COUNTY GOVERNMENT OF KITUI

MINISTRY OF WATER AND IRRIGATION

WATER DEPARTMENT

TECHNICAL DESIGN REPORT

FOR

CONSTRUCTION OF TIVA SUMP WELL – IVOVOA –MASOKA WATER SUPPLY PROJECT IN KYANGWITHYA WEST WARD, KITUI CENTRAL SUB COUNTY IN KITUI COUNTY.

AUG 2024

Compiled by:
Planning, Survey & Design Unit

Financed By: Financing Locally - Led Climate Action (FLLoCA)

Thro': County Ministry of Energy, Environment, Forestry, Natural & Mineral Resources (MEEFN&MR)

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EXECUTIVE SUMMARY

The county Government of Kitui under the leadership of H.E Julius Malombe in his "**THE KITUI PROMISE**" has prioritized to improve portable water to Kitui residents for both domestic, establish kitchen gardens as well as to mitigate adverse effects of climate change.
Kitui County is among the counties severely affected by impacts of climate change. This has led to hazards such as drought, environmental degradation, livestock diseases, crop pest and diseases, human wild life conflict, human diseases and social risks. As a result, the County Climate has been negatively affected. Due to the impacts of climate change the communities has ventured into unsustainable livelihoods such as charcoal business and commercial sand harvesting, and this has greatly led to environmental degradation.

Kitui County Government in collaboration with Financing Locally - Led Climate Action (FLLoCA) Program through Ministry of Energy, Environment, Forestry, Natural & Mineral Resources (MEEFN& MR) is working to mitigate the negative effects brought by climate change through forest restoration, tree nursery establishment, construction of sand dams, construction of sump wells among others.

It is in wake of this that Tiva Sump well– Ivovoa - Masoka water supply project will be implemented

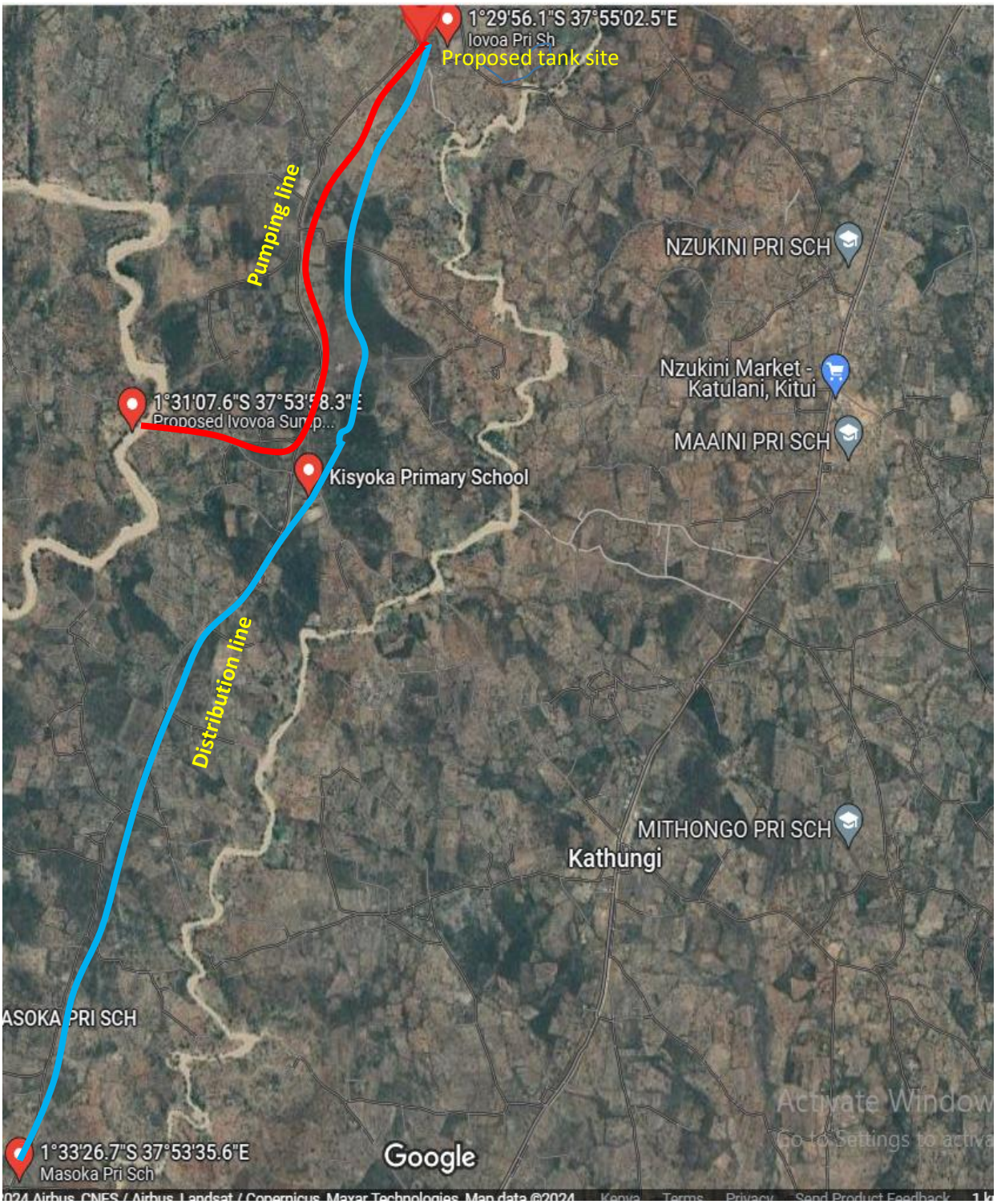
The project is located in Kavuta County Village, Kyangwithya West Ward,Kitui Central Sub County. The project is expected to serve **3049** people in the ultimate year 2046.

The source of the water supply is proposed sump well to be constructed at Tiva River.

The designers adopted a design horizon of twenty years in accordance with the Practice Manual for Water Supply Services in Kenya. However, in view that the system will be a pumped system it is proposed that the implementation be done in phases that is intake works, pumping lines, storage and distribution tanks, distribution pipeline and water drawing points.

1.0 INTRODUCTION

1.1 Location



1.2 General

Tiva Sump well– Ivovoa - Masoka water supply project is located in Kavuta County village in Kyangwithya West, Kitui Central Sub County in Kitui County. The project is intended to serve Kisyoka, Ivovoa, Masoka, and Canaani areas in Kavuta Village. The Project site is approximately 29km to the South West of Kitui Town. Accessibility to the project site is through Kitui- Wikililye – Kathukini tarmac road and Kathukini – Katulani – Ivovoa - Masoka all-weather road.

1.3 Background

The project was conceived after Kitui County Government in collaboration with Financing Locally - Led Climate Action (FLLoCA) Program agreed working together to mitigate negative effects brought by climate change.

The ministry of Energy, Environment, Climate Change, Forestry, Natural and Mineral Resources is mandated to coordinate climate change matters in all sectors sensitive to climate change in Kitui County. Under the FLLoCA program, the ministry has been working in collaboration with various stakeholders including key county departments such as Water, Agriculture & Livestock, and other development partners. The ministry spearheaded the Participatory Climate Risk Assessment (PCRA) in the year 2023 that led to development of ward climate change action plans, which guided in the development of Kitui County Climate Change Action Plan (KCCCAP 2023-2027). During the PCRA process, community proposed climate resilient actions with a broad objective of addressing drought, environmental degradation, and socio-economic risks. **Construction of sump wells** was among the proposed interventions by communities aimed at addressing water scarcity, food insecurity, and environmental degradation. During the exercise construction of Tiva Sump well– Ivovoa - Masoka water supply project was among the prioritized

intervention in Kyangwithya ward. The project is aimed to address acute water shortage and supply of uncontaminated water to the adjoining community as well as the institutions within the project area. Once implemented the project will supplement other water sources at the ultimate year (2046) in domestic uses. The project is estimated to cost Ksh. 30,737,837.71

1.4 Scope of the Project

The project Main components includes;

1.4.1 Intake Works

i. 15 – 40m^3 Intake sump/relief well

ii. Construction of Pump control room/ attendant house

iii. Construction of VIP Latrine

iv. Pumping unit and Solar Assembly

v. Intake Compound Fencing

1.4.2 Transmission Lines

i. 3919m long 50/63mm Dia. HDPE/GS pipes Rising main from Intake (Tiva river) to proposed Tank site near Ivovoa primary school.

ii. 7480m long 75/63/32mm Dia. HDPE pipes Distribution pipeline from Tank through Kisyoka to Masoka primary school.

iii. 400m 32mm Dia. Pipe connection to schools and other public institutions.

1.4.3 Storage/Distribution Tanks

i. 6m high steel tower with 4no – 10m^3 plastic water tanks interconnected.

ii. 10m^3 storage water tanks placed on water kiosks

1.4.4 Water Drawing points

i. Construction of 4 no Standard Ministry water Kiosks

2.0 GENERAL DESCRIPTION OF THE AREA

2.1 Climate

The project area generally lies in high lying topography in Kitui central. The area experience Semi-arid climatic condition with temperatures ranging from 16^{o}C during the coldest months (June – July) and 31^{o}C (during the hottest months (January- March) and average rainfall 650mm with two rainy seasons, April –June (long rains) and October-December (short rains).

2.2 Geology and physiographic

The supply area lies within the extensive regional metamorphic zone of the Mozambican belt generally characterized by ridge and start of basement system. The predominant local geological formation is the sandy soils that are weathering products of undifferentiated basement system.

2.3 Hydrology

The annual rainfall received ranges between 500– 900mm p.a most of the rains comes in October- December season. Rains are sometimes erratic and poorly distributed.

3.0 SOCIO ECONOMIC INFRASTRUCTURE

3.1 Administration

The area is administered by chief Kavuta Location and village administrator Kavuta County Village, as well as Ward Administrator Kyangwithya West Ward and Sub County Administrator Kitui Central North.

3.2 Education

The project will supply water to 4no public Schools, namely; Kisyoka Primary School, Kisyoka Junior Secondary School, Ivovoa Primary,Masoka Primary School respectively.

3.3 Health and sanitation

The area of the project has 1no Health centre; Kisyoka Dispensary which serves the area.

3.4 Transport /Telecommunication and Power supply.

There exist all weather roads connecting the areas to Katulani, Kavusuni and Itoleka Markets market. The area is fairly served by the national power grid and fairly by telephone networks such as safaricom and airtel.

3.5 Commerce and industry

The project area is served by Kitui, Itoleka, Tiva and Katulani markets where farm products and livestock are sold.

3.6 Agriculture and Livestock

Mixed farming is the main system practiced (agro-pastoralism) with crop and livestock enterprise complimenting each other as means of livelihood. The farmers also practice subsistence mixed cropping whereby surplus is sold in the local markets. Livestock rearing is mostly practiced as commercial enterprise.

The crops grown include; Maize, peas, cow peas, green grams among others. Bee keeping is also practiced within the project area.

3.7 Other water sources

The alternative water sources are undeveloped shallow wells at Mwilini and Tiva Rivers which are 4km and 6km respectively away from proposed project area.

4.0 WATER SUPPLY

4.1 General

The proposed water supply system shall be composed of intake source, rising main, distribution lines and plastic water tanks on a steel tower. There shall be in addition water kiosks strategically located to serve as central watering points for the communities.

4.2 Water Source

The source of water shall be a sump well sunk at Ivovoa seasonal river

(*Location -1.518781, 37.899519*).

4.3 Water Treatment

No water analysis has been carried out but it is assumed much of the water to be tapped shall undergo physical treatment through infiltration system.

However, to render the water safe for human consumption, mild chlorination has been proposed. An FRO dozer for mild chlorination shall be incorporated in the water works and specifically at the one of the 4 interconnected $10M^3$ elevated plastic water tank.

4.4 Pipe Network

Water shall be pumped to 4No. Water Tanks on a 6m High Steel Tower from which a distribution pipelines will be connected to serve all water kiosks and institutions within the project area.

The size of the pipes adopted was based on the following consideration: -

(i) The velocity through pipes should be over 0.50M/S to prevent any sludge settlement in the pipe

(ii) Pipe sizes and friction losses in the pipes have been determined through economic analysis using the Harzen williams hydraulic formular.

Pipes profile will generally follow existing topography with uniform rise to an air valve or a fall to a washout. Average soil cover on HDPE pipe will be 0.60m. Galvanized Steel pipes on rocky sections shall be anchored with concrete.

4.5 Storage Tanks

4 no. Water Tanks on a 6m High Steel Tower has been located at strategic vantage point to enable it command water supply by gravity to the water kiosks and targeted households.

4.6 Air Valves

There will be single and double air valves located at accentuate high points. The function of the air valves shall be: -

a) To allow the passage of air into and out of the pipes when it is charged or emptied,
b) To facilitate the escape of air trapped at high points and,
c) To prevent the formation of partial vacuum during sudden burst.

All air valves will be from approved manufacturer and will have isolating shut off cocks so that they can be repaired without interfering with water in pipes during service.

Small air valve chambers will be provided for all air valves. The chamber walls will be of concrete block work or masonry and will be covered by a 1000 x 1000 x 50mm thick precast concrete slab having ventilation holes.

4.7 Mark posts

Mark posts shall be placed along the pipelines at an interval of 200m except where they follow the main roads. They will also be placed at all bends, river and road crossings. They will be square 100 x 100mm, 700mm lettered MAJI.

4.8 Wash Out

There will be washouts along the pipeline at all low points. Additional washouts have also to be installed at accentuate low level. The washouts will consist of short pipe branches provided with sluice valves. Access to the sluice valves will be through 1000mm cubed concrete chamber constructed above it and covered by a 1000mm x 1000mm x 50mm thick precast concrete cover slab. The provision of wash outs is a requirement as per section 9.6 of MOWD design manual. Therefore, the design has adopted wash out size by assuming a shear stress of $10N/m^2$ on the walls of the main pipe and available pressure of 0.1-0.2 MPa. The diameter(d) of the pipe should be:

d=0.6D if the upstream and downstream sides of the main are washed simultaneously.

d=0.4D if only one side is washed at a time

where d is the diameter at washout in mm.

D is the diameter of the main pipe in mm

4.9 Water Kiosk

Water will be connected to the water pipelines and serve existing water kiosks and additional proposed water kiosks.

4.10 Indicator Plates and Marker Posts

Precast concrete plates will be fixed at all Sectional Valves, Air Valves and Wash Outs and marked SV, AV and WO respectively. The marker posts will be provided at 150m spacing along the main distribution line and rising main and lettered "MAJI" for future identification.

The indicator plates and marker posts will be painted with at least two coats of plastic emulsion paint. They shall be blue in colour with white lettering as per MOWD design manual.

4.11 Road Crossings

Request for road crossing cuttings, shall be applied to the Ministry of Roads and Public Works. To provide sufficient protection to pipes under road crossings, the minimum cover to the sleeved pipe shall be a minimum of 2.0m Road crossing details are provided.

4.12 Future Expansion

The pipe network for the distribution does not cover the entire supply area. Thus, the distribution system will have to be intensified to deliver the water closer to the people by ultimate year.

In the event of future expansions, this report should be consulted to ensure that the water supply is not jeopardized in regard to the technical planning criteria adopted during design.

5.0 POPULATION PROJECTION AND WATER DEMAND

5.1 Design period

The project infrastructure is designed to serve for period of 20 years. The ultimate is year is 2046.

5.2 Population projection

The population expected to be served in the ultimate year is estimated at 3049. Growth rates have been comfortably assumed purposely for design of this project and are indicated in the population projection table as shown below.

Population Outline			
			Present
Villages	Kisyoka		800
	Ivovoa		820
	Masoka		450
Market Centres	Kisyoka	Shops	10
		Hotels	2
		Butcheries	1
		Bars	0
		P/Mills	2
	Ivovoa	Shops	10
		Hotels	1
		Butcheries	0
		Bars	0
		P/Mills	2
	Masoka	Shops	11
		Hotels	4
		Butcheries	0

		Bars	0
		P/Mills	1
	Canaani	Shops	4
		Hotels	1
		Butcheries	0
		Bars	0
		P/Mills	0
Institutions	Kisyoka Pri. Sch.	Pupils	101
		Teachers	7
		Non Teachers	1
	Kisyoka JSS	Pupils	37
		Teachers	3
		Non Teachers	0
	Ivovoa Pri. Sch.	Pupils	100
		Teachers	12
		Non Teachers	2
	Maosoka Pri. Sch.	Pupils	212
		Teachers	6
		Non Teachers	2
	Churches 4@ 30		120
	Dispensary/Health facility		1

5.3 Water Demand

Table 5.1: Service Type

	IC %			NC %		
	Initial	**Future**	**Ultimate**	**Initial**	**Future**	**Ultimate**
Urban Areas						
High and Medium Class Housing	100	100	100	0	0	0
Low class Housing	10	30	50	90	70	50
Rural Areas						
High potential	20	40	80	80	60	20
Medium potential	10	20	40	90	80	60
Low potential	5%	10%	20%	95%	90%	80%

Table 5.2: Consumption Rates (From design manual for water supplies)

CONSUMER	**UNIT**	**RURAL AREAS**			**URBAN AREAS**		
		High potential	**Medium potential**	**Low potential**	**High Class Housing**	**Medium Class Housing**	**Low Class Housing**
People with individual connections	1/head / day	60	50	40	250	150	75
People without connections	1/head / day	20	15	10	-	-	20

Livestock unit	1/head / day	50	-
Boarding schools	1/head / day	50	
Day schools with WC without WC	1/head / day	25 5	
Hospitals Regional District other	1/bed/ day	400 200 100	+ 20 1 per outpatient and day (minimum 5000 1/day)
Dispensary and Health Centre	1/day	5000	
Hotels High Class Medium Class Low Class	1/bed/ day	600 300 50	
Administrative offices	1/head / day	25	
Bars	1/day	500	
Shops	1/day	100	
Unspecified industry	1/ha/day		20,000
Coffee pulping factories	1/kg coffee	25 (when re-circulation of water is used).	

Population Projection (population growth rate is assumed as (1.5%)						
			Present	**Initial (2025)**	**Future(2036)**	**Ultimate (2046)**
		1.50%	5	1.0	10.0	10.0
Villages	Kisyoka		861.8	874.8	1015.2	1178.2
	Ivovoa		883.4	896.6	1040.6	1207.6
	Masoka		484.8	492.0	571.0	662.7
Market Centres	Kisyoka	Shops	10	10.2	11.8	13.7
		Hotels	2	2.0	2.4	2.7
		Butcheries	1	1.0	1.2	1.4
		Bars	0	0.0	0.0	0.0
		P/Mills	2	2.0	2.4	2.7
	Ivovoa	Shops	10	10.2	11.8	13.7
		Hotels	1	1.0	1.2	1.4
		Butcheries	0	0.0	0.0	0.0
		Bars	0	0.0	0.0	0.0
		P/Mills	2	2.0	2.4	2.7
	Masoka	Shops	11	11.2	13.0	15.0
		Hotels	4	4.1	4.7	5.5
		Butcheries	0	0.0	0.0	0.0
		Bars	0	0.0	0.0	0.0
		P/Mills	1	1.0	1.2	1.4
	Canaani	Shops	4	4.1	4.7	5.5
		Hotels	1	1.0	1.2	1.4
		Butcheries	0	0.0	0.0	0.0
		Bars	0	0.0	0.0	0.0

		P/Mills	0	0.0	0.0	0.0
Institutions	Kisyoka Pri. Sch.	Pupils	101	102.5	119.0	138.1
		Teachers	7	7.1	8.2	9.6
		Non Teachers	1	1.0	1.2	1.4
	Kisyoka JSS	Pupils	37	37.6	43.6	50.6
		Teachers	3	3.0	3.5	4.1
		Non Teachers	0	0.0	0.0	0.0
	Ivovoa Pri. Sch.	Pupils	100	101.5	117.8	136.7
		Teachers	12	12.2	14.1	16.4
		Non Teachers	2	2.0	2.4	2.7
	Maosoka Pri. Sch.	Pupils	212	215.2	249.7	289.8
		Teachers	6	6.1	7.1	8.2
		Non Teachers	2	2.0	2.4	2.7
	Churches 4@ 30		2	2.0	2.3	2.7
	Dispensary/Health facility		1	1.0	1.2	1.4

Water Demand

			Consumption rate	**Initial (2025)**	**Future(2035)**	**Ultimate (2045)**
Villages	Kisyoka	IC	40	1.750	4.061	9.425
		NC	10	8.310	9.137	9.425
	Ivovoa	IC	40	1.793	4.162	9.661
		NC	10	8.518	9.365	9.661

	Masoka	IC	40	0.984	2.284	5.302
		NC	10	4.674	20.558	5.302
Market Centres						
	Kisyoka	Shops	100	1.015	1.178	1.367
		Hotels	300	0.609	0.707	0.820
		Butcheries	100	0.102	0.118	0.137
		Bars	300	0.000	0.000	0.000
		P/Mills	100	0.203	0.236	0.273
	Ivovoa	Shops	100	1.015	1.178	1.367
		Hotels	300	0.305	0.353	0.410
		Butcheries	100	0.000	0.000	0.000
		Bars	300	0.000	0.000	0.000
		P/Mills	100	0.203	0.236	0.273
	Masoka	Shops	100	1.117	1.296	1.504
		Hotels	300	1.218	1.414	1.640
		Butcheries	100	0.000	0.000	0.000
		Bars	300	0.000	0.000	0.000
		P/Mills	100	0.102	0.118	0.137
Institutions	Kisyoka Pri. Sch.	Students	5	0.513	0.595	0.690
		Teachers	25	0.178	0.206	0.239
		Non Teachers	25	0.025	0.029	0.034
	Kisyoka JSS	Pupils	5	0.188	0.218	0.253
		Teachers	25	0.076	0.088	0.103
		Non Teachers	25	0.000	0.000	0.000
	Ivovoa Pri. Sch.	Pupils	5	0.508	0.589	0.684
		Teachers	25	0.305	0.353	0.410

		Non Teachers	25	0.051	0.059	0.068
	Masoka Pri. Sch.	Pupils	5	1.076	1.249	1.449
		Teachers	25	0.152	0.177	0.205
		Non Teachers	25	0.051	0.059	0.068
	Church 9 @ 45		25	0.050	0.058	0.067
	Dispensary		5000	5.075	5.890	6.835
	TOTAL			**40.163**	**65.969**	**67.811**

Thus, the ultimate (2046) water demand is 67.811m^3/day

This will not call upgrading of the pumping system in the ultimate year given that climatic conditions will not affect river recharge as the design sump well capacity is still high.

6.0 MARKET STUDY

6.1 Economy and income situation

The income situation is fair because the rains received are adequate. It is expected that the community will be active in terms of unskilled labour and availing of locally available materials.

6.2 Willingness and ability to pay for water

The willingness to pay for water will be high, considering that this is a pipeline scheme and most of the community will be relieved of going for long distances to get water. The portability of the water will also act as an incentive to the community. Earnings from livestock sales will enable community to pay for water so that the project can be self-sustainable. During public engagements held with community, the beneficiary members expressed their willingness to pay for the water.

7.0 OTHER WATER SOURCES

7.1 Other possible sources

Other possible sources of water in the area are earth Dams, Sand dams as well as roof harvesting which depends majorly on the income of the household to put up such rain water harvesting structures.

7.2 Other Recommended water sources

Construction of Earth dams and water pans is highly recommended. Water from these sources can improve in establishment of tree nurseries, agricultural products through small scale irrigation in the project area.

Main Distribution

GI	120
uPVC	150

Chainage	Ground Levels	IL	Static Line	Energy Line - E_L	Hydraulic Levels	Pipe details					Soil Type	Actual velocity (m/s)	Q(flow) M^3/S	f (frictional Coeficient)	Diatance (m)	Losses (m)	$Vf = V^2/2g$	Head	HG(%)	Remarks	
			10			Dia.(m) Internal	Dia.(m) external	Pipe Material	Pipe class	Wall Thickness (mm)			7.00								
0	1000.503	999.503	1010.503	1010.503	1010.503	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	0	0.00	0.06	10.0	0.00	Proposed TS (IPC)	
8.5803448	1000.235	999.235	1010.503	1010.445	1010.455	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	9	0.05	0.06	10.2	0.56	Edge road Ivovoa	
18.667275	999.804	998.804	1010.503	1010.388	1010.399	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	10	0.06	0.06	10.6	0.56	Edge road Ivovoa	
70.180828	998.952	997.952	1010.503	1010.330	1010.110	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	52	0.29	0.06	11.2	0.56		
112.54467	998.05	997.05	1010.503	1010.272	1009.873	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	42	0.24	0.06	11.8	0.56		
153.25597	997.635	996.635	1010.503	1010.215	1009.645	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	41	0.23	0.06	12.0	0.56	KM3 (IPC)	
227.60629	996.047	995.047	1010.503	1010.157	1009.229	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	74	0.42	0.06	13.2	0.56		
280.88113	995.124	994.124	1010.503	1010.100	1008.931	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	53	0.30	0.06	13.8	0.56		
334.37962	994.317	993.317	1010.503	1010.042	1008.631	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	53	0.30	0.06	14.3	0.56		
396.93502	993.58	992.58	1010.503	1009.984	1008.281	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	63	0.35	0.06	14.7	0.56		
480.76467	992.704	991.704	1010.503	1009.927	1007.812	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	84	0.47	0.06	15.1	0.56		
550.92146	992.319	991.319	1010.503	1009.869	1007.419	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	70	0.39	0.06	15.1	0.56		
612.25005	991.92	990.92	1010.503	1009.811	1007.076	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	61	0.34	0.06	15.2	0.56		
686.39476	991.815	990.815	1010.503	1009.754	1006.661	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	74	0.42	0.06	14.8	0.56		
745.92145	991.911	990.911	1010.503	1009.696	1006.328	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	60	0.33	0.06	14.4	0.56		
805.81845	992.403	991.403	1010.503	1009.639	1005.992	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	60	0.34	0.06	13.6	0.56		
862.51861	992.115	991.115	1010.503	1009.581	1005.675	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	57	0.32	0.06	13.6	0.56		
926.16636	991.987	990.987	1010.503	1009.523	1005.319	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	64	0.36	0.06	13.3	0.56	Edge Road Kavuta	
953.38036	991.918	990.918	1010.503	1009.466	1005.166	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	27	0.15	0.06	13.2	0.56	Edge Road Kavuta	
1003.4366	992	991	1010.503	1009.408	1004.886	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	50	0.28	0.06	12.9	0.56		
1052.2761	992.205	991.205	1010.503	1009.350	1004.613	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	49	0.27	0.06	12.4	0.56		
1070.1282	992.229	991.229	1010.503	1009.293	1004.513	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	18	0.10	0.06	12.3	0.56		
1111.402	992.059	991.059	1010.503	1009.235	1004.282	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	41	0.23	0.06	12.2	0.56		
1157.9895	992.464	991.464	1010.503	1009.178	1004.021	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	47	0.26	0.06	11.6	0.56		
1227.081	992.511	991.511	1010.503	1009.120	1003.634	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	69	0.39	0.06	11.1	0.56		
1280.3555	992.432	991.432	1010.503	1009.062	1003.336	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	53	0.30	0.06	10.9	0.56	Edge road	
1290.0024	992.36	991.36	1010.503	1009.005	1003.282	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	10	0.05	0.06	10.9	0.56	Edge road	
1332.7791	992.374	991.374	1010.503	1008.947	1003.043	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	43	0.24	0.06	10.7	0.56		
1375.7557	992.408	991.408	1010.503	1008.889	1002.802	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	43	0.24	0.06	10.4	0.56		
1422.9966	992.243	991.243	1010.503	1008.832	1002.538	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	47	0.26	0.06	10.3	0.56		
1468.4497	992.255	991.255	1010.503	1008.774	1002.283	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	45	0.25	0.06	10.0	0.56		
1529.0782	992.544	991.544	1010.503	1008.717	1001.944	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	61	0.34	0.06	9.4	0.56	Gate Homestead	
1594.5609	993.16	992.16	1010.503	1008.659	1001.577	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	65	0.37	0.06	8.4	0.56		
1640.9719	993.176	992.176	1010.503	1008.601	1001.318	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	46	0.26	0.06	8.1	0.56		
1677.0155	993.225	992.225	1010.503	1008.544	1001.116	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	36	0.20	0.06	7.9	0.56		
1720.3266	993.145	992.145	1010.503	1008.486	1000.873	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	43	0.24	0.06	7.7	0.56		
1761.1491	992.905	991.905	1010.503	1008.428	1000.645	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	41	0.23	0.06	7.7	0.56	Gate Homestead	
1833.2985	992.309	991.309	1010.503	1008.371	1000.241	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	72	0.40	0.06	7.9	0.56		
1866.3932	992.263	991.263	1010.503	1008.313	1000.056	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	33	0.19	0.06	7.8	0.56		
1901.0313	991.662	990.662	1010.503	1008.256	999.862	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	35	0.19	0.06	8.2	0.56		
1939.0339	991.219	990.219	1010.503	1008.198	999.649	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	38	0.21	0.06	8.4	0.56		
1992.1352	990.007	989.007	1010.503	1008.140	999.352	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	53	0.30	0.06	9.3	0.56		
2047.4643	988.673	987.673	1010.503	1008.083	999.042	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	55	0.31	0.06	10.4	0.56		
2090.5005	987.359	986.359	1010.503	1008.025	998.801	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	43	0.24	0.06	11.4	0.56		
2131.6448	985.419	984.419	1010.503	1007.967	998.571	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	41	0.23	0.06	13.2	0.56		
2152.373	985.839	984.839	1010.503	1007.910	998.455	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	21	0.12	0.06	12.6	0.56		
2187.547	985.313	984.313	1010.503	1007.852	998.258	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	35	0.20	0.06	12.9	0.56		
2244.235	984.49	983.49	1010.503	1007.795	997.941	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	57	0.32	0.06	13.5	0.56		
2276.397	985.394	984.394	1010.503	1007.737	997.761	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	32	0.18	0.06	12.4	0.56		
2304.87	986.407	985.407	1010.503	1007.679	997.601	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	28	0.16	0.06	11.2	0.56		
2358.371	987.016	986.016	1010.503	1007.622	997.302	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	54	0.30	0.06	10.3	0.56		
2404.31	987.506	986.506	1010.503	1007.564	997.045	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	46	0.26	0.06	9.5	0.56		
2460.372	988.321	987.321	1010.503	1007.506	996.731	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	56	0.31	0.06	8.4	0.56	Chief's Office Ivovoa	
2507.411	988.576	987.576	1010.503	1007.449	996.468	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	47	0.26	0.06	7.9	0.56		
2556.332	989.041	988.041	1010.503	1007.391	996.194	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	49	0.27	0.06	7.2	0.56		
2622.984	989.023	988.023	1010.503	1007.334	995.821	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	67	0.37	0.06	6.8	0.56	Gate homestead	
2686.235	989.592	988.592	1010.503	1007.276	995.467	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	63	0.35	0.06	5.9	0.56		
2727.753	989.61	988.61	1010.503	1007.218	995.234	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	42	0.23	0.06	5.6	0.56	Edge road to Tiva	
2745.778	989.406	988.406	1010.503	1007.161	995.133	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	18	0.10	0.06	5.7	0.56	KM2 (IPC)	
2772.669	989.624	988.624	1010.503	1007.103	994.983	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	27	0.15	0.06	5.4	0.56		
2807.16	989.476	988.476	1010.503	1007.045	994.790	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	34	0.19	0.06	5.3	0.56	Kisyoka Shops	
2845.283	989.439	988.439	1010.503	1006.988	994.576	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	38	0.21	0.06	5.1	0.56	Kisyoka Shops	
2901.247	988.976	987.976	1010.503	1006.930	994.263	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	56	0.31	0.06	5.3	0.56		
2910.984	988.918	987.918	1010.503	1006.873	994.209	0.0654	75	HDPE	PN10	4.8	Sandy soil	0.58	0.00194	150	10	0.05	0.06	5.3	0.56	Edge road to Kisyoka scho	60%
2946.378	988.289	987.289	1010.503	1006.831	994.028	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	150	35	0.18	0.04	5.7	0.51	End shops	
3005.933	987.349	986.349	1010.503	1006.789	993.725	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	150	60	0.30	0.04	6.4	0.51		
3072.444	986.036	985.036	1010.503	1006.747	993.386	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	150	67	0.34	0.04	7.3	0.51		
3146.906	985.521	984.521	1010.503	1006.705	993.006	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	150	74	0.38	0.04	7.5	0.51	Edge road	
3204.899	984.828	983.828	1010.503	1006.664	992.710	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	150	58	0.30	0.04	7.9	0.51		
3275.898	983.16	982.16	1010.503	1006.622	992.349	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	150	71	0.36	0.04	9.2	0.51		
3333.275	981.803	980.803	1010.503	1006.580	992.056	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	150	57	0.29	0.04	10.3	0.51		
3378.043	980.612	979.612	1010.503	1006.538	991.828	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	150	45	0.23	0.04	11.2	0.51		
3438.468	979.566	978.566	1010.503	1006.497	991.520	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	150	60	0.31	0.04	12.0	0.51		
3501.318	978.812	977.812	1010.503	1006.455	991.199	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	150	63	0.32	0.04	12.4	0.51		
3570.569	977.921	976.921	1010.503	1006.413	990.846	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	150	69	0.35	0.04	12.9	0.51		
3625.525	977.153	976.153	1010.503	1006.371	990.566	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	150	55	0.28	0.04	13.4	0.51	Church	
3700.449	976.756	975.756	1010.503	1006.329	990.184	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	150	75	0.38	0.04	13.4	0.51		
3735.494	976.071	975.071	1010.503	1006.288	990.008	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	151	35	0.18	0.04	13.9	0.50		
3784.835	974.787	973.787	1010.503	1006.246	989.762	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	152	49	0.25	0.04	15.0	0.50		
3826.013	973.702	972.702	1010.503	1006.204	989.560	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	153	41	0.20	0.04	15.9	0.49		
3860.184	972.582	971.582	1010.503	1006.162	989.394	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	154	34	0.17	0.04	16.8	0.49		
3902.308	971.259	970.259	1010.503	1006.121	989.192	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	155	42	0.20	0.04	17.9	0.48		
3961.503	969.549	968.549	1010.503	1006.079	988.912	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	156	59	0.28	0.04	19.4	0.47		
4008.462	968.492	967.492	1010.503	1006.037	988.692	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	157	47	0.22	0.04	20.2	0.47	Canaan Shops	45%
4042.087	967.946	966.946	1010.503	1005.995	988.536	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	158	34	0.16	0.04	20.6	0.46		
4080.764	967.343	966.343	1010.503	1005.953	988.359	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	159	39	0.18	0.04	21.0	0.46		
4142.136	966.611	965.611	1010.503	1005.912	988.081	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	160	61	0.28	0.04	21.5	0.45		
4201.58	965.803	964.803	1010.503	1005.870	987.816	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	161	59	0.27	0.04	22.0	0.45		
4249.755	967.354	966.354	1010.503	1005.828	987.603	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	162	48	0.21	0.04	20.2	0.44		
4290.129	968.257	967.257	1010.503	1005.786	987.426	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	163	40	0.18	0.04	19.2	0.44		
4343.352	968.803	967.803	1010.503	1005.745	987.196	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	164	53	0.23	0.04	18.4	0.43		
4379.973	969.185	968.185	1010.503	1005.703	987.040	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	165	37	0.16	0.04	17.9	0.43		
4408.996	969.369	968.369	1010.503	1005.661	986.917	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	166	29	0.12	0.04	17.5	0.42		
4456.258	969.547	968.547	1010.503	1005.619	986.720	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	167	47	0.20	0.04	17.2	0.42		
4491.963	969.796	968.796	1010.503	1005.577	986.572	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	168	36	0.15	0.04	16.8	0.41		
4525.141	969.792	968.792	1010.503	1005.536	986.436	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	169	33	0.14	0.04	16.6	0.41		
4568.939	969.65	968.65	1010.503	1005.494	986.259	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	170	44	0.18	0.04	16.6	0.40		
4633.825	969.197	968.197	1010.503	1005.452	986.000	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	171	65	0.26	0.04	16.8	0.40		
4698.189	968.778	967.778	1010.503	1005.410	985.745	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	172	64	0.25	0.04	17.0	0.40		
4769.657	968.508	967.508	1010.503	1005.369	985.466	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	173	71	0.28	0.04	17.0	0.39		
4813.891	968.29	967.29	1010.503	1005.327	985.294	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	174	44	0.17	0.04	17.0	0.39		
4866.326	967.898	966.898	1010.503	1005.285	985.093	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	175	52	0.20	0.04	17.2	0.38		
4911.144	967.778	966.778	1010.503	1005.243	984.923	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	176	45	0.17	0.04	17.1	0.38		
4961.285	967.258	966.258	1010.503	1005.201	984.735	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	177	50	0.19	0.04	17.5	0.38		
5019.396	966.848	965.848	1010.503	1005.160	984.520	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	178	58	0.22	0.04	17.7	0.37		
5075.186	966.443	965.443	1010.503	1005.118	984.315	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	179	56	0.21	0.04	17.9	0.37		
5125.783	965.769	964.769	1010.503	1005.076	984.131	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	180	51	0.18	0.04	18.4	0.36		
5152.016	965.133	964.133	1010.503	1005.034	984.036	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	181	26	0.09	0.04	18.9	0.36		
5204.396	964.174	963.174	1010.503	1004.993	983.849	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	182	52	0.19	0.04	19.7	0.36		
5239.148	963.673	962.673	1010.503	1004.951	983.727	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	183	35	0.12	0.04	20.1	0.35		
5284.082	963.22	962.22	1010.503	1004.909	983.570	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	184	45	0.16	0.04	20.4	0.35	Canteen	
5324.926	962.86	961.86	1010.503	1004.867	983.429	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	185	41	0.14	0.04	20.6	0.35		
5378.099	962.446	961.446	1010.503	1004.825	983.247	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	186	53	0.18	0.04	20.8	0.34		
5426.794	961.885	960.885	1010.503	1004.784	983.082	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	187	49	0.17	0.04	21.2	0.34		
5471.64	961.76	960.76	1010.503	1004.742	982.931	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	188	45	0.15	0.04	21.2	0.34		
5516.253	962.233	961.233	1010.503	1004.700	982.783	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	189	45	0.15	0.04	20.6	0.33		
5562.571	962.774	961.774	1010.503	1004.658	982.631	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	190	46	0.15	0.04	19.9	0.33		
5615.064	963.031	962.031	1010.503	1004.617	982.460	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	191	52	0.17	0.04	19.4	0.33		
5663.732	963.31	962.31	1010.503	1004.575	982.303	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	192	49	0.16	0.04	19.0	0.32		
5733.025	963.754	962.754	1010.503	1004.533	982.081	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	193	69	0.22	0.04	18.3	0.32		
5788.525	964.136	963.136	1010.503	1004.491	981.905	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	194	55	0.18	0.04	17.8	0.32		
5834.857	964.414	963.414	1010.503	1004.449	981.760	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	195	46	0.15	0.04	17.3	0.31		
5872.728	964.667	963.667	1010.503	1004.408	981.643	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	196	38	0.12	0.04	17.0	0.31		
5922.1	964.693	963.693	1010.503	1004.366	981.491	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	197	49	0.15	0.04	16.8	0.31		
5970.541	964.85	963.85	1010.503	1004.324	981.343	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	198	48	0.15	0.04	16.5	0.30		
6008.881	965.039	964.039	1010.503	1004.282	981.227	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	199	38	0.12	0.04	16.2	0.30		
6048.058	964.586	963.586	1010.503	1004.241	981.110	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	200	39	0.12	0.04	16.5	0.30		
6084.996	964.144	963.144	1010.503	1004.199	981.000	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	201	37	0.11	0.04	16.9	0.30		
6132.801	963.49	962.49	1010.503	1004.157	980.860	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	202	48	0.14	0.04	17.4	0.29		
6174.987	962.806	961.806	1010.503	1004.115	980.737	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	203	42	0.12	0.04	17.9	0.29		
6218.009	962.082	961.082	1010.503	1004.073	980.613	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	204	43	0.12	0.04	18.5	0.29		
6248.075	961.777	960.777	1010.503	1004.032	980.527	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	205	30	0.09	0.04	18.8	0.29	Kisyoka Shop	
6284.112	961.128	960.128	1010.503	1003.990	980.425	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	206	36	0.10	0.04	19.3	0.28		
6335.076	960.729	959.729	1010.503	1003.948	980.282	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	207	51	0.14	0.04	19.6	0.28		
6345.963	960.754	959.754	1010.503	1003.906	980.252	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	208	11	0.03	0.04	19.5	0.28		
6381.628	960.519	959.519	1010.503	1003.865	980.153	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	209	36	0.10	0.04	19.6	0.28		
6429.968	960.452	959.452	1010.503	1003.823	980.021	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	210	48	0.13	0.04	19.6	0.27	Edge road	
6444.505	960.331	959.331	1010.503	1003.781	979.982	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	211	15	0.04	0.04	19.7	0.27	Edge road	
6484.024	960.301	959.301	1010.503	1003.739	979.876	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	212	40	0.11	0.04	19.6	0.27		
6507.764	960.341	959.341	1010.503	1003.697	979.813	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	213	24	0.06	0.04	19.5	0.27		
6558.203	960.367	959.367	1010.503	1003.656	979.679	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	214	50	0.13	0.04	19.3	0.26		
6600.161	960.203	959.203	1010.503	1003.614	979.570	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	215	42	0.11	0.04	19.4	0.26		
6648.047	959.671	958.671	1010.503	1003.572	979.445	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	216	48	0.12	0.04	19.8	0.26		
6715.299	958.656	957.656	1010.503	1003.530	979.272	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	217	67	0.17	0.04	20.6	0.26		
6732.873	958.37	957.37	1010.503	1003.489	979.228	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	218	18	0.04	0.04	20.9	0.26	Opp Church	
6799.421	957.32	956.32	1010.503	1003.447	979.059	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	219	67	0.17	0.04	21.7	0.25		
6840.289	956.436	955.436	1010.503	1003.405	978.957	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	220	41	0.10	0.04	22.5	0.25		
6900.963	955.17	954.17	1010.503	1003.363	978.806	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	221	61	0.15	0.04	23.6	0.25		
6939.206	954.367	953.367	1010.503	1003.321	978.712	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	222	38	0.09	0.04	24.3	0.25	Centre Access Road 4m wide	
6976.072	953.373	952.373	1010.503	1003.280	978.621	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	223	37	0.09	0.04	25.2	0.24		
7019.877	952.467	951.467	1010.503	1003.238	978.515	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	224	44	0.11	0.04	26.0	0.24		
7078.481	951.478	950.478	1010.503	1003.196	978.374	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	225	59	0.14	0.04	26.9	0.24		
7130.958	950.802	949.802	1010.503	1003.154	978.249	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	226	52	0.13	0.04	27.4	0.24		
7175.726	950.462	949.462	1010.503	1003.113	978.143	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	227	45	0.11	0.04	27.7	0.24		
7219.105	950.084	949.084	1010.503	1003.071	978.041	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	228	43	0.10	0.04	28.0	0.23		
7260.743	949.877	948.877	1010.503	1003.029	977.944	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	229	42	0.10	0.04	28.1	0.23		
7314.975	949.913	948.913	1010.503	1002.987	977.819	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	230	54	0.13	0.04	27.9	0.23		
7348.547	950.48	949.48	1010.503	1002.945	977.742	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	231	34	0.08	0.04	27.3	0.23	Start Masoka Shops	
7394.35	951.307	950.307	1010.503	1002.904	977.638	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	232	46	0.10	0.04	26.3	0.23		
7416.759	951.448	950.448	1010.503	1002.862	977.587	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	233	22	0.05	0.04	26.1	0.23		
7433.971	951.665	950.665	1010.503	1002.820	977.549	0.0549	63	HDPE	PN10	4.05	Sandy soil	0.49	0.00117	234	17	0.04	0.04	25.9	0.22	KM4(IPC) Proposed Water Kiosk	
7445.865	952.475	951.475	1010.503	1002.780	977.492	0.0277	32	HDPE	PN10	2.15	Sandy soil	0.48	0.00029	235	12	0.06	0.04	25.0	0.48	Masoka Pri Sch. Fence	25%
7475.609	952.121	951.121	1010.503	1002.740	977.351	0.0277	32	HDPE	PN10	2.15	Sandy soil	0.48	0.00029	236	30	0.14	0.04	25.2	0.47	Masoka Pri Sch. Kitchen	

10005.03	9995.03	10105.03	10105.03	0,10005.03	0,9995.03	0,10105.03	0,10105.03
10002.35	9992.35	10104.454	10104.55	8.58034480	8.58034480	8.58034480	8.58034480663253,10104.5497119389
9998.04	9988.04	10103.877	10103.985	18.6672748	18.6672748	18.6672748	18.6672748648662,10103.9850921959
9989.52	9979.52	10103.301	10101.102	70.1808275	70.1808275	70.1808275	70.1808275870031,10101.1016015073
9980.5	9970.5	10102.725	10098.73	112.544669	112.544669	112.544669	112.544669114535,10098.7302693797
9976.35	9966.35	10102.149	10096.451	153.255967	153.255967	153.255967	153.255967767643,10096.4514389674
9960.47	9950.47	10101.572	10092.29	227.606293	227.606293	227.606293	227.606293616982,10092.2896512251
9951.24	9941.24	10100.996	10089.308	280.881131	280.881131	280.881131	280.881131233199,10089.3075719453
9943.17	9933.17	10100.42	10086.313	334.379619	334.379619	334.379619	334.379619155374,10086.3129737546
9935.8	9925.8	10099.844	10082.811	396.935020	396.935020	396.935020	396.935020153935,10082.8114114128
9927.04	9917.04	10099.267	10078.119	480.764667	480.764667	480.764667	480.764667808635,10078.1190150304
9923.19	9913.19	10098.691	10074.192	550.921464	550.921464	550.921464	550.921464279007,10074.1919616886
9919.2	9909.2	10098.115	10070.759	612.250050	612.250050	612.250050	612.25005019159,10070.7590707875
9918.15	9908.15	10097.539	10066.609	686.394764	686.394764	686.394764	686.394764243837,10066.6087922436
9919.11	9909.11	10096.962	10063.277	745.921454	745.921454	745.921454	745.921454610399,10063.2767631304
9924.03	9914.03	10096.386	10059.924	805.818447	805.818447	805.818447	805.818447557103,10059.9240061895
9921.15	9911.15	10095.81	10056.75	862.518614	862.518614	862.518614	862.518614267628,10056.750192812
9919.87	9909.87	10095.234	10053.187	926.166360	926.166360	926.166360	926.166360323371,10053.1874860406
9919.18	9909.18	10094.657	10051.664	953.380358	953.380358	953.380358	953.380358302834,10051.6641721625
9920	9910	10094.081	10048.862	1003.43657	1003.43657	1003.43657	1003.4365778267,10048.8622562534
9922.05	9912.05	10093.505	10046.128	1052.27606	1052.27606	1052.27606	1052.27606863026,10046.1284471969
9922.29	9912.29	10092.929	10045.129	1070.12818	1070.12818	1070.12818	1070.1281804659,10045.1291684531
9920.59	9910.59	10092.352	10042.819	1111.40195	1111.40195	1111.40195	1111.40195534782,10042.8188532202
9924.64	9914.64	10091.776	10040.211	1157.98947	1157.98947	1157.98947	1157.98947863417,10040.2110989011
9925.11	9915.11	10091.2	10036.344	1227.08104	1227.08104	1227.08104	1227.08104259213,10036.343672354
9924.32	9914.32	10090.624	10033.362	1280.35549	1280.35549	1280.35549	1280.35549419892,10033.3616146812
9923.6	9913.6	10090.047	10032.822	1290.00237	1290.00237	1290.00237	1290.00237436694,10032.821626898
9923.74	9913.74	10089.471	10030.427	1332.77909	1332.77909	1332.77909	1332.77909300058,10030.4271838175
9924.08	9914.08	10088.895	10028.022	1375.75573	1375.75573	1375.75573	1375.75573271433,10028.0215500785
9922.43	9912.43	10088.318	10025.377	1422.99660	1422.99660	1422.99660	1422.99660860414,10025.3772240992
9922.55	9912.55	10087.742	10022.833	1468.44967	1468.44967	1468.44967	1468.4496779522,10022.8329712704
9925.44	9915.44	10087.166	10019.439	1529.07821	1529.07821	1529.07821	1529.07821946377,10019.4392656207
9931.6	9921.6	10086.59	10015.774	1594.56088	1594.56088	1594.56088	1594.56088160404,10015.7738487242
9931.76	9921.76	10086.013	10013.176	1640.97194	1640.97194	1640.97194	1640.97194554454,10013.175971784
9932.25	9922.25	10085.437	10011.158	1677.01554	1677.01554	1677.01554	1677.01554333892,10011.158417701
9931.45	9921.45	10084.861	10008.734	1720.32659	1720.32659	1720.32659	1720.326591872,10008.7340653013
9929.05	9919.05	10084.285	10006.449	1761.14912	1761.14912	1761.14912	1761.14912492664,10006.4490085012
9923.09	9913.09	10083.708	10002.41	1833.29847	1833.29847	1833.29847	1833.29847492409,10002.4104212185
9922.63	9912.63	10083.132	10000.558	1866.39317	1866.39317	1866.39317	1866.39317276164,10000.5579329312
9916.62	9906.62	10082.556	9998.6191	1901.03130	1901.03130	1901.03130	1901.03130566549,9998.61905027953
9912.19	9902.19	10081.98	9996.4918	1939.03390	1939.03390	1939.03390	1939.03390707603,9996.49184022471
9900.07	9890.07	10081.403	9993.5195	1992.13523	1992.13523	1992.13523	1992.13523687103,9993.51947311109
9886.73	9876.73	10080.827	9990.4224	2047.46433	2047.46433	2047.46433	2047.46433559814,9990.42240578496
9873.59	9863.59	10080.251	9988.0134	2090.50046	2090.50046	2090.50046	2090.50046098098,9988.01344231307
9854.19	9844.19	10079.675	9985.7104	2131.64476	2131.64476	2131.64476	2131.64476296787,9985.71037437465
9858.39	9848.39	10079.098	9984.5501	2152.37278	2152.37278	2152.37278	2152.37278904474,9984.55011523841
9853.13	9843.13	10078.522	9982.5812	2187.54669	2187.54669	2187.54669	2187.54669410201,9982.58124253686
9844.9	9834.9	10077.946	9979.4081	2244.23527	2244.23527	2244.23527	2244.23527582672,9979.40807763334
9853.94	9843.94	10077.37	9977.6078	2276.39679	2276.39679	2276.39679	2276.39679510015,9977.60782437073
9864.07	9854.07	10076.793	9976.014	2304.87025	2304.87025	2304.87025	2304.87025367158,9976.01401170737
9870.16	9860.16	10076.217	9973.0193	2358.37105	2358.37105	2358.37105	2358.37105996554,9973.01928374493
9875.06	9865.06	10075.641	9970.4478	2404.30983	2404.30983	2404.30983	2404.30983501328,9970.44784335504
9883.21	9873.21	10075.065	9967.3098	2460.37179	2460.37179	2460.37179	2460.37179167859,9967.30975402734
9885.76	9875.76	10074.488	9964.6767	2507.41080	2507.41080	2507.41080	2507.41080107361,9964.67672760178
9890.41	9880.41	10073.912	9961.9383	2556.33215	2556.33215	2556.33215	2556.3321560335,9961.93833616794
9890.23	9880.23	10073.336	9958.2075	2622.98357	2622.98357	2622.98357	2622.98357198879,9958.20749783252
9895.92	9885.92	10072.759	9954.667	2686.23510	2686.23510	2686.23510	2686.23510292721,9954.66696935286
9896.1	9886.1	10072.183	9952.343	2727.75262	2727.75262	2727.75262	2727.75262862514,9952.34301007539
9894.06	9884.06	10071.607	9951.334	2745.77820	2745.77820	2745.77820	2745.77820389931,9951.33402164976
9896.24	9886.24	10071.031	9949.8288	2772.66910	2772.66910	2772.66910	2772.66910213656,9949.82879340247
9894.76	9884.76	10070.454	9947.8982	2807.15999	2807.15999	2807.15999	2807.15999765992,9947.89815241912
9894.39	9884.39	10069.878	9945.7642	2845.28264	2845.28264	2845.28264	2845.28264453842,9945.76422277361
9889.76	9879.76	10069.302	9942.6316	2901.24685	2901.24685	2901.24685	2901.24685662122,9942.63160473605
9889.18	9879.18	10068.726	9942.0866	2910.98375	2910.98375	2910.98375	2910.98375432909,9942.08657818687
9882.89	9872.89	10068.308	9940.2823	2946.37833	2946.37833	2946.37833	2946.37833972156,9940.28234644982
9873.49	9863.49	10067.89	9937.2466	3005.93309	3005.93309	3005.93309	3005.93309678574,9937.24655491289
9860.36	9850.36	10067.472	9933.8562	3072.44398	3072.44398	3072.44398	3072.44398911159,9933.85617580651
9855.21	9845.21	10067.055	9930.0605	3146.90566	3146.90566	3146.90566	3146.90566716199,9930.06050702716
9848.28	9838.28	10066.637	9927.1043	3204.89910	3204.89910	3204.89910	3204.89910670425,9927.10430333096
9831.6	9821.6	10066.219	9923.4852	3275.89772	3275.89772	3275.89772	3275.89772134479,9923.48516349924
9818.03	9808.03	10065.801	9920.5604	3333.27517	3333.27517	3333.27517	3333.27517191683,9920.56035971456
9806.12	9796.12	10065.383	9918.2783	3378.04323	3378.04323	3378.04323	3378.04323688501,9918.27831677703
9795.66	9785.66	10064.966	9915.1982	3438.46774	3438.46774	3438.46774	3438.46774421356,9915.19818989862
9788.12	9778.12	10064.548	9911.9944	3501.31771	3501.31771	3501.31771	3501.31771526401,9911.99442550402
9779.21	9769.21	10064.13	9908.4643	3570.56944	3570.56944	3570.56944	3570.56944634737,9908.46433270365
9771.53	9761.53	10063.712	9905.663	3625.52466	3625.52466	3625.52466	3625.52466398791,9905.66300174627
9767.56	9757.56	10063.295	9901.8437	3700.44938	3700.44938	3700.44938	3700.44938910578,9901.84372923755
9760.71	9750.71	10062.877	9900.0792	3735.49449	3735.49449	3735.49449	3735.49449736699,9900.07916042209
9747.87	9737.87	10062.459	9897.625	3784.83513	3784.83513	3784.83513	3784.8351340267,9897.62497752941
9737.02	9727.02	10062.041	9895.6015	3826.01284	3826.01284	3826.01284	3826.01284405222,9895.60153831975
9725.82	9715.82	10061.624	9893.9426	3860.18359	3860.18359	3860.18359	3860.18359283022,9893.94255270272
9712.59	9702.59	10061.206	9891.9218	3902.30804	3902.30804	3902.30804	3902.30804858909,9891.92178450634
9695.49	9685.49	10060.788	9889.1157	3961.50338	3961.50338	3961.50338	3961.50338949525,9889.11572245727
9684.92	9674.92	10060.37	9886.9159	4008.46202	4008.46202	4008.46202	4008.46202186523,9886.91590935714
9679.46	9669.46	10059.952	9885.3592	4042.08663	4042.08663	4042.08663	4042.08663447265,9885.35915222266
9673.43	9663.43	10059.535	9883.5893	4080.76376	4080.76376	4080.76376	4080.76376131707,9883.58927463062
9666.11	9656.11	10059.117	9880.8133	4142.13641	4142.13641	4142.13641	4142.13641650734,9880.813263487
9658.03	9648.03	10058.699	9878.1554	4201.57958	4201.57958	4201.57958	4201.57958396072,9878.15537399114
9673.54	9663.54	10058.281	9876.0258	4249.75540	4249.75540	4249.75540	4249.75540749284,9876.0258436083
9682.57	9672.57	10057.864	9874.2614	4290.12915	4290.12915	4290.12915	4290.12915402546,9874.26141492552
9688.03	9678.03	10057.446	9871.9616	4343.35234	4343.35234	4343.35234	4343.35234867784,9871.96163312595
9691.85	9681.85	10057.028	9870.397	4379.97289	4379.97289	4379.97289	4379.97289151914,9870.39696940349
9693.69	9683.69	10056.61	9869.1707	4408.99564	4408.99564	4408.99564	4408.99564888239,9869.17073077697
9695.47	9685.47	10056.192	9867.196	4456.25768	4456.25768	4456.25768	4456.25768236623,9867.19595405499
9697.96	9687.96	10055.775	9865.7205	4491.96296	4491.96296	4491.96296	4491.96296956468,9865.72046415426
9697.92	9687.92	10055.357	9864.3644	4525.14113	4525.14113	4525.14113	4525.14113848767,9864.36439219012
9696.5	9686.5	10054.939	9862.5937	4568.93931	4568.93931	4568.93931	4568.93931477309,9862.59370793666
9691.97	9681.97	10054.521	9859.9988	4633.82475	4633.82475	4633.82475	4633.82475087384,9859.99884195972
9687.78	9677.78	10054.104	9857.4525	4698.18885	4698.18885	4698.18885	4698.18885405206,9857.45247178409
9685.08	9675.08	10053.686	9854.6552	4769.65730	4769.65730	4769.65730	4769.65730798925,9854.65523323622
9682.9	9672.9	10053.268	9852.9423	4813.89148	4813.89148	4813.89148	4813.89148433474,9852.94231261604
9678.98	9668.98	10052.85	9850.9333	4866.32557	4866.32557	4866.32557	4866.32557167834,9850.93329554477
9677.78	9667.78	10052.432	9849.2341	4911.14384	4911.14384	4911.14384	4911.14384509932,9849.23410414275
9672.58	9662.58	10052.015	9847.353	4961.28476	4961.28476	4961.28476	4961.28476895467,9847.35295883928
9668.48	9658.48	10051.597	9845.1954	5019.39553	5019.39553	5019.39553	5019.39553581303,9845.1954366913
9664.43	9654.43	10051.179	9843.1454	5075.18635	5075.18635	5075.18635	5075.18635808794,9843.14542919463
9657.69	9647.69	10050.761	9841.3054	5125.78265	5125.78265	5125.78265	5125.78265263613,9841.30537534469
9651.33	9641.33	10050.344	9840.3611	5152.01598	5152.01598	5152.01598	5152.01598572533,9840.361076946
9641.74	9631.74	10049.926	9838.4947	5204.39648	5204.39648	5204.39648	5204.39648368034,9838.49472341616
9636.73	9626.73	10049.508	9837.269	5239.14818	5239.14818	5239.14818	5239.1481858833,9837.26899807747
9632.2	9622.2	10049.09	9835.7001	5284.08199	5284.08199	5284.08199	5284.0819986072,9835.70005508791
9628.6	9618.6	10048.673	9834.2882	5324.92616	5324.92616	5324.92616	5324.92616404265,9834.2881533075
9624.46	9614.46	10048.255	9832.4683	5378.09865	5378.09865	5378.09865	5378.09865803986,9832.46834535526
9618.85	9608.85	10047.837	9830.8182	5426.79364	5426.79364	5426.79364	5426.79364540057,9830.81824597029
9617.6	9607.6	10047.419	9829.3135	5471.63977	5471.63977	5471.63977	5471.63977007072,9829.31350729549
9622.33	9612.33	10047.001	9827.8312	5516.25283	5516.25283	5516.25283	5516.25283213857,9827.831223805
9627.74	9617.74	10046.584	9826.3072	5562.57124	5562.57124	5562.57124	5562.57124992195,9826.30724633358
9630.31	9620.31	10046.166	9824.5968	5615.06426	5615.06426	5615.06426	5615.06426261928,9824.59682067532
9633.1	9623.1	10045.748	9823.0263	5663.73163	5663.73163	5663.73163	5663.73163424511,9823.02631136006
9637.54	9627.54	10045.33	9820.8116	5733.02547	5733.02547	5733.02547	5733.0254728321,9820.81159056184
9641.36	9631.36	10044.913	9819.0547	5788.52468	5788.52468	5788.52468	5788.52468673581,9819.05466028008
9644.14	9634.14	10044.495	9817.6018	5834.85713	5834.85713	5834.85713	5834.85713596896,9817.60182071453
9646.67	9636.67	10044.077	9816.4255	5872.72830	5872.72830	5872.72830	5872.72830909691,9816.42549656097
9646.93	9636.93	10043.659	9814.9063	5922.10004	5922.10004	5922.10004	5922.10004405659,9814.90633683523
9648.5	9638.5	10043.241	9813.4297	5970.54057	5970.54057	5970.54057	5970.5405709216,9813.42974172459
9650.39	9640.39	10042.824	9812.2719	6008.88085	6008.88085	6008.88085	6008.8808550767,9812.27188204661
9645.86	9635.86	10042.406	9811.0997	6048.05828	6048.05828	6048.05828	6048.05828882229,9811.09967336603
9641.44	9631.44	10041.988	9810.0047	6084.99551	6084.99551	6084.99551	6084.99551396204,9810.00465433159
9634.9	9624.9	10041.57	9808.6004	6132.80076	6132.80076	6132.80076	6132.80076988699,9808.60041409952
9628.06	9618.06	10041.153	9807.3725	6174.98707	6174.98707	6174.98707	6174.9870742046,9807.37250754039
9620.82	9610.82	10040.735	9806.1316	6218.00941	6218.00941	6218.00941	6218.00941120595,9806.13161141628
9617.77	9607.77	10040.317	9805.2723	6248.07455	6248.07455	6248.07455	6248.07455176631,9805.27225843453
9611.28	9601.28	10039.899	9804.2514	6284.11215	6284.11215	6284.11215	6284.11215361536,9804.25143580016
9607.29	9597.29	10039.481	9802.8207	6335.07585	6335.07585	6335.07585	6335.07585806345,9802.82069682203
9607.54	9597.54	10039.064	9802.5178	6345.96330	6345.96330	6345.96330	6345.96330101383,9802.51776207087
9605.19	9595.19	10038.646	9801.5342	6381.62757	6381.62757	6381.62757	6381.62757145318,9801.53420645426
9604.52	9594.52	10038.228	9800.2128	6429.96784	6429.96784	6429.96784	6429.96784052469,9800.21280302395
9603.31	9593.31	10037.81	9799.8189	6444.50488	6444.50488	6444.50488	6444.50488462052,9799.81890708718
9603.01	9593.01	10037.393	9798.7574	6484.02432	6484.02432	6484.02432	6484.02432072336,9798.757423643
9603.41	9593.41	10036.975	9798.1253	6507.76398	6507.76398	6507.76398	6507.76398563237,9798.1253145188
9603.67	9593.67	10036.557	9796.7939	6558.20337	6558.20337	6558.20337	6558.20337342721,9796.79387942837
9602.03	9592.03	10036.139	9795.6959	6600.16111	6600.16111	6600.16111	6600.16111103334,9795.69585365252
9596.71	9586.71	10035.721	9794.4534	6648.04743	6648.04743	6648.04743	6648.0474371389,9794.45340150264
9586.56	9576.56	10035.304	9792.7234	6715.29941	6715.29941	6715.29941	6715.29941330373,9792.72335361885
9583.7	9573.7	10034.886	9792.2751	6732.87274	6732.87274	6732.87274	6732.87274096316,9792.27511519662
9573.2	9563.2	10034.468	9790.592	6799.42139	6799.42139	6799.42139	6799.42139414211,9790.59200221296
9564.36	9554.36	10034.05	9789.5671	6840.28911	6840.28911	6840.28911	6840.28911465635,9789.56708187747
9551.7	9541.7	10033.633	9788.0582	6900.96290	6900.96290	6900.96290	6900.96290103097,9788.0581726738
9543.67	9533.67	10033.215	9787.115	6939.20550	6939.20550	6939.20550	6939.20550729603,9787.11502809287
9533.73	9523.73	10032.797	9786.2133	6976.07246	6976.07246	6976.07246	6976.07246818291,9786.2133464416
9524.67	9514.67	10032.379	9785.1508	7019.87674	7019.87674	7019.87674	7019.87674104444,9785.15083492546
9514.78	9504.78	10031.962	9783.741	7078.48108	7078.48108	7078.48108	7078.48108332349,9783.74101295934
9508.02	9498.02	10031.544	9782.4889	7130.95804	7130.95804	7130.95804	7130.95804162915,9782.48892071549
9504.62	9494.62	10031.126	9781.4295	7175.72594	7175.72594	7175.72594	7175.72594917432,9781.42946353521
9500.84	9490.84	10030.708	9780.4112	7219.10528	7219.10528	7219.10528	7219.10528943095,9780.41119082145
9498.77	9488.77	10030.29	9779.4417	7260.74343	7260.74343	7260.74343	7260.74343763687,9779.44168015017
9499.13	9489.13	10029.873	9778.1891	7314.97473	7314.97473	7314.97473	7314.97473509518,9778.18909706465
9504.8	9494.8	10029.455	9777.4199	7348.54680	7348.54680	7348.54680	7348.54680829451,9777.41988643889
9513.07	9503.07	10029.037	9776.3788	7394.34999	7394.34999	7394.34999	7394.34999206053,9776.3787960936
9514.48	9504.48	10028.619	9775.8735	7416.75859	7416.75859	7416.75859	7416.75859366811,9775.87349749927
9516.65	9506.65	10028.202	9775.4884	7433.97093	7433.97093	7433.97093	7433.97093415356,9775.48843727375
9524.75	9514.75	10027.799	9774.9213	7445.86486	7445.86486	7445.86486	7445.86486428623,9774.9212753941
9521.21	9511.21	10027.396	9773.514	7475.60944	7475.60944	7475.60944	7475.60944530626,9773.5140159969

							Summary
75	PN10	0	2910.984		2910.984		2910.984
63	PN10	0	7433.971		4522.987		4522.987
32	PN10		7475.609		41.639		41.639
					7475.609		7475.609

PUMPING

GI	120
uPVC	150

Chainage	Ground Levels	IL	Static Line	Energy Line - E_L	Hydraulic Levels	Pipe details					Soil Type	Actual velocity (m/s)	Q(flow) M^3/S	f (frictional Coeficient)	Diatance (m)	Losses (m)	$Vf=V^2/2g$	Head	HG(%)	Remarks
						Dia.(m) Internal	Dia.(m) external	Pipe Material	Pipe class	Wall Thickness (mm)			6.60							
0.000	938.926	937.926	1084.116	1084.116	1084.116	0.05	50	GI	PN16	0	rocky soils	0.93	0.00183	120	0	0.00	0.15	145.2	0.00	Centre sumpwell
9.088	938.973	937.973	1084.116	1083.966	1083.861	0.05	50	GI	PN16	0	rocky soils	0.93	0.00183	120	9	0.26	0.15	144.9	2.81	
18.649	938.938	937.938	1084.116	1083.816	1083.592	0.05	50	GI	PN16	0	rocky soils	0.93	0.00183	120	10	0.27	0.15	144.7	2.81	Solar area
24.778	940.955	939.955	1084.116	1083.666	1083.420	0.05	50	GI	PN16	0	rocky soils	0.93	0.00183	120	6	0.17	0.15	142.5	2.81	
38.275	944.647	943.647	1084.116	1083.516	1083.041	0.05	50	GI	PN16	0	rocky soils	0.93	0.00183	120	13	0.38	0.15	138.4	2.81	
68.097	946.216	945.216	1084.116	1083.366	1082.205	0.05	50	GI	PN16	0	rocky soils	0.93	0.00183	120	30	0.84	0.15	136.0	2.81	
95.364	949.282	948.282	1084.116	1083.216	1081.439	0.05	50	GI	PN16	0	rocky soils	0.93	0.00183	120	27	0.77	0.15	132.2	2.81	
123.083	950.605	949.605	1084.116	1083.066	1080.661	0.05	50	GI	PN16	0	rocky soils	0.93	0.00183	120	28	0.78	0.15	130.1	2.81	
143.124	949.732	948.732	1084.116	1082.916	1080.099	0.05	50	GI	PN16	0	rocky soils	0.93	0.00183	120	20	0.56	0.15	130.4	2.81	
173.296	952.235	951.235	1084.116	1082.766	1079.252	0.05	50	GI	PN16	0	rocky soils	0.93	0.00183	120	30	0.85	0.15	127.0	2.81	
223.833	953.95	952.95	1084.116	1082.616	1077.834	0.05	50	GI	PN16	0	rocky soils	0.93	0.00183	120	51	1.42	0.15	123.9	2.81	Near School Solars
257.594	955.007	954.007	1084.116	1082.466	1076.887	0.05	50	GI	PN16	0	rocky soils	0.93	0.00183	120	34	0.95	0.15	121.9	2.81	
315.984	956.983	955.983	1084.116	1082.316	1075.248	0.05	50	GI	PN12.5	0	rocky soils	0.93	0.00183	120	58	1.64	0.15	118.3	2.81	
363.641	959.341	958.341	1084.116	1082.166	1073.910	0.05	50	GI	PN12.5	0	rocky soils	0.93	0.00183	120	48	1.34	0.15	114.6	2.81	Centre Access Road
380.163	960.182	959.182	1084.116	1082.016	1073.447	0.05	50	GI	PN12.5	0	rocky soils	0.93	0.00183	120	17	0.46	0.15	113.3	2.81	Culvert
434.894	962.948	961.948	1084.116	1081.866	1071.911	0.05	50	GI	PN12.5	0	rocky soils	0.93	0.00183	120	55	1.54	0.15	109.0	2.81	
491.798	965.516	964.516	1084.116	1081.716	1070.314	0.05	50	GI	PN12.5	0	rocky soils	0.93	0.00183	120	57	1.60	0.15	104.8	2.81	
557.107	967.176	966.176	1084.116	1081.566	1068.481	0.05	50	GI	PN12.5	0	rocky soils	0.93	0.00183	120	65	1.83	0.15	101.3	2.81	
603.167	968.753	967.753	1084.116	1081.417	1067.188	0.05	50	GI	PN12.5	0	rocky soils	0.93	0.00183	120	46	1.29	0.15	98.4	2.81	
646.557	970.734	969.734	1084.116	1081.298	1066.582	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	43	0.61	0.12	95.8	1.40	
656.524	971.174	970.174	1084.116	1081.179	1066.443	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	10	0.14	0.12	95.3	1.40	
698.112	973.053	972.053	1084.116	1081.060	1065.861	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	42	0.58	0.12	92.8	1.40	Opp sec School Gate
755.572	975.365	974.365	1084.116	1080.941	1065.058	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	57	0.80	0.12	89.7	1.40	
807.651	978.593	977.593	1084.116	1080.823	1064.330	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	52	0.73	0.12	85.7	1.40	15m to school tank
807.770	978.592	977.592	1084.116	1080.704	1064.329	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	0	0.00	0.12	85.7	1.40	
911.679	983.426	982.426	1084.116	1080.585	1062.877	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	104	1.45	0.12	79.5	1.40	
913.088	983.519	982.519	1084.116	1080.466	1062.857	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	1	0.02	0.12	79.3	1.40	Gate AIC Nguuku
967.744	985.134	984.134	1084.116	1080.348	1062.093	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	55	0.76	0.12	77.0	1.40	Gate Primary School
999.964	986.298	985.298	1084.116	1080.229	1061.643	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	32	0.45	0.12	75.3	1.40	
1037.759	987.794	986.794	1084.116	1080.110	1061.114	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	38	0.53	0.12	73.3	1.40	
1072.999	989.406	988.406	1084.116	1079.991	1060.622	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	35	0.49	0.12	71.2	1.40	
1091.025	989.61	988.61	1084.116	1079.872	1060.370	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	18	0.25	0.12	70.8	1.40	
1132.542	989.592	988.592	1084.116	1079.754	1059.790	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	42	0.58	0.12	70.2	1.40	
1195.794	989.023	988.023	1084.116	1079.635	1058.906	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	63	0.88	0.12	69.9	1.40	
1262.445	989.041	988.041	1084.116	1079.516	1057.974	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	67	0.93	0.12	68.9	1.40	
1311.366	988.576	987.576	1084.116	1079.397	1057.290	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	49	0.68	0.12	68.7	1.40	
1358.405	988.321	987.321	1084.116	1079.279	1056.633	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	47	0.66	0.12	68.3	1.40	
1414.467	987.506	986.506	1084.116	1079.160	1055.849	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	56	0.78	0.12	68.3	1.40	
1460.406	987.016	986.016	1084.116	1079.041	1055.207	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	46	0.64	0.12	68.2	1.40	
1513.907	986.407	985.407	1084.116	1078.922	1054.459	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	54	0.75	0.12	68.1	1.40	Centre acess road 6m wide
1542.380	985.394	984.394	1084.116	1078.804	1054.061	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	28	0.40	0.12	68.7	1.40	
1574.542	984.49	983.49	1084.116	1078.685	1053.612	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	32	0.45	0.12	69.1	1.40	
1631.230	985.313	984.313	1084.116	1078.566	1052.820	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	57	0.79	0.12	67.5	1.40	
1666.404	985.839	984.839	1084.116	1078.447	1052.328	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	35	0.49	0.12	66.5	1.40	Centre road to Mutiuni
1687.132	985.419	984.419	1084.116	1078.328	1052.038	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	21	0.29	0.12	66.6	1.40	
1728.277	987.359	986.359	1084.116	1078.210	1051.463	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	41	0.58	0.12	64.1	1.40	
1771.313	988.673	987.673	1084.116	1078.091	1050.862	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	43	0.60	0.12	62.2	1.40	
1826.642	990.007	989.007	1084.116	1077.972	1050.088	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	55	0.77	0.12	60.1	1.40	
1879.743	991.219	990.219	1084.116	1077.853	1049.346	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	53	0.74	0.12	58.1	1.40	
1917.746	991.662	990.662	1084.116	1077.735	1048.815	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	38	0.53	0.12	57.2	1.40	
1952.384	992.263	991.263	1084.116	1077.616	1048.331	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	35	0.48	0.12	56.1	1.40	Gate Dipensary/Start shops
1985.479	992.309	991.309	1084.116	1077.497	1047.868	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	33	0.46	0.12	55.6	1.40	
2057.628	992.905	991.905	1084.116	1077.378	1046.860	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	72	1.01	0.12	54.0	1.40	
2098.451	993.145	992.145	1084.116	1077.259	1046.289	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	41	0.57	0.12	53.1	1.40	
2141.762	993.225	992.225	1084.116	1077.141	1045.684	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	43	0.61	0.12	52.5	1.40	
2177.805	993.176	992.176	1084.116	1077.022	1045.180	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	36	0.50	0.12	52.0	1.40	
2224.216	993.16	992.16	1084.116	1076.903	1044.532	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	46	0.65	0.12	51.4	1.40	
2289.699	992.544	991.544	1084.116	1076.784	1043.616	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	65	0.92	0.12	51.1	1.40	
2350.328	992.255	991.255	1084.116	1076.666	1042.769	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	61	0.85	0.12	50.5	1.40	
2395.781	992.243	991.243	1084.116	1076.547	1042.134	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	45	0.64	0.12	49.9	1.40	
2443.021	992.408	991.408	1084.116	1076.428	1041.474	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	47	0.66	0.12	49.1	1.40	
2485.998	992.374	991.374	1084.116	1076.309	1040.873	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	43	0.60	0.12	48.5	1.40	opposite KN1-943.528 (Edge rod t
2528.775	992.36	991.36	1084.116	1076.191	1040.275	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	43	0.60	0.12	47.9	1.40	Edge road to Kathiani
2538.422	992.432	991.432	1084.116	1076.072	1040.140	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	10	0.13	0.12	47.7	1.40	
2591.696	992.511	991.511	1084.116	1075.953	1039.396	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	53	0.74	0.12	46.9	1.40	
2660.788	992.464	991.464	1084.116	1075.834	1038.430	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	69	0.97	0.12	46.0	1.40	
2707.375	992.059	991.059	1084.116	1075.715	1037.779	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	47	0.65	0.12	45.7	1.40	
2748.649	992.229	991.229	1084.116	1075.597	1037.202	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	41	0.58	0.12	45.0	1.40	
2766.501	992.205	991.205	1084.116	1075.478	1036.952	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	18	0.25	0.12	44.7	1.40	Angaza Academy
2815.341	992	991	1084.116	1075.359	1036.270	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	49	0.68	0.12	44.3	1.40	
2865.397	991.918	990.918	1084.116	1075.240	1035.570	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	50	0.70	0.12	43.7	1.40	
2892.611	991.987	990.987	1084.116	1075.122	1035.190	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	27	0.38	0.12	43.2	1.40	
2956.259	992.115	991.115	1084.116	1075.003	1034.300	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	64	0.89	0.12	42.2	1.40	opp Masonry tank
3012.959	992.403	991.403	1084.116	1074.884	1033.508	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	57	0.79	0.12	41.1	1.40	
3072.856	991.911	990.911	1084.116	1074.765	1032.671	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	60	0.84	0.12	40.8	1.40	
3132.382	991.815	990.815	1084.116	1074.646	1031.839	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	60	0.83	0.12	40.0	1.40	
3206.527	991.92	990.92	1084.116	1074.528	1030.802	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	74	1.04	0.12	38.9	1.40	
3267.856	992.319	991.319	1084.116	1074.409	1029.945	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	61	0.86	0.12	37.6	1.40	
3338.013	992.704	991.704	1084.116	1074.290	1028.965	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	70	0.98	0.12	36.3	1.40	
3421.842	993.58	992.58	1084.116	1074.171	1027.793	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	84	1.17	0.12	34.2	1.40	
3484.398	994.317	993.317	1084.116	1074.053	1026.919	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	63	0.87	0.12	32.6	1.40	
3537.896	995.124	994.124	1084.116	1073.934	1026.171	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	53	0.75	0.12	31.0	1.40	
3591.171	996.047	995.047	1084.116	1073.815	1025.426	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	53	0.74	0.12	29.4	1.40	
3665.521	997.635	996.635	1084.116	1073.696	1024.387	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	74	1.04	0.12	26.8	1.40	
3706.23	998.05	997.05	1084.116	1073.578	1023.818	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	41	0.57	0.12	25.8	1.40	
3748.6	998.952	997.952	1084.116	1073.459	1023.226	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	42	0.59	0.12	24.3	1.40	
3800.11	999.804	998.804	1084.116	1073.340	1022.506	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	52	0.72	0.12	22.7	1.40	
3810.2	1000.24	999.235	1084.116	1073.221	1022.365	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	10	0.14	0.12	22.1	1.40	
3818.78	1000.5	999.503	1084.116	1073.102	1022.245	0.053	63	HDPE	PN12.5	5	Red/loamy soil	0.83	0.00183	150	9	0.12	0.12	21.7	1.40	Gate Homestead

61.87

									HG	Static Head
	9389.26	9379.26	10841.2	10841.2	10841.2	0,9389.26	0,9379.26	0,10841.1	0,10841.1	0,10841.1557557052
	9389.73	9379.73	10839.7	10838.6	10841.2	9.0881499	9.0881499	9.0881499	9.0881499	9.0881499774983,10841.1557557052
	9389.38	9379.38	10838.2	10835.9	10841.2	18.649112	18.649112	18.649112	18.649112	18.6491124278974,10841.1557557052
	9409.55	9399.55	10836.7	10834.2	10841.2	24.778303	24.778303	24.778303	24.778303	24.7783033214709,10841.1557557052
38.275	9446.47	9436.47	10835.2	10830.4	10841.2	38.275010	38.275010	38.275010	38.275010	38.2750105499673,10841.1557557052
	9462.16	9452.16	10833.7	10822	10841.2	68.097268	68.097268	68.097268	68.097268	68.0972681765024,10841.1557557052
	9492.82	9482.82	10832.2	10814.4	10841.2	95.364408	95.364408	95.364408	95.364408	95.364408107562,10841.1557557052
	9506.05	9496.05	10830.7	10806.6	10841.2	123.08337	123.08337	123.08337	123.08337	123.08337370891,10841.1557557052
	9497.32	9487.32	10829.2	10801	10841.2	143.12359	143.12359	143.12359	143.12359	143.123591621861,10841.1557557052
	9522.35	9512.35	10827.7	10792.5	10841.2	173.29553	173.29553	173.29553	173.29553	173.295539802212,10841.1557557052
	9539.5	9529.5	10826.2	10778.3	10841.2	223.83308	223.83308	223.83308	223.83308	223.833082738026,10841.1557557052
	9550.07	9540.07	10824.7	10768.9	10841.2	257.59377	257.59377	257.59377	257.59377	257.593775533057,10841.1557557052
	9569.83	9559.83	10823.2	10752.5	10841.2	315.98413	315.98413	315.98413	315.98413	315.984137349476,10841.1557557052
	9593.41	9583.41	10821.7	10739.1	10841.2	363.64100	363.64100	363.64100	363.64100	363.641003055637,10841.1557557052
	9601.82	9591.82	10820.2	10734.5	10841.2	380.16322	380.16322	380.16322	380.16322	380.163223790216,10841.1557557052
	9629.48	9619.48	10818.7	10719.1	10841.2	434.89420	434.89420	434.89420	434.89420	434.8942029339,10841.1557557052
	9655.16	9645.16	10817.2	10703.1	10841.2	491.79849	491.79849	491.79849	491.79849	491.798499054677,10841.1557557052
	9671.76	9661.76	10815.7	10684.8	10841.2	557.10654	557.10654	557.10654	557.10654	557.106543007574,10841.1557557052
	9687.53	9677.53	10814.2	10671.9	10841.2	603.16693	603.16693	603.16693	603.16693	603.166933518375,10841.1557557052
	9707.34	9697.34	10813	10665.8	10841.2	646.55681	646.55681	646.55681	646.55681	646.556810091318,10841.1557557052
	9711.74	9701.74	10811.8	10664.4	10841.2	656.52405	656.52405	656.52405	656.52405	656.524054695693,10841.1557557052
	9730.53	9720.53	10810.6	10658.6	10841.2	698.11151	698.11151	698.11151	698.11151	698.111514981144,10841.1557557052
	9753.65	9743.65	10809.4	10650.6	10841.2	755.57151	755.57151	755.57151	755.57151	755.57151038669,10841.1557557052
	9785.93	9775.93	10808.2	10643.3	10841.2	807.65127	807.65127	807.65127	807.65127	807.651274076556,10841.1557557052
	9785.92	9775.92	10807	10643.3	10841.2	807.77035	807.77035	807.77035	807.77035	807.770358081228,10841.1557557052
	9834.26	9824.26	10805.9	10628.8	10841.2	911.67865	911.67865	911.67865	911.67865	911.678654025334,10841.1557557052
	9835.19	9825.19	10804.7	10628.6	10841.2	913.08803	913.08803	913.08803	913.08803	913.088034385735,10841.1557557052
	9851.34	9841.34	10803.5	10620.9	10841.2	967.74381	967.74381	967.74381	967.74381	967.743816907044,10841.1557557052
	9862.98	9852.98	10802.3	10616.4	10841.2	999.96434	999.96434	999.96434	999.96434	999.964340382034,10841.1557557052
	9877.94	9867.94	10801.1	10611.1	10841.2	1037.7586	1037.7586	1037.7586	1037.7586	1037.75867674351,10841.1557557052
	9894.06	9884.06	10799.9	10606.2	10841.2	1072.9989	1072.9989	1072.9989	1072.9989	1072.99898119666,10841.1557557052
	9896.1	9886.1	10798.7	10603.7	10841.2	1091.0245	1091.0245	1091.0245	1091.0245	1091.02455647082,10841.1557557052
	9895.92	9885.92	10797.5	10597.9	10841.2	1132.5420	1132.5420	1132.5420	1132.5420	1132.54208216875,10841.1557557052
	9890.23	9880.23	10796.3	10589.1	10841.2	1195.7936	1195.7936	1195.7936	1195.7936	1195.79361310717,10841.1557557052
	9890.41	9880.41	10795.2	10579.7	10841.2	1262.4450	1262.4450	1262.4450	1262.4450	1262.44502906246,10841.1557557052
	9885.76	9875.76	10794	10572.9	10841.2	1311.3663	1311.3663	1311.3663	1311.3663	1311.36638402235,10841.1557557052
	9883.21	9873.21	10792.8	10566.3	10841.2	1358.4053	1358.4053	1358.4053	1358.4053	1358.40539341737,10841.1557557052
	9875.06	9865.06	10791.6	10558.5	10841.2	1414.4673	1414.4673	1414.4673	1414.4673	1414.46735008268,10841.1557557052
	9870.16	9860.16	10790.4	10552.1	10841.2	1460.4061	1460.4061	1460.4061	1460.4061	1460.40612513043,10841.1557557052
	9864.07	9854.07	10789.2	10544.6	10841.2	1513.9069	1513.9069	1513.9069	1513.9069	1513.90693142439,10841.1557557052
	9853.94	9843.94	10788	10540.6	10841.2	1542.3803	1542.3803	1542.3803	1542.3803	1542.38038999582,10841.1557557052
	9844.9	9834.9	10786.8	10536.1	10841.2	1574.5419	1574.5419	1574.5419	1574.5419	1574.54190926925,10841.1557557052
	9853.13	9843.13	10785.7	10528.2	10841.2	1631.2304	1631.2304	1631.2304	1631.2304	1631.23049099395,10841.1557557052
	9858.39	9848.39	10784.5	10523.3	10841.2	1666.4043	1666.4043	1666.4043	1666.4043	1666.40439605123,10841.1557557052
	9854.19	9844.19	10783.3	10520.4	10841.2	1687.1324	1687.1324	1687.1324	1687.1324	1687.13242212809,10841.1557557052
	9873.59	9863.59	10782.1	10514.6	10841.2	1728.2767	1728.2767	1728.2767	1728.2767	1728.27672411498,10841.1557557052
	9886.73	9876.73	10780.9	10508.6	10841.2	1771.3128	1771.3128	1771.3128	1771.3128	1771.31284949782,10841.1557557052
	9900.07	9890.07	10779.7	10500.9	10841.2	1826.6419	1826.6419	1826.6419	1826.6419	1826.64194822493,10841.1557557052
	9912.19	9902.19	10778.5	10493.5	10841.2	1879.7432	1879.7432	1879.7432	1879.7432	1879.74327801994,10841.1557557052
	9916.62	9906.62	10777.3	10488.2	10841.2	1917.7458	1917.7458	1917.7458	1917.7458	1917.74587943047,10841.1557557052
	9922.63	9912.63	10776.2	10483.3	10841.2	1952.3840	1952.3840	1952.3840	1952.3840	1952.38401233432,10841.1557557052
	9923.09	9913.09	10775	10478.7	10841.2	1985.4787	1985.4787	1985.4787	1985.4787	1985.47871017188,10841.1557557052
	9929.05	9919.05	10773.8	10468.6	10841.2	2057.6280	2057.6280	2057.6280	2057.6280	2057.62806016932,10841.1557557052
	9931.45	9921.45	10772.6	10462.9	10841.2	2098.4505	2098.4505	2098.4505	2098.4505	2098.45059322397,10841.1557557052
	9932.25	9922.25	10771.4	10456.8	10841.2	2141.7616	2141.7616	2141.7616	2141.7616	2141.76164175705,10841.1557557052
	9931.76	9921.76	10770.2	10451.8	10841.2	2177.8052	2177.8052	2177.8052	2177.8052	2177.80523955142,10841.1557557052
	9931.6	9921.6	10769	10445.3	10841.2	2224.2163	2224.2163	2224.2163	2224.2163	2224.21630349193,10841.1557557052
	9925.44	9915.44	10767.8	10436.2	10841.2	2289.6989	2289.6989	2289.6989	2289.6989	2289.6989656322,10841.1557557052
	9922.55	9912.55	10766.7	10427.7	10841.2	2350.3275	2350.3275	2350.3275	2350.3275	2350.32750714376,10841.1557557052
	9922.43	9912.43	10765.5	10421.3	10841.2	2395.7805	2395.7805	2395.7805	2395.7805	2395.78057649182,10841.1557557052
	9924.08	9914.08	10764.3	10414.7	10841.2	2443.0214	2443.0214	2443.0214	2443.0214	2443.02145238163,10841.1557557052
	9923.74	9913.74	10763.1	10408.7	10841.2	2485.9980	2485.9980	2485.9980	2485.9980	2485.99809209538,10841.1557557052
	9923.6	9913.6	10761.9	10402.7	10841.2	2528.7748	2528.7748	2528.7748	2528.7748	2528.77481072902,10841.1557557052
	9924.32	9914.32	10760.7	10401.4	10841.2	2538.4216	2538.4216	2538.4216	2538.4216	2538.42169089704,10841.1557557052
	9925.11	9915.11	10759.5	10394	10841.2	2591.6961	2591.6961	2591.6961	2591.6961	2591.69614250383,10841.1557557052
	9924.64	9914.64	10758.3	10384.3	10841.2	2660.7877	2660.7877	2660.7877	2660.7877	2660.78770646179,10841.1557557052
	9920.59	9910.59	10757.2	10377.8	10841.2	2707.3752	2707.3752	2707.3752	2707.3752	2707.37522974815,10841.1557557052
	9922.29	9912.29	10756	10372	10841.2	2748.6490	2748.6490	2748.6490	2748.6490	2748.64900463006,10841.1557557052
	9922.05	9912.05	10754.8	10369.5	10841.2	2766.5011	2766.5011	2766.5011	2766.5011	2766.5011164657,10841.1557557052
	9920	9910	10753.6	10362.7	10841.2	2815.3406	2815.3406	2815.3406	2815.3406	2815.34060726926,10841.1557557052
	9919.18	9909.18	10752.4	10355.7	10841.2	2865.3968	2865.3968	2865.3968	2865.3968	2865.39682679313,10841.1557557052
	9919.87	9909.87	10751.2	10351.9	10841.2	2892.6108	2892.6108	2892.6108	2892.6108	2892.61082477259,10841.1557557052
	9921.15	9911.15	10750	10343	10841.2	2956.2585	2956.2585	2956.2585	2956.2585	2956.25857082834,10841.1557557052
	9924.03	9914.03	10748.8	10335.1	10841.2	3012.9587	3012.9587	3012.9587	3012.9587	3012.95873753886,10841.1557557052
	9919.11	9909.11	10747.7	10326.7	10841.2	3072.8557	3072.8557	3072.8557	3072.8557	3072.85573048556,10841.1557557052
	9918.15	9908.15	10746.5	10318.4	10841.2	3132.3824	3132.3824	3132.3824	3132.3824	3132.38242085213,10841.1557557052
	9919.2	9909.2	10745.3	10308	10841.2	3206.5271	3206.5271	3206.5271	3206.5271	3206.52713490437,10841.1557557052
	9923.19	9913.19	10744.1	10299.5	10841.2	3267.8557	3267.8557	3267.8557	3267.8557	3267.85572081696,10841.1557557052
	9927.04	9917.04	10742.9	10289.6	10841.2	3338.0125	3338.0125	3338.0125	3338.0125	3338.01251728733,10841.1557557052
	9935.8	9925.8	10741.7	10277.9	10841.2	3421.8421	3421.8421	3421.8421	3421.8421	3421.84216494203,10841.1557557052
	9943.17	9933.17	10740.5	10269.2	10841.2	3484.3975	3484.3975	3484.3975	3484.3975	3484.39756594059,10841.1557557052
	9951.24	9941.24	10739.3	10261.7	10841.2	3537.8960	3537.8960	3537.8960	3537.8960	3537.89605386276,10841.1557557052
	9960.47	9950.47	10738.2	10254.3	10841.2	3591.1708	3591.1708	3591.1708	3591.1708	3591.17089147898,10841.1557557052
	9976.35	9966.35	10737	10243.9	10841.2	3665.5212	3665.5212	3665.5212	3665.5212	3665.52121732832,10841.1557557052
	9980.5	9970.5	10735.8	10238.2	10841.2	3706.2325	3706.2325	3706.2325	3706.2325	3706.23251598143,10841.1557557052
	9989.52	9979.52	10734.6	10232.3	10841.2	3748.5963	3748.5963	3748.5963	3748.5963	3748.59635750896,10841.1557557052
	9998.04	9988.04	10733.4	10225.1	10841.2	3800.1099	3800.1099	3800.1099	3800.1099	3800.1099102311,10841.1557557052
	10002.4	9992.35	10732.2	10223.7	10841.2	3810.1968	3810.1968	3810.1968	3810.1968	3810.19684028933,10841.1557557052
	10005	9995.03	10731	10222.5	10841.2	3818.7771	3818.7771	3818.7771	3818.7771	3818.77718509596,10841.1557557052

Borehole depth (m) =	10		
Pumping water level (m) =	10		
Yield (m3/hr) =	15	6.60	44%

52.8

POWER REQUIREMENT								
H (m)	Q (L/Sec)	Constant			Pump efficiency		KW	
155	1.83	102			0.6		4.65	5.5
	add factor of safety					1.4	6.51 KW	7.7
							8.14 KVA	

Head				
Pump water level				10.00
Frictional Losses				61.87
delivery head				61.58
Tank height				1.50
Residual head			15%	20.24
		Total Head		155.190

						Summary
50	GI	0	603.167		603.167	603.167
63	PN20	0	0.000		0.000	0.000
63	PN16		807.651		204.484	204.484
63	PN12.5		3818.777		3011.126	3011.126
					3818.777	3818.777

1	377719.5	9832472.733	949.383	ROAD
2	377685.9	9832482.356	946.728	ROAD
3	377659.7	9832485.188	943.868	ROAD
4	377632	9832474.117	940.766	ROAD
5	377540.2	9832427.467	938.926	P SUMPWELL
6	377545.2	9832419.882	938.973	
7	377551.3	9832412.539	938.938	
8	377552.7	9832409.54	939.533	
9	377555.6	9832404.766	942.898	
10	377528	9832445.543	939.373	
11	377510.8	9832467.782	943.596	
12	377503	9832477.559	943.992	
13	377482.5	9832454.514	943.844	
14	377486.5	9832447.709	942.9	
15	377489	9832444.131	941.422	
16	377509	9832415.57	938.925	
17	377523.1	9832391.703	938.939	
18	377528.7	9832383.086	942.197	
19	377529.4	9832379.971	943.622	
20	377532.7	9832376.415	943.992	
21	377492.5	9832337.155	944.072	
22	377483.5	9832348.752	939.704	
23	377481.3	9832351.547	939.082	
24	377465.4	9832369.52	939.246	
25	377454.2	9832386.193	938.797	
26	377447.5	9832399.509	939.339	
27	377445.8	9832402.943	940.336	
28	377443	9832418.505	941.338	
29	377435.8	9832433.904	942.605	
30	377440.1	9832416.148	942.861	
31	377575.2	9832383.788	945.523	SOLAR AREA
32	377592.4	9832369.178	947.403	SOLAR AREA
33	377580.1	9832359.433	947.287	SOLAR AREA
34	377595.4	9832397.362	946.338	SOLAR AREA
35	377584.8	9832405.485	945.443	SOLAR AREA
36	377575.4	9832413.881	943.302	
37	377571.6	9832423.317	940.226	
38	377568.8	9832428.526	939.023	
39	377562.9	9832448.068	939.002	
40	377613.6	9832466.648	939.123	ROAD
41	377593.7	9832476.802	939.138	ROAD
42	377579.9	9832482.071	939.128	ROAD
43	377575.5	9832484.401	940.464	ROAD
44	377553	9832488.617	940.798	ROAD
45	377543.6	9832490.821	942.375	ROAD
46	377525.9	9832499.359	943.937	ROAD
47	377594	9832561.524	944.408	ROAD
48	377604.1	9832555.684	943.62	ROAD
49	377606	9832554.808	941.392	
50	377633.2	9832544.567	940.569	
51	377659.1	9832534.793	939.27	
52	377677.5	9832525.426	939.331	
53	377685.3	9832520.836	942.052	
54	377719.9	9832570.421	943.564	
55	377709.7	9832573.861	941.576	
56	377701.8	9832577.857	939.381	
57	377671.6	9832590.859	939.806	
58	377632.8	9832604.084	941.315	
59	377627.6	9832607.124	944.558	
60	377647.4	9832675.328	942.395	
61	377648.6	9832675.404	941.27	

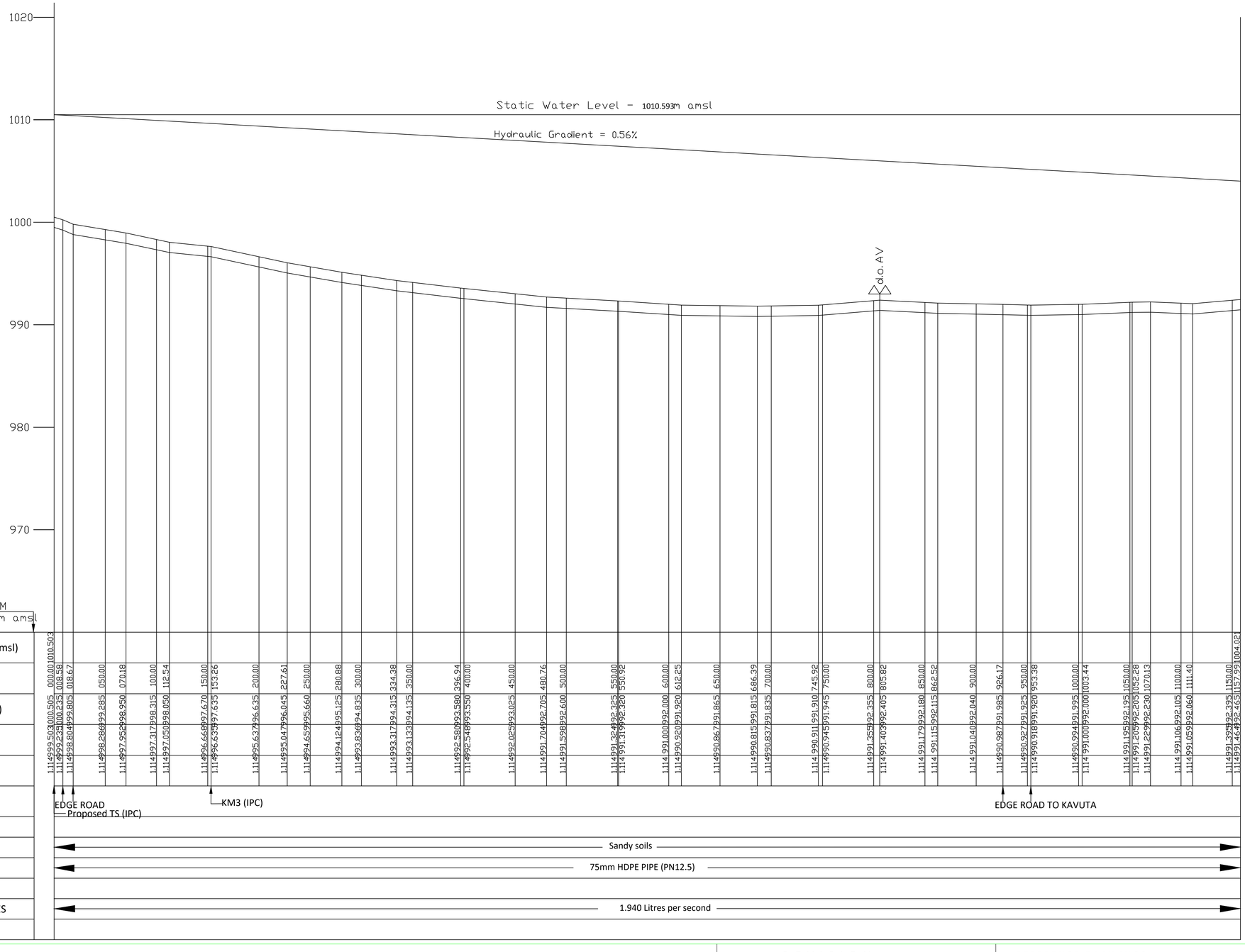
62	377668.8	9832682.62	940.777	
63	377671.6	9832683.448	939.673	
64	377703.2	9832690.43	939.862	
65	377708	9832691.428	942.668	
66	377646.6	9832675.754	943.562	
67	377613.5	9832731.01	944.214	
68	377617.6	9832739.27	941.638	
69	377620.3	9832741.697	939.992	
70	377627.9	9832754.077	940.003	
71	377642.6	9832778.618	940.067	
72	377643.9	9832782.255	941.1	
73	377655.6	9832805.724	941.36	
74	377657.8	9832815.101	944.095	
75	377655.9	9832465.032	945.399	KM1
76	377554.4	9832407.635	940.955	PL
77	377564.1	9832399.006	944.647	PL
78	377584.8	9832377.673	946.216	PL
79	377605.7	9832360.431	949.282	PL
80	377632.7	9832354.256	950.605	PL
81	377652.7	9832352.477	949.732	PL GULLY 3M
82	377682.7	9832353.075	952.235	PL
83	377732.6	9832345.17	953.95	PL
84	377760.7	9832363.943	955.007	PL
85	377809	9832396.607	956.983	PL
86	377851.8	9832417.461	959.341	PL
87	377868.3	9832418.085	960.182	PL
88	377922.1	9832408.316	962.948	PL
89	377978.8	9832405.314	965.516	PL
90	378041.6	9832387.333	967.176	PL
91	378084.1	9832369.639	968.753	PL
92	378125	9832355.351	970.734	PL EDGE ROAD
93	378134.9	9832356.698	971.174	PL EDGE ROAD
94	378176.4	9832357.954	973.053	PL
95	378233.8	9832358.746	975.365	PL
96	378285.5	9832352.805	978.593	PL
97	378285.5	9832352.923	978.592	PL
98	378387.7	9832370.844	983.426	PL
99	378389.1	9832370.734	983.519	CP
100	378443.2	9832378.071	985.134	PL
101	378475.4	9832376.36	986.298	PL
102	378511.1	9832364.143	987.794	PL
103	378539.3	9832343.048	989.406	PL KM2
104	378549.1	9832358.2	989.61	EDGE ROAD
105	378565.5	9832396.354	989.592	
106	378587.4	9832455.675	989.023	GATE HOMESTEAD
107	378610.3	9832518.281	989.041	
108	378623.2	9832565.47	988.576	
109	378629.9	9832612.018	988.321	OPP ENTRANE ASS CHIEF OFFICE
110	378640.5	9832667.06	987.506	
111	378654.7	9832710.768	987.016	
112	378678.8	9832758.536	986.407	
113	378690.3	9832784.561	985.394	
114	378693.3	9832816.57	984.49	
115	378686.1	9832872.795	985.313	
116	378678.5	9832907.134	985.839	
117	378672.3	9832926.902	985.419	
118	378652.8	9832963.117	987.359	
119	378630.9	9833000.103	988.673	
120	378603.8	9833048.35	990.007	
121	378576.3	9833093.759	991.219	
122	378561.9	9833128.938	991.662	

123	378547.5	9833160.433	992.263	
124	378542.3	9833193.111	992.309	
125	378538.1	9833265.136	992.905	OPP GATE HOMESTEAD
126	378547.7	9833283.979	992.573	CP
127	378538.7	9833305.954	993.145	PL
128	378544.2	9833348.911	993.225	PL
129	378550	9833384.476	993.176	PL
130	378553.4	9833430.766	993.16	PL
131	378545.8	9833495.799	992.544	PL GATE HOMESTEAD
132	378549.3	9833556.324	992.255	PL
133	378552.2	9833601.687	992.243	PL
134	378558.2	9833648.54	992.408	PL
135	378570.6	9833689.694	992.374	PL
136	378582.6	9833730.744	992.36	PL EDGE ROAD
137	378586.1	9833739.736	992.432	PL EDGE ROAD
138	378604.7	9833789.668	992.511	PL
139	378635	9833851.744	992.464	PL
140	378663.4	9833888.695	992.059	PL
141	378673.8	9833928.627	992.229	PL
142	378675.6	9833946.387	992.205	PL TEE PROPOSED WK IVOVOA
143	378685.1	9833994.293	992	PL
144	378699.4	9834042.283	991.918	PL EGDEEDGE ROAD KAVUTA
145	378713.4	9834065.616	991.987	PL EGDEEDGE ROAD KAVUTA
146	378756.6	9834112.353	992.115	PL
147	378794.1	9834154.853	992.403	PL
148	378833.6	9834199.891	991.911	PL
149	378873.5	9834244.016	991.815	PL
150	378924.4	9834297.93	991.92	PL
151	378969.1	9834339.91	992.319	PL
152	379024	9834383.625	992.704	PL
153	379086	9834440.052	993.58	PL
154	379131.9	9834482.547	994.317	PL
155	379168.9	9834521.203	995.124	PL
156	379207.9	9834557.49	996.047	PL
157	379267	9834602.563	997.635	PL KM 3
158	379290.5	9834635.781	998.05	PL
159	379304.8	9834675.665	998.952	PL
160	379323.3	9834723.714	999.804	PL EDGE ROAD
161	379331.9	9834718.373	1000.235	PL EDGE ROAD
162	379339.6	9834714.611	1000.503	PL PROPOSED TS
163	379283.8	9834593.081	997.42	EDGE ROAD SCH
164	379296.9	9834569.956	996.593	SCH
165	379326.7	9834532.794	994.616	SCH
166	379351.1	9834502.735	991.932	SCH
167	379365.7	9834498.82	991.945	SCH
168	379392.6	9834502.442	992.576	SCH
169	379436.4	9834518.225	993.946	SCH OPP CHURCH
170	379442.3	9834576.431	997.448	IVOVOA PRI SCH 10000L TANK
171	379416.7	9834637.721	999.989	ATSCH CPD
172	379336.8	9834757.335	1000.52	EX
173	379351.6	9834784.405	1001.293	EX ENTRANCE KWA KILILE HOMESTEAD
174	379406	9834871.295	1003.479	OPP KWA KILONZO GATE
175	379424.5	9834925.79	1004.833	KWA MBOYA GATE
176	379440.6	9834978.936	1005.684	EX
177	379444.5	9835013.703	1006.179	EX CANTEE KIOKO
178	379435.7	9835081.002	1007.173	EX
179	379416.6	9835168.469	1007.346	EX
180	379414.1	9835182.888	1007.361	EX
181	379414.1	9835182.974	1007.362	EX
182	379339.6	9834714.617	1000.575	PROPOSED TS
183	378533.4	9832316.82	989.624	

184	378524.2	9832283.581	989.476	KISYOKA SHOPS
185	378519.4	9832245.761	989.439	KISYOKA SHOPS
186	378510.6	9832190.497	988.976	
187	378505.2	9832145.735	988.289	ENDSHOPS
188	378493.5	9832087.35	987.349	
189	378485.1	9832021.385	986.036	
190	378477.1	9831947.268	985.548	
191	378460.1	9831891.453	984.828	
192	378430.9	9831826.777	983.16	
193	378401.1	9831777.745	981.803	
194	378372.4	9831743.359	980.612	
195	378336.9	9831694.502	979.566	
196	378304.3	9831640.795	978.812	
197	378265.9	9831583.179	977.921	
198	378231.4	9831540.378	977.153	CHURCH
199	378176.4	9831489.538	976.756	
200	378147.7	9831469.35	976.071	
201	378113.5	9831433.817	974.787	
202	378083.3	9831405.914	973.702	
203	378059.6	9831381.26	972.582	
204	378026.6	9831355.16	971.259	
205	377977.5	9831322.138	969.549	
206	377940.5	9831293.211	968.492	CANAAN SHOPS
207	378508.6	9832180.96	988.918	EDGE ROAD SCHS
208	378520	9832180.317	988.861	EDGE ROAD SCHS
209	378546.3	9832179.783	989.236	S
210	378594.6	9832177.982	989.786	S
211	378622.8	9832178.518	990.405	S EDGE ROAD KAVUMBUNI
212	378627.1	9832179.948	990.415	S EDGE ROAD KAVUMBUNI
213	378633.3	9832163.415	990.166	S OPP AIC
214	378644.7	9832134.432	989.82	S
215	378662.9	9832096.435	989.09	S
216	378685.3	9832050.983	987.985	S EDGE ROAD
217	378677.8	9832044.54	988.002	S EDGE ROAD
218	378670.4	9832039.771	988.103	S PR GATE
219	378646	9832033.365	988.163	S
220	378619	9832008.27	987.652	ATSCH CPD
221	378595.4	9832007.624	987.693	ATSCH TANKS
222	378606.3	9831978.895	987.337	S PLAY GROUND
223	378572.6	9831953.563	986.982	S PROPOSED SEC SCH
224	378519.2	9831950.801	986.529	S PROPOSED SEC SCH CMPD
225	378485.9	9831944.617	985.556	S EDGE ROAD
226	378473.9	9831947.768	985.521	EDGE ROAD
227	377918.8	9831267.552	967.946	
228	377966.7	9831303.257	968.993	C
229	377891.6	9831240.036	967.343	
230	377847.4	9831197.506	966.611	
231	377807.8	9831153.184	965.803	
232	377776.1	9831116.9	967.354	
233	377753.3	9831083.62	968.257	
234	377732	9831034.847	968.803	
235	377718.7	9831000.7	969.185	
236	377713.2	9830972.215	969.369	
237	377710.7	9830925.02	969.547	
238	377710	9830889.322	969.796	
239	377706.8	9830856.303	969.792	
240	377698.6	9830813.274	969.65	
241	377674.6	9830753.002	969.197	
242	377646.9	9830694.903	968.778	
243	377619	9830629.111	968.508	
244	377604.9	9830587.159	968.29	

245	377585.2	9830538.596	967.898
246	377566.7	9830497.739	967.778
247	377552.6	9830449.621	967.258
248	377543.6	9830392.219	966.848
249	377521.6	9830340.951	966.443
250	377496.2	9830297.212	965.769

251	377479.9	9830276.637	965.133	
252	377442.5	9830252.931	964.633	CP
253	377429.3	9830263.315	964.174	
254	377402.5	9830241.201	963.673	
255	377371.5	9830208.687	963.22	CANTEE
256	377347.9	9830175.324	962.86	
257	377319.3	9830130.525	962.446	
258	377309.5	9830082.828	961.885	
259	377306.8	9830038.06	961.76	
260	377301.8	9829993.737	962.233	
261	377298.7	9829947.524	962.774	
262	377291.2	9829895.567	963.031	
263	377276.3	9829849.251	963.31	
264	377266.6	9829780.632	963.754	
265	377261	9829725.42	964.136	
266	377249.8	9829680.458	964.414	
267	377236.8	9829644.905	964.667	
268	377220.5	9829598.296	964.693	
269	377198.1	9829555.333	964.85	
270	377177.3	9829523.131	965.039	
271	377163.2	9829486.572	964.586	
272	377149.9	9829452.138	964.144	
273	377135.6	9829406.521	963.49	
274	377123.5	9829366.125	962.806	
275	377108.9	9829325.632	962.082	
276	377096.9	9829298.096	961.777	ENTRANCE KISYOKA DISP
277	377086.8	9829263.491	961.128	
278	377066.8	9829216.634	960.729	
279	377077.1	9829220.064	960.754	
280	377061.2	9829188.169	960.519	
281	377048.6	9829141.482	960.452	EDGE ROAD
282	377044.8	9829127.461	960.331	EDGE ROAD
283	377035.8	9829088.97	960.301	
284	377030.1	9829065.937	960.341	
285	377019.2	9829016.691	960.367	
286	377007.6	9828976.371	960.203	
287	376996	9828929.901	959.671	
288	376976.5	9828865.568	958.656	
289	376970.7	9828848.961	958.37	OPP CHURCH
290	376942.5	9828788.703	957.32	
291	376931.7	9828749.303	956.436	
292	376925.6	9828688.949	955.17	
293	376915.4	9828652.09	954.367	CENTRE OF ROAD 4M
294	376910.6	9828615.553	953.373	
295	376902	9828572.615	952.467	
296	376892.3	9828514.833	951.478	
297	376882.6	9828463.264	950.802	
298	376869.6	9828420.425	950.462	
299	376856.1	9828379.179	950.084	
300	376842.8	9828339.723	949.877	
301	376826.7	9828287.961	949.913	
302	376809.7	9828258.994	950.48	START SHOPS
303	376786.7	9828219.361	951.307	
304	376772.3	9828202.269	951.448	
305	376756	9828177.933	951.964	
306	376757.7	9828150.497	952.241	MASOKA PR GATE
307	376795.4	9828154.916	952.121	MASOKA PR KITCHEN AND TANKS
308	376786.8	9828183.388	952.475	MASOKA PR FENCE
309	376791.5	9828198.875	951.411	
310	376787.9	9828195.195	951.665	KM4 PROPOSED WATER KIOSK MASOKA
BASE_1	377726.8	9832474.719	950.047	Autonomous Setup



REVISION		REFERENCE DRAWINGS	
DATE	DESCRIPTION	DRG. No.	DESCRIPTION

COUNTY GOVERNMENT OF KITUI

MINISTRY OF WATER & IRRIGATION

Kitui Central Sub County

KISYOKA - IVOVOA - MASOKA SUMPWELL WATER SUPPLY PROJECT

Proposed Tank Site – Ivovoa – Kisyoka – Masoka Mkt Ditribution Line

Ch. 0+000 – Ch. 1+157.99

CLIENT: Kitui County Ministry of Energy, Environment, Forestry, Natural & Mineral Resources

Sheet 1 of 7

SCALE: Horz. 1:2000, Vert. 1:200

FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING

SURVEYED BY	Munyoki & Alex	DATE: Aug 2024
DRAWN BY	K. Kamwilwa	DATE: Aug 2024
CHECKED BY	R. Munyoki	DATE: Aug 2024
DESIGNED BY	M. M. Mulwa	DATE: Aug 2024
CHECKED BY	Eng. Saidi Titus	DATE: Aug 2024

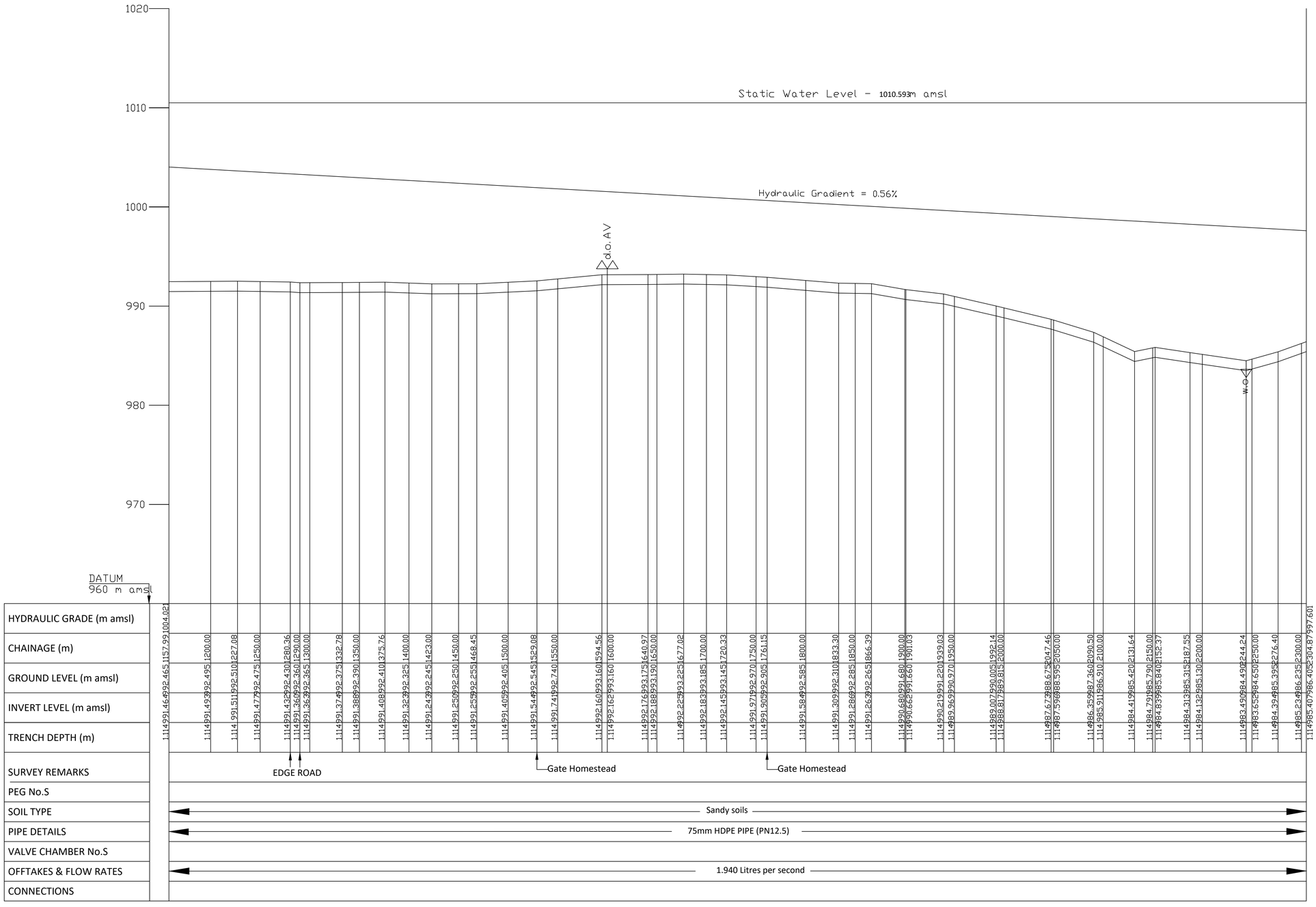
APPROVED BY: ENG. KENNEDY P. MUTATI
Deputy Director Water

Date Aug 2024

CHIEF OFFICER WATER Date:Aug 2024

MWI

DRG. No.
MEECFN & NR/KTI/AUG/2024/03 - 02



REVISION	
DATE	DESCRIPTION

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COUNTY GOVERNMENT OF KITUI

MINISTRY OF WATER & IRRIGATION

Kitui Central Sub County

KISYOKA - IVOVOA - MASOKA SUMPWELL WATER SUPPLY PROJECT

Proposed Tank Site – Ivovoa – Kisyoka – Masoka Mkt Ditribution Line

Ch. 1+157.99 – Ch. 2+304.87

CLIENT: **Kitui County Ministry of Energy, Environment, Forestry, Natural & Mineral Resources**

Sheet 2 of 7

SCALE: Horz. 1:2000, Vert. 1:200

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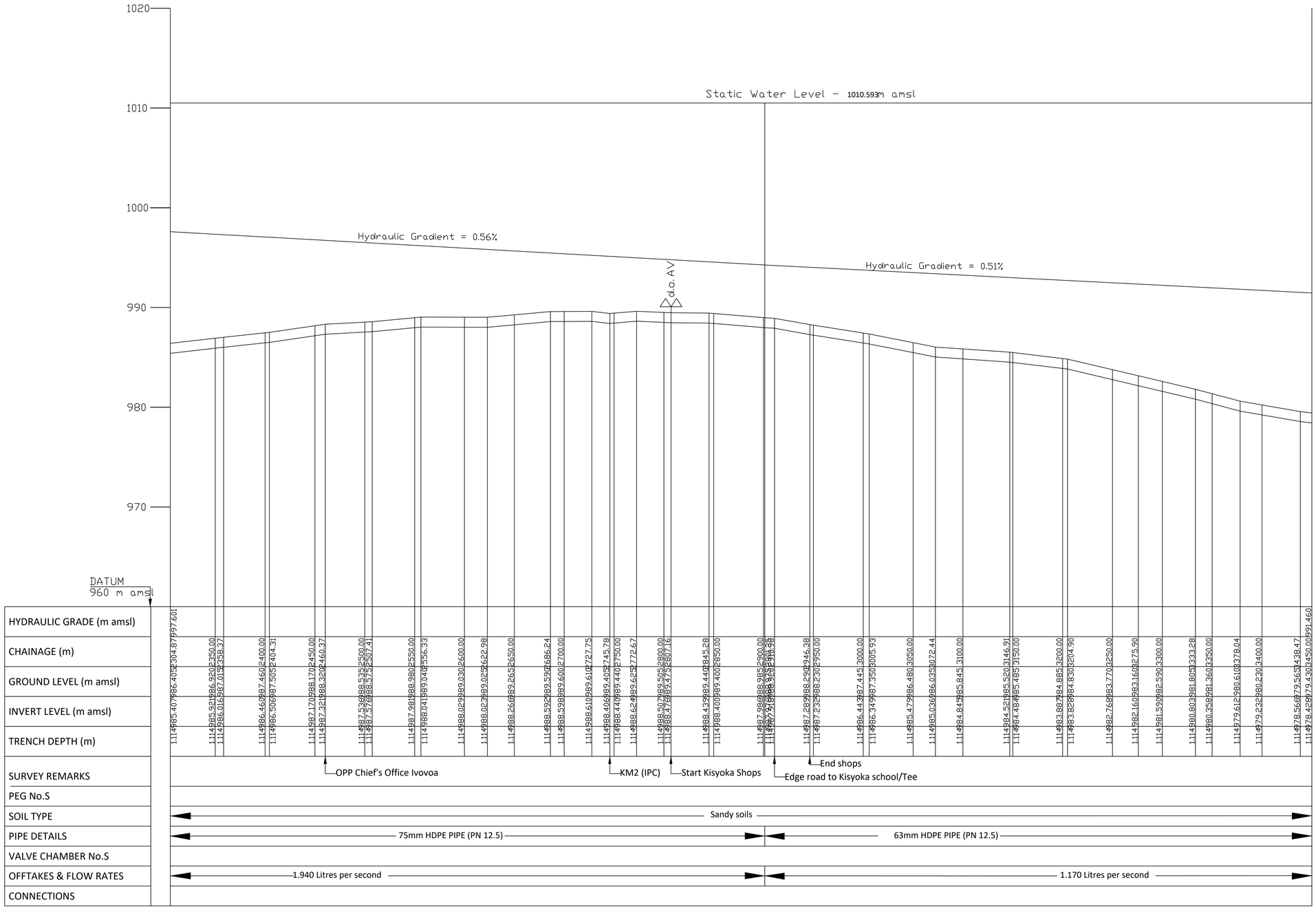

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COUNTY GOVERNMENT OF KITUI

MINISTRY OF WATER & IRRIGATION

Kitui Central Sub County

KISYOKA - IVOVOA - MASOKA SUMPWELL WATER SUPPLY PROJECT

Proposed Tank Site – Ivovoa – Kisyoka – Masoka Mkt Ditribution Line

Ch. 2+304.87 – Ch. 3+450.00

CLIENT: **Kitui County Ministry of Energy, Environment, Forestry, Natural & Mineral Resources**

Sheet 3 of 7

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Deputy Director Water

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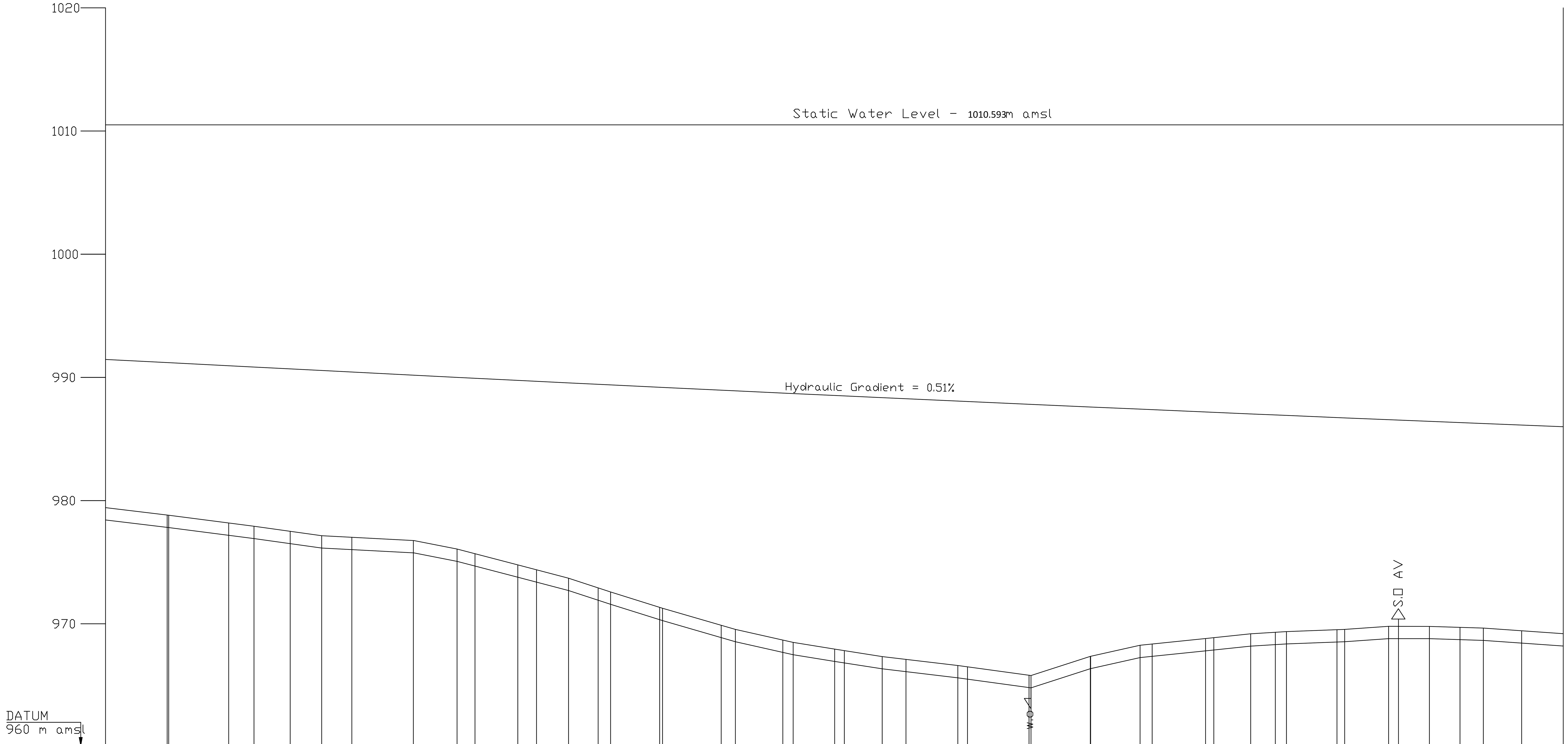

CHAINAGE (m)	HYDRAULIC GRADE (m amsl)	GROUND LEVEL (m amsl)	INVERT LEVEL (m amsl)	TRENCH DEPTH (m)
3450.00	991.460	979.430	978.428	1.114
3500.00		978.830	977.828	1.114
3501.32		978.810	977.812	1.114
3550.00		978.185	977.186	1.114
3570.57		977.920	976.921	1.114
3600.00		977.510	976.510	1.114
3625.52		977.155	976.153	1.114
3650.00		977.025	976.023	1.114
3700.00		976.760	975.758	1.114
3700.45		976.755	975.756	1.114
3735.49		976.070	975.071	1.114
3750.00		975.695	974.694	1.114
3784.84		974.785	973.787	1.114
3800.00		974.385	973.387	1.114
3826.01		973.700	972.702	1.114
3850.00		972.915	971.916	1.114
3860.18		972.580	971.582	1.114
3900.00		971.330	970.331	1.114
3902.31		971.260	970.259	1.114
3950.00		969.880	968.881	1.114
3961.50		969.550	968.549	1.114
4000.00		968.680	967.682	1.114
4008.46		968.490	967.492	1.114
4042.09		967.945	966.946	1.114
4050.00		967.825	966.823	1.114
4080.76		967.345	966.343	1.114
4100.00		967.115	966.114	1.114
4142.14		966.610	965.611	1.114
4150.00		966.505	965.504	1.114
4200.00		965.825	964.824	1.114
4201.58		965.805	964.803	1.114
4249.76		967.355	966.354	1.114
4250.00		967.360	966.359	1.114
4290.13		968.255	967.257	1.114
4300.00		968.360	967.358	1.114
4343.35		968.805	967.803	1.114
4350.00		968.870	967.872	1.114
4379.97		969.185	968.185	1.114
4400.00		969.310	968.312	1.114
4409.00		969.370	968.369	1.114
4450.00		969.525	968.523	1.114
4456.26		969.545	968.547	1.114
4491.96		969.795	968.796	1.114
4500.00		969.795	968.795	1.114
4525.14		969.790	968.792	1.114
4550.00		969.710	968.711	1.114
4568.94		969.650	968.650	1.114
4600.00		969.435	968.433	1.114
4633.82	985.427	969.195	968.197	1.114

SURVEY REMARKS	Canaan Shops (Ch. 4008.46)
PEG No.S	
SOIL TYPE	Sandy soils
PIPE DETAILS	63mm HDPE PIPE (PN 12.5)
VALVE CHAMBER No.S	
OFFTAKES & FLOW RATES	1.170 Litres per second
CONNECTIONS	

REVISION		REFERENCE DRAWINGS	
DATE	DESCRIPTION	DRG. No.	DESCRIPTION

COUNTY GOVERNMENT OF KITUI

MINISTRY OF WATER & IRRIGATION

Kitui Central Sub County

KISYOKA - IVOVOA - MASOKA SUMPWELL WATER SUPPLY PROJECT

Proposed Tank Site – Ivovoa – Kisyoka – Masoka Mkt Ditribution Line

Ch. 3+450.00 – Ch. 4+633.82

CLIENT: **Kitui County Ministry of Energy, Environment, Forestry, Natural & Mineral Resources**

Sheet 4 of 7

SCALE: Horz. 1:2000, Vert. 1:200

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CHECKED BY	Eng. Saidi Titus	DATE: Aug 2024

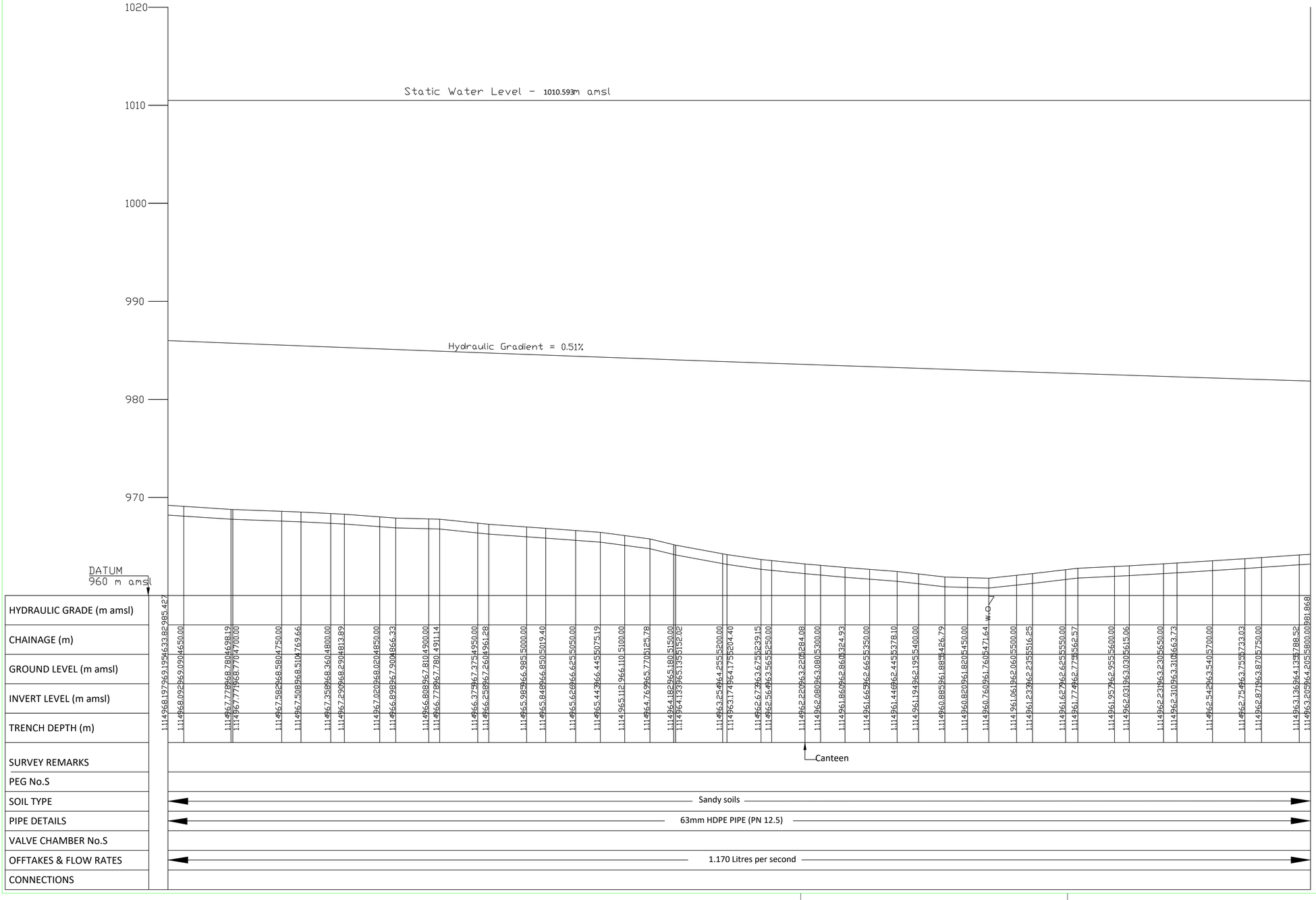
APPROVED BY: ENG. KENNEDY P. MUTATI
Deputy Director Water

Date Aug 2024

CHIEF OFFICER WATER Date:Aug 2024

MWI

DRG. No.
MEECFN & NR/KTI/AUG/2024/03 - 02



REVISION		REFERENCE DRAWINGS	
DATE	DESCRIPTION	DRG. No.	DESCRIPTION

COUNTY GOVERNMENT OF KITUI

MINISTRY OF WATER & IRRIGATION

Kitui Central Sub County

KISYOKA - IVOVOA - MASOKA SUMPWELL WATER SUPPLY PROJECT

Proposed Tank Site – Ivovoa – Kisyoka – Masoka Mkt Ditribution Line

Ch. 4+633.82 – Ch. 5+800.00

CLIENT: Kitui County Ministry of Energy, Environment, Forestry, Natural & Mineral Resources

Sheet 5 of 7

SCALE: Horz. 1:2000, Vert. 1:200

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Deputy Director Water

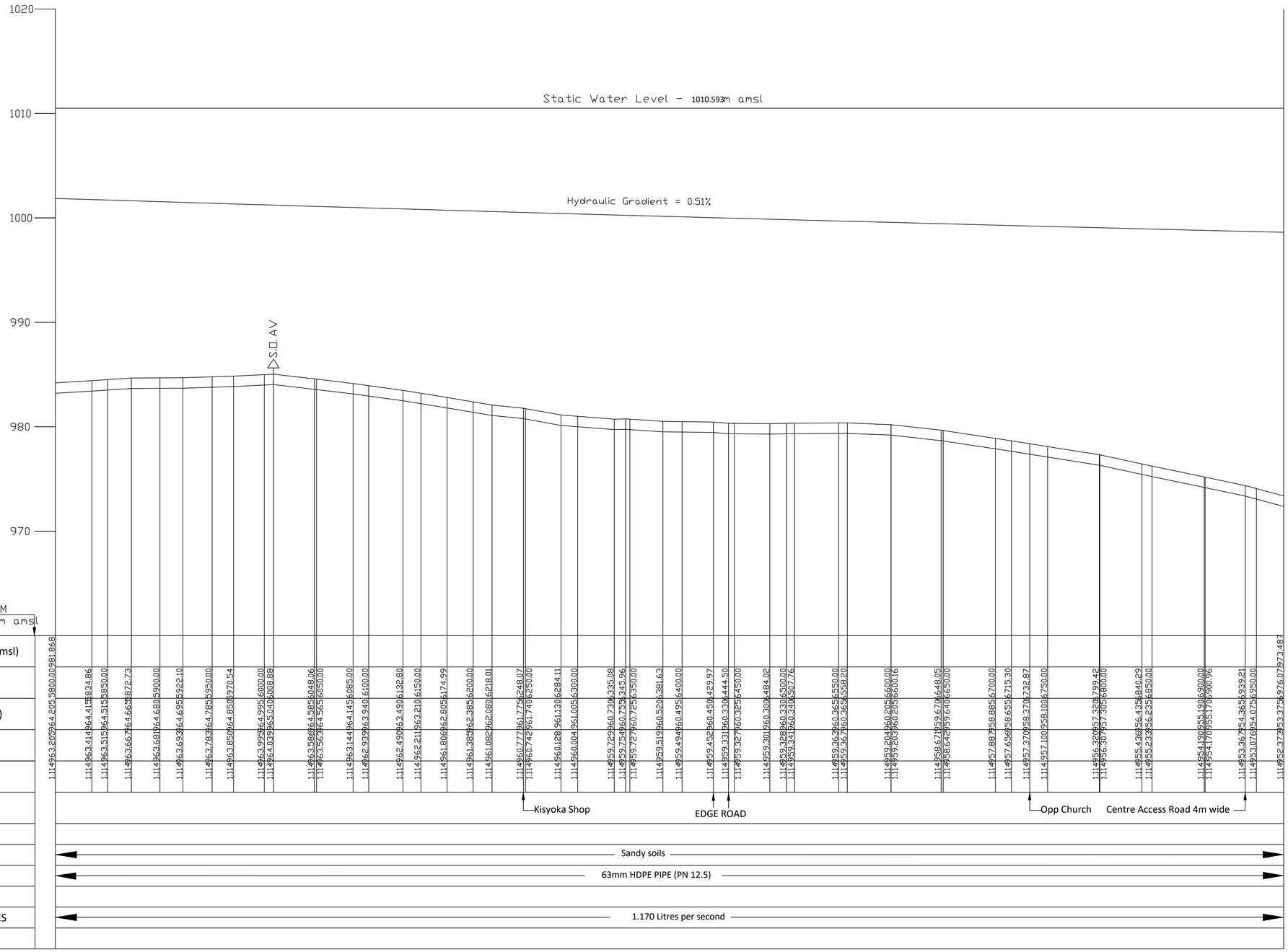
Date Aug 2024

CHIEF OFFICER WATER Date:Aug 2024

MWI

DRG. No.

MEECFN & NR/KTI/AUG/2024/03 - 02



REVISION		REFERENCE DRAWINGS	
DATE	DESCRIPTION	DRG. No.	DESCRIPTION

COUNTY GOVERNMENT OF KITUI

MINISTRY OF WATER & IRRIGATION

Kitui Central Sub County

KISYOKA - IVOVOA - MASOKA SUMPWELL WATER SUPPLY PROJECT

Proposed Tank Site – Ivovoa – Kisyoka – Masoka Mkt Ditribution Line

Ch. 5+800.00 – Ch. 6+976.07

CLIENT: **Kitui County Ministry of Energy, Environment, Forestry, Natural & Mineral Resources**

Sheet 6 of 7

SCALE: Horz. 1:2000, Vert. 1:200

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Deputy Director Water

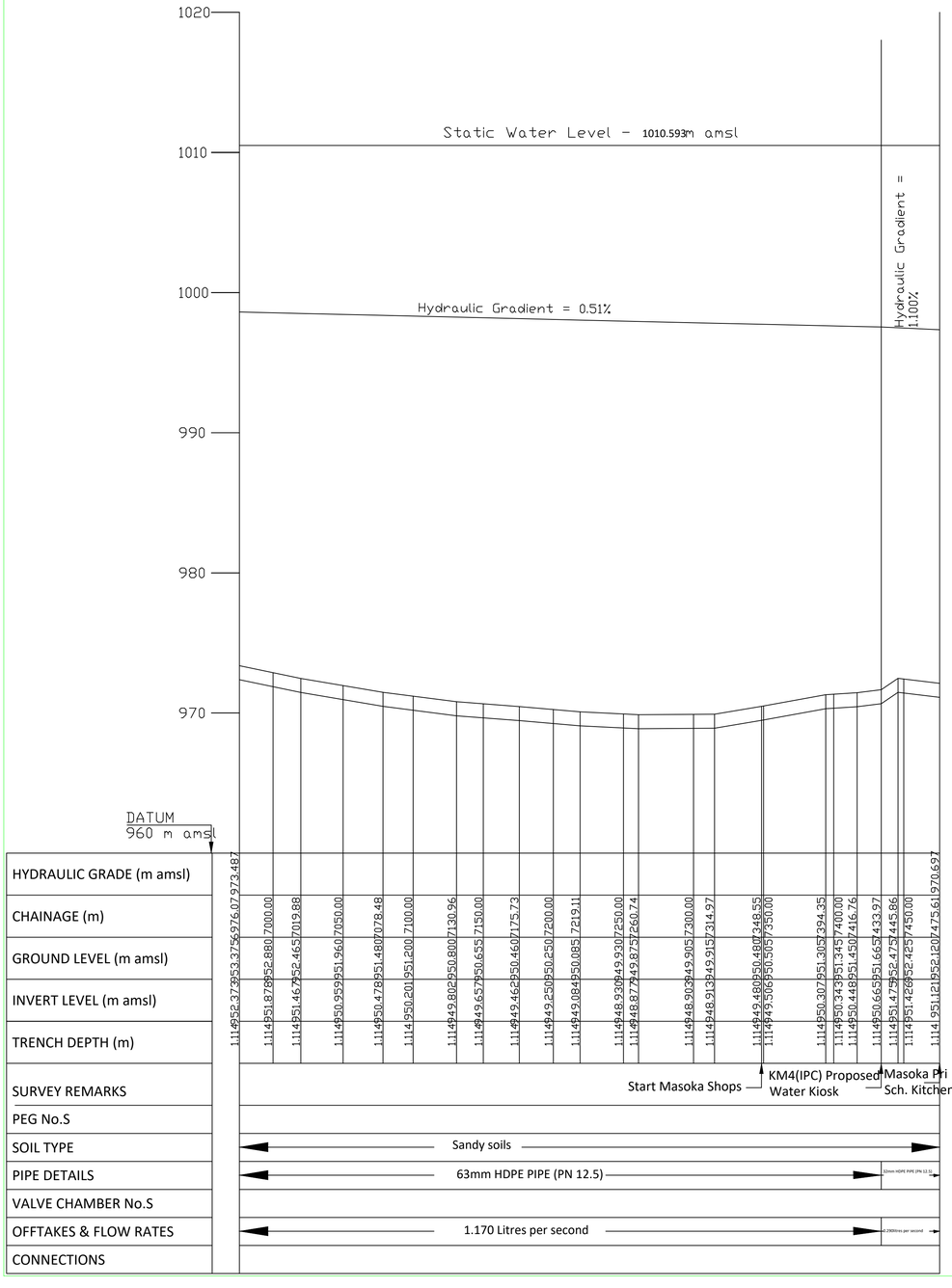
Date Aug 2024

CHIEF OFFICER WATER Date:Aug 2024

MWI

DRG. No.

MEECFN & NR/KTI/AUG/2024/03 - 02



REVISION		REFERENCE DRAWINGS	
DATE	DESCRIPTION	DRG. No.	DESCRIPTION

COUNTY GOVERNMENT OF KITUI

MINISTRY OF WATER & IRRIGATION

Kitui Central Sub County

KISYOKA - IVOVOA - MASOKA SUMPWELL WATER SUPPLY PROJECT

Proposed Tank Site – Ivovoa – Kisyoka – Masoka Mkt Ditribution Line

Ch. 6+976.07 – Ch. 7+475.61

CLIENT: **Kitui County Ministry of Energy, Environment, Forestry, Natural & Mineral Resources**

Sheet 7 of 7

SCALE: Horz. 1:2000, Vert. 1:200

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Deputy Director Water

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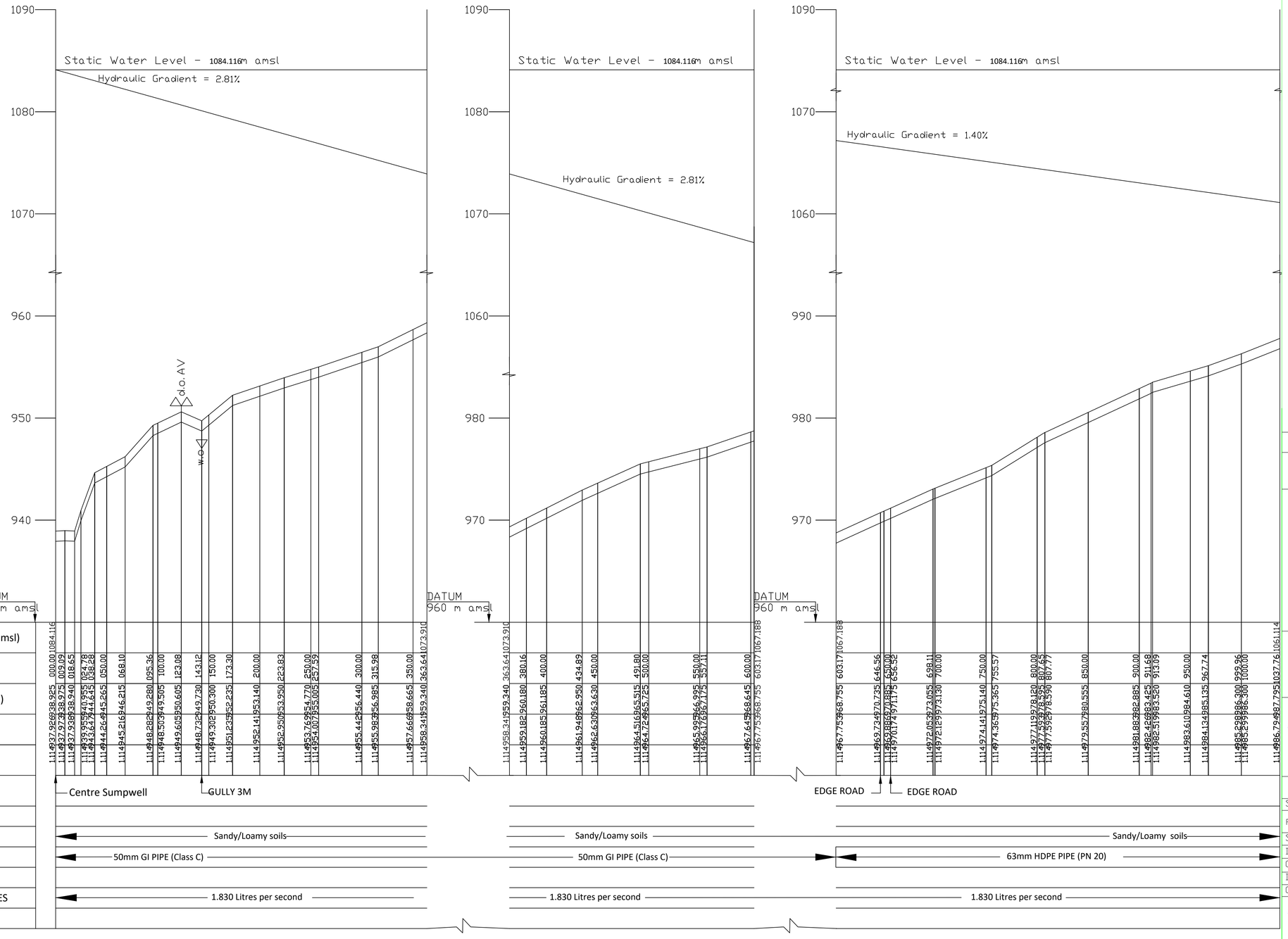

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COUNTY GOVERNMENT OF KITUI

MINISTRY OF WATER & IRRIGATION

Kitui Central Sub County

KISYOKA - IVOVOA - MASOKA SUMPWELL WATER SUPPLY PROJECT

Rising Main (Ivovoa Sump – Proposed tank site near Ivovoa Pri. School)

Ch. 0+000 – Ch. 1+037.76

CLIENT: **Kitui County Ministry of Energy, Environment, Forestry, Natural & Mineral Resources**

Sheet 1 of 4

SCALE: Horz. 1:2000, Vert. 1:200

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Deputy Director Water

Date Aug 2024

CHIEF OFFICER WATER Date: Aug 2024

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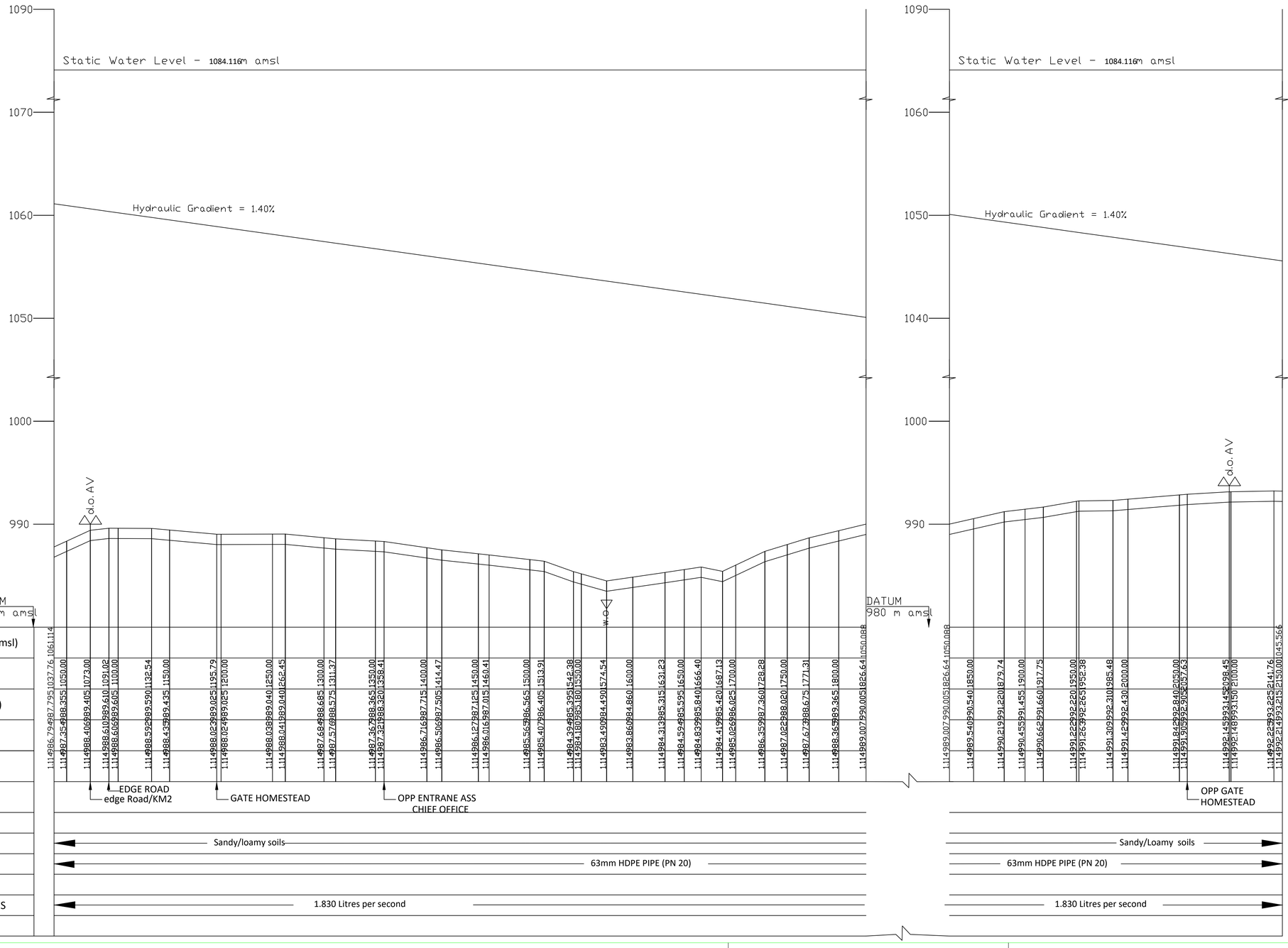
MEECFN & NR/KTI/AUG/2024/03 - 01



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COUNTY GOVERNMENT OF KITUI

MINISTRY OF WATER & IRRIGATION

Kitui Central Sub County

KISYOKA - IVOVOA - MASOKA SUMPWELL WATER SUPPLY PROJECT

Rising Main (Ivovoa Sump – Proposed tank site near Ivovoa Pri. School)

Ch. 1+037.76– Ch. 2+150.00

CLIENT: Kitui County Ministry of Energy, Environment, Forestry, Natural & Mineral Resources

Sheet 2 of 4

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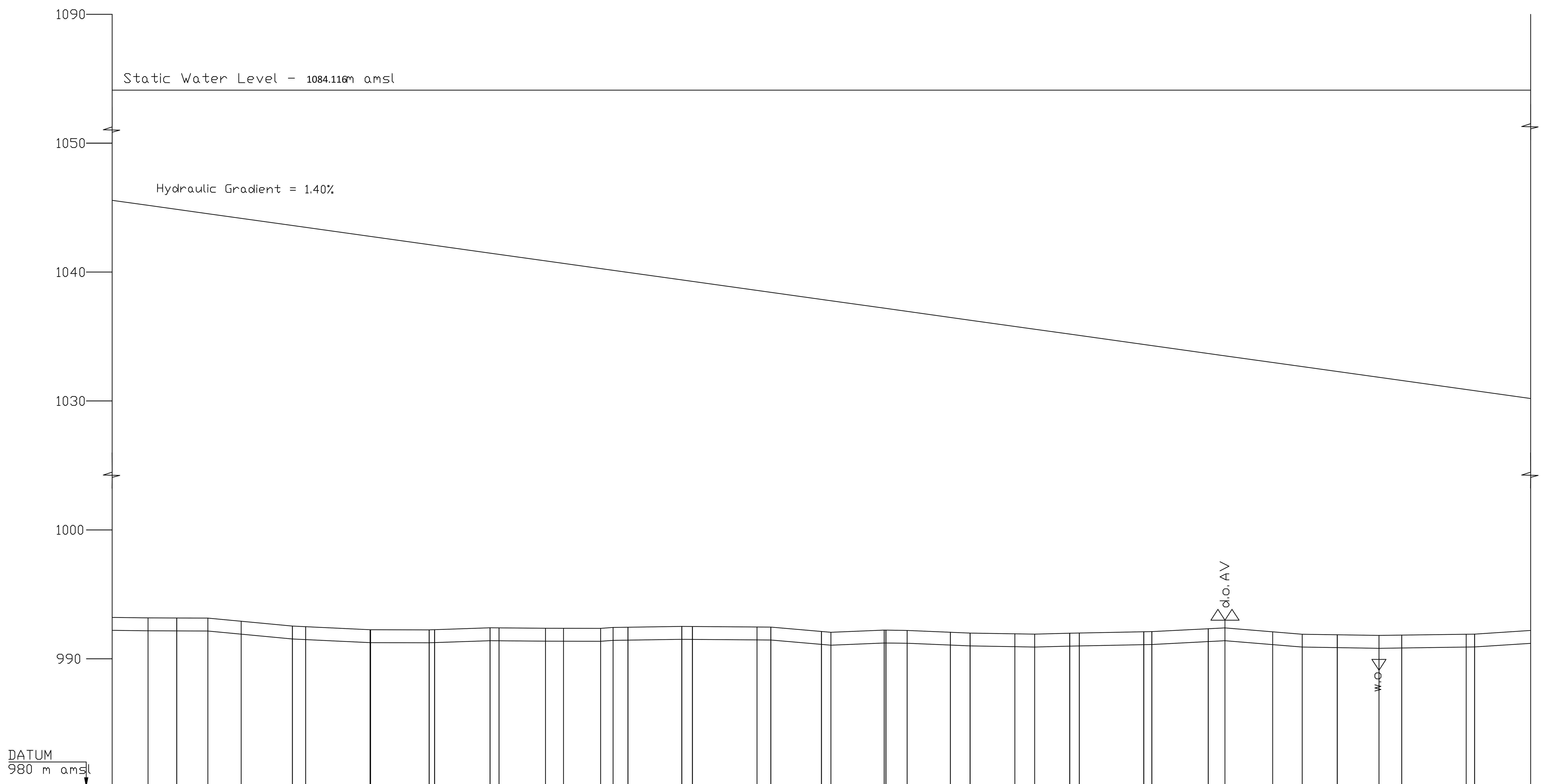

CHAINAGE (m)	GROUND LEVEL (m amsl)	INVERT LEVEL (m amsl)	TRENCH DEPTH (m)	HYDRAULIC GRADE (m amsl)	SURVEY REMARKS
2150.00	993.215	992.214	1.114	1045.566	
2177.81	993.175	992.176	1.114		
2200.00	993.170	992.168	1.114		
2224.22	993.160	992.160	1.114		
2250.00	992.915	991.917	1.114		
2289.70	992.545	991.544	1.114		GATE HOMESTEAD
2300.00	992.495	991.495	1.114		
2350.00	992.255	991.257	1.114		
2350.33	992.255	991.255	1.114		
2395.78	992.245	991.243	1.114		
2400.00	992.260	991.258	1.114		
2443.02	992.410	991.408	1.114		
2450.00	992.400	991.402	1.114		
2486.00	992.375	991.374	1.114		
2500.00	992.370	991.369	1.114		
2528.77	992.360	991.360	1.114		EDGE ROAD
2538.42	992.430	991.432	1.114		EDGE ROAD
2550.00	992.450	991.449	1.114		
2591.70	992.510	991.511	1.114		
2600.00	992.505	991.505	1.114		
2650.00	992.470	991.471	1.114		
2660.79	992.465	991.464	1.114		
2700.00	992.125	991.123	1.114		
2707.38	992.060	991.059	1.114		
2748.65	992.230	991.229	1.114		
2750.00	992.225	991.227	1.114		
2766.50	992.205	991.205	1.114		PL TEE PROPOSED WK IVOVOA POLYTECHNIC
2800.00	992.065	991.064	1.114		
2815.34	992.000	991.000	1.114		
2850.00	991.945	990.943	1.114		
2865.40	991.920	990.918	1.114		EDGE ROAD KAVUTA
2892.61	991.985	990.987	1.114		EDGE ROAD KAVUTA
2900.00	992.000	991.002	1.114		
2950.00	992.100	991.102	1.114		
2956.26	992.115	991.115	1.114		
3000.00	992.335	991.337	1.114		
3012.96	992.405	991.403	1.114		
3050.00	992.100	991.099	1.114		
3072.86	991.910	990.911	1.114		
3100.00	991.865	990.867	1.114		
3132.38	991.815	990.815	1.114		
3150.00	991.840	990.840	1.114		
3200.00	991.910	990.911	1.114		
3206.53	991.920	990.920	1.114		
3250.00	992.205	991.203	1.114	1030.192	

PEG No.S	
SOIL TYPE	Sandy/Loamy soils
PIPE DETAILS	63mm HDPE PIPE (PN 20)
VALVE CHAMBER No.S	
OFFTAKES & FLOW RATES	1.830 Litres per second
CONNECTIONS	

REVISION

DATE	DESCRIPTION

REFERENCE DRAWINGS

DRG. No.	DESCRIPTION

COUNTY GOVERNMENT OF KITUI

MINISTRY OF WATER & IRRIGATION

Kitui Central Sub County

KISYOKA - IVOVOA - MASOKA SUMPWELL WATER SUPPLY PROJECT

Rising Main (Ivovoa Sump – Proposed tank site near Ivovoa Pri. School)

Ch. 2+150.00– Ch. 3+250.00

CLIENT: Kitui County Ministry of Energy, Environment, Forestry, Natural & Mineral Resources

Sheet 3 of 4

SCALE: Horz. 1:2000, Vert. 1:200

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DESIGNED BY	M. M. Mulwa	DATE: Aug 2024
CHECKED BY	Eng. Saidi Titus	DATE: Aug 2024

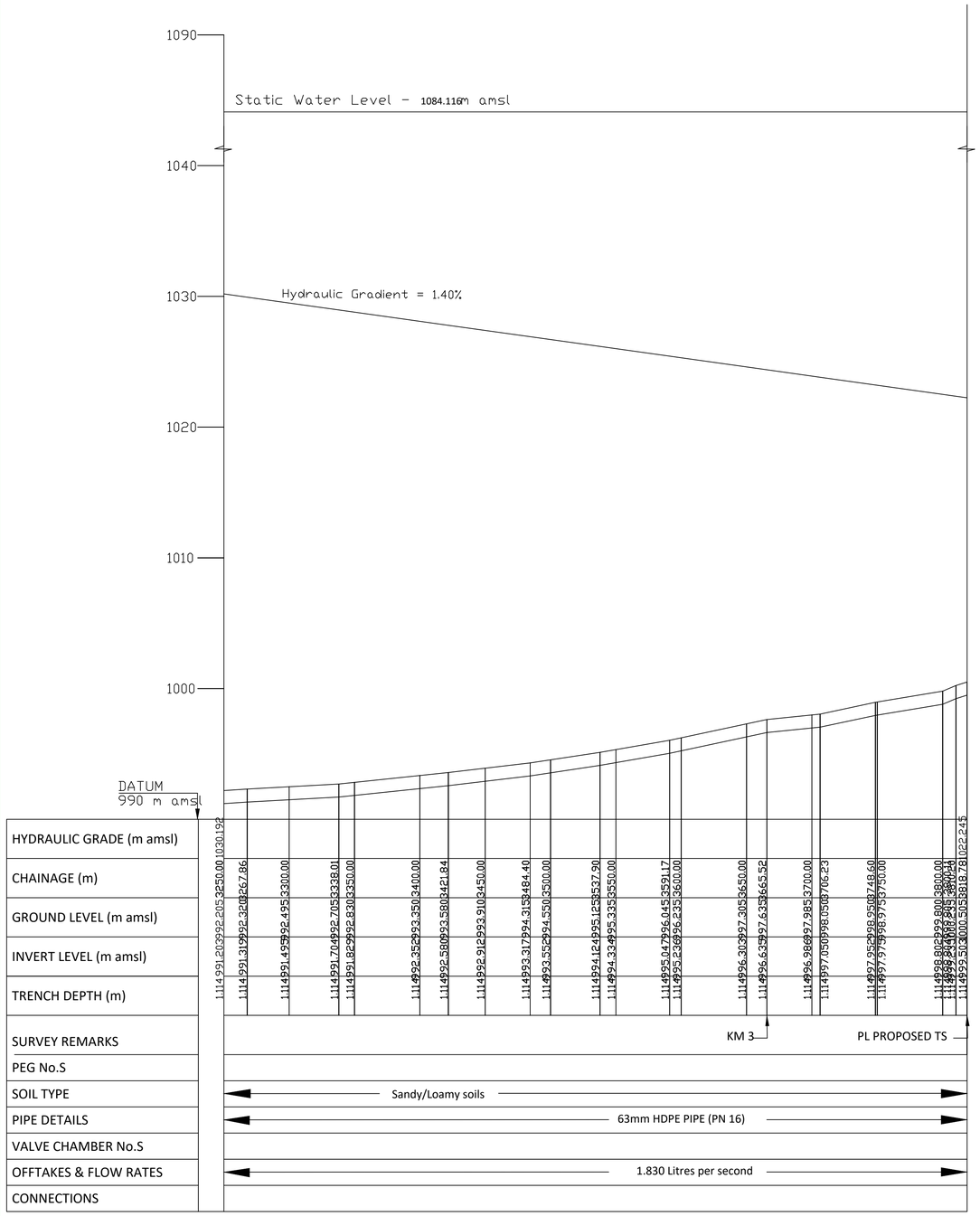
APPROVED BY: ENG. KENNEDY P. MUTATI
Deputy Director Water

Date Aug 2024

CHIEF OFFICER WATER Date: Aug 2024

MWI

DRG. No.
MEECFN & NR/KTI/AUG/2024/03 - 01



REVISION		REFERENCE DRAWINGS	
DATE	DESCRIPTION	DRG. No	DESCRIPTION

COUNTY GOVERNMENT OF KITUI

MINISTRY OF WATER & IRRIGATION

Kitui Central Sub County

KISYOKA - IVOVOA - MASOKA SUMPWELL WATER SUPPLY PROJECT

Rising Main (Ivovoa Sump – Proposed tank site near Ivovoa Pri. School)

Ch. 3+250.00– Ch. 3+818.78

CLIENT: **Kitui County Ministry of Energy, Environment, Forestry, Natural & Mineral Resources**

Sheet 4 of 4

SCALE: Horz. 1:2000, Vert. 1:200

FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING

SURVEYED BY	Munyoki & Alex	DATE: Aug 2024
DRAWN BY	K. Kamwilwa	DATE: Aug 2024
CHECKED BY	R. Munyoki	DATE: Aug 2024
DESIGNED BY	M. M. Mulwa	DATE: Aug 2024
CHECKED BY	Eng. Saidi Titus	DATE: Aug 2024

APPROVED BY: ENG. KENNEDY P. MUTATI
Deputy Director Water

Date Aug 2024

CHIEF OFFICER WATER Date: Aug 2024

MWI

DRG. No.

MEECFN & NR/KTI/AUG/2024/03 - 01

BAR BENDING SCHEDULE

MEMBER	BAR MARK	TYPE & SIZE	No. OF MEMBERS	No. IN EACH	TOTAL No.	LENGTH OF EACH BAR	SHAPE	TOTAL MY8	TOTAL MY10	TOTAL MY12	TOTAL MY16
FLOOR SLAB	1	Y10	1	2	2	6020	6020		12.04		
	2	Y10	1	4	4	6000	6000		24.0		
	3	Y10	1	4	4	5940	5940		23.76		
	4	Y10	1	4	4	5830	5830		23.32		
	5	Y10	1	4	4	5680	5680		22.72		
	6	Y10	1	4	4	5480	5480		21.92		
	7	Y10	1	4	4	5230	5230		20.94		
	8	Y10	1	4	4	4920	4920		19.68		
	9	Y10	1	4	4	4530	4530		18.12		
	10	Y10	1	4	4	4040	4040		16.16		
	11	Y10	1	4	4	3410	3410		13.64		
	12	Y10	1	4	4	2560	2560		10.24		
	13	Y10	1	4	4	1020	1020		4.08		
	14	Y12	1	4	4	6020	6020			12.04	
	15	Y12	1	2	2	5940	5940			23.76	
	16	Y12	1	4	4	5680	5680			22.72	
	17	Y12	1	4	4	5230	5230			20.94	
	18	Y12	1	4	4	4530	4530			18.12	
	19	Y12	1	4	4	3410	3410			13.64	
	20	Y12	1	4	4	1020	1020			4.08	
	21	Y12	1	12	12	2500	2500			30.0	
SUMP	22	Y10	1	2	2	3400	900 / 700		6.8		
	23	Y10	1	5	5	1700	500 / 700 / 500		8.5		
	24	Y10	1	4	4	1900	500 / 900 / 500		7.6		
	25	Y10	1	10	10	1210	1210		12.1		
WALLS	26	Y8	1	3X40	120	6000	6000 / 2.6	720			
ROOF SLAB	27	Y10	1	4	4	5370	5370		21.48		
	28	Y10	1	8	8	5360	5360		42.88		
	29	Y10	1	8	8	5310	5310		42.48		
	30	Y10	1	8	8	5240	5240		41.92		
	31	Y10	1	8	8	5130	5130		41.40		
	32	Y10	1	8	8	4990	4990		39.92		
	33	Y10	1	8	8	4810	4810		38.48		
	34	Y10	1	8	8	4600	4600		36.80		
	35	Y10	1	8	8	4330	4330		34.64		
	36	Y10	1	8	8	4010	4010		32.08		
	37	Y10	1	8	8	3620	3620		28.96		
	38	Y10	1	8	8	3140	3140		25.12		
	39	Y10	1	8	8	2500	2500		20.00		
	40	Y10	1	8	8	1550	1550		12.4		
	41	Y16	1	4	4	1950	1950				7.8
TOTAL LENGTH								720	723.82	145.3	7.8
WEIGHT PER M								0.395	0.616	0.888	1.579
SUB-TOTAL WT								284.4	445.87	129.03	12.32
TOTAL WEIGHT											871.62

NOTES:-

CONCRETE:-
ALL CONCRETE CLASS 25/20 THE AGGREGATES SHOULD COMPLY WITH THE FOLLOWING STANDARDS:- BS 882, BS 877, BS 1047,BS 3797, BS4619.THE CHLORIDE CONTENT OF THE AGGREGATES SHOULD BE CAREFULLY CONSIDERED.MINIMUM CEMENT CONTENT TO BE 290KG/M^3. IF THE CONCRETE I TO BE EXPOSED TO SULPHATE ATTACK,SULPHATE RESISTING OR SUPER SULPHATE CEMENT SHOULD BE USED.

ADMIXTURES:-
MAY BE USED WITH PRIOR APPROVAL OF THE ENGINEER.

REINFORECEMENTS:-
SPECIFIC REFERENCE IS MADE TO BS 4449 AND BS4461. CONCRETE NORMALY SPECIFIED AS 40MM.

CONSTRUCTION JOINTS:-
ONLY WHEN SHOWN,OTHERWISE NOT PERMITTED.

BLINDING LAYER:-
75MM IS RECOMMENDED,GRADE 15,BUT IF THERE ARE INJURIOUS SOILS OR EXCESSIVE GROUND WATER,GRADE 25 IS RECOMMENDED. IT IS RECOMMENDED THAT THE LAST FEW INCHES OF EXCAVATION BE REMOVED BY HAND

1.THE MASONRY WALL SHALL NOT BE CONNECTED TO EITHER THE FLOOR SLAB OR THE ROOF SLAB. THE WALL SUPPORTING AREA OF THE FLOOR SLAB AS WELL AS THE TOP OF THE WALL SHALL BE TROWEL FINISHED AND PAINTED WITH THREE COATS OF BITUMINOUS PAINT.

2.THE MASONRY WALL SHALL BE BUILT OF GOOD QUALITY LOCAL BUILDING STONES OR CONCRETE BLOCKS. THE SIZE OF THE STONES WILL BE
WIDTH: NOT LESS 225MM
LENGTH: BETWEEN 200MM – 300MM
HEIGHT: + NOT LESS THAN 150MM
THE STONES SHALL BE SOAKED IN WATER FPR 24HRS: BEFORE BEING BUILT INTO THE WALL.PARTICULAR CARE MUST BE TAKEN TO FILL THE JOINTS WITH MOTAR.
MOTAR RATIO 1:3 (CEMENT TO SAND) ALL JOINTS TO BE ABOUT 20MM.

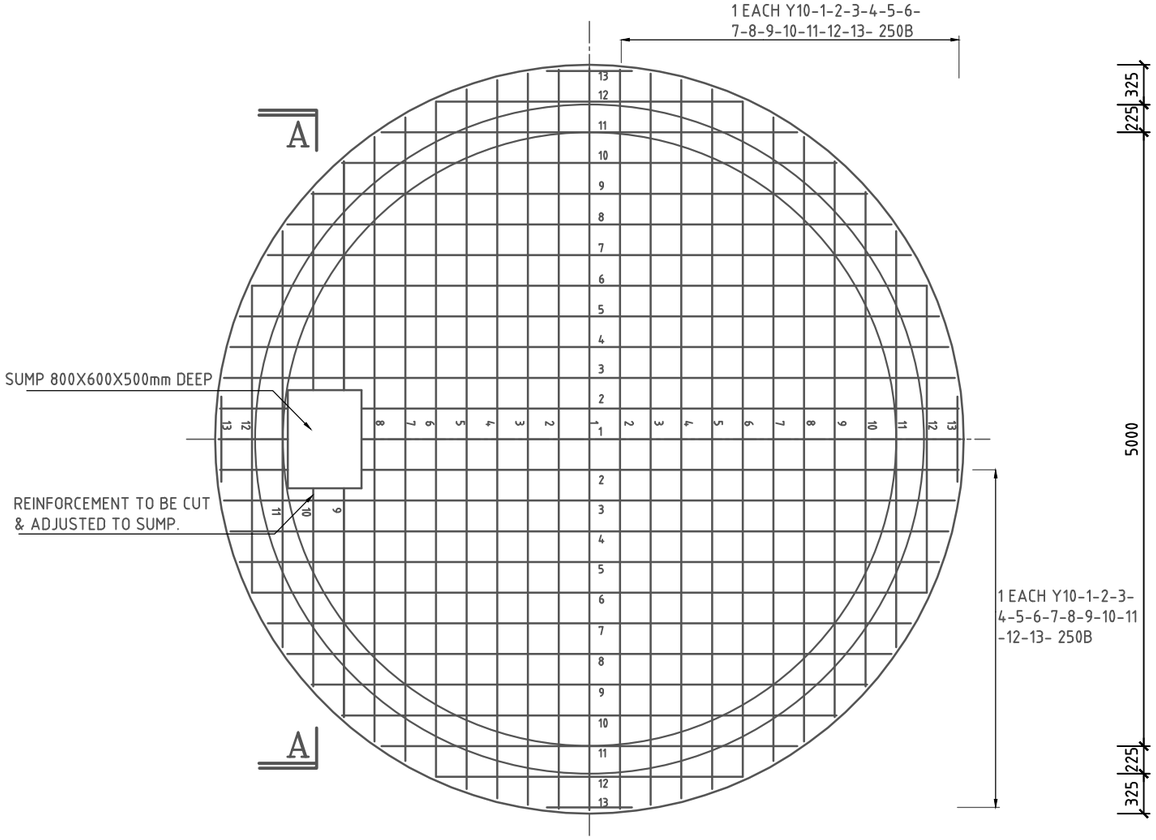
3. THE EXTERIOR SURFACE OF THE TANK SHALL RECEIVE ONE COAT OF CEMENT WASH.

4. THE INTERIOR SURFACE OF THE TANK SHALL BE PLASTERED. THICKNESS OF PLASTER 15MM WITH MOTAR ,MIX OF 1:2(CEMENT : SAND). TO OBTAIN A WATERPROOF PLASTERING,"PUDLO" CEMENT SHOULD BE ADDED.

MINISTRY OF WATER & IRRIGATION- MAJI HOUSE

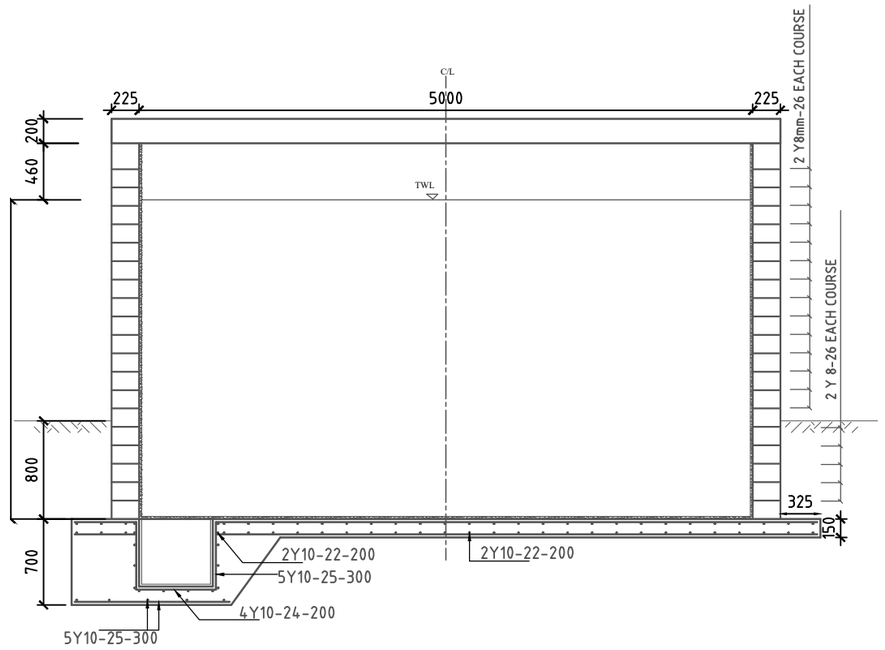
50 M^3 MASONRY STORAGE TANK
(NOTES)

DESIGNED	J.M MUIRURI	DEC 1986	SHEET 3 OF 3
DRAWN	J.M MUIRURI	DEC 1986	SCALE: AS SHOWN
DIGITIZED	ALUCHIO M.F	JUNE 2009	DRG. NO.
CHECKED	ENG. B.I KASABULI	JUNE 2009	M.W.I
APPROVED	D.W.S	JUNE 2009	013-TYPE-084B



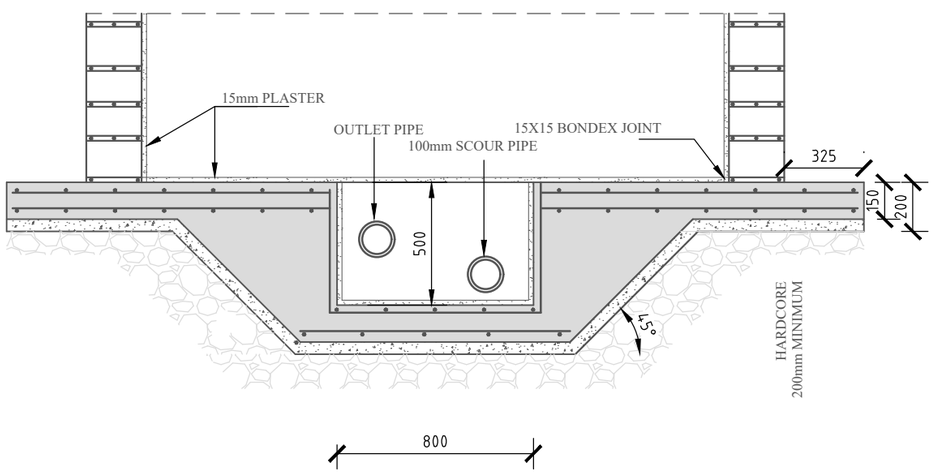
BOTTOM REINFORCEMENT OF FLOOR SLAB

SCALE 1:50



SECTION THRO' CENTRE OF TANK

SCALE 1:50

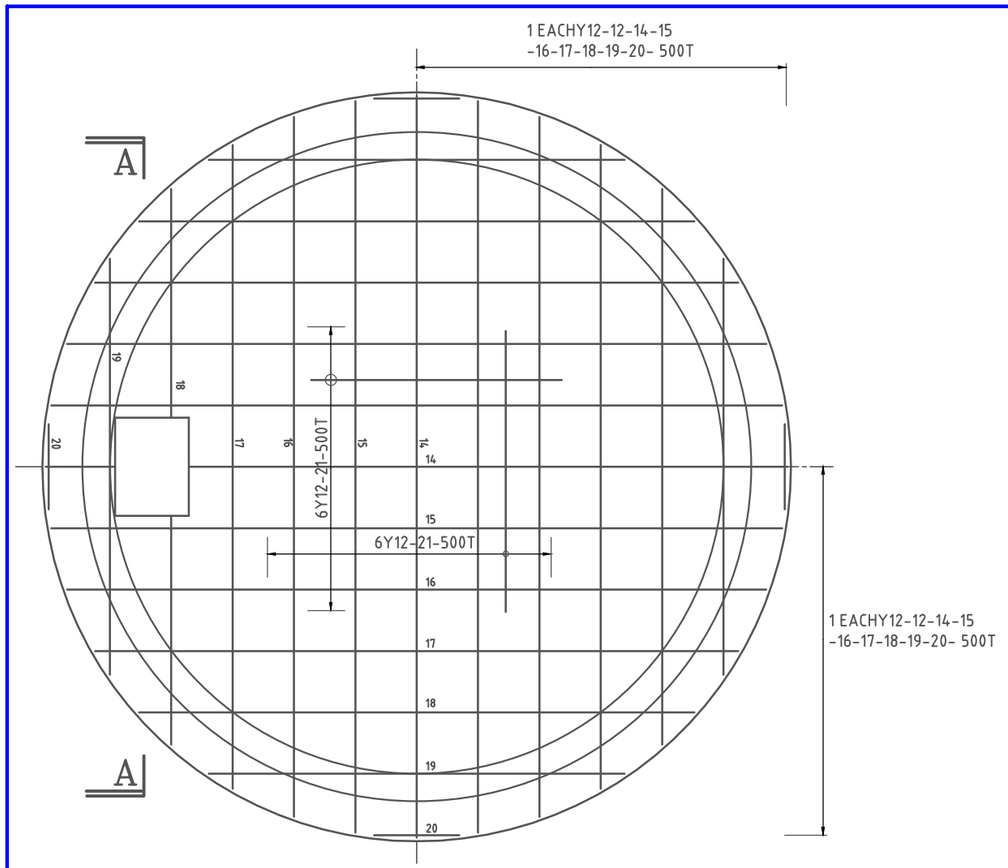


MINISTRY OF WATER & IRRIGATION- MAJI HOUSE

50 M³ MASONRY STORAGE TANK

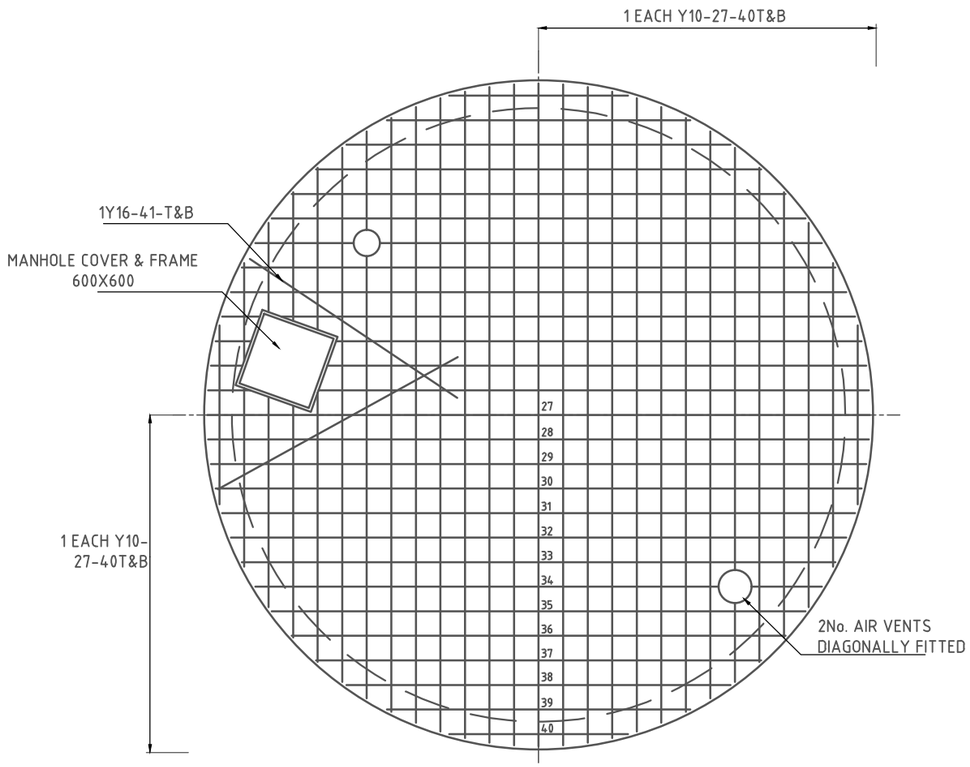
ROOF & FLOOR SLAB REINFORCEMENT

DESIGNED	J.M MUIRURI	DEC 1986	SHEET 1 OF 3
DRAWN	J.M MUIRURI	DEC 1986	SCALE: AS SHOWN
DIGITIZED	ALUCHIO M.F	JUNE 2009	DRG. NO.
CHECKED	ENG. B.I KASABULI	JUNE 2009	M.W.I
APPROVED	D.W.S	JUNE 2009	013-TYPE-084B



TOP REINFORCEMENT OF FLOOR SLAB

SCALE 1:50



REINFORCEMENT OF ROOF SLAB

SCALE 1:50

MINISTRY OF WATER & IRRIGATION- MAJI HOUSE

50 M³ MASONRY STORAGE TANK

ROOF & FLOOR SLAB REINFORCEMENT

DESIGNED	J.M MUIRURI	DEC 1986	SHEET 2 OF 3
DRAWN	J.M MUIRURI	DEC 1986	SCALE: AS SHOWN
DIGITIZED	ALUCHIO M.F	JUNE 2009	DRG. NO.
CHECKED	ENG. B.I KASABULI	JUNE 2009	M.W.I
APPROVED	D.W.S	JUNE 2009	013-TYPE-084B

PIPE INSTALLATIONS

	POS No.	FITTING	DIA. (mm)	No.	REMARKS
SCOUR	1	SLIUCE VALVE	100mm	1	
	2	VIKING JOHNSON FLANGED ADAPTOR		1	
	3	HEXAGON NIPPLE		1	SEE NOTES SCOUR PIPE
	4	SCREWED FLANGE		1	
	5	PIPE W/ PUDDLE FLANGE ONE END THREADED, ONE PLAIN		1	L= 600mm
	6	SOCKET		2	
	7	PIPE, ONE END THREADED, ONE PLAIN.		1	LENGTH TO BE CUT ON SITE
OVERFLOW	8	TEE EQUAL (F)	D1	1	
	9	BEND 90 ° (F)	D1	2	
	10	ROUND ELBOW (F)	D1	2	
	11	HEXAGONAL NIPPLE	D1	1	
	12	REDUCING SOCKET (F)	D1D	1	SEE NOTES OVERFLOW
	13	PIPE W/ PUDDLE FLANGE THREADED BOTH ENDS	D1	1	L=600mm
	14	PIPE THREADED BOTH ENDS	D1	3	LENGTH TO BE CUT ON SITE
	14A	PVC/G.S ADAPTOR THR/ SOCKET	D1	1	L= 600. TYPE A1
OUTLET	15	SLUICE VALVE FLANGED	D2	1	
	16	CHECK VALVE FLANGED	D2	1	
	17	VIKING JOHNSON FLANGED ADAPTOR	D2	1	
	18	TEE EQUAL (F)	D2	1	SEE NOTE INLET PIPE
	19	HEXAGON NIPPLE	D2	1	
	20	SCREWED FLANGE	D2	1	
	21	PIPE W/PUDDLE FLANGE ONE END THREADED ONE PLAIN	D2	1	L=600mm
	22	SOCKET	D2	1	
	23	PIPE ONE END THREADED ONE PLAIN	D2	1	LENGTH TO BE CUT ON SITE
INLET	24	BALL VALVE FLANGED	D3	1	
	25	ROUND ELBOW (F)	D3	1	
	26	BEND 90°	D3	2	SEE NOTES INLET PIPE
	27	HEXAGON NIPPLE	D3		
	28	PIPE W/PUDDLE FLANGE ONE END THREADED ONE PLAIN	D3	1	L=600mm
	29	SCREWED FLANGE	D3	2	
	30	PIPE ONE END THREADED & ONE END PLAIN	D3	1	LENGTH TO BE CUT ON SITE
	31	PIPE THREADED BOTH ENDS	D3	2	LENGTH TO BE CUT ON SITE
	32	PVC/G.S ADAPTOR THR/SOCKET	D3	1	L=600mm. TYPE A1

NOTES
1.ALL PIPES SHALL BE OF MEDIUM DUTY AND COMFORM TO B.S 1387.
2.ALL FITTINGS SHALL CONFORM TO BS 1740 AND THREADING SHALL BE ACCORING TO BS 21.
3.ALL FLANGES SHALL CONFORM TO BS 4504 PN 16:10 PARALELLED 4.MACHINE FINISHED AND AT RIGHT ANGLES TO THE DIRECTIONAL AXIS.
5.FITTINGS SHALL BE OF BANDED TYPE (RIBBS)
6.ALL PIPES AND FITTINGS SHALL BE GALVANISED STEEL (G.S)

NOTES

OVERFLOW PIPE
PIPE DIAMETER = D1 MAXIMUM OULET CAPACITY Q_o MAX. DEPENDENT ON D1,D' AND WATER LEVEL ABOVE INLET.
D1 MINIMUM = 100mm WITH INLET MOUTH = 100mm (POS 12 REDUCING SOCKET IS THEN OMMITED)
CAPACITIES D1/D' = 100/100 Q_o MAX. = 9l/s
" = 100/150 " = 20l/s ALL CAPACITIES CALCULATED WITH WATER LEVEL. = 100/150
" = 150/200 " = 36l/s 200mm ABOVE INLET MOUTH
DIAMETER SHOULD BE CHOSEN ACCORDING TO THE MAX. INLET CAPACITY CALCULATED IN EACH CASE.
TOP OVERFLOW LEVEL MUST BE 20-30mm. ABOVE T.W.L TO ENSURE THAT THE BALL VALVE IS FULLY CLOSED.

SCOUR PIPE
SCOUR DIA. IS ALWAYS 100mm WHEN D1 (OVERFLOW DIA) > 100mm. POS 11 MUST BE CHANGED TO A REDUCING BUSH WITH NIPPLE KEEPING THE SCOUR VALVE POS 1 ALWAYS 100mm.

OUTLET PIPE
PIPE DIA. CAN VARY FROM 50mm. (2") UP TO 200mm (8"). (ABOVE 200mm. THE SUMP MUST BE WIDER AND DEEPER) D2 IS ALWAYS GREATER OR EQUAL TO D3.

INLET PIPE
TYPE OF BALL VALVE IS DEPENDENT ON PRESSURE AND WHETHER THE INLET PIPE IS CONNECTED TO A GRAVITY OR PUMPING MAIN (REF IS MADE TO DIFFERENT CATALOGUES, FO INSTANCE " GLENFIELD & KENNEDY").
MAX. DIA SHOULD BE 150mm TO KEEP A CLEARANCE BETWEEN THE BALL ARM AND ROOF WITH 500mm.
AVAILABLE FROM T.W.L TO ROOF THIS PERMITS A SIZE RANGE FOR A BALL VALVE OF TYPE "GLENFIELD" FROM 50mm. (2") UP TO 150mm (6") DEPENDENT ON TYPE (GRAVITY OR PUMPING).
A DOWN PIPE SHOULD ALWAYS BE FITTED TO THE BALL VALVE SUBMERGED 200mm. UNDER L.W.L TO KEEP THE FLOAT IN A STEADY POSITION WHEN WATER IS FLOWING INTO THE TANK.
THE MAX. PERMISSIBLE INLET CAPACITY IS BASED ON MAX. FLOW VELOCITY OF 2.1 m/s OR 3.0 m/s DEPENDENT OF TYPE OF BALL VALVE. (REF. GLRNFIELD & KENNEDY CATALOGUE)

CAPACITIES

		Y = 2.1 l/S	V = 3.0 m/s
(2")	50mm	4.5l/s	6m/s
(3")	80mm	10l/s	14m/s
(4")	100mm	18l/s	25m/s
(5")	125mm	27l/s	40m/s
(6")	150mm	38l/s	55m/s

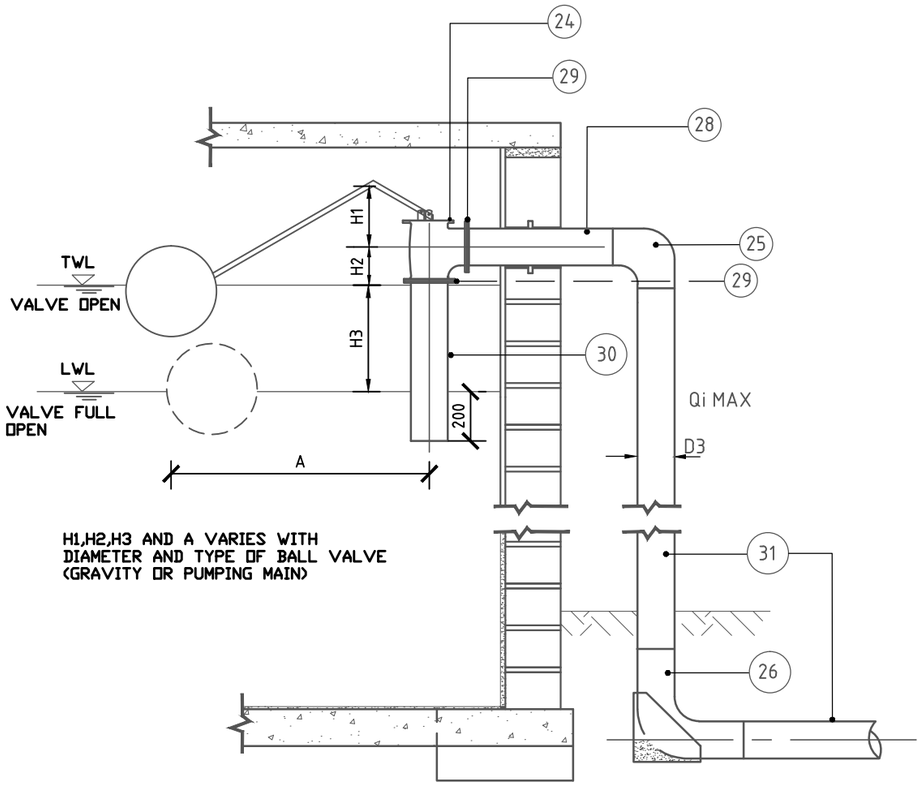
IF THE INFLOW TO THE STORAGE TANK IS BY GRAVITY AND THE AVAILABLE MANOMETRIC HEAD AT THE TANK IS ABOVE 5M. THEN IT IS ADVISABLE TO REDUCE THE SIZE OF THE BALL VALVE COMPARED TO THE DIAMETER OF THE PIPELINE. THIS IS EASILY DONE BY USING A REDUCING TEE IN POS 18.

WARNING
THIS PIPELINE INSTALLATIONS CANNOT BE USED FOR BREAK PRESSURE TANKS.

MINISTRY OF WATER & IRRIGATION- MAJI HOUSE

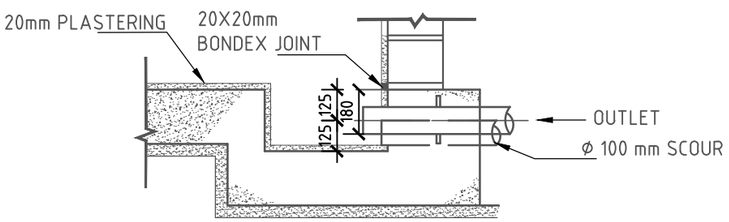
NOT FOR BREAK PRESSURE TANK TYPICAL PIPE LINSTALLATIONS FOR GROUNDLEVEL TANKS WITH COMBINED INLET & OUTLET PIPE FOR $10m^3$ TO $150m^3$

DESIGNED	T. DIESTAD		SHEET 3 OF 3
TRACED	N.O MOMAMYI	MAY 1975	SCALE: AS SHOWN
DIGITIZED	ALUCHIO M.F	OCT. 1999	DRG. NO.
CHECKED	ENG. B.I KASABULI	JUNE 2009	M.W.I
APPROVED	D.W.S	JUNE 2009	013-TYPE-088



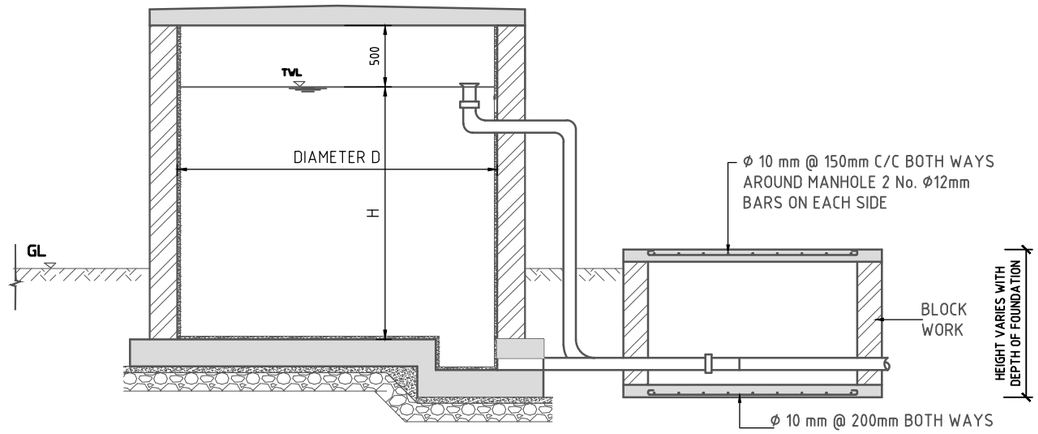
SECTION C–C INLET PIPE

SCALE 1:25



SECTION B–B OUTLET & SCOUR PIPE

SCALE 1:25



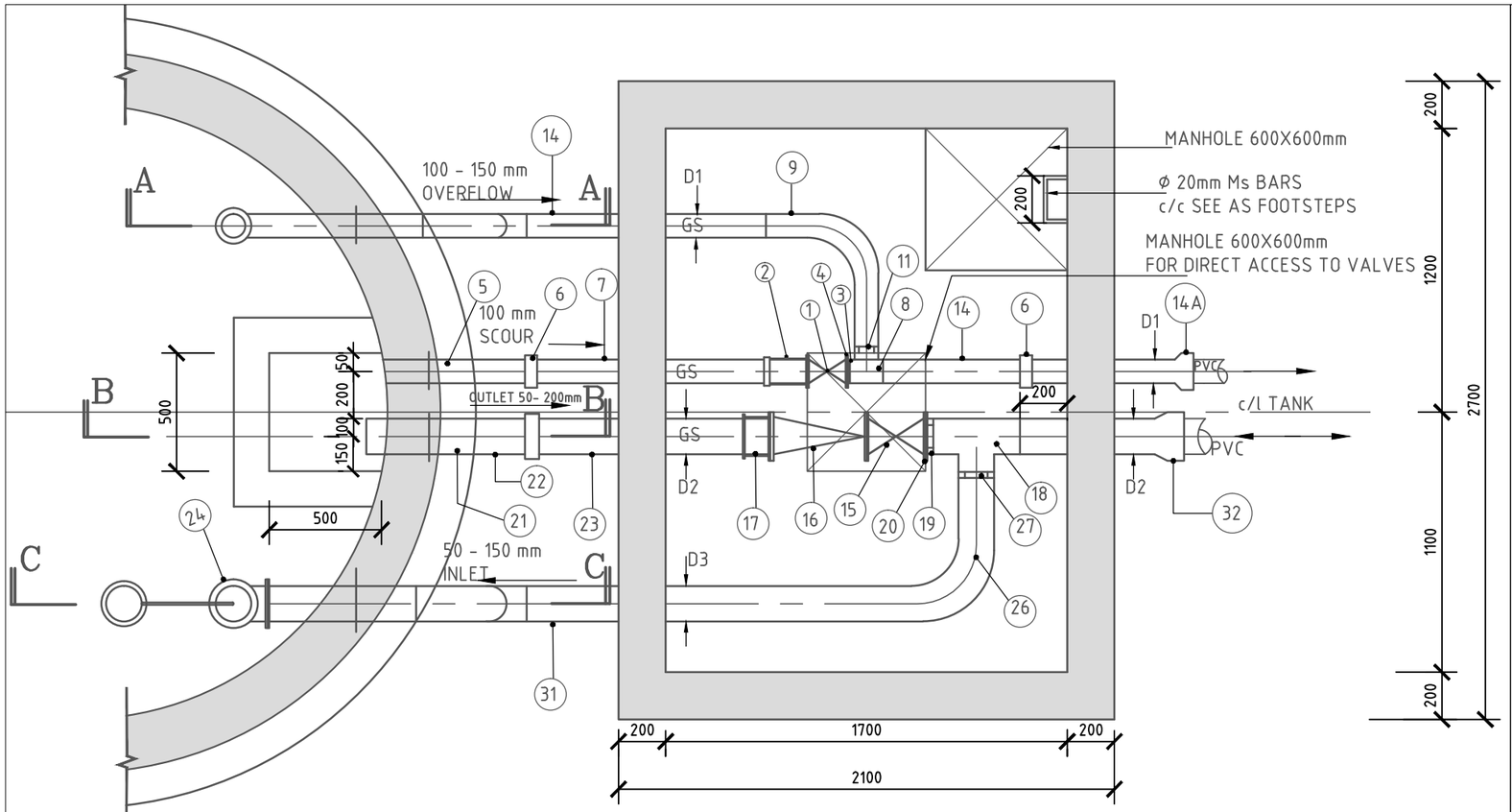
STORAGE TANK VALVE CHAMBER

SCALE 1:50

MINISTRY OF WATER & IRRIGATION- MAJI HOUSE

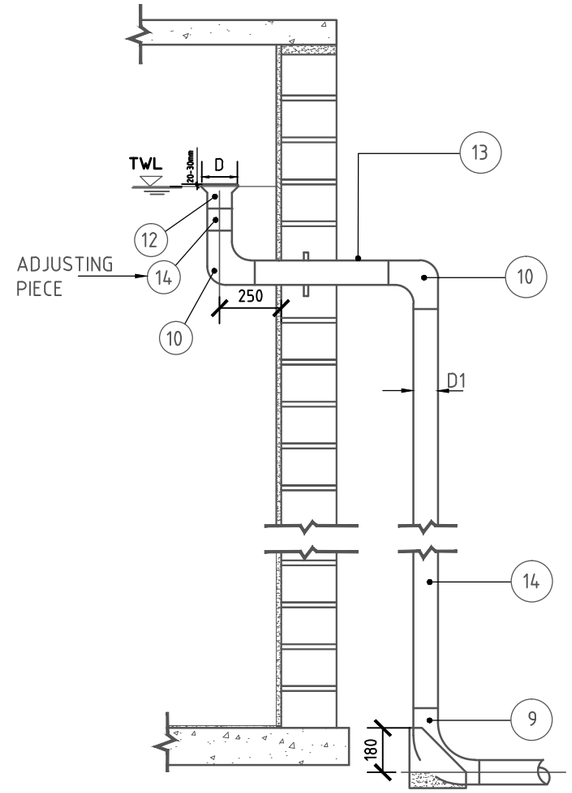
NOT FOR BREAK PRESSURE TANK TYPICAL PIPE LINSTALLATIONS FOR GROUNDLEVEL TANKS WITH COMBINED INLET & OUTLET PIPE FOR $10m^3$ TO $150m^3$

DESIGNED	T. DIESTAD		SHEET 1 OF 3
TRACED	N.O MOMAMYI	MAY 1975	SCALE: AS SHOWN
DIGITIZED	ALUCHIO M.F	OCT. 1999	DRG. NO.
CHECKED	ENG. B.I KASABULI	JUNE 2009	M.W.I
APPROVED	D.W.S	JUNE 2009	013-TYPE-088



VALVE CHAMBER

SCALE 1:25



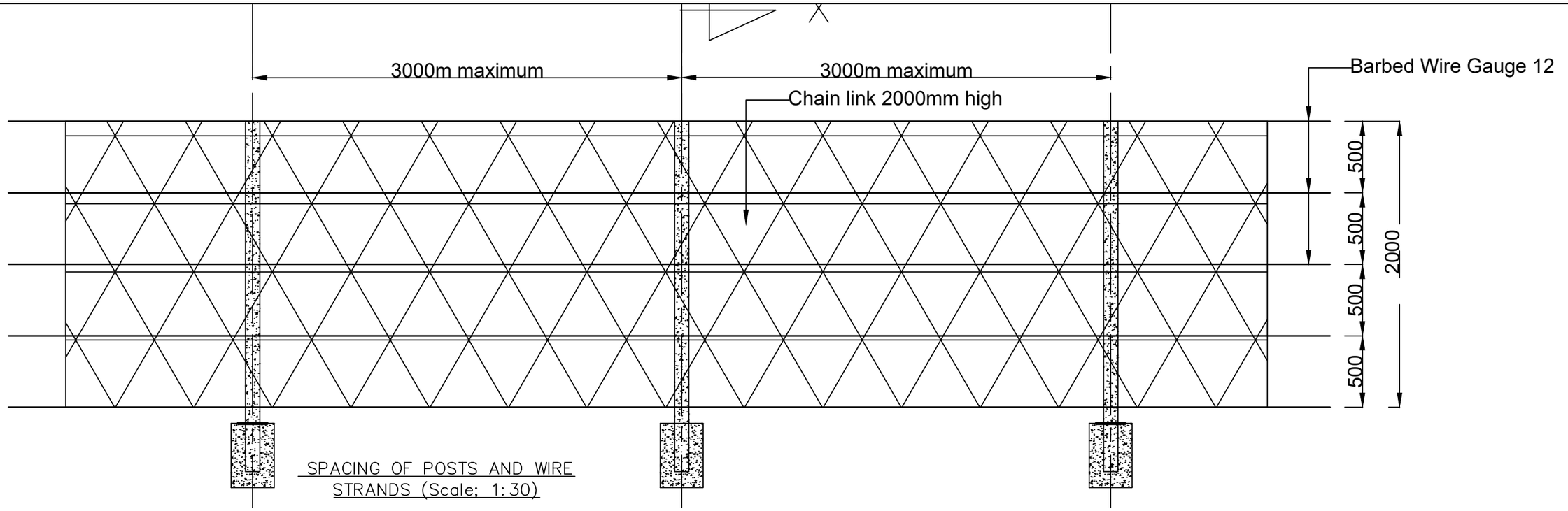
SECTION A–A
OVERFLOW PIPE

SCALE 1:25

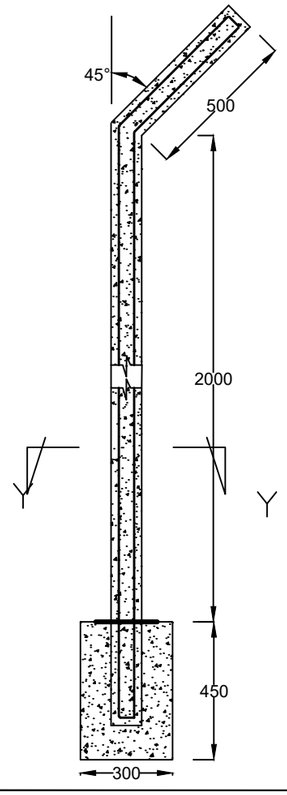
MINISTRY OF WATER &
IRRIGATION- MAJI HOUSE

NOT FOR BREAK PRESSURE TANK
TYPICAL PIPE LINSTALLATIONS FOR
GROUNDLEVEL TANKS WITH COMBINED
INLET & OUTLET PIPE
FOR 10m³ TO 150m³

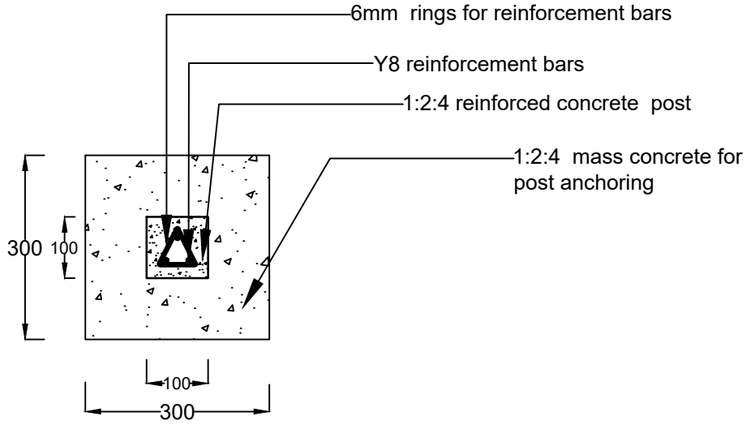
DESIGNED	T. DIESTAD		SHEET 2 OF 3
TRACED	N.O MOMAMYI	MAY 1975	SCALE: AS SHOWN
DIGITIZED	ALUCHIO M.F	OCT. 1999	DRG. NO.
CHECKED	ENG. B.I KASABULI	JUNE 2009	M.W.I
APPROVED	D.W.S	JUNE 2009	013-TYPE-088



SPACING OF POSTS AND WIRE STRANDS (Scale; 1:30)



SECTION X – X
(Scale; 1:20)



SECTION Y – Y
(Scale; 1:10)

MINISTRY OF AGRICUTURE, WATER & LIVESTOCK DEVELOPMENT

THE COUNTY GOVERNMENT OF KITUI

FENCING FOR EARTHDAMS, WATER TANKS, and BOREHOLE /PUMPHOUSE COMPOUNDS

Sheet 2 of 2

Scale: As Shown

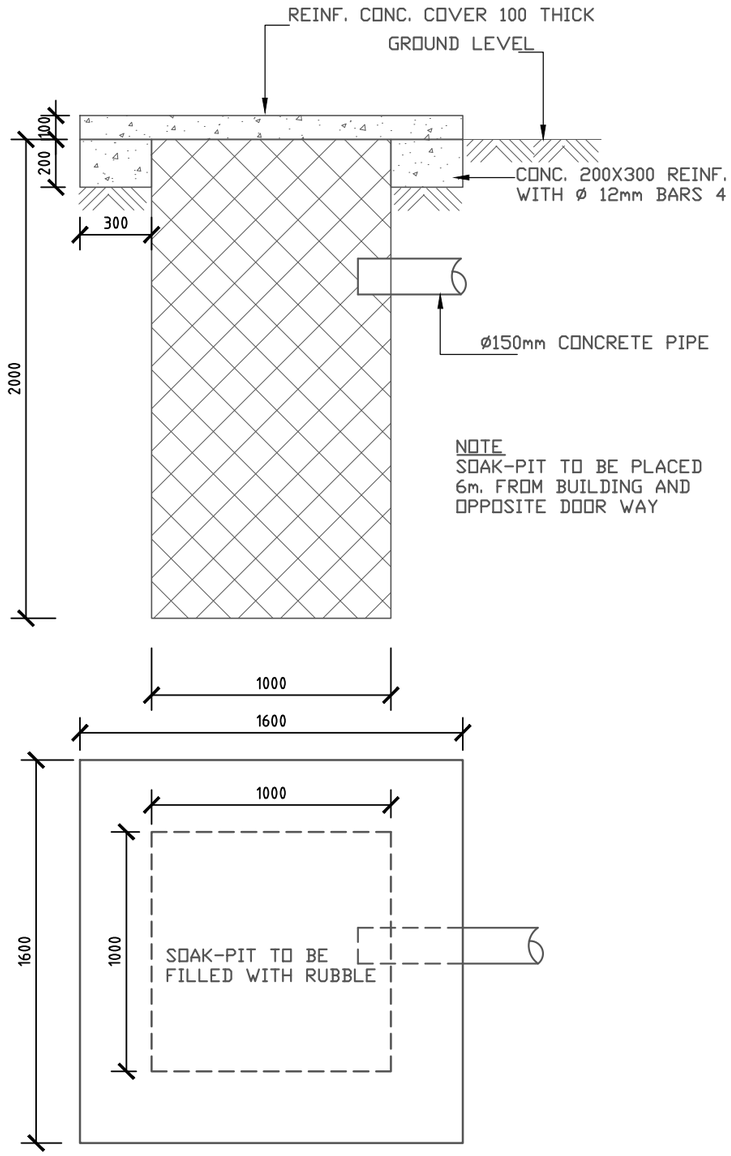
FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING

SURVEYED BY		DATE:
DIGITIZED BY	M. M. Mulwa	DATE: Jan 2018
CHECKED BY		DATE
DESIGNED BY	M. M. Mulwa	DATE: Jan 2018
CHECKED BY		DATE

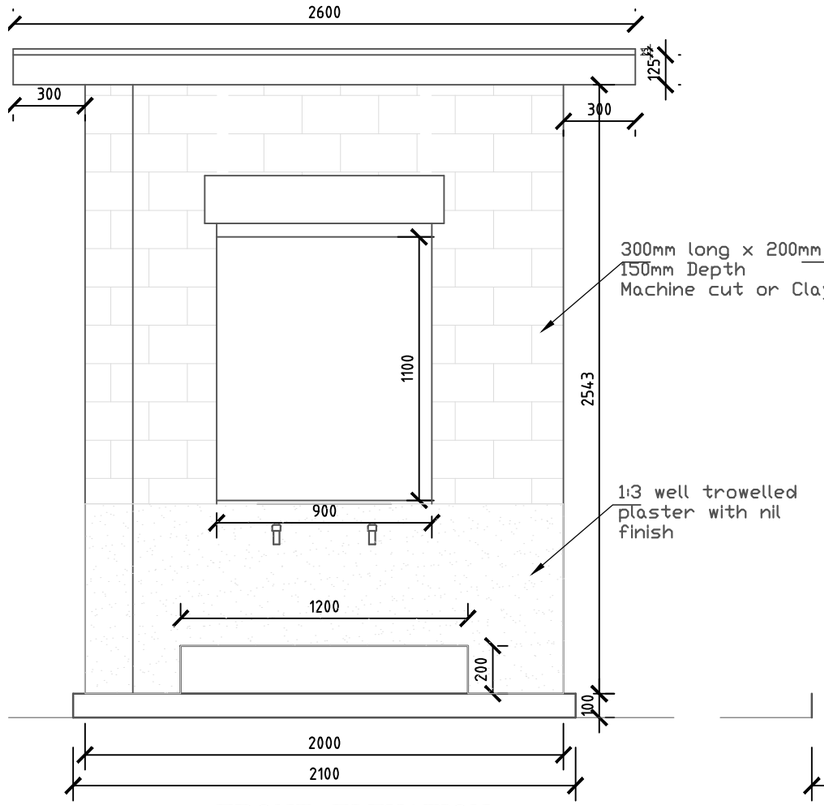
Director Water Services & Resources Date

Head Water Resources Date

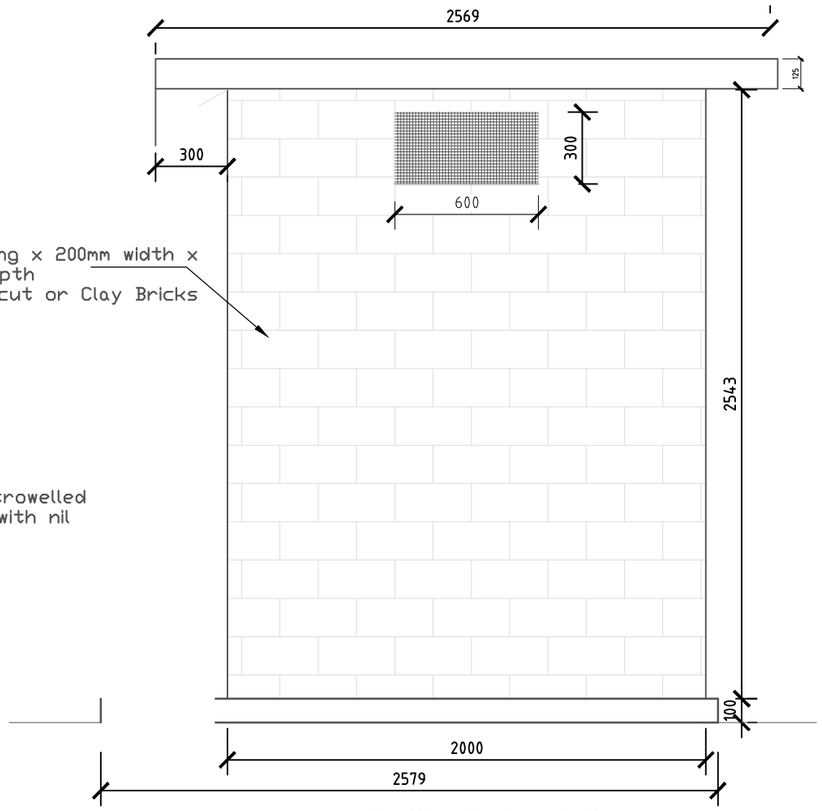
DRG. No. MAW&LD



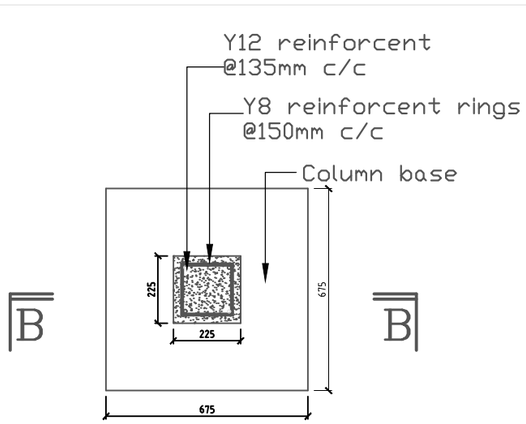
SECTION B–B
SCALE 1:25



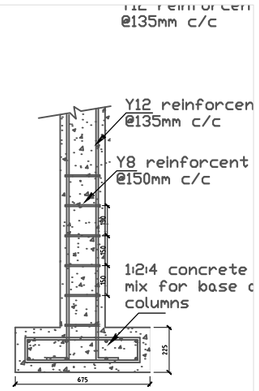
FRONT ELEVATION
SCALE 1:25



BACK ELEVATION
SCALE 1:25



COLUMN ARRANGEMENT
Scale 1:20



SECTION B–B
COLUMN ARRANGEMENT
Scale 1:30

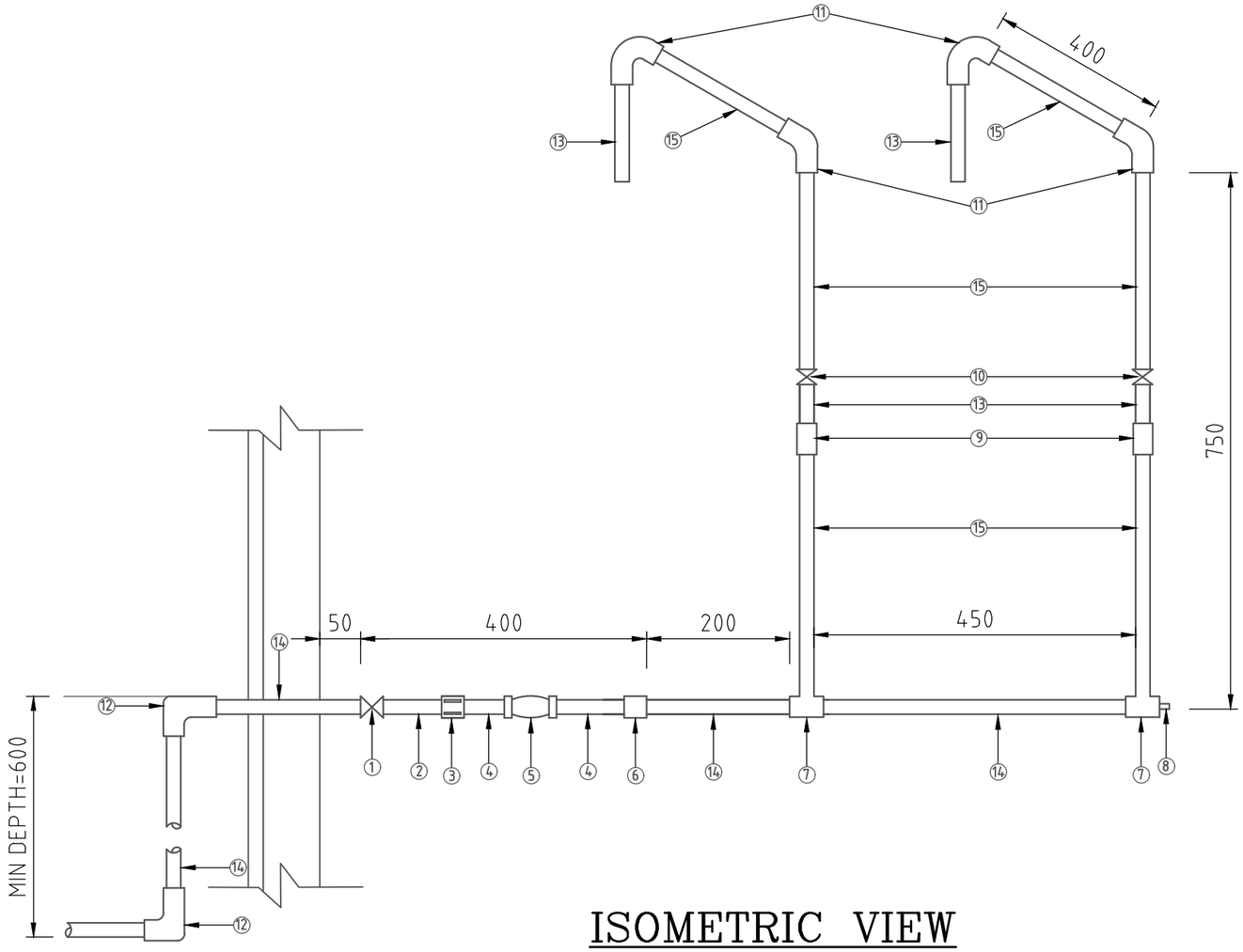
COUNTY MINISTRY OF AGRICULTURE, WATER AND LIVESTOCK DEVELOPMENT

DEPARTMENT OF WATER AND IRRIGATION

STANDARD WATER KIOSK

ALL DIMENSIONS IN MILLIMETERS

DESIGNED	M. MULWA		SHEET 3 OF 4
DRAWN	M. MULWA	April 2020	SCALE: AS SHOWN
DIGITIZED	M. MULWA	April 2020	DRG. NO.
CHECKED			
APPROVED	Chief Officer	April 2020	018-TYPE-004



ISOMETRIC VIEW
DETAIL OF PIPING

SCALE 1:10

LIST OF PIPE MATERIAL			
ITEM	DESCRIPTION	UNIT	QUANTITY
15	15mm G.S PIPE	PIECES	1200mm
14	20mm G.S PIPE	PIECES	1425mm
13	15mm BARREL NIPPLE	PIECES	4
12	20mm BEND	PIECES	2
11	15mm BEND	PIECES	4
10	15mm GLOBE VALVE	PIECES	2
9	15mm UNION SOCKET	PIECES	2
8	20mm PLUG	PIECES	1
7	20X15 REDUCING TEE	PIECES	2
6	20mm SOCKET	PIECES	1
5	20mm WASH WATER METER	PIECES	1
4	20mm METER UNION	PIECES	2
3	20mm SOCKET UNION	PIECES	1
2	20mm BARREL NIPPLE	PIECES	2
1	20mm GATE VALVE	PIECES	1

COUNTY MINISTRY OF AGRICULTURE,
WATER AND LIVESTOCK DEVELOPMENT

DEPARTMENT OF WATER AND IRRIGATION

STANDARD WATER KIOSK

ALL DIMENSIONS IN MILLIMETERS

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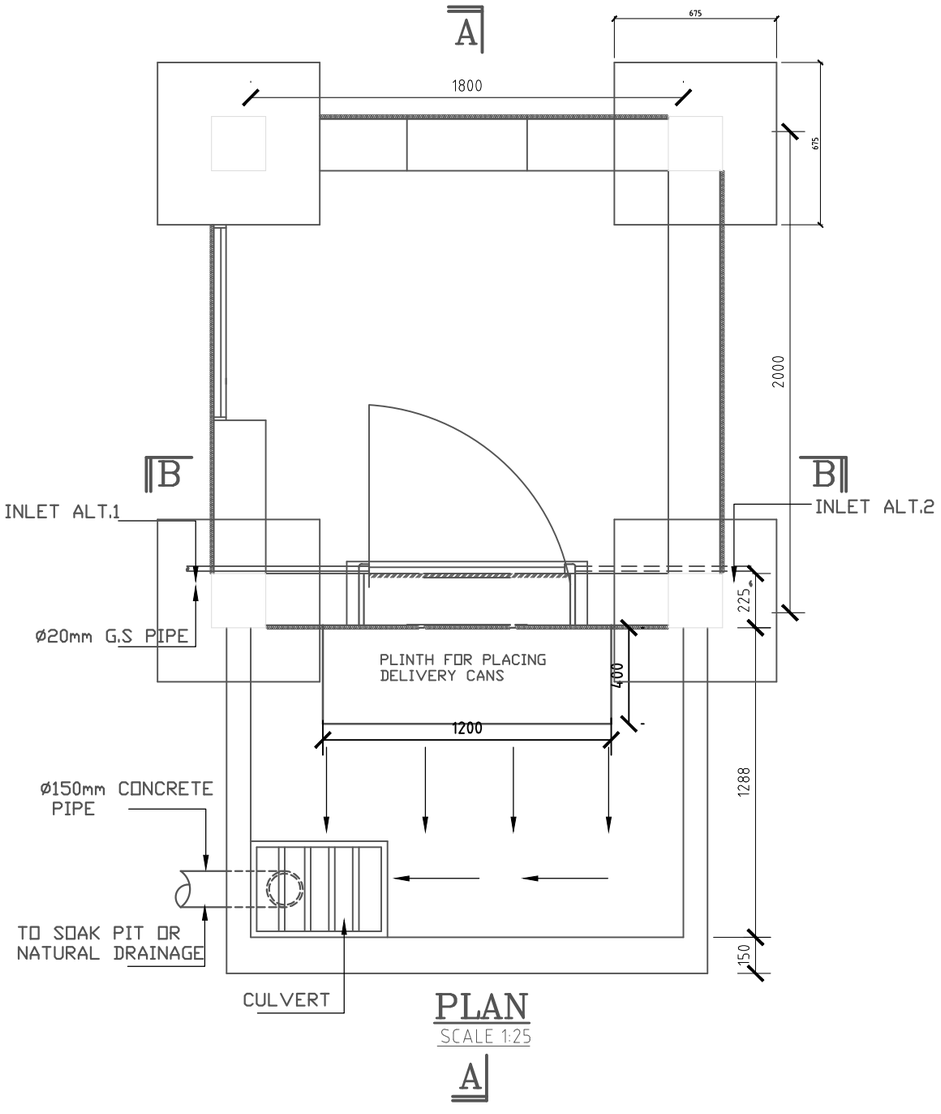
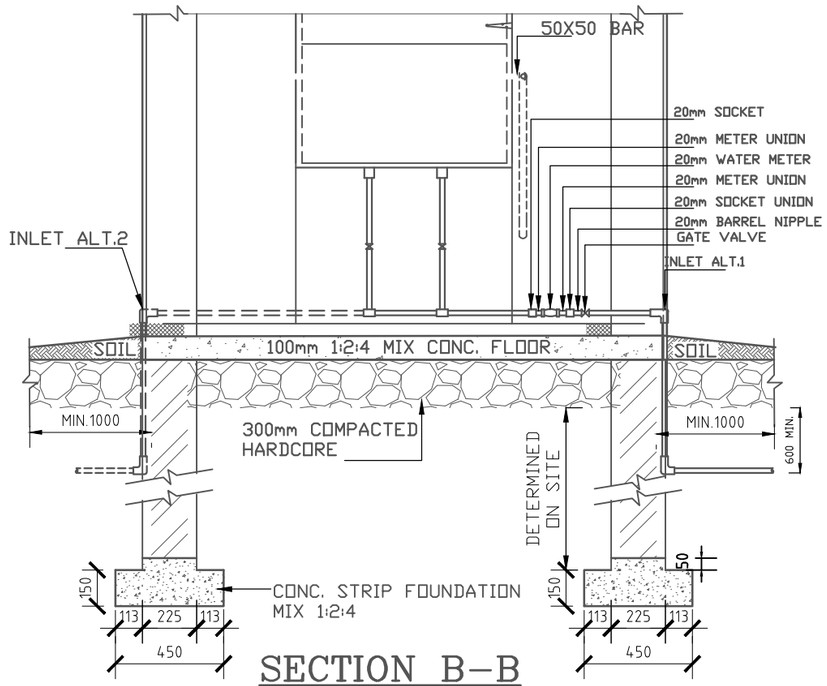


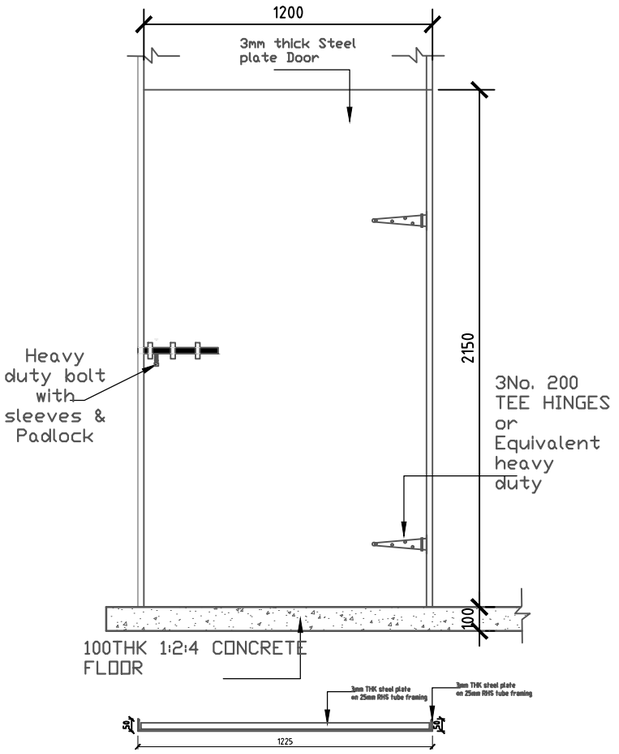
PLAN

SCALE 1:25



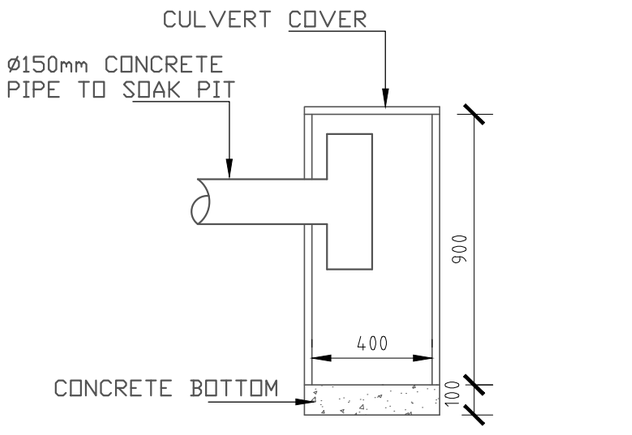
SECTION B–B

SCALE 1:25



DETAIL OF DOOR

SCALE 1:25



DETAIL OF CULVERT RING

SCALE 1:20

COUNTY MINISTRY OF AGRICULTURE, WATER AND LIVESTOCK DEVELOPMENT

DEPARTMENT OF WATER AND IRRIGATION

STANDARD WATER KIOSK

ALL DIMENSIONS IN MILLIMETERS

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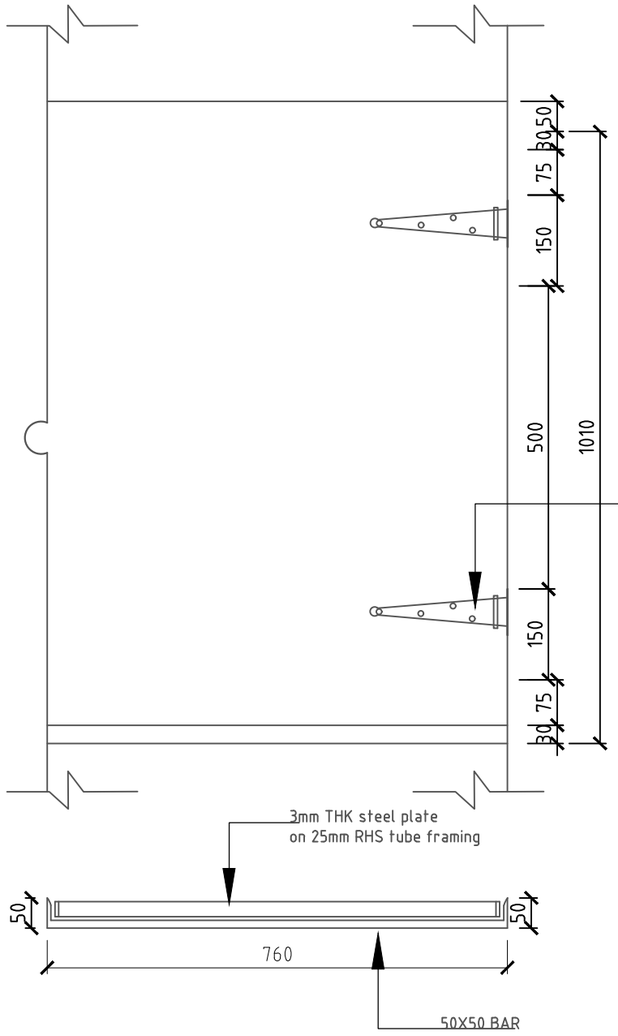
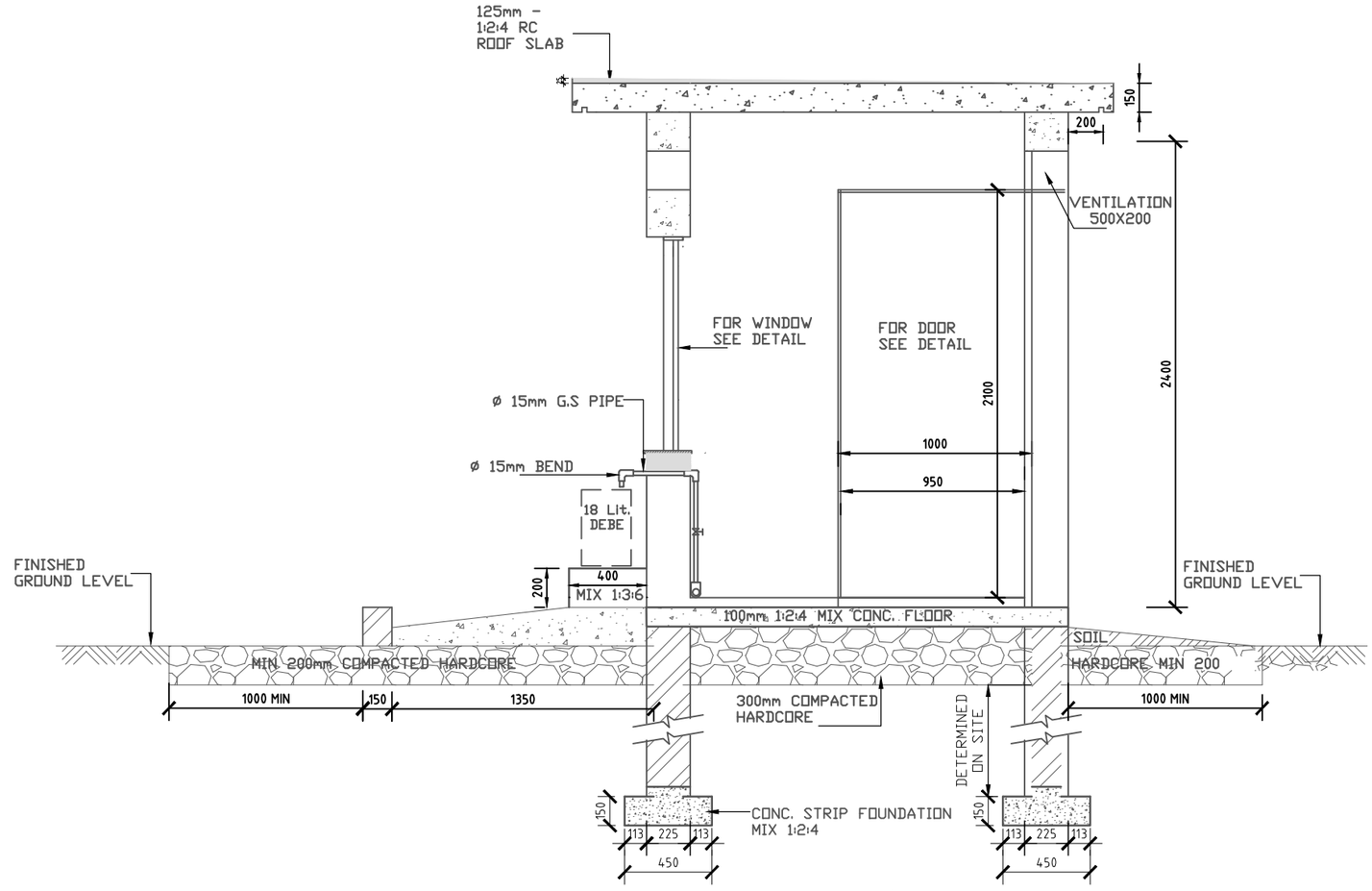
APPROVED	Chief Officer	April 2020	018-TYPE-004



DETAIL OF WINDOW

SCALE 1:10



SECTION THRO' A-A

SCALE 1:25

COUNTY MINISTRY OF AGRICULTURE,
WATER AND LIVESTOCK DEVELOPMENT

DEPARTMENT OF WATER AND IRRIGATION

STANDARD WATER KIOSK

ALL DIMENSIONS IN MILLIMETERS

DESIGNED	M. MULWA		SHEET 2 OF 4
DRAWN	M. MULWA	April 2020	SCALE: AS SHOWN
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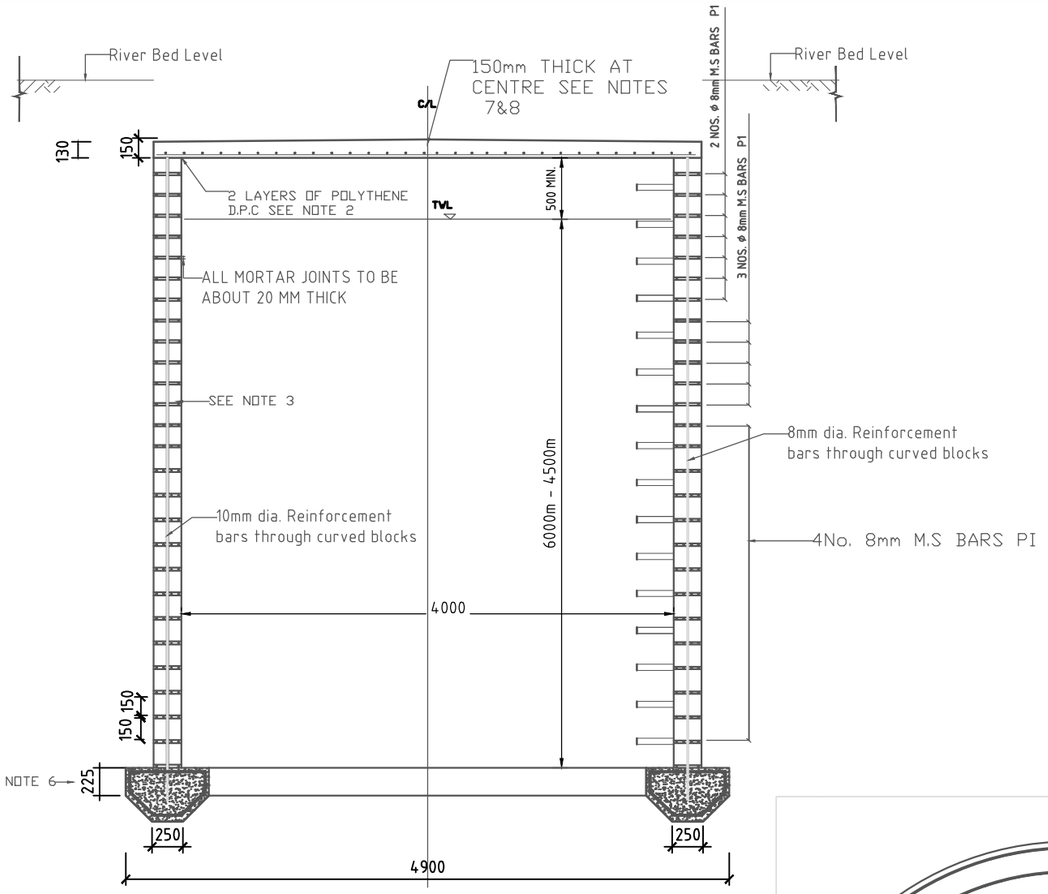
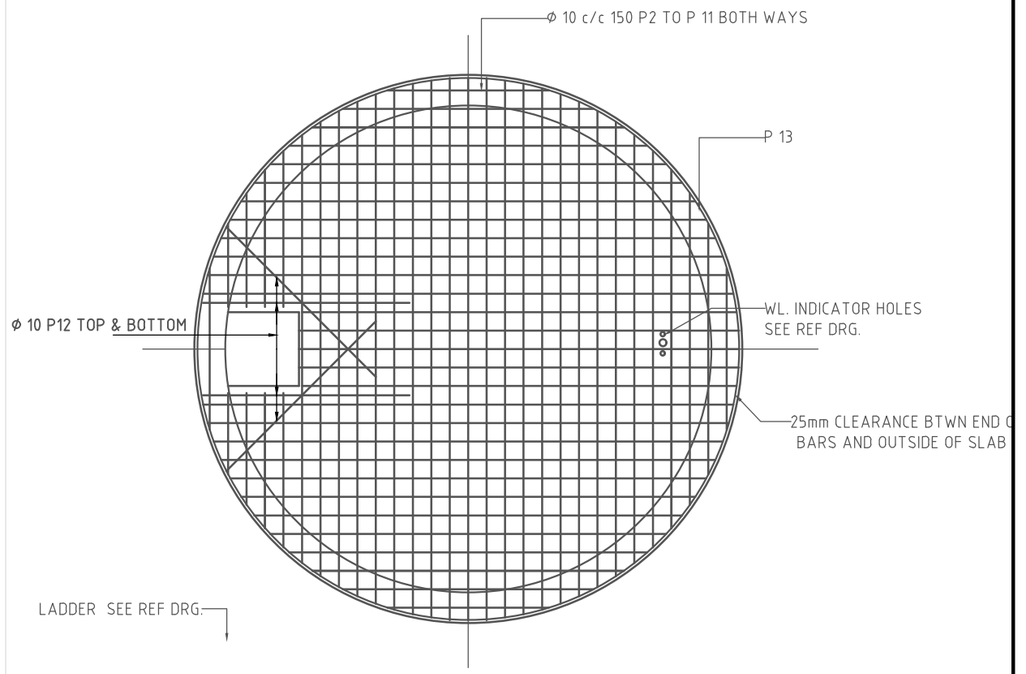
APPROVED	Chief Officer	April 2020	018-TYPE-004



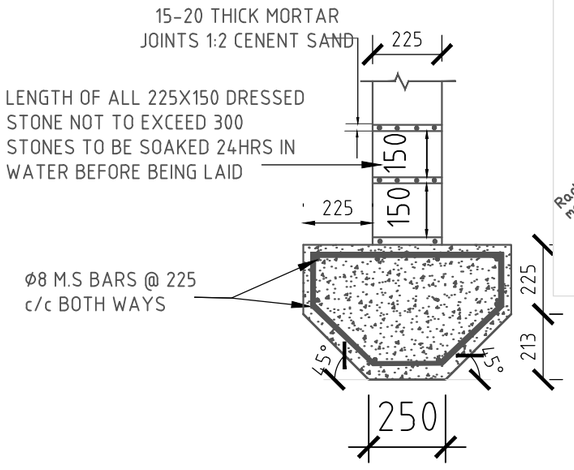
SECTION A–A

SCALE 1:50



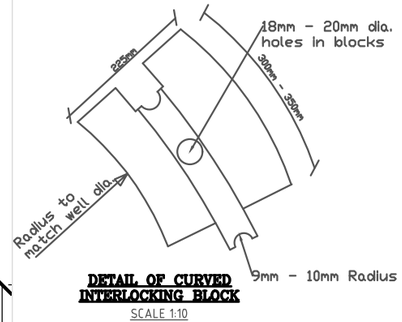
ROOF REINFORCEMENT

SCALE 1:50



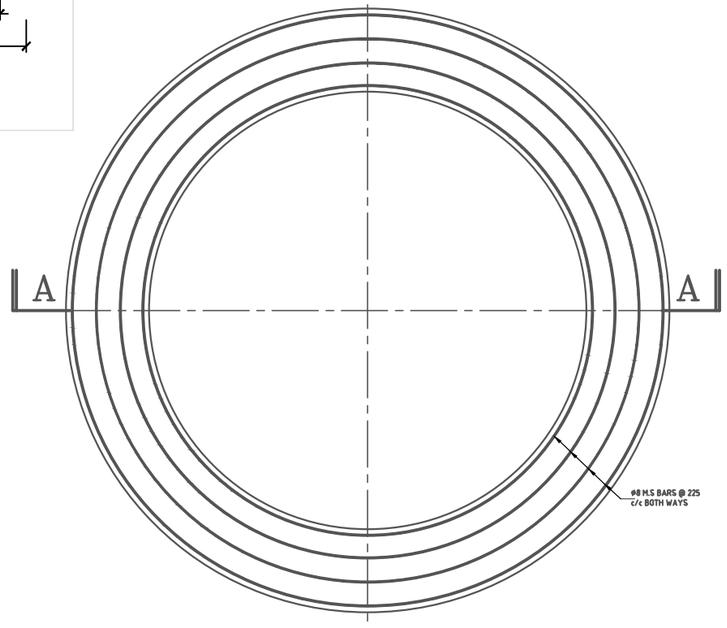
DETAIL AT FOOT OF WALL & WELL RING

SCALE 1:20



DETAIL OF CURVED INTERLOCKING BLOCK

SCALE 1:10



WELL RING REINFORCEMENT

SCALE 1:50

MINISTRY OF AGRICULTURE , WATER & IRRIGATION – KITUI COUNTY			
DEPARTMENT OF WATER & IRRIGATION			
25 – 40m³ MASONRY RELIEF/SUMPWELL			
DESIGNED	M MIKE	NOV 2019	SHEET 1 OF 2
			SCALE: AS SHOWN
DIGITIZED	M MIKE	NOV 2019	DRG. NO.
CHECKED			M.W.I
APPROVED	CO, W&I	NOV 2019	

BAR BENDING SCHEDULE

LOCATION	BAR MARK	BAR DIA. (mm)	TOTAL No.	LENGTH A (mm)	LENGTH B (mm)	CUT LENGTH (mm)	TOTAL LENGTH (m)	TYPE OF SHAPE	SKETCH OF SHAPE
WALL	1	8		AS REQUIRED		519675	576.0	A	A
ROOF	2	10	10	4370		4570	45.7	B	B
	3	"	8	4320		4430	35.5	B	
	4	"	8	4010		4210	33.7	B	
	5	"	8	3690		3890	31.2	B	
	6	"	4	3470		3670	14.7	B	
	7	"	4	3220		3420	13.7	B	
	8	"	4	2910		3110	12.5	B	
	9	"	4	2530		2730	11.0	B	
	10	"	4	2040		2240	9.0	B	
	11	"	4	1310		1510	6.1	B	
	12	"	8	1700		1900	15.2	B	
	13	8	2	7800		8000	16.0	A	
WELL RING	14	8	2	11504		11604	23.208	A	C
	15	8	2	12592		12792	25.384	A	
	16	8	2	13817		14017	27.834	A	
	17	8	2	15042		14242	30.284	A	
	18	8	59	1600		1800	94.6	C	
WALL	WALL	10	45	6000		6150	276.75	D	D
SUMMARY (length in meters)	BAR DIAMETER						8	10	
	TANK SITED ON NORMAL SOIL CONDITIONS						793.31	521.05	

NOTES

1.HARD-CORE LAYER THICKNESS SHALL BE DETERMINED BY THE ENGINEER, BUT NOT LESS THAN 200mm

2. MASONARY WALL SHALL BE CONNECTED TO THE WELL RING AND THE ROOF SLAB.

3.THE MASONARY WALL SHALL BE BUILT OF GOOD QUALITY CURVED INTERLOCKING BLOCKS (MADE OF CONCRETE CLASS 20/20). THE SIZE SHALL BE:

WIDTH: NOT LESS THAN 225mm

LENGTH: BETWEEN 200 AND 300 mm

HEIGHT: NOT MORE THAN 150 mm

THE STONES SHALL BE SOAKED IN WATER FOR 24HRS BEFORE BEING BUILT INTO THE WALL. PARTICULAR CARE MUST BE TAKEN TO FILL ALL THE JOINTS COMPLETELY WITH MOTAR.(MOTAR MIXTURE 3:1, SAND: CEMENT)

4. CONCRETE CONCRETE CLASS 20/20 (MIXTURE 1:2:4) FOR WELL RING, ROOF SLAB AS WELL AS CONCRETE BLOCKS.

5. REINFORCEMENT MILD STEELBARS TO BS 4449 MINIMUM CONCRETE COVER OF THE OF REINFORCEMENT 40mm

6.WELL RING OF THE SUMP MUST BE 200mm OR MORE, THE REINFORCEMENT MUST BE DIAM. DIAM. 8mm BARS C/C 200 CBOTHWAYS)

7. CONSTRUCTION JOINTS ARE NOT PERMITTED ,THE SLABS MUST BE CASTED IN ONE TIME.

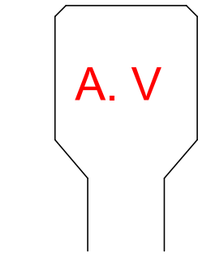
8. FORMWORK FOR THE ROOF SLAB MUST HAVE A CAMBER OF 20mm AT THE CENTRE

MINISTRY OF AGRICULTURE , WATER & IRRIGATION – KITUI COUNTY

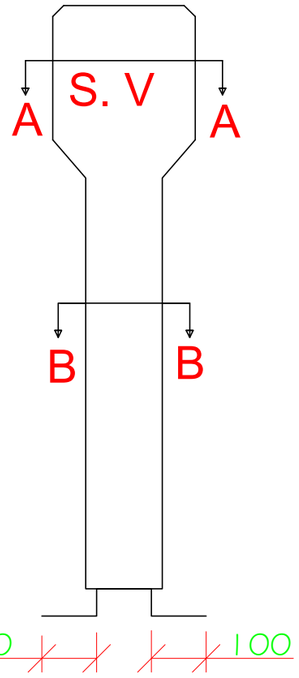
DEPARTMENT OF WATER & IRRIGATION

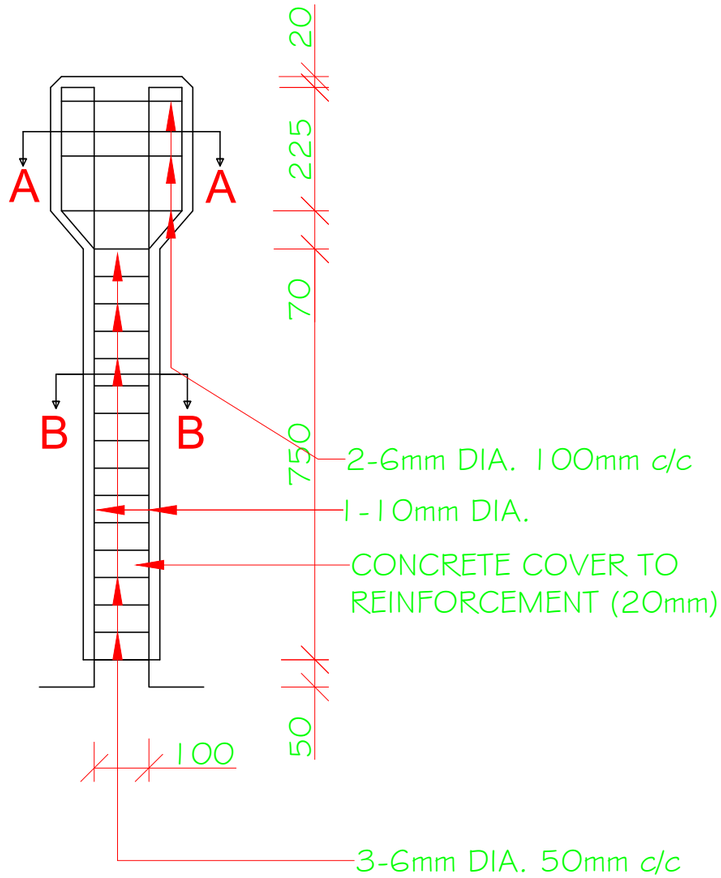
25 – 40m³ MASONRY RELIEF/SUMPWELL

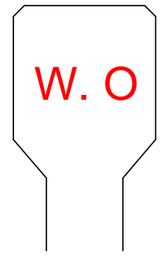
DESIGNED	M MIKE	NOV 2019	SHEET 2 OF 2
			SCALE: AS SHOWN
DIGITIZED	M MIKE	NOV 2019	DRG. NO.
CHECKED			W & I
APPROVED	CO, W&I	NOV 2019	



DIMENSIONS AS
FOR SLUICE VALVE



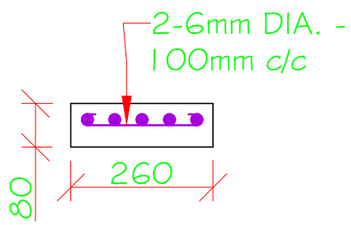




DIMENSIONS AS
FOR SLUICE VALVE

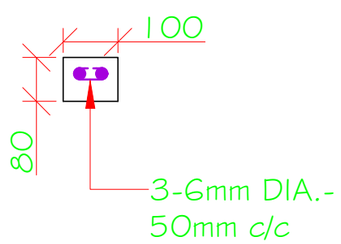
MARKER POST

SCALE 1:10



SECTION A-A

SCALE 1:10



SECTION B-B

SCALE 1:10

REVISION		
No.	DATE	DESCRIPTION

REFERENCE DRAWINGS

H.O. No.	DESCRIPTION

MINISTRY OF WATER
& IRRIGATION

HEADQUARTERS

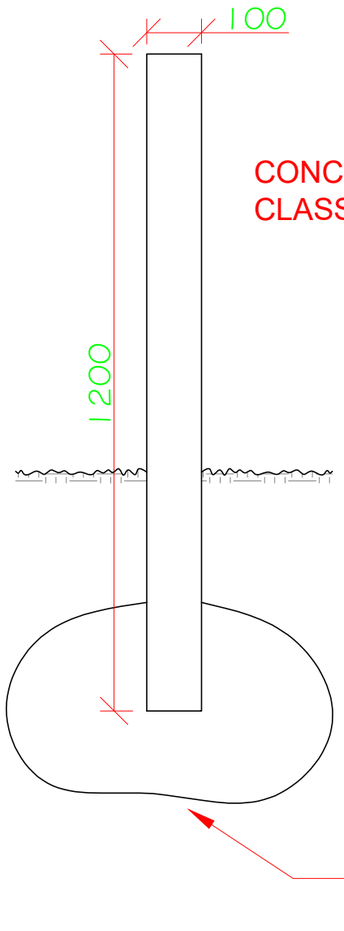
MANHOLES & MARKER POST

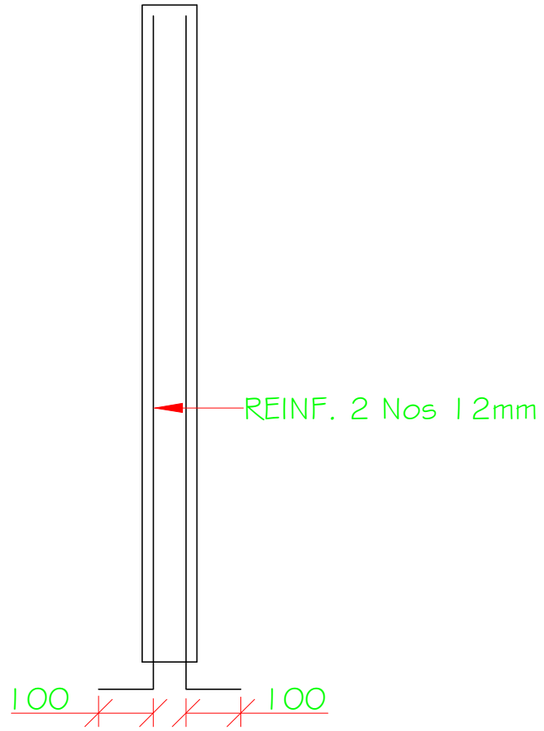
SHEET 2 OF 4

SCALE AS SHOWN

FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING

M.o.W.I	DRG. No.	017-TYPE-008
	FILE No.	
DESIGNED/ DRAWN	J. N. MAINA	DATE :
CHECKED:	ENG. KASABULI	DATE : MARCH 10, 2010
DIGITIZED :	MUGAMBI D.	DATE : MARCH 10, 2010
CHECKED :	CHEBII	DATE : MARCH 10, 2010





PIPELINE MARKER TYPE II

SCALE 1:10

BAR BENDING CHART

BAR MARK	DIAMETER IN mm	No. OF BARS	LENGTH (mm)	TOTAL LENGTH (mm)	BAR BENDING DETAILS
1	10	2	1640	3250	
2	6	3	340	1020	
3	6	16	140	2240	

REVISION		
No.	DATE	DESCRIPTION

REFERENCE DRAWINGS

H.O. No.	DESCRIPTION

MINISTRY OF WATER
& IRRIGATION

HEADQUARTERS

MANHOLES & MARKER POST

SHEET 3 OF 4

SCALE AS SHOWN

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M.o.W.I	DRG. No.	017-TYPE-008
	FILE No.	

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DIGITIZED :	MUGAMBI D.	DATE : MARCH 10, 2010
CHECKED :	CHEBII	DATE : MARCH 10, 2010

AIR VALVES

DETAILS OF FITTINGS IN MANHOLES

1. AIR VALVE ON 100mm DIA. G.S PIPE
MANHOLE TYPE A

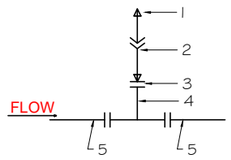


FIG. 1
SCALE 1:10

ITEM No.	DESCRIPTION	No. OF ITEMS
1.	SINGLE ORIFICE AIR VALVE (SMALL ORIFICE TYPE)	1
2.	G.S REDUCING BUSH 50mmX50mm	1
3.	STEEL FLANGE, FEMALE THREADED 50mm N.I.D	1
4.	FLANGED STEEL TEE 100mmX50mm	1
5.	FLANGED STEEL PIPE 100mm N.I.D	

2. AIR VALVE ON 80mm DIA. G.S PIPE
MANHOLE TYPE A

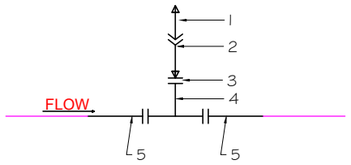


FIG. 2
SCALE 1:10

ITEM No.	DESCRIPTION	No. OF ITEMS
1.	SINGLE ORIFICE AIR VALVE (SMALL ORIFICE TYPE)	1
2.	G.S REDUCING BUSH 50mmX25mm	1
3.	G.S FLANGE, FEMALE THREADED 50mm N.I.D	1
4.	FLANGED STEEL TEE 100mmX50mm	
5.	80mm DIA. G.S PIPES FLANGED	

3. AIR VALVE ON 50mm DIA. PVC PIPE
MANHOLE TYPE A

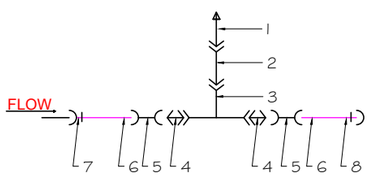


FIG. 3
SCALE 1:10

ITEM No.	DESCRIPTION	No. OF ITEMS
1.	SINGLE ORIFICE AIR VALVE (SMALL ORIFICE TYPE)	1
2.	G.S REDUCING BUSH 50mmX25mm	1
3.	STEEL TEE 50mm N.I.D FEMALE THREADED	1
4.	STEEL NIPPLE 50mm DIA.	2
5.	G.S SOCKET 50mm DIA.	2
6.	G.S PIPE 50mm N.I.D	-
7.	ADAPTER UNION PVC/ BRASS 50mm N.I.D	1
8.	ADAPTER UNION BRASS/ PVC 50mm N.I.D	1

NOTES:
1. THE ADAPTERS ARE SUITED OUTSIDE THE MANHOLES
2. ALL AIR VALVES SHALL BE SCREWED TYPE WITH MALE THREADS.

NOTES:
1. PVC PIPES CROSSING MANHOLE WALLS SHALL BE WRAPPED WITH THREE (3) LAYERS OF POLYTHENE SHEETING.
2. ALL MANHOLES ARE OF TYPE A
3. EVERY MANHOLE SHALL HAVE A MARKER POST INDICATING THE PURPOSE i.e SV, WO & AV FOR SLUICE VALVE, WASHOUT, AIR VALVE.
4. ALL MANHOLE SHALL BE PROVIDED WITH PADLOCKS.

WASH-OUT

DETAILS OF FITTINGS IN MANHOLES

1. WASH-OUT ON 100mm DIA. G.S PIPE
MANHOLE TYPE A

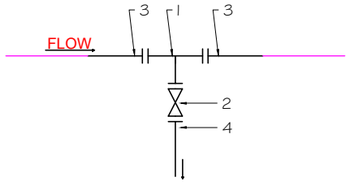


FIG. 4
SCALE 1:10

ITEM No.	DESCRIPTION	No. OF ITEMS
1.	FLANGED STEEL TEE 100mmX50mm	1
2.	FLANGED C.I SLUICE VALVE 50mm N.I.D	1
3.	FLANGED G.S PIPE (MAIN LINE) 100mm N.I.D	-
4.	FLANGED G.S PIPE (DRAIN) 50mm N.I.D	-

2. WASH-OUT ON 80mm DIA. G.S PIPE
MANHOLE TYPE A

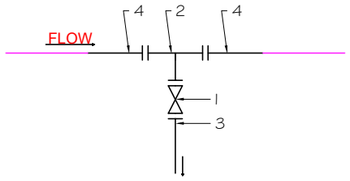


FIG. 5
SCALE 1:10

ITEM No.	DESCRIPTION	No. OF ITEMS
1.	FLANGED C.I SLUICE VALVE 50mm N.I.D	1
2.	FLANGED STEEL TEE 80mmX40mm	1
3.	G.S PIPE (DRAIN) 50mm N.I.D	1
4.	G.S PIPE (MAIN LINE) 80mm N.I.D	1

3. WASH-OUT ON 50mm DIA. PVC PIPE
MANHOLE TYPE A

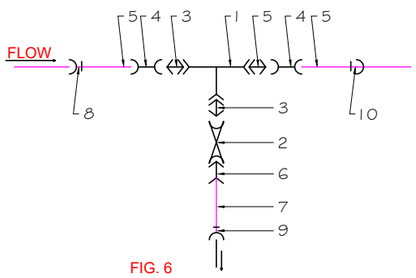


FIG. 6
SCALE 1:10

ITEM No.	DESCRIPTION	No. OF ITEMS
1.	STEEL TEE 50mm N.I.D	1
2.	GATE VALVE 80mm DIA.	1
3.	HEXAGONAL NIPPLE 50mm DIA.	3
4.	G.S SOCKET 50mm DIA.	2
5.	G.S PIPE 50mm DIA.	-
6.	G.S REDUCING BUSH 50mmX25mm	1
7.	G.S PIPE 25mm DIA.	-
8.	ADAPTER UNION PVC/ BRASS 50mm N.I.D	1
9.	ADAPTER UNION BRASS/ PVC 25mm N.I.D	1
10.	ADAPTER UNION BRASS/ PVC 50mm N.I.D	1

NOTES:
1. THE DRAIN PIPES TO TERMINATE ON A NATURAL DEPRESSION OR FALLOW.
2. THE PIPE ADAPTERS TO BE OUTSIDE THE MANHOLES.
3. ALL MANHOLES ARE OF TYPE A.

REVISION		
No.	DATE	DESCRIPTION

REFERENCE DRAWINGS

H.O. No.	DESCRIPTION

MINISTRY OF WATER
& IRRIGATION

HEADQUARTERS

MANHOLES & MARKER POST

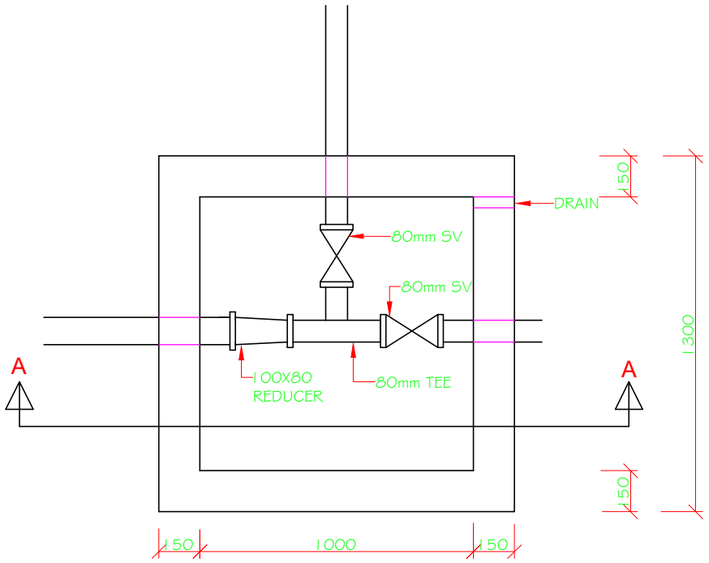
SHEET 4 OF 4

SCALE AS SHOWN

FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING

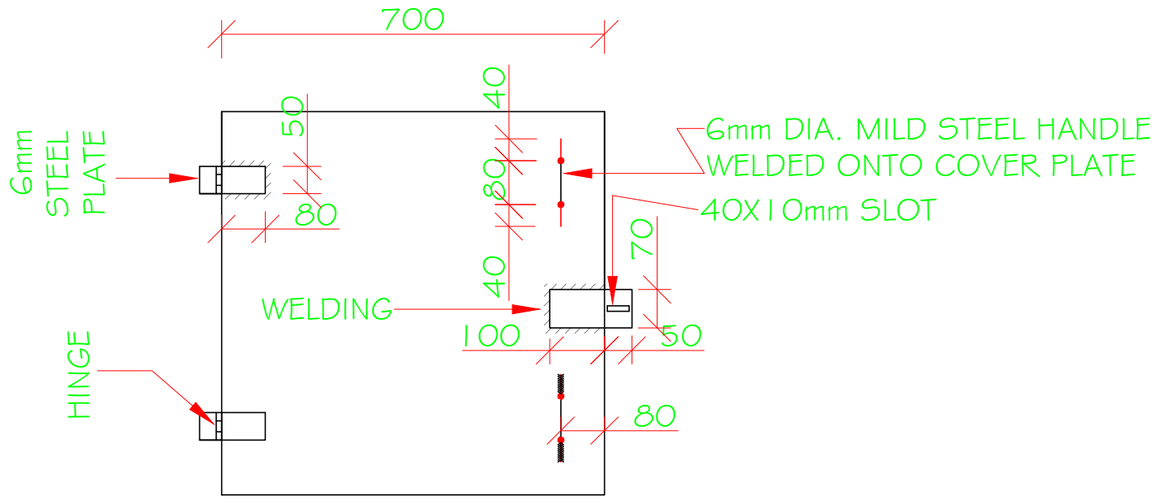
M.o.W.I	DRG. No.	017-TYPE-008
	FILE No.	

DESIGNED/ DRAWN	J. N. MAINA	DATE :
CHECKED:	ENG. KASABULI	DATE : MARCH 10, 2010
DIGITIZED :	MUGAMBI D.	DATE : MARCH 10, 2010
CHECKED :	CHEBII	DATE : MARCH 10, 2010



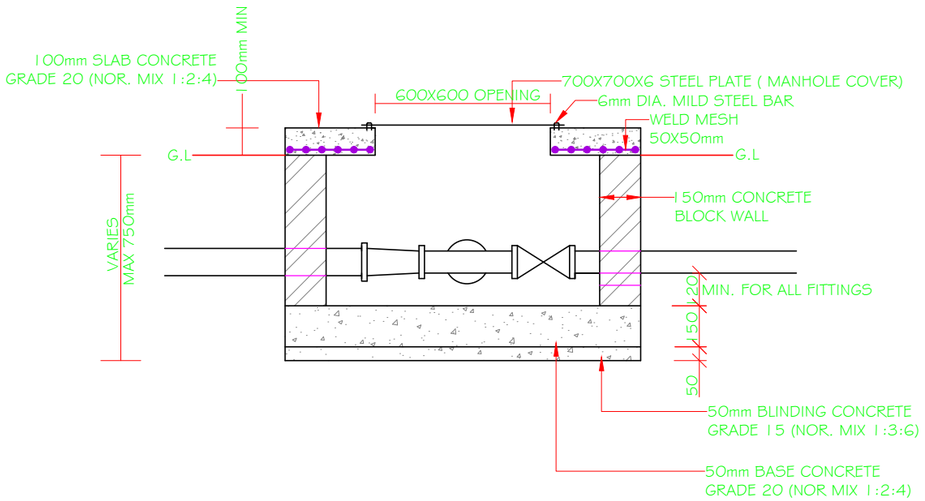
PLAN OF MAN HOLE TYPE A

SCALE 1:20



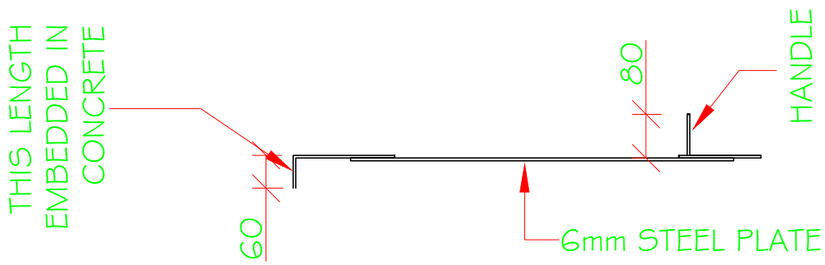
PLAN OF COVER PLATE

SCALE 1:10



SECTION A-A

SCALE 1:20



FRONT VIEW

SCALE 1:10

REVISION		
No.	DATE	DESCRIPTION

REFERENCE DRAWINGS

H.O. No.	DESCRIPTION

MINISTRY OF WATER
& IRRIGATION

HEADQUARTERS

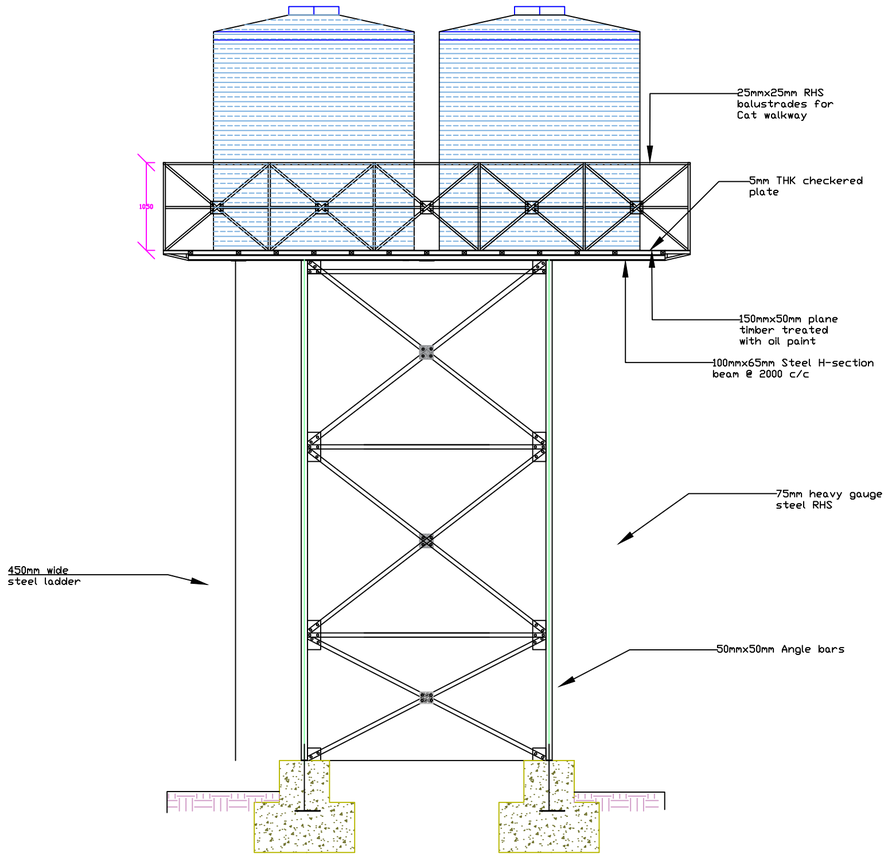
MANHOLES & MARKER POST

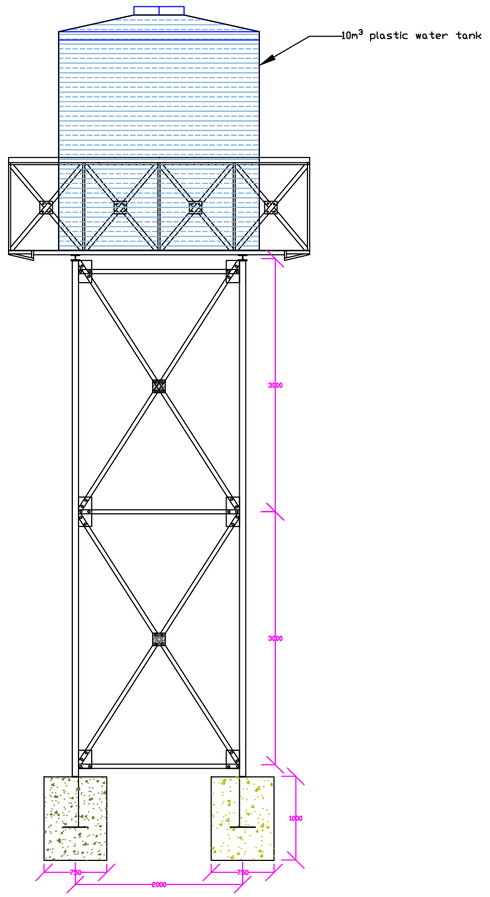
SHEET 1 OF 4

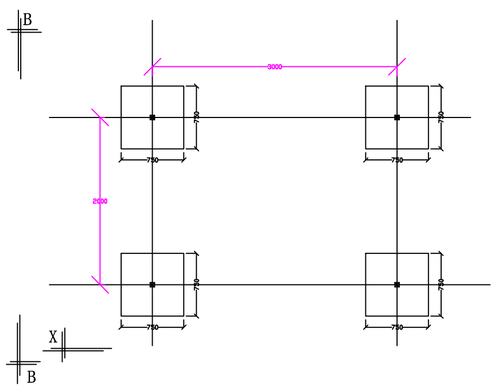
SCALE AS SHOWN

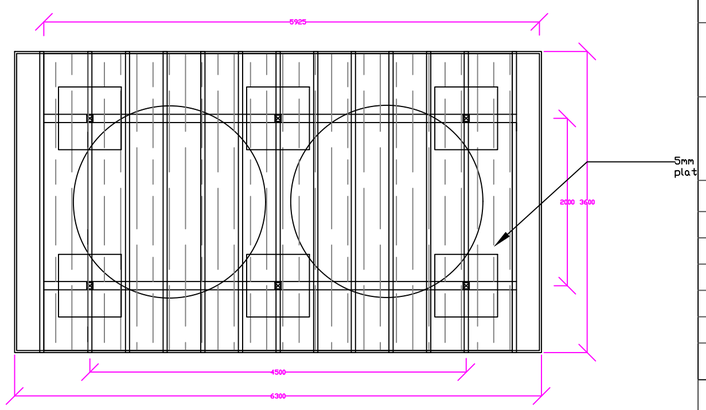
FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING

M.o.W.I	DRG. No.	017-TYPE-008
	FILE No.	
DESIGNED/ DRAWN	J. N. MAINA	DATE :
CHECKED:	ENG. KASABULI	DATE : MARCH 10, 2010
DIGITIZED :	MUGAMBI D.	DATE : MARCH 10, 2010
CHECKED :	CHEBII	DATE : MARCH 10, 2010









COUNTY GOVERNMENT OF KITUI

MINISTRY OF WATER & IRRIGATION

DEPARTMENT OF WATER

TWO PLASTIC WATER TANKS ON A 12M HIGH STEEL TOWER

DRAWN BY

Sheet 1 of 2

SCALE: AS SHOWN

FIGURED:DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING

SURVEYED BY		
	K. Kamwilwa	DATE: March 2023
	M. M. Mulwa	DATE: March 2023
DESIGNED BY	M. M. Mulwa	DATE: March 2023
	Eng.T. Saidi	DATE: March 2023

APPROVED BY : ENG KENNEDY P MUTATI
Deputy Director Water

DATE: March 2023

CHIEF OFFICER WATER DATE: March 2023

MoW&I

DRG. No.

CGOKTI/MWI/WD/2023/004 (1)

REVISION

DATE	DESCRIPTION

REFERENCE DRAWINGS

DRG. No.	DESCRIPTION