.001	<0.001	<0.001	0.048	0.019	0.012	54.2	1.5	SW	27.5	85.5
10mins	0.002	0.015	0.015	0.021	<0.001	<0.001	<0.001	0.043	0.015	0.009	54.7	1.7	SW	27.5	85.5
Avg (ppm)	0.002	0.016	0.014	0.021	BDL	BDL	BDL	0.059	0.029	0.018	53.0	2.15		27.6	85.3
µg/M3	5.67	29.47	15.84	40.57	BDL	BDL	BDL	59.17	29.17	18.17	53.0	2.15		27.6	85.3

AQC2															
Time (Mins)	SO2	NO2	CO	O3	CXHY	VOC	NH3	SPM	PM10	PM2.5	NOISE (dB) Day	WIND SPD (m/s)	WIND DIR	TEMP (Oc)	REL HM (%)
10mins	0.001	0.021	0.009	0.016	<0.001	<0.001	<0.001	0.072	0.041	0.024	53.1	1.1	SW	27.4	86.3
10mins	0.001	0.018	0.011	0.015	<0.001	<0.001	<0.001	0.067	0.035	0.022	54.2	0.9	SW	27.2	86.6
10mins	0.000	0.019	0.011	0.016	<0.001	<0.001	<0.001	0.060	0.028	0.019	54.6	1.2	SW	27.3	86.5
10mins	0.002	0.016	0.012	0.014	<0.001	<0.001	<0.001	0.065	0.034	0.021	56.5	1.1	SW	27.3	86.5
10mins	0.002	0.016	0.011	0.015	<0.001	<0.001	<0.001	0.044	0.016	0.009	53.2	1.3	SW	27.4	86.3
10mins	0.001	0.013	0.009	0.015	<0.001	<0.001	<0.001	0.052	0.022	0.015	52.4	0.8	SW	27.4	86.3
Avg (ppm)	0.001	0.017	0.011	0.015	BDL	BDL	BDL	0.060	0.029	0.018	54.0	1.07		27.3	86.4
µg/M3	3.05	32.29	12.02	29.77	BDL	BDL	BDL	60.00	29.33	18.33	54.0	1.07		27.3	86.4

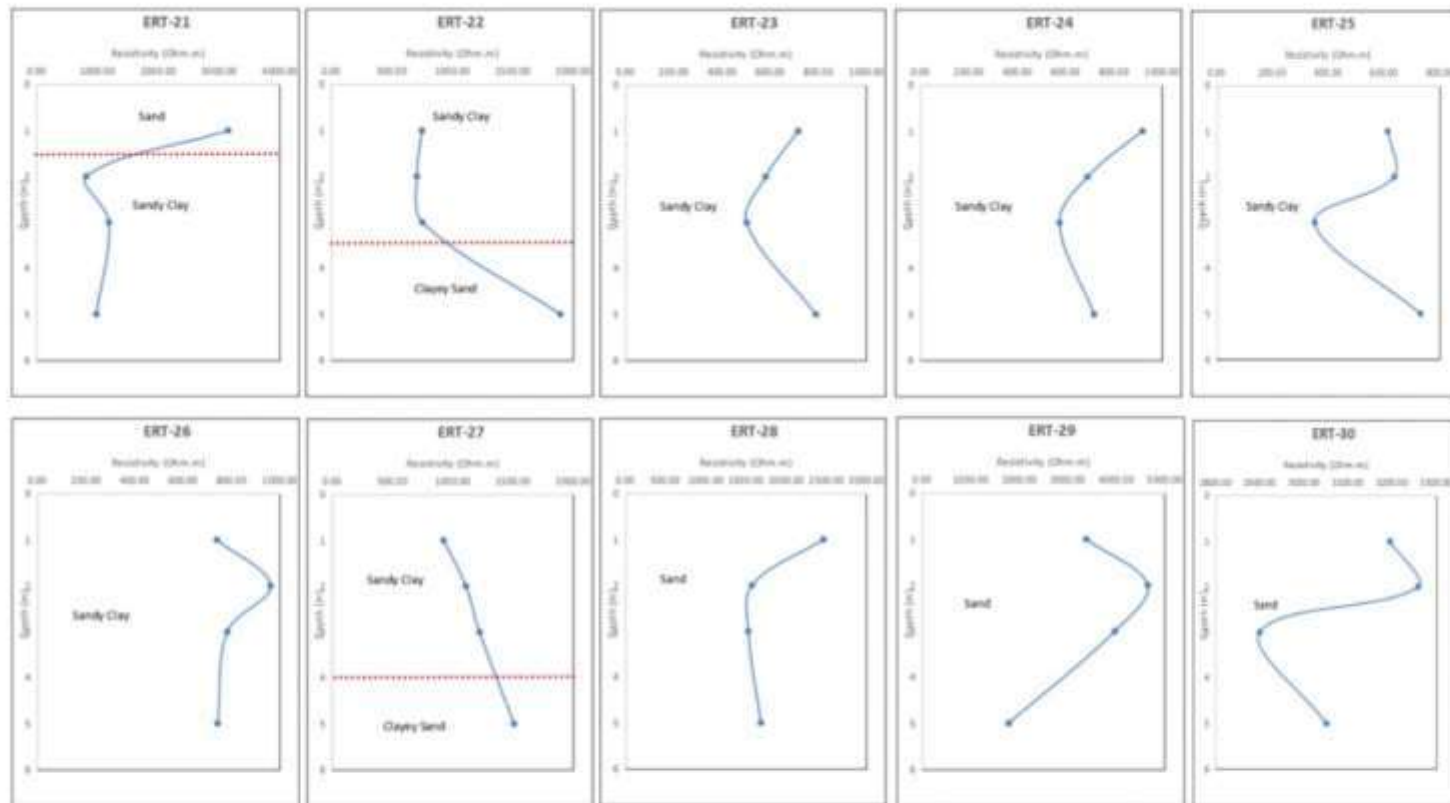
ANNEXURE 4.2: GEOLOGY RESULTS (RESISTIVITY DEPTH PROFILE DIAGRAMS)



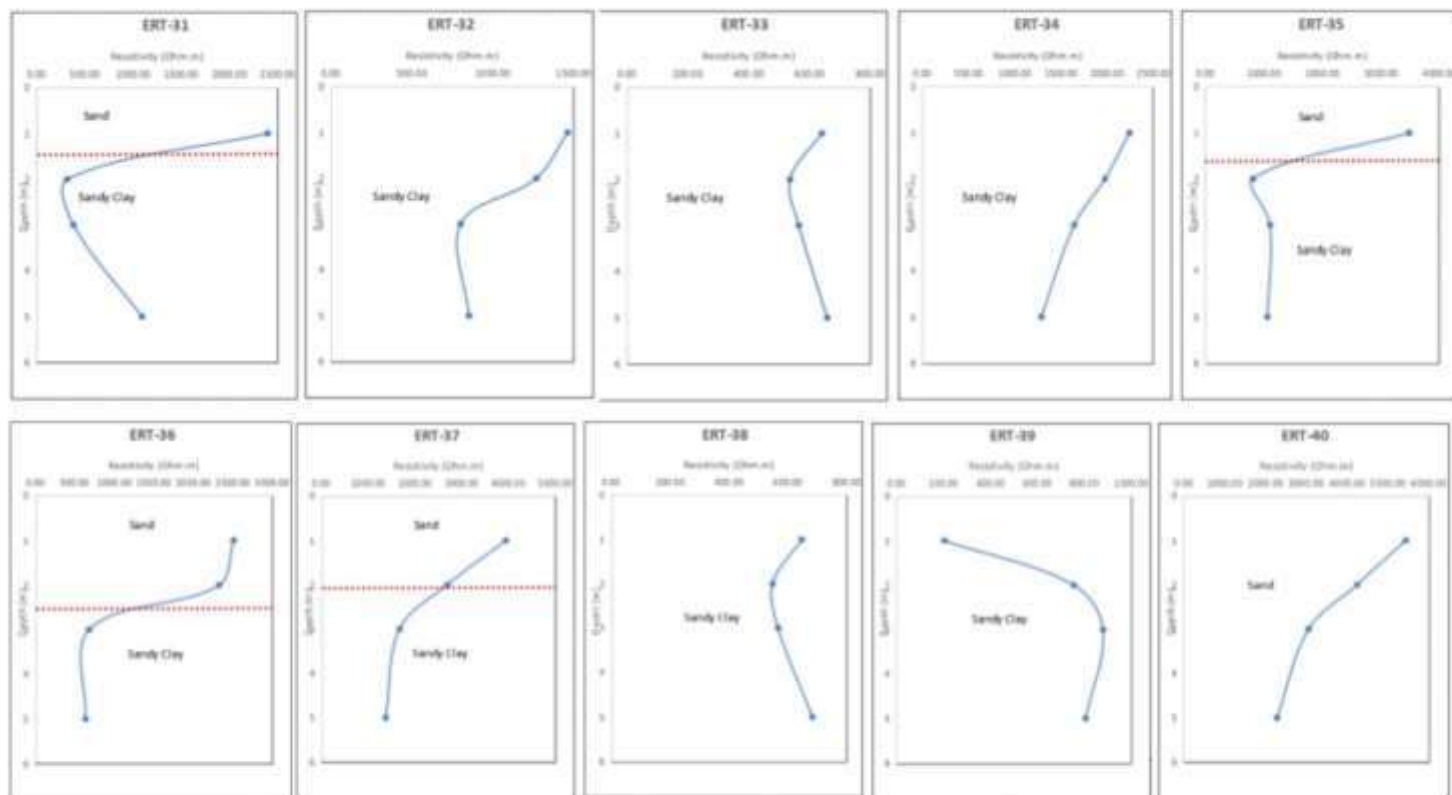
Resistivity depth profiles for surveys conducted within the survey area using Wenner array (ERT1 to ERT10)



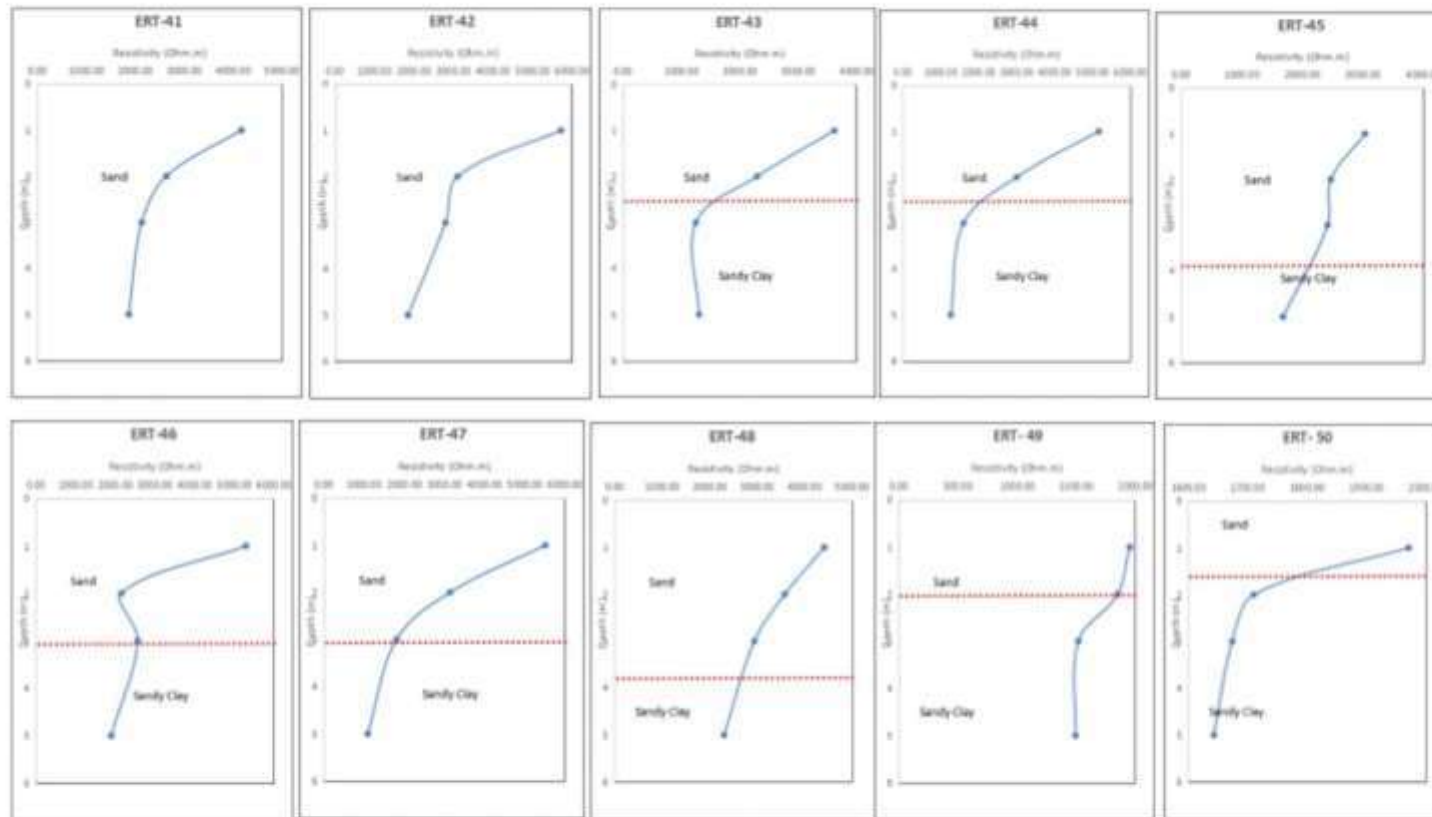
Resistivity depth profiles for surveys conducted within the survey area using Wenner array (ERT11 to ERT20)



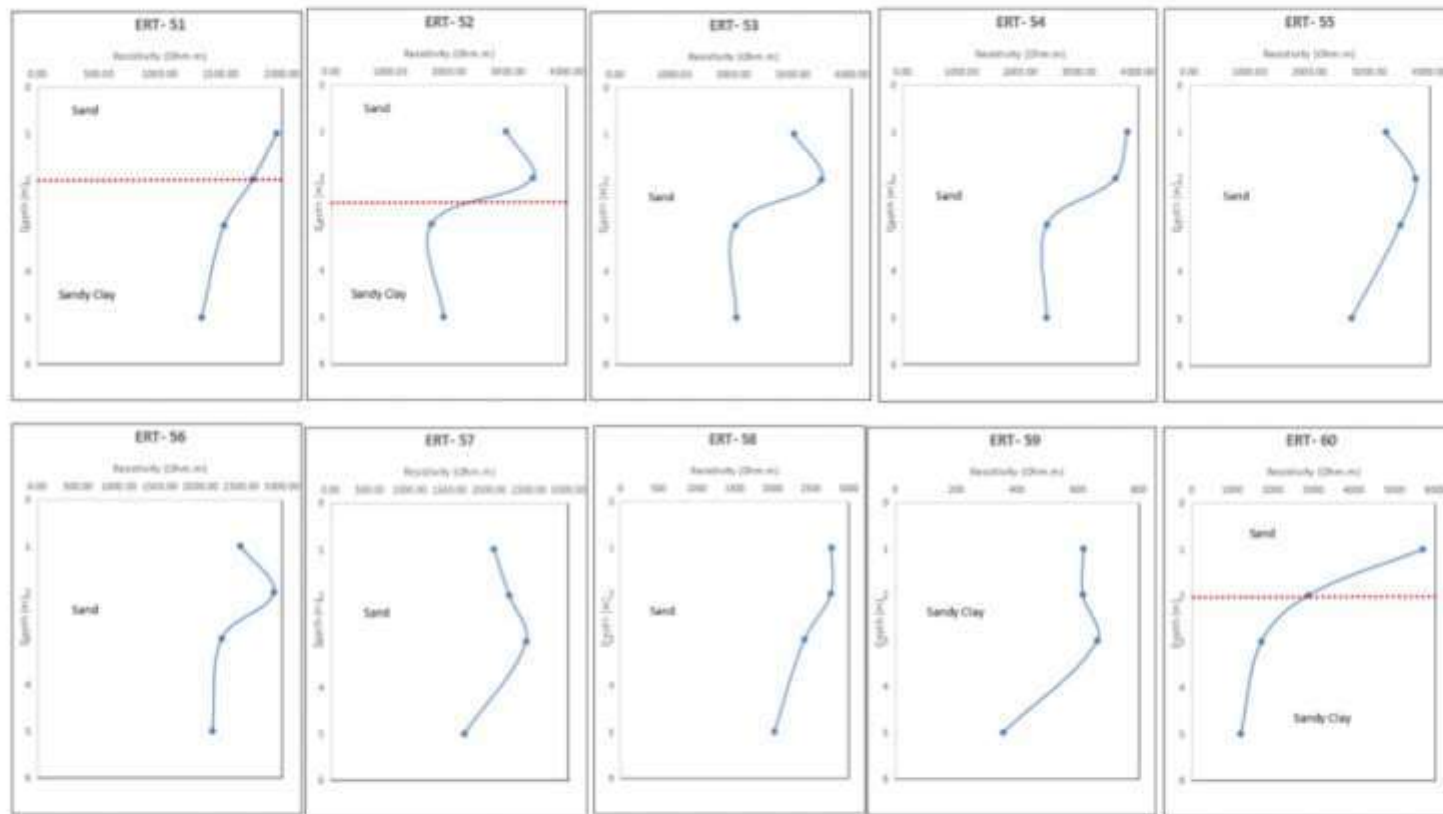
Resistivity depth profiles for surveys conducted within the survey area using Wenner array (ERT21 to ERT30)



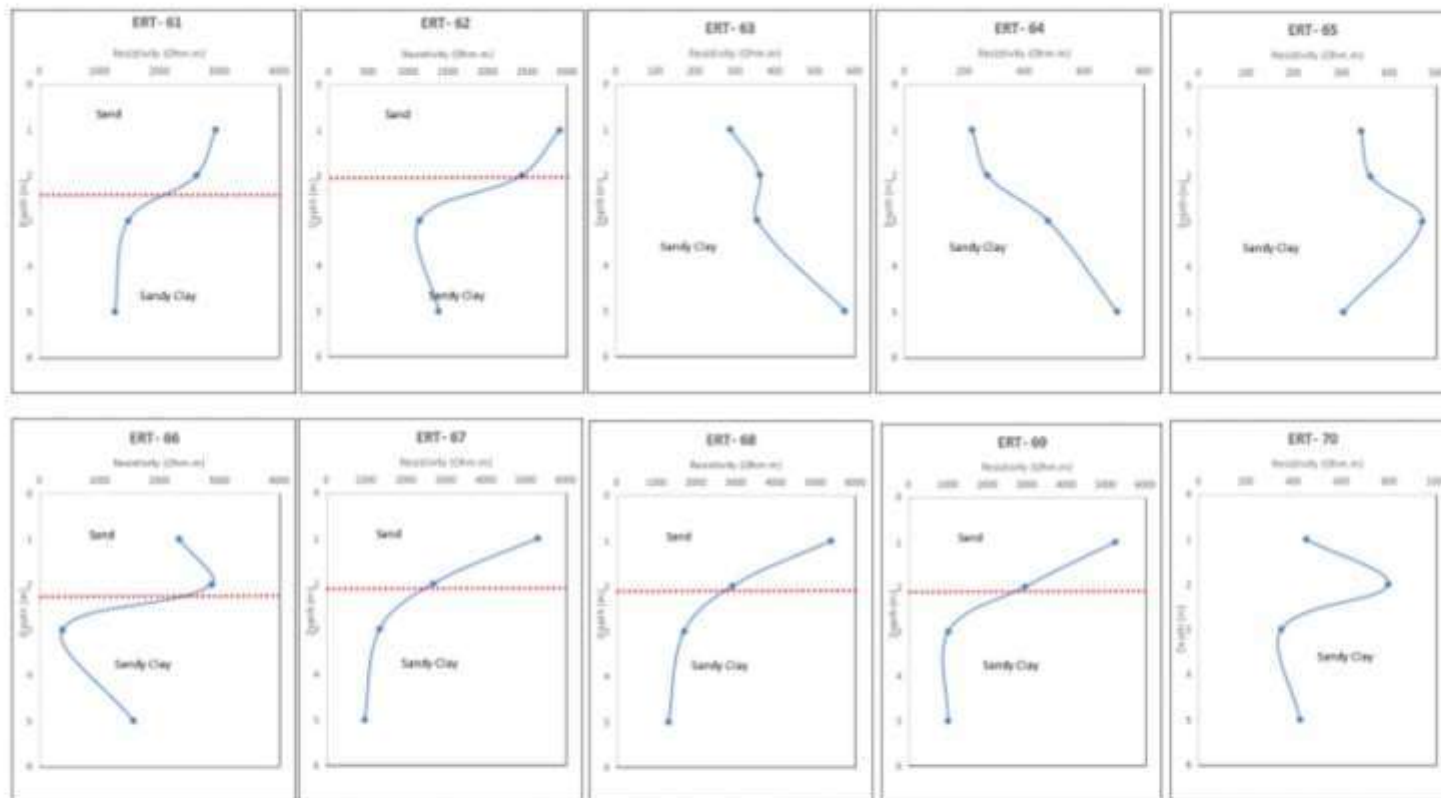
Resistivity depth profiles for surveys conducted within the survey area using Wenner array (ERT31 to ERT40)



Resistivity depth profiles for surveys conducted within the survey area using Wenner array (ERT41 to ERT50)



Resistivity depth profiles for surveys conducted within the survey area using Wenner array (ERT51 to ERT60)



Resistivity depth profiles for surveys conducted within the survey area using Wenner array (ERT61 to ERT70)

ANNEXURE 4.3: SOIL QUALITY RESULTS

DRY SEASON

Topsoil (0-15cm) Results

S/N	Parameter(s)	SS 1T	SS 2T	SS 3T	SS 4T	SS 5T	SS 6T	SS 7T	SS 8T	SS 9T	SS 10T
1	pH	4.5	4.1	4.4	6.7	5.8	4.9	4.7	4.5	4.7	4.9
2	Moisture Content (%)	5.56	4.53	3.08	4.85	8.25	7.30	10.31	7.31	5.16	7.51
3	Sulphide, S ₂ (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4	Sulphate, SO ₄ ²⁻ (mg/kg)	7	10	3	14	10	4	4	3	16	5
5	Nitrate, NO ₃ ⁻ (mg/kg)	1.0	2.0	0.5	2.4	2.0	0.7	0.8	0.6	2.6	1.2
6	Total Nitrogen (%)	0.162	0.155	0.131	0.098	0.132	0.091	0.081	0.155	0.121	0.105
7	Phosphate, PO ₄ ³⁻ (mg/kg)	0.68	1.68	0.5	1.79	1.68	0.52	0.65	0.42	2.45	0.52
8	THC (mg/kg)	1.61	1.15	1.09	1.12	1.24	1.14	1.13	1.71	1.2	1.11
9	TPH (mg/kg)	2.00	2.42	1.60	2.25	1.34	1.26	1.54	1.87	1.04	1.39
10	PAH (mg/kg)	0.003	0.002	0.003	0.003	0.003	0.002	0.003	0.003	0.002	<0.001
11	BETEX (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
12	Phenol (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
13	Ammonia (mg/kg)	0.21	0.17	0.20	0.38	0.30	0.16	0.14	0.20	0.32	0.24
14	TOC (%)	1.872	1.794	1.521	1.131	1.521	1.053	0.936	1.794	1.404	1.209
15	TOM (%)	3.237	3.102	2.630	1.955	2.630	1.821	1.618	3.102	2.428	2.090
16	Electric Conductivity (µs/cm)	82	118	43	191	125	45	36	37	245	44
17	Sand (%)	85.79	81.10	86.97	84.47	83.09	87.05	82.76	82.45	85.43	84.57
18	Silt (%)	5.25	5.65	4.85	3.96	4.26	4.26	3.12	3.25	5.72	5.80
19	Clay (%)	8.96	13.25	8.18	11.57	12.65	8.69	14.12	14.30	8.85	9.63
20	Particle Size Distribution	SS	LS	SS	LS	LS	SS	LS	LS	SS	SS
21	Porosity	0.40	0.37	0.42	0.39	0.38	0.42	0.38	0.38	0.40	0.39
22	Colour	Brown	Brown	Dark Brown	Brown	Dark Brown	Brown	Light Brown	Dark Brown	Dark Brown	Dark Brown

S/N	Parameter(s)	SS 1T	SS 2T	SS 3T	SS 4T	SS 5T	SS 6T	SS 7T	SS 8T	SS 9T	SS 10T
23	Permeability (cm/sec)×10	0.13	0.12	0.12	0.16	0.17	0.17	0.15	0.15	0.13	0.12
24	Bulk Density (g/cm ³)	1.17	1.05	1.15	1.18	1.13	1.30	1.14	1.14	1.10	1.26
25	Sodium, Na (mg/kg)	43.55	30.94	32.07	37.28	24.21	28.68	25.55	38.41	23.04	34.91
26	Magnesium, Mg (mg/kg)	3.21	2.45	3.75	10.25	6.39	5.80	4.80	2.33	6.54	2.14
27	Calcium, Ca (mg/kg)	<0.001	<0.001	<0.001	682.8	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28	Potassium, K (mg/kg)	4.58	4.72	5.45	11.61	3.91	7.93	6.36	4.31	8.26	4.04
29	Manganese, Mn (mg/kg)	12.63	31.60	9.28	21.46	12.06	12.41	4.57	28.40	40.50	20.97
30	Vanadium, V (mg/kg)	<0.001	<0.001	0.72	1.18	0.53	0.66	0.19	0.42	0.14	0.05
31	Nickel, Ni (mg/kg)	<0.001	<0.001	15.16	24.78	11.15	13.95	3.99	8.74	2.88	1.15
32	Chromium, Cr (mg/kg)	<0.001	<0.001	6.04	2.00	<0.001	<0.001	<0.001	1.60	5.26	<0.001
33	Iron, Fe (mg/kg)	256.4	156.7	200.8	331.0	379.9	599.7	229.8	215.8	189.7	291.6
34	Lead, Pb (mg/kg)	0.92	1.18	1.74	2.78	1.59	2.11	2.43	2.18	2.38	2.86
35	Copper, Cu (mg/kg)	12.54	10.74	15.16	13.02	15.73	22.70	13.46	7.97	17.31	16.13
36	Zinc, Zn (mg/kg)	7.36	8.18	6.73	14.01	49.24	12.20	6.63	8.35	8.43	8.91
37	Mercury, Hg (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
38	Arsenic, As (mg/kg)	0.12	0.1	0.14	0.12	0.14	0.21	0.12	0.07	0.16	0.15
39	HUB (CFU/g) x 10 ³	1.0	0.9	1.5	0.9	1.3	0.8	0.9	1.1	0.6	1.7
40	HUF (CFU/g) x 10 ³	0.6	0.7	1.0	0.4	0.8	0.3	0.4	0.7	0.4	1.1
41	THB (CFU/g) x 10 ⁶	3.3	3	4.1	3.2	2.4	1.8	2.4	3.2	2.6	3.2
42	THF (CFU/g) x 10 ⁶	2.6	1.8	2.7	1.9	1.1	0.7	1.8	2.4	1	2

Topsoil (0-15cm) Results

S/N	Parameter(s)	SS 11T	SS 12T	SS 13T	SS 14T	SS 15T	SS 16T	SS 17T	SS 18T	SS 19T	SS 20T
1	pH	4.8	4.6	4.3	4.5	4.7	4.5	4.5	4.4	4.5	4.3
2	Moisture Content (%)	5.10	8.30	5.03	7.33	4.30	10.73	11.23	8.75	9.83	7.06
3	Sulphide, S ₂ (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4	Sulphate, SO ₄ ²⁻ (mg/kg)	3	15	8	4	2	3	2	4	4	8
5	Nitrate, NO ₃ ⁻ (mg/kg)	0.7	2.8	1.3	0.7	0.8	0.9	0.8	0.8	0.8	1.0
6	Total Nitrogen (%)	0.172	0.150	0.155	0.154	0.158	0.162	0.148	0.145	0.142	0.135
7	Phosphate, PO ₄ ³⁻ (mg/kg)	0.52	1.73	1.21	0.65	0.43	0.38	0.3	0.38	0.65	1.25
8	THC (mg/kg)	1.1	1.22	1.26	1.18	1.11	1.13	1.31	1.13	1.32	0.84
9	TPH (mg/kg)	1.39	1.63	1.51	1.21	1.13	1.99	2.00	2.42	2.52	2.44
10	PAH (mg/kg)	0.002	<0.001	0.002	0.002	0.003	<0.001	0.002	0.002	0.003	0.002
11	BETEX (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
12	Phenol (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
13	Ammonia (mg/kg)	0.25	0.25	0.25	0.20	0.33	0.29	0.18	0.21	0.75	0.15
14	TOC (%)	1.981	1.98	1.794	1.794	1.833	1.872	1.716	1.677	1.638	1.56
15	TOM (%)	3.439	3.000	3.102	3.100	3.169	3.237	2.967	2.900	2.832	2.679
16	Electric Conductivity (µs/cm)	38	143	73	39	28	49	28	49	56	73
17	Sand (%)	82.13	84.16	84.25	85.47	80.15	82.06	86.49	86.35	84.33	81.60
18	Silt (%)	6.12	6.88	6.89	5.65	5.75	6.25	4.30	3.12	4.10	4.65
19	Clay (%)	11.75	8.96	8.86	7.88	14.10	11.69	9.21	8.53	11.57	13.75
20	Particle Size Distribution	LS	SS	SS	SS	LS	LS	SS	SS	LS	LS
21	Porosity	0.37	0.39	0.40	0.41	0.37	0.39	0.44	0.43	0.41	0.38
22	Colour	Dark Brown	Brown	Brown	Dark Brown	Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Reddish
23	Permeability (cm/sec)×10	0.13	0.11	0.15	0.13	0.12	0.15	0.18	0.13	0.11	0.13
24	Bulk Density (g/cm ³)	1.30	1.15	1.10	1.13	1.30	1.16	1.10	1.25	1.30	1.42
25	Sodium, Na (mg/kg)	24.59	25.03	25.48	22.23	25.09	18.39	26.21	24.54	29.42	41.12

S/N	Parameter(s)	SS 11T	SS 12T	SS 13T	SS 14T	SS 15T	SS 16T	SS 17T	SS 18T	SS 19T	SS 20T
26	Magnesium, Mg (mg/kg)	2.45	1.72	2.07	2.10	1.17	1.23	1.15	4.15	3.96	3.1
27	Calcium, Ca (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28	Potassium, K (mg/kg)	4.60	3.75	4.92	4.85	2.55	3.11	2.42	6.14	7.79	5.44
29	Manganese, Mn (mg/kg)	12.81	7.62	10.52	14.67	11.83	7.07	4.69	2.27	3.42	4.19
30	Vanadium, V (mg/kg)	0.19	0.41	0.49	0.63	<0.001	0.74	0.03	0.35	<0.001	<0.001
31	Nickel, Ni (mg/kg)	3.95	8.61	10.19	13.21	<0.001	15.58	10.65	7.28	<0.001	<0.001
32	Chromium, Cr (mg/kg)	<0.001	<0.001	0.29	<0.001	<0.001	<0.001	<0.001	0.80	<0.001	<0.001
33	Iron, Fe (mg/kg)	397.1	299.0	314.5	396.6	348.1	253.8	250.1	272.2	161.20	365.80
34	Lead, Pb (mg/kg)	3.08	3.07	2.43	2.57	2.97	4.02	3.63	4.18	3.20	3.17
35	Copper, Cu (mg/kg)	16.15	12.50	8.78	26.30	23.88	23.40	18.19	10.50	16.31	17.78
36	Zinc, Zn (mg/kg)	9.32	7.07	6.24	7.76	8.47	6.30	7.58	5.94	6.8	6.49
37	Mercury, Hg (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
38	Arsenic, As (mg/kg)	0.15	0.12	0.08	0.24	0.22	0.22	0.17	0.1	0.2	0.2
39	HUB (CFU/g) x 10 ³	1.0	1.6	1.2	0.6	0.8	1.1	1.3	0.6	1.1	1.0
40	HUF (CFU/g) x 10 ³	0.6	0.8	0.8	0.3	0.7	0.5	0.6	0.2	0.5	0.4
41	THB (CFU/g) x 10 ⁶	3.7	4.2	2.8	2	2.5	4	3.6	2.1	3	3.6
42	THF (CFU/g) x 10 ⁶	2.7	2.3	1.7	1.1	1.3	2.3	2.1	1.8	2.4	2

Topsoil (0-15cm) Results

S/N	Parameter(s)	SS 21T	SS 22T	SS 23T	SS 24T	SS 25T	SS 26T	SS 27T	SS 28T	SS 29T	SS 30T
1	pH	4.5	4.6	5	5.3	4.6	5.1	4.9	5.4	4.9	4.7
2	Moisture Content (%)	8.33	5.56	8.85	7.25	5.80	6.70	10.33	8.26	7.76	8.26
3	Sulphide, S ₂ (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4	Sulphate, SO ₄ ²⁻ (mg/kg)	3	8	3	12	3	5	5	2	3	4
5	Nitrate, NO ₃ ⁻ (mg/kg)	0.8	1.3	1.0	2.5	0.8	0.9	1.0	0.2	0.8	1.2
6	Total Nitrogen (%)	0.134	0.091	0.140	0.185	0.196	0.138	0.147	0.190	0.152	0.187
7	Phosphate, PO ₄ ³⁻ (mg/kg)	0.75	0.69	1.1	2.1	0.48	0.48	0.46	0.65	0.4	1.7
8	THC (mg/kg)	1.1	1.92	1.03	1.41	1.12	1.03	0.73	1.06	1.21	1.16
9	TPH (mg/kg)	1.12	1.10	1.15	1.54	1.12	1.57	1.21	1.12	1.87	1.35
10	PAH (mg/kg)	0.002	0.004	0.002	0.003	0.002	0.003	0.002	0.004	0.002	0.002
11	BETEX (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
12	Phenol (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
13	Ammonia (mg/kg)	0.23	0.31	0.27	0.40	0.31	0.32	0.28	0.25	0.40	0.20
14	TOC (%)	1.56	1.053	1.638	2.145	2.262	1.599	1.706	2.193	1.758	2.16
15	TOM (%)	2.696	1.821	2.832	3.709	3.911	2.765	2.950	3.792	3.040	3.735
16	Electric Conductivity (µs/cm)	38	63	33	227	59	62	81	40	50	79
17	Sand (%)	85.61	85.43	86.59	86.95	84.36	85.14	85.26	87.25	85.70	86.43
18	Silt (%)	5.72	5.12	5.25	4.10	3.06	2.90	2.49	2.49	2.23	5.32
19	Clay (%)	8.67	9.45	8.16	8.95	12.58	11.96	12.25	10.26	12.07	8.25
20	Particle Size Distribution	SS	SS	SS	SS	LS	LS	LS	LS	LS	SS
21	Porosity	0.42	0.41	0.45	0.46	0.40	0.41	0.41	0.42	0.42	0.42
22	Colour	Dark Brown	Dark Brown	Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Brown	Dark Brown
23	Permeability (cm/sec)×10	0.13	0.12	0.13	0.14	0.12	0.13	0.16	0.14	0.15	0.13
24	Bulk Density (g/cm ³)	1.10	1.18	1.30	1.17	1.25	1.23	1.15	1.17	1.23	1.20
25	Sodium, Na (mg/kg)	36.83	38.27	26.33	17.30	40.06	35.88	71.01	28.13	38.55	21.38

S/N	Parameter(s)	SS 21T	SS 22T	SS 23T	SS 24T	SS 25T	SS 26T	SS 27T	SS 28T	SS 29T	SS 30T
26	Magnesium, Mg (mg/kg)	5.1	2.46	2.70	21.07	<0.001	<0.001	2.15	21.30	5.80	<0.001
27	Calcium, Ca (mg/kg)	<0.001	<0.001	<0.001	617	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28	Potassium, K (mg/kg)	5.00	3.93	3.53	38.43	5.02	20.87	8.02	4.34	3.47	3.56
29	Manganese, Mn (mg/kg)	25.10	38.30	11.34	27.70	5.57	29.10	58.30	43.60	36.20	16.09
30	Vanadium, V (mg/kg)	0.05	0.53	0.25	<0.001	0.01	<0.001	<0.001	<0.001	0.24	0.42
31	Nickel, Ni (mg/kg)	1.15	11.04	5.25	<0.001	0.19	<0.001	<0.001	<0.001	5.05	8.76
32	Chromium, Cr (mg/kg)	0.0	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
33	Iron, Fe (mg/kg)	264.10	115.2	406.4	540.6	205.7	147.0	386.6	273.6	288.8	85.5
34	Lead, Pb (mg/kg)	3.74	3.70	4.24	4.06	3.82	3.61	4.51	3.76	3.95	3.90
35	Copper, Cu (mg/kg)	15.27	15.15	15.81	24.28	17.74	13.82	13.22	13.81	21.90	11.72
36	Zinc, Zn (mg/kg)	7.9	6.55	8.91	29.97	7.68	9.37	12.06	7.96	6.70	6.32
37	Mercury, Hg (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
38	Arsenic, As (mg/kg)	0.1	0.14	0.15	0.22	0.16	0.13	0.12	0.13	0.21	0.11
39	HUB (CFU/g) x 10 ³	1.0	1.4	0.8	0.6	0.7	1.0	0.9	1.6	1.9	0.6
40	HUF (CFU/g) x 10 ³	0.8	1.2	0.3	0.4	0.5	0.6	0.6	1.0	1.2	0.5
41	THB (CFU/g) x 10 ⁶	2.9	3.5	2.7	2.8	3.6	2	2.8	3.3	4.2	3.1
42	THF (CFU/g) x 10 ⁶	1.7	2.6	1.5	2	2.1	1.3	1.6	2.1	2.8	2.2

Topsoil (0-15cm) Results

S/N	Parameter(s)	SS 31T	SS 32T	SS 33T	SS 34T	SS 35T	SS 36T	SS 37T	SS 38T	SSC 1T	SSC 2T
1	pH	4.7	4.8	4.6	4.4	4.8	4.6	4.8	4.7	5.6	5.7
2	Moisture Content (%)	7.25	10.10	9.26	7.25	5.30	5.33	5.76	8.12	10.13	8.63
3	Sulphide, S ₂ (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4	Sulphate, SO ₄ ²⁻ (mg/kg)	2	5	3	3	0	3	3	10	3	10
5	Nitrate, NO ₃ ⁻ (mg/kg)	0.5	1.1	0.8	0.7	0.2	0.7	0.4	0.8	0.3	0.8
6	Total Nitrogen (%)	0.166	0.183	0.164	0.194	0.169	0.092	0.110	0.161	0.098	0.122
7	Phosphate, PO ₄ ³⁻ (mg/kg)	1.27	1.75	0.34	1.2	0.12	0.25	1.85	2.01	2.7	0.75
8	THC (mg/kg)	1.14	1.12	1.18	1.27	1.27	1.11	1.38	2.28	0.51	0.68
9	TPH (mg/kg)	1.50	1.10	1.11	1.14	1.92	2.22	1.89	1.69	1.00	1.69
10	PAH (mg/kg)	0.004	<0.001	0.005	<0.001	0.002	0.004	0.003	0.002	0.002	0.003
11	BETEX (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
12	Phenol (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
13	Ammonia (mg/kg)	0.26	0.42	0.25	0.33	0.25	0.33	0.18	0.25	0.28	0.21
14	TOC (%)	1.925	2.116	1.896	2.245	1.956	1.068	1.275	1.867	1.131	1.416
15	TOM (%)	3.328	3.659	3.278	3.882	3.382	1.847	2.204	3.228	1.955	2.448
16	Electric Conductivity (µs/cm)	38	103	52	57	9	48	28	54	22	52
17	Sand (%)	80.85	85.10	86.10	85.26	87.23	84.30	86.33	87.33	89.25	86.16
18	Silt (%)	2.94	3.32	4.50	4.28	5.22	4.24	5.02	3.39	2.00	3.02
19	Clay (%)	16.21	11.58	9.40	10.46	7.55	11.46	8.65	9.28	8.75	10.82
20	Particle Size Distribution	SL	LS	SS	LS	SS	LS	SS	SS	SS	LS
21	Porosity	0.37	0.40	0.42	0.40	0.42	0.40	0.42	0.43	0.43	0.42
22	Colour	Brown	Dark Brown	Brown	Brown	Dark Brown	Brown	Brown	Dark Brown	Brown	Brown
23	Permeability (cm/sec)×10	0.15	0.13	0.13	0.14	0.15	0.16	0.13	0.15	0.17	0.13
24	Bulk Density (g/cm ³)	1.26	1.26	1.17	1.33	1.20	1.53	1.17	1.18	1.16	1.21
25	Sodium, Na (mg/kg)	30.86	25.72	32.60	39.03	27.85	25.80	33.23	33.53	21.73	22.17
26	Magnesium, Mg (mg/kg)	21.03	5.53	11.53	11.30	4.53	3.16	7.80	2.40	10.45	7.48

S/N	Parameter(s)	SS 31T	SS 32T	SS 33T	SS 34T	SS 35T	SS 36T	SS 37T	SS 38T	SSC 1T	SSC 2T
27	Calcium, Ca (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28	Potassium, K (mg/kg)	3.61	6.16	4.74	3.82	4.24	3.62	4.79	3.67	2.11	3.44
29	Manganese, Mn (mg/kg)	45.10	45.70	47.40	16.43	4.78	1.84	3.18	1.97	2.84	1.84
30	Vanadium, V (mg/kg)	<0.001	0.58	<0.001	<0.001	<0.001	<0.001	0.14	0.36	0.23	0.14
31	Nickel, Ni (mg/kg)	<0.001	12.08	<0.001	<0.001	3.87	<0.001	2.94	7.51	4.84	3.01
32	Chromium, Cr (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
33	Iron, Fe (mg/kg)	168.5	306.0	193.1	318.2	423.1	176.7	124.1	287.7	148.7	210.4
34	Lead, Pb (mg/kg)	3.51	3.61	3.39	3.06	3.64	3.63	3.06	3.61	3.65	3.08
35	Copper, Cu (mg/kg)	8.86	25.52	10.28	24.30	25.67	8.31	21.20	14.12	13.38	20.60
36	Zinc, Zn (mg/kg)	5.27	9.40	8.33	7.97	7.14	5.28	7.66	5.88	2.97	4.76
37	Mercury, Hg (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
38	Arsenic, As (mg/kg)	0.08	0.24	0.1	0.22	0.24	0.08	0.2	0.13	0.12	0.19
39	HUB (CFU/g) x 10 ³	1.4	0.2	1.1	0.6	0.6	1.3	1.1	0.9	1.2	1.8
40	HUF (CFU/g) x 10 ³	0.6	0.9	0.8	0.3	0.2	0.6	0.8	0.6	0.7	0.5
41	THB (CFU/g) x 10 ⁶	2.3	3.5	2.7	2.8	2.2	3.6	2.6	1.7	2.9	3.7
42	THF (CFU/g) x 10 ⁶	1.3	2.7	1.9	1	1	2.1	2.3	0.8	1.3	2.5

Subsoil (15-30cm) Results

S/N	Parameter(s)	SS 1B	SS 2B	SS 3B	SS 4B	SS 5B	SS 6B	SS 7B	SS 8B	SS 9B	SS 10B
1	pH	4.5	4.5	4.3	6.3	6.1	4.6	4.9	4.7	4.6	4.8
2	Moisture Content (%)	7.10	6.27	5.70	8.87	10.31	8.12	10.45	8.70	7.20	8.25
3	Sulphide, S ₂ (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4	Sulphate, SO ₄ ²⁻ (mg/kg)	2	3	3	10	3	3	3	6	14	3
5	Nitrate, NO ₃ ⁻ (mg/kg)	0.8	0.7	0.8	2.3	0.8	0.8	0.8	0.9	2.0	1.0
6	Total Nitrogen (%)	0.149	0.140	0.149	0.089	0.122	0.109	0.066	0.132	0.109	0.102
7	Phosphate, PO ₄ ³⁻ (mg/kg)	0.42	0.52	0.5	1.76	0.38	0.62	0.37	0.46	1.69	0.39
8	THC (mg/kg)	1.16	1.24	1.14	1.12	1.21	1.12	1.11	1.32	1.24	1.12
9	TPH (mg/kg)	1.65	2.25	1.40	2.65	1.21	1.20	1.10	1.67	0.75	1.21
10	PAH (mg/kg)	0.002	0.002	0.002	0.004	0.003	0.003	0.002	0.002	0.002	<0.001
11	BETEX (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
12	Phenol (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
13	Ammonia (mg/kg)	0.16	0.15	0.21	0.32	0.25	0.15	0.23	0.18	0.32	0.20
14	TOC (%)	1.723	1.612	1.723	1.026	1.412	1.258	0.758	1.524	1.265	1.176
15	TOM (%)	2.980	2.787	2.979	1.774	2.441	2.175	1.311	2.635	2.187	2.033
16	Electric Conductivity (µs/cm)	31	49	40	161	29	35	25	58	121	32
17	Sand (%)	82.10	80.74	85.92	82.55	82.39	85.87	82.14	79.88	82.55	83.31
18	Silt (%)	4.95	6.10	5.12	4.12	3.96	5.38	3.10	6.17	4.30	4.36
19	Clay (%)	12.95	13.16	8.96	13.33	13.65	8.75	14.76	13.95	13.15	12.33
20	Particle Size Distribution	LS	SS	SS	LS	LS	SS	LS	LS	LS	LS
21	Porosity	0.37	0.37	0.47	0.38	0.37	0.40	0.37	0.37	0.38	0.39
22	Colour	Brown	Brown	Dark Brown	Brown	Brown	Brown	Light Brown	Dark Brown	Brown	Dark Brown
23	Permeability (cm/sec)×10	0.14	0.11	0.15	0.15	0.16	0.16	0.16	0.13	0.14	0.13
24	Bulk Density (g/cm ³)	1.25	1.20	1.17	1.20	1.15	1.25	1.16	1.25	1.25	1.15
25	Sodium, Na (mg/kg)	27.73	28.59	22.52	28.56	32.59	30.08	24.56	20.85	27.95	25.56

S/N	Parameter(s)	SS 1B	SS 2B	SS 3B	SS 4B	SS 5B	SS 6B	SS 7B	SS 8B	SS 9B	SS 10B
26	Magnesium, Mg (mg/kg)	0.98	2.63	1.90	16.12	5.21	5.25	1.58	0.90	2.37	1.63
27	Calcium, Ca (mg/kg)	<0.001	<0.001	<0.001	579.3	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28	Potassium, K (mg/kg)	2.98	4.30	3.88	20.05	7.77	7.59	3.79	1.41	5.77	3.09
29	Manganese, Mn (mg/kg)	9.10	14.66	10.55	21.17	21.87	13.43	3.30	14.07	38.10	17.77
30	Vanadium, V (mg/kg)	0.26	0.14	<0.001	0.43	0.59	<0.001	<0.001	0.20	0.27	0.21
31	Nickel, Ni (mg/kg)	5.56	3.01	<0.001	8.96	12.49	<0.001	<0.001	4.19	5.62	4.35
32	Chromium, Cr (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	1.00	1.99	<0.001	<0.001
33	Iron, Fe (mg/kg)	266.7	220.3	275.7	269.0	354.4	292.9	269.4	249.9	277.3	35.5
34	Lead, Pb (mg/kg)	0.82	2.48	1.29	2.10	2.14	1.33	1.77	2.00	2.07	2.91
35	Copper, Cu (mg/kg)	19.16	2.55	9.16	15.87	17.71	11.45	15.32	24.03	26.62	9.24
36	Zinc, Zn (mg/kg)	3.90	6.97	5.01	9.57	58.65	7.69	6.12	6.29	10.99	5.66
37	Mercury, Hg (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
38	Arsenic, As (mg/kg)	0.18	0.02	0.08	0.15	0.16	0.11	0.14	0.22	0.25	0.09
39	HUB (CFU/g) x 10 ³	0.5	0.6	0.8	0.5	0.8	0.3	0.5	0.8	0.3	1.2
40	HUF (CFU/g) x 10 ³	0.2	0.4	0.6	0.2	0.5	0.1	0.1	0.4	0.2	0.6
41	THB (CFU/g) x 10 ⁶	2.6	2.1	3	1.5	1.5	1	1	1.9	1.7	2.1
42	THF (CFU/g) x 10 ⁶	1.4	1	1.6	0.6	0.8	0.3	0.6	1	0.4	1.3

Subsoil (15-30cm) Results

S/N	Parameter(s)	SS 11B	SS 12B	SS 13B	SS 14B	SS 15B	SS 16B	SS 17B	SS 18B	SS 19B	SS 20B
1	pH	4.6	4.4	4.3	4.6	4.5	4.5	4.3	4.4	4.5	4.6
2	Moisture Content (%)	6.53	8.65	4.86	9.10	6.36	11.53	11.57	8.83	8.27	9.25
3	Sulphide, S ₂ (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4	Sulphate, SO ₄ ²⁻ (mg/kg)	3	3	5	2	2	0	2	2	4	4
5	Nitrate, NO ₃ ⁻ (mg/kg)	0.8	0.7	1.0	0.6	0.6	0.5	0.7	0.7	0.9	1.0
6	Total Nitrogen (%)	0.150	0.147	0.123	0.132	0.144	0.148	0.138	0.127	0.116	0.114
7	Phosphate, PO ₄ ³⁻ (mg/kg)	0.39	0.55	0.3	0.28	0.35	0.29	0.32	0.31	0.4	0.53
8	THC (mg/kg)	1.41	1.18	1.21	1.14	1.12	1.24	1.12	1.04	1.14	0.71
9	TPH (mg/kg)	1.26	1.52	1.28	1.08	0.98	1.45	1.63	2.12	2.33	2.26
10	PAH (mg/kg)	0.003	<0.001	0.002	0.002	0.003	<0.001	0.002	0.003	0.002	0.002
11	BETEX (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
12	Phenol (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
13	Ammonia (mg/kg)	0.27	0.30	0.33	0.25	0.28	0.20	0.28	0.33	0.20	0.14
14	TOC (%)	1.736	1.696	1.425	1.526	1.668	1.712	1.6	1.465	1.338	1.318
15	TOM (%)	3.002	2.932	2.464	2.638	2.884	2.960	2.766	2.533	2.313	2.279
16	Electric Conductivity (µs/cm)	36	43	46	23	26	21	23	29	43	40
17	Sand (%)	79.15	82.63	83.57	81.57	80.77	80.24	86.40	82.23	82.55	80.95
18	Silt (%)	7.15	8.12	4.30	6.12	4.88	7.33	5.25	6.52	5.10	4.80
19	Clay (%)	13.70	9.25	12.13	12.31	14.35	12.43	8.35	11.16	12.35	14.25
20	Particle Size Distribution	LS	SS	LS	LS	LS	LS	SS	LS	LS	LS
21	Porosity	0.36	0.38	0.40	0.38	0.38	0.37	0.44	0.39	0.39	0.38
22	Colour	Dark Brown	Brown	Dark Brown	Dark Brown	Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Reddish Brown
23	Permeability (cm/sec)×10	0.12	0.13	0.14	0.13	0.13	0.15	0.17	0.13	0.12	0.14
24	Bulk Density (g/cm ³)	1.20	1.18	1.25	1.33	1.28	1.25	1.13	1.33	1.53	1.14
25	Sodium, Na (mg/kg)	25.27	25.43	24.79	34.67	27.50	28.23	25.42	46.24	39.84	33.44
26	Magnesium, Mg (mg/kg)	2.50	1.40	3.30	1.65	1.85	1.50	2.86	2.58	2.3	2.75

S/N	Parameter(s)	SS 11B	SS 12B	SS 13B	SS 14B	SS 15B	SS 16B	SS 17B	SS 18B	SS 19B	SS 20B
27	Calcium, Ca (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28	Potassium, K (mg/kg)	4.84	3.65	5.89	3.04	3.55	3.27	3.95	4.92	4.71	4.53
29	Manganese, Mn (mg/kg)	4.31	7.65	8.86	11.40	13.08	7.92	3.98	4.60	5.16	6.66
30	Vanadium, V (mg/kg)	0.17	<0.001	<0.001	0.63	0.25	<0.001	0.26	0.15	0.71	0.49
31	Nickel, Ni (mg/kg)	3.56	<0.001	<0.001	3.3	5.23	<0.001	5.37	3.08	14.57	10.33
32	Chromium, Cr (mg/kg)	<0.001	2.06	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
33	Iron, Fe (mg/kg)	560.3	490.7	537.9	607.7	387.9	270.2	380.9	468.60	150.50	391.60
34	Lead, Pb (mg/kg)	2.98	1.57	2.55	2.90	3.45	3.02	3.75	3.67	3.72	4.17
35	Copper, Cu (mg/kg)	4.08	14.05	22.30	18.87	13.64	19.02	19.34	14.82	12.97	26.41
36	Zinc, Zn (mg/kg)	8.78	6.76	6.81	8.52	9.35	7.32	6.57	5.85	5.37	6.67
37	Mercury, Hg (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
38	Arsenic, As (mg/kg)	0.04	0.13	0.21	0.17	0.13	0.18	0.18	0.1	0.1	0.2
39	HUB (CFU/g) x 10 ³	0.7	1.1	0.7	0.3	0.5	0.7	0.8	0.2	0.7	0.8
40	HUF (CFU/g) x 10 ³	0.4	0.5	0.6	0.1	0.2	0.2	0.3	0.1	0.2	0.3
41	THB (CFU/g) x 10 ⁶	2.4	2.9	1.9	0.9	1.6	2.5	2.3	1.6	2.1	2.7
42	THF (CFU/g) x 10 ⁶	1.3	1.7	1	0.5	0.6	1.7	1	0.6	1.8	1.3

Subsoil (15-30cm) Results

S/N	Parameter(s)	SS 21B	SS 22B	SS 23B	SS 24B	SS 25B	SS 26B	SS 27B	SS 28B	SS 29B	SS 30B
1	pH	4.6	4.5	5.6	5.7	4.6	5	5.1	5	4.7	4.7
2	Moisture Content (%)	8.76	6.20	8.98	7.63	7.33	7.34	10.48	8.23	7.85	8.55
3	Sulphide, S ₂ (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4	Sulphate, SO ₄ ²⁻ (mg/kg)	2	3	8	10	2	8	3	2	3	3
5	Nitrate, NO ₃ ⁻ (mg/kg)	0.7	1.2	1.0	2.0	0.3	1.5	0.8	0.2	0.7	0.8
6	Total Nitrogen (%)	0.112	0.077	0.113	0.156	0.182	0.121	0.132	0.169	0.127	0.164
7	Phosphate, PO ₄ ³⁻ (mg/kg)	0.3	0.45	1.3	1.67	0.4	1.67	0.38	0.45	0.38	1.33
8	THC (mg/kg)	1.11	1.21	0.73	1.13	0.52	1.16	0.74	0.54	1.31	1.23
9	TPH (mg/kg)	1.03	0.86	1.06	1.32	0.69	1.28	1.09	0.86	1.65	1.23
10	PAH (mg/kg)	0.002	0.003	0.002	0.003	0.003	0.003	0.003	0.002	0.003	10.002
11	BETEX (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
12	Phenol (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
13	Ammonia (mg/kg)	0.20	0.32	0.20	0.32	0.21	0.49	0.16	0.15	0.25	0.15
14	TOC (%)	1.296	0.896	1.31	1.805	2.107	1.41	1.53	1.95	1.469	1.895
15	TOM (%)	2.241	1.549	2.265	3.121	3.643	2.438	2.645	3.372	2.540	3.276
16	Electric Conductivity (µs/cm)	29	34	64	130	28	125	50	26	40	50
17	Sand (%)	82.17	85.55	84.05	82.40	82.65	82.95	83.16	85.56	81.75	84.66
18	Silt (%)	6.20	4.80	4.70	5.25	4.89	4.59	2.47	1.99	3.00	2.89
19	Clay (%)	11.63	9.65	11.25	12.35	12.46	12.46	14.37	12.45	15.25	12.45
20	Particle Size Distribution	LS	SS	LS	LS	LS	LS	LS	LS	SL	LS
21	Porosity	0.39	0.42	0.40	0.39	0.38	0.39	0.39	0.41	0.38	0.40
22	Colour	Dark Brown	Dark Brown	Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Brown	Dark Brown
23	Permeability (cm/sec)×10	0.13	0.12	0.13	0.13	0.15	0.13	0.15	0.13	0.13	0.14
24	Bulk Density (g/cm ³)	1.17	1.23	1.24	1.20	1.30	1.34	1.16	1.43	1.17	1.13
25	Sodium, Na (mg/kg)	52.08	37.97	32.43	49.28	34.11	37.10	36.59	36.63	22.81	25.91
26	Magnesium, Mg (mg/kg)	1.03	2.30	1.75	7.82	0.73	11.83	3.03	11.25	2.17	4.53

S/N	Parameter(s)	SS 21B	SS 22B	SS 23B	SS 24B	SS 25B	SS 26B	SS 27B	SS 28B	SS 29B	SS 30B
27	Calcium, Ca (mg/kg)	<0.001	<0.001	<0.001	113.2	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28	Potassium, K (mg/kg)	2.68	3.72	2.41	13.17	4.96	13.11	5.09	2.98	3.01	2.87
29	Manganese, Mn (mg/kg)	21.18	35.20	5.51	67.40	0.27	29.20	52.20	33.10	15.44	24.00
30	Vanadium, V (mg/kg)	<0.001	0.18	<0.001	0.71	<0.001	<0.001	0.13	0.30	0.55	0.08
31	Nickel, Ni (mg/kg)	<0.001	3.69	<0.001	14.96	<0.001	<0.001	2.79	6.14	11.5	1.73
32	Chromium, Cr (mg/kg)	<0.001	<0.001	0.85	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
33	Iron, Fe (mg/kg)	478.20	301.7	369.5	349.9	387.1	60.7	305.2	200.0	375.3	294.9
34	Lead, Pb (mg/kg)	4.94	3.47	4.14	4.38	3.78	4.48	4.13	4.02	4.54	3.85
35	Copper, Cu (mg/kg)	30.43	11.69	21.22	19.75	7.95	20.91	19.74	23.54	16.39	11.91
36	Zinc, Zn (mg/kg)	7.39	6.67	8.48	12.55	9.59	10.12	8.09	5.03	7.66	8.31
37	Mercury, Hg (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
38	Arsenic, As (mg/kg)	0.3	0.11	0.2	0.18	0.07	0.19	0.18	0.22	0.15	0.11
39	HUB (CFU/g) x 10 ³	0.6	0.8	0.5	0.2	0.4	0.8	0.5	1.2	1.1	0.4
40	HUF (CFU/g) x 10 ³	0.4	0.5	0.2	0.1	0.1	0.2	0.4	0.6	0.7	0.3
41	THB (CFU/g) x 10 ⁶	1.8	2.2	1	1.6	2.4	1.2	2.1	2.2	2.7	1.6
42	THF (CFU/g) x 10 ⁶	1.2	1.1	0.6	0.5	1.6	0.8	1	1.4	1.9	0.6

Subsoil (15-30cm) Results

S/N	Parameter(s)	SS 31B	SS 32B	SS 33B	SS 34B	SS 35B	SS 36B	SS 37B	SS 38B	SSC 1B	SSC 2B
1	pH	4.6	4.5	4.6	4.5	4.7	4.6	4.8	4.9	4.6	5.1
2	Moisture Content (%)	8.34	11.24	10.10	7.10	4.83	5.47	7.82	6.10	7.23	7.12
3	Sulphide, S ₂ (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4	Sulphate, SO ₄ ²⁻ (mg/kg)	0	3	3	0	0	0	0	8	5	2
5	Nitrate, NO ₃ ⁻ (mg/kg)	0.3	1.0	0.8	0.3	0.2	0.2	0.3	0.7	0.8	0.8
6	Total Nitrogen (%)	0.143	0.164	0.133	0.182	0.149	0.083	0.106	0.143	0.088	0.109
7	Phosphate, PO ₄ ³⁻ (mg/kg)	0.28	1.25	0.38	0.48	0.13	0.16	2.5	1.38	1.3	0.46
8	THC (mg/kg)	1.07	1.01	1.28	1.28	1.02	1.12	2.27	1.17	0.12	0.67
9	TPH (mg/kg)	1.36	0.95	0.98	0.86	1.53	2.10	1.52	1.40	<0.001	1.58
10	PAH (mg/kg)	0.003	0.004	0.002	<0.001	0.002	0.005	0.002	0.005	0.003	0.002
11	BETEX (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
12	Phenol (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
13	Ammonia (mg/kg)	0.33	0.33	0.20	0.32	0.26	0.20	0.28	0.10	0.25	0.18
14	TOC (%)	1.65	1.896	1.538	2.108	1.725	0.955	1.23	1.658	1.016	1.256
15	TOM (%)	2.853	3.278	2.659	3.645	2.983	1.651	2.127	2.867	1.756	2.172
16	Electric Conductivity (µs/cm)	18	54	44	29	10	17	15	52	27	20
17	Sand (%)	82.16	82.75	83.76	85.60	85.52	86.25	82.65	54.16	86.13	84.31
18	Silt (%)	2.46	2.15	2.99	4.15	5.13	4.10	4.93	2.24	4.61	2.00
19	Clay (%)	15.38	15.10	12.25	10.25	9.35	9.65	12.42	13.60	9.26	13.69
20	Particle Size Distribution	SL	SL	LS	LS	SS	SS	LS	LS	SS	LS
21	Porosity	0.38	0.38	0.40	0.40	0.41	0.42	0.42	0.42	0.42	0.42
22	Colour	Brown	Dark Brown	Brown	Brown	Dark Brown	Brown	Brown	Dark Brown	Brown	Brown
23	Permeability (cm/sec)×10	0.13	0.14	0.13	0.13	0.15	0.13	0.18	0.16	0.18	0.12
24	Bulk Density (g/cm ³)	1.17	1.18	1.25	1.32	1.25	1.32	1.20	1.18	1.17	1.20
25	Sodium, Na (mg/kg)	57.55	45.75	32.58	38.66	31.69	34.09	24.46	27.71	21.45	21.71
26	Magnesium, Mg (mg/kg)	<0.001	8.10	<0.001	7.30	2.75	4.30	<0.001	12.30	2.86	9.53

S/N	Parameter(s)	SS 31B	SS 32B	SS 33B	SS 34B	SS 35B	SS 36B	SS 37B	SS 38B	SSC 1B	SSC 2B
27	Calcium, Ca (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28	Potassium, K (mg/kg)	2.67	4.49	5.82	3.71	5.27	5.08	2.77	4.46	2.19	2.78
29	Manganese, Mn (mg/kg)	55.10	38.10	34.90	21.21	6.12	2.72	3.19	2.69	1.81	1.68
30	Vanadium, V (mg/kg)	0.22	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.30	0.24	0.08
31	Nickel, Ni (mg/kg)	4.69	<0.001	<0.001	13.62	3.73	<0.001	<0.001	6.29	4.99	1.61
32	Chromium, Cr (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
33	Iron, Fe (mg/kg)	195.5	296.5	321.4	244.1	369.0	488.0	260.2	86.0	477.0	320.7
34	Lead, Pb (mg/kg)	3.43	4.50	3.39	3.71	3.93	5.54	4.12	3.88	3.45	3.46
35	Copper, Cu (mg/kg)	9.93	17.12	24.15	8.70	20.44	<0.001	13.17	0.70	11.39	16.59
36	Zinc, Zn (mg/kg)	6.46	7.17	8.20	5.20	7.11	7.24	4.68	5.42	4.90	6.55
37	Mercury, Hg (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
38	Arsenic, As (mg/kg)	0.09	0.16	0.22	0.08	0.19	<0.001	0.12	0.01	0.1	0.15
39	HUB (CFU/g) x 10 ³	1.0	0.8	0.5	0.3	0.3	0.9	0.6	0.5	0.8	1.0
40	HUF (CFU/g) x 10 ³	0.2	0.6	0.2	0.1	0.2	0.5	0.4	0.2	0.4	0.2
41	THB (CFU/g) x 10 ⁶	2	2	1.6	1.2	1.5	2.7	2.1	1	1.1	2.4
42	THF (CFU/g) x 10 ⁶	0.8	1.5	0.6	0.6	0.4	1.6	1.4	0.3	0.6	1.8

WET SEASON

Topsoil (0-15cm) Results

S/N	Parameter(s)	SS 1T	SS 2T	SS 3T	SS 4T	SS 5T	SS 6T	SS 7T	SS 8T	SS 9T	SS 10T
1	pH	3.59	3.84	4.28	3.76	4.87	5.26	4.86	5.7	4.59	5.39
2	Moisture Content (%)	12.81	11.15	9.23	10.38	16.24	10.03	18.49	9.91	11.38	13.15
3	Sulphide, S ₂ (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4	Sulphate, SO ₄ ²⁻ (mg/kg)	7.6	11.8	6.3	10.5	14.2	14.6	8.7	11.8	21.4	12.6
5	Nitrate, NO ₃ ⁻ (mg/kg)	1.94	2.16	0.85	2.73	2.88	0.94	0.97	0.92	2.68	2.15
6	Total Nitrogen (%)	0.188	0.192	0.175	0.147	0.169	0.148	0.136	0.199	0.183	0.176
7	Phosphate, PO ₄ ³⁻ (mg/kg)	0.83	1.69	0.57	1.99	1.86	0.94	0.85	0.93	2.64	0.58
8	THC (mg/kg)	1.15	1.21	1.09	1.01	0.82	1.06	1.12	1.25	0.97	1.03
9	TPH (mg/kg)	1.34	2.07	1.16	1.44	1.05	1.21	1.37	1.39	1.11	1.22
10	PAH (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
11	BETEX (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
12	Phenol (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
13	Ammonia (mg/kg)	0.12	0.24	0.38	0.11	0.53	0.11	0.19	0.06	0.44	0.37
14	TOC (%)	1.993	1.947	1.869	1.437	1.883	1.436	1.014	1.853	1.612	1.394
15	TOM (%)	3.435	3.356	3.222	2.477	3.246	2.475	1.748	3.194	2.779	2.403
16	Electric Conductivity (µs/cm)	96	70	32	56	24	58	28	42	72	72
17	Sand (%)	83.51	80.38	84.97	84.11	82.94	85.71	80.92	80.82	83.31	84.07
18	Silt (%)	5.38	6.27	5.36	4.09	4.48	4.83	3.89	3.59	6.2	6.25
19	Clay (%)	11.11	13.35	9.67	11.8	12.58	9.46	15.19	15.59	10.49	9.68
20	Particle Size Distribution	SS	LS	SS	LS	LS	SS	LS	LS	SS	SS
21	Porosity	0.37	0.38	0.36	0.39	0.37	0.4	0.38	0.38	0.39	0.38
22	Colour	Brown	Brown	Dark Brown	Brown	Dark Brown	Brown	Brown	Dark Brown	Dark Brown	Dark Brown
23	Permeability (cm/sec)×10	0.34	0.31	0.37	0.32	0.35	0.38	0.30	0.15	0.35	0.33
24	Bulk Density (g/cm ³)	1.36	1.31	1.39	1.28	1.34	1.25	1.29	1.35	1.27	1.32

S/N	Parameter(s)	SS 1T	SS 2T	SS 3T	SS 4T	SS 5T	SS 6T	SS 7T	SS 8T	SS 9T	SS 10T
25	Sodium, Na (mg/kg)	39.21	29.37	30.64	31.36	23.55	26.49	25.04	37.79	21.85	32.73
26	Magnesium, Mg (mg/kg)	3.01	2.16	3.22	10.04	5.17	5.21	4.94	2.71	6.18	1.83
27	Calcium, Ca (mg/kg)	<0.001	<0.001	<0.001	556	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28	Potassium, K (mg/kg)	4.61	4.98	6.02	12.11	4.05	8.28	6.99	4.85	8.91	4.63
29	Manganese, Mn (mg/kg)	12.93	33.64	9.96	21.61	12.27	12.83	4.77	28.71	41.35	22.71
30	Vanadium, V (mg/kg)	<0.001	<0.001	0.61	0.92	0.52	0.53	0.12	0.37	0.19	0.01
31	Nickel, Ni (mg/kg)	<0.001	<0.001	13.73	24.22	9.83	13.41	3.52	8.35	2.47	0.98
32	Chromium, Cr (mg/kg)	<0.001	<0.001	5.71	1.69	<0.001	<0.001	<0.001	1.02	4.71	<0.001
33	Iron, Fe (mg/kg)	281.6	166.1	213.4	331.8	383.2	622.5	234.3	222.7	193.3	281.9
34	Lead, Pb (mg/kg)	0.61	1.01	1.22	2.53	1.21	1.75	2.06	2.01	2.33	2.17
35	Copper, Cu (mg/kg)	9.42	10.15	14.27	12.61	15.07	21.48	13.18	7.36	17.07	11.64
36	Zinc, Zn (mg/kg)	7.16	7.83	6.11	14.01	48.52	10.68	6.25	8.04	8.15	6.38
37	Mercury, Hg (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
38	Arsenic, As (mg/kg)	0.06	<0.001	0.11	0.07	0.13	0.18	0.09	0.03	0.12	0.11
39	HUB (CFU/g) x 10 ³	3.1	2.6	3.4	1.9	2.7	1.9	1.4	1.8	1.3	2.7
40	HUF (CFU/g) x 10 ³	1.2	0.9	1.2	0.6	0.9	0.7	0.9	0.5	0.8	1.6
41	THB (CFU/g) x 10 ⁶	4.7	3.9	4.6	3.9	2.7	2.1	2.7	3.9	3.1	3.8
42	THF (CFU/g) x 10 ⁶	2.9	2.1	2.9	2.3	1.8	1.1	2.1	2.8	1.4	2.2

Topsoil (0-15cm) Results

S/N	Parameter(s)	SS 11T	SS 12T	SS 13T	SS 14T	SS 15T	SS 16T	SS 17T	SS 18T	SS 19T	SS 20T
1	pH	5.03	4.57	4.44	5.08	4.51	4.69	5.11	5.3	5.53	5.29
2	Moisture Content (%)	8.36	15.47	9.32	7.33	11.05	16.21	19.07	13.27	17.00	10.75
3	Sulphide, S ₂ (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4	Sulphate, SO ₄ ²⁻ (mg/kg)	13.9	17.1	3.0	8.4	11.6	6.8	5.5	6.9	8.2	4.1
5	Nitrate, NO ₃ ⁻ (mg/kg)	0.79	2.91	1.75	0.83	1.32	1.51	1.26	1.75	1.21	1.55
6	Total Nitrogen (%)	0.191	0.183	0.171	0.194	0.187	0.191	0.179	0.183	0.191	0.174
7	Phosphate, PO ₄ ³⁻ (mg/kg)	0.52	1.77	1.46	1.69	0.84	0.53	0.71	0.68	0.83	1.65
8	THC (mg/kg)	1.06	1.08	1.01	0.93	0.82	1.02	1.16	1.00	1.19	0.84
9	TPH (mg/kg)	1.18	1.27	1.23	1.14	1.07	1.49	1.63	2.15	2.38	2.25
10	PAH (mg/kg)	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
11	BETEX (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
12	Phenol (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
13	Ammonia (mg/kg)	0.09	0.42	0.07	0.21	0.08	0.31	0.49	0.09	0.8	0.14
14	TOC (%)	1.993	1.981	1.872	1.893	1.901	1.899	1.916	1.812	1.794	1.856
15	TOM (%)	3.435	3.415	3.227	3.263	3.277	3.273	3.303	3.123	3.092	3.199
16	Electric Conductivity (µs/cm)	22	80	100	28	56	46	66	30	22	36
17	Sand (%)	80.30	80.38	80.88	84.07	77.62	79.84	84.72	83.94	81.73	79.18
18	Silt (%)	7.28	9.68	9.95	8.27	15.03	7.18	5.06	9.32	12.68	15.02
19	Clay (%)	12.42	9.94	9.17	7.66	7.35	12.98	10.22	6.74	5.59	5.8
20	Particle Size Distribution	LS	SS	SS	SS	LS	LS	SS	SS	LS	LS
21	Porosity	0.41	0.4	0.39	0.36	0.41	0.41	0.38	0.39	0.42	0.38
22	Colour	Dark Brown	Brown	Brown	Dark Brown	Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Reddish
23	Permeability (cm/sec)×10	0.28	0.29	0.32	0.35	0.27	0.29	0.4	0.32	0.26	0.25
24	Bulk Density (g/cm ³)	1.22	1.25	1.29	1.38	1.19	1.24	1.31	1.28	1.17	1.55
25	Sodium, Na (mg/kg)	23.81	25.84	22.72	20.71	24.75	18.03	25.13	24.17	29.28	40.51

S/N	Parameter(s)	SS 11T	SS 12T	SS 13T	SS 14T	SS 15T	SS 16T	SS 17T	SS 18T	SS 19T	SS 20T
26	Magnesium, Mg (mg/kg)	2.06	1.57	1.71	1.72	1.39	1.16	0.72	4.01	3.48	2.73
27	Calcium, Ca (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28	Potassium, K (mg/kg)	4.85	4.03	5.16	5.02	2.98	3.87	3.01	7.22	7.95	5.89
29	Manganese, Mn (mg/kg)	14.93	8.85	12.09	16.12	11.99	7.92	5.15	3.18	3.92	4.64
30	Vanadium, V (mg/kg)	0.04	0.33	0.41	0.57	<0.001	0.42	<0.001	0.22	<0.001	<0.001
31	Nickel, Ni (mg/kg)	3.26	8.25	9.38	12.07	<0.001	15.02	10.19	6.84	<0.001	<0.001
32	Chromium, Cr (mg/kg)	<0.001	<0.001	0.11	<0.001	<0.001	<0.001	<0.001	0.03	<0.001	<0.001
33	Iron, Fe (mg/kg)	428.5	351.3	302.6	402.1	366.5	268.2	257.4	293.8	180.3	381.7
34	Lead, Pb (mg/kg)	3.26	1.94	2.11	2.26	2.48	4.11	3.15	3.92	2.74	2.49
35	Copper, Cu (mg/kg)	13.48	11.58	8.28	23.49	23.13	22.57	18.01	9.78	16.12	13.05
36	Zinc, Zn (mg/kg)	9.17	6.33	6.92	7.95	8.02	4.97	6.86	5.43	6.27	6.17
37	Mercury, Hg (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
38	Arsenic, As (mg/kg)	0.13	0.09	<0.001	0.21	0.18	0.19	0.13	0.02	0.17	0.12
39	HUB (CFU/g) x 10 ³	2.0	2.4	3.2	3.6	1.9	2.6	2.4	1.5	2.2	3
40	HUF (CFU/g) x 10 ³	0.8	0.9	0.9	0.5	0.9	1.1	0.3	0.4	0.8	0.9
41	THB (CFU/g) x 10 ⁶	4.2	4.6	3.1	2.6	2.9	4.5	3.9	3.4	3.9	4.3
42	THF (CFU/g) x 10 ⁶	2.9	2.8	2.0	1.7	1.7	2.5	2.4	2.2	2.6	2.9

Topsoil (0-15cm) Results

S/N	Parameter(s)	SS 21T	SS 22T	SS 23T	SS 24T	SS 25T	SS 26T	SS 27T	SS 28T	SS 29T	SS 30T
1	pH	5.21	5.4	4.83	4.75	4.79	5.56	5.34	5.03	4.93	5.12
2	Moisture Content (%)	12.41	7.93	11.76	10.02	8.68	9.99	14.58	12.01	9.54	11.32
3	Sulphide, S ₂ (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4	Sulphate, SO ₄ ²⁻ (mg/kg)	7.4	120.7	6.2	9.6	5.1	136.1	9.4	4.7	68.8	5
5	Nitrate, NO ₃ ⁻ (mg/kg)	1.27	1.93	1.76	2.85	1.18	1.21	1.54	0.79	1.27	1.58
6	Total Nitrogen (%)	0.179	0.137	0.163	0.189	0.198	0.177	0.182	0.194	0.172	0.191
7	Phosphate, PO ₄ ³⁻ (mg/kg)	0.92	0.99	1.45	2.28	0.72	0.76	0.54	0.91	0.58	1.94
8	THC (mg/kg)	0.57	1.23	0.82	1.07	0.93	0.79	0.71	0.85	0.95	0.99
9	TPH (mg/kg)	1.03	1.04	1.01	1.22	1.18	1.35	1.18	1.03	1.65	1.15
10	PAH (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
11	BETEX (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
12	Phenol (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
13	Ammonia (mg/kg)	0.48	0.51	0.35	0.05	0.51	0.63	0.43	0.39	0.38	0.51
14	TOC (%)	1.855	1.218	1.772	2.319	2.447	1.892	1.915	2.265	1.983	2.537
15	TOM (%)	3.198	2.099	3.054	3.997	4.218	3.261	3.301	3.904	3.418	4.373
16	Electric Conductivity (µs/cm)	70	62	42	34	46	56	70	44	102	40
17	Sand (%)	83.74	83.61	84.55	84.83	81.76	82.68	82.94	84.73	82.96	83.95
18	Silt (%)	9.72	10.21	9.12	9.81	4.05	3.71	3.42	3.18	3.02	9.14
19	Clay (%)	6.54	6.18	6.33	5.36	14.19	13.61	13.64	12.09	14.02	6.91
20	Particle Size Distribution	SS	SS	SS	SS	LS	LS	LS	LS	LS	SS
21	Porosity	0.41	0.39	0.47	0.35	0.39	0.37	0.41	0.36	0.39	0.43
22	Colour	Dark Brown	Dark Brown	Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Brown	Dark Brown
23	Permeability (cm/sec)×10	0.34	0.31	0.39	0.41	0.31	0.32	0.34	0.37	0.31	0.36
24	Bulk Density (g/cm ³)	1.33	1.27	1.38	1.39	1.44	1.26	1.31	1.34	1.40	1.28
25	Sodium, Na (mg/kg)	36.27	37.19	26.12	17.01	38.58	31.73	69.58	27.26	38.13	21.38
26	Magnesium, Mg (mg/kg)	4.69	2.14	1.39	20.73	<0.001	<0.001	1.88	19.48	5.05	<0.001

S/N	Parameter(s)	SS 21T	SS 22T	SS 23T	SS 24T	SS 25T	SS 26T	SS 27T	SS 28T	SS 29T	SS 30T
27	Calcium, Ca (mg/kg)	<0.001	<0.001	<0.001	571	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28	Potassium, K (mg/kg)	5.64	4.26	4.03	38.74	5.31	21.80	8.46	4.88	3.91	3.85
29	Manganese, Mn (mg/kg)	25.82	38.94	11.88	28.26	6.25	30.28	59.55	45.02	36.73	16.96
30	Vanadium, V (mg/kg)	<0.001	0.44	0.17	<0.001	<0.001	<0.001	<0.001	<0.001	0.20	0.37
31	Nickel, Ni (mg/kg)	0.68	8.92	4.73	<0.001	0.02	<0.001	<0.001	<0.001	4.16	8.14
32	Chromium, Cr (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
33	Iron, Fe (mg/kg)	277.5	146.9	411.6	573.2	237.1	181.8	392.3	294.4	301.2	118.5
34	Lead, Pb (mg/kg)	3.23	3.12	4.05	3.72	3.26	3.34	4.28	3.21	3.57	3.12
35	Copper, Cu (mg/kg)	15.16	14.61	15.57	24.12	17.47	13.29	13.00	13.49	21.03	11.25
36	Zinc, Zn (mg/kg)	7.02	6.34	8.45	29.18	7.09	9.16	10.67	7.23	6.01	4.66
37	Mercury, Hg (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
38	Arsenic, As (mg/kg)	0.08	0.11	0.14	0.20	0.12	0.07	0.11	0.12	0.16	0.07
39	HUB (CFU/g) x 10 ³	2.3	2.1	1.6	2.2	2.4	3.1	2.2	2.0	2.2	1.6
40	HUF (CFU/g) x 10 ³	1.1	0.9	0.7	1.1	0.9	1.3	0.9	1.1	1.5	0.9
41	THB (CFU/g) x 10 ⁶	3.6	4.1	3.4	3.3	3.9	2.7	3.2	3.7	4.6	3.9
42	THF (CFU/g) x 10 ⁶	1.9	3.1	1.8	2.3	2.5	1.8	1.9	2.6	3.2	2.7

Topsoil (0-15cm) Results

S/N	Parameter(s)	SS 31T	SS 32T	SS 33T	SS 34T	SS 35T	SS 36T	SS 37T	SS 38T	SSC 1T	SSC 2T
1	pH	4.96	4.82	4.71	4.86	4.52	5.09	5.17	4.72	4.72	4.95
2	Moisture Content (%)	9.73	15.11	11.83	10.27	9.14	8.83	7.91	13.40	16.59	13.21
3	Sulphide, S ₂ (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4	Sulphate, SO ₄ ²⁻ (mg/kg)	62.9	5.9	65	80.5	3.1	9.9	6.3	16.7	38.8	98.1
5	Nitrate, NO ₃ ⁻ (mg/kg)	0.92	1.61	1.08	1.12	0.69	1.03	0.86	1.13	1.12	1.57
6	Total Nitrogen (%)	0.183	0.194	0.179	0.199	0.192	0.141	0.186	0.185	0.121	0.163
7	Phosphate, PO ₄ ³⁻ (mg/kg)	1.72	1.75	0.61	1.83	0.36	0.54	1.92	2.03	2.96	1.12
8	THC (mg/kg)	1.00	0.67	0.82	1.07	0.79	1.02	1.07	1.58	0.48	0.53
9	TPH (mg/kg)	1.23	1.05	1.12	1.38	1.47	1.83	1.42	1.44	1.01	1.37
10	PAH (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
11	BETEX (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
12	Phenol (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
13	Ammonia (mg/kg)	0.34	0.62	0.26	0.19	0.37	0.02	0.19	0.21	0.25	0.45
14	TOC (%)	2.011	2.357	1.903	2.511	2.901	1.378	1.549	1.993	1.475	1.829
15	TOM (%)	3.466	4.063	3.28	4.328	5.001	2.375	2.67	3.435	2.542	3.153
16	Electric Conductivity (µs/cm)	50	72	62	30	64	30	40	54	56	44
17	Sand (%)	78.42	82.96	84.29	83.41	85.42	81.82	84.74	85.82	87.46	83.71
18	Silt (%)	17.28	12.24	5.16	5.01	5.89	12.38	9.43	9.93	9.74	3.54
19	Clay (%)	4.3	4.8	10.55	11.58	8.69	5.8	5.83	4.25	2.80	12.75
20	Particle Size Distribution	SL	LS	SS	LS	SS	LS	SS	SS	SS	LS
21	Porosity	0.41	0.41	0.37	0.39	0.41	0.42	0.38	0.41	0.38	0.40
22	Colour	Brown	Dark Brown	Brown	Brown	Dark Brown	Brown	Brown	Dark Brown	Brown	Brown
23	Permeability (cm/sec)×10	0.23	0.28	0.36	0.33	0.39	0.25	0.32	0.42	0.29	0.31
24	Bulk Density (g/cm ³)	1.35	1.39	1.133	1.31	1.42	1.49	1.29	1.45	1.44	1.23
25	Sodium, Na (mg/kg)	30.21	25.36	31.43	37.69	27.00	23.15	31.53	33.04	21.41	21.55
26	Magnesium, Mg (mg/kg)	21.25	4.49	11.41	10.54	4.17	2.93	7.35	2.24	10.21	7.26

S/N	Parameter(s)	SS 31T	SS 32T	SS 33T	SS 34T	SS 35T	SS 36T	SS 37T	SS 38T	SSC 1T	SSC 2T
27	Calcium, Ca (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28	Potassium, K (mg/kg)	4.03	6.37	4.99	4.15	4.66	3.92	4.98	3.77	2.35	3.92
29	Manganese, Mn (mg/kg)	45.78	46.51	49.07	17.22	5.15	2.31	3.77	2.36	3.31	2.16
30	Vanadium, V (mg/kg)	<0.001	0.42	<0.001	<0.001	<0.001	<0.001	0.08	0.26	0.17	0.09
31	Nickel, Ni (mg/kg)	<0.001	10.42	<0.001	<0.001	3.22	<0.001	2.16	5.87	4.31	3.17
32	Chromium, Cr (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
33	Iron, Fe (mg/kg)	177.8	352.3	215.9	330.4	455.7	194.2	157.5	302.1	163.0	227.5
34	Lead, Pb (mg/kg)	3.36	3.18	3.02	2.63	3.26	3.41	2.74	3.42	3.17	3.17
35	Copper, Cu (mg/kg)	8.31	25.27	9.58	22.53	25.22	7.97	21.19	12.75	13.04	19.65
36	Zinc, Zn (mg/kg)	4.46	9.03	8.01	7.32	65.68	5.03	7.28	3.98	2.34	4.29
37	Mercury, Hg (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
38	Arsenic, As (mg/kg)	0.03	0.22	0.05	0.18	0.21	0.05	0.14	0.11	0.09	0.17
39	HUB (CFU/g) x 103	2.7	1.8	2.1	2.7	1.3	3.1	2.5	1.8	2.2	2.7
40	HUF (CFU/g) x 103	1.3	1.1	0.9	0.7	0.9	0.7	1.3	0.9	1.1	0.8
41	THB (CFU/g) x 106	2.7	4.1	3.4	3.6	2.8	3.9	3.1	2.5	3.1	4.3
42	THF (CFU/g) x 106	1.8	2.9	2.1	1.8	1.7	2.8	2.7	1.2	1.5	2.9

Subsoil (15-30cm) Results

S/N	Parameter(s)	SS 1B	SS 2B	SS 3B	SS 4B	SS 5B	SS 6B	SS 7B	SS 8B	SS 9B	SS 10B
1	pH	3.48	4.71	3.83	3.75	4.48	4.34	4.71	5.78	4.64	5.41
2	Moisture Content (%)	12.16	9.03	7.75	13.00	15.47	13.06	16.31	11.69	9.57	12.73
3	Sulphide, S ₂ (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4	Sulphate, SO ₄ ²⁻ (mg/kg)	0.8	19.3	8.5	12.4	21.2	10.1	17.9	33.2	28	11.4
5	Nitrate, NO ₃ ⁻ (mg/kg)	1.01	0.94	0.92	1.12	0.96	1.04	0.88	1.22	1.03	0.92
6	Total Nitrogen (%)	0.161	0.157	0.156	0.102	0.134	0.097	0.073	0.116	0.125	0.109
7	Phosphate, PO ₄ ³⁻ (mg/kg)	0.48	0.65	0.55	2.09	0.46	0.78	0.43	1.72	1.59	1.29
8	THC (mg/kg)	1.21	1.26	1.11	1.1	1.53	1.09	1.27	1.33	1.28	1.11
9	TPH (mg/kg)	1.77	2.61	1.49	2.73	1.28	1.28	1.63	1.85	1.03	1.52
10	PAH (mg/kg)	0.002	0.003	0.003	0.002	0.004	0.003	0.003	0.002	0.002	0.001
11	BETEX (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
12	Phenol (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
13	Ammonia (mg/kg)	0.05	0.09	0.19	0.07	0.12	0.08	0.19	0.13	0.28	0.15
14	TOC (%)	1.826	1.676	1.861	1.118	1.483	1.346	0.819	1.615	1.316	1.258
15	TOM (%)	3.148	2.889	3.208	1.927	2.557	2.321	1.412	2.784	2.269	2.169
16	Electric Conductivity (µs/cm)	68	26	62	54	56	62	40	32	44	20
17	Sand (%)	81.74	80.31	85.46	82.18	82.05	85.41	81.62	79.36	82.18	82.94
18	Silt (%)	4.82	6.43	5.36	4.39	4.18	5.52	3.48	6.48	4.52	4.61
19	Clay (%)	13.44	13.26	9.18	13.43	13.77	9.07	14.90	14.16	13.3	12.45
20	Particle Size Distribution	LS	SS	SS	LS	LS	SS	LS	LS	LS	LS
21	Porosity	0.371	0.384	0.363	0.395	0.378	0.402	0.389	0.387	0.394	0.411
22	Colour	Brown	Brown	Dark Brown	Brown	Brown	Brown	Light Brown	Dark Brown	Brown	Dark Brown
23	Permeability (cm/sec)×10	0.34	0.31	0.37	0.33	0.35	0.38	0.3	0.31	0.36	0.34
24	Bulk Density (g/cm ³)	1.36	1.31	1.39	1.28	1.34	1.25	1.29	1.33	1.27	1.32
25	Sodium, Na (mg/kg)	29.15	28.91	22.54	28.97	32.73	30.12	24.9	20.88	28.36	25.65

S/N	Parameter(s)	SS 1B	SS 2B	SS 3B	SS 4B	SS 5B	SS 6B	SS 7B	SS 8B	SS 9B	SS 10B
26	Magnesium, Mg (mg/kg)	1.02	2.96	2.05	16.44	5.28	5.31	1.85	1.25	2.72	1.86
27	Calcium, Ca (mg/kg)	<0.001	<0.001	<0.001	561.1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28	Potassium, K (mg/kg)	3.02	4.96	4.27	20.83	8.22	7.97	4.28	1.96	6.13	3.61
29	Manganese, Mn (mg/kg)	9.76	15.05	11.02	21.74	22.35	13.78	3.91	14.89	38.95	18.03
30	Vanadium, V (mg/kg)	0.32	0.22	<0.01	0.63	0.61	<0.01	0.03	0.16	0.29	0.27
31	Nickel, Ni (mg/kg)	5.37	3.22	<0.001	7.85	13.01	<0.001	<0.001	4.04	5.79	4.82
32	Chromium, Cr (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	1.31	2.23	<0.001	0.003
33	Iron, Fe (mg/kg)	282.9	222.4	281.6	273.9	351.6	297.3	274.2	233.7	281.3	35.5
34	Lead, Pb (mg/kg)	0.88	2.67	1.73	2.65	2.33	1.84	1.91	3.04	2.81	2.86
35	Copper, Cu (mg/kg)	19.82	2.93	9.59	16.07	17.92	11.77	15.72	24.66	28.17	9.92
36	Zinc, Zn (mg/kg)	4.06	6.77	4.68	9.82	58.05	8.14	6.86	6.91	9.99	6.12
37	Mercury, Hg (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
38	Arsenic, As (mg/kg)	0.21	0.12	0.9	0.3	0.18	0.14	0.12	0.23	0.27	0.11
39	HUB (CFU/g) x 10 ³	0.65	0.72	0.89	0.59	0.93	1.17	0.61	0.36	0.47	1.23
40	HUF (CFU/g) x 10 ³	0.4	0.6	0.6	0.4	0.6	0.5	0.2	0.3	0.2	0.6
41	THB (CFU/g) x 10 ⁶	3.05	2.62	3.48	1.78	1.93	1.22	1.15	1.93	1.73	3.02
42	THF (CFU/g) x 10 ⁶	1.7	1.1	1.4	0.9	1.4	0.3	0.7	1.2	0.5	1.1

Subsoil (15-30cm) Results

S/N	Parameter(s)	SS 11B	SS 12B	SS 13B	SS 14B	SS 15B	SS 16B	SS 17B	SS 18B	SS 19B	SS 20B
1	pH	5.08	5.04	4.97	5.39	4.87	5.76	4.92	5.16	5.4	4.9
2	Moisture Content (%)	9.95	12.88	7.63	12.50	9.45	14.72	17.01	11.26	13.15	14.02
3	Sulphide, S ₂ (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4	Sulphate, SO ₄ ²⁻ (mg/kg)	3.7	11.6	7.2	4.1	14.2	3.6	6.6	21.8	9.2	9.8
5	Nitrate, NO ₃ ⁻ (mg/kg)	0.98	0.96	0.98	0.66	0.72	0.96	0.91	1.06	0.92	1.04
6	Total Nitrogen (%)	0.168	0.157	0.135	0.141	0.163	0.165	0.146	0.142	0.329	0.144
7	Phosphate, PO ₄ ³⁻ (mg/kg)	1.16	0.76	0.34	0.45	1.45	1.31	1.47	1.74	0.79	1.05
8	THC (mg/kg)	1.49	1.22	1.4	1.16	1.11	1.28	1.32	1.14	1.46	0.88
9	TPH (mg/kg)	1.67	1.99	1.84	1.18	1.09	1.83	1.71	2.25	2.39	2.31
10	PAH (mg/kg)	0.003	0.002	0.003	0.002	0.003	10.001	0.002	0.003	0.002	0.001
11	BETEX (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
12	Phenol (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
13	Ammonia (mg/kg)	0.21	0.24	0.09	0.02	0.1	0.09	0.16	0.05	0.11	0.06
14	TOC (%)	1.874	1.781	1.525	1.618	1.818	1.78	1.696	1.582	1.405	1.41
15	TOM (%)	3.231	3.070	2.629	2.789	3.134	3.069	2.924	2.727	2.422	2.431
16	Electric Conductivity (µs/cm)	28	48	46	36	36	36	44	14	32	54
17	Sand (%)	78.62	82.18	83.21	81.22	80.28	79.91	86.02	81.84	82.16	80.43
18	Silt (%)	7.42	8.35	4.61	6.31	5.12	7.58	5.41	6.84	5.36	6.43
19	Clay (%)	13.96	9.47	12.18	12.47	14.6	12.51	8.57	11.32	12.48	13.14
20	Particle Size Distribution	LS	SS	LS	LS	LS	LS	SS	LS	LS	LS
21	Porosity	0.384	0.402	0.393	0.367	0.418	0.406	0.359	0.397	0.425	0.414
22	Colour	Dark Brown	Brown	Dark Brown	Dark Brown	Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Reddish Brown
23	Permeability (cm/sec)×10	0.29	0.31	0.33	0.37	0.27	0.29	0.4	0.31	0.26	0.25
24	Bulk Density (g/cm ³)	1.22	1.25	1.29	1.38	1.19	1.24	1.41	1.28	1.47	1.21
25	Sodium, Na (mg/kg)	25.43	25.41	24.97	34.64	27.52	28.17	25.83	46.7	39.94	33.82

S/N	Parameter(s)	SS 11B	SS 12B	SS 13B	SS 14B	SS 15B	SS 16B	SS 17B	SS 18B	SS 19B	SS 20B
26	Magnesium, Mg (mg/kg)	2.58	1.65	3.39	1.87	1.85	1.59	3.01	2.79	2.36	2.79
27	Calcium, Ca (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28	Potassium, K (mg/kg)	5.11	4.83	6.34	3.52	3.97	3.80	4.33	5.37	4.99	4.81
29	Manganese, Mn (mg/kg)	4.72	7.91	9.01	11.84	13.55	8.13	4.27	5.04	5.76	7.043
30	Vanadium, V (mg/kg)	0.23	0.08	0.01	0.84	0.31	0.04	0.33	0.21	0.86	0.42
31	Nickel, Ni (mg/kg)	3.91	<0.001	<0.001	3.72	5.85	<0.001	5.91	3.56	14.83	10.94
32	Chromium, Cr (mg/kg)	<0.001	2.88	<0.001	<0.001	0.011	<0.001	<0.001	<0.001	<0.001	<0.001
33	Iron, Fe (mg/kg)	561.4	491.8	561.5	631.4	385.7	278.3	383.1	488.3	150.8	395.3
34	Lead, Pb (mg/kg)	2.86	1.72	2.83	2.50	3.70	3.87	3.94	3.99	3.99	4.11
35	Copper, Cu (mg/kg)	4.59	14.48	26.14	19.11	13.22	19.11	19.97	16.51	13.01	26.85
36	Zinc, Zn (mg/kg)	8.81	6.9	6.93	8.36	9.83	7.55	6.82	5.97	5.74	6.92
37	Mercury, Hg (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
38	Arsenic, As (mg/kg)	0.06	0.13	0.24	0.21	0.13	0.21	0.19	0.15	0.14	0.21
39	HUB (CFU/g) x 10 ³	0.69	1.47	0.91	0.53	1.29	1.82	2.72	1.12	2.15	1.73
40	HUF (CFU/g) x 10 ³	0.6	0.8	0.9	0.4	0.6	0.3	0.8	0.3	0.5	0.7
41	THB (CFU/g) x 10 ⁶	2.58	2.14	1.91	2.03	1.96	3.22	3.05	2.86	2.11	2.93
42	THF (CFU/g) x 10 ⁶	1.7	2	1.5	0.9	0.9	1.6	1.4	1.1	2	1.5

Subsoil (15-30cm) Results

S/N	Parameter(s)	SS 21B	SS 22B	SS 23B	SS 24B	SS 25B	SS 26B	SS 27B	SS 28B	SS 29B	SS 30B
1	pH	5.01	5.26	5.28	4.99	4.58	5.57	5.18	4.5	5.03	5.4
2	Moisture Content (%)	12.94	8.88	10.95	10.52	9.38	9.68	13.06	10.83	9.59	11.31
3	Sulphide, S ₂ (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4	Sulphate, SO ₄ ²⁻ (mg/kg)	5.3	427.1	17.8	23.3	4.4	37.4	15.8	30.5	66.1	7.3
5	Nitrate, NO ₃ ⁻ (mg/kg)	0.93	1.14	1.39	2.5	0.45	1.72	1.12	0.88	0.84	1.26
6	Total Nitrogen (%)	0.124	0.131	0.172	0.204	0.18	0.188	0.183	0.136	0.181	0.161
7	Phosphate, PO ₄ ³⁻ (mg/kg)	1.24	0.95	1.33+U9:Y9	1.58	1.07	1.98	1.13	0.61	1.39	1.18
8	THC (mg/kg)	1.37	1.39	1.71	1.16	0.84	1.62	0.99	0.62	1.88	1.32
9	TPH (mg/kg)	1.12	1.85	1.31	1.44	0.86	1.78	1.19	1.05	1.19	1.35
10	PAH (mg/kg)	0.003	0.003	0.004	0.003	0.003	0.002	0.004	0.004	0.004	0.003
11	BETEX (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
12	Phenol (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
13	Ammonia (mg/kg)	0.13	0.72	0.06	0.15	0.12	0.16	0.08	0.10	0.26	0.12
14	TOC (%)	1.348	0.986	1.389	1.949	2.212	1.509	1.560	1.717	1.436	1.596
15	TOM (%)	2.324	1.700	2.395	3.36	3.813	2.602	2.689	2.96	2.476	2.752
16	Electric Conductivity (µs/cm)	48	24	30	34	54	30	36	840	32	36
17	Sand (%)	81.79	85.17	83.63	82.08	82.29	82.58	82.78	85.21	81.31	84.22
18	Silt (%)	4.97	5.02	4.91	5.48	5.18	4.82	2.71	2.26	3.21	3.14
19	Clay (%)	13.14	9.81	11.46	12.44	12.53	12.6	14.51	12.53	15.48	12.64
20	Particle Size Distribution	LS	SS	LS	LS	LS	LS	LS	LS	SL	LS
21	Porosity	0.381	0.395	0.368	0.354	0.399	0.386	0.374	0.361	0.392	0.379
22	Colour	Dark Brown	Dark Brown	Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Brown	Dark Brown
23	Permeability (cm/sec)×10	0.34	0.3	0.39	0.41	0.3	0.33	0.32	0.37	0.32	0.36
24	Bulk Density (g/cm ³)	1.33	1.27	1.35	1.39	1.26	1.31	1.34	1.40	1.28	1.35
25	Sodium, Na (mg/kg)	52.01	39.15	32.82	49.88	34.31	37.50	36.99	36.88	22.89	27.14

S/N	Parameter(s)	SS 21B	SS 22B	SS 23B	SS 24B	SS 25B	SS 26B	SS 27B	SS 28B	SS 29B	SS 30B
26	Magnesium, Mg (mg/kg)	1.37	2.33	1.95	7.91	1.28	12.18	3.23	11.61	2.73	4.87
27	Calcium, Ca (mg/kg)	<0.001	<0.001	<0.001	121.6	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28	Potassium, K (mg/kg)	3.15	3.94	2.93	13.45	5.13	13.45	5.68	3.18	3.63	3.22
29	Manganese, Mn (mg/kg)	21.67	35.81	5.98	67.82	0.47	29.71	52.62	33.48	15.95	25.27
30	Vanadium, V (mg/kg)	0.11	0.25	<0.01	0.88	0.21	<0.01	0.20	0.36	0.57	0.23
31	Nickel, Ni (mg/kg)	<0.001	4.11	<0.001	15.03	<0.001	<0.001	3.45	6.14	11.82	1.76
32	Chromium, Cr (mg/kg)	<0.001	<0.001	1.47	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	,0.001
33	Iron, Fe (mg/kg)	476.8	300.3	367.4	351.8	387.1	127.4	314.7	207.2	379.5	295.3
34	Lead, Pb (mg/kg)	5.23	3.85	3.72	4.72	3.78	5.02	4.45	4.77	4.82	3.97
35	Copper, Cu (mg/kg)	14.43	11.88	22.07	20.36	7.95	22.12	19.91	23.87	16.94	13.22
36	Zinc, Zn (mg/kg)	8.16	6.92	8.52	12.82	9.59	10.65	8.09	5.88	7.61	6.84
37	Mercury, Hg (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
38	Arsenic, As (mg/kg)	0.17	0.14	0.20	0.18	0.11	0.22	0.19	0.25	0.17	0.11
39	HUB (CFU/g) x 103	1.03	1.16	1.24	0.75	0.61	0.83	1.78	1.39	1.31	0.87
40	HUF (CFU/g) x 103	0.6	0.9	0.5	0.6	0.3	0.2	0.6	0.9	1.2	0.7
41	THB (CFU/g) x 106	2.38	2.66	1.82	2.21	2.64	1.88	2.79	3.01	3.05	1.94
42	THF (CFU/g) x 106	0.9	1.4	0.7	1.1	1.5	0.9	1.3	1.7	2.3	1.1

Subsoil (15-30cm) Results

S/N	Parameter(s)	SS 31B	SS 32B	SS 33B	SS 34B	SS 35B	SS 36B	SS 37B	SS 38B	SSC 1B	SSC 2B
1	pH	4.85	4.90	4.93	4.93	4.64	5.20	4.93	4.84	4.41	5.24
2	Moisture Content (%)	12.47	14.15	18.38	10.55	7.72	9.11	10.47	9.29	10.42	9.93
3	Sulphide, S ₂ (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4	Sulphate, SO ₄ ²⁻ (mg/kg)	91.9	12.6	47	24.5	7.1	17.3	25.8	7.7	99.5	66.0
5	Nitrate, NO ₃ ⁻ (mg/kg)	0.84	1.71	0.28	0.64	0.51	0.73	0.39	0.72	1.13	0.95
6	Total Nitrogen (%)	0.154	0.162	0.146	0.207	0.167	0.091	0.114	0.174	0.179	0.157
7	Phosphate, PO ₄ ³⁻ (mg/kg)	0.67	1.48	0.82	1.28	0.44	0.39	2.52	1.68	1.33	0.38
8	THC (mg/kg)	1.04	1.09	1.27	1.33	1.16	1.47	2.53	1.81	0.67	0.91
9	TPH (mg/kg)	1.31	1.15	1.23	0.91	1.73	2.55	1.59	1.47	0.23	1.84
10	PAH (mg/kg)	0.002	0.004	0.003	0.002	0.004	0.005	0.004	0.006	0.004	0.003
11	BETEX (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
12	Phenol (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
13	Ammonia (mg/kg)	0.43	0.29	0.37	0.19	0.18	0.08	0.15	0.04	0.39	0.31
14	TOC (%)	1.883	1.950	2.121	2.041	1.802	2.119	1.806	1.961	2.214	1.869
15	TOM (%)	3.246	3.362	3.657	3.519	3.107	3.653	3.114	3.381	3.817	3.222
16	Electric Conductivity (µs/cm)	32	68	52	40	52	24	34	50	64	48
17	Sand (%)	81.47	82.18	83.41	85.21	85.08	85.93	84.02	84.02	85.72	83.94
18	Silt (%)	2.83	2.37	3.28	4.37	5.42	4.36	5.11	5.11	2.53	3.01
19	Clay (%)	15.70	15.45	13.31	10.42	9.5	9.71	10.87	10.87	11.75	13.05
20	Particle Size Distribution	SL	SL	LS	LS	SS	SS	LS	LS	SS	LS
21	Porosity	0.431	0.317	0.382	0.388	0.365	0.423	0.379	0.356	0.348	0.405
22	Colour	Brown	Dark Brown	Brown	Brown	Dark Brown	Brown	Brown	Dark Brown	Brown	Brown
23	Permeability (cm/sec)×10	0.24	0.28	0.36	0.33	0.39	0.25	0.35	0.38	0.42	0.29
24	Bulk Density (g/cm ³)	1.14	1.2	1.38	1.31	1.42	1.18	1.35	1.42	1.41	1.23
25	Sodium, Na (mg/kg)	57.81	45.77	32.93	40.45	31.82	34.13	24.96	27.77	21.93	21.65
26	Magnesium, Mg (mg/kg)	0.76	9.62	3.19	7.97	2.96	4.81	0.75	12.81	3.16	10.07
27	Calcium, Ca (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28	Potassium, K (mg/kg)	2.96	4.84	5.92	4.31	5.58	5.41	3.02	4.87	2.52	2.90

S/N	Parameter(s)	SS 31B	SS 32B	SS 33B	SS 34B	SS 35B	SS 36B	SS 37B	SS 38B	SSC 1B	SSC 2B
29	Manganese, Mn (mg/kg)	55.83	38.61	34.97	21.66	6.39	2.95	3.38	2.99	2.27	2.03
30	Vanadium, V (mg/kg)	0.27	<0.01	0.1	<0.01	0.12	0.01	0.06	0.32	0.29	0.16
31	Nickel, Ni (mg/kg)	4.41	<0.001	<0.001	13.83	3.99	<0.001	<0.001	7.21	5.18	1.93
32	Chromium, Cr (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
33	Iron, Fe (mg/kg)	197.6	299	324.1	250.5	382	489.4	261.7	101.4	491.6	321.2
34	Lead, Pb (mg/kg)	3.82	4.72	3.83	3.92	4.35	5.92	4.13	3.58	3.56	3.77
35	Copper, Cu (mg/kg)	10.25	17.86	24.58	9.16	20.99	40.08	13.22	2.15	11.71	16.82
36	Zinc, Zn (mg/kg)	6.78	7.44	8.22	4.93	7.36	7.41	4.95	5.82	5.02	6.79
37	Mercury, Hg (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
38	Arsenic, As (mg/kg)	0.18	0.19	0.23	0.15	0.21	<0.001	0.12	0.05	0.21	0.18
39	HUB (CFU/g) x 10 ³	1.72	1.37	0.92	0.57	0.83	0.65	0.82	0.75	0.54	1.07
40	HUF (CFU/g) x 10 ³	0.3	0.9	0.5	0.4	0.6	0.4	0.7	0.3	0.7	0.5
41	THB (CFU/g) x 10 ⁶	2.52	2.66	1.91	1.57	1.82	3.10	2.74	1.49	1.93	2.68
42	THF (CFU/g) x 10 ⁶	1.4	1.9	1.2	0.9	1.3	1.8	1.8	0.5	0.9	2.1

ANNEXURE 4.4:

GROUNDWATER QUALITY RESULTS/STIFF DIAGRAMS

DRY SEASON

S/N	Parameter(s)	GW 1	GW 2	GW 3	GW 4	GW5	GW 6	GW 7	GW 8	GW 9	GW 10
1	pH	7.86	7.67	6.65	6.67	6.71	7.17	7.22	7.29	7.42	7.34
2	Temperature (°C)	35.4	34.2	29.0	29.0	29.2	34.2	33.4	35.4	36.5	35.3
3	Appearance	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
4	Elec. Conductivity (µs/cm)	23.0	101.0	22.0	15.0	17.0	15.0	12.0	41.0	24.0	26.0
5	TDS (mg/l)	13.0	56.0	12.0	9.0	10.0	9.0	7.0	23.0	11.0	13.0
6	Turbidity (NTU)	1.3	1.0	<1.0	1.6	1.0	<1.0	<1.0	<1.0	<1.0	1.0
7	TSS (mg/l)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
8	Total Hardness (mg/l)	5.0	20.0	4.0	2.0	4.0	2.0	2.0	10.0	6.0	8.0
9	Total Alkalinity (mg/l)	16.0	14.0	10.0	10.0	12.0	10.0	12.0	12.0	10.0	14.0
10	Chloride, Cl ⁻ (mg/l)	4.0	18.0	4.0	3.0	4.0	4.0	2.0	8.0	6.0	5.0
11	Sulphate, SO ₄ ²⁻ (mg/l)	2.0	5.0	2.0	1.0	2.0	1.0	1.0	2.0	3.0	2.0
12	Nitrate, NO ₃ ⁻ (mg/l)	0.40	1.30	0.40	0.30	0.30	0.30	0.20	0.70	0.80	0.40
13	Phosphate, PO ₄ ³⁻ (mg/l)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
14	Cyanide (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
15	Ammonia (mg/l)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
16	Silica (mg/l)	7.6	3.2	4.3	2.0	3.9	6.2	4.9	7.2	5.9	8.3
17	Salinity (ppt)	0.01	0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
18	Oil & Grease (mg/l)	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
19	DO (mg/l)	4.10	4.20	4.70	3.90	4.30	4.50	5.00	4.50	4.10	4.30
20	BOD (mg/l)	<1.00	2.70	2.30	2.50	<1.00	2.50	3.80	2.00	2.20	1.60
21	COD (mg/l)	2.00	4.50	4.00	4.40	2.20	4.60	5.00	3.60	4.00	3.60
22	Sodium, Na (mg/l)	5.59	8.47	3.79	2.42	2.57	2.42	2.13	3.93	2.41	2.83
23	Potassium, K (mg/l)	0.15	3.43	0.18	0.16	0.12	0.17	0.11	1.23	0.63	0.31
24	Calcium, Ca (mg/l)	1.28	6.71	0.96	0.62	1.19	0.63	0.57	3.16	1.78	2.31
25	Magnesium, Mg (mg/l)	0.25	0.69	0.32	0.11	0.23	0.08	0.11	0.36	0.34	0.42
26	Manganese, Mn (mg/l)	0.056	0.037	0.029	0.043	0.052	0.048	0.061	0.047	0.072	0.033
27	Iron, Fe (mg/l)	0.174	0.247	0.126	0.217	0.242	0.089	0.146	0.115	0.146	0.106
28	Copper, Cu (mg/l)	0.089	0.060	0.120	0.046	0.143	0.056	0.156	0.045	0.065	0.033
29	Zinc, Zn (mg/l)	0.012	0.025	0.010	0.015	0.018	0.012	0.013	0.014	0.040	0.017
30	Arsenic, As (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

S/N	Parameter(s)	GW 1	GW 2	GW 3	GW 4	GW5	GW 6	GW 7	GW 8	GW 9	GW 10
31	Chromium, Cr (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
32	Lead, Pb (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
33	Mercury, Hg (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
34	Nickel, Ni (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
35	Cadmium, Cd (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
36	HUB (CFU/ml) x 10 ²	0.5	0.3	0.2	NIL	0.3	0.2	0.2	0.6	0.5	0.2
37	HUF (CFU/ml) x 10 ²	0.3	0.1	0.1	NIL	NIL	NIL	0.1	0.2	0.2	0.1
38	THB (CFU/ml) x 10 ²	2.1	1.8	1.6	1.5	1.4	1.6	1.5	2.0	1.6	1.8
39	THF (CFU/ml) x 10 ²	1.3	0.6	1.1	0.4	0.8	0.5	0.6	1.3	1.0	1.2
40	Total Coliform (MPN/100ml)	0	2.0	3.0	0	0	0	0	0	0	0
41	Faecal Coliform (MPN/100ml)	0	0	0	0	0	0	0	0	0	0

S/N	Parameter(s)	GW 11	GW 12	GW 13	GW 14	GW 15	GW 16	GW 17	GW 18	GW 19	GW 20
1	pH	7.31	4.28	4.27	6.72	4.91	4.33	4.65	7.63	5.87	5.55
2	Temperature (°C)	34.2	29.2	29.3	28.3	26.6	27.7	28.3	27.8	27.8	27.0
3	Appearance	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
4	Elec. Conductivity (µs/cm)	39.0	169.5	102.7	23.6	83.7	17.1	13.9	16.8	19.4	13.3
5	TDS (mg/l)	21.0	84.9	51.5	11.8	41.8	8.5	7.0	8.4	9.7	6.7
6	Turbidity (NTU)	1.4	<1.0	1.2	<1.0	1.0	<1.0	1.0	<1.0	1.0	<1.0
7	TSS (mg/l)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
8	Total Hardness (mg/l)	10.0	42.0	25.0	4.0	15.0	2.0	2.0	2.0	2.0	2.0
9	Total Alkalinity (mg/l)	12.0	8.0	10.0	11.0	10.0	8.0	10.0	12.0	10.0	8.0
10	Chloride, Cl ⁻ (mg/l)	8.0	45.0	30.0	5.0	23.0	4.0	3.0	3.0	3.0	2.0
11	Sulphate, SO ₄ ²⁻ (mg/l)	2.0	7.0	5.0	2.0	4.0	1.0	1.0	1.0	1.0	1.0
12	Nitrate, NO ₃ ⁻ (mg/l)	0.50	1.80	1.40	0.40	1.00	0.20	0.20	0.10	0.10	0.20
13	Phosphate, PO ₄ ³⁻ (mg/l)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
14	Cyanide (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
15	Ammonia (mg/l)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
16	Silica (mg/l)	5.8	8.0	5.0	6.3	6.0	7.2	4.4	5.1	4.7	7.2
17	Salinity (ppt)	0.01	0.08	0.05	0.02	0.04	0.02	0.02	0.01	0.01	0.02
18	Oil & Grease (mg/l)	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
19	DO (mg/l)	4.20	4.40	4.70	3.80	3.90	3.60	3.50	4.70	4.80	4.60
20	BOD (mg/l)	1.80	<1.00	1.50	3.20	4.30	4.80	4.20	4.80	2.70	4.30
21	COD (mg/l)	3.90	2.00	2.90	6.50	9.00	11.50	8.50	12.50	4.80	8.50
22	Sodium, Na (mg/l)	3.59	12.47	11.44	2.85	10.22	1.85	1.49	2.15	1.94	1.41
23	Potassium, K (mg/l)	0.59	3.96	2.52	0.12	0.89	0.22	0.09	0.14	0.26	0.06
24	Calcium, Ca (mg/l)	2.88	12.27	6.73	1.08	5.27	0.55	0.51	0.62	0.59	0.65
25	Magnesium, Mg (mg/l)	0.57	2.65	1.78	0.27	0.41	0.12	0.15	0.09	0.11	0.07
26	Manganese, Mn (mg/l)	0.037	0.068	0.083	0.056	0.102	0.087	0.093	0.164	0.134	0.098
27	Iron, Fe (mg/l)	0.162	0.252	0.185	0.241	0.157	0.161	0.121	0.172	0.049	0.086
28	Copper, Cu (mg/l)	0.076	0.055	0.016	0.021	0.027	0.065	0.135	0.196	0.065	0.039
29	Zinc, Zn (mg/l)	0.073	0.022	0.037	0.027	0.020	0.028	0.035	0.010	0.026	0.037
30	Arsenic, As (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
31	Chromium, Cr (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
32	Lead, Pb (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
33	Mercury, Hg (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
34	Nickel, Ni (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
35	Cadmium, Cd (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
36	HUB (CFU/ml) x 10 ²	0.6	0.3	0.6	NIL	0.3	0.1	0.4	0.3	0.5	0.6
37	HUF (CFU/ml) x 10 ²	0.4	0.1	0.2	NIL	0.2	0.1	0.1	0.2	0.1	0.3
38	THB (CFU/ml) x 10 ²	2.6	2.3	1.7	1.7	2.1	1.7	1.9	2.7	1.8	2.6
39	THF (CFU/ml) x 10 ²	1.8	1.4	1.0	0.6	1.4	0.8	1.2	1.5	1.1	1.4

S/N	Parameter(s)	GW 11	GW 12	GW 13	GW 14	GW 15	GW 16	GW 17	GW 18	GW 19	GW 20
40	Total Coliform (MPN/100ml)	2.0	4.0	0	0	0	0	0	2.0	0	0
41	Faecal Coliform (MPN/100ml)	0	0	0	0	0	0	0	0	0	0

S/N	Parameter(s)	GW 21	GW 22	GW C1	GW C2
1	pH	5.38	4.94	5.16	4.68
2	Temperature (°C)	27.2	27.5	28.4	28.6
3	Appearance	Clear	Clear	Clear	Clear
4	Elec. Conductivity (µs/cm)	49.9	106.5	26.8	52.6
5	TDS (mg/l)	24.5	53.2	25.8	26.4
6	Turbidity (NTU)	<1.0	<1.0	<1.0	<1.0
7	TSS (mg/l)	<1.0	<1.0	<1.0	<1.0
8	Total Hardness (mg/l)	12.0	22.0	5.0	15.0
9	Total Alkalinity (mg/l)	8.0	8.0	10.0	8.0
10	Chloride, Cl ⁻ (mg/l)	14.0	24.0	6.0	8.0
11	Sulphate, SO ₄ ²⁻ (mg/l)	3.0	5.0	2.0	4.0
12	Nitrate, NO ₃ ⁻ (mg/l)	0.70	1.40	0.60	1.00
13	Phosphate, PO ₄ ³⁻ (mg/l)	<0.10	<0.10	<0.10	<0.10
14	Cyanide (mg/l)	<0.001	<0.001	<0.001	<0.01
15	Ammonia (mg/l)	<0.10	<0.10	<0.10	<0.10
16	Silica (mg/l)	4.0	5.3	9.6	3.8
17	Salinity (ppt)	0.03	0.06	0.01	0.01
18	Oil & Grease (mg/l)	<1.00	<1.00	<1.00	<1.00
19	DO (mg/l)	3.90	4.60	3.90	3.60
20	BOD (mg/l)	4.70	2.80	<1.00	1.90
21	COD (mg/l)	12.00	4.50	2.60	4.50
22	Sodium, Na (mg/l)	5.84	8.59	2.96	2.38
23	Potassium, K (mg/l)	0.38	1.21	0.18	0.43
24	Calcium, Ca (mg/l)	3.84	6.85	1.53	4.61
25	Magnesium, Mg (mg/l)	0.45	1.08	0.29	0.68
26	Manganese, Mn (mg/l)	0.133	0.042	0.068	0.127
27	Iron, Fe (mg/l)	0.167	0.072	0.173	0.243
28	Copper, Cu (mg/l)	0.179	0.087	0.065	0.116
29	Zinc, Zn (mg/l)	0.045	0.016	0.013	0.078
30	Arsenic, As (mg/l)	<0.001	<0.001	<0.001	<0.001
31	Chromium, Cr (mg/l)	<0.001	<0.001	<0.001	<0.001
32	Lead, Pb (mg/l)	<0.001	<0.001	<0.001	<0.001
33	Mercury, Hg (mg/l)	<0.001	<0.001	<0.001	<0.001
34	Nickel, Ni (mg/l)	<0.001	<0.001	<0.001	<0.001

S/N	Parameter(s)	GW 21	GW 22	GW C1	GW C2
35	Cadmium, Cd (mg/l)	<0.001	<0.001	<0.001	<0.001
36	HUB (CFU/ml) x 10 ²	0.4	0.2	0.4	0.4
37	HUF (CFU/ml) x 10 ²	0.3	0.1	0.3	0.1
38	THB (CFU/ml) x 10 ²	2.4	1.7	2.2	1.7
39	THF (CFU/ml) x 10 ²	1.0	0.6	1.2	0.8
40	Total Coliform (MPN/100ml)	3.0	0	2.0	3.0
41	Faecal Coliform (MPN/100ml)	0	0	0	0

WET SEASON

S/N	Parameter(s)	GW 1	GW 2	GW 3	GW 4	GW5	GW 6	GW 7	GW 8	GW 9	GW 10
1	pH	7.55	7.16	6.42	6.46	6.62	6.89	6.84	6.95	6.79	7.11
2	Temperature (°C)	26.4	25.9	25.8	25.9	26.7	25.8	27.1	26.1	28.1	26.1
3	Appearance	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
4	Elec. Conductivity (µs/cm)	18.6	89.6	19.5	13.6	18.6	17.3	10.4	36.8	22.6	18.9
5	TDS (mg/l)	10.2	47.2	9.6	8.2	9.2	9.4	5.9	20.3	12.4	10.3
6	Turbidity (NTU)	1.80	1.20	0.02	1.70	1.00	1.00	0.03	0.01	0.50	1.60
7	TSS (mg/l)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
8	Total Hardness (mg/l)	3	18	5	3	2	3	2	6	4	6
9	Total Alkalinity (mg/l)	10	11	9	8	10	7	11	16	8	12
10	Chloride, Cl ⁻ (mg/l)	2	12	3	2	21	3	1	2	2	2
11	Sulphate, SO ₄ ²⁻ (mg/l)	2	3	1	0	1	3	1	2	2	1
12	Nitrate, NO ₃ ⁻ (mg/l)	0.6	1.4	0.7	0.4	0.6	0.4	0.4	0.9	1.2	0.9
13	Phosphate, PO ₄ ³⁻ (mg/l)	0.04	0.1	<0.10	0.01	<0.10	<0.10	<0.10	0.07	0.03	0.01
14	Cyanide (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
15	Ammonia (mg/l)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
16	Silica (mg/l)	5.1	3	4.1	1.85	3.02	517	2.8	6.4	5.01	7.03
17	Salinity (ppt)	0.01	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
18	Oil & Grease (mg/l)	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
19	DO (mg/l)	6.1	6.2	6.4	6.3	6.1	6.3	5.9	6.5	6.3	6.3
20	BOD (mg/l)	1.3	2.9	3.0	2.9	1.0	3.0	3.9	2.7	2.7	1.9
21	COD (mg/l)	2.00	4.70	4.01	4.91	2.92	4.76	5.98	4.01	4.00	4.00
22	Sodium, Na (mg/l)	4.97	6.08	3.05	2.11	2.29	2.27	1.93	2.85	2.12	2.38
23	Potassium, K (mg/l)	0.18	2.85	0.36	0.44	0.71	0.38	0.3	1.12	0.95	0.72
24	Calcium, Ca (mg/l)	1.06	4.14	0.77	0.50	1.00	0.31	0.39	3.04	1.08	2.11
25	Magnesium, Mg (mg/l)	0.13	0.49	0.15	0.07	0.14	0.02	0.10	0.21	0.29	0.18
26	Manganese, Mn (mg/l)	0.121	0.113	0.117	0.180	0.105	0.142	0.105	0.092	0.105	0.089
27	Iron, Fe (mg/l)	0.306	0.294	0.195	0.241	0.286	0.169	0.199	0.174	0.182	0.146
28	Copper, Cu (mg/l)	0.302	0.116	0.310	0.192	0.284	0.132	0.248	0.930	0.121	0.075
29	Zinc, Zn (mg/l)	0.041	0.063	0.120	0.101	0.118	0.122	0.094	0.746	0.132	0.105
30	Arsenic, As (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
31	Chromium, Cr (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
32	Lead, Pb (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
33	Mercury, Hg (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
34	Nickel, Ni (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
35	Cadmium, Cd (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
36	HUB (CFU/ml) x 10 ²	0.7	0.4	0.1	0.1	0.2	0.2	0.3	0.5	0.6	0.1

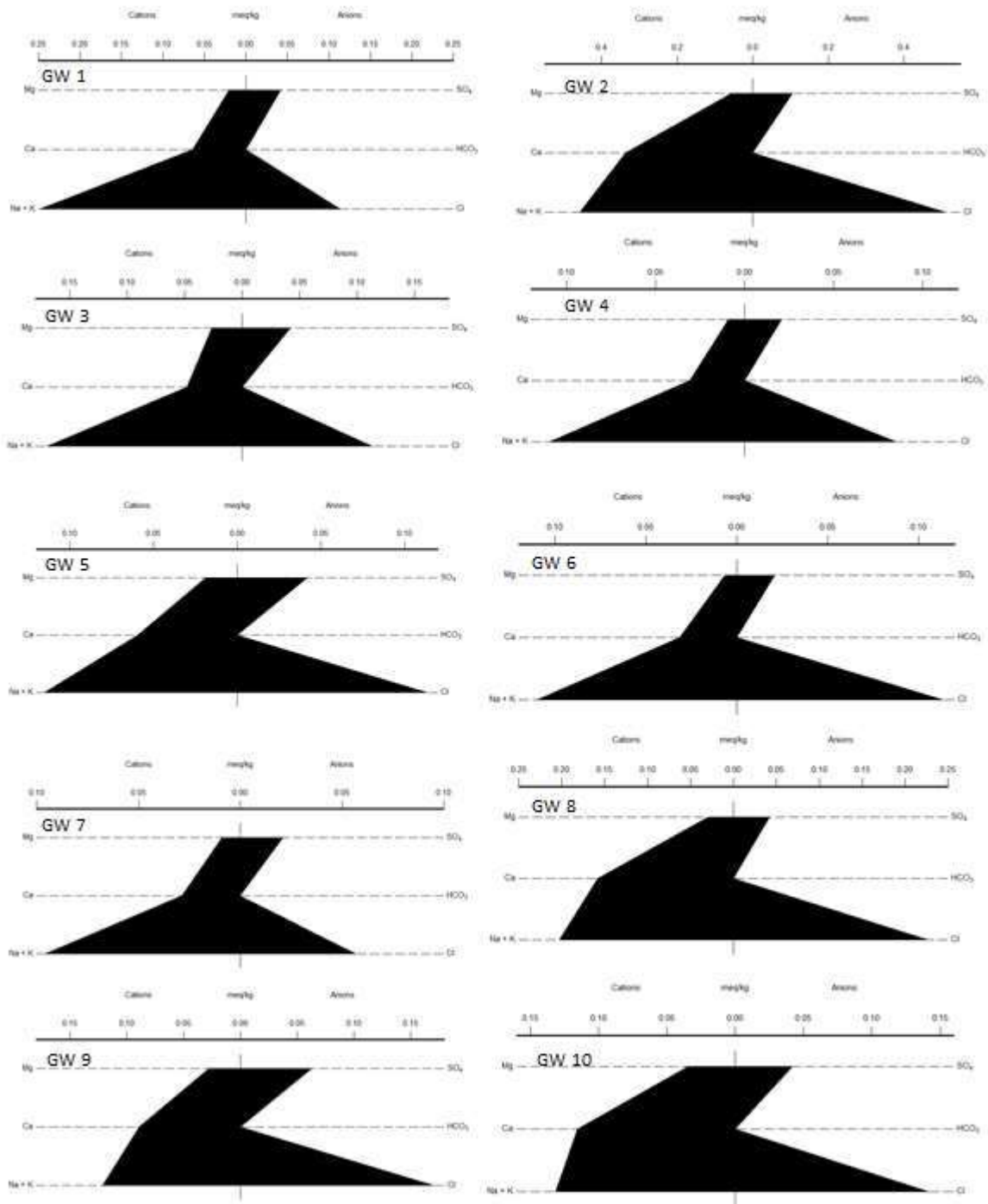
S/N	Parameter(s)	GW 1	GW 2	GW 3	GW 4	GW5	GW 6	GW 7	GW 8	GW 9	GW 10
37	HUF (CFU/ml) x 10 ²	0.1	0.1	0.1	0	0	0.2	0.1	0.2	0.1	0.1
38	THB (CFU/ml) x 10 ²	5.1	1.6	1.0	1.2	1.0	2.2	2.6	2.9	5.0	4.6
39	THF (CFU/ml) x 10 ²	1.5	1.0	1.6	0.8	1.0	0.7	1.0	1.7	1.4	1.8
40	Total Coliform (MPN/100ml)	1	3	2	1	0	0	2	0	0	1
41	Faecal Coliform (MPN/100ml)	0	0	0	0	0	0	0	0	0	0

S/N	Parameter(s)	GW 11	GW 12	GW 13	GW 14	GW 15	GW 16	GW 17	GW 18	GW 19	GW 20
1	pH	6.89	4.56	4.62	6.66	4.76	4.81	4.86	7.32	5.52	5.41
2	Temperature (°C)	27.3	25.8	25.7	26.8	26.8	25.9	26.4	26.8	27.1	26.2
3	Appearance	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
4	Elec. Conductivity (µs/cm)	32.7	142.6	98.4	24.7	79.3	14.6	10.3	14.7	17.2	14.9
5	TDS (mg/l)	18.2	76.2	52.5	13.6	42.4	8.4	6.2	8.3	10.2	8.9
6	Turbidity (NTU)	1.49	0.04	1.42	0.03	1.40	0.17	1.10	0.22	1.30	0.08
7	TSS (mg/l)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
8	Total Hardness (mg/l)	11	26	15	2	8	3	2	3	4	2
9	Total Alkalinity (mg/l)	8	10	6	14	12	10	8	10	8	9
10	Chloride, Cl ⁻ (mg/l)	10	3	1	4	4	2	8	6	4	4
11	Sulphate, SO ₄ ²⁻ (mg/l)	1	6	2	1	2	1	1	1	0	0
12	Nitrate, NO ₃ ⁻ (mg/l)	0.9	2.2	1.8	0.7	1.3	0.7	0.6	0.2	0.2	0.4
13	Phosphate, PO ₄ ³⁻ (mg/l)	<0.10	<0.10	<0.10	0.03	<0.10	<0.10	<0.10	0.11	0.03	0.1
14	Cyanide (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
15	Ammonia (mg/l)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
16	Silica (mg/l)	5.02	7.57	5.16	5.21	4.89	6.18	4.01	4.73	4	6.31
17	Salinity (ppt)	0.01	0.05	0.03	0.01	0.03	0.01	0.01	0.01	0.01	0.01
18	Oil & Grease (mg/l)	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
19	DO (mg/l)	6.3	5.9	5.8	5.8	5.7	5.6	5.6	5.3	4.4	4.8
20	BOD (mg/l)	3.0	1.4	1.9	3.6	4.9	5.9	5.6	6.0	1.9	5.2
21	COD (mg/l)	4.61	2.93	2.99	7.61	10.00	12.00	11.22	13.11	4.94	9.03
22	Sodium, Na (mg/l)	2.47	8.71	9.83	2.28	6.53	1.47	1.15	1.76	1.88	1.14
23	Potassium, K (mg/l)	0.91	2.63	2.08	0.17	0.72	0.16	0.05	0.1	0.15	0.13
24	Calcium, Ca (mg/l)	2.06	8.72	5.35	0.81	3.85	0.40	0.39	0.57	0.36	0.52
25	Magnesium, Mg (mg/l)	0.39	2.01	1.27	0.14	0.29	0.08	0.11	0.02	0.06	0.03
26	Manganese, Mn (mg/l)	0.092	0.104	0.126	0.091	0.174	0.138	0.162	0.201	0.165	0.140
27	Iron, Fe (mg/l)	0.220	0.294	0.218	0.292	0.301	0.215	0.163	0.191	0.107	0.124
28	Copper, Cu (mg/l)	0.138	0.104	0.073	0.096	0.051	0.154	0.185	0.247	0.138	0.083
29	Zinc, Zn (mg/l)	0.132	0.116	0.103	0.102	0.100	0.141	0.107	0.112	0.104	0.093
30	Arsenic, As (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
31	Chromium, Cr (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
32	Lead, Pb (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
33	Mercury, Hg (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
34	Nickel, Ni (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
35	Cadmium, Cd (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
36	HUB (CFU/ml) x 10 ²	0.7	0.5	0.7	0.2	0.2	0.3	0.5	0.3	0.6	0.5
37	HUF (CFU/ml) x 10 ²	0.3	0.2	0.2	0.1	0.3	0.1	0.2	0.2	0.2	0.3
38	THB (CFU/ml) x 10 ²	3.2	2.7	3.1	4.2	3.5	3.2	2.7	3.1	2.3	3.1
39	THF (CFU/ml) x 10 ²	2.0	1.2	1.6	0.9	1.7	1.0	1.6	2.0	1.7	1.6

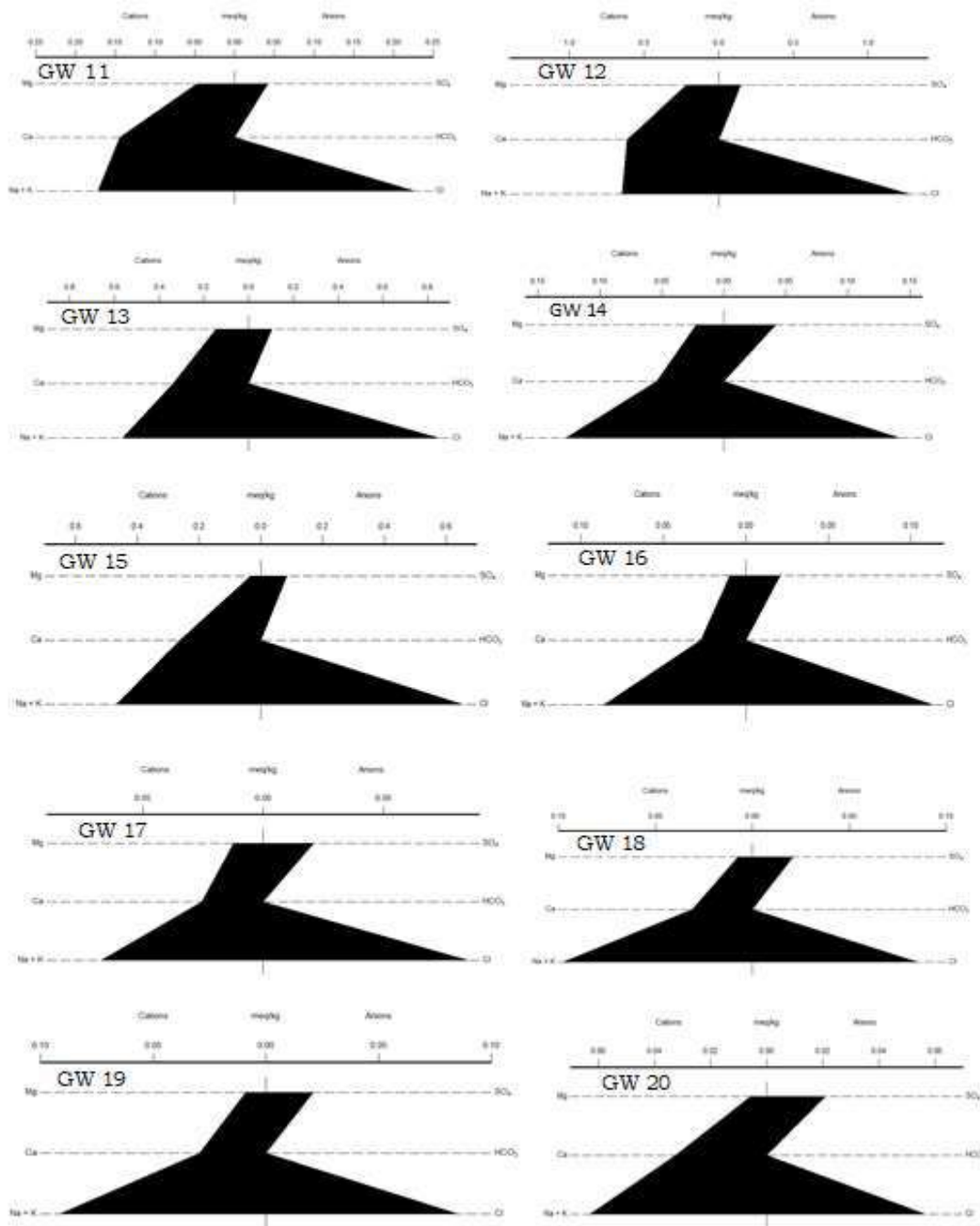
S/N	Parameter(s)	GW 11	GW 12	GW 13	GW 14	GW 15	GW 16	GW 17	GW 18	GW 19	GW 20
40	Total Coliform (MPN/100ml)	3	3	1	0	2	1	0	2	1	0
41	Faecal Coliform (MPN/100ml)	0	0	0	0	0	0	0	0	0	0

S/N	Parameter(s)	GW 21	GW 22	GW C1	GW C2
1	pH	5.44	5.06	5.12	5.31
2	Temperature (°C)	26.8	27.2	27.3	27.2
3	Appearance	Clear	Clear	Clear	Clear
4	Elec. Conductivity (µs/cm)	44.7	94.5	30.6	46.9
5	TDS (mg/l)	24.8	50.3	16.8	26.2
6	Turbidity (NTU)	0.03	0.51	0.47	0.13
7	TSS (mg/l)	<1.0	<1.0	<1.0	<1.0
8	Total Hardness (mg/l)	8	14	4.0	8
9	Total Alkalinity (mg/l)	11	6	9	6
10	Chloride, Cl ⁻ (mg/l)	3	4	1	1
11	Sulphate, SO ₄ ²⁻ (mg/l)	2	3	3	2
12	Nitrate, NO ₃ ⁻ (mg/l)	1	1.6	0.9	1.4
13	Phosphate, PO ₄ ³⁻ (mg/l)	0.11	<0.10	0.01	0.01
14	Cyanide (mg/l)	<0.001	<0.001	<0.001	<0.01
15	Ammonia (mg/l)	<0.10	<0.10	<0.10	<0.10
16	Silica (mg/l)	3.95	3.91	8.89	4.04
17	Salinity (ppt)	0.02	0.03	0.01	0.01
18	Oil & Grease (mg/l)	<1.00	<1.00	<1.00	<1.00
19	DO (mg/l)	5.6	5.2	4.9	4.8
20	BOD (mg/l)	6.0	2.3	2.0	1.9
21	COD (mg/l)	13.10	5.02	3.01	5.02
22	Sodium, Na (mg/l)	4.37	6.82	2.15	2.01
23	Potassium, K (mg/l)	0.29	1.18	0.13	0.36
24	Calcium, Ca (mg/l)	3.01	5.45	1.22	2.86
25	Magnesium, Mg (mg/l)	0.31	0.82	0.23	0.51
26	Manganese, Mn (mg/l)	0.193	0.128	0.105	0.151
27	Iron, Fe (mg/l)	0.211	0.128	0.267	0.325
28	Copper, Cu (mg/l)	0.177	0.142	0.116	0.180
29	Zinc, Zn (mg/l)	0.082	0.131	0.093	0.102
30	Arsenic, As (mg/l)	<0.001	<0.001	<0.001	<0.001
31	Chromium, Cr (mg/l)	<0.001	<0.001	<0.001	<0.001
32	Lead, Pb (mg/l)	<0.001	<0.001	<0.001	<0.001
33	Mercury, Hg (mg/l)	<0.001	<0.001	<0.001	<0.001
34	Nickel, Ni (mg/l)	<0.001	<0.001	<0.001	<0.001

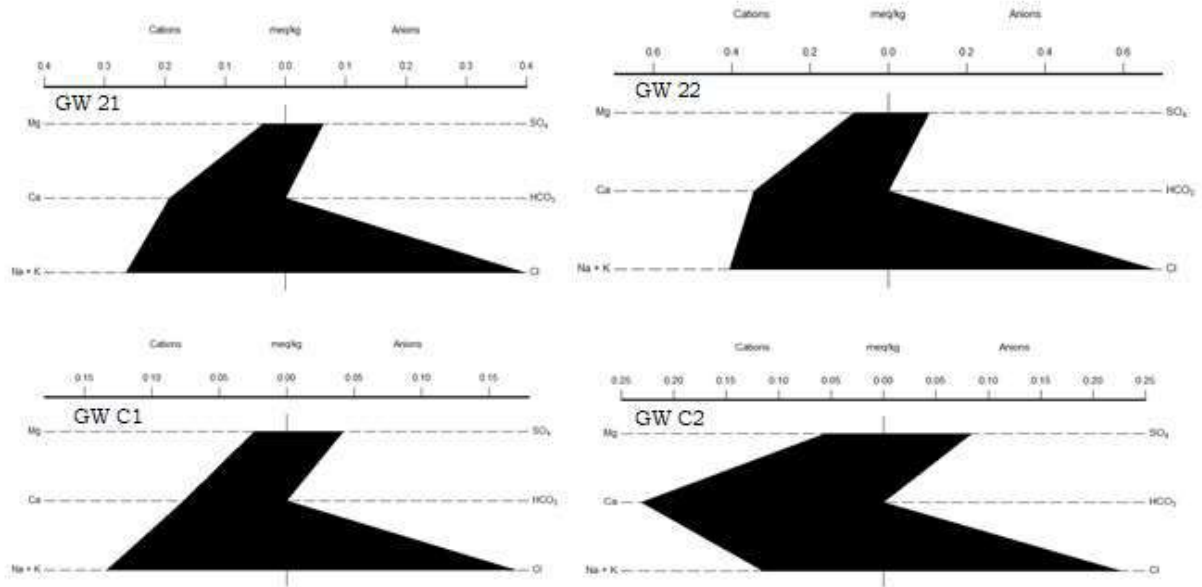
S/N	Parameter(s)	GW 21	GW 22	GW C1	GW C2
35	Cadmium, Cd (mg/l)	<0.001	<0.001	<0.001	<0.001
36	HUB (CFU/ml) x 10 ²	0.6	0.3	0.4	0.5
37	HUF (CFU/ml) x 10 ²	0.4	0.1	0.3	0.2
38	THB (CFU/ml) x 10 ²	2.9	2.0	2.8	2.4
39	THF (CFU/ml) x 10 ²	1.3	0.9	1.7	1.0
40	Total Coliform (MPN/100ml)	3	3	2	2
41	Faecal Coliform (MPN/100ml)	0	0	0	0



Stiff diagram showing groundwater chemistry across the project site (GW1 - GW10)



Stiff diagram showing groundwater chemistry across the project site (GW11 - GW20)



Stiff diagram showing groundwater chemistry across the project site (GW21-GWC2)

ANNEXURE 4.5:

SURFACE WATER QUALITY RESULTS

S/N	Parameter(s)	DRY SEASON			WET SEASON		
		SW 1	SW 2	SW 3	SW 1	SW 2	SW 3
0	Depth (meters)	5.7	3.8	4.1	6.8	4.7	5.5
1	pH	7.49	7.61	7.59	7.75	7.70	7.82
2	Appearance	Clear	Clear	Clear	Clear	Clear	Clear
3	Temperature (°C)	31.2	28.1	26.6	27.3	26.3	25.8
4	Elec. Conductivity (µs/cm)	7,720	37.0	18.0	5264	27.8	16.2
5	TDS (mg/l)	3,890	19.0	11.0	2641	13.5	8.1
6	Turbidity (NTU)	5.6	4.8	4.5	5.8	11.2	11.8
7	TSS (mg/l)	4.4	3.8	3.1	4.1	6.5	6.2
8	Salinity (ppt)	4.40	0.02	0.01	4.67	0.01	0.01
9	Total Hardness (mg/l)	940.0	14.0	10.0	780	12	9
10	Alkalinity (mg/l)	65.0	40.0	30.0	60	20	18
11	Chloride, Cl ⁻ (mg/l)	2,280	12.0	8.0	1,864	35	35
12	Sulphate, SO ₄ ²⁻ (mg/l)	345	4.0	2.0	182	14	5
13	Phosphate, PO ₄ ³⁻ (mg/l)	1.36	0.75	0.62	3.82	1.43	1.97
14	Nitrate, NO ₃ ⁻ (mg/l)	3.36	0.89	0.56	5.12	1.99	2.27
15	Cyanide (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
16	Ammonia (mg/l)	0.68	0.30	0.20	0.57	0.43	0.94
17	Total Nitrogen (mg/l)	9.54	5.88	5.35	6.96	4.94	5.27
18	Oil & Grease (mg/l)	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
19	DO (mg/l)	5.60	5.80	4.60	5.2	5.4	5.6
20	BOD ₅ (mg/l)	16.20	12.00	10.00	17	9	11
21	COD (mg/l)	54.40	38.80	32.40	48.3	30.5	32.8
22	Sodium, Na (mg/l)	1219.72	18.68	12.35	896.14	11.95	10.27
23	Potassium, K (mg/l)	28.68	1.78	1.23	31.52	2.6	2.79
24	Calcium, Ca (mg/l)	298.96	4.15	2.88	207.04	3.11	1.52
25	Magnesium, Mg (mg/l)	45.47	0.81	0.57	29.57	0.45	0.287
26	Silver, Ag (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
27	Cobalt, Co (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

S/N	Parameter(s)	DRY SEASON			WET SEASON		
		SW 1	SW 2	SW 3	SW 1	SW 2	SW 3
28	Manganese, Mn (mg/l)	0.056	0.021	0.016	0.104	0.057	0.032
29	Vanadium, V (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
30	Nickel, Ni (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
31	Chromium, Cr (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
32	Iron, Fe (mg/l)	0.271	0.081	0.032	0.288	0.097	0.053
33	Lead, Pb (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
34	Copper, Cu (mg/l)	0.089	0.041	0.026	0.065	0.035	0.018
35	Zinc, Zn (mg/l)	0.075	0.032	0.034	0.081	0.037	0.030
36	Mercury, Hg (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
37	Cadmium, Cd (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
38	Arsenic, As (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
39	HUB (CFU/ml) x 10 ²	0.3	0.4	0.6	0.7	0.2	0.5
40	HUF (CFU/ml) x 10 ²	0.1	0.2	0.4	0.6	0.5	1.0
41	THB (CFU/ml) x 10 ²	2.0	2.4	2.1	2.0	3.5	9.6
42	THF (CFU/ml) x 10 ²	1.2	1.1	1.6	1.4	1.9	2.7
43	Fecal Coliform (MPN/100ml)	23	0	15	35	9	20
44	Total Coliform (MPN/100ml)	60	8	20	90	20	32

ANNEXURE 4.6

SEDIMENT QUALITY RESULTS

S/N	Parameter(s)	DRY SEASON			WET SEASON		
		SED 1	SED 2	SED 3	SED 1	SED 2	SED 3
1.	pH	5.2	5.3	5.0	4.69	5.79	4.97
2.	Moisture Content (%)	28.35	27.23	28.12	42.72	40.15	42.63
3.	Sulphide, S ₂ (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4.	Sulphate, SO ₄ ²⁻ (mg/kg)	25	10	13	18	6	9
5.	Nitrate, NO ₃ ⁻ (mg/kg)	2.5	2.0	2.4	4.1	3.5	3.7
6.	Total Nitrogen (%)	0.222	0.231	0.209	0.318	0.290	0.288
7.	Phosphate, PO ₄ ³⁻ (mg/kg)	1.75	1.21	1.43	3.02	2.11	2.05
8.	THC (mg/kg)	3.51	2.12	2.68	4.16	3.42	3.73
9.	TPH (mg/kg)	41.30	23.30	34.51	32.2	28.8	36.9
10.	PAH (mg/kg)	0.006	0.002	0.003	0.010	0.020	0.020
11.	BETEX (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
12.	Phenol (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
13.	Ammonia (mg/kg)	0.45	0.38	0.32	0.72	1.25	0.88
14.	TOC (%)	2.565	2.675	2.415	4.431	3.995	4.003
15.	TOM (%)	4.435	4.625	4.172	7.639	6.889	6.9011
16.	Electric Conductivity (µs/cm)	858	141	273	525	108	246
17.	Sand (%)	78.25	76.78	78.16	69.43	68.91	71.33
18.	Silt (%)	3.45	3.52	3.38	8.24	8.46	7.61
19.	Clay (%)	18.30	19.70	18.46	22.33	22.63	21.06
20.	Particle Size Distribution	SL	SL	SL	SL	SL	SL
21.	Porosity	0.365	0.360	0.362	0.381	0.374	0.395
22.	Colour	Black	Black	Black	Black	Brown	Black
23.	Permeability (cm/sec)×10	0.25	0.20	0.23	0.38	0.38	0.38
24.	Bulk Density (g/cm ³)	1.31	1.26	1.30	1.63	1.61	1.64
25.	Sodium, Na (mg/kg)	83.93	33.62	45.89	69.77	31.53	37.14
26.	Magnesium, Mg (mg/kg)	21.07	20.31	21.00	20.94	20.01	20.63

S/N	Parameter(s)	DRY SEASON			WET SEASON		
		SED 1	SED 2	SED 3	SED 1	SED 2	SED 3
27.	Calcium, Ca (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28.	Potassium, K (mg/kg)	22.21	5.02	29.68	23.42	6.27	31.03
29.	Manganese, Mn (mg/kg)	<0.001	4.65	4.03	0.013	4.98	4.47
30.	Vanadium, V (mg/kg)	<0.001	<0.001	0.49	<0.001	<0.001	0.41
31.	Nickel, Ni (mg/kg)	<0.001	<0.001	10.30	<0.001	<0.001	11.78
32.	Chromium, Cr (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
33.	Iron, Fe (mg/kg)	34.59	<0.01	63.72	39.14	5.83	74.05
34.	Lead, Pb (mg/kg)	3.44	3.86	3.74	4.72	4.18	4.52
35.	Copper, Cu (mg/kg)	15.60	7.14	4.65	18.3	11.26	8.18
36.	Zinc, Zn (mg/kg)	11.32	12.35	15.27	12.93	15.49	19.45
37.	Mercury, Hg (mg/kg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
38.	Arsenic, As (mg/kg)	0.14	0.07	0.04	0.27	0.18	0.13
39.	HUB (CFU/g) x 10 ³	1.3	0.8	0.8	14	27	22
40.	HUF (CFU/g) x 10 ³	0.9	0.6	0.3	3	4	3
41.	THB (CFU/g) x 10 ⁵	3.2	2.7	2.3	26.5	19.4	23.8
42.	THF (CFU/g) x 10 ⁵	2.4	1.5	1.2	10	13	11

NOTE: *LS – LOAMY SAND, SS – SANDY SOIL, SL – SANDY LOAMY.*

ANNEXURE 4.7: VEGETATION RESULTS

(TREES, SHRUBS AND HERBACEOUS PLANTS)

DRY SEASON

ANNEXURE 4.7b CHECKLIST OF TREE AND SHRUB IDENTIFIED IN THE STUDY AREA

S/N	Species Name	T1	T2	T3	T4	T5	T6	T7	T8	Species Freq.	Relative Abundance	Species Evenness	IUCN STATUS
1	<i>Acasia sp.</i>	0	0	3	0	0	0	0	0	12.5	0.42	0	NE
2	<i>Albizia sp.</i>	0	0	3	0	0	0	0	0	12.5	0.42	0	NE
3	<i>Alchornea cordifolia</i>	0	3	4	7	24	21	0	0	62.5	8.19	0.82	NE
4	<i>Alchornea laxiflora</i>	0	0	0	0	13	0	0	0	12.5	1.81	0	NE
5	<i>Alchornea oppositifolia</i>	5	0	3	0	0	0	0	0	25	1.11	0.95	NE
6	<i>Allophalus sp.</i>	0	0	0	4	0	0	0	0	12.5	0.56	0	NE
7	<i>Alstonia boonei</i>	2	0	1	0	2	0	0	0	37.5	0.69	0.96	NE
8	<i>Annona sp.</i>	0	0	0	1	0	0	0	0	12.5	0.14	0	NE
9	<i>Anthocliesta sp.</i>	0	0	0	0	3	2	0	0	25	0.69	0.97	NE
10	<i>Anthocliesta vogelli</i>	4	2	0	3	5	0	0	0	50	1.94	0.96	NE
11	<i>Anthonatha macrophylla</i>	16	0	0	8	14	0	0	0	37.5	5.28	0.96	NE
12	<i>Ceiba pentandra</i>	0	0	0	0	1	0	0	0	12.5	0.14	0	NE
13	<i>Cleistopholis pantens</i>	0	0	3	0	7	0	0	0	25	1.39	0.88	NE
14	<i>Dracinia sp.</i>	2	0	0	3	0	0	0	0	25	0.69	0.97	NE
15	<i>Dicrodes edulis</i>	0	0	4	0	0	0	0	0	12.5	0.56	0	LC
16	<i>Elieas guineensis</i>	12	4	7	4	21	14	0	0	75	8.61	0.9	LC
17	<i>Ficus exerparata</i>	4	0	0	0	0	0	0	0	12.5	0.56	0	LC
18	<i>Ficus muscosa</i>	5	0	0	0	0	0	0	0	12.5	0.69	0	LC
19	<i>Ficus sp</i>	0	5	5	7	0	12	0	0	50	4.03	0.95	LC
20	<i>Ficus sur</i>	3	0	0	0	0	0	0	0	12.5	0.42	0	LC
21	<i>Gracinia mannii</i>	0	0	0	2	3	4	0	0	37.5	1.25	0.97	LC

S/N	Species Name	T1	T2	T3	T4	T5	T6	T7	T8	Species Freq.	Relative Abundance	Species Evenness	IUCN STATUS
22	<i>Harungana madagascarensis</i>	4	0	7	13	24	2	0	0	62.5	6.94	0.81	LC
23	<i>Kola sp.</i>	0	0	0	0	3	8	0	0	25	1.53	0.85	LC
24	<i>Macaranga sp.</i>	0	0	12	0	7	0	0	0	25	2.64	0.95	NE
25	<i>Mallotus sp.</i>	2	0	0	7	0	0	0	0	25	1.25	0.76	NE
26	<i>Mangifera indica</i>	5	0	0	0	3	0	0	0	25	1.11	0.95	NE
27	<i>Maniphytom fulvum</i>	0	0	0	10	24	0	0	0	25	4.72	0.87	NE
28	<i>Meosobotrya sp.</i>	8	0	0	0	0	0	0	0	12.5	1.11	0	NE
29	<i>Milecia excelsa</i>	3	0	0	0	0	0	0	0	12.5	0.42	0	LC
30	<i>Millettia arboensis</i>	0	12	14	6	9	0	0	0	50	5.69	0.97	NE
31	<i>Millettia thonningii</i>	0	0	0	0	3	0	0	0	12.5	0.42	0	NE
32	<i>Musanga sp.</i>	0	0	7	0	6	5	0	0	37.5	2.5	0.99	NE
33	<i>Myristica sp.</i>	0	0	0	2	0	0	0	0	12.5	0.28	0	NE
34	<i>Napoleona sp.</i>	0	7	3	0	8	3	0	0	50	2.92	0.93	NE
35	<i>Nauclea pobeguinii</i>	0	0	0	0	5	0	0	0	12.5	0.69	0	LC
36	<i>Newbouldia leavis</i>	2	5	0	0	3	0	0	0	37.5	1.39	0.94	LC
37	<i>Pentacletra macrophylla</i>	0	9	0	7	5	0	0	0	37.5	2.92	0.97	LC
38	<i>Psidium guajava</i>	7	0	0	0	0	0	0	0	12.5	0.97	0	LC
39	<i>Pterocarpus santaloides</i>	0	0	0	4	0	7	0	0	25	1.53	0.95	LC
40	<i>Raphia sp.</i>	0	0	0	5	7	0	0	0	25	1.67	0.98	LC
41	<i>Raphia spp.,</i>	0	0	12	0	0	0	0	0	12.5	1.67	0	LC
42	<i>Senna alata</i>	0	0	27	0	0	0	0	0	12.5	3.75	0	LC
43	<i>Senna semea</i>	12	0	0	0	0	0	0	0	12.5	1.67	0	LC
44	<i>Spondias mombin</i>	0	0	6	0	4	9	0	0	37.5	2.64	0.95	LC
45	<i>Streculia tragacantha</i>	0	0	0	0	17	6	0	0	25	3.19	0.83	LC
46	<i>Symphonia globulifera</i>	0	0	0	0	3	0	0	0	12.5	0.42	0	LC
47	<i>Tectonia grandis</i>	0	0	0	0	3	0	0	0	12.5	0.42	0	LC
48	<i>Terminalia sp.</i>	0	0	0	0	1	0	0	0	12.5	0.14	0	LC

S/N	Species Name	T1	T2	T3	T4	T5	T6	T7	T8	Species Freq.	Relative Abundance	Species Evenness	IUCN STATUS
49	<i>Treculia sp.</i>	0	0	0	2	0	0	0	0	12.5	0.28	0	LC
50	<i>Dialium guineensis</i>	0	0	0	14	0	21	0	0	25	4.86	0.97	LC
51	<i>Vitex sp.</i>	0	0	3	2	0	0	0	0	25	0.69	0.97	LC

Note: NE = Not Evaluated, LC = Least Concern

ANNEXURE 4.7b: CHECKLIST OF HERBACEOUS PLANTS IDENTIFIED IN THE STUDY AREA

S/N	Species Name	T1	T2	T3	T4	T5	T6	T7	T8	Species Freq.	Relative Abundance	Species Evenness	IUCN Status
1	<i>Panicum maximum</i>	21	0	0	31	0	39	23	0	50	2.73	0.98	NE
2	<i>Manihot esculenta</i>	48	0	0	12	0	43	0	0	37.5	2.46	0.88	NE
3	<i>Andropogon gayanus</i>	0	0	0	15	24	23	31	0	50	2.23	0.98	NE
4	<i>Sida acuta</i>	12	0	0	23	0	55	0	0	37.5	2.15	0.84	NE
5	<i>Bambusa vulgaris</i>	0	20	3	20	3	31	0	0	62.5	1.84	0.82	NE
6	<i>Aspilia africana</i>	0	19	0	25	3	29	0	0	50	1.82	0.87	NE
7	<i>Phyllathus amarus</i>	23	0	0	0	39	13	0	0	37.5	1.79	0.92	NE
8	<i>Custus afer</i>	3	39	0	10	20	35	0	10	37.5	1.65	0.88	NE
9	<i>Sporobolus pyramidalis</i>	0	0	0	0	0	67	0	0	12.5	1.6	0	NE
10	<i>Urena lobata</i>	3	2	0	10	45	5	0	0	62.5	1.56	0.61	NE
11	<i>Pennisetum pedicellatum,</i>	22	0	0	0	0	0	43	0	25	1.56	0.92	NE
12	<i>Euphorbia heterophylla</i>	22	0	0	0	0	0	0	37	25	1.41	0.95	NE
13	<i>Chromoleneae odorata</i>	0	8	6	29	13	0	0	0	50	1.34	0.86	NE
14	<i>Euphorbia hirta</i>	12	0	0	0	0	43	0	0	25	1.32	0.76	NE
15	<i>Asystasia gangetica</i>	29	0	0	24	0	0	0	0	25	1.27	0.99	NE
16	<i>Digitaria gayana</i>	0	0	0	0	0	0	53	0	12.5	1.27	0	NE
17	<i>Monechma ciliatum</i>	0	31	0	0	0	0	0	17	25	1.15	0.94	NE
18	<i>Cynodium sp.</i>	0	3	0	23	0	21	0	0	37.5	1.12	0.81	NE
19	<i>Calapogonium muconoides</i>	0	0	12	10	0	23	0	0	37.5	1.08	0.94	NE
20	<i>Dioscorea sp.</i>	0	0	10	4	31	0	0	0	37.5	1.08	0.73	NE
21	<i>Brachiaria spp</i>	0	0	0	0	0	0	45	0	12.5	1.08	0	NE
22	<i>Hackelochloa granularis</i>	0	0	0	0	0	0	45	0	12.5	1.08	0	NE
23	<i>Panicum laxum</i>	0	44	0	0	0	0	0	0	12.5	1.05	0	NE
24	<i>Sacilepsis africana</i>	0	43	0	0	0	0	0	0	12.5	1.03	0	NE
25	<i>Croton lobatus</i>	0	0	0	0	10	32	0	0	25	1.01	0.79	NE
26	<i>Leptochloa filiformis</i>	0	0	0	0	0	0	42	0	12.5	1.01	0	NE
27	<i>Desmodium salicifolium</i>	0	0	0	0	0	0	0	41	12.5	0.98	0	NE

S/N	Species Name	T1	T2	T3	T4	T5	T6	T7	T8	Species Freq.	Relative Abundance	Species Evenness	IUCN Status
28	<i>Rottboellia cochinchinensis</i>	0	0	0	0	0	0	39	0	12.5	0.93	0	NE
29	<i>Ludwigia</i> spp.	7	18	11	2	0	0	0	0	50	0.91	0.85	NE
30	<i>Chrysopogon aciculatus</i>	0	0	0	0	0	0	37	0	12.5	0.89	0	NE
31	<i>Cyperus</i> spp.	13	0	21	35	0	0	0	0	12.5	0.84	0	NE
32	<i>Ipomea</i> sp.	0	0	3	0	10	21	0	0	37.5	0.81	0.79	NE
33	<i>Salvinia nymphaeella</i>	0	34	0	0	0	0	0	0	12.5	0.81	0	NE
34	<i>Sida linifolia</i>	0	0	0	0	0	0	0	34	12.5	0.81	0	NE
35	<i>Creponia</i> sp.	0	0	0	33	0	0	0	0	12.5	0.79	0	NE
36	<i>Brachiaria deflexa</i>	0	0	0	0	0	0	32	0	12.5	0.77	0	NE
37	<i>Imperata cylindrical</i>	0	0	0	0	0	0	32	0	12.5	0.77	0	NE
38	<i>Tomatococcus danieli</i>	32	0	0	0	0	0	0	0	12.5	0.77	0	NE
39	<i>Triumfetta rhomboidea</i>	0	0	0	0	0	0	0	32	12.5	0.77	0	NE
40	<i>Mimosa invosa</i>	0	0	0	31	0	0	0	0	12.5	0.74	0	NE
41	<i>Dactyloctenium aegyptium</i>	0	0	0	0	0	0	30	0	12.5	0.72	0	NE
42	<i>Cissus</i> sp.	3	0	2	0	10	14	0	0	50	0.69	0.82	NE
43	<i>Aframomum</i> spp.	0	0	0	0	29	0	0	0	12.5	0.69	0	NE
44	<i>Hypoestes forskalei</i>	0	29	0	0	0	0	0	0	12.5	0.69	0	NE
45	<i>Zea mays</i>	0	0	0	29	0	0	0	0	12.5	0.69	0	NE
46	<i>Fumtunia</i> sp.	6	0	0	8	13	0	0	0	37.5	0.65	0.95	NE
47	<i>Euphorbia</i> spp.	0	0	0	0	27	0	0	0	12.5	0.65	0	NE
48	<i>Malvastrum coromandelianum</i>	0	0	0	0	0	0	0	27	12.5	0.65	0	NE
49	<i>Vernonia cineræ</i>	0	27	0	0	0	0	0	0	12.5	0.65	0	NE
50	<i>Musa</i> spp.	0	2	0	0	0	24	0	0	25	0.62	0.39	NE
51	<i>Passiflora feotida</i>	13	12	0	0	0	0	0	0	25	0.6	1	NE
52	<i>Combretum racemosum</i>	0	0	0	0	25	0	0	0	12.5	0.6	0	NE
53	<i>Eragrostis atrovirens</i>	0	0	0	0	0	0	25	0	12.5	0.6	0	NE
54	<i>Hyparrhenia involucre</i>	0	0	0	0	0	0	25	0	12.5	0.6	0	NE

S/N	Species Name	T1	T2	T3	T4	T5	T6	T7	T8	Species Freq.	Relative Abundance	Species Evenness	IUCN Status
55	<i>Amaramthus sp.</i>	3	2	0	0	18	0	0	0	37.5	0.55	0.61	NE
56	<i>Lageneria breviflora</i>	0	2	0	0	15	0	0	6	37.5	0.55	0.77	NE
57	<i>Cymbopogon giganteus</i>	0	0	0	0	0	0	23	0	12.5	0.55	0	NE
58	<i>Cynthula prostrata</i>	0	0	23	0	0	0	0	0	12.5	0.55	0	NE
59	<i>Evolvulus alsinoides</i>	0	0	0	0	0	0	0	23	12.5	0.55	0	NE
60	<i>Gomphrena sp.</i>	23	0	0	0	0	0	0	0	12.5	0.55	0	NE
61	<i>Pentodon pantandrus</i>	0	23	0	0	0	0	0	0	12.5	0.55	0	NE
62	<i>Perperomia sp.</i>	23	0	0	0	0	0	0	0	12.5	0.55	0	NE
63	<i>Physalis angulata</i>	0	23	0	0	0	0	0	0	12.5	0.55	0	NE
64	<i>Vernonia galamensis</i>	0	0	0	0	0	0	0	23	12.5	0.55	0	NE
65	<i>Cintrocima pubiscense</i>	10	0	0	12	0	0	0	0	25	0.53	0.99	NE
66	<i>Mimosa pidica</i>	0	19	0	3	0	0	0	0	25	0.53	0.57	NE
67	<i>Colocasis esculenta</i>	0	0	0	22	0	0	0	0	12.5	0.53	0	NE
68	<i>Diptazium samnatii</i>	22	0	0	0	0	0	0	0	12.5	0.53	0	NE
69	<i>Hiptis swavelencse</i>	0	0	0	22	0	0	0	0	12.5	0.53	0	NE
70	<i>Mormodica charantia</i>	22	0	0	0	0	0	0	0	12.5	0.53	0	NE
71	<i>Scleria naumanniana</i>	22	0	0	0	0	0	0	0	12.5	0.53	0	NE
72	<i>Combretum racemosum</i>	9	0	12	0	0	0	0	0	25	0.5	0.99	NE
73	<i>Andropogon tectorum</i>	0	0	0	0	0	0	21	0	12.5	0.5	0	NE
74	<i>Hyperthelia dissolute</i>	0	0	0	0	0	0	21	0	12.5	0.5	0	NE
75	<i>Sida cordifolia</i>	21	0	0	0	0	0	0	0	12.5	0.5	0	NE
76	<i>Desmodium scorpirus</i>	0	20	0	0	0	0	0	0	12.5	0.48	0	NE
77	<i>Sesanum alatum</i>	0	0	0	0	0	0	0	20	12.5	0.48	0	NE
78	<i>Conyza Sumatrensis</i>	2	0	0	0	7	0	10	0	37.5	0.45	0.86	NE
79	<i>Amarathus hybridus</i>	0	4	0	15	0	0	0	0	25	0.45	0.74	NE
80	<i>Cissus gracilis</i>	0	0	0	19	0	0	0	0	12.5	0.45	0	NE
81	<i>Daniellia oliveri</i>	0	0	0	0	0	0	0	19	12.5	0.45	0	NE
82	<i>Oldenlandia herbacea</i>	0	0	0	0	0	0	0	19	12.5	0.45	0	NE

S/N	Species Name	T1	T2	T3	T4	T5	T6	T7	T8	Species Freq.	Relative Abundance	Species Evenness	IUCN Status
83	<i>Crotalaria macrocalyx</i>	0	0	3	0	0	15	0	0	25	0.43	0.65	NE
84	<i>Hibiscus haspan</i>	5	0	0	0	0	0	0	13	25	0.43	0.85	NE
85	<i>Combretum platypterum</i>	0	0	0	18	0	0	0	0	12.5	0.43	0	NE
86	<i>Eriosema psoraleoides</i>	0	0	0	0	0	0	0	18	12.5	0.43	0	NE
87	<i>Sida rhombifolia</i>	0	0	0	0	0	0	0	18	12.5	0.43	0	NE
88	<i>Adenia lobata</i>	6	0	3	6	2	0	0	0	50	0.41	0.93	NE
89	<i>Aspilia bussei</i>	0	0	0	7	0	10	0	0	25	0.41	0.98	NE
90	<i>Combretum spp.</i>	0	7	0	10	0	0	0	0	25	0.41	0.98	NE
91	<i>Clapertonia fiblifomis</i>	0	0	0	17	0	0	0	0	12.5	0.41	0	NE
92	<i>Hypoestes cancellata</i>	0	0	0	0	0	0	0	17	12.5	0.41	0	NE
93	<i>Polycarpaea corymbosa</i>	0	0	0	0	0	0	0	17	12.5	0.41	0	NE
94	<i>Chrysanthellum indicum</i>	0	13	0	0	3	0	0	0	25	0.38	0.7	NE
95	<i>Combretum bracteatum</i>	0	0	0	0	0	16	0	0	12.5	0.38	0	NE
96	<i>Laggera aurita</i>	0	0	0	0		0	0	16	12.5	0.38	0	NE
97	<i>Loudetia annua</i>	0	0	0	0	0	0	16	0	12.5	0.38	0	NE
98	<i>Sclerocarpus africanus</i>	0	0	0	0	0	0	0	16	12.5	0.38	0	NE
99	<i>Vernonia perrottetii</i>	0	0	0	0	0	0	0	16	12.5	0.38	0	NE
100	<i>Landolphia sp.</i>	12	0	0	0	3	0	0	0	25	0.36	0.72	NE
101	<i>Hydrolea palustris</i>	15	0	0	0	0	0	0	0	12.5	0.36	0	NE
102	<i>Luffa cylindrica</i>	7	0	0	3	0	4	0	0	37.5	0.34	0.94	NE
103	<i>Clerodendrum splendens</i>	5	0	9	0	0	0	0	0	25	0.34	0.94	NE
104	<i>Lantana camara</i>	9	0	0	0	5	0	0	0	25	0.34	0.94	NE
105	<i>Loudetia arundinacea</i>	0	0	0	0	0	0	14	0	12.5	0.34	0	NE
106	<i>Tephrosia pedicellata</i>	0	0	0	0	0	0	0	14	12.5	0.34	0	NE
107	<i>Melastrutum sp.</i>	0	0	0	13	0	0	0	0	12.5	0.31	0	NE
108	<i>Vernonia amygdalina</i>	13	0	0	0	0	0	0	0	12.5	0.31	0	NE
109	<i>Cochlospermum planchoni</i>	0	7	0	0	3	0	2	0	37.5	0.29	0.87	NE
110	<i>Blepharis maderaspatensis</i>	0	0	3	0	9	0	0	0	25	0.29	0.81	NE

S/N	Species Name	T1	T2	T3	T4	T5	T6	T7	T8	Species Freq.	Relative Abundance	Species Evenness	IUCN Status
111	<i>Allanmanda</i> sp.	0	0	0	0	0	12	0	0	12.5	0.29	0	NE
112	<i>Cleome</i> sp.	0	0	0	0	0	12	0	0	12.5	0.29	0	NE
113	<i>Heteropogon connortus</i>	0	0	0	0	0	0	12	0	12.5	0.29	0	NE
114	<i>Ipomoea trichantha</i>	12	0	0	0	0	0	0	0	12.5	0.29	0	NE
115	<i>Ipomoea involucreata</i>	0	0	0	12	0	0	0	0	12.5	0.29	0	NE
116	<i>Leonotis nepetifolia</i>	0	0	0	0	0	0	0	12	12.5	0.29	0	NE
117	<i>Psychotria polanthera</i>	12	0	0	0	0	0	0	0	12.5	0.29	0	NE
118	<i>Sorghum arundinaceum</i>	0	0	0	0	0	0	12	0	12.5	0.29	0	NE
119	<i>Spermacoce octodon</i>	0	0	0	0	0	0	0	12	12.5	0.29	0	NE
120	<i>Acanthus montanus</i>	0	3	2	5	0	0	0	0	37.5	0.24	0.94	NE
121	<i>Carica papaya</i>	3	7	0	0	0	0	0	0	25	0.24	0.88	NE
122	<i>Xanthosoma sagittifolia</i>	0	7	0	3	0	0	0	0	25	0.24	0.88	NE
123	<i>Bidens pinnata</i>	0	10	0	0	0	0	0	0	12.5	0.24	0	NE
124	<i>Cenchrus biflorus</i>	0	0	0	0	0	0	10	0	12.5	0.24	0	NE
125	<i>Elusine indica</i>	10	0	0	0	0	0	0	0	12.5	0.24	0	NE
126	<i>Hyptis spicigera</i>	0	0	0	0	0	0	0	10	12.5	0.24	0	NE
127	<i>Ipomoea triloba</i>	0	10	0	0	0	0	0	0	12.5	0.24	0	NE
128	<i>Vernonia ambigua</i>	0	0	0	0	0	0	0	10	12.5	0.24	0	NE
129	<i>Stachythapheta cyanensis</i>	0	0	0	9	0	0	0	0	12.5	0.22	0	NE
130	<i>Smilax anceps</i>	3	0	2	3	0	0	0	0	37.5	0.19	0.99	NE
131	<i>Calamus</i> sp.	0	0	5	0	2	0	0	0	25	0.17	0.86	NE
132	<i>Chamaecrista mimosoides</i>	0	0	0	0	0	5	0	2	25	0.17	0.86	NE
133	<i>Croton hirsuta</i>	0	4	0	3	0	0	0	0	25	0.17	0.99	NE
134	<i>Abrus</i> sp.	0	0	0	7	0	0	0	0	12.5	0.17	0	NE
135	<i>Aerva javanica</i>	0	0	0	0	0	0	0	7	12.5	0.17	0	NE
136	<i>Ageratum houtonianum</i>	0	7	0	0	0	0	0	0	12.5	0.17	0	NE
137	<i>Canna indica</i>	0	7	0	0	0	0	0	0	12.5	0.17	0	NE
138	<i>Cloeme retrosperma</i>	7	0	0	0	0	0	0	0	12.5	0.17	0	NE

S/N	Species Name	T1	T2	T3	T4	T5	T6	T7	T8	Species Freq.	Relative Abundance	Species Evenness	IUCN Status
139	<i>Isoblerlina doka</i>	0	0	0	0	0	0	0	7	12.5	0.17	0	NE
140	<i>Polygonum lanigerum</i>	0	7	0	0	0	0	0	0	12.5	0.17	0	NE
141	<i>Celosia leptostachya</i>	2	0	0	4		0	0	0	25	0.14	0.92	NE
142	<i>Combretum hispidum</i>	0	6	0	0	0	0	0	0	12.5	0.14	0	NE
143	<i>Justicia carnea</i>	0	6	0	0	0	0	0	0	12.5	0.14	0	NE
144	<i>Rhynchospora corymbosa</i>	6	0	0	0	0	0	0	0	12.5	0.14	0	NE
145	<i>Sphenoclea zzylanica</i>	6	0	0	0	0	0	0	0	12.5	0.14	0	NE
146	<i>Combretum indicum</i>	0	5	0	0	0	0	0	0	12.5	0.12	0	NE
147	<i>Echhornea natans</i>	0	5	0	0	0	0	0	0	12.5	0.12	0	NE
148	<i>Nelsonia canescens</i>	0	5	0	0	0	0	0	0	12.5	0.12	0	NE
149	<i>Piliostigma thonningii</i>	0	0	0	0	0	0	0	5	12.5	0.12	0	NE
150	<i>Solanum torvum</i>	5	0	0	0	0	0	0	0	12.5	0.12	0	NE
151	<i>Syngonium pobophyllum</i>	0	0	5	0	0	0	0	0	12.5	0.12	0	NE
152	<i>Adenia cissampliodes</i>	4	0	0	0	0	0	0	0	12.5	0.1	0	NE
153	<i>Albemuscus esculenta</i>	4	0	0	0	0	0	0	0	12.5	0.1	0	NE
154	<i>Fuirena umbellata</i>	4	0	0	0	0	0	0	0	12.5	0.1	0	NE
155	<i>Solanum nigrum</i>	4	0	0	0	0	0	0	0	12.5	0.1	0	NE
156	<i>Acmella uglinosa</i>	0	3	0	0	0	0	0	0	12.5	0.07	0	NE
157	<i>Brillantasia lamum</i>	0	0	0	0	3	0	0	0	12.5	0.07	0	NE
158	<i>Fimbristylis littoralis</i>	3	0	0	0	0	0	0	0	12.5	0.07	0	NE
159	<i>Heteranthera callifolia</i>	3	0	0	0	0	0	0	0	12.5	0.07	0	NE
160	<i>Paulinia sp.</i>	0	0	0	3	0	0	0	0	12.5	0.07	0	NE
161	<i>Synedrella sp.</i>	3	0	0	0	0	0	0	0	12.5	0.07	0	NE
162	<i>Triumffeta cordifolia</i>	3	0	0	0	0	0	0	0	12.5	0.07	0	NE
163	<i>Aeschynomene indica</i>	2	0	0	0	0	0	0	0	12.5	0.05	0	NE
164	<i>Cyperus haspan</i>	0	2	0	0	0	0	0	0	12.5	0.05	0	NE
165	<i>Melochia corchorifolia</i>	2	0	0	0	0	0	0	0	12.5	0.05	0	NE
166	<i>Citrus cinensis</i>	0	0	1	0	0	0	0	0	12.5	0.02	0	NE

Note: NE = Not Evaluated, LC = Least Concern

WET SEASON

Checklist of plant species identified in the study area

S/N	Botanical name	T1	T2	T3	T4	T5	T6	T7	T8	freg.	RA	Evenness	IUCN status
1	<i>Manihot esculenta</i>	10	0	0	20	15	5	3	0	62.5	1.68	0.89	LC
2	<i>Carica papaya</i>	3	2	0	0	0	1	0	0	37.5	0.19	0.92	LC
3	<i>Costus afer</i>	3	0	0	14	21	21	0	0	50	1.87	0.89	LC
4	<i>Costus lucanusianus</i>	2	0	0	0	0	0	0	0	12.5	0.06	0	LC
5	<i>Harungana madagascariensis</i>	2	0	3	0	0	5	3	0	50	0.41	0.96	LC
6	<i>Clerodendrum splendens</i>	1	0	0	0	4	7	9	0	50	0.66	0.86	LC
7	<i>Elaeis guineensis</i>	4	6	5	7	3	6	5	0	87.5	1.14	0.98	LC
8	<i>Senna hirsuta</i>	1	0	0	0	2	0	0	0	25	0.09	0.92	LC
9	<i>Senna obtusifolia</i>	1	0	0	0	0	3	0	0	25	0.13	0.81	LC
10	<i>Maesobotrya</i> sp./spp.	4	0	0	0	1	0	0	0	25	0.16	0.72	NE
11	<i>Bidens pilosa</i>	20	0	0	0	0	0	0	0	12.5	0.63	0	LC
12	<i>Alternanthera sessilis</i>	10	0	0	0	25	0	17	0	37.5	1.65	0.94	LC
13	<i>Commelina benghalensis</i>	9	0	0	0	5	0	0	0	25	0.44	0.94	LC
14	<i>Glyphaea brevis</i>	2	0	0	0	0	0	0	0	12.5	0.06	0	LC
15	<i>Ageratum conyzoides</i>	23	0	0	0	0	0	0	0	12.5	0.73	0	LC
16	<i>Dioscorea rotundata</i>	7	0	0	0	0	0	0	0	12.5	0.22	0	NE
17	<i>Trema orientalis</i>	1	0	0	0	0	0	0	0	12.5	0.03	0	LC
18	<i>Talinum triangulare</i>	20	0	7	0	0	0	0	22	37.5	1.55	0.91	LC
19	<i>Combretum racemosum</i>	3	0	0	0	5	0	0	0	25	0.25	0.95	LC

S/N	Botanical name	T1	T2	T3	T4	T5	T6	T7	T8	freg.	RA	Evenness	IUCN status
20	<i>Allophylus africanus</i>	2	0	0	0	0	0	0	3	25	0.16	0.97	LC
21	<i>Ludwigia abyssinica</i>	21	0	0	5	0	0	0	0	25	0.82	0.71	LC
22	<i>Ludwigia adscendens</i>	8	10	0	7	0	0	0	0	37.5	0.79	0.99	LC
23	<i>Hibiscus</i> sp.	2	0	0	0	0	0	0	0	12.5	0.06	0	NE
24	<i>Aspilia africana</i>	23	15	9	5	6	0	0	0	62.5	1.83	0.9	LC
25	<i>Panicum laxum</i>	25	39	0	0	51	0	0	0	37.5	3.64	0.96	LC
26	<i>Diodia samentosa</i>	4	3	0	0	0	0	21	0	37.5	0.89	0.67	LC
27	<i>Ipomoea involucrata</i>	12	7	0	0	0	0	0	0	25	0.6	0.95	LC
28	<i>Macaranga madagascariensis</i>	3	4	0	0	0	0	0	0	25	0.22	0.99	LC
29	<i>Anthonata macrophylla</i>	5	5	3	5	0	7	6	0	75	0.98	0.98	NE
30	<i>Mimosa pudica</i>	7	29	4	0	0	0	3	0	50	1.36	0.7	LC
31	<i>Melastomastrum</i> sp.	4	34	0	0	0	0	0	0	25	1.2	0.49	NE
32	<i>Alchornea laxiflora</i>	3	5	2	4	0	0	0	0	50	0.44	0.96	LC
33	<i>Alchornea cordifolia</i>	8	6	9	9	5	7	3	0	87.5	1.49	0.97	LC
34	<i>Milletia</i> sp.	0	2	0	0	0	0	0	0	12.5	0.06	0	NE
35	<i>Chromolaena odorata</i>	0	12	0	15	7	5	5	0	62.5	1.39	0.94	LC
36	<i>Ficus</i> sp.	0	2	0	0	0	0	0	0	12.5	0.06	0	NE
37	<i>Amaranthus</i> sp.	0	3	0	0	0	0	0	0	12.5	0.09	0	NE
38	<i>Pentaclethra macrophylla</i>	0	1	0	0	0	0	2	0	25	0.09	0.92	LC
39	<i>Funtumia</i> sp.	0	1	0	0	0	0	0	0	12.5	0.03	0	NE
40	<i>Anthocleista vogelii</i>	0	3	0	0	0	0	0	0	12.5	0.09	0	LC
41	<i>Combretum</i> spp.	0	5	0	0	0	0	0	0	12.5	0.16	0	NE
42	<i>Justicia carnea</i>	0	2	0	0	0	0	0	0	12.5	0.06	0	LC
43	<i>Pennisetum</i> sp.	0	23	0	0	0	0	0	0	12.5	0.73	0	NE
44	<i>Newbouldia laevis</i>	0	1	0	0	0	2	2	0	37.5	0.16	0.96	LC
45	<i>Bambusa vulgaris</i>	0	9	3	0	0	0	10	5	50	0.85	0.93	LC
46	<i>Amaranthus hybridus</i>	0	10	0	0	0	0	0	0	12.5	0.32	0	LC

S/N	Botanical name	T1	T2	T3	T4	T5	T6	T7	T8	freg.	RA	Evenness	IUCN status
47	<i>Combretum indicum</i>	0	3	0	0	0	0	0	0	12.5	0.09	0	LC
48	<i>Eichhornia natans</i>	0	2	0	0	0	0	0	0	12.5	0.06	0	LC
49	<i>Urena lobata</i>	0	7	0	5	0	12	13	0	50	1.17	0.95	LC
50	<i>Ipomoea triloba</i>	0	6	0	0	0	13	0	0	25	0.6	0.9	LC
51	<i>Physalis angulata</i>	0	8	0	0	0	0	0	5	25	0.41	0.96	LC
52	<i>Bidens pinnata</i>	0	8	0	0	0	0	0	0	12.5	0.25	0	LC
53	<i>Ludwigia</i> spp.	0	4	0	0	0	0	0	0	12.5	0.13	0	NE
54	<i>Vernonia cinerea</i>	0	10	0	0	0	0	0	0	12.5	0.32	0	LC
55	<i>Musa</i> spp.	0	7	0	5	0	0	0	0	25	0.38	0.98	NE
56	<i>Acmella uliginosa</i>	0	7	0	0	0	0	0	0	12.5	0.22	0	LC
57	<i>Cyperus haspan</i>	0	19	0	0	0	0	0	0	12.5	0.6	0	LC
58	<i>Sacciolepis africana</i>	0	29	0	0	0	0	0	0	12.5	0.92	0	LC
59	<i>Polygonum lanigerum</i>	0	5	0	0	0	0	0	0	12.5	0.16	0	LC
60	<i>Heteranthera callifolia</i>	0	4	0	0	0	0	0	0	12.5	0.13	0	LC
61	<i>Pentodon pentandrus</i>	0	5	0	0	0	0	0	0	12.5	0.16	0	LC
62	<i>Salvinia nymphaeella</i>	0	4	0	0	0	0	0	0	12.5	0.13	0	LC
63	<i>Sphenoclea zeylanica</i>	0	2	0	0	0	0	0	0	12.5	0.06	0	LC
64	<i>Melochia corchorifolia</i>	0	4	0	0	0	0	0	0	12.5	0.13	0	LC
65	<i>Acanthus montanus</i>	0	3	0	0	0	0	0	0	12.5	0.09	0	LC
66	<i>Hypoestes forskalii</i>	0	4	0	0	0	0	0	0	12.5	0.13	0	LC
67	<i>Monechma ciliatum</i>	0	4	0	0	0	0	0	0	12.5	0.13	0	LC
68	<i>Nelsonia canescens</i>	0	6	0	0	0	0	0	0	12.5	0.19	0	LC
69	<i>Ageratum houstonianum</i>	0	7	9	0	0	0	0	0	25	0.51	0.99	LC
70	<i>Xanthosoma sagittifolium</i>	0	8	0	0	0	0	0	0	12.5	0.25	0	LC
71	<i>Desmodium scorpiurus</i>	0	9	0	0	0	0	0	7	25	0.51	0.99	LC
72	<i>Croton hirtus</i>	0	23	3	20	5	5	0	0	62.5	1.77	0.82	LC
73	<i>Canna indica</i>	0	4	0	0	0	0	0	0	12.5	0.13	0	LC

S/N	Botanical name	T1	T2	T3	T4	T5	T6	T7	T8	freg.	RA	Evenness	IUCN status
74	<i>Gomphrena</i> sp.	0	6	0	0	0	0	0	0	12.5	0.19	0	NE
75	<i>Panicum</i> spp.	0	27	0	0	0	0	0	0	12.5	0.85	0	NE
76	<i>Cynodon</i> sp.	0	7	0	0	0	0	0	0	12.5	0.22	0	NE
77	<i>Napoleona</i> sp.	0	6	0	0	0	0	0	0	12.5	0.19	0	NE
78	<i>Phyllanthus amarus</i>	0	9	0	29	0	0	0	21	37.5	1.87	0.91	LC
79	<i>Delonix regia</i>	0	2	0	2	0	0	0	0	25	0.13	1	LC
80	<i>Kyllinga brevifolia</i>	0	23	0	13	0	0	0	0	25	1.14	0.94	LC
81	<i>Cyperus richardii</i>	0	3	0	7	0	0	0	0	25	0.32	0.88	LC
82	<i>Eclipta alba</i>	0	0	9	0	0	0	0	0	12.5	0.28	0	LC
83	<i>Combretum hispidum</i>	0	0	2	0	0	0	0	0	12.5	0.06	0	LC
84	<i>Myrianthus arboreus</i>	0	0	2	3	1	0	2	0	50	0.25	0.95	LC
85	<i>Sida acuta</i>	0	0	32	7	9	17	8	13	75	2.72	0.91	LC
86	<i>Centrosema pubescens</i>	0	0	7	5	10	5	7	0	62.5	1.08	0.98	LC
87	<i>Amorphophallus</i> sp.	0	0	2	0	0	0	0	0	12.5	0.06	0	NE
88	<i>Cyantula prostrata</i>	0	0	12	3	0	0	0	0	25	0.47	0.72	NE
89	<i>Smilax anceps</i>	0	0	3	0	5	2	5	3	62.5	0.57	0.96	LC
90	<i>Dioscorea bulbifera</i>	0	0	10	3	0	15	0	0	37.5	0.89	0.86	LC
91	<i>Milicia excelsa</i>	0	0	3	0	1	2	1	1	62.5	0.25	0.93	NT
92	<i>Anthocleista vogelii</i>	0	0	4	2	5	0	0	1	50	0.38	0.89	LC
93	<i>Psidium guajava</i>	0	0	1	0	0	0	0	0	12.5	0.03	0	LC
94	<i>Cnetis ferruginea</i>	0	0	3	0	0	0	0	0	12.5	0.09	0	LC
95	<i>Mangifera indica</i>	0	0	1	1	0	0	0	0	25	0.06	1	LC
96	<i>Alchornea optisifolius</i>	0	0	3	7	0	0	0	0	25	0.32	0.88	LC
97	<i>Trichilia cordata</i>	0	0	2	0	0	0	0	0	12.5	0.06	0	LC
98	<i>Icacina trichantha</i>	0	0	7	4	0	5	9	2	62.5	0.85	0.93	LC
99	<i>Piper nigrum</i>	0	0	4	0	0	0	0	0	12.5	0.13	0	LC
100	<i>Phyllanthus niruri</i>	0	0	19	4	0	0	0	0	25	0.73	0.67	LC

S/N	Botanical name	T1	T2	T3	T4	T5	T6	T7	T8	freg.	RA	Evenness	IUCN status
101	<i>Annona</i> sp.	0	0	1	0	0	0	0	0	12.5	0.03	0	NE
102	<i>Saccharum officinarum</i>	0	0	6	0	0	0	0	0	12.5	0.19	0	LC
103	<i>Ammannia baccifera</i>	0	0	2	0	0	0	0	0	12.5	0.06	0	LC
104	<i>Boerhavia coccinea</i>	0	0	7	0	0	0	0	0	12.5	0.22	0	LC
105	<i>Boerhavia diffusa</i>	0	0	5	0	0	0	0	0	12.5	0.16	0	LC
106	<i>Passiflora foetida</i>	0	0	3	0	0	0	0	0	12.5	0.09	0	LC
107	<i>Ficus sur</i>	0	0	0	2	0	2	7	3	50	0.44	0.89	LC
108	<i>Nauclea diderrichii</i>	0	0	0	1	0	0	2	0	25	0.09	0.92	NT
109	<i>Mimosa invisa</i>	0	0	0	13	5	0	0	0	25	0.57	0.85	LC
110	<i>Ficus exasperata</i>	0	0	0	5	0	0	0	0	12.5	0.16	0	LC
111	<i>Panicum maximum</i>	0	0	0	45	21	13	0	0	37.5	2.5	0.88	LC
112	<i>Sporobolus pyramidalis</i>	0	0	0	29	0	0	0	0	12.5	0.92	0	LC
113	<i>Calopogonium mucunoides</i>	0	0	0	3	5	0	7	0	37.5	0.47	0.95	LC
114	<i>Senna alata</i>	0	0	0	2	0	0	0	0	12.5	0.06	0	LC
115	<i>Senna occidentalis</i>	0	0	0	3	0	0	0	0	12.5	0.09	0	LC
116	<i>Senna siamea</i>	0	0	0	1	0	0	0	0	12.5	0.03	0	LC
117	<i>Momordica charantia</i>	0	0	0	2	0	0	0	5	25	0.22	0.86	LC
118	<i>Icacina mannii</i>	0	0	0	6	0	7	4	0	37.5	0.54	0.98	LC
119	<i>Icacina senegalensis</i>	0	0	0	8	0	0	5	0	25	0.41	0.96	LC
120	<i>Dioscorea alata</i>	0	0	0	10	0	0	0	0	12.5	0.32	0	LC
121	<i>Dioscorea hirtiflora</i>	0	0	0	3	0	3	0	0	25	0.19	1	LC
122	<i>Baphia nitida</i>	0	0	0	4	2	5	7	3	62.5	0.66	0.95	LC
123	<i>Spondias mombin</i>	0	0	0	2	1	0	0	2	37.5	0.16	0.96	LC
124	<i>Cissus aralioides</i>	0	0	0	2	0	0	0	0	12.5	0.06	0	LC
125	<i>Emilia sonchifolia</i>	0	0	0	3	0	0	0	0	12.5	0.09	0	LC
126	<i>Emilia praetermissa</i>	0	0	0	5	0	0	0	0	12.5	0.16	0	LC
127	<i>Melanthera scandens</i>	0	0	0	5	0	0	0	0	12.5	0.16	0	LC

S/N	Botanical name	T1	T2	T3	T4	T5	T6	T7	T8	freg.	RA	Evenness	IUCN status
128	<i>Lagenaria breviflora</i>	0	0	0	6	0	0	0	0	12.5	0.19	0	LC
129	<i>Momordica charantia</i>	0	0	0	2	0	0	0	0	12.5	0.06	0	LC
130	<i>Dioscorea dumetorum</i>	0	0	0	3	0	0	0	0	12.5	0.09	0	LC
131	<i>Mimosa diplotricha</i>	0	0	0	7	0	3	0	0	25	0.32	0.88	LC
132	<i>Anchomanes difformis</i>	0	0	0	3	5	3	7	0	50	0.57	0.95	LC
133	<i>Phyllanthus muellerianus</i>	0	0	0	3	0	0	0	0	12.5	0.09	0	LC
134	<i>Brachiaria deflexa</i>	0	0	0	18	0	0	32	0	25	1.58	0.94	LC
135	<i>Stachytarpheta cayennensis</i>	0	0	0	4	3	0	0	0	25	0.22	0.99	LC
136	<i>Cocos nucifera</i>	0	0	0	2	0	0	0	0	12.5	0.06	0	LC
137	<i>Albizia zygia</i>	0	0	0	1	0	3	3	1	50	0.25	0.91	LC
138	<i>Pterocarpus</i> spp.	0	0	0	2	0	0	5	0	25	0.22	0.86	NE
139	<i>Tectona grandis</i>	0	0	0	1	0	0	0	0	12.5	0.03	0	LC
140	<i>Persea americana</i>	0	0	0	1	0	1	0	0	25	0.06	1	LC
141	<i>Tabernaemontana</i> sp.	0	0	0	3	0	0	0	0	12.5	0.09	0	NE
142	<i>Rauvolfia vomitoria</i>	0	0	0	5	2	4	3	7	62.5	0.66	0.95	LC
143	<i>Anacardium occidentale</i>	0	0	0	1	0	0	0	0	12.5	0.03	0	LC
144	<i>Muntingia calabura</i>	0	0	0	1	0	0	0	0	12.5	0.03	0	LC
145	<i>Corchorus tridens</i>	0	0	0	7	0	0	0	0	12.5	0.22	0	LC
146	<i>Corchorus olitorius</i>	0	0	0	3	0	0	0	0	12.5	0.09	0	LC
147	<i>Andropogon gayanus</i>	0	0	0	45	0	0	0	0	12.5	1.42	0	LC
148	<i>Peperomia pellucida</i>	0	0	0	12	0	0	0	0	12.5	0.38	0	LC
149	<i>Portulaca oleracea</i>	0	0	0	4	0	0	0	0	12.5	0.13	0	LC
150	<i>Landolphia dulcis</i>	0	0	0	0	3	0	0	3	25	0.19	1	LC
151	<i>Dioscorea</i> spp.	0	0	0	0	12	0	18	0	25	0.95	0.97	NE
152	<i>Alchornea</i> spp.	0	0	0	0	3	0	5	0	25	0.25	0.95	NE
153	<i>Alstonia boonei</i>	0	0	0	0	2	1	2	1	50	0.19	0.96	LC
154	<i>Ludwigia decurrens</i>	0	0	0	0	23	0	0	0	12.5	0.73	0	LC

S/N	Botanical name	T1	T2	T3	T4	T5	T6	T7	T8	freg.	RA	Evenness	IUCN status
155	<i>Ludwigia erecta</i>	0	0	0	0	14	0	0	0	12.5	0.44	0	LC
156	<i>Ludwigia hyssopifolia</i>	0	0	0	0	6	0	0	0	12.5	0.19	0	LC
158	<i>Millettia aboensis</i>	0	0	0	0	3	0	0	0	12.5	0.09	0	LC
159	<i>Cleistopholis patens</i>	0	0	0	0	2	0	0	0	12.5	0.06	0	LC
160	<i>Cola gigantea</i>	0	0	0	0	1	2	5	0	37.5	0.25	0.82	LC
161	<i>Cola millenii</i>	0	0	0	0	3	3	3	2	50	0.35	0.99	LC
162	<i>Albizia adianthifolia</i>	0	0	0	0	0	2	1	0	25	0.09	0.92	LC
163	<i>Dracaena</i> sp.	0	0	0	0	0	1	1	0	25	0.06	1	NE
164	<i>Spermacoce ocymoides</i>	0	0	0	0	21	17	0	23	37.5	1.93	0.99	LC
165	<i>Macaranga micrantha</i>	0	0	0	0	0	5	0	0	12.5	0.16	0	LC
166	<i>Baphia pubescens</i>	0	0	0	0	0	4	3	2	37.5	0.28	0.97	LC
167	<i>Uvariadendron calophyllum</i>	0	0	0	0	0	2	0	0	12.5	0.06	0	DD
168	<i>Uvariadendron connivens</i>	0	0	0	0	0	1	0	0	12.5	0.03	0	LC
169	<i>Triumfetta rhomboidea</i>	0	0	0	0	0	3	4	0	25	0.22	0.99	LC
170	<i>Stachytarpheta jamaicensis</i>	0	0	0	0	0	4	5	0	25	0.28	0.99	LC
171	<i>Sterculia tragacantha</i>	0	0	0	0	0	3	2	0	25	0.16	0.97	LC
172	<i>Bombax ceiba</i>	0	0	0	0	0	2	1	1	37.5	0.13	0.95	LC
173	<i>Uvaria chamae</i>	0	0	0	0	0	3	0	0	12.5	0.09	0	LC
174	<i>Pycnanthus angolensis</i>	0	0	0	0	0	2	0	0	12.5	0.06	0	LC
175	<i>Triclisia subcordata</i>	0	0	0	0	0	4	2	5	37.5	0.35	0.94	LC
176	<i>Pterocarpus santalinoides</i>	0	0	0	0	0	2	1	0	25	0.09	0.92	LC
177	<i>Kyllinga</i> spp.	0	0	0	0	0	23	0	0	12.5	0.73	0	NE
178	<i>Terminalia mantaly</i>	0	0	0	0	0	3	1	0	25	0.13	0.81	LC
179	<i>Cola pachycarpa</i>	0	0	0	0	0	1	1	0	25	0.06	1	LC
180	<i>Artocarpus altilis</i>	0	0	0	0	0	1	0	0	12.5	0.03	0	LC
181	<i>Treculia africana</i>	0	0	0	0	0	1	0	0	12.5	0.03	0	LC
182	<i>Chrysophyllum albidum</i>	0	0	0	0	0	2	0	0	12.5	0.06	0	LC

S/N	Botanical name	T1	T2	T3	T4	T5	T6	T7	T8	freg.	RA	Evenness	IUCN status
183	<i>Dacryodes edulis</i>	0	0	0	0	0	1	0	0	12.5	0.03	0	LC
184	<i>Allamanda cathartica</i>	0	0	0	0	0	2	0	0	12.5	0.06	0	LC
185	<i>Jatropha curcas</i>	0	0	0	0	0	2	0	0	12.5	0.06	0	LC
186	<i>Terminalia catappa</i>	0	0	0	0	0	3	0	0	12.5	0.09	0	LC
187	<i>Annona muricata</i>	0	0	0	0	0	1	0	0	12.5	0.03	0	LC
188	<i>Macaranga barteri</i>	0	0	0	0	0	5	3	0	25	0.25	0.95	LC
189	<i>Croton lobatus</i>	0	0	0	0	0	12	0	0	12.5	0.38	0	LC
190	<i>Ipomoea involucrata</i>	0	0	0	0	0	5	0	0	12.5	0.16	0	LC
191	<i>Tetrapleura tetraptera</i>	0	0	0	0	0	1	0	0	12.5	0.03	0	LC
192	<i>Pricalima nitida</i>	0	0	0	0	0	1	0	0	12.5	0.03	0	LC
193	<i>Pterocarpus soyauxii</i>	0	0	0	0	0	1	0	0	12.5	0.03	0	LC
194	<i>Brachystegia eurycoma</i>	0	0	0	0	0	2	0	0	12.5	0.06	0	LC
195	<i>Albizia glaberrima</i>	0	0	0	0	0	0	2	3	25	0.16	0.97	LC
196	<i>Scyphocephalum mannii</i>	0	0	0	0	0	0	1	0	12.5	0.03	0	LC
197	<i>Allophylus cobbe</i>	0	0	0	0	0	0	2	1	25	0.09	0.92	LC
198	<i>Allophylus nigericus</i>	0	0	0	0	0	0	3	2	25	0.16	0.97	LC
199	<i>Allophylus spicatus</i>	0	0	0	0	0	0	1	9	25	0.32	0.47	LC
200	<i>Oldenlandia corymbosa</i>	0	0	0	0	0	0	29	21	25	1.58	0.98	LC
201	<i>Spermacoce verticillata</i>	0	0	0	0	0	0	21	32	25	1.68	0.97	LC
202	<i>Macaranga monandra</i>	0	0	0	0	0	0	3	0	12.5	0.09	0	LC
203	<i>Macaranga heudelotii</i>	0	0	0	0	0	0	1	3	25	0.13	0.81	LC
204	<i>Baphia</i> spp.	0	0	0	0	0	0	5	0	12.5	0.16	0	NE
205	<i>Uvariadendron</i> spp.	0	0	0	0	0	0	3	2	25	0.16	0.97	NE
206	<i>Mimosa</i> spp.	0	0	0	0	0	0	13	0	12.5	0.41	0	NE
207	<i>Kyllinga erecta</i>	0	0	0	0	0	0	34	0	12.5	1.08	0	LC
208	<i>Kyllinga podophylla</i>	0	0	0	0	0	0	22	0	12.5	0.7	0	LC
209	<i>Cyperus bulbosa</i>	0	0	0	0	0	0	32	0	12.5	1.01	0	LC

S/N	Botanical name	T1	T2	T3	T4	T5	T6	T7	T8	freg.	RA	Evenness	IUCN status
210	<i>Setaria barbata</i>	0	0	0	0	0	0	23	0	12.5	0.73	0	LC
211	<i>Brachiaria decumbens</i>	0	0	0	0	0	0	12	0	12.5	0.38	0	LC
212	<i>Cleistopholis patens</i>	0	0	0	0	0	0	3	0	12.5	0.09	0	LC
213	<i>Monodora myristica</i>	0	0	0	0	0	0	1	0	12.5	0.03	0	LC
214	<i>Musanga cecropioides</i>	0	0	0	0	0	0	1	0	12.5	0.03	0	LC
215	<i>Garcinia mannii</i>	0	0	0	0	0	0	2	0	12.5	0.06	0	LC
218	<i>Hevea brasiliensis</i>	0	0	0	0	0	0	0	3	12.5	0.09	0	LC
219	<i>Synedrella nodiflora</i>	0	0	0	0	0	0	0	20	12.5	0.63	0	LC
220	<i>Tridax procumbens</i>	0	0	0	0	0	0	0	13	12.5	0.41	0	LC
221	<i>Cleome ruidosperma</i>	0	0	0	0	0	0	0	17	12.5	0.54	0	LC
222	<i>Leptemon owariense</i>	0	0	0	0	0	0	0	2	12.5	0.06	0	LC
223	<i>Acalypha fimbriata</i>	0	0	0	0	0	0	0	5	12.5	0.16	0	LC
224	<i>Euphorbia hirta</i>	0	0	0	0	0	0	0	21	12.5	0.66	0	LC
225	<i>Euphorbia heterophylla</i>	0	0	0	0	0	0	0	27	12.5	0.85	0	LC
226	<i>Euphorbia hyssopifolia</i>	0	0	0	0	0	0	0	31	12.5	0.98	0	LC
227	<i>Scleria</i> sp.	0	0	0	0	0	0	0	23	12.5	0.73	0	NE
228	<i>Alysicarpus vaginalis</i>	0	0	0	0	0	0	0	21	12.5	0.66	0	LC
229	<i>Symphonia globulifera</i>	0	0	0	0	0	0	0	2	12.5	0.06	0	LC
230	<i>Pueraria phaseoloides</i>	0	0	0	0	0	0	0	7	12.5	0.22	0	LC
231	<i>Malvastrum coromandelianum</i>	0	0	0	0	0	0	0	5	12.5	0.16	0	LC
232	<i>Mitracarpus villosus</i>	0	0	0	0	0	0	0	2	12.5	0.06	0	LC
233	<i>Lindernia crustacea</i>	0	0	0	0	0	0	0	5	12.5	0.16	0	LC
234	<i>Scoparia dulcis</i>	0	0	0	0	0	0	0	8	12.5	0.25	0	LC
235	<i>Triumfetta cordifolia</i>	0	0	0	0	0	0	0	4	12.5	0.13	0	LC
236	<i>Laportea aestuans</i>	0	0	0	0	0	0	0	12	12.5	0.38	0	LC
237	<i>Pouzolzia guineensis</i>	0	0	0	0	0	0	0	9	12.5	0.28	0	LC

S/N	Botanical name	T1	T2	T3	T4	T5	T6	T7	T8	freg.	RA	Evenness	IUCN status
238	<i>Reissantia indica</i>	0	0	0	0	0	0	0	2	12.5	0.06	0	LC
239	<i>Daniellia oliveri</i>	0	0	0	0	0	0	0	2	12.5	0.06	0	LC
240	<i>Dialium guineense</i>	0	0	0	0	0	0	0	5	12.5	0.16	0	LC
241	<i>Isoberlinia doka</i>	0	0	0	0	0	0	0	2	12.5	0.06	0	LC
242	<i>Eleusine indica</i>	0	0	0	0	0	0	0	23	12.5	0.73	0	LC
243	<i>Napoleona imperialis</i>	0	0	0	0	0	0	0	3	12.5	0.09	0	LC
244	<i>Phyllanthus amarus</i>	0	21	0	10	0	0	0	23	37.5	1.71	0.95	LC
245	<i>Bombax buonopozense</i>	0	0	0	0	0	0	0	3	12.5	0.09	0	LC
246	<i>Macaranga spinosa</i>	0	0	0	0	0	0	0	2	12.5	0.06	0	LC
247	<i>Vitex grandifolia</i>	0	0	0	0	0	0	0	1	12.5	0.03	0	LC
248	<i>Uvariadendron occidentale</i>	0	0	0	0	0	0	0	1	12.5	0.03	0	LC
249	<i>Plukenetia conophora</i>	0	0	0	0	0	0	0	1	12.5	0.03	0	LC

ANNEXURE 4.8 ECOSYSTEM SERVICES

Ethnobotanical Value/Uses of Plant in the Project Area

S/N	Species Composition	Common Name	Family	Ethnobotanical Value/Uses
1	<i>Gmelina arborea</i>	Gmelina	<i>Lamiaceae</i>	It is used for making furniture, boats, and musical instruments.
2	<i>Tectona grandis</i>	Teak	<i>Lamiaceae</i>	It is used for poles, beams, trusses, columns, roofs, doors, window frames, flooring, planking, panelling, and staircases etc.
3	<i>Pentacletra macrophylla</i>	Africa oil bean	<i>Fabaceae</i>	Extracts of the leaf, bark, seed and fruit pulp have anti-inflammatory and anthelmintic activity, and are used to treat gonorrhoea and convulsions etc.
4	<i>Newbouldia laevis</i>	Boundary tree	<i>Bignoniaceae</i>	The bark of <i>Newbouldia laevis</i> tree can be used for treating stomachic, piles and constipation.
5	<i>Ficus exasperate</i>	Sandpaper tree	<i>Moraceae</i>	Sandpaper tree is widely used as a source of sandpaper and as a valuable medicinal plant.
6	<i>Mangifera indica</i>	Mango	<i>Anacardiaceae</i>	Various parts of plant are used as a dentrifice, antiseptic, astringent, diaphoretic, stomachic, vermifuge, tonic, laxative and diuretic and to treat diarrhoea, dysentery, anaemia etc.
7	<i>Cassia Sp</i>	Candle bush	<i>Fabaceae</i>	The leaf of the tree is used for erysipelas, malaria, rheumatism, and ulcers, the buds are used for biliousness, etc.
8	<i>Moringa oleifera</i>	Drumstick tree	<i>Moringaceae</i>	Protecting and nourishing skin and hair.
9	<i>Anthocleista vogelii</i>	Cabbage tree	<i>Gentianaceae</i>	It is used in West Africa as a strong purgative and diuretic.

S/N	Species Composition	Common Name	Family	Ethnobotanical Value/Uses
10	<i>Harungana madagascariensis</i>	Haronga	<i>Hypericaceae</i>	It is used for the treatment of chest pains and urogenital infections.
11	<i>Nauclea dendrichii</i>	Opepe	<i>Rubiaceae</i>	It is hard, dense and resistant to fungi and insects, and is used in joinery, flooring and marine construction.
12	<i>Spondias moubin</i>	Hog plum	<i>Anacardiaceae</i>	The fruit has been used as a diuretic and febrifuge.
13	<i>Rauvolfia vomitoria</i>	Poison devil pepper	<i>Apocynaceae</i>	The roots, leaves, and stem are used in medicine. People use <i>Rauvolfia vomitoria</i> for convulsions, fever, weakness, inability to sleep, mental disorders, etc.
14	<i>Coco nucifera</i>	Coconut tree	<i>Arecaceae</i>	Industry is using the husk fibre from the pith as raw material for carpets, car seat stuffing, and in agricultural as fertilizers.
15	<i>Psidium guajava</i>	Guava	<i>Myrtaceae</i>	It is used for inflammation, diabetes, hypertension, caries, wounds, pain relief, fever, diarrhoea, rheumatism, lung diseases, and ulcers.
16	<i>Persea americana</i>	Avocado	<i>Lauraceae</i>	It is used in the treatment of diarrhoea, dysentery caused by helminths and amoebas, toothache.
17	<i>Alstonia macrophylla</i>	Hard milkwood	<i>Apocynaceae</i>	It is used for making roof beams, frames, poles and toys.
18	<i>Alstonia boonei</i>	Stool wood	<i>Apocynaceae</i>	It is used with other preparations in the treatment of fractures or dislocation.
19	<i>Raphia hookeri</i>	Raphia palm	<i>Arecaceae</i>	It is used as tying material for horticulture and handicrafts.
20	<i>Albizia zygia</i>	Nongo	<i>Fabaceae</i>	It is used for carving, flooring and furniture.
21	<i>Garcinia cola</i>	Bitter kola	<i>Clusiaceae</i>	The seeds are used for liver disorders, bronchitis, throat infections, colic, head or chest colds, and cough.
22	<i>Entandrophragma cylindricum</i>	sapele or sapelli or	<i>Meliaceae</i>	It is used for for flooring, interior joinery, interior trim, panelling, stairs, furniture, cabinet work, musical instruments, carvings, ship building, veneer, and plywood.

S/N	Species Composition	Common Name	Family	Ethnobotanical Value/Uses
		sapele mahogany		
23	<i>Funtumia elastica</i>	Silk rubber	<i>Apocynaceae</i>	It is used for treatment of whooping cough, asthma, blennorrhoea, painful menstruation, fungal infections, and wounds.
24	<i>Ricinodendron heudelotii</i>	Corkwood	<i>Euphorbiaceae</i>	It is used in treating constipation, cough, dysentery, rheumatism, rickets in children, oedema etc.
25	<i>Ficus sur</i>	Sandpaper tree	<i>Moraceae</i>	The tree is used as an ornamental and shade tree.
26	<i>Sterculia tragacantha</i>	African tragacanth	<i>Sterculiaceae</i>	It is used as food and medicine.
27	<i>Hevea brasiliensis</i>	Pará rubber tree	<i>Euphorbiaceae</i>	It is used for the manufacture of a range of products, especially tyres.
28	<i>Mitragyna ciliata</i>	Heartwood	<i>Rubiaceae</i>	<i>Mitragyna ciliata</i> is widely used in traditional medicine for the treatment of inflammation, hypertension, headache, rheumatism, gonorrhoea, and broncho-pulmonary diseases.
29	<i>Terminalia catappa</i>	India almond	<i>Combretaceae</i>	Juice of young leaves are employed in preparation of ointment for leprosy, scabies and also used internally for colic and headache.
30	<i>Theobroma cocoa</i>	Cacao tree	<i>Malvaceae</i>	Food and pharmaceutical additives.
31	<i>Ficus glumosa</i>	Cedar bush fig	<i>Moraceae</i>	It is used as an ornamental.
32	<i>Xylopia aethiopica</i>	Cherry tree (Uda)	<i>Annonaceae</i>	It is used extensively in construction, African cuisine, and traditional medicine. The plant's bark is used to make doors and partitions.
33	<i>Ceiba pentandra</i>	Ukong	<i>Malvaceae</i>	<i>Ceiba pentandra</i> bark decoction has been used as a diuretic, as an aphrodisiac, and to treat headache, as well as type II diabetes.

S/N	Species Composition	Common Name	Family	Ethnobotanical Value/Uses
34	<i>Pterocarpus erinaceus</i>	Abura	<i>Fabaceae</i>	It is used for fuel wood, for medicinal purposes, as a woodworking material, and is useful as a nitrogen-fixing plant.
35	<i>Terminalia ivorensis</i>	Black afara	<i>Combretaceae</i>	The wood is used for fine carpentry, joinery, building, flooring, and plywood manufacture.
36	<i>Brachystegia eurycoma</i>	Achi	<i>Fabaceae</i>	It is used in cooking.
37	<i>Triplochiton scleroxylon</i>	Obeche	<i>Malvaceae</i>	The timber is used in the manufacture of veneer, furniture, picture frames and mouldings.
38	<i>Mansonia altissima</i>	African black walnut	<i>Malvaceae</i>	It is used in spear traps for large game.
39	<i>Bambusa vulgaris</i>	Bamboo	<i>Bambusae</i>	It is used as a building material.
40	<i>Phoenix Sp</i>	Indian date palm	<i>Arecaceae</i>	The fruit serves as a tonic and restorative and is also used as an analgesic to mitigate pain from backache and in the buttocks.
41	<i>Baphia nitida</i>	Camwood	<i>Fabaceae</i>	It is used for house posts, rafters, naves of wheels and utensils such as walking sticks, mortars, pestles, etc.
42	<i>Polyalthia longifolia</i>	Masquerade tree	<i>Annonaceae</i>	It is used in the treatment of fever, helminthiasis, diabetes, and various cardiac problems.
43	<i>Delonix regia</i>	Royal Poinciana	<i>Fabaceae</i>	It provides forage for livestock and the seed meal can be fed to farm animals.
44	<i>Hura crepitans</i>	Sandbox tree	<i>Euphorbiaceae</i>	It treats skin diseases, rheumatism, intestinal worms.
45	<i>Citrus sinensis</i>	sweet oranges	<i>Rutaceae</i>	It's main uses are for food and beverages, and cosmetics.
46	<i>Dracaena arborea</i>	African dragon tree	<i>Asparagaceae</i>	It is used against gonorrhoea, smallpox, malaria, and leishmaniosis.

S/N	Species Composition	Common Name	Family	Ethnobotanical Value/Uses
47	<i>Musanga cecropioides</i>	Umbrella tree	<i>Moraceae</i>	The sheath-like stipules are applied as emmenagogue and oxytotic, and to treat stomach complaints, hiccough, and wounds.
48	<i>Alchornea cordifolia</i>	Christmas bush	<i>Euphorbiaceae</i>	It supplies dye and wood and in other occasions it is widely used for food.
49	<i>Elaeis guineensis</i>	Palm tree	<i>Arecaceae</i>	Palm oil is extracted from the mesocarp of the fruit and is used traditionally for the treatment of headaches, pains, rheumatism, etc.
50	<i>Pycnanthus angolensis</i>	African nutmeg	<i>Myristicaceae</i>	The seeds are sometimes used as a spice.
51	<i>Syzygium maloe</i>	Brush cherries or satin ash	<i>Myrtaceae</i>	It is used as fruit.
52	<i>Raphia hookeri</i>	Raphia palm	<i>Arecaceae</i>	It is used as tying material for horticulture and handicrafts.
53	<i>Dacryodes edulis</i>	Bush pear	<i>Burseraceae</i>	It is used in treating various ailments such as wound, skin diseases, dysentery, and fever.
54	<i>Milicia excelsa</i>	African teak	<i>Moraceae</i>	The tree is nitrogen fixing and the leaves are used for mulching.
55	<i>Allanblackia floribunda</i>	Tallow tree	<i>Clusiaceae</i>	It has been long used in traditional African medicine to treat hypertension.
56	<i>Bombax ceiba</i>	Cotton tree	<i>Malvaceae</i>	
57	<i>Mansonia altissima</i>	African black walnut	<i>Sterculiaceae</i>	It is used for general and high-class joinery, cabinet work, furniture, turnery, decorative veneer, and handicrafts.
58	<i>Funtumia Africana</i>	Rubber tree	<i>Apocynaceae</i>	A latex exudes copiously from wounds in the bark.
59	<i>Picralima nitida</i>	The Akuamma	<i>Apocynaceae</i>	It is use in treating fever, hypertension, jaundice, dysmenorrhea, gastrointestinal disorders, and malaria.
60	<i>Artocarpus altilis</i>	Breadfruit	<i>Moraceae</i>	The fruit is nutritious and a valuable staple food in most Pacific Islands.

S/N	Species Composition	Common Name	Family	Ethnobotanical Value/Uses
61	<i>Annona muricata</i>	Soursop	<i>Annonaceae</i>	Muricata, the juicy flesh-fruit of the soursop is a remedy for rheumatism, arthritic pain, fever, neuralgia, heart, and liver diseases, etc.
62	<i>Kigelia Africana</i>	Sausage tree	<i>Bignoniaceae</i>	The powdered mature fruit is applied as a dressing in the treatment of wounds, abscesses, and ulcers.
61	<i>Ceiba buonopozense</i>	Cotton tree	<i>Malvaceae</i>	They are used in the treatment of cholera, tubercular fistula, coughs, urinary complaints etc.
63	<i>Terminalia superba</i>	Limba, or white afara	<i>Combretaceae</i>	It is used for making furniture, table tennis blades (as outer ply), and musical instruments etc.
64	<i>Quercus Sp</i>	Black oak	<i>Fagaceae</i>	It provides protective shading for houses and people, lowering energy needs for cooling homes.
65	<i>Tetrapleura tetraptera</i>	Aidan fruit	<i>Fabaceae</i>	It is used in the treatment of arthritis and other inflammatory conditions, asthma, diabetes mellitus, hypertension, epilepsy etc.
66	<i>Juglans regia</i>	Persia walnut	<i>Juglandaceae</i>	It is used in traditional medicine for a wide array of ailments that include helminthiasis, diarrhoea, sinusitis et.

ANNEXURE 4.9

QUESTIONNAIRE SIA/HIA

FOR INDORAMA 20" X 76KM NATURAL GAS PIPELINE PROJECT

SOCIAL SECTOR

HOUSEHOLD QUESTIONNAIRE

1. Study No: _____
2. Interviewer's No: _____
3. Interview No.: _____
4. Community: _____
5. Community Status: _____

READ

This questionnaire relates to community/socio-economic studies for the INDORAMA Natural Gas Pipeline Project. We shall ask you questions that relate to your household, dwelling unit and residential environment. We also wish to find out your feelings and opinions about the Pipe Line Route, i.e. how it will affect the overall socio-economic life of yourself, your household, and your area. We shall be grateful to receive complete and accurate answers. The answers you provide would certainly be useful in the overall execution of the project. Please be assured the answers you provide will not be used for unauthorized purposes.

6. Date of Interview: _____
7. Length of Edit: _____
8. Local Govt. Area: _____
9. Exact Time Now: _____

SECTION A

DWELLING UNIT ASPECTS

FOR ALL
RESPONDENTS

TICK BOXES AS APPROPRIATE

A.1 How many living rooms do you have in this dwelling unit?
_____ (rooms)

A.2 Do you own this dwelling unit, are you renting it or what?

1 ☐ Own 2 ☐ Renting 3 ☐ Other

A.2 (a) If "Other", please specify:

- i ☐ Doubling up with
parents/relatives
ii ☐ Company quarters
iii ☐ Government quarters

FOR RENTERS ONLY

TICK BOXES AS APPROPRIATE

A.3 How long have you lived in this community? _____ (Years)

A.4 Before you moved into this community, in which community were you residing
(if applicable)?

- (a) Community _____
(b) Local Government Area _____
(c) State _____

A.5 If you have moved, please state your primary reason for moving

A.6 How much rent do you pay per year for your present dwelling unit? ₦_____

A.7 Who is your present landlord?

1 ☐ Individual 2 ☐ Community 3 ☐ Others, please specify

A.8 Do you think that the rent you are paying is too high, about right or too low for this type of accommodation?

1 ☐ Too high 2 ☐ About right 3 ☐ Too low

A.9 Are you considering making a permanent move from this dwelling unit to another one?

1 ☐ Yes 2 ☐ No

A.9 (a) If "Yes", will it be in the same community or to another community?

1 ☐ Same community 2 ☐ Different community

A.9 (b) If "Different community", please specify:

- (a) Community _____
- (b) Local Government Area _____
- (c) State _____

FOR OWNER-OCCUPIERS
ONLY

A.10 How long have you lived in this Community? _____ (Years)

A.11 Did you buy (or are you buying) this dwelling unit or did you build it yourself?

1 ☐ Bought/buying 2 ☐ Built

A.11 (a) If you built it yourself, how did you acquire the land?

- | | | | | | |
|---|--------------------------|-----------------------|---|--------------------------|-----------------------------|
| 1 | ☐ | Bought/buying | 2 | ☐ | Inherited |
| 3 | ☐ | Lease from government | 4 | ☐ | Other, please specify _____ |

A.11 (b) How did you raise the money to buy/build your house?

- | | | | | | |
|---|--------------------------|--------------------|---|--------------------------|-------------------------------|
| 1 | ☐ | Personal savings | 2 | ☐ | Mortgage Loan |
| 3 | ☐ | Thrift/osusu loans | 4 | ☐ | Grants from relatives/friends |
| 5 | ☐ | Inherited funds | 6 | ☐ | Other, please specify _____ |

A.11(c) What is the age of the dwelling unit?
_____ (Years)

A.12 Before you moved into this community, in which community were you residing (if applicable)?

(a) Community _____

(b) Local Government Area _____

(c) State _____

A.13 If you have moved, please state your main reasons for moving

SECTION B

ENVIRONMENTAL CONDITIONS AND SERVICES

FOR ALL RESPONDENTS

B.1 How do you store your household garbage before disposal?

TICK ONE BOX

- | | | |
|---|--|--|
| <p>1 ☐ Stored in polythene bags</p> <p>2 ☐ Stored in metal waste bins</p> | <p>3 ☐ Stored in plastic waste bins</p> <p>4 ☐ Stored in waste baskets</p> | <p>5 ☐ Stored in cartons</p> <p>6 ☐ Other, _____ (specify)</p> |
|---|--|--|

B.2 State the major way you dispose of your household garbage.

B.3 What major type of toilet system do you use?

B.4 What is the main source of water for your household?

(a) For drinking

(b) For other household purposes

B.5 Is electricity available in your home?

1 ☐ Yes 2 ☐ No

B.6 What is the major energy source for cooking in your household?

- | | |
|---|--|
| <p>1 ☐ Firewood</p> <p>3 ☐ Gas</p> <p>5 ☐ Other, specify _____</p> | <p>2 ☐ Kerosene</p> <p>4 ☐ Electricity</p> |
|---|--|

- B.7 I shall now use some statements to describe your residential neighbourhood/ community. Please tell me to what extent you agree or disagree with each of the statements.

Aspect	1 Agree Strongly	2 Agree Some- what	3 Uncertain	4 Disagree Somewhat	5 Disagree Strongly
(a) My neighbourhood is quiet					
(b) My neighbourhood is friendly					
(c) There is a lot of road traffic (vehicular)					
(d) The neighbourhood is crowded					
(e) There are too many strangers					
(f) The neighbourhood is safe (i.e. crime rate is low)					
(g) The neighbourhood is attractive					

- B.8 Are there some services or facilities that you do not have now that you would like to have in this neighbourhood/ community?

1 ☐ Yes 2 ☐ No

B.6(a) If " Yes", what are these (Mention 3 in order of importance)?

- i _____
- ii _____
- iii _____

- B.9 On the whole, would you say that this community is a good community to live in?

1 ☐ Yes 2 ☐ No

B.10 (a) If "No", please explain (Mention 3 reasons for your response)

- i _____
- ii _____
- iii _____

SECTION C

PERCEPTIONS OF THE PROPOSED INDORAMA GAS PIPELINE PROJECT

FOR ALL RESPONDENTS

C.1 With reference to the INDORAMA Pipe Line Route that will pass through your area, how do you think this will affect your community (a) positively and (b) negatively.

C.1 (a) Three key positive effects (in order of importance.)

1	
2	
3	

C.1 (b) Three key negative effects in order of importance.

1	
2	
3	

C.2 In the last five years, has your community benefited from any INDORAMA development projects?

1 ☐ Yes 2 ☐ No (If "No", Go to C.4)

C.2 (a) If "Yes", please name the three most important in order of importance:

i	
ii	
iii	

C.3 Everything considered, how pleased or displeased are you with the INDORAMA Pipeline project?

i	☐	Very displeased
ii	☐	Somewhat displeased
iii	☐	Neither pleased nor displeased
iv	☐	Somewhat pleased
v	☐	Very pleased

C.3 (a) If you are displeased, please tell us (in order of importance) three major reasons for your displeasure:

- i _____
- ii _____
- iii _____

C.3 (b) If you are pleased, state (in order of importance) the three major reasons for your pleasure:

- i _____
- ii _____
- iii _____

C.4 Do you expect anything from INDORAMA in connection with this project?

1 ☐ Yes 2 ☐ No

C.4 (a) If "Yes", state your three most urgent expectations (in order of urgency):

- i _____
- ii _____
- iii _____

C.5 How would you describe the relationship between your Community and INDORAMA?
(TICK APPROPRIATE BOX)

- i ☐ Very strained
- ii ☐ Somewhat strained
- iii ☐ Don't know / uncertain (DK/UC)
- iv ☐ Somewhat cordial
- v ☐ Very cordial

C.5 (a) Please give reasons for your answer:

C.6 Please comment freely on how you think the Pipeline project will affect aspects of life in your community/neighborhood.

SECTION D

PERSONAL CHARACTERISTICS

FOR ALL RESPONDENTS

TICK BOXES AS APPROPRIATE

Please provide us some information about yourself and your household

D.1 Sex of respondent:

Male

Female

D.2 What is your age as at your last birthday _____

D.3 What is your marital status?

- | | | |
|-----|--|-----------------------------|
| i | | Married |
| ii | | Separated |
| iii | | Widowed |
| iv | | Divorced |
| v | | Single/Never Married |
| vi | | Any other, specify
_____ |

D.4. What is your relationship to the head of this household?

- | | | |
|------|--|-------------------------|
| i | | Head |
| ii | | Spouse(Husband or Wife) |
| iii | | Daughter |
| iv | | Somewhat pleased |
| v | | Son |
| vi | | Mother |
| vii | | Father |
| viii | | Friends |
| ix | | Other relations |

D.5 Please state the number of persons in your household (including yourself) who fall into the following age categories:

S/N o.	Age categories (years)	Gender		Total
		1. Male	2. Female	
(i)	00 - 04			
(ii)	05 - 09			

(iii)	10 - 14			
(iv)	15 - 19			
(v)	20 - 24			
(vi)	25 - 29			
(vii)	30 - 34			
(viii)	35 - 39			
(ix)	40 - 44			
(x)	45 - 49			
(xi)	50-54			
(xii)	55-59			
(xiii)	60-64			
(xiv)	65-69			
(xv)	70 and above			

D.6 What is your State of origin?

1. Rivers	15. Enugu	29. Ondo
2. Abia	16. Gombe	20. Osun
3. Adamawa	17. Imo	31. Oyo
4. Akwa-Ibom	18. Jigawa	32. Plateau
5. Anambra	19. Kaduna	33. Sokoto
6. Bayelsa	20. Kano	34. Taraba
7. Bauchi	21. Kastina	35. Yobe
8. Benue	22. Kebbi	36. Zamfara
9. Borno	23. Kogi	37. FCT
10. Cross rivers	24. Kwara	38. States outside Nigeria
11. Delta	25. Lagos	
12. Ebonyi	26. Nasarawa	
13. Edo	27. Niger	
14. Ekiti	28. Ogun	

D.7 What is your ethnic group?

1. Ibo	6. Ikwerre	11. Isoko	16. Hausa
2. Ogba	7. Etche	12. Andoni	17. Fulani
3. Yoruba	8. Urobo	13. Ogoni	18.
4. Ibibio	9. Itsekiri	14. Kalabari	19.
5. Efik	10. Edo	15. Ijaw	20.

D.8 What is the highest level of education that you have attained?

(i) No formal education	(vii) Tertiary (uncompleted)
(ii) Pre-primary	(viii) Tertiary (completed)
(iii) Primary (uncompleted)	(ix) Teachers Grade II Certificate
(iv) Primary (completed)	(x) Trade Test Certificate
(v) Secondary (uncompleted)	(xi) City and Guilds Certificate
(vi) Secondary (completed)	

D.9 What is the highest level of education that your wife/husband has attained?

(i) No formal education	(viii) Tertiary (uncompleted)
(ii) Pre-primary	(viii) Tertiary (completed)
(iii) Primary (uncompleted)	(ix) Teachers Grade II Certificate
(iv) Primary (completed)	(x) Trade Test Certificate
(v) Secondary (uncompleted)	(xi) City and Guilds Certificate
(vi) Secondary (completed)	

D.10 How many members of your household (including yourself) fall into the following educational categories?

Educational categories	Gender		Total
	1. Male	2. Female	
(i) No formal education			
(ii) Pre-primary			
(iii) Primary (uncompleted)			
(iv) Primary (completed)			
(v) Secondary (uncompleted)			
(vi) Secondary (completed)			
(ix) Tertiary (uncompleted)			
(viii) Tertiary (completed)			

(ix) Teachers Grade II Certificate			
(x) Trade Test Certificate			
(xi) City and Guilds Certificate			

D. 11 Please tell me the number of persons in your household (broken down by gender) that fall into the specified age categories and are attending the types of educational institutions indicated

Age categories	Number in Household		Educational institution	Number Attending		Percent	
	M	F		M	F	M	F
2-5			Pre-primary school				
6-12			Primary school				
13-19			Secondary school				
Total							

D.12 Are you employed (including self-employment), unemployed, retired, or a housewife? _____

D.12 (a) If unemployed, please state what type of skill you have

D.13 How many members of your household (including yourself) fall into the following employment categories?

Employment Status	Gender		Total
	1. Male	2. Female	
i) Employed			
ii) Retired			
iii) Unemployed			
iv) Housewife			

D. 13(a) For the unemployed members of your household Please state how many fall into the age categories

S/No.	Age Category	Male	Female
1	19-29		
2	30-39		
3	40-49		
4	50 and above		

Total		
-------	--	--

D.14 For the employed members of your household, how many fall into the primary occupational categories specified below:

S/No.	Occupational categories	Gender		Total
		1. Male	2. Female	
(i)	Farmers			
(ii)	Fishermen			
(iii)	Hunters			
(iv)	Craftsmen/technicians (artisans)			
(v)	Traders			
(vi)	Businessmen/contractors			
(vii)	Senior workers, including professionals (engineers, doctors, lawyers, etc.) in government service.			
(viii)	Professionals (engineers, doctors, lawyers, etc.) in private practice.			
(ix)	Senior workers, including professionals (engineers, doctors, lawyers, etc.) in multinational corporations and other companies			
(x)	Junior workers (clerical and allied) working in government			
(xi)	Junior workers (clerical and allied) in multi-national corporations and other companies			
(xii)	Paramedical staff (nurses and midwives, public health officers, laboratory technicians), etc. in government			
(xiii)	Paramedical staff (nurses and midwives, public health officers, laboratory technicians), etc. in multi-nationals and other companies.			

D.15 What is your usual mode of transport to your place of employment?

1. Personal car	4. Official car	7. speed boat
2. Staff bus	5. Taxi	8. Walking
3. Commercial bus	6. Bicycle	9. Other, specify _____

D.16 Please estimate your monthly individual income ₦_____

D.17 To which of the following monthly income categories does your household (i.e. housekeeping unit, or all those feeding from the same pot) belong?

(TICK APPROPRIATE BOX)

code	Amount	Midpoint	Code	Amount	Midpoint
1	Less than ₦8,000	4,000	8	68,000 – 77,999	73,000
2	8,000 – 17,999	13,000	9	78,000 – 87,999	83,000
3	18,000 – 27,999	23,000	10	88,000 – 97,999	93,000
4	28,000 – 37,999	33,000	11	98,000 – 107,999	103,000
5	38,000 – 47,999	43,000	12	108,000 – 117,999	113,000
6	48,000 – 57,999	53,000	13	118,000 – 127,999	123,000
7	58,000 – 67,999	63,000	14	128,000 and more	139,500

SECTION E

DIRECT OBSERVATION AND MEASUREMENT

FOR THE INTERVIEWER

(TICK APPROPRIATE BOX UNDER EACH NUMBER)

E.1 House Type:

1. Rooming house (courtyard)	4. Block of flats (multi-family)
2. Rooming house (wagon type)	5. Semi-detached
3. Single-family	6. Storied building (single family)

E.2 Building Materials

E.2 (a) Walling:

1. Corrugated iron sheets	4. Blocks
2. Wood	5. Burnt bricks
3. Mud	6. Cardboard/plywood sheets

E.2 (b) Roofing:

1. Corrugated Iron Sheets	5. Decking
2. Wood	6. Cardboard/Plywood Sheets
3. Slate	7. Asbestos
4. Thatch	8. Other, Specify: _____
9. Aluminum Roofing Sheets	

E.3 Foundation:

1. Strip	3. Pile
2. Raft	4. None

E. 4 Building Conditions

Condition	1. Yes	2. No
Foundation in good condition		
Foundation affected by erosion		
No foundation		
Cracked walls		
Ceiling in good condition		
No ceiling or cracked		
Fascia board in good condition		
Windows in good condition		
Doors in good condition		
Building needs painting		
Building needs plastering		

E.5 Overall House Condition Rating:

1. Good (Needs No Repair)	3. Bad (Needs Major Repair)
2. Fairly Good (Needs Minor Repair)	4. Very Bad (Beyond Repair)

E.6 Household Parking:

1. Private Garage	3. Curtilage (Within Premises)
2. Street Side	4. Communal

E.7 Open Spaces:

1. Available within compound
2. Not available

E.8 Distance to nearest dwelling house from respondent's:

1. Less than 5 metres	3. 10 - 14 metres
2. 5 - 9 metres	4. 15 metres or more

E.9 Distance from Respondent's Dwelling to Basic Facilities:

S/n	Facility	1. More Than 2 Km	2. Between 1 and 2 Km	3. Less Than 1 Km
o				

(i)	Primary School			
(ii)	Police Station			
(iii)	Hospital/Clinic/Maternity			
(iv)	Shopping Area/Local Market			
(v)	Recreational Playground			
(vii)	Church			
(vii)	Mosque			
(viii)	Secondary School			

SECTION F

PUBLIC HEALTH ASPECTS

FOR ALL RESPONDENTS

F.1 What is the distance of the following facilities to members of your household?

Type of Health Facility	< 1 Km	1-3 Km	>3 km
Hospital			
Clinic			
Dispensary			
Patent Medicine Store			
Traditional Healing Centre			

F.2 Describe the prevalence of the following types of disease in your household in the last 12 months (As diagnosed by a health professional).

Types of Disease	No. of Cases	Number of Deaths
Typhoid		
hepatitis		
Cholera		
Malaria		
Asthma		
Bronchitis		
Cataract		
Eye Problems		
Conjunctivitis		
Skin Diseases		
Respiratory Tract Infections		
High Blood Pressure		
stroke		
Burns		

F.3 How many people died in your household in the last 12 months?

F.4 How many people were born in the last 12 months? _____

F.5 How many children 1-year-old or less have died in the last 12 months? _____

F.6 How many children 5 years or less have died in the last 12 months?

F.7 Specify any strange ailments that have occurred in your household in the recent past that you can attribute to oil spills:

1. _____

2. _____

3. _____

F.8 Have you observed any contamination of your water (taste, colour, odour) in the recent past that you can attribute to oil spills in your community?

1. ☐ Yes

2. ☐ No

F.8 (a) If "Yes", please explain:

F.9 Have you experienced fire outbreak from pipelines in your community?

1. ☐ Yes

2. ☐ No

F. 10 (a) If "Yes", what was the cause of the fire outbreak?

F.11(a) If yes to F11(a), how many persons died?

Thank You

ANNEXURE 4.10

CULTURAL HERITAGE

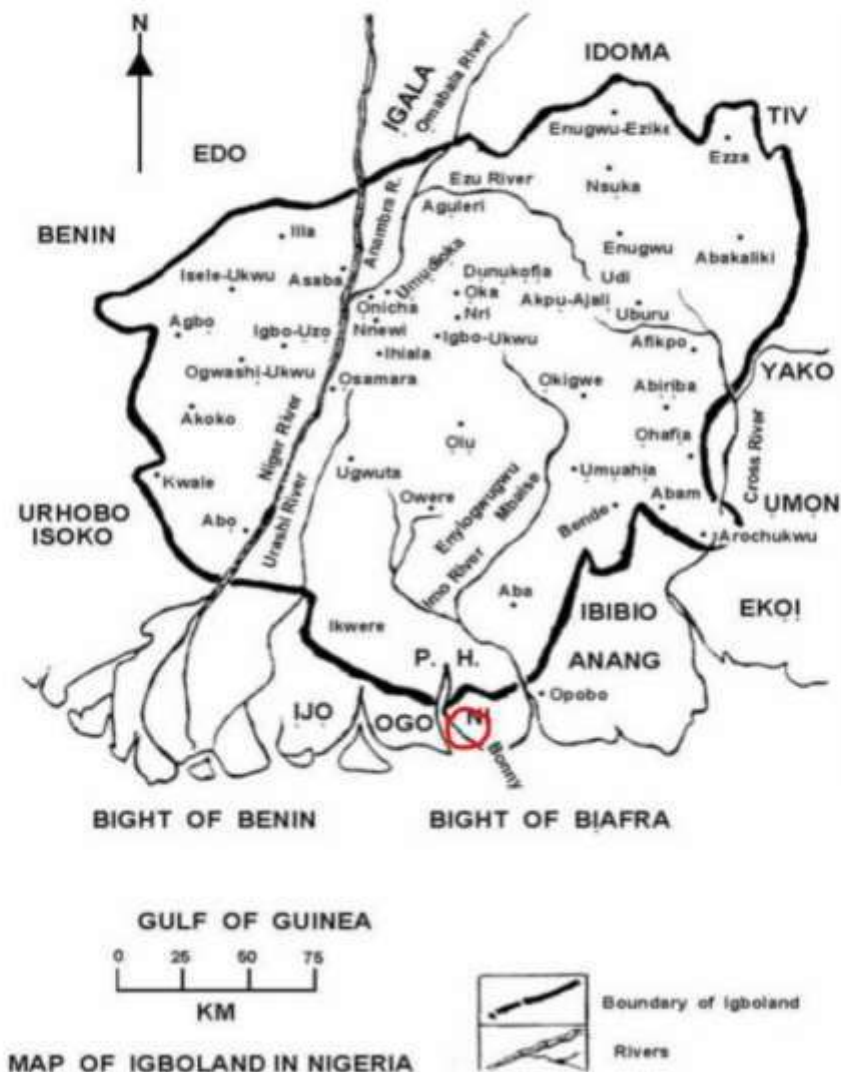
Literature review of Nigerian archaeology studies to date

Archaeological research began relatively late in south-eastern Nigeria, with the first excavation in the region taking place in 1960.¹ Prior to this more informal research took place in 1910, lead by European scholar Frobenius who focussed on recovering objects rather than documenting archaeological context. The discovery of terracotta, copper and bronze objects spurred further research, leading to a flurry of researchers interested in the collection of Nigerian artefacts through archaeological surveys.

In 1943 the Nigerian Department of Antiquities (NDA) was established in Nigeria to oversee archaeological works and in the late 1960s the first systematic surveys were carried out by the NDA in partnership with University of Cape Town, University of Ibadan, University of Ife-Ife and University of Nigeria. Excavations such as the Igboekwu excavations in Anambra State, southeastern Nigeria, yielded large quantities of glass beads, intricately produced bronze artefacts, potsherds, and various iron tools which revealed the intrinsic value and ingenuity of the surrounding Igbo kingdom. **Error! Reference source not found.** locates the Igbo region of Nigeria on a map in relation to the Project AoI.

Archaeological studies in south-eastern Nigeria in more recent years have shed light on the technology used to extract raw materials in the past for the production of stone, metal tools and pottery. Traditional methods of raw material extraction continue into the 21st century within the Igbo region with evidence of iron smelting, pottery making and tin mining see figure below.

¹ Ngonadi, C. Archaeology of Igboland, Southeastern Nigeria. Oxford Research Encyclopedia of Anthropology. Retrieved 18 Feb. 2023, from <https://oxfordre.com/anthropology/view/10.1093/acrefore/9780190854584.001.0001/acrefore-9780190854584-e-556>.



The extent of Igboland, with approximate Project AoI circled in red.²

² Validating perceptual objective listening quality assessment methods on the tonal language Igbo - Scientific Figure on ResearchGate. Available from: https://www.researchgate.net/figure/Map-of-Igboland-in-Nigeria_fig2_27353122 [accessed 18 Feb, 2023]



Locations for studied archaeological sites in southeast Nigeria in relation to the Project AoI³

³ Babalola, Abidemi & AJEKIGBE, PHILIP. (2007). Poverty Alleviation in Nigeria: Need for the Development of Archaeo-Tourism, *Anatolia*, 18: 223-242. 10.1080/13032917.2007.9687203.

Archaeological and Historic Background

This *Section* provides a period-by-period overview of the archaeology and history of the region, wider study area and Project Area of Influence. Each period concludes with a preliminary assessment of the potential for cultural heritage resources to be present within the Project AoI.

Early Stone Age (c. 1.5 ma BCE – c. 130,000 BCE)

Very little is known about the Early Stone Age (ESA) in West Africa generally, partly due to historic research interests and partly due to geological inconsistencies, for example the lack of faulting to expose Early Quaternary sediments that we see across East Africa. The earliest reported ESA identified in West Africa remains controversial as pebble choppers similar to the Oldowan complex has been found in multi-period assemblages, and whilst an Oldowan presence in West Africa is possible there is no clear evidence yet to support this⁴.

The Acheulean in contrast to the Oldowan, has been identified in abundance throughout Nigeria, however there are currently very few direct age estimates from primary context. Mai Idon Toro, an archaeological site in Northern Nigeria yielded Acheulean stone artefacts for researchers from the 1920's through to the 1960's and have been studied further out of situ and without the knowledge of the dilapidated state of the archaeological site⁵.

Middle Stone Age (c. 130,000 BCE – c. 12,000 BCE)

The emergence of the chronological record for the Middle Stone Age (MSA) in Nigeria and West Africa in general indicates that core and flake technologies were present from the Middle Pleistocene at least until the Pleistocene Holocene boundary (c. 126,000 – 12,000 BCE)⁶. Evidence for MSA archaeological material in low-lying forested areas such as the Project AoI remains questionable however inter-regional styles and differences in technological style may vary based on raw material availability.

MSA assemblages in West Africa in general have been typologically identified based on links to other regions, for example the 'Sangoan' and 'Mousterian', though more recently local

⁴ Scerri, EM.L. 2019. Review of the book *The Middle Stone Age of Nigeria in its West African context* by Philip Allsworth-Jones. Oxford Archaeopress. Published in Azania doi.org/10.1080/0067270X.2019.1676052

⁵ Jock, Agai & Agai, Jock. (2021). A Report on the History of the Acheulean Industry of Mai Idon Toro in the Central-Region of Nigeria. IUP Journal of History and Culture. 1. 29-41. 10.30560/ch.v1n1p29.

⁶ Scerri, EM.L. 2019. Review of the book *The Middle Stone Age of Nigeria in its West African context* by Philip Allsworth-Jones. Oxford Archaeopress. Published in Azania doi.org/10.1080/0067270X.2019.1676052

terms have been used to describe MSA technologies throughout the region, such as 'Tiemassessanian'. In northern Nigeria there are two sites of considerable importance, Nok and Zenabi which yielded an abundance of disc-cores and blades with prepared platforms, in contrast to the 'Sangoan' industry which dominates the South with a Levallois technology⁷.

Based on the scarce evidence of MSA archaeological material in southern Nigeria, particularly in low-lying areas of high fluvial and estuarine activity, the potential for MSA cultural heritage to be present within the Project AoI is **low**.

Later Stone Age (c. 12,000 BCE – c. 1 BCE)

The Later Stone Age (LSA) sees significant innovation and technological diversification including micro and macro-lithic assemblages and a marked reduction on tool size, particularly geometric microliths seen across Nigeria dating to c. 12,000 BCE in basal stratigraphic lenses at the Iwo Eleru Rock Shelter, southwest Nigeria. The environment surrounding this well-known site is predominantly low-lying rainforest, indicating the **low to moderate** potential for buried LSA archaeological material to exist within the project AoI.

Pottery and agriculture is thought to have developed in c. 8000 BCE in the region, linked with the introduction of ground-stone axes,⁸ which signifies a change in ecological conditions. These axes were used for felling trees, allowing for agricultural expansion. Linguistic studies suggest that some of the earliest plants cultivated in southern Nigeria include oil palm, kolanuts, yams, and wine palm.⁹ The appearance of trapezoid tools from c.1500 BCE also suggest that grasses were exploited.¹⁰

Iron Age (c. 1 CE– c. 1600 CE)

The agricultural growth in the first millennium CE was likely helped by the early production of iron tools used for bush clearance and land tilling.¹¹ The rapid spread of iron production in this period suggests that there was either population movement, effective trade networks from iron production sites, or both.¹² Analysis of glass beads found at the Igbo-Ukwu burial site (140 km north of site) dated between the tenth and fifteenth centuries CE suggest

⁷ Scerri, EM.L. 2019. Review of the book *The Middle Stone Age of Nigeria in its West African context* by Philip Allsworth-Jones. Oxford Archaeopress. Published in Azania doi.org/10.1080/0067270X.2019.1676052

⁸ Emuobosa A. Orijemie, 'The Archaeobotany of the Later Stone Age (LSA) in Nigeria: A Review' in *Plants and People in the African Past*, ed. A. M. Mercuri (2018), p. 370

⁹ Emuobosa A. Orijemie, 'The Archaeobotany of the Later Stone Age (LSA) in Nigeria: A Review' in *Plants and People in the African Past*, ed. A. M. Mercuri (2018), p. 364.

¹⁰ Emuobosa A. Orijemie, 'The Archaeobotany of the Later Stone Age (LSA) in Nigeria: A Review' in *Plants and People in the African Past*, ed. A. M. Mercuri (2018), p. 364.

¹¹ Joseph C. Chukwu, 'Traditional Igbo Building Architecture: An Historical Perspective', *Arts and Design Studies*, 34 (2015), p. 7

¹² Susan Keech McIntosh, 'Igbo-Ukwu at 50: A Symposium on Recent Archaeological Research and Analysis', *African Archaeological Review* (2022), p. 376

established trade connections up the River Niger to Gao, on to Mesopotamia, and perhaps even as far as India.¹³ The evidence for long-distance over-land trade indicates that Igboland was connected to global trade networks long before direct European contact from the sixteenth century. Moreover, the use of river systems as transport networks may mean that there is a **moderate potential** for archaeological evidence of this to be found at the Project AoI due to its proximity to an established river transport network.

Religion was an important facet of Igbo society, influencing other aspects of life such as law.¹⁴ As with the history, this theology is difficult to reconstruct as the concept of *Chukwu* (a supreme god) was already a complex formation of different (and varying) motifs and beliefs within the Igbo religious experience prior to its appropriation by Christian missionaries in the nineteenth century.¹⁵ Nevertheless, it is clear that reincarnation was (and still is) pivotal within the Igbo social system as they believe that their ancestors return to temporal life after death.¹⁶ This creates the sense that the living and the dead occupy the same universe, along with a pantheon of supernatural powers that control the heavens and earth.¹⁷

An important part of this belief is of living and dead ancestor worship, including feasting and daily invocations.¹⁸ This extended to burial where the dead are prepared for their journey into eternity, with every caution being observed to ensure that the dead person is in a state of contentment.¹⁹ Although few people now engage the rites of the ancestors, many of the practices have shifted in the present. Indeed, the *Alommo* (the annual feast of the ancestors) has transitioned into *emume iwaji ohuru* (new yam festival).²⁰ Therefore, it is important to view the present intangible culture of the communities surrounding the Project AoI with the **possibility of complex religious change with considerable time depth.**

European Contact and Colonial Era (c.1550 – 1960)

The volume of goods within the established global trade increased dramatically with the arrival of European traders in the later fifteenth century due to the size of the European ships.²¹ Initially, the main exports from the area were gold, ivory, gum, timber, pepper, and slaves (already an established facet of the local economy) in exchange for European manufactured

¹³ Susan Keech McIntosh, 'Igbo-Ukwu at 50: A Symposium on Recent Archaeological Research and Analysis', *African Archaeological Review* (2022), pp. 376-377.

¹⁴ Emmanuel C. Onyeozili and Obi N. I. Ebbe 'Social Control in Precolonial Igboland of Nigeria', *African Journal of Criminal Studies*, 6 (2012), p. 31.

¹⁵ Chukwuma Azuonye, 'Igbo Folktales and the Evolution of the Idea of Chukwu as the Supreme God of Igbo Religion', *Nsukka Journal of Linguistics and African Languages* (1987), p. 44.

¹⁶ Emmanuel C. Onyeozili and Obi N. I. Ebbe 'Social Control in Precolonial Igboland of Nigeria', *African Journal of Criminal Studies*, 6 (2012), p. 31.

¹⁷ Emmanuel C. Onyeozili and Obi N. I. Ebbe 'Social Control in Precolonial Igboland of Nigeria', *African Journal of Criminal Studies*, 6 (2012), p. 31.

¹⁸ Onukwube Alex Alfred Anedo, *Neglect of Ancestors (Ndichie): The Bane of Modern Igbo Problems* (2008), pp. 6-10.

¹⁹ Onukwube Alex Alfred Anedo, *Neglect of Ancestors (Ndichie): The Bane of Modern Igbo Problems* (2008), p. 6.

²⁰ Onukwube Alex Alfred Anedo, *Neglect of Ancestors (Ndichie): The Bane of Modern Igbo Problems* (2008), pp. 10-11.

²¹ P. A. Oguagha, 'The Impact of European Trade on Igbo-Igala Commercial Relations in The Lower Niger C. 1650-1850 A.D.', *Journal of the Historical Society of Nigeria*, vol. 11, no. 3/4, (1982) p. 14. <<http://www.jstor.org/stable/41857115>> (Accessed 5 Oct. 2023).

goods such as textiles, firearms, and spirits.²² However, by the end of the seventeenth century the demand for slaves had greatly increased.²³ Igboland experienced the most intensive slave-trading activity in West Africa, with approximately 75% of total exports from the area between 1640 and 1800 being enslaved peoples.²⁴

The direct contact that Europeans had with members of Igboland at this point was minimal outside of the coastal hinterland.²⁵ However, the Project AoI sits within this hinterland, approx. 25km upstream from Bonny, one of the largest trading ports in western-central Africa during the height of the transatlantic slave trade.²⁶ Indeed, there is consensus amongst academics that by the mid-seventeenth century the waterways of the River Niger, including the Bonny River where the Project AoI is situated, were transformed into a major hub for commerce and exchange of goods.²⁷

Therefore, it is likely that there is **moderate potential** for encountering archaeological evidence of maritime trade, including marine archaeology. The economic migration towards the coast and the number of enslaved people passing through Igboland would have caused a major demographic shift throughout the region. It is possible this may also be seen in archaeological evidence from the Project AoI.

By mid-nineteenth century, the forced trafficking of enslaved peoples out of the Bights of Benin and Biafra had all but ceased.²⁸ Following the abolition of the slave trade in 1807 the British Royal Navy opened a trade route with the coastal towns driven by the palm oil industry. This became the economic basis for the region.²⁹ At the turn of the twentieth century the British Empire attempted to seize these resources, and their ultimate economic benefit, by military force throughout the whole of what is now Nigeria as part of the wider European 'Scramble for Africa'.

The military invasion of Igboland did not take place until 1901.³⁰ However, the arrival of the British prior to and during lead to increased encounters between Igbo and other communities

²² P. A. Oguagha, 'The Impact of European Trade on Igbo-Igala Commercial Relations in The Lower Niger C. 1650-1850 A.D.', *Journal of the Historical Society of Nigeria*, vol. 11, no. 3/4, (1982) p. 14. <<http://www.jstor.org/stable/41857115>> [Accessed 5 Oct. 2023].

²³ P. A. Oguagha, 'The Impact of European Trade on Igbo-Igala Commercial Relations in The Lower Niger C. 1650-1850 A.D.', *Journal of the Historical Society of Nigeria*, vol. 11, no. 3/4, (1982) p. 14. <<http://www.jstor.org/stable/41857115>> [Accessed 5 Oct. 2023].

²⁴ John N. Oriji, 'Chapter 8: Igboland, Slavery, and the Drums of War and Heroism' in *Fighting the Slave Trade: West African Strategies*, ed. Sylviane A. Diouf (2017), p. 121.

²⁵ P. A. Oguagha, 'The Impact of European Trade on Igbo-Igala Commercial Relations in The Lower Niger C. 1650-1850 A.D.', *Journal of the Historical Society of Nigeria*, vol. 11, no. 3/4, (1982) p. 14. <<http://www.jstor.org/stable/41857115>> [Accessed 5 Oct. 2023].

²⁶ Klas Rönnbäck, 'The Slave Trades out of Africa' in *The History of African Development*, ed. Ewout Frankema, Ellen Hillboom, Ushehwedu Kufakuriani, and Felix Meier zu Salhausen (2020), p. 6.

²⁷ P. A. Oguagha, 'The Impact of European Trade on Igbo-Igala Commercial Relations in The Lower Niger C. 1650-1850 A.D.', *Journal of the Historical Society of Nigeria*, vol. 11, no. 3/4, (1982) p. 14. <<http://www.jstor.org/stable/41857115>> [Accessed 5 Oct. 2023].

²⁸ Klas Rönnbäck, 'The Slave Trades out of Africa' in *The History of African Development*, ed. Ewout Frankema, Ellen Hillboom, Ushehwedu Kufakuriani, and Felix Meier zu Salhausen (2020), p. 6.

²⁹ David Pratten, 'Currency & Conflict in Colonial Nigeria' in *The Political Economy of Everyday Life in Africa* (2017), p. 72.

³⁰ O. N. Njoku, 'Colonialism and the Decline of the Traditional Metal Industry of the Igbo, Nigeria', *Interaria*, 15 (2), pp. 60-61.

around the Niger River and Delta. The colonialism of Igboland changed traditional cultural practices, as noted above. Christianity and individualism fundamentally shifted the focus of the social structure away from communalism and ancestor worship towards Western practices.³¹ This can be seen in the introduction of the Igbo rectangular house designs,³² as well as the construction of Christian churches. The changing design in these tangible buildings represent the shifting intangible cultural practices in Igboland during the colonial period. There is a **high potential** for some of these buildings to be still present in the villages surrounding the Project AoI.

Port Harcourt (20km Northeast of Project AoI, upriver) was established by the colonial administration in 1912 to export coal from the region.³³ The Port is situated thirty-three miles inland as it is the first area of solid land after the unbroken stretch of mangroves that extend down to the coast.³⁴ In the 1920s the Bonny River was dredged to increase its navigable depth.³⁵ This **may impact the marine archaeological potential of the Project AoI** as there is a chance that archaeology within the river bed has been disturbed or removed. In the 1950s oil was discovered in the Niger Delta, leading to the rapid growth and development of the Port as a centre for oil exploitation.³⁶

In summary, there is **moderate potential** for archaeological evidence of trade to be found within the study area, although marine archaeology may have been disturbed by the dredging of the River Bonny. There is **high potential** for buildings from the Colonial Era to be present in the villages surrounding the Project AoI.

Independence (1960 – present day)

Nigeria claimed independence from the United Kingdom in 1960, leaving Igboland confined mostly to the southeast region of Nigeria. From the mid-1960s there was increasing political turmoil, the beginning of which was marked by the January 1966 coup.³⁷ The intensifying political tensions and ethnically motivated violence led to the splintering of Nigeria into twelve states and the creation of the Republic of Biafra where the Project AoI is located.³⁸ The

³¹ Joseph C. Chukwu, 'Traditional Igbo Building Architecture: An Historical Perspective', *Arts and Design Studies*, 34 (2015), pp. 10-11

³² Joseph C. Chukwu, 'Traditional Igbo Building Architecture: An Historical Perspective', *Arts and Design Studies*, 34 (2015), p. 11

³³ Toyin Falola, Ann Genova, and Matthew M. Heaton, *Historical Dictionary of Nigeria* (2018), p. 305

³⁴ Ayodeji Olukoju, 'Playing Second Fiddle: The Development of Port Harcourt and Its Role in the Nigerian Economy', *International Journal of Maritime History* (1966), p. 107

³⁵ Ayodeji Olukoju, 'Playing Second Fiddle: The Development of Port Harcourt and Its Role in the Nigerian Economy', *International Journal of Maritime History* (1966), p. 110

³⁶ Akachi Odoemene, 'Agony in the Garden': Incongruity of Governance and the Travails of Port Harcourt City, Nigeria, 1912-2010', *Africana: The Niger Delta* (2011), p. 113

³⁷ Johnson Oloosebikan Aremu and Lateef Oluwafemi Buhari, 'Sense and Senselessness of War: Aggregating the Causes, Gains and Losses of the Nigerian Civil War, 1967-1970', *IAFOR Journal of Arts and Humanities* (2017), p. 63

³⁸ Johnson Oloosebikan Aremu and Lateef Oluwafemi Buhari, 'Sense and Senselessness of War: Aggregating the Causes, Gains and Losses of the Nigerian Civil War, 1967-1970', *IAFOR Journal of Arts and Humanities* (2017), p. 65

Republic of Biafra was not recognised by the Nigerian Government as a sovereign state independent of Nigeria, which eventually led to a full-blown war on the 6th July 1966.³⁹

There is **moderate archaeological potential** for evidence of the civil war to be seen on the landscape surrounding the town of Aba (50km Northwest from Project AoI) and Port Harcourt (20km Northeast from Project AoI), both important strategic Biafran cities in the conflict.⁴⁰ Biafra became part of Nigeria once again in 1970 with military support from the United Kingdom however the tactics used to reunite Biafra and Nigeria remain controversial.⁴¹

In summary, there is **moderate potential** for archaeological evidence from post-Independence, including the Civil War, to be found within the study area due to its proximity with important strategic centres. Moreover, there is a **high potential** for oral knowledge about the recent history of Port Harcourt and the surrounding areas (including the Project AoI) to be present within the communities surrounding the Project AoI.

³⁹ Johnson Oluosebikan Aremu and Lateef Oluwafemi Buhari, 'Sense and Senselessness of War: Aggregating the Causes, Gains and Losses of the Nigerian Civil War, 1967-1970', *IAFOR Journal of Arts and Humanities* (2017), p. 66.

⁴⁰ Mathews, Martin P. (2002). *Nigeria: Current Issues and Historical Background*. Nova Publishers. p. 38. ISBN 1-59033-316-0; Akachi Odoemena, 'Agony in the Garden': Incongruity of Governance and the Travails of Port Harcourt City, Nigeria, 1912-2010', *Africana: The Niger Delta* (2011), p. 115.

⁴¹ Minogue, Martin; Judith Molloy (1974). *African Aims & Attitudes: Selected Documents*. General C. O. Ojukwu: CUP Archive. p. 393. ISBN 0-521-20426-7.

ANNEXURE 4.11

COMPREHENSIVE STAKEHOLDER ENGAGEMENTS REPORT

Introduction

Stakeholder engagement is a key aspect of the Environmental and Social Impact Assessment (ESIA) and also a requirement of the EIA Act CAP E12 LFN 2004. Stakeholder engagement during an EIA process is essential to ensure an inclusive, transparent, and robust assessment. As it leads to better decision-making, more sustainable outcomes, and helps to build trust and consensus among all parties involved. If well handled, it gives credibility and authenticity to the entire process and eventual report. The License to Operate (LTO) and Freedom to Operate (FTO) are products of fruitful stakeholder's engagements. This aspect of the ESIA for the 76KM pipeline project was handled by the consulting team of experts at different level.

Summary of Previous Engagements

Date	Stakeholder	Purpose	No. of attendees
21 September 2023	- Federal Ministry of Environment - Rivers State Ministry of Environment	Site verification required for Project categorization	8
19 October 2023	- FMEnv, ISMEnv, RSMEnv, LGAs - Council of Chiefs, - Paramount Rulers of respective Communities, - Elders, Women and women leaders, Youths, - NGOs, Civil societies, - Farmers, Traders, Fishers, students etc.	Scoping workshop for ESIA, Terms of Reference and Scope of Work A broader engagement to further educate participants on the proposed Pipeline project scope, environmental, social, economic and health aspects. Possible impacts of the project and community perspective (expectation, benefits, and perception etc.)	145
9 December 2023	Cluster Heads	Inform the Cluster of the proposed Pipeline Project scope; environmental, social, economic and health aspects. Clarify the roles and responsibilities of the Cluster Heads with regards to the Project.	4
15 December 2023	Cluster 1 communities' stakeholders: - The Paramount Ruler - Community Chairman - Youth President and Executives - Women group	Inform participants of the proposed Pipeline Project scope; environmental, social, economic and health aspects. Discuss possible impacts of the Project and obtain community	53

Date	Stakeholder	Purpose	No. of attendees
	- Youth Rep. of Youth Council - Community Members	perspectives (expectations, benefits, perceptions etc.).	
14 December 2023	Cluster 2 communities' stakeholders: - The Paramount Ruler - Community Chairman - Youth President and Executives - Women group - Youth Rep. of Youth Council - Community Members	Inform participants of the proposed Pipeline Project scope; environmental, social, economic and health aspects. Discuss possible impacts of the Project and obtain community perspectives (expectations, benefits, perceptions etc.).	87
20 December 2023	Cluster 3 communities' stakeholders: - The Paramount Ruler - Community Chairman - Youth President and Executives - Women group - Youth Rep. of Youth Council - Community Members	Inform participants of the proposed Pipeline Project scope; environmental, social, economic and health aspects. Discuss possible impacts of the project and obtain community perspectives (expectations, benefits, perceptions etc.).	135
19 December 2023	Cluster 4 communities' stakeholders: - The Paramount Ruler - Community Development Committee (CDC) Chairman - Youth President and Executives - Women group - Youth Rep. of Youth Council - Fishermen and Hunter - Community Members	Inform participants of the proposed Pipeline Project scope; environmental, social, economic and health aspects. Discuss possible impacts of the Project and obtain community perspectives (expectations, benefits, perceptions etc.).	91

FIRST ENGAGEMENT
SITE VERIFICATION BY ENVIRONMENT ASSESSMENT DEPARTMENT
(EAD) AND RIVERS STATE MINISTRY OF ENVIRONMENT (RSMENV)
OFFICERS

Proceedings

Date : 21 September 2023

Venue: Indorama Complex and Project Site

The site verification engagement session commenced at about 10:30am with introduction of participants which include Reps of FMEnv Abuja, FMEnv Zonal Office Port Harcourt, Rivers State Ministry of Environment (RSMEnv), and Proponent Reps. Total 10 attendees in the session.

The site verification activities were carried out by a multidisciplinary team consisting of environmental scientists, engineers, and other relevant experts from AGPC, Indorama, Consultant and Regulator. The team conducted extensive field visits to the proposed project site, observed the surrounding ecosystems, and interacted among stakeholders present as it relates to the proposed project. The verification process also involved reviewing project documents, including the proposed pipeline Right of Way (RoW), technical specifications of pipeline. The summary of engagement session is as below.

1. The Project Proponent Rep explained the proposed 20" x 76km natural pipeline project to the stakeholder present.
2. The FMEnv reps explained the purpose of the visit, which was supported by RSMEnv rep.
3. The FMEnv rep explained that EIA site verification visit is aimed to categories the project considering various environmental & social aspects.
4. The Ministry further instructed to submit Scoping Workshop report and revised Terms of Reference (TOR) incorporating significant issues raised at the Scoping Workshop and a detailed sampling frame for review and approval.
5. The Ministry was informed about the Scoping Workshop Program and the Ministry confirmed the participation.

The site verification ended successfully with the objectives of the engagement achieved, which includes that the project has actually not started, developmental projects around project environment. The Regulators further run through the EIA process to all stakeholder present confirm that the site verification is one the preliminary stages of EIA process. Below are photographs from site verification exercise.

PHOTO GALLERY



INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

ATTENDANCE SHEET

PROJECT	NG Pipeline – 76km				
DATE & TIME	21 st September 2023; 10:00 PM				
VENUE	Project Office Conference Room				
TOPIC	NG Pipeline (76km) Project – Site Verification Visit				
S/N	NAME	COMMUNITY / ORGANIZATION	PHONE NUMBER	Gender	Sign
1	IKOMAH, F. B	FMENV, PHC	08255662496	M	
2	NEKEGU FRANKLIN	FMENV Abaya	08070983447	M	
3	Adegoke Joseph	FMENV, Abuya	08032850037	M	
4	EMERECHE, CECILIA	FMENV, PHC	08077290905	F	
5	Dr. Ken. O. Owaro	RS MENV, PHC	08033094426	M	
6	Baruwa S. Dammag	Indorama	08052116035	M	
7	Dr. Makenda Jain	Indorama	08070324523	M	
8	Toyin Olusoba	Indorama	08068264786	F	
9					
10					

SECOND ENGAGEMENT
SCOPING WORKSHOP ORGANIZED FOR
76KM GAS PIPELINE PROJECT AT GOLDEN TULIP HOTEL, STADIUM
ROAD, PORT HARCOURT

As advised by the Federal Ministry of Environment (FMEnv) vide letter reference number FMEnv/EA/EIA/7236/Vol.1/68 of 12th October 2023, the scoping workshop involving stakeholders was conducted on 19th October 2023.

The workshop commenced with an opening prayer by Mrs. Josephine Nwoye at about 9:35am, which was further complemented with second stanza of the Nigerian National Anthem followed introduction of stakeholders, by welcome remark by Indorama, safety briefing and opening remark by FMEnv representative.

The key stakeholders in attendance were:

1. Representative of the Federal Minister of Environment, Abuja
2. Zonal Controller of the Federal Ministry of Environment, Port Harcourt
3. Zonal Controller of the Federal Ministry of Environment, Owerri.
4. Representative of State Ministry of Environment, Rivers State
5. Representative of State Ministry of Environment, Imo State
6. Representative of Ohaji/Egbema LGA
7. Leadership of the 23 communities along the pipeline RoW
8. Youth Leaders
9. Women Leaders
10. Consultant team
11. The Indorama Team

A total of 145 attendees were present in the scoping workshop as shown in the attendance sheet.

IEFCL's MD OPENING REMARK

The representative of the Managing Director of Indorama Eleme Fertilizer & Chemicals Limited (IEFCL) Mr. Phool Singh in his opening remark thanked all stakeholders for finding time to honor their Invitation. Going further he explained to stakeholders that the engagement is for the proposed 76km Natural Gas Pipeline Project that will deliver gas from Asa in Ohaji/Egbema LGA of the Imo State to Indorama Complex in Eleme LGA of the Rivers State. Concluding he cited the objective of the engagement as per the ESIA statutory requirement and assured stakeholders of Indorama commitments to environmental protection.

FME_{env} REP OPENING REMARK

The Representative of the Honorable Minister – Mr. Omovoh Gift Ochonogor in his opening remark welcomed all participants to the scoping workshop, confirming that Indorama applied for ESIA approval of Proposed 76km Natural Gas Pipeline Project. Per EIA Act, the Honorable Minister advised Indorama to carryout scoping workshop to review the draft ESIA ToR/SoW submitted to the Ministry with the relevant stakeholders for their inputs. Furthermore, he stated the importance of the scoping workshop referring to it as a major component in the ESIA process, which brings all stakeholder together, give them the opportunity to be aware of developmental activities within their environment and more so afford them the opportunity to participate in the ESIA approval process. Going forward he confirms that this is not the first time Indorama has carried out such an engagement, as they are religiously complying to the ESIA process in any of their developmental projects. Concluding, he told the participants that Indorama will be making a presentation on the submitted draft ToR/SoW for the proposed project for their input, urging them to listen attentively to make valuable contributions that will help the Ministry take a sound decision to the benefit of our environment.

DRAFT ToR/SoW PRESENTATION BY THE ESIA CONSULTANT

The presentation of the draft ESIA ToR and scope of work submitted to the Federal Ministry of Environment was made by Mr. Solomon Nwachukwu. During his presentation he informed the participants about the Proponent and background of the Project before diligently reviewing the Scope of the ESIA study which covered description of the Project and the Physical, Biophysical, and socio-economic environmental components of the proposed ESIA study. He confirmed that the ESIA study would cover 23 communities for socio-economic studies. He emphasized that the socio-economic study would cover various Socio-economic variables including Cultural Heritage. He informed that the ESIA report will also cover assessment of possible associated and potential (positive and negative) impacts of the various phases of the proposed project, mitigation measures and management plans. He explained in clear terms that the ESIA study approach will be in line with the requirements of the FME_{env} ESIA process. He also explained about the ESIA report format, ESIA schedule and deliverables. Concluding He stated that the ESIA study will be carried out with reference to National Regulations and International Guidelines. The presentation made to stakeholders is appended as annexure 2.

QUESTIONS AND RESPONSES

Mrs. Josephine Woryi: During such meetings I will request presentation material be made available to participants ahead of time to enable them to study the material. Going

forward she asked, what are the safety and health hazards that will affect the communities hosting this pipeline project?

Response: Responding to the question, Dr. Jain of Indorama explained the ESIA process in detail. He explained the importance of the baseline data, process of impact assessment and mitigation measures including management plans. He explained that during ESIA process, the impact including safety & health impact will be assessed and mitigation measures will be proffered. The engineering design will follow the National/International codes ensuring the safety aspects of the project, that will eliminate the possibility of health impacts.

Mr. Okere Samuel: What are the measures to prevent contamination of surface & groundwater?

Response: Both the use of technology and strict adherence to standard operating procedures will all be employed to prevent the possibilities of contamination of both surface and groundwater resources from accidental release. Moreso, the ESIA study will cover the study of groundwater and surface water which will be used as reference in future.

Mr. Chima Ugo: Having listened to the presentation attentively, security of the pipeline is not mentioned during the presentation. What is the measure for pipeline security?

Response: The monitoring of the pipeline will employ the same technology and security surveillance procedure as currently practiced for the existing 83km pipeline i.e., the use of optical fiber cable to monitor remotely and the MoU and Security surveillance contract with host communities.

Mr. Kinsley Nweke: The existing pipeline right of way (RoW) is currently being encroached upon, any plan for settlement on the encroachment or new acquisitions process.

Response: The proposed 76km gas pipeline will be laid on the existing pipeline right of way, as no new land acquisition is envisaged.

Dr. Shammah Anyalebechi: A young girl died in our community in 2008 due to pipeline explosion. What are the mitigation measures to avert such an occurrence?

Response: Responding to the question, Mr. Kendrick Oluka informed stakeholders that Indorama only started operation of their first pipeline project in 2014. However, he confirmed that safety is key to every Indorama operation. Furthermore, he registered his dissatisfaction with the issue of sabotage on pipeline.

Chief Wgbara: Display of the ESIA report at the LGA council headquarters will be an invitation to Politicians to hijack the process to the disadvantage of the local community, he warned.

Response: Responding to the question, Indorama informed the stakeholders that the ESIA report display approach will be in line with the requirements of the Federal Ministry of Environment, as such has no political coloration.

Mr. Kingsley Akano: He began by confirming that Indorama fulfills whatever they promise, urging participants to foster peace in their various communities to enable actualization of the proposed project. Furthermore, he added that non-execution of CSR project is a problem of contractors, advising Indorama to appoint contractors by themselves for completion of projects awarded.

Response: Responding to the question Mr. Kendrick Oluka informed stakeholders that contracts are awarded to contractors nominated by the leadership of the community after verifying the capabilities.

Mr. Oliver KSC: What are the measures that the community will benefit from job opportunity that this project will provide during construction?

Response: This will be purely based on merit, knowledge, and skills. The community leadership will be informed to sublet the information in their communities, whenever opportunity arises. This is the process being used presently by Indorama.

Mr. Eze Vincent Nwosu: During the question-and-answer session Eze Vincent confirmed that Indorama is a company to work with, adding that they are committed to every promise they made to their host community. He further appeals to Indorama to come to their aid with respect to the community issues.

Engr. Nwgbo – Zonal Controller Imo State (FMEnv): The pipeline from Asa to Indorama, I want to ask are you drilling your own well?

Response: Responding to the question, Dr. Jain of Indorama confirmed that Indorama is not drilling well, rather they are laying pipeline that will transport gas from Anoh gas manifold to Indorama facility in Eleme.

CLOSING REMARKS

Dr. Kenneth Okoro – Rep of Commissioner, Rivers State Ministry of Environment

Commenting during the engagement, Dr. Kenneth Okoro confirmed that Indorama is doing well on all fronts, especially in the area of environmental protection, owing to the level of their compliance with environmental laws applicable to the operations. He further appeals

to the host communities to give Indorama the enabling environment to actualize this project.

Mr. Ikomah FB – Zonal Controller, FMEnv Port Harcourt Office, Rivers State

In his remark Mr. Ikomah expressed satisfaction on the Proponent attitude in observing the ESIA protocols. He urged the communities to encourage Indorama with their support to see that the project comes to fruition.

Mr. Omovoh Gift Ochonogor - FMEnv Minister's Rep

The Representative of the Honorable Minister confirmed that Indorama is a responsible corporate organization owing to their drive for environmental protection in all their operations. Furthermore, he confirmed that as a Ministry, they have listened to questions and answers provided, testimonial from the stakeholder about Indorama. Finally, he thanked all participants for their participation and valuable contributions.

Vote of thanks

Engr. Sylvester of Indorama gave the vote of thanks, appreciating all stakeholders for coming and being open with their contributions. He assured participants that Indorama will do their part to ensure that the proposed project is delivered in due consideration to the environment.

The meeting ended at about 11:30am with a closing prayer. After that, everyone present in the meeting was treated to refreshment.

EVENT PHOTOGRAPHS





INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

ATTENDANCE SHEET

PROJECT	76KM GAS PIPELINE FROM ANOH GAS MANIFOLD TO INDORAMA COMPLEX
DATE & TIME	October 19 th , 2023; 09:00 AM
VENUE	Golden Tulip Hotel, 63 Stadium Road by Mummy B Junction, Port Harcourt
TOPIC	76KM GAS PIPELINE PROJECT ESIA – Scoping Workshop

S/N	NAME	COMMUNITY / ORGANIZATION	PHONE NUMBER	Gender	Sign
1	Dr. K.O. Okeke	RSMEN	08033094426	M	
2	Dr. Mrs. Adenike Oluwalanle	Per Okeke/Obinna	08034647990	F	
3	Ikemath, F.O.	FINEVU PITE	08056622496	M	
4	Eng. Ubois Okeke	FINEVU Carthor	08030855787	Male	
5	Okeke Obinna N	STATE MIN. of Environment	08068021844	M	
6	Umueti Cuth Okeke	Fed. Min. of Environment	08076922255	M	
7	PHOOL SINGH	Indorama	08052316666	M	
8	Dr. MAHENDRA JAIN	INDORAMA	08072345523	M	
9	Sylvester Okeke	Indorama	08035658244	M	
10	Andan Wai - Okeke	Indorama	08033334134	M	

ATTENDANCE SHEET

INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

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S/N	NAME	COMMUNITY / ORGANIZATION	PHONE NUMBER	Gender	Sign
11	MORDU I-J.	OMADUNG	08053061197	MALE	
12	Ego MERY	OMADUNG	08151104532	FEMALE	
13	Tony Nwilegent	OMADUNG	09037815778	male	
14	Chief Patrick Dordy	Omadiene	09165662763	MALE	
15	FELE BENEDICT MUDAKA	IMATH MUDAKA	07065382576	MALE	
16	NOJOKU CHIEF KUDAGELY	IMATH	07039253984	MALE	
17	Agnes Okegbara	IMATH	09032402910	male	
18	Kudagep Muteke	IMATH	08028656732	male	
19	Agnes Anugbo	IMATH	0813480917	female	
20	Nwamguma Chris	IMATH	08065730909	Male	

INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

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S/N	NAME	COMMUNITY / ORGANIZATION	PHONE NUMBER	Gender	Sign
21	Mr. Z. K. K. F. N. Omuoka	Osuaka F. R. Omuoka	07064859585	M	
22	Chief Victor Oboisike	Osuaka Chief	08088091388	M	
23	Silkealine Mekuenu	Osuaka	08124945242	M	
24	Joy Sunday	Ipob I	08155881022	F	
25	OLIVER N. NWIDIA (KSC)	AKPAJO	08035518874	M	
26	Roseline D. OSAROLUJI	AKPAJO	08037761650	F	
27	Emmanuel Oluwa	AKPAJO	0803704407	M	
28	Osambaka Ladunsi Ngeia	AKPAJO	08037070505	M	
29	Godday Maku OATA	AKPAJO	08065832929	M	
30	ALI UCHIE ATANI	AKANI YOUTH PRESIDENT	08062655828	M	

INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

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S/N	NAME	COMMUNITY / ORGANIZATION	PHONE NUMBER	Gender	Sign
31	ORAU SUNDAY EASIL	DEUNHA CDC	08063478195	MALE	
32	MURKINDIKOM EZEKIEL	Orkeshin C.D.C Chairman	08030670149	MALE	
33	CHUMWATH, UAD KUNGBA	CHUMWATH CDC	08036636525	MALE	
34	IGWE, SUNDAY OHAHUKU	OMADENE CDC	08037351266	MALE	
35	OKPARAKANTA STEPHEN A.	160 SAKETAKA	08038838335	MALE	
36	thon Miji Chemberlain	160 Cluster Leader	08037771535	MALE	
37	BAKARE BABATUNDE	Orkeshin CDC	09063568643	MALE	
38	NYOZI Amabelle	ATOKI TOWN	08036683481	FEMALE	
39	TEMPLER, C. AGIBAKATA	ATOKI TOWN	080-66901666	MALE	
40	Chiforhon G.N.I AGIBAKATA	ATOKI TOWN	08033419382	MALE	

INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

ATTENDANCE SHEET

PROJECT	76KM GAS PIPELINE FROM ANOH GAS MANIFOLD TO INDORAMA COMPLEX
DATE & TIME	October 19 th , 2023; 09:00 AM
VENUE	Golden Tulip Hotel, 63 Stadium Road by Mummy B Junction, Port Harcourt
TOPIC	76KM GAS PIPELINE PROJECT ESIA – Scoping Workshop

S/N	NAME	COMMUNITY / ORGANIZATION	PHONE NUMBER	Gender	Sign
41	HON NDIKALISI ASD	ELELENUO	08033408774	MALE	
42	UGOCHUKWU NTOKE	ELELENUO	08062270528	MALE	
43	Allen N. Nyeche	ELELENUO (CDC)	0805689917	MALE	
44	Ngozi Chinda	ELELENUO	08038250223	FEMALE	
45	Emmanuel Weli	ELELENUO	09136286177	MALE	
46	Ikechi Ambele	Agora (Cinema)	08022865433	MALE	
47	Amadi Chima	Agora Secretary	08104774853	FEMALE	
48	CHUCKLUKWA ALUWA	Agora	07068956470	MALE	
49	Chief TPI Day Nwuna	Agora	08063264254	MALE	
50	Emmanuel Okwura	AhARA (CDC)	08104227448	MALE	

INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

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TOPIC	76KM GAS PIPELINE PROJECT ESIA – Scoping Workshop

S/N	NAME	COMMUNITY / ORGANIZATION	PHONE NUMBER	Gender	Sign
51	Alexechi John	Onitama	08036224026	M	
52	Stef F. I. Azindait JP	✓	07061173201	M	
53	WALELE CHARITY	✓	07065428511	F	
54	Edoziwa WALE	✓	08102889948	M	
55	Onuohi Samuel	Umuohi - Umuohi	08067028196	M	
56	Goodness & Godwin Umuohi	Umuohi	08130734449	F	
57	AGBAM THOMAS MGBECHI	Umuohi	07063844728	M	
58	Umuohi SILESTINE	CONSULTING Firm	08032906422	M	
59	OBINIA, Richard O.	✓	08032628237	M	
60	Godwin Abel	IMEH	0803719932	M	

INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

ATTENDANCE SHEET

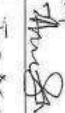
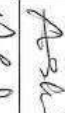
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TOPIC	76KM GAS PIPELINE PROJECT ESIA – Scoping Workshop

S/N	NAME	COMMUNITY / ORGANIZATION	PHONE NUMBER	Gender	Sign
61	Chief Adolphus Nwankwo	Community Chief	08034215548	M	
62	NKWO ELENUA VICTOR	EDG-ELM SECRETARY	09026235849	MALE	
63	CHIDOLE Nwankwo	EDG-ELM CDC	08026050541	Males	
64	Comr. Ebene Samuel O.	EDG-ELM Press Officer	08025416937	M	
65	CHIKOGE MARF	EDG-ELM WARDEN	09061113061	FEMALE	
66	AKOZIE Ekwu	Imokoma's Club	08030803258	Male	
67	Oji Ikenael	Anwara 2	080839714362	Male	
68	12E CHIKI	Anwara 1	08038253988	Male	
69	OPAMAH Saturday	Anwara 2	09081957987	Male	
70	Pastor Inezie Kanyo	Anwara 2	09084158416	Male	

INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

ATTENDANCE SHEET

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VENUE	Golden Tulip Hotel, 63 Stadium Road by Mummy B Junction, Port Harcourt
TOPIC	76KM GAS PIPELINE PROJECT ESIA – Scoping Workshop

S/N	NAME	COMMUNITY / ORGANIZATION	PHONE NUMBER	Gender	Sign
71	Chief R. Ibrahim. Oluwalanle	Oluwalanle	08025501486	Male	
72	Colund M. Ofori	Umunagodo	08101735168	Male	
73	Dr. Jones	Umunagodo	08105734248	Woman	
74	Sylvester Dida	Akamu	09039378409	M	
75	Amadi, Chetuo	Akamu	07062601395	M	
76	Eyikunaya Kingsley	Akamu	08022779044	M	
77	Edechi Olucci L	Akamu	09137658975	F	
78	NRE GIDEN MOSKE JR.	ASSA	08032756579	M.	
79	Hoti Cummins Ipreere	ASSA	08147208023	M	
80	Eng. Eric N. Nwanku	ASSA	08069064463	M	

INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

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TOPIC	76KM GAS PIPELINE PROJECT ESIA – Scoping Workshop

S/N	NAME	COMMUNITY / ORGANIZATION	PHONE NUMBER	Gender	Sign
81	Chief Chifor Ndili	Rumokwura 1	0837082034	M	
82	Chief Godwin Akilic	✓	090 967 44894	F	
83	AGBOLU GBEKEE	✓	08037356603	M	
84	Chief Bennett A. Akolore	✓	08101369669	✓	
85	Isaiah to. Onanwa	✓	08037690191	F	
86	Ulli Okueghalam	HAARIFA	08032686746	m	
87	Blessing Okeke, 195th	Harara	09015995764	F	
88	Pham Egnat Ctticorze	✓	08147041296	m	
89	Mondy Okachukwu Nwagwu	✓	09128663532	m	
90	Patience Ogbu	✓	07017970487	F	

INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

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S/N	NAME	COMMUNITY / ORGANIZATION	PHONE NUMBER	Gender	Sign
91	Eng. Akpan, Abong Obi	Central Imeiri Local Government	08030855901	Male	
92	Engr. Heston Adetunji O. Ode	REP. House Chairman, Eleme Constituency	08034464890	Female	
93	OKOROMA OBUINA-M	REP. HOUSE MEMBER, Eleme Constituency	08068021844	Male	
94	Omorehin Gift Deleogbor	REP. MEMBER OF ENVIRONMENT	08096577085	Male	
95	Est. Oluo Jackson	ANARRA	07088256529	Male	
96	Est. Zula Gbade Chtu	ASSA	08060120645	Male	
97	Obodo Bithlomeu Ikoku	ASSA - P.G.	08038670167	Male	
98	Est. Rinnu Nwaka	Umuakuru	08088695629	Male	
99	Kingdom Chimeka	Umuakuru	08142879139	Male	
100	Joy Oyejorin	Umuakuru	08162600161	Female	

INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

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TOPIC	76KM GAS PIPELINE PROJECT ESIA – Scoping Workshop

S/N	NAME	COMMUNITY / ORGANIZATION	PHONE NUMBER	Gender	Sign
101	Akam Kingsley	Odeja Community P.G	08064559887	Male	
102	Nwuneric Joseph	Odeja Leader	08024382530	male	
103	Nathana Gnedoh Chigo	W/Leader	09044581829	Female	
104	HITA Stanley N	DA SSE	07035118156	Male	
105	Chief Ibaka Udoenkwa C	Chief of staff Odeja	08064184794	Male	
106	ADEGUMU MATHURUO	FED MAN OF ENURU (117)	08053813584	Female	
107	BARIEENEE, GOVERNMENT B.	FED MAN OF ENURU	08077290705	Female	
108	Agogo-Jacke Boma favour	IO-MORGE-WT-SEE LTD	09033210161	Female	
109	Luck, MARY NUS	UNNOCITEM	08105822274	MTC	
110	Eze Dor Sharmah, Anyalekebi	Unuefa - Unuefan	08033918351	Male	

INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

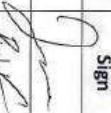
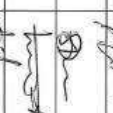
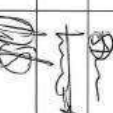
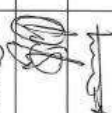
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TOPIC	76KM GAS PIPELINE PROJECT ESIA – Scoping Workshop				
S/N	NAME	COMMUNITY / ORGANIZATION	PHONE NUMBER	Gender	Sign
111	Ongedikachi Nwogu	CDC Chairman Chokoko Community	08160257995	Male	
112	Em. Michael Nwazi	Chokoko Community	09067104193	Male	
113	Oboroma Ekechika E.	Youth Leader	07038830626	Male	
114	Eze Samuel Oshiam	Ngwagbide Chokoko	081659144796	Male	
115	Anoali Irene	Chokoko Com. Women Leader	07062947021	Female	
116	Chief Friday Okoro	Rumokoma Afa	08110432022	Male	
117	FRED OGBONDA	Opurum Com.	08030985817	M.	
118	Zonahus A. Anoali	1PO	08064366410	male	
119	Chief Okachukwu Idoriosa	1PO	09122826065	male	
120	Chief Ugoji Iweavus	1PO	08038889189	male	

INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

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S/N	NAME	COMMUNITY / ORGANIZATION	PHONE NUMBER	Gender	Sign
121	FRANCE NINAMBI KIOSI	Uboing	08077976662	M	
122	PETER OYURUM	Uboing	08064097358	M	
123	SIMEON I. DIKE	Chc Uboing	08062049213	M	
124	CHIEF INNOCENT ANADI	Peace Chief Uboing	08082746642	M	
125	CHARLES OYURUM	Youth leader Uboing	07033905909	M	
126	Mr. JOSEPH NIMEDIKIKE	CHAIRMAN OF ANOH IN COMMUNITY Uboing	09066804829	M	
127	ISA ALEXANDER OKACHI	SECREARY Uboing	08184602777	M	
128	BESTRICE KHAGOR	WOMAN LEADER Uboing	07023603931	F	
129	EZELINNO CENT NIMOSU	COMMUNICATOR	08039450252	M	
130	CHUKWUEMEKA PETER	UNMARKED	07010986328	M	

INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

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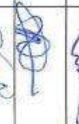
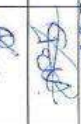
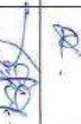
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VENUE	Golden Tulip Hotel, 63 Stadium Road by Mummy B Junction, Port Harcourt
TOPIC	76KM GAS PIPELINE PROJECT ESIA – Scoping Workshop

S/N	NAME	COMMUNITY / ORGANIZATION	PHONE NUMBER	Gender	Sign
131	Hugh Chief I. O. Didig	Dmerekwa	070882144871	Male	
132	Mu Stanley Anuadi	Dmerekwa	08060866152	Male	
133	Mrs Jennifer Akeme	Dmerekwa	08064426742 ~~081084744871~~	Female	
134	Hugh Chief C.D. Chukriq	Dmerekwa	05053262915	Male	
135	KOATE, Basilium Bwate	ECs	08106523803	Male	
136	Dr Obot Dominic Akpa	ECs	08032717955	M	
137	Sausaq -Lorka	ECs	07037993486	m	
138	Aie Chikwa	Eleme	0808667357	M	
139	Emmanuel Okerke	ELEME	09037542653	M	
140	Enuuvuoka Chiborikam	Eleme	08148400393	M	

INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

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VENUE	Golden Tulip Hotel, 63 Stadium Road by Mummy B Junction, Port Harcourt
TOPIC	76KM GAS PIPELINE PROJECT ESIA – Scoping Workshop

S/N	NAME	COMMUNITY / ORGANIZATION	PHONE NUMBER	Gender	Sign
141	MR KENDRICK OLUKA	INDORAMA	0805586428	M	
142	MR KUZZE NGOFI	INDORAMA	08063345885	M	
143	JAKA GODSPOWER	INDORAMA	08134446692	M	
144	OKAKABARI OLOR	INDORAMA	07667576053	F	
145	Juma BEBE -OKPABI	INDORAMA	07627215286	M	

THIRD ENGAGEMENT

COMMUNITY LEVEL ENGAGEMENTS UNDER FOUR (4) CLUSTERS

Cluster 1 (Atali, Elemenwo, Rumuokwurusi and Akpajo)

Date of Engagement:	15 December 2023
Venue	Village Town Hall/Palace
Facilitator	Consulting Team

Stakeholder's Groups Present

- i. The Paramount Ruler of Community
- ii. Community Chairman
- iii. Fishermen and Hunters Association
- iv. Consulting Team (Safespace)
- v. Youth President and Executives
- vi. Women Leader and Executives
- vii. Cross section of Community

Attendance of participants by Gender

Total Attendance - **53**

Aim and Objective of the Engagement

The objective of this engagement was to establish a productive dialogue with Cluster 1 communities to be affected by the proposed Indorama 76km pipeline. The engagement sought to address community concerns, share project information, and build relationships to foster understanding and cooperation.

Key Activities:

1. Community Meetings:

- The Four communities were gathered a central place within Cluster 1.
- Meetings were held in local community halls, ensuring maximum accessibility.
- Presentations were made to disseminate project details, including its purpose, expected benefits, and potential impacts on communities.
- Opportunities for questions, comments, and concerns were provided, facilitating an open and transparent dialogue.

2. Stakeholder Consultation:

- Stakeholder consultations were conducted with local community leaders, opinion leaders, and representatives.
- These consultations aimed to gather insights into the project's potential social, economic, and environmental impacts, as well as suggestions for mitigation measures.
- Stakeholder feedback was documented and will be considered in future project planning and implementation.

3. Village Visits:

- The team visited various villages within Cluster 1 to gather firsthand information such as infrastructural development, sacred sites and questionnaire administration within the communities.
- This allowed for a more personal and detailed understanding of community concerns, needs, and aspirations.
- The team sought to build trust and rapport through these interactions.

Key Findings:

1. Community Concerns:

- Key concerns revolved around Youth employment/empowerment, land acquisition potential disruptions to farming activities, pollution, land ownership, and compensation for land use.
- There were also concerns about vandalism and possible fire outbreak.
- Certain households expressed concerns about the potential impact on their livelihoods and income streams.

2. Information Gaps:

- Some community members expressed a lack of clear understanding of the project's objectives, timeline, and potential benefits.
- Limited awareness of sustainable construction practices and environmental mitigation measures was also observed.

3. Community Support:

- Despite concerns, there was a general willingness among community members to collaborate, provided their concerns were adequately addressed.
- Many expressed interest in potential job opportunities and sought guidance on ways to maximize the project's benefits to their communities.

Response

Based on the findings of this engagement, the following steps are proposed:

1. Addressing Concerns:

- Engage with relevant stakeholders to develop a comprehensive plan to address community concerns related to youth employment/empowerment farming disruptions, land ownership, compensation, and monitor potential impacts on water sources.
- Develop an information package in local languages to better communicate project objectives, benefits, and timeline.

2. Mitigation Measures:

- Collaborate with environmental experts to devise comprehensive mitigation measures to minimize the project's environmental impact, and also employ the use of technology for surveillance
- Engage local communities in environmental awareness and education programs, promoting sustainable practices.

3. Ongoing Engagement:

- Work with community liaison office to maintain regular communication and feedback channels with Cluster 1 communities throughout the project's lifecycle.
- Organize regular community meetings, informative sessions, and project updates to foster transparency and community involvement.

Conclusion:

The engagement with Cluster 1 communities was successful and was productive in establishing a dialogue and addressing initial concerns. It is important to implement the proposed next steps to ensure effective mitigation of community concerns and maximization of project benefits. Continuous engagement and transparency will be key to maintaining positive relationships with affected communities.

Photo gallery



ATTENDANCE SHEET **INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA**

PROJECT	76KM GAS PIPELINE FROM ANOH GAS MANIFOLD TO INDORAMA COMPLEX		
DATE & TIME	15th December, 2023 10:08am.		
VENUE	Atelu Community		
TOPIC	76KM GAS PIPELINE PROJECT ESIA - FIELD DATA GATHERING EXERCISE		

S/N	NAME	Position / ORGANIZATION	PHONE NUMBER	Gender	Sign
01	~~Chief Hon. Okeke~~	Chief	08033419862	M	
2	Flavia U. Ekwueme-George	Yacht Lady	08030855250	M	
3	Chief Friday Chime	Chief	08101452022	M	
4	Chief Sony Ekwueme	Elder	08032724755	M	
5	Eng. Fred Okeke	Fourth	08030785817	M	
6	Chisom Sonia Ibigo	Woman group	07030416982	F	
7	Ademariy Ojenda	Woman group	08067177414	F	
8	Florence Ekwueme	Woman group	08132790444	F	
9	Ngazi Amekshule	Woman leader	08036683489	F	
10	Chief Anselm Anasirin	Elder	07033928498	M	
11	Chief Charles Eke	Chief	07046355007	M	

12 Lainta Simdy Chime

08162286977

77 ELELELE Community
INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

ATTENDANCE SHEET

PROJECT		76KM GAS PIPELINE FROM ANOH GAS MANIFOLD TO INDORAMA COMPLEX			
DATE & TIME		18th December, 2023 12:46pm			
VENUE		Elelele Community			
TOPIC		76KM GAS PIPELINE PROJECT ESIA - FIELD DATA GATHERING EXERCISE			
S/N	NAME	Community / ORGANIZATION	PHONE NUMBER	Gender	Sign
1	Allen Ntehe	CD C Chairman	08035199112	M	[Signature]
2	NDUBUISI Ntehe	PRINCIPAL	08033408774	M	[Signature]
3	Sig Chief Simeon Ntehe	P.R.O: ELELELE	08036667300	M	[Signature]
4	CHUDU VANESSA CHUDE	YOUTH LEADER	08032146147	F	[Signature]
5	Augustina (BUDUBURUSI)	women leader	08034860793	F	[Signature]
6	thor, moses EJEKING	ELELELE LEADER	08055312086	F	[Signature]
7	Quinn Alkalo		07037581471	F	[Signature]
8	HON. HASO CHINUA		08091942073	M	[Signature]
9	APRIL CLINIA	ELCEN	08033106074	M	[Signature]
10	MEL NICKEL	YOUTH PRINCIPAL	08086494414	F	[Signature]
11	FRANK NTEHE		08035533063	M	[Signature]

INDORAMA
INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

ATTENDANCE SHEET

PROJECT	76KM GAS PIPELINE FROM ANOH GAS MANIFOLD TO INDORAMA COMPLEX				
DATE & TIME	15th December, 2023.				
VENUE	Palace of H.H. Eze C. Nkema JP.				
TOPIC	76KM GAS PIPELINE PROJECT ESIA - FIELD DATA GATHERING EXERCISE				
S/N	NAME	DESCRIPTION / ORGANIZATION	PHONE NUMBER	Gender	Sign
1.	Chief Clifford Nwali	Former R.T.C. Chairman	08037082034	M	
2.	Chief Godwin Anibiri	Community CLT	09096744899		
3.	Chief Ben Nwogu	Community Chief	0801367669		
4.	Comr. Azubuike Igwe	MBLOR	08037356603		
5.	Agbodu GBEKE	Community CLT	08037356603	M	
6.	Solomon I. Nwoko	Community CLT	08037356603	M	
7.	H.H. EZE C. Nkema JP.	PARLIAMENT. RULER.	08037356603	F	
8.	Mrs. Joy Cliff	Community CLT	08037356603	F	

AFPAJD
INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

ATTENDANCE SHEET

PROJECT	76KM GAS PIPELINE FROM ANOH GAS MANIFOLD TO INDORAMA COMPLEX				
DATE & TIME	15/12/2023 2:00 PM				
VENUE	Akpa Plate				
TOPIC	76KM GAS PIPELINE PROJECT ESIA - FIELD DATA GATHERING EXERCISE				
S/N	NAME	Position / ORGANIZATION	PHONE NUMBER	Gender	Sign
1	Sir Eluwa N. Nwidera	CDC Chairman	08033518874	Male	[Signature]
2	Osasoluwa Godwin Nwasi	Deputy CDC Chairman	08037070505	Male	[Signature]
3	Hen Samuel Oluwa	Stakeholder	0803704407	Male	[Signature]
4	Samson Premise Alake	Youth Leader	07064693184	Male	[Signature]
5	Mr Mrs Roseline D. Osarodun	Women Leader	08037761680	Female	[Signature]
6	Ben Godday Uwuwa Oluwa	CDC Secretary	08065832929	Male	[Signature]
7	Godness Wuuwa Oluwa	Women Rep	08107227699	Female	[Signature]
8	mercy Oluwa	Member	08068500847	Female	[Signature]
9	Nwodu Edward	Youth member	08063762412	Male	[Signature]
10	Janet Nwaka		080608184550846	Female	[Signature]
11	Esther Agednigo	Youth	08146296340	F	[Signature]

INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

ATTENDANCE SHEET

192

PROJECT	76KM GAS PIPELINE FROM ANOH GAS MANIFOLD TO INDORAMA COMPLEX				
DATE & TIME	15/12/2023 2.00pm				
VENUE	Atkpa ISO - ELEME				
TOPIC	76KM GAS PIPELINE PROJECT ESIA - FIELD DATA GATHERING EXERCISE				
S/N	NAME	COMMUNITY / ORGANIZATION	PHONE NUMBER	Gender	Sign
12	Monday Chugor	~~Member~~ Elder	08165245741	m	with
13	ROBERT OWAITE	MEMBER	08109208324	MALE	Resident
14	Friday Okanje	Youth	08036470082	m	Chugor
15	Friday Nwidaa	~~Youth~~	08716259559	male	Chugor
16	Hezekiah Okaka	Member	08032430726	m	~~Hezekiah~~
17	Daniel Okaka	Youth	08170401780	m	Daniel
18	Johnson Okaka	Youth	08034856480	m	Johnson
19	Mercy Ephraim Okaka	Member	08068857838	f	Mercy
20	Alamy Ben	Stakeholder	08137211844	f	Alamy
21	Renita Alale	Stakeholder	08030536313	f	Renita
22	Friday Nwimeene	Stakeholder	08038851238	m	Friday

Cluster 2 (Umuechem, Abara, Umuogodo, Imeh, Edegelem, Chokocho and Umuakuru)

Date of Engagement: 14 December 2023
Venue Village Town Hall/Palace
Facilitator Consulting Team

Stakeholder's Groups Present

- The Paramount Ruler of Community
- Community Chairman
- Fishermen and Hunters Association
- Consulting Team (Safespace)
- Security Guards
- Youth President and Executives
- Women Leader and Executives
- Community Members

Attendance of participants by Gender

Total - **87**

Aim and Objective of the Engagement

The objective of this engagement was to establish a productive dialogue with Cluster 2 communities to be affected by the proposed Indorama 76km pipeline. The engagement sought to address community concerns, share project information, and build relationships to foster understanding and cooperation.

Key Activities:

1. Community Meetings:

- The seven communities under this Cluster 2 were visited individual and reported under cluster 2.
- Meetings were held in village town halls/palace, ensuring maximum accessibility.
- Presentations were made to disseminate project details, including its purpose, expected benefits, and potential impacts on communities.
- Opportunities for questions, comments, and concerns were provided, facilitating an open and transparent dialogue.

2. Stakeholder Consultation:

- Stakeholder consultations were conducted with local community leaders, opinion leaders, and representatives.
- These consultations aimed to gather insights into the project's potential social, economic, and environmental impacts, as well as suggestions for mitigation measures.
- Stakeholder feedback was documented and will be considered in future project planning and implementation.

3. Village Visits:

- The team visited various villages within Cluster 2 to gather firsthand information such as infrastructural development, sacred sites and questionnaire administration within the communities.
- This allowed for a more personal and detailed understanding of community concerns, needs, and aspirations.
- The team sought to build trust and rapport through these interactions.

Key Findings:

1. Community Concerns:

- Key concerns revolved around Youth employment/empowerment, land acquisition, potential disruptions to farming activities, pollution, land ownership, and compensation for land use.
- There were also concerns about vandalism and possible fire outbreaks.
- Certain households expressed concerns about the potential impact on their livelihoods and income streams.

2. Information Gaps:

- Some community members expressed a lack of clear understanding of the project's objectives, timeline, and potential benefits.
- Limited awareness of sustainable construction practices and environmental mitigation measures was also observed.

3. Community Support:

- Despite concerns, there was a general willingness among community members to collaborate, provided their concerns were adequately addressed.
- Many expressed interest in potential job opportunities and sought guidance on ways to maximize the project's benefits to their communities.

Response

Based on the findings of this engagement, the following steps are proposed:

1. Addressing Concerns:

- Engage with relevant stakeholders to develop a comprehensive plan to address community concerns related to youth employment/empowerment farming disruptions, land ownership, compensation, and monitor potential impacts on water sources.
- Develop an information package in local languages to better communicate project objectives, benefits, and timeline.

2. Mitigation Measures:

- Collaborate with environmental experts to devise comprehensive mitigation measures to minimize the project's environmental impact, and also employ the use of technology for surveillance
- Engage local communities in environmental awareness and education programs, promoting sustainable practices.

3. Ongoing Engagement:

- Work with community liaison office to maintain regular communication and feedback channels with Cluster 2 communities throughout the project's lifecycle.
- Organize regular community meetings, informative sessions, and project updates to foster transparency and community involvement.

Conclusion:

The engagement with Cluster 2 communities was successful and productive in establishing a dialogue and addressing initial concerns. It is crucial to implement the proposed next steps to ensure effective mitigation of community concerns and maximization of project benefits. Continuous engagement and transparency will be key to maintaining positive relationships with affected communities.

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P122
INDORAMA

INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

ATTENDANCE SHEET

PROJECT	76KM GAS PIPELINE FROM ANOH GAS MANIFOLD TO INDORAMA COMPLEX
DATE & TIME	14th Dec 2023 - 12:31 noon
VENUE	Paramount Ruler's Place Umuochem Community
TOPIC	76KM GAS PIPELINE PROJECT ESIA - FIELD DATA GATHERING EXERCISE

S/N	NAME	COMMUNITY/ORGANIZATION	PHONE NUMBER	Gender	Sign
1	Nwobilo J. Morgan	Umuochem	08037426571	Male	
2	Eze Sampson Emoy	Umuochem	08050941429	M	
3	Eze Gilbert Odamini, JP		08069557804	M	
4	Eze Jacobs Odamini		08036674998	M	
5	Eze Bartholomew Omalu		08059855123	M	
6	Akpan Uwakabo M		07063844928	M	
7	Echeibege		08160817812	M	
8	Azuwasi Kenuts		08100257266	M	
9	Edele Oweiso Amikwas		08051946001	M	
10	Godwin Oweiso		08077830029	M	
11	Lucky M. Odamini		08120204050		

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ATTENDANCE SHEET

2 of 2

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Abara Etche

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INDORAMA

INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

ATTENDANCE SHEET

PROJECT	76KM GAS PIPELINE FROM ANOH GAS MANIFOLD TO INDORAMA COMPLEX
DATE & TIME	14th Dec. 2023 - 11:29
VENUE	Chief Lucke's Place - Abara Community Etche.
TOPIC	76KM GAS PIPELINE PROJECT ESIA - FIELD DATA GATHERING EXERCISE

S/N	NAME	COMMUNITY / ORGANIZATION	PHONE NUMBER	Gender	Sign
1	Muachibor T. Morgan	Abara Etche.	08039446571	male	
2	CHF Lucke Nduala	Abara	07068956470	m	
3	CHF Friday Afula	Abara	08063244254	m	
4	Eden Stanford Azuonwu	Abara	08072227089	m	
5	Forrester R. Nwankwo	Abara	07067804390	m	
6	Teddy Anthoni S. M.	Abara	08070655649	m	
7	Kelechi Ali	Abara	08038292964	m	
8	SAAG Onyiah	Abara	08064418295	m	
9	Goodson Oluo	Abara	08105824562	m	
10	Doris Lucke	Abara	081502486	m	
11	Irene Chinedu	Abara	08088262467	m	

Abana Community
INDORAMA ELEMENT FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

ATTENDANCE SHEET

Pg 2 of 2

PROJECT	76KM GAS PIPELINE FROM ANOH GAS MANIFOLD TO INDORAMA COMPLEX
DATE & TIME	14th Dec, 2023
VENUE	Palace of HPH - Abana Community
TOPIC	76KM GAS PIPELINE PROJECT ESIA - FIELD DATA GATHERING EXERCISE

S/N	NAME	COMMUNITY / ORGANIZATION	PHONE NUMBER	Gender	Sign
12	1st C/O Amuseleem	Abana	08140447607	Male	
	Amubelma Redulla	Abana	08140447607		
	ARUONWA IKETHI C	ABARA ETEKE	070671192937	Male	
	Adindly Amadi	Abana Eteke	08052546855	Male	
	Simeon Amasfula		08024991233	Male	
	Emmanuel C. Nwagwu		08102376324		
	Ching Nwankwo		07032196542		
	Amaka Chinda		0816482988		
	Cyprian Chinda		0904168935		
	Am Ekebe				

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INDORAMA
INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA
ATTENDANCE SHEET

PROJECT	76KM GAS PIPELINE FROM ANOH GAS MANIFOLD TO INDORAMA COMPLEX
DATE & TIME	14th December, 2023.
VENUE	Umuogodo Community Hall
TOPIC	76KM GAS PIPELINE PROJECT ESIA - FIELD DATA GATHERING EXERCISE

S/N	NAME	CLUSTER / ORGANIZATION	PHONE NUMBER	Gender	Sign
1	Musobido J. Morgan	Cluster leader	08037428571	male	
2	Kun Oshery Akwete	C. D. C chairman	08088656738	male	
3	Ose Begimina Nwaka	Traditional ruler	07065302396	male	
4	Emmanuel Nwoduokwu	TPP's leader	08068178877	male	
5	Nyduket Chaelis	Former youth leader	08132777975	male	
6	Sir Temere Nwagaji	Opinion leader	08026073452	male	
7	MU. Jothu Amadi	Opinion leader	0802786524	male	
8	~~Amadi~~ Blessing Nwaka	Woman leader	07014928546	female	

INDORAMA
INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

ATTENDANCE SHEET

PROJECT	76KM GAS PIPELINE FROM ANOH GAS MANIFOLD TO INDORAMA COMPLEX
DATE & TIME	14TH DECEMBER, 2023
VENUE	MEET COMMUNITIES HERE
TOPIC	76KM GAS PIPELINE PROJECT ESIA - FIELD DATA GATHERING EXERCISE

S/N	NAME	Position / ORGANIZATION	PHONE NUMBER	Gender	Sign
1	Morgidior Jones Morgan	Cluster leader	0805742571	Male	
2	Elor Godwin Aled	Lead CDC chairman	08037119932	Male	
3	Alvan Eugene Christian	Meet you leader	08065730909	Male	
4	Abraham I. Bawura	Community leader	08025821486	Male	
5	Ayaustrale Oleye O. Boro	Lead CDC chairman	07032409410	Male	
6	Njoku Ejike Ikingale	CDC chairman	07037253984	Male	
7	Godson Nwanguwa	Community Chief	08084479679	Male	
8	Olisa Chidi	Community leader	0816635558	Male	
9	Calvin Muelor	Community leader	0816733168	Male	

EDF ELEME - ETCE
INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

ATTENDANCE SHEET

PROJECT	76KM GAS PIPELINE FROM ANOH GAS MANIFOLD TO INDORAMA COMPLEX				
DATE & TIME	14TH DECEMBER, 2023				
VENUE	EDF ELEME COMMUNITY HALL				
TOPIC	76KM GAS PIPELINE PROJECT ESIA - FIELD DATA GATHERING EXERCISE				
S/N	NAME	POSTER / ORGANIZATION	PHONE NUMBER	Gender	Sign
1	Mwabior J. Morgan	Cluster leader	0803442657	Male	
2	CHIDOR Nwagboke	CD CATHARINE	08026050541	Male	
3	Sr GSC Ougboke	Member	08037598979	Male	
4	En Nwankwo Reginald	Chief of Okole	08014717110	Male	
5	En Emmanuel Oluo	Chief, Umurewa	080302576517	Male	
6	En Gabriel O. A. Nwankwo	Belumbe Edogbo	08059554535	Male	
7	Offere Isaac Chikeike	Umuoaele-Idinma	08065311052	Male	
8	Kingsley Okafor Williams	Umuoaele	08028205440	Male	
9	Ekeoma Adiora	Umuoaele	08103661684	Female	
10	Mrs Chukwue Mary	Umuoaele leader	0906113061	Female	
11	Cyprian Nwagboke		08079315640	Male	
12	Okere Samuel B.	Edogbo youth leader	08025416937	Male	

CHKOCHS - ETCHE 4°59'27"N 7°31'38"E
INDORAMA
 INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

ATTENDANCE SHEET

PROJECT	76KM GAS PIPELINE FROM ANOM GAS MANIFOLD TO INDORAMA COMPLEX
DATE & TIME	14TH DECEMBER, 2023
VENUE	CHKOCHS COMM. HALL
TOPIC	76KM GAS PIPELINE PROJECT ESIA - FIELD DATA GATHERING EXERCISE

S/N	NAME	COMPANY / ORGANIZATION	PHONE NUMBER	Gender	Sign
1	Abimbola Simon	Chairman	080394256511	Male	[Signature]
2	Clifford Nwankwo	Executive Director	08168979384	Male	[Signature]
3	David Michael O. Nwagwu	Area Field Lead	09067104193	Male	[Signature]
4	Mr. S. Samuel A. Nwagwu	Area Field Lead		Male	[Signature]
5	Eze Samuel O. Nwagwu	Area Field Lead	08165944796	Male	[Signature]
6	Gen. Innocent M. Nwagwu	Division Lead	09036117158	Male	[Signature]
7	Gen. M. Nwagwu	Executive Secretary	08163935938	Male	[Signature]
8	Gen. Benson Nwagwu	C.D.C Member	08080009035	Male	[Signature]
9	Gen. Onyiah Nwagwu	Executive Secretary	08160857995	Male	[Signature]
10	Gen. Okeke Nwagwu	Executive Secretary	07028820626	Male	[Signature]
11	Mrs. Nwagwu	MEMBER	08041823491	Female	[Signature]

12 Mrs. Nwagwu Irene Woman LEADER 0706294724 for CHKOCHS

UMAKURU - ETCHE
INDORAMA
INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

ATTENDANCE SHEET

PROJECT	76KM GAS PIPELINE FROM ANCH GAS MANIFOLD TO INDORAMA COMPLEX				
DATE & TIME	14th DECEMBER, 2023				
VENUE	UMAKURU CONG. HALL				
TOPIC	76KM GAS PIPELINE PROJECT ESIA - FIELD DATA GATHERING EXERCISE				
S/N	NAME	POSITION COMMUNITY ORGANIZATION	PHONE NUMBER	Gender	Sign
1	Nwagbika J. Nwagbika	Cluster leader	08037445711	Male	
2	Izefi Nwofenji Nwofenji	UMAKURU	08037445711	✓	
3	Oziwa Chinaka	UMAKURU	08174491840	✓	
4	Godwin D. D.	UMAKURU	08162600161	✓	
5	Chike Onogorom	UMAKURU	09020218799	✓	
6	Imoet Onogorom	UMAKURU	08165110947	✓	
7	Iti Onogorom	UMAKURU	08138570505	✓	
8	Iti Onogorom	UMAKURU	08165237345	✓	
	Nkochoyere Ima Gbaf	UMAKURU	07010641947	✓	
	Kingdon Chivota	UMAKURU	08142871139	✓	

PHOTO GALLERY



Cluster 3 (Ipo, Omademe, Ozuoha, Omanwa, Ubima, Omereolu)

Date of Engagement: 20th December 2023
Venue Village Town Hall/Palace
Facilitator Consulting Team

Stakeholder's Groups Present

- The Paramount Ruler of Community
- Community Chairman
- Fishermen and Hunters Association
- Consulting Team (Safespace)
- Security Guards
- Youth President and Executives
- Women Leader and Executives
- Community Members

Attendance of participants by Gender

Total - 135

Aim and Objective of the Engagement

The objective of this engagement was to establish a productive dialogue with Cluster 3 communities to be affected by the proposed Indorama 76km pipeline. The engagement sought to address community concerns, share project information, and build relationships to foster understanding and cooperation.

Key Activities:

1. Community Meetings:

- The seven communities under this Cluster 3 were visited individual and reported under cluster 3.
- Meetings were held in village town halls/palace, ensuring maximum accessibility.
- Presentations were made to disseminate project details, including its purpose, expected benefits, and potential impacts on communities.
- Opportunities for questions, comments, and concerns were provided, facilitating an open and transparent dialogue.

2. Stakeholder Consultation:

- Stakeholder consultations were conducted with local community leaders, opinion leaders, and representatives.
- These consultations aimed to gather insights into the project's potential social, economic, and environmental impacts, as well as suggestions for mitigation measures.
- Stakeholder feedback was documented and will be considered in future project planning and implementation.

3. Village Visits:

- The team visited various villages within Cluster 3 to gather firsthand information such as infrastructural development, sacred sites and questionnaire administration within the communities.
- This allowed for a more personal and detailed understanding of community concerns, needs, and aspirations.
- The team sought to build trust and rapport through these interactions.

Key Findings:

1. Community Concerns:

- Key concerns revolved around Youth employment/empowerment, land acquisition potential disruptions to farming activities, pollution, land ownership, and compensation for land use.
- There were also concerns about vandalism and possible fire outbreak.
- Certain households expressed concerns about the potential impact on their livelihoods and income streams.

2. Information Gaps:

- Some community members expressed a lack of clear understanding of the project's objectives, timeline, and potential benefits.
- Limited awareness of sustainable construction practices and environmental mitigation measures was also observed.

3. Community Support:

- Despite concerns, there was a general willingness among community members to collaborate, provided their concerns were adequately addressed.
- Many expressed interest in potential job opportunities and sought guidance on ways to maximize the project's benefits to their communities.

Response

Based on the findings of this engagement, the following steps are proposed:

1. Addressing Concerns:

- Engage with relevant stakeholders to develop a comprehensive plan to address community concerns related to youth employment/empowerment farming disruptions, land ownership, compensation, and monitor potential impacts on water sources.
- Develop an information package in local languages to better communicate project objectives, benefits, and timeline.

2. Mitigation Measures:

- Collaborate with environmental experts to devise comprehensive mitigation measures to minimize the project's environmental impact, and also employ the use of technology for surveillance
- Engage local communities in environmental awareness and education programs, promoting sustainable practices.

3. Ongoing Engagement:

- Work with community liaison office to maintain regular communication and feedback channels with Cluster 3 communities throughout the project's lifecycle.
- Organize regular community meetings, informative sessions, and project updates to foster transparency and community involvement.

Conclusion:

The engagement with Cluster 3 communities was successful and productive in establishing a dialogue and addressing initial concerns. It is important to implement the proposed next steps to ensure effective mitigation of community concerns and maximization of project benefits. Continuous engagement and transparency will be key to maintaining positive relationships with affected communities.

PHOTO GALLERY



INDORAMA ELEMENTAL FERTILIZER & CHEMICALS LIMITED, ELEMENT, RIVERS STATE, NIGERIA

ATTENDANCE SHEET

PROJECT	76KM GAS PIPELINE FROM ANOH GAS MANIFOLD TO INDORAMA COMPLEX		
DATE & TIME	20th December, 2023. 8:30 AM		
VENUE	Ipo Community Hall		
TOPIC	76KM GAS PIPELINE PROJECT ESIA - FIELD DATA GATHERING EXERCISE		

S/N	NAME	Community / Organization	PHONE NUMBER	Gender	Sign
1	EZE CHINA GRISSON OBIAGIE	PARAMOUNT KULU	09071723745	M	
2	ELDER, JIMDIAT WOSTI	HEAD, OMAKIKE	090337692	M	
3	CHIEF, DEEPHEN OKPARANTA	HEAD, OMAKIKE	08038830378	M	
4	ELDER, EPHRIAM NNADI	HEAD, OMAKIKE		M	
5	CHIEF EDWIN OKACHUKWU	Community Chief	09122826065	M	
6	ELDER, ACHONNUS AMADI	HEAD, MGBUMIN		M	
7	CHIEF JOHN AMOS OKOT	CHIEF, OMAKIKE	09134768950	M	
8	CHIEF DONATUS OBIAGIE	CHIEF OMAKIKE	08037400164	M	
9	KECH ISAAC. O.	Community Leader	07067481330	M	
10	CHARLES MOSES	Community Member	08038491392	M	
11	OBIAGIE MONDAY		07037666262	M	

IPD COMMUNITY 503/13 **INDORAMA**
INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

ATTENDANCE SHEET

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PROJECT	76KM GAS PIPELINE FROM ANOH GAS MANIFOLD TO INDORAMA COMPLEX
DATE & TIME	20th Dec 2023
VENUE	IPD Community Hall
TOPIC	76KM GAS PIPELINE PROJECT ESIA - FIELD DATA GATHERING EXERCISE

S/N	NAME	COMMUNITY / ORGANIZATION	PHONE NUMBER	Gender	Sign
01	Madu Pease		08064246900	M	<i>[Signature]</i>
02	Mali Samuel		08130280719	✓	<i>[Signature]</i>
03	Joy Sunday		081555481002	F	S.S
04	Emmanuel Thabaz		07068712391	M	<i>[Signature]</i>
05	Ramson Amadi		0703766262	M	<i>[Signature]</i>
06	Odigwe Nwobara		0703766262	M	<i>[Signature]</i>
07	Charles Moses		08038491392	M	<i>[Signature]</i>
08	Cadins Odunwa		07015002805	M	<i>[Signature]</i>
09	Elue Chidi		09095170049	M	<i>[Signature]</i>
10	Emmanuel Anzadi		09047071921	M	<i>[Signature]</i>
11	Samson Amadi		070198070	M	<i>[Signature]</i>

ATTENDANCE SHEET

76KM GAS PIPELINE FROM ANOH GAS MANIFOLD TO INDORAMA COMPLEX

25th December, 2023. 12:45pm

Fogel's Palace - Omaha

76KM GAS PIPELINE PROJECT ESIA – FIELD DATA GATHERING EXERCISE

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INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

ATTENDANCE SHEET

PROJECT	76KM GAS PIPELINE FROM ANOH GAS MANIFOLD TO INDORAMA COMPLEX
DATE & TIME	28th December, 2023 10:13 am
VENUE	Ego's Palace Onademu
TOPIC	76KM GAS PIPELINE PROJECT ESIA - FIELD DATA GATHERING EXERCISE

S/N	NAME	Person community / ORGANIZATION	PHONE NUMBER	Gender	Sign
01	HON CHF IK WARDU		08053061197	Male	Chklyth
02	Abel Ebereser Nodur	Family Head.	08135494654	✓	Wardur
03	Atta Christian Mgo	Family Head	08103628975	M	Atta
04	Mr. Chiechi Ntingbu	Family Chairman	08031515446	"	Chiechi
05	Onurakwe J. Wali	Family Head	07035959283	M	Onurakwe
06	Temple Ntingbu	Onurakwe	07030934328	M	Temple
07	Ona Simon Nodur	Family Head		M	Ona
08	Sylvanus Amadi	Onurakwe		M	Sylvanus
09	Isa Onurakwe	Onurakwe		M	Isa
10	Ony JNO Nungwa Jr	Paramount Ruler	091168555138	M	Ony
11	Chief Patricia Amadi - Wardu	Ego Nundi-Ka	09165662963	M	Chief

ORADEME

INDORAMA

INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

ATTENDANCE SHEET

PROJECT	76KM GAS PIPELINE FROM ANOH GAS MANIFOLD TO INDORAMA COMPLEX
DATE & TIME	20th December, 2023 10:13 am
VENUE	Ego's Palae Oradelem.
TOPIC	76KM GAS PIPELINE PROJECT ESIA - FIELD DATA GATHERING EXERCISE

S/N	NAME	Position / ORGANIZATION	PHONE NUMBER	Gender	Sign
01	Hon Cttf Ik WODU		08053061197	Male	Okellu
02	Major Ebenezer Nwogu	Family Head.	08135494654	✓	Okellu
03	Mr. A Christian Nwogu	Family Head	08103628975	M	Okellu
04	Mr. Chinedu Nwogu	Family Headman	08031515446	M	Okellu
05	Mr. Nwogu J. Wale	Family Head	07035959283	M	Okellu
06	Temple Nwogu	Oradelem	07030934328	M	Okellu
07	Mr. Simeon Nwogu	Family Head		M	Okellu
08	Sylvanus Anadi	Oradelem		M	Okellu
09	Mr. Anadi	Oradelem		M	Okellu
10	Chief JNO Nwogu	Oradelem	091168555138	M	Okellu
11	Chief Patrick Anadi - WODU	Oradelem	09165669963	M	Okellu

ATTENDANCE SHEET

INDO PRAWA

272

60 | Page

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INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

ATTENDANCE SHEET

pg. 1 of 4

PROJECT	76KM GAS PIPELINE FROM ANOH GAS MANIFOLD TO INDORAMA COMPLEX
DATE & TIME	20th December, 2023 12:45pm
VENUE	Eyo's Palace Omuamaka
TOPIC	76KM GAS PIPELINE PROJECT ESIA - FIELD DATA GATHERING EXERCISE

S/N	NAME	COMMUNITY / ORGANIZATION	PHONE NUMBER	Gender	Sign
1	Alexechi Idun	Community Rep	08136224026	M	
2	LOVE DAY Ejiwori	ELDER	08181294193	M	
3	KENNETH ALEBBS E. JIKEME	ELDER	08064810644	M	
4	~~FEUNRETH~~ FEUNRETH ALEBBS	CHIEF	07064433201	M	
5	ANUNNE JOTHU ALEBBS	CHIEF	08067431766	M	
6	Cyprian Ekebe	ELDER	09032222098	M	
7	Victor Idadi	Farmer	08163134299	M	
8	Elder ISAIAH M. OMBURUKA	ELDER	08067650904	M	
9	Alexechi Ismael	Mr	08063037287	M	
10	MARTIN I. Idadi	Mr	07033396342	M	
11	Eleknachukwu E. Ekebe (Jr)	Messrs	08021374904	Male	

① Muanuwa

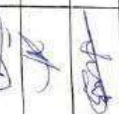
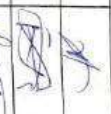
INDORAMA

INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

ATTENDANCE SHEET

2 of 2

PROJECT	76KM GAS PIPELINE FROM ANOH GAS MANIFOLD TO INDORAMA COMPLEX
DATE & TIME	25th December, 2023 12:45pm
VENUE	Ege's Palace, Omuana
TOPIC	76KM GAS PIPELINE PROJECT ESIA – FIELD DATA GATHERING EXERCISE

S/N	NAME	COMMUNITY / ORGANIZATION	PHONE NUMBER	Gender	Sign
12	Etiase Christopher	Omuana	0906660004	M	
13	Emmanuel Eke	"	09062899129	"	
14	Felix Eke	"	08403657437	"	
15	Amadi Emmanuel Henry	Omuana	0968505444	M	
16	Dimitry Kugley	Omuana	09079055946	M	
12	Samuel Eke	"	07036543985	"	
18	Chimezie Eke	"	0916115445	M	
19	Imosegt Eke	"	0814402359	M	
20	Chimezie Anthonia	~~Omuana~~	0912453351	M	CHT
21	Thank God Wokeguma	Omuana	0806662917	M	
22	Amadi Godwin Chiege	Omuana	0803715142	M	

INDORAMA
INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

ATTENDANCE SHEET

3rd 4

PROJECT	76KM GAS PIPELINE FROM ANOH GAS MANIFOLD TO INDORAMA COMPLEX
DATE & TIME	28 th December, 2023 12:45pm
VENUE	Fgo's Palace - Onuama
TOPIC	76KM GAS PIPELINE PROJECT ESIA - FIELD DATA GATHERING EXERCISE

S/N	NAME	COMMUNITY / ORGANIZATION	PHONE NUMBER	Gender	Sign
23	WHL Edeoro	Onuama	08102889248	m	WHL
24	AMADI THAKAD	Onuama	07049217084	m	AMADI
25	BALIKI'S WIFE	Onuama	07069734514	m	BALIKI
26	ODINAKACH WADI	Onuama	0707442350	m	ODINAKACH
27	CHINEDU WADI	Onuama	08102582639	m	CHINEDU
28	Dchebe wadi	Onuama	07025916576	m	Dchebe
29	AMADI progress	Onuama	070723	m	AMADI
30	OBINICHI AMADI	Onuama	070695019	m	OBINICHI
31	Chinazor Agwu	Onuama	08128528540	m	Chinazor
32	CHIBUEZOA WADI	Onuama	0810297649	m	CHIBUEZOA
33	Awenda Emeke	Onuama	08132905689	m	Awenda

INDORAMA

INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

ATTENDANCE SHEET

PROJECT	76KM GAS PIPELINE FROM ANOH GAS MANIFOLD TO INDRAMANA COMPLEX
DATE & TIME	20th December, 2023 12:45pm
VENUE	Ego's Palace - Dumanara
TOPIC	76KM GAS PIPELINE PROJECT ESIA - FIELD DATA GATHERING EXERCISE

[illegible]

LBIMA

INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

ATTENDANCE SHEET

B182

PROJECT	76KM GAS PIPELINE FROM ANCH GAS MANIFOLD TO INDORAMA COMPLEX
DATE & TIME	20th December, 2023 1:20pm
VENUE	Ukoma Community
TOPIC	76KM GAS PIPELINE PROJECT ESIA - FIELD DATA GATHERING EXERCISE

S/N	NAME	COMMUNITY / ORGANIZATION	PHONE NUMBER	Gender	Sign
1.	PRINCE NINAMDI KIOSU	CCD LBIMA	08077776662	M	
2.	BRACHI ISAH KEMAL	SECRETARY	08134602777	M	
3.	MAKALELL Semud Eze	Youth	08032932676	M	
4.	OFURUM CHINYEM CHARLES	Joint Leader	07033925909	M	
5.	AGBARAKUN GEORGE	CDC Ukoma	08062874630	M	
6.	NINAMDI PHILIP		09131705877	M	
7.	CHINKEKE DINKPA		0909334433		
8.	Chumaka Igode	0816644672	0703676261	M	
9.	MOSU KIDILLO	Security	07032335081		
10.	Ameanin Nyelise	Security	08160187195		
11.	Nwa Agbarakun		09166801984		

LB/M/A

INDORAMA

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ATTENDANCE SHEET

B 2 9 2

PROJECT	76KM GAS PIPELINE FROM ANCH GAS MAINFOLD TO INDORAMA COMPLEX
DATE & TIME	28 th December, 2023 1:40 pm
VENUE	Ideme Community
TOPIC	76KM GAS PIPELINE PROJECT ESIA - FIELD DATA GATHERING EXERCISE

S/N	NAME	COMMUNITY / ORGANIZATION	PHONE NUMBER	Gender	Sign
12	James Odegha	Security	0813166 0571	M	
13	Orimokun Kefeyem			M	
14	Francis Ogun		08109443785	M	
15	Adekun Salinas		08100168439	M	
16	Andecci Incebet		09033211599	F	
17	Klamyima Kledi	Yoth		F	
18	Mary Wogborom	Klames Assembly		F	
19	Christians Klay	Klames Assembly	08140227188	F	
20	Juan Maxwell	Yoth	09061768832	F	
21	Scholar Olu Dala	Yoth	09067686148	F	
22	Chigere Dinkas	Yoth	08062787492	M	
23	Mobodo Uderem	Security	09060844145	M	

OMERELA COMMUNITY
INDORAMA ELEMENT FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

ATTENDANCE SHEET

PROJECT	76KM GAS PIPELINE FROM ANOH GAS MANIFOLD TO INDORAMA COMPLEX
DATE & TIME	20th December, 2023 2:12pm
VENUE	Omerela Town Hall
TOPIC	76KM GAS PIPELINE PROJECT ESIA - FIELD DATA GATHERING EXERCISE

S/N	NAME	COMMUNITY / ORGANIZATION	PHONE NUMBER	Gender	Sign
1.	HIGH CHIEF C.D. CHUKWU JP	OMERELA	08053262915	M	
2.	Chief. Imocest Epara	Omerela Community	07086581157	m	
3.	Chief Albert Wond	Omerela Community	08104832411	M	
4.	Chief A.U. Ejimch	Omerela Comm.	08022451731	M.	
5.	Samuel Chima	Omerela Community	08129531566	m	
6.	A. Cyprian Akoyisa	Omerela Community	09042001478	M	
7.	Chief Sunday Anaka	Omerela	09012824722	m	
8.	Chief Gabriel Anedi	Omerela	08083400973	m	
9.	Chief Simon Sunday Piti	Omerela	09066275334	m	
10.	Chief Emmanuel Okoyanagi	Omerela	09165340345	m	
11.	Chief Ikemba Lawrence	Omerela	08085821905	m	
12.	CHIEF Godwin Ikola	Omerela	09031070327	m	
13.	Chief James Ekwunife	Omerela	08147391838	m	

OMEARELY COMMUNITY . INDORAMA
INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

ATTENDANCE SHEET

PROJECT	76KM GAS PIPELINE FROM ANOH GAS MAINFOLD TO INDORAMA COMPLEX
DATE & TIME	20th December 2023 2:12pm
VENUE	Omexela Town Hall
TOPIC	76KM GAS PIPELINE PROJECT ESIA - FIELD DATA GATHERING EXERCISE

S/N	NAME	COMMUNITY / ORGANIZATION	PHONE NUMBER	Gender	Sign
14	Kenneth Udojue	Omexela Omexela	07012333197	M	[Signature]
15	Peter Obara S.	Omexela - Omexela	-	Male	[Signature]
16	Sunday Amaobi	Omexela - Omexela	07030976648	M	[Signature]
17	Samuel Opara Obo	Omexela - Omexela	07081430437	M	[Signature]
18	Chief Samuel Igwe N.	Omexela - Oga	08023682337	M	[Signature]
19	Solomon Igwe E	Omexela - Oga	08131290105	M	[Signature]
20	OMAH Augustinus	Ogala	08030665170	M	[Signature]
21	Geoffrey Uosin	Omexela - Omexela	07033548105	M	[Signature]
22	James Uosin	Omexela - Omexela	0810750313	M	[Signature]
23	Sunday Wabara	Omexela	0907611218	M	[Signature]
24	Sunday Iyin	Omexela	07012224807	M	[Signature]

25 Okechukwu D. Udo Omearely 08135868094 M [Signature]

Cluster 4 (Omuapu, Awara1, Awara 2, Ochia and Asa)

Date of Engagement: 19th December 2023
Venue Village Town Hall/Palace
Facilitator Consulting Team

Stakeholder's Groups Present

- The Paramount Ruler of Community
- Community Chairman
- Fishermen and Hunters Association
- Consulting Team (Safespace)
- Security Guards
- Youth President and Executives
- Women Leader and Executives
- Community Members

Attendance of participants by Gender

Total - **91**

Aim and Objective of the Engagement

The objective of this engagement was to establish a productive dialogue with Cluster 4 communities to be affected by the proposed Indorama 76km pipeline. The engagement sought to address community concerns, share project information, and build relationships to foster understanding and cooperation.

Key Activities:

1. Community Meetings:

- The seven communities under this Cluster 4 were visited individual and reported under cluster 4.
- Meetings were held in village town halls/palace, ensuring maximum accessibility.
- Presentations were made to disseminate project details, including its purpose, expected benefits, and potential impacts on communities.
- Opportunities for questions, comments, and concerns were provided, facilitating an open and transparent dialogue.

2. Stakeholder Consultation:

- Stakeholder consultations were conducted with local community leaders, opinion leaders, and representatives.

- These consultations aimed to gather insights into the project's potential social, economic, and environmental impacts, as well as suggestions for mitigation measures.
- Stakeholder feedback was documented and will be considered in future project planning and implementation.

3. Village Visits:

- The team visited various villages within Cluster 4 to gather firsthand information such as infrastructural development, sacred sites and questionnaire administration within the communities.
- This allowed for a more personal and detailed understanding of community concerns, needs, and aspirations.
- The team sought to build trust and rapport through these interactions.

Key Findings:

1. Community Concerns:

- Key concerns revolved around Youth employment/empowerment, land acquisition, potential disruptions to farming activities, pollution, land ownership, and compensation for land use.
- There were also concerns about vandalism and possible fire outbreak.
- Certain households expressed concerns about the potential impact on their livelihoods and income streams.

2. Information Gaps:

- Some community members expressed a lack of clear understanding of the project's objectives, timeline, and potential benefits.
- Limited awareness of sustainable construction practices and environmental mitigation measures was also observed.

3. Community Support:

- Despite concerns, there was a general willingness among community members to collaborate, provided their concerns were adequately addressed.
- Many expressed interest in potential job opportunities and sought guidance on ways to maximize the project's benefits to their communities.

Response

Based on the findings of this engagement, the following steps are proposed:

1. Addressing Concerns:

- Engage with relevant stakeholders to develop a comprehensive plan to address community concerns related to youth employment/empowerment farming disruptions, land ownership, compensation, and monitor potential impacts on water sources.
- Develop an information package in local languages to better communicate project objectives, benefits, and timeline.

2. Mitigation Measures:

- Collaborate with environmental experts to devise comprehensive mitigation measures to minimize the project's environmental impact, and also employ the use of technology for surveillance
- Engage local communities in environmental awareness and education programs, promoting sustainable practices.

3. Continuous Engagement:

- Work with community liaison office to maintain regular communication and feedback channels with Cluster 4 communities throughout the project's lifecycle.
- Organize regular community meetings, informative sessions, and project updates to foster transparency and community involvement.

Conclusion:

The engagement with Cluster 4 communities was successful and productive in establishing a dialogue and addressing initial concerns. It is important to implement the proposed next steps to ensure effective mitigation of community concerns and maximization of project benefits. Continuous engagement and transparency will be key to maintaining positive relationships with affected communities.

PHOTO GALLERY



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ATTENDANCE SHEET

PROJECT	76KM GAS PIPELINE FROM ANOH GAS MANIFOLD TO INDORAMA COMPLEX
DATE & TIME	19th December, 2023 9:03
VENUE	
TOPIC	76KM GAS PIPELINE PROJECT ESIA - FIELD DATA GATHERING EXERCISE

S/N	NAME	Position Community / ORGANIZATION	PHONE NUMBER	Gender	Sign
1	COM. ATHAN UCHE ALI	YOUTH LEADER	08062655828	M	
2	ENG. KENNEDY OBI	VICE YOUTH LEADER	08064500454	M	
3	Catherine Ogburn		02011489059	F	
4	Mrs Elechi Iwasie-O	Woman leader	01137658975	F	
5	Blessing Gbaze		07012014625	F	
6	Pst Fideles Anuadi	Paster	07065627778	M	
7	Uwebu Marcillus C	Chairman	08066988020	M	
8	Com Udenma Ogburn	Secretary (Youth)	07031316534	M	
9	Cyrillus Ogburn	Youth President (Formal)	08081300733	M	
10	Sylvester Uadia	C.O.C. Chairman	09039378409	M	
11	Past MICHAEL	Chieft	08108863055	M	

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ATTENDANCE SHEET

B. 2 of 2

PROJECT		76KM GAS PIPELINE FROM ANOH GAS MANIFOLD TO INDORAMA COMPLEX			
DATE & TIME					
VENUE					
TOPIC		76KM GAS PIPELINE PROJECT ESIA – FIELD DATA GATHERING EXERCISE			
S/N	NAME	Position COMMUNITY/ ORGANIZATION	PHONE NUMBER	Gender	Sign
12	LIVINIA Amaka	-	08163552287	M	LS
13	Ala Lawrence A.	-		M	LS
14	Enyinyang Kingsley I.	CDC Sec/Clk	08022277904	M	LS

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ATTENDANCE SHEET

PROJECT 76KM GAS PIPELINE FROM ANOH GAS MANIFOLD TO INDORAMA COMPLEX

DATE & TIME

19th December, 2023 12:15pm

VENUE

TOPIC 76KM GAS PIPELINE PROJECT ESIA – FIELD DATA GATHERING EXERCISE

S/N	NAME	Position COMPANIES / ORGANIZATION	PHONE NUMBER	Gender	Sign
	Idelias Sunday P.	C.O.C. Okunna	07088147332	M	
	Green O. OGBUJI	YOUTH PABSI	08038494701	M	
	12E CHINE	Secretary	08038053988	M	
	Onyiahosa Akpetose		05056490763	M	
	Ade Henry Nnaka		07083147381	M	
	Ogboye Ismael			M	
	Pastor Jackmore Ogbari		07088256529	M	
	Pastor Paul Obayokunde		08025339142	M	
	Agoe Savio		09123091334	M	
	Sunday Benfidence	Norman Denor	08026443700	F	
	Enight Chikezie		09059477620	M	

Annex 1
INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

ATTENDANCE SHEET

PROJECT	76KM GAS PIPELINE FROM ANOH GAS MANIFOLD TO INDORAMA COMPLEX
DATE & TIME	19th December, 2023 12:31pm
VENUE	Awara Community Hall.
TOPIC	76KM GAS PIPELINE PROJECT ESIA – FIELD DATA GATHERING EXERCISE

S/N	NAME	Community / ORGANIZATION	PHONE NUMBER	Gender	Sign
	Okeagbala Uti		08032656706	M	
	Olu Ogbo			F	
	Adams Egbelu			F	
	Isreal Umana		07012088073	M	
	Ugo Egbelu		09014474660	M	
	James Bekee		0802646315	M	
	Abio Okechukwu			M	
	Emudo Chigorie			M	
	Richmond Igbeh			F	
	Joy Okechukwu			F	
	Mwita Sunday			F	

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ATTENDANCE SHEET

PROJECT 76KM GAS PIPELINE FROM ANOH GAS MANIFOLD TO INDORAMA COMPLEX

DATE & TIME 19th December 2023 12:20pm

VENUE Adura R Community Hall.

TOPIC 76KM GAS PIPELINE PROJECT ESIA - FIELD DATA GATHERING EXERCISE

S/N	NAME	ORGANIZATION	PHONE NUMBER	Gender	Sign
1	Ihuozze Kenayo	C D C	09024158416	M	[Signature]
2	Enay Saturday	CCF chairman	09081957787	M	CCF
3	Chibwike Eduma	House youth	0912460257	M	Env
4	Okechukwu Anura	House youth	07086646776	M	Env
5	Oji Leonard	House youth	08083974362	M	Env
6	Igwe Chibwea Demas	House leader	08038355203 0822145951	M	Env
7	Aloysius Emmanuel Gibe	Yates Sec.	0706117924	M	[Signature]
8	Isumo Joy	Women leader	09079415486	F	CCF
9	Abuchi Chibwike	Woman	09072245923	F	-9
10	Annan Niguelochi	Woman	08140105619	F	-4
11	Geethanand Kragingo	Woman	09091641655	F	-0

INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

ATTENDANCE SHEET

4th Dec 2023
B. 2 of 2.

PROJECT	76KM GAS PIPELINE FROM ANOH GAS MANIFOLD TO INDORAMA COMPLEX
DATE & TIME	19th December, 2023.
VENUE	Arhara 2 Town Hall.
TOPIC	76KM GAS PIPELINE PROJECT ESIA - FIELD DATA GATHERING EXERCISE

S/N	NAME	Post or Community / ORGANIZATION	PHONE NUMBER	Gender	Sign
12	Ogiji Jey	Indorama representative	09079415186	F	[Signature]
13	Iyue Choice	Member	08124291715	F	[Signature]
14	Iyue Choice	Member	08064956449	F	[Signature]
15	Opem Ching	Youth member	090716002976		[Signature]
16	Amadi Eligah	Youth Prov	09044779412	M	[Signature]
17	Obiareje Vitus	Youth member		M	[Signature]
18	Odi Confidence	09027935057	09027935057	M	[Signature]
19	Iyue N'oo 21	Youth member	09030834181	M	[Signature]
20	Eyikeluji Ndeburisi	Ikwerre youth leader	08038937718	M	[Signature]
21	Eyikeluji Nna	Youth member	08184337345	M	[Signature]
22	Aloysius Ndayay	Youth member	09066117924	M	[Signature]

OCHA Community
INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

ATTENDANCE SHEET

Pg 1

PROJECT	76KM GAS PIPELINE FROM ANCH GAS MANIFOLD TO INDORAMA COMPLEX
DATE & TIME	19th December, 2023. 1:20pm
VENUE	Ocha Community
TOPIC	76KM GAS PIPELINE PROJECT ESIA - FIELD DATA GATHERING EXERCISE

S/N	NAME	Position / ORGANIZATION	PHONE NUMBER	Gender	Sign
1	ELUEZE PRISCILLA	MEMBER	09112189242	F	
2	ELUEZE PRISCILLA	VILLAGE YOUTH LEAD	09011617484	M	
3	ULUHAH MONDAY	VILLAGE YOUTH LEAD	08141116059	M	
4	AMADI SILAS	VILLAGE YOUTH LEAD	0904576436	M	
5	OLUCHU ONYEKWE	MEMBER	0914233063	M	
6	COBU OROY	MEMBER	08122250072	M	
7	NZABE ELI	MEMBER	08068917341	M	
8	Onima Traoré	MEMBER	08122250072	M	
9	Muamemezi Ogunji	MEMBER	07085700645	F	
10	Mweleli Ogunji	MEMBER	09044581029	F	
11	Emelo Nathanael	MEMBER			

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ATTENDANCE SHEET

PROJECT 76KM GAS PIPELINE FROM ANOH GAS MANIFOLD TO INDORAMA COMPLEX

DATE & TIME 19th December, 2023 3:12pm

VENUE Abu Community Hall

TOPIC 76KM GAS PIPELINE PROJECT ESIA - FIELD DATA GATHERING EXERCISE

S/N	NAME	ORGANIZATION	PHONE NUMBER	Gender	Sign
1	Chukwura Timothy C.	Youth President	09065091550	Male	Chukwura
2	Eunogor Ndukeisi C	Youth member	09069123018	Male	Eunogor
3	Ejiofor Cosmas C.	Youth member	08821738057	male	Ejiofor
4	Okocha Pudente	Youth member	09169551872	male	Okocha
5	Uhu Bright Ezeudo	Youth Member	07040749786	Male	Uhu
6	Chukwura Promise	Youth Member	08087582162	Male	Chukwura
7	Uhu Destiny Ozioron	Youth Member	07040749786	Male	Uhu
8	Ogbon BETHIEL IHESINACHA	Youth member	08065954858	male	Ogbon
9	Ugoma Godstime Sza-kur	Youth member	09076426932	male	Ugoma
10	Ikenma Bright Ezeke	Youth member	070472147452	male	Ikenma
11	Ukiliang Anthony	Youth member	09073950692	male	Ukiliang

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INDORAMA ELEME FERTILIZER & CHEMICALS LIMITED, ELEME, RIVERS STATE, NIGERIA

ATTENDANCE SHEET

62012

PROJECT	76KM GAS PIPELINE FROM ANOH GAS MANIFOLD TO INDORAMA COMPLEX
DATE & TIME	19th December, 2023 3:12 pm
VENUE	ASA Community Hall.
TOPIC	76KM GAS PIPELINE PROJECT ESIA - FIELD DATA GATHERING EXERCISE

S/N	NAME	ASTTTON COMMUNITY / ORGANIZATION	PHONE NUMBER	Gender	Sign
12	Omenudo Kingsley	youth member	08167981754	male	MO
13	Odingha Uwakpa	CG -	09114056445	-	SA
14	Ulu Smart Akedu	youth member	08024205084	male	SA
15	Chika JERRY	youth member	07064409931	male	SA
16	Ogbuji Templa	-		=	2
17	Odoeze C. Mesmer.	-	0806465589	=	SA-C
18	Ogbarika Wisdom	-	09021663057	=	SA
19	Asor Enyana	-	070644550949	=	SA
20	Chief Edna Okwudibia	-	08064409931	SA	SA
21	Chief Edna Okwudibia	-	08024205084	SA	SA
22	Asor Jonathan	-	08087602977		SA

ANNEXURE 4.12

Indorama Engagements with Stakeholders in Pipeline Host Communities and CSR Projects

MOU with Pipeline Communities

Harmonious relationship with local environment plays an important role on the overall industrial peace. Since 2014 company has MOU with Pipeline Host Communities. Highlight of budgets are as under:

MOU's with Pipeline Communities – 25% increase in 2023 – 2025 MOU in view of Line 3

MOU Period	Duration (Yrs.)	No of Communities	Budget (Naira)
2014 - 2016	3	30	150,000,000
2017 - 2019	3	30	240,000,000
2020 - 2022	3	30	300,000,000
2023 - 2025	3	30	375,000,000

MOU with 30 Pipeline Communities		
Initiatives	2023-25 Budget (Mn Naira)	Cumulative Impact
Community Development Projects	375	Completed 75 projects
Women Micro Grants		Supported 180 women
Scholarships for students		Bursary support to 420 students
Skill Acquisition and Youth Empowerment		Trained 180 Youths & Women on various skills

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Overview of CSR Projects – to be carried out during Line 3

30 Pipeline Communities

Community	Total Spend	Projects
Cluster 1	FOR 2022, N37.5 Million for three (3), Akpajo community no project for 2022 due to pending litigation	Extension of Electricity in Atali Community, Construction of five (5) Classroom Block in Elemenwo Community School, Construction of 300 Meters Rumuwutche, Apamini Rumuwogo Concrete Road in Rumukwurusi.
Cluster 2	N87.5 Million	Construction of Fence around community Health centre in Abara Community, Extension of Electricity in Chokocho Community, Extension of Electricity in Umuogodo Community, Extension of Electricity in Imeh Community, /Renovation of Health Centre in Umuechem community, Construction of ICT Training Centre in Umuakuru community and Construction of Health Centre in Edegelem Community.
Cluster 3	N75 Million	Construction of 5 Nos Overhead Tank Stands for Community Water in Ipo Community, Construction of Modern Market in Omuawa Community, Construction of Shops Inside Market in Omademe Community, Construction of 12 Lock Up Shop in Ozuaha, Construction of Civil Centre Phase II in Omerelu Community and Construction of Police Quarters in Ubima Community
Cluster 4	N12.5Million	Construction of Community Development Centre/Conference Hall in Akanu community
Cluster 5	N100 Million	Rehabilitation of Technical Workshop Building in Modern Boys Secondary School in Omoku 1 Community, Construction of Health Centre in Omoku 2 Community, Construction of Drainage System in Obrikom Community, Renovation of Community Health Centre in Egbogoro Community, Construction of Administrative Office for Teachers & Classroom in Okpurukpuali Community, Extension of Electricity in Okansu Community, Construction of Administrative Block in Uju community and Construction of Market Complex in Obor Community

CSR Projects (MOU 2020-22)

30 Pipeline Communities

30 Pipeline Communities under MOU 2020-22			
Community	2020-22 MOU Projects	Total Spend (Mn Naira)	Status
Cluster 1	Extension of Electricity in Atali Community, Construction of five (5) Classroom Block in Elemenwo Community School, Installation of street Solar lights	40	All projects completed
Cluster 2	Construction of Fence around community Health centre in Abara Community, Extension of Electricity in Chokocho, Umuogodo and Imeh Communities, Renovation of Health Centre in Umuechem and Edegelem Communities, Construction of ICT Training Centre in Umuakuru community	70	All projects Completed
Cluster 3	Construction of 5 Nos Overhead Tank Stands for Community Water in Ipo Community, Construction of Modern Market in Omuawa Community, Construction of Shops Inside Market in Omademe Community, Construction of 12 Lock Up Shop in Ozuaha, Construction of Civil Centre Phase II in Omerelu Community and Construction of Police Quarters in Ubima Community	70	5 completed, 2 ongoing
Cluster 4	Construction of Community Development Centre/Conference Hall in Akanu community	10	1 completed, 2 pending
Cluster 5	Rehabilitation of Technical Workshop Building in Modern Boys Secondary School in Omoku 1 Community, Construction of Health Centre in Omoku 2 Community, Construction of Drainage System in Obrikom Community, Renovation of Community Health Centre in Egbogoro Community, Construction of Administrative Office for Teachers & Classroom in Okpurukpuali Community, Extension of Electricity in Okansu Community, Construction of Administrative Block in Uju community and Construction of Market Complex in Obor Community	90	8 completed, 1 ongoing

Pipeline Communities – Skill Acquisition & Scholarship

Skill Acquisition Programme

- On October 4th, 2021, a skill acquisition program was conducted.
- A total of **182 young** individuals successfully completed the program, with **64 being women**.
- Starter packs were provided to all trainees, and the vocational training program covered various skills, as outlined in the MOU, such as Scaffolding, Rigging, Electrical Wiring & Installation, Grinding, Tile fixing, Paint Production & Painting, Fish Farming, and more. scheduled to occur once during the MOU period of 2020-2022.

Scholarship

- Total of **56 young men & women** qualified for scholarship in 2022,
- 25 beneficiaries were women

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Pipeline Communities – Skill Acquisition & Scholarship



Skill Acquisition and Scholarship Programmes

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Pipeline communities; Cluster 1 CSR Projects

CLUSTER 1 is made up of four (4) communities group into one cluster as see below,

S/N	COMMUNITY	PROJECTS	PHASES	STATUS
1	Akpajo Community	Purchase & installation of 500KVA Transformer	I	Completed
		Purchase & installation of 500KVA Transformer	II	Completed
2	Rumuokwurus i Community	Interlocking & construction of pavement round Rumuokwursi Civic center	I	Completed
		Construction of Road	II	Completed
		Construction of 300 Meters Concrete Road	III	WIP
3	Atali Community	Grading of Road	I	Completed
		Construction of Borehole water	II	Completed
4	Eledenwo Community	Construction of Police station at Mangrove Estate	I	Completed
		Construction of police administrative block	II	Completed
		Construction of five (5) classroom blocks	III	WIP



INDORAMA

Pipeline communities; Cluster 2 CSR projects

CLUSTER 2 is made up of Seven (7) communities group into one cluster as see below

S/N	COMMUNITY	PROJECTS	PHASE S	STATUS
1	Abara	Renovation of Community Health Center	I	Completed
		Renovation of Community Health Center	II	Completed
		Construction Fence around Community Health Center	III	Completed
2	Umuecheme	Construction of Borehole water with solar	I	Completed
		Construction of Corpers Lodge	II	Completed
		Rehabilitation /Renovation of Health Centre	III	WIP
3	Chokocho	Electricity Extension	I	Completed
		Electricity Extension and Purchase & installation of two (2) Transformers	II	Completed
4	Umuakaru	Construction of Borehole water	I	Completed
		Electricity Extension	II	Completed
		Construction of ICT Training Centre	III	WIP
5	Edegelem	Electricity Extension	I	Completed
		Electricity Extension	II	Completed
		Construction of Health Centre	III	WIP
6	Imeh	Grading of four (4) different farm roads	I	Completed
		Construction of seven lock-up shops	II	Completed
7	Umuogodo	Construction of Borehole water	I	Completed
		Construction of mini daily market shops	II	WIP



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Pipeline communities; Cluster 3 CSR projects

CLUSTER 3 is made up of six (6) communities group into one cluster as see below

S/N	COMMUNITY	PROJECT	PHASES	STATUS
1	Ipo Community	Construction of Market shops	I	Completed
		Construction of Teachers Quarters	II	Completed
		Construction of five (5) Nos over Head Water Tank stands	III	WIP
2	Omademe Community	Construction of Chapel Hall in community Secondary School	I	Completed
		Construction of Corpers Lodge	II	Completed
		Construction of Shops inside market	III	WIP
3	Ozuoha Community	Construction of Town Hall	I	Completed
		Construction of Community Development Center	II	Completed
4	Ubima Community	Construction of Corpers Lodge	I	Completed
		Construction of police station	II	Pending
		Construction of police Quarters	III	WIP
5	Omerelu Community	Purchase of land/Fencing	I	Completed
		Construction of Civil center	II	On - going
		Construction of Civil center Phase 2	III	WIP
6	Omanwa Community	Construction of Chapel Hall in community Secondary School	I	Completed
		Construction of five bedroom Corpers Lodge	II	Completed
		Construction of Modern Market	III	WIP



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Pipeline communities; Cluster 4 CSR projects

CLUSTER 4 is made up of three (3) communities group into one cluster as see below				
S/N	COMMUNITY	PROJECT	PHASES	STATUS
1	Awarra 1 community	Construction of police station	I	WIP
		Construction of six (6) classroom blocks	II	WIP
2	Awarra 2 community	Construction of police station	I	WIP
		Construction of six (6) classroom blocks	II	WIP
3	Akanu Community	Construction of Development Centre /Conference Hall	1	WIP



Pipeline communities; Cluster 5 CSR Projects

CLUSTER 5 is made up of nine (9) communities group into one cluster as see below

S/ N	COMMUNITY	PROJECT	PHASES	STATUS
1	Omoku 1 Community	Construction of Borehole water	I	Completed
		Construction of four (4) classroom blocks	II	Completed
		Rehabilitation of technical workshop building in modern boys secondary school	III	WIP
2	Omoku 2 Community	Construction of Borehole water	I	Completed
		Renovation of six (6) classroom blocks	II	Completed
		Construction of Health Centre Building	III	WIP
3	Okprukpuali Community	Construction of six (6) classroom blocks	I	Completed
		Construction of Fence	II	Completed
		Construction of Administrative office for teachers & classroom	III	WIP
4	Obrikom Community	Construction of Borehole water	I	Completed
		Renovation of six (6) classroom blocks	II	Completed
		Construction of Drainages system	III	WIP
5	Obor Community	Electricity Extension	I	Completed
		Construction of lock-up shops	II	Completed
		Construction of Market complex	III	WIP
6	Okansu Community	Electricity Extension	I	Completed
		Renovation of Town Hall	II	Completed
7	Egbogoro Community	Construction of Chapel Hall for community secondary school	I	Completed
		Construction of six (6) classroom blocks	II	Completed
		Renovation of Health Center	III	WIP
8	Egbeda Community	Renovation of Health Center	I	Completed
		Renovation of Town Hall	II	Completed
9	Uju Community	Construction of six (6) classroom blocks	I	Completed
		Construction of Fence	II	Completed
		Construction of Administrative blocks	III	WIP



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Pipeline communities; Cluster 5 CSR projects (continuation)



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Palliative Measures During Covid-19

Executive Summary on Palliative Measures

Frequency	Rice (50 kg Bag)	Beans (50 kg)	Garri (50 kg)	Noodles (cartons)	Beneficiaries
Phase - I	1,320	880	880	4,400	6 Host Communities; 2 Jetty Communities; 30 Pipeline communities; 6 other communities from Eleme LG
Phase - II	240	160	160	800	6 Host Communities; 2 Jetty Communities
Phase - III	240	160	160	800	6 Host Communities; 2 Jetty Communities
Phase - IV	240	160	160	800	6 Host Communities; 2 Jetty Communities
Phase - V	240	160	160	800	6 Host Communities; 2 Jetty Communities
Phase - VI	240	160	160	800	6 Host Communities; 2 Jetty Communities
Phase - VII	240	160	160	800	6 Host Communities; 2 Jetty Communities
Total (Bags / Cartons)	2,760	1,840	1,840	9,200	
Total quantity distributed (Kgs / Packs)	138,000	92,000	92,000	552,000	** Noodles is in Pack. Other Items are Kgs
No of Household reachedout	17,250				
Avg Family Size	5				
Total No of people benefited	86,250				

Pictures From Palliatives Distribution



- CR&D staff with Ogboloma clan members Onne Community



2022 Flood relief outreach

- In the wake of the 2022 flood that hit some states in Nigeria and caused untold hardship, Indorama through its Community Relations & Development department donated some relief materials to the flood victims in its Cluster V Pipeline communities as well as some neighboring Communities within her sphere of influence and operations as a support to cushion the effects of flood induced challenges.
- A total of nine (9) Cluster V pipeline communities were affected and they include,

- Omoku I,
- Omoku II,
- Uju,
- Obor,
- Okansu,
- Ebogoro,
- Obrikom,
- Egbada,
- Okpurukpuali

And three (3) neighboring communities,

- Ebocha,
- Ahoada and
- Ahoada - West Communities.

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2022 FLOOD RELIEF MATERIALS DONATION

16



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2022 FLOOD RELIEF MATERIALS DONATION

17



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2022 FLOOD RELIEF MATERIALS DONATION

18



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Customized Indorama Exercise Books Distribution

- ❖ The community relations department team embarked on the distribution of sixty thousand (60,000) customized exercise books
- ❖ To all the primary and secondary schools within our host and jetty communities.
- ❖ A total of twenty-two (22) schools benefited from the distribution
- ❖ They were super excited with Indorama for its benevolence towards them
- ❖ They send their appreciations

Pictures From The Exercise Books Distributions



Pictures From The Exercise Books Distributions



Pictures From The Exercise Books Distributions

