RESULTS

The results of the physicochemical and microbial analysis of Ugbowo groundwater samples are presented on Table 1.1- 1.10. The results showed Electrical conductivity (EC), Turbidity, Total suspended solid (TSS), Salinity, Alkalinity, Total Dissolve Solids (TDS), and Dissolved Oxygen (DO), odor, color/clarity, total hydrocarbon content (THC), pH, Sodium (Na), Potassium (K), Chloride, Sulphate, Nitrate, and Phosphate.

The selected parameters for computing water quality index are presented in table I – IV and the water quality index results are shown in table A – U.

The results for the statistical analysis of the groundwater samples are contained in tables 3 and 4.

Table 1.1: Mean Value of Groundwater Assessment of Ugbowo Benin City (BOREHOLE STATION 1)

Test Description	Unit	Recommended Limit (WHO)	Dry Season	Wet Season
1. pH	Nil	6.5-7.5	5.1	4.5
2. Nitrate (NO_3)	Mg/l	0-50	2.330	1.301
3. Electrical Conductivity	µs/cm	0-1000	67.89	81.70
4. Turbidity	NTU	0.5-5.0	0.00	0.00
5. Dissolved Oxygen	Mg/l	5-10	4.4	4.5
6. Total Dissolved Solids	Mg/l	0-500	38.76	40.90
7. Sodium	Mg/l	0-200	2.467	0.280
8. Lead (Pb)	Mg/l	0-0.01	0.00	0.00
9. Sulphate	Mg/l	0-250	1.029	0.048
10. Zinc (Zn)	Mg/l	0-3	0.337	0.412
11. Copper (Cu)	Mg/l	0-2	0.059	0.082
12. Chloride (Cl^-)	Mg/l	0-50	34.78	88.60
13. Iron (Fe)	Mg/l	0.2-1	0.478	0.991
14. Carbonate	Mg/l	0-250	22.48	30.40
15. Total Suspended Solids	Mg/l	0.00	0.00	0.00
16. Nitrite (NO_2)	Mg/l	0-0.5	0.022	0.076
17. Cadmium (Cd)	Mg/l	0-0.003	0.00	0.00
18. Nickel (Ni)	Mg/l	0-0.02	0.00	0.00
19. Total Hydrocarbon	Mg/l	0 in 100ml	0.00	0.00
20. Phosphate (PO_4)	^oC	0-250	0.047	0.083
21. Temperature	Ω.m	Ambient	28.30	28.70
22. Resistivity	Nil	0-1	0.013	0.0122
23. Color/Clarity	Nil	Colorless	Colorless	Colorless
24. Odor	Mg/l	Odorless	Odorless	Odorless
25. Alkalinity	g/l	200-600	63.48	56.78
26. Salinity	Mg/l	0-50	0.062	0.037
27. Chromium (Cr)	Mg/l	0-0.05	0.00	0.00
28. Manganese (Mn)	Mg/l	0-0.05	0.133	0.187
29. Magnesium (Mg)	Cfu/ml	0-200	4.667	3,670
30. Potassium (K)	Mg/l	0-200	1.803	0.180
31. Total Coliform Count	Mg/l	0 in 250ml	0.00	0.00
32. COD	Mg/l	0.00	0.00	0.00
33. Calcium		Nil	0.00	0.00
34. Vanadium				

Table 1.2: Mean Value of Groundwater Assessment of Ugbowo Benin City (BOREHOLE STATION 2)

Test Description	Unit	Recommended Limit (WHO)	Dry Season	Wet Season
1. Ph	Nil	6.5-7.5	4.7	4.2
2. Nitrate (NO_3)	Mg/l	0-50	2.036	1.155
3. Electrical Conductivity	µs/cm	0-1000	56.78	64.90
4. Turbidity	NTU	0.5-5.0	0.00	0.00
5. Dissolved Oxygen	Mg/l	5-10	4.5	4.4
6. Total Dissolved Solids	Mg/l	0-500	0.00	0.00
7. Sodium	Mg/l	0-200	3.041	0.200
8. Lead (Pb)	Mg/l	0-0.01	0.00	0.00
9. Sulphate	Mg/l	0-250	2.047	0.051
10. Zinc (Zn)	Mg/l	0-3	1.029	0.387
11. Copper (Cu)	Mg/l	0-2	0.623	0.071
12. Chloride (Cl^-)	Mg/l	0-50	34.06	88.60
13. Iron (Fe)	Mg/l	0.2-1	0.056	0.840
14. Carbonate	Mg/l	0-250	32.07	24.40
15. Total Suspended Solids	Mg/l	0.00	0.00	0.00
16. Nitrite (NO_2)	Mg/l	0-0.5	0.056	0.061
17. Cadmium (Cd)	Mg/l	0-0.003	0.00	0.00
18. Nickel (Ni)	Mg/l	0-0.02	0.00	0.00
19. Total Hydrocarbon	Mg/l	0 in 100ml	0.00	0.00
20. Phosphate (PO_4)	°C	0-250	0.047	0.052
21. Temperature	Ω.m	Ambient	28.6	28.5
22. Resistivity	Nil	0-1	0.012	0.017
23. Color/Clarity	Nil	Colorless	Colorless	Colorless
24. Odor	Mg/l	Odorless	Odorless	Odorless
25. Alkalinity	g/l	200-600	55.68	67.06
26. Salinity	Mg/l	0-50	0.342	0.029
27. Chromium (Cr)	Mg/l	0-0.05	0.00	0.00
28. Manganese (Mn)	Mg/l	0-0.05	0.104	0.180
29. Magnesium (Mg)	Cfu/ml	0-200	4.051	3.024
30. Potassium (K)	Mg/l	0-200	0.240	0.150
31. Total Coliform Count	Mg/l	0 in 250ml	0.00	0.00
32. COD	Mg/l	0.00	0.00	0.00
33. Calcium		0-200	0.431	0.660
34. Vanadium		Nil	0.00	0.00

Table 1.3: Mean Value of Groundwater Assessment of Ugbowo Benin City (BOREHOLE STATION 3)

Test Description	Unit	Recommended Limit (WHO)	Dry Season	Wet Season
1. pH	Nil	6.5-7.5	5.2	5.1
2. Nitrate (NO_3)	Mg/l	0-50	2.338	1.405
3. Electrical Conductivity	µs/cm	0-1000	49.87	66.88
4. Turbidity	NTU	0.5-5.0	0.00	0.00
5. Dissolved Oxygen	Mg/l	5-10	4.6	4.3
6. Total Dissolved Solids	Mg/l	0-500	23.67	33.02
7. Sodium	Mg/l	0-200	9.08	22.09
8. Lead (Pb)	Mg/l	0-0.01	0.00	0.00
9. Sulphate	Mg/l	0-250	1.054	2.09
10. Zinc (Zn)	Mg/l	0-3	0.409	0.335
11. Copper (Cu)	Mg/l	0-2	0.278	1.092
12. Chloride (Cl^-)	Mg/l	0-50	33.78	33.99
13. Iron (Fe)	Mg/l	0.2-1	0.598	0.605
14. Carbonate	Mg/l	0-250	59.89	24.56
15. Total Suspended Solids	Mg/l	0.00	0.00	0.00
16. Nitrite (NO_2)	Mg/l	0-0.5	0.305	0.201
17. Cadmium (Cd)	Mg/l	0-0.003	0.00	0.00
18. Nickel (Ni)	Mg/l	0-0.02	0.00	0.00
19. Total Hydrocarbon	Mg/l	0 in 100ml	0.00	0.00
20. Phosphate (PO_4)	°C	0-250	0.203	0.104
21. Temperature	Ω.m	Ambient	28.50	28.80
22. Resistivity	Nil	0-1	0.013	0.014
23. Color/Clarity	Nil	Colorless	Colorless	Colorless
24. Odor	Mg/l	Odorless	Odorless	Odorless
25. Alkalinity	g/l	200-600	44.79	33.44
26. Salinity	Mg/l	0-50	3.78	8.03
27. Chromium (Cr)	Mg/l	0-0.05	0.00	0.00
28. Manganese (Mn)	Mg/l	0-0.05	0.309	0.238
29. Magnesium (Mg)	Mg/l	0-200	11.66	23.04
30. Potassium (K)	Mg/l	0-200	0.103	22.56
31. Total Coliform Count	Cfu/ml	0 in 250ml	0.00	0.00
32. COD	Mg/l	0.00	0.00	0.00
33. Calcium	Mg/l	0-200	33.09	22.78
34. Vanadium	Mg/l	Nil	0.00	0.00

Table 1.4: Mean Value of Groundwater Assessment of Ugbowo Benin City (BOREHOLE STATION 4)

Test Description	Unit	Recommended Limit (WHO)	Dry Season	Wet Season
1. pH	Nil	6.5-7.5	4.4	5.1
2. Nitrate (NO_3)	Mg/l	0-50	0.784	0.510
3. Electrical Conductivity	µs/cm	0-1000	35.20	19.30
4. Turbidity	NTU	0.5-5.0	0.00	0.00
5. Dissolved Oxygen	Mg/l	5-10	4.4	4.6
6. Total Dissolved Solids	Mg/l	0-500	17.70	9.60
7. Sodium	Mg/l	0-200	0.110	0.100
8. Lead (Pb)	Mg/l	0-0.01	0.00	0.00
9. Sulphate	Mg/l	0-250	0.044	0.040
10. Zinc (Zn)	Mg/l	0-3	0.222	0.345
11. Copper (Cu)	Mg/l	0-2	0.050	0.051
12. Chloride (Cl^-)	Mg/l	0-50	70.90	70.90
13. Iron (Fe)	Mg/l	0.2-1	0.610	0.524
14. Carbonate	Mg/l	0-250	61.00	36.60
15. Total Suspended Solids	Mg/l	0.00	0.00	0.00
16. Nitrite (NO_2)	Mg/l	0-0.5	0.041	0.033
17. Cadmium (Cd)	Mg/l	0-0.003	0.00	0.00
18. Nickel (Ni)	Mg/l	0-0.02	0.00	0.00
19. Total Hydrocarbon	Mg/l	0 in 100ml	0.00	0.00
20. Phosphate (PO_4)	^oC	0-250	0.044	0.037
21. Temperature	Ω.m	Ambient	28.60	28.80
22. Resistivity	Nil	0-1	0.014	0.012
23. Color/Clarity	Nil	Colorless	Colorless	Colorless
24. Odor	Mg/l	Odorless	Odorless	Odorless
25. Alkalinity	g/l	200-600	46.06	65.09
26. Salinity	Mg/l	0-50	0.016	0.008
27. Chromium (Cr)	Mg/l	0-0.05	0.00	0.00
28. Manganese (Mn)	Mg/l	0-0.05	0.140	0.161
29. Magnesium (Mg)	Cfu/ml	0-200	3.047	6.098
30. Potassium (K)	Mg/l	0-200	0.100	0.050
31. Total Coliform Count	Mg/l	0 in 250ml	0.00	0.00
32. COD	Mg/l	0.00	0.00	0.00
33. Calcium		Nil	0.00	0.00
34. Vanadium				

Table 1.5: Mean Value of Groundwater Assessment of Ugbowo Benin City (BOREHOLE STATION 5)

Test Description	Unit	Recommended Limit (WHO)	Dry Season	Wet Season
1. pH	Nil	6.5-7.5	5.3	5.5
2. Nitrate (NO_3)	Mg/l	0-50	2.033	1.074
3. Electrical Conductivity	µs/cm	0-1000	56.79	81.70
4. Turbidity	NTU	0.5-5.0	0.00	0.00
5. Dissolved Oxygen	Mg/l	5-10	4.4	4.6
6. Total Dissolved Solids	Mg/l	0-500	17.08	27.80
7. Sodium	Mg/l	0-200	12.09	0.150
8. Lead (Pb)	Mg/l	0-0.01	0.00	0.00
9. Sulphate	Mg/l	0-250	0.033	0.044
10. Zinc (Zn)	Mg/l	0-3	0.207	0.381
11. Copper (Cu)	Mg/l	0-2	0.043	0.060
12. Chloride (Cl^-)	Mg/l	0-50	49.08	70.90
13. Iron (Fe)	Mg/l	0.2-1	0.348	0.777
14. Carbonate	Mg/l	0-250	36.09	18.30
15. Total Suspended Solids	Mg/l	0.00	0.00	0.00
16. Nitrite (NO_2)	Mg/l	0-0.5	0.167	0.055
17. Cadmium (Cd)	Mg/l	0-0.003	0.00	0.00
18. Nickel (Ni)	Mg/l	0-0.02	0.00	0.00
19. Total Hydrocarbon	Mg/l	0 in 100ml	0.00	0.00
20. Phosphate (PO_4)	^oC	0-250	0.049	0.053
21. Temperature	Ω.m	Ambient	28.70	28.60
22. Resistivity	Nil	0-1	0.011	0.012
23. Color/Clarity	Nil	Colorless	Colorless	Colorless
24. Odor	Mg/l	Odorless	Odorless	Odorless
25. Alkalinity	g/l	200-600	53.99	62.01
26. Salinity	Mg/l	0-50	0.019	0.025
27. Chromium (Cr)	Mg/l	0-0.05	0.00	0.00
28. Manganese (Mn)	Mg/l	0-0.05	0.132	0.177
29. Magnesium (Mg)	Cfu/ml	0-200	13.02	6.07
30. Potassium (K)	Mg/l	0-200	0.167	0.130
31. Total Coliform Count	Mg/l	0 in 250ml	0.00	0.00
32. COD	Mg/l	0.00	0.00	0.00
33. Calcium		Nil	0.00	0.00
34. Vanadium				

Table 1.6: Mean Value of Groundwater Assessment of Ugbowo Benin City (BOREHOLE STATION 6)

Test Description	Unit	Recommended Limit (WHO)	Dry Season	Wet Season
1. pH	Nil	6.5-7.5	4.8	4.6
2. Nitrate (NO_3)	Mg/l	0-50	0.970	1.653
3. Electrical Conductivity	µs/cm	0-1000	88.50	89.10
4. Turbidity	NTU	0.5-5.0	0.00	0.00
5. Dissolved Oxygen	Mg/l	5-10	4.5	4.6
6. Total Dissolved Solids	Mg/l	0-500	44.10	44.50
7. Sodium	Mg/l	0-200	0.250	0.311
8. Lead (Pb)	Mg/l	0-0.01	0.00	0.00
9. Sulphate	Mg/l	0-250	0.103	0.114
10. Zinc (Zn)	Mg/l	0-3	0.584	0.613
11. Copper (Cu)	Mg/l	0-2	0.217	0.222
12. Chloride (Cl^-)	Mg/l	0-50	70.90	88.6
13. Iron (Fe)	Mg/l	0.2-1	0.877	0.914
14. Carbonate	Mg/l	0-250	30.50	30.32
15. Total Suspended Solids	Mg/l	0.00	0.00	0.00
16. Nitrite (NO_2)	Mg/l	0-0.5	0.080	0.084
17. Cadmium (Cd)	Mg/l	0-0.003	0.00	0.00
18. Nickel (Ni)	Mg/l	0-0.02	0.00	0.00
19. Total Hydrocarbon	Mg/l	0 in 100ml	0.00	0.00
20. Phosphate (PO_4)	^oC	0-250	0.125	0.113
21. Temperature	Ω.m	Ambient	28.90	29.10
22. Resistivity	Nil	0-1	ND	ND
23. Color/Clarity	Nil	Colorless	Colorless	Colorless
24. Odor	Mg/l	Odorless	Odorless	Odorless
25. Alkalinity	g/l	200-600	54.56	67.43
26. Salinity	Mg/l	0-50	0.040	0.041
27. Chromium (Cr)	Mg/l	0-0.05	0.00	0.00
28. Manganese (Mn)	Mg/l	0-0.05	0.351	0.445
29. Magnesium (Mg)	Cfu/ml	0-200	0.480	0.510
30. Potassium (K)	Mg/l	0-200	0.170	0.220
31. Total Coliform Count	Mg/l	0 in 250ml	0.00	0.00
32. COD	Mg/l	0.00	ND	ND
33. Calcium		Nil	0.880	0.940
34. Vanadium			0.00	0.00

Table 1.7: Mean Value of Groundwater Assessment of Ugbowo Benin City (BOREHOLE STATION 7)

Test Description	Unit	Recommended Limit (WHO)	Dry Season	Wet Season
1. pH	Nil	6.5-7.5	5.0	4.6
2. Nitrate (NO_3)	Mg/l	0-50	0.230	0.581
3. Electrical Conductivity	µs/cm	0-1000	19.60	33.40
4. Turbidity	NTU	0.5-5.0	0.00	0.00
5. Dissolved Oxygen	Mg/l	5-10	4.4	4.5
6. Total Dissolved Solids	Mg/l	0-500	9.80	16.60
7. Sodium	Mg/l	0-200	0.10	0.15
8. Lead (Pb)	Mg/l	0-0.01	0.00	0.00
9. Sulphate	Mg/l	0-250	0.055	0.071
10. Zinc (Zn)	Mg/l	0-3	0.183	0.671
11. Copper (Cu)	Mg/l	0-2	0.087	0.165
12. Chloride (Cl^-)	Mg/l	0-50	35.50	53.20
13. Iron (Fe)	Mg/l	0.2-1	0.442	0.708
14. Carbonate	Mg/l	0-250	12.20	18.30
15. Total Suspended Solids	Mg/l	0.00	0.00	0.00
16. Nitrite (NO_2)	Mg/l	0-0.5	0.028	0.044
17. Cadmium (Cd)	Mg/l	0-0.003	0.00	0.00
18. Nickel (Ni)	Mg/l	0-0.02	0.00	0.00
19. Total Hydrocarbon	Mg/l	0 in 100ml	0.00	0.00
20. Phosphate (PO_4)	^oC	0-250	0.016	0.035
21. Temperature	Ω.m	Ambient	28.30	29.00
22. Resistivity	Nil	0-1	ND	ND
23. Color/Clarity	Nil	Colorless	Colorless	Colorless
24. Odor	Mg/l	Odorless	Odorless	Odorle0ss
25. Alkalinity	g/l	200-600	73.20	66.33
26. Salinity	Mg/l	0-50	0.009	0.015
27. Chromium (Cr)	Mg/l	0-0.05	0.00	0.00
28. Manganese (Mn)	Mg/l	0-0.05	0.151	0.194
29. Magnesium (Mg)	Cfu/ml	0-200	0.150	0.270
30. Potassium (K)	Mg/l	0-200	0.050	0.080
31. Total Coliform Count	Mg/l	0 in 250ml	0.00	0.00
32. COD	Mg/l	0.00	ND	ND
33. Calcium		Nil	0.33	0.50
34. Vanadium			0.00	0.00

Table 1.8: Mean Value of Groundwater Assessment of Ugbowo Benin City (BOREHOLE STATION 8)

Test Description	Unit	Recommended Limit (WHO)	Dry Season	Wet Season
1. pH	Nil	6.5-7.5	4.6	4.5
2. Nitrate (NO_3)	Mg/l	0-50	0.592	0.654
3. Electrical Conductivity	µs/cm	0-1000	35.70	44.70
4. Turbidity	NTU	0.5-5.0	0.00	0.00
5. Dissolved Oxygen	Mg/l	5-10	4.4	4.3
6. Total Dissolved Solids	Mg/l	0-500	18.00	22.4
7. Sodium	Mg/l	0-200	0.17	0.21
8. Lead (Pb)	Mg/l	0-0.01	0.00	0.00
9. Sulphate	Mg/l	0-250	0.088	0.092
10. Zinc (Zn)	Mg/l	0-3	0.488	0.512
11. Copper (Cu)	Mg/l	0-2	0.171	0.184
12. Chloride (Cl^-)	Mg/l	0-50	53.20	53.21
13. Iron (Fe)	Mg/l	0.2-1	0.712	0.780
14. Carbonate	Mg/l	0-250	24.40	30.50
15. Total Suspended Solids	Mg/l	0.00	0.00	0.00
16. Nitrite (NO_2)	Mg/l	0-0.5	0.051	0.062
17. Cadmium (Cd)	Mg/l	0-0.003	0.00	0.00
18. Nickel (Ni)	Mg/l	0-0.02	0.00	0.00
19. Total Hydrocarbon	Mg/l	0 in 100ml	0.00	0.00
20. Phosphate (PO_4)	^oC	0-250	0.037	0.049
21. Temperature	Ω.m	Ambient	28.70	28.80
22. Resistivity	Nil	0-1	ND	ND
23. Color/Clarity	Nil	Colorless	Colorless	Colorless
24. Odor	Mg/l	Odorless	Odorless	Odorless
25. Alkalinity	g/l	200-600	44.38	33.67
26. Salinity	Mg/l	0-50	0.016	0.020
27. Chromium (Cr)	Mg/l	0-0.05	0.00	0.00
28. Manganese (Mn)	Mg/l	0-0.05	0.218	0.274
29. Magnesium (Mg)	Cfu/ml	0-200	0.30	0.32
30. Potassium (K)	Mg/l	0-200	0.11	0.15
31. Total Coliform Count	Mg/l	0 in 250ml	0.00	0.00
32. COD	Mg/l	0.00	ND	ND
33. Calcium		Nil	0.54	0.61
34. Vanadium			0.00	0.00

Table 1.9: Mean Value of Groundwater Assessment of Ugbowo Benin City (BOREHOLE STATION 9)

Test Description	Unit	Recommended Limit (WHO)	Dry Season	Wet Season
1. pH	Nil	6.5-7.5	4.7	4.9
2. Nitrate (NO_3)	Mg/l	0-50	0.581	0.443
3. Electrical Conductivity	µs/cm	0-1000	33.4	56.34
4. Turbidity	NTU	0.5-5.0	0.00	0.00
5. Dissolved Oxygen	Mg/l	5-10	4.5	4.4
6. Total Dissolved Solids	Mg/l	0-500	10.70	23.78
7. Sodium	Mg/l	0-200	0.10	0.21
8. Lead (Pb)	Mg/l	0-0.01	0.00	0.00
9. Sulphate	Mg/l	0-250	0.062	0.032
10. Zinc (Zn)	Mg/l	0-3	0.444	0.135
11. Copper (Cu)	Mg/l	0-2	0.133	0.203
12. Chloride (Cl^-)	Mg/l	0-50	35.5	44.21
13. Iron (Fe)	Mg/l	0.2-1	0.597	0.442
14. Carbonate	Mg/l	0-250	18.3	22.12
15. Total Suspended Solids	Mg/l	0.00	0.00	0.00
16. Nitrite (NO_2)	Mg/l	0-0.5	0.032	0.041
17. Cadmium (Cd)	Mg/l	0-0.003	0.00	0.00
18. Nickel (Ni)	Mg/l	0-0.02	0.00	0.00
19. Total Hydrocarbon	Mg/l	0 in 100ml	0.00	0.00
20. Phosphate (PO_4)	^oC	0-250	0.027	0.019
21. Temperature	Ω.m	Ambient	29.0	29.3
22. Resistivity	Nil	0-1	ND	ND
23. Color/Clarity	Nil	Colorless	Colorless	Colorless
24. Odor	Mg/l	Odorless	Odorless	Odorless
25. Alkalinity	g/l	200-600	55.68	36.7
26. Salinity	Mg/l	0-50	0.010	0.022
27. Chromium (Cr)	Mg/l	0-0.05	0.00	0.00
28. Manganese (Mn)	Mg/l	0-0.05	0.187	0.103
29. Magnesium (Mg)	Cfu/ml	0-200	0.20	0.31
30. Potassium (K)	Mg/l	0-200	0.070	0.067
31. Total Coliform Count	Mg/l	0 in 250ml	0.00	0.00
32. COD	Mg/l	0.00	ND	ND
33. Calcium		Nil	0.48	0.53
34. Vanadium			0.00	0.00

Table 1.10: Mean Value of Groundwater Assessment of Ugbowo Benin City (BOREHOLE STATION 10)

Test Description	Unit	Recommended Limit (WHO)	Dry Season	Wet Season
1. pH	Nil	6.5-7.5	4.6	5.1
2. Nitrate (NO_3)	Mg/l	0-50	0.402	0.506
3. Electrical Conductivity	µs/cm	0-1000	42.19	38.79
4. Turbidity	NTU	0.5-5.0	0.00	0.00
5. Dissolved Oxygen	Mg/l	5-10	4.3	4.6
6. Total Dissolved Solids	Mg/l	0-500	22.03	19.18
7. Sodium	Mg/l	0-200	0.19	0.32
8. Lead (Pb)	Mg/l	0-0.01	0.00	0.00
9. Sulphate	Mg/l	0-250	0.039	0.027
10. Zinc (Zn)	Mg/l	0-3	0.502	0.201
11. Copper (Cu)	Mg/l	0-2	0.092	0.118
12. Chloride (Cl^-)	Mg/l	0-50	46.07	28.09
13. Iron (Fe)	Mg/l	0.2-1	0.302	0.203
14. Carbonate	Mg/l	0-250	28.07	30.02
15. Total Suspended Solids	Mg/l	0.00	0.00	0.00
16. Nitrite (NO_2)	Mg/l	0-0.5	0.019	0.011
17. Cadmium (Cd)	Mg/l	0-0.003	0.00	0.00
18. Nickel (Ni)	Mg/l	0-0.02	0.00	0.00
19. Total Hydrocarbon	Mg/l	0 in 100ml	0.00	0.00
20. Phosphate (PO_4)	^oC	0-250	0.006	0.023
21. Temperature	Ω.m	Ambient	29.2	29.1
22. Resistivity	Nil	0-1	ND	ND
23. Color/Clarity	Nil	Colorless	Colorless	Colorless
24. Odor	Mg/l	Odorless	Odorless	Odorless
25. Alkalinity	g/l	200-600	76.02	66.21
26. Salinity	Mg/l	0-50	0.021	0.019
27. Chromium (Cr)	Mg/l	0-0.05	0.00	0.00
28. Manganese (Mn)	Mg/l	0-0.05	0.099	0.122
29. Magnesium (Mg)	Cfu/ml	0-200	0.19	0.42
30. Potassium (K)	Mg/l	0-200	0.065	0.107
31. Total Coliform Count	Mg/l	0 in 250ml	0.00	0.00
32. COD	Mg/l	0.00	ND	ND
33. Calcium		Nil	0.61	0.92
34. Vanadium			0.00	0.00

Table I: Parameters of water quality index computation (Wet Season)

Parameters	BOREHOLE STATION 1	BOREHOLE STATION 2	BOREHOLE STATION 3	BOREHOLE STATION 4	BOREHOLE STATION 5
pH	4.8	4.6	5	4.6	4.6
Nitrate	0.97	1.653	0.23	0.581	0.592
EC	88.5	89.1	19.6	33.4	35.7
Turbidity	0	0	0	0	0
DO	4.5	4.6	4.4	4.5	4.4
TDS	44.1	44.5	9.8	16.6	18
Sodium	0.25	0.311	0.1	0.15	0.17
Lead	0	0	0	0	0
Sulphate	0.103	0.114	0.055	0.071	0.088
Zinc	0.584	0.613	0.183	0.671	0.488
Copper	0.217	0.222	0.087	0.165	0.171
Chloride	70.9	88.6	35.5	53.2	53.2
Iron	0.877	0.914	0.442	0.708	0.712
Carbonate	30.5	30.32	12.2	18.3	24.4
TSS	0	0	0	0	0
Nitrite	0.08	0.084	0.028	0.044	0.051
Cadmium	0	0	0	0	0
Nickel	0	0	0	0	0
THC	0	0	0	0	0
Phosphate	0.125	0.113	0.016	0.035	0.037
Alkalinity	54.56	67.43	78.2	66.33	44.38
Calcium	0.88	0.94	0.33	0.5	0.54

Table II: Parameters of water quality index computation (Wet Season)

Parameters	BOREHOLE STATION 6	BOREHOLE STATION 7	BOREHOLE STATION 8	BOREHOLE STATION 9	BOREHOLE STATION 10
pH	4.5	4.7	4.9	4.6	5.1
Nitrate	0.654	0.581	0.443	0.402	0.506
EC	44.7	33.4	56.34	42.19	38.79
Turbidity	0	0	0	0	0
DO	4.3	4.5	4.4	4.3	4.6
TDS	22.4	10.7	23.78	22.03	19.18
Sodium	0.21	0.1	0.21	0.19	0.32
Lead	0	0	0	0	0
Sulphate	0.092	0.062	0.032	0.039	0.027
Zinc	0.512	0.444	0.135	0.502	0.201
Copper	0.184	0.133	0.203	0.092	0.118
Chloride	53.21	35.5	44.21	46.07	28.09
Iron	0.78	0.597	0.442	0.302	0.203
Carbonate	30.5	18.3	22.12	28.07	30.02
TSS	0	0	0	0	0
Nitrite	0.062	0.032	0.041	0.019	0.011
Cadmium	0	0	0	0	0
Nickel	0	0	0	0	0
THC	0	0	0	0	0
Phosphate	0.049	0.027	0.019	0.006	0.023
Alkalinity	33.67	55.68	36.7	76.02	66.21
Calcium	0.61	0.48	0.53	0.61	0.92

Table III: Parameters of water quality index computation (Dry Season)

Parameters	BOREHOLE STATION 1	BOREHOLE STATION 2	BOREHOLE STATION 3	BOREHOLE STATION 4	BOREHOLE STATION 5
pH	5.1	5.3	5.6	5.7	5.2
Nitrate	2.33	1.301	2.036	1.155	2.338
EC	67.89	81.7	56.78	64.9	49.87
Turbidity	0	0	0	0	0
DO	4.4	4.5	4.5	4.4	4.6
TDS	38.76	40.9	0	0	23.67
Sodium	2.467	0.28	3.041	0.2	9.08
Lead	0	0	0	0	0
Sulphate	1.029	0.048	2.047	0.051	1.054
Zinc	0.337	0.412	1.029	0.387	0.409
Copper	0.059	0.082	0.623	0.071	0.278
Chloride	34.78	88.6	34.06	88.6	33.78
Iron	0.478	0.991	0.056	0.84	0.598
Carbonate	22.48	30.4	32.07	24.4	59.89
TSS	0	0	0	0	0
Nitrite	0.022	0.076	0.056	0.061	0.305
Cadmium	0	0	0	0	0
Nickel	0	0	0	0	0
THC	0	0	0	0	0
Phosphate	0.047	0.083	0.047	0.052	0.203
Alkalinity	63.48	56.78	55.68	67.06	44.79
Calcium	3.467	0.76	0.431	0.66	33.09

Table IV: Parameters of water quality index computation (Dry Season)

Parameters	BOREHOLE STATION 6	BOREHOLE STATION 7	BOREHOLE STATION 8	BOREHOLE STATION 9	BOREHOLE STATION 10
pH	5.1	5.7	5.1	5.3	5.5
Nitrate	1.405	0.784	0.51	2.033	1.074
EC	66.88	35.2	19.3	56.79	81.7
Turbidity	0	0	0	0	0
DO	4.3	4.4	4.6	4.4	4.6
TDS	33.02	17.7	9.6	17.08	27.8
Sodium	22.09	0.11	0.1	12.09	0.15
Lead	0	0	0	0	0
Sulphate	2.09	0.044	0.04	0.033	0.044
Zinc	0.335	0.222	0.345	0.207	0.381
Copper	1.092	0.05	0.051	0.043	0.06
Chloride	33.99	70.9	70.9	49.08	70.9
Iron	0.605	0.61	0.524	0.348	0.777
Carbonate	24.56	61	36.6	36.09	18.3
TSS	0	0	0	0	0
Nitrite	0.201	0.041	0.033	0.167	0.055
Cadmium	0	0	0	0	0
Nickel	0	0	0	0	0
THC	0	0	0	0	0
Phosphate	0.104	0.044	0.037	0.049	0.053
Alkalinity	33.44	46.06	65.09	53.99	62.01
Calcium	22.78	0.48	0.33	4.79	0.51

Table A: Water quality index of water sample collected from BOREHOLE STATION 1 (Wet Season)

S/No	Parameters	WHO Limits (Sn)	Test Results (Vn)	Weightage (Wn)	Quality Rating (qn)	[(Wn*qn)]
1	pH	6.5	4.8	0.15385	440	67.69231
2	Nitrate	50	0.97	0.02000	1.94	0.03880
3	EC	1000	88.5	0.00100	8.85	0.00885
4	Turbidity	5	0	0.20000	0	0.00000
5	DO	5	4.5	0.20000	105.2083333	21.04167
6	TDS	500	44.1	0.00200	8.82	0.01764
7	Sodium	200	0.25	0.00500	0.125	0.00063
8	Lead	0.01	0	100.00000	0	0.00000
9	Sulphate	250	0.103	0.00400	0.0412	0.00016
10	Zinc	3	0.584	0.33333	19.46666667	6.48889
11	Copper	2	0.217	0.50000	10.85	5.42500
12	Chloride	250	70.9	0.00400	28.36	0.11344
13	Iron	1	0.877	1.00000	87.7	87.70000
14	Carbonate	250	30.5	0.00400	12.2	0.04880
15	TSS	5	0	0.20000	0	0.00000
16	Nitrite	0.5	0.08	2.00000	16	32.00000
17	Cadmium	0.003	0	333.33333	0	0.00000
18	Nickel	0.02	0	50.00000	0	0.00000
19	THC	0.001	0	1000.00000	0	0.00000
20	Phosphate	5	0.125	0.20000	2.5	0.50000
21	Alkalinity	600	54.56	0.00167	9.093333333	0.01516
22	Calcium	200	0.88	0.00500	0.44	0.00220
				∑ = 1488.16718		∑ = 221.094
Z= [∑(Wn*qn)]/[(∑Wn)] = 0.148567675						
WQI = 99.85%						

Table B: Water quality index of water sample collected from BOREHOLE STATION 2 (Wet Season)

S/No	Parameters	WHO Limits (Sn)	Test Results (Vn)	Weightage (Wn)	Quality Rating (qn)	[(Wn*qn)]
1	pH	6.5	4.6	0.15385	480	73.84615
2	Nitrate	50	1.653	0.02000	3.306	0.06612
3	EC	1000	89.1	0.00100	8.91	0.00891
4	Turbidity	5	0	0.20000	0	0.00000
5	DO	5	4.6	0.20000	104.1666667	20.83333
6	TDS	500	44.5	0.00200	8.9	0.01780
7	Sodium	200	0.311	0.00500	0.1555	0.00078
8	Lead	0.01	0	100.00000	0	0.00000
9	Sulphate	250	0.114	0.00400	0.0456	0.00018
10	Zinc	3	0.613	0.33333	20.43333333	6.81111
11	Copper	2	0.222	0.50000	11.1	5.55000
12	Chloride	250	88.6	0.00400	35.44	0.14176
13	Iron	1	0.914	1.00000	91.4	91.40000
14	Carbonate	250	30.32	0.00400	12.128	0.04851
15	TSS	5	0	0.20000	0	0.00000
16	Nitrite	0.5	0.084	2.00000	16.8	33.60000
17	Cadmium	0.003	0	333.33333	0	0.00000
18	Nickel	0.02	0	50.00000	0	0.00000
19	THC	0.001	0	1000.00000	0	0.00000
20	Phosphate	5	0.113	0.20000	2.26	0.45200
21	Alkalinity	600	67.43	0.00167	11.23833333	0.01873
22	Calcium	200	0.94	0.00500	0.47	0.00235
				∑ = 1488.16718		∑ = 232.798
Z= [∑(Wn*qn)]/[(∑Wn)] = 0.156432519						
WQI = 99.844%						

Table C: Water quality index of water sample collected from BOREHOLE STATION 3 (Wet Season)

S/No	Parameters	WHO Limits (Sn)	Test Results (Vn)	Weightage (Wn)	Quality Rating (qn)	[(Wn*qn)]
1	pH	6.5	5	0.15385	400	61.53846
2	Nitrate	50	0.23	0.02000	0.46	0.00920
3	EC	1000	19.6	0.00100	1.96	0.00196
4	Turbidity	5	0	0.20000	0	0.00000
5	DO	5	4.4	0.20000	106.25	21.25000
6	TDS	500	9.8	0.00200	1.96	0.00392
7	Sodium	200	0.1	0.00500	0.05	0.00025
8	Lead	0.01	0	100.00000	0	0.00000
9	Sulphate	250	0.055	0.00400	0.022	0.00009
10	Zinc	3	0.183	0.33333	6.1	2.03333
11	Copper	2	0.087	0.50000	4.35	2.17500
12	Chloride	250	35.5	0.00400	14.2	0.05680
13	Iron	1	0.442	1.00000	44.2	44.20000
14	Carbonate	250	12.2	0.00400	4.88	0.01952
15	TSS	5	0	0.20000	0	0.00000
16	Nitrite	0.5	0.028	2.00000	5.6	11.20000
17	Cadmium	0.003	0	333.33333	0	0.00000
18	Nickel	0.02	0	50.00000	0	0.00000
19	THC	0.001	0	1000.00000	0	0.00000
20	Phosphate	5	0.016	0.20000	0.32	0.06400
21	Alkalinity	600	78.2	0.00167	13.03333333	0.02172
22	Calcium	200	0.33	0.00500	0.165	0.00083
				$\sum$ = 1488.16718		$\sum$ = 142.575
Z= [$\sum$(Wn*qn)]/[($\sum$Wn)] = 0.095805822						
WQI = 99.904%						

Table D: Water quality index of water sample collected from BOREHOLE STATION 4 (Wet Season)

S/No	Parameters	WHO Limits (Sn)	Test Results (Vn)	Weightage (Wn)	Quality Rating (qn)	[(Wn*qn)]
1	pH	6.5	4.6	0.15385	480	73.84615
2	Nitrate	50	0.581	0.02000	1.162	0.02324
3	EC	1000	33.4	0.00100	3.34	0.00334
4	Turbidity	5	0	0.20000	0	0.00000
5	DO	5	4.5	0.20000	105.2083333	21.04167
6	TDS	500	16.6	0.00200	3.32	0.00664
7	Sodium	200	0.15	0.00500	0.075	0.00038
8	Lead	0.01	0	100.00000	0	0.00000
9	Sulphate	250	0.071	0.00400	0.0284	0.00011
10	Zinc	3	0.671	0.33333	22.36666667	7.45556
11	Copper	2	0.165	0.50000	8.25	4.12500
12	Chloride	250	53.2	0.00400	21.28	0.08512
13	Iron	1	0.708	1.00000	70.8	70.80000
14	Carbonate	250	18.3	0.00400	7.32	0.02928
15	TSS	5	0	0.20000	0	0.00000
16	Nitrite	0.5	0.044	2.00000	8.8	17.60000
17	Cadmium	0.003	0	333.33333	0	0.00000
18	Nickel	0.02	0	50.00000	0	0.00000
19	THC	0.001	0	1000.00000	0	0.00000
20	Phosphate	5	0.035	0.20000	0.7	0.14000
21	Alkalinity	600	66.33	0.00167	11.055	0.01843
22	Calcium	200	0.5	0.00500	0.25	0.00125
				∑ = 1488.16718		∑ = 195.176
Z= [∑(Wn*qn)]/[(∑Wn)] = 0.131152039						
WQI = 99.869%						

Table E: Water quality index of water sample collected from BOREHOLE STATION 5 (Wet Season)

S/No	Parameters	WHO Limits (Sn)	Test Results (Vn)	Weightage (Wn)	Quality Rating (qn)	[(Wn*qn)]
1	pH	6.5	4.6	0.15385	480	73.84615
2	Nitrate	50	0.592	0.02000	1.184	0.02368
3	EC	1000	35.7	0.00100	3.57	0.00357
4	Turbidity	5	0	0.20000	0	0.00000
5	DO	5	4.4	0.20000	106.25	21.25000
6	TDS	500	18	0.00200	3.6	0.00720
7	Sodium	200	0.17	0.00500	0.085	0.00043
8	Lead	0.01	0	100.00000	0	0.00000
9	Sulphate	250	0.088	0.00400	0.0352	0.00014
10	Zinc	3	0.488	0.33333	16.26666667	5.42222
11	Copper	2	0.171	0.50000	8.55	4.27500
12	Chloride	250	53.2	0.00400	21.28	0.08512
13	Iron	1	0.712	1.00000	71.2	71.20000
14	Carbonate	250	24.4	0.00400	9.76	0.03904
15	TSS	5	0	0.20000	0	0.00000
16	Nitrite	0.5	0.051	2.00000	10.2	20.40000
17	Cadmium	0.003	0	333.33333	0	0.00000
18	Nickel	0.02	0	50.00000	0	0.00000
19	THC	0.001	0	1000.00000	0	0.00000
20	Phosphate	5	0.037	0.20000	0.74	0.14800
21	Alkalinity	600	44.38	0.00167	7.396666667	0.01233
22	Calcium	200	0.54	0.00500	0.27	0.00135
				$\sum$ = 1488.16718		$\sum$ = 196.714
$Z= [\sum(Wn*qn)]/[(\sum Wn)] = 0.132185572$						
WQI = 99.868%						

Table F: Water quality index of water sample collected from BOREHOLE STATION 6 (Wet Season)

S/No	Parameters	WHO Limits (Sn)	Test Results (Vn)	Weightage (Wn)	Quality Rating (qn)	[(Wn*qn)]
1	pH	6.5	4.5	0.15385	500	76.92308
2	Nitrate	50	0.654	0.02000	1.308	0.02616
3	EC	1000	44.7	0.00100	4.47	0.00447
4	Turbidity	5	0	0.20000	0	0.00000
5	DO	5	4.3	0.20000	107.2916667	21.45833
6	TDS	500	22.4	0.00200	4.48	0.00896
7	Sodium	200	0.21	0.00500	0.105	0.00053
8	Lead	0.01	0	100.00000	0	0.00000
9	Sulphate	250	0.092	0.00400	0.0368	0.00015
10	Zinc	3	0.512	0.33333	17.06666667	5.68889
11	Copper	2	0.184	0.50000	9.2	4.60000
12	Chloride	250	53.21	0.00400	21.284	0.08514
13	Iron	1	0.78	1.00000	78	78.00000
14	Carbonate	250	30.5	0.00400	12.2	0.04880
15	TSS	5	0	0.20000	0	0.00000
16	Nitrite	0.5	0.062	2.00000	12.4	24.80000
17	Cadmium	0.003	0	333.33333	0	0.00000
18	Nickel	0.02	0	50.00000	0	0.00000
19	THC	0.001	0	1000.00000	0	0.00000
20	Phosphate	5	0.049	0.20000	0.98	0.19600
21	Alkalinity	600	33.67	0.00167	5.611666667	0.00935
22	Calcium	200	0.61	0.00500	0.305	0.00153
				∑ = 1488.16718		∑ = 211.851
Z= [∑(Wn*qn)]/[(∑Wn)] = 0.142357242						
WQI = 99.858%						

Table G: Water quality index of water sample collected from BOREHOLE STATION 7 (Wet Season)

S/No	Parameters	WHO Limits (Sn)	Test Results (Vn)	Weightage (Wn)	Quality Rating (qn)	[(Wn*qn)]
1	pH	6.5	4.7	0.15385	460	70.76923
2	Nitrate	50	0.581	0.02000	1.162	0.02324
3	EC	1000	33.4	0.00100	3.34	0.00334
4	Turbidity	5	0	0.20000	0	0.00000
5	DO	5	4.5	0.20000	105.2083333	21.04167
6	TDS	500	10.7	0.00200	2.14	0.00428
7	Sodium	200	0.1	0.00500	0.05	0.00025
8	Lead	0.01	0	100.00000	0	0.00000
9	Sulphate	250	0.062	0.00400	0.0248	0.00010
10	Zinc	3	0.444	0.33333	14.8	4.93333
11	Copper	2	0.133	0.50000	6.65	3.32500
12	Chloride	250	35.5	0.00400	14.2	0.05680
13	Iron	1	0.597	1.00000	59.7	59.70000
14	Carbonate	250	18.3	0.00400	7.32	0.02928
15	TSS	5	0	0.20000	0	0.00000
16	Nitrite	0.5	0.032	2.00000	6.4	12.80000
17	Cadmium	0.003	0	333.33333	0	0.00000
18	Nickel	0.02	0	50.00000	0	0.00000
19	THC	0.001	0	1000.00000	0	0.00000
20	Phosphate	5	0.027	0.20000	0.54	0.10800
21	Alkalinity	600	55.68	0.00167	9.28	0.01547
22	Calcium	200	0.48	0.00500	0.24	0.00120
				$\sum$ = 1488.16718		$\sum$ = 172.811
Z= [$\sum$(Wn*qn)]/[($\sum$Wn)] = 0.116123503						
WQI = 99.884%						

Table H: Water quality index of water sample collected from BOREHOLE STATION 8 (Wet Season)

S/No	Parameters	WHO Limits (Sn)	Test Results (Vn)	Weightage (Wn)	Quality Rating (qn)	[(Wn*qn)]
1	pH	6.5	4.9	0.15385	420	64.61538
2	Nitrate	50	0.443	0.02000	0.886	0.01772
3	EC	1000	56.34	0.00100	5.634	0.00563
4	Turbidity	5	0	0.20000	0	0.00000
5	DO	5	4.4	0.20000	106.25	21.25000
6	TDS	500	23.78	0.00200	4.756	0.00951
7	Sodium	200	0.21	0.00500	0.105	0.00053
8	Lead	0.01	0	100.00000	0	0.00000
9	Sulphate	250	0.032	0.00400	0.0128	0.00005
10	Zinc	3	0.135	0.33333	4.5	1.50000
11	Copper	2	0.203	0.50000	10.15	5.07500
12	Chloride	250	44.21	0.00400	17.684	0.07074
13	Iron	1	0.442	1.00000	44.2	44.20000
14	Carbonate	250	22.12	0.00400	8.848	0.03539
15	TSS	5	0	0.20000	0	0.00000
16	Nitrite	0.5	0.041	2.00000	8.2	16.40000
17	Cadmium	0.003	0	333.33333	0	0.00000
18	Nickel	0.02	0	50.00000	0	0.00000
19	THC	0.001	0	1000.00000	0	0.00000
20	Phosphate	5	0.019	0.20000	0.38	0.07600
21	Alkalinity	600	36.7	0.00167	6.116666667	0.01019
22	Calcium	200	0.53	0.00500	0.265	0.00133
				$\sum$ = 1488.16718		$\sum$ = 153.267
$Z= [\sum(Wn*qn)]/[(\sum Wn)] = 0.102990764$						
WQI = 99.897%						

Table I: Water quality index of water sample collected from BOREHOLE STATION 9 (Wet Season)

S/No	Parameters	WHO Limits (Sn)	Test Results (Vn)	Weightage (Wn)	Quality Rating (qn)	[(Wn*qn)]
1	pH	6.5	4.6	0.15385	480	73.84615
2	Nitrate	50	0.402	0.02000	0.804	0.01608
3	EC	1000	42.19	0.00100	4.219	0.00422
4	Turbidity	5	0	0.20000	0	0.00000
5	DO	5	4.3	0.20000	107.2916667	21.45833
6	TDS	500	22.03	0.00200	4.406	0.00881
7	Sodium	200	0.19	0.00500	0.095	0.00048
8	Lead	0.01	0	100.00000	0	0.00000
9	Sulphate	250	0.039	0.00400	0.0156	0.00006
10	Zinc	3	0.502	0.33333	16.73333333	5.57778
11	Copper	2	0.092	0.50000	4.6	2.30000
12	Chloride	250	46.07	0.00400	18.428	0.07371
13	Iron	1	0.302	1.00000	30.2	30.20000
14	Carbonate	250	28.07	0.00400	11.228	0.04491
15	TSS	5	0	0.20000	0	0.00000
16	Nitrite	0.5	0.019	2.00000	3.8	7.60000
17	Cadmium	0.003	0	333.33333	0	0.00000
18	Nickel	0.02	0	50.00000	0	0.00000
19	THC	0.001	0	1000.00000	0	0.00000
20	Phosphate	5	0.006	0.20000	0.12	0.02400
21	Alkalinity	600	76.02	0.00167	12.67	0.02112
22	Calcium	200	0.61	0.00500	0.305	0.00153
				$\sum$ = 1488.16718		$\sum$ = 141.177
Z= [$\sum$(Wn*qn)]/[($\sum$Wn)] = 0.094866478						
WQI = 99.905						

Table J: Water quality index of water sample collected from BOREHOLE STATION 10 (Wet Season)

S/No	Parameters	WHO Limits (Sn)	Test Results (Vn)	Weightage (Wn)	Quality Rating (qn)	[(Wn*qn)]
1	pH	6.5	5.1	0.15385	380	58.46154
2	Nitrate	50	0.506	0.02000	1.012	0.02024
3	EC	1000	38.79	0.00100	3.879	0.00388
4	Turbidity	5	0	0.20000	0	0.00000
5	DO	5	4.6	0.20000	104.1666667	20.83333
6	TDS	500	19.18	0.00200	3.836	0.00767
7	Sodium	200	0.32	0.00500	0.16	0.00080
8	Lead	0.01	0	100.00000	0	0.00000
9	Sulphate	250	0.027	0.00400	0.0108	0.00004
10	Zinc	3	0.201	0.33333	6.7	2.23333
11	Copper	2	0.118	0.50000	5.9	2.95000
12	Chloride	250	28.09	0.00400	11.236	0.04494
13	Iron	1	0.203	1.00000	20.3	20.30000
14	Carbonate	250	30.02	0.00400	12.008	0.04803
15	TSS	5	0	0.20000	0	0.00000
16	Nitrite	0.5	0.011	2.00000	2.2	4.40000
17	Cadmium	0.003	0	333.33333	0	0.00000
18	Nickel	0.02	0	50.00000	0	0.00000
19	THC	0.001	0	1000.00000	0	0.00000
20	Phosphate	5	0.023	0.20000	0.46	0.09200
21	Alkalinity	600	66.21	0.00167	11.035	0.01839
22	Calcium	200	0.92	0.00500	0.46	0.00230
				$\sum = 1488.16718$		$\sum = 109.417$
$Z= [\sum(Wn*qn)]/[(\sum Wn)] = 0.07352467$						
WQI = 99.926%						

Table K: Water quality index of water sample collected from BOREHOLE STATION 1 (Dry Season)

S/No	Parameters	WHO Limits (Sn)	Test Results (Vn)	Weightage (Wn)	Quality Rating (qn)	[(Wn*qn)]
1	pH	6.5	5.1	0.15385	380	58.46154
2	Nitrate	50	2.33	0.02000	4.66	0.09320
3	EC	1000	67.89	0.00100	6.789	0.00679
4	Turbidity	5	0	0.20000	0	0.00000
5	DO	5	4.4	0.20000	106.25	21.25000
6	TDS	500	38.76	0.00200	7.752	0.01550
7	Sodium	200	2.467	0.00500	1.2335	0.00617
8	Lead	0.01	0	100.00000	0	0.00000
9	Sulphate	250	1.029	0.00400	0.4116	0.00165
10	Zinc	3	0.337	0.33333	11.23333333	3.74444
11	Copper	2	0.059	0.50000	2.95	1.47500
12	Chloride	250	34.78	0.00400	13.912	0.05565
13	Iron	1	0.478	1.00000	47.8	47.80000
14	Carbonate	250	22.48	0.00400	8.992	0.03597
15	TSS	5	0	0.20000	0	0.00000
16	Nitrite	0.5	0.022	2.00000	4.4	8.80000
17	Cadmium	0.003	0	333.33333	0	0.00000
18	Nickel	0.02	0	50.00000	0	0.00000
19	THC	0.001	0	1000.00000	0	0.00000
20	Phosphate	5	0.047	0.20000	0.94	0.18800
21	Alkalinity	600	63.48	0.00167	10.58	0.01763
22	Calcium	200	3.467	0.00500	1.7335	0.00867
				∑ = 1488.16718		∑ = 141.960
Z= [∑(Wn*qn)]/[(∑Wn)] = 0.095392647						
WQI = 99.905%						

Table L: Water quality index of water sample collected from BOREHOLE STATION 2 (Dry Season)

S/No	Parameters	WHO Limits (Sn)	Test Results (Vn)	Weightage (Wn)	Quality Rating (qn)	[(Wn*qn)]
1	pH	6.5	5.3	0.15385	340	52.30769
2	Nitrate	50	1.301	0.02000	2.602	0.05204
3	EC	1000	81.7	0.00100	8.17	0.00817
4	Turbidity	5	0	0.20000	0	0.00000
5	DO	5	4.5	0.20000	105.2083333	21.04167
6	TDS	500	40.9	0.00200	8.18	0.01636
7	Sodium	200	0.28	0.00500	0.14	0.00070
8	Lead	0.01	0	100.00000	0	0.00000
9	Sulphate	250	0.048	0.00400	0.0192	0.00008
10	Zinc	3	0.412	0.33333	13.73333333	4.57778
11	Copper	2	0.082	0.50000	4.1	2.05000
12	Chloride	250	88.6	0.00400	35.44	0.14176
13	Iron	1	0.991	1.00000	99.1	99.10000
14	Carbonate	250	30.4	0.00400	12.16	0.04864
15	TSS	5	0	0.20000	0	0.00000
16	Nitrite	0.5	0.076	2.00000	15.2	30.40000
17	Cadmium	0.003	0	333.33333	0	0.00000
18	Nickel	0.02	0	50.00000	0	0.00000
19	THC	0.001	0	1000.00000	0	0.00000
20	Phosphate	5	0.083	0.20000	1.66	0.33200
21	Alkalinity	600	56.78	0.00167	9.463333333	0.01577
22	Calcium	200	0.76	0.00500	0.38	0.00190
				∑ = 1488.16718		∑ = 210.095
Z= [∑(Wn*qn)]/[(∑Wn)] = 0.141176716						
WQI = 99.859%						

Table M: Water quality index of water sample collected from BOREHOLE STATION 3 (Dry Season)

S/No	Parameters	WHO Limits (Sn)	Test Results (Vn)	Weightage (Wn)	Quality Rating (qn)	[(Wn*qn)]
1	pH	6.5	5.6	0.15385	280	43.07692
2	Nitrate	50	2.036	0.02000	4.072	0.08144
3	EC	1000	56.78	0.00100	5.678	0.00568
4	Turbidity	5	0	0.20000	0	0.00000
5	DO	5	4.5	0.20000	105.2083333	21.04167
6	TDS	500	0	0.00200	0	0.00000
7	Sodium	200	3.041	0.00500	1.5205	0.00760
8	Lead	0.01	0	100.00000	0	0.00000
9	Sulphate	250	2.047	0.00400	0.8188	0.00328
10	Zinc	3	1.029	0.33333	34.3	11.43333
11	Copper	2	0.623	0.50000	31.15	15.57500
12	Chloride	250	34.06	0.00400	13.624	0.05450
13	Iron	1	0.056	1.00000	5.6	5.60000
14	Carbonate	250	32.07	0.00400	12.828	0.05131
15	TSS	5	0	0.20000	0	0.00000
16	Nitrite	0.5	0.056	2.00000	11.2	22.40000
17	Cadmium	0.003	0	333.33333	0	0.00000
18	Nickel	0.02	0	50.00000	0	0.00000
19	THC	0.001	0	1000.00000	0	0.00000
20	Phosphate	5	0.047	0.20000	0.94	0.18800
21	Alkalinity	600	55.68	0.00167	9.28	0.01547
22	Calcium	200	0.431	0.00500	0.2155	0.00108
				∑ = 1488.16718		∑ = 119.535
Z= [∑(Wn*qn)]/[(∑Wn)] = 0.080323819						
WQI = 99.920						

Table O: Water quality index of water sample collected from BOREHOLE STATION 4 (Dry Season)

S/No	Parameters	WHO Limits (Sn)	Test Results (Vn)	Weightage (Wn)	Quality Rating (qn)	[(Wn*qn)]
1	pH	6.5	5.7	0.15385	260	40.00000
2	Nitrate	50	1.155	0.02000	2.31	0.04620
3	EC	1000	64.9	0.00100	6.49	0.00649
4	Turbidity	5	0	0.20000	0	0.00000
5	DO	5	4.4	0.20000	106.25	21.25000
6	TDS	500	0	0.00200	0	0.00000
7	Sodium	200	0.2	0.00500	0.1	0.00050
8	Lead	0.01	0	100.00000	0	0.00000
9	Sulphate	250	0.051	0.00400	0.0204	0.00008
10	Zinc	3	0.387	0.33333	12.9	4.30000
11	Copper	2	0.071	0.50000	3.55	1.77500
12	Chloride	250	88.6	0.00400	35.44	0.14176
13	Iron	1	0.84	1.00000	84	84.00000
14	Carbonate	250	24.4	0.00400	9.76	0.03904
15	TSS	5	0	0.20000	0	0.00000
16	Nitrite	0.5	0.061	2.00000	12.2	24.40000
17	Cadmium	0.003	0	333.33333	0	0.00000
18	Nickel	0.02	0	50.00000	0	0.00000
19	THC	0.001	0	1000.00000	0	0.00000
20	Phosphate	5	0.052	0.20000	1.04	0.20800
21	Alkalinity	600	67.06	0.00167	11.17666667	0.01863
22	Calcium	200	0.66	0.00500	0.33	0.00165
				∑ = 1488.16718		∑ = 176.187
Z= [∑(Wn*qn)]/[(∑Wn)] = 0.118392175						
WQI = 99.882%						

Table P: Water quality index of water sample collected from BOREHOLE STATION 5 (Dry Season)

S/No	Parameters	WHO Limits (Sn)	Test Results (Vn)	Weightage (Wn)	Quality Rating (qn)	[(Wn*qn)]
1	pH	6.5	5.2	0.15385	360	55.38462
2	Nitrate	50	2.338	0.02000	4.676	0.09352
3	EC	1000	49.87	0.00100	4.987	0.00499
4	Turbidity	5	0	0.20000	0	0.00000
5	DO	5	4.6	0.20000	104.1666667	20.83333
6	TDS	500	23.67	0.00200	4.734	0.00947
7	Sodium	200	9.08	0.00500	4.54	0.02270
8	Lead	0.01	0	100.00000	0	0.00000
9	Sulphate	250	1.054	0.00400	0.4216	0.00169
10	Zinc	3	0.409	0.33333	13.63333333	4.54444
11	Copper	2	0.278	0.50000	13.9	6.95000
12	Chloride	250	33.78	0.00400	13.512	0.05405
13	Iron	1	0.598	1.00000	59.8	59.80000
14	Carbonate	250	59.89	0.00400	23.956	0.09582
15	TSS	5	0	0.20000	0	0.00000
16	Nitrite	0.5	0.305	2.00000	61	122.00000
17	Cadmium	0.003	0	333.33333	0	0.00000
18	Nickel	0.02	0	50.00000	0	0.00000
19	THC	0.001	0	1000.00000	0	0.00000
20	Phosphate	5	0.203	0.20000	4.06	0.81200
21	Alkalinity	600	44.79	0.00167	7.465	0.01244
22	Calcium	200	33.09	0.00500	16.545	0.08273
				∑ = 1488.16718		∑ = 270.702
Z= [∑(Wn*qn)]/[(∑Wn)] = 0.181902811						
WQI = 99.818%						

Table Q: Water quality index of water sample collected from BOREHOLE STATION 6 (Dry Season)

S/No	Parameters	WHO Limits (Sn)	Test Results (Vn)	Weightage (Wn)	Quality Rating (qn)	[(Wn*qn)]
1	pH	6.5	5.1	0.15385	380	58.46154
2	Nitrate	50	1.405	0.02000	2.81	0.05620
3	EC	1000	66.88	0.00100	6.688	0.00669
4	Turbidity	5	0	0.20000	0	0.00000
5	DO	5	4.3	0.20000	107.2916667	21.45833
6	TDS	500	33.02	0.00200	6.604	0.01321
7	Sodium	200	22.09	0.00500	11.045	0.05523
8	Lead	0.01	0	100.00000	0	0.00000
9	Sulphate	250	2.09	0.00400	0.836	0.00334
10	Zinc	3	0.335	0.33333	11.16666667	3.72222
11	Copper	2	1.092	0.50000	54.6	27.30000
12	Chloride	250	33.99	0.00400	13.596	0.05438
13	Iron	1	0.605	1.00000	60.5	60.50000
14	Carbonate	250	24.56	0.00400	9.824	0.03930
15	TSS	5	0	0.20000	0	0.00000
16	Nitrite	0.5	0.201	2.00000	40.2	80.40000
17	Cadmium	0.003	0	333.33333	0	0.00000
18	Nickel	0.02	0	50.00000	0	0.00000
19	THC	0.001	0	1000.00000	0	0.00000
20	Phosphate	5	0.104	0.20000	2.08	0.41600
21	Alkalinity	600	33.44	0.00167	5.573333333	0.00929
22	Calcium	200	22.78	0.00500	11.39	0.05695
				∑ = 1488.16718		∑ = 252.553
Z= [∑(Wn*qn)]/[(∑Wn)] = 0.169707195						
WQI = 99.830%						

Table R: Water quality index of water sample collected from BOREHOLE STATION 7 (Dry Season)

S/No	Parameters	WHO Limits (Sn)	Test Results (Vn)	Weightage (Wn)	Quality Rating (qn)	[(Wn*qn)]
1	pH	6.5	5.7	0.15385	260	40.00000
2	Nitrate	50	0.784	0.02000	1.568	0.03136
3	EC	1000	35.2	0.00100	3.52	0.00352
4	Turbidity	5	0	0.20000	0	0.00000
5	DO	5	4.4	0.20000	106.25	21.25000
6	TDS	500	17.7	0.00200	3.54	0.00708
7	Sodium	200	0.11	0.00500	0.055	0.00028
8	Lead	0.01	0	100.00000	0	0.00000
9	Sulphate	250	0.044	0.00400	0.0176	0.00007
10	Zinc	3	0.222	0.33333	7.4	2.46667
11	Copper	2	0.05	0.50000	2.5	1.25000
12	Chloride	250	70.9	0.00400	28.36	0.11344
13	Iron	1	0.61	1.00000	61	61.00000
14	Carbonate	250	61	0.00400	24.4	0.09760
15	TSS	5	0	0.20000	0	0.00000
16	Nitrite	0.5	0.041	2.00000	8.2	16.40000
17	Cadmium	0.003	0	333.33333	0	0.00000
18	Nickel	0.02	0	50.00000	0	0.00000
19	THC	0.001	0	1000.00000	0	0.00000
20	Phosphate	5	0.044	0.20000	0.88	0.17600
21	Alkalinity	600	46.06	0.00167	7.676666667	0.01279
22	Calcium	200	0.48	0.00500	0.24	0.00120
				$\sum$ = 1488.16718		$\sum$ = 142.810
$Z= [\sum(Wn*qn)]/[(\sum Wn)] = 0.095963685$						
WQI = 99.904%						

Table S: Water quality index of water sample collected from BOREHOLE STATION 8 (Dry Season)

S/No	Parameters	WHO Limits (Sn)	Test Results (Vn)	Weightage (Wn)	Quality Rating (qn)	[(Wn*qn)]
1	pH	6.5	5.1	0.15385	380	58.46154
2	Nitrate	50	0.51	0.02000	1.02	0.02040
3	EC	1000	19.3	0.00100	1.93	0.00193
4	Turbidity	5	0	0.20000	0	0.00000
5	DO	5	4.6	0.20000	104.1666667	20.83333
6	TDS	500	9.6	0.00200	1.92	0.00384
7	Sodium	200	0.1	0.00500	0.05	0.00025
8	Lead	0.01	0	100.00000	0	0.00000
9	Sulphate	250	0.04	0.00400	0.016	0.00006
10	Zinc	3	0.345	0.33333	11.5	3.83333
11	Copper	2	0.051	0.50000	2.55	1.27500
12	Chloride	250	70.9	0.00400	28.36	0.11344
13	Iron	1	0.524	1.00000	52.4	52.40000
14	Carbonate	250	36.6	0.00400	14.64	0.05856
15	TSS	5	0	0.20000	0	0.00000
16	Nitrite	0.5	0.033	2.00000	6.6	13.20000
17	Cadmium	0.003	0	333.33333	0	0.00000
18	Nickel	0.02	0	50.00000	0	0.00000
19	THC	0.001	0	1000.00000	0	0.00000
20	Phosphate	5	0.037	0.20000	0.74	0.14800
21	Alkalinity	600	65.09	0.00167	10.84833333	0.01808
22	Calcium	200	0.33	0.00500	0.165	0.00083
				$\sum$ = 1488.16718		$\sum$ = 150.369
$Z= [\sum(Wn*qn)]/[(\sum Wn)] = 0.101042811$						
WQI = 99.899%						

Table T: Water quality index of water sample collected from BOREHOLE STATION 9 (Dry Season)

S/No	Parameters	WHO Limits (Sn)	Test Results (Vn)	Weightage (Wn)	Quality Rating (qn)	[(Wn*qn)]
1	pH	6.5	5.3	0.15385	340	52.30769
2	Nitrate	50	2.033	0.02000	4.066	0.08132
3	EC	1000	56.79	0.00100	5.679	0.00568
4	Turbidity	5	0	0.20000	0	0.00000
5	DO	5	4.4	0.20000	106.25	21.25000
6	TDS	500	17.08	0.00200	3.416	0.00683
7	Sodium	200	12.09	0.00500	6.045	0.03023
8	Lead	0.01	0	100.00000	0	0.00000
9	Sulphate	250	0.033	0.00400	0.0132	0.00005
10	Zinc	3	0.207	0.33333	6.9	2.30000
11	Copper	2	0.043	0.50000	2.15	1.07500
12	Chloride	250	49.08	0.00400	19.632	0.07853
13	Iron	1	0.348	1.00000	34.8	34.80000
14	Carbonate	250	36.09	0.00400	14.436	0.05774
15	TSS	5	0	0.20000	0	0.00000
16	Nitrite	0.5	0.167	2.00000	33.4	66.80000
17	Cadmium	0.003	0	333.33333	0	0.00000
18	Nickel	0.02	0	50.00000	0	0.00000
19	THC	0.001	0	1000.00000	0	0.00000
20	Phosphate	5	0.049	0.20000	0.98	0.19600
21	Alkalinity	600	53.99	0.00167	8.998333333	0.01500
22	Calcium	200	4.79	0.00500	2.395	0.01198
				$\sum$ = 1488.16718		$\sum$ = 179.016
$Z= [\sum(Wn*qn)]/[(\sum Wn)] = 0.120292967$						
WQI = 99.880%						

Table U: Water quality index of water sample collected from BOREHOLE STATION 10 (Dry Season)

S/No	Parameters	WHO Limits (Sn)	Test Results (Vn)	Weightage (Wn)	Quality Rating (qn)	[(Wn*qn)]
1	pH	6.5	5.5	0.15385	300	46.15385
2	Nitrate	50	1.074	0.02000	2.148	0.04296
3	EC	1000	81.7	0.00100	8.17	0.00817
4	Turbidity	5	0	0.20000	0	0.00000
5	DO	5	4.6	0.20000	104.1666667	20.83333
6	TDS	500	27.8	0.00200	5.56	0.01112
7	Sodium	200	0.15	0.00500	0.075	0.00038
8	Lead	0.01	0	100.00000	0	0.00000
9	Sulphate	250	0.044	0.00400	0.0176	0.00007
10	Zinc	3	0.381	0.33333	12.7	4.23333
11	Copper	2	0.06	0.50000	3	1.50000
12	Chloride	250	70.9	0.00400	28.36	0.11344
13	Iron	1	0.777	1.00000	77.7	77.70000
14	Carbonate	250	18.3	0.00400	7.32	0.02928
15	TSS	5	0	0.20000	0	0.00000
16	Nitrite	0.5	0.055	2.00000	11	22.00000
17	Cadmium	0.003	0	333.33333	0	0.00000
18	Nickel	0.02	0	50.00000	0	0.00000
19	THC	0.001	0	1000.00000	0	0.00000
20	Phosphate	5	0.053	0.20000	1.06	0.21200
21	Alkalinity	600	62.01	0.00167	10.335	0.01723
22	Calcium	200	0.51	0.00500	0.255	0.00128
				∑ = 1488.16718		∑ = 172.856
Z= [∑(Wn*qn)]/[(∑Wn)] = 0.116153904						
WQI = 99.884%						

Table 1 Summary results of water quality index

Location	Wet Season		Dry Season	
	WQI (%)	**Remark**	**WQI (%)**	**Remark**
BOREHOLE STATION 1	99.850	Excellent	99.906	Excellent
BOREHOLE STATION 2	99.844	Excellent	99.859	Excellent
BOREHOLE STATION 3	99.904	Excellent	99.920	Excellent
BOREHOLE STATION 4	99.869	Excellent	99.882	Excellent
BOREHOLE STATION 5	99.868	Excellent	99.818	Excellent
BOREHOLE STATION 6	99.858	Excellent	99.830	Excellent
BOREHOLE STATION 7	99.884	Excellent	99.904	Excellent
BOREHOLE STATION 8	99.897	Excellent	99.899	Excellent
BOREHOLE STATION 9	99.905	Excellent	99.880	Excellent
BOREHOLE STATION 10	99.926	Excellent	99.884	Excellent
Average	**99.88**	**Excellent**	**99.89**	**Excellent**

Table 2: Interpretation of water quality index values (Tyagi et al., 2013)

National Sanitation Foundation Water Quality Index (NSFWQI)	
WQI Value	**Rating of Water Quality**
91-100	Excellent Water Quality
71-90	Good Water Quality
51-70	Medium Water Quality
26-50	Bad Water Quality
0-25	Very Bad Water Quality
Negative	Extremely Bad Water Quality

Table 3: Testing the assumption of normality for MANOVA

Test of Normality							
		Kolmogorov-Smirnov			Shapiro-Wilk		
Parameter	Season	Statistic	df	Sig.	Statistic	df	Sig.
pH	Wet season	.257	10	.060	.888	10	.163
	Dry season	.196	10	.200	.864	10	.085
Nitrate (No3)	Wet season	.307	10	.008	.789	10	.011
	Dry season	.195	10	.200	.925	10	.397
Electrical Conductivity	Wet season	.259	10	.056	.838	10	.042
	Dry season	.173	10	.200	.930	10	452
Disssolved Oxygen	Wet season	.178	10	.200	.907	10	.258
	Dry season	.246	10	.089	.874	10	.111
Total Dissolved Solids	Wet season	.278	10	.028	.832	10	.036
	Dry season	.122	10	.200	.940	10	.557
Sodium	Wet season	.154	10	.200	.938	10	.531
	Dry season	.303	10	.010	.736	10	.002
Sulphate	Wet season	.141	10	.200	.950	10	.666
	Dry season	.358	10	.001	.725	10	.002
Zinc (Zn)	Wet season	.222	10	.176	.881	10	.132
	Dry season	.390	10	0.00	.653	10	0.00
Copper (Cu)	Wet season	.147	10	.200	.929	10	.438
	Dry season	.375	10	0.00	.643	10	0.00
Chloride (Cl-)	Wet season	.248	10	.083	.916	10	.327
	Dry season	.240	10	.107	.830	10	.033
Iron (Fe)	Wet season	.176	10	.200	.947	10	.628
	Dry season	.159	10	.200	.966	10	.849
Carbonate	Wet season	.209	10	.200	.866	10	.089

	Dry season	.246	10	.088	.843	10	.048
Nitrite (No2)	Wet season	.123	10	.200	.956	10	.736
	Dry season	.310	10	.007	.797	10	.013
Phosphate (PO4)	Wet season	.278	10	.280	.784	10	.009
	Dry season	.346	10	.001	.668	10	0.00
Temperature	Wet season	.121	10	.200	.954	10	.717
	Dry season	.174	10	.200	.929	10	.441

Multivariate Tests [c]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent Parameter	OBorehole Station erved Power
Intercept	Pillalis Trace	1.000	4.326E4[a]	18.000	1.000	.004	1.000	778668.476	1.000
	Wilks' Lambda	.000	4.326E4[a]	18.000	1.000	.004	1.000	778668.476	1.000
	Hotelling's Trace	7.787E5	4.326E4[a]	18.000	1.000	.004	1.000	778668.476	1.000
	Roy's Largest Root	7.787E5	4.326E4[a]	18.000	1.000	.004	1.000	778668.476	1.000
Season	Pillalis Trace	.998	23.258[a]	18.000	1.000	.162	.998	418.645	.246
	Wilks' Lambda	.002	23.258[a]	18.000	1.000	.162	.998	418.645	.246
	Hotelling's Trace	418.645	23.258[a]	18.000	1.000	.162	.998	418.645	.246
	Roy's Largest Root	418.645	23.258[a]	18.000	1.000	.162	.998	418.645	.246

a. Exact statistic

b. Computing using alpha = .05

c. Design Intercept + Season

Table 4: Multivariate statistical table