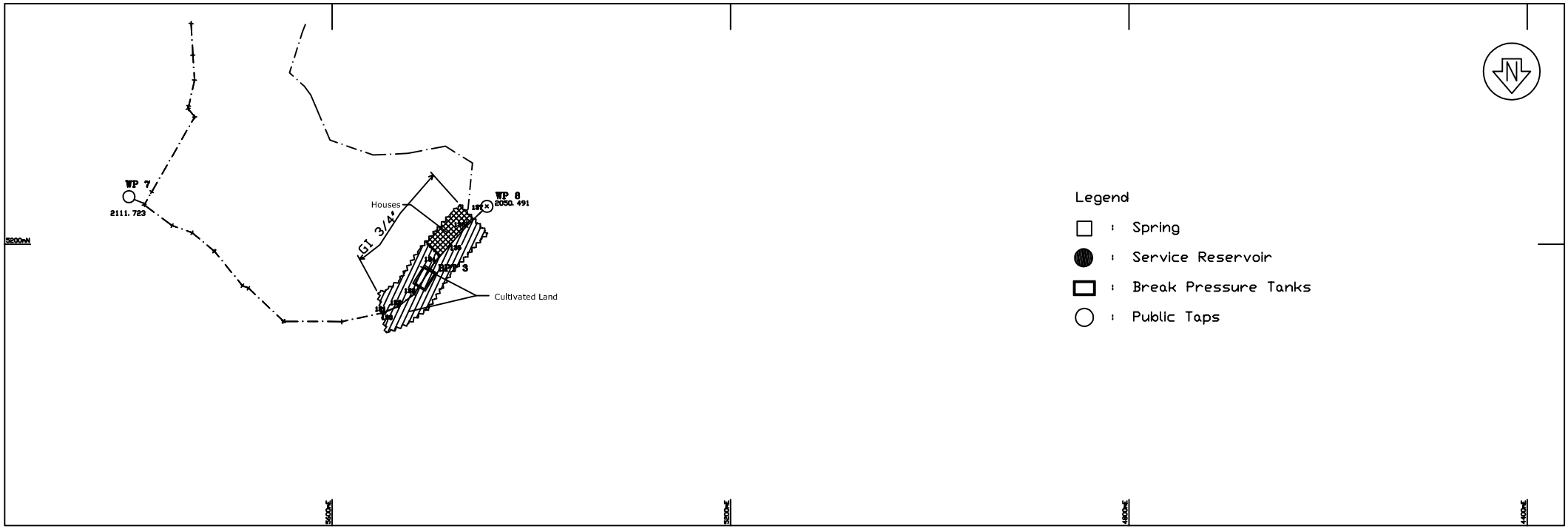
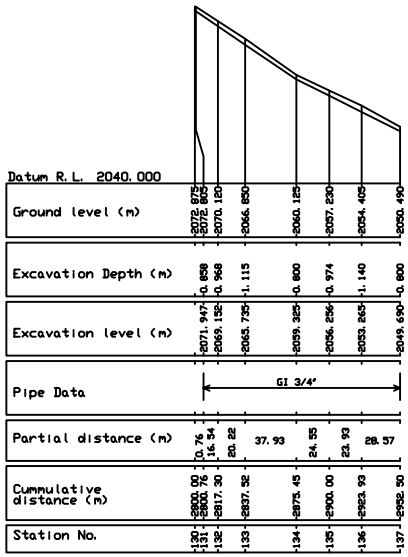
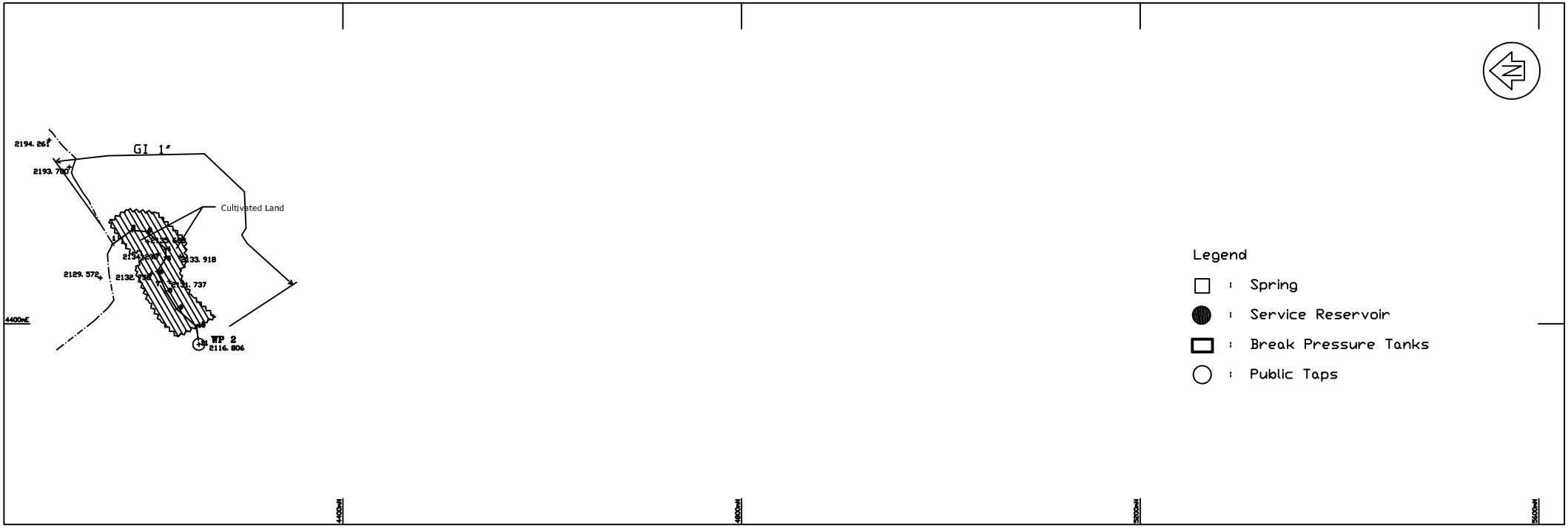
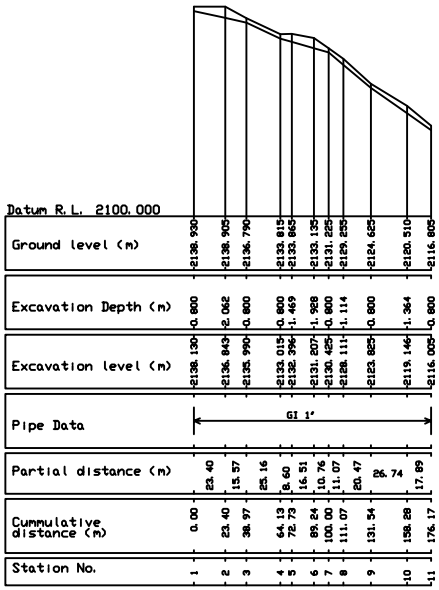




Longitudinal section between 2800.00 and 2952.50 op1line1

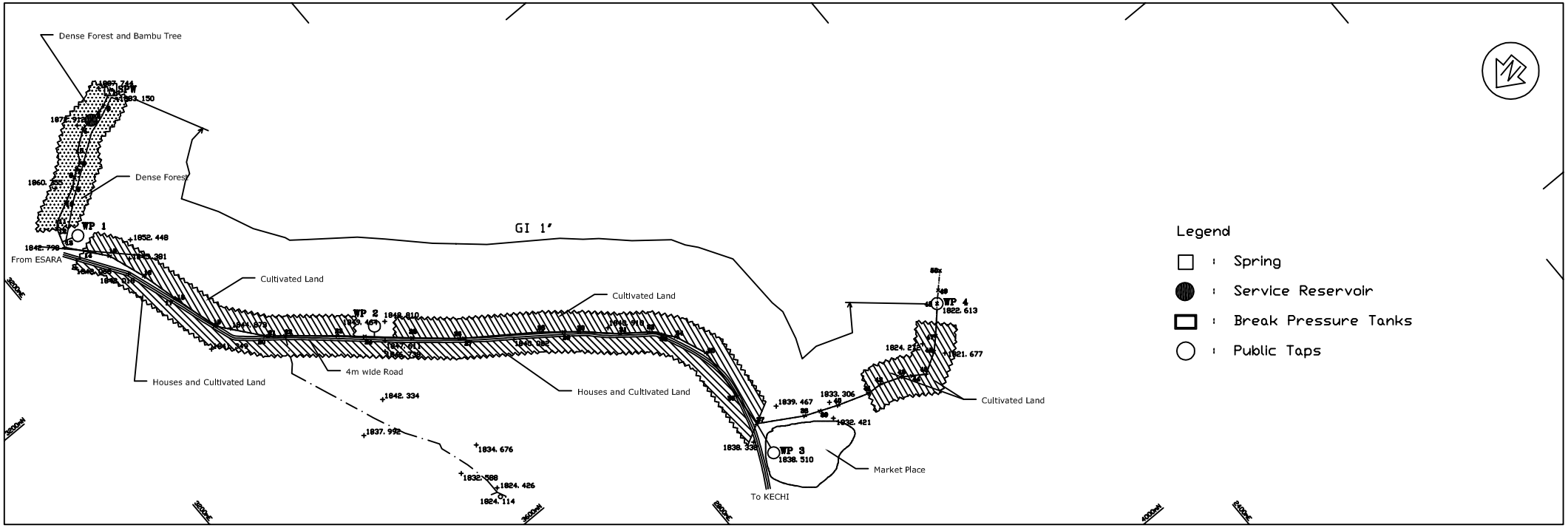
OWNER :	PROJECT NAME :	CONSULTING ENGINEERS :	DRAWING TITLE :		
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	THE BASIC DESIGN STUDY ON THE PROJECT FOR WATER SUPPLY IN SOUTHERN NATIONS, NATIONALITIES AND PEOPLE'S REGIONAL STATE IN THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA	NIPPON KOEI CO.,LTD.	Ofa (Yoge) 3/4 (Topographical Drawing)		
			SCALE Vt=1:500 Hz=1:2,000	DATE February 2005	DRAWING NO. SF-2.17

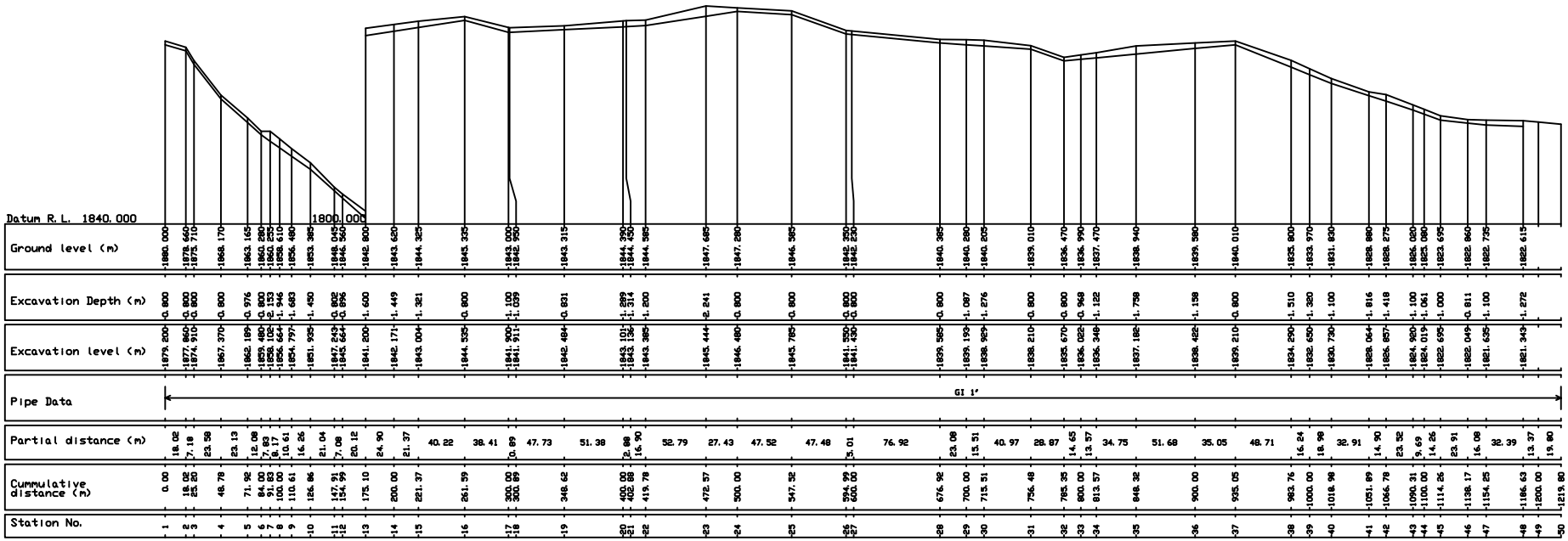




Longitudinal section between 0.00 and 176.17 op1line2

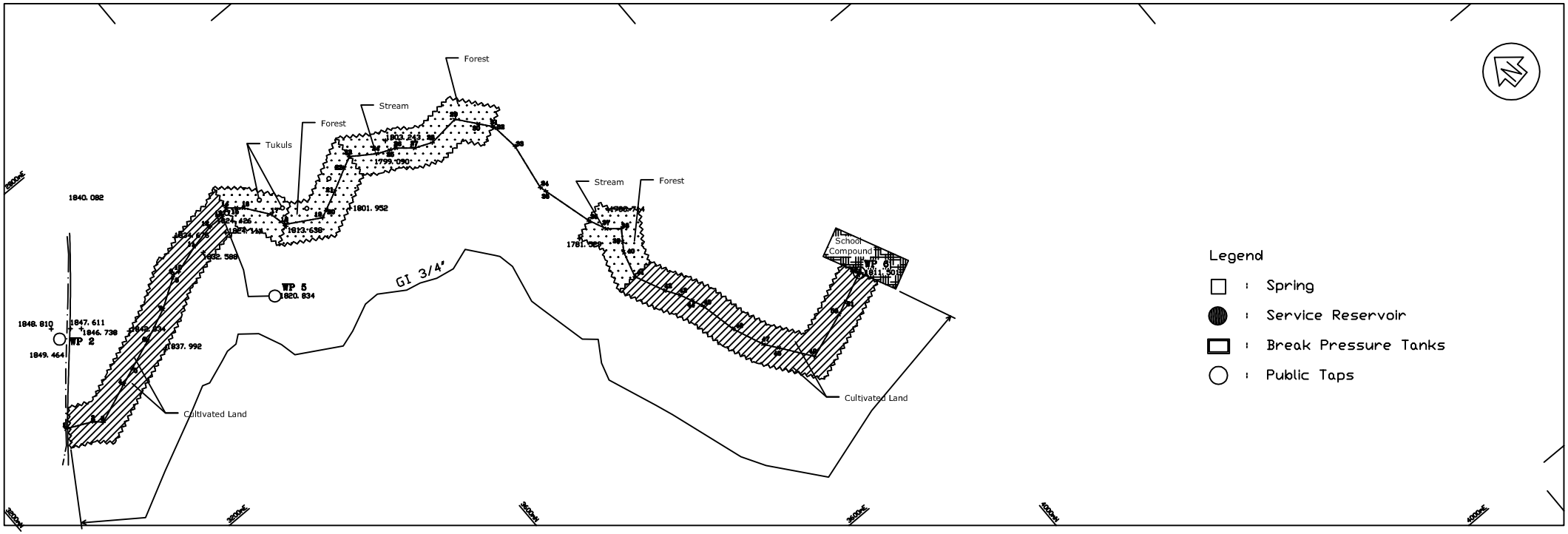
OWNER : JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	PROJECT NAME : THE BASIC DESIGN STUDY ON THE PROJECT FOR WATER SUPPLY IN SOUTHERN NATIONS, NATIONALITIES AND PEOPLE'S REGIONAL STATE IN THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA	CONSULTING ENGINEERS : NIPPON KOEI CO.,LTD.	DRAWING TITLE : Ofa (Yoge) 4/4 (Topographical Drawing)
			SCALE Vt=1:500 Hz=1:2,000 / DATE February 2005 / DRAWING NO. SF-2.18

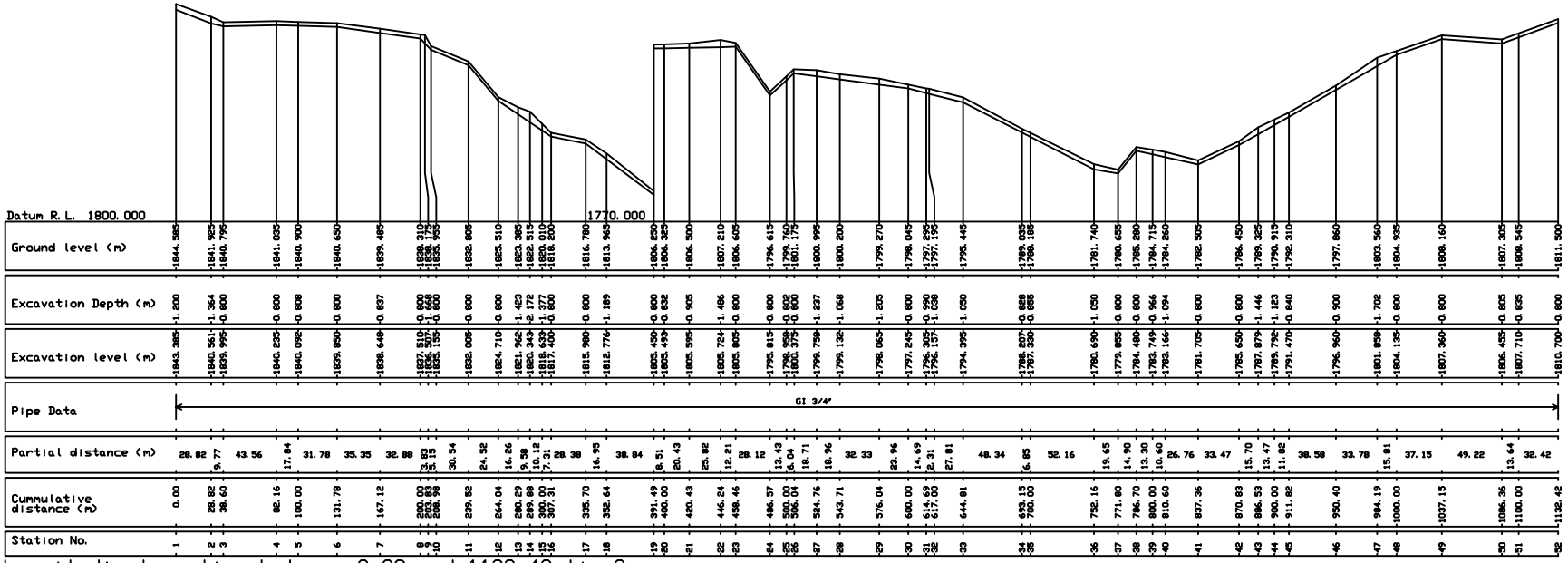




Longitudinal section between 0.00 and 1219.80 line1

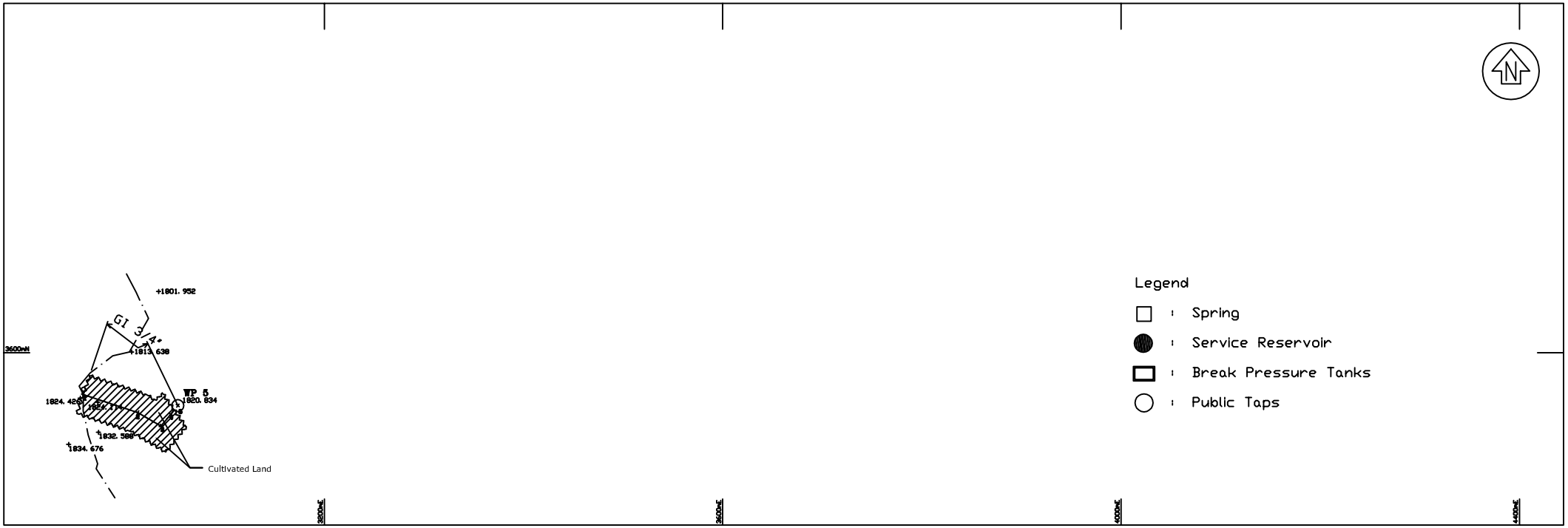
OWNER : JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	PROJECT NAME : THE BASIC DESIGN STUDY ON THE PROJECT FOR WATER SUPPLY IN SOUTHERN NATIONS, NATIONALITIES AND PEOPLE'S REGIONAL STATE IN THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA	CONSULTING ENGINEERS : NIPPON KOEI CO.,LTD.	DRAWING TITLE : Sengeti 1/3 (Topographical Drawing)	
			SCALE Vt=1:500 Hz=1:2,000	DATE February 2005
				DRAWING NO. SF-2.19

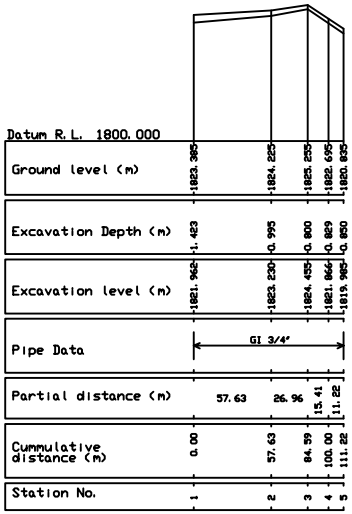




Longitudinal section between 0.00 and 1132.42 line2

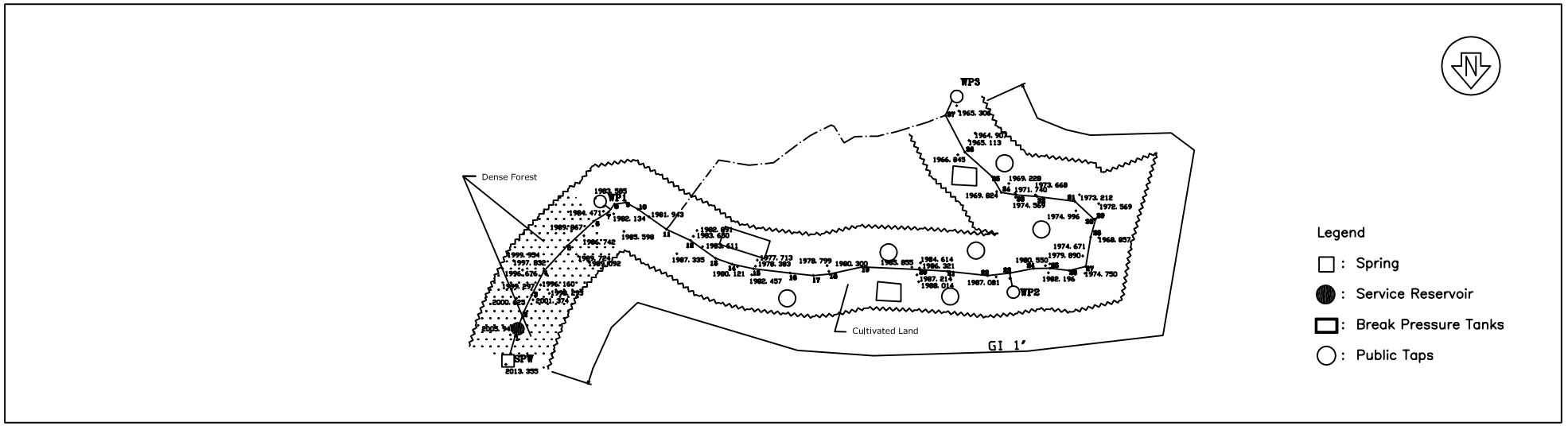
OWNER : JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	PROJECT NAME : THE BASIC DESIGN STUDY ON THE PROJECT FOR WATER SUPPLY IN SOUTHERN NATIONS, NATIONALITIES AND PEOPLE'S REGIONAL STATE IN THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA	CONSULTING ENGINEERS : NIPPON KOEI CO.,LTD.	DRAWING TITLE : Sengeti 2/3 (Topographical Drawing)
			SCALE Vt=1:500 Hz=1:2,000 / DATE February 2005 / DRAWING NO. SF-2.20

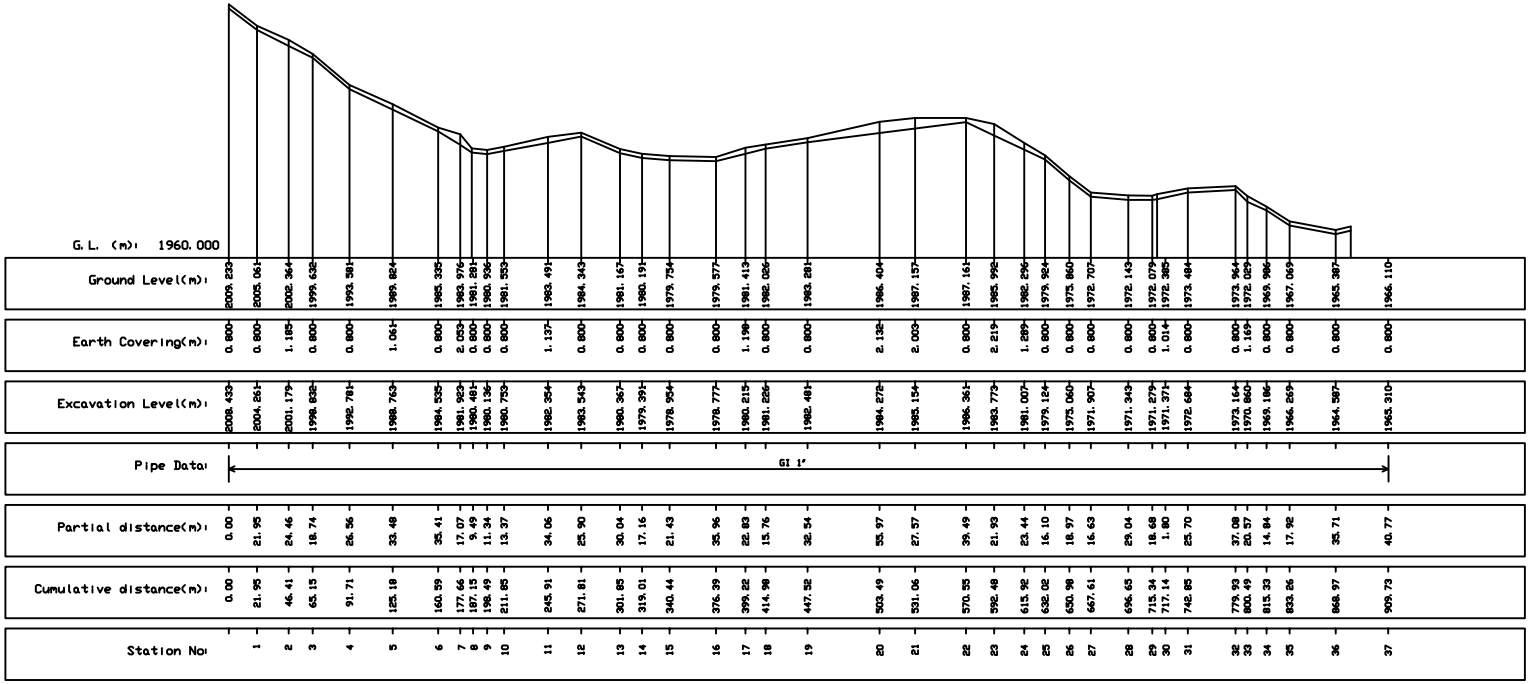




Longitudinal section between 0.00 and 111.22 line3

OWNER : JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	PROJECT NAME : THE BASIC DESIGN STUDY ON THE PROJECT FOR WATER SUPPLY IN SOUTHERN NATIONS, NATIONALITIES AND PEOPLE'S REGIONAL STATE IN THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA	CONSULTING ENGINEERS : NIPPON KOEI CO.,LTD.	DRAWING TITLE : Sengeti 3/3 (Topographical Drawing)
			SCALE Vt=1:500 Hz=1:2,000 / DATE February 2005 / DRAWING NO. SF-2.21

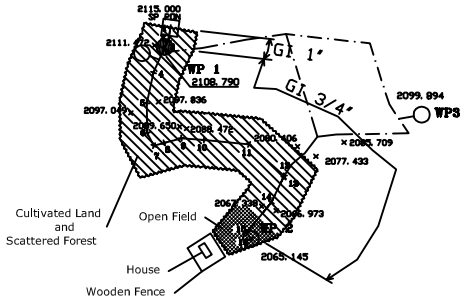




OWNER : JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	PROJECT NAME : THE BASIC DESIGN STUDY ON THE PROJECT FOR WATER SUPPLY IN SOUTHERN NATIONS, NATIONALITIES AND PEOPLE'S REGIONAL STATE IN THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA	CONSULTING ENGINEERS : NIPPON KOEI CO.,LTD.	DRAWING TITLE : L. Argoba - Kora (Topographical Drawing)	
			SCALE Vt=1:500 Hz=1:2,000	DATE February 2005
				DRAWING NO. SF-2.22

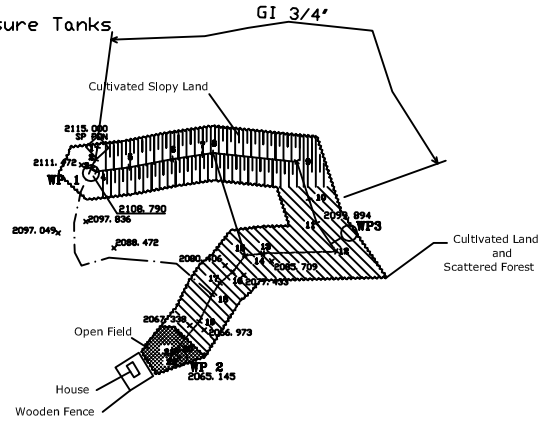
Legend

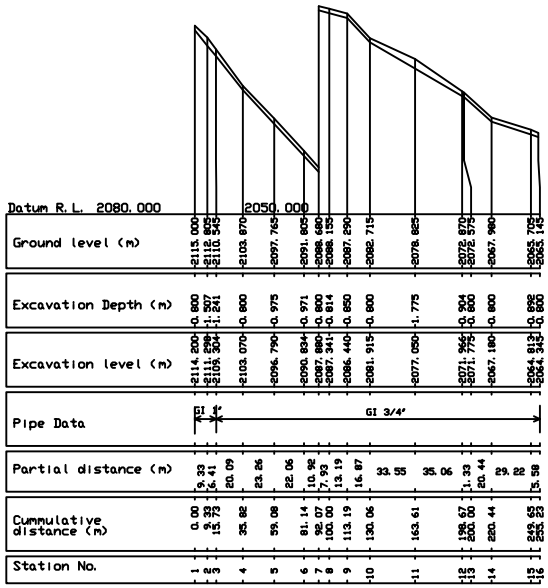
- : Spring
- : Service Reservoir
- : Break Pressure Tanks
- : Public Taps



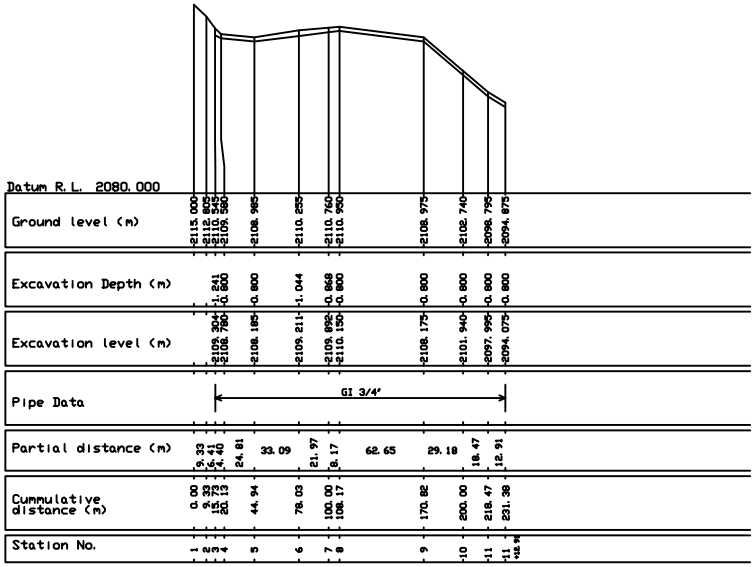
Legend

- : Spring
- : Service Reservoir
- : Break Pressure Tanks
- : Public Taps



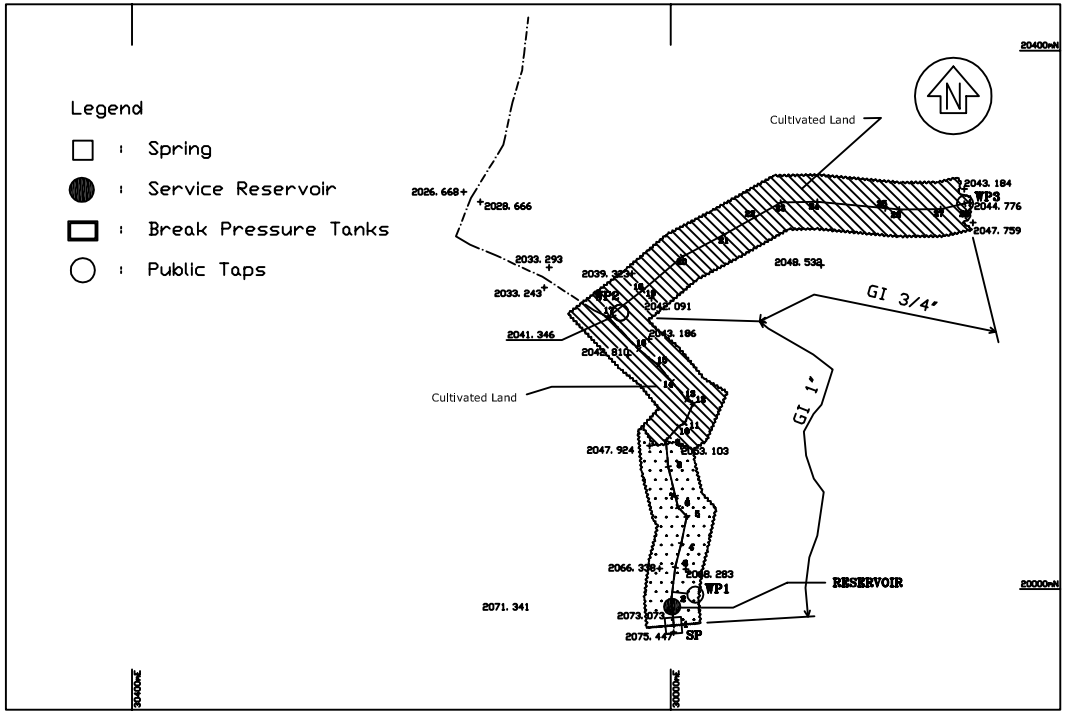


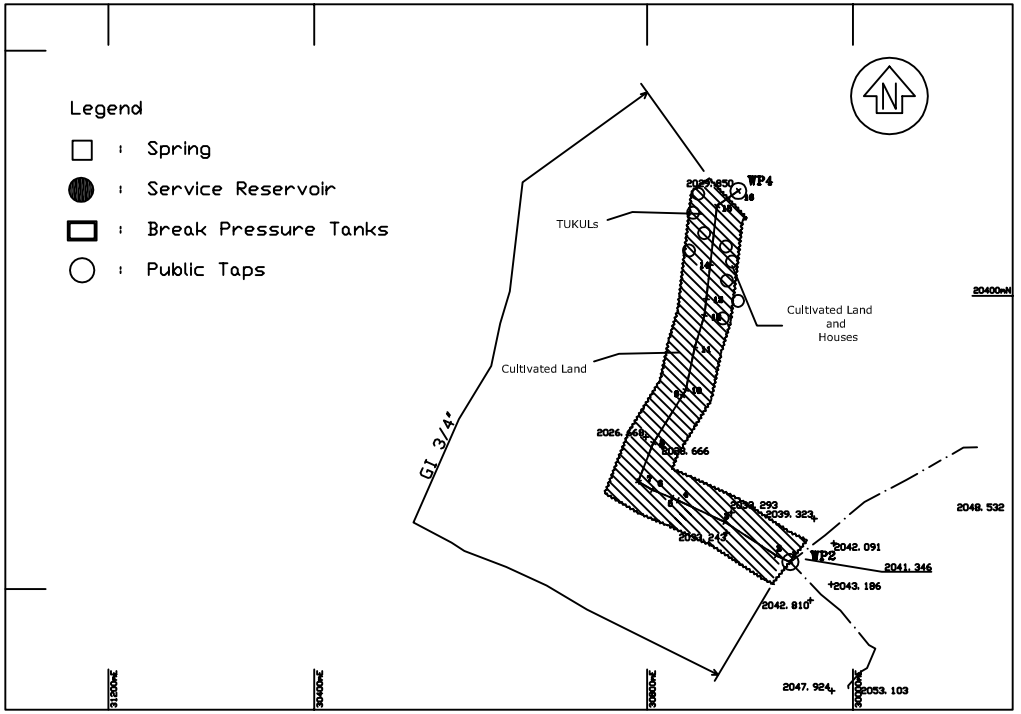
Longitudinal section line1 Sp-WP1-WP2

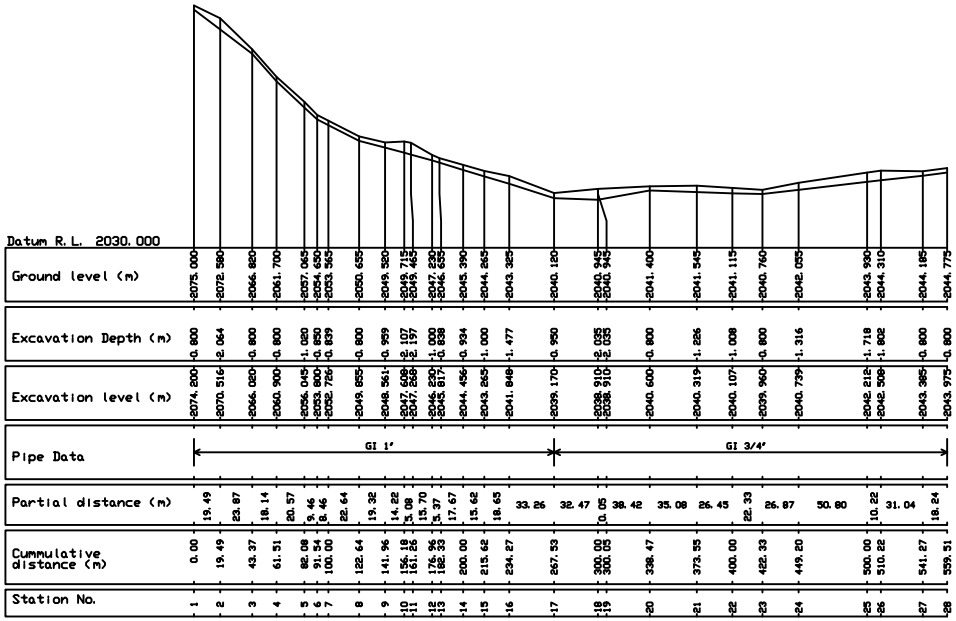


Longitudinal section between line2 Sp-WP3-WP2

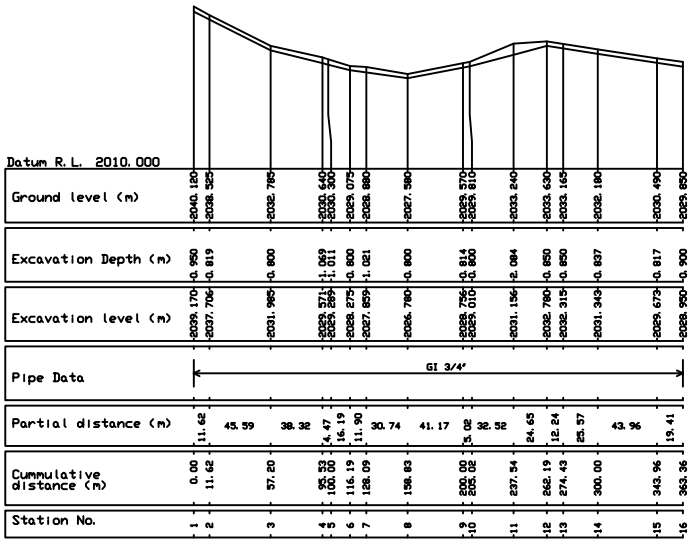
OWNER : JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	PROJECT NAME : THE BASIC DESIGN STUDY ON THE PROJECT FOR WATER SUPPLY IN SOUTHERN NATIONS, NATIONALITIES AND PEOPLE'S REGIONAL STATE IN THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA	CONSULTING ENGINEERS : NIPPON KOEI CO.,LTD.	DRAWING TITLE : L/Argoba (Hamro) 1/1 (Topographical Drawing)
			SCALE Vt=1:500 Hz=1:2,000 / DATE February 2005 / DRAWING NO. SF-2.23





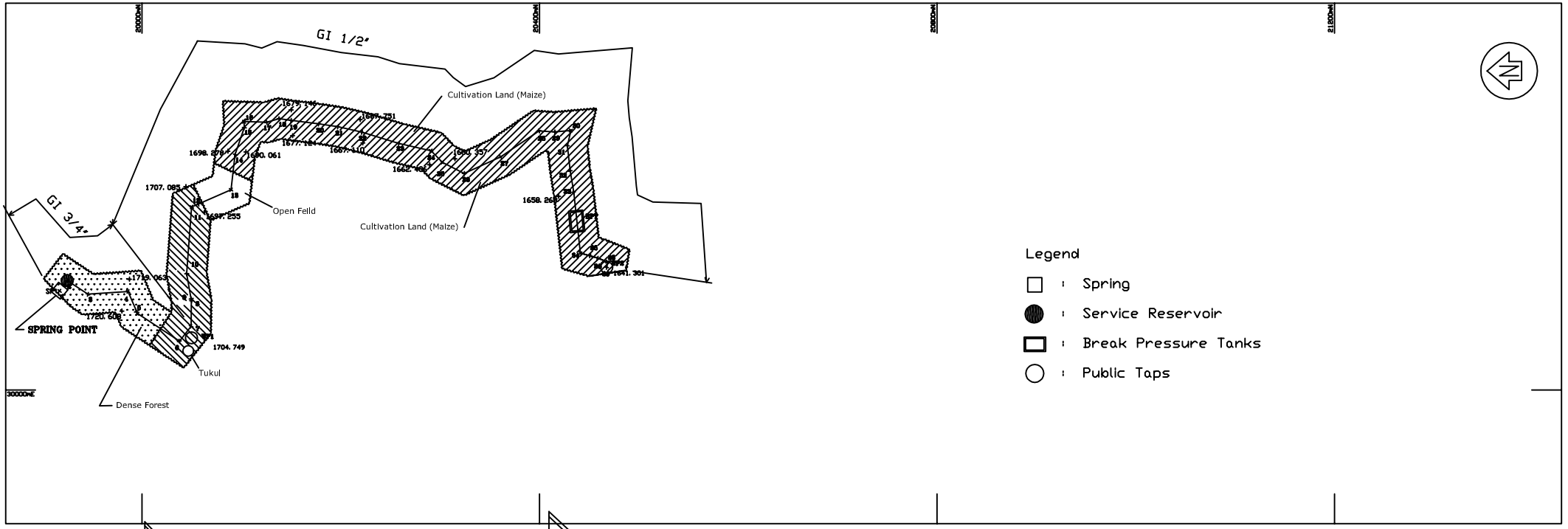


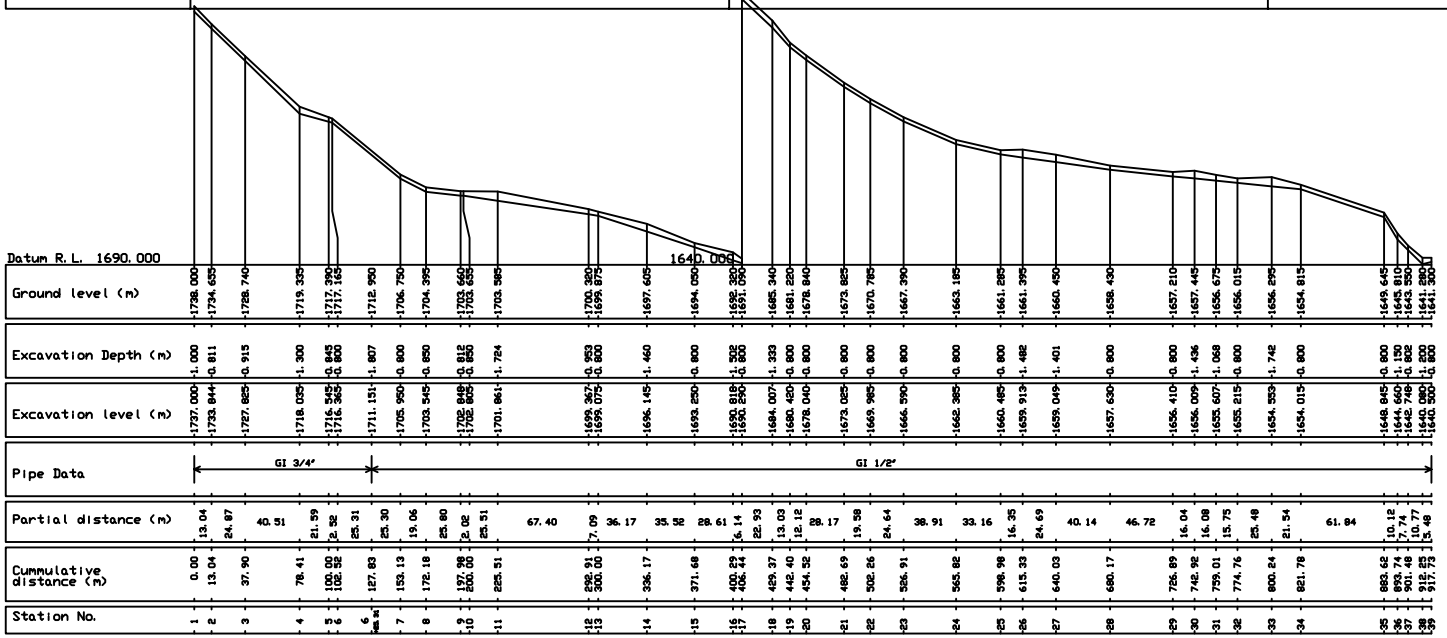
Longitudinal section between 0. 00 and 559. 51 Line 1 Sp to Wp3



Longitudinal section between 0. 00 and 363. 36 Junction to Wp4

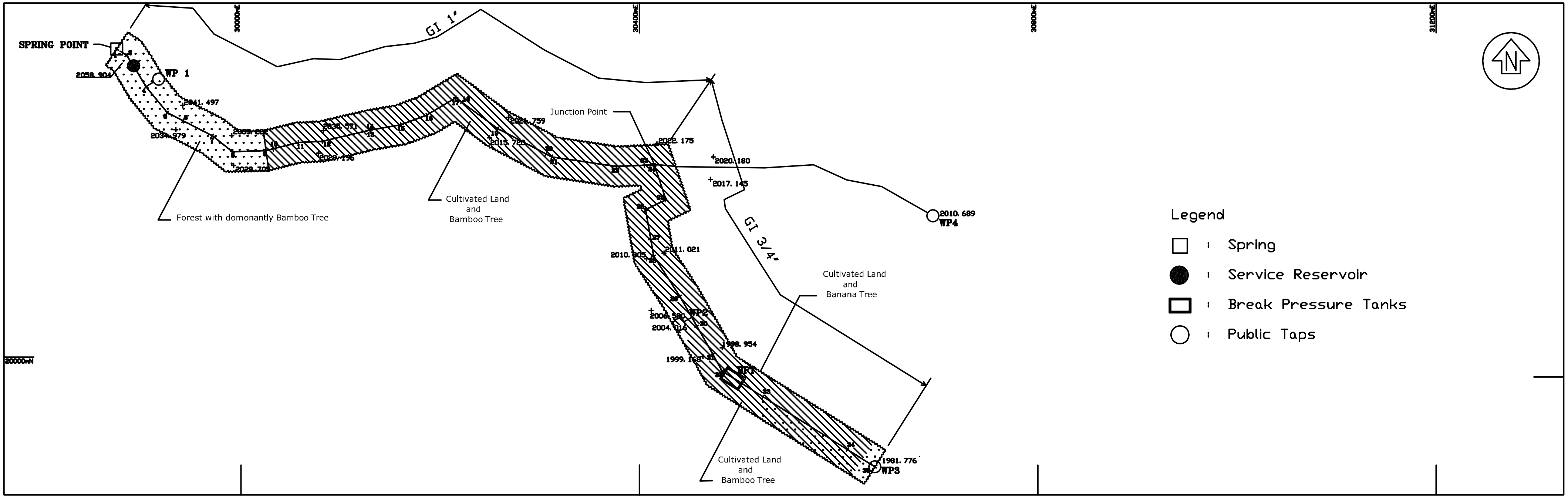
OWNER : JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	PROJECT NAME : THE BASIC DESIGN STUDY ON THE PROJECT FOR WATER SUPPLY IN SOUTHERN NATIONS, NATIONALITIES AND PEOPLE'S REGIONAL STATE IN THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA	CONSULTING ENGINEERS : NIPPON KOEI CO.,LTD.	DRAWING TITLE : L/Argoba (Abello) 1/1 (Topographical Drawing)
			SCALE Vt=1:500 Hz=1:2,000 / DATE February 2005 / DRAWING NO. SF-2.24

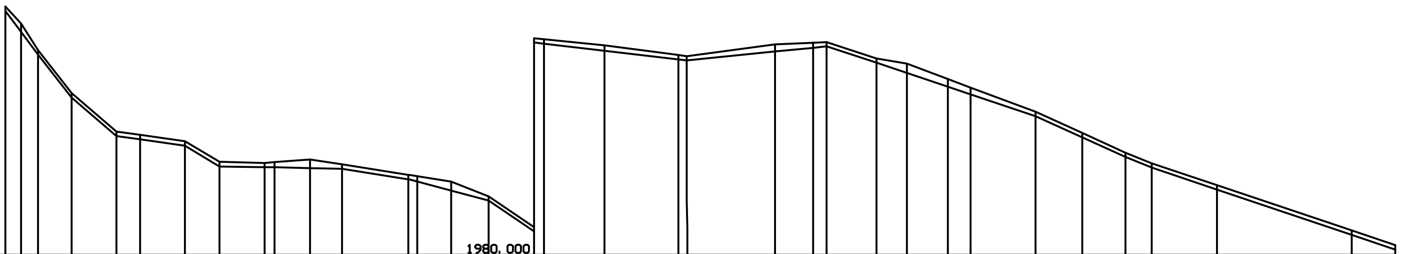




Longitudinal section between 0.00 and 917.73 Line 1

OWNER : JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	PROJECT NAME : THE BASIC DESIGN STUDY ON THE PROJECT FOR WATER SUPPLY IN SOUTHERN NATIONS, NATIONALITIES AND PEOPLE'S REGIONAL STATE IN THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA	CONSULTING ENGINEERS : NIPPON KOEI CO.,LTD.	DRAWING TITLE : Walayte (Elcola) 1/1 (Topographical Drawing)
			SCALE Vt=1:500 Hz=1:2,000 / DATE February 2005 / DRAWING NO. SF-2.25





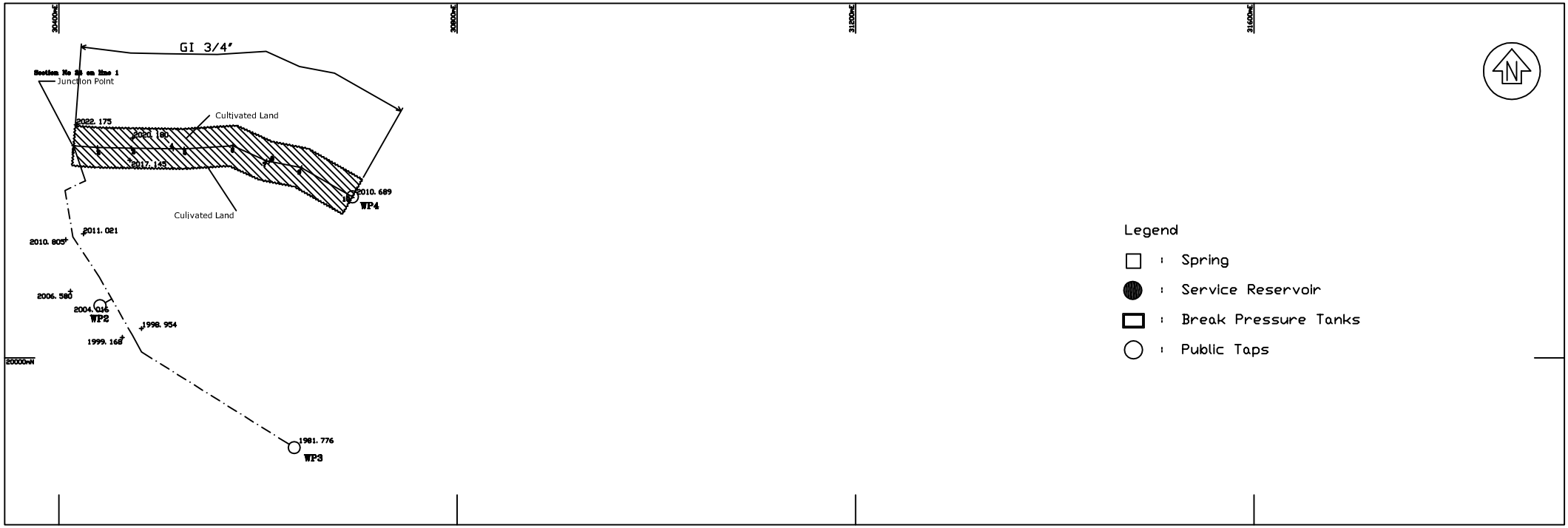
Station No.	Chainage / Cummulative distance (m)	Ground level (m)	Excavation Depth (m)	Excavation level (m)	Partial distance (m)	Pipe Data
1	0.00	2061.000	0.800	2060.200	11.72	GI 1"
2	11.72	2057.860	1.563	2056.297	12.58	GI 1"
3	24.29	2052.915	0.800	2052.115	24.87	GI 1"
4	49.16	2044.955	0.800	2044.155	33.37	GI 1"
5	82.53	2037.805	0.800	2037.005	17.47	GI 1"
6	100.00	2037.205	0.811	2036.394	33.48	GI 1"
7	133.48	2036.050	0.850	2035.200	25.56	GI 1"
8	159.05	2032.225	0.900	2031.325	33.63	GI 1"
9	192.68	2032.025	0.801	2031.224	7.32	GI 1"
10	200.00	2032.155	0.950	2031.205	26.39	GI 1"
11	226.39	2032.635	1.562	2031.073	23.74	GI 1"
12	250.13	2031.760	0.800	2030.960	49.20	GI 1"
13	299.33	2029.815	0.823	2028.992	0.67	GI 1"
14	300.00	2029.790	0.800	2028.990	31.09	GI 1"
15	331.09	2028.580	1.673	2026.907	27.80	GI 1"
16	358.89	2025.850	0.800	2025.050	33.81	GI 1"
17	392.69	2020.125	0.800	2019.325	7.31	GI 1"
18	400.00	2019.945	0.832	2019.113	44.95	GI 1"
19	444.95	2018.810	1.001	2017.809	55.05	GI 1"
20	500.00	2017.020	0.807	2016.213	6.22	GI 1"
21	506.22	2016.820	0.800	2016.020	65.57	GI 1"
22	571.80	2018.970	1.311	2017.659	28.20	GI 1"
23	600.00	2019.315	0.951	2018.364	9.98	GI 1"
24	609.98	2019.440	0.800	2018.640	37.06	GI 3/4"
25	647.04	2016.390	0.800	2015.590	22.70	GI 3/4"
26	669.75	2015.455	1.772	2013.683	30.25	GI 3/4"
27	700.00	2012.590	1.448	2011.142	17.00	GI 3/4"
28	717.00	2010.980	1.266	2009.714	48.34	GI 3/4"
29	765.34	2006.505	0.800	2005.705	34.66	GI 3/4"
30	800.00	2002.565	0.811	2001.754	32.10	GI 3/4"
31	832.10	1998.920	0.800	1998.120	19.47	GI 3/4"
32	851.56	1996.955	0.800	1996.155	48.44	GI 3/4"
33	900.00	1992.890	0.800	1992.090	100.00	GI 3/4"
34	1000.00	1984.500	0.810	1983.690	32.49	GI 3/4"
35	1032.49	1981.775	0.800	1980.975		

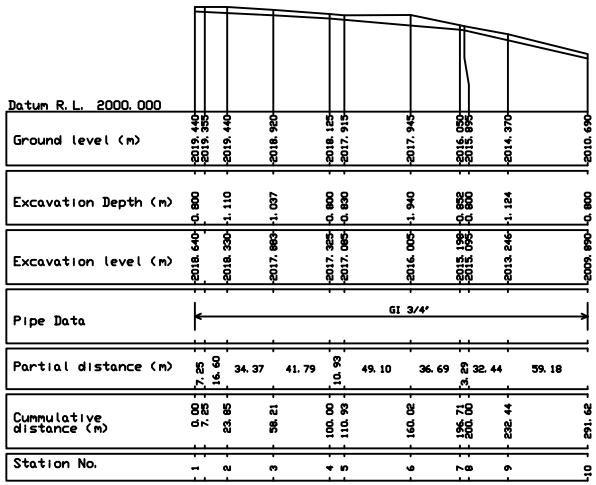
Chainage: Hz scale 1:2000, Vt scale 1: 500

Longitudinal section between 0.00 and 1032.49 Line 1 Sp to WP3

OWNER :	PROJECT NAME :	CONSULTING ENGINEERS :	DRAWING TITLE :
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	THE BASIC DESIGN STUDY ON THE PROJECT FOR WATER SUPPLY IN SOUTHERN NATIONS, NATIONALITIES AND PEOPLE'S REGIONAL STATE IN THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA	NIPPON KOEI CO.,LTD.	Busabaso (Kogdeya) 1/2 (Topographical Drawing)

SCALE	DATE	DRAWING NO.
Vt=1:500 Hz=1:2,000	February 2005	SF-2.26



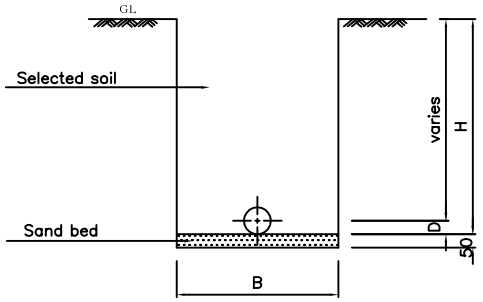


Longitudinal section between 0.00 and 291.62 Junction to Wp4

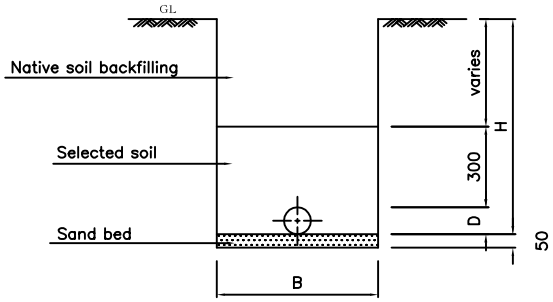
OWNER : JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	PROJECT NAME : THE BASIC DESIGN STUDY ON THE PROJECT FOR WATER SUPPLY IN SOUTHERN NATIONS, NATIONALITIES AND PEOPLE'S REGIONAL STATE IN THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA	CONSULTING ENGINEERS : NIPPON KOEI CO.,LTD.	DRAWING TITLE : Busabaso (Kodgeya) 2/2 (Topographical Drawing)	
			SCALE Vt=1:500 Hz=1:2,000	DATE February 2005
				DRAWING NO. SF-2.27

Unit:mm

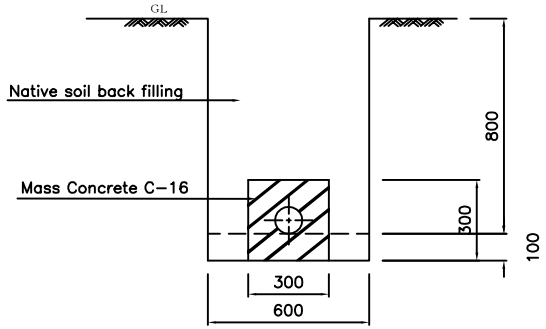
H	1,050	1,550	2,050
B	600	700	800



Typical section of soil excavation



Typical section of rock excavation



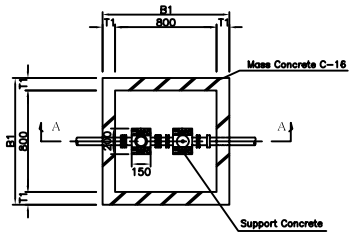
Section of road crossing

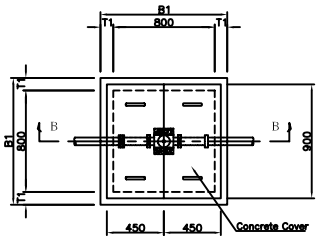
OWNER : JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	PROJECT NAME : THE BASIC DESIGN STUDY ON THE PROJECT FOR WATER SUPPLY IN SOUTHERN NATIONS, NATIONALITIES AND PEOPLE'S REGIONAL STATE IN THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA	CONSULTING ENGINEERS : NIPPON KOEI CO.,LTD.	DRAWING TITLE : Typical Section of Earth Work for Pipe Laying
			SCALE S=1:100 / DATE February 2005 / DRAWING NO. SF-2.28

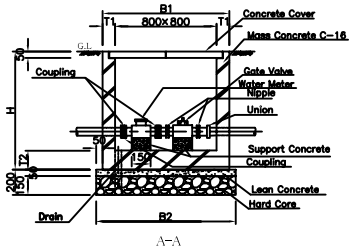
Unit:mm

Dimension	H=1.00m	H=1.50m
T1	100	150
T2	150	200
B1	1,000	1,100
B2	1,100	1,200
H	1,300	1,850

Pipe Size	Bolt DIA
1/2" ~1"	φ6mm
1" 1/2	φ10mm
2" ~2" 1/2	φ15mm



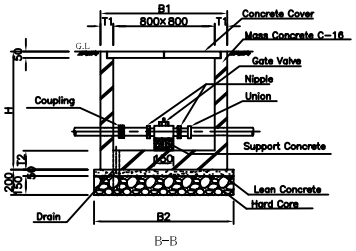




A-A

Water Meter & Gate Valve chamber

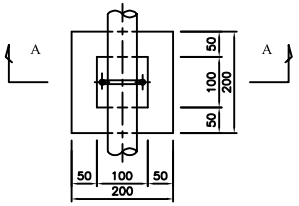
S=1:20

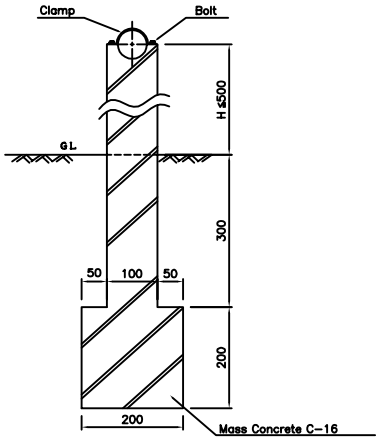


B-B

Water Meter & Gate Valve chamber

S=1:20

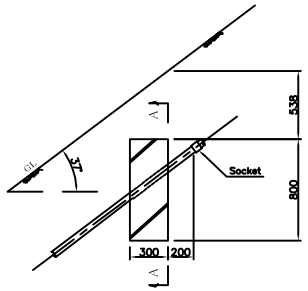


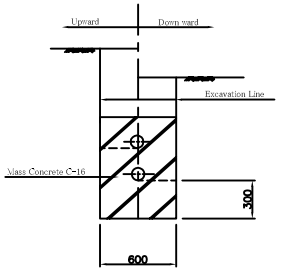


A-A

Support Concrete

S=1:5





A - A

Concrete block for pipe on slope

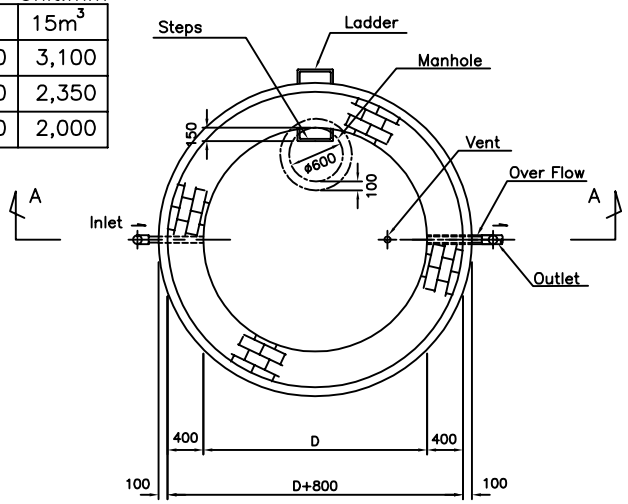
S=1:20

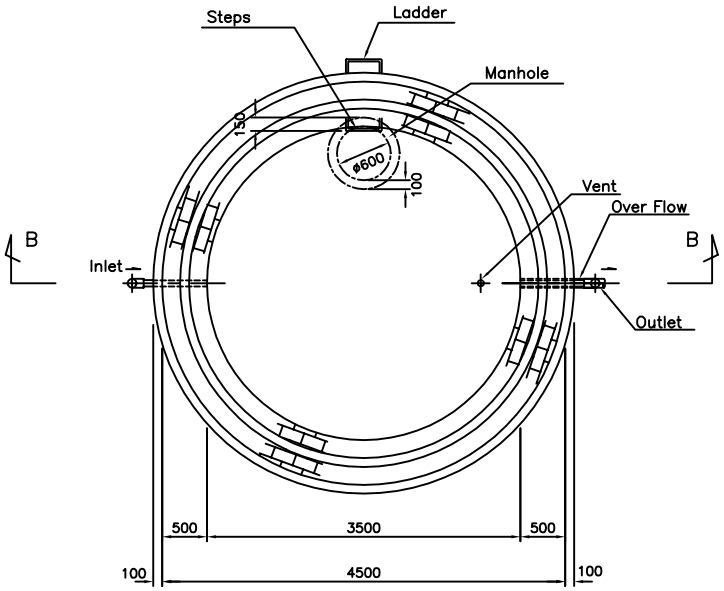
N.B. : The Chambers of wash-out and air valves are also applied to types of the chambers shown in drawing No.2.29.

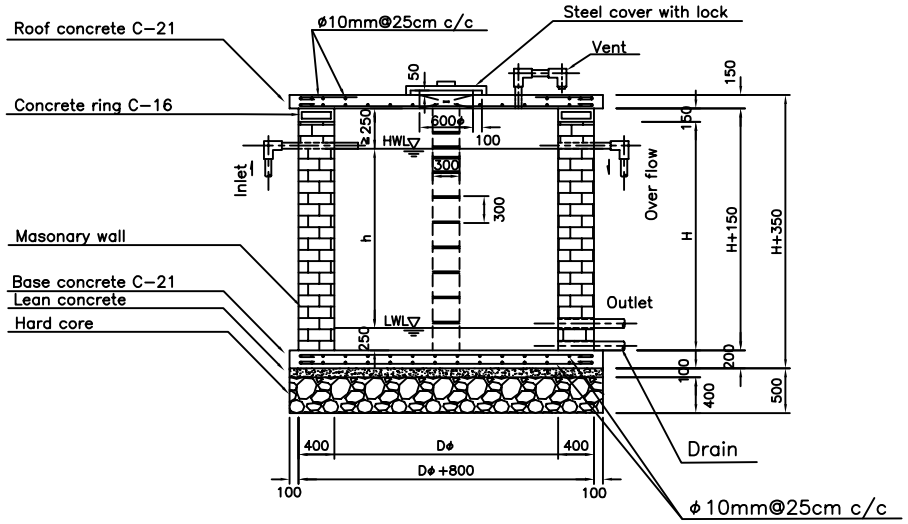
OWNER :	PROJECT NAME :	CONSULTING ENGINEERS :	DRAWING TITLE : Chambers, Support Concrete and Concrete Block for Pipe on Slope		
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	THE BASIC DESIGN STUDY ON THE PROJECT FOR WATER SUPPLY IN SOUTHERN NATIONS, NATIONALITIES AND PEOPLE'S REGIONAL STATE IN THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA	NIPPON KOEI CO.,LTD.	SCALE: S=1:20 S=1:5	DATE: February 2005	DRAWING NO.: SF-2.29

Unit:mm

Dimension	5m³	10m³	15m³
D	2,100	2,500	3,100
H	1,850	2,350	2,350
h	1,500	2,000	2,000

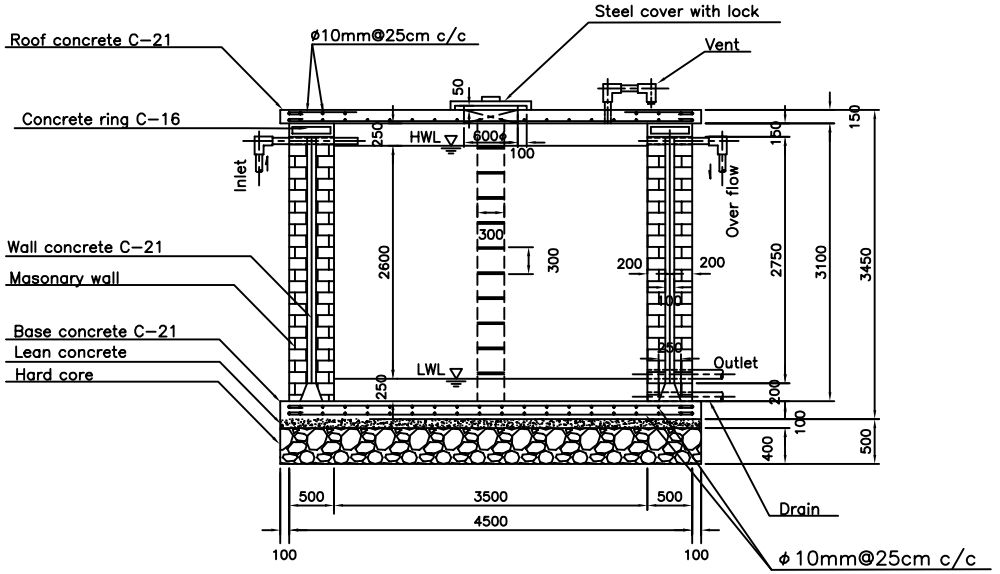






A − A

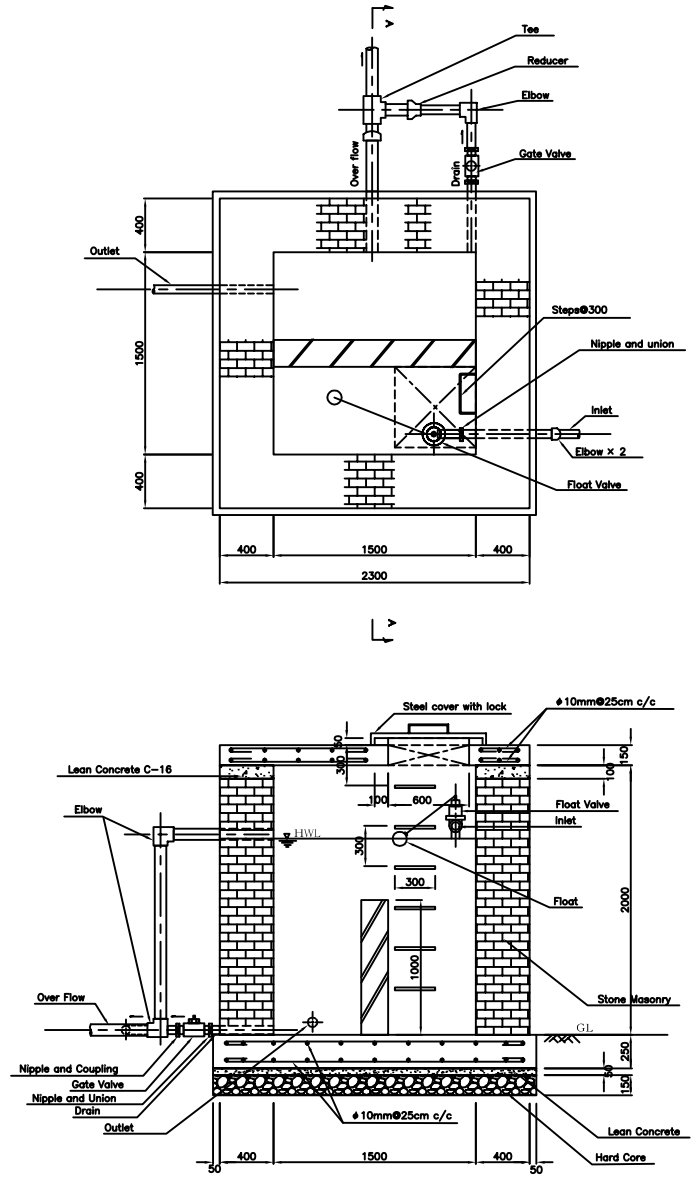
Service reservoir (5m³ ,10m³ ,15m³)



B − B

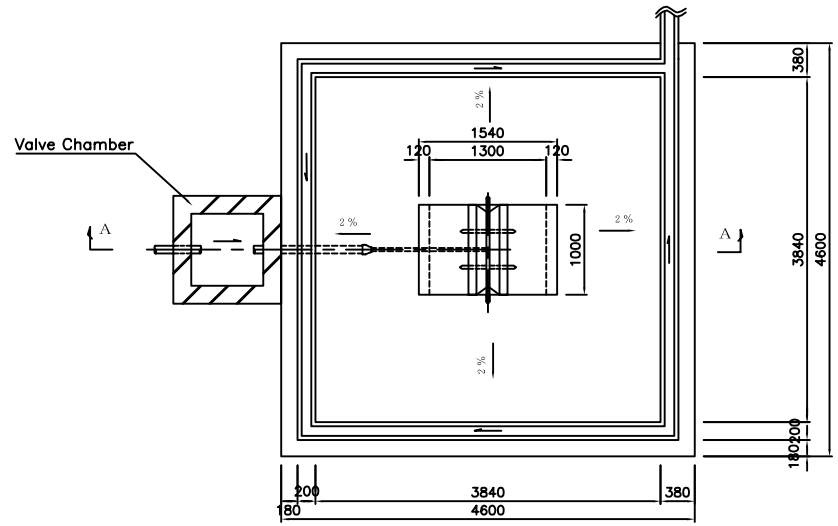
Service reservoir (25m³)

OWNER : JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	PROJECT NAME : THE BASIC DESIGN STUDY ON THE PROJECT FOR WATER SUPPLY IN SOUTHERN NATIONS, NATIONALITIES AND PEOPLE'S REGIONAL STATE IN THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA	CONSULTING ENGINEERS : NIPPON KOEI CO.,LTD.	DRAWING TITLE : Service Reservoirs (Stone Masonry Type :5m3, 10m3, 15m3 and 25m3)
			SCALE S=1:30 / DATE February 2005 / DRAWING NO. SF-3.1

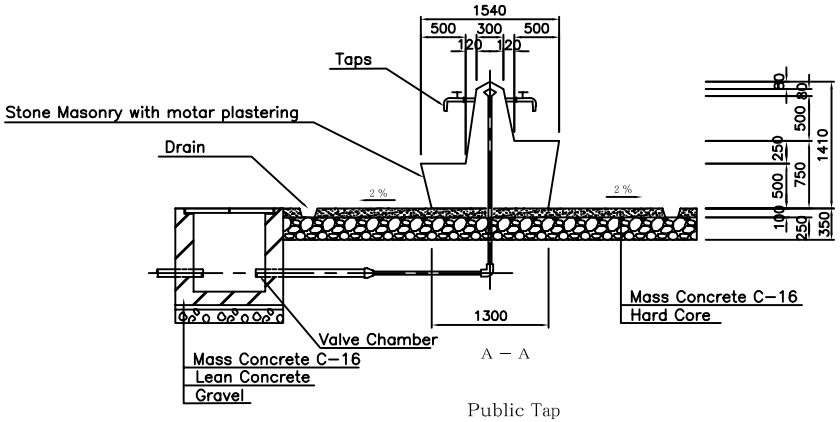


A – A
Break Pressure Tank

OWNER : JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	PROJECT NAME : THE BASIC DESIGN STUDY ON THE PROJECT FOR WATER SUPPLY IN SOUTHERN NATIONS, NATIONALITIES AND PEOPLE'S REGIONAL STATE IN THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA	CONSULTING ENGINEERS : NIPPON KOEI CO.,LTD.	DRAWING TITLE : Break Pressure Tank (Stone Masonry Type:5m3) SCALE S=1:20 / DATE February 2005 / DRAWING NO. SF-4.1

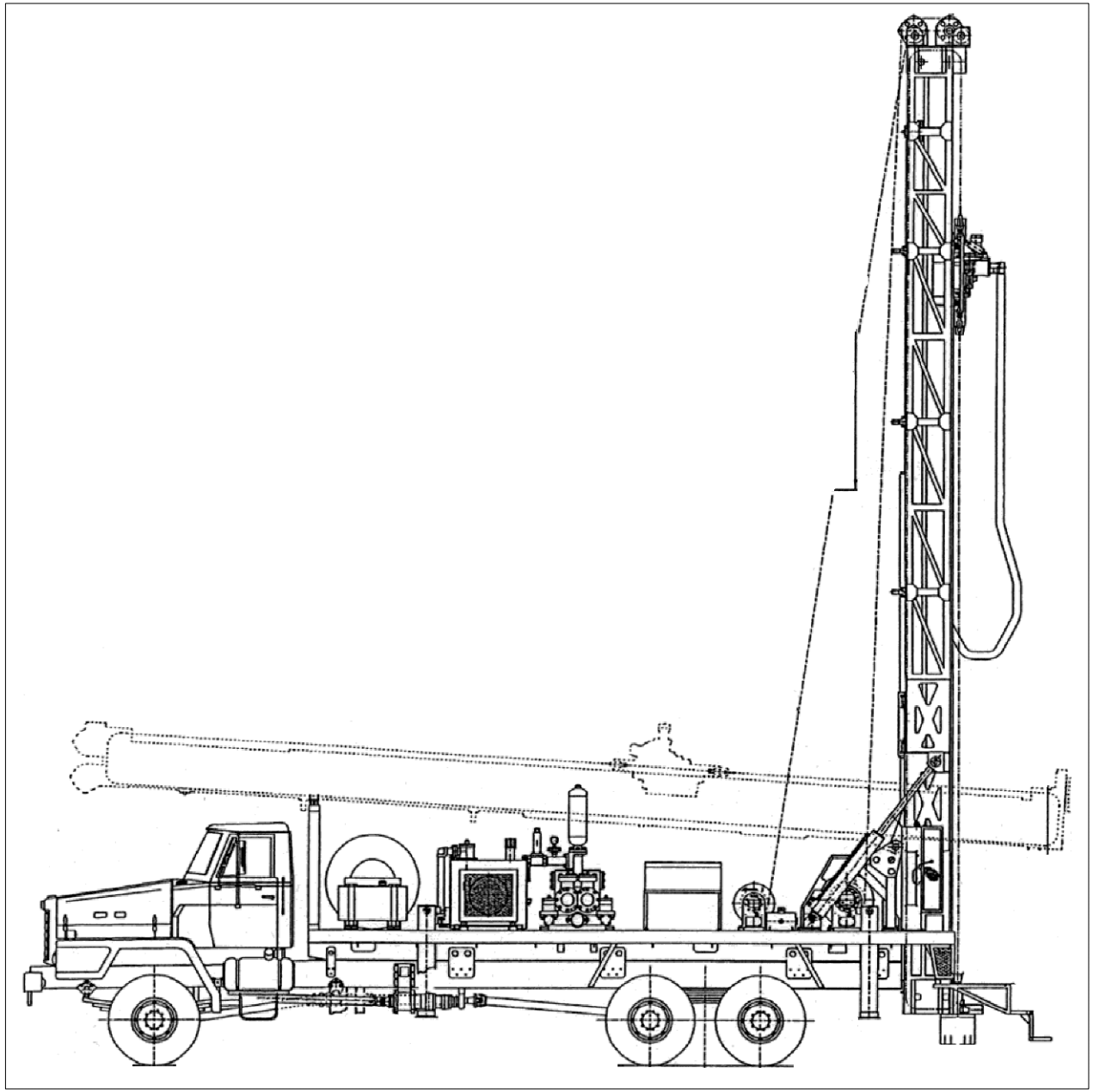


PLAN

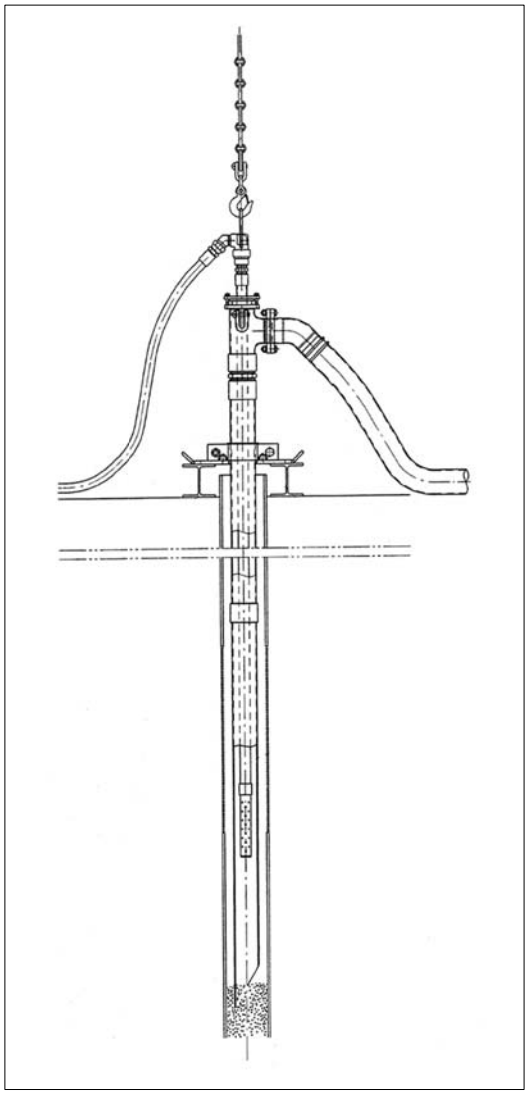


Public Tap

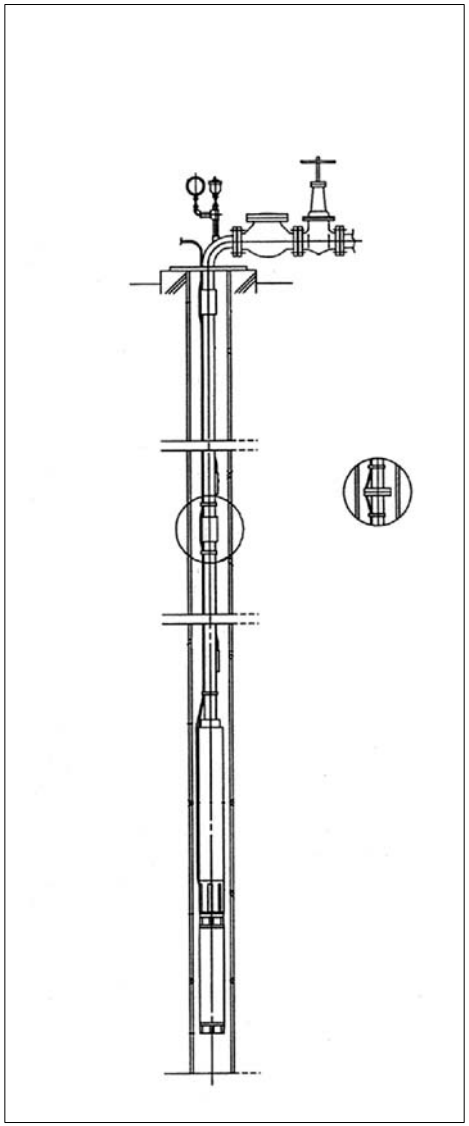
OWNER : JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	PROJECT NAME : THE BASIC DESIGN STUDY ON THE PROJECT FOR WATER SUPPLY IN SOUTHERN NATIONS, NATIONALITIES AND PEOPLE'S REGIONAL STATE IN THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA	CONSULTING ENGINEERS : NIPPON KOEI CO.,LTD.	DRAWING TITLE : Public Tap		
			SCALE S=1:30	DATE February 2005	DRAWING NO. SF-5.1



OWNER : JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	PROJECT NAME : THE BASIC DESIGN STUDY ON THE PROJECT FOR WATER SUPPLY IN SOUTHERN NATIONS, NATIONALITIES AND PEOPLE'S REGIONAL STATE IN THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA	CONSULTING ENGINEERS : NIPPON KOEI CO.,LTD.	DRAWING TITLE : Rotary Drilling Rig		
			SCALE None	DATE February 2005	DRAWING NO. PE-1.1

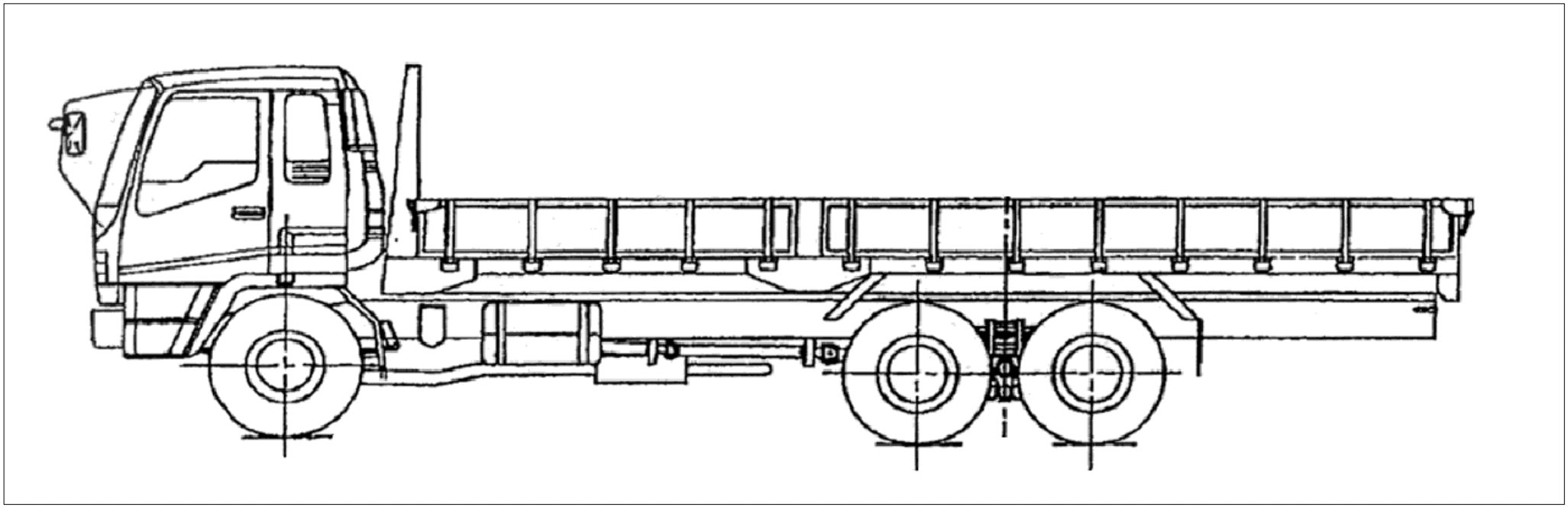


Air Lift Equipment

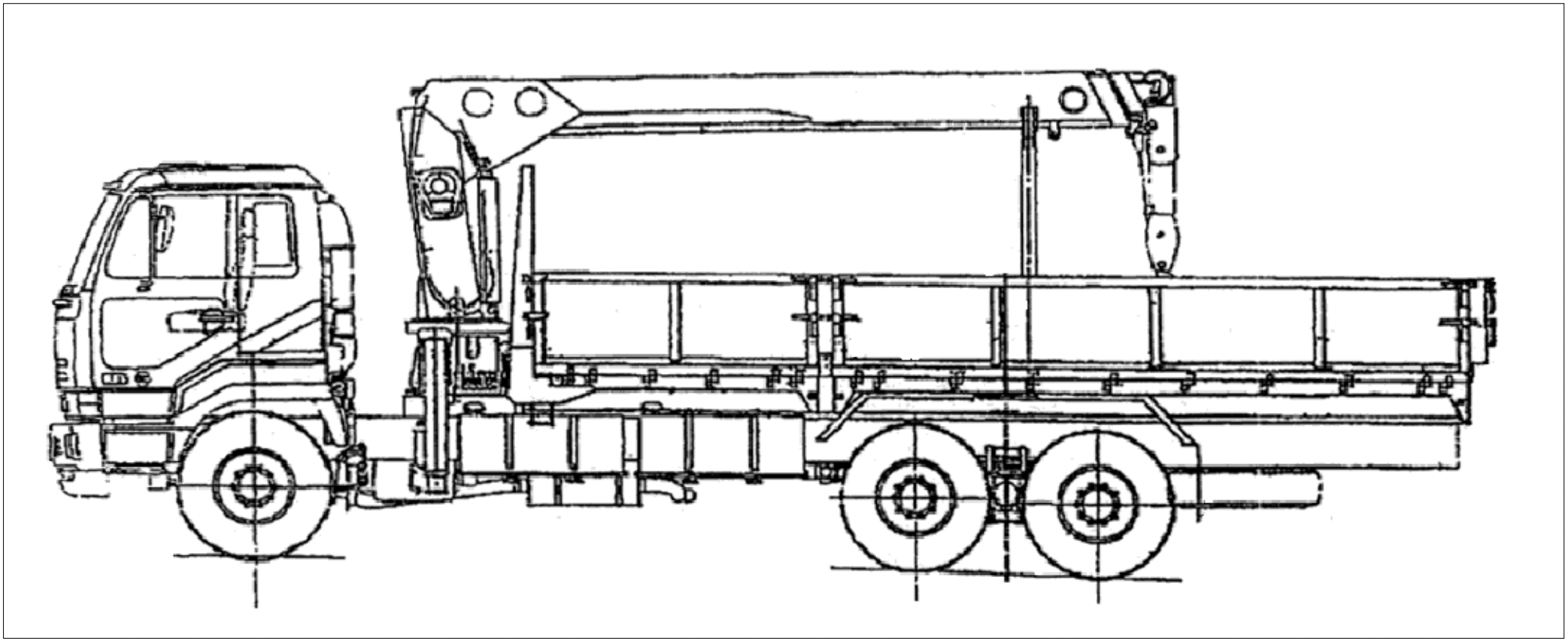


Pumping Test Machinery

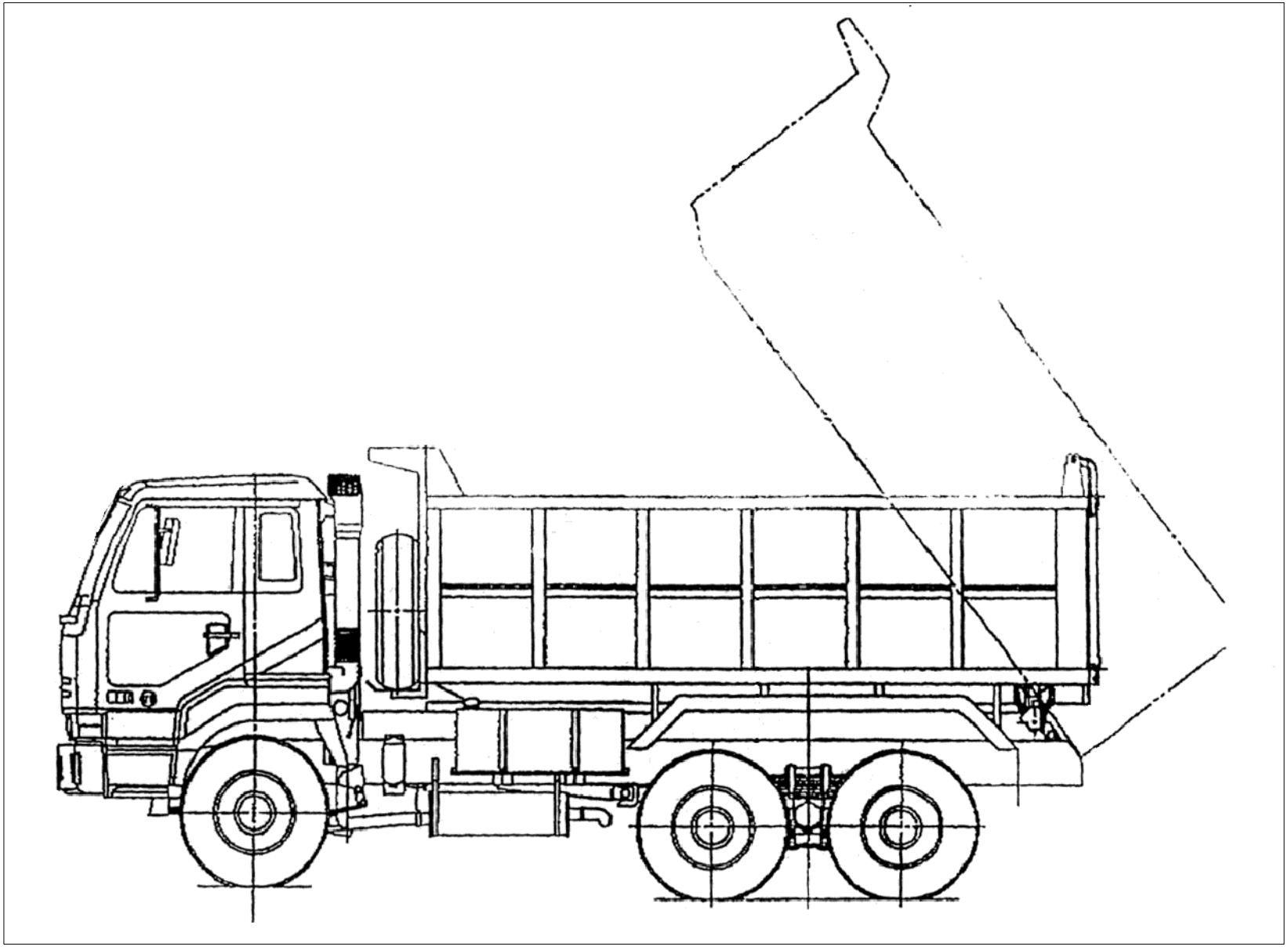
OWNER : JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	PROJECT NAME : THE BASIC DESIGN STUDY ON THE PROJECT FOR WATER SUPPLY IN SOUTHERN NATIONS, NATIONALITIES AND PEOPLE'S REGIONAL STATE IN THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA	CONSULTING ENGINEERS : NIPPON KOEI CO.,LTD.	DRAWING TITLE : Air Lift Equipment / Pumping Test Machinery SCALE: None / DATE: February 2005 / DRAWING NO.: PE-2.1



OWNER : JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	PROJECT NAME : THE BASIC DESIGN STUDY ON THE PROJECT FOR WATER SUPPLY IN SOUTHERN NATIONS, NATIONALITIES AND PEOPLE'S REGIONAL STATE IN THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA	CONSULTING ENGINEERS : NIPPON KOEI CO.,LTD.	DRAWING TITLE : Gargo Truck		
			SCALE None	DATE February 2005	DRAWING NO. PE-3.1



OWNER : JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	PROJECT NAME : THE BASIC DESIGN STUDY ON THE PROJECT FOR WATER SUPPLY IN SOUTHERN NATIONS, NATIONALITIES AND PEOPLE'S REGIONAL STATE IN THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA	CONSULTING ENGINEERS : NIPPON KOEI CO.,LTD.	DRAWING TITLE : Gargo Truck with Crane		
			SCALE None	DATE February 2005	DRAWING NO. PE-3.2



OWNER :	PROJECT NAME :	CONSULTING ENGINEERS :	DRAWING TITLE :		
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	THE BASIC DESIGN STUDY ON THE PROJECT FOR WATER SUPPLY IN SOUTHERN NATIONS, NATIONALITIES AND PEOPLE'S REGIONAL STATE IN THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA	NIPPON KOEI CO.,LTD.	Dump Truck		
			SCALE: None	DATE: February 2005	DRAWING NO.: PE-3.3

5.2
Results of Water Quality Survey

Laboratory Water Quality Analysis (SNNPR State)

	Zone	Woreda	Kebele	Water Point		Chemicals of Health Significance									Substance and Parameters that may give rise to complaints from consumers									
						Ba	Cd	Cr	Cu	Mn	Pb	CN	F	No_3	Zn	Al	Fe	H_2S	TDS	Hardnes	Cl	So_4	Na	pH
						(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	–
1	Sidama	Hulla	Chirone	HDW	Rf	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.001	0.12	7.53	<0.1	<0.1	<0.1	Nil	0.64	50	3	–	3.5	6.67
2	Gedeo	Y. Chefe	Chito	BH	Rf	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.003	0.1	23.92	0.2	<0.1	0.1	**0.64**	120	32	9	–	7	6.77
3	Silti	Silti	Danuecho Mukerie	HDW	Rf	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.001	0.27	10.19	<0.1	<0.1	<0.1	**0.64**	286	123	11	7	9	7.08
4	Silti	Dalacha	Gale Chaba	BH	Rf	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.005	**3.76**	0.89	0.2	<0.1	<0.1	**0.64**	1331	249	25	30	186	7.63
5	Hadiya	Lemo	Achamo	BH	Rf	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.008	1.4	0	0.5	<0.1	<0.1	**0.32**	607	249	3	–	27	7.62
6	K. Tembara	Angacha	Uetuge	HDW	Rf	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.001	0.61	3.54	<0.1	**8.2**	**4.3**	Nil	131	41	4	2	12	6.89
7	Gurage	Gumer	Wenwzerana Grote	HDW	Rf	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.001	0.13	**84.17**	<0.1	<0.1	<0.1	**0.32**	411	125	34	12	15	7.03
8	Wolaita	BolosoSore	Dubo	BH	Rf	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.001	0.79	–	<0.1	<0.1	<0.1	Nil	159	34	–	–	20	7.17
9	Dowro	Esara	Gudumu-1	CSP	Sr	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0	0.09	2.66	<0.1	<0.1	<0.1	Nil	29	8	–	–	2.2	6.76
10	Dowro	Esara	Gudumu-2	CSP	Sr	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.001	0.1	0.44	<0.1	<0.1	<0.1	Nil	78	31	–	–	3.8	7.65
11	Dowro	Esara	Arusi Balla-1	CSP	Sr	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.001	0.2	0.89	<0.1	<0.1	0.1	Nil	126	50	–	–	6.6	7.07
12	Dowro	Esara	Arusi Balla-2	CSP	Sr	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.001	0.15	1.77	<0.1	<0.1	<0.1	Nil	95	39	–	–	5.4	6.63
13	Dowro	Esara	Ofa-1	CSP	Sr	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.001	0.1	3.1	<0.1	**1.3**	0.4	**0.32**	59	19	–	1	3.1	6.56
14	Dowro	Esara	Ofa-2	CSP	Sr	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.001	0.12	0.44	<0.1	<0.1	0.1	**0.32**	72	26	–	–	3.9	7.05
15	Dowro	Esara	Duzi-1	CSP	Sr	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.001	0.12	2.66	<0.1	<0.1	<0.1	**0.32**	81	24	–	–	5.8	6.98
16	Dowro	Esara	Duzi-2	CSP	Sr	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.001	0.12	0	<0.1	**1.5**	**0.8**	Nil	62	22	–	–	3.6	7.01
17	Dowro	Esara	Arusi Bale	CSP	Sr	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.001	0.21	24.37	<0.1	<0.1	<0.1	**0.32**	258	56	34	4	18	6.97
18	Dowro	Esara	Sengeti	CSP	Sr	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.002	0.16	1.77	<0.1	<0.1	0.1	Nil	139	49	–	–	9	6.97
19	Dowro	Tocha	Kechi Tuta-1	CSP	Sr	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.001	0.07	8.42	<0.1	<0.1	<0.1	Nil	63	20	–	–	3.4	6.36
20	Dowro	Tocha	Kechi Tuta-2	CSP	Sr	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0	0.06	1.77	<0.1	<0.1	0.1	Nil	29	8	1	1	2.2	5.93
21	Dowro	Tocha	Shushuri-1	CSP	Sr	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0	0.06	6.65	<0.1	**0.6**	0.4	**0.32**	31	6	–	1	2.5	6.31
22	Dowro	Tocha	Shushuri-2	CSP	Sr	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.001	0.09	2.66	<0.1	0.3	0.2	Nil	43	10	–	1	3.5	7.1
23	Dowro	Tocha	Medihanalem-1	CSP	Sr	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0	0.06	0	<0.1	<0.1	<0.1	**0.32**	22	3	–	–	2.6	6.25
24	Dowro	Tocha	Medihanalem-2	CSP	Sr	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0	0.06	0.44	<0.1	<0.1	<0.1	Nil	23	6	1	–	2.5	5.82
25	Dowro	Tocha	Medihanalem-3	CSP	Sr	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.003	0.06	6.2	<0.1	<0.1	0.1	**0.32**	35	6	1	–	2.8	7.11
26	Dowro	Tocha	G2	CSP	Rf	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.002	0.45	0.44	<0.1	<0.1	<0.1	**0.32**	411	168	1	1	25	7.74
27	Dowro	Loma	War-1	WSP	Rf	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.002	1.59	–	<0.1	<0.1	<0.1	Nil	442	201	–	1	24	8.1
28	Dowro	Loma	Ar-1	CSP	Sr	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.001	0.18	3.99	<0.1	<0.1	**1.0**	Nil	114	41	2	1	6.2	6.39
29	Dowro	Loma	lal-1	CSP	Rf	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.002	1.05	8.86	<0.1	<0.1	<0.1	Nil	401	178	6	–	24	7.88
30	Wolaita	KK	DM1	HDW	Rf	<0.1	<0.1	<0.1	<0.1	0.6	<0.1	0.002	0.14	0.44	<0.1	<0.1	0.1	Nil	68	20	–	–	5.1	6.55
31	S. Omo	Bak	GK-1	BH	Rf	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0	0.65	13.29	0.1	<0.1	<0.1	Nil	681	231	17	11	62	7.13
32	Derashe	Derashe	AdsA-1	CSP	Sr	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0	0.06	5.76	<0.1	**10.5**	<0.1	Nil	63	20	4	4	3.4	6.16
33	Derashe	Derashe	AdsA-2	CSP	Sr	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.005	0.05	1.33	<0.1	<0.1	<0.1	Nil	26	5	–	–	2.5	6.07
34	Derashe	Derashe	Waly-1	CSP	Sr	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.001	0.21	0.44	<0.1	<0.1	<0.1	**0.32**	633	301	2	1	32	8.06
35	Derashe	Derashe	L/Ar-1	CSP	Sr	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.001	0.13	11.08	<0.1	0.1	<0.1	Nil	239	99	7	1	14	7.5
36	Derashe	Derashe	L/Ar-2	CSP	Sr	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.001	0.13	8.86	<0.1	<0.1	<0.1	Nil	518	251	7	1	18	7.43
37	Derashe	Derashe	Busa-1	CSP	Sr	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.001	0.1	5.76	0.1	<0.1	<0.1	Nil	290	134	9	–	9	8
38	Derashe	Derashe	L/Ar-3	CSP	Sr	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.001	0.18	2.22	<0.1	0.2	0.2	Nil	149	48	6	–	11	7.54
(Ethiopian Standards)						1.8	0.003	0.01	5	0.8	0.02	0.07	3	50	6	0.4	0.4	0.07	1776	392	533	483	358	

Note HDW: Hand Dug Well, BH: Borehole, CSP: Cold Spring, WSP: Worm Spring
Sr: Water Source for the project, Rf: Refference water point for assessmemt

Results of In-Situ Water Quality Analysis (SNNPR State)

No.		Zone	Woreda	Kebele	Sepecific Location (UTM)		Water Point	In- Situ Analysis						Q/W test in	Sampled	Flow meter	Elevation a.m.s.l	Geology
								Temp deg. C	pH	Cond. (μ s/cm)	Fe mg/L	F mg/L	T.Conliform					
					Easting	Northing		ET. Sdd =>		2,960	0.4	3		Labo.		(L/sec)		
1	1	Dawero	Tocha	Kechi Idgit 1	277451	777626	CS	19.6	5.6	36	<0.2	<0.4	25				2210	Basalt
1	2	Dawero	Tocha	Kechi Idgit 2	276736	730194	CS	19.2	6.2	62	<0.2	0.6	10				2161	Basalt
2	1	Dawero	Tocha	Bera Doba 1	281884	785950	CS	16.6	6.6	19	<0.2	0.6	0				2775	Basalt
2	2	Dawero	Tocha	Bera Doba 2	282078	785920	CS	14.3	6.8	30	<0.2	0.4	0				2758	Basalt
3	1	The Kebele was canceled due to inaccessibility																
4	1	Dawero	Tocha	Aba Dahe 1	267600	794947	CS	22	6.6	136	1.5	0.6	>100				1624	Basalt
4	2	Dawero	Tocha	Aba Dahe 2	267754	794919	CS	19.2	7.4	184	0.5	0.5	>100				1611	Basalt
5	1	Dawero	Tocha	Kechi Tuta 1	276336	730194	CS							Labo.	W. sampled		2161	Basalt
5	2	Dawero	Tocha	Kechi Tuta 2	277011	780998	CS							Labo.	W. sampled		2226	Basalt
6	1	Dawero	Tocha	Shishuri 1	282180	781765	CS							Labo.	W. sampled		2434	Basalt
6	2	Dawero	Tocha	Shishuri 2	282380	782677	CS							Labo.	W. sampled		2445	Basalt
7	1	Dawero	Tocha	Medhane Alem 1	282800	785631	CS							Labo.	W. sampled		2729	Basalt
7	2	Dawero	Tocha	Medhane Alem 2	282894	784460	CS							Labo.	W. sampled		2647	Basalt
7	3	Dawero	Tocha	Medhane Alem 3	283714	783573	CS							Labo.	W. sampled		2605	Basalt
8	1	Dawero	Tocha	Wara gessa 1	288390	792650	CS	24.8	6.3	136	0.5	0.8	>100				1490	Basalt
8	2	Dawero	Tocha	Wara gessa 2	297455	793265	HDW	23.8	7	298	<0.2	0.5	>100				1389	Basalt
9	1	Dawero	Tocha	Waruma Kessa 1	284177	792539	CS							Labo.	W. sampled		1527	Basalt
9	2	Dawero	Tocha	Waruma Kessa 2	228064	792452	CS	22.9	8.4	455	<0.2	1.2	43				1534	Basalt
10	1	Warima Kessa (sama Kebele as 9)																
11	1	Dawero	Tocha	Gorika 1	277599	793297	HDW	24.3	7.4	540	>10	0.8	>100				1595	Basalt
11	2	Dawero	Tocha	Gorika 2	278387	793374	CS	22.7	7.5	219	<0.2	0.5	>100	Labo.	W. sampled		1564	Basalt
12	1	Dawero	Tocha	Aba Gerga 1	266638	794966	CS	20.3	7.3	485	<0.2	0.5	>100				1454	Basalt
12	2	Dawero	Tocha	Aba Gerga 2	266699	795158	CS	19.8	7.3	400	2	0.5	>100				1449	Basalt
13	1	Dawro	Loma	Loma Barzie 1	305591	770315	CS	17.5	6.9	54	<0.2	0.5	4				2331	Basalt
13	2	Dawro	Loma	Loma Barzie 2	305499	771229	CS	18	6.8	74	<0.2	0.6	25				2220	Basalt
14	1	The Kebele was canceled due to inaccessibility																
15	1	Dawro	Loma	Gufa Gato 1	302069	757915	CS	18.3	7.7	66	<0.2	0.5	>100				2245	Tuff
15	2	Dawro	Loma	Gufa Gato 2	304113	759899	CS	17.9	7.4	39	<0.2	0.4	23				2206	Tuff
16	1	The Kebele was canceled due to inaccessibility																
17	1	Dawro	Loma	Lala Ambe 1	317009	766943	CS	25.4	7.7	411	<0.2	0.8	54	Labo.			1304	Basalt
17	2	Dawro	Loma	Lala Ambe 2	316413	769521	CS	21.7	7.2	583	<0.2	0.8	>100				1328	Basalt
18	1	not measured due to inaccesiblility. * Dissa kebele is adjacent to Arga Bacho 1 (abount 2.0 km) therefore represantable by results of Arga Bacho																
19	1	Dawro	Loma	Lomma Bale 1	305294	785421	CS	18.9	7.5	24	<0.2	0.5	0				2419	Tuff
19	2	Dawro	Loma	Lomma Bale 2	305494	785521	CS	18.1	5.7	13	<0.2	0.5	5				2390	Tuff
20	1	Dawro	Loma	Arga Bacho 1	301069	755676	CS							Labo.	w.sampled	0.5	2156	Trachy basalt

Results of In-Situ Water Quality Analysis (SNNPR State)

No.		Zone	Woreda	Kebele	Sepecific Location (UTM)		Water Point	In- Situ Analysis						Q/W test in	Sampled	Flow meter	Elevation a.m.s.l	Geology
								Temp deg. C	pH	Cond. (μ s/cm)	Fe mg/L	F mg/L	T.Conliform					
					Easting	Northing		ET. Sdd =>		2,960	0.4	3		Labo.		(L/sec)		
21	1	Dawero	Esara	Duzi 1	274909	762431	CS	16.6	7.6	60	<0.2	0.6	>100				2340	Basalt
21	2	Dawero	Esara	Duzi 2	275869	762090	CS	17.2	6.9	139	<0.2	0.4	35				2329	Basalt
22	1	Dawero	Esara	Gego 1	284257	762102	CS	17.6	6.6	109	<0.2	0.4	75				2242	Basalt
22	2	Dawero	Esara	Gego 2	283888	761969	CS	18	6.8	151	0.5	0.6	40				2208	Basalt
23	1	Dawero	Esara	Arusi Bala 1	278530	762862	CS	17.4	6.9	133	<0.2	0.6	45	Labo.	w.Sampled	0.05	2328	Basalt
23	2	Dawero	Esara	Arusi Bala 2	279007	762840	CS	17.4	6.4	98	<0.2	0.5	30	Labo.	w.Sampled	0.33	2248	Basalt
24	1	(Same Kebele as 23)		-> Arusi Bale														
25	1	Dawero	Esara	Gudumu 1	273350	768087	CS							Labo.	w.Sampled	0.1	2432	Basalt
25	2	Dawero	Esara	Gudumu 2	273622	762730	CS							Labo.	w.Sampled	0.075	2427	Basalt
26	1	Dawero	Esara	Guza 1	282862	762001	CS							Labo.	w.Sampled	0.1	2196	Basalt
26	2	Dawero	Esara	Guza2	283115	761996	CS							Labo.	w.Sampled	0.05	2216	Basalt
27	1	Dawero	Esara	Hagalie 02 (1)	287277	762885	CS	18.6	7.8	71	<0.2	0.4	>100				2030	Basalt
27	2	Dawero	Esara	Hagalie 02 (2)	286223	762259	CS	18.1	7.4	55	<0.2	0.6	80				2124	Basalt
28	1	Dawero	Esara	Ofa 1	284471	762172	CS							Labo.	w.Sampled	0.175	2225	Basalt
28	2	Dawero	Esara	Ofa 2	284378	761881	CS							Labo.	w.Sampled	0.022	2234	Basalt
29	1	Dawero	Esara	Sengeti 1	276746	770110	CS							Labo.	w.Sampled	0.26	1838	Basalt
30	1	Dawero	Esara	Dali 1 (Dalba 3)	278340	774085	CS	16.8	6.5	33	<0.2	0.7	>100				2047	Basalt
30	2	Dawero	Esara	Dali 2 (Dalba 3)	278455	773964	CS	15.6	6.4	87	10	0.5	>100				2039	Basalt
31	1	Dawero	Esara	Bale 1	280399	763376	HDW	16.4	7.1	275	<0.2	0.5	0	Labo.	w.Sampled		2349	Basalt
31	2	Dawero	Esara	Bale 2	280201	768247	CS	16.3	6.5	73	<0.2	0.4	60				2314	Basalt
33	1	Sidama	Eler Hula	Chirome 1	45953	712503	CS	17.6	6.3	85	<0.2	0.3	38			0.3	2555	Basalt
33	2	Sidama	Eler Hula	Chirome 2	45875	712898	HDW	18	6.2	43	<0.2	0.8	30	Labo.	W. Sampled		2624	Tuff & Basalt
34	1	Sidama	Eler Hula	Wirama 1	444456	722818	HDW	17.8	5.6	28.8	<0.2	0.6	50				2704	Acidic Vol
34	2	Sidama	Eler Hula	Wirama 2	444888	722478	CS	17.4	5.3	47.4	<0.2	0.5	1			0.25	2677	Acidic Vol
35	1	Sidama	Eler Hula	Gassie 1	443569	720433	HDW	16.6	6.3	149.2	2	0.8	1				2736	Acidic Vol
35	2	Sidama	Eler Hula	Gassie 2	443119	720757	HDW	17.2	6.1	29.6	<0.2	0.8	0				2764	Acidic Vol
36	1	Sidama	Eler Hula	Sukie Bonbie														
37	1	Sidama	Eler Hula	Sedie 1	469738	715777	CS	20.6	6.9	532	<0.2	0.4	58			0.1	2052	Basalt
37	2	Sidama	Eler Hula	Sedie 2	46913	715951	CS	18.9	7.3	493	<0.2	0.6	96			0.5	2051	Basalt
38	1	Sidama	Eler Hula	Bedesa Chechu														
39	1	Sidama	Eler Hula	Damide Chirecha 1	46930	714139	CS	25.7	7.2	350	<0.2	0.2	81			0.1	2155	Basalt
40	1	Sidama	Eler Hula	Abayie Qeraro	d due to inaccessibility)													
41	1	Sidama	Eler Hula	Memsa Wacho	470694	713928	CS	20.3	6.7	423	<0.2	0.2	>100			not flow	2065	Basalt
42	1			Abayie Adola														
43	1	Sidama	Eler Hula	Hobana Gangawa 1	455726	728929	HDW	19.2	5.7	60	<0.2	0.6	3				2598	Tuff

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No.		Zone	Woreda	Kebele	Sepecific Location (UTM)		Water Point	In- Situ Analysis						Q/W test in	Sampled	Flow meter	Elevation a.m.s.l	Geology
								Temp deg. C	pH	Cond. (μ s/cm)	Fe mg/L	F mg/L	T.Conliform					
					Easting	Northing		ET. Sdd =>		2,960	0.4	3		Labo.		(L/sec)		
43	2	Sidama	Eler Hula	Hobana Gangawa 2	45586	728471	CS	18.1	5.2	94	<0.2	0.4	3			0.25	2600	Tuff
44	1	Sidama	Eler Hula	Delya 1	46496	711937	HDW	19.4	5.7	129	<0.2	0.4	>100				2574	Basalt
44	2	Sidama	Eler Hula	Delya 2	46485	711857	CS	20	6.3	113.2	<0.2	0.4	1			<0.1 l/s	2534	Tuff & Basalt
45	1	Sidama	Eler Hula	Dadahie 1	45428	733276	HDW	18.3	6.4	42	<0.2	0.8	20				2729	Tuff
45	2	Sidama	Eler Hula	Dadahie2	45465	732998	CS	18.8	5.2	32	<0.2	0.4	0			0.2	2639	Tuff
46	1	Gedeo	Yirga Chefe	Aforsa Worabe 1	40962	679704	HDW	20.8	7.1	213	<0.2	0.4	30				1813	Tuff
46	2	Gedeo	Yirga Chefe	Aforsa Worabe 2	410650	681254	CS	22	5.8	80	<0.2	0.6	37			?(In storage)	1830	Tuff
47	1	Gedeo	Yirga Chefe	Konga 1	41181	676582	CS	20.3	6.3	166	<0.2	0.4	16			0.25	1898	Basalt
47	2	Gedeo	Yirga Chefe	Konga 2	41217	676977	BH	21.2	6.4	145	<0.2	0.6	10				1896	Tuff & Basalt
48	1	Gedeo	Yirga Chefe	Wote 1	411515	673325	CS	17.4	6.3	139	0.2	0.4	>100		W. Sampled	<0.1	2196 m	Tuff
48	2	Gedeo	Yirga Chefe	Wote 2	411636	673221	HDW	18.2	5.9	434	<0.2	0.4	>100				2236	Tuff
49	1	Gedeo	Yirga Chefe	Chelba 1	412779	689794	BH	21	6.6	93	<0.2	0.3	76				1867	Tuff
49	2	Gedeo	Yirga Chefe	Chelba 2	412612	696773	CS	20	5.7	70	<0.2	0.3	47	Labo.	W. Sampled		1860	Tuff
50	1	Gedeo	Yirga Chefe	Chito 1	413155	688798	HDW	20.8	5.7	122	<0.2	0.5	>>100				1854	Tuff
50	2	Gedeo	Yirga Chefe	Chito 2	412800	683863	BH	20	6.1	115	<0.2	0.5	100				1853	Tuff
51	1	Gedeo	Yirga Chefe	Oru Batala 2	415600	682700	HDW	19.6	5.2	307	<0.2	0.4	32				2000	Tuff
51	2	Gedeo	Yirga Chefe	Oru Batela 1	415500	682600	CS	17.8	6.3	93	<0.2	0.5	>100			0.1	1980	Tuff
52	1	Gedeo	Yirga Chefe	Resiti 1	403205	674034	CS	23.1	5.9	67	<0.2	0.8	87				2057	Tuff
53	1	Gedeo	Yirga Chefe	Tutity 1	411142	692959	HDW	21.2	6.3	163	<0.2	0.6	>100				1926	Basalt
53	2	Gedeo	Yirga Chefe	Tutity 2	411171	692452	HDW	21.7	6.3	610	<0.2	0.8	>100				2007	Basalt
54	1	Gedeo	Yirga Chefe	Adame 1	472117	694355	HDW	22.2	6.4	120	<0.2	0.8	25				1848	Tuff
54	2	Gedeo	Yirga Chefe	Adame 2	411847	684438	CS	22.1	5.7	30	<0.2	0.4	5			0.1	1980	Tuff
55	1	Gedeo	Yirga Chefe	Birbiskela 1	414141	677061	HDW	18.4	5.6	78	<0.2	0.3	>100				2111	Basalt
55	2	Gedeo	Yirga Chefe	Birbiskela 2	414835	676675	CS	18.4	7.1	46	<0.2	0.5	18				2183	Basalt
56	1	Gedeo	Yirga Chefe	Chiriku 1	402540	680991	BH	21.6	6.6	654	<0.2	0.8	0				2000	Tuff
56	2	Gedeo	Yirga Chefe	Chiriku 2	402671	680905	CS	21.7	7	350	<0.2	0.6	92				1926	Tuff
57	1	Gedeo	Yirga Chefe	Dako 1	411694	693793	HDW	20.6	6.8	73	<0.2	0.6	>100				2019	Basalt
57	2	Gedeo	Yirga Chefe	Dako 2	412464	693800	CS	21.2	6.1	112	<0.2	0.5	33				1957	Tuff
58	1	Gedeo	Yirga Chefe	Udessa 1	405000	476254	CS	19.6	6.5	162	<0.2	0.6	26				2016	Basalt
59	1	Gedeo	Yirga Chefe	Kedida 1	402204	674687	BH	21.6	6.8	204	<0.2	0.8	0				2170	Tuff
59	2	Gedeo	Yirga Chefe	Kedida 2	402601	675335	BH	21.6	6.9	214	<0.2	0.8	0				2196	Tuff
60	1	Hadiya	Lemo	Bukuna Chachey 1	365624	837301	HDW	20.6	6.3	190	<0.2	0.5	>100				2190	Tuff & ash
60	2	Hadiya	Lemo	Bukuna Chachey 2	365624	837350	CS	20.2	5.8	136	<0.2	0.4	2				2181	Tuff & ash
61	1	Hadiya	Lemo	Hayse 1	375546	828983	HDW	20.8	6.4	110	<0.2	0.5	66				2203	Tuff & ash
61	2	Hadiya	Lemo	Hayse 2	376377	828696	HDW	21.3	6.6	492	<0.2	0.5	69				2184	Tuff & ash

Results of In-Situ Water Quality Analysis (SNNPR State)

No.		Zone	Woreda	Kebele	Sepecific Location (UTM)		Water Point	In- Situ Analysis						Q/W test in	Sampled	Flow meter	Elevation a.m.s.l	Geology
								Temp deg. C	pH	Cond. (μ s/cm)	Fe mg/L	F mg/L	T.Conliform					
					Easting	Northing		ET. Sdd =>		2,960	0.4	3		Labo.		(L/sec)		
62	1	Hadiya	Lemo	Lereba 1	373460	829804	HDW	20.3	7.2	254	2	0.5	>100				2208	Tuff & ash
62	2	Hadiya	Lemo	Lereba 2	371517	830228	HDW	16.5	6.9	280	<0.2	0.5	43				2204	Tuff & ash
63	1	Hadiya	Lemo	Ana 1	386246	838330	BH	23.5	7.1	250	<0.2	0.6	0				2376	Tuff
64	1	Hadiya	Lemo	Achamo 1	394877	847300	BH	24.3	7.1	693	<0.2	0.8	0				2011	Tuff & ash
64	2	Hadiya	Lemo	Achamo 2	393646	846282	BH	23.7	7.2	653	<0.2	1	0	Labo.			2015	Tuff & ash
65	1	The Kebele was canceled due to inaccessibility																
66	1	Hadiya	Lemo	Lafto Lanka 1	388605	349563	BH	24.2	7.3	456	<0.2	0.8	0				2103	Tuff & ash
66	2	Hadiya	Lemo	Lafto Lanka 2	388001	849348	BH	20.6	6.8	420	<0.2	0.5	0				2094	Tuff & ash
67	1	Hadiya	Lemo	Homa Agera 1	390010	538014	BH	23.5	6.6	380	<0.2	0.6	0				2232	Tuff & ash
67	2	Hadiya	Lemo	Homa Agera 2	390129	837979	CS	21.2	6.8	213	<0.2	0.8	>100				2242	ash
68	1	The Kebele was canceled due to inaccessibility																
69	1	The Kebele was canceled due to inaccessibility																
70	1	Woleiyta	Boloso Sore Woreda	Anchucho Doge 1	354668	772426	CS	22.4	6.5	132	<0.2	0.6	>100				1948	Tuff
70	2	Woleiyta	Boloso Sore Woreda	Anchucho Doge 2	235399	770530	HDW	23.8	6.1	92	<0.2	0.4	28				1952	ash
71	1	Woleiyta	Boloso Sore Woreda	Dembez Zamere 1	351009	769931	HDW	20.6	7.5	339	<0.2	0.5	60				1969	Tuff
71	2	Woleiyta	Boloso Sore Woreda	Dembez Zamere 2	351475	772951	CS	20.6	6	69	<0.2	0.4	3				1909	Tuff
72	1	Woleiyta	Boloso Sore Woreda	Dubo 1	354813	781525	HDW	22.4	6.1	89	1	0.8	30				1805	Tuff
72	2	Woleiyta	Boloso Sore Woreda	Dubo 2	355936	781376	BH	27.6	6.9	164	<0.2	0.8	0	Labo.	W.sampled		1760	Tuff
73	1	Woleiyta	Boloso Sore Woreda	Adma mcho 1	365077	778133	BH	21.3	7.4	262	<0.2	0.5	0				1854	Tuff &Ign
73	2	Woleiyta	Boloso Sore Woreda	Admamcho 2	366671	778730	HDW	22	6.7	176	<0.2	0.3	22				1861	Tuff & Ign
74	1	Woleiyta	Boloso Sore Woreda	Gara Godo 1	365051	782709	HDW	22.6	7.1	227	<0.2	0.4	26				1839	Tuff & ash
74	2	Woleiyta	Boloso Sore Woreda	Gara Godo 2	362805	781752	CS	25.6	6.5	90	<0.2	0.5	26				1768	Tuff & ash
75	1	Woleiyta	Boloso Sore Woreda	Wormuma 1	353813	787115	BH	25.4	6.9	124	<0.2	0.8	0				1725	Tuff
75	2	Woleiyta	Boloso Sore Woreda	Wormuma 1	357818	787115	HDW	23	6.2	54	<0.2	0.4	>100				1746	Tuff
76	1	Woleiyta	Boloso Sore Woreda	Gumuno 1	352521	768635	HDW	21.6	6.7	105	<0.2	0.5	63				1982	Tuff
76	2	Woleiyta	Boloso Sore Woreda	Gununo 2	352341	768522	CS	22.3	6	98	<0.2	0.5	>100				1968	Tuff
77	1	Woleiyta	Boloso Sore Woreda	Bombie 1	343460	790018	HDW	25	6.1	124	<0.2	0.4	52				1544	Tuff
77	2	Woleiyta	Boloso Sore Woreda	Bombie 2	343328	789296	HDW	23.7	6	767	<0.2	0.4	26				1547	Tuff
78	1	Woleiyta	Boloso Sore Woreda	Adila 1	348972	788111	HDW	24.5	7.2	265	<0.2	0.4	>100				1667	Tuff
78	2	Woleiyta	Boloso Sore Woreda	Adila 2	349049	788766	HDW	23.4	6.1	70	<0.2	0.4	81				1667	Tuff
79	1	Woleiyta	Boloso Sore Woreda	Farawoch 1	346683	790181	BH	26.8	7.7	238	<0.2	0.8	0				1541	Tuff
79	2	Woleiyta	Boloso Sore Woreda	Farawocho 2	346437	789692	HDW	24	6.2	90	<0.2	0.5	>100				1571	Tuff
80	1	Woleiyta	Boloso Sore Woreda	Chema -embecho 2	355217	787401	CS	27.9	7.3	259	<0.2	0.8	0				1667	Tuff
80	2	Woleiyta	Boloso Sore Woreda	Chema-embecho 1	353866	788816	HDW	22.9	7	244	<0.2	0.7	8				1697	Tuff

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								Temp deg. C	pH	Cond. (μ s/cm)	Fe mg/L	F mg/L	T.Conliform					
					Easting	Northing		ET. Sdd =>		2,960	0.4	3		Labo.		(L/sec)		
81	1	Woleiyta	Boloso Sore Woreda	Mitila - embecho 1	352302	790360	BH	21	6.7	140	<0.2	0.6	0				1752	Tuff
81	2	Woleiyta	Boloso Sore Woreda	Mitila - embecho 2	352906	789697	HDW	23.9	5.7	68	<0.2	0.5	>100				1686	Tuff
82	1	Woleiyta	Boloso Sore Woreda	Achura 1	355322	790893	CS	24.6	6.5	131	<0.2	0.4	2				1633	Tuff ,ash
82	2	Woleiyta	Boloso Sore Woreda	Achura 2	356668	790370	HDW	23.8	7.2	362	<0.2	0.8	0				1686	Tuff
83	1	Woleiyta	Kindo Koisha	Doge Mashedo 1	349339	764649	HDW	20.7	5.9	68	0.2	0.4	14	Labo.	W.Sampled		2110	Tuff
83	2	Woleiyta	Kindo Koisha	Doge Mashedo2	348436	768737	HDW	19.2	5.9	68	0.2	0.4	56				2123	Tuff
84	1	Woleiyta	Kindo Koisha	Dege Shakisho 1	345644	765947	HDW	21.7	6.2	47	0.2	0.4	54				2000	Tuff
84	2	Woleiyta	Kindo Koisha	Doge Shakisho 2	349647	766529	HDW	20.9	6.5	143	3	0.6	>100				2020	Tuff
85	1	Woleiyta	Kindo Koisha	Doge Larosso 1	345680	762740	CS	25.4	7.3	62	<0.2	0.4	17				1576	Trachy basalt
86	1	Kambata & Tembaro	Angacha	Amcho Wato 1	N/A	N/A												
86	2	Kambata & Tembaro	Angacha	Wenjela	372509	824742	CS	20	7.3	336	<0.2	0.8	>100				2132	ash, tuff
87	1	Kambata & Tembaro	Angacha	Bonga 1	381567	812065	BH	20.4	7.3	253	<0.2	1					2105	Tuff & ash
88	1	Kambata & Tembaro	Angacha	Lume suticho 1	365647	808023	CS	17.7	6	90	<0.2	0.4	>100				2653	Tuff & ash
88	2	Kambata & Tembaro	Angacha	Lume Suticho 2	366372	808202	HDW	16.5	6.9	230	<0.2	0.6	32				2701	Tuff & ash
89	1	Kambata & Tembaro	Angacha	Uetuge 1	369173	814124	CS	17.6	7.6	164	<0.2	0.6	74				2393	Ign,tuff
89	2	Kambata & Tembaro	Angacha	Uetuge 2	368980	813677	HDW	18	6.5	134	<0.2	0.8	>100	Labo.	W. Sampled		2460	ash, tuff
90	1	Kambata & Tembaro	Angacha	Jeba Dodoba 2	371944	817040	HDW	20.3	6.6	227	<0.2	0.4	>100				2203	ash, tuff
90	2	Kambata & Tembaro	Angacha	Jeba Dodoga 1	371367	816016	CS	19.6	6.4	244	<0.2	0.6	2				2228	ash, tuff
91	1	Derashe	Special Woreda	Adis Altema Mandaro	304165	615993									W.sampled		2464	Basalt
92	1		Special Woreda	Adis Altema Mandaro														
93	1	Canceled	Special Woreda															
94	1	Derashe	Special Woreda	Adis Altema Ketdito	307132	616242									W.sampled		2650	Basalt
95	1	Derashe	Special Woreda	L/Argba Abalo	317796	626138									W.sampled		2066	Basalt
95	2	Derashe	Special Woreda	L/Argba Hamero	317768	625630									W.sampled		2160	Basalt
96	1		Special Woreda	L/Argba Abalo														
97	1	Derashe	Special Woreda	L/Arguba Kora	318361	622889									W.sampled		2141	Basalt
98	1	Derashe	Special Woreda	Walayte Elikola	318016	628560									W.sampled		1773	Basalt
99	1		Special Woreda	Walayte Elikola														
100	1	Derashe	Special Woreda	Busabaso Kadiya	313719	634134									W.sampled		2062	Basalt
101	1		Special Woreda	Busabaso Kadiya														
102	1	canceled																
103	1	Silty	Silty	Bozie Sabola 1	425020	887680	Stream	16.7	8.3	113	<0.2	0.2	85		No other water pt		2161	Basalts
104	1	Silty	Silty	Agoda Librira 1	427656	888955	HDW	20.3	7.3	530	<0.2	0.8	>100				2102	Basalts
104	2	Silty	Silty	Agoda Librira 2	427717	888962	HDW	22.2	7.1	798	<0.2	0.8	9				2100	Alluvium

Results of In-Situ Water Quality Analysis (SNNPR State)

No.		Zone	Woreda	Kebele	Sepecific Location (UTM)		Water Point	In- Situ Analysis						Q/W test in	Sampled	Flow meter	Elevation a.m.s.l	Geology
								Temp deg. C	pH	Cond. (μ s/cm)	Fe mg/L	F mg/L	T.Conliform					
					Easting	Northing		ET. Sdd =>		2,960	0.4	3		Labo.		(L/sec)		
105	1	The Kebele was canceled due to inaccessibility																
106	1	Silty	Silty	Senana Gerira 1	420701	887505	Stream	21	8.1	183	<0.2	0.5	>100		No other water pt.		2074	Tuff
107	1	Silty	Silty	Wolya Sidst 1	424740	886522	CS	24.9	7.6	247	<0.2	0.7	2		They use koto Balosa		2137	Tuff
108	1	Silty	Silty	Koto Baloso 1	424805	884810	Stream	22.4	8.3	125	<0.2	0.7	>100		No other water Pt.		2126	Tuff
109	1	Silty	Silty	Asano Dugderera 1	#######	882279	CS	20.6	6.5	217	<0.2	0.5	85				2229	Tuff
109	2	Silty	Silty	Asano Dugderera 2	422057	880057	HDW	21.3	7.3	365	<0.2	0.6	56				2246	Tuff
110	1	The Kebele was canceled due to inaccessibility																
111	1	Silty	Silty	Danicho Mukere 1	420542	880057	CS	22.3	6.4	287	<0.2	0.3	35				2316	Tuff
111	2	Silty	Silty	Danicho Mukere 2	420515	880477	HDW	20.2	6.6	290	<0.2	0.5	30	Labo.	W. Sampled		2342	Tuff
112	1	Silty	Dalocho	Angamo Yedi 1	398324	864606	HDW	21.6	6.1	258	<0.2	0.6					2304	Tuff & Ash
112	2	Silty	Dalocho	Angamo Yedi 2	398607	865899	CS	20.8	6.2	128	<0.2	0.8					2301	Tuff & Ash
113	1	Silty	Dalocho	Acherayi Kotecho 1	406939	863319	BH	21	8.1	437	<0.2	1					2064	Tuff & Ash
114	1	Silty	Dalocho	Bureka Dilapo 1	414511	863492	CS	30.4	7.2	372	<0.2	1.5	43				1961	Rhyolite
114	2	Silty	Dalocho	Bureka Dilapo 2	414662	863615	HDW	26.5	7.3	383	<0.2	1.2	0				1965	Soils,Tuff
115	1	Silty	Dalocho	Germama Gale 1	414278	866927	BH Broken						17				1973	Igm & Ash
116	1	Silty	Dalocho	Koro Shimu	414480	867500											1980	Igm & Ash
117	1	merged with 115	Dalocho	Korogalay->Gemama Gale														
118	1	Silty	Dalocho	Kura Kolish -> Gola Kure	422609	872367	BH	23.8	7.4	454	<0.2	0.8	_ _ _				2000	Igm & Ash
119	1	merged with 118	Dalocho	lona Shemeto 1 ->Gola K	415210	867650											1985	Igm & Ash
120	1	Silty	Dalocho	eno Shola -> Wanja Shao	426255	862026	CS	26.5	8.4	364	<0.2	1.5		Bureka 1 water after 20 km pipeline			1896	Tuff & Ash
121	1	Merged with 120	Dalocho	eja Golachibe -> Wanja S	430151	863035	BH	33.7	7.5	1253	<0.2	1.5	3	Labo.	W. Sampled		1863	Tuff & Ash
122	1	Gurage	Gumer	Hamebeyeta 1	379023	884928	HDW	19.2	6.3	51	<0.2	0.2	29				2385	Tuff
122	2	Gurage	Gumer	Hamebeyeta 2	378981	885046	HDW	19.4	5.8	49	<0.2	0.5	12				2388	Tuff
123	1	Gurage	Gumer	Wenwezerana Gorate 1	381648	882444	HDW	17.5	6.7	420	<0.2	0.5	18	Labo.			2550	Tuff
124	1	Gurage	Gumer	Zara 1	379573	887996	HDW	19	6	46	<0.2	0.5	33				2285	Ign.tuff
124	2	Gurage	Gumer	Zara 2	379996	887532	HDW	19	6.3	78	<0.2	0.6	18				2300	Tuff
125	1	Gurage	Gumer	Fegnekir 1	385678	879342	HDW	16.2	7	116	<0.2	0.5	6				2772	Tuff
125	2	Gurage	Gumer	Fegnekir 2	385990	878874	HDW	16	6	115	<0.2	0.8	0				2757	Tuff
126	1	Gurage	Gumer	Aremua 1	391617	878541	*	14.6	6.7	168	<0.2	0.5	1				2843	Tuff
126	2	Gurage	Gumer	Aremua 2	392332	876409	CS	13.8	7	40	<0.2	0.6	11				2803	Tuff
127	1	South Omo	Bako Gazer	Alga 1	228970	640246	BH	24	6.6	204	<0.2	0.6	0				1460	Granite
127	2	South Omo	Bako Gazer	Alga 2	228974	640668	HDW	24	5.9	63	<0.2	0.4	0				1431	Granite
128	1	South Omo	Bako Gazer	Kaisa 1	236853	632996	BH	24	6.7	707	<0.2	0.8	0		W. sampled		1423	Basalt
128	2	South Omo	Bako Gazer	Kaisa 2	236448	635534	BH	25	6.6	454	0.6	1	0				1470	Basalt
129	1	South Omo	Bako Gazer	Muti 1	227400	656295	HDW	21.4	5.8	98	<0.2	0.4	76				1612	Basalt

Results of In-Situ Water Quality Analysis (SNNPR State)

No.		Zone	Woreda	Kebele	Sepecific Location (UTM)		Water Point	In- Situ Analysis						Q/W test in	Sampled	Flow meter	Elevation a.m.s.l	Geology
								Temp deg. C	pH	Cond. (μ s/cm)	Fe mg/L	F mg/L	T.Conliform					
					Easting	Northing		ET. Sdd =>		2,960	0.4	3		Labo.		(L/sec)		
129	2	South Omo	Bako Gazer	Muti 2	227779	657281	CS	21.5	5.8	30	<0.2	0.4	83				1638	Basalt
130	1	South Omo	Bako Gazer	Aida 1	232310	655804	CS	21.3	6.1	142	<0.2	0.5	10				1746	Basalt
130	2	South Omo	Bako Gazer	Aida 2	231195	654060	CS	22	6.6	302	<0.2	0.6	21				1607	Basalt
131	1	South Omo	Bako Gazer	Birhan School Gazer 1	231821	652252	HDW	22	6.8	415	<0.2	0.4	>100				1616	Basalt
131	2	South Omo	Bako Gazer	Birhan School Gazer 2	231843	651284	HDW	20.7	5.6	97	<0.2	0.4	>100				1669	Basalt
							181	164	164	164	164	164	160					

* 118 Kebeles were visited.
* In situ water quality tests were performed at **164** water points.
* Laboratory water quality tests were performed for **30** samples.

* CS: Cold Spring
* BH: Bore Hole
* HDW: Hand Dug Well

ETHIOPIAN GEOLOGICAL SURVEY CENTRAL GEOLOGICAL LABORATORY

WATER LABORATORY
DATA CODING FOR TRACE CONSTITUENTS

Dep./Proj. **Originator** Geomatrix **Approved by** HEAD,CGL

Sample Type Water **Source Area** **Date Submitted** 20/12/2004

Chemical Constituents in ppm(mg/lit.) **Date completed** 24/01/05

Request No. 12685-2005PVT

FIELD No.	TchSh1CSP	TchSh2CSP	TchMedh1CSP	TchMedh2CSP	TchMedh3CSP	TchG2CSP	chWar1CWSP	LomaAr1CSP	Lomalal1CSP	KKDM1HDW
LAB. No.	12723	12724	12725	12726	12727	12728	12729	12730	12731	12732
Barium (Ba)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium (Cd)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium (Cr)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Copper (Cu)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc (Zn)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Manganses (Mn)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.6
Aluminum (Al)	0.6	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Iron (Fe)	0.4	0.2	<0.1	<0.1	0.1	<0.1	<0.1	1	<0.1	0.1
Lead (Pb)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cyanide (CN)	0	0.001	0	0	0.003	0.002	0.002	0.001	0.002	0.002
Hydrogen Sulfide (H2S)	0.32	Nil	0.32	Nil	0.32	0.32	Nil	Nil	Nil	Nil
Total dissolved solids(TDS)	31	43	22	23	35	411	442	114	401	68
Hardness	6.47	10.36	3.48	6.38	6.47	167.52	200.73	41.49	177.64	20.07

Analysed by Water Analysts **Checked by**

Head, Central Geological Laboratory **Head Water Lab**

Teclaye Lemma (Dr.)
Head, Central Geological Laboratory

ETHIOPIAN GEOLOGICAL SURVEY CENTRAL GEOLOGICAL LABORATORY

WATER LABORATORY
DATA CODING FOR MAJOR CONSTITUENTS

Dep./Proj. **Originator** *Geomatrix* **Approved by** Head, CGL

Sample Type Water **Source Area** **Date Submitted** 20/12/04

Chemical Constituents in ppm(mg/lit.) **Date completed** 24/01/05

Request No. 12685-2005PVT

FIELD No.	TchSh1CSP	TchSh2CSP	TchMedh1CSP	TchMedh2CSP	chMedh3CSP	TchG2CSP	chWar1CWSP	LomaAr1CSP	Lomalal1CSP	KKDM1HDW
LAB. No.	12723	12724	12725	12726	12727	12728	12729	12730	12731	12732
Chloride(Cl)	-	-	-	1	1	1	-	2	6	-
Sulphate(SO4)	1	1	-	-	-	1	1	1	-	-
Fluoride(F)	0.06	0.09	0.06	0.06	0.06	0.45	1.59	0.18	1.05	0.14
Nitrate(NO3)	6.65	2.66	0	0.44	6.2	0.44	-	3.99	8.86	0.44
Sodium(Na)	2.5	3.5	2.6	2.5	2.8	25	24	6.2	24	5.1
pH	6.31	7.1	6.25	5.82	7.11	7.74	8.1	6.39	7.88	6.55

Analysed by Water Analysts

Checked by

Head, Water Laboratory

Head, Central Geological Laboratory

Teslaye Lemma (Dr.)
Head, Central Geological Laboratory

ETHIOPIAN GEOLOGICAL SURVEY CENTRAL GEOLOGICAL LABORATORY

WATER LABORATORY
DATA CODING FOR TRACE CONSTITUENTS

Dep./Proj. **Originator** Geomatrix **Approved by** HEAD,CGL

Sample Type Water **Source Area** **Date Submitted** 20/12/04

Chemical Constituents in ppm(mg/lit.) **Date completed** /01/05

Request No. 12685-2005PVT

FIELD No.	Esr. ArB-1CS	Esr.ArB.2CSP	EsrOf1CSP	EsrOf2CSP	EsrGz1CSP	EsrGz2CSP	EsrB1HDW	TchSen1CSP	TchKlu1CSP	TchKlu2CSP
LAB. No.	12713	12714	12715	12716	12717	12718	12719	12720	12721	12722
Barium (Ba)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium (Cd)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium (Cr)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Copper (Cu)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc (Zn)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Manganses (Mn)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1
Aluminum (Al)	<0.1	<0.1	1.3	<0.1	<0.1	1.5	<0.1	<0.1	<0.1	<0.1
Iron (Fe)	0.1	<0.1	0.4	0.1	<0.1	0.8	<0.1	0.1	<0.1	0.1
Lead (Pb)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cyanide (CN)	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0
Hydrogen Sulfide (H2S)	Nil	Nil	0.32	0.32	0.32	Nil	0.32	Nil	Nil	Nil
Total dissolved solids(TDS)	126	95	59	72	81	62	258	139	63	29
Hardness	49.7	38.56	18.81	26.19	23.81	22.29	55.99	48.93	19.8	8.29

Analysed by Water Analysts **Checked by**

Head Water Lab

Head, Central Geological Laboratory

Testaye Demise
Head, Central Geological Laboratory

ETHIOPIAN GEOLOGICAL SURVEY CENTRAL GEOLOGICAL LABORATORY

WATER LABORATORY
DATA CODING FOR MAJOR CONSTITUENTS

Dep./Proj. **Originator** *Geomatrix* **Approved by** Head, CGL

Sample Type Water **Source Area** **Date Submitted** 20/12/04

Chemical Constituents in ppm(mg/lit.) **Date completed** 24/01/05

Request No. 12685-2005PVT

FIELD No.	Esr. ArB-1CSP	Esr.ArB.2CSP	EsrOf1CSP	EsrOf2CSP	EsrGz1CSP	EsrGz2CSP	EsrB1HDW	TchSen1CSP	TchKtu1CSP	TchKtu2CSP
LAB. No.	12713	12714	12715	12716	12717	12718	12719	12720	12721	12722
Chloride(Cl)	-	-	-	-	-	-	34	-	-	1
Sulphate(SO4)	-	-	1	-	-	-	4	-	-	1
Fluoride(F)	0.2	0.15	0.1	0.12	0,.12	0.12	0.21	0.16	0.07	0.06
Nitrate(NO3)	0.89	1.77	3.1	0.44	2.66	0	24.37	1.77	8.42	1.77
Sodium(Na)	6.6	5.4	3.1	3.9	5.8	3.6	18	9	3.4	2.2
pH	7.07	6.63	6.56	7.05	6.98	7.01	6.97	6.97	6.36	5.93

Analysed by Water Analysts

Checked by

Head, Water Laboratory

Head, Central Geological Laboratory

25/01/2005

Teclaye Lemma (Dr.)
Head, Central Geological Laboratory

ETHIOPIAN GEOLOGICAL SURVEY CENTRAL GEOLOGICAL LABORATORY

WATER LABORATORY
DATA CODING FOR TRACE CONSTITUENTS

Dep./Proj. **Originator** Geomatrix **Approved by** HEAD,CGL

Sample Type Water **Source Area** **Date Submitted** 20/12/04

Chemical Constituents in ppm(mg/lit.) **Date completed** 24/01/05

Request No. 12685-2005PVT

FIELD No.	Hul. Ch2HDW	Yirg Ch2BH	Sil. D.Mu2HDW	Dal.G.Ch. 1BH	Lem.Ach 2BH	Ang. U 2HDW	u. W G 1HDW	Bol. S. D 2BH	Esr. G. 1CSP	Esr. G 2CSP
LAB. No.	12703	12704	12705	12706	12707	12708	12709	12710	12711	12712
Barium (Ba)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium (Cd)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium (Cr)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Copper (Cu)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc (Zn)	<0.1	0.2	<0.1	0.2	0.5	<0.1	<0.1	<0.1	<0.1	<0.1
Manganses (Mn)	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aluminum (Al)	<0.1	<0.1	<0.1	<0.1	<0.1	8.2	<0.1	<0.1	<0.1	<0.1
Iron (Fe)	<0.1	0.1	<0.1	<0.1	<0.1	4.3	<0.1	<0.1	<0.1	<0.1
Lead (Pb)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cyanide (CN)	0.001	0.003	0.001	0.005	0.008	0.001	0.001	0.001	0	0.001
Hydrogen Sulfide (H2S)	0.64	0.64	0.64	0.64	0.32	Nil	0.32	Nil	Nil	Nil
Total dissolved solids(TDS)	50	120	286	1331	607	131	411	159	29	78
Hardness	12.61	31.56	122.71	249.44	249.05	41.49	125.2	33.5	8.2	31.07

Analysed by Water Analysts **Checked by**

Head Water Lab

Head, Central Geological Laboratory

Federal Democratic Republic of Ethiopia — Ministry of Mines and Geological Survey of Ethiopia

Tesfaye Lemma (Dr.)
Head, Central Geological Laboratory

ETHIOPIAN GEOLOGICAL SURVEY CENTRAL GEOLOGICAL LABORATORY

WATER LABORATORY
DATA CODING FOR MAJOR CONSTITUENTS

Dep./Proj. **Originator** *Geomatrix* **Approved by** Head, CGL

Sample Type Water **Source Area** **Date Submitted** 20/12/04

Chemical Constituents in ppm(mg/lit.) **Date completed** 24/01/05

Request No. 12685-2005PVT

FIELD No.	Hul. Ch2HDW	Yirg Ch2BH	Sil. D.Mu2HDW	Dal.G.Ch. 1BH	Lem.Ach 2BH	Ang. U 2HDW	u. W G 1HDW	Bol. S. D 2BH	Esr. G. 1CSP	Esr. G 2CSP
LAB. No.	12703	12704	12705	12706	12707	12708	12709	12710	12711	12712
Chloride(Cl)	3	9	11	25	3	4	34	-	-	-
Sulphate(SO4)	-	-	7	30	-	2	12	-	-	1
Fluoride(F)	0.12	0.1	0.27	3.76	1.4	0.61	0.13	0.79	0.09	0.1
Nitrate(NO3)	7.53	23.92	10.19	0.89	0	3.54	84.17	-	2.66	0.44
Sodium(Na)	3.5	7	9	186	27	12	15	20	2.2	3.8
pH	6.67	6.77	7.08	7.63	7.62	6.89	7.03	7.17	6.76	7.65

Analysed by Water Analysts

Checked by

Head, Water Laboratory

Head, Central Geological Laboratory

24/1/2005

Tesfaye Lemma (Dr.)
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The Federal Democratic Republic of Ethiopia
Ministry of Mines
Geological Survey

ETHIOPIAN GEOLOGICAL SURVEY CENTRAL GEOLOGICAL LABORATORY

WATER LABORATORY
DATA CODING FOR TRACE CONSTITUENTS

Dep./Proj. **Originator** Geomatrix **Approved by** HEAD,CGL

Sample Type Water **Source Area** **Date Submitted** 20/12/2004

Chemical Constituents in ppm(mg/lit.) **Date completed** 24/01/05

Request No. 12685-2005PVT

FIELD No.	BakGK1BH	Der.AdsA1CSP	DerAdsA2CSP	DerWaly1CSP	DerL/Ar1CSP	DerL/Ar2CSP	DerBusa1CSP	DerL/Ar3CSP
LAB. No.	12733	12734	12735	12736	12737	12738	12739	12740
Barium (Ba)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium (Cd)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium (Cr)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Copper (Cu)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc (Zn)	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1
Manganses (Mn)	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aluminum (Al)	<0.1	10.5	<0.1	<0.1	<0.1	<0.1	<0.1	0.2
Iron (Fe)	<0.1	5.3	<0.1	<0.1	0.1	<0.1	<0.1	0.2
Lead (Pb)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cyanide (CN)	0.001	0	0	0.005	0.001	0.001	0.001	0.001
Hydrogen Sulfide (H2S)	Nil	Nil	Nil	0.32	Nil	Nil	Nil	Nil
Total dissolved solids(TDS)	681	63	26	633	239	518	290	149
Hardness	231.17	20.15	4.81	300.7	98.61	251.15	134.18	48.26

Analysed by Water Analysts **Checked by**

Head Water Lab

The Federal Democratic Republic of Ethiopia * Ministry of Mines Geological Survey of Ethiopia *

Head, Central Geological Laboratory

Teklaye Lemma (Dr.)
Head, Central Geological Laboratory

ETHIOPIAN GEOLOGICAL SURVEY CENTRAL GEOLOGICAL LABORATORY

WATER LABORATORY
DATA CODING FOR MAJOR CONSTITUENTS

Dep./Proj. **Originator** *Geomatrix* **Approved by** Head, CGL

Sample Type Water **Source Area** **Date Submitted** 20/12/04

Chemical Constituents in ppm(mg/lit.) **Date completed** 24/01/05

Request No. 12685-2005PVT

FIELD No.	BakGK1BH	er.AdsA1CSP	DerAdsA2CSP	DerWaly1CSP	DerL/Ar1CSP	DerL/Ar2CSP	DerBusa1CSP	DerL/Ar3CSP
LAB. No.	12733	12734	12735	12736	12737	12738	12739	12740
Chloride(Cl)	17	4	-	2	7	7	9	6
Sulphate(SO4)	11	4	-	1	1	1	-	-
Fluoride(F)	0.65	0.06	0.05	0.21	0.13	0.13	0.1	0.18
Nitrate(NO3)	13.29	5.76	1.33	0.44	11.08	8.86	5.76	2.22
Sodium(Na)	62	3.4	2.5	32	14	18	9	11
pH	7.13	6.16	6.07	8.06	7.5	7.43	8	7.54

Analysed by Water Analysts

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Head, Central Geological Laboratory

Tesfaye Lemma (D/
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Federal Democratic Republic of Ethiopia
Ministry of Mines
Geological Survey

5.3
Selection of Project Target Communities

No. in the original list	K-No.	*	Zone	Woreda	Kebele	Type of Schem & Q'ty (Recommended for B/D)					Notes
						Q'ty	HDW	SW-HP	SP-onspot	GPS	
1	SK-1		Dawero	Tocha	**Kechi Idigit -> Kechi**	3		3			" Kechi Idigit" is the same as "Kechi Kebele". "Kechi Idigit" shall read as "Kechi". See (SK-1)
2	SK-2		Dawero	Tocha	Goradoba	2		2			
3	-	c	Dawero	Tocha	Shechikale	0		0			Canceled due to inaccessibility (2 hrs walk to reach)
4	SK-3		Dawero	Tocha	**Aba Dahi -> Aba**	3		3			"Aba Dahi" was merged with "Aba Kebele". See (SK-3)
5	(SK-1)		Dawero	Tocha	Kechi	2				2	same village as SK-17
6	SK-4		Dawero	Tocha	Shushuri	2			2		
7	SK-5		Dawero	Tocha	Medihanalem	3			3		
8	SK-6		Dawero	Tocha	Wara Gessa	3		3			
9	SK-7		Dawero	Tocha	Waruma Kessa	1				1	
10	SK-7		Dawero	Tocha	Waruma Kessa	3		3			
11	SK-8		Dawero	Tocha	Gorika	3		3			
12	(SK-3)		Dawero	Tocha	Aba	3		3			same village as SK-3
13	SK-9		Dawero	Loma	**Loma Bota -> Loma Borge**	2		2			"Loma Bata" shall read as "Loma Borze"
14	-	c	Dawero	Loma	Kawcha	0		0			Canceled due to inaccessibility (2.5 hrs walk to reach)
15	SK-10		Dawero	Loma	Gufo Gato	6		6			
16	-	c	Dawero	Loma	Yeli Chawla	0		0			Canceled due to inaccessibility (3 hrs walk to reach)
17	SK-11		Dawero	Loma	Lala Ambe	5		5			
18	SK-12		Dawero	Loma	Dissa	7		7			
19	SK-13		Dawero	Loma	Lomma Bale	6		6			
20	SK-14		Dawero	Loma	Arga Bacho	1			1		
21	SK-15		Dawero	Esara	**Duzi**	1		1			
22	SK-16		Dawero	Esara	Gego	1		1			
23	SK-17		Dawero	Esara	Arusi Bale	2				2	One spring in re-(SK-17) is developed as GPS.
24	(SK-17)		Dawero	Esara	Arusi Bale	1			1		- do -
25	SK-18		Dawero	Esara	Gudumu	2				2	
26	(SK-15)		Dawero	Esara	**Guzi -> Duzi**	2			2		"Guzi" shall read as "Duzi"
27	SK-19		Dawero	Esara	Hagali 02	2		2			
28	SK-20		Dawero	Esara	Ofa	2			1	1	One spring for SP-on-spot, the other for GPS
29	SK-21		Dawero	Esara	Sengeti	1				1	
30	SK-22		Dawero	Esara	Dalba 3/Dali/	4		4			
31	SK-23		Dawero	Esara	Bale	10		10			
32	(SK-17)		Dawero	Esara	Aruse Bale	2		2			same village as SK-17
33	SK-24		Sidama	Hula	Chiro Ne	2		2			
34	SK-25		Sidama	Hula	Worema	2		2			
35	SK-26		Sidama	Hula	**Gansa -> Gasse**	2		2			"Gansa" shall read as "Gasse",
36	-	c	Sidama	Hula	Sukie Bonbie	0		0			Canceled due to inaccessibility (el. 500 m down a valley)
37	SK-27		Sidama	Hula	Sede	1		1			
38	-	c	Sidama	Hula	Bedesa Chechu	0		0			Canceled due to inaccessibility (opposite side over a valley)
39	SK-28		Sidama	Hula	Damlo Chercha	1		1			
40	SK-29		Sidama	Hula	Abayie Qeraro	1		1			
41	SK-30		Sidama	Hula	Menisa Wacho	1		1			
42	-	c	Sidama	Hula	Abayie Adola	0		0			Cancelled due to in accessibility (6 km on foot path)
43	SK-31		Sidama	Hula	Hobena Ganegawa	1		1			
44	SK-32		Sidama	Hula	Deleya	1		1			
45	SK-33		Sidama	Hula	Adahie	1		1			

No. in the original list	K-No.	*	Zone	Woreda	Kebele	Type of Schem & Q'ty (Recommended for B/D)					Notes
						Q'ty	HDW	SW-HP	SP-onspot	GPS	
46	SK-34		Gedeo	Yirga Chaffe	Hafursa worabi	2		2			
47	SK-35		Gedeo	Yirga Chaffe	Konga	2		2			
48	SK-36		Gedeo	Yirga Chaffe	Wote	2		2			
49	SK-37		Gedeo	Yirga Chaffe	Chelba	2		2			
50	SK-38		Gedeo	Yirga Chaffe	Chito	2		2			
51	SK-39		Gedeo	Yirga Chaffe	Oru Batala	1		1			
52	SK-40		Gedeo	Yirga Chaffe	Resity	1		1			
53	SK-41		Gedeo	Yirga Chaffe	Tutuity	1		1			
54	SK-42		Gedeo	Yirga Chaffe	Adame	1		1			
55	SK-43		Gedeo	Yirga Chaffe	Birbisa Kala	1		1			
56	SK-44		Gedeo	Yirga Chaffe	Chirku	1		1			
57	SK-45		Gedeo	Yirga Chaffe	Dako	1		1			
58	SK-46		Gedeo	Yirga Chaffe	Udessa	1		1			
59	SK-47		Gedeo	Yirga Chaffe	Kedida	1		1			
60	SK-48		Hadiya	Lemo	Bukuna chachey	2		2			
61	SK-49		Hadiya	Lemo	Hayse	2		2			
62	SK-50	*	Hadiya	Lemo	Lereba	2		2			
63	SK-51		Hadiya	Lemo	Ana	2		2			
64	SK-52		Hadiya	Lemo	Achamo	2		2			
65	-	c	Hadiya	Lemo	Doisha Hule	0		0			Canceled due to the kebele in Shashogo wareda
66	SK-53		Hadiya	Lemo	Lafto Lenka	2		2			
67	SK-54	*	Hadiya	Lemo	Homa Gare	2		2			
68	-	cc	Hadiya	Shashogo	Doisha Kenema	0		0			Canceled by the Ethiopia. No alternative sites are proposed.
69	-	cc	Hadiya	Misha	Wesgehta 1&2	0		0			Canceled by the Ethiopia. No alternative sites are proposed.
70	SK-55		Wolaita	Boloso sore	Anchurcho Dege	3		3			
71	SK-56		Wolaita	Boloso sore	Dmaba Zamina	4		4			
72	SK-57		Wolaita	Boloso sore	Dubo	3		3			
73	SK-58		Wolaita	Boloso sore	Ademancho	2		2			
74	SK-59		Wolaita	Boloso sore	**Gara Gubo -> Gara Godo**	4		4			"Gara Gubo" shall read as "Gara Godo"
75	SK-60		Wolaita	Boloso sore	Wermuma	4		4			
76	SK-61	*	Wolaita	Boloso sore	Gununo	3		3			
77	SK-62	*	Wolaita	Boloso sore	Bomebea	3		3			
78	SK-63	*	Wolaita	Boloso sore	Adila	1		1			
79	SK-64		Wolaita	Boloso sore	Farawocha	1		1			
80	SK-65		Wolaita	Boloso sore	Chama henbeacho	1		1			
81	SK-66		Wolaita	Boloso sore	Matila Hibeche	1		1			
82	SK-67		Wolaita	Boloso sore	Achura	1		1			
83	SK-68		Wolaita	Kindo Koyesha	Doge Mashedo	1		1			
84	SK-69		Wolaita	Kindo Koyesha	Doge Shakisho	1		1			
85	SK-70		Wolaita	Kindo Koyesha	**Doge Sarosa -> Doge Larosa**	1		1			"Goge Sarosa" shall read as "Doge Larosa"
86	SK-71		K.tembaro	Anegacha	WenejlaAmcho wato	1		1			
87	SK-72		K.tembaro	Anegacha	Bonga	1		1			
88	SK-73		K.tembaro	Anegacha	Lume suticho	1		1			
89	SK-74		K.tembaro	Anegacha	Uetuge	1		1			
90	SK-75		K.tembaro	Anegacha	Jeba Dodoba	1		1			
91	SK-76		Derashe	Special Woreda	Ades Altema	1			1		
92	SK-76		Derashe	Special Woreda	Ades Altema	1			-	1	32 km away from the wareda office.

No. in the original list	K-No.	*	Zone	Woreda	Kebele	Type of Schem & Q'ty (Recommended for B/D)					Notes
						Q'ty	HDW	SW-HP	SP-onspot	GPS	
93	-	c	Derashe	Special Woreda	Walessa	0			-	-	"The spring" is a dug well. Not possible to develop for GPS or SP-on-Spot
94	-	*, c	Derashe	Special Woreda	L/Holte	0			-	-	- do -
95	SK-77		Derashe	Special Woreda	L/Arguba	1				1	
96	(SK-77)		Derashe	Special Woreda	L/Arguba	1				1	same village as SK-77
97	(SK-77)		Derashe	Special Woreda	L/Arguba	1				1	same village as SK-77
98	SK-78		Derashe	Special Woreda	Walayte	1				1	
99	-	c	Derashe	Special Woreda	Walayte	0			-	-	Yield is too small to develop
100	SK-79		Derashe	Special Woreda	Busabaso	1				1	
101	-	c	Derashe	Special Woreda	Busabaso	0			-	-	Facility for a spring-on-spot exists.
102	-	c	Silti	Silty	Aedebrwelwya Ageta	0		0			Canceled due to inaccessibility (3 hrs walk)
103	SK-80		Silti	Silty	Bozie Sabola	2		2			
104	SK-81	*	Silti	Silty	Aegodie Lobriera	3		3			
105		c	Silti	Silty	Dobo Bedeno	0		0			Canceled due to inaccessibility (3 hrs walk)
106	SK-82		Silti	Silty	Senene Gerierar	2		2			
107	SK-83		Silti	Silty	Weliya Sidest	2		2			
108	SK-84		Silti	Silty	Koto Balosd	3		3			
109	SK-85		Silti	Silty	Asano Degderiea	4		4			
110		c	Silti	Silty	Abezana	0		0			Canceled due to inaccessibility (3 hrs walk)
111	SK-86		Silti	Silty	Daniecho Mukerie	4		4			
112	SK-87		Silti	Dalocha	Laygnaw Yedi	2		2			
113	SK-88		Silti	Dalocha	Acherayi Konecho	2		2			
114	SK-89		Silti	Dalocha	Bureka	2		2			
115	SK-90		Silti	Dalocha	Germama	2		2			Merged with 117 Korogalay, renamed as Germama Gala
116	SK-91		Silti	Dalocha	Koro	2		2			
117	(SK-92)		Silti	Dalocha	Korogalay	2		2			Merged with 115 Germama, renamed as Germama Gala
118	SK-92		Silti	Dalocha	Kura Kolisa	2		2			Merged with 119 Golana Shemeto, renamed as Gola Kure
119	SK-94		Silti	Dalocha	Golana Shemeto	2		2			Merged with 118 Kura Kolisa, renamed as Gola Kure
120	SK-93		Silti	Dalocha	Husend Shola	2		2			Merged with 121 Waneja Golachiba, renamed as Wanja Shaola
121	SK-96		Silti	Dalocha	Waneja Golachiba	2		2			Merged with 120 Husend Shola, renamed as Wanja Shaola
122	(SK-94)		Gurage	Gumer	Hamebeyata	3		3			
123	SK-95		Gurage	Gumer	Wenwzerana Gorate	3		3			
124	(SK-96)		Gurage	Gumer	Zara	3		3			
125	SK-97		Gurage	Gumer	Fegnekir	3		3			
126	SK-98		Gurage	Gumer	Aremua	3		3			
127	SK-99	*	South Omo	Backo Gazer	**Aynalem -> Alga**	1		1			All kebeles nominated in South Omo are inaccessible.
128	SK-100		South Omo	Backo Gazer	**Tanbale -> Kaysa**	2		2			Alternative kebeles were proposed by the Zone/Wareda.
129	SK-101		South Omo	Backo Gazer	**Aydamr -> Muti**	2		2			
130	SK-102		South Omo	Backo Gazer	**Aldemer -> Ayda**	2		2			
131	SK-103		South Omo	Backo Gazer	**Lofit -> Gazer**	1		1			
						240		214	11	15	

Note * Social Survey: Existed Water Supply Facilities are working
c Request of Cancellation in the field survey
cc Request of Cancellation in Discussion of Inception

5.4
Social Survey Results

Social Survey Results

(1) Finalization of Applicant Kebeles (Administrative village)

An official request was made by Southern Nations, Nationalities and Peoples' Regional State Government of Ethiopia (hereinafter refer to SNNPR) with an intention to construct two hundred forty seven (247) rural water supply schemes situated in a total of one hundred twenty nine (129) Kebeles that are defined as administrative villages in Ethiopia. Immediately after the commencement of the Basic Design Study (hereinafter refer to as the BD Study), it was found that out of 129 Kebeles, nine Kebeles are identified with areas inaccessible by heavy trucks used for drilling and construction purposes, since these areas can be reached only by a two to three-hour walk on foot. In addition to these nine Kebeles, three Kebeles, where natural springs are to be used as the source of water supply, were found to have water sources inappropriate for the intended project due to a shortfall of water flow from springs as per requirements, while a few Kebeles have already installed new water supply schemes, and some Kebeles have been removed from the request list by wareda (district) offices.

As a result, it is finalized and confirmed through the Study by SNNPR that an intended project is formulated to construct a total of 214 shallow borehole schemes, 11 on-spot spring development schemes and 15 gravity-pipeline schemes to serve a total of about 92,000 (ninety two thousand) rural population in 103 Kebeles, 14 waredas(districts), and 10 Zones. The summary is presented in the table 1.

Table 1 Finalized Targets of the requested Project

Name of Zone	Name of Wareda	No. of Kebeles	Population to be served
Dawro	Tocha	8	13,122
	Loma	6	9,998
	Esara	9	13,768
Sidama	Hula	10	4,550
Gedeo	Yirga Chaffe	14	6,650
Hadiya	Lemo	7	4,900
Walaita	Boroso Sore	13	10,850
	Kindo Koysha	3	1,050
Kambata and Tambaro	Angacha	5	1,750
Deresha	Special Wareda	4	3,350
Sility	Silte	7	7,000
	Dalocha	7	7,000
Gurage	Gumer	5	5,250
South Omo	Bacho Gazer	5	2,800
10 Zones	14 Waredas	103	92,038

(2) Objectives of the Social Survey

A social survey was carried out, mainly with the two following objectives;

i) to collect quantitative and related information of the current socio-economic situation and the present status of water users in all the targeted villages; and,

ii) to make a rapid assessment on the social preparedness of applicant communities for their self-management of an intended water supply scheme.

(3) Period of Social Survey

25 October to 30 November 2004

(4) Basic Methods of Social Survey

An interview method was employed to collect necessary information from the Representatives of the respective 14 wareda offices, Chairpersons and women's and youths' representatives of 103 Kebeles, and focal groups of applicant communities, by using both close-ended and open-ended questionnaires.

(5) Main findings from Social Survey

1) Number of Kebeles (administrative villages) included in the Social Survey

The social survey was undertaken in all the 103 Kebeles, while focal group meetings and interviews of village representatives were carried out in 231 applicant local communities, out of 240 communities, that submitted their respective applications to the Wareda offices concerned through Kebele offices for the construction of rural water supplies.

2) Present status of water supply

From interviews with 231 applicant local communities it was found that water supply schemes were previously constructed in 17 percent of the local communities. Except for 10 schemes, community members expressed their views that those schemes were rarely in use. The main reasons behind this lack of use are comprised of (i) long distance since these schemes are said to be located outside of their villages and (ii) poor quality of water causing outbreaks of water borne diseases. In relation with the 10 schemes, it is confirmed that these schemes are located within the geographical area of other hamlets/villages than the applicant local communities.

3) Involvement in collective actions for village development activities

It was revealed that a Kebele school committee is organized in 46.3 percent of applicant communities, a health committee is established in 46 percent of applicant communities, while an HIV/AIDS prevention committee is formed in 5.6 percent of applicant communities. In addition to these, 17 percent of communities had experience in organizing themselves into water committees in the past.

All the applicant local communities have experience in making contributions in the form of provision of labour, local materials, and cash. With regards to cash contributions, the minimum contribution was 50 cents per household, while the maximum total contributions from a single local community, Silte, reached Birr 22,000 to build a school. Out of the total population in the targeted communities, 29.5 % had experience in cash contributions towards village development works including construction of schools, rural roads, farmers' training centers, and Kebeke offices as well as environmental conservation activities such as terracing, soil conservation, rain water harvesting, and afforestation. To sum up, it is found that all the interviewed applicant communities expressed their preparedness to make their contributions towards construction of a proposed water supply scheme by providing the project with their labour forces, local materials and/or cash. Besides, 23.4 % of the 231 interviewed community leaders have expressed that they are prepared to raise funds from community members to be used for water supply.

4) Existing water sources

The Table 2 shows the existing water sources that are currently in use by local communities

Table 2 Existing water source

Existing water source	Rainy Season	Dry Season
Rivers	84 %	79 %
Ponds	7 %	3 %
Natural unprotected springs	7 %	12 %
Springs locally protected	15 %	1 %
Shallow wells	0 %	1 %
Hand pumps	0 %	1 %
Others	1 %	3 %

In relation to the water quality of the said existing water sources, a self-assessment was made through interview surveys resulting in the table 3. To sum up, more than half of the interviewed community members were dissatisfied with the water quality of existing water

sources used both in the rainy and dry seasons. It is also revealed that water quality in the dry season is felt to be more serious and poorer than in the rainy season.

Table 3 Water Quality from Existing Water Sources

Felt-assessment	Rainy Season	Dry Season
Good quality	36.8 %	19.5 %
Tolerable quality	11.3 %	23.4 %
Poor quality	51.9 %	57.1 %

With regards to the average consumption of water per household per day, it was revealed that around 20 liters per day per household is the mean of water consumption in interviewed communities. Regarding a degree of awareness on the relationship between water quality and diseases, it was revealed that only 49 percent of interviewed males and 46 % of the females are aware of its cause-effect relationship. On the contrary there are people who doe not recognize the relationship between water quality and water borne diseases.

In relation to role delineation among the genders, the member of the family, who usually fetches water in all interviewed communities was found to be an adult woman. Following adult woman, a female child was found to be most likely to be responsible for fetching water, and adult males in all interviewed communities fetch water only when their wives are sick or pregnant.

5) Willingness to pay water fees

It was revealed that all the interviewed community leaders expressed, in principle, their preparedness to make a payment of water fees.

In 14 waredas (districts), 18 villages are found to have adopted a fixed-rate water charge system, while 10 villages had to make a payment in accordance with a consumption-proportional rate system.

In the case of the fixed rate systems, the most popular monthly rate is around Birr 1.00 per household, while the rate of 10 cents per 20 liters is commonly applied in the case of consumption-proportional rate systems. Despite such current practices prevailing in the 14 waredas, 49% of interviewed local community members expressed their views that a rate of 5 cents per 20 liters is preferable. On the other hand, 24 % of interviewed community

members are found to be reluctant to make any payment of water fees. In accordance with the intention survey, 6 cents per 20 liters shall be the consumption-proportional rate.

Table 4 Self-assessment of Consumption-Proportional Rate per 20 liter

Wareda	Number of Votes				Total
	No charge	5 cents	10 cents	25 cents	
Tocha	34	172	34	0	240
Loma	10	167	16	5	198
Esara	5	233	27	2	267
Hula	0	110	12	0	122
Yirga Chaffe	0	173	14	0	187
Lemo	75	139	120	13	347
Boroso Sore	204	244	163	57	668
Kindo Koysha	44	11	0	0	55
Angacha	20	21	0	9	50
Special Wareda	147	145	106	24	422
Silte	174	242	171	34	621
Dalocha	223	248	172	29	672
Gumer	26	82	24	0	132
Bacho Gazer	27	75	89	27	218
Total	989	2,062	948	200	4,199
Ratio in %	24%	49%	23%	5%	100%

In a combination of two survey results that (i) average daily consumption of water is around 20 liters per household, and (ii) 5 cents is the most preferable rate of water fee per 20 liters, it shall be further calculated that the total amount of water fees account for around Birr 1.50 per household per month, which is similar to the level of the fixed rate prevailing in the 14 waredas at around Birr 1.00.

With regards to the degree of awareness on the type of costs, it is indicated in the table 5 that a majority of members are well aware of three basic types of costs, i.e., (i) operation cost; (ii) maintenance cost; and (iii) replacement cost.

Table 5 Degree of Awareness on Types of Costs

Type of Costs	Aware		No	
	Male	Female	Male	Female
Operation Cost	89 %	82 %	11 %	18 %
Maintenance Cost	93 %	75 %	7 %	25 %
Replacement Cost	94 %	89 %	6 %	11 %

6) Current capacity to pay water fees

In reference to the practices of the two water charge systems, i.e., the fixed rate water charge system and the consumption-proportional rate water charge system, patterns of rates

adopted by the respective existing water committees, which are managerial units of individual water supply schemes organized by users, are presented in the Table 6 and Table 7 respectively.

Table 6 Rate adopted in the Fixed Rate Water Charge System

Monthly Fixed Rate per household in Birr	Number of Water Committees					Total
	Bacho Gazer	Boroso Sore	Derasge	Lemo	Silte	
0.25		1				1
0.30		1				1
0.50	1	1				2
1.00		3		2	3	8
2.00			1			1
3.00				4		4
5.00					1	1
Total	1	6	1	6	4	18

Despite the fact that the size of the survey sample is small, 44 % of present water committees are found to adopt the fixed rate of Birr 1.00 per household per month. This provides a basis for assessing current capacity of payment in the respective waredas.

Table 7 Rate adopted in the Consumption-Proportional Rate Water Charge System

Proportional Rate per one Jerri Can (20 liters)	Number of Water Committees			Total
	Boroso Sore	Dalocha	Silte	
0.10	2	3	2	7
0.25		1		1
0.30	1			1
0.50	1			1
Total	4	4	2	10

In the case of the consumption-proportional rate water charge system, it is found that a rate of 10 cents per 20 liters is commonly used in the interviewed existing water committees in the three targeted Waredas. This result also provides a basis for assessing the current capacity of payment in the respective waredas.

The main expenditures of a water committee can be categorized into three items of expenditure; namely, (i) operation cost; (ii) maintenance cost; and (iii) replacement cost. In the context of policy implementation on water supply in Ethiopia, full-cost recovery is, in principle, to be applied for the case of urban water supply schemes, while partial cost-recovery is addressed to rural water supply schemes in which the user's community is responsible for meeting at least operation and maintenance costs with an exemption of

replacement cost. In the case of shallow wells with hand pumps, the main item of expenditure for operation cost is expenditures for a guard. In the interviews it was expressed by the interviewed community members that around Birr 100 shall be a preferable rate applied for the monthly salary of an operator. However, modes of payment are found to vary from locality to locality due to the financial capacity of individual water committees. It was observed that salary for a guard can be paid in a combination of cash and kind. In some cases the local community provides a guard with a farm plot under the recognition of a Peasant Association (i.e., Kebele) by which the guard can earn from agricultural production. Other item included in operation cost is stationary cost for administrative works of the water committee. With regards to maintenance cost, no reliable data is available. In reference to the Regional Guideline for Management of Rural Water Supply Schemes in Oromia, a regional state neighboring SNNPR, it is suggested that 3 percent (%) of investment cost shall be reserved annually to meet a variety of maintenance costs to be required for spare-part procurement, repair of pumps and other equipment and the like. With regards to replacement reserves for hand pumps, it shall be suggested that Birr 750 shall be accumulated annually by a water committee when a price of hand pump is estimated on an average at Birr 6,000 for a service period of eight (8) years. This implies that monthly replacement reserve for the hand pump is calculated at Birr 62.5. As mentioned earlier, however, a mandate to accumulate replacement reserves by rural water supply schemes is exempted in accordance with the current policy guideline in Ethiopia in general as well as in SNNPR in particular. As consequence, each water committee is expected to reserve an amount ranging from Birr15 to Birr 120 monthly. In other words, individual user households, who form a water committee, are expected to make a payment at a rate ranging from Birr 0.2 to Birr 1.7 in the case of a fixed rate water charge system, depending upon patterns of local arrangements to cover z alary of a guard. This amount is eventually found to be similar with the present rates of water fees practiced in existing water committees.

7) Intention for organizing Water Committees

Table 8 Awareness to organize Water Committee

Intention to organize themselves into a Water Committee	Willingness to Organize a Water Committee		Willingness to Participate as an Executive Member	
	Male	Female	Male	Female
	97 %	99 %	99 %	98 %

In accordance with regional guidelines, users of each water supply scheme are requested to form a water committee that can be defined as a managerial unit of a scheme responsible for ensuring its effective, efficient and sustainable management. Within the water committee, an executive committee is to be established through democratic election for administration of daily operation and management activities. The executive committee consists of seven members including chairperson, vice-chairperson, secretary, treasurer, cashier, storekeeper and internal auditor. Although the executive members take day to day responsibility for operation and management of the scheme, the members are advised to work on a voluntary basis without any salary or remuneration. Under such working conditions, interviewed local community leaders expressed their willingness to organize themselves into a water committee and to actively participate in activities to be undertaken by the executive committee.

Despite the above, the degree of willingness varies from locality to locality. In some waredas where nomadic lifestyle is predominant, the degree of understanding on tasks of the water committee is found to be lower, requiring awareness building on this issue at the time of implementation.

8) Physical aspects of preparedness

As stated in the Table 9, applicant local communities can be categorized into four groups in terms of three aspects of physical conditions; namely, (i) accessible by heavy truck to an intended site; (ii) readiness of land allocation for an intended water supply scheme; and, (iii) geographical distance between the centre of the hamlet and location of the proposed site.

Table 9 Categorization of Applicant Communities by Physical Preparedness

Items	Ratio in %
(1) Full accessibility	66 %
(2) Insufficient readiness of land allocation within a distance of around a 20 minute walk	15 %
(3) Presence of necessity of construction of an access road with a length of a 20 to 40 minute walk	13 %
(4) Presence of necessity of construction of an access road with a length of more than a 40 minute walk	6 %

In consideration of the above, an implementation plan is advised to be formulated.

(5) Expected outcomes from implementation of an intended Project

Expected outcomes to be obtained from the implementation of this intended project are presented in Table 10 using an indicator of water coverage rate in comparative views on situations without and with project intervention.

Using statistical data obtained from the Water Supply and Sanitation Master Plan formulated by the Ministry of Water Resources, this intended project can contribute towards a 3.3 % increase in the water coverage rate in 14 waredas in 2006 when construction works shall be completed. In other words, this improvement is equivalent to an increase in water coverage rate of the entire SNNPR at a ratio of 7%.

The intended project shall be formulated with a planning period of 10 years from 2005 to 2014. Within the time frame of the planning period, in addition to the improvement estimated as above, it is expected that a further 260,000 population shall have access to potable water for the subsequent period from 2006 of 2014 in a case where drilling rigs to be provided through the project can continue drilling at the same pace of annual drilling of 60 boreholes, each of which can serve 350 population. In such case, the implementation of the intended project can contribute towards an increase in water coverage for the 14 waredas at a rate of 7.64 percent as well as 1.54 percent for the entire region. These expected outcomes are presented in the Table 10.

Table 10 Expected Outcomes

Zone	Wareda	Population			Population served				Increased Served Population		Water Coverage Rate WCR)					Change in WCR	
		2000*2	2006*4	2014*4	2000*2	W/O-P	W-P		2006	2014	2000*2	W/O-P		W-P		(point)	
						2006/2014	2006	2014				2006/2014	2014	2006	2014	2006	2014
		a	b	c	d	e=d	f=e+h	g=e+i	h	i	j=d/a	k=e/b	l=e/c	m=f/b	n=g/c	o=m-k	p=n-l
Dawro	Tocha	53,861	64,330	78,810	16,881	16,881	30,003		13,122		31.3%	21.4%		38.1%		16.7	
	Loma	55,049	65,749	80,547	17,253	17,253	27,251		9,998		31.3%	21.4%		33.8%		12.4	
	Esara	53,861	64,330	78,810	16,881	16,881	30,649		13,768		31.3%	21.4%		38.9%		17.5	
Sidama	Hula	207,855	248,258	304,135	60,881	60,881	65,431		4,550		29.3%	20.0%		21.5%		1.5	
Gedeo	Yirga Chafe	150,305	179,521	219,927	40,602	40,602	47,252		6,650		27.0%	18.5%		21.5%		3.0	
Hadiya	Lemo	308,291	368,217	451,093	79,241	79,241	84,141		4,900		25.7%	17.6%		18.7%		1.1	
Walaita	Boroso Sore	277,330	331,237	405,791	86,917	86,917	97,767		10,850		31.3%	21.4%		24.1%		2.7	
	Kindo Koysha	163,793	195,631	239,663	51,334	51,334	52,384		1,050		31.3%	21.4%		21.9%		0.4	
K.Tambaro	Angacha	176,400	210,689	258,109	61,844	61,844	63,594		1,750		35.1%	24.0%		24.6%		0.7	
Deresha	Special Wareda	97,660	116,643	142,897	20,428	20,428	23,144	23,627	2,716	3,199	20.9%	14.3%	14.3%	16.2%	16.5%	1.9	2.24
Sility	Silty	135,074	161,330	197,641	21,961	21,961	28,961		7,000		16.3%	11.1%		14.7%		3.5	
	Dalocha	137,144	163,802	200,670	22,298	22,298	29,298		7,000		16.3%	11.1%		14.6%		3.5	
Gurage	Gumer	284,306	339,569	415,998	46,224	46,224	51,474		5,250		16.3%	11.1%		12.4%		1.3	
South Omo	Bacho Gazer	226,290	270,276	331,109	26,461	26,461	29,261		2,800		11.7%	8.0%		8.8%		0.8	
Targetted 14 Waredas		2,327,219	2,779,583	3,405,199	569,205	569,205	661,243	829,205	92,038	260,000	24.5%	20.5%	16.7%	23.8%	24.4%	3.3	7.64
SNNPR*2		11,557,000	13,803,449	16,910,266	2,946,076	2,946,076	3,038,114	3,206,076	92,038	260,000	25.5%	21.3%	17.4%	22.0%	19.0%	0.7	1.54

*1 not used
*2 Population (2000) from "The National Water Master Plan (2003)"
*3 not used
*4 Population growth rate: 2.57%
・Year of 2006:A year when the construction of requested 240 schemes to be completed; Year of 2014:Final year in planning period
・Population to be served in 2006: Interview results from BD study with relevant information
・Population to be served in 2014年: From the year of 2007 onwards, 60 wells per year x 350 people per/well x8 year=168,000.
In case of Deresha Special Waredas, population to be served per scheme are estimanted and incorporated into a plan of operation.

*W-P: With project
*W/O-P: Without project