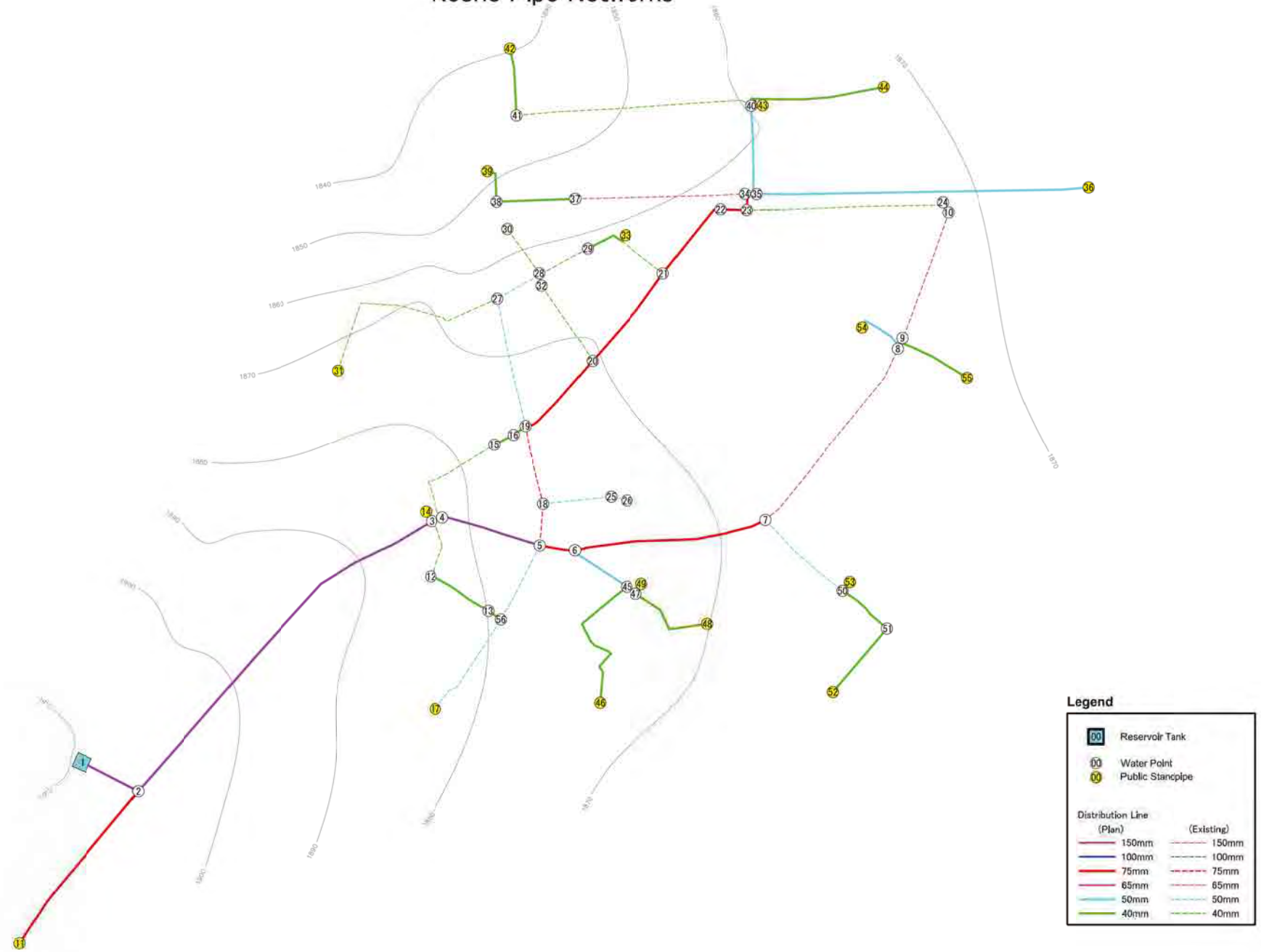
資料６　参考資料

管網計算書

Koshe Pipe Networks



------Koshe <<Hazen-Williams Formula>>------

Tank	1	Maximum EHP	42.655	(m)
Node	55	Minimum EHP	1.657	(m)
Line	59	Maximum I	35.878	(‰)
Pump,Decom	0	Maximum V	0.852	(m/s)

Convergence Gap (cm)

Calculation 14 (times)

<< Explanatory Notes >>

- Node -
HP: Head Pressure
GL: Ground Level
EHP: Effectual Head Pressure
Qc: Consumption of Water

- Line -
D: Diameter
L: Length of Pipe
Coef: Friction Coefficient
Q: Quantity of Flow
V: Velocity of Flow
I: Hydraulic Gradient
HL: Head Loss
P: Add Pressure

--- NodeData ---

Node	HP (m)	GL (m)	EHP 1st(m)	EHP 2nd(m)	Qc (l/s)	Remarks
1	1909.720	1909.720		0.000	-9.951	Reservoir Tank
2	1909.192	1905.668		3.524	0.000	
3	1906.164	1883.071		23.093	0.000	
4	1906.117	1882.410		23.707	0.000	
5	1905.536	1875.284		30.252	0.000	
6	1904.511	1873.565		30.946	0.000	
7	1902.502	1869.147		33.355	0.000	
8	1900.765	1867.137		33.628	0.000	
9	1900.758	1866.658		34.100	0.000	
10	1900.758	1869.152		31.606	0.000	
11	1909.040	1907.383		1.657	0.535	WF
12	1905.817	1884.136		21.681	0.000	
13	1905.428	1879.639		25.789	0.000	
14	1906.092	1883.245		22.847	0.535	WF
15	1902.656	1877.529		25.127	0.000	
16	1901.995	1875.842		26.153	0.000	
17	1904.458	1883.288		21.170	0.535	WF
18	1904.181	1875.885		28.296	0.000	
19	1901.574	1875.026		26.548	0.000	
20	1898.876	1870.555		28.321	0.803	PS,SS
21	1896.986	1864.739		32.247	0.000	
22	1895.569	1860.993		34.576	0.052	HC
23	1895.146	1861.332		33.814	0.000	
24	1895.146	1869.139		26.007	0.000	

--- LineData ---

Node ST	Node EN	D (mm)	L (m)	Coef C	Q (l/s)	V (m/s)	I (‰)	HL (m)	P (m)
1	2	150.0	147.747	110	9.951	0.563	3.571	0.528	0.000
2	3	150.0	939.570	110	9.416	0.533	3.223	3.029	0.000
2	11	80.0	447.777	110	0.535	0.106	0.340	0.152	0.000
3	4	150.0	17.047	110	8.628	0.488	2.742	0.047	0.000
3	12	40.0	139.065	110	0.253	0.202	2.492	0.347	0.000
3	14	40.0	7.269	110	0.535	0.426	9.944	0.072	0.000
4	5	150.0	243.235	110	8.006	0.453	2.387	0.581	0.000
4	15	40.0	263.560	110	0.622	0.495	13.131	3.461	0.000
5	6	80.0	82.144	110	3.745	0.745	12.486	1.026	0.000
5	56	50.0	191.080	110	0.282	0.143	1.022	0.195	0.000
5	18	80.0	97.015	110	3.979	0.792	13.970	1.355	0.000
6	7	80.0	453.485	110	2.140	0.426	4.429	2.009	0.000
6	45	50.0	144.569	110	1.605	0.818	25.651	3.708	0.000
7	8	65.0	515.025	110	1.070	0.323	3.373	1.737	0.000
7	50	50.0	243.732	110	1.070	0.545	12.106	2.951	0.000
8	9	65.0	7.418	110	0.535	0.161	0.935	0.007	0.000
8	54	50.0	110.719	110	0.535	0.273	3.354	0.371	0.000
9	10	65.0	333.226	110	0.000	0.000	0.000	0.000	0.000
9	55	40.0	174.199	110	0.535	0.426	9.944	1.732	0.000
12	13	40.0	156.330	110	0.253	0.202	2.492	0.390	0.000
15	16	40.0	50.361	110	0.622	0.495	13.131	0.661	0.000
18	19	80.0	186.614	110	3.979	0.792	13.970	2.607	0.000
18	25	40.0	158.279	110	0.000	0.000	0.000	0.000	0.000
19	20	80.0	220.495	110	3.704	0.737	12.236	2.698	0.000

--- NodeData ---

Node	HP (m)	GL (m)	EHP 1st(m)	EHP 2nd(m)	Qc (l/s)	Remarks
25	1904.181	1872.823		31.358	0.000	
26	1904.181	1871.898		32.283	0.000	
27	1898.928	1865.020		33.908	0.000	
28	1898.741	1863.759		34.982	0.000	
29	1897.738	1862.937		34.801	0.000	
30	1898.741	1856.565		42.176	0.000	
31	1894.024	1875.027		18.997	0.535	WF
32	1898.749	1864.368		34.381	0.000	
33	1896.979	1861.995		34.984	0.535	WF
34	1894.890	1860.977		33.913	0.000	
35	1894.829	1860.943		33.886	0.000	
36	1892.221	1871.908		20.313	0.535	WF
37	1894.513	1858.187		36.326	0.000	
38	1892.699	1852.591		40.108	0.000	
39	1891.919	1849.846		42.073	0.535	WF
40	1889.336	1860.315		29.021	0.000	
41	1883.866	1848.883		34.983	0.000	
42	1882.400	1839.745		42.655	0.536	WF
43	1889.274	1860.834		28.440	0.535	WF
44	1886.197	1868.769		17.428	0.535	WF
45	1900.803	1872.038		28.765	0.000	
46	1897.199	1873.656		23.543	0.535	WF
47	1900.523	1872.038		28.485	0.000	
48	1898.256	1870.005		28.251	0.535	WF
49	1900.428	1872.038		28.390	0.535	WF
50	1899.552	1867.845		31.707	0.000	
51	1898.208	1867.193		31.015	0.000	
52	1896.290	1867.684		28.606	0.535	WF
53	1899.526	1867.830		31.696	0.535	WF
54	1900.393	1866.204		34.189	0.535	WF
55	1899.026	1868.599		30.427	0.535	WF
56	1905.341	1879.300		26.041	0.000	

--- LineData ---

Node ST	Node EN	D (mm)	L (m)	Coef C	Q (l/s)	V (m/s)	I (‰)	HL (m)	P (m)
19	27	50.0	303.199	110	0.897	0.457	8.728	2.646	0.000
20	21	80.0	261.639	110	2.787	0.555	7.223	1.890	0.000
20	32	40.0	222.294	110	0.115	0.091	0.573	0.127	0.000
21	22	80.0	204.163	110	2.728	0.543	6.944	1.418	0.000
21	33	50.0	129.327	110	0.059	0.030	0.056	0.007	0.000
22	23	80.0	63.126	110	2.676	0.533	6.700	0.423	0.000
23	24	40.0	464.151	110	0.000	0.000	0.000	0.000	0.000
23	34	80.0	38.208	110	2.676	0.533	6.700	0.256	0.000
25	26	40.0	37.965	110	0.000	0.000	0.000	0.000	0.000
27	28	50.0	114.746	110	0.362	0.184	1.625	0.186	0.000
27	31	40.0	493.119	110	0.535	0.426	9.944	4.903	0.000
28	29	40.0	125.131	110	0.476	0.379	8.016	1.003	0.000
28	30	40.0	130.223	110	0.000	0.000	0.000	0.000	0.000
34	35	80.0	13.664	110	2.141	0.426	4.433	0.061	0.000
34	37	65.0	402.668	110	0.535	0.161	0.935	0.376	0.000
35	36	50.0	777.601	110	0.535	0.273	3.354	2.608	0.000
35	40	50.0	213.887	110	1.606	0.818	25.680	5.493	0.000
37	38	40.0	182.455	110	0.535	0.426	9.944	1.814	0.000
38	39	40.0	78.437	110	0.535	0.426	9.944	0.780	0.000
40	41	40.0	548.221	110	0.536	0.427	9.978	5.470	0.000
40	43	40.0	6.300	110	0.535	0.426	9.944	0.063	0.000
40	44	40.0	315.732	110	0.535	0.426	9.944	3.140	0.000
41	42	40.0	146.947	110	0.536	0.427	9.978	1.466	0.000
45	46	40.0	362.364	110	0.535	0.426	9.943	3.603	0.000
45	47	40.0	7.785	110	1.070	0.852	35.878	0.279	0.000
47	48	40.0	227.992	110	0.535	0.426	9.943	2.267	0.000
47	49	40.0	9.601	110	0.535	0.426	9.940	0.095	0.000
50	51	40.0	135.164	110	0.535	0.426	9.943	1.344	0.000
50	53	50.0	7.577	110	0.535	0.273	3.354	0.025	0.000
51	52	40.0	192.803	110	0.535	0.426	9.943	1.917	0.000
29	33	40.0	94.730	110	0.476	0.379	8.016	0.759	0.000
28	32	40.0	13.200	110	-0.115	-0.091	-0.573	-0.008	0.000
16	19	40.0	32.050	110	0.622	0.495	13.131	0.421	0.000
13	56	40.0	34.710	110	0.253	0.202	2.492	0.086	0.000
56	17	50.0	263.334	110	0.535	0.273	3.354	0.883	0.000

Kela Pipe Networks

------Kela <<Hazen-Williams Formula>>------

Tank	1	Maximum EHP	45.768	(m)
Node	70	Minimum EHP	0.000	(m)
Line	76	Maximum I	39.838	(‰)
Pump,Decom	1	Maximum V	0.901	(m/s)
Convergence Gap				(cm)
Calculation	15			(times)

<< Explanatory Notes >>

- Node -
HP: Head Pressure
GL: Ground Level
EHP: Effectual Head Pressure
Qc: Consumption of Water

- Line -
D: Diameter
L: Length of Pipe
Coef: Friction Coefficient
Q: Quantity of Flow
V: Velocity of Flow
I: Hydraulic Gradient
HL: Head Loss
P: Add Pressure

--- NodeData ---

Node	HP (m)	GL (m)	EHP 1st(m)	EHP 2nd(m)	Qc (l/s)	Remarks
1	2033.481	2033.481		0.000	-5.055	Reservoir Tank
2	1965.040	1948.611		16.429	0.000	
3	1963.632	1939.003		24.629	0.000	
4	1961.979	1934.691		27.288	0.000	
5	1961.114	1931.676		29.438	0.000	
6	1960.473	1929.715		30.758	0.000	
7	1959.924	1927.879		32.045	0.000	
8	1958.739	1921.506		37.233	0.000	
9	1958.319	1920.697		37.622	0.000	
10	1957.427	1919.230		38.197	0.000	
11	1957.301	1919.382		37.919	0.000	
12	1954.764	1920.142		34.622	0.000	
13	1953.589	1917.509		36.080	0.000	
14	1950.542	1910.984		39.558	0.000	
15	1949.916	1904.148		45.768	0.245	WF
16	1964.999	1947.839		17.160	0.245	WF
17	1959.059	1938.153		20.906	0.000	
18	1957.258	1933.940		23.318	0.000	
19	1957.249	1933.795		23.454	0.000	
20	1957.249	1930.478		26.771	0.000	
21	1958.753	1932.350		26.403	0.245	WF
22	1957.245	1933.940		23.305	0.245	WF
23	1961.721	1935.409		26.312	0.245	WF
24	1961.114	1932.389		28.725	0.000	
25	1960.862	1931.725		29.137	0.245	WF

--- LineData ---

Node ST	Node EN	D (mm)	L (m)	Coef C	Q (l/s)	V (m/s)	I (‰)	HL (m)	P (m)
1	101	100	343.295	110	5.055	0.644	7.339	2.520	-63.296
2	3	100	210.221	110	4.810	0.613	6.694	1.407	0.000
2	16	40	17.325	110	0.245	0.195	2.341	0.041	0.000
3	4	80	111.520	110	4.110	0.818	14.830	1.654	0.000
3	17	40	279.276	110	0.700	0.558	16.375	4.573	0.000
4	5	80	65.349	110	3.865	0.769	13.234	0.865	0.000
4	23	40	109.816	110	0.245	0.195	2.341	0.257	0.000
5	6	80	54.666	110	3.620	0.720	11.723	0.641	0.000
5	24	40	98.500	110	0.000	0.000	0.000	0.000	0.000
5	25	40	107.663	110	0.245	0.195	2.341	0.252	0.000
6	7	80	46.860	110	3.620	0.720	11.723	0.549	0.000
6	26	40	98.489	110	0.000	0.000	0.000	0.000	0.000
7	8	80	171.332	110	2.722	0.542	6.915	1.185	0.000
7	27	40	96.172	110	0.318	0.253	3.801	0.366	0.000
7	33	40	92.568	110	0.579	0.461	11.527	1.067	0.000
8	9	80	60.660	110	2.722	0.542	6.915	0.419	0.000
8	49	40	82.427	110	0.000	0.000	0.000	0.000	0.000
9	10	80	122.894	110	2.795	0.556	7.263	0.893	0.000
9	70	40	197.500	110	-0.073	-0.058	-0.251	-0.049	0.000
10	11	80	23.660	110	2.360	0.470	5.309	0.126	0.000
10	51	40	206.970	110	0.435	0.346	6.783	1.404	0.000
11	12	40	82.703	110	0.983	0.783	30.676	2.537	0.000
11	58	50	145.391	110	1.377	0.702	19.314	2.808	0.000
12	13	40	65.294	110	0.737	0.587	17.995	1.175	0.000
12	65	40	115.933	110	0.246	0.196	2.359	0.273	0.000

--- NodeData ---

Node	HP (m)	GL (m)	EHP 1st(m)	EHP 2nd(m)	Qc (l/s)	Remarks
26	1960.473	1930.360		30.113	0.000	
27	1959.558	1928.000		31.558	0.000	
28	1959.452	1927.934		31.518	0.000	
29	1958.779	1923.150		35.629	0.000	
30	1958.582	1921.437		37.145	0.000	
31	1959.514	1923.394		36.120	0.000	
32	1959.493	1923.846		35.647	0.000	
33	1958.857	1927.851		31.006	0.000	
34	1957.755	1927.888		29.867	0.000	
35	1957.369	1928.381		28.988	0.000	
36	1956.956	1927.710		29.246	0.000	
37	1957.045	1929.157		27.888	0.000	
38	1957.045	1929.063		27.982	0.000	
39	1958.857	1922.723		36.134	0.000	
40	1957.755	1922.963		34.792	0.000	
41	1957.348	1928.381		28.967	0.245	WF
42	1956.028	1925.554		30.474	0.000	
43	1955.538	1925.545		29.993	0.000	
44	1955.413	1925.256		30.157	0.000	
45	1954.354	1926.058		28.296	0.000	
46	1954.278	1923.551		30.727	0.000	
47	1955.395	1925.554		29.841	0.245	WF
48	1954.286	1927.010		27.276	0.245	WF
49	1958.739	1921.905		36.834	0.000	
50	1957.549	1918.461		39.088	0.245	PS
51	1956.023	1920.945		35.078	0.000	
52	1955.600	1921.917		33.683	0.000	
53	1954.243	1922.430		31.813	0.000	
54	1952.914	1923.896		29.018	0.000	
55	1952.914	1920.546		32.368	0.000	
56	1953.426	1914.149		39.277	0.245	WF
57	1952.801	1921.601		31.200	0.245	WF
58	1954.493	1920.240		34.253	0.000	
59	1934.161	1918.427		15.734	0.057	HC
60	1933.900	1918.427		15.473	0.000	
61	1933.432	1915.083		18.349	0.245	WF
62	1954.478	1919.523		34.955	0.245	WF
63	1934.148	1917.143		17.005	0.245	WF
64	1929.415	1909.205		20.210	0.585	WF, SS
65	1954.491	1919.576		34.915	0.000	
66	1954.491	1921.720		32.771	0.000	

--- LineData ---

Node ST	Node EN	D (mm)	L (m)	Coef C	Q (l/s)	V (m/s)	I (‰)	HL (m)	P (m)
13	14	40	359.190	110	0.491	0.391	8.482	3.047	0.000
13	68	40	571.453	110	0.246	0.196	2.359	1.348	0.000
14	15	40	267.493	110	0.245	0.195	2.341	0.626	0.000
14	69	40	245.917	110	0.246	0.196	2.359	0.580	0.000
17	18	40	244.116	110	0.455	0.363	7.379	1.801	0.000
17	21	40	130.855	110	0.245	0.195	2.341	0.306	0.000
18	19	40	5.072	110	0.210	0.168	1.766	0.009	0.000
18	22	40	5.679	110	0.245	0.195	2.341	0.013	0.000
19	20	40	136.507	110	0.000	0.000	0.000	0.000	0.000
19	37	40	115.628	110	0.210	0.168	1.766	0.204	0.000
27	28	40	53.117	110	0.224	0.179	1.990	0.106	0.000
27	31	40	110.228	110	0.094	0.075	0.396	0.044	0.000
28	29	40	177.006	110	0.318	0.253	3.801	0.673	0.000
28	32	40	102.017	110	-0.094	-0.075	-0.396	-0.040	0.000
29	30	40	51.827	110	0.318	0.253	3.801	0.197	0.000
31	32	40	54.418	110	0.094	0.075	0.396	0.022	0.000
33	34	40	95.542	110	0.579	0.461	11.527	1.101	0.000
33	39	40	146.024	110	0.000	0.000	0.000	0.000	0.000
34	35	40	33.543	110	0.579	0.461	11.527	0.387	0.000
34	40	40	136.666	110	0.000	0.000	0.000	0.000	0.000
35	36	40	98.991	110	0.334	0.266	4.166	0.412	0.000
35	41	40	8.815	110	0.245	0.195	2.341	0.021	0.000
36	37	40	50.163	110	-0.210	-0.168	-1.766	-0.089	0.000
36	42	40	90.239	110	0.545	0.434	10.285	0.928	0.000
37	38	40	138.678	110	0.000	0.000	0.000	0.000	0.000
42	43	40	52.927	110	0.515	0.410	9.269	0.491	0.000
42	51	40	113.817	110	0.030	0.024	0.047	0.005	0.000
43	44	40	9.301	110	0.628	0.500	13.384	0.124	0.000
43	52	40	110.842	110	-0.113	-0.090	-0.559	-0.062	0.000
44	45	40	197.707	110	0.383	0.305	5.357	1.059	0.000
44	47	40	7.621	110	0.245	0.195	2.341	0.018	0.000
45	46	40	94.286	110	0.138	0.110	0.810	0.076	0.000
45	48	40	29.162	110	0.245	0.195	2.341	0.068	0.000
51	52	40	55.214	110	0.465	0.370	7.667	0.423	0.000
52	53	40	296.448	110	0.352	0.280	4.577	1.357	0.000
53	54	40	567.522	110	0.245	0.195	2.341	1.329	0.000
53	56	40	348.657	110	0.245	0.195	2.341	0.816	0.000
54	55	40	165.147	110	0.000	0.000	0.000	0.000	0.000
54	57	40	48.292	110	0.245	0.195	2.341	0.113	0.000
58	59	40	510.374	110	1.132	0.901	39.838	20.332	0.000
58	62	40	6.427	110	0.245	0.195	2.341	0.015	0.000

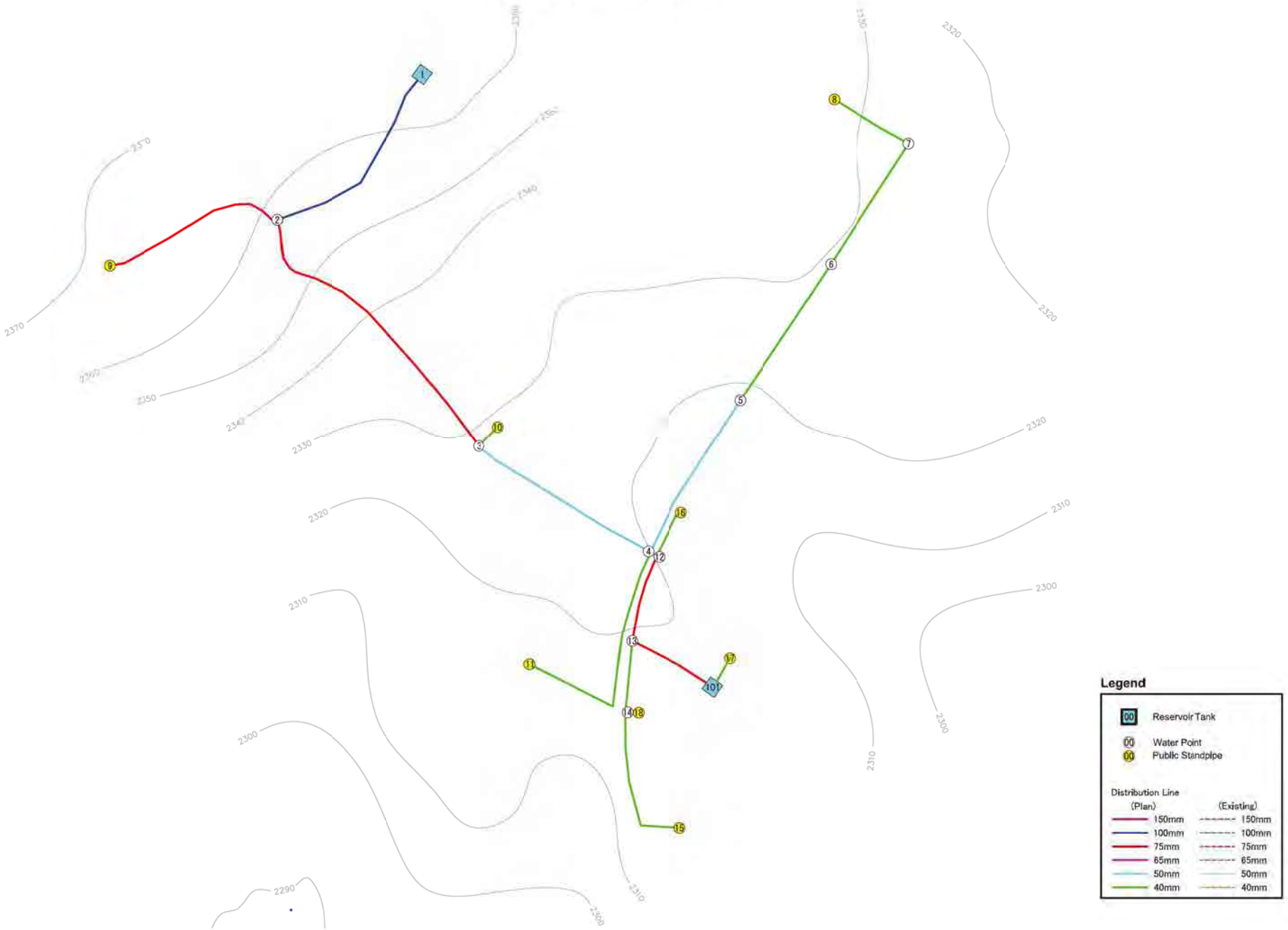
--- NodeData ---

Node	HP (m)	GL (m)	EHP 1st(m)	EHP 2nd(m)	Qc (l/s)	Remarks
67	1953.804	1915.690		38.114	0.246	WF
68	1952.241	1912.444		39.797	0.246	WF
69	1949.962	1906.120		43.842	0.246	WF
101	1967.665	1967.665	63.296	0.000	0.000	BPT
70	1958.369	1920.520		37.849	0.000	

--- LineData ---

Node ST	Node EN	D (mm)	L (m)	Coef C	Q (l/s)	V (m/s)	I (‰)	HL (m)	P (m)
59	60	40	11.632	110	0.830	0.661	22.421	0.261	0.000
59	63	40	5.560	110	0.245	0.195	2.341	0.013	0.000
60	61	40	200.019	110	0.245	0.195	2.341	0.468	0.000
60	64	40	382.306	110	0.585	0.466	11.733	4.485	0.000
65	66	40	198.090	110	0.000	0.000	0.000	0.000	0.000
65	67	40	291.038	110	0.246	0.196	2.359	0.687	0.000
101	2	100	357.760	110	5.055	0.644	7.340	2.626	0.000
46	53	40	43.300	110	0.138	0.110	0.810	0.035	0.000
30	70	40	56.200	110	0.318	0.253	3.801	0.214	0.000
70	50	40	350.370	110	0.245	0.195	2.341	0.820	0.000

Tiya Pipe Networks



------Tiya <<Hazen-Williams Formula>>------

Tank	2	Maximum EHP	54.503	(m)
Node	17	Minimum EHP	5.404	(m)
Line	18	Maximum I	16.359	(‰)
Pump,Decom	0	Maximum V	0.557	(m/s)

Convergence Gap (cm)

Calculation 12 (times)

<< Explanatory Notes >>

- Node -
HP: Head Pressure
GL: Ground Level
EHP: Effectual Head Pressure
Qc: Consumption of Water

- Line -
D: Diameter
L: Length of Pipe
Coef: Friction Coefficient
Q: Quantity of Flow
V: Velocity of Flow
I: Hydraulic Gradient
HL: Head Loss
P: Add Pressure

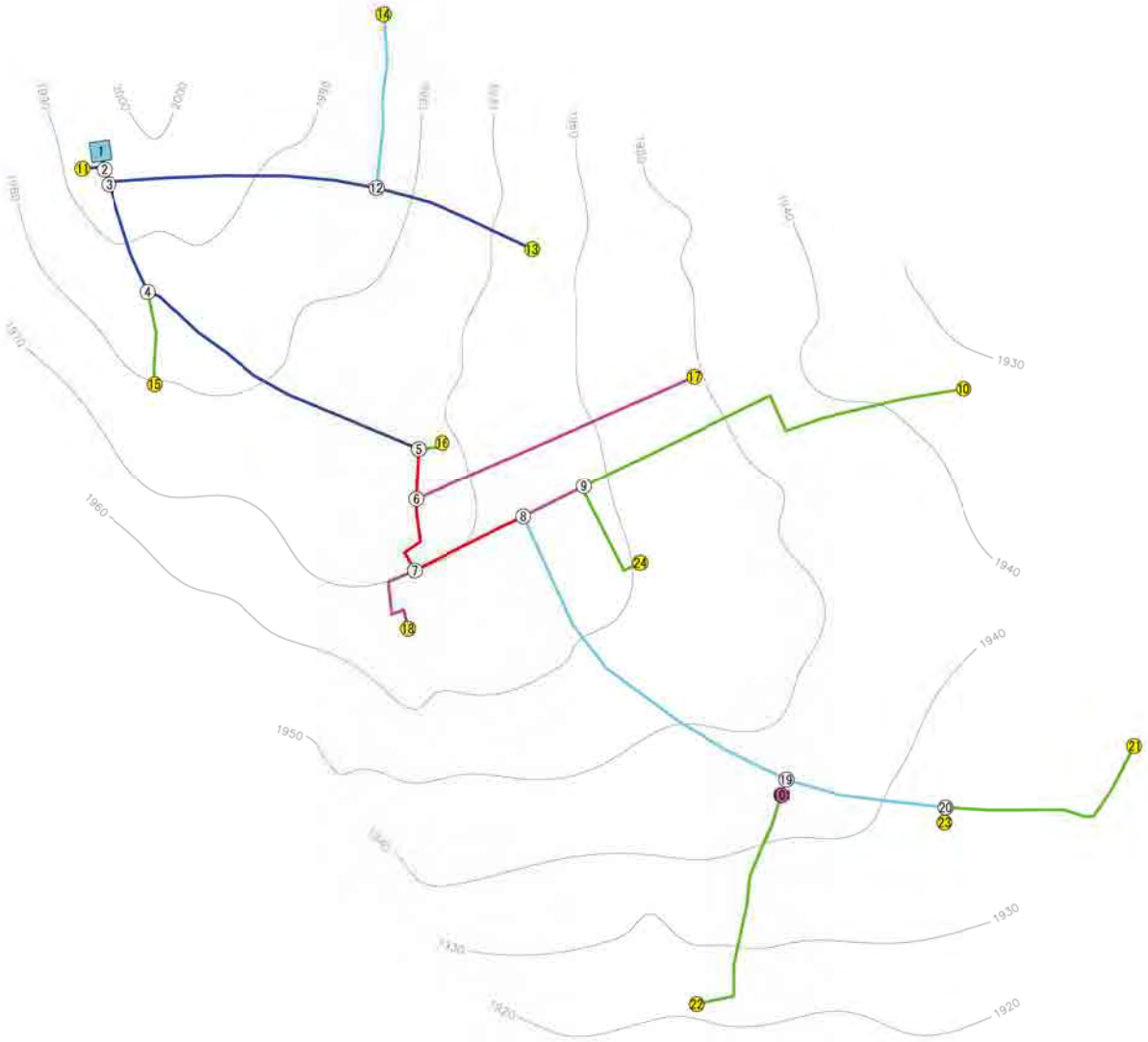
--- NodeData ---

Node	HP (m)	GL (m)	EHP 1st(m)	EHP 2nd(m)	Qc (l/s)	Remarks
1	2374.912	2364.912		10.000	-1.582	Reservoir Tank
101	2330.000	2320.000		10.000	-1.400	Reservoir Tank
2	2374.579	2358.950		15.629	0.000	
3	2373.655	2329.119		44.536	0.000	
4	2370.670	2320.726		49.944	0.000	
5	2369.677	2319.155		50.522	0.159	PS
6	2368.323	2328.945		39.378	0.000	
7	2367.138	2325.923		41.215	0.000	
8	2366.424	2332.844		33.580	0.349	WF
9	2374.525	2369.121		5.404	0.350	WF
10	2373.399	2329.274		44.125	0.374	HC, WF
11	2368.566	2314.063		54.503	0.350	WF
12	2329.744	2319.523		10.221	0.000	
13	2329.770	2320.552		9.218	0.000	
14	2327.567	2315.470		12.097	0.000	
15	2326.290	2314.275		12.015	0.350	WF
16	2329.304	2316.806		12.498	0.350	WF
17	2329.719	2318.590		11.129	0.350	WF
18	2327.539	2315.341		12.198	0.350	WF

--- LineData ---

Node ST	Node EN	D (mm)	L (m)	Coef C	Q (l/s)	V (m/s)	I (‰)	HL (m)	P (m)
1	2	100	390.441	110	1.582	0.202	0.854	0.333	0.000
2	3	80	579.635	110	1.232	0.245	1.594	0.924	0.000
2	9	80	347.633	110	0.350	0.070	0.155	0.054	0.000
3	4	50	371.019	110	0.858	0.437	8.044	2.984	0.000
3	10	40	49.930	110	0.374	0.298	5.124	0.256	0.000
4	5	50	325.848	110	0.508	0.259	3.047	0.993	0.000
4	11	40	464.270	110	0.350	0.279	4.532	2.104	0.000
4	12	50	13.176	110	+++++	+++++	+++++	+++++	+++++
5	6	40	300.499	110	0.349	0.278	4.509	1.355	0.000
6	7	40	262.755	110	0.349	0.278	4.508	1.185	0.000
7	8	40	158.304	110	0.349	0.278	4.509	0.714	0.000
12	13	80	162.770	110	-0.350	-0.070	-0.155	-0.025	0.000
12	16	40	97.124	110	0.350	0.279	4.533	0.440	0.000
13	14	40	134.640	110	0.700	0.557	16.359	2.203	0.000
13	101	80	194.340	110	-1.050	-0.209	-1.185	-0.230	0.000
14	15	40	281.725	110	0.350	0.279	4.532	1.277	0.000
14	18	40	6.277	110	0.350	0.279	4.532	0.028	0.000
17	101	40	62.000	110	-0.350	-0.279	-4.533	-0.281	0.000

Adilo Pipe Networks



Legend

- Reservoir Tank
- Water Point
- Public Standpipe
- Break Pressure

Distribution Line

(Plan)	(Existing)
100mm	100mm
75mm	75mm
65mm	65mm
50mm	50mm
40mm	40mm

------Adilo <<Hazen-Williams Formula>>------

Tank	1	Maximum EHP	37.280	(m)
Node	24	Minimum EHP	0.000	(m)
Line	24	Maximum I	26.908	(‰)
Pump,Decom	1	Maximum V	0.914	(m/s)

Convergence Gap (cm)

Calculation 13 (times)

<< Explanatory Notes >>

- Node -
HP: Head Pressure
GL: Ground Level
EHP: Effectual Head Pressure
Qc: Consumption of Water

- Line -
D: Diameter
L: Length of Pipe
Coef: Friction Coefficient
Q: Quantity of Flow
V: Velocity of Flow
I: Hydraulic Gradient
HL: Head Loss
P: Add Pressure

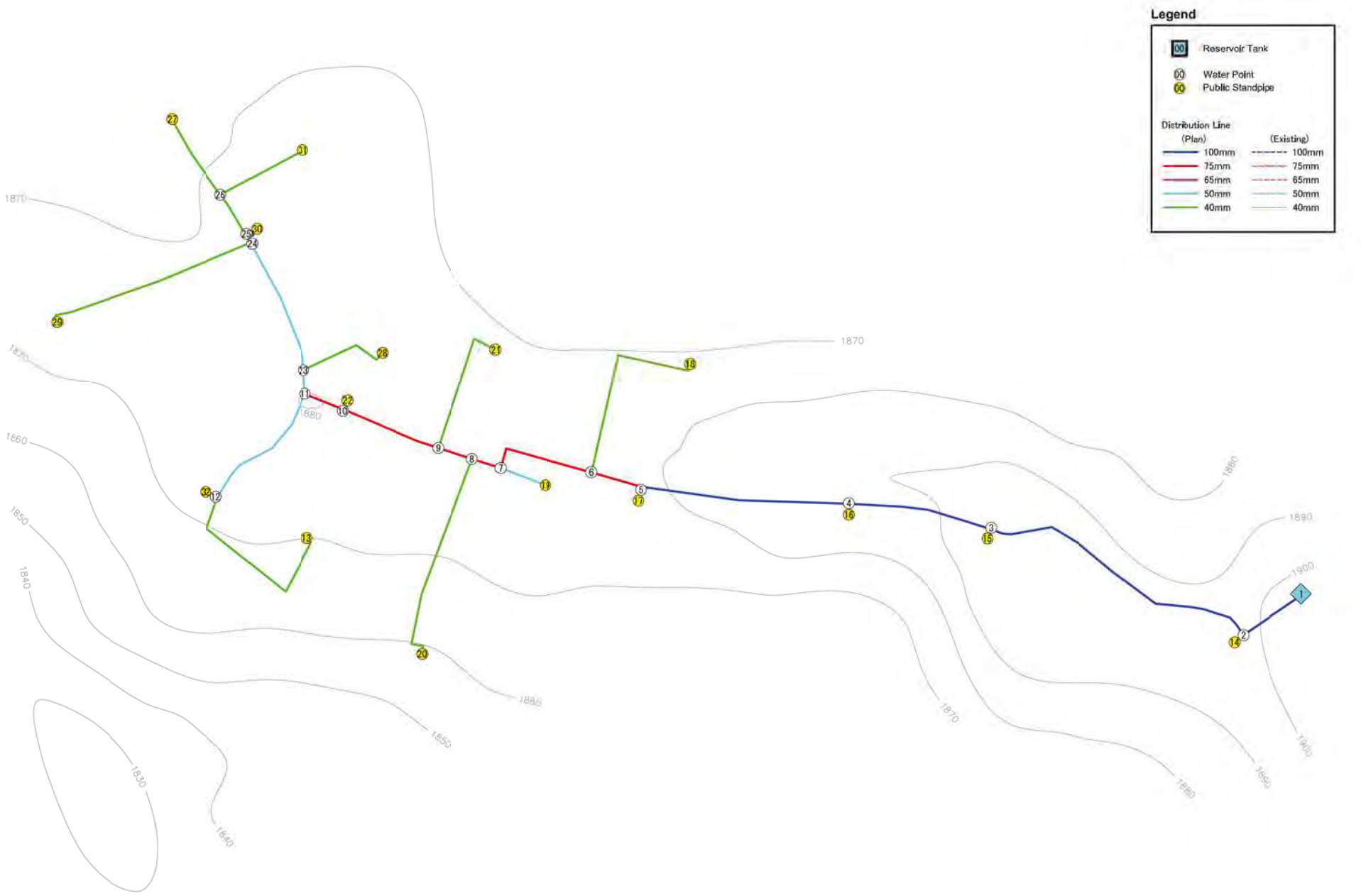
--- NodeData ---

Node	HP (m)	GL (m)	EHP 1st(m)	EHP 2nd(m)	Qc (l/s)	Remarks
1	1995.660	1995.660		0.000	-7.175	Reservoir Tank
2	1995.450	1995.123		0.327	0.000	
3	1995.066	1993.448		1.618	0.218	SS
4	1993.172	1986.799		5.373	0.000	
5	1989.001	1972.582		16.419	0.000	
6	1987.417	1973.733		13.684	0.000	
7	1985.412	1970.723		14.689	0.340	PS
8	1983.652	1967.145		16.507	0.000	
9	1983.133	1962.950		20.183	0.045	HC
10	1974.212	1936.932		37.280	0.547	WF
11	1995.445	1993.855		1.590	0.547	WF
12	1994.833	1983.879		10.954	0.000	
13	1994.793	1964.576		30.217	0.547	WF
14	1993.610	1985.600		8.010	0.547	WF
15	1991.232	1979.393		11.839	0.547	WF
16	1988.464	1971.266		17.198	0.547	WF
17	1986.824	1951.391		35.433	0.547	WF
18	1985.229	1965.878		19.351	0.547	WF
19	1962.784	1944.171		18.613	0.000	
20	1958.642	1936.631		22.011	0.000	
21	1953.831	1932.992		20.839	0.549	WF
22	1938.655	1920.724		17.931	0.549	WF
23	1958.588	1937.036		21.552	0.549	WF
24	1980.793	1959.939		20.854	0.549	WF
101	1944.171	1944.171	18.613	-0.000	0.000	

--- LineData ---

Node ST	Node EN	D (mm)	L (m)	Coef C	Q (l/s)	V (m/s)	I (‰)	HL (m)	P (m)
1	2	100	14.989	110	7.175	0.914	14.039	0.210	0.000
2	3	100	31.623	110	6.628	0.844	12.122	0.383	0.000
2	11	100	36.077	110	0.547	0.070	0.119	0.004	0.000
3	4	100	235.094	110	5.316	0.677	8.057	1.894	0.000
3	12	100	539.939	110	1.094	0.139	0.431	0.233	0.000
4	5	100	633.009	110	4.769	0.608	6.589	4.171	0.000
4	15	40	187.221	110	0.547	0.436	10.361	1.940	0.000
5	6	80	101.589	110	4.222	0.840	15.589	1.584	0.000
5	16	40	51.803	110	0.547	0.436	10.361	0.537	0.000
6	7	80	166.330	110	3.675	0.731	12.057	2.005	0.000
6	17	65	609.368	110	0.547	0.165	0.974	0.593	0.000
7	8	80	243.480	110	2.788	0.555	7.229	1.760	0.000
7	18	65	187.393	110	0.547	0.165	0.974	0.182	0.000
8	9	65	136.459	110	1.141	0.344	3.800	0.519	0.000
8	19	50	775.519	110	1.647	0.839	26.908	20.868	0.000
9	10	40	861.068	110	0.547	0.436	10.361	8.921	0.000
9	24	40	224.348	110	0.549	0.437	10.431	2.340	0.000
12	13	100	336.413	110	0.547	0.070	0.120	0.040	0.000
12	14	50	350.090	110	0.547	0.279	3.495	1.223	0.000
19	20	50	326.115	110	1.098	0.559	12.700	4.142	0.000
101	22	40	528.746	110	0.549	0.437	10.431	5.516	0.000
20	21	40	461.222	110	0.549	0.437	10.431	4.811	0.000
20	23	40	5.143	110	0.549	0.437	10.432	0.054	0.000
19	101	40	0.010	110	0.549	0.437	10.436	0.000	-18.613

Teferi Kela Pipe Networks



------Teferi Kela <<Case.2 : Hazen-Williams Formula>>------

Tank	1	Maximum EHP	40.023	(m)
Node	31	Minimum EHP	9.246	(m)
Line	31	Maximum I	24.939	(‰)
Pump,Decom	0	Maximum V	0.803	(m/s)
Convergence Gap				(cm)
Calculation	13			(times)

<< Explanatory Notes >>

- Node -
HP: Head Pressure
GL: Ground Level
EHP: Effectual Head Pressure
Qc: Consumption of Water

- Line -
D: Diameter
L: Length of Pipe
Coef: Friction Coefficient
Q: Quantity of Flow
V: Velocity of Flow
I: Hydraulic Gradient
HL: Head Loss
P: Add Pressure

--- NodeData ---

Node	HP (m)	GL (m)	EHP 1st(m)	EHP 2nd(m)	Qc (l/s)	Remarks
1	1910.320	1906.320		4.000	-5.158	Reservoir Tank
2	1909.535	1894.606		14.929	0.000	
3	1906.383	1897.137		9.246	0.000	
4	1904.980	1883.041		21.939	0.000	
5	1903.155	1879.119		24.036	0.000	
6	1901.993	1875.998		25.995	0.000	
7	1899.822	1875.025		24.797	0.000	
8	1899.309	1875.119		24.190	0.000	
9	1898.790	1875.721		23.069	0.000	
10	1897.777	1878.856		18.921	0.000	
11	1897.448	1880.076		17.372	0.000	
12	1895.696	1874.242		21.454	0.289	PS
13	1894.788	1869.755		25.033	0.280	WF
14	1909.525	1893.912		15.613	0.280	WF
15	1906.352	1897.024		9.328	0.280	WF
16	1904.932	1881.521		23.411	0.281	WF
17	1903.135	1879.242		23.893	0.281	WF
18	1901.056	1874.315		26.741	0.281	WF
19	1899.594	1876.166		23.428	0.281	WF
20	1898.289	1858.266		40.023	0.281	WF
21	1895.949	1870.395		25.554	0.621	WF, SS
22	1897.747	1879.255		18.492	0.281	WF
23	1896.630	1880.192		16.438	0.000	
24	1893.533	1877.210		16.323	0.000	
25	1893.226	1876.525		16.701	0.000	

--- LineData ---

Node ST	Node EN	D (mm)	L (m)	Coef C	Q (l/s)	V (m/s)	I (‰)	HL (m)	P (m)
1	2	100	102.978	110	5.158	0.657	7.620	0.785	0.000
2	3	100	458.814	110	4.878	0.621	6.871	3.152	0.000
2	14	40	3.406	110	0.280	0.223	2.998	0.010	0.000
3	4	100	227.860	110	4.598	0.586	6.159	1.403	0.000
3	15	40	10.323	110	0.280	0.223	2.998	0.031	0.000
4	5	100	332.919	110	4.317	0.550	5.480	1.824	0.000
4	16	40	15.775	110	0.281	0.224	3.018	0.048	0.000
5	6	80	81.022	110	4.036	0.803	14.342	1.162	0.000
5	17	40	6.642	110	0.281	0.224	3.018	0.020	0.000
6	7	80	173.090	110	3.755	0.747	12.547	2.172	0.000
6	18	40	310.555	110	0.281	0.224	3.018	0.937	0.000
7	8	80	47.188	110	3.474	0.691	10.863	0.513	0.000
7	19	40	75.442	110	0.281	0.224	3.018	0.228	0.000
8	9	80	55.860	110	3.193	0.636	9.293	0.519	0.000
8	20	40	337.855	110	0.281	0.224	3.018	1.020	0.000
9	10	80	162.712	110	2.572	0.512	6.226	1.013	0.000
9	21	40	216.773	110	0.621	0.494	13.105	2.841	0.000
10	11	80	65.413	110	2.291	0.456	5.026	0.329	0.000
10	22	40	10.039	110	0.281	0.224	3.018	0.030	0.000
11	12	50	221.607	110	0.850	0.433	7.905	1.752	0.000
11	23	50	38.925	110	1.441	0.734	21.008	0.818	0.000
12	13	40	303.023	110	0.280	0.223	2.998	0.908	0.000
12	32	40	1.015	110	0.281	0.224	3.018	0.003	0.000
23	24	50	220.320	110	1.160	0.591	14.059	3.098	0.000
23	28	40	142.932	110	0.281	0.224	3.018	0.431	0.000

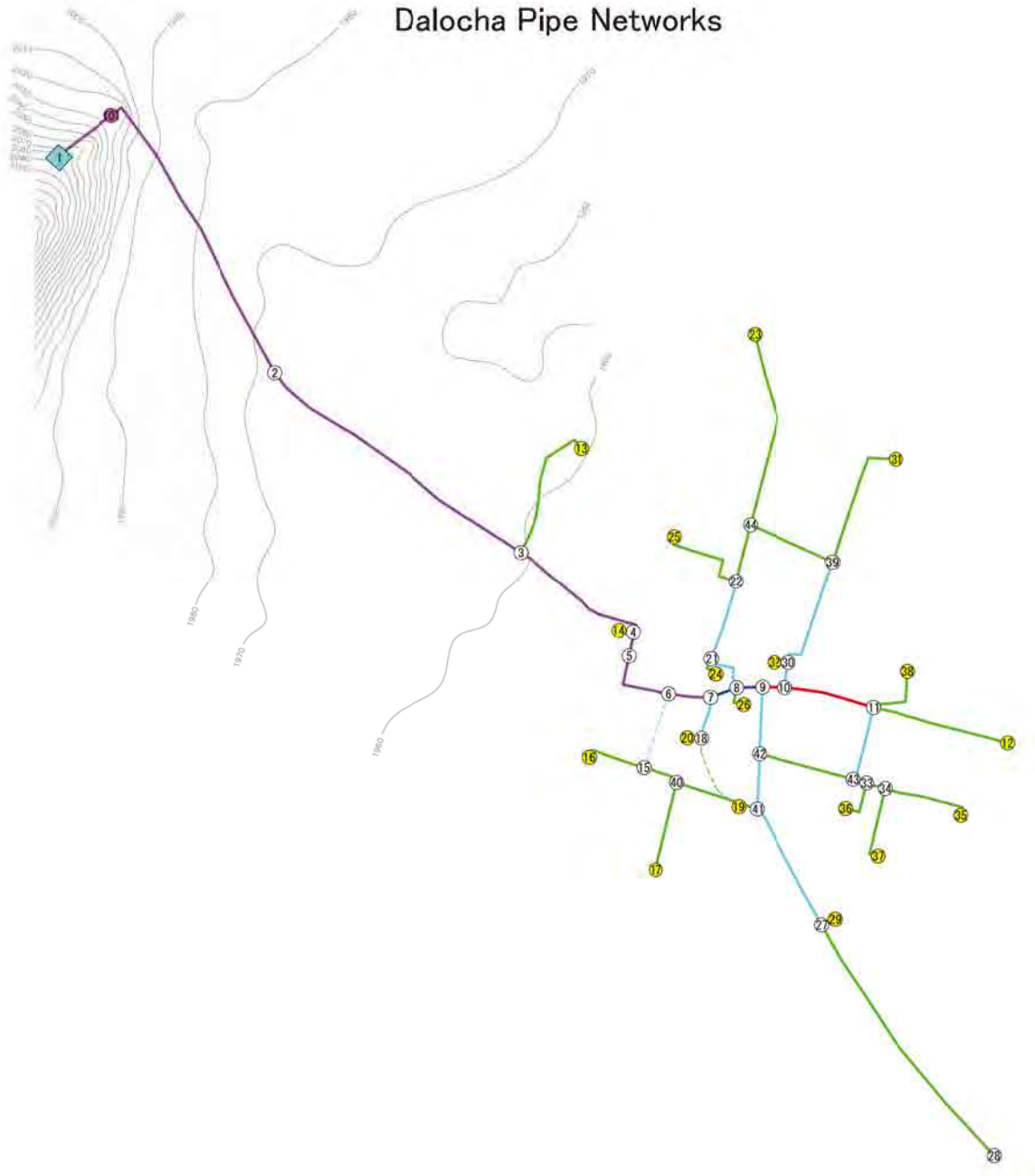
--- NodeData ---

Node	HP (m)	GL (m)	EHP 1st(m)	EHP 2nd(m)	Qc (l/s)	Remarks
26	1892.280	1872.950		19.330	0.036	HC
27	1891.854	1863.362		28.492	0.281	WF
28	1896.199	1877.847		18.352	0.281	WF
29	1892.519	1872.834		19.685	0.281	WF
30	1893.215	1876.489		16.726	0.281	WF
31	1891.835	1877.421		14.414	0.281	WF
32	1895.693	1874.523		21.170	0.281	WF

--- LineData ---

Node ST	Node EN	D (mm)	L (m)	Coef C	Q (l/s)	V (m/s)	I (‰)	HL (m)	P (m)
24	25	40	12.300	110	0.879	0.700	24.939	0.307	0.000
24	29	40	335.896	110	0.281	0.224	3.018	1.014	0.000
25	26	40	77.446	110	0.598	0.476	12.221	0.946	0.000
25	30	40	3.804	110	0.281	0.224	3.018	0.011	0.000
26	27	40	141.129	110	0.281	0.224	3.018	0.426	0.000
26	31	40	147.318	110	0.281	0.224	3.018	0.445	0.000

Dalocha Pipe Networks



Legend

- Reservoir Tank
- Water Point
- Public Standpipe
- Break Pressure

Distribution Line

(Plan)	(Existing)
150mm	150mm
100mm	100mm
75mm	75mm
65mm	65mm
50mm	50mm
40mm	40mm

------Dalocha <<Hazen-Williams Formula>>------

Tank	1	Maximum EHP	57.060	(m)
Node	44	Minimum EHP	0.000	(m)
Line	48	Maximum I	70.866	(‰)
Pump,Decom	1	Maximum V	1.230	(m/s)

Convergence Gap (cm)

Calculation 14 (times)

<< Explanatory Notes >>

- Node -
HP: Head Pressure
GL: Ground Level
EHP: Effectual Head Pressure
Qc: Consumption of Water

- Line -
D: Diameter
L: Length of Pipe
Coef: Friction Coefficient
Q: Quantity of Flow
V: Velocity of Flow
I: Hydraulic Gradient
HL: Head Loss
P: Add Pressure

--- NodeData ---

Node	HP (m)	GL (m)	EHP 1st(m)	EHP 2nd(m)	Qc (l/s)	Remarks
1	2074.150	2074.150		0.000	-10.340	Reservoir Tank
2	2011.566	1954.506		57.060	0.000	
3	2007.224	1959.680		47.544	0.000	
4	2005.381	1961.978		43.403	0.000	
5	2005.068	1963.532		41.536	0.000	
6	2004.171	1964.740		39.431	0.000	
7	2003.788	1963.941		39.847	0.000	
8	2002.395	1963.366		39.029	0.000	
9	2001.705	1963.636		38.069	0.000	
10	2000.578	1963.271		37.307	0.000	
11	1998.989	1964.748		34.241	0.119	HC
12	1994.224	1965.700		28.524	0.515	WF
13	2002.434	1959.427		43.007	0.515	WF
14	2005.224	1961.978		43.246	0.515	WF
15	2000.229	1966.988		33.241	0.000	
16	1998.317	1966.448		31.869	0.515	WF
17	1995.191	1965.588		29.603	0.515	WF
18	2001.835	1966.753		35.082	0.000	
19	1998.136	1967.018		31.118	0.515	WF
20	2001.777	1966.416		35.361	0.515	WF
21	1998.288	1962.708		35.580	0.000	
22	1994.493	1964.382		30.111	0.000	
23	1985.486	1969.210		16.276	0.515	WF
24	1997.864	1962.754		35.110	0.515	WF
25	1991.519	1963.988		27.531	0.515	WF

--- LineData ---

Node ST	Node EN	D (mm)	L (m)	Coef C	Q (l/s)	V (m/s)	I (‰)	HL (m)	P (m)
1	101	150	250.000	110	10.340	0.585	3.833	0.958	-57.064
2	3	150	1132.693	110	10.340	0.585	3.833	4.342	0.000
3	4	150	528.629	110	9.825	0.556	3.487	1.844	0.000
3	13	40	516.975	110	0.515	0.410	9.266	4.790	0.000
4	5	150	99.128	110	9.310	0.527	3.157	0.313	0.000
4	14	40	16.949	110	0.515	0.410	9.262	0.157	0.000
5	6	150	284.034	110	9.310	0.527	3.156	0.897	0.000
6	7	150	154.966	110	8.166	0.462	2.476	0.384	0.000
6	15	50	287.861	110	1.144	0.583	13.694	3.942	0.000
7	8	100	101.834	110	7.074	0.901	13.676	1.393	0.000
7	18	50	155.341	110	1.092	0.556	12.571	1.953	0.000
8	9	100	96.410	110	4.985	0.635	7.153	0.690	0.000
8	21	50	166.022	110	1.574	0.802	24.738	4.107	0.000
8	26	40	74.489	110	0.515	0.410	9.266	0.690	0.000
9	10	80	84.469	110	3.882	0.773	13.346	1.127	0.000
9	42	50	240.480	110	1.103	0.562	12.812	3.081	0.000
10	11	80	335.784	110	2.218	0.442	4.733	1.589	0.000
10	30	50	93.921	110	1.664	0.848	27.427	2.576	0.000
11	12	40	514.192	110	0.515	0.410	9.266	4.764	0.000
11	43	50	275.240	110	1.069	0.545	12.088	3.327	0.000
11	38	40	241.592	110	0.515	0.410	9.266	2.239	0.000
15	16	40	206.408	110	0.515	0.410	9.266	1.913	0.000
15	40	40	145.900	110	0.629	0.500	13.404	1.956	0.000
18	19	40	323.390	110	0.577	0.459	11.437	3.698	0.000
18	20	40	6.230	110	0.515	0.410	9.266	0.058	0.000

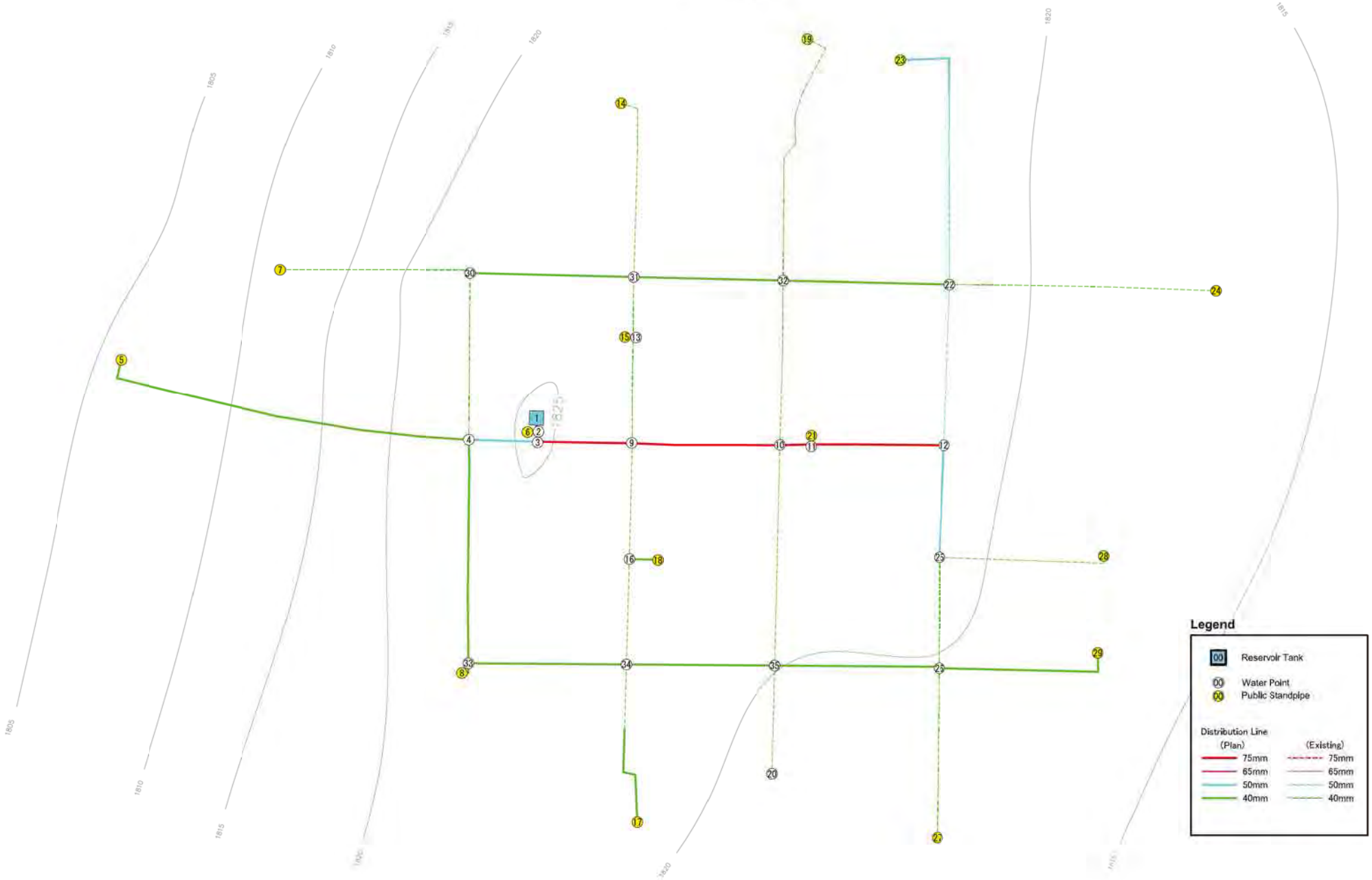
--- NodeData ---

Node	HP (m)	GL (m)	EHP 1st(m)	EHP 2nd(m)	Qc (l/s)	Remarks
26	2001.705	1964.676		37.029	0.515	WF
27	1993.916	1965.374		28.542	0.000	
28	1990.540	1960.212		30.328	0.288	SS
29	1993.769	1965.369		28.401	0.515	WF
30	1998.002	1962.358		35.644	0.000	
31	1987.200	1968.607		18.593	0.515	WF
32	1997.941	1962.450		35.491	0.515	WF
33	1992.549	1965.878		26.671	0.000	
34	1991.740	1965.616		26.124	0.000	
35	1988.955	1964.764		24.191	0.515	WF
36	1991.037	1966.494		24.543	0.515	WF
37	1989.202	1965.693		23.509	0.515	WF
38	1996.750	1963.866		32.884	0.515	WF
39	1991.941	1963.331		28.610	0.663	PS
101	2016.128	2016.128	57.064	0.000	0.000	BPT
40	1998.274	1966.782		31.492	0.000	
41	1998.050	1966.607		31.443	0.000	
42	1998.624	1966.720		31.904	0.000	
43	1995.662	1966.200		29.462	0.000	
44	1991.956	1966.870		25.086	0.000	

--- LineData ---

Node ST	Node EN	D (mm)	L (m)	Coef C	Q (l/s)	V (m/s)	I (‰)	HL (m)	P (m)
21	22	50	319.590	110	1.059	0.540	11.875	3.795	0.000
21	24	40	45.739	110	0.515	0.410	9.266	0.424	0.000
22	44	40	247.430	110	0.544	0.433	10.253	2.537	0.000
22	25	40	320.993	110	0.515	0.410	9.266	2.974	0.000
27	28	40	1068.942	110	0.288	0.229	3.158	3.376	0.000
27	29	40	15.806	110	0.515	0.410	9.266	0.146	0.000
30	39	50	438.749	110	1.149	0.586	13.815	6.061	0.000
30	32	40	6.560	110	0.515	0.410	9.266	0.061	0.000
33	34	50	71.717	110	1.030	0.525	11.281	0.809	0.000
33	36	40	163.254	110	0.515	0.410	9.266	1.513	0.000
34	35	40	300.564	110	0.515	0.410	9.266	2.785	0.000
34	37	40	273.978	110	0.515	0.410	9.266	2.539	0.000
39	31	40	511.581	110	0.515	0.410	9.266	4.740	0.000
101	2	150	1189.920	110	10.340	0.585	3.834	4.562	0.000
40	17	40	332.690	110	0.515	0.410	9.266	3.083	0.000
19	40	40	243.680	110	-0.114	-0.090	-0.564	-0.137	0.000
19	41	40	68.410	110	0.176	0.140	1.264	0.086	0.000
42	43	40	370.150	110	0.476	0.379	8.004	2.963	0.000
42	41	50	127.510	110	0.627	0.320	4.504	0.574	0.000
41	27	50	581.103	110	0.803	0.409	7.114	4.134	0.000
43	33	40	43.915	110	1.545	1.230	70.866	3.112	0.000
39	44	40	336.640	110	-0.029	-0.023	-0.045	-0.015	0.000
44	23	40	698.259	110	0.515	0.410	9.266	6.470	0.000

Mito Pipe Networks



------Mito <<Hazen-Williams Formula>>------

Tank	1	Maximum EHP	22.793	(m)
Node	34	Minimum EHP	5.619	(m)
Line	40	Maximum I	28.414	(‰)
Pump,Decom	0	Maximum V	1.162	(m/s)

Convergence Gap (cm)

Calculation 13 (times)

<< Explanatory Notes >>

- Node -
HP: Head Pressure
GL: Ground Level
EHP: Effectual Head Pressure
Qc: Consumption of Water

- Line -
D: Diameter
L: Length of Pipe
Coef: Friction Coefficient
Q: Quantity of Flow
V: Velocity of Flow
I: Hydraulic Gradient
HL: Head Loss
P: Add Pressure

--- NodeData ---

Node	HP (m)	GL (m)	EHP 1st(m)	EHP 2nd(m)	Qc (l/s)	Remarks
1	1834.996	1824.996		10.000	-5.838	Reservoir Tank
2	1834.772	1824.930		9.842	0.000	
3	1834.493	1824.947		9.546	0.000	
4	1832.938	1824.002		8.936	0.000	
5	1830.953	1808.160		22.793	0.357	WF
6	1834.745	1824.985		9.760	0.357	WF
7	1829.969	1812.037		17.932	0.357	WF
8	1830.646	1823.089		7.557	0.357	WF
9	1832.937	1824.626		8.311	0.000	
10	1831.797	1823.384		8.413	0.000	
11	1831.675	1822.668		9.007	0.000	
12	1831.314	1820.732		10.582	0.000	
13	1831.011	1825.099		5.912	0.000	
14	1829.767	1823.824		5.943	0.357	WF
15	1830.975	1825.155		5.820	0.358	WF
16	1830.990	1823.778		7.212	0.000	
17	1829.115	1821.691		7.424	0.460	WF, SS
18	1830.839	1823.701		7.138	0.358	WF
19	1829.131	1823.348		5.783	0.358	WF
20	1830.569	1820.740		9.829	0.041	HC
21	1831.640	1822.679		8.961	0.358	WF
22	1830.053	1821.300		8.753	0.000	
23	1828.401	1821.998		6.403	0.688	WF, PS
24	1828.643	1816.326		12.317	0.358	WF
25	1830.529	1820.634		9.895	0.000	

--- LineData ---

Node ST	Node EN	D (mm)	L (m)	Coef C	Q (l/s)	V (m/s)	I (‰)	HL (m)	P (m)
1	2	80	7.878	110	5.838	1.162	28.414	0.224	0.000
2	3	80	11.048	110	5.481	1.091	25.274	0.279	0.000
2	6	40	5.836	110	0.357	0.284	4.701	0.027	0.000
3	4	50	76.917	110	1.411	0.719	20.212	1.555	0.000
3	9	80	106.868	110	4.070	0.810	14.564	1.556	0.000
4	5	40	422.224	110	0.357	0.284	4.701	1.985	0.000
4	30	40	186.700	110	0.549	0.437	10.434	1.948	0.000
4	33	40	245.590	110	0.505	0.402	8.936	2.195	0.000
9	10	80	166.444	110	2.707	0.539	6.847	1.140	0.000
9	13	40	119.365	110	0.695	0.553	16.131	1.925	0.000
9	16	40	129.907	110	0.668	0.532	14.987	1.947	0.000
10	11	80	34.476	110	1.899	0.378	3.552	0.122	0.000
10	32	40	187.850	110	0.438	0.348	6.853	1.287	0.000
10	35	40	241.840	110	0.370	0.295	5.031	1.217	0.000
11	12	80	149.570	110	1.541	0.307	2.413	0.361	0.000
11	21	40	7.380	110	0.358	0.285	4.725	0.035	0.000
12	22	50	180.771	110	0.795	0.405	6.975	1.261	0.000
12	25	50	126.115	110	0.747	0.381	6.222	0.785	0.000
13	31	40	70.000	110	0.337	0.268	4.218	0.295	0.000
13	15	40	7.686	110	0.358	0.285	4.726	0.036	0.000
16	34	40	113.280	110	0.310	0.247	3.613	0.409	0.000
16	18	40	31.804	110	0.358	0.285	4.725	0.150	0.000
22	23	50	309.041	110	0.688	0.351	5.343	1.651	0.000
22	24	40	298.334	110	0.358	0.285	4.726	1.410	0.000
25	26	40	124.290	110	0.389	0.310	5.510	0.685	0.000

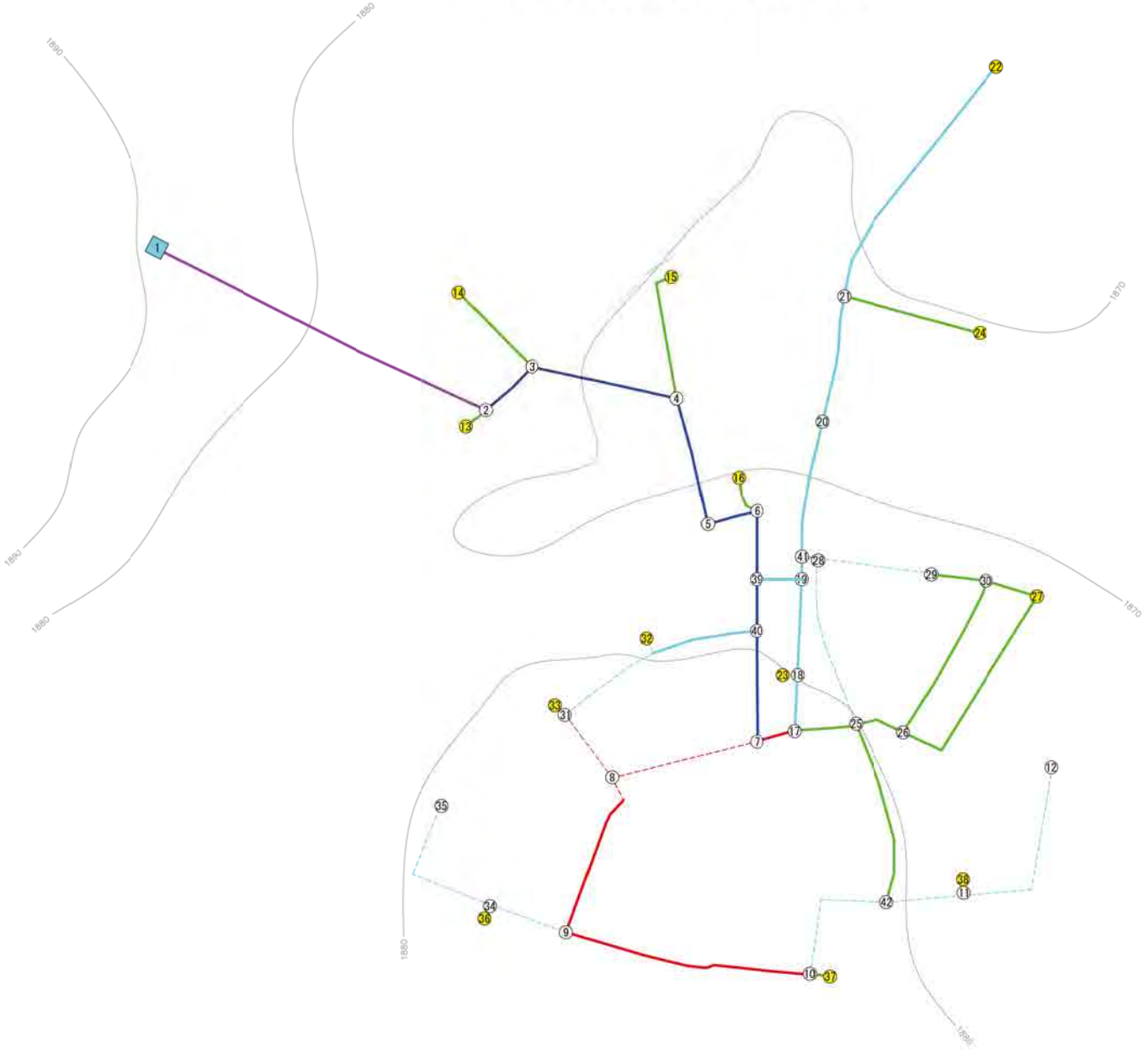
--- NodeData ---

Node	HP (m)	GL (m)	EHP 1st(m)	EHP 2nd(m)	Qc (l/s)	Remarks
26	1829.844	1817.921		11.923	0.000	
27	1828.945	1818.886		10.059	0.358	WF
28	1829.620	1817.623		11.997	0.358	WF
29	1828.899	1815.184		13.715	0.358	WF
30	1830.990	1824.012		6.978	0.000	
31	1830.716	1825.097		5.619	0.000	
32	1830.510	1823.650		6.860	0.000	
33	1830.744	1823.070		7.674	0.000	
34	1830.580	1822.980		7.600	0.000	
35	1830.580	1821.780		8.800	0.000	

--- LineData ---

Node ST	Node EN	D (mm)	L (m)	Coef C	Q (l/s)	V (m/s)	I (‰)	HL (m)	P (m)
25	28	40	192.253	110	0.358	0.285	4.726	0.909	0.000
26	27	40	190.238	110	0.358	0.285	4.725	0.899	0.000
26	29	40	200.001	110	0.358	0.285	4.726	0.945	0.000
30	7	40	217.127	110	0.357	0.284	4.702	1.021	0.000
31	14	40	201.876	110	0.357	0.284	4.701	0.949	0.000
32	19	40	291.784	110	0.358	0.285	4.725	1.379	0.000
33	8	40	20.887	110	0.357	0.284	4.701	0.098	0.000
34	17	40	194.934	110	0.460	0.366	7.517	1.465	0.000
35	20	40	127.638	110	0.041	0.033	0.085	0.011	0.000
30	31	40	183.780	110	0.192	0.153	1.493	0.274	0.000
31	32	40	169.630	110	0.172	0.137	1.215	0.206	0.000
32	22	40	185.970	110	0.251	0.200	2.458	0.457	0.000
33	34	40	177.560	110	0.148	0.118	0.921	0.163	0.000
34	35	40	167.240	110	-0.002	-0.002	0.000	0.000	0.000
35	26	40	184.210	110	0.327	0.260	3.997	0.736	0.000

Alem Gebeya Pipe Networks



------Alem Gebeya <<Hazen-Williams Formula>>------

Tank	1	Maximum EHP	29.790	(m)
Node	41	Minimum EHP	6.952	(m)
Line	46	Maximum I	9.468	(‰)
Pump,Decom	0	Maximum V	0.645	(m/s)
Convergence Gap				(cm)
Calculation	14			(times)

<< Explanatory Notes >>

- Node -
HP: Head Pressure
GL: Ground Level
EHP: Effectual Head Pressure
Qc: Consumption of Water

- Line -
D: Diameter
L: Length of Pipe
Coef: Friction Coefficient
Q: Quantity of Flow
V: Velocity of Flow
I: Hydraulic Gradient
HL: Head Loss
P: Add Pressure

--- NodeData ---

Node	HP (m)	GL (m)	EHP 1st(m)	EHP 2nd(m)	Qc (l/s)	Remarks
1	1898.748	1888.748		10.000	-5.431	Reservoir Tank
2	1898.001	1873.394		24.607	0.000	
3	1897.176	1872.538		24.638	0.000	
4	1895.502	1865.712		29.790	0.000	
5	1894.236	1873.525		20.711	0.000	
6	1893.745	1873.607		20.138	0.000	
7	1892.617	1881.471		11.146	0.056	HC
8	1891.805	1883.855		7.950	0.000	
9	1890.957	1883.781		7.176	0.000	
10	1890.169	1881.534		8.635	0.000	
11	1886.523	1878.719		7.804	0.131	SS
12	1885.742	1876.339		9.403	0.436	PS
13	1897.808	1873.126		24.682	0.369	WF
14	1896.282	1873.630		22.652	0.369	WF
15	1894.333	1868.081		26.252	0.370	WF
16	1893.398	1871.665		21.733	0.370	WF
17	1892.590	1881.108		11.482	0.000	
18	1892.481	1880.013		12.468	0.000	
19	1892.496	1877.150		15.346	0.000	
20	1890.717	1864.591		26.126	0.000	
21	1889.339	1867.189		22.150	0.000	
22	1888.506	1876.171		12.335	0.370	WF
23	1892.371	1880.381		11.990	0.370	WF
24	1888.093	1868.821		19.272	0.370	WF
25	1892.273	1880.324		11.949	0.000	

--- LineData ---

Node ST	Node EN	D (mm)	L (m)	Coef C	Q (l/s)	V (m/s)	I (‰)	HL (m)	P (m)
1	2	150	641.861	110	5.431	0.307	1.163	0.747	0.000
2	3	100	112.130	110	5.062	0.645	7.358	0.825	0.000
2	13	40	38.633	110	0.369	0.294	4.998	0.193	0.000
3	4	100	261.695	110	4.693	0.598	6.396	1.674	0.000
3	14	40	178.970	110	0.369	0.294	4.998	0.894	0.000
4	5	100	230.432	110	4.323	0.551	5.494	1.266	0.000
4	15	40	232.775	110	0.370	0.295	5.023	1.169	0.000
5	6	100	89.436	110	4.323	0.551	5.493	0.491	0.000
6	39	100	111.880	110	3.953	0.504	4.655	0.521	0.000
6	16	40	69.047	110	0.370	0.295	5.023	0.347	0.000
7	8	80	264.707	110	1.754	0.349	3.066	0.812	0.000
7	17	80	69.998	110	0.571	0.114	0.383	0.027	0.000
8	9	80	300.995	110	1.677	0.334	2.820	0.849	0.000
8	31	65	137.214	110	0.077	0.023	0.026	0.004	0.000
9	10	80	442.914	110	1.307	0.260	1.777	0.787	0.000
9	34	40	143.188	110	0.370	0.295	5.023	0.719	0.000
10	11	50	385.110	110	0.937	0.477	9.468	3.646	0.000
10	37	40	29.502	110	0.370	0.295	5.023	0.148	0.000
11	12	50	340.005	110	0.436	0.222	2.296	0.781	0.000
11	38	40	6.975	110	0.370	0.295	5.023	0.035	0.000
17	18	50	98.313	110	0.295	0.150	1.112	0.109	0.000
17	25	40	108.697	110	0.276	0.220	2.920	0.317	0.000
18	19	50	169.144	110	-0.075	-0.038	-0.089	-0.015	0.000
18	23	40	21.975	110	0.370	0.295	5.023	0.110	0.000
19	41	50	32.300	110	0.834	0.425	7.631	0.246	0.000

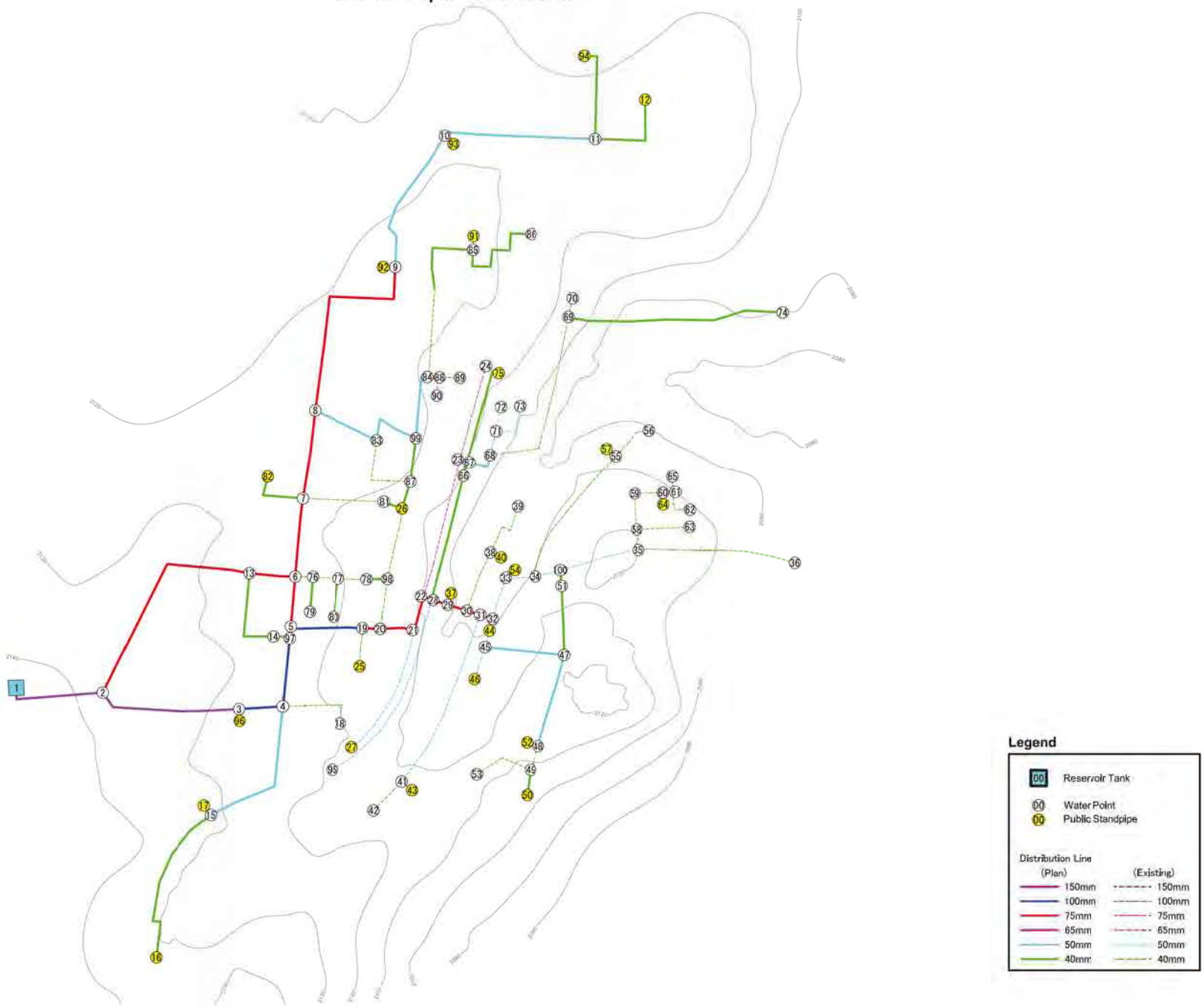
--- NodeData ---

Node	HP (m)	GL (m)	EHP 1st(m)	EHP 2nd(m)	Qc (l/s)	Remarks
26	1892.125	1879.357		12.768	0.000	
27	1891.840	1870.393		21.447	0.370	WF
28	1892.246	1876.439		15.807	0.000	
29	1892.165	1873.446		18.719	0.000	
30	1892.052	1871.508		20.544	0.000	
31	1891.802	1883.168		8.634	0.000	
32	1892.039	1879.887		12.152	0.370	WF
33	1891.756	1883.391		8.365	0.370	WF
34	1890.237	1883.060		7.177	0.000	
35	1890.237	1881.702		8.535	0.000	
36	1890.210	1883.258		6.952	0.370	WF
37	1890.021	1881.444		8.577	0.370	WF
38	1886.488	1878.515		7.973	0.370	WF
39	1893.224	1877.280		15.944	0.000	
40	1893.026	1879.140		13.886	0.000	
41	1892.249	1876.260		15.989	0.000	
42	1892.273	1880.540		11.733	0.000	

--- LineData ---

Node ST	Node EN	D (mm)	L (m)	Coef C	Q (l/s)	V (m/s)	I (‰)	HL (m)	P (m)
20	21	50	225.315	110	0.740	0.377	6.116	1.378	0.000
21	22	50	491.656	110	0.370	0.189	1.694	0.833	0.000
21	24	40	247.970	110	0.370	0.295	5.023	1.246	0.000
25	26	40	91.063	110	0.201	0.160	1.626	0.148	0.000
25	28	50	306.150	110	0.075	0.038	0.088	0.027	0.000
26	27	40	392.857	110	0.130	0.104	0.725	0.285	0.000
26	30	40	305.683	110	0.071	0.057	0.237	0.073	0.000
28	29	50	204.990	110	0.169	0.086	0.396	0.081	0.000
31	32	50	215.918	110	-0.293	-0.149	-1.096	-0.237	0.000
31	33	50	27.166	110	0.370	0.189	1.694	0.046	0.000
34	35	50	272.803	110	0.000	0.000	0.000	0.000	0.000
34	36	40	5.506	110	0.370	0.295	5.023	0.028	0.000
39	40	100	69.230	110	3.044	0.388	2.869	0.199	0.000
40	7	100	224.402	110	2.381	0.303	1.821	0.409	0.000
41	20	50	250.626	110	0.740	0.377	6.116	1.533	0.000
39	19	50	81.340	110	0.909	0.463	8.954	0.728	0.000
32	40	50	198.100	110	-0.663	-0.338	-4.983	-0.987	0.000
28	41	50	26.450	110	-0.094	-0.048	-0.134	-0.004	0.000
29	30	40	95.790	110	0.169	0.134	1.174	0.112	0.000
27	30	40	94.160	110	-0.240	-0.191	-2.253	-0.212	0.000
25	42	40	320.590	110	0.000	0.000	0.000	0.000	0.000

Kibet Pipe Networks



------Kibet <<Hazen-Williams Formula>>------

Tank	1	Maximum EHP	46.642	(m)
Node	99	Minimum EHP	8.358	(m)
Line	106	Maximum I	26.282	(‰)
Pump,Decom	0	Maximum V	1.012	(m/s)
Convergence Gap				(cm)
Calculation	16			(times)

<< Explanatory Notes >>

- Node -
HP: Head Pressure
GL: Ground Level
EHP: Effectual Head Pressure
Qc: Consumption of Water

- Line -
D: Diameter
L: Length of Pipe
Coef: Friction Coefficient
Q: Quantity of Flow
V: Velocity of Flow
I: Hydraulic Gradient
HL: Head Loss
P: Add Pressure

--- NodeData ---

Node	HP (m)	GL (m)	EHP 1st(m)	EHP 2nd(m)	Qc (l/s)	Remarks
1	2150.850	2140.850		10.000	-9.506	Reservoir Tank
2	2149.963	2139.079		10.884	0.000	
3	2149.186	2127.460		21.726	0.000	
4	2147.640	2123.382		24.258	0.000	
5	2145.566	2125.171		20.395	0.000	
6	2145.482	2122.633		22.849	0.000	
7	2144.111	2124.921		19.190	0.000	
8	2143.243	2126.090		17.153	0.000	
9	2141.969	2122.030		19.939	0.000	
10	2136.691	2118.864		17.827	0.000	
11	2134.185	2115.446		18.739	0.000	
12	2132.944	2113.439		19.505	0.356	WF
13	2146.150	2124.685		21.465	0.000	
14	2145.831	2125.494		20.337	0.000	
15	2143.337	2131.180		12.157	0.250	PS
16	2141.042	2132.684		8.358	0.356	WF
17	2143.321	2132.326		10.995	0.356	WF
18	2147.640	2121.059		26.581	0.000	
19	2143.956	2118.412		25.544	0.000	
20	2142.953	2117.023		25.930	0.000	
21	2140.780	2111.295		29.485	0.000	
22	2138.861	2109.638		29.223	0.000	
23	2136.790	2110.175		26.615	0.000	
24	2136.790	2114.186		22.604	0.000	
25	2143.441	2118.110		25.331	0.356	WF

--- LineData ---

Node ST	Node EN	D (mm)	L (m)	Coef C	Q (l/s)	V (m/s)	I (‰)	HL (m)	P (m)
1	2	150	270.495	110	9.506	0.538	3.281	0.887	0.000
2	3	150	414.307	110	7.026	0.398	1.874	0.776	0.000
2	13	80	654.797	110	2.480	0.494	5.822	3.812	0.000
3	4	100	126.103	110	6.669	0.849	12.259	1.546	0.000
3	96	40	3.921	110	0.357	0.284	4.701	0.018	0.000
4	97	100	201.859	110	5.707	0.727	9.187	1.854	0.000
4	15	50	432.899	110	0.962	0.490	9.941	4.304	0.000
4	18	40	236.547	110	0.000	0.000	0.000	0.000	0.000
5	6	80	150.876	110	0.697	0.139	0.555	0.084	0.000
5	19	100	209.879	110	5.177	0.659	7.670	1.610	0.000
6	7	80	226.922	110	2.531	0.504	6.046	1.372	0.000
6	76	40	51.420	110	0.479	0.381	8.097	0.416	0.000
7	8	80	258.050	110	1.844	0.367	3.361	0.867	0.000
7	81	40	247.593	110	0.331	0.263	4.084	1.011	0.000
7	82	40	170.566	110	0.357	0.284	4.701	0.802	0.000
8	9	80	609.511	110	1.427	0.284	2.091	1.275	0.000
8	83	50	199.052	110	0.417	0.212	2.110	0.420	0.000
9	10	50	435.924	110	1.070	0.545	12.106	5.277	0.000
9	92	40	8.011	110	0.357	0.284	4.701	0.038	0.000
10	11	50	438.914	110	0.713	0.363	5.709	2.506	0.000
10	93	40	4.251	110	0.357	0.284	4.701	0.020	0.000
11	12	40	265.486	110	0.356	0.283	4.677	1.242	0.000
11	94	40	274.941	110	0.357	0.284	4.701	1.293	0.000
13	6	80	130.610	110	2.313	0.460	5.115	0.668	0.000
13	14	40	275.641	110	0.168	0.133	1.158	0.319	0.000

--- NodeData ---

Node	HP (m)	GL (m)	EHP 1st(m)	EHP 2nd(m)	Qc (l/s)	Remarks
26	2142.917	2115.382		27.535	0.356	WF
27	2140.163	2119.354		20.809	0.356	WF
28	2138.498	2108.265		30.233	0.000	
29	2137.799	2102.452		35.347	0.000	
30	2137.102	2099.897		37.205	0.000	
31	2136.679	2099.397		37.282	0.000	
32	2136.375	2099.958		36.417	0.000	
33	2134.010	2097.610		36.400	0.000	
34	2133.057	2101.605		31.452	0.000	
35	2132.339	2110.281		22.058	0.000	
36	2132.339	2085.697		46.642	0.000	
37	2137.778	2103.256		34.522	0.356	WF
38	2136.256	2096.736		39.520	0.000	
39	2136.256	2093.164		43.092	0.000	
40	2136.242	2097.330		38.912	0.356	WF
41	2135.837	2112.616		23.221	0.000	
42	2135.837	2115.240		20.597	0.000	
43	2135.762	2113.679		22.083	0.356	WF
44	2135.456	2100.764		34.692	0.356	WF
45	2134.636	2101.402		33.234	0.000	
46	2134.185	2103.583		30.602	0.356	WF
47	2132.542	2115.322		17.220	0.000	
48	2129.820	2112.995		16.825	0.000	
49	2128.928	2108.872		20.056	0.000	
50	2128.583	2104.541		24.042	0.356	WF
51	2132.564	2106.378		26.186	0.250	SS
52	2129.794	2112.844		16.950	0.356	WF
53	2128.500	2111.373		17.127	0.250	PS
54	2133.868	2097.537		36.331	0.356	WF
55	2131.057	2096.956		34.101	0.000	
56	2131.057	2090.742		40.315	0.000	
57	2131.009	2096.918		34.091	0.356	WF
58	2132.246	2109.531		22.715	0.000	
59	2132.081	2103.667		28.414	0.000	
60	2131.676	2100.249		31.427	0.000	
61	2131.676	2099.808		31.868	0.000	
62	2131.676	2100.802		30.874	0.000	
63	2132.246	2103.362		28.884	0.000	
64	2131.641	2101.405		30.236	0.356	WF
65	2131.676	2096.788		34.888	0.000	
66	2138.498	2108.323		30.175	0.000	

--- LineData ---

Node ST	Node EN	D (mm)	L (m)	Coef C	Q (l/s)	V (m/s)	I (‰)	HL (m)	P (m)
15	16	40	490.699	110	0.356	0.283	4.677	2.295	0.000
15	17	40	3.342	110	0.356	0.283	4.677	0.016	0.000
19	20	80	50.343	110	4.821	0.960	19.929	1.003	0.000
19	25	40	110.148	110	0.356	0.283	4.677	0.515	0.000
20	21	80	98.801	110	5.084	1.012	21.991	2.173	0.000
20	98	40	136.350	110	-0.263	-0.210	-2.675	-0.365	0.000
21	22	80	99.817	110	4.728	0.941	19.225	1.919	0.000
21	27	50	391.161	110	0.356	0.181	1.577	0.617	0.000
22	23	50	409.489	110	0.668	0.340	5.060	2.072	0.000
22	28	80	25.044	110	4.060	0.808	14.500	0.363	0.000
23	24	50	281.908	110	0.000	0.000	0.000	0.000	0.000
23	67	50	21.176	110	0.668	0.340	5.060	0.107	0.000
28	29	80	48.215	110	4.060	0.808	14.500	0.699	0.000
28	66	40	387.735	110	0.000	0.000	0.000	0.000	0.000
28	95	50	590.268	110	0.000	0.000	0.000	0.000	0.000
29	30	80	56.962	110	3.704	0.737	12.234	0.697	0.000
29	37	40	4.425	110	0.356	0.283	4.677	0.021	0.000
30	31	80	41.701	110	3.348	0.666	10.146	0.423	0.000
30	38	40	180.957	110	0.356	0.283	4.677	0.846	0.000
31	32	80	36.952	110	2.992	0.596	8.239	0.304	0.000
31	41	50	533.929	110	0.356	0.181	1.577	0.842	0.000
32	33	50	124.270	110	1.366	0.696	19.025	2.364	0.000
32	44	50	34.970	110	1.626	0.829	26.282	0.919	0.000
33	34	50	87.645	110	1.010	0.515	10.876	0.953	0.000
33	54	40	30.435	110	0.356	0.283	4.677	0.142	0.000
34	100	50	70.910	110	0.654	0.333	4.863	0.345	0.000
34	55	40	427.802	110	0.356	0.283	4.677	2.001	0.000
35	36	40	456.267	110	0.000	0.000	0.000	0.000	0.000
35	58	50	59.038	110	0.356	0.181	1.577	0.093	0.000
38	39	40	180.786	110	0.000	0.000	0.000	0.000	0.000
38	40	40	3.092	110	0.356	0.283	4.677	0.014	0.000
41	42	40	116.135	110	0.000	0.000	0.000	0.000	0.000
41	43	40	15.983	110	0.356	0.283	4.677	0.075	0.000
44	45	50	49.257	110	1.270	0.647	16.632	0.819	0.000
45	46	40	96.633	110	0.356	0.283	4.677	0.452	0.000
45	47	50	231.563	110	0.914	0.466	9.046	2.095	0.000
47	48	50	273.750	110	0.962	0.490	9.941	2.721	0.000
47	51	40	199.262	110	-0.048	-0.038	-0.114	-0.023	0.000
48	49	40	71.217	110	0.606	0.482	12.525	0.892	0.000
48	52	40	5.532	110	0.356	0.283	4.677	0.026	0.000
49	50	40	73.854	110	0.356	0.283	4.677	0.345	0.000

--- NodeData ---

Node	HP (m)	GL (m)	EHP 1st(m)	EHP 2nd(m)	Qc (l/s)	Remarks
67	2136.682	2108.095		28.587	0.000	
68	2136.568	2102.470		34.098	0.000	
69	2134.639	2106.042		28.597	0.061	HC
70	2134.639	2107.806		26.833	0.000	
71	2136.568	2105.941		30.627	0.000	
72	2136.568	2106.436		30.132	0.000	
73	2136.568	2102.376		34.192	0.000	
74	2133.124	2091.008		42.116	0.250	PS
75	2135.351	2112.332		23.019	0.357	WF
76	2145.066	2122.276		22.790	0.000	
77	2144.470	2121.038		23.432	0.000	
78	2143.793	2119.135		24.658	0.000	
79	2145.066	2123.687		21.379	0.000	
80	2144.470	2121.325		23.145	0.000	
81	2143.099	2117.965		25.134	0.000	
82	2143.309	2128.245		15.064	0.357	WF
83	2142.823	2124.603		18.220	0.000	
84	2141.679	2118.845		22.834	0.250	PS
85	2139.365	2122.430		16.935	0.000	
86	2139.365	2114.809		24.556	0.000	
87	2142.798	2118.980		23.818	0.000	
88	2141.679	2117.527		24.152	0.000	
89	2141.679	2114.879		26.800	0.000	
90	2141.679	2118.391		23.288	0.000	
91	2139.177	2122.201		16.976	0.357	WF
92	2141.931	2121.967		19.964	0.357	WF
93	2136.671	2118.914		17.757	0.357	WF
94	2132.893	2107.830		25.063	0.357	WF
95	2138.498	2120.196		18.302	0.000	
96	2149.168	2126.958		22.210	0.357	WF
97	2145.786	2124.878		20.908	0.000	
98	2143.318	2116.772		26.546	0.000	
99	2142.517	2121.355		21.162	0.000	
100	2132.712	2105.603		27.110	0.000	

--- LineData ---

Node ST	Node EN	D (mm)	L (m)	Coef C	Q (l/s)	V (m/s)	I (‰)	HL (m)	P (m)
49	53	40	176.255	110	0.250	0.199	2.430	0.428	0.000
55	56	40	131.054	110	0.000	0.000	0.000	0.000	0.000
55	57	40	10.240	110	0.356	0.283	4.677	0.048	0.000
58	59	50	104.191	110	0.356	0.181	1.577	0.164	0.000
58	63	40	152.352	110	0.000	0.000	0.000	0.000	0.000
59	60	40	86.780	110	0.356	0.283	4.677	0.406	0.000
60	61	40	24.246	110	0.000	0.000	0.000	0.000	0.000
60	64	40	7.488	110	0.356	0.283	4.677	0.035	0.000
61	62	40	88.867	110	0.000	0.000	0.000	0.000	0.000
61	65	40	42.976	110	0.000	0.000	0.000	0.000	0.000
67	68	50	93.469	110	0.311	0.158	1.228	0.115	0.000
67	75	40	283.306	110	0.357	0.284	4.701	1.332	0.000
68	69	40	529.735	110	0.311	0.248	3.641	1.929	0.000
68	71	40	71.348	110	0.000	0.000	0.000	0.000	0.000
69	70	40	58.494	110	0.000	0.000	0.000	0.000	0.000
69	74	40	623.395	110	0.250	0.199	2.430	1.515	0.000
71	72	40	75.603	110	0.000	0.000	0.000	0.000	0.000
71	73	40	133.830	110	0.000	0.000	0.000	0.000	0.000
76	77	40	73.651	110	0.479	0.381	8.097	0.596	0.000
76	79	40	100.940	110	0.000	0.000	0.000	0.000	0.000
77	78	40	83.608	110	0.479	0.381	8.097	0.677	0.000
77	80	40	111.265	110	0.000	0.000	0.000	0.000	0.000
83	99	50	180.990	110	0.370	0.188	1.692	0.306	0.000
83	87	40	229.783	110	0.047	0.037	0.109	0.025	0.000
84	85	40	492.333	110	0.357	0.284	4.701	2.314	0.000
84	88	40	29.543	110	0.000	0.000	0.000	0.000	0.000
85	86	40	308.178	110	0.000	0.000	0.000	0.000	0.000
85	91	40	39.868	110	0.357	0.284	4.701	0.187	0.000
88	89	40	62.123	110	0.000	0.000	0.000	0.000	0.000
88	90	40	59.718	110	0.000	0.000	0.000	0.000	0.000
97	5	100	22.660	110	5.874	0.748	9.693	0.220	0.000
14	97	40	39.250	110	0.168	0.133	1.158	0.045	0.000
98	26	40	216.718	110	0.216	0.172	1.847	0.400	0.000
78	98	40	58.640	110	0.479	0.381	8.097	0.475	0.000
81	26	40	44.510	110	0.331	0.263	4.084	0.182	0.000
26	87	40	81.230	110	0.190	0.152	1.468	0.119	0.000
99	84	50	197.720	110	0.607	0.309	4.237	0.838	0.000
87	99	40	127.390	110	0.237	0.189	2.206	0.281	0.000
100	35	50	236.832	110	0.356	0.181	1.577	0.374	0.000
51	100	40	44.050	110	-0.298	-0.237	-3.361	-0.148	0.000

Tebela Pipe Networks

------Tebela <<Hazen-Williams Formula>>------

Tank	1	Maximum EHP	61.561	(m)
Node	105	Minimum EHP	0.000	(m)
Line	110	Maximum I	18.875	(‰)
Pump,Decom	2	Maximum V	0.693	(m/s)
Convergence Gap				(cm)
Calculation	16			(times)

<< Explanatory Notes >>

- Node -
HP: Head Pressure
GL: Ground Level
EHP: Effectual Head Pressure
Qc: Consumption of Water

- Line -
D: Diameter
L: Length of Pipe
Coef: Friction Coefficient
Q: Quantity of Flow
V: Velocity of Flow
I: Hydraulic Gradient
HL: Head Loss
P: Add Pressure

--- NodeData ---

Node	HP (m)	GL (m)	EHP 1st(m)	EHP 2nd(m)	Qc (l/s)	Remarks
1	1678.381	1678.381		0.000	-8.058	Reservoir Tank
2	1678.199	1676.007		2.192	0.000	
3	1677.925	1668.631		9.294	0.000	
4	1677.566	1658.226		19.340	0.000	
5	1677.260	1646.157		31.103	0.000	
6	1645.968	1639.002		6.966	0.000	
7	1644.782	1622.461		22.321	0.000	
8	1643.881	1609.817		34.064	0.000	
9	1643.512	1607.250		36.262	0.000	
10	1606.354	1594.223		12.131	0.000	
11	1604.665	1576.966		27.699	0.000	
12	1604.599	1576.369		28.230	0.000	
13	1604.334	1573.896		30.438	0.000	
14	1601.814	1571.704		30.110	0.000	
15	1599.537	1554.241		45.296	0.428	WF
16	1677.401	1674.463		2.938	0.428	WF
17	1677.401	1672.897		4.504	0.000	
18	1677.566	1661.599		15.967	0.000	
19	1676.781	1648.368		28.413	0.000	
20	1676.403	1650.357		26.046	0.000	
21	1676.077	1649.234		26.843	0.000	
22	1675.378	1643.766		31.612	0.428	WF
23	1676.781	1637.273		39.508	0.000	
24	1676.403	1658.797		17.606	0.000	
25	1676.077	1636.907		39.170	0.000	

--- LineData ---

Node ST	Node EN	D (mm)	L (m)	Coef C	Q (l/s)	V (m/s)	I (‰)	HL (m)	P (m)
1	2	150	83.441	110	7.630	0.432	2.183	0.182	0.000
2	3	150	125.506	110	7.630	0.432	2.184	0.274	0.000
1	16	40	149.000	110	0.428	0.341	6.578	0.980	0.000
3	4	150	164.522	110	7.630	0.432	2.184	0.359	0.000
16	17	40	114.000	110	0.000	0.000	0.000	0.000	0.000
4	18	40	238.669	110	0.000	0.000	0.000	0.000	0.000
4	19	50	353.552	110	0.428	0.218	2.219	0.784	0.000
4	97	150	147.141	110	7.202	0.408	1.962	0.289	0.000
5	26	40	255.729	110	0.428	0.341	6.578	1.682	0.000
5	103	50	66.552	110	0.858	0.437	8.043	0.535	0.000
6	7	80	190.750	110	2.570	0.511	6.215	1.186	0.000
6	64	50	22.396	110	0.462	0.236	2.561	0.057	0.000
7	8	80	145.068	110	2.570	0.511	6.215	0.902	0.000
7	71	40	185.171	110	0.000	0.000	0.000	0.000	0.000
8	78	40	94.800	110	0.000	0.000	0.000	0.000	0.000
8	99	80	59.324	110	2.570	0.511	6.215	0.369	0.000
9	79	40	346.013	110	0.000	0.000	0.000	0.000	0.000
9	105	40	160.990	110	-0.462	-0.368	-7.592	-1.222	0.000
9	101	50	201.565	110	0.888	0.452	8.572	1.728	0.000
10	11	80	379.980	110	2.144	0.427	4.445	1.689	0.000
10	88	40	228.134	110	0.000	0.000	0.000	0.000	0.000
11	12	80	14.833	110	2.144	0.427	4.445	0.066	0.000
12	13	80	153.988	110	1.286	0.256	1.725	0.266	0.000
12	92	50	293.306	110	0.858	0.437	8.043	2.359	0.000
13	14	50	313.913	110	0.857	0.437	8.026	2.519	0.000

--- NodeData ---

Node	HP (m)	GL (m)	EHP 1st(m)	EHP 2nd(m)	Qc (l/s)	Remarks
26	1675.578	1651.057		24.521	0.000	
27	1674.548	1651.380		23.168	0.428	WF
28	1644.045	1635.621		8.424	0.000	
29	1643.271	1622.653		20.618	0.000	
30	1642.713	1606.313		36.400	0.000	
31	1642.272	1593.231		49.041	0.000	
32	1641.889	1593.630		48.258	0.000	
33	1642.480	1632.547		9.933	0.000	
34	1639.482	1624.862		14.620	0.000	
35	1638.259	1615.631		22.628	0.000	
36	1636.555	1606.840		29.715	0.428	WF
37	1637.740	1613.522		24.218	0.428	WF
38	1642.476	1618.695		23.781	0.240	PS
39	1642.343	1608.422		33.921	0.000	
40	1642.554	1619.897		22.657	0.000	
41	1642.324	1606.516		35.808	0.000	
42	1641.848	1593.133		48.715	0.000	
43	1640.565	1583.234		57.331	0.428	WF
44	1638.171	1595.288		42.883	0.504	SS
45	1636.966	1593.401		43.565	0.000	
46	1635.119	1580.862		54.257	0.428	WF
47	1638.041	1591.871		46.170	0.000	
48	1638.041	1584.353		53.688	0.000	
49	1638.041	1580.780		57.261	0.000	
50	1637.491	1590.581		46.910	0.000	
51	1637.491	1583.731		53.760	0.000	
52	1637.491	1579.621		57.870	0.000	
53	1637.394	1590.441		46.953	0.428	WF
54	1637.491	1583.958		53.533	0.000	
55	1638.041	1584.216		53.825	0.000	
56	1675.278	1643.225		32.053	0.000	
57	1673.786	1645.217		28.569	0.000	
58	1673.249	1638.793		34.456	0.000	
59	1673.249	1630.264		42.985	0.000	
60	1674.995	1639.154		35.841	0.000	
61	1674.312	1629.658		44.654	0.429	WF
62	1674.995	1640.497		34.498	0.000	
63	1672.573	1633.373		39.200	0.429	WF
64	1645.910	1639.553		6.357	0.000	
65	1645.717	1622.587		23.130	0.000	
66	1645.717	1608.138		37.579	0.000	

--- LineData ---

Node ST	Node EN	D (mm)	L (m)	Coef C	Q (l/s)	V (m/s)	I (‰)	HL (m)	P (m)
13	95	40	216.040	110	0.429	0.342	6.606	1.427	0.000
14	15	40	346.172	110	0.428	0.341	6.578	2.277	0.000
14	96	40	251.694	110	0.429	0.342	6.606	1.663	0.000
19	20	40	57.525	110	0.428	0.341	6.578	0.378	0.000
19	23	40	124.015	110	0.000	0.000	0.000	0.000	0.000
20	21	40	49.567	110	0.428	0.341	6.578	0.326	0.000
20	24	40	193.066	110	0.000	0.000	0.000	0.000	0.000
21	22	40	106.207	110	0.428	0.341	6.578	0.699	0.000
21	25	40	206.667	110	0.000	0.000	0.000	0.000	0.000
26	27	40	156.576	110	0.428	0.341	6.578	1.030	0.000
28	29	80	198.581	110	1.997	0.398	3.898	0.774	0.000
28	33	50	183.135	110	0.887	0.452	8.548	1.565	0.000
29	30	80	202.675	110	1.656	0.330	2.755	0.558	0.000
29	40	40	165.594	110	0.341	0.272	4.329	0.717	0.000
30	31	40	197.743	110	0.239	0.190	2.230	0.441	0.000
30	41	80	188.070	110	1.417	0.282	2.065	0.388	0.000
31	32	40	171.786	110	0.239	0.190	2.230	0.383	0.000
33	34	50	374.326	110	0.856	0.436	8.009	2.998	0.000
33	38	50	199.338	110	0.031	0.016	0.017	0.003	0.000
34	35	50	152.730	110	0.856	0.436	8.009	1.223	0.000
35	36	40	259.065	110	0.428	0.341	6.578	1.704	0.000
35	37	40	78.793	110	0.428	0.341	6.578	0.518	0.000
38	39	40	178.517	110	0.132	0.105	0.746	0.133	0.000
41	42	80	195.395	110	1.549	0.308	2.436	0.476	0.000
42	43	40	195.049	110	0.428	0.341	6.578	1.283	0.000
42	44	50	194.834	110	1.360	0.693	18.875	3.678	0.000
44	45	40	183.136	110	0.428	0.341	6.578	1.205	0.000
44	47	50	58.412	110	0.428	0.218	2.219	0.130	0.000
45	46	40	280.895	110	0.428	0.341	6.578	1.848	0.000
47	48	40	143.082	110	0.000	0.000	0.000	0.000	0.000
47	50	40	83.596	110	0.428	0.341	6.578	0.550	0.000
48	49	40	83.846	110	0.000	0.000	0.000	0.000	0.000
48	55	40	44.387	110	0.000	0.000	0.000	0.000	0.000
50	51	40	127.588	110	0.000	0.000	0.000	0.000	0.000
50	53	40	14.837	110	0.428	0.341	6.578	0.098	0.000
51	52	40	107.151	110	0.000	0.000	0.000	0.000	0.000
51	54	40	93.297	110	0.000	0.000	0.000	0.000	0.000
56	57	40	225.926	110	0.429	0.342	6.606	1.493	0.000
56	60	40	42.860	110	0.429	0.342	6.606	0.283	0.000
57	58	40	81.278	110	0.429	0.342	6.606	0.537	0.000
58	59	40	79.924	110	0.000	0.000	0.000	0.000	0.000

--- NodeData ---

Node	HP (m)	GL (m)	EHP 1st(m)	EHP 2nd(m)	Qc (l/s)	Remarks
67	1645.782	1635.190		10.592	0.000	
68	1645.782	1629.145		16.637	0.000	
69	1645.483	1624.169		21.314	0.000	
70	1645.296	1611.823		33.473	0.000	
71	1644.782	1623.759		21.023	0.000	
72	1644.782	1624.408		20.374	0.000	
73	1644.782	1625.112		19.670	0.000	
74	1644.782	1618.883		25.899	0.000	
75	1644.782	1612.558		32.224	0.000	
76	1644.782	1614.590		30.192	0.000	
77	1644.782	1620.521		24.261	0.000	
78	1643.881	1611.385		32.496	0.000	
79	1643.512	1608.420		35.092	0.000	
80	1607.250	1606.765		0.485	0.000	
81	1607.250	1593.912		13.338	0.000	
82	1607.250	1585.177		22.073	0.000	
83	1607.250	1578.995		28.255	0.000	
84	1644.734	1596.510		48.224	0.000	
85	1607.250	1587.541		19.709	0.000	
86	1607.250	1584.688		22.562	0.000	
87	1607.250	1573.056		34.194	0.000	
88	1606.354	1591.898		14.456	0.000	
89	1636.490	1584.581		51.909	0.030	HC
90	1633.293	1601.293		32.000	0.429	WF
91	1634.383	1593.500		40.883	0.429	WF
92	1602.240	1568.172		34.068	0.000	
93	1599.284	1560.623		38.661	0.429	WF
94	1602.196	1568.093		34.103	0.429	WF
95	1602.906	1566.688		36.218	0.429	WF
96	1600.151	1579.974		20.177	0.429	WF
97	1677.277	1646.157		31.120	0.000	
98	1646.157	1646.157	31.120	0.000	0.000	
99	1643.512	1607.250		36.262	0.000	
100	1607.250	1607.250	36.262	0.000	0.000	
101	1641.784	1594.223		47.561	0.000	
102	1638.527	1576.966		61.561	0.000	
103	1676.725	1639.002		37.723	0.000	
104	1677.277	1635.621		41.656	0.000	
105	1644.734	1606.260		38.474	0.000	
106	1645.469	1622.900		22.569	0.000	

--- LineData ---

Node ST	Node EN	D (mm)	L (m)	Coef C	Q (l/s)	V (m/s)	I (‰)	HL (m)	P (m)
58	63	40	102.334	110	0.429	0.342	6.606	0.676	0.000
60	61	40	103.384	110	0.429	0.342	6.606	0.683	0.000
60	62	40	109.446	110	0.000	0.000	0.000	0.000	0.000
64	65	50	190.309	110	0.281	0.143	1.017	0.194	0.000
64	67	40	95.919	110	0.182	0.145	1.343	0.129	0.000
65	66	50	170.981	110	0.000	0.000	0.000	0.000	0.000
65	70	40	139.527	110	0.281	0.224	3.017	0.421	0.000
67	68	40	75.155	110	0.000	0.000	0.000	0.000	0.000
67	69	40	222.336	110	0.182	0.145	1.343	0.299	0.000
71	72	40	55.825	110	0.000	0.000	0.000	0.000	0.000
71	74	40	49.027	110	0.000	0.000	0.000	0.000	0.000
72	73	40	114.836	110	0.000	0.000	0.000	0.000	0.000
72	77	40	130.282	110	0.000	0.000	0.000	0.000	0.000
74	75	40	80.148	110	0.000	0.000	0.000	0.000	0.000
74	76	40	98.895	110	0.000	0.000	0.000	0.000	0.000
80	81	50	202.079	110	0.000	0.000	0.000	0.000	0.000
81	82	50	201.631	110	0.000	0.000	0.000	0.000	0.000
81	85	40	272.856	110	0.000	0.000	0.000	0.000	0.000
82	83	40	107.841	110	0.000	0.000	0.000	0.000	0.000
82	86	40	187.837	110	0.000	0.000	0.000	0.000	0.000
86	87	40	251.360	110	0.000	0.000	0.000	0.000	0.000
89	90	40	483.996	110	0.429	0.342	6.606	3.197	0.000
89	91	40	318.994	110	0.429	0.342	6.606	2.107	0.000
92	93	40	447.465	110	0.429	0.342	6.606	2.956	0.000
92	94	40	6.734	110	0.429	0.342	6.606	0.044	0.000
97	5	50	1.000	110	1.286	0.655	17.016	0.017	0.000
97	98	150	0.010	110	5.916	0.335	1.363	0.000	-31.120
98	6	100	66.552	110	3.032	0.386	2.848	0.190	0.000
98	28	80	274.431	110	2.884	0.574	7.697	2.112	0.000
99	9	80	0.010	110	0.426	0.085	0.222	0.000	0.000
99	100	80	0.010	110	2.144	0.427	4.445	0.000	-36.262
100	10	80	201.565	110	2.144	0.427	4.445	0.896	0.000
100	80	50	19.538	110	0.000	0.000	0.000	0.000	0.000
101	102	50	379.980	110	0.888	0.452	8.572	3.257	0.000
102	89	50	237.629	110	0.888	0.452	8.572	2.037	0.000
103	56	50	179.831	110	0.858	0.437	8.043	1.446	0.000
97	104	40	274.431	110	0.000	0.000	0.000	0.000	0.000
105	84	40	166.700	110	0.000	0.000	0.000	0.000	0.000
106	70	40	129.000	110	0.182	0.145	1.343	0.173	0.000
69	106	40	10.200	110	0.182	0.145	1.343	0.014	0.000
70	105	40	74.000	110	0.462	0.368	7.592	0.562	0.000

--- NodeData ---

Node	HP (m)	GL (m)	EHP 1st(m)	EHP 2nd(m)	Qc (l/s)	Remarks

--- LineData ---

Node ST	Node EN	D (mm)	L (m)	Coef C	Q (l/s)	V (m/s)	I (‰)	HL (m)	P (m)
40	38	40	18.000	110	0.341	0.272	4.329	0.078	0.000
39	41	40	25.000	110	0.132	0.105	0.746	0.019	0.000
32	42	40	18.000	110	0.239	0.190	2.230	0.040	0.000

収集資料リスト

番号	名　称	形態 図書･ビデオ 地図･写真等	ｵﾘｼﾞﾅﾙ･ ｺﾋﾟｰ	発行機関	発行年
1	Environmental Policy	電子ﾌｧｲﾙ	ｺﾋﾟｰ	Federal Democratic Republic of Ethiopia Environmental Protection Authority	1997
2	Proclamation No. 89/1997 Federal Rural land Administration	電子ﾌｧｲﾙ	ｺﾋﾟｰ	Federal Negarit Gazeta of the Federal Democratic Republic of Ethiopia	1997
3	Ethiopian Water Resources Management Policy	図書	ｺﾋﾟｰ	Federal Democratic Republic of Ethiopia Ministry of Water Resources	1999
4	Environmental Impact Assessment Guideline Document	電子ﾌｧｲﾙ	ｺﾋﾟｰ	Federal Democratic Republic of Ethiopia Environmental Protection Authority	2000
5	Ethiopian Water Sector Strategy	図書	ｺﾋﾟｰ	Federal Democratic Republic of Ethiopia Ministry of Water Resources	2001
6	Ethiopian Water Sector Policy	電子ﾌｧｲﾙ	ｺﾋﾟｰ	Federal Democratic Republic of Ethiopia Ministry of Water Resources	2001
7	Environmental Impact Assessment Procedural Guideline Series 1	電子ﾌｧｲﾙ	ｺﾋﾟｰ	Federal Democratic Republic of Ethiopia Environmental Protection Authority	2003 Nov.
8	Draft Rural Water Supply and Sanitation Design Criteria	電子ﾌｧｲﾙ	ｺﾋﾟｰ	Ministry of Water Resources, Rural Water Supply and Sanitation Department	2005 Apr.
9	Gender Mainstreaming Field Manual For Water Supply & Sanitation Projects	電子ﾌｧｲﾙ	ｺﾋﾟｰ	Ministry of Water Resources Women's Affairs Department	2005 Dec.
10	Council of Ministers Regulation No.115/2005 Ethiopian Water Resources Management Regulations	電子ﾌｧｲﾙ	ｺﾋﾟｰ	Federal Negarit Gazeta of the Federal Democratic Republic of Ethiopia	2005 Mar.
12	Southern Nations Nationalities and People's Region (SNNPR) Livelihood Profiles Regional Overview	電子ﾌｧｲﾙ	ｺﾋﾟｰ	USAID	2005
13	Urban Water Supply Design Criteria	電子ﾌｧｲﾙ	ｺﾋﾟｰ	Ministry of Water Resources, Urban Water Supply and Sanitation Department	2006 Jan.
14	2004/5 Household Income, Consumption and Expenditure Survey (HICE) Volume I, II	電子ﾌｧｲﾙ	ｺﾋﾟｰ	Federal Democratic Republic of Ethiopia Central Statistical Agency (CSA)	2007

番号	名　称	形態 図書･ビデオ 地図･写真等	ｵﾘｼﾞﾅﾙ･ ｺﾋﾟｰ	発行機関	発行年
15	Butajira – Ziway areas Development Study	電子ﾌｧｲﾙ	ｺﾋﾟｰ	Ministry of Water Resources (MoWS) Ethiopian Water Technology Centre (EWTEC)	2008 Jan.
16	Ethiopia: Overview of Selected Biodiversity	電子ﾌｧｲﾙ	ｺﾋﾟｰ	Biodiversity Indicators Development National Task Force for the Project of UNEP-WCMC	2010
17	Experience and Future Direction in Ethiopian Rural Land	電子ﾌｧｲﾙ	ｺﾋﾟｰ	World Bank Presented at the Annual World Bank Conference on Land and Poverty	2011 Apr.
18	The WaSH Implementation Framework	電子ﾌｧｲﾙ	ｺﾋﾟｰ	Federal Democratic Republic of Ethiopia	2011 Aug.
19	The Study on Groundwater Resources Assessment in the Rift Valley Lakes Basin in Ethiopia, Final Report (Data Book)	電子ﾌｧｲﾙ	ｺﾋﾟｰ	JICA (Japan International Cooperation Agency)	2012
20	The 2010/11 Ethiopian Households Consumption – Expenditure (HCE) Survey, Result for : Country Level Statistical Report	電子ﾌｧｲﾙ	ｺﾋﾟｰ	Federal Democratic Republic of Ethiopia Central Statistical Agency (CSA)	2012 Dec.
21	Rural Land Policy, Rural Transformation and Recent Trends in Large-scale Rural Land Acquisitions in Ethiopia	電子ﾌｧｲﾙ	ｺﾋﾟｰ	European Report Development	2012
22	Ethiopian Investment Commission Factor Cost	電子ﾌｧｲﾙ	ｺﾋﾟｰ	Ethiopian Investment Commission	2014 Jun.
23	Geological Map, 838C2 KELLA	地形図 図面	ｺﾋﾟｰ	EMA (Ethiopian Mapping Agency)	
24	Geological Map, 838C4 BUTAJIRA	地形図 図面	ｺﾋﾟｰ	EMA	
25	Geological Map, 838D1 BUI	地形図 図面	ｺﾋﾟｰ	EMA	
26	Geological Map, 838D3 KOSHE	地形図 図面	ｺﾋﾟｰ	EMA	
27	Geological Map, 738A1 DALOCHA	地形図 図面	ｺﾋﾟｰ	EMA	
28	Geological Map, 738A2 TORA	地形図 図面	ｺﾋﾟｰ	EMA	
29	Geological Map, 738A3 WILBAREG	地形図 図面	ｺﾋﾟｰ	EMA	
30	Geological Map, 738A4 MITO	地形図 図面	ｺﾋﾟｰ	EMA	
31	Geological Map, 738B1 ZIWAY	地形図 図面	ｺﾋﾟｰ	EMA	

番号	名　称	形態 図書･ビデオ 地図･写真等	ｵﾘｼﾞﾅﾙ･ ｺﾋﾟｰ	発行機関	発行年
32	Geological Map, 738B3 BULBULA	地形図 図面	ｺﾋﾟｰ	EMA	
33	Geological Map, 737D4 SHONE	地形図 図面	ｺﾋﾟｰ	EMA	
34	Geological Map, 638A4 YIRGA ALEM	地形図 図面	ｺﾋﾟｰ	EMA	
35	Geological Map, 638C3 DILA	地形図 図面	ｺﾋﾟｰ	EMA	
36	Geological Map, 637B2 SODO	地形図 図面	ｺﾋﾟｰ	EMA	
37	Geological Map, 637B3 GESUBA	地形図 図面	ｺﾋﾟｰ	EMA	
38	Geological Map, 637B4 TEBELA	地形図 図面	ｺﾋﾟｰ	EMA	

資料７　その他資料

成功井構造図

Site No. Koshe Town BH-1

Well No.	Location	Coordinate (UTM)		Altitude	Town	Zone	State	Country
BH-1	Koshe	447544	886648	1,797 m	Koshe	Gurage	SNNPR	Ethiopia

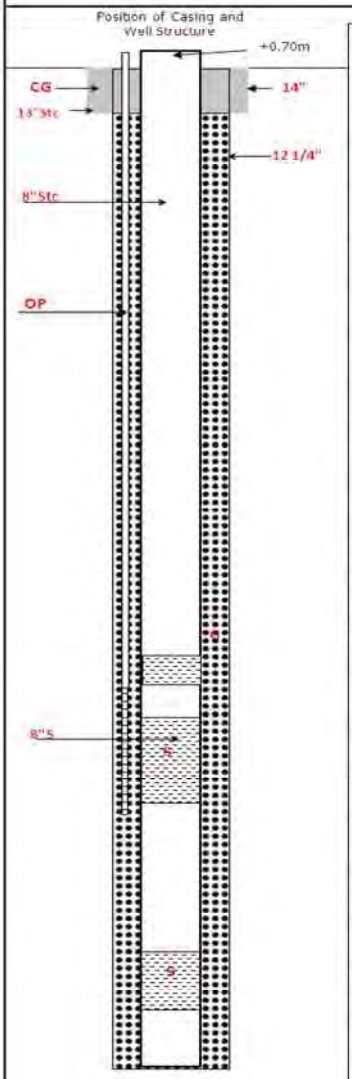
Date: from	to	Drilling :	Equipment Type	Method	Well Type	Final Depth	Diamater	Casing Position
21.09.13	3.11.2013		Top 500	Mud Rotary		GL -200.0m	0 to 10 14", 10m - 200m 12"	+0.8 to 200m 8"

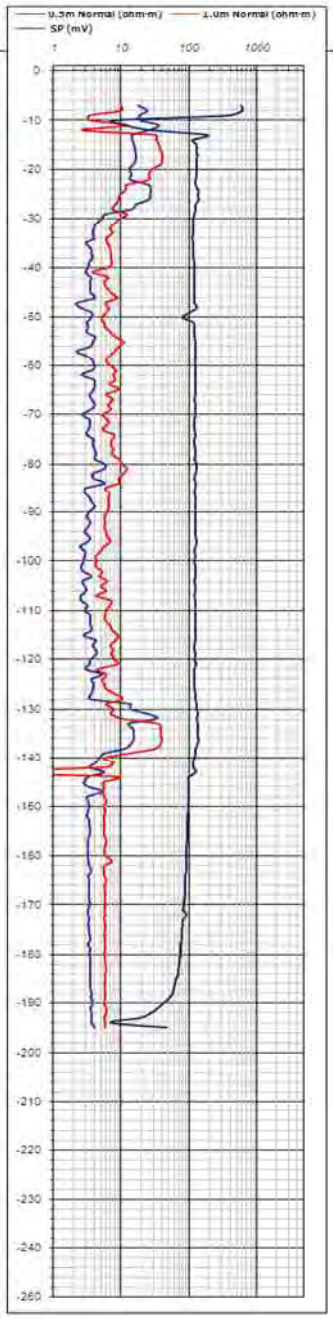
Casing Type :	Size	Inside Dia.	Outside Dia.	Joint Type	Screen Pipe :	Material	Diameter	Slot Size	Joint Type
Steel	8"	203.0mm	218.0mm	threaded	Steel	8"	203.0mm	2.0mm	Threaded

8" Screen Position				Total Length
116m - 122m	128m -146m	178m -188m		36.0m

Observation Pipe:	Material	Diameter	Slot Size	Open Rate	Joint Type	Installation depth:	Total Length:
	GS	3/4"			Threaded	170.0m	170.0m

Gravel Pakking	Origin	Gravel Size	Location	Volume	Development :	Method	SWL (m)	DWL (m)	SWL (m)	Discharge (litre/sec)
	Basaltic	ø 4-6mm		5.0 m³		Air	Air	36.5 m	14.8 m	36.0 l/s





Well Column	Depth (m)	Lithology
	-20	Reworked Volcano clastic sediment:-
	-114m	Tuff :-
	-144m	**Basalt**:- Sconaceous basalt with layer of pumice between 122m and 132m
	-200m	**Tuff & welded tuff**

SIMBOL:

CG = Cement Grout
OP = observation pipe
G = Gravel
BS = Bentonite sealed
Stc = Steel Casing
S = Screen
P = Pump Position
R=Reducer

Site No. Kella Town BH-1

Well No.	Location	Coordinate (UTM)		Altitude	Town	Zone	State	Country
BH-2	Kella	444364	911784	1,691 m	KELLA	Gurage	SNNPR	Ethiopia

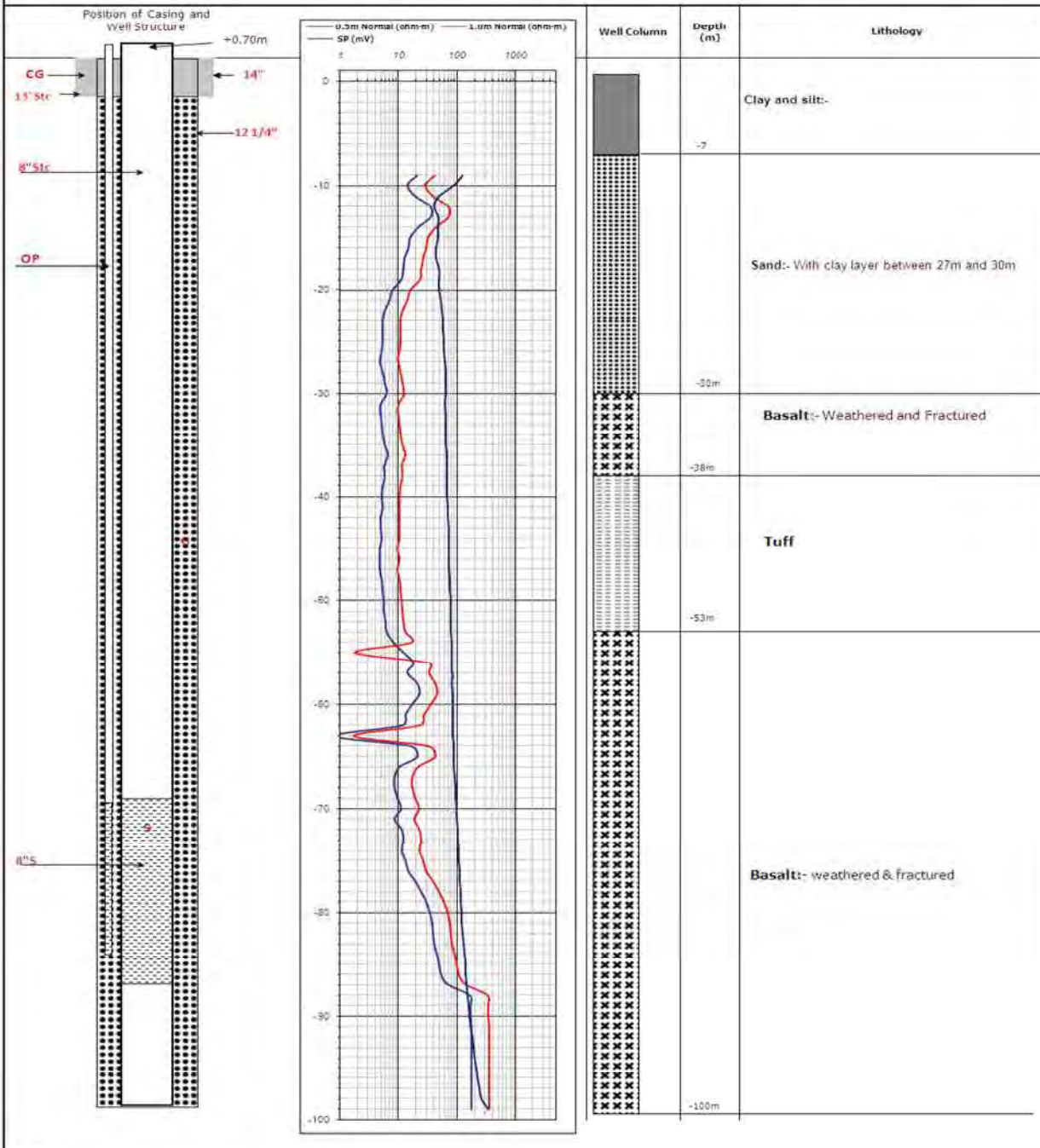
Date: from	to	Drilling :	Equipment Type	Method	Well Type	Final Depth	Diamater	Casing Position
19.11.2013	3.12.2013		Top 500	Mud Rotary		GL -99.0m	0 to 6 .14", 6m -99m 12"	+0.8 to 99m .8"

Casing Type :	Size	Inside Dia:	Outside Dia.	Joint Type	Screen Pipe :	Material	Diameter	Slot Size	Joint Type
Steel	8"	203.0mm	219.0mm	threaded	Steel	8"	203.0mm	2.0mm	Threaded

8" Screen Position					Total Length
57m - 63m	69m - 87m				18.0m

Observation Pipe:	Material	Diameter	Slot Size	Open Rate	Joint Type	Installation depth:				Total Length
	GS	3/4"			Threaded	84.0m				84.0m

Gravel Pakking	Origin	Gravel Size	Location	Volume	Development :	Method	SWL (m)	DWL (m)	SWL (m)	Discharge (litre/sec)
	Basaltic	ø 4-6mm		5.0 m³		Air	Air	42.8 m	17.1 m	5.0 l/s



SIMBOL:

CG = Cement Grout
OP = observation pipe
G = Gravel
BS = Bentonite sealed
Stc = Steel Casing
S = Screen
P = Pump Position
R=Reducer

Site No. Kella Town BH-2

Well No.	Location	Coordinate (UTM)		Altitude	Town	Zone	State	Country
BH-2	Kella	444697	911678	1,891 m	KELLA	Gurage	SNNPR	Ethiopia

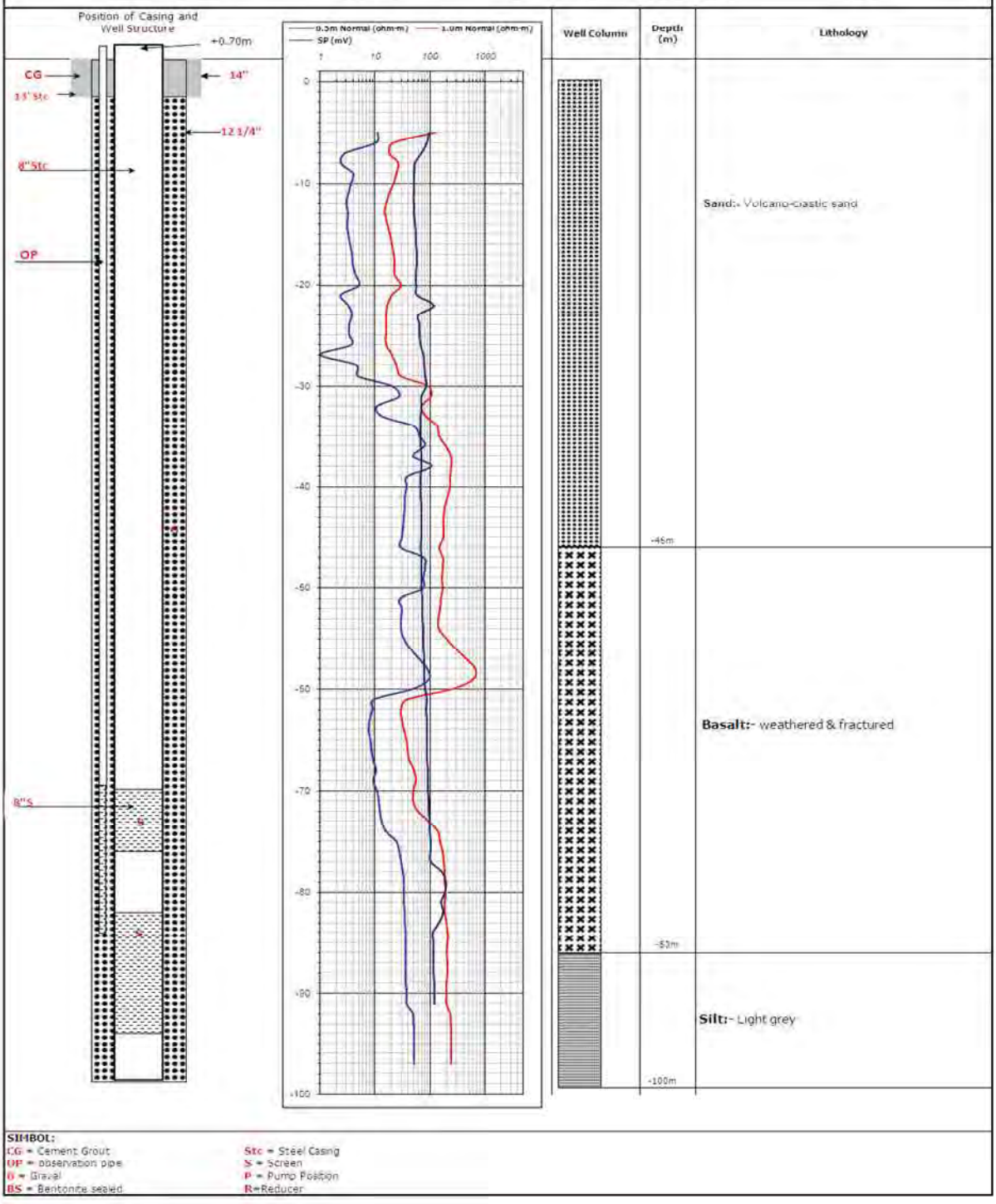
Date: from	to	Drilling :	Equipment Type	Method	Well Type	Final Depth	Diameter		Casing Position
29.01.2014	13.02.2014		Top 500	Mud Rotary		GL -100.0m	0 to 6 14", 6m -100m 12"		+0.8 to 100m 8"

Casing Type :	Size	Inside Dia.	Outside Dia.	Joint Type	Screen Pipe :	Material	Diameter	Slot Size	Joint Type
Steel	8"	203.0mm	218.0mm	threaded	Steel	8"	203.0mm	2.0mm	Threaded

8" Screen Position					Total Length
64m - 76m		82m - 94m			24.0m

Observation Pipe:	Material	Diameter	Slot Size	Open Rate	Joint Type	Installation depth				Total Length
	GS	3/4"			Threaded	72.0m				72.0m

Gravel Pakking	Origin	Gravel Size	Location	Volume	Divelopment :	Method	SWL (m)	DWL (m)	SWL (m)	Discharge (litre/sec)
	Basaltic	ø 4-6mm		5.0 m³		Air	Air	52.8 m	5.97 m	5.3 l/s



SIMBOL:

CG = Cement Grout
OP = observation pipe
G = Gravel
BS = Bentonite sealed
Stc = Steel Casing
S = Screen
P = Pump Position
R=Reducer

Site No. Tiya BH-1

Well No.	Location	Coordinate (UTM)		Altitude	Town	Zone	State	Country
BH-1	Tiya	456201	931924	2,239 m	Tiya	Gurage	SNNPR	Ethiopia

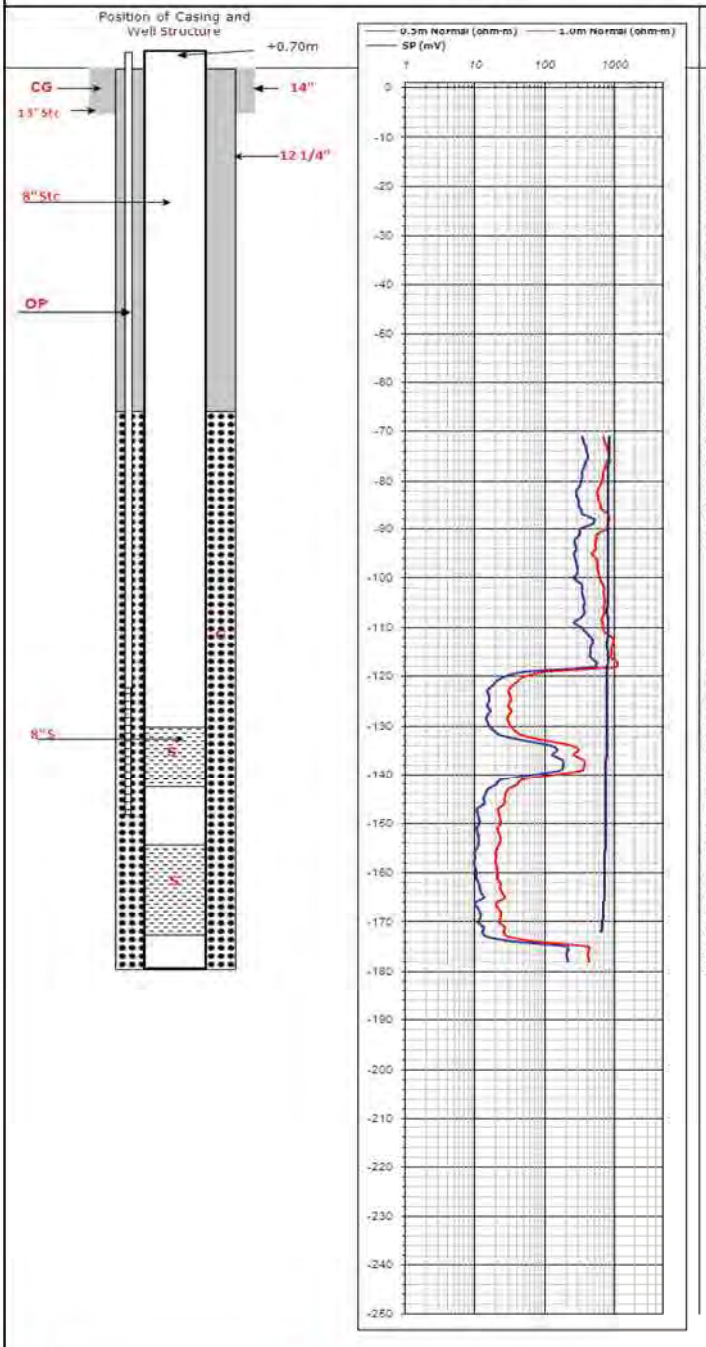
Date: from	to	Drilling :	Equipment Type	Method	Well Type	Final Depth	Diameter	Casing Position
11/10/2013	14/11/2013		Top 300	DTH		GL -180.0m	0 to 4 12", 4m - 180m 12"	+0.8 to 180m 8"

Casing Type :	Size	Inside Dia.	Outside Dia.	Joint Type	Screen Pipe :	Material	Diameter	Slot Size	Joint Type
Steel	8"	203.0mm	218.0mm	threaded	Steel	8"	203.0mm	2.0mm	Threaded

8" Screen Position					Total Length
120m - 144m		156m - 174m			30.0m

Observation Pipe:	Material	Diameter	Slot Size	Open Rate	Joint Type	Installation depth:				Total Length
	GS	3/4"			Threaded	150.0m				150.0m

Gravel Packing	Origin	Gravel Size	Location	Volume	Development :	Method	SWL (m)	DWL (m)	SWL (m)	Discharge (litre/sec)
	Basaltic	ø 2-5mm		3.0 m³		Air	2r	123 m	70 m	2.0 l/s



Well Column	Depth (m)	Lithology
	-10	**Welded Tuff:-** Weathered
	-28m	**Rhyolite:-**
	-39m	**Basalt:-** With minor silt and clay
	-93m	**Rhyolite:-**
	-116m	**Welded Tuff:-** Fractured and slightly weathered
	-134m	**Basalt:-** Weathered and fractured with layer of sandy gravel between 122m qnd 128m
	-144m	**Rhyolite:-** Fractured
	-150m	**Ignimbrite**
		Basalt:- Weathered and fractured

SIMBOL:

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Site No. Adilo Town BH-1

Well No.	Location	Coordinate (UTM)		Altitude	Town	Zone	State	Country
BH-1	Adilo	388335	797642		Adilo	Kembata	SNNPR	Ethiopia

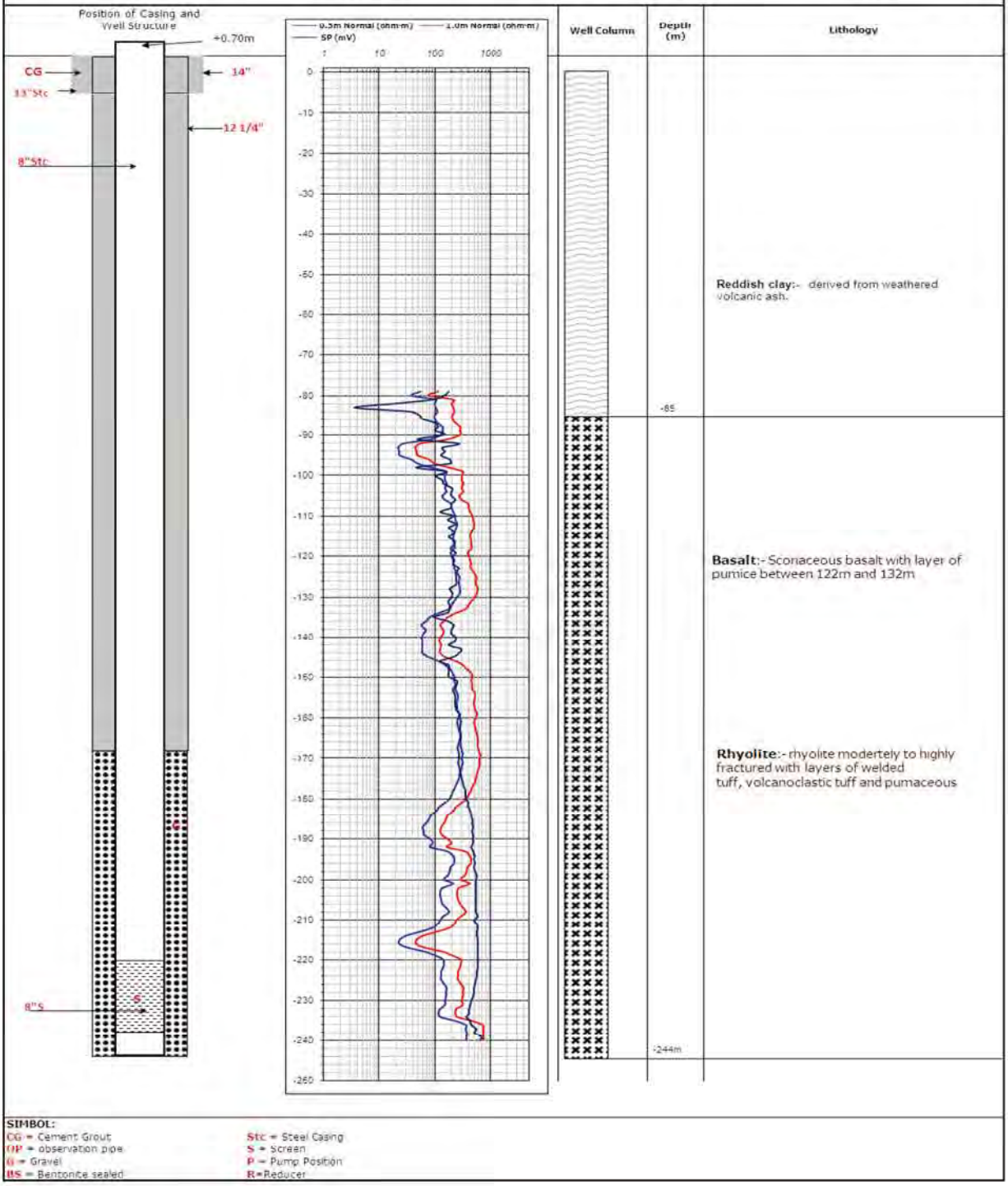
Date: from	to	Drilling :	Equipment Type	Method	Well Type	Final Depth	Diamater	Casing Position
20/11/13	19/12/13		TH-64	Mud Rotary		GL -244.0m	0 to 10, 14", 10m - 244m 12"	+0.8 to 244m 8"

Casing Type :	Size	Inside Dia.	Outside Dia.	Joint Type	Screen Pipe :	Material	Diameter	Slot Size	Joint Type
Steel	8"	203.0mm	218.0mm	threaded	Steel	8"	203.0mm	2.0mm	Threaded

8" Screen Position	Total Length
220m - 238m	18.0m

Observation Pipe:	Material	Diameter	Slot Size	Open Rate	Joint Type	Installation depth:	Total Length:
	GS	3/4"			Threaded		

Gravel Packing	Origin	Gravel Size	Location	Volume	Development :	Method	SWL (m)	DWL (m)	SWL (m)	Discharge (litre/sec)
	Basaltic	ø 4-6mm		6.0 m³		Air	Air	194.4 m	193.8 m	5.0 l/s



SIMBOL:

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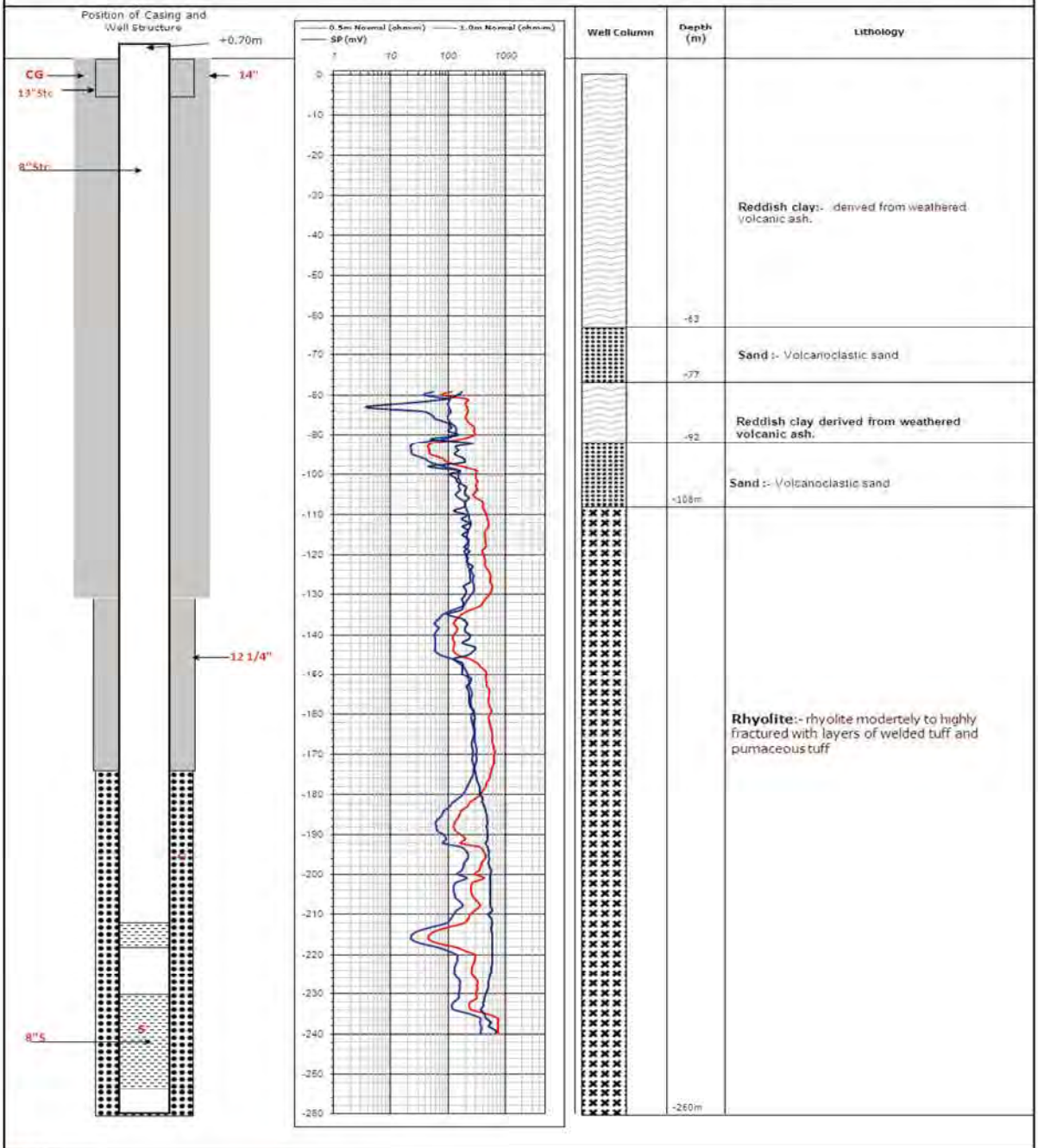
OP = observation pipe
G = Gravel
BS = Bentonite sealed
Stc = Steel Casing
S = Screen
P = Pump Position
R=Reducer

Site No. Adilo Town BH-2

Well No.	Location		Coordinate (UTM)		Altitude	Town	Zone	State	Country
BH-2	Adilo		387423	796781	1,949 m	Adilo	Kembata	SNNPR	Ethiopia
Date: from	**to**	**Drilling :**	Equipment Type	Method	Well Type	Final Depth	Diameter		Casing Position
26.12.13	26.01.14		TH-64	DTH		GL -260.0m	0 to 132 14", 132m - 260m 12"		+0.8 to 260m 8"
Casing Type :	Size	Inside Dia.	Outside Dia.	Joint Type	**Screen Pipe :**	Material	Diameter	Slot Size	Joint Type
Steel	8"	203.0mm	218.0mm	threaded	Steel	8"	203.0mm	2.0mm	Threaded
8" Screen Position									Total Length
212m - 218m			200m - 254m						30.0m
Observation Pipe:	Material	Diameter	Slot Size	Open Rate	Joint Type	Installation depth:			Total Length
	GS	3/4"			Threaded				
Gravel Pakking	Origin	Gravel Size	Location	Volume	**Divelopment :**	Method	SWL (m)	DWL (m)	SWL (m)	Discharge (litre/sec)
	Basaltic	ø 4-6mm		5.0 m³		Air	Air	198.0 m	197.7 m	5.0 l/s



SIMBOL:

CG = Cement Grout
OP = observation pipe
G = Gravel
BS = Bentonite sealed
Stc = Steel Casing
S = Screen
P = Pump Position
R=Reducer

Site No. Teferi KelaTown BH1

Well No.	Location	Coordinate (UTM)		Altitude	Town	Zone	State	Country
BH-1	Teferi Kela	432796	718369	1,851 m	Teferi Kela	Sidama	SNNPR	Ethiopia

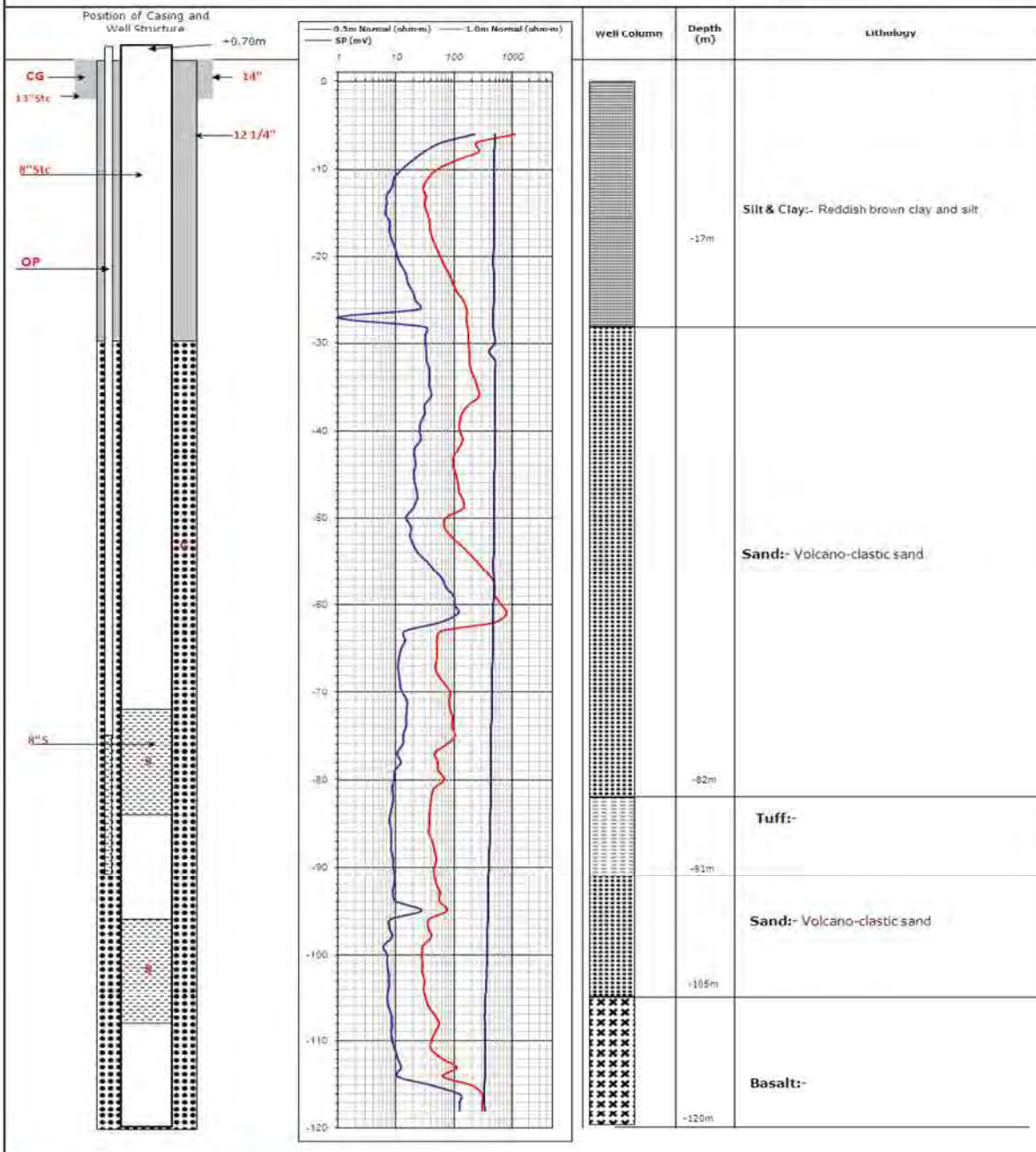
Date: from	to	Drilling :	Equipment Type	Method	Well Type	Final Depth	Diameter	Casing Position
15.12.13	6.2.2014		Top 300	Mud Rotary		GL -120.0m	0 to 10 14", 10m -120m 12"	+0.8 to 120m 8"

Casing Type :	Size	Inside Dia.	Outside Dia.	Joint Type	Screen Pipe :	Material	Diameter	Slot Size	Joint Type
Steel	8"	203.0mm	218.0mm	threaded	Steel	8"	203.0mm	2.0mm	Threaded

8" Screen Position									Total Length
72m - 84m		96m - 108m							24.0m

Observation Pipe:	Material	Diameter	Slot Size	Open Rate	Joint Type	Installation depth:			Total Length
	GS	3/4"			Threaded	102.0m			102.0m

Gravel Pakking	Origin	Gravel Size	Location	Volume	Divelopment :	Method	SWL (m)	DWL (m)	SWL (m)	Discharge (litre/sec)
	Basaltic	ø 4-6mm		5.0 m³		Air	Air	47.6 m	11.26 m	5.0 l/s



SIMBOL:

CG = Cement Grout	Stc = Steel Casing
OP = observation pipe	S = Screen
G = Gravel	P = Pump Position
BS = Bentonite sealed	R=Reducer

Site No. Teferi KelaTown BH2

Well No.	Location	Coordinate (UTM)	Altitude	Town	Zone	State	Country
BH-2	Teferi Kela			Teferi Kela	Sidama	SNNPR	Ethiopia

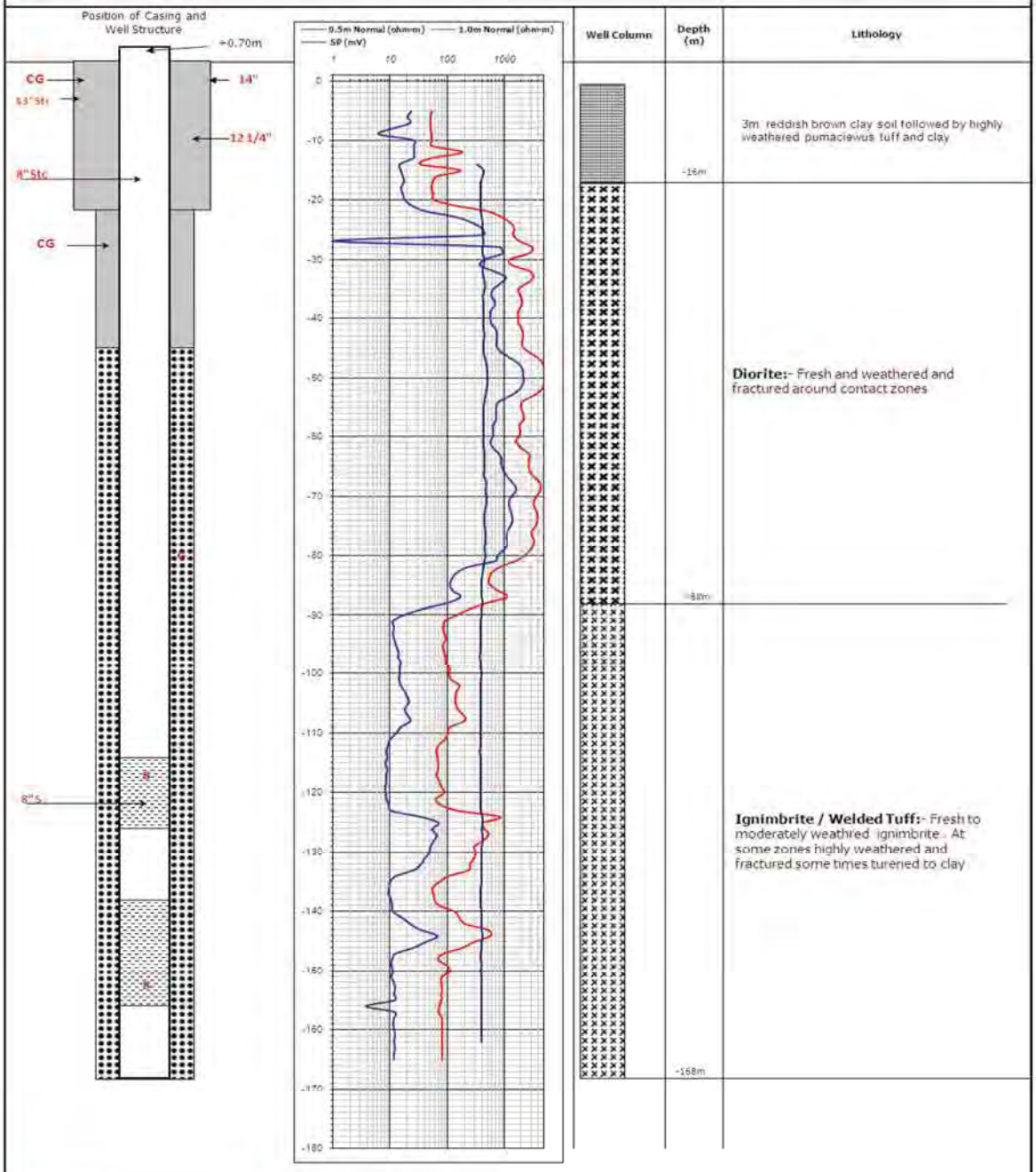
Date: from	to	Drilling :	Equipment Type	Method	Well Type	Final Depth	Diameter	Casing Position
2.2.2014	12.6.2014			Mud Rotary		GL -168.0m	0 to 21 14", 21m -168m 12"	40.6 to 166.7 8"

Casing Type :	Size	Inside Dia.	Outside Dia.	Joint Type	Screen Pipe :	Material	Diameter	Slot Size	Joint Type
Steel	8"	203.0mm	216.0mm	threaded	Steel	8"	203.0mm	2.0mm	Threaded

8" Screen Position						Total Length
114m - 126m		138m -156m				30.0m

Observation Pipe:	Material	Diameter	Slot Size	Open Rate	Joint Type	Installation depth:				Total Length
	GS	3/4"			Threaded					

Gravel Pakking	Origin	Gravel Size	Location	Volume	Divelopment :	Method	SWL (m)	DWL (m)	SWL (m)	Discharge (litre/sec)
	Basaltic	6 -4.6mm		5.0m³		Air	Air	104.8 m	16.64 m	4.2 l/s



SIMBOL:

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G = Gravel
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S = Screen
P = Pump Position
R=Reducer

Site No. Mitto Town

Well No.	Location	Coordinate (UTM)		Altitude	Town	Zone	State	Country
BH-1	Mitto	428498	849245	1,785 m	Mitto	Site	SNNPR	Ethiopia

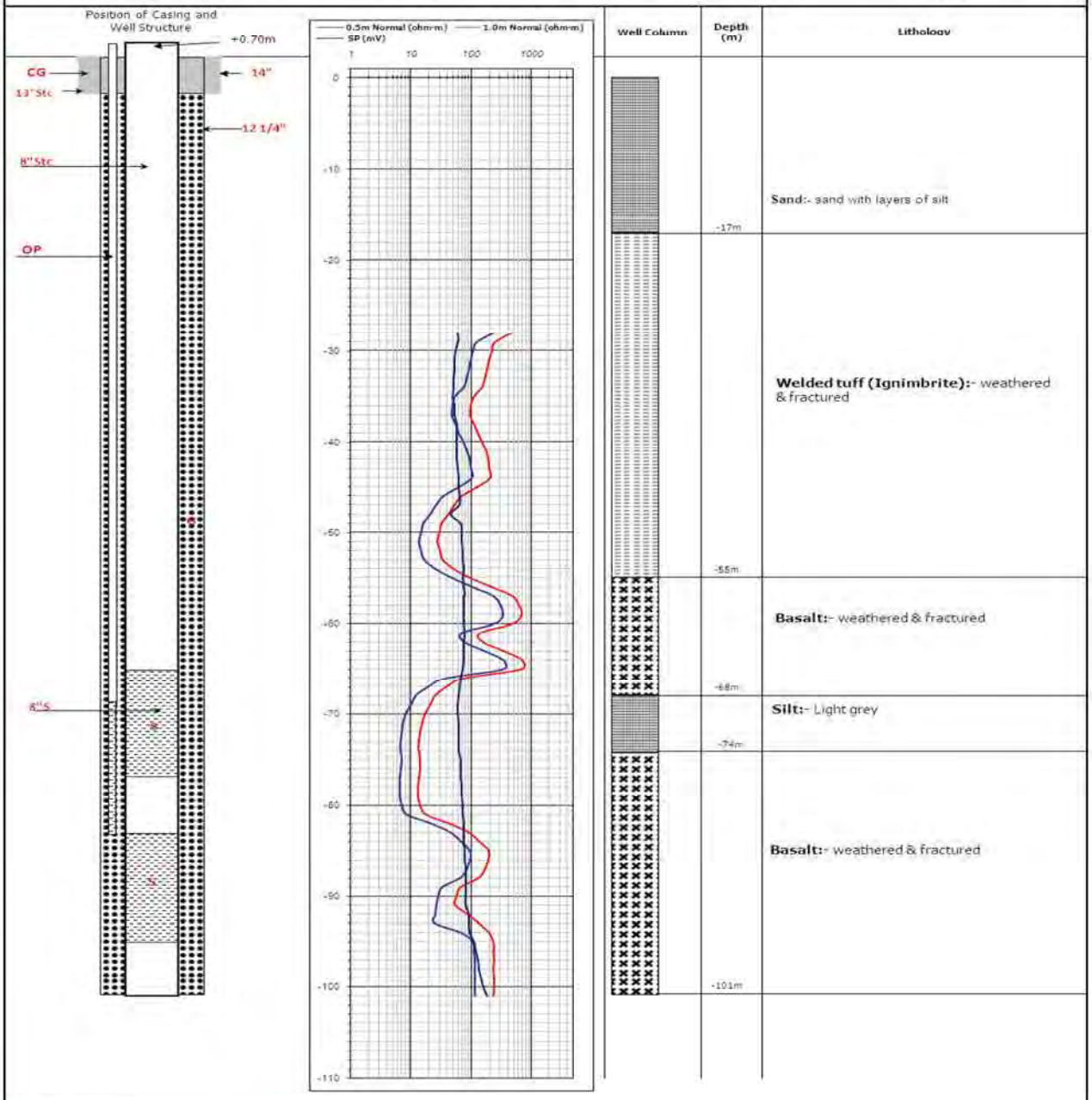
Date: from	to	Drilling :	Equipment Type	Method	Well Type	Final Depth	Diameter		Casing Position
8.12.2013	17.12.2013		Top 500	Mud Rotary		GL -101.0m	0 to 6 14", 6m -101m 12"		+0.8 to 101m 8"

Casing Type :	Size	Inside Dia.	Outside Dia.	Joint Type	Screen Pipe :	Material	Diameter	Slot Size	Joint Type
Steel	8"	203.0mm	218.0mm	threaded	Steel	8"	203.0mm	2.0mm	Threaded

8" Screen Position					Total Length
	49m - 54m		85m - 94m		18.0m

Observation Pipe:	Material	Diameter	Slot Size	Open Rate	Joint Type	Installation depth:				Total Length
	GS	3/4"			Threaded	64.0m				64.0m

Gravel Pakking	Origin	Gravel Size	Location	Volume	Divelopment :	Method	SWL (m)	DWL (m)	SWL (m)	Discharge (litre/sec)
	Basaltic	ø 4-6mm		5.0 m³		Air	Air	36.3 m	29.30 m	14.3 l/s



SIMBOL:

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OP = observation pipe	S = Screen
G = Gravel	P = Pump Position
BS = Bentonite sealed	R=Reducer

Site No. Alem Gebeya BH-1

Well No.	Location	Coordinate (UTM)		Altitude	Town	Zone	State	Country
BH-1	Alem Gebeya	408434	835749	1,877 m	Tiya	Gurage	SNNPR	Ethiopia

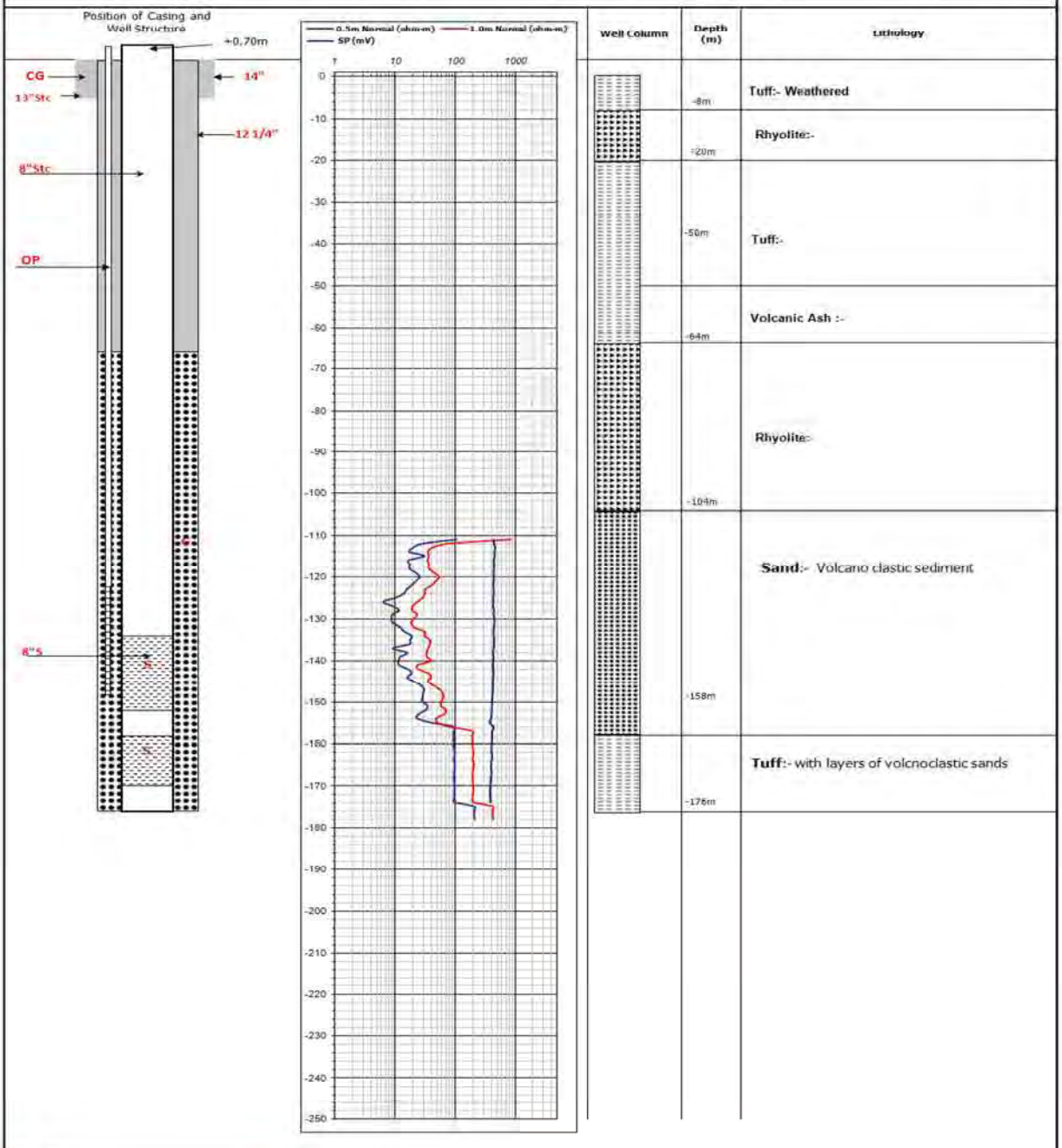
Date: from	to	Drilling :	Equipment Type	Method	Well Type	Final Depth	Diamater	Casing Position
24/10/13	13/02/14		Top500	DTH		GL -176.0m	0 to 4 12", 4m - 176m 12"	+0.8 to 176m 8"

Casing Type :	Size	Inside Dia.	Outside Dia.	Joint Type	Screen Pipe :	Material	Diameter	Silot Size	Joint Type
Steel	8"	203.0mm	218.0mm	threaded	Steel	8"	203.0mm	2.0mm	Threaded

8" Screen Position			Total Length
134m - 152m	158m - 170m		30.0m

Observation Pipe:	Material	Diameter	Silot Size	Open Rate	Joint Type	Installation depth:	Total Length
	GS	3/4"			Threaded	150.0m	150.0m

Gravel Pakking	Origin	Gravel Size	Location	Volume	Divelopment :	Method	SWL (m)	DWL (m)	SWL (m)	Discharge (litre/sec)
	Basaltic	ø 2-6mm		5.0 m³		Air	Air	122 m	110 m	9.7 l/s



SIMBOL:

CG = Cement Grout	Stc = Steel Casing
OP = observation pipe	S = Screen
G = Gravel	P = Pump Position
BS = Bentonite sealed	R=Reducer

Site No. Humbo (Tebela) Town BH-1

Well No.	Location	Coordinate (UTM)		Altitude	Town	Zone	State	Country
BH-1	Humbo	360208	7409424	1,484 m	Humbo	Wolaita	SNNPR	Ethiopia

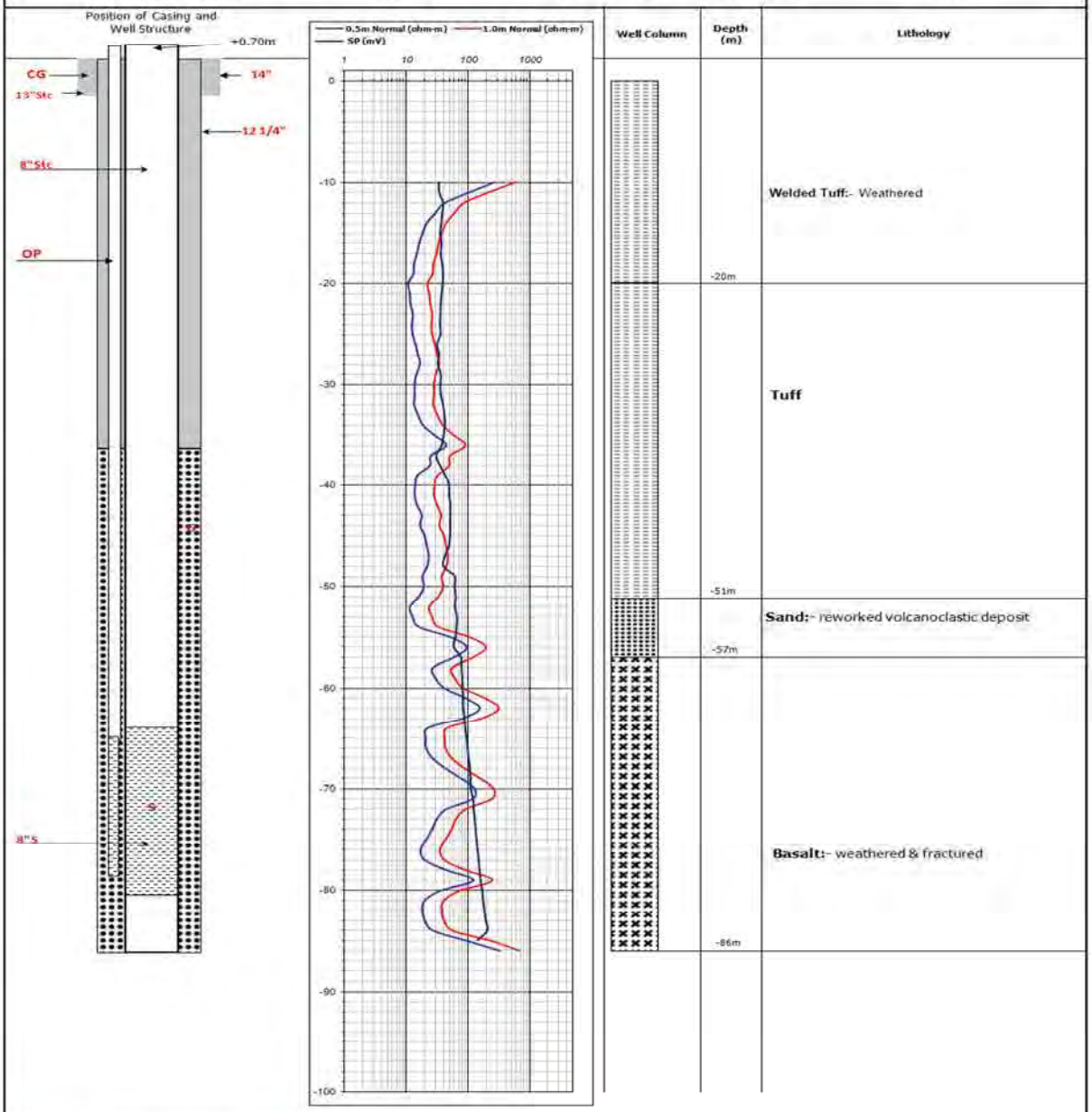
Date: from	to	Drilling :	Equipment Type	Method	Well Type:	Final Depth	Diamater		Casing Position
29.11.13	9/12/2014		Top: 300	ØTH		GL -86.0m	0 to 6 14", 6m -86m 12"		+0.8 to 86m 8"

Casing Type :	Size	Inside Dia.	Outside Dia.	Joint Type:	Screen Pipe :	Material	Diameter	Slot Size	Joint Type
Steel	8"	203.0mm	219.0mm	threaded	Steel	8"	203.0mm	2.0mm	Threaded

8" Screen Position	Total Length
64m - 82m	18.0m

Observation Pipe:	Material	Diameter	Slot Size	Open Rate	Joint Type	Installation depth:			Total Length
	GS	3/4"			Threaded	78.0m			78.0m

Gravel Pakking	Origin	Gravel Size	Location	Volume	Divelopment :	Method	SWL (m)	DWL (m)	SWL (m)	Discharge (litre/sec)
	Basaltic	ø 4-6mm		5.0 m³		Air	Air	35.5 m	11.1 m	24.5 l/s



SIMBOL:

CG = Cement Grout	Stc = Steel Casing
OP = observation pipe	S = Screen
G = Gravel	P = Pump Position
BS = Bentonite sealed	R=Reducer

Site No. Kibet Town BH-1

Well No.	Location	Coordinate (UTM)		Altitude	Town	Zone	State	Country
BH-1	Kibet	427136	888297	2,083 m	Kibet	Silte	SNNPR	Ethiopia

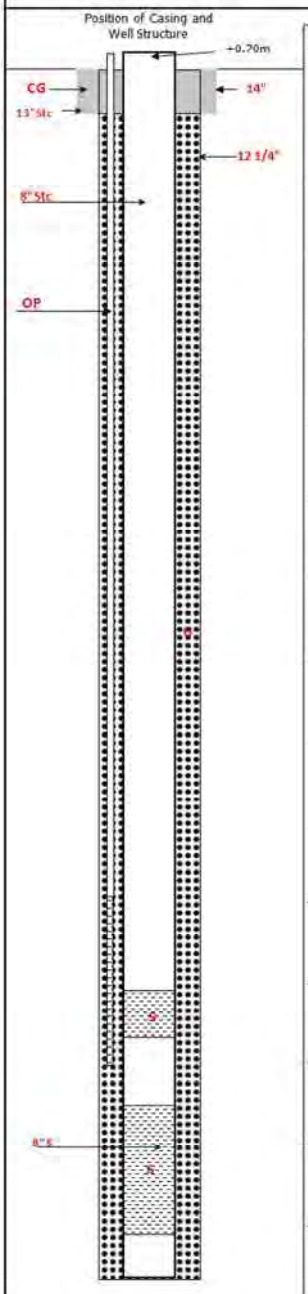
Date: from	to	Drilling :	Equipment Type	Method	Well Type	Final Depth	Diamater	Casing Position
18/09/2013	30/09/2013		Top 500	Mud Rotary		GL -147.0m	0 to 6 14", 6m - 147m 12"	+0.8 to 147m 8"

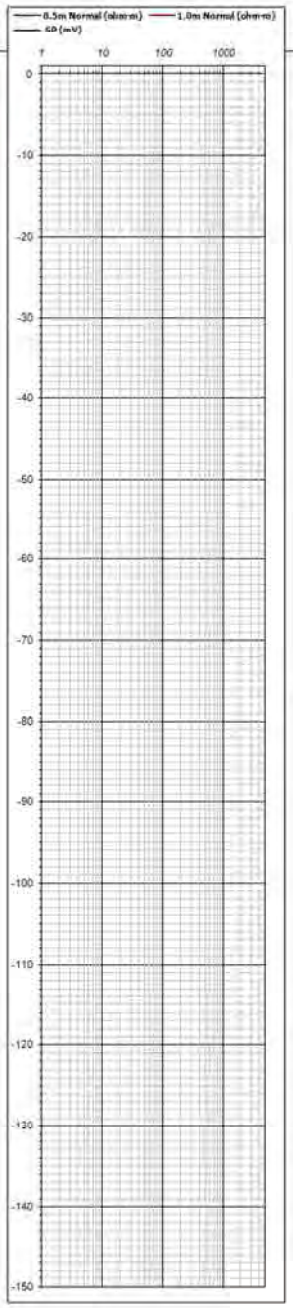
Casing Type :	Size	Inside Dia.	Outside Dia.	Joint Type	Screen Pipe :	Material	Diameter	Slot Size	Joint Type
Steel	8"	203.0mm	218.0mm	threaded	Steel	8"	203.0mm	2.0mm	Threaded

8" Screen Position						Total Length
111m - 117m		123m-141m				24.0m

Observation Pipe:	Material	Diameter	Slot Size	Open Rate	Joint Type	Installation depth:				Total Length
	GS	3/4"			Threaded	120.0m				120.0m

Gravel Pakking	Origin	Gravel Size	Location	Volume	Development :	Method	SWL (m)	DWL (m)	SWL (m)	Discharge (litre/sec)
	Basaltic	ø 4-6mm		5.0 m³		Air	Air	97.0 m	78.0 m	13.1 l/s





Well Column	Depth (m)	Lithology
	-3	**Soil:-** Sanady soil
	-5	**Basalt:-** Vesicular fractured basalt
	-21	**Rhyolite:-** fractured
	-75m	**Tuff** :- pumaceous tuff light gray and reddish gray in weathered zones
	-80m	**Rhyolite:-** fractured
	-111m	**Reworked Volcanoclastic deposit** :- reworked materials derived from volcanic ash, scoria, lithic tuffs and pumaceous tuffs
	-120m	**Scoria :-** reworked scoria deposit mixed with sands of different origin
	-125m	**Rhyolite/Ignimbrite:-** Fractured and weathered
	-130m	**Reworked Volcanoclastic deposit** :- reworked materials derived from pyroclastic deposits
	-133m	**Rhyolite/Ignimbrite:-** Fractured and weathered
	-147m	**Reworked Volcanoclastic deposit** :- reworked materials derived from pyroclastic deposits **Rhyolite:-** Fractured and weathered

SIMBOL:

CG = Cement Grout
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G = Gravel
BS = Bentonite sealed
Stc = Steel Casing
S = Screen
P = Pump Position
R=Reducer

水質検査結果

ውሃ ሥራዎች ዲዛይንና ቁጥጥር
ድርጅት ላቦራቶሪ አገልግሎት
ንዑስ የሥራ ሂደት
የውሃ ጥራት ክፍል

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Fax. 251 - 116 - 61 53 71/61 08 98
e-mail w.w.d.s.e@ethionet.et

SELECTED PHYSIO CHEMICAL AND BACTERIOLOGICAL WATER ANALYSIS RESULTS
Client/Project:AG CONSULT, Consulting Hydrogeologyist and Engineers

SOURCE OF SAMPLE	Well				Ethiopian Standard maximum allowable Concentration (mg/l)
LOCATION	Gurage Zone				
DATE OF COLLECTION	14/6/2013				
DATE RECEIVED	17/6/2013				
CLIENTS ID.NO.	KOSHE 01				
LAB.ID NO.	2371/2005				–
Colour (app)	Colourless				
Odor	Odourless				–
Taste	Tasteless				–
Turbidity (NTU)	0.37				7.0
Total Solids 105 ^{0}C (mg/l)	432.00				–
T. Dissolved Solid 105^{0}C(mg/l)	420.00				1776.0
Electrical Conductivity (µS/cm)	732.00				–
P^H	7.48				6.5-8.5
Ammonia (mg/l NH_3)	0.14				2.0
Sodium (mg/l Na)	136.00				358.0
Potassium (mg/l K)	17.00				–
Total Hardness (mg/l Ca CO_3)	70.00				392.0
Calcium (mg/l Ca)	20.00				–
Magnesium (mg/l Mg)	4.80				–
Total Iron (mg/l Fe)	0.03				0.4
Manganese (mg/l Mn)	0.03				0.13
Fluoride (mg/l F)	1.77				3.0
Chloride (mg/l Cl)	10.01				533.0
Nitrite (mg/l NO_2)	0.01				6.0
Nitrate (mg/l NO_3)	0.57				50.0
Alkalinity (mg/l $CaCO_3$)	370.00				–
Carbonate (mg/l CO_3)	Nil				–
Bicarbonate (mg/l HCO_3)	451.40				–
Sulphate (mg/l SO_4)	3.54				483.0
Phosphate (mg/l PO_4)	–				–
Copper(mg/l Cu)	0.001				5.0
Aluminum(mg/l Al)	0.006				0.4
Chromium(mg/l Cr)	0.002				0.1
Boron(mg/l B)	0.114				0.3
Lead (mg/l)	Nil				–
Total Coliform Per 100 ml	–				–
Fecal Coliform Per 100 ml	–				–

REMARK:- The test result can be compared with the Ethiopian Standard maximum allowable concentration (mg/l) presented on the last column. The water sample was collected and submitted to our laboratory by this client.

Checked by: _____ Approved by: _____
Date: 5/7/2013 Date: 05/07/2013

የውሃ ሥራዎች ዲዛይንና ቁጥጥር
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ንዑስ የሥራ ሂደት
የውሃ ጥራት ክፍል

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SELECTED PHYSIO CHEMICAL AND BACTERIOLOGICAL WATER ANALYSIS RESULTS

Client/Project:AG CONSULT, Consulting Hydrogeologyist and Engineers

					Ethiopian Standard maximum allowable Concentration (mg/l)
SOURCE OF SAMPLE	Well				
LOCATION	Gurage Zone				
DATE OF COLLECTION	15/6/2013				
DATE RECEIVED	17/6/2013				
CLIENTS ID.NO.	KOSHE 02				
LAB.ID NO.	2380/2005				—
Colour (app)	Colourless				
Odor	Odourless				—
Taste	Tasteless				—
Turbidity (NTU)	Nil				7.0
Total Solids 105 °C (mg/l)	464.00				—
T. Dissolved Solid 105°C(mg/l)	460.00				1776.0
Electrical Conductivity (µS/cm)	772.00				—
P^H	7.08				6.5-8.5
Ammonia (mg/l NH_3)	0.18				2.0
Sodium (mg/l Na)	113.00				358.0
Potassium (mg/l K)	13.50				—
Total Hardness (mg/l Ca CO_3)	170.00				392.0
Calcium (mg/l Ca)	54.40				—
Magnesium (mg/l Mg)	8.16				—
Total Iron (mg/l Fe)	0.03				0.4
Manganese (mg/l Mn)	0.01				0.13
Fluoride (mg/l F)	1.24				3.0
Chloride (mg/l Cl)	16.38				533.0
Nitrite (mg/l NO_2)	0.02				6.0
Nitrate (mg/l NO_3)	2.57				50.0
Alkalinity (mg/l $CaCO_3$)	378.00				—
Carbonate (mg/l CO_3)	Nil				—
Bicarbonate (mg/l HCO_3)	461.16				—
Sulphate (mg/l SO_4)	15.06				483.0
Phosphate (mg/l PO_4)	—				—
Copper(mg/l Cu)	0.006				5.0
Aluminum(mg/l Al)	0.002				0.4
Chromium(mg/l Cr)	0.001				0.1
Boron(mg/l B)	0.007				0.3
Lead (mg/l)	Nil				—
Total Coliform Per 100 ml	—				—
Fecal Coliform Per 100 ml	—				—

REMARK:- The test result can be compared with the Ethiopian Standard maximum allowable concentration (mg/l) presented on the last column. The water sample was collected and submitted to our laboratory by the client.

Checked by: [signature]
Date: 5/7/2013

Approved by: [signature]
Date: 05/07/2013

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Water Works Design and
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SELECTED PHYSIO CHEMICAL AND BACTERIOLOGICAL WATER ANALYSIS RESULTS
Client/Project:AG CONSULT, Consulting Hydrogeologyist and Engineers

SOURCE OF SAMPLE	Well				Ethiopian Standard maximum allowable Concentration (mg/l)
LOCATION	Gurage Zone				
DATE OF COLLECTION	15/6/2013				
DATE RECEIVED	17/6/2013				
CLIENTS ID.NO.	KELLA				
LAB.ID NO.	2375/2005				–
Colour (app)	Colourless				
Odor	Odourless				–
Taste	Tasteless				–
Turbidity (NTU)	Nil				7.0
Total Solids 105 ^{0}C (mg/l)	386.00				–
T. Dissolved Solid 105^{0}C(mg/l)	380.00				1776.0
Electrical Conductivity (µS/cm)	573				–
P^H	6.40				6.5-8.5
Ammonia (mg/l NH_3)	0.19				2.0
Sodium (mg/l Na)	18.50				358.0
Potassium (mg/l K)	4.70				–
Total Hardness (mg/l Ca CO_3)	250.00				392.0
Calcium (mg/l Ca)	81.60				–
Magnesium (mg/l Mg)	11.04				–
Total Iron (mg/l Fe)	0.03				0.4
Manganese (mg/l Mn)	0.04				0.13
Fluoride (mg/l F)	0.51				3.0
Chloride (mg/l Cl)	10.92				533.0
Nitrite (mg/l NO_2)	0.01				6.0
Nitrate (mg/l NO_3)	12.42				50.0
Alkalinity (mg/l $CaCO_3$)	160				–
Carbonate (mg/l CO_3)	Nil				–
Bicarbonate (mg/l HCO_3)	195.2				–
Sulphate (mg/l SO_4)	133.23				483.0
Phosphate (mg/l PO_4)	–				–
Copper(mg/l Cu)	0.008				5.0
Aluminum(mg/l Al)	0.002				0.4
Chromium(mg/l Cr)	0.005				0.1
Boron(mg/l B)	0.057				0.3
Lead (mg/l)	Nil				–
Total Coliform Per 100 ml	–				–
Fecal Coliform Per 100 ml	–				–

REMARK:- The test result can be compared with the Ethiopian Standard maximum allowable concentration (mg/l) presented on the last column.The water sample was collected and submitted to our laboratory by the client.

Checked by: _____
Date: 5/7/2013

Approved by: _____
Date: 05/07/2013

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SELECTED PHYSIO CHEMICAL AND BACTERIOLOGICAL WATER ANALYSIS RESULTS
Client/Project:AG CONSULT, Consulting Hydrogeologyist and Engineers

SOURCE OF SAMPLE	Well				Ethiopian Standard maximum allowable Concentration (mg/l)
LOCATION	Gurage Zone				
DATE OF COLLECTION	17/6/2013				
DATE RECEIVED	17/6/2013				
CLIENTS ID.NO.	TIYA				
LAB.ID NO.	2378/2005				–
Colour (app)	Colourless				
Odor	Odourless				–
Taste	Tasteless				–
Turbidity (NTU)	0.37				7.0
Total Solids 105 ^{0}C (mg/l)	212.00				–
T. Dissolved Solid 105^{0}C(mg/l)	200.00				1776.0
Electrical Conductivity (µS/cm)	354.00				–
P^H	6.60				6.5-8.5
Ammonia (mg/l NH_3)	0.20				2.0
Sodium (mg/l Na)	11.50				358.0
Potassium (mg/l K)	7.70				–
Total Hardness (mg/l Ca CO_3)	160.00				392.0
Calcium (mg/l Ca)	47.20				–
Magnesium (mg/l Mg)	10.08				–
Total Iron (mg/l Fe)	0.05				0.4
Manganese (mg/l Mn)	0.01				0.13
Fluoride (mg/l F)	0.63				3.0
Chloride (mg/l Cl)	5.46				533.0
Nitrite (mg/l NO_2)	0.01				6.0
Nitrate (mg/l NO_3)	0.67				50.0
Alkalinity (mg/l $CaCO_3$)	184.00				–
Carbonate (mg/l CO_3)	Nil				–
Bicarbonate (mg/l HCO_3)	224.48				–
Sulphate (mg/l SO_4)	0.33				483.0
Phosphate (mg/l PO_4)	–				–
Copper(mg/l Cu)	0.006				5.0
Aluminum(mg/l Al)	0.002				0.4
Chromium(mg/l Cr)	0.001				0.1
Boron(mg/l B)	0.107				0.3
Lead (mg/l)	Nil				–
Total Coliform Per 100 ml	–				–
Fecal Coliform Per 100 ml	–				–

REMARK:- The test result can be compared with the Ethiopian Standard maximum allowable concentration (mg/l) presented on the last column. The water sample was collected and submitted to our laboratory by the client.

Checked by: _____ Approved by: _____
Date: 5/7/2013 Date: 05/07/2013

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SELECTED PHYSIO CHEMICAL AND BACTERIOLOGICAL WATER ANALYSIS RESULTS
Client/Project:AG CONSULT, Consulting Hydrogeologyist and Engineers

SOURCE OF SAMPLE	Well				Ethiopian Standard maximum allowable Concentration (mg/l)
LOCATION	Sodo				
DATE OF COLLECTION	13/6/2013				
DATE RECEIVED	14/6/2013				
CLIENTS ID.NO.	ADILO				
LAB.ID NO.	2367/2005				–
Colour (app)	Colourless				
Odor	Odourless				–
Taste	Tasteless				–
Turbidity (NTU)	0.37				7.0
Total Solids 105 ^{0}C (mg/l)	190.00				–
T. Dissolved Solid 105^{0}C(mg/l)	180.00				1776.0
Electrical Conductivity (µS/cm)	313				–
P^H	6.95				6.5-8.5
Ammonia (mg/l NH_3)	0.14				2.0
Sodium (mg/l Na)	32.00				358.0
Potassium (mg/l K)	9.90				–
Total Hardness (mg/l Ca CO_3)	92.00				392.0
Calcium (mg/l Ca)	20.00				–
Magnesium (mg/l Mg)	10.08				–
Total Iron (mg/l Fe)	0.03				0.4
Manganese (mg/l Mn)	0.02				0.13
Fluoride (mg/l F)	0.65				3.0
Chloride (mg/l Cl)	3.64				533.0
Nitrite (mg/l NO_2)	0.01				6.0
Nitrate (mg/l NO_3)	0.78033				50.0
Alkalinity (mg/l $CaCO_3$)	160				–
Carbonate (mg/l CO_3)	Nil				–
Bicarbonate (mg/l HCO_3)	195.2				–
Sulphate (mg/l SO_4)	0.22				483.0
Phosphate (mg/l PO_4)	–				–
Copper(mg/l Cu)	0.004				5.0
Aluminum(mg/l Al)	0.002				0.4
Chromium(mg/l Cr)	0.006				0.1
Boron(mg/l B)	0.079				0.3
Lead (mg/l)	Nil				–
Total Coliform Per 100 ml	–				–
Fecal Coliform Per 100 ml	–				–

REMARK:- The test result can be compared with the Ethiopian Standard maximum allowable concentration (mg/l) presented on the last column. The water sample was collected and submitted to our laboratory by the client.

Checked by: _____ Approved by: _____
Date: 5/7/2013 Date: 05/07/2013

Water Works Design and Supervision Enterprise Laboratory Service

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SELECTED PHYSIO CHEMICAL AND BACTERIOLOGICAL WATER ANALYSIS RESULTS

Client/Project:AG CONSULT, Consulting Hydrogeologyist and Engineers

SOURCE OF SAMPLE	Well				Ethiopian Standard maximum allowable Concentration (mg/l)
LOCATION	Sodo				
DATE OF COLLECTION	12/6/2013				
DATE RECEIVED	14/6/2013				
CLIENTS ID.NO.	TEFERI KELLA				
LAB.ID NO.	2370/2005				–
Colour (app)	Colourless				
Odor	Odourless				–
Taste	Tasteless				–
Turbidity (NTU)	0.37				7.0
Total Solids I05 ^{0}C (mg/l)	230.00				–
T. Dissolved Solid 105^{0}C(mg/l)	220.00				1776.0
Electrical Conductivity (µS/cm)	381.00				–
P^H	7.36				6.5-8.5
Ammonia (mg/l NH_3)	0.16				2.0
Sodium (mg/l Na)	52.00				358.0
Potassium (mg/l K)	3.90				–
Total Hardness (mg/l Ca CO_3)	74.00				392.0
Calcium (mg/l Ca)	18.40				–
Magnesium (mg/l Mg)	6.72				–
Total Iron (mg/l Fe)	0.03				0.4
Manganese (mg/l Mn)	0.02				0.13
Fluoride (mg/l F)	0.86				3.0
Chloride (mg/l Cl)	3.64				533.0
Nitrite (mg/l NO_2)	0.01				6.0
Nitrate (mg/l NO_3)	0.40				50.0
Alkalinity (mg/l $CaCO_3$)	204.00				–
Carbonate (mg/l CO_3)	Nil				–
Bicarbonate (mg/l HCO_3)	248.88				–
Sulphate (mg/l SO_4)	0.11				483.0
Phosphate (mg/l PO_4)	–				–
Copper(mg/l Cu)	0.005				5.0
Aluminum(mg/l Al)	0.002				0.4
Chromium(mg/l Cr)	0.002				0.1
Boron(mg/l B)	0.007				0.3
Lead (mg/l)	Nil				–
Total Coliform Per 100 ml	–				–
Fecal Coliform Per 100 ml	–				–

REMARK:- The test result can be compared with the Ethiopian Standard maximum allowable concentration (mg/l) presented on the last column.The water sample was collected and submitted to our laboratory by the client.

Checked by: _____
Date: 5/7/2013

Approved by: _____
Date: 05/7/2013

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SELECTED PHYSIO CHEMICAL AND BACTERIOLOGICAL WATER ANALYSIS RESULTS

Client/Project:AG CONSULT, Consulting Hydrogeologyist and Engineers

SOURCE OF SAMPLE	Well				Ethiopian Standard maximum allowable Concentration (mg/l)
LOCATION	Silte Zone				
DATE OF COLLECTION	15/6/2013				
DATE RECEIVED	17/6/2013				
CLIENTS ID.NO.	DALOCHA				
LAB.ID NO.	2377/2005				–
Colour (app)	Colourless				
Odor	Odourless				–
Taste	Tasteless				–
Turbidity (NTU)	0.4				7.0
Total Solids 105 °C (mg/l)	220.00				–
T. Dissolved Solid 105°C(mg/l)	210.00				1776.0
Electrical Conductivity (μS/cm)	358.00				–
p^H	6.83				6.5-8.5
Ammonia (mg/l NH_3)	0.12				2.0
Sodium (mg/l Na)	49.00				358.0
Potassium (mg/l K)	9.40				–
Total Hardness (mg/l Ca CO_3)	62.00				392.0
Calcium (mg/l Ca)	18.40				–
Magnesium (mg/l Mg)	3.84				–
Total Iron (mg/l Fe)	0.03				0.4
Manganese (mg/l Mn)	0.01				0.13
Fluoride (mg/l F)	1.45				3.0
Chloride (mg/l Cl)	5.46				533.0
Nitrite (mg/l NO_2)	0.02				6.0
Nitrate (mg/l NO_3)	0.91				50.0
Alkalinity (mg/l $CaCO_3$)	180.00				–
Carbonate (mg/l CO_3)	Nil				–
Bicarbonate (mg/l HCO_3)	219.60				–
Sulphate (mg/l SO_4)	0.22				483.0
Phosphate (mg/l PO_4)	–				–
Copper(mg/l Cu)	0.002				5.0
Aluminum(mg/l Al)	0.002				0.4
Chromium(mg/l Cr)	0.001				0.1
Boron(mg/l B)	0.086				0.3
Lead (mg/l)	Nil				–
Total Coliform Per 100 ml	–				–
Fecal Coliform Per 100 ml	–				–

REMARK:- The test result can be compared with the Ethiopian Standard maximum allowable concentration (mg/l) presented on the last column. The water sample was collected and submitted to our laboratory by the client.

Checked by: [signature]
Date: 5/7/2013

Approved by: [signature]
Date: 05/07/2013

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SELECTED PHYSIO CHEMICAL AND BACTERIOLOGICAL WATER ANALYSIS RESULTS
Client/Project:AG CONSULT, Consulting Hydrogeologyist and Engineers

						Ethiopian Standard maximum allowable Concentration (mg/l)
SOURCE OF SAMPLE	Well					
LOCATION	Silte Zone					
DATE OF COLLECTION	15/6/2013					
DATE RECEIVED	17/6/2013					
CLIENTS ID.NO.	MITTO					
LAB.ID NO.	2376/2005					–
Colour (app)	Colourless					
Odor	Odourless					–
Taste	Tasteless					–
Turbidity (NTU)	Nil					7.0
Total Solids I05 ^{0}C (mg/l)	278.00					–
T. Dissolved Solid 105^{0}C(mg/l)	270.00					1776.0
Electrical Conductivity (µS/cm)	429.00					–
P^H	7.09					6.5-8.5
Ammonia (mg/l NH_3)	0.19					2.0
Sodium (mg/l Na)	58.00					358.0
Potassium (mg/l K)	10.00					–
Total Hardness (mg/l Ca CO_3)	126.00					392.0
Calcium (mg/l Ca)	28.00					–
Magnesium (mg/l Mg)	13.44					–
Total Iron (mg/l Fe)	0.03					0.4
Manganese (mg/l Mn)	0.03					0.13
Fluoride (mg/l F)	0.74					3.0
Chloride (mg/l Cl)	7.28					533.0
Nitrite (mg/l NO_2)	0.01					6.0
Nitrate (mg/l NO_3)	3.31					50.0
Alkalinity (mg/l $CaCO_3$)	226.00					–
Carbonate (mg/l CO_3)	Nil					–
Bicarbonate (mg/l HCO_3)	275.72					–
Sulphate (mg/l SO_4)	0.89					483.0
Phosphate (mg/l PO_4)	–					–
Copper(mg/l Cu)	0.004					5.0
Aluminum(mg/l Al)	0.002					0.4
Chromium(mg/l Cr)	0.005					0.1
Boron(mg/i B)	0.064					0.3
Lead (mg/l)	Nil					–
Total Coliform Per 100 ml	–					–
Fecal Coliform Per 100 ml	–					–

REMARK:- The test result can be compared with the Ethiopian Standard maximum allowable concentration (mg/l) presented on the last column.The water sample was collected and submitted to our laboratory by the client.

Checked by: _____ Approved by: _____
Date: 5/7/2013 Date: 05/07/2013

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SELECTED PHYSIO CHEMICAL AND BACTERIOLOGICAL WATER ANALYSIS RESULTS
Client/Project:AG CONSULT, Consulting Hydrogeologyist and Engineers

SOURCE OF SAMPLE	Well				Ethiopian Standard maximum allowable Concentration (mg/l)
LOCATION	Silte Zone				
DATE OF COLLECTION	14/6/2013				
DATE RECEIVED	17/6/2013				
CLIENTS ID.NO.	TORRA 01				
LAB.ID NO.	2374/2005				–
Colour (app)	Colourless				
Odor	Odourless				–
Taste	Tasteless				–
Turbidity (NTU)	0.37				7.0
Total Solids I05 ^{0}C (mg/l)	612.00				–
T. Dissolved Solid 105^{0}C(mg/l)	600.00				1776.0
Electrical Conductivity (µS/cm)	971.00				–
P^H	7.19				6.5-8.5
Ammonia (mg/l NH_3)	0.15				2.0
Sodium (mg/l Na)	180.00				358.0
Potassium (mg/l K)	22.00				–
Total Hardness (mg/l Ca CO_3)	130.00				392.0
Calcium (mg/l Ca)	48.00				–
Magnesium (mg/l Mg)	2.40				–
Total Iron (mg/l Fe)	0.03				0.4
Manganese (mg/l Mn)	0.04				0.13
Fluoride (mg/l F)	1.64				3.0
Chloride (mg/l Cl)	23.66				533.0
Nitrite (mg/l NO_2)	0.01				6.0
Nitrate (mg/l NO_3)	1.18				50.0
Alkalinity (mg/l $CaCO_3$)	474.00				–
Carbonate (mg/l CO_3)	Nil				–
Bicarbonate (mg/l HCO_3)	578.28				–
Sulphate (mg/l SO_4)	36.55				483.0
Phosphate (mg/l PO_4)	–				–
Copper(mg/l Cu)	0.001				5.0
Aluminum(mg/l Al)	0.002				0.4
Chromium(mg/l Cr)	0.004				0.1
Boron(mg/l B)	0.129				0.3
Lead (mg/l)	Nil				–
Total Coliform Per 100 ml	–				–
Fecal Coliform Per 100 ml	–				–

REMARK:- The test result can be compared with the Ethiopian Standard maximum allowable concentration (mg/l) presented on the last column.The water sample was collected and submitted to our laboratory by the client.

Checked by: _____ Approved by: _____
Date: 5/7/2013 Date: 05/07/2013

Water Works Design and Supervision Enterprise Laboratory

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SELECTED PHYSIO CHEMICAL AND BACTERIOLOGICAL WATER ANALYSIS RESULTS
Client/Project:AG CONSULT, Consulting Hydrogeologyist and Engineers

SOURCE OF SAMPLE	Well				Ethiopian Standard maximum allowable Concentration (mg/l)
LOCATION	Silte Zone				
DATE OF COLLECTION	14/6/2013				
DATE RECEIVED	17/6/2013				
CLIENTS ID.NO.	TORRA 02				
LAB.ID NO.	2373/2005				–
Colour (app)	Colourless				
Odor	Odourless				–
Taste	Tasteless				–
Turbidity (NTU)	0.37				7.0
Total Solids 105 ^{0}C (mg/l)	628.00				–
T. Dissolved Solid 105^{0}C(mg/l)	620.00				1776.0
Electrical Conductivity (µS/cm)	1002.00				–
P^H	7.48				6.5-8.5
Ammonia (mg/l NH_3)	0.17				2.0
Sodium (mg/l Na)	166.00				358.0
Potassium (mg/l K)	21.00				–
Total Hardness (mg/l Ca CO_3)	122.00				392.0
Calcium (mg/l Ca)	46.40				–
Magnesium (mg/l Mg)	1.44				–
Total Iron (mg/l Fe)	0.03				0.4
Manganese (mg/l Mn)	0.03				0.13
Fluoride (mg/l F)	1.63				3.0
Chloride (mg/l Cl)	28.21				533.0
Nitrite (mg/l NO_2)	0.02				6.0
Nitrate (mg/l NO_3)	0.80				50.0
Alkalinity (mg/l $CaCO_3$)	456.00				–
Carbonate (mg/l CO_3)	Nil				–
Bicarbonate (mg/l HCO_3)	556.32				–
Sulphate (mg/l SO_4)	51.94				483.0
Phosphate (mg/l PO_4)	–				–
Copper(mg/l Cu)	0.005				5.0
Aluminum(mg/l Al)	0.006				0.4
Chromium(mg/l Cr)	0.007				0.1
Boron(mg/l B)	0.150				0.3
Lead (mg/l)	Nil				–
Total Coliform Per 100 ml	–				–
Fecal Coliform Per 100 ml	–				–

REMARK:- The test result can be compared with the Ethiopian Standard maximum allowable concentration (mg/l) presented on the last column.The water sample was collected and submitted to our laboratory by the client.

Checked by: _____ Approved by: _____
Date: 5/7/2013 Date: 05/7/2013

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SELECTED PHYSIO CHEMICAL AND BACTERIOLOGICAL WATER ANALYSIS RESULTS
Client/Project:AG CONSULT, Consulting Hydrogeologyist and Engineers

SOURCE OF SAMPLE	Well				Ethiopian Standard maximum allowable Concentration (mg/l)
LOCATION	Sodo				
DATE OF COLLECTION	13/6/2013				
DATE RECEIVED	14/6/2013				
CLIENTS ID.NO.	SANKURA				
LAB.ID NO.	2369/2005				–
Colour (app)	Colourless				
Odor	Odourless				–
Taste	Tasteless				–
Turbidity (NTU)	0.4				7.0
Total Solids 105 ^{0}C (mg/l)	408.00				–
T. Dissolved Solid 105^{0}C(mg/l)	400.00				1776.0
Electrical Conductivity (µS/cm)	640.00				–
P^H	7.82				6.5-8.5
Ammonia (mg/l NH_3)	0.15				2.0
Sodium (mg/l Na)	105.0				358.0
Potassium (mg/l K)	13.00				–
Total Hardness (mg/l Ca CO_3)	136.00				392.0
Calcium (mg/l Ca)	44.00				–
Magnesium (mg/l Mg)	6.24				–
Total Iron (mg/l Fe)	0.03				0.4
Manganese (mg/l Mn)	0.04				0.13
Fluoride (mg/l F)	1.63				3.0
Chloride (mg/l Cl)	5.46				533.0
Nitrite (mg/l NO_2)	0.02				6.0
Nitrate (mg/l NO_3)	0.44				50.0
Alkalinity (mg/l $CaCO_3$)	338.00				–
Carbonate (mg/l CO_3)	Nil				–
Bicarbonate (mg/l HCO_3)	412.36				–
Sulphate (mg/l SO_4)	0.22				483.0
Phosphate (mg/l PO_4)	–				–
Copper(mg/l Cu)	0.005				5.0
Aluminum(mg/l Al)	0.002				0.4
Chromium(mg/l Cr)	0.004				0.1
Boron(mg/l B)	0.114				0.3
Lead (mg/l)	Nil				–
Total Coliform Per 100 ml	–				–
Fecal Coliform Per 100 ml	–				–

REMARK:- The test result can be compared with the Ethiopian Standard maximum allowable concentration (mg/l) presented on the last column.The water sample was collected and submitted to our laboratory by the client.

Checked by: _____
Date: 5/7/2013

Approved by: _____
Date: 05/7/2013

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SELECTED PHYSIO CHEMICAL AND BACTERIOLOGICAL WATER ANALYSIS RESULTS
Client/Project:AG CONSULT, Consulting Hydrogeologyist and Engineers

SOURCE OF SAMPLE	Well				Ethiopian Standard maximum allowable Concentration (mg/l)
LOCATION	Silte Zone				
DATE OF COLLECTION	25/6/2013				
DATE RECEIVED	17/6/2013				
CLIENTS ID.NO.	KIBET-01				
LAB.ID NO.	2372/2005				–
Colour (app)	Colourless				
Odor	Odourless				–
Taste	Tasteless				–
Turbidity (NTU)	0.37				7.0
Total Solids I05 ^{0}C (mg/l)	316.00				–
T. Dissolved Solid 105^{0}C(mg/l)	300.00				1776.0
Electrical Conductivity (µS/cm)	486.00				–
P^H	6.50				6.5-8.5
Ammonia (mg/l NH_3)	0.15				2.0
Sodium (mg/l Na)	41.00				358.0
Potassium (mg/l K)	10.10				–
Total Hardness (mg/l Ca CO_3)	176.00				392.0
Calcium (mg/l Ca)	62.40				–
Magnesium (mg/l Mg)	4.80				–
Total Iron (mg/l Fe)	0.03				0.4
Manganese (mg/l Mn)	0.03				0.13
Fluoride (mg/l F)	0.59				3.0
Chloride (mg/l Cl)	7.28				533.0
Nitrite (mg/l NO_2)	0.02				6.0
Nitrate (mg/l NO_3)	12.25				50.0
Alkalinity (mg/l $CaCO_3$)	226.00				–
Carbonate (mg/l CO_3)	Nil				–
Bicarbonate (mg/l HCO_3)	275.72				–
Sulphate (mg/l SO_4)	4.87				483.0
Phosphate (mg/l PO_4)	–				–
Copper(mg/l Cu)	0.005				5.0
Aluminum(mg/l Al)	0.002				0.4
Chromium(mg/l Cr)	0.001				0.1
Boron(mg/l B)	0.114				0.3
Lead (mg/l)	Nil				–
Total Coliform Per 100 ml	–				–
Fecal Coliform Per 100 ml	–				–

REMARK:- The test result can be compared with the Ethiopian Standard maximum allowable concentration (mg/l) presented on the last column.The water sample was collected and submitted to our laboratory by the client.

Checked by: _____
Date: 5/7/2013

Approved by: _____
Date: 05/07/2013

Water Works Design and Supervision Enterprise Laboratory Service

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SELECTED PHYSIO CHEMICAL AND BACTERIOLOGICAL WATER ANALYSIS RESULTS

Client/Project:AG CONSULT, Consulting Hydrogeologyist and Engineers

SOURCE OF SAMPLE	Well				Ethiopian Standard maximum allowable Concentration (mg/l)
LOCATION	Silte Zone				
DATE OF COLLECTION	15/6/2013				
DATE RECEIVED	17/6/2013				
CLIENTS ID.NO.	KIBET 02				
LAB.ID NO.	2379/2005				–
Colour (app)	Colourless				
Odor	Odourless				–
Taste	Tasteless				–
Turbidity (NTU)	Nil				7.0
Total Solids I05 ^{0}C (mg/l)	266.00				–
T. Dissolved Solid 105^{0}C(mg/l)	260.00				1776.0
Electrical Conductivity (µS/cm)	455.00				–
P^H	6.65				6.5-8.5
Ammonia (mg/l NH_3)	0.19				2.0
Sodium (mg/l Na)	33.50				358.0
Potassium (mg/l K)	9.30				–
Total Hardness (mg/l Ca CO_3)	166.00				392.0
Calcium (mg/l Ca)	49.60				–
Magnesium (mg/l Mg)	10.08				–
Total Iron (mg/l Fe)	0.04				0.4
Manganese (mg/l Mn)	0.01				0.13
Fluoride (mg/l F)	0.63				3.0
Chloride (mg/l Cl)	6.37				533.0
Nitrite (mg/l NO_2)	0.02				6.0
Nitrate (mg/l NO_3)	6.01				50.0
Alkalinity (mg/l $CaCO_3$)	222.00				–
Carbonate (mg/l CO_3)	Nil				–
Bicarbonate (mg/l HCO_3)	270.84				–
Sulphate (mg/l SO_4)	1.77				483.0
Phosphate (mg/l PO_4)	–				–
Copper(mg/l Cu)	0.004				5.0
Aluminum(mg/l Al)	0.002				0.4
Chromium(mg/l Cr)	0.006				0.1
Boron(mg/l B)	0.007				0.3
Lead (mg/l)	Nil				–
Total Coliform Per 100 ml	–				–
Fecal Coliform Per 100 ml	–				–

REMARK:- The test result can be compared with the Ethiopian Standard maximum allowable concentration (mg/l) presented on the last column. The water sample was collected and submitted to our laboratory by the client.

Checked by: _____ Approved by: _____

Date: 5/7/2013 Date: 05/07/2013

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SELECTED PHYSIO CHEMICAL AND BACTERIOLOGICAL WATER ANALYSIS RESULTS

Client/Project: AG CONSULT, Consulting Hydrogeologyist and Engineers

SOURCE OF SAMPLE	Well				Ethiopian Standard maximum allowable Concentration (mg/l)
LOCATION	Silte Zone				
DATE OF COLLECTION	15/6/2013				
DATE RECEIVED	17/6/2013				
CLIENTS ID.NO.	LAKE				
LAB.ID NO.	2381/2003				
Colour (app)	Colourless				–
Odor	Odourless				–
Taste	Tasteless				–
Turbidity (NTU)	0.73				7.0
Total Solids 105 ^{0}C (mg/l)	300.00				–
T. Dissolved Solid 105^{0}C(mg/l)	280.00				1776.0
Electrical Conductivity (µS/cm)	438.00				–
p^H	8.56				6.5-8.5
Ammonia (mg/l NH_3)	0.19				2.0
Sodium (mg/l Na)	47.00				358.0
Potassium (mg/l K)	12.00				–
Total Hardness (mg/l Ca CO_3)	150.00				392.0
Calcium (mg/l Ca)	33.60				–
Magnesium (mg/l Mg)	15.84				–
Total Iron (mg/l Fe)	0.04				0.4
Manganese (mg/l Mn)	0.02				0.13
Fluoride (mg/l F)	0.55				3.0
Chloride (mg/l Cl)	10.01				533.0
Nitrite (mg/l NO_2)	0.02				6.0
Nitrate (mg/l NO_3)	0.46				50.0
Alkalinity (mg/l $CaCO_3$)	236.00				–
Carbonate (mg/l CO_3)	36.00				–
Bicarbonate (mg/l HCO_3)	214.72				–
Sulphate (mg/l SO_4)	0.29				483.0
Phosphate (mg/l PO_4)	–				–
Copper(mg/l Cu)	0.005				5.0
Aluminum(mg/l Al)	0.004				0.4
Chromium(mg/l Cr)	0.002				0.1
Boron(mg/l B)	0.007				0.3
Lead (mg/l)	Nil				–
Total Coliform Per 100 ml	–				–
Fecal Coliform Per 100 ml	–				–

REMARK:- The test result can be compared with the Ethiopian Standard maximum allowable concentration (mg/l) presented on the last column. The water sample was collected and submitted to our laboratory by the client.

Checked by: [signature]
Date: 5/7/2013

Approved by: [signature]
Date: 05/11/2013

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SELECTED PHYSIO CHEMICAL AND BACTERIOLOGICAL WATER ANALYSIS RESULTS
Client/Project:AG CONSULT, Consulting Hydrogeologyist and Engineers

SOURCE OF SAMPLE	Well				Ethiopian Standard maximum allowable Concentration (mg/l)
LOCATION	Sodo				
DATE OF COLLECTION	13/6/2013				
DATE RECEIVED	14/6/2013				
CLIENTS ID.NO.	TEBELLA				
LAB.ID NO.	2368/2005				–
Colour (app)	Colourless				
Odor	Odourless				–
Taste	Tasteless				–
Turbidity (NTU)	0.37				7.0
Total Solids 105 ^{0}C (mg/l)	172.00				–
T. Dissolved Solid 105^{0}C(mg/l)	160.00				1776.0
Electrical Conductivity (µS/cm)	260.00				–
P^H	6.90				6.5-8.5
Ammonia (mg/l NH_3)	0.14				2.0
Sodium (mg/l Na)	15.00				358.0
Potassium (mg/l K)	4.90				–
Total Hardness (mg/l Ca CO_3)	104.00				392.0
Calcium (mg/l Ca)	29.60				–
Magnesium (mg/l Mg)	7.20				–
Total Iron (mg/l Fe)	0.03				0.4
Manganese (mg/l Mn)	0.02				0.13
Fluoride (mg/l F)	0.52				3.0
Chloride (mg/l Cl)	2.73				533.0
Nitrite (mg/l NO_2)	0.01				6.0
Nitrate (mg/l NO_3)	2.17				50.0
Alkalinity (mg/l $CaCO_3$)	138.00				–
Carbonate (mg/l CO_3)	Nil				–
Bicarbonate (mg/l HCO_3)	168.36				–
Sulphate (mg/l SO_4)	0.22				483.0
Phosphate (mg/l PO_4)	–				–
Copper(mg/l Cu)	0.001				5.0
Aluminum(mg/l Al)	0.002				0.4
Chromium(mg/l Cr)	0.002				0.1
Boron(mg/l B)	0.100				0.3
Lead (mg/l)	Nil				–
Total Coliform Per 100 ml	–				–
Fecal Coliform Per 100 ml	–				–

REMARK:- The test result can be compared with the Ethiopian Standard maximum allowable concentration (mg/l) presented on the last column.The water sample was collected and submitted to our laboratory by the client.

Checked by: _____
Date: 5/7/2013

Approved by: _____
Date: 05/07/2013

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Water Works Design and Supervision
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SELECTED PHYSIO CHEMICAL AND BACTERIOLOGICAL WATER ANALYSIS RESULTS
Client/Project: TAM Geo-Engineering P.L.C.

						Ethiopian Standard maximum allowable Concentration (mg/l)
SOURCE OF SAMPLE	Well					
LOCATION	Gurage Zone					
DATE OF COLLECTION	26/11/2013					
DATE RECEIVED	29/11/2013					
CLIENTS ID.NO.	Tiya					
LAB.ID NO.	923/2006					–
Colour (app)	Colourless					–
Odor	Odorless					–
Taste	Tasteless					–
Turbidity (NTU)	Trace					7.0
Total Solids I05 ^{0}C (mg/l)	244.00					–
T. Dissolved Solid 105^{0}C(mg/l)	240.00					1776.0
Electrical Conductivity (µS/cm)	398.00					–
P^H	7.60					6.5-8.5
Ammonia (mg/l NH_3)	0.29					2.0
Sodium (mg/l Na)	25.00					358.0
Potassium (mg/l K)	7.90					–
Total Hardness (mg/l Ca CO_3)	172.00					392.0
Calcium (mg/l Ca)	44.00					–
Magnesium (mg/l Mg)	14.88					–
Total Iron (mg/l Fe)	0.07					0.4
Manganese (mg/l Mn)	0.03					0.13
Fluoride (mg/l F)	0.86					3.0
Chloride (mg/l Cl)	6.37					533.0
Nitrite (mg/l NO_2)	0.04					6.0
Nitrate (mg/l NO_3)	0.74					50.0
Alkalinity (mg/l $CaCO_3$)	214.00					–
Carbonate (mg/l CO_3)	Nil					–
Bicarbonate (mg/l HCO_3)	261.08					–
Sulphate (mg/l SO_4)	0.22					483.0
Phosphate (mg/l PO_4)	–					–
Copper(mg/l Cu)	0.005					5.0
Aluminum(mg/l Al)	0.008					0.4
Chromium(mg/l Cr)	Trace					0.1
Boron(mg/l B)	0.072					0.3

REMARK:- The test result can be compared with the Ethiopian Standard maximum allowable concentration (mg/l) indicated on the last column. The water sample was collected and submitted to our laboratory by the client.

Tested by: [illegible] Processed By Tufa Checked by: [illegible] Approved by: [illegible]

Date: 23-12-2013 Date 23/12/2013 Date 24/12/13 Date: 24/12/13

Water Works Design and Supervision Enterprise Laboratory Service

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Water Works Design and Supervision Enterprise Laboratory Service Sub Process

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SELECTED PHYSIO CHEMICAL AND BACTERIOLOGICAL WATER ANALYSIS RESULTS
Client/Project: TAM Geo-Engineering P.L.C.

SOURCE OF SAMPLE	Well				Ethiopian Standard maximum allowable Concentration (mg/l)
LOCATION	Gurage Zone				
DATE OF COLLECTION	30/12/2013				
DATE RECEIVED	2/1/2014				
CLIENTS ID.NO.	Koshe				
LAB.ID NO.	1196/2006				–
Colour (app)	Colourless				–
Odor	Odorless				–
Taste	Tasteless				–
Turbidity (NTU)	Trace				7.0
Total Solids I05 ^{0}C (mg/l)	470.0				–
T. Dissolved Solid 105^{0}C(mg/l)	460.0				1776.0
Electrical Conductivity (µS/cm)	750				–
P^H	7.97				6.5-8.5
Ammonia (mg/l NH_3)	1.53				2.0
Sodium (mg/l Na)	138.00				358.0
Potassium (mg/l K)	8.60				–
Total Hardness (mg/l Ca CO_3)	70.00				392.0
Calcium (mg/l Ca)	16.80				–
Magnesium (mg/l Mg)	6.72				–
Total Iron (mg/l Fe)	0.17				0.4
Manganese (mg/l Mn)	0.06				0.13
Fluoride (mg/l F)	1.14				3.0
Chloride (mg/l Cl)	5.46				533.0
Nitrite (mg/l NO_2)	Trace				6.0
Nitrate (mg/l NO_3)	0.08				50.0
Alkalinity (mg/l $CaCO_3$)	410.00				–
Carbonate (mg/l CO_3)	Nil				–
Bicarbonate (mg/l HCO_3)	500.20				–
Sulphate (mg/l SO_4)	0.33				483.0
Phosphate (mg/l PO_4)	0.49				–
Copper(mg/l Cu)	Trace				5.0
Aluminum(mg/l Al)	0.012				0.4
Chromium(mg/l Cr)	0.002				0.1
Boron(mg/l B)	0.063				0.3

REMARK:- The test result can be compared with the Ethiopian Standard maximum allowable concentration (mg/l) indicated on the last column.The water sample was collected and submitted to our laboratory by the client.

Tested by: _____ Processed By _____ Checked by: _____ Approved by: _____
Date: 17/1/14 Date 17/1/14 Date 17/1/14 Date: 17/1/14

Water Design and Supervision Enterprise Laboratory Service

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SELECTED PHYSIO CHEMICAL AND BACTERIOLOGICAL WATER ANALYSIS RESULTS
Client/Project: TAM Geo-Engineering P.L.C.

SOURCE OF SAMPLE	Well				Ethiopian Standard maximum allowable Concentration (mg/l)
LOCATION	Gurage Zone				
DATE OF COLLECTION	2/1/2014				
DATE RECEIVED	9/1/2014				
CLIENTS ID.NO.	Kella				
LAB.ID NO.	1221/2006				–
Colour (app)	Colourless				–
Odor	Odorless				–
Taste	Tasteless				–
Turbidity (NTU)	Trace				7.0
Total Solids 105 ^{0}C (mg/l)	388.00				–
T. Dissolved Solid 105^{0}C(mg/l)	380.00				1776.0
Electrical Conductivity (µS/cm)	570.00				–
P^H	7.12				6.5-8.5
Ammonia (mg/l NH_3)	0.24				2.0
Sodium (mg/l Na)	21.50				358.0
Potassium (mg/l K)	7.00				–
Total Hardness (mg/l Ca CO_3)	264.00				392.0
Calcium (mg/l Ca)	84.00				–
Magnesium (mg/l Mg)	12.96				–
Total Iron (mg/l Fe)	0.10				0.4
Manganese (mg/l Mn)	Trace				0.13
Fluoride (mg/l F)	0.61				3.0
Chloride (mg/l Cl)	3.64				533.0
Nitrite (mg/l NO_2)	Trace				6.0
Nitrate (mg/l NO_3)	1.73				50.0
Alkalinity (mg/l $CaCO_3$)	212.00				–
Carbonate (mg/l CO_3)	Nil				–
Bicarbonate (mg/l HCO_3)	258.64				–
Sulphate (mg/l SO_4)	114.90				483.0
Phosphate (mg/l PO_4)	–				–
Copper(mg/l Cu)	0.033				5.0
Aluminum(mg/l Al)	Trace				0.4
Chromium(mg/l Cr)	0.001				0.1
Boron(mg/l B)	0.065				0.3
Zinc (mg/l)	–				15

REMARK:- The test result can be compared with the Ethiopian Standard maximum allowable concentration (mg/l) indicated on the last column. The water sample was collected and submitted to our laboratory by the client.

Tested by: [signature] Processed By [signature] Checked by: [signature] Approved by: [signature]
Date: 17/01/14 Date 17/1/14 Date 17/01/14 Date: 12/01/14

Water Works Design and Supervision Enterprise Laboratory Service

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SELECTED PHYSIO CHEMICAL AND BACTERIOLOGICAL WATER ANALYSIS RESULTS
Client/Project: TAM Geo-Engineering P.L.C.

SOURCE OF SAMPLE	Well				Ethiopian Standard maximum allowable Concentration (mg/l)
LOCATION	Wolaita				
DATE OF COLLECTION	19/1/2014				
DATE RECEIVED	28/1/2014				
CLIENTS ID.NO.	Humbo				
LAB.ID NO.	1431/2006				–
Colour (app)	Colourless				–
Odor	Odorless				–
Taste	Tasteless				–
Turbidity (NTU)	Trace				7.0
Total Solids 105 ^{0}C (mg/l)	216.00				–
T. Dissolved Solid 105^{0}C(mg/l)	210.00				1776.0
Electrical Conductivity (µS/cm)	352.00				–
P^H	6.88				6.5-8.5
Ammonia (mg/l NH_3)	0.14				2.0
Sodium (mg/l Na)	35.50				358.0
Potassium (mg/l K)	8.90				–
Total Hardness (mg/l Ca CO_3)	108.00				392.0
Calcium (mg/l Ca)	27.20				–
Magnesium (mg/l Mg)	9.60				–
Total Iron (mg/l Fe)	0.03				0.4
Manganese (mg/l Mn)	Trace				0.13
Fluoride (mg/l F)	0.58				3.0
Chloride (mg/l Cl)	3.64				533.0
Nitrite (mg/l NO_2)	0.02				6.0
Nitrate (mg/l NO_3)	0.74				50.0
Alkalinity (mg/l $CaCO_3$)	180.00				–
Carbonate (mg/l CO_3)	Nil				–
Bicarbonate (mg/l HCO_3)	219.60				–
Sulphate (mg/l SO_4)	0.22				483.0
Phosphate (mg/l PO_4)	0.22				–
Copper(mg/l Cu)	Trace				5.0
Aluminum(mg/l Al)	0.002				0.4
Chromium(mg/l Cr)	0.001				0.1
Boron(mg/l B)	0.120				0.3

REMARK:- The test result can be compared with the Ethiopian Standard maximum allowable concentration (mg/l) indicated on the last column.The water sample was collected and submitted to our laboratory by the client.

Tested by: _____ Processed By _____ Checked by: _____ Approved by: _____
Date: 04-02-2014 Date 4/2/14 Date 5/2/14 Date: 5/2/14

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Water Works Design and Supervision
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SELECTED PHYSIO CHEMICAL AND BACTERIOLOGICAL WATER ANALYSIS RESULTS
Client/Project: TAM Geo-Engineering P.L.C.

SOURCE OF SAMPLE	Well				Ethiopian Standard maximum allowable Concentration (mg/l)
LOCATION	Silte				
DATE OF COLLECTION	23/1/2014				
DATE RECEIVED	28/1/2014				
CLIENTS ID.NO.	Mito				
LAB.ID NO.	1432/2006				–
Colour (app)	Colourless				–
Odor	Odorless				–
Taste	Tasteless				–
Turbidity (NTU)	Trace				7.0
Total Solids I05 ^{0}C (mg/l)	272.00				–
T. Dissolved Solid 105^{0}C(mg/l)	260.00				1776.0
Electrical Conductivity (µS/cm)	430.00				–
P^H	7.56				6.5-8.5
Ammonia (mg/l NH_3)	0.15				2.0
Sodium (mg/l Na)	53.00				358.0
Potassium (mg/l K)	10.00				–
Total Hardness (mg/l Ca CO_3)	118.00				392.0
Calcium (mg/l Ca)	22.40				–
Magnesium (mg/l Mg)	14.88				–
Total Iron (mg/l Fe)	0.04				0.4
Manganese (mg/l Mn)	Trace				0.13
Fluoride (mg/l F)	1.96				3.0
Chloride (mg/l Cl)	7.28				533.0
Nitrite (mg/l NO_2)	0.02				6.0
Nitrate (mg/l NO_3)	4.14				50.0
Alkalinity (mg/l $CaCO_3$)	214.00				–
Carbonate (mg/l CO_3)	Nil				–
Bicarbonate (mg/l HCO_3)	261.08				–
Sulphate (mg/l SO_4)	0.33				483.0
Phosphate (mg/l PO_4)	0.26				–
Copper(mg/l Cu)	0.007				5.0
Aluminum(mg/l Al)	Trace				0.4
Chromium(mg/l Cr)	Trace				0.1
Boron(mg/l B)	0.240				0.3

REMARK:- The test result can be compared with the Ethiopian Standard maximum allowable concentration (mg/l) indicated on the last column.The water sample was collected and submitted to our laboratory by the client.

Tested by: [illegible] Processed By [illegible] Checked by: [illegible] Approved by: [illegible]
Date: 04-02-2014 Date 04/02/2014 Date 5/2/14 Date: 5/2/14

Water Works Design and Supervision Enterprise Laboratory Service

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SELECTED PHYSIO CHEMICAL AND BACTERIOLOGICAL WATER ANALYSIS RESULTS
Client/Project: TAM Geo-Engineering P.L.C.

SOURCE OF SAMPLE	–				Ethiopian Standard maximum allowable Concentration (mg/l)
LOCATION	Silite Zone				
DATE OF COLLECTION	4/2/2014				
DATE RECEIVED	10/2/2014				
CLIENTS ID.NO.	Kibet No 1				
LAB.ID NO.	1525/2006				–
Colour (app)	Colourless				–
Odor	Odorless				–
Taste	Tasteless				–
Turbidity (NTU)	Trace				7.0
Total Solids 105 ^{0}C (mg/l)	312.00				–
T. Dissolved Solid 105^{0}C(mg/l)	300.00				1776.0
Electrical Conductivity (µS/cm)	467.00				–
P^H	6.69				6.5-8.5
Ammonia (mg/l NH_3)	0.21				2.0
Sodium (mg/l Na)	33.00				358.0
Potassium (mg/l K)	8.70				–
Total Hardness (mg/l Ca CO_3)	184.00				392.0
Calcium (mg/l Ca)	63.20				–
Magnesium (mg/l Mg)	6.24				–
Total Iron (mg/l Fe)	0.02				0.4
Manganese (mg/l Mn)	0.06				0.13
Fluoride (mg/l F)	0.58				3.0
Chloride (mg/l Cl)	6.37				533.0
Nitrite (mg/l NO_2)	0.06				6.0
Nitrate (mg/l NO_3)	19.12				50.0
Alkalinity (mg/l $CaCO_3$)	230.00				–
Carbonate (mg/l CO_3)	Nil				–
Bicarbonate (mg/l HCO_3)	280.60				–
Sulphate (mg/l SO_4)	2.77				483.0
Phosphate (mg/l PO_4)	0.19				–
Copper(mg/l Cu)	0.0198				5.0
Aluminum(mg/l Al)	Trace				0.4
Chromium(mg/l Cr)	0.010				0.1
Boron(mg/l B)	0.233				0.3
Zinc (mg/l)	–				–

REMARK:- The test result can be compared with the Ethiopian Standard maximum allowable concentration (mg/l) indicated on the last column.The water sample was collected and submitted to our laboratory by the client.

Tested by: [signature] Processed By [signature] Checked by: [signature] Approved by: [signature]
Date: 17/02/14 Date 17/2/14 Date 17/2/14 Date: 17/2/14

Water Works Design and Supervision Enterprise Laboratory Service

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SELECTED PHYSIO CHEMICAL AND BACTERIOLOGICAL WATER ANALYSIS RESULTS
Client/Project: TAM Geo-Engineering P.L.C.

					Ethiopian Standard maximum allowable Concentration (mg/l)
SOURCE OF SAMPLE	Well				
LOCATION	Gurage				
DATE OF COLLECTION	15/2/2014				
DATE RECEIVED	19/2/2014				
CLIENTS ID.NO.	Kela No-2				
LAB.ID NO.	1604/2006				–
Colour (app)	Colourless				–
Odor	Odorless				–
Taste	Tasteless				–
Turbidity (NTU)	Trace				7.0
Total Solids 105 ^{0}C (mg/l)	288.00				–
T. Dissolved Solid 105^{0}C(mg/l)	280.00				1776.0
Electrical Conductivity (µS/cm)	422.00				–
P^H	6.57				6.5-8.5
Ammonia (mg/l NH_3)	0.16				2.0
Sodium (mg/l Na)	33.00				358.0
Potassium (mg/l K)	5.50				–
Total Hardness (mg/l Ca CO_3)	164.00				392.0
Calcium (mg/l Ca)	47.20				–
Magnesium (mg/l Mg)	11.04				–
Total Iron (mg/l Fe)	0.07				0.4
Manganese (mg/l Mn)	0.01				0.13
Fluoride (mg/l F)	1.06				3.0
Chloride (mg/l Cl)	7.28				533.0
Nitrite (mg/l NO_2)	0.02				6.0
Nitrate (mg/l NO_3)	1.01				50.0
Alkalinity (mg/l $CaCO_3$)	180.00				–
Carbonate (mg/l CO_3)	Nil				–
Bicarbonate (mg/l HCO_3)	219.60				–
Sulphate (mg/l SO_4)	44.54				483.0
Phosphate (mg/l PO_4)	0.24				–
Copper(mg/l Cu)	0.020				5.0
Aluminum(mg/l Al)	0.008				0.4
Chromium(mg/l Cr)	0.006				0.1
Boron(mg/l B)	0.006				0.3

REMARK:- The test result can be compared with the Ethiopian Standard maximum allowable concentration (mg/l) indicated on the last column. The water sample was collected and submitted to our laboratory by the client.

Tested by: [signature] Processed By [signature] Checked by: [signature] Approved by: [signature]
Date: 25/2/14 Date 25/2/14 Date 26/2/14 Date: 26/2/14

Water Works Design and Supervision Enterprise Laboratory Service

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SELECTED PHYSIO CHEMICAL AND BACTERIOLOGICAL WATER ANALYSIS RESULTS
Client/Project: TAM Geo-Engineering P.L.C.

						Ethiopian Standard maximum allowable Concentration (mg/l)
SOURCE OF SAMPLE	Well					
LOCATION	Silte					
DATE OF COLLECTION	18/2/2014					
DATE RECEIVED	19/2/2014					
CLIENTS ID.NO.	Alem gebeya					
LAB.ID NO.	1606/2006					–
Colour (app)	Colourless					–
Odor	Odorless					–
Taste	Tasteless					–
Turbidity (NTU)	Trace					7.0
Total Solids 105 ^{0}C (mg/l)	472.00					–
T. Dissolved Solid 105^{0}C(mg/l)	460.00					1776.0
Electrical Conductivity (µS/cm)	706.00					–
P^H	7.10					6.5-8.5
Ammonia (mg/l NH_3)	0.12					2.0
Sodium (mg/l Na)	109.00					358.0
Potassium (mg/l K)	11.90					–
Total Hardness (mg/l Ca CO_3)	160.00					392.0
Calcium (mg/l Ca)	45.60					–
Magnesium (mg/l Mg)	11.04					–
Total Iron (mg/l Fe)	0.16					0.4
Manganese (mg/l Mn)	0.09					0.13
Fluoride (mg/l F)	2.04					3.0
Chloride (mg/l Cl)	5.46					533.0
Nitrite (mg/l NO_2)	0.05					6.0
Nitrate (mg/l NO_3)	0.25					50.0
Alkalinity (mg/l $CaCO_3$)	384.00					–
Carbonate (mg/l CO_3)	Nil					–
Bicarbonate (mg/l HCO_3)	468.48					–
Sulphate (mg/l SO_4)	0.44					483.0
Phosphate (mg/l PO_4)	0.12					–
Copper(mg/l Cu)	0.040					5.0
Aluminum(mg/l Al)	0.010					0.4
Chromium(mg/l Cr)	0.004					0.1
Boron(mg/l B)	0.025					0.3

REMARK:- The test result can be compared with the Ethiopian Standard maximum allowable concentration (mg/l) indicated on the last column. The water sample was collected and submitted to our laboratory by the client.

Tested by: _____ Processed By _____ Checked by: _____ Approved by: _____
Date: 25/2/14 Date 25/2/14 Date 26/2/14 Date: 26/2/14

Water Works Design and Supervision Enterprise Laboratory Service

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SELECTED PHYSIO CHEMICAL AND BACTERIOLOGICAL WATER ANALYSIS RESULTS
Client/Project: TAM Geo-Engineering P.L.C.

SOURCE OF SAMPLE	Well				Ethiopian Standard maximum allowable Concentration (mg/l)
LOCATION	Silte				
DATE OF COLLECTION	13/2/2014				
DATE RECEIVED	19/2/2014				
CLIENTS ID.NO.	Mito				
LAB.ID NO.	1605/2006				–
Colour (app)	Colourless				–
Odor	Odorless				–
Taste	Tasteless				–
Turbidity (NTU)	Trace				7.0
Total Solids I05 ^{0}C (mg/l)	270.00				–
T. Dissolved Solid 105^{0}C(mg/l)	260.00				1776.0
Electrical Conductivity (µS/cm)	420.00				–
P^H	7.33				6.5-8.5
Ammonia (mg/l NH_3)	0.11				2.0
Sodium (mg/l Na)	46.50				358.0
Potassium (mg/l K)	9.60				–
Total Hardness (mg/l Ca CO_3)	132.00				392.0
Calcium (mg/l Ca)	33.60				–
Magnesium (mg/l Mg)	11.52				–
Total Iron (mg/l Fe)	0.04				0.4
Manganese (mg/l Mn)	0.01				0.13
Fluoride (mg/l F)	1.12				3.0
Chloride (mg/l Cl)	4.55				533.0
Nitrite (mg/l NO_2)	0.01				6.0
Nitrate (mg/l NO_3)	3.07				50.0
Alkalinity (mg/l $CaCO_3$)	210.00				–
Carbonate (mg/l CO_3)	Nil				–
Bicarbonate (mg/l HCO_3)	256.20				–
Sulphate (mg/l SO_4)	0.22				483.0
Phosphate (mg/l PO_4)	0.17				–
Copper(mg/l Cu)	0.026				5.0
Aluminum(mg/l Al)	0.006				0.4
Chromium(mg/l Cr)	0.007				0.1
Boron(mg/l B)	0.051				0.3

REMARK:- The test result can be compared with the Ethiopian Standard maximum allowable concentration (mg/l) indicated on the last column. The water sample was collected and submitted to our laboratory by the client.

Tested by: _____ Processed By _____ Checked by: _____ Approved by: _____
Date: 25/2/14 Date 25/2/14 Date 26/2/14 Date: 26/2/14

Water Works Design and Supervision Enterprise Laboratory Service

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SELECTED PHYSIO CHEMICAL AND BACTERIOLOGICAL WATER ANALYSIS RESULTS
Client/Project: TAM Geo-Engineering P.L.C.

SOURCE OF SAMPLE	Well				Ethiopian Standard maximum allowable Concentration (mg/l)
LOCATION	Sidama Zone				
DATE OF COLLECTION	19/2/2014				
DATE RECEIVED	25/2/2014				
CLIENTS ID.NO.	Teferi Kela				
LAB.ID NO.	1622/2006				–
Colour (app)	Colourless				–
Odor	Odorless				–
Taste	Tasteless				–
Turbidity (NTU)	2.92				7.0
Total Solids 105 ^{0}C (mg/l)	216.00				–
T. Dissolved Solid 105^{0}C(mg/l)	200.00				1776.0
Electrical Conductivity (µS/cm)	302.00				–
P^H	6.97				6.5-8.5
Ammonia (mg/l NH_3)	0.16				2.0
Sodium (mg/l Na)	51.50				358.0
Potassium (mg/l K)	8.30				–
Total Hardness (mg/l Ca CO_3)	50.00				392.0
Calcium (mg/l Ca)	12.80				–
Magnesium (mg/l Mg)	4.32				–
Total Iron (mg/l Fe)	0.32				0.4
Manganese (mg/l Mn)	0.01				0.13
Fluoride (mg/l F)	0.70				3.0
Chloride (mg/l Cl)	5.46				533.0
Nitrite (mg/l NO_2)	0.13				6.0
Nitrate (mg/l NO_3)	4.66				50.0
Alkalinity (mg/l $CaCO_3$)	158.00				–
Carbonate (mg/l CO_3)	Nil				–
Bicarbonate (mg/l HCO_3)	192.76				–
Sulphate (mg/l SO_4)	0.78				483.0
Phosphate (mg/l PO_4)	0.26				–
Copper(mg/l Cu)	0.05				5.0
Aluminum(mg/l Al)	Trace				0.4
Chromium(mg/l Cr)	0.011				0.1
Boron(mg/l B)	Trace				0.3

REMARK:- The test result can be compared with the Ethiopian Standard maximum allowable concentration (mg/l) indicated on the last column. The water sample was collected and submitted to our laboratory by the client.

Tested by: [illegible] Processed By [illegible]
Date: 4/3/2014 Date 4/3/14

Checked by: [illegible]
Date 04/03/14

Approved by: [illegible]
Date: 04/03/14

Water Design and Supervision Enterprise Laboratory Service

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Water Works Design and Supervision Enterprise Laboratory Service Sub Process

Water Quality Section

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Addis Ababa

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SELECTED PHYSIO CHEMICAL AND BACTERIOLOGICAL WATER ANALYSIS RESULTS
Client/Project: TAM Geo-Engineering P.L.C.

SOURCE OF SAMPLE	Well					Ethiopian Standard maximum allowable Concentration (mg/l)
LOCATION	Wolaita					
DATE OF COLLECTION	3/3/2014					
DATE RECEIVED	3/3/2014					
CLIENTS ID.NO.	Adilo No-1					
LAB.ID NO.	1682/2006					–
Colour (app)	Colourless					–
Odor	Odorless					–
Taste	Tasteless					–
Turbidity (NTU)	Trace					7.0
Total Solids I05 ^{0}C (mg/l)	196.00					–
T. Dissolved Solid 105^{0}C(mg/l)	186.00					1776.0
Electrical Conductivity (µS/cm)	289.00					–
P^H	6.72					6.5-8.5
Ammonia (mg/l NH_3)	0.15					2.0
Sodium (mg/l Na)	33.50					358.0
Potassium (mg/l K)	9.80					–
Total Hardness (mg/l Ca CO_3)	86.00					392.0
Calcium (mg/l Ca)	23.20					–
Magnesium (mg/l Mg)	6.72					–
Total Iron (mg/l Fe)	0.06					0.4
Manganese (mg/l Mn)	Trace					0.13
Fluoride (mg/l F)	0.71					3.0
Chloride (mg/l Cl)	8.19					533.0
Nitrite (mg/l NO_2)	0.01					6.0
Nitrate (mg/l NO_3)	0.36					50.0
Alkalinity (mg/l $CaCO_3$)	150.00					–
Carbonate (mg/l CO_3)	Nil					–
Bicarbonate (mg/l HCO_3)	183.00					–
Sulphate (mg/l SO_4)	0.19					483.0
Phosphate (mg/l PO_4)	0.65					–
Copper(mg/l Cu)	0.013					5.0
Aluminum(mg/l Al)	0.014					0.4
Chromium(mg/l Cr)	0.007					0.1
Boron(mg/l B)	0.042					0.3

REMARK:- The test result can be compared with the Ethiopian Standard maximum allowable concentration (mg/l) indicated on the last column. The water sample was collected and submitted to our laboratory by the client.

Tested by: _____ Processed By _____ Checked by: _____ Approved by: _____
Date: 07/03/14 Date 7/3/14 Date 10/03/14 Date: 20/3/14

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SELECTED PHYSIO CHEMICAL AND BACTERIOLOGICAL WATER ANALYSIS RESULTS
Client/Project: TAM Geo-Engineering P.L.C.

SOURCE OF SAMPLE	Well					Ethiopian Standard maximum allowable Concentration (mg/l)
LOCATION	Wolaita					
DATE OF COLLECTION	3/3/2014					
DATE RECEIVED	3/4/2014					
CLIENTS ID.NO.	Adilo No-2					
LAB.ID NO.	1683/2006					–
Colour (app)	Colourless					–
Odor	Odorless					–
Taste	Tasteless					–
Turbidity (NTU)	Trace					7.0
Total Solids 105 ^{0}C (mg/l)	198.00					–
T. Dissolved Solid 105^{0}C(mg/l)	190.00					1776.0
Electrical Conductivity (µS/cm)	295.00					–
P^H	6.75					6.5-8.5
Ammonia (mg/l NH_3)	0.21					2.0
Sodium (mg/l Na)	36.50					358.0
Potassium (mg/l K)	10.10					–
Total Hardness (mg/l Ca CO_3)	92.00					392.0
Calcium (mg/l Ca)	24.00					–
Magnesium (mg/l Mg)	7.68					–
Total Iron (mg/l Fe)	0.11					0.4
Manganese (mg/l Mn)	Trace					0.13
Fluoride (mg/l F)	0.70					3.0
Chloride (mg/l Cl)	6.37					533.0
Nitrite (mg/l NO_2)	0.01					6.0
Nitrate (mg/l NO_3)	0.42					50.0
Alkalinity (mg/l $CaCO_3$)	156.00					–
Carbonate (mg/l CO_3)	Nil					–
Bicarbonate (mg/l HCO_3)	190.32					–
Sulphate (mg/l SO_4)	0.19					483.0
Phosphate (mg/l PO_4)	0.27					–
Copper(mg/l Cu)	0.020					5.0
Aluminum(mg/l Al)	0.018					0.4
Chromium(mg/l Cr)	0.009					0.1
Boron(mg/l B)	0.036					0.3

REMARK:- The test result can be compared with the Ethiopian Standard maximum allowable concentration (mg/l) indicated on the last column. The water sample was collected and submitted to our laboratory by the client.

Tested by: _____ Date: 07/03/14
Processed By _____ Date 7/3/14
Checked by: _____ Date 10/03/14
Approved by: _____ Date: 10/3/14

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SELECTED PHYSIO CHEMICAL AND BACTERIOLOGICAL WATER ANALYSIS RESULTS
Client/Project: TAM Geo-Engineering P.L.C.

SOURCE OF SAMPLE	Well				
LOCATION	Alemgeheya				
DATE OF COLLECTION	21/3/2014				
DATE RECEIVED	24/3/2014				
CLIENTS ID.NO.	Alemgebeya 8hr				
LAB.ID NO.	1997/2006				
Colour (app)	Colourless				
Odor	Odorless				
Taste	Tasteless				
Turbidity (NTU)	Trace				
Total Solids I05 ^{0}C (mg/l)	468.00				
T. Dissolved Solid 105^{0}C(mg/l)	460.00				
Electrical Conductivity (µS/cm)	723.00				
P^H	7.27				
Ammonia (mg/l NH_3)	0.34				
Sodium (mg/l Na)	113.00				
Potassium (mg/l K)	12.90				
Total Hardness (mg/l Ca CO_3)	160.00				
Calcium (mg/l Ca)	51.20				
Magnesium (mg/l Mg)	7.68				
Total Iron (mg/l Fe)	0.05				
Manganese (mg/l Mn)	0.00				
Fluoride (mg/l F)	1.57				
Chloride (mg/l Cl)	5.46				
Nitrite (mg/l NO_2)	0.01				
Nitrate (mg/l NO_3)	1.17				
Alkalinity (mg/l $CaCO_3$)	386.00				
Carbonate (mg/l CO_3)	Nil				
Bicarbonate (mg/l HCO_3)	470.92				
Sulphate (mg/l SO_4)	0.19				
Phosphate (mg/l PO_4)	0.27				
Copper(mg/l Cu)	0.033				
Aluminum(mg/l Al)	0.006				
Chromium(mg/l Cr)	Trace				
Boron(mg/l B)	0.040				
Zinc (mg/l)	0.128				

REMARK:- The water sample was collected and submitted to our laboratory by the client.

Tested by: _____ Processed By _____ Checked by: _____ Approved by: _____
Date: 09/04/14 Date 9/4/14 Date 9/4/14 Date: 9/04/14

Water Works Design and Supervision Enterprise Laboratory Service

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SELECTED PHYSIO CHEMICAL AND BACTERIOLOGICAL WATER ANALYSIS RESULTS
Client/Project: TAM Geo-Engineering P.L.C.

SOURCE OF SAMPLE	Well				
LOCATION	Alemgeheya				
DATE OF COLLECTION	22/3/2014				
DATE RECEIVED	24/3/2014				
CLIENTS ID.NO.	Alemgebeya 24hr				
LAB.ID NO.	1998/2006				
Colour (app)	Colourless				
Odor	Odorless				
Taste	Tasteless				
Turbidity (NTU)	Trace				
Total Solids I05 ^{0}C (mg/l)	490.0				
T. Dissolved Solid 105^{0}C(mg/l)	480.0				
Electrical Conductivity (µS/cm)	737.00				
P^H	7.2				
Ammonia (mg/l NH_3)	0.32				
Sodium (mg/l Na)	112.00				
Potassium (mg/l K)	16.00				
Total Hardness (mg/l Ca CO_3)	180.00				
Calcium (mg/l Ca)	56.00				
Magnesium (mg/l Mg)	9.60				
Total Iron (mg/l Fe)	0.07				
Manganese (mg/l Mn)	0.00				
Fluoride (mg/l F)	1.36				
Chloride (mg/l Cl)	6.37				
Nitrite (mg/l NO_2)	0.09				
Nitrate (mg/l NO_3)	2.33				
Alkalinity (mg/l $CaCO_3$)	390.00				
Carbonate (mg/l CO_3)	Nil				
Bicarbonate (mg/l HCO_3)	475.80				
Sulphate (mg/l SO_4)	0.19				
Phosphate (mg/l PO_4)	0.21				
Copper(mg/l Cu)	0.0132				
Aluminum(mg/l Al)	0.014				
Chromium(mg/l Cr)	Trace				
Boron(mg/l B)	0.030				
Zinc (mg/l)	0.115				

REMARK:- The water sample was collected and submitted to our laboratory by the client.

Tested by: _____ Processed By _____ Checked by: _____ Approved by: _____
Date: 09/04/14 Date 9/04/14 Date 9/4/14 Date: 9/04/14

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SELECTED PHYSIO CHEMICAL AND BACTERIOLOGICAL WATER ANALYSIS RESULTS
Client/Project: TAM Geo-Engineering P.L.C.

SOURCE OF SAMPLE	Well				
LOCATION	Sidama				
DATE OF COLLECTION	15/6/2014				
DATE RECEIVED	26/6/2014				
CLIENTS ID.NO.	BH-2 Teferi Kella				
LAB.ID NO.	2823/2006				
Colour (app)	Colourless				
Odor	Odorless				
Taste	Tasteless				
Turbidity (NTU)	Trace				
Total Solids I05 ^{0}C (mg/l)	248.00				
T. Dissolved Solid 105^{0}C(mg/l)	240.00				
Electrical Conductivity (µS/cm)	396.00				
P^H	7.64				
Ammonia (mg/l NH_3)	0.32				
Sodium (mg/l Na)	63.00				
Potassium (mg/l K)	4.00				
Total Hardness (mg/l Ca CO_3)	66.00				
Calcium (mg/l Ca)	16.80				
Magnesium (mg/l Mg)	5.76				
Total Iron (mg/l Fe)	0.02				
Manganese (mg/l Mn)	Trace				
Fluoride (mg/l F)	1.38				
Chloride (mg/l Cl)	10.01				
Nitrite (mg/l NO_2)	0.002				
Nitrate (mg/l NO_3)	0.45				
Alkalinity (mg/l $CaCO_3$)	198.00				
Carbonate (mg/l CO_3)	Nil				
Bicarbonate (mg/l HCO_3)	241.56				
Sulphate (mg/l SO_4)	0.33				
Phosphate (mg/l PO_4)	0.19				
Copper(mg/l Cu)	0.040				
Aluminum(mg/l Al)	0.002				
Chromium(mg/l Cr)	Trace				
Boron(mg/l B)	0.119				

REMARK:- The water sample was collected and submitted to our laboratory by the client.

Tested by: _____ Date: 27/6/14
Processed By _____ Date 27/6/14
Checked by: _____ Date 27/6/14
Approved by: _____ Date: 27/6/14

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