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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR PROPOSED THIKA-KIGORO-KABETE GRAVITY WATER SUPPLY PIPELINES







FINAL STUDY REPORT

000987

JUNE 2016

ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT STUDY REPORT

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LIST OF ACRONYMS

ACC	Assistant County Commissioner
AFD	Agence Française de Développement
AIDS	Acquired Immunodeficiency Syndrome
AWSB	Athi Water Services Board
BS	British Standards
CSR	Corporate Social Responsibility
DCC	Deputy County Commissioner
DOSH	Directorate of Occupational Safety and Health
EIA	Environmental Impact Assessment
EMCA	Environmental Management & Coordination Act
ESIA	Environmental & Social Impact Assessment
ha	Hectare
HEP	Hydro Electric Power
HIV	Human Immunodeficiency Virus
ITCZ	Inter Tropical Convergence Zone
KFS	Kenya Forest Service
Km	Kilometre
KURA	Kenya Urban Roads Authority
KeNHA	Kenya National Highways Authority
KeRRA	Kenya Rural Roads Authority
KNBS	Kenya National Bureau of Statistics
KTDA	Kenya Tea Development Authority
KWS	Kenya Wildlife Service
m	Metre
MCA	Member of County Assembly
MDGs	Millennium Development Goals
mm	Milimetre
m/s	Metres per second
NCT 1	Northern Collector Tunnel Phase 1
NEMA	National Environment Management Authority
NGO	Non-governmental organisation
NWL	Normal Water Level
NCWSC	Nairobi City Water and Sewerage Company
OP	Operational Policy
OSHA	Occupational Safety and Health Act
PPE	Personal Protective Equipment
RAP	Resettlement Action Plan
RGS	River Gauging Station
RWGM	Raw Water Gravity Mains
STI	Sexually Transmitted Infection
TB	Tuberculosis
TWGM	Treated Water Gravity Mains
URTI	Upper Respiratory Tract Infections
USD	United States Dollar
VCT	Voluntary Counselling and Testing
VIP	Ventilated Improved Pit Latrines
WASREB	Water Services Regulatory Board
WaSSIP	Water and Sanitation Services Improvement Project
WB	World Bank
WRMA	Water Resources Management Authority
WRUA	Water Resource Users Association
WTW	Water Treatment Works
WSPs	Water Services Providers
WSTF	Water Services Trust Fund

EXECUTIVE SUMMARY

E1 Project background and components

Athi Water Services Board (AWSB) commissioned GIBB Africa Ltd to carry out an Environmental and Social Impact Assessment (ESIA) and a Resettlement Action Plan (RAP) comprising the following;

- Northern Collector Tunnel-Phase 1
- Raw Water Pipeline, and Treated Water Pipeline to Kabete Reservoir.

Due to the complexity of tunnel and pipeline construction, the ESIA and RAP studies for the tunnel and pipeline were conducted separately to ensure that the unique issues associated with the tunnel and pipelines would be addressed comprehensively. The ESIA study for the tunnel was completed and submitted to the National Environment Management Authority (NEMA) in December 2014. The study report was then reviewed and an approval issued on 9 February 2015 under EIA licences no: NEMA/EIA/PSL/1207.

The Northern Collector Tunnel will transfer raw water through a tunnel approximately 11.8 km from intakes at the Maragua, Gikigie and Irati Rivers to an outlet at the Githika River near Makomboki, (Muranga County) upstream of the existing Thika Reservoir into which the water will be transferred to Thika Dam. About 120,960 m^3/day of raw water added in Thika Dam will be drawn through Thika-Kigoro-Kabete Gravity Water Pipelines thus the need for ESIA and RAP studies. The implementation of Thika dam-Kigoro-Gigiri-Kabete Gravity Water Supply project includes the following components:

- Construction of raw water gravity main from Thika dam to the proposed Kigoro Water Treatment Plant 6km downstream of Thika dam and;
- Construction of 60km Treated Water gravity main up to Kabete reservoirs (capacity 1.60m^3/s) via Ngethu and Gigiri Water Treatment Plants to meet the city's year 2017 water demand.

Thus this report summarises the Environmental and Social Impact Assessment (ESIA) of the Thika-Kigoro-Kabete Gravity Water Pipelines.

The objective of the construction of Thika dam-Kigoro-Kabete Gravity Water Supply Pipeline is to increase water supply to Nairobi by 120,960m^3/day.in order to reduce the gap between the demand and supply. The combined yield of the developed Water sources for Nairobi Water Supply is about 540,000m^3/day against the current demand estimated at about 750,000m^3/day.

The pipeline is expected to traverse three counties as follows:

- Muranga County;
  - Gatanga Sub- County;
- Kiambu County;
  - Gatundu North Sub- County;
  - Gatundu South Sub County;
  - Githunguri Sub- County;
  - Kiambu Sub County; and
- Nairobi City County;
  - Westlands Sub County.

Following screening and scoping at initial stages to identify the key issues arising from the project, an ESIA Project Report for Raw and Treated Water Gravity Supply Pipelines was prepared and submitted to the National Environment Management Authority (NEMA) for review.

After review of the project report and determination of need for ESIA study by NEMA, TOR for the study was prepared and approved by NEMA in July 2014 (Ref No: NEMA/5/2/12499)

E2 Methodology

The ESIA has been conducted in accordance with Environmental Management and Coordination Act (EMCA), 1999 and EMCA (Environmental Impact Assessment and Audit) Regulations, 2003 Thus EMCA 1999 section 3f of the Second Schedule require all water transport projects to undergo an Environmental and Social Impact Assessment (ESIA).

In order to prepare this report, the Consultant has reviewed the following previous study reports and documentation:

- ESIA for Northern Collector Tunnel Phase 1
- Final Design Supervision of Thika-Kigoro-Kabete Raw Water and Treated Water Pipelines;
- Design Report for Northern Collector Tunnel Phase 1
- Geotechnical reports and data;
- Feasibility and Master plan reports for developing new water sources for Nairobi and satellite towns; and
- Various Policies, Acts and Regulations relevant to the environmental assessment of the project.

The study tools applied during the field study were as follows:

- Transect walks;
- Ecological survey;
- Household survey;
- Public meetings;
- Key informant interviews.

All of the identified potential impacts arising from this project have been subjected to either standard recognized best practice mitigation measures or to impact specific, feasible and cost effective mitigation.

E3 Legal and regulatory framework

During this study, the Consultant has reviewed all the relevant policies, legal and regulatory frameworks, including the above, in order to comply with the requirement of Regulation 18 (1) (b) of the Kenya Environmental (Impact Assessment and Audit Regulations) 2003 which obligates an environmental assessment study report to among others to include a concise description of national environmental legislative and regulatory framework. Thus, the construction and operation of the Thika-Kigoro-Kabete Gravity Water Pipelines is expected to conform to a number of legislative and regulatory requirements and other guidelines and policies, the main of which are as follows:

- National legislation, including:
  - The Constitution
  - Environment Management and Coordination Act, 1999;
  - Lands Act 2012;
  - Environmental (Impact Assessment and Audit Regulations) 2003;
  - Environmental Policy;
  - National Water Policy and
  - Land Policy.

- International Finance Institution (IFI) Policies, including the World Bank Safeguard and AFD policies
- Other international conventions that Kenya has ratified in regards to environmental management

E4 Environmental setting

a) Climate

Temperature

The average temperature of Nairobi varies between 17°C to 20°C with the month of July and August being the coldest with temperature as low as 10°C

The average annual temperature of Kiambu areas ranges from 20.4°C-34°C. While the daily temperatures in Muranga vary from 14°C and 18°C and it can go down to as low as 6°C in high potential humid areas.

Rainfall

Muranga County has two rainy seasons in April-May (long rains); and October-November (short rains). The average annual rainfall ranges from as low as 410mm in the lower area and to as high as 2700mm in the Aberdare ranges.

Kiambu County experiences bi-modal type of rainfall with long rains being from March to May and the short rains between October to November. The average annual rainfall ranges between 1200mm to 2000mm.

The average annual rainfall in Nairobi is about 900mm, but the actual amount in any one year may vary from less than 500mm to more than 1500mm.

Humidity

Mean annual relative humidity in Muranga County range from 65% at lower elevations to 80% or more above 2,500 metres.

The average monthly humidity in Kiambu and Nairobi ranges between 45% and 60% during the evening and between 60% and 90% in the morning. From the month of January to April, relative humidity values in Nairobi have been known to drop to anywhere from 10% to 20%.

Wind speed and direction

The winds across the project area surfaces are predominantly easterly throughout the entire year. They are shifted to northeast between October and April, and they are shifted southeast between May and September. Right before the long rains season the strongest winds occur, reaching speeds of 20 to 25 miles per hour. During the rest of the year, winds are usually at speeds of 10 to 15 miles per hour.

Sunshine

During the early mornings within the project area, the climatic conditions are often cloudy, but the sun peaks through by mid-morning. Throughout the year, there is an average of seven hours of sunshine per day. 30% more sunlight reached the ground during the afternoon than in the morning.

b) Hydrology

Nairobi draws most of its waters from rivers in the Aberdares Conservation Area (ACA) in the Upper Tana River Basin, Muranga County. The NCT raw water expected to feed the new pipeline from Thika dam through Kigoro to Kabete Reservoir will be constructed in the Upper Tana Sub-catchment in Kigumo and Kagema sub-counties. The NCT will draw water from three rivers namely River Irati, Gikigie and Maragua and transfer it to Thika dam, through Githika outfall tunnel located few kilometres from upstream of the dam.

The water being added to the dam through NCT will cater for the new pipeline running from Thika dam through Kigoro WTW to Kabete. However, the amount of raw water added to the dam is about 120,960m^3/day which is less than the design capacity of Thika-Kigoro-Kabete pipeline of about 138,240m^3/day. For sustainability of the dam during operation, only 120,960m^3/day being added by NCT will be drawn from Thika dam to Thika-Kigoro-Kabete Gravity Water Pipeline.

The Thika-Kigoro-Kabete Gravity Water Supply pipelines will transverse through Tana River Basin in Gatanga sub-county, Muranga County and Athi River Basin in Kiambu and Nairobi Counties. Although the pipeline is entirely closed and no water will be abstracted from any of the rivers, the pipeline is expected to be laid along, under or over some of the rivers located in the Tana and Athi River Basins. The Raw Water pipeline will be laid along Thika River which falls in the Tana River Basin in Gatanga sub-county while the treated water pipeline will cross several rivers from Kigoro in Gatanga sub-county, Muranga County to Kabete, Westlands sub-county, Nairobi County. Some of the permanent rivers to be crossed by the treated water pipeline include but not limited to;

- The Chania River separating Muranga and Kiambu Counties;
- Kiama River in Muranga
- Ndarugu, Ruiru and Kamiti Rivers in Kiambu; and
- Thigiri and Mathare Rivers in Nairobi.

c) Geology

The project area is covered exclusively by Tertiary volcanic materials overlying folded Precambrian Basement System rocks of the Mozambique Belt. The youngest Tertiary rocks are the Limuru Trachytes, which are subsequently underlain by Kerichwa Valley Tuffs, Nairobi Trachytes, the Athi Series and the Kapiti Phonolites.

The geology of Muranga consists of volcanic rocks of the Pleistocene age in the western part of Aberdares and basement system rock of Achaean type falls in the eastern part of Aberdares. The project area in Gatanga, Muranga County being on the eastern part of Aberdares the rocks composed of the basement system are expected to be encountered during excavation. These are characterised with porous beds and disconformities within the volcanic rock system forming important aquifers.

The pipeline route shows a lithostratigraphy of thick red brown soils, basalts and agglomerates, middle and upper Kerichwa Valley tuffs, lower Kerichwa valley tuffs, Kiambu trachytes and Nairobi trachytes. All these formations are outcropping in part except for Nairobi trachytes. The Kerichwa valley tuffs indicates deep weathering that grades into fractured and fresh rock mass at deeper levels. The trachytes of Kiambu indicate marginal weathering but fractured effects. In Nairobi the geological history has been dominated by volcanic activity whereby a thick succession of alkaline lavas and associated tuffs began accumulating in mid- Miocene times and continued into the upper Pleistocene. Practically the entire Nairobi area is covered by these volcanic rocks derived from the Rift Valley region and estimated to accumulate in volume to more than 250 cubic miles (1,042 cubic km) and cover an area of nearly 1,200 square miles (3,000km^2).

d) Soils

Superficial deposits in the area comprise of red volcanic soils in the higher sloping grounds and black cotton soils in the low lying swampy areas in Muranga County. On the higher grounds, the red soil attains thicknesses ranging from 3-7 metres. The black cotton soils are however limited in occurrence. In Kiambu County soils are developed on undifferentiated tertiary volcanic and basic igneous rocks. They are well drained, dark reddish brown and are of moderate fertility. In some places soils are imperfectly drained, very deep, dark grey to black with calcareous, slightly saline deep sub soils. While Nairobi soils are composed of red volcanic soils derived from Limuru trachyte of the Rift Valley region. The soils in the area are highly susceptible to erosion.

e) Groundwater resources

Murang'a County is located within the Tana Catchment Area which is known to have abundant ground water resources. The County has 10 permanent rivers, 400 shallow wells, 75 springs, 30 dams and 100 boreholes that supply water that ources supply 60 per cent of the county population with clean and safe drinking water. The average borehole yields in the area is $7.13m^3$/hr but ranges from nil to $50m^3$/hr. the average borehole depth is 117.0m but water is commonly struck at a depth of 84.4m with average water resting level of 42.8m.

Kiambu County includes numerous springs, streams, shallow wells and boreholes. The region has numerous boreholes with an average yield of 7m3/hr and pumps set at an average depth of 200 to 300 m deep. Currently Kiambu Town depends on boreholes as a source of clean water. The water in Kiambu County is provided by Kiambu Water and Sewerage Company.

Nairobi mainly receives its water from rivers originating in the Aberdare Range and the Mt. Kenya water catchment area. Nairobi aquifer system (surface area of about 6,500km2) is Nairobi's second water source which is vulnerable to destruction. There are approximately 4,800 boreholes in Nairobi, with an estimated daily supply of 65,000 m^3 for domestic, 60,000 m^3 of industrial water, 3,000 m^3 for livestock uses and 28,000 m^3 for irrigation in the Nairobi Aquifer Suite catchment area (WRMA, 2010). The present contribution of groundwater is estimated to $45,000m^3$/day with main groundwater abstraction comes from the individual domestic wells with $25,000m^3$/day. There are approximately 4,800 boreholes in Nairobi, with an estimated daily supply of 65,000 m^3 for domestic, 60,000 m^3 of industrial water, 3,000 m^3 for livestock uses and 28,000 m^3 for irrigation in the Nairobi Aquifer Suite catchment. Most of the boreholes in Nairobi have been drilled to depths of 100-350m depending on the location.

f) Ecology

Vegetation

The natural biological environment of the project area has been substantially changed by human settlements and most of the land in the project area is under agricultural practises.

Vegetation of Muranga County is mainly composed of planted vegetation of Eucalyptus trees, *Grevillea* and wattle trees used mainly for commercial purposes. Tea plantations contribute the largest percentage of ground cover followed by food crops composed of maize, yams, kales and cabbages. Although the project area is highly transformed by human activities, some areas along Thika River (within Thika dam compound and immediately after Kigoro WTW) have indigenous tree. Some of the indigenous trees observed in the project area include *Prunus africana, Vitex keniensis, Olea africana, Croton megalocarpus* and *Dombeya.*

Although project area in Kiambu County lies along the existing pipeline wayleave, the area is dominated by food crops (maize, yams, beans, kales, and cabbages), napier grass, coffee bushes and commercial trees. *Eucalyptus, Grevillea*, Avocado and Mangoes were the widespread tree species in the area. Some the indigenous species spotted along the river

crossings and within coffee farms along the project area include *Dombeya, Spathodea campanulata, Juniperus procera, Podocarpus falcatus,Prunus africana, Acacia mearnsii, Croton megalocarpus* and *Olea africana*. Invasive species of *Lantana camara* was also widely spotted along the project area

In Westland Sub-County, Nairobi region trees were mainly planted along the road reserve and within residential areas. Some of the species observed included *Eucalyptus, Newtonia buchananii, Euphorbia, Juniperus procera, Spathodea campanulata*, Jacaranda, *Grevillea* and *Acacia*. *Eucalyptus* and were the most diverse and dominant species in the project area. Invasive *Lantana camara* was also observed along the project area.

The most dominant grass in the entire project area included *Themeda triandria, Cynodon dactylon, Chloris gayana, Digitaria, Eragrostis superba, Paspalllum, Cyperus rotundus,* Sedge grass and planted Napier grass. However sedge grasses were mainly observed along the river bank and swampy areas while napier grass was widely planted along the riparian land of Thika River

Fauna

Given the modified natural environment, there are few terrestrial fauna in the project area of influence which is predominantly settled and farmed areas. Fauna in the proposed project area mainly comprised of various bird species, domestic animals, and rodents such as mice and insects.

E5 Socio-economic setting

a) Administration

The project area traverses three counties namely Muranga, Kiambu and Nairobi. In Muranga the project will pass through Gatanga Sub-county, in Kiambu the project will pass through four sub-counties namely Gatundu North, Gatundu South, Githunguri and Kiambu while in Nairobi County the pipeline will pass through Westlands sub-county. The pipelines will transverse several locations as shown

County	Sub-County	Division	Location
Murang'a	Gatanga	Kigoro	Ndakaini
			Kigoro
		Gatanga	Kiria-ini
			Gatanga
Kiambu	Gatundu North	Chania	Gituamba
			Makwa
			Kairi
		Mangu	Gathaite
			Karuri
	Gatundu South	Ngenda	Ituru
			Ngenda
			Kimunyu
		Kiamwangi	Mutati
			Kiamwangi
	Githunguri	Komothai	Komothai
		Ngewa	Ngewa
		Ikinu	Ikinu
	Kiambu	Kiambu Municipality	Kamiti
			Riabai
			Kirigiti

County	Sub-County	Division	Location
			Kiambu settled area
Nairobi	Westlands	Westlands	Highridge
			Parklands
			Kitisuru

According to KNBS, the projected growth rate for Muranga County is estimated at 0.4 percent per annum. The population density of Gatanga Sub-County was approximately 273 persons per square kilometre and the male: female sex ratio for the county is 48:52.

Population of Kiambu County was estimated at 1,623,282 with a density of 638 persons per square kilometre. This encompasses the six sub counties that make up Kiambu County of which four namely Gatundu North, Gatundu South, Githunguri and Kiambu Sub-Counties lies along the project area where 60.8% of Kiambu population live in urban areas. The population growth rate of Kiambu stands at 2.95.

The population of Westlands Sub-County, Nairobi County stands at 247,102. Out of the total population distribution in Westland Sub-County, an estimate 96,079 persons live along the project area. The population growth rate of Nairobi Sub-County is estimated at 3.93% per annum.

b) Population

Population distribution in the locations covered by the project is shown in table below.

County	Sub-County	Division	Location	Affected population per location	Total affected population at sub-county level
Muranga	Gatanga	Ndakaini	Ndakaini	7,324	33,249
		Kigoro	Kigoro	4,376	
		Gatanga	Kiria-ini	8,104	
			Gatanga	13,445	
Kiambu	Gatundu North	Chania	Gituamba	4,426	55,051
			Makwa	11,319	
			Kairi	8,993	
		Mangu	Gathaite	20,166	
			Karuri	10,147	
	Gatundu South	Ngenda	Ituru	4,526	30,252
			Ngenda	5,799	
			Kimunyu	8,699	
		Kiamwangi	Mutati	5,765	
			Kiamwangi	5,463	
	Githunguri	Komothai	Komothai	9,861	55,922
		Ngewa	Ngewa	22,393	
		Ikinu	Ikinu	23,668	
	Kiambu	Kiambu Municipality	Kamiti	6,657	53,529
			Riabai	25,909	
			Kirigiti	13,070	
			Kiambu settled area	7,893	
Nairobi	Westlands	Westlands	Highridge	53,720	96,079
			Parklands	11,117	
			Kitisuru	31,242	
	Total			**324,082**	**324,082**

Source: 2009 Kenya population and Housing Census.

c) Economic activities

The main economic activity in Muranga and Kiambu county is agriculture.

The conducive climate, high rainfall and moderate temperature in Muranga, has made it suitable for wide cultivation of tea in the area and also investing in growing of subsistence crops such as as yams, bananas, beans, maize, vegetables (sukuma and cabbages). Planting of commercial trees such as Grevillea and Eucalyptus is also being practised in the area.

Kiambu County depend on agriculture and sometime small scale businesses for source of income. Agriculture in the area is characterised by the largescale coffee plantations and growing of subsitence crops. The towns in Gatundu and Kiambu subcounties host a few mini supermarkets and commercial bank, taking advantage of the fast growing population and the proximity to Nairobi City. There are other numerous business ventures such as the hospitality sector with hotels, bars, and restaurants.

Nairobi economy depends on employment and commercial ventures/trade.

d) Water supply

The major sources of water for domestic and industrial use in Muranga County are rivers, springs, shallow wells, borehole and rain harvesting. Muranga County has 27 water supply schemes some of which are Muranga and Kangema water supply schemes that covers over 80% of their targets. The two main existing water supply schemes in the project area are Gathaini Water Project and Karura Water Project.

Within Kiambu County, only 12.5% of the households connected piped water. Sources of water for domestic use within the Project's Zone of Influence are presented below:

Water sources	Githunguri Sub County	Gatundu Sub County	Kiambu Sub County
Streams	25.1%	32.8%	17.2%
Boreholes/springs/ wells	55.7%	20.5%	12.7%
Piped water to dwellings	2.9%	7.4%	42.7%
Piped water	12.7%	30.2%	3.4%
Rain harvest	1.0%	1.7%	2.4%
Water Vendors	2.2%	1.3%	21.1%

Water distribution in Nairobi is not equitable with the high class people getting more water than the low class people living in the informal settlements and slums. Sixty percent (60%) of the City's residents live in slum areas, yet only 22% of these households have water connections. On the other hand, higher income groups, or 11-12% of the population, consume 30% of domestic water. For example, Residents with piped water in Githogoro and Kibagare informal settlement have built water kiosks where they resell water to other residents who cannot access clean piped water. In the middle income areas, only about 40% have access to piped water 24 hours a day, the rest are supplied by illegal water connections, vendors, kiosks or boreholes

e) Health issues

Upper Respiratory Tract Infections (URTI) is very common in Muranga County which is attributed to the increasing levels of atmospheric pollution caused by dust, smoke from Thika industries and increase in the number of petrol engines. Diarrhoeal diseases are also prevalent cause by ingestion of contamination of food and/or drinking water. Other prevalent diseases in Muranga County include skin infections, pneumonia, urinary tract infections, chicken pox and eye and ear infections.

Prevalent Diseases in Kiambu County include Malaria, Respiratory Tract Infections, Intestinal Worms, and Broncho-pneumonia.

Disease prevalence in the in Nairobi included Common cold, URT infection, Malaria, Skin infection, and Diarrhoea.

f) Housing and settlement

Majority of the population along the project area in Muranga County have houses with iron sheet roofing, Cemented floors and brick walls. There are also houses that were made of wooden floors and walls. The population in the project area is linear along the roads, nucleated around market centres and dispersed in tea farming areas.

In Kiambu County, 48.3 percent of all homes in the county are stone-alled, 4.9 percent are brick/block, 4.8 percent are mud/wood. 74.6 percent of the houses have cemented floors and 87.5 percent have corrugated iron sheets and 0.1 percent have other forms of roofing materials. Within the project zone of influence in Nairobi, housing and settlement varies with majority of the people living in housing estates or private homes. There are only two informal settlements along the project namely Githogoro and Kibagare .Most of the houses in this slums are made of GCI sheets walls and roof with wooden doors.

E6 Project description

The complete pipeline covers a total length of 64.8 km in length broken down as follows:

- Raw water pipeline: covers 5.5 km long, running from Thika Dam through to Kigoro Water Treatment Plant
- Treated water pipeline: covers 59.3 km long, running from Kigoro Water Treatment Plant to the existing Kabete reservoirs located in Westlands, Nairobi. The treated water pipeline will run through a new route of 12.5km from Kigoro to Ngethu which has to be acquired before joining the existing pipeline wayleave at Ngethu.

The pipeline material and type of joints proposed for raw and treated water pipeline is as shown below

Diameter	Length	Pressure rating	Pipeline material and joints
Raw Water Pipeline			
DN 1200	5.5	PN 16	• Ductile Iron (with Socket and Spigot or Self Anchored Joints)
Treated Water Pipelines			
DN 1200	10.6	PN 25	• Ductile Iron (with Socket and Spigot or Self Anchored Joints)
DN 1200	38.3	PN 40	• Steel (Welded Joints)
DN 800	10.4	PN 25	• Ductile Iron (with Socket and Spigot or Self Anchored Joints)

Ductile iron_pipes and their fittings shall be externally protected by a metallic zinc spray coating and internally lined with cement mortar. While buried steel pipes shall be externally protected externally with triple layer polythene coating and above ground pipes, protected by a triple layer polypropylene coating (3LPP) with polypropylene shall be used. Internal protection of steel pipes steel pipes will be by fusion-bonded epoxy coating

The pipe capacity for the raw water main has been designed at 172,800 m^3/day whiles the treated water main with a capacity of 138,240 m^3/day. However, only 120,960 m^3/day of raw water added to the Thika Dam through the NCT-1 tunnel will be transmitted to Kigoro Water Treatment Plant.

The treated water pipeline has been proposed to transmit 120,960 m^3/day to Kabete reservoirs. The remaining capacity will be used in future after the construction of Mathioya dam. The DN 1200mm treated water pipe will branch at Ngethu into a new DN 800mm and an existing DN 700mm from Gigiri. The DN 800mm pipeline has been designed with a capacity of 81,382 m^3/day of water to Kabete Reservoirs while the existing DN 700 pipe has a capacity of 56,858 m^3/day.

The pipelines will traverse a rugged terrain with numerous high and low points, streams, seasonal and permanent rivers thus under river crossings as well as aerial crossings on reinforced concrete piers and steel bridges have been adopted. There are numerous major tarmac, cabro and murram road crossings that the pipeline will pass through.

In order to minimize head losses and to reduce the risks of water hammer phenomenon, the maximum flow velocities in the raw water and treated water pipeline has been limited to 2 m/s.

The depth of cover for both the Raw Water and Treated Water Gravity Mains shall be been kept to a minimum of 1.0m to pipeline crown. To reduce the number of changes in grade, the cover to pipe has been varied from this minimum to a maximum of approximately 3m at a few localized high point sections.

The pipeline appurtences will be as indicated below.

N°	Pipeline facility	Purpose	Number on the pipeline	
			Raw	Treated
1	Sectional valves	Isolation of sections of pipeline for repairs or flushing	3	7
2	Washouts/ Blow-offs	Maintenance work for allowing flowing out of water during cleaning of the water main	15	104
3	Air Valves	Situated at raised areas along the pipe to allow venting of the pipeline.	18	111
4	Chambers	Housing of pipeline fittings	2	7
5	Road Crossings	To achieve the proposed pressure and gravity supply. Cutting of the road to allow laying of the pipe.	1	27
6	Waterway/River crossings	To maintain pressure rating and gravity flow of water. The pipe will be laid under or over the river. Steel bridges and columns will be used to support pipes constructed over a river.	3	31
7.	Swamp crossings	To maintain pressure rating and gravity flow of water. The pipe will be laid across the respective swamp through support of piers.	1	4
8.	Flow measuring meter	Electromagnetic meters will be used to provide real-time measurement to detect any abnormal flow of water along the pipeline	1	2

The river crossings along the raw and treated water pipelines are as follows:

River	Chainages	Location
Raw water pipeline		
Thika River	0+100,	Ndakaini
Thika River	0+950. 1+010, 1+260,	Kigoro
Treated water pipeline		
Stream	3+320	Gatanga
Ruamboro River	6+620	Gatanga
Kiama River	8+960	Gatanga
Chania River	10+660	Chania
Stream	11+080	Chania
Karimenu River	14+780	Kamwangi
Ndarugu River	17+300	Kamwangi
Mandume River	18+490	Githaithe
Ruambura River	19+300	Karuri
Kiariga stream	20+850	Karuri
Thiririka River	22+190	Gatundu town
Niendu stream	23+330	Ngenda
Mararo stream	24+280	Ngenda
Theta River	25+060	Ngenda
Kamaratu Stream	25+740	Kiamwangi
Mugutha stream	26+670	Kiamwangi
Komothai River	28+390	Komothai
Ruiru River	30+280	Githunguri
Ngewa stream	32+200	Githunguri
Mukuya River	33+020	Githunguri
Kamiti River	36+280	Kamiti
Ithuru River	37+427	Kamiti
Kiu River	39+058	Kirigiti
Gakiamba	40+029	Kirigiti
Karigiti River	41+160	Kirigiti
Riara River	41+580	Ruaka
Gatharaini	43+317	Ruaka
Ruiruaka River	47+680	Ruaka
Thigiri River	53+680	Highridge
Gitathuru River	54+870	Highridge
Mathare River	55+840	Kitisuru

The raw and treated water pipelines will cross the following swamps

Swamp	Chainage	Location
Raw water pipeline		
Swamp	3+020	Kigoro
Treated water pipeline		
Swamp	5+340	Kiria-ini
Swamp	7+600	Gatanga
Kianjibbi Swamp	34+280	Githunguri
Kirigiti swamp	40+900	Kirigiti

It should be noted that the locals indicated that some of the swamps in the area do not have a specific name hence only the location of the swamp was sited.

E7 Public consultation

A total of nineteen (19) public meetings were held along the entire project area in several sub-counties with seven (7) meetings in Gatanga sub-county, Muranga County, five (5) meetings in Gatundu North, two (2) meetings in Gatundu South, one (1) meeting in Githunguri, two (2) meetings in Kiambu and two (2) meetings in Westlands sub-county. The location and dates of meetings in each sub-county are presented in below

County	Sub County	Location	Venue	Date
Muranga	Gatanga	Ndakaini	NCWSC offices	2/5/2015
		Ndakaini	NCWSC offices	13/6/2015
		Kigoro	Kanunga Chiefs office	5/5/2015
		Ndunyu Chege	Kagongo Tea Buying Centre	6/5/2015
		Ndunyu Chege	Ndunyu Chege Tea Buying Centre	14/5/2015
		Kiriai- Ini	Chief's Office	4/5/2015
		Gatanga	Tea Buying Centre	10/5/2015
Kiambu	Gatundu North	Ngethu	Ngethu social hall	19/5/2015
		Ngethu	Chiefs office (social hall)	29/5/2015
		Ngorongo	Ngorongo Social hall at Assistant county commissioners offices	15/5/2015
		Kamwangi	Kamwangi DC Grounds	22/5/2015
		Kamwangi	DCC's office	12/5/2015
	Gatundu South	Ng'enda	Chiefs Camp	14/5/2015
		Kiamwangi	Kiamwangi Social Hall	15/5/2015
	Githunguri	Komothai	Chief's Camp	13/5/2015
	Kiambu	Kamiti	Chief's office	5/6/2015
		Kirigithi	Kirigithi stadium	6/5/2015
Nairobi	Westlands	Githongoro	Karura AIC Church	5/5/2015
		Kibarage	Kibagare Social Hall	9/6/2015

The issues main issues raised during public consultations include

- Unresolved historical wayleave acquisition (PAPs were unsatisfied with the way compensation was done during the previous pipeline wayleave acquisition);
- Flooding experienced from the washout valves which end up destroying land and asset in the surrounding areas;
- Water supply to the people living near the project area;
- Disruption of existing public utilities;
- Lack of compensation of assets not in the construction wayleave destroyed by the contractor during previous construction works;
- Employment opportunity during project implementation;
- Improvement of sanitation especially in Nairobi informal settlement.

E8 Impact assessment

Thika-Kigoro-Kabete Gravity Water supply pipeline will have both positive and negative impacts to the environment and the community living along the pipeline. Mitigation measures have been put across to ensure that the negative impacts do not have adverse impacts on the environment and

where possible the natural ecosystem should be restored to the way it was before the construction works or even better. Some of the impacts identified include:

Construction phase

Positive Impacts

Environmental and social issues	Impact	Enhancement/ mitigation
Income generating opportunities	Employment. Vendors, supply of food and retailers.	The contractor should comply with the legal requirements for employment and working conditions as prescribed by Kenyan Law. The contractor should also strive to adopt international best case practice as recommended by the International Labour Organisation. Ensure that the gender and youth provision of 30% is considered during employment.
Creation of market opportunities for construction material	Construction materials required will include cement, reinforcement iron bars, sand, pipes and appurtenances.	Bidders with locally available construction materials should be given priority during tendering process to ensure highest benefit to the local supplier hence boosting the standard of living of the traders.
Desirable social change	Cultural change	Contractor should consider employing the locals to provide semi-skilled labour.

Negative effect

Environmental and social issues	Impacts	Mitigation Measures
Wayleave acquisition for raw and treated water pipeline	Loss of land and assets; and Economic displacement.	• Implement the RAP to enable compensation payment and resettlement of PAPs prior to the contractor taking possession of any construction site. • Ensure that compensation has been done fairly and all the PAPs are satisfied before embarking on construction. • Previous issues on compensation alleged from PAPs from previous wayleave acquisition should be addressed early in advance so as the contractor can have a smooth and uninterrupted time during construction phase.
Disturbance of neighbouring land owners	Destruction of uncompensated assets adjacent to the construction sites	• Adjacent landowners must be informed of the commencement of construction activities; • A Community Liaison Officer (CLO) will be appointed to be an intermediate between the project team and the surrounding community; and • The Contractor should stick to the existing construction way-leave to prevent unwanted destruction of the surrounding assets; • Any damages outside the designated wayleave should be immediately reported to the Resident Engineer and prompt compensation paid by the

Environmental and social issues	Impacts	Mitigation Measures
		contractor in accordance with the principles of RAP and in agreement with the affected parties.
Interruption of existing installations	Interference with existing telephone wiring and existing WSP pipeline.	• A notice should be put up in good time to inform the affected communities/people of the interruptions likely to be cause as the pipeline in laid at specific public utilities; • Capacity building and training should be conducted among the construction workers on the way they can protect themselves from exposed dangers during construction; • The contactor should try as much as possible to restrict the construction activities to the mapped out area to avoid increase disturbance of existing installations in the area.
	Interruption of WRMA RGS.	• In case of interruption of WRMA RGS on the Target Rivers, ASWB should inform WRMA early for relocation of the device, if already destroyed for replacement purposes. From the consultations with WRMA, the cost of relocation or replacement of RGS is incurred on the project proponent. The apparatus are only handled by WRMA technical staff.
Soil erosion and sedimentation	Excavated materials, soil disposal at the wrong places and clearance of vegetation.	• Clear delineation of construction work areas to avoid unnecessary vegetation clearance and soil loosening; • Implement planned erosion control measures to avoid erosion in areas that are prone to erosion, e.g. steep slopes and drainage lines; • Topsoil stockpiles will be vegetated to prevent erosion; • Where feasible, topsoil must be reinstated and rehabilitated on top of sub soil; • All excavation works must be properly backfilled and compacted; • Ensure downstream water users are informed about any unprecedented release of heavily silted water into the river; • Where possible, construction activities should be scheduled to occur outside of the rainy season, to reduce the anticipated volume of runoff during construction; and • Planting of vegetation cover such grass along the pipeline wayleave to curb soil erosion after construction works.
Occupation Health and Safety hazards	Health of the workers and risk of accidents.	• Registration of the workplace by the Director, Directorate of Occupational Safety and Health (DOSH) forming the basis of his work statistics; • Establishment of a Health and Safety Committee for the project team as per the Health and Safety Committee Rules 2004 of the OSHA Act; • The Contractor shall present a Health and Safety Plan for approval by the Engineer prior to commencement of work;

Environmental and social issues	Impacts	Mitigation Measures
		• Qualified Health and Safety auditor should be contracted to conduct annual Health and Safety (H&S) and a registered Fire Auditor to undertake a fire audit and develop relevant policy for the site; • Provision of appropriate Personal Protective Equipment (PPE) for project; • Maintain an incident/accident register, in accordance with the OSHA 2007 and report incidences to the respective DOSH; • Provide adequate sanitary facilities • Basic training on Environment, health and safety; • Provide first Aid kit at all work areas and site and maintain it equipped; • Provide adequate fire fighting equipment capable of fighting all classes of fire at campsite; • Put "No smoking signs" in areas where inflammables are stored; • Provide clean drinking water to the construction workers at all times; • Rehabilitate excavated sites as soon as construction is completed; • Initiate HIV/AIDS awareness, prevention and training for the workers and community
	Safety of the public	• Along pipeline routes, warning signs, warning tapes and notices will deter access to trenches; • The excavation of trenches ahead of pipe laying and backfilling shall be limited such that the period from the time of opening a trench to temporary reinstatement shall not normally exceed 48 hours unless exceptional circumstances agreed with the Engineer prevail; • Work crews on roads shall include flagmen to provide for the safe passage of traffic and all work sites shall be adequately watched and lit during the hours of darkness • Construction truck drivers should observe due care at all times for their safety and that of the public during the construction • All works which may pose a hazard to humans and domestic animals are to be protected, fenced, demarcated or cordoned off as instructed by the Project Manager. If appropriate, symbolic warning signs must be erected;
Testing and commissioning	Generation of large amount of waste water Use of a higher concentration of chemicals during testing of the treated pipeline Flooding of the	• A notice should be put up to inform members of the date and time the pipeline will be tested and expected impacts; • Residents along the target river should be sensitize and educated on impact of chemicals being used during testing; • If possible testing should be timed to coincide with the dry months when the river are not flooded to

Environmental and social issues	Impacts	Mitigation Measures
	surrounding areas Possible contamination of ground and water resources.	reduce the project zone of impacts of induced floods; • Contractor should get a permit from WRMA before releasing water with chemicals into the any river in the project area; • A well constructed channel should be put up so as to reduce the velocity of water downstream hence minimize the impact of high pressure water to the river course and also minimise erosion; • Contractor should sensitize workers on the impacts of direct contact with the chlorine; • Contractor should provide works with PPEs before handling of any chemicals
River crossings	Pollution of rivers; Destruction of water banks and riparian areas; Sedimentation of river beds.	• Contractor should abide to Water Act and WRMA regulations; • AWSB should apply for permits before conducting any under river crossings; • Reinstate the river system to the way it were before construction works or even in a better state; • Restoration of any WRMA RGS interfered with during construction; • Revegetate the river bank and the riparian areas.
Road crossing/use of road reserves	Cutting of roads to allow laying of the pipeline; Road congestion due to blockage of one road; Possible danger of accidents to occur when motorised are not aware of the on-going construction activity; Destruction of culverts and water storm drain	• Liaise with relevant roads authorities to minimize any service disruptions; • Ensure advance notice to all of any planned disruptions • AWSB should reinstate the road according as stated in laws and regulations of Kenya i.e. KeNHA and Kenya Roads Act. • The contractor should abide to the instructions of road reinstatement as illustrated in the detailed Design Report. • The contractor should restrict the constructions works to the time of the day when there is limited traffic flow along the affected roads i.e. restrict pipeline construction works from 11am to 3pm. • Contractor/AWSB should put up a notice to inform the affected road users on the likely inconvenience with specified dates and length of time for the construction works • Contractor should stick to the area designated for construction works to prevent the likelihood construction vehicles obstructing the whole road.
Water supply interruptions	Possible interruption of water supply to Nairobi due to criss-crossing of the new pipeline along the previous pipelines	• A notice should be issued to affected supply chain about the water supply interruptions with schedule period of time. • The affected pipes should be fixed at the shortest time possible to allow for quick restoration of normal water supply. • Disruption of any services within the project area by the contractor should be repaired before continuation of excavation.

Environmental and social issues	Impacts	Mitigation Measures
Vegetation clearance	Loss of vegetation such as woodlots and cash crops.	• Contractor must ensure clear delineation of construction work areas to avoid unnecessary vegetation clearance; • Tree farmers should be compensated and those along the construction wayleave be encourage to plant after construction works are complete • Contractor should avoid cutting down of Mugumo trees in the area. where feasible the consent of KFS and local leaders should be soughted out; • The trees planted should be pipeline friendly to protect the pipe from being destroyed by mature/penetrative roots; • Tree farmers should be notified in advance to harvest their trees
Soil compaction	Use of Vehicle such heavy trucks and earth movers.	• Vehicles must be kept on existing/designated access roads/tracks where possible; • Minimize compaction during stockpiling by working the soil in the dry state; • Split compacted areas to reduce runoff and re-vegetate where required; • All topsoil and other soil profiles must be managed strictly.
Noise generation and vibration	Heavy machines and construction vehicles will result to noise pollution and vibration.	• Noise levels shall be kept within acceptable limits preferably as stipulated within the Environmental Management and Coordination Act (Noise and Excessive Vibration Pollution) Control Regulations, 2009 and construction activities shall, where possible, be limited to normal working hours; • Monitoring of noise and vibration in sensitive locations (hospitals, teaching facilities, churches) near the project area to ensure they are at acceptable standards; • Equipment should be maintained regularly to reduce noise as a result of friction; • Workers exposed to high-level noise must wear personal protective equipment (PPE); • Use of silencers where applicable, should be encouraged; • Residents in close proximity should be given at least 24 hours notification of any abnormal noise source e.g. planned blasting.
Spoils generation	The excavated materials are prone to erosion through surface water runoff during rainy seasons and may even end up in rivers; Spoil dumps left bare will encourage establishment of fast colonising plants and	• Maximise the re-use of excavated materials in the works as far as feasible to ensure that no permanent spoil dumps are created; • The spoil materials can be used elsewhere as recommended by the county government such as in road constructions and rehabilitation. From consultations it is recommended that the spoils may be given to farmers with tree nurseries or landscaping agencies for free; • Properly dispose off the spoil in the identified by the

Environmental and social issues	Impacts	Mitigation Measures
	invasive species.	design team and approved by the confirmed land owners; • Care should be taken to avoid spoil location in land that could otherwise be used for productive purposes; • Ensure the contractor formulate and implement erosion and siltation management measures at chosen spoil locations.
Water quality	Pollution of water resources from sediment from earthworks, wet cement, detergents, paints and other chemicals, accidental oils and fuels spills and leaks from deployed equipment.	• Implement Standard Operating Procedures (SOPs) for working in water and application of best practice on sediment control and soil stockpiles. • Apply for a water discharge license and ensure that the conditions of the license are observed; • Provide proper measures to direct effluent to silt removal facilities like earth bunds / U-channels; • Ensure that the u-channels and manholes are free of silt and sediment; • All manholes on-site should be covered and sealed; • Sandbags/earth bund should be adopted to prevent washing away of sand/silt and wastewater to drains, catch pit, public road and footpath; • Storage areas for fuels, oils or other liquid chemicals should be far away from surface water drains and all vehicle be serviced off site • Direct domestic waste water to septic tanks.
Spread of invasive species	Invasive species such as *Lantana camara* and *Thithonia diversifolia* may quickly spread in area if the area is left bare after construction. Borrowed soil from another place to the may have propagules of an invasive species.	• Materials and equipment used during construction should not contain propagules of species from another area • All invasive species/weeds along the project area should be destroyed and none of the species should be replanted in the area • Trees and grasses should planted in the area immediately after construction
Visual impact	Construction of access road and clearance of vegetation; Excavation and spoils will also change the visual appearance of the area; Development of informal business depending on the intensity of labour needed.	• Restoration of the affected area to almost as it were before or even in a better state • Planting grasses along the pipeline wayleave to curb soil erosion and improve the aesthetic view of the area; • Continuous monitoring of the pipeline wayleave to ensure there no informal settlements are cropping up in the area
Solid waste generation	Generation of solid waste at the contractor's campsite, workshop, broken construction	• Formulation and implementation suitable Waste Management Plan in line with Waste Management Regulations, 2006. The plan must cover both hazardous and non-hazardous wastes;

Environmental and social issues	Impacts	Mitigation Measures
	materials and vehicle parts along the wayleave.	• Final disposal of the site waste should be done at a location that shall be approved by Resident Engineer • Any hazardous wastes generated must be handled appropriately and disposed of only by licensed hazardous wastes handlers; • Provide sanitation facilities such as toilets and bathrooms; • The sanitation facilities should be approved by the relevant authority; • Develop a waste management plan to handle temporary storage, transport and disposal of hazardous waste; • Disposal of all surplus construction materials and debris shall be carried out in accordance with the EMCA 2006 Waste management regulations; • Strategically place skips and bins within the camp sites and construction sites; • Empty the skips and bins regularly to avoid overfilling; • The sanitation facilities must be approved by relevant authorities • Re-use and recycle recyclable wastes • Provide oil drums and plants/equipments with drip trays; • Present proposal of the camp site layout for approval by the relevant authorities
Liquid waste generation:	Concrete washings, runoff from camp and workshop areas, and various liquid waste streams from washing construction vehicle and equipment washing. Waste water generation during testing and commissioning of the pipeline.	• All grey water runoff or uncontrolled discharges from the site/working areas (including wash-down areas) to water courses should be contained and properly channelled; • Water containing such pollutants as cements, concrete, lime, chemicals and fuels shall be discharged into a conservancy tank for removal from site; • Potential pollutants of any kind and in any form shall be kept, stored and used in such a manner that any escape can be contained and the water table not endangered; • The contractor must act promptly on remedying any pollution incidents on site.
Soil pollution	Improper handling of fluids such as oil grease and other hydro-carbons lead to spills and leakages.	• No vehicle/plant maintenance shall take place on undesignated site. In case of emergency, a drip tray shall be used to avoid diesel and / or oil spills; • Concrete mixing shall not be done on bare soil but rather on mortarboards, a large metal sheet or concrete slab. The slabs for concrete mixing shall be removed on completion of construction works; • Excavated material shall be stockpiled at a demarcated site, within the construction zone;

Environmental and social issues	Impacts	Mitigation Measures
		• Once the construction activities have terminated, rehabilitation of the area should be done including the area excavated soil was stockpiled.
Influx of workers into the project area	Growth and mushrooming of unplanned developments; Possible increase in social deviance behaviours.	• As much as feasible, the unskilled labour should be obtained from amongst the locals; • Provide adequate accommodation for non-local workforce • Liaise with respective county governments to control developments in the area and ensure provision of adequate services
Shift of unskilled labour force from agriculture to construction works	Likelihood shift from agricultural practises to construction works due to the high wages offered.	• Wages should be offered within the prevailing market rates Kenya • Employment should be offered in line with the local labour laws international best practice and avoid any employment of underage individuals.
Air quality	Dust and fossil fuel emission	• Maintain all plant and equipment at the manufacturers specification; • Regular sprinkling of water e at least thrice a day • Stockpiled materials (sand and aggregate) should be maintained dump to prevent dust emissions • Cement debagging process will be undertaken in sheltered areas; • The cleared area should be revegetated immediately after construction to prevent airborne dust to wind gust • Reduce truck speeds to avoid stirring up the dust through installing of speed limit • Turn off machines that are idle reduce air emissions; • Workers at the construction site should be issued with PPEs i.e. dust masks
Risks of Oil spills/leaks	Contamination of soil, surface waters and sometime ground waters.	• There should clarity in labelling and storage of fluids in secure place with minimal ease of contamination in case of spills or leaks • Implement Standard Operating Procedures (SOPs) for working in water, including checks on equipment condition (especially leaks of oils, fuel, hydraulics), refuelling protocols (at safe location away from water, availability of spill kits and knowledge of their use, and emergency spill procedures); • Vehicle maintenance should be done on purpose-built impervious concrete platforms with oil and grease traps; • Ensure that all equipment are in good condition, clean and free from leaks; • Oil spill containment and cleanup equipment should be kept at the contractor's camp.
Immigration and settlement	Increased population which may lead to unplanned developments in the	• Monitor the trend of migration during the project implementation and adjust the required utilities accordingly. • Engage a community liaison officer with knowledge

Environmental and social issues	Impacts	Mitigation Measures
	area.	on local cultures and social structures to facilitate smooth engagement between the local community and project staff from different cultures; and • Sensitize the project workers on local culture. • As much as feasible, the unskilled labour should be obtained from amongst the locals; • Liaise with respective county governments to control developments in the area and ensure provision of adequate services
Cultural sites and archaeological sites	Felling of *Ficus thonngii* (Mugumo tree) which is regarded as sacred among the Kikuyu community; Possible damage of any other cultural and archaeological sites	• Cutting of Mugumo tree along the project area should be avoided. If necessary, the consent of Kikuyu elders should be sought before felling the tree. • Development and implementation of a chance find procedure in case archaeological sites are found during the construction process.
Increased HIV/AIDS incidence	Increased risk of HIV prevalence due to influx of people to work for the contractor.	• Offer HIV/AIDS sensitization to the skilled and semi-skilled construction staff in collaboration with local health facilities; • Provide condoms at strategic points within the contractors camp, dispensers near lodges and hospitals where people are likely to pick them; • Offer VCT services to the community with the help of local health facilities; • As far as possible, hire local community members in the semi-skilled category. Interventions to support this may include training of local community members to enhance their qualifications.

Operational

Positive impacts

Environmental and social issues	Impact	Enhancement/ mitigtigation
Employment opportunies	manage, maintain and scout the proposed pipeline route from Thika dam to Kabete Reservoir.	Workers should be employed and remunerated in accordance with the provisions of Kenyan labour laws and best international practices as contained in ILO and IFC Performance Standard 2: Labour and Working Conditions.
Increased access to clean portable water by Nairobi	More people/household in Nairobi will be able to be supplied with clean portable water hence improved sanitation.	Reduction water borne diseases among the residents of Nairobi.
Generation of tax revenue	Government revenue in the form of Pay As You Earn (PAYE) and Value Added Tax (VAT) for the	NCWSC should comply with the tax revenue regulations according to Kenya Revenue Authority.

Environmental and social issues	Impact	Enhancement/ mitigtigation
	operating licenses and corporation tax at 30% of net income	
Spurred growth of rural centers	The construction of Thika-Kigoro-Kabete pipelines necessitates the construction of Kigoro Treatment Plant which is likely to spur the growth of a trading centre at Kigoro and Kanunga areas.	Growth of such centres should be promoted through provision of commensurate public facilities including water and sanitation services.

Negative impacts

Environmental and social issues	Possible Impacts	Mitigation Measures
Increase of domestic wastewater generation	Increase in water supply in Nairobi will increases availability of portable piped water hence generation of more waste water as a by product.	• Expansion of the sewerage system and the sewer treatment works to cater for the increase wastewater likely to be generated by increased water supply. • Construction of community toilets that connected to the sewer system through WASSIP project.
Cleaning of the pipes through washouts and swabs	Flooding of adjacent farms and homesteads.	• Well designed drainage should be created at all washouts and swab chambers.
Vandalism of pipeline infrastructure	Vandalism of manholes for the washouts, air valves and swabs and other chambers will lead to high maintenance cost of the pipeline	• Use of concrete lid chambers for the respective manholes compared to the metallic ones; • Continuous surveillance of the pipeline route to reduce the rate of vandalism along the pipeline.
Illegal connections	Likely to occur along the pipeline especially where there are informal settlements.	• Regular audit should be contacted to ensure the pipeline is well maintained and there no illegal connections created along the pipeline • Workers should be employed to strictly manage and monitor the pipeline way-leave to prevent people from malpractices behaviour.

Cumulative impacts

Environmental and social issues	Possible Impacts	Mitigation Measures
Wayleave acquisition	Continuous sub-division of land from 12m to 6m and the proposed 3m will reduce some plots to uneconomically viable state;	• AWSB should resolve all issues arising from previous wayleave acquisition of 12m and 6m before the start of the construction works; • AWSB should permanently acquire the 3m land for the pipeline wayleave and compensate PAPs according to the RAP;

Environmental and social issues	Possible Impacts	Mitigation Measures
	Inadequate compensation of the previous acquired pipeline wayleave; Poor revegetation of existing wayleave has increasing erosion effect in the area affecting adjacent land to the pipeline wayleave	• AWSB should ensure proper revegetation of the area is done to curb the impact of soil erosion.
Wastewater management in Nairobi City	Increase in water supply in Nairobi will generate more domestic waste water which cannot be supported by the current sewerage network and the treatment plant in Dandora and Kariobangi. Domestic and industrial waste water will eventually ends up in Nairobi River affecting the BOD of the river. The impact will be experienced in the lower end of Athi River affecting the aquatic life and domestic use.	• AWSB should expand the sewerage system to cover more households and in tandem expand the treatment plant in Dandora and Kariobangi. • If possible AWSB can also construct a new treatment to take care of the increased water supplied to Nairobi residents. • Sanitation blocks encompassing of toilets, bathrooms and taps with clean water can be put up informal settlement and connected to the sewerage network. • AWSB should expand their pipeline networks to cater more for low and middle income population to ensure more people have access to water during the better part of the week. • Increase the number of exhaust vehicles to empty the filled septic tanks. • Better roads should be constructed in the informal settlements to ensure easy access of exhaust vehicles to most parts of the areas • Education awareness should be carried out to train the people on the impact of releasing raw sewage into the rivers ecosystem

E9 Environmental and Social Monitoring

In order to prevent adverse environmental and social impacts during implementation and realize the project benefits, a detailed Environmental and Social Management Plan (ESMP) for each project phase has been prepared. The Supervising Engineer for the project will be responsible for environmental management and related social components.

The ESMP has proposed various ways to mitigate negative impacts. These include measures during construction to mitigate risks of: Land acquisition, interruption of existing physical settings such as roads, soil erosion and pollution, water pollution, air and noise pollution, solid waste management and occupational and health risks related to the project construction

Environmental specifications for the contractor have also been included in the Environmental and Social Management Plan (ESMP). These will ensure that the mitigation measures are implemented. It is recommended that environmental audits and monitoring be undertaken during construction and upon completion of the project to document the status and progress of implementation of mitigation measures.

E10 Conclusion and recommendation

The proposed Thika-Kigoro-Kabete Gravity Water Pipelines will have appreciatable benefits to the people of Nairobi and its environs through increase of water supply hence increases access to clean and piped water and also reduce the challenges that are associated with water shortages such as water rationing and water-borne disease. However to realise this benefits, AWSB should resolve all historical issues concerning the previous wayleave acquisition of 18m before the construction works commences.

The ESIA report has been carried in compliance with the EMCA regulations to enable NEMA to determine the adverse impacts of the project to the environment and social settings. The study indicated that the benefits from the proposed project outweigh the negative impacts by far hence the several recommendation has been proposed to ensure the negative impacts are mitigated. Strict implementation of the Environmental Management and Monitoring Plan will mitigate and/or prevention potentially adverse environmental impacts resulting from project construction, operation and decommissioning phases.

The Resettlement Action Plan prepared alongside this ESIA study report be implemented before mobilisation of contractor to site and any additional land requirements by the contractor not covered under the RAP should be included in the updated version of the document together with consultations made with appropriate PAPs and stakeholders and implemented before actual construction begins.

The project impacts that have been raised in this report are anticipatory and there could be other emerging issues during and after project implementation. Therefore, the project should be subjected to periodic Environmental Monitoring to capture emerging issues and ensure compliance of the contractor to the ESMP and NEMA`s conditional approval.

1 INTRODUCTION

1.1 Project Background

The National Policy on Water Resources Management and Development focuses on streamlining provision of water for domestic use, agriculture, livestock development and industrial utilization with a view to realize the goals (among them Goal No. 7 of the Millennium Development Goals (MDGs) as well as the Kenya Vision 2030.

The Government of Kenya has received funds from the Agence Française de Development (AFD) and additional financing from the World Bank for the Water and Sanitation Services Improvement Project (WaSSIP). Athi Water Services Board (AWSB) is mandated to provide Water and Sewerage services in Nairobi City County and some of its satellite towns, whose water demand is increasing rapidly due to population increase into the City coupled with increased water demands from the industries. Nairobi is the country's largest economic centre and generates 45% of the country's GDP, in the process employing 43% of all Kenya's urban workers (Oxfam, 2009). It is also the largest industrial centre and food, beer, vehicles, soaps, textiles and chemicals are all produced or processed in the city.

The main source of water for Nairobi is the Eastern Aberdare Rivers found within the Aberdare Conservation Area (ACA). The ACA includes the Aberdare National Park and the gazetted Forest Reserves that surround the National Park. These areas are all under Government protection through Kenya Wildlife Services (KWS) and Kenya Forest Service (KFS). They are not subject to catchment degradation through settlement and forest clearance, as has been recorded in other national forests, such as the Mau Forest. It can reasonably be assumed that the "protected area" status will not only be maintained by the Government, but will be strengthened; hence the sustainability of the surface water sources arising from the ACA is assured under current Government policy, subject to control of permitted abstraction.

The present sources of water and their respective yields are as given below:

- Thika Dam 329,000 m^3/day
- Sasumua Dam 58,000 m^3/day
- Ruiru 21,700 m^3/day
- (Chania) Ngethu 104,000 m^3/day
- Kikuyu Springs 4,800 m^3/day

The ground water contribution to Nairobi Water supply (domestic, commercial or industrial purpose) by public, private or individual boreholes is estimated to be approximately 45,000m^3/day.

The combined yield of the developed water sources for Nairobi Water Supply is about 540,000m^3/day against the current demand estimated at about 750,000m^3/day *(Source: AWSB*
The proposed bulk Water Supply to Nairobi City- Northern Collector Tunnel, Downstream Works, and the Raw Water Pipeline, Kigoro Treatment Works situated in Kigoro, Gatanga Sub- County and the Treated Water Pipeline to Kabete Reservoir Tank projects are part of the WaSSIP projects which aim to provide water to Nairobi and its environs as described below (Section 1.3)

In order to bridge the existing supply gap and meet the projected future demand, a Feasibility Study and Master Plan for Developing New Water Sources for Nairobi and its Satellite Towns up to the year 2035 was commissioned by AWSB and concluded in 2012 by Consultant Egis Bceom International in association with Mangat I.B. Patel & Partners. Thus the project Northern Collector Phase 1 and Thika-Kigoro-Kabete Gravity Water Supply Pipelines project is derived from Nairobi

Water Master Plan for Developing New Water Sources for Nairobi and 13 Satellite Towns namely Kikuyu, Ruiru-Juja, Kiambu, Karuri, Githunguri, Mavoko Municipality, Ngong Township, Ongata Rongai, Thika, Gatundu, Limuru, Lari and Tala-Kangundo.

Following the complexity and varied impact assessment expected during the tunnel and pipeline construction, the ESIA and RAP studies for NCT 1 and Thika-Kigoro-Kabete Pipeline were done separately to ensure that the unique issues associated with the tunnel and pipelines would be addressed comprehensively. The ESIA study for the tunnel was completed and submitted to the National Environment Management Authority (NEMA) in December 2014. The study report was then reviewed and an approval issued on 9 February 2015 under EIA licences no: NEMA/EIA/PSL/1207.

The Northern Collector Tunnel (NCT) will transfer raw water through a tunnel approximately 11.8 km from intakes at the Maragua, Gikigie and Irati Rivers to an outlet at the Githika River near Makomboki, (Muranga County) upstream of the existing Thika Reservoir where the water will be transferred to Thika Dam. About 120,960m^3/day of raw water will be added to Thika Dam expected to feed the new Thika-Kigoro-Kabete Gravity Water Pipelines. The implementation of Thika dam-Kigoro-Gigiri-Kabete Gravity Water Supply project includes the following components:

- Construction of raw water gravity main from Thika dam to the proposed Kigoro Water Treatment Plant 6km downstream of Thika dam and;
- Construction of 60km Treated Water gravity main up to Kabete reservoirs (capacity 1.60m^3/s) via Ngethu and Gigiri Water Treatment Plants to meet the city's year 2017 water demand.

Thus this report summarises the Environmental and Social Impact Assessment (ESIA) of the Thika-Kigoro-Kabete Gravity Water Pipelines.

The Thika-Kigoro-Kabete Gravity Water Pipelines which is approximately 60km from Thika dam to Kabete will transverse through three counties namely Muranga, Kiambu and Nairobi County. The Raw water pipeline will be constructed along Thika River in Gatanga sub-county Muranga County up to the treatment plant in Kigoro and the treated water will run through peoples' farms and along the road reserves up to Kabete.

Although the pipeline has been designed with a capacity of 172,800m^3/day for Raw Water and 138,240m^3/day for treated water, only 120,960m^3/day being added to the dam through NCT will be available for transmission through the new proposed pipeline. This is in regards to operational policy safeguards of the dam to ensure sustainability of the dam and water supply to Nairobi throughout the year.

1.2 Project Rationale

Population which is a major determinant of water consumption in Nairobi has rapidly grown over the years. According to 2009 census by Kenya National and Bureau of Statistics (KNBS) the population of Nairobi was estimated at 3.138 million covering 25% of urban population in Kenya. According to Nairobi Water Masterplan Report the population of Nairobi is estimated to increase to 4.3million in 2020 and 5.6million in 2030 when the growth rate is kept as low as 2.8 percent. The table 1-1 below illustrate the population growth of Nairobi and its satellite towns.

Table 1-1: High and Low Growth Nairobi Centric Development Scenario

Local Authority	Urban Pop. In 1999	Urban in 2009	Pop. Growth Rate	Growth Rate Low Growth Nairobi Centric	Growth Rate High Growth Nairobi Centric	Low 2020	Low 2030	Low 2035	High 2020	High 2030	High 2035
Nairobi city	2.1m	3.13m	3.93%	2.80%	5.00%	4.3m	5.6m	6.4m	5.4m	8.7m	11.2m
Kiambu	13,814	16,853	2.20%	1.20%	2.20%	19,216	21,651	22,981	21411	26616	29676
Limuru	4,141	5,100	2.30%	1.30%	2.30%	5,879	6,689	7,135	6,549	8,222	9,212
Karuri	19,746	26,574	3.40%	2.40%	3.40%	34,495	43,728	49,233	38,387	53,628	63,386
Kikuyu	4,100	6,562	6.00%	5.00%	6.00%	11,223	18,281	23,332	12,457	22,308	29,853
Thika	88,265	113,861	2.90%	1.90%	2.90%	140,053	169,057	185,739	155,935	207,538	239,428
Machakos	161,442	192,117	1.90%	1.0%.	1.90%	214,339	236,763	248,841	236,310	285,249	313,397
Kajiado	9028	13,903	5.40%	4.40%	5.40%	22,326	34,341	42,591	24,794	41,953	54,571
Ruiru	109,574	199,383	7.20%	8.20%	8.20%	428,382	858,576	1.2	474,447	1.04m	1.54m

Source (AWSB Water Masterplan)

Increase in population will put more pressure on natural resources such as water. The current water supply in Nairobi at 540,000m^3/day against the current demand estimated at about 750,000m^3/day. The difference between the demand and supply is very large indicating that a large percentage of Nairobi population especially those living in informal settlements and slums have difficulty in accessing clean water. For instance out of 42% who have a direct connection to the pipeline network, more than 40% do not receive 24-hour service, 30% receive water once every two days and 10% receive water once a week, which is reflected by a general feeling of lack of water supply (Nairobi City Water Demand Report, 2005). Piped water being the major source of clean water in Nairobi there is need to increase water supplied to Nairobi hence the necessity to construct additional pipeline. The pipeline has been proposed to run from Thika (Ndakaini) dam to Kigoro where the water will be treated before being conventionally pumped by gravity to Kabete Reservoir for supply. The new pipeline is estimated to supply about 120,960m^3/day of water to the residents of Nairobi City and its satellite towns

1.3 Project Location

The proposed Thika-Kigoro-Kabete Water Gravity Pipeline Project route for the Raw Water Pipeline originates from Thika (Ndakaini) Dam to Kigoro Treatment Plant in Kigoro Location Gatanga Sub-country, Muranga County. The Raw water will be treated at Kigoro WTW before being pumped by gravity to Kabete. The treated water pipeline route will run from Kigoro Treatment Plant to Ngethu where it will join the existing wayleave of with water pipelines from Ngethu WTW. From Ngethu the treated water pipeline will be laid along the existing wayleave up to Northern by-pass where the pipeline will take a new route to pass through Gigiri and Kibarage slums ending in Kabete Reservoir in Kitusuru Location, Westlands Sub County, Nairobi City County. The bulk water gravity pipelines route falls within three counties and six sub-counties is shown table 1-2 below;

Table 1-2: Administrative units covered by the Water Pipelines

County	Sub-County	Division	Location
Murang'a	Gatanga	Kigoro	Ndakaini
			Kigoro
		Gatanga	Kiria-ini
			Gatanga
Kiambu	Gatundu North	Chania	Gituamba
			Makwa
			Kairi
		Mangu	Gathaite
			Karuri
	Gatundu South	Ngenda	Ituru
			Ngenda
			Kimunyu
		Kiamwangi	Mutati
			Kiamwangi
	Githunguri	Komothai	Komothai
		Ngewa	Ngewa
		Ikinu	Ikinu
	Kiambu	Kiambu Municipality	Kamiti
			Riabai
			Kirigiti
			Kiambu settled area
Nairobi	Westlands	Westlands	Highridge
			Parklands
			Kitisuru

Figure 1-1: Map showing location of the project area in Kenya

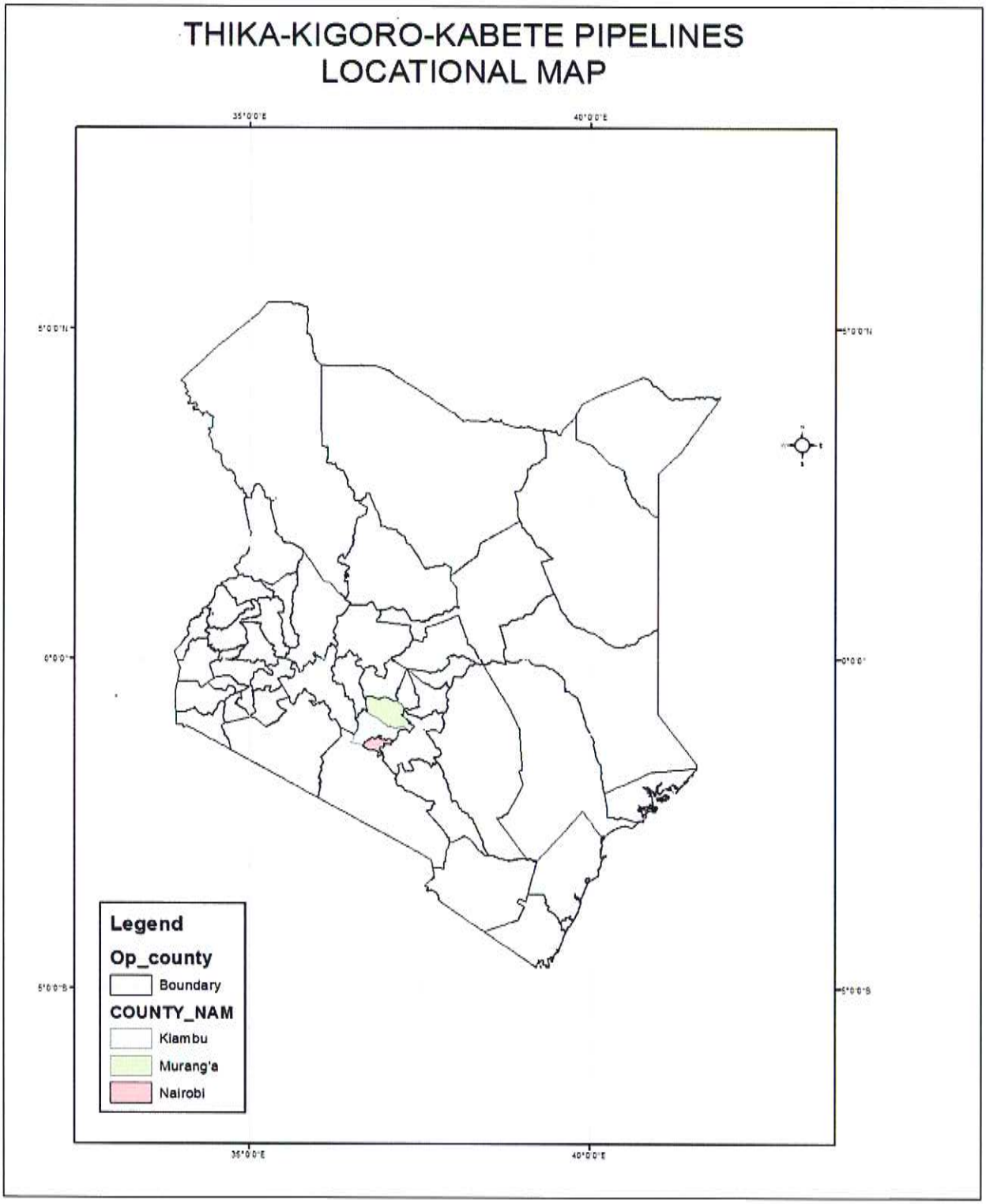


Figure 1-2: Thika-Kigoro-Kabete Pipelines project area

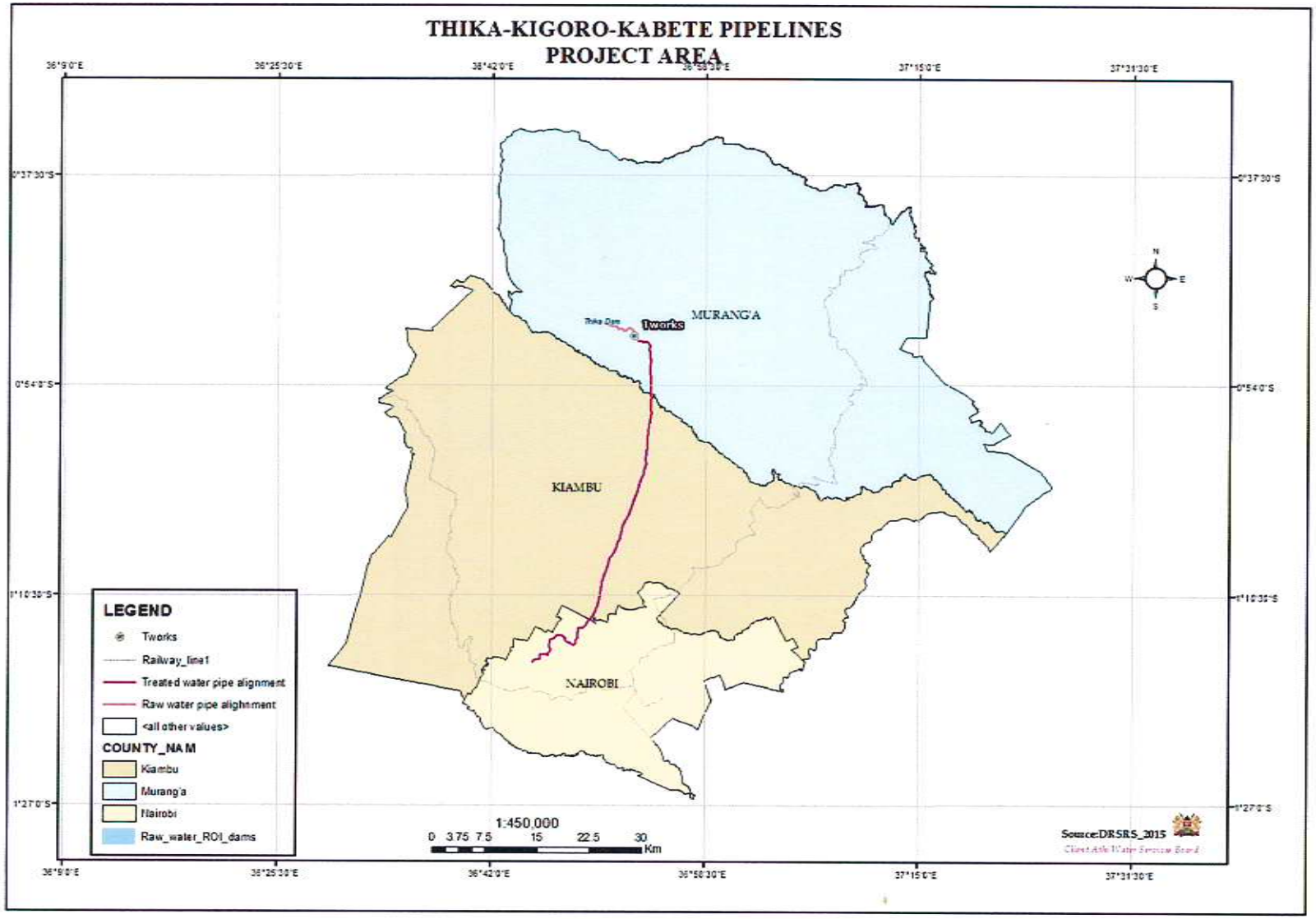
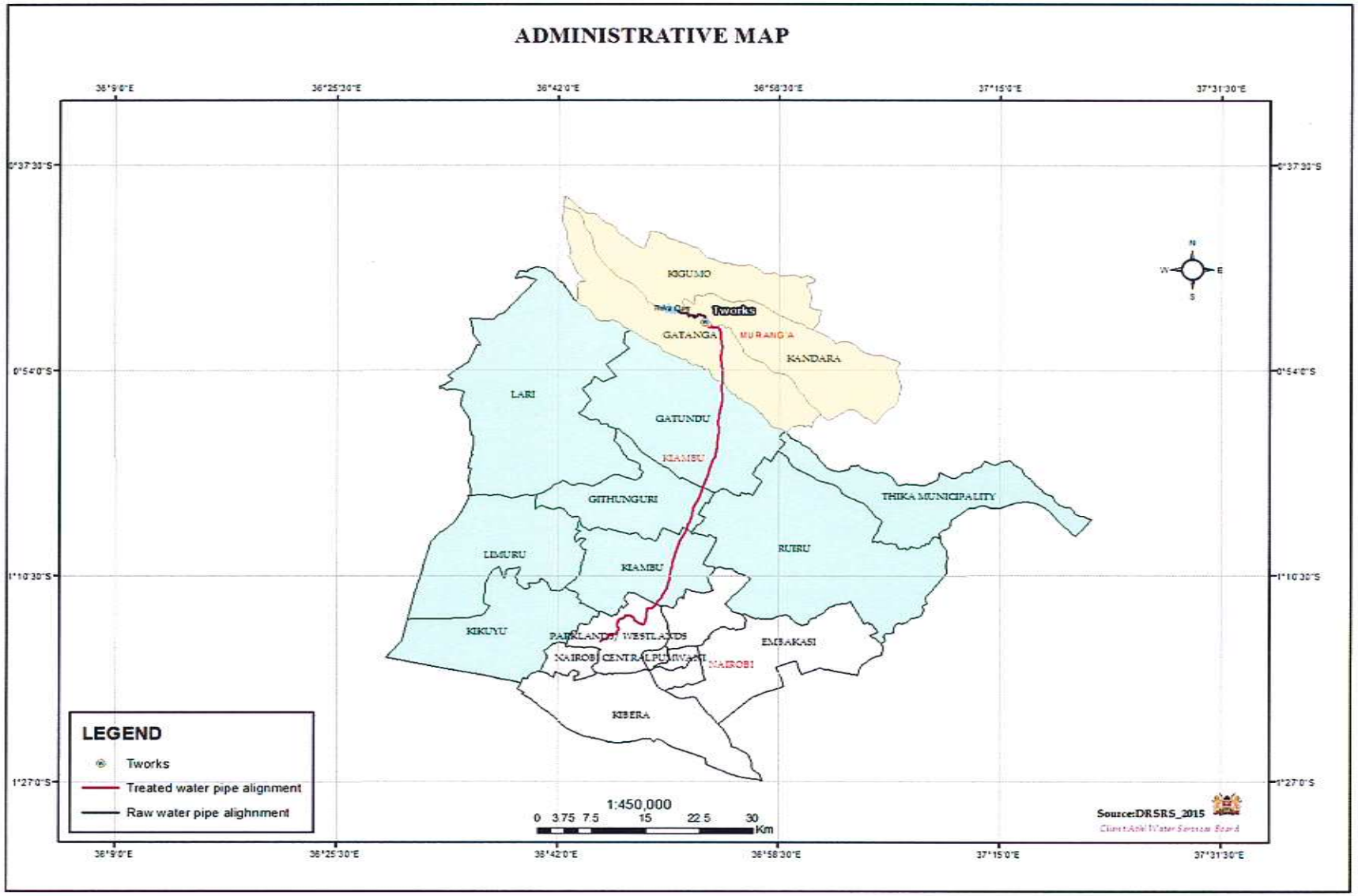


Figure 1-3: Map showing the administrative boundaries of Thika-Kigoro-Kabete Pipelines



1.4 Objectives of the ESIA study

The main objectives of the environmental and social impact study are to:

- To comply with the Environmental (Impact Assessment and Audit) Regulations, 2003;
- Determine the sustainability of the project on environmental and social safeguards;
- Provide a baseline description of bio-physical and socio-cultural environment of the project area;
- Identify and assess potential impacts of the project on the bio-physical and socio-cultural environment;
- Allow for consultations with all interested and affected parties and the relevant authorities; and
- To recommend cost effective measures to be implemented for mitigation of the expected impacts.

1.5 Study Methodology

In order to meet the study objectives, the first step was for the key staff to undertake desk study and preliminary site visit. Based on the site visit, observations relevant to the project which could influence the Environmental and Social Impact Assessment Study were identified.

1.5.1 Screening Visit

Screening is the process of determining whether a project should be subjected to an ESIA and evaluating the extent of assessment required. A site visit to the Project area was undertaken on 10 and 28 April 2014. The following activities were undertaken:

- Site analysis: Reconnaissance of the proposed location of the pipelines to develop an impression of topography, flora and fauna, economic activities, existing developments and potential project affected persons; and
- Meeting with the Sub-County Administration and the representatives of Muranga, Kiambu and Nairobi County to plan for smooth information dissemination to the general public

Field visits to all parts of the study area gave insight on the following:

- State of natural resources;
- Housing and settlement within the project area;
- Existing roads networks;
- Water sources in the project area;
- Drainage systems;
- Human behaviours related to water, sanitation and waste management issues.

1.5.2 Project Report and Scoping

From the initial literature review, fieldwork and consultations, a Project Report was prepared and submitted to NEMA as an application for a detailed ESIA Study for the proposed project. After review of the project report and confirmation of the need for a detailed ESIA study by NEMA, Terms of Reference (TOR) for this study was prepared and submitted to NEMA (Ref No: NEMA/5/2/12499)

1.5.3 ESIA Study

The field study was undertaken from April to July 2015 to evaluate the types, mode of action and magnitude of the specific projected effects and impacts, both favourable and detrimental to the environment and natural resources. This included;

- Desk study;
- Ecological survey,
- Socio-economic survey; and
- Public and stakeholders consultation

The methodology used to carry above named activities is described below;

(a) Desk Study

In order to prepare this study report, the environmental team reviewed the following reports but not limited to;

- ESIA for Northern Collector Tunnel Phase 1;
- Design Report on Northern Collector Tunnel Phase 1;
- Design Report for Thika-Kigoro-Kabete Raw Water and Treated Water Pipelines;
- Nairobi Water Masterplan Report;
- ESIA Project Report for Thika-Kigoro Raw Water Supply and Kigoro-Kabete Treated Water Supply Pipelines; and
- Various Policies, Acts and Regulations pertinent to the environmental assessment of the project. These included but not limited to the following:
    - The Constitution of Kenya, 2010;
    - The Environment Management and Coordination Act, 1999;
    - Wildlife (Conservation and Management) Act 2013;
    - The Occupational Safety and Health Act, 2007;
    - Work Injury Benefits Act (WIBA);
    - Employment Act;
    - The County Governments Act 2012;
    - Urban Areas and Cities Act No. 13 of 2011;
    - The Penal Code (Cap. 63);
    - The Public Health Act (Cap. 242);
    - The Water Act 2002;
    - National Environment Action Plan 2009 – 2013;
    - The National Policy on Water Resource Management and Development, Sessional Paper No. 1 of 1999;
    - Environmental Policy, 2013
    - Kenya's Vision 2030; and
    - Millennium Development Goals (MDGs).

(b) Ecological Survey

Qualitative study (Field survey) and quantitative study (Literature review) methodologies were used during the ecological survey. Due to the vastness of the project area, flora, fauna and avifauna identification was done through transect walks and in some instances through drive sampling. Locals were used as key informants on local knowledge so as to identify local names and establish importance of biodiversity to the local community.

Quantitative and qualitative findings were used to evaluate the project potential impacts on the biodiversity and propose feasible mitigation measures. The following were the key components surveyed during the ecological study:

(i) Vegetation

Under this category, two practical ecological aspects were studied and tabulated appropriately;

- Spatial vegetation cover; and
- Vegetation types/species.

Vegetation characteristics determined were sampled through transects lines and quadrants established at the proposed site for the pipeline. Quadrat measuring 20m by 20m was used to sample woody species while quadrats of 10m by 10m were used for grass sampling.

Spatial vegetation cover: This involved the identification of the general vegetation cover within the project area. This was done through site walks for identification and categorization of vegetation cover into physiognomic classes.

Vegetation types/ species: Various vegetation species were identified through expert and local knowledge. Where the experts could not readily identify the species on site, local (Kikuyu)) identification was used for subsequent scientific naming using a technical handbook for the useful trees and shrubs for Kenya (Maundu and Tengnas, 2005). In accordance with the plant scientific/taxonomic classification, the various vegetation types or species were identified and categorized into their various physiognomic classes

(ii) Fauna

Identification of animal species was conducted through direct observations and recorded. Various modes and combination of modes will be used in identifying fauna within the project area. These included:

- Visual sighting;
- Spoors;
- Droppings;
- Photography;
- Transects walk;
- Hairs/feathers;
- Diggings; and
- Local knowledge.

Avifauna survey

Avifauna study was conducted to determine distribution and abundance of bird species along the project area. Opportunistic observations, vocals and point transect methods were used to determine bird distribution within the area.

Mammals survey

Mammal survey was conducted through direct observations. Various modes and combination of modes were used in identifying of wild mammals within the project area. Interviews with the locals were also conducted to establish other species found in the project area. However no wild animals were observed or reported with the project area.

Herpetofauna survey

Reptile and amphibian species were sampled along the transect line through systematic sampling and use of vocals especially for amphibians. The microhabitats of key importance included rocks, forest patches, streams and ponds.

(c) Mapping of Baseline Environment

Spatial data for mapping was collected through:

- Hand-held GPS equipment; and
- Collection and purchase of base maps.

Using Computer Aided Mapping technologies, graphic presentations were prepared as part of the output on the baseline environment.

All GIS maps were prepared in ARCGIS10.1 and exported as JPEG for documentation and presentation. The maps unless otherwise stated were generated at the scale of 1:410,000. In some cases however, sections of selected maps were blown out to highlight specific areas of interest.

(d) Socio-economic household survey

In order to establish the current living conditions of the people living within the project area primary data collection was done through administration of questionnaires.

The objectives of the survey were as follows:

- To prepare a socio-economic profile of PAPs;
- To assess incomes, identify productive activities, and collect data to plan for income restoration;
- To identify possible vulnerable groups.

Data collected from the household survey included:

- Demographic characteristics of the PAPs;
- Sources of income and economic activities of the PAPs;
- Marital status of the PAPs and the number of household members who would be affected by the project.
- Levels of education of the household head and other members of the PAP household;
- Levels of education of the business owners.

Data Analysis

The analysis of quantitative data was done using PASW (Predictive Analytics SoftWare), formally known as Statistical Packages for Social Sciences (SPSS). Data was presented in form of prose, tables, matrices, pie charts and graphs.

Data collected from the household survey was triangulated with information from site surveys, observations by the sociologist, focus group discussions and key informant interviews.

(e) Public Consultations and stakeholders engagement

Further public consultations were undertaken during the full environment and social impact assessment study to document the social impacts to the project area and general community perceptions on the project based on final project designs.

The main objectives of the above exercise were to:

- Introduce the consultancy team and the scope of work;
- Obtain more information about the project area;
- Obtain views of the local area administration on the project;
- Collect baseline information on the project area.
- Obtain anticipated environmental and social issues and recommendation arising from pipeline construction.

In general, the following steps were followed in carrying out the entire consultation and public participation process:

- Identification of institutions and individuals interested in the process and compiling a database of the interested and affected parties
- Public / Technical Meetings at various levels and with different target groups
- Key informants interview through one on one, small group meetings and email correspondences
- Door to door distribution of public consultation forms along the pipeline corridor where it was difficult to convene a public meeting.

The public participation and stakeholders engagement was conducted in four ways, namely;

- General public meetings in Muranga, Kiambu and Nairobi counties;
- Key Informant Interviews and;
- Social economic surveys and observations

(i) Public meetings

Consultations with the communities were conducted in the project area with the help of the local administration including the Deputy County Commissioners, Assistant County Commissioners, chiefs and assistant chiefs. Given the large size of the project area, a total of seven (7) meetings were held in Gatanga Sub-county, five (5) meetings in Gatundu North, two (2) meetings in Gatundu South, one (1) meeting in Githunguri, two (2) meetings in Kiambu and two (2) meetings in Westland sub-county and were held at location levels within the project area.

(ii) Distribution of public consultation forms

The public consultation forms were also distributed to primary stakeholders (Private home/land owners in Nairobi and Kiambu who live along the pipeline route as well as those within the 1.5km of the proposed pipeline corridor). The forms had a brief project description and purpose of the ESIA.

(iii) Key Informant Interviews

One on one interviews were carried out among secondary stakeholders at the Sub County level and their comments on the project after incorporated into the study report accordingly. Other Stakeholders where one on one meeting were not able to be carried

out were briefed about the project in writing and questionnaires on the possible impacts that could arise from the project sent to them. These forms had a validity period of 10 days from the date of issue after which it's assumed that the stakeholder had no concerns on the project.

(f) Incorporating public views into the ESIA report

Views of those affected by or interested in the project informed identification and evaluation of both social and environmental impacts and have also been considered in the formulation of mitigation measures and formulation of the environment management plan.

Stakeholders and public consultations feedback is presented in chapter six and records of meetings are provided in Appendix IV.

1.6 ESIA Study Team

The ESIA team comprised of the following;

Eng. Maurice Namiinda	Project Director and Water Supply Engineer
George G. Owuor	Team Leader and Lead Environmentalist
Anastasia Ngatti	Assistant Team Leader
Aggrey O. Kwadha	Environmentalist
George Wandera	Sociologist
Dr. John M. Nyangaga	Hydrologist
Vincent Imala	GIS Expert
Joyce Owino	Assistant Sociologist
Peter Newton Stower	Assistant Environmentalist
Meave Omuruli	Assistant Environmentalist
Catherine Juma	Assistant Sociologist

1.7 Structure of the Report

This report has been prepared under the following chapters:

Executive summary: This chapter presents a summary of the significant findings and recommended actions, with an emphasis on expected impacts.

Chapter 1: **Introduction:** This chapter gives description of the project background, location, purpose, objectives, study methodology and the structure of the report.

Chapter 2: **Policy, legal and regulatory framework**: This chapter outlines the overview of legislative framework, regulatory, international guidelines and conventions relevant to this project.

Chapter 3: **Baseline environmental setting:** This chapter gives description of the environmental and social setting of project and surrounding areas, e.g., climate, soils, geology, vegetation, fauna, land use, human populations, socio-economics activities, cultural heritage, water supply and sanitation.

Chapter 4: **Project description:** This chapter gives a description of the project details and design and implementation strategies.

Chapter 5: **Project alternatives:** This chapter gives an analysis of project alternatives including the no-project option.

Chapter 6: **Public consultation:**' This chapter gives description of the objectives, methods used and summary of results of the public consultation activities undertaken during the study.

Chapter 7: **Impacts assessment and proposed mitigations:** This chapter presents the analysis of beneficial and adverse impacts of the project on the biophysical and human (social, cultural and economic) environments. The analysis covers anticipated impacts during the construction, operation phases and decommissioning phases and also proposed enhancement and mitigation measures.

Chapter 8: **Environmental and social management plan:** This chapter gives succinct summary impacts assessed and proposed mitigation measures outlined in Chapter 7, role and responsibilities and project costs.

Chapter 9: **Conclusions and recommendations:** This chapter summarises the Consultant's conclusion and recommendations form the assessment.

2 POLICY, LEGAL AND REGULATORY FRAMEWORK

2.1 Background

Regulation 18 (1) (b) of the Environmental (Impact Assessment and Audit Regulations) 2003 require an environmental assessment study report to, among others; include a concise description of national environmental legislative and regulatory framework. This chapter presents a review of the relevant policy, legal and regulatory framework applicable to environmental and social management of the proposed Thika-Kigoro-Kabete Gravity Water Supply Pipelines both at local and international levels and applicable WB and AFD operational policies that may be triggered by the project.

2.2 Policy Framework

2.2.1 Environmental Policy 2013

The Environmental Policy 2013 provides an integrated framework approach to planning and sustainable management of natural resources in the Kenya and suggests a broad range of measures and actions responding to key environmental issues and challenges. The Policy also recognises the various vulnerable ecosystems and proposes various policy measures not only to mainstream sound environmental management practices in all sectors of society but also recommends strong institutional and governance measures to support the achievement of the desired objectives and goal.

Section 4 of this policy gives provision and guideline principles in the management of the ecosystems and sustainable use of natural resources. It recognizes that natural system such as forests, grasslands, freshwaters, wetlands, marine and arid and semi-arid areas are under intense pressure from human activities hence being highly degraded.

Section 5.6.1 names pipeline construction as one of the infrastructure development likely to have a negative impact on the environment due to vegetation clearance, disturbance of fauna habitat, social and psychological disturbance, excavation works and spillage during construction. However the Policy recommends several guidelines that the government should implement to ensure infrastructure development does not have adverse impacts on the environment. These guidelines include:

- Carry out Strategic Environmental Assessment (SEA);
- Environmental Impact Assessment, Social Impact Assessment and Public participation in the planning and approval of infrastructural projects;
- Develop and implement environmentally-friendly national infrastructural development strategy and action plan and;
- Ensure that periodic Environmental Audits are carried out for all infrastructural projects.

Relevance

AWSB is conducting an ESIA study for the project in compliance with the policy guidelines for infrastructure development projects.

2.2.2 Sessional Paper No. 3 of 2009 on Land Policy

Sessional Paper No. 3 of 2009 on Land Policy was adopted by Parliament in 2009 to provide an overall framework and define the key measures required to address the critical issues of land administration, access to land, land use planning, restitution of historical injustices, environmental degradation, conflicts, unplanned proliferation of informal urban settlements, outdated legal framework, institutional framework and information management. It also addresses constitutional issues such as compulsory acquisition and development control as well as tenure.

Chapter 3 of land policy is linked to constitutional reforms, regulation of property rights is vested in the government by the Constitution with powers to regulate how private land is used in order to protect the public interest. The Government exercises these powers through compulsory acquisition and development control. Compulsory acquisition is the power of the State to take over land owned privately for a public purpose. However, the Government must make prompt payment of compensation.

Section 3.4.3 under Environmental Management Principles, provides for the policy actions for addressing environmental problems such as degradation of natural resources, soil erosion, and pollution of air, water and land.

The policy advocates for environmental assessment and audit as a land management tool to ensure environmental impact assessments and audits are carried out on all land developments that may degrade the environment and take appropriate actions to correct the situation. Public participation has also been indicated as key in the monitoring and protection of the environment.

Relevance

For the areas where there will be need for land acquisition, AWSB has commissioned the preparation of a Resettlement Action Plan (RAP) which requires participation of the affected land owners and users and payment of adequate compensation.

The land where the treatment works has been proposed in Kigoro location will be acquired by AWSB on a willing buyer willing seller basis.

The ESMP prepared in this report will be implemented to ensure sustainable use of land resources and mitigate activities that would cause adverse environmental impacts arising during construction and operational phases.

2.2.3 Sessional Paper No. 1 of 1999 on National Policy on Water Resources Management and Development policy

The Government developed a National Water Policy which was adopted by Parliament as Sessional Paper No 1 of 1999 in April, 1999. The policy justified a management hand over, argued that ownership of a water facility encouraged proper operation and maintenance, and that those facilities should, therefore, be handed over to those responsible for their operation and maintenance. The Policy stated that the Government would hand over urban water systems to independent departments within local authorities, and the rural water supplies, to communities.

The overall objective of the National Water Policy is to lay the foundation for the rational and efficient framework for meeting the water needs for national economic development, poverty alleviation, environmental protection and social well-being of the people through sustainable water resource management.The policy recognizes importance of water resources in determining the economic and social development agenda in Kenya and also as a vital element in maintaining the ecosystem, wildlife and recreation, hydropower production, and maritime transportation.

Under the policy objective, *'To progressively achieve universal rights to water supply and sanitation for all by 2030 in the rural and urban areas'*, one of the policy statements is to ensure access to water and sanitation according to rights. All relevant public sector institution and each WSP shall progressively enhance the rights to safe, reliable and affordable water and sanitation for all (100% service coverage by 2030).

Relevance

The project after completion shall be handed over to Nairobi City Water and Sewerage Company (NCWSC) which is responsible for management of water supply in Nairobi and its satellite cities as recommended in the policy document.

2.2.4 Millennium Development Goals (MDGs)

Adopted by world leaders in the year 2000 and set to be achieved by 2015, the Millennium Development Goals (MDGs) provide concrete, numerical benchmarks for tackling extreme poverty in its many dimensions. The MDGs also provide a framework for the entire international community to work together towards a common end making sure that human development reaches everyone, everywhere. If these goals are achieved, World poverty will be cut by half, tens of millions of lives will be saved, and billions more people will have the opportunity to benefit from the global economy.

Goal 7 of the MDGs is on ensuring Environmental Sustainability. It highlights on the following issues that need to be addressed:

- Protection of forest ecosystems;
- Need for reduction in Green House Gases;
- Reduce overexploitation of marine resources;
- Promoting Non extinction of some animal species;
- Improve access and quality of water especially to the poor; and
- Try and face out the sprawling of urban slums.

Goal 7c target is to improve access and quality of water to the people by ensuring more that half of the proportion of the population access safe drinking water and basic sanitation by 2015.

Relevance

By increasing the water supply to Nairobi City and its environs, the Thika-Kigoro-Kabete pipeline is directly contributing to Kenya's achievement of target 7c.

To ensure Environmental sustainability is achieved, the mitigation measures proposed in the ESMP in this report should be adhered to during the project implementation.

2.2.5 Kenya's Vision 2030

Vision 2030 aspires to transform Kenya into a newly industrialized middle-income country by 2030. The blueprint is categorized into three pillars namely economic, social and political. The strategy of the social pillar is to ensure a just and cohesive society enjoying equitable social development in a clean and secure environment and water and sanitation is one of the key goals mentioned in this sector. Vision 2030 recognizes that Kenya is a water scarce country and that the economic and social development envisaged in Vision 2030 will require high quality water supplies. The water and sanitation sector goal is in line with the Vision 2030 is "*to ensure that improved water and sanitation are available and accessible to all*".

One of the flagship projects of Vision 2030 is to rehabilitate and expand urban water supply and sanitation in the key satellite towns identified under the economic pillar. Therefore construction of Thika-Kigoro-Kabete Gravity Water Supply Pipeline to provide water for Nairobi and its satellites town is in tandem with Vision 2030.

Regarding environment, the Vision states that Kenya aims to be a nation living in a clean, secure and sustainable environment by 2030. Some of the goals for 2012 is to lessen by half all environmental related diseases and commissioning of Public-Private Partnerships (PPPs) for improved efficiency in water and sanitation delivery.

Relevance

The Thika-Kigoro-Kabete water supply project is in line with the Vision 2030 and specifically falls under the flagship project of rehabilitating and expanding urban water supply and sanitation in Nairobi and its key satellite towns.

Increase in access to clean water in Nairobi and its satellite towns will reduce the risk of water-related diseases among the residents of Nairobi and its environs and in turn will improve the living standards of the targeted population.

2.3 Legal Framework

The Legislative frameworks relevant to the project are discussed below:

2.3.1 The Constitution of Kenya

Part II of Chapter 5 of the Kenyan Constitution (Environment and Natural Resources), puts the responsibility of the state to:

- Ensure sustainable exploitation, utilization, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits;
- Work to achieve and maintain a tree cover of at least ten per cent of the land area of Kenya;
- Protect and enhance intellectual property in, and indigenous knowledge of, biodiversity and the genetic resources of the communities;
- Encourage public participation in the management, protection and conservation of the environment;
- Protect genetic resources and biological diversity;
- Establish systems of environmental impact assessment, environmental audit and monitoring of the environment;
- Eliminate processes and activities that are likely to endanger the environment; and
- Utilize the environment and natural resources for the benefit of the people of Kenya.

Section 7 of the Constitution also states that "Every person has a duty to cooperate with State organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources.

The Constitution also emphasizes that:

- Land use and management shall by law benefit local communities;
- Community land be protected from encroachment by State;
- Law shall protect rivers, forests and water bodies;

- The state provide equitable access to land;

Relevance

The Constitution of Kenya advocates for sound environmental management and sustainability ensuring that efficient utilization of the environment and natural resources for the benefit of all the people. This study is being done in compliance with Chapter 5 of the Constitution.

2.3.2 The Environment Management and Coordination Act, 1999

The Environment Management and Coordination Act (EMCA), 1999 provides for the establishment of an appropriate legal and institutional framework for the management of the environment and for the matters connected therewith and incidental hereto. EMCA is implemented by the guiding principle that every person has a right to a clean and healthy environment and can seek redress through the High court if this right has been, is likely to be or is being contravened.

Section 58 of the Act makes it a mandatory requirement for an ESIA study to be carried out by proponents intending to implement projects specified in the second schedule of the Act. Such projects have a potential of causing significant impact on the environment. Similarly, section 68 of the same Act requires operators of existing projects or undertakings to carry out environmental audits in order to determine the level of conformance with statements made during the EIA study. The proponent is required to submit the EIA and environmental audit reports to NEMA for review and necessary action.

Relevance

Environmental Management and Coordination Act (EMCA), 1999 in its Second Schedule 3 (f) requires water transport projects to undergo Environmental Impact Assessment (EIA). This report has been compiled to comply with EMCA and the Environmental (Impact Assessment and Audit) Regulations, 2003.

EMCA has provided for the development of several subsidiary legislations and guidelines that govern environmental management which are relevant to the proposed project as reviewed below.

(a) Environmental Impact Assessment and Audit Regulations 2003

The Environmental Impact Assessment and Audit Regulations state in Regulation 3 "the Regulations should apply to all policies, plans, programmes, projects and activities specified in Part IV, Part V, and the Second Schedule of the Act. Part IV of the Regulations indicates the procedures to be taken during preparation, submission and approval of the Environmental Impact Assessment Study Report (This report).

Regulation 4(1) further states that: *"...no Proponent shall implement a project:*

(a) Likely to have a negative environmental impact; or
(b) For which an environmental impact assessment is required under the Act or these Regulations, unless an environmental impact assessment has been concluded and approved in accordance with these Regulations..."

Relevance

The project is being subjected to environmental impact assessment in order to identify the impact of the project to the environment and propose the best mitigation measures as required in the regulations.

(b) The Environmental Management and Co-ordination Act (Water Quality) Regulations, 2006

These Regulations provides for sustainable management of water resources including prevention of water pollution and protection of water sources (lakes, rivers, streams, springs, wells, and other water sources). It is an offence under Regulation No. 4 (2), for any person to throw or cause to flow into or near a water resource any liquid, solid, or gaseous substance or deposit any such substance in or near it, as to cause pollution.

Regulation 9 provides for water quality monitoring. It states that the Authority in consultation with the relevant lead agency, shall maintain water quality monitoring for sources of domestic water at least twice every calendar year and such monitoring records shall be in the prescribed form as set out in the second schedule to these regulations.

Regulation No. 11 further makes it an offence for any person to discharge or apply any poison, toxic, noxious or obstructing matter, radioactive waste or other pollutants or permit the dumping or discharge of such matter into the aquatic environment unless such discharge, poison, toxic, noxious or obstructing matter, radioactive waste or pollutant complies with the standards for effluent discharge into the environment as stipulated in the Third schedule of this Act.

The Act further states that every person who generates and discharges effluent into the environment under a licence issued under the Act shall carry out effluent discharge quality and quantity monitoring in accordance with methods and procedures of sampling and analysis prescribed by the Authority, and shall submit quarterly records of such monitoring to the Authority or its designated representative.

Relevance

During the operational phase, effluent from Kigoro Treatment Works will be discharged into Thika River after the raw from the Thika dam has been treated. Thus, NCWSC is expected to abide by the standards stated in the Third Schedule of this regulation in treatment of the effluent before it is discharged to the river.

AWSB should also apply for a discharge permit from NEMA before the project becomes operational.

(c) The Environmental Management and Co-ordination (Waste Management) Regulations, 2006

These Regulations were published in the Kenya Gazette Supplement No. 69, Legislative Supplement No. 37, and Legal Notice No. 121 of 29th September 2006. The regulations provide details on management (handling, storage, transportation, treatment, and disposal) of various waste streams including:

- Domestic waste;
- Industrial waste;
- Hazardous and toxic waste;
- Pesticides and toxic substances;
- Biomedical wastes; and
- Radioactive waste.

Regulation No. 4 (1) makes it an offence for any person to dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle.

Regulation 5 (1) provides categories of cleaner production methods that should be adopted by waste generators in order to minimize the amount of waste generated and they include:

Improvement of production process through

- Conserving raw materials and energy;
- Eliminating the use of toxic raw materials and wastes;
- Reducing toxic emissions and wastes.

Monitoring the product cycle from beginning to end by

- Identifying and eliminating potential negative impacts of the product;
- Enabling the recovery and re-use of the product where possible, and
- Reclamation and recycling and
- Incorporating environmental concerns in the design and disposal of a product.

Regulation 6 requires waste generators to segregate waste by separating hazardous waste from non-hazardous waste for appropriate disposal. Regulation 15 prohibits any industry from discharging or disposing of any untreated waste in any state into the environment. Regulation 17 (1) makes it an offence for any person to engage in any activity likely to generate any hazardous waste without a valid Environmental Impact Assessment license issued by NEMA.

Relevance

The proposed water supply project will generate wastes during construction and operational phases, which will need to be disposed as per the guidelines in the regulations.

(d) The Environmental Management and Coordination Act (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009

These regulations were published as legal Notice No. 61 being a subsidiary legislation to the Environmental Management and Co-ordination Act, 1999. The regulations provide information on the following:

i. Prohibition of excessive noise and vibration;
ii. Provisions relating to noise from certain sources;
iii. Provisions relating to licensing procedures for certain activities with a potential of emitting excessive noise and/or vibrations and
iv. Noise and excessive vibrations mapping.

According to regulation 3 (1), no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment.

Regulation 4 prohibits any person to (a) make or cause to be made excessive vibrations that annoy, disturb, injure, or endanger the comfort, repose, health, or safety of others and the environment; or (b) cause to be made excessive vibrations that exceed 0.5 centimetres per second beyond any source property boundary or 30 metres from any moving source.

Regulation 5 further makes it an offence for any person to make, continue or cause to be made or continued any noise in excess of the noise levels set in the First Schedule to these Regulations, unless such noise is reasonably necessary to the preservation of life, health, safety or property.

Regulation 12 (1) makes it an offence for any person to operate a motor vehicle which- (a) produces any loud and unusual sound; and (b) exceeds 84 dB(A) when accelerating. According to sub-regulation 2 of this regulation, No person shall at any time sound the horn or other warning device of a vehicle except when necessary to prevent an accident or an incident. Regulation 13 (1) provides that except for the purposes specified in sub-Regulation (2) there under, no person shall operate construction equipment (including but not limited to any pile driver, steam shovel, pneumatic hammer, derrick or steam or electric hoist) or perform any outside construction or repair work so as to emit noise in excess of the permissible levels as set out in the Second Schedule to these Regulations.

Regulation 19 (1) prohibits any person to carry out activities relating to fireworks, demolitions, firing ranges or specific heavy industry without a valid permit issued by the Authority. According to sub-regulation 4, such permit shall be valid for a period not exceeding three months.

Relevance

The contractor/sub-contractor will be required to ensure compliance with the above regulations in order to promote a healthy and safe working environment throughout the construction phase. This shall include regular inspection and maintenance of equipment and prohibition of unnecessary hooting of vehicles.

(e) The Environmental Management and Coordination Act (Air Quality) Regulations, 2014

These Regulations were published in the Kenya Gazette Supplement No. 41, Legislative Supplement No. 15, and Legal Notice No.341 of 11 April 2014. The purpose of the regulations is to provide for the prevention, control and abatement of air pollution to ensure clean and healthy ambient air. Section 5, Part I of these regulations mandates the Authority in consultation with relevant lead agencies to formulate the National Emissions Standards for air pollutants such as for those stipulated under the Third Schedule.

The regulations prohibit emission of liquid solid or gaseous substance either directly or indirectly in levels exceeding those set out in the First Schedule of these regulations. On Vehicular Emissions the regulations in Section 25 (1) states that no person shall cause or allow emission of visible air pollutants from a stationary vehicle in excess of the limits set out under the prescribed standards.

Part VIII of these regulations forbid any person operating construction equipment or handling construction materials to emit particulate matter that exceeds the limits set out in the First schedule of these regulations. This applies to activities during construction; demolition of structures, buildings; stockpiling or other storage of materials likely to cause ambient air quality and waste incinerator.

Relevance

The project will generate dust and fumes emission during construction phase. This will arise during excavation, demolition of structures and use of construction vehicles. Thus, the contractor should adhere to the Air quality regulations.

2.3.3 The Water Act 2002

The Water Act of 2002 provides for the management, conservation, use and control of water resources and for acquisition and regulation of rights to use water; to provide for the regulation and management of water supply and sewerage services. Section 18 of this Act provides for national monitoring and information systems on water resources. Following on this, sub-Section 3

mandates the Water Resources Management Authority to demand from any person or institution, specified information, documents, samples or materials on water resources. Under these rules, specific records may be required to be kept by a site operator and the information thereof furnished to the Authority.

Section 73 of the Act provides that a person who is licensed to supply water has a responsibility to safeguarding the water sources against degradation. According to section 75 (1) such a person is required to construct and maintain drains, sewers and other works for intercepting, treating or disposing of any foul water arising or flowing upon land for preventing pollution of water sources within his/her jurisdiction.

Section 94 of the Act also makes it an offence to throw or convey or cause or permit to be thrown or conveyed, any rubbish, dirt, refuse, effluent, trade waste or other offensive or unwholesome matter or thing into or near to water resource in such a manner as to cause, or be likely to cause, pollution of the water resource.

Relevance

The proposed water supply project will require continuous monitoring of the quality of water being abstracted from the rivers upstream of the dam and also the water being released from Thika (Ndakaini) dam through the draw off tunnel to Kigoro treatment works.

The proponent will be required to ensure that project activities throughout all phases do not cause pollution of the water resources.

The water supplier for the construction process should protect the water source from where the water is being drawn.

(a) The Water Resources Management Rules, 2007

As a subsidiary to the Act, a legislative supplement, The Water Resources Management Rules, 2007 was gazetted to guide all policies, plans, programmes and activities that are subject to the Water Act, 2002. The Water Resources Management Rules empower Water Resources Management Authority (WRMA) to impose management controls on land use falling under riparian land. It also enables any person with a complaint related to any matter covered by these rules to the appropriate office in WRMA as per the Tenth Schedule which provides a format for report on complaints.

Section 116 (2) of Part IX on: Conservation of Riparian and Catchment Areas define the riparian land on each side of a watercourse as a minimum of six metres or equal to the full width of the watercourse up to a maximum of thirty metres on either side of the bank.

The Sixth Schedule on Protection and Conservation of Riparian and Catchment Areas further provides activities proscribed on riparian land as:

- Tillage or cultivation;
- Clearing of indigenous trees or vegetation;
- Building of permanent structures;
- Disposal of any form of waste within the riparian land;
- Excavation of soil or development of quarries;
- Planting of exotic species that may have adverse effect to the water resource; or
- Any other activity that in the opinion of the Authority and other relevant stakeholders may degrade the watercourse.

Relevance

The pipeline will in some areas be laid along the riparian land. More than 30 river crossings have been proposed across several rivers in the project area. AWSB will be expected to comply with the regulations during construction and operation phases of the project.

2.3.4 The Public Health Act (Cap. 242)

This is an Act of Parliament to make provision for securing and maintaining health. Section 115 of this act prohibits causing nuisance or other condition liable to be injurious or dangerous to health. Section 118 provides a list of nuisances that includes any noxious matter, or wastewater, flowing or discharged from any premises, wherever situated, into any public street, or into the gutter or side channel of any watercourse, irrigation channel or bed thereof not approved for the reception of such discharge.

The Public Health (Drainage and Latrine) Rules

Rule 85 provides that every owner or occupier of every workshop, workplace or other premises where persons are employed shall provide proper and sufficient latrines for use by employees.
Rule 87 requires every contractor, builder or other person employing workers for the demolition, construction, reconstruction, or alteration of any building or other work in any way connected with building to provide in an approved position sufficient and convenient temporary latrines for use by such workers. Rule 91 provides that no person shall construct a latrine in connection with a building other than a water closet or a urinal, where any part of the site of such building is within 200 feet of a sewer belonging to the local authority that is at a suitable level, and where there is sufficient water supply.

Relevance

This Act is applicable to the project since the contractor will be required to construct toilets in the contractor's campsite for use by contractors, workers and visitors to the site during the construction period.

2.3.5 The Penal Code (Cap. 63)

Section 191 of the Penal Code makes it an offence for any person or institution that voluntarily corrupts, or foils water for public springs or reservoirs rendering it less fit for its ordinary use. Similarly, section 192 prohibits making the atmosphere in any place noxious to health of persons/institution in dwellings or business premises in the neighbourhood or those passing along a public way.

Relevance

The contractor and AWSB will be required to ensure strict adherence to the Environmental Management Plan throughout the project implementation in order to mitigate against any possible negative impact associated with dust, noise, and effluent discharge.

2.3.6 The County Governments Act 2012

The County Government Act 2012 makes provisions for county governments' powers, functions and responsibilities to deliver services and for connected purposes.

Relevance

The project is a national project under AWSB. However, it directly affects three (3) counties namely Muranga, Kiambu and Nairobi. In the interest of public participation, open communication between AWSB and the three counties is important for the success of the project.

2.3.7 Occupational Safety and Health Act, 2007

Occupational Safety and Health Act (OSHA) is an Act of Parliament that provides for the safety, health and welfare of all workers and all persons lawfully present at workplaces, to provide for the establishment of the National Council for Occupational Safety and Health and for connected purposes.

It applies to all workplaces where any person is at work, whether temporarily or permanently. The purpose of this Act is to:

- Secure the safety, health and welfare of persons at work; and
- Protect persons other than persons at work against safety and health arising out of, or in connection with the activities of persons at work.

OSHA 2007 revokes the Factories and Other Places of Work Cap.514. The scope of OSHA 2007 has been expanded to cover all workplaces including offices, schools, academic institutions, factories, and plantations as well as machinery and equipments used. It establishes codes of practices to be approved and issued by the Directorate of Occupational Safety and Health Services (DOSHS) for practical guidance of the various provisions of the Act.

Relevance

The contractor, AWSB and NCWSC will be required to comply with all the provisions of the Act throughout the project cycle.

2.3.8 Work Injury Benefits Act (WIBA)

WIBA is an act of Parliament to provide for compensation to workers for injuries suffered in the course of their employment.

It outlines the following:

- Employer's liability for compensation for death or incapacity resulting from accident;
- Compensation in fatal cases;
- Compensation in case of permanent partial incapacity;
- Compensation in case of temporary incapacity;
- Persons entitled to compensation and methods of calculating the earnings;
- No compensation shall be payable under this Act in respect of any incapacity or death resulting from a deliberate self-injury;
- Notice of an accident, causing injury to a workman, of such a nature as would entitle him for compensation shall be given in the prescribed form to the director.

Relevance

The contractor, AWSB and NCWSC will need to abide by all the provisions of WIBA throughout the project cycle.

2.3.9 The Employment Act, 2007

This an Act of Parliament that define the fundamental rights of employees, provide basic conditions of employment of employees, regulate employment of children, and provide for matters connected with the foregoing.

The Act focuses on legislation on matters concerning:

- Employment relationship
- Protection of wages
- Rights and duties in employment

Employment of children in the following forms is prohibited in the following sections of the Act:

Section 53. (1) Notwithstanding any provision of any written law, no person shall employ a child in any activity that constitutes worst form of child labour.

Section 56. (1) No person shall employ a child who has not attained the age of thirteen years whether gainfully or otherwise in any undertaking.

(2) A child of between thirteen years of age and sixteen years of age may be employed to perform light work which is

(a) Not likely to be harmful to the child's health or development; and

(b) Not such as to prejudice the child's attendance at school, his participation in vocational orientation or training programmes approved by Minister or his capacity to benefit from the instructions received.

Relevance

This project is expected to create several employment opportunities to the people from construction phase to operational phase. During the implementation phase, all employers that will be involved in various aspects will be required to adhere to the said regulations so as not to compromise the workers rights.

2.3.10 The Wildlife Conservation and Management Act, 2013

This Act became operational on 10 January 2014. One of its guiding principles is the devolution of conservation and management of wildlife to landowners and managers in areas where wildlife occurs, through in particular the recognition of wildlife conservation as a form of land-use, better access to benefits from wildlife conservation, and adherence to the principles of sustainable utilization. Section 25 of the act provides for compensation for injuries and damages caused by wildlife (species listed in its third schedule) to humans and their properties respectively. Such compensation claims are to be reviewed and awarded by County Wildlife Conservation and Compensation Committees at the ruling market rates: provided that no compensation shall be paid where the owner of the livestock, crops or other property failed to take reasonable measures to protect the properties from damage by wildlife or land use practices are incompatible with the ecosystem-based management plan for the area.

The Act in its sixth schedule list various animal and tree species that are nationally considered as critically endangered, vulnerable, nearly threatened and protected. It also lists in its seventh schedule, national invasive species for which control is required.

Relevance

Although there no area of major conservation in the area, some of species listed as protected species have been planted by farmers along the project area. These include *Prunus africana* and *Vitex keniensis*. Although, this species have been planted, the contractor should avoid cutting them unless it is absolutely necessary.

Lantana camara listed an invasive species in sixth schedule of this Act should not be used to revegetate the area after construction.

2.3.11 Public Roads and Road of Access Act (Cap 399)

The Act provides for the following with regard to public roads:

- Dedication of line of public travel;
- Application to construct roads of access;
- Notice to be served on land owners affected;
- Granting of leave to construct road of access;
- Notification of order to be registered;
- Right of way over road of Access;
- Power to cancel or alter road of access; and
- Prohibition of classes of traffic

Relevance

There is the need for consultative cooperation before alteration/upgrade of some registered roads, as well as establishment of access roads. The pipeline will also be laid below some roads therefore provisions of the Act will be relevant.

2.3.12 The Kenya Roads Act of 2007

The Act stipulates the legal and institutional aspects of the road sub-sector policy. The Act provides for the establishment of three independent Road Authorities, namely:

I. Kenya National Highways Authority (KeNHA), responsible for the administration, control, development and maintenance of all class A, B and C roads in Kenya,
II. Kenya Rural Roads Authority (KeRRA), responsible for rural and small town roads including class D, E roads and Special Purpose Roads; and
III. Kenya Urban Roads Authority (KURA) responsible for all City and Municipal Roads.

The Authorities fall under the Ministry responsible for infrastructure, which retains the role of policy formulation, and general oversight of public roads including regulatory aspects such as technical standards.

Relevance

The proponent will require liaison with these institutions in the trenching, improvements existing and development of any new roads within the project area. ASWB should adhere to the regulations in this Act for proposed road crossings or use of road reserves.

(a) Kenya Roads (Kenya National Highway Authority) Regulations 2013

This regulations was formulated in reference to section 22 (2) (d) and 46 of the Kenya Roads Act to determine, impose and levy rates, tolls charges, dues or fees for any of its services or for the use by any person of its facilities.

Section 6 of Part II of this regulation state that a person who wishes to use of any portion of a road reserves on a class A, B or C road, shall make an application to the Director-General and the design be approved by authority before commencement of work. The Act also indicates that the cost of restoration of any disturbed roads must be paid by the proponent, in this case AWSB as stated in Part 1 A of Schedule in this regulation.

Relevance

The treated water supply pipeline will be laid along Northern by-pass road reserve and cross it at the overpass located near Runda Road. This road is under the management of KeNHA thus AWSB will be required to get an approval from the authority and pay the necessary fee before the pipeline is laid in the stated area.

AWSB should also ensure that the contractor reinstate all the affected road reserves immediately after construction.

2.3.13 Acts Related to Land

(b) The Land Act 2012 Cap 280

This is an Act of Parliament intended to give effect to Article 68 of the Constitution, to revise, consolidate and rationalize land laws; to provide for the sustainable administration and management of land and land based resources, and for connected purposes. Parts 1 and 2 of section 4 of the Act outline the main guiding principles in land management and administration, binding to all land actors including state officers. These principles are to be applied when Enacting, applying or interpreting any provisions of this Act; and when making or implementing public policy decisions.

The Act vests management of land on National Land Commission (NLC). In discharging their functions and exercising of their powers under this Act, the Commission and any State officer or public officer shall be guided by the following values and principles;

a) Equitable access to land;
b) Security of land rights;
c) Sustainable and productive management of land resources;
d) Transparent and cost effective administration of land;
e) Conservation and protection of ecologically sensitive areas;
f) Elimination of gender discrimination in law, customs and practices related to land and property in land;
g) Encouragement of communities to settle land disputes through recognized local community initiatives;
h) Participation, accountability and democratic decision making within communities, the public and the Government;
i) Technical and financial sustainability;
j) Affording equal opportunities to members of all ethnic groups;
k) Non-discrimination and protection of the marginalized; and
l) Democracy, inclusiveness and participation of the people; and
m) Alternative dispute resolution mechanisms in land dispute handling and management.

Acquisition of Private Land for Public Use

Section 110(1) of the Act provides that land may be acquired compulsorily under this if the Commission certifies, in writing, that the land is required for public purposes or in the public interest as related to and necessary for fulfillment of the stated public purpose.

In such an acquisition, this Act, in section 111(1) provides that just compensation shall be paid promptly in full to all persons whose interests in the land have been determined.

The procedure for land acquisition is laid out in Part VIII of the Act.

Elements for consideration under this procedure include the following:

- The Act requires that the owners, residents and their spouses should also be notified; as opposed to just the owners;
- The inspector would also have to get the consent of the occupier and give them not less than seven days' notice to enter the premises;
- The Commission shall have the power of a court to summon and examine witnesses and compel the production and delivery to the Commission of documents of title to the land;
- Separate award of compensation to every person. An award is final and conclusive evidence of the size of the land, the value in the opinion of the Commission and the amount of compensation payable, whether or not the person attends the inquiry;
- Regulations and rules pertaining to this process are yet to be gazetted;
- The Commission shall make rules to regulate assessment of just compensation;
- The Commission may post pone an inquiry or adjourn the hearing of an inquiry from time to time for sufficient cause.

Provisions on Acquisition of wayleave

The Land Act, 2012 provides for mechanisms of wayleave acquisition either as public right of way or communal right of way.

Section 143 of the act empowers NLC to create public rights of way. *A public right of way may be:* (a) *a right of way created for the benefit of the national or county government, a local authority, a public authority or any corporate body to enable all such institutions, organizations, authorities and bodies to carry out their functions, referred to in the Act as a wayleave; or* (b) *a right of way created for the benefit of the public, referred to in section 145 of this Act as a communal right of way.*

A public right of way shall attach to and run with the servient land in respect of which it has been created and shall be binding on all owners from time to time of the servient land, any manner they are occupying the land, whether under a land or a derivative right thereof, or under customary law or as a successor in title to any such owner or as a trespasser.

Section 144 (1) states that an application, for the creation of a wayleave, shall be made by any State department, or the county government, or public authority or corporate body, to the NLC.

In applying for wayleave, section 144(4) requires the applicant to serve a notice on:

a) All persons occupying land over which the proposed wayleave is to be created, including persons occupying land in accordance with customary pastoral rights;
b) The county government in whose area of jurisdiction land over which the proposed wayleave is to be created is located;
c) All persons in actual occupation of land in an urban and peri-urban area over which the proposed wayleave is to be created; and
d) Any other interested person.

Subsection (5) requires NLC to publish the application along the route of the proposed wayleave calculated to bring the application clearly and in a comprehensible manner to the notice of all persons using land over which the proposed wayleave is likely to be created.

Section 145 (1) provides that a county government, an association, or any group of persons may make an application to the commission for a communal right of way.

Once an application has been made to NLC, the determination for creation of a wayleave is conducted as per section 146 of the Act and includes:

- NLC, after at least ninety days from the date of the serving of notices, considering all the information received and all representations and objections made by any person served with a notice and recommending to the Cabinet Secretary whether to:(i) appoint a public inquiry to give further consideration to the representations and objections; or(ii) refer the application to the County Government for its opinion on whether to approve the application; or (iii) initiate and facilitate negotiations between those persons who have made representations on the application and the applicant with a view to reaching a consensus on that application;
- The Cabinet Secretary determining whether or not to create to create a public right of way, after taking account, as the case may be, of:*(a)* the recommendations of the Commission; or *(b)* the advice of the county government; or *(c)* the outcome of any negotiations referred to above;
- The Cabinet Secretary creating a public right of way by order in the Gazette. The order comes into force thirty days after its publication in the gazette.

An appeal against an order creating the wayleave is allowed within six weeks after the order has been made. Such appeal is made to the Court on a point of law against an order made by the Cabinet Secretary, but apart from such an appeal, an order of the Cabinet Secretary shall not be questioned by way of judicial review or otherwise in any court.

According to section 148, prompt compensation shall be payable (by the State Department, county government, public authority or corporate body that applied for the public right of way) to any person for the use of land, of which the person is in lawful or actual occupation, as a communal right of way and, with respect to a wayleave, in addition to any compensation for the use of land for any damage suffered in respect of trees crops and buildings as shall, in cases of private land, be based on the value of the land as determined by a qualified valuer.

In case of disagreement or dissatisfaction on amount or method of or time taken to make payment, the affected individual may apply to court for determination and award.

Section 148 (6) stipulates that NLC shall make regulations prescribing the criteria to be applied in the payment of compensation. However, these regulations have not yet been formulated.

(c) The National Land Commissions Act, 2012

This is an Act of Parliament to make further provision as to the functions and powers of the National Land Commission, qualifications and procedures for appointments to the commission; to give effect to the objects and principles of devolved government in land management and administration, and for connected purposes.

The mandate of the Commission, as provided for in the Act, Pursuant to Article 67(2) of the Constitution, shall be:

- To manage public land on behalf of the national and county governments;
- To recommend a national land policy to the national government;
- To advise the national government on a comprehensive programme for the registration of Title in land throughout Kenya;
- To conduct research related to land and the use of natural resources, and make recommendations to appropriate authorities;
- To initiate investigations, on its own initiative or on a complaint, into present or historical land injustices, and recommend appropriate redress;
- To encourage the application of traditional dispute resolution mechanisms in land conflicts;
- To assess tax on land and premiums on immovable property in any area designated by law; and
- To monitor and have oversight responsibilities over land use planning throughout the country
- On behalf of, and with the consent of the national and county governments, alienate public land;
- To monitor the registration of all rights and interests in land;
- To ensure that public land and land under the management of designated state agencies are sustainably managed for their intended purpose and for future generations;
- Develop and maintain an effective land information management system at national and county levels;
- Manage and administer all unregistered trust land and unregistered community land on behalf of the county government; and
- Develop and encourage alternative dispute resolution mechanisms in land dispute handling and management.

This Commission will be integral in the management of land issues arising from the project implementation, especially as far as portals and pipelines wayleave acquisition is concerned.

(d) The Land Registration Act, Act No. 3 of 2012

This is an Act of Parliament intended to revise, consolidate and rationalize the registration of titles to land, to give effect to the principles and objects of devolved government in land registration, and for connected purposes.

Land Registry

Section 7(1) of the Act provides for establishment of a land registry in each registration unit which shall keep registers of the following regarding land:

- A land register, in the form to be determined by the Commission;
- The cadastral map;
- Parcel files containing the instruments and documents that support subsisting entries in the land register.
- Any plans which shall, after a date appointed by the Commission, be geo-referenced;
- The presentation book, in which shall be kept a record of all applications numbered consecutively in the order in which they are presented to the registry;
- An index, in alphabetical order, of the names of the proprietors; and
- A register and a file of powers of attorney.

Maintenance of documents, including land title deeds

Further, section 9(1) provides that the Registrar shall maintain the register and any document required to be kept under this Act in a secure, accessible and reliable format. These documents include;

- Publications, or any matter written, expressed, or inscribed on any substance by means of letters, figures or marks, or by more than one of those means, that may be used for the purpose of recording that matter;
- Electronic files; and
- An integrated land resource registers.

The register, as provided for in part 2 of section 9, shall contain the following particulars;

- Name, personal identification number, national identity card number, and address of the proprietor;
- In the case of a body corporate, name, postal and physical address, certified copy of certificate of incorporation, personal identification numbers and passport size photographs of persons authorized and where necessary attesting the affixing of the common seal;
- Names and addresses of the previous proprietors;
- Size, location, user and reference number of the parcel; and
- Any other particulars as the Registrar may, from time to time, determine.

These provisions are essential to any new land acquisition or transaction processes arising from implementation of the water supply project.

(e) The Land and Environment Court Act, 2012

This is an Act of Parliament to give effect to Article 162(2) (b) of the Constitution; to establish a superior court to hear and determine disputes relating to the environment and the use and occupation of, and title to, land, and to make provision for its jurisdiction functions and powers, and for connected purposes. The principal objective of this Act is to enable the Court to facilitate the just, expeditious, proportionate and accessible resolution of disputes governed by this Act.

Section 13 (2) (b) of the Act outlines that in exercise of its jurisdiction under Article 162 (2) (b) of the Constitution, the Court shall have power to hear and determine disputes relating to environment and land, including disputes:

- Relating to environmental planning and protection, trade, climate issues, land use planning, title, tenure, boundaries, rates, rents, valuations, mining, minerals and other natural resources;
- Relating to compulsory acquisition of land;
- Relating to land administration and management;
- Relating to public, private and community land and contracts, chooses in action or other instruments granting any enforceable interests in land; and
- Any other dispute relating to environment and land.

Section 24 (2) also states that the Chief Justice shall make rules to regulate the practice and procedure, in tribunals and subordinate courts, for matters relating to land and environment.

Section 30 (1) states that all proceedings relating to the environment or to the use and occupation and title to land pending before any Court or local tribunal of competent

jurisdiction shall continue to be heard and determined by the same court until the Environment and Land Court established under this Act comes into operation or as may be directed by the Chief Justice or the Chief Registrar.

Any land or/and environmental cases arising from the project will be handled in accordance with the provisions of this Act.

Relevance of the above Land Acts

Land is a basic factor of production for any development. The above requirements should be adhered to during project implementation.

2.3.14 The Physical Planning Act, 1996

The Act provides for the preparation and implementation of physical development plans and for connected purposes. It defined development, in section 3(a), as the making of any material change in the use or density of any buildings or land or the subdivision of any land which for the purposes of this Act classified as Class A development. Class A development constitutes deposition of refuse, scrap or waste materials on land, erection of dwellings and display of advertisements.

In order to promote health, safety, order, amenity, convenience and general welfare of all its inhabitants as well as efficiency and economy in the process of development and improvement of communications, the Act provides that every local authority must have a physical development plan as.

- *"...The basis for disposing of land acquired, or to be acquired under the plan by a local authority or relevant authority;*
- ***Section 4:** The re-planning and reconstruction of the plan area, or any part thereof, including any provisions necessary for.....*
- ***Section 4 (e):** Effecting such exchanges of land or cancellation of existing sub-divisions as may be necessary or convenient for purposes mentioned above in this paragraph*
- ***Section 4 (f):** Adjustment of rights between owners or other persons interested in such lands, roads, streets or right of way....."*

Section 29 of the Act vests powers in the local authorities to control development in their respective areas of jurisdiction, with legal mandate to vet development applications and approval or disapproval thereof.

In section 30, the legislation declares that any person intending to carry out development within a local authority is required to apply for development permission, forwarded to the clerk of the local authority. Until such permission is granted, no development activity shall be carried out by the proponent.

Relevance

The raw water from Thika dam for the new pipeline will be treated at Kigoro treatment plant. During the project implementation there is likely to have a variety of additives, storage of construction materials, processing and housing and sanitation structures just but a few. For each development case, the stipulated procedure laid down by this Act shall be complied with before the activities begin.

It is however notable that this Act is under review to align it with the new constitution. Some of its provisions like the local authorities are no longer applicable.

2.4 World Bank Safeguard policies

2.4.1 World Bank policy OP 4.01 Environmental Assessment

World Bank requires environmental assessment for projects proposed for the Bank financing to help ensure that they are environmentally sound and sustainable, and thus improve on decision making. Projects are screened and assigned categories (A, B, C or FI) depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts.

Following screening of the Main project, *Water and Sanitation Service Improvement Project - Additional Financing*, this project was classified as category A, requiring a full Environmental Assessment (EA). This is because the environmental and social impacts of Thika-Kigoro-Kabete Raw and Treated Water Gravity Pipelines component were anticipated to be significant.

Based on the review of the major constraints and opportunities facing sustainable development in Africa, and taking into account, key principles underlying environmental sustainability and the overall objectives of the Policy, a number of key environmental issues have been identified. WB's policy principles relevant to the project include:

- Environmental sustainability of project activities;
- Application of environmental assessment;
- Potential adverse impact on biodiversity;
- Improving Urban Environmental Management;
- Institution and Capacity Building;
- Increasing Awareness; and
- Stakeholder Participation.

Relevance

Implementation of Thika-Kigoro-Kabete gravity water pipelines is required to take place within WB policy framework on the best practices when it comes to ensuring that the project does not destabilize the riverine aquatic ecosystem, affect downstream users or degrade the environment. Thus the study has been incorporated WB Environmental Policy in the analysis of impacts and ESMP.

2.4.2 World Bank policy OP 4.04 Natural Habitats

The WB recognises that conservation of natural habitats, like other measures that protect and enhance the environment, is essential for long-term sustainable development. The Bank therefore supports the protection, maintenance, and rehabilitation of natural habitats and their functions in its economic and sector work, project financing, and policy dialogue. The Bank supports, and expects borrowers to apply, a precautionary approach to natural resource management to ensure opportunities for environmentally sustainable development.

Relevance

Although the natural terrestrial vegetation cover in the project area has been significantly altered, the water supply pipelines will pass along or across natural rivers with native and exotic species. Precaution is thus required in line with OP 4.04 to ensure the riverine resources management are sustainable.

2.4.3 World Bank policy OP 4.11 Physical Cultural Resources

OP 4.11 on Physical Cultural Resources, was revised on April 2013 to takes into account the recommendations in *Investment Lending Reform: Modernizing and Consolidating Operational Policies and Procedures*, Given that some cultural resources may not be known or visible, it is important that a project's potential impacts on cultural resources are considered at the earliest possible stages of project processing.

The policy requires assessment of potential impacts of a project on physical cultural resources as an integral part of the environmental assessment process. It also recognises physical cultural resources as important source of valuable scientific and historical information, as assets for economic and social development and as an integral part of peoples' cultural identity and practices.

The assessment of impacts to cultural heritage has been based on identified aboveground features and known sites of archaeological interest. The policy also indicates precaution is necessary in case of chance find of any archeological site.

Relevance

Mugumo tree which are considered as sacred species in the Kikuyu community were observed along the project area during ecological survey. The contractor should not fell any of the Mugumo tree in the area and if necessary consent from the Kikuyu elders should be sought.

The contractor and AWSB will be required to follow Chance Find Procedures and contact the National Museums of Kenya (NMK) should any archeological site or artifact encountered during construction.

2.4.4 World Bank Operational Policy 4:12 Involuntary Resettlement

The World Bank Operational Policy on Involuntary Resettlement (OP 4.12) establishes guidelines for land acquisition and compensation of people affected by a World Bank funded project. Key principles and policy objectives of OP 4:12 can be summarised as:

- To minimise or avoid involuntary resettlement where feasible and to explore all viable alternative project designs;
- To conceive and implement resettlement activities as sustainable development programs where affected people are provided with sufficient investment resources and opportunities to share in project benefits.

Relevance

The project triggers OP 4.12 as land take will arise to secure a 3m permanent wayleave or easement for the pipeline. Temporary land take of 6m will also arise adjacent to the 3m wayleave to secure a construction wayleave. A RAP study has been carried out as separate study to give guidance on land acquisition and compensation to the affected persons.

The above policy principles have been applied through consulting affected persons and according them opportunities to participate in the planning and execution of resettlement programs. This will assist the Project Affected Persons (PAPs) where resettlement is necessary, to improve their livelihood and living standards, income earning capacity and production levels, or at least to restore them in a manner that maintains sustainability of resettlement programs. The RAP report has been publicly disclosed in Kenya and in the World Bank InfoShop.

The Compensation framework shall be based on:

- For agricultural land, land of equal productive use or potential, prepared to a similar level and located in the vicinity of the affected land;
- For residential land, land of equal size and use, with similar infrastructure and services and located in the vicinity of affected land;
- For structures, full replacement cost to purchase or build new structures of a similar size and quality to affected houses and other affected structures; and
- Subsidies to assist AP with costs associated with the transition period in the resettlement site e.g., moving costs, living allowance, business losses lost production etc.

2.4.5 World Bank Operational Policy 4:37 Safety of Dams

This OP provides guidelines to ensure safety at Bank financed projects involving dams. Safety measures require appropriate plans for:

- Construction supervision and quality assurance;
- Instrumentation plan;
- Operation and Maintenance (O&M) plan; and
- Emergency preparedness plan.

In the case of existing dams, any dam that can influence the performance of a project must be identified and its safety assessed. Necessary dam safety measures or remedial work are implemented. According to the OP, Dams over 15 meters in height are classified as large dams. High hazard dams are those under 15 metres but which are in a zone of high seismicity and /or where foundations and other design features are complex.

Relevance

The pipelines will on commissioning receive its waters from existing Thika (Ndakaini) Dam hence triggering this OP. AWSB will review and update the dam safety and emergency preparedness plan if necessary.

2.5 AFD Policy on Environmental and Social Risk Management

2.5.1 Policy

The environmental and social risk management process (including risks related to climate change) for the operations financed by AFD applies throughout the project life cycle. This risk management mechanism meets the objectives of harmonizing the environmental and social procedures of Official Development Assistance agencies set out in the Paris Declaration on Aid Effectiveness.

2.5.2 Environmental and Social Risks

The policy recognizes that projects can have risks in terms of ecology (adverse effect on natural environments and biodiversity), pollution (water, air, soil) and nuisances (noise, waste...) and natural, technological and health risks. They can also have an impact on the health and safety of communities, natural resources (water resources, soil and underground resources, land resources), on the living conditions of communities, and on the natural, historical and/or cultural heritage. The social risks mainly concern the respect of fundamental human rights for which there are recognized international standards, laws and conventions: human traffic, sex tourism, population displacement, forced labour, working conditions, equity for disadvantaged or excluded

social groups (particularly women), non-respect of cultural diversity, adverse effects on the environment, etc.

2.5.3 Reference Standards

All operations financed by AFD Group are required to comply with the national regulations of the country where the operation is implemented, including for environmental and social issues. However, as regulations in the countries where AFD Group operates are sometimes incomplete or being developed, AFD Group uses a number of rules, good practices and directives produced by international standard-setting organizations as a reference.

This mainly concerns:

- The UN Principles for Responsible Investment (UNPRI);
- The World Bank Safeguard Policies for public sector financing;
- The IFC Performance Standards for private sector financing. These standards are applied by Proparco for high-risk projects (A and B+); and
- The "Principles for Responsible Financing". They are used by all European Development Finance Institutions (EDFI Group) and are applied by Proparco.

The major international conventions ratified by the countries where AFD operates are also used as references, mainly:

- The United Nations Universal Declaration on Human Rights;
- The ILO fundamental conventions on labour law;
- The United Nations Convention on the Elimination of All Forms of Discrimination against Women (CEDAN); and
- The OECD guidelines.

AFD promotes inclusion of environmental and social (E&S) clauses in the contracts for goods and services financed by Official Development Assistance to promote a level playing field for international competitive bidding and improve the overall level of E&S requirements.

Relevance

The gravity water pipelines will have to comply with the Kenyan environmental laws (reviewed in section 2.3) as required by this policy and the anticipated risks from its implementation have been assessed based on the relevant World Bank environmental and social safeguards. Kenya has also ratified majority of the international conventions recognised by AFD above e.g. on human rights, Labour laws and the CEDAN. AWSB shall also include E&S clauses in the pipeline contract to impose on the project's contractor E&S performance.

2.6 Institutional Framework

The following are the main institutions that perform regulatory roles and are relevant to the Project.

2.6.1 Ministry of Water and Irrigation

The mandate of the Ministry is to protect, conserve and manage water resources and ensure sustainable use of water for agriculture in Kenya with a view of supporting socio-economic development, reduce poverty, improve living standards and ensure a clean environment.

The Ministry's Water Department has its fundamental goal and purpose as conserving, managing and protecting water resources for socio-economic development. Its aim is to improve the living standards of people by ensuring proper access to available water resources.

Relevance

Water resources, land, flora and fauna and the air are core components of the natural environment. The proposed development project will utilize surface water and all the other resources at one stage or another. Any extractive or depository uses of the resources are guided by the various programmes and regulations under the ministry and consistent consultative partnerships, including adherence to relevant legal provisions will be required in the entire course of the project.

2.6.2 The National Environment Management Authority (NEMA)

The responsibility of NEMA is to exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of Government in the implementation of all policies relating to the environment.

Some of the NEMA functions are performed through committees established by EMCA as follows.

(a) Standards and Enforcement Review Committee (SERC)

EMCA provides for the establishment and enforcement of environmental quality standards to be set by a technical committee of NEMA known as the Standards and Enforcement Review Committee (SERC).

(b) Public Complaints Committee

EMCA has also established a Public Complaints Committee, which provides the administrative mechanism for addressing environmental harm. The Committee has the mandate to investigate complaints relating to environmental damage and degradation. The members of the Public Complaints Committee include representatives from the Law Society of Kenya, Non-governmental Organization (NGO) and the business community.

(c) County Environmental Offices

NEMA has offices at county level contributing to decentralised environmental management.

Relevance

The project will have to be licensed by NEMA before construction starts and thereafter comply with NEMA regulations on environmental matters.

2.6.3 Water Resource Management Authority (WRMA)

The Water Resource Management Authority is a national organization with the mandate of regulation of water resources issues such as water allocation, source protection and conservation, water quality management and pollution control and international waters. The services provided by WRMA include:

- Planning, management, protection and conservation of water resources.
- Planning, allocations, apportionment assessment and monitoring of water resources.
- Issuance of water permits.
- Water rights and enforcement of permit conditions.

- Regulation of conservation and abstraction structures.
- Regulation and control of water use.
- Coordination of the water resources management plan.

WRMA offices in Nairobi, Kiambu and Muranga sub-regions will be responsible for issuance of permits that will allow obstruction of a river course during under river crossings and enforcement of any conditions attached.

2.6.4 Water Services Regulatory Board

Water Services Regulatory Board (WSRB) oversees the implementation of policies and strategies relating to provision of water and sewerage services. This institution is responsible for licensing Water Services Providers (WSP) and monitors the compliance of WSPs. The additional Raw and Treated Water Gravity Pipelines which is being spear headed by AWSB and later be handed over NCWSC for management must comply with WSRB regulations.

2.6.5 Athi Water Services Board

Athi Water Services Board (AWSB) is the project implementing agency. AWSB is one of the eight Water Boards under the Ministry of Environment, Water and Natural Resources created under Section 51 of the Water Act 2002 to bring about efficiency, economy and sustainability in the provision of water and sewerage services in Kenya.

Core mandates of AWSB include:

- Plans and develops National Public Water Works for bulk water supply;
- Formulates Development and Investment Plans in liaison with county governments;
- Provides input to the national development and financing plan; and
- Provides technical assistance to Water Service Providers for county asset development

AWSB is serving a population of over 4.5 million in Nairobi City County and some of its satellite towns.

2.6.6 Nairobi City Water and Sewerage Company (NCWSC)

NCWSC is a Water Service Provider formed in line with the Water Act of 2012 and is charged with the provision of the water and sewerage services in Nairobi County. NCWSC has been appointed by the Athi Water Service Board to provide water and sewerage services to the residents of Nairobi.

NCWSC will be responsible for operation and maintenance (O&M) of the project once commissioned.

2.6.7 Kenya Forest Service

Kenya Forest Service (KFS) is mandated to manage protected forests within the country. Protection of the Aberdare forest will be vital for sustained water supply for the project targeted Rivers. The pipeline will not pass through any gazetted or protected forest areas. However, commercial forestry being practised by several people along the project area will be affected therefore KFS is important institution which is in the front line to encourage farmers to plant trees so as to increase the green cover of the area.

2.6.8 KeNHA, KURA and KeRRA

Kenya National Highway Authority (KeNHA), Kenya Urban Roads Authority (KURA) and Kenya Rural Roads Authority (KeRRA) are institution and govern and manage highways, urban roads and rural roads respectively.

The proposed pipeline is expected to cross some roads or be laid along the road reserve under the jurisdiction of the three authorities in Muranga, Kiambu and Nairobi County. These institutions are important because they are responsible for issuance of permit to allow road crossings or use of the respective road reserve.

2.6.9 Directorate of Occupational Safety and Health

Directorate of Occupational Safety and Health Services (DOSH) is a government agency responsible for enforcement of Occupational Safety and Health throughout the country for the protection of workers and the general public at all work places in line with OSHA, 2007.

2.6.10 County Government of Muranga, Kiambu and Nairobi

The pipeline will pass through three counties namely Muranga, Kiambu and Nairobi County. These counties will have various inputs in the project implementation in line with constitutional functions of county governments. The functions of the county government relevant to the proposed project, as outlined in the Fourth Schedule, Constitution of Kenya 2010 are as follows:

- Provision of essential services such health services, county transport, education;
- Implementation of specific national government policies on natural resources and environmental conservation; and

The county governments of Muranga, Kiambu and Nairobi is thus expected to help in coordinating various project related activities as far as general environmental conservation and public participation are concerned. This will be better achieved through the Department of Ministry of Environment, Water and Natural Resources established in each County.

2.7 International Conventions

2.7.1 Convention on Biological Diversity

This global convention was held to foster conservation and sustainable use of biological resources, to preserve their diversity for posterity. Kenya is a signatory to this convention, and which it ratified in 1994. The provisions of this Convention have since been integrated in the laws of Kenya after the promulgation of the 2010 Constitution. The government also developed the Fourth National Report on the Kenya National Biodiversity Strategy and Action Plan.

Relevance

In line with the spirit of the convention, there is need to integrate biodiversity in which provides key ecological goods and services in implementation of a project. Thus this project shall consider minimal destruction of biological resources to ensure sustainability as recommended in the ESMP.

2.7.2 The Ramsar Convention

This is the Convention on Wetlands of International Importance. It was held in Ramsar, in 1971 and came into force in 1975, hence the name Ramsar Convention. The aim of this convention was to raise to global context the value of wetlands in our ecosystem and encourage partner states to develop instruments for conservation and management of wetlands. Kenya ratified the convention in June 1990.

The convention defines "Wise use of wetlands" as "the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development". "Wise use" therefore has at its heart the conservation and sustainable use of wetlands and their resources, for the benefit of humankind.

Under the "three pillars" of the Convention, the Parties have committed themselves to:

- Work towards the wise use of all their wetlands through national land-use planning, appropriate policies and legislation, management actions, and public education;
- Designate suitable wetlands for the List of Wetlands of International Importance ("Ramsar List") and ensure their effective management; and
- Cooperate internationally concerning transboundary wetlands, shared wetland systems, shared species, and development projects that may affect wetlands.

Relevance

There is no designated Ramsar site within the project area. However, to avoid detrimental effects during the implementation cycle the diversion of some of the rivers and streams for under river crossing, construction along Thika River and overcrossings of pipelines will have minimal impact on water uses downstream.

2.7.3 African Convention on the Conservation of Nature and Natural Resources

It was held on 15 September, 1968 in Algiers. The convention sought to awaken the continent on the need to preserve natural ecosystems and employ sustainable use of natural resources of economic importance, particularly the soil, water, flora and fauna.

Relevance

Some indigenous trees exist within the project area whose conservation are important. Therefore planting of indigenous trees along the project area is recommended to project shall be encouraged to try to restore a balance within the ecosystem.

2.7.4 Kyoto Protocol to the United Nations Framework Convention on Climate Change

The Kyoto Protocol requires signatories to the United Nations Framework Convention on Climate Change to reduce their green house emissions levels to 5% below 1990 levels by the year 2012. The Protocol came into force on 16th February 2005, and Kenya became a member in the same. However, major countries like United States, China, India, and Australia are not signatories to the Protocol.

Relevance

Compliance with this convention will largely inform the technical and environmental evaluation of the project. There is thus a necessity that proper adherence to minimal carbon emission levels during the construction phases of the project since automobiles that emit carbon dioxide will be used.

2.7.5 The 1992 United Nations Framework Convention on Climate Change (UNFCCC);

The primary purpose of the convention is to establish methods to minimize global warming and in particular the emission of the greenhouse gases. The UNFCCC was adopted on 9th May 1992 and came into force on 21st March 1994. The Convention has been ratified by 189 states. Kenya ratified the Convention on 30th August 1994.

The project implementation will most certainly be accompanied by use of a variety of hydrocarbon based fuels and other chemical substances. Some of the gases or compounds resulting from consistent use of these substances result into increase greenhouse gas emission into the atmosphere. There will thus be need to employ domesticated versions of the agreed carbon-curbing measures to reduce carbon emissions into the atmosphere.

3 BASELINE ENVIRONMENTAL SETTING

3.1 Physical environment

3.1.1 Climate

(a) Temperature

The average annual temperature of Kiambu areas ranges from 20.4°C-34°C. While that of Muranga varies from 14°C and 18°C and sometimes can go down to as low as 6°C in high potential humid areas especially in the month of July and August.

The average temperature of Nairobi varies between 17°C to 20°C with the month of July and August being the coldest with temperature as low as 10°C.

In most parts of the project area July and August are noted as the coldest months of the year while the hottest months being March and October.

(b) Humidity

Mean annual relative humidity in Muranga County range from 65% at lower elevations to 80% or more above 2,500 metres. Humidity is greatest at dawn and lowest in the early afternoon when the temperature reaches the diurnal maximum. The average monthly humidity in Kiambu and Nairobi ranges between 45% and 60% during the evening and between 60% and 90% in the morning.

Due to the location of Nairobi, south of the equator, in combination with humid air pumped in from the Indian Ocean, the humidity values for each day are generally on the higher end. Refer to table 3-1 below.

Table 3-1: Average monthly humidity values

County	J	F	M	A	M	J	J	A	S	O	N	D
Muranga	59.7	57.5	60.8	69.1	69.6	68.1	68.8	68.2	61.1	61.6	68.8	65.3
Kiambu	54	55	61	71	74	76	71	70	65	62	69	65
Nairobi	45	37	43	53	55	59	53	53	50	47	57	54

From the month of January to April, relative humidity values in Nairobi have been known to plummet to anywhere from 10% to 20%. The typical day starts off nearly saturated in the morning hours, and steadily decreases throughout the remainder of the day.

(c) Rainfall

The rainfall regime is greatly influenced by Inter-Tropical Convergence Zone (ITCZ) which separates the north-eastern and south-eastern trade wind systems and the belt of maximum rainfall follows the position of the overhead sun with a time lag of about 4 to 6 weeks.

Muranga County has two rainy seasons in April-May (long rains); and October-November (short rains). The average annual rainfall ranges from as low as 410mm in the lower area and 2700mm in the Aberdare ranges. The rainfall is reliable and well distributed throughout the year and is adequate for cultivation as well as rearing livestock.

Kiambu County experiences bi-modal type of rainfall with long rains being from March to May followed by a cold season usually with drizzles and frost during June to August and the short rains between October to November. The average annual rainfall ranges between 1200mm to 2000mm.

The average annual rainfall in Nairobi is about 900mm, but the actual amount of rainfall in any one year may vary from less than 500 mm to more than 1500 mm.

(d) Wind

The winds across the project area surfaces are predominantly easterly throughout the entire year. They are shifted to northeast between October and April, and they are shifted southeast between May and September. Right before the long rains season the strongest winds occur, reaching speeds of 20 to 25 miles per hour. During the rest of the year, winds are usually at speeds of 10 to 15 miles per hour. During the night, the winds are calm, both in Muranga, Kiambu and Nairobi areas.

(e) Sunshine

During the early mornings within the project area, the climatic conditions are often cloudy, but the sun peeks through by mid-morning. Throughout the year, there is an average of seven hours of sunshine per day. 30% more sunlight reached the ground during the afternoon than in the morning.

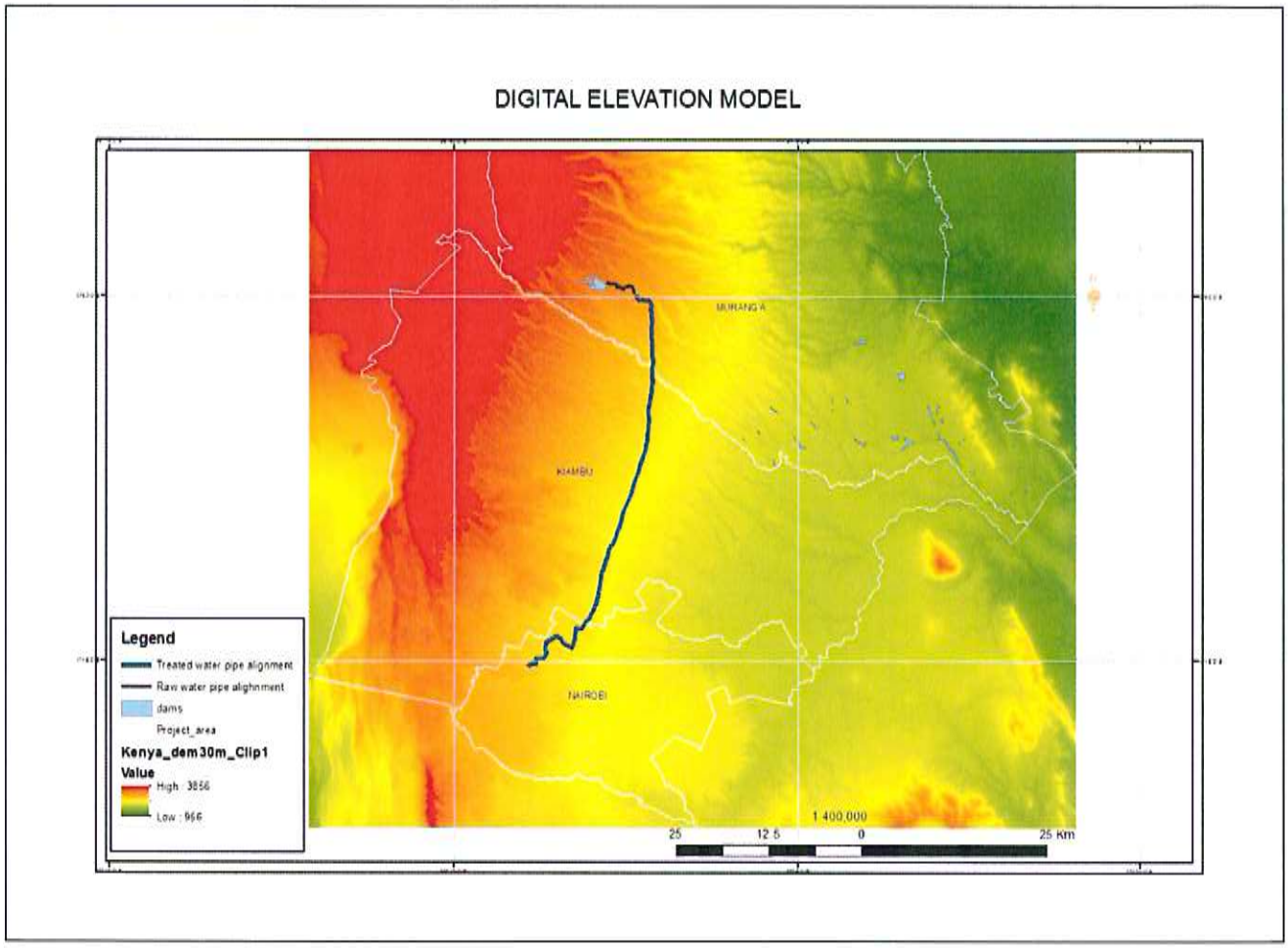
3.1.2 Topography

The proposed gravity water transmission pipeline is marked at a sharp drop in altitude from about 2100m at Thika Dam to about 1700m at Kabete Reservoir. There are several step-faults between Thika Dam and Thirika River with each step followed by a relatively table-like structure that terminates in the next step. For instance, step fault 1 occurs immediately after the Thika dam followed by an 8km flat table, step fault 2 occurs at the location of the Kiama River with the base of the scarp at Chania River, and the step fault 3 whose scarp is gentle occurs at Ruabora River and base of the scarp at Thirika River. The rest of the profile is marked by a gentle slope with minor and localized undulations.

The project area in Kiambu area lies between 1500-1800 meters above sea level and generally slopes eastwards. It is also landscaped by altering ridges and valleys. Four prominent physiographic units are recognised in the Nairobi area, reflecting on the volcanic rock types and the tectonic movements that have affected and resulted to the inherent topographical contrast.

The terrain and the slope of the project area in Muranga, Kiambu and Nairobi Counties are represented in Figure 3-1 below;

Figure 3-1: Topography of the project area



3.1.3 Hydrology

Nairobi draws most of its waters from rivers in the ACA in the Upper Tana River Basin, Muranga County. The NCT raw water expected to feed the new pipeline from Thika dam through Kigoro to Kabete Reservoir will be constructed in the Upper Tana Sub-catchment in Kigumo and Kagema sub-counties. The NCT will draw water from three rivers namely River Irati, Gikigie and Maragua and transfer it to Thika dam, through Githika outfall tunnel located few kilometres from upstream of the dam.

The water being added to the dam through NCT will cater for the new pipeline running from Thika dam through Kigoro WTW to Kabete. However, the amount of raw water added to the dam is about 120,960m^3/day which is less than the design capacity of Thika-Kigoro-Kabete pipeline of about 138,240m^3/day. For sustainability of the dam during operation, only 120,960m^3/day being added by NCT will be drawn from Thika dam to Thika-Kigoro-Kabete Gravity Water Pipeline.

The Thika-Kigoro-Kabete Water Supply pipelines will transverse through Tana River Basin in Gatanga sub-county, Muranga County and Athi River Basin in Kiambu and Nairobi County. Although the pipeline is entirely closed and no water will be abstracted from any of the rivers, the pipeline is expected to be laid along, under or over some of the rivers located in the Tana and Athi River Basins. The Raw Water pipeline will be laid along Thika River which falls in the Tana River Basin in Gatanga sub-county while the treated water pipeline will cross several rivers from Kigoro in Gatanga

sub-county, Muranga County to Kabete, Westlands sub-county, Nairobi County. Some of the permanent rivers to be crossed by the treated water pipeline include but not limited to;

- The Chania River separating Muranga and Kiambu Counties;
- Kiama River in Muranga
- Ndarugu, Ruiru and Kamiti Rivers in Kiambu; and
- Thigiri and Karura Rivers in Nairobi.

In Nairobi, the main drainage is easterly with most of the rivers draining to the west of the City County (towards downstream of Nairobi River) having a semi-mature drainage patterns.

3.1.4 Geology

The project area is covered exclusively by Tertiary volcanic materials overlying folded Precambrian Basement System rocks of the Mozambique Belt. The youngest Tertiary rocks are the Limuru Trachytes, which are subsequently underlain by Kerichwa Valley Tuffs, Nairobi Trachytes, the Athi Series and the Kapiti Phonolites.

Geologically, the pipeline route shows a lithostratigraphy of thick red brown soils, basalts and agglomerates, middle and upper Kerichwa Valley tuffs, lower Kerichwa Valley tuffs, Kiambu trachytes and Nairobi trachytes. All these formations are outcropping in part except for Nairobi trachytes. The Kerichwa Valley tuffs indicates deep weathering that grades into fractured and fresh rock mass at deeper levels. The trachytes of Kiambu indicate marginal weathering but fractured effects. In Nairobi the geological history has been dominated by volcanic activity whereby a thick succession of alkaline lavas and associated tuffs began accumulating in mid- Miocene times and continued into the upper Pleistocene. Practically the entire Nairobi area is covered by these volcanic rocks derived from the Rift Valley region and estimated to accumulate in volume to more than 250 cubic miles (1,042 cubic km) and cover an area of nearly 1,200 square miles (3,000km^2).

Limuru Trachytes (LT) are associated with pyroclastic rocks covering a wide area on the eastern shoulder of the Rift Valley and represents some of the final out-pouring of lava and volcanic ejectamenta from this part of the Rift zone. The Limuru Trachyte is soft, but rarely fissile, and highly porphyritic with stumpy feldspars in a pale groundmass. Typically, the rock contains large anorthoclase phenocrysts in a matrix of untwined orthoclase. The phenocrysts of anorthoclase are frequently cracked and range in size up to a centimetre, occurring as separate crystals or as small glomeroporphyritic aggregates. This trachyte forms the thickest individual lava type in the Nairobi area and, with the intercalated trachytic and agglomerate tuffs.

Kerichwa Valley Tuffs (KVT) is composed of ash and pumice flows which appear to be the result of explosive eruption over a short time (Saggerson, 1991). They include a group of trachytic tuffs and agglomerates. The formation can be divided into three members which vary in physical properties and distribution as a result of volcanism at different times. Presence of soil horizons, conglomerates and fluvial deposits, attributable to periods of erosion indicate time intervals between successive eruptions. The Kerichwa Valley Tuffs vary in thickness and any or all the members may be absent, complicating the local stratigraphy. The Lower and Middle Tuffs are confined mainly to the valleys, whereas the Upper Tuffs are more widespread and originally might have covered nearly the entire area.

Nairobi Trachytes (NT) is made of lava which is greenish-grey, occasionally porphyritic, with feldspar phenocrysts in a fine-grained groundmass. Lamination and banding which are common in the NT are due to flow and flattening within the lava flow. These are ash and pumice flows which appear to be the result of explosive eruption over a short time. They include a group of trachytic tuffs and agglomerates.

Nairobi Phonolites (NP) comprises of several lava flows, which cover a large part of the greater Nairobi. They extend northwards from the National Park to Kiambu. The NP overlies the Athi Series with some disconformity, and the contact between the two formations is exposed in the prominent scarp which forms most of the southern outcrop of the lava. The NP occur as a black, blue-grey porphyritic rock hence can be distinguished from the older Kapiti Phonolites because of its lack of large phenocrysts. Individual lava flows are generally 30 to 46 m thick with a maximum thickness expected within the Embakasi area.

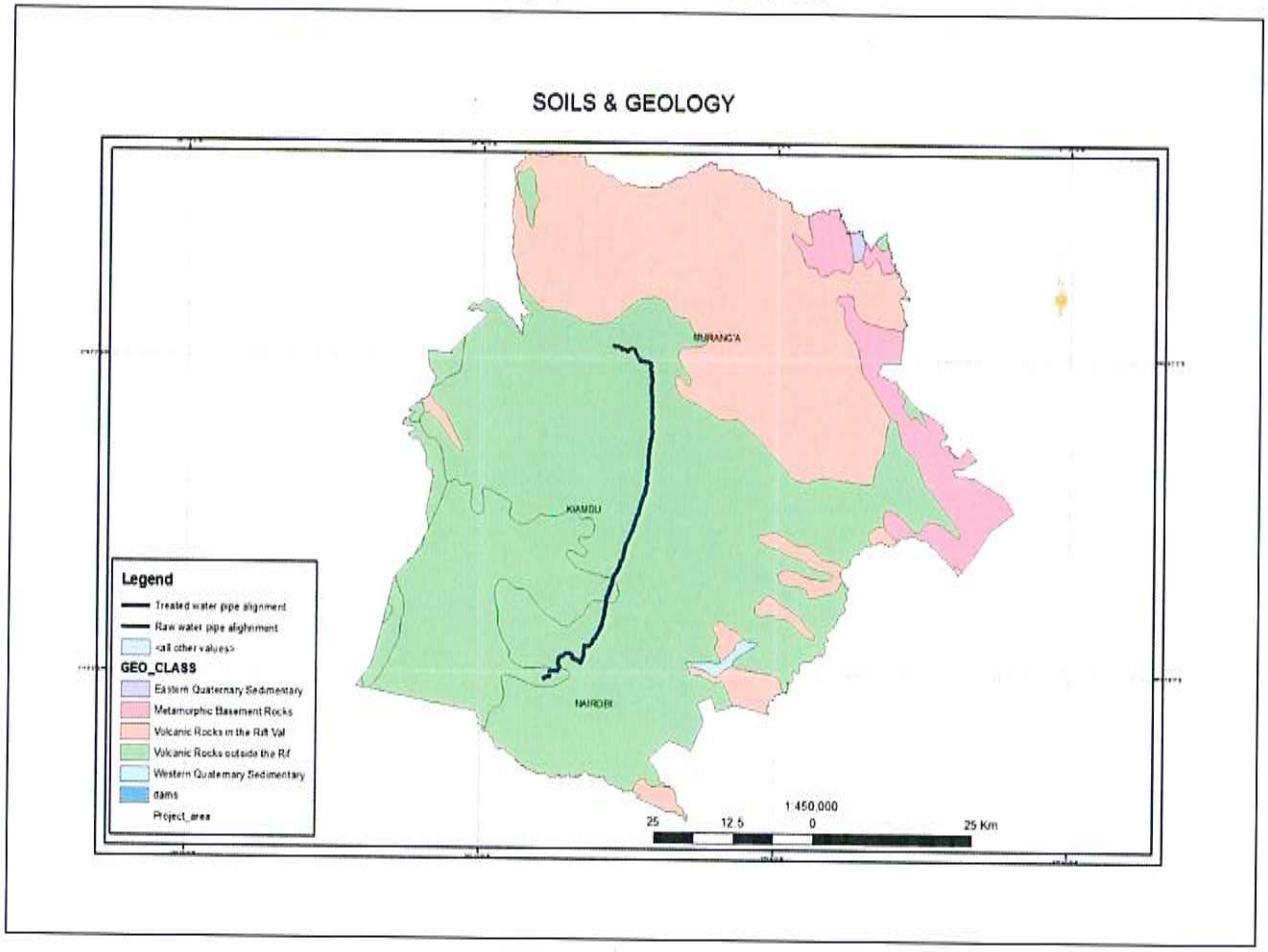
Athi Series Tuffs and Lake Beds (AS) are a series of partly stratified sediments laid down in a prehistoric "Athi Lake", between 10 and 13 million years ago. This large, ancient lake was formed after the initial Kapiti lava flows, and stretched from Thika to the present Nairobi/Athi area. The predominantly lacustrine sediments mainly consist of reworked volcanic material, varying from bentonite clays to tuff bands and welded tuff deposits. They also include obsidian sands, pumice bands, conglomerates, and calcareous nodules and silicious agglomerates (diatomite).The AS reach its maximum thickness near the centre of Nairobi but it becomes thin or non-existent towards Thika Town, erosion having stripped it away to expose the Kapiti Phonolites. The Athi Series are sub-divided into three classes as described below:

- Upper Athi Series (UAS) consist mainly of sandy sediments, tuffs and lake beds while clays are considered subordinate in this series. This series occurs in thin, narrow, mafic non-porphyritic flows equivalent to basalts. The Lake Beds form very important aquifers throughout much of the Nairobi area.
- The Middle Athi Series (MAS) consists of basaltic flows, basaltic sands and agglomerates. The lavas show abundant insets of feldspar, and the basaltic sands often have a clayey matrix. A maximum thickness of 150 m has been penetrated in some boreholes.
- Lower Athi Series (LAS) comprise predominantly clayey deposits, occur beneath the basaltic Middle Athi Series (MAS) and the upper-most flow of the Kapiti Phonolite with a maximum thickness exceeding 150m. The LAS is known only from borehole logs: throughout its range, it is covered by either Upper or Middle Athi Series material.

The Kapiti Phonolite (KP) sheet overlies the folded Precambrian Basement rocks covering a vast area between Muranga and Athi River. The several flows within the KP are occasionally intercalated with basaltic sands and clayey strata. The KP is a dense, light to dark-grey coloured volcanic rock, characterized by large phenocrysts of feldspar and waxy looking nepheline, set in a fine-grained, dark groundmass. The highly variable thickness of these phonolites is to a large extent determined by the pre-volcanic land surface. The phonolites are known to reach a thickness of 150m in zones neighbouring the slopes of the Basement hills near Athi River.

A map illustrating the geology and soils of Muranga, Kiambu and Nairobi is represented in figure 3-2 below

Figure 3-2: Geology and soils of Muranga, Kiambu and Nairobi.



3.1.5 Soils

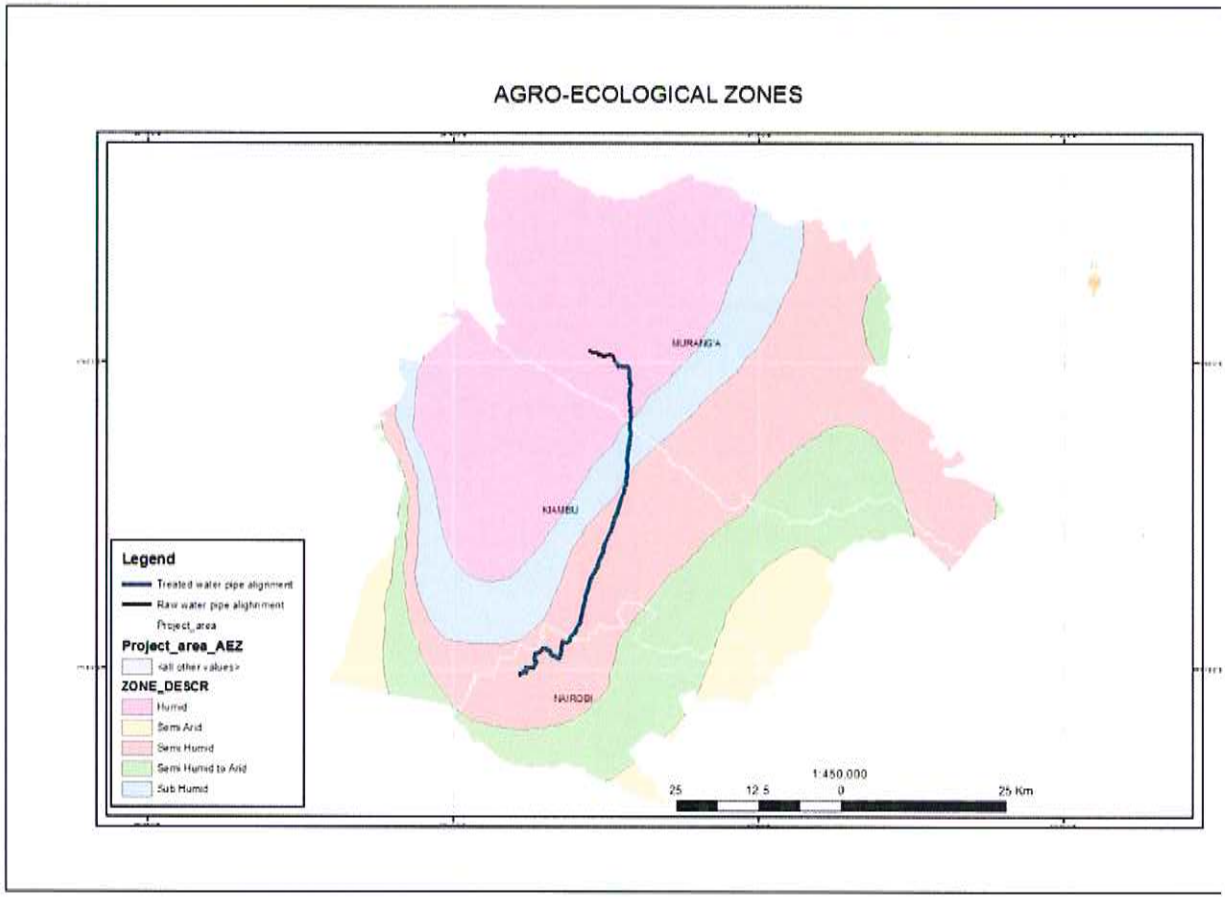
Superficial deposits in the area comprise of red volcanic soils in the higher sloping grounds and black cotton soils in the low lying swampy areas. On the higher grounds, the red soil attains thicknesses ranging from 3-7 metres. The black cotton soils are however limited in occurrence.

In Gatanga Sub- County and Kiambu areas soils are developed on undifferentiated tertiary volcanic and basic igneous rocks. They are well drained, dark reddish brown and are of moderate fertility. In some places soils are imperfectly drained, very deep, dark grey to black with calcareous, slightly saline deep sub soils.

3.1.6 Agro-ecological zones

Gatanga sub-county falls within agro-ecological zone 2 and 3. Zone 2 is characterized by high humid conditions which support the growth of tea while zone 3 is characterized with coffee plantations (found at the border of Muranga and Kiambu County near Chania River). The project area in Kiambu County lies within agro-ecological 3 referred to as sub-humid and semi-humid conditions. The agro-ecological zone of the entire project area is illustrated in figure 3-3 below.

Figure 3-3: Map showing agro-ecological zone of Muranga, Kiambu and Nairobi



3.1.7 Ground Water Resource

Murang'a

Murang'a County is located within the Tana Catchment Area which is known to have abundant ground water resources. These water resources include rivers, shallow wells, springs, dams, boreholes and roof catchment (from rainfall). According to Murang'a County Integrated Development Plan 2013-2017, Murang'a County has 10 permanent rivers, 400 shallow wells, 75 springs, 30 dams and 100 boreholes that supply water for domestic and agricultural use in the county. All these sources supply 60 per cent of the county population with clean and safe drinking water.

Available quantitative information on the area's groundwater reviewed is old (National Environment and Human Settlements Secretariat, 1982) and indicates that most boreholes in Murang'a County are located in the lower altitude areas to the east. The average borehole yields in the area is 7.13m^3/hr but ranges from nil to 50m^3/hr. the average borehole depth is 117.0m but water is commonly struck at a depth of 84.4m with average water resting level of 42.8m.

Due to the present degraded water catchments and the uncontrolled felling of trees in individual farms the amounts and quality of water resources in the county have deteriorated over the last ten years. However, the situation has not reached critical levels. The Water Act 2002 endorsed the creation of WRMA which is mandated to ensure protection and conservation of the catchments; gives guidelines on water allocation and other issues pertaining to water resources management and that include the Tana Catchment Area.

Klambu

Kiambu County includes numerous springs, streams, shallow wells and boreholes. Groundwater is used for agricultural, industrial, household, recreational and environmental activities. Kiambu region has numerous boreholes with an average yield of 7m3/hr and pumps set at an average depth of 200 to 300 m deep (ESIA Project Report for Proposed Kiambu Water Supply Project, 2014). Currently Kiambu Town depends on boreholes as a source of clean water. The water in Kiambu County is provided by Kiambu Water and Sewerage Company.

Nairobi

Nairobi mainly receives its water from rivers originating in the Aberdare Range and the Mt. Kenya water catchment area. The Nairobi River Basin consists of three major rivers (Nairobi, Ngong, and Mathare) whose catchments are found within the Kikuyu and Limuru Hills. Thus protecting these ecosystems is of major importance for the city's water security.

Nairobi aquifer system (surface area of about 6,500km2) is Nairobi's second water source (Mumma et al., 2011). It underlies much of the Nairobi metropolitan area, but recharges naturally from the southern Aberdare's and eastern Rift escarpment. This aquifer system is predominantly vulnerable to depletion (Mumma et al., 2011) and future degradation and extensive agricultural use could impact Nairobi's aquifer water quality. There are approximately 4,800 boreholes in Nairobi, with an estimated daily supply of 65,000 m^3 for domestic, 60,000 m^3 of industrial water, 3,000 m^3 for livestock uses and 28,000 m^3 for irrigation in the Nairobi Aquifer Suite catchment area (WRMA, 2010).

Thus, Nairobi the present contribution of groundwater is estimated to 45,000m^3/day. The main groundwater abstraction comes from the individual domestic wells with 25,000m^3/day. There are approximately 4,800 boreholes in Nairobi, with an estimated daily supply of 65,000 m^3 for domestic, 60,000 m^3 of industrial water, 3,000 m^3 for livestock uses and 28,000 m^3 for irrigation in the Nairobi Aquifer Suite catchment area (WRMA, 2010). According to the study most of the boreholes in Nairobi have been drilled to depths of 100-350m depending on the location (Sander P, 1997)

3.2 Biological environmental setting

3.2.1 General Overview

Vegetation cover form important wildlife habitats in addition to serving other ecological and economic functions. The vegetation cover in the project area consists of moist savannas, dry savannas and farmlands. The natural biological environment of the project area has however been substantially changed by human settlements. Most of the land in this area is under cash crop plantations of tea in Gatanga sub-county and Coffee bushes in Kiambu County, small scale arable farming and settlements (both rural and urban settlements). Due to the homogeneity of the area which is covered by farmlands, there were no major fauna of conservational importance identified along the project area.

From a total of 68 vegetation sampling points established across the study area (19 in Gatanga sub-county, 17 in Gatundu North and South sub-counties, 16 in Githunguri and Kiambu sub-counties and 165 in Westlands), the frequency of major woody species identified in the project is summarised below.

Table 3-2: Frequency and Density of major woody species in the project area in Gatanga sub-county

Common/local Name (Kikuyu)	Botanical name	Frequency (out of 19 quadrats)	Average density (Plants/Ha)
Muiri	*Prunus africana*	9	54
Mutamaiyu	*Olea africana*	9	86
Mukinduri	*Croton megalocarpus*	11	36
Murema	*Combretum*	2	4
Mukeu	*Dombeya*	8	52
Podo/Muthengera	*Podocarpus falcatus*	3	4
Wattle tree	*Acacia mearnsii*	12	139
Grevillea/Mubariti	*Grevillea robusta*	15	354
Blue gum/Mubau	*Eucalyptus*	14	432
Mutharakwa	*Juniperus procera*	1	7
Muthakwa	*Vernonia*	4	16
Mukigi	*Lantana camara*	8	106
Loquat	*Eriobotrya japonica*	2	12
Avocado	*Persea americana*	6	39
	Ficus	3	27
Nandi flame	*Spathodea campanulata*	6	18
Kei apple	*Dovyalis caffra*	3	3
Wild berry	*Rubus sp.*	1	14
Mango	*Mangifera indica*	2	9
Cassia	*Senna*	1	2
Mubera/Guava	*Psidium guajava*	2	7
Bamboo/Murangi	*Arundinaria alpina*	1	4
Meru oak/Muhuru	*Vitex kinensis*	3	24
Finger euphorbia	*Euphorbia turicalli*	2	15

Exotic *Eucalyptus spp* and *Grevillea* were the most dominant with high density of 432 and 354 respectively in Gatanga sub-location followed by planted indigenous Wattle trees (*Acacia mearnsii*) with a density of 139. Although indigenous species were diverse in the area, these species had a lower density. For instance, *Prunus africana*, *Olea africana* and *Dombeya* had a density of 54, 86 and 52 respectively.

Table 3-3: Frequency and Density of major woody species within the project area in Gatundu North and Gatundu South sub-county

Common/local Name (Kikuyu)	Botanical name	Frequency (out of 17 quadrats)	Average density (Plants/Ha)
Grevillea/Mubariti	*Grevillea robusta*	15	287
Blue gum/Mubau	*Eucalyptus*	18	371
Mango	*Mangifera indica*	8	24
Finger euphorbia	*Euphorbia turicalli*	8	86
Mukigi	*Lantana camara*	13	102
Nandi flame	*Spathodea campanulata*	10	45
Avocado	*Persea americana*	13	131
Mukinduri	*Croton megalocarpus*	12	34
	Ficus	6	12
Makadamia	*Macadamia tetraphylla*	8	47

Common/local Name (Kikuyu)	Botanical name	Frequency (out of 17 quadrats)	Average density (Plants/Ha)
Mutharakwa	*Juniperus procera*	4	18
Drumstick tree	*Moringa oleifera*	1	3
Maruru	*Thithonia diversifolia*	4	43
Wattle tree	*Acacia mearnsii*	9	53
Cassia	*Senna*	7	22
Bougainvillea	*Bougainvillea glabra*	4	58
Kei apple	*Dovyalis caffra*	3	42
Mubera/Guavas	*Psidium guajava*	2	9
Meru oak/Muhuru	*Vitex kinensis*	5	12
Pawpaw	*Asmina triloba*	2	5
Flamboyant	*Delonix regia*	1	2
Murema	*Combretum*	1	2
Muiri	*Prunus africana*	4	9
Muthakwa	*Vernonia*	1	3
Mukeu	*Dombeya*	2	9

In Gatundu North and Gatundu South sub-county, *Eucalyptus* and *Grevillea robusta* had the highest density while *Acacia mearnsii*, *Macadamia* and *Croton megalocarpus* had the highest density among indigenous species.

Table 3-4: Frequency and Density of major woody species within the project area in Githunguri and Kiambu sub-county

Common/local Name (Kikuyu)	Botanical name	Frequency (out of 16 quadrats)	Average density (Plants/Ha)
Mukima	*Grevillea robusta*	11	97
Mukinduri	*Croton megalocarpus*	12	38
Mukigi	*Lantana camara*	11	118
	Ficus	5	24
Jacaranda	*Jacaranda mimosifolia*	2	7
Mutharakwa	*Juniperus procera*	4	25
Blue gum/Mubau	*Eucalyptus*	8	163
Cypress	*Cupressus lusitanica*	1	5
Finger euphorbia	*Euphorbia tulicaris*	1	4
Umbrella tree	*Schefflera actinophylla*	5	8
Mugaa	*Acacia abyssinica*	2	5
Cassia	*Senna*	3	10
Mango	*Mangifera indica*	8	30
Avocado	*Persea americana*	3	19
Nandi flame	*Spathodea campanulata*	9	57
Mukeu	*Dombeya*	5	14
Wattle tree	*Acacia mearnsii*	3	10
Muiri	*Prunus africana*	3	7
Mutamaiyu	*Olea africana*	2	4
Maruru	*Thithonia diversifolia*	5	96
Podo/Muthengera	*Podocarpus falcatus*	3	10
Mukurue	*Albizia gummifera*	2	11
Mutati	*Polyscis fulva*	1	2

Common/local Name (Kikuyu)	Botanical name	Frequency (out of 16 quadrats)	Average density (Plants/Ha)
Murera	*Acacia xanthophloea*	2	4
Pawpaw	*Asmina triloba*	1	7
Bitter albizia	*Albizia amara*	1	5
Castor oil plant	*Ricinus communis*	2	10
Pine	*Pinus spatula*	1	2
Bougainvillea	*Bougainvillea glabra*	3	72
Angel's trumpet	*Datura suaveolens*	1	7

Eucalyptus spp was the most dominant woody species in Githunguri and Kiambu Sub-county while *Spathodea campanulata* and *Tithonia diversifolia* were the most diverse and with among the indigenous species in the area.

Table 3-5: Frequency and Density of major woody species within the project area in Westlands sub-county

Common/local Name (Kikuyu)	Botanical name	Frequency (out of 16 quadrats)	Average density (Plants/Ha)
Mukinduri	*Croton megalocarpus*	7	19
Blue gum/Mubau	*Eucalyptus*	9	122
Mukima	*Grevillea robusta*	4	30
Nandi flame	*Spathodea campanulata*	9	46
Cassia	*Senna*	4	13
Maruru	*Thithonia diversifolia*		
Wattle tree	*Acacia mearnsii*	3	14
Mutharakwa	*Juniperus procera*	4	10
	Newtonia buchananii	7	38
Mukeu	*Dombeya*	8	30
Bamboo/Murangi	*Arundinaria alpina*	2	19
Mugaa	*Acacia abysinicca*	2	9
Bottle brush tree	*Callistemom spendens*	1	2
Bougainvillea	*Bougainvillea glabra*	4	86
	Ficus	3	5
Muiri	*Prunus africana*		
Mango	*Mangifera indica*	1	4
Murera	*Acacia xanthophloea*	3	5
Avocado	*Persea americana*	2	10
Jacaranda	*Jacaranda mimosifolia*	3	7
Muthakwa	*Vernonia*	6	41
Podo/Muthengera	*Podocarpus falcatus*	1	2
Kei apple	*Doyvalis caffra*	2	32
Duranta	*Duranta erecta*	7	76
Hibiscus	*Hibiscus rosa-sinensis*	2	7
Pine	*Pinus patula*	1	2
Castor oil tree	*Ricinus communis*	2	7
Lantana	*Lantana camara*	9	122
Mahogany	*Afzelia quanzensis*	1	2
Miombo	*Brachystegia*	3	7
Neem	*Azadirachta indica*	1	2

Common/local Name (Kikuyu)	Botanical name	Frequency (out of 16 quadrats)	Average density (Plants/Ha)
Umbrella tree		1	2
Finger euphorbia	*Euphorbia tulicaris*	1	5
Yellow Oleander	*Thevetia thevetioides*	1	4
Kamiti/Thika palm	*Filicium decipiens*	1	4

In Westland sub-county, *Eucalyptus* and *Newtonia buchananii* were the most diverse and dominant species in the area. Invasive *Lantana camara* had also a higher density of 122 along this area due to increased rate of urbanisation and disturbance of the natural ecosystem. This species were observed along the road reserves.

From the tables above it manifest that Gatanga sub-county has the highest number of tree species followed by Gatundu North and Gatundu South. This is attributed to increase in commercial forestry activities in the area as one move towards Nairobi. Westlands sub-county had the least number of tree species because of urbanization activities along the project area. Further, it should be noted that woody species with the highest densities are mainly exotic trees such as *Eucalyptus* and *Grevillea robusta*. The high density of these species is attributed to the species commercial benefits to the surrounding communities. On the other hand, the most frequent indigenous woody species along the project area are *Croton megalocarpus* and *Spathodea campanulata*.

Lantana camara, Vernonia and *Tithonia diversifolia* were also observed in several quadrats laid during the field sampling. According to the Wildlife and Conservation Act, 2013, sixth schedule *Lantana camara* is listed as an invasive species. *Vernonia, Lantana* and *Thithonia* are quick colonizers of disturbed areas/bare areas therefore such species should be uprooted along the project area and should also not be used during replanting after construction.

During the field assessment, several vegetation types were identified along the project area and they include;

- Farmland vegetation
- Riparian vegetation
- Grassland vegetation
- Bushland

The listed vegetation types are discussed below;

3.2.2 Farmland vegetation

This is the most widespread vegetation type at the proposed project area for the water supply pipeline wayleave. This vegetation is interspersed through cultivated fields with arable farming, settled areas and large scale areas with cash crop plantations of tea in Gatanga sub-county and coffee in Kiambu county.

Eucalyptus spp and *Grevillea* were the widespread exotic trees species in the farmland in the study area. This species were noted to have the highest density and frequency in occurrence in the area. Their dominance is attributed to their economic value because of the ready market for the harvested tree products.

Most farmers practise arable farming along the river ecosystem. The main types of crops observed in the study area include bananas, yams, maize, arrow roots, beans and Napier grasses.

3.2.3 Riparian Vegetation

The pipeline passes through several rivers along the project area. The entire raw water gravity pipeline will be laid along Thika River while Treated water supply pipeline will cross several rivers in Gatanga, Gatundu North, Gatundu South, Githunguri, Kiambu and Westlands sub-counties.

The riparian in the study area encompass both indigenous and exotic trees. However, the exotic trees were noted to be more frequent and dense than the indigenous ones. Grevillea, Eucalyptus and Wattle trees were the most frequent with higher percentage cover in the area compared to the indigenous *Prunus africana, Olea africana, Croton megalocarpus, Spathodea campanulata* and *Dombeya*. Pockets of indigenous species were observed at chainages 1+400-1+600 and 1+600-1+800.

From the field assessment, most of the riparian vegetation has been cleared to pave way for agricultural activities. This is evident along most of the rivers where crops have been planted up to the lower tidal zone of the river. Where the riparian vegetation exists, it was observed that the vegetation strips rarely extend beyond a width of five meters from the river bank. For instance, Thika River is one of the most affected rivers where the width of the river has drastically reduced even to less than 5m in some area because of increase in cultivated area. Photoplate 3-1 and 3-2 clearly indicates the difference in the width of river at cultivated areas and uncultivated areas.



Photoplate 3-1: Size of Thika River drastically reduced by cultivation activities at the riparian



Photoplate 3-2: Size of Thika River within Ndakaini dam fence (no cultivation being done)

Some of the farmers have adopted soil conservation measures through planting of napier grasses along the river bank hence replacing the natural riparian vegetation.

During an interview with KFS, the forester indicated that the riparian area can be replanted with bamboo trees and indigenous trees than the exotic ones. This will help increase the area vegetation cover and also conserve the river bank and its riparian from human encroachment and destructions.

3.2.4 Vegetation along Thika River

Vegetation along Thika River encompasses indigenous and exotic trees, tea plantations and small-scale cultivated crops. These also include the planted indigenous vegetation within Thika dam compound along Thika River.

The woody vegetation along Thika River Riparian is summarised as below

Table 3-6: Woody Species within the project area along Thika River

Common/local Name (Kikuyu)	Botanical name	Frequency (out of 13 quadrats)	Average density (Plants/Ha)
Muiri	*Prunus africana*	9	78
Mutamaiyu	*Olea africana*	8	123
Mukinduri	*Croton megalocarpus*	5	23
Murema	*Combretum*	2	6
Mukeu	*Dombeya*	6	71
Podo/Muthengera	*Podocarpus falcatus*	3	6
Wattle tree	*Acacia mearnsii*	9	152
Grevillea/Mubariti	*Grevillea robusta*	9	298
Blue gum/Mubau	*Eucalyptus*	10	429
Mutharakwa	*Juniperus procera*	1	10
Muthakwa	*Vernonia*	4	23

The dominant exotic trees are *Eucalyptus* and *Grevillea* with some area having large plantation of *Eucalyptus* trees. *Eucalyptus* was noted to be the most dense exotic tree species along Thika River. Most of the indigenous vegetation listed in the table above are found within Thika (Ndakaini) dam compound. These indigenous species as shown in photoplate 3-3 have been planted in the area.



Photoplate 3-3: Vegetation within Thika dam compound along the project area.

Areas within Thika dam land and between chainage 1+400-1+800 was noted to have the highest vegetation composition compared to the rest of the riparian within the project area along Thika River. This area carries the dominant species being indigenous such as *Acacia mearnsi, Olea africana, Prunus africana*, *Vitex keniensis*, *Ficus* and *Croton*.

Lantana camara an invasive species and *Vernonia* were also observed along the study area within Thika River riparian. These species are quick colonizers of disturbed areas hence they should not be used to revegetate the project area after construction works are completed.

It was noted that more efforts is required in conservation of Thika River especially its riparian area to avoid the river from shrinking even further.

3.2.5 Woodlots

A number of woodlots dot the project area. These vegetation classes consist of mainly pure stands of fast growing exotic woody species including *Eucalyptus spp, Grevillea robusta* and *Juniperus procera.* Occasionally, woodlots with mixed stands of these species were also noted e.g. a woodlot along the existing wayleave had mixed stands of *Eucalyptus spp, Grevillea robusta,* and *Juniperus procera.* The woodlots are of various growth stages ranging from saplings, poles to mature trees. *Eucalyptus* and *Grevillea* however is the most frequent woodlot species in the area.

The densities of the woody species within the woodlots were estimated at a quadrat of 20m by 20m. The species densities within woodlots range from 122 plants per hectare to 432 plants per hectare for *Eucalyptus spp* and 354 plants per hectare to 30 plants per hectare for *Grevillea robusta.*

The woodlots serve both economic and ecological functions. Ecologically, the woodlots do not form a key habitat for any wildlife other than in isolated cases where weaver birds were noted nesting on eucalyptus woodlots. Economically, mature woodlots in the area are mainly harvested for curation purposes in tea and coffee industries, timber or electricity poles (sold to Kenya Power and Lighting Company). The grass cover in some woodlots also acts as grazing grounds for domestic animals.

3.2.6 Grassland vegetation

Most of the study area is covered with grass species. These grasses are found on the farmlands, undergrowth on trees, on open grounds and settled areas. Grasses play an important ecological function to the ecosystem. For instance, they provide a good ground cover in an area hence curbing the impact of soil erosion.

The most dominant grass within the project area include *Themeda triandria, Cynodon dactylon, Chloris gayana, Digitaria, Eragrostis superba, Paspalllum, Cyperus rotundus,* Sedge grass and planted Napier grass. However sedge grasses were mainly observed along the river bank and swampy areas while Napier grass was widely planted along the riparian of Thika River.

Digitaria spp. is categorised as an invader in range management hence quickly colonizes disturbed and bare areas. These species are also unpalatable thus not a preferred grass for grazing animals.

3.2.7 Bushland

Vernonia, Lantana and *Thithonia diversifolia* form part of the bushland community along the study area. *Lantana* was noted to have a higher density and ground cover in the area compared to *Vernonia* and *Thithonia.* This species were mainly identified along disturbed areas especially at settled areas and at the road crossings.

Isolated trees within this bushland include *Euphorbia turicalli, Ficus spp* and *Dombeya.* Patches of herbaceous cover exist in sections of the bushland. The herbaceous patches are dominated by mixed grass type of vegetation such as *Themeda triandria, Cynodon dactylon, Chloris gayana, Digitaria, Eragrostis superba, Paspalllum, Cyperus rotundus,* and Sedge grass.

This vegetation cluster provides habitat to small mammals such as rodents and squirrels and birds and herpetofauna such as chameleon and green snakes.

3.2.8 Vegetation at Swampy areas

During the field assessment it was noted that most of the swampy areas have been drained and converted to agricultural land. This was evident by stalk of maize stumps and tree stands of *Eucalyptus spp., Grevillea* and Wattle trees at marshy areas that locals reported were once regarded as a swamp.

Papyrus reeds, water lilies and sedge grass were the common species observed in some of the swamps in the area. These species are important for swamp conservation and also plays key ecological roles such as water purification and water retaining purposes. Thus destruction of these areas may have a significant negative impact to the river ecosystem also underground water.

Scattered trees of indigenous *Ficus, Dombeya* and *Senna* were also observed on some of the swamps in the area such as Kianjibbi and Kirigithi swamp in Kiambu County.

3.2.9 Flora of conservation importance

Flora of conservation importance are species that are listed in the Wildlife Conservation and Management Act 2013, CITES and IUCN Red List as protected species. Such species are endangered, threatened or vulnerable to extinction with continuous exploitation.

There is no protected forest within the project area. Apart from *Prunus africana* and Vitex *keniensis* which is listed as vulnerable tree under the sixth schedule of the Wildlife Conservation and Management Act of 2013, no other flora of conservation importance was noted in the project area. *Prunus africana* and *Vitex keniensis* in the project area is however mainly planted within farmlands, tea and coffee plantation and residential areas.

3.2.10 Invasive species

The Wildlife (Conservation and Management) Act of 2013 has listed all the nationally declared invasive alien species in Kenya. Invasive alien species have a tendency to dominate or replace the canopy or herbaceous layer of natural ecosystems, thereby transforming the structure, composition and function of natural ecosystems. Therefore, it is important that all these alien species be managed by means of an eradication and monitoring programme. Some invader plants may also degrade ecosystems through superior competitive capabilities to exclude native plant species.

Alien plant species easily invade disturbed/cleared areas with disastrous impacts on the natural community. Invaders and weed species must be controlled to prevent further spread to other areas and it is recommended that all individuals of the invader species be removed and eradicated.

Lantana camara is found in the entire project area while *Thevetia peruviana* and *Datura stramonium* are found within Westlands sub-county. These are the nationally declared alien species in the wildlife and Conservation Act.

All the above listed species easily colonizes disturbed and bare areas therefore none of them should be used to revegetate the area after construction. In cases where soil will be borrowed elsewhere to the proposed site, caution should be taken to ensure that the propagules are not transferred to new sites. The construction site should also be monitored during operation to check for any invasive/colonizers sprouting in the area. When such species are spotted along the pipeline, they should be uprooted.

3.2.11 Fauna

Given the modified natural environment, there are few terrestrial wild fauna in the project area of influence which is predominantly settled areas. Fauna in the proposed project area is mainly comprised of various bird species, domestic animals, and rodents such as mice and insects. Karura

forest which is next to the proposed project site is a habitat to the largest members of the fauna in the area. Some of the fauna likely to stray in this part of the project area are the antelopes, monkeys and bush pigs.

Rivers, streams and swamps form riverine wetlands and create suitable habitats for various adaptable species. Further, artificial wetlands (fish ponds) have been created in some parts of the project area to rear fish species for commercial purposes.

(a) Mammals

Mammals are, from a human perspective, the dominant life form on earth. They exploit a large number of ecological niches and are often the first consideration when habitat integrity and functionality is considered. However, there were no major animals of conservation concern found within the project area.

The homogeneity of land use as farmlands along the project area, it reduced the chances of identification of large wild mammals. However, from the local interview with the local people there no large wild mammals that seen around the area.

(b) Reptiles

Reptiles are cold-blooded vertebrates. They serve as both predator and prey within an ecosystem depending on their size and exist within various habitats. If reptiles were to be removed from a system, the whole ecosystem may collapse. Reptiles are generally shy and extremely sensitive to habitat destruction and transformation (Branch, 1998).

Reptiles favour low-lying rocky habitats, ridges, termite mounds, tree stumps, bark and/or holes in which to hunt, feed and seek shelter. Some reptiles that were observed include Chameleon, green snakes, young black mamba and house gecko. Local guides also confirmed the presence of other reptiles like savannah monitor.

(c) Amphibians

Amphibians can either be terrestrial or aquatic species. This species prefer rocky habitat, dark areas or the bank of aquatic system. Frogs and toads were the amphibian species identified in the area with frogs being within the river ecosystem while toads on terrestrial land.

(d) Fishes

From the interview with the Fisheries Officers Muranga, Kiambu and Nairobi, it was clear that Tilapia was the major type of fish species likely to be encountered in the affected rivers during pipeline constructions. However, the County Director of Fisheries, Muranga County indicated there is a probability of encountering trout fish in the upper section of Chania River. This was attributed to the movement pattern of the trout species which move upstream to breed (due to cold conditions) and downstream to feed and grow (warm conditions). The Fisheries Officers also stated that different types of fish species are also farmed by the local community with ponds where some of the locals use borehole water while other farmers depend on surface water for pond maintenance. The types of fish farmed include tilapia, mudfish and catfish.

The fisheries officers in each county indicated that fish farming has been recently introduced in the area and has become one of the leading sources of protein to the surrounding communities. Most of this fishes are rared in small scale fish pond.

Fishing farming in the area is done for both subsistence and commercial purposes. It had emerged to be one of the important sources of income among the locals.

(e) Avifauna

Some of the avifauna species observed in the project area are listed in table 3-7 below.

Table 3-7: Avifauna species within the project area

Common (Local) name	Scientific name
Weavers	*Ploceus spp*
African black duck	*Anas sparsa leucostigma*
Greenbul	*Andropadus*
Eagles	*Polemaetus bellicosus*
Speckled mouse birds	*Colius striatus*
Blue-naped mousebird	*Urocolius macrourus*
Doves	*Streptopelia spp*
Speckled pigeon	*Columba guinea*
Golden breasted bunting	
Camaroptera	*Camaroptera*
Slate coloured boubou	*Laniarius funebris*
Common fiscal	*Lanius collaris humeralis*
Fire finch	*Lagonosticta senegala*
Bee-eater	*Merops spp.*
Sunbird	*Nectarinia*
Red bishop	*Euplectes franciscanus*
White-browned scrub robin	*Cercotrichas leucophyrs*
Cattle egret	*Bubulcus ibis*
Red fronted tinkerbird	*Pogoniulus pusillus affinis*
Barbet	*Trocholaema*
Superb starling	*Lamprotonis superbus*

There was no important bird of conservation observed in the project area as listed in the Wildlife and Conservation Act and IUCN Red List. This is attributed to the numerous exotic trees in the area that are planted for commercial purposes. Exotic trees are not preferred habitat for avifauna. However, caution should be taken where indigenous trees like *Acacia*, *Podocarpus* and *Ficus* trees exist. These trees were noted to nest most birds in the area as shown in photoplate 3-4 below.



Photoplate 3-4: Bird nest observed on *Acacia mearnsii* at project area, Kamiti River

(f) Other fauna

Few species of insects are also found at the project areas. This species include green grasshoppers, crockets, butterflies and bees. During the field survey, several beehives were seen hanging on trees found in the project area.

3.3 Socio- economic environmental setting

3.3.1 Administration

The project area traverses three counties namely Muranga, Kiambu and Nairobi. In Muranga the project will pass through Gatanga Sub-County, in Kiambu the project will pass through four sub-counties namely Gatundu North, Gatundu South, Githunguri and Kiambu while in Nairobi County the pipeline will pass through Westlands sub-county. The pipelines will traverse several locations as shown in table 3-8.

Table 3-8: Administrative units along the project area

County	Sub-County	Division	Location
Muranga	Gatanga	Kigoro	Ndakaini
			Kigoro
		Gatanga	Kiria-ini
			Gatanga
Kiambu	Gatundu North	Chania	Gituamba
			Makwa
			Kairi
		Mangu	Gathaite
			Karuri
	Gatundu South	Ngenda	Ituru
			Ngenda

County	Sub-County	Division	Location
			Kimunyu
		Kiamwangi	Mutati
			Kiamwangi
	Githunguri	Komothai	Komothai
		Ngewa	Ngewa
		Ikinu	Ikinu
	Kiambu	Kiambu Municipality	Kamiti
			Riabai
			Kirigiti
			Kiambu settled area
Nairobi	Westlands	Westlands	Highridge
			Parklands
			Kitisuru

3.3.2 Energy

Muranga

There are two forms of energy namely: renewable and non-renewable. The raw materials for energy in Muranga include biomass, fossil fuel, hydro, solar and wind. Dependence on woody biomass has had far reaching effects on the forest cover while use fossil fuels contribute to climate change. Exploitation of either energy sources creates opportunities for employment and income generation, both of which have a positive impact on improving the quality of life while reducing poverty.

From the census data 2009, firewood was the main source of energy for cooking is fuel-wood, charcoal, Kerosene and crop residue for majority of rural people. Urbanites use electricity, charcoal and kerosene. The urbanites are responsible for enormous conversion of trees into charcoal. Institutions of learning and Tea factories use largely firewood, for cooking and processing of tea respectively. Electricity is largely used for lighting purposes. The major environmental issue emanating is reduction of forest/tree cover as the demand for tree-based fuel is escalating.

According to the operations and maintenance officer KPLC rural electrification is still going on with all towns and shopping centres having been connected to the power grid, 4 % or less of all shopping centres may be lacking the power connection. Use of biogas is limited to cost while solar energy is limited to both cost and safety of the installed units.

Environmental friendly technologies have been encouraged and are widely used in the county. The major kinds in use include the energy saving devices are jikos, liners, fireless cookers, metal clades, etc.



Photoplate 3-5: Stack of fire wood on sale by the road side in Rwagetha, Gatanga Sub-County



Photoplate 3-6: Electricity transformer in Kigoro Gatanga Sub-County

Kiambu

The main source of cooking energy in the county is firewood standing at about 47.3 percent, while paraffin which is the major source of lighting fuel. This poses a great challenge to the realisation of 10 percent forest cover within the county. Connection to the national grid is well established at trading centres with 98 percent of all trading centres connected. However, connection to individual homes is low and there is need for up-scaling of the rural electrification programme.

Nairobi

Energy in Nairobi is mainly needed for cooking, heating and lighting of households, power for industry and transportation. Nairobi use a combination of fuels whose sources include biomass, fossil fuels, hydro and geothermal energy. However, the current demand for energy in Nairobi is very high compared to the supply hence most people especially at household level are opting for solar energy to help them meet the need of energy.

Nairobi is estimated to consume approximately 91,250 tons of charcoal annually, equivalent to the destruction of over 900,000 tons of green wood each year (Barnett and Ndanyi 2003). According to Commission on Revenue Allocation (2011), 72.4 per cent of Nairobi households are connected to electricity. For cooking, however, 68.3 percent of households use kerosene, 19.8 percent liquefied petroleum gas (LPG), 7.4 per cent charcoal and only 1.8 per cent electricity (CBS et al. 2004).

Nairobi also faces the challenges of vandalism of electricity systems such as illegal connections, stealing oil or copper from transformers and eventually stealing transformers. This has contributed to the rate of blackouts being experience in the City.

3.3.3 Transport and communication

Muranga

Muranga County is served by different class of roads that has opened up the county to markets for the tea, macadamia, bananas and coffee. The road network in the area consists of the following class of roads.

Table 3-9: Road network in Muranga County

	Road class	Road reference	Road Name	Road length
Murang`a County	A	A2	Namanga Moyale Road	911.11 Km
	B	B23	Nyeri Mwitingiri Road	10.85 Km
		B26	Kangema Muranga	21.26 Km
		B25	Kenol –Kianjiru road	63.83 Km
	C	C165	Gathumbi – Kaharati Road	19.852 Km
		C154	Kigoro-Kilimambogo Road	67.36 Km
		C168	Mairoini –Muranga Road	32.97 Km
	D	D1343	Kamrugu –Makenzee Road	15.561 Km
		D1346	Kamrugu- Kamrugu Road	2.75 Km
		D1345	Gatura Kiawathiga Road	38.50 Km
		D1340	Gituya-Ndula Road	44.048 Km
		D1344	Kariangaini-Gacharage Road	15.885 Km
		D1339	Kariangaini-Karega Road	29.339 Km
		D1335	Gakira-Kiangage Road	48.89 Km
		D1336	Githambo Gakiogo road	33.51 Km
		D1337	Gikomora Maragua	14.82 Km

The project area has a number of murram roads of class D, E, F, G that run through the county connecting the farms to the buying centres and factories.



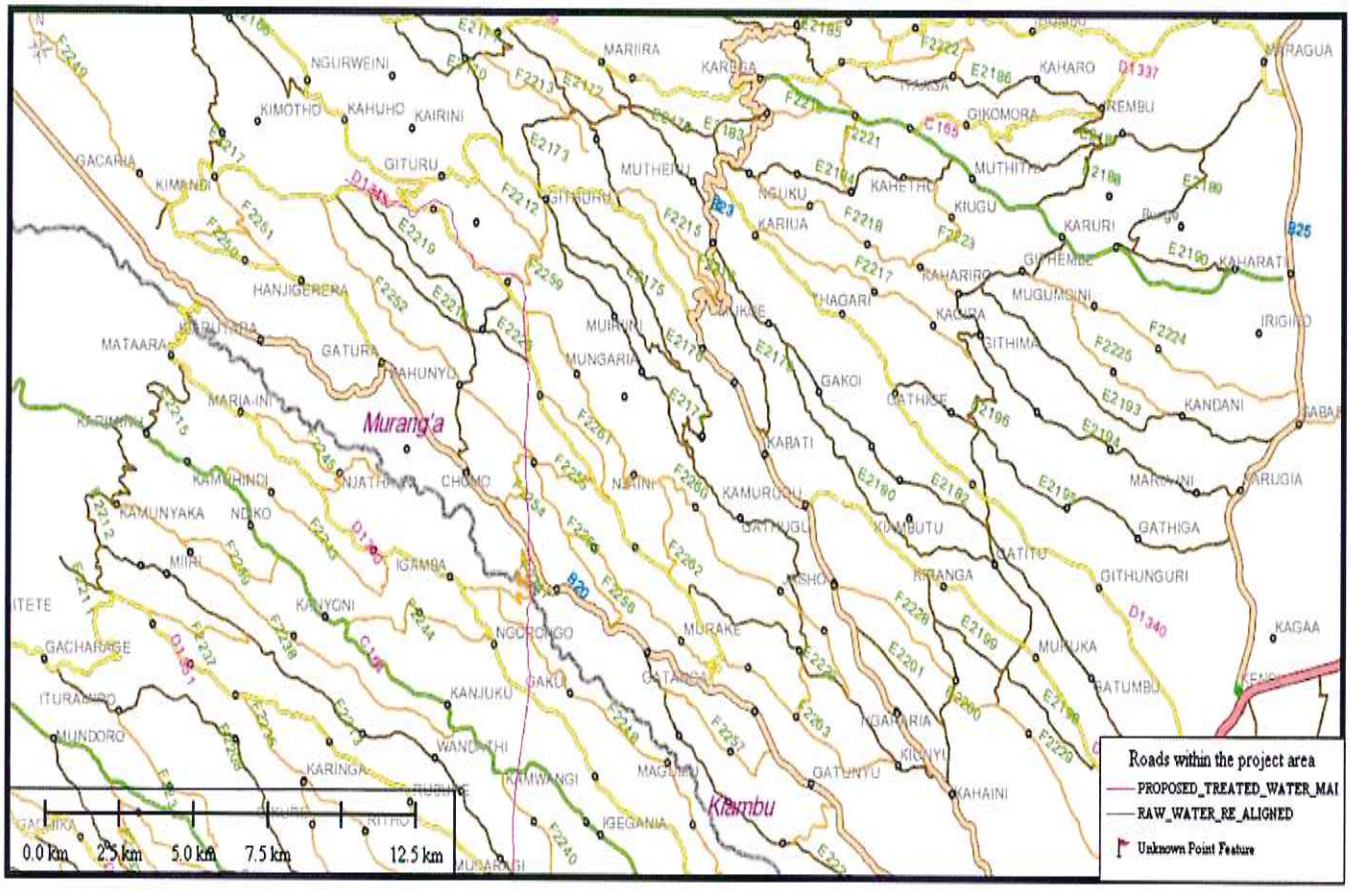
Photoplate 3-7: Murram road from Kigoro to Kiria-ini.



Photoplate 3-8: Tarmac road from Rwagetha to Kirwara.

The Major form of motorised transport is through the use of motorcycle taxis (*bodaboda*) and 14 seater Public Service Vehicles. Non motorised transport modes such as donkey pulled carts are also available in the area. Figure 3-4.

Figure 3-4: Road network within the project area



3.3.4 Water supply and Water use

Muranga

Muranga is located within the Tana Catchment Area. The area has abundant water resources but there is inadequate infrastructure for water supply and distribution. According to the County Public Health office, about 40% of the population in Murang'a County have access to safe drinking water.

Water is used for multiple purposes including domestic purposes, livestock keeping, agricultural uses as well as small scale irrigation and industrial uses such as coffee processing. According to the County Irrigation Officer, the main sources of water for domestic and industrial use are rivers, springs, shallow wells, borehole and roof harvesting.

The County Environment Director, NEMA, indicated that human activities such as coffee processing and poor farming methods have resulted in pollution and siltation of water resources. Other sources of pollution include use of agrochemicals that end up in river systems. Point source pollution also occurs due to domestic activities carried out by the local community along river banks. Such activities include laundry, bathing and washing cars. During drought conditions, people also resort to farming in wetlands, riparian land and swamps to increase food production for domestic use.

Water pollution poses a risk to human health considering that there are people who source domestic water directly from the rivers.

Community members through water project committees manage most of the other water supply schemes. The water projects source their water from River Maragwa and Irati. The two main existing water supply schemes in the project area are Gatharaini Water Project and Karura Water Project.

The Technical Manager MUWASCO stated that the water levels in the rivers have been declining over the years such that they have had to ration water in some of the months to ensure that users downstream have access to water in the rivers.

Key environmental issues in management and utilization of water resources in Muranga County are:

- Water scarcity due to declining sources;
- Climate variability resulting to droughts ;
- Catchment's degradation due to poor farming methods and deforestation;
- Poor allocation methods resulting to water related conflicts; and
- Decreased efficiency of water use due to numerous losses of the available.

Kiambu

In Kiambu County, the average household uses the following amount of water for various tasks.

1	Cooking	90 litres/day	22.5%
2	Washing	180litres/day	45%
3	Drinking	30litres/day	7.5%
4	Farming	100litres/day	25%

The four sub counties transverse by the project have different sources of water as follows;

- Kiambu Sub County-Boreholes and water from the Nairobi Pipeline;
- Githunguri-Surface water sources and off takes from the water pipeline from Sasumua;
- Gatundu South- Surface water;
- Gatundu North- Surface water from the several huge rivers within the area.

Within Kiambu County only 12.5% of the households have access to piped water. The sources of water within the Project's Zone of Influence are broken down in the table below:

Water sources	Githunguri Sub County	Gatundu Sub County	Kiambu Sub County
Streams	25.1%	32.8%	17.2%
Boreholes/springs/ wells	55.7%	20.5%	12.7%
Piped water to dwellings	2.9%	7.4%	42.7%
Piped water	12.7%	30.2%	3.4%
Rain harvest	1.0%	1.7%	2.4%
Water Vendors	2.2%	1.3%	21.1%

The sources of water within the area vary in terms of quality, quantity usage and reliability. Rivers are the main source of surface water. Though generally turbid, they serve as the major source of water for domestic use. The quantity is inadequate. Ground water on the other hand is saline low yielding and unreliable.

Rain water is harvested on a low scale and is being promoted mainly in schools. AWSB has been partnering with the County Government to donate storage tanks to schools, thus promoting rain water harvesting.

Below is a table showing the current water demand in Kiambu County versus the projected demand in the year 2035 as well as the water service providers.

Sub counties within Kiambu County	Current water demand	Projected water demand	Water service Providers
Kiambu	3,290 m3/day	20,730 m3/day	Kiambu Water and Sewerage Company
Kiambaa	2,767 m3/day	28,566 m3/day	Karuri Water and Sanitation Company
Ruiru	6,960 m3/day	131,978 m3/day	Ruiru Water And Sewerage Company
Limuru	1,776 m3/day	9,208 m3/day	Ruiru Juja Water and Sanitation Company
Githunguri	1,736 m3/day	4,603 m3/day	Githunguri Water and Sanitation Company
Gatundu	3,000 m3/day	3,149 m3/day	Gatundu South Water and Sanitation Company
Thika	26,000 m3/day	5,9545 m3/day	Thika Water and Sewerage Company

There are several water projects being carried out by the community or government agency in Kiambu County. Some of the identified projects include;

i. Community projects

The water officer, Kiambu County indicated that the community water projects cannot sustain themselves and have been requesting for help from the County from time to time. In the long run, the County plans to have a maximum of two water companies providing services in the whole County. Some of the community managed water supply projects including but are not limited to;

- Kiamumbi Community Water supply project in Kiambu Sub County
- Komothai Community Water supply project in Githunguri Sub County

ii. Government projects

a) Theta Dam

The construction of Theta Dam in Gatundu is ongoing. On completion, Theta dam reservoir will have a storage capacity of 2 million cubic meters (2 Billion litres). This will enable production of 15,000 m3/day of water that will augment both the Ndarugu and Thiririka water projects reliability. This will improve water supply to the upper parts of Gatundu such as Gachika, Kiamuoria, Kiganjo, Gatitu of greater Kiganjo location and upper parts of greater Ndarugu locations.

b) Mataara Production Systems

Athi Water through funding from World Bank completed the construction of four new water treatment plants to produce 11,000m3/day of potable water to communities in Gatundu North and 11,000m3/day to communities in Gatundu South who have off-takes from the Nairobi water mains.

The works are located at the existing Thiririka and Ndarugu treatment works sites in Gatundu South and Kairi and Gakoe in Gatundu North and were commissioned in April 2011.

This resulted in production of 22,000m3 /day of treated water that benefits 300,000 people in Gatundu South and Karimenu.

From the public consultations held in Gatundu, there seemed to be a crisis as it emerged that most residents were not connected to water supply and access to water at the off-takes from the Nairobi Water Mains was not allowed. With the recent cholera outbreak in the country, the health of the residents is at risk.

Nairobi

Water supply in Nairobi is characterised with both achievements and challenges. The achievements are attributed to the expansions of infrastructure to meet the growing population demands and recent reduction of water losses. Challenges include poor quality and intermittent water supply as only 40% of the city residents receive water continuously.

Sixty percent (60%) of the City's residents live in slum areas, yet only 22% of these households have water connections. On the other hand, higher income groups, or 11-12% of the population, consume 30% of domestic water, (IRIN, 2013 and UN-HABITAT, 2007). Those fortunate enough to have piped water pay relatively low tariffs while slum residents who rely on other water sources and of poor quality pay much more. For example, residents with piped water in Githogoro and Kibagare informal settlement have built water kiosks where they resell water to other residents who cannot access clean piped water. The water is usually sold at 2 shillings per 20 litre jerricans. The proposed wayleave for the pipeline runs through these settlements. In the recent past Nairobi has been dealing with Cholera outbreak and there were 3 incidences at Githogoro slum, along the pipeline route.

In the middle income areas, only about 40% have access to piped water 24 hours a day, the rest are supplied by illegal water connections, vendors, kiosks or boreholes.

Water quality is mostly safe as the water utility companies within Nairobi have stringent water quality monitoring programs to ensure water is safe for drinking. However due to leakages and intermittent supply, treated water is sometimes contaminated before it reaches the tap.

Nairobi residents in the high income areas receive treated, piped water into their dwellings. The water is provided by the Nairobi Water and Sewerage Company and supplemented by private ground water sources (boreholes). In certain high income areas (e.g. Runda and Karen) people wholly rely on ground water sources from Private Water Companies or individuals. Other Water Service Providers within the project zone of influence include Runda Water and Sewerage Company, a private company that provides water to Runda and Kitisuru areas.

3.3.5 Health

Muranga

Upper Respiratory Tract Infections (URTI) are very common in the County which the CPHO attributed to the increasing levels of atmospheric pollution caused by dust, smoke from Thika industries and increase in the number of petrol engines. The CPHO also indicated that cold in higher altitude areas is also a factor. Diarrheal diseases are also prevalent thus suggesting contamination of food and / or drinking water.

The top ten prevalent diseases in Muranga are presented in the table below;

Disease prevalence according to Public Health Officer records

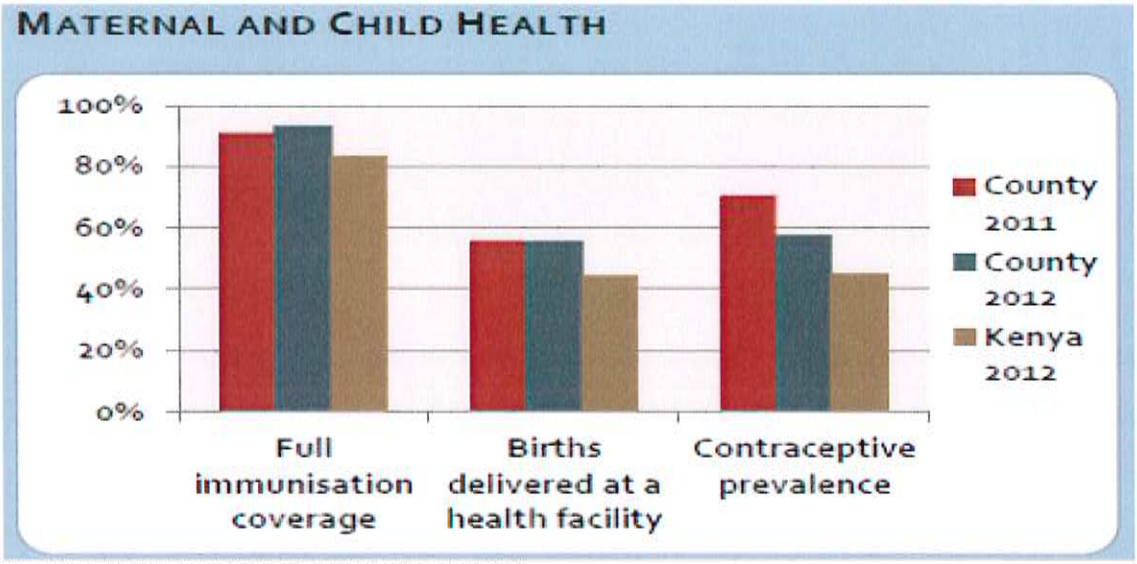
Muranga County	
No	**Most prevalent illness**
1	Upper respiratory tract infection
2	Skin disorders
3	Pneumonia
4	Diarrhoea
5	Urinary tract infection
6	Normal accidents
7	Chicken pox
8	Eye infections
9	Rheumatism
10	Ear infections

Source: Murang'a Public health Office, 2015

The following interventions have been established by the Ministry of Health to improve the public health situation:

- Supervision and ensuring proper waste management at all levels of production storage, collection, transportation and disposal;
- Water quality analysis to ensure safe water supply;
- Improved sanitation and good Hygiene by carrying out health campaigns such as hand washing campaigns ;
- Vector & Vermin control through proper waste management to keep away rodents , draining stagnant water to reduce mosquito breeding grounds,

Information of the available health facilities were obtained from the County Public Health Officer Muranga County.

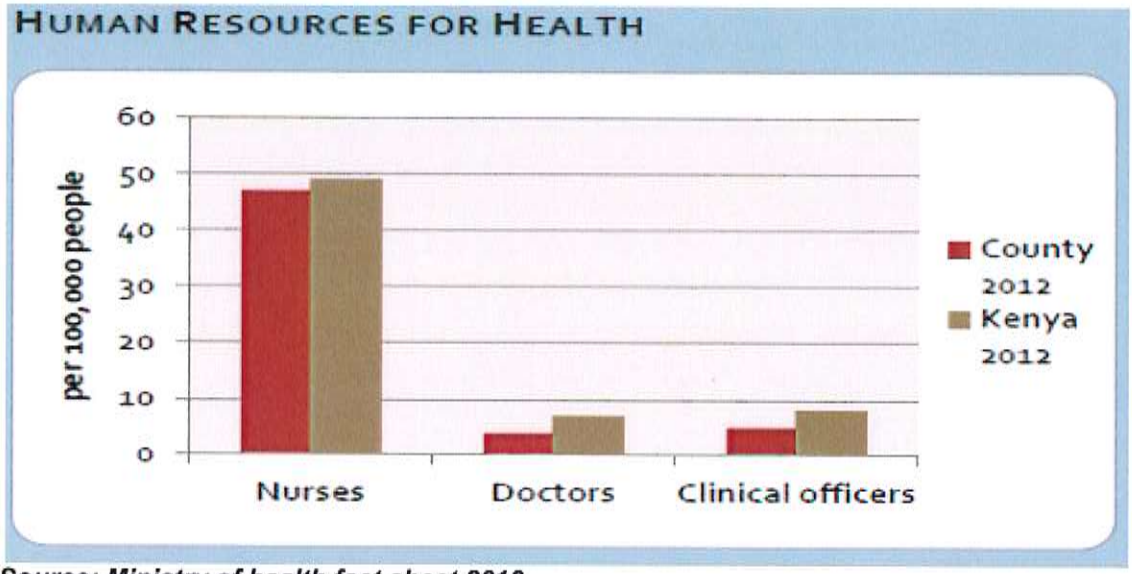


Source: Ministry of health fact sheet 2013

The ratio of medical personnel to the target population is below the required standard as shown below

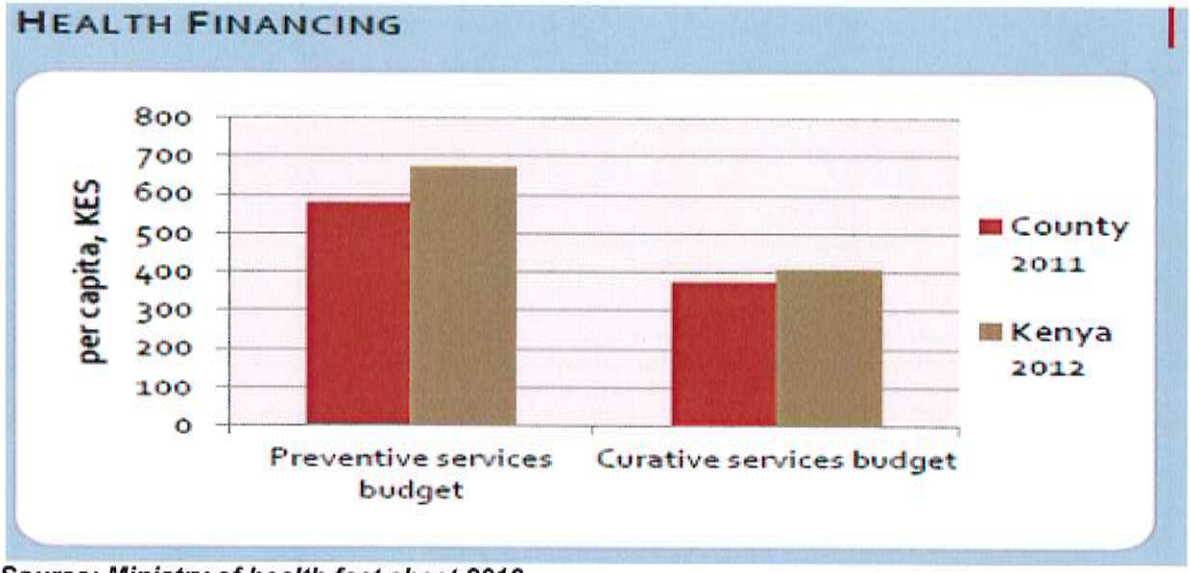
Medical Personnel	Current Ratio	Standard Ratio (WHO)
Doctors	7 out of every 100,000	250 out of every 100
Nurses	49 out of every 100, 000	250 out of every 100
Clinical Officers	9 out of every 100,000	250 out of every 100,000

In comparison with national statistics however, the ratio of medical personnel in Murang'a County is below the national average of 103 per 100,000.



Source: Ministry of health fact sheet 2013

The health sector in Muranga County has received more funding towards preventive health care followed by curative services.



Source: Ministry of health fact sheet 2013

Kiambu

There are a total of 364 health facilities spread across Kiambu County. The flagship health institution in the county is the Thika Level Five Hospital. Others are; three Level-4 in Gatundu South, Kiambaa and Kikuyu Constituencies and four Level-3 in Gatundu North, Juja, Kiambaa and Limuru Constituencies. There are 20 Level-2 (Health Centres) and 54 Level-ones (dispensaries) which are well distributed within the county. The rest of the facilities are private with 17 Mission Hospitals, five nursing homes, 36 dispensaries and 169 private clinics. The doctor/population ratio in the county is 1:17,000 and the nurse/population ratio stands at 1:1,300. The average distance to the health facility is seven Km and the facilities are well accessed since the road network is good.

Prevalent Diseases in Kiambu County include:

- Malaria,
- Respiratory Tract Infections,
- Intestinal Worms, and
- Broncho-pneumonia.

Nairobi

According to the SCMOH- Westlands, there are 7 public health facilities and over 60 private facilities in number. All the health facilities are level 3 and their main purpose is to provide primary healthcare services. Records of morbidity patterns were not available at the time of the interview but were to be made available on mail.

Disease prevalence according to the household survey was as follows; Common cold, which could be attributed to the weather, URT infection which sometimes occurs as a complication of common cold, as well as a result of dust pollution during dry season, Malaria, Skin infection, Diarrhoea diseases and warm in stools were mostly reported from lower income household and this could be attributed to water and sanitation issues experienced in low income habitats.

Disease prevalence according to Household survey

Disease	Occurrence rate percentage
Common Cold	75%
URT Infection	15%
Malaria	5%
Skin Infection	1%
Diarrhoea Diseases	3%
Worm in Stool	1%

3.3.6 Land Use and Land Tenure

Muranga

Muranga County has a wide land use because of its wide Agro-Ecological Zone range. The forests occupy the highest grounds while cash crops like tea, coffee and macadamia follow the forests in that order. Horticultural crops and Subsistence crops like maize and beans are found in the mid and lower zones of the county.

The lower parts of Muranga County consist of semi-arid areas and account for about 3,000 ha of the total land cover in the County.

Land tenure in the area consists of private, community and government land. The private land mostly consists of freehold tenure while leasehold tenure is mostly found in town centres. Community land is held in trust by the County Government of Muranga.

Kiambu

In Kiambu County, land tenure can be classified as communal land, Government trust land, and privately owned land where the owner holds the title under a freehold or leasehold system.

Land is the most important resource in agricultural production. Limited availability of productive land is a major constraint to increased agricultural production. The average holding size of land is approximately 0.36 Ha on small scale and 69.5 Ha on large scale. The small land holdings are mostly found in upper parts of Gatundu North, Gatundu South, Kiambaa, Limuru and Kikuyu Sub-counties.

Population pressure in the county has led to sub-division of land to small uneconomical units (average of 0.36 Ha) and this, coupled with poor soil fertility, has led to low yield production. The small land sizes do not produce sufficient food to feed the population of the County.

Within the project area, it was observed that most of the people occupying land especially next to the existing pipelines had very small plots. Many were complaining that they had nowhere to move to being that they have children and grand children who need to settle down but a big portion of their land cannot be constructed on as there are water pipes passing underneath.

Nairobi

About 80% of land in Nairobi is owned by the Government, but these lands are held by several types of users. About 41% of government lands (33% of total land) have been alienated to private and other parties

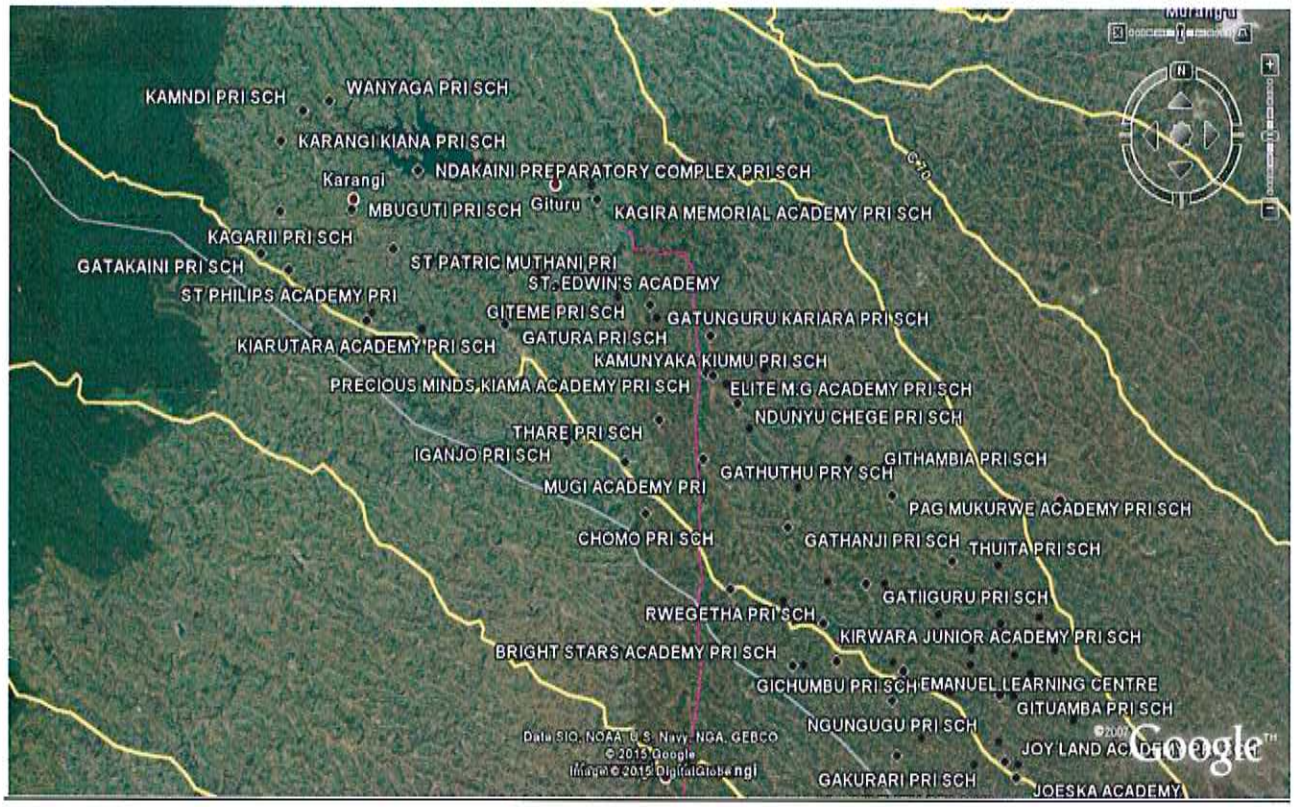
3.3.7 Education

Murang'a

From the County Education office, Murang`a County has 5 levels of educational facilities starting with Early Childhood Development centres, Primary schools, Secondary schools, polytechnics and Universities, According to records from the County Education Office, Murang'a County has 634 primary schools served by 6,324 teachers. These consist of both public and private institutions. Figure 3-5 below shows the proximity of schools to the project area in Muranga County.

The pupil teacher ratio in the county stands at 33.5% which is a within the required standards of 1 teacher for every 40 students.

Figure 3-5: Overleaf shows the spatial distribution of primary schools in the project area.



The transition rate (proportion of students from the primary level who move to the secondary school level) is at 70 percent. Again, at the county, net set secondary school enrolment rate is 71.04% for both boys and girls. School dropouts within primary school are much higher as compared to secondary school. The CEO attributed the high dropout rate to lack of school fees, pregnancy, and lack of parental guidance.

Kiambu

According to the Annual Status Report on Basic Education, Training and Service Delivery for Kiambu County (2013/2014), there are 1244 Pre-School ECD centres of which some are attached to primary schools in the county. Of these, 415 are public and 729 are private. Teachers' shortage is prevalent due to the rising number of enrolment every year. Currently the teacher pupil ratio stands at 1:50.

In primary and secondary schools, enrolment and teacher/pupil ratio varies as follows;

- 81% of age 6-13 years old children attend primary schools with a teacher/ pupil ratio of 1:60 by 2009. The total population of these primary school going age group was 327,106 by 2009
- 80% enrolment for secondary school going age(14-17 years)with a teacher pupil ration of 1:50

The numbers of education facilities existing within the project Zone of impact are as follows;

Primary schools and enrolment

Sub County	Public	Private	Total	Total Enrolment
Gatundu South	55	23	78	20817
Gatundu North	56	36	92	24281
Kiambu	43	56	99	38311
Githunguri	53	37	90	24376
Total	**207**	**152**	**359**	**107785**

Secondary schools and enrolment

Sub County	Public	Private	Total	Total Enrolment
Gatundu South	34	03	37	10584
Gatundu North	33	01	34	9708
Githunguri	32	02	34	14665
Kiambu	21	06	27	11454
Total	**120**	**12**	**132**	**46411**

Tertiary institutions and enrolment

The County of Kiambu has four tertiary institutions which include;

- Kilimambogo TTC;
- Thogoto TTC;
- Thika TTI;
- Kenya Institute of Science and Technology (KIST) in Githunguri Sub County.

The total enrolment for these institutions combined is 7407.

The transition rate from primary to secondary school in 2013 was at 70%. A survey carried out by the Sub County Directors of Education revealed that most students who enrol in form one and class one do not complete form four and standard 8 in the same number respectively as would be expected. The number of dropouts stands at 30% on the overall. The reasons for dropping out are related to;

- Poverty which inhibits the parents ability to provide for their children especially the girl child;
- Cultural practices;
- Border and cross border businesses;
- Matatu business;
- Tea and coffee picking.

Nairobi

During our consultation at the Westlands Sub County Education Office (SCEO), there were no records for Early Childhood Development schools, as the records are under the National Government. However during our transect walk we observed approximately 10 ECD schools within the project area.

Numbers of Primary and Secondary recorded in the area are as follows:

- 27 public primary schools and 44 private primary schools.
- 7 public secondary schools and 3 privates Secondary Schools within Westlands sub County.

Under tertiary level there are two Public Universities within Westlands Sub County University of Nairobi and its subsidiary campuses that is Upper Kabete Campus, Chiromo Campus and Parklands Campus, as well as Jomo Kenyatta University of Agriculture and Technology Westlands Campus.

The number of school enrolment as per gender was on a 50-50 ratio according to the SCEO.

Table showing some of the school within the project area

Level	School
Early Childhood Development	Kyuna Kindergarten
Primary Schools	Lower Kabete Primary
	Farasi Lane Primary
	Karura Forest Primary
	Cheleta Primary
	St. Martins Kibagare
Secondary Schools	New Dawn Secondary School

3.3.8 Population and Demography

The total population of the affected sub counties are shown in table 3-9 below;

Table 3-10: Total population per sub-county in the project area

County	Sub-county	Total population
Muranga	Gatanga	163,597
Kiambu	Gatundu North	100,611
	Gatundu South	114,180
	Githunguri	147,763
	Kiambu	108,698
Nairobi	Westlands	247,102

Out of the total population distribution in sub-counties as the specific population distribution done by ESIA team in the locations covered by the project is shown in Table 3-10 below.

Table 3-11: Population in the project area

County	Sub-County	Division	Location	Affected population per location	Total affected population at sub-county level
Muranga	Gatanga	Ndakaini	Ndakaini	7,324	33,249
		Kigoro	Kigoro	4,376	
		Gatanga	Kiria-ini	8,104	
			Gatanga	13,445	
Kiambu	Gatundu North	Chania	Gituamba	4,426	55,051
			Makwa	11,319	
			Kairi	8,993	
		Mangu	Gathaite	20,166	
			Karuri	10,147	
	Gatundu South	Ngenda	Ituru	4,526	30,252
			Ngenda	5,799	
			Kimunyu	8,699	
		Kiamwangi	Mutati	5,765	
			Kiamwangi	5,463	
	Githunguri	Komothai	Komothai	9,861	55,922
		Ngewa	Ngewa	22,393	
		Ikinu	Ikinu	23,668	
	Kiambu	Kiambu Municipality	Kamiti	6,657	53,529
			Riabai	25,909	
			Kirigiti	13,070	
			Kiambu settled area	7,893	

County	Sub-County	Division	Location	Affected population per location	Total affected population at sub-county level
Nairobi	Westlands	Westlands	Highridge	53,720	96,079
			Parklands	11,117	
			Kitisuru	31,242	
Total				**324,082**	**324,082**

Source: 2009 Kenya population and Housing Census.

Muranga

The Population and Housing Census conducted by the KNBS in 2009 established that Murang'a County population is composed of 451,751 males and 484,477 females with Gatanga sub-county having 80,987 males and 82,610 females. The projected growth rate for the County was placed at 0.4 percent per annum. The following is the projected population of Gatanga sub-county;

Year	Population
2009	163,597
2012	165,572
2015	167,571
2017	168,917

Source: Muranga County Integrated Development Plan, 2013-2017

According to the Census 2009, the population density of Gatanga Sub-County was estimated to be 273 persons per square kilometre.

The male: female sex ratio for the county is 48:52. The higher female population in relation to male is attributed to high male emigration to other counties and towns in search of employment and business opportunities.

Kiambu

Population of Kiambu County was estimated at 1,623,282 with a density of 638 persons per square kilometre. This encompasses the six sub counties that make up Kiambu County of which four namely Gatundu North, Gatundu South, Githunguri and Kiambu Sub-Counties lies along the project area. 60.8% of Kiambu population live in urban areas. the future population projections according to KNBS 2009 was 1,766,058 with 873,200 males and 892,857 females in 2012 and reach 2,032,464 in 2017 with a growth rate of 2.81. The population growth for the affected sub-county is as follows;

	Population projection for Affected 4 Sub-counties in Kiambu County			
Sub-county	**2009**	**2012**	**2015**	**2017**
Gatundu North	100,611	109,460	119,088	125,972
Gatundu South	114,180	124,223	135,149	142,962
Githunguri	147,763	160,760	174,899	185,010
Kiambu	108,698	118,259	128,660	136,098

Source: Kiambu County Integrated Development Plan 2013-2017.

Nairobi

The pipeline will traverse through several locations in Westlands Sub-County. According to the 2009 census by KNBS the population of Westlands Sub-County stands at 247,102. Out of the total population distribution in Westland Sub-County, an estimate 96,079 persons live along the project area. The population growth rate of Nairobi Sub-County is estimated at 3.93% per annum.

3.3.9 Economic activities

Muranga and Kiambu counties fall within the Kenya highlands with high potential for agricultural activities. With young volcanic soils lying on rainy harvesting slopes and suitable altitudes, the project area is able to support a thriving agriculture sector.

To majority of the people in these areas, land is the greatest source of livelihood. With the exception of a few large plantations in parts of some counties, average farm holdings are small with many households occupying less than one acre of land. This is common for example in the high potential areas of Muranga, Nyeri, Kirinyaga, Embu, and Meru.

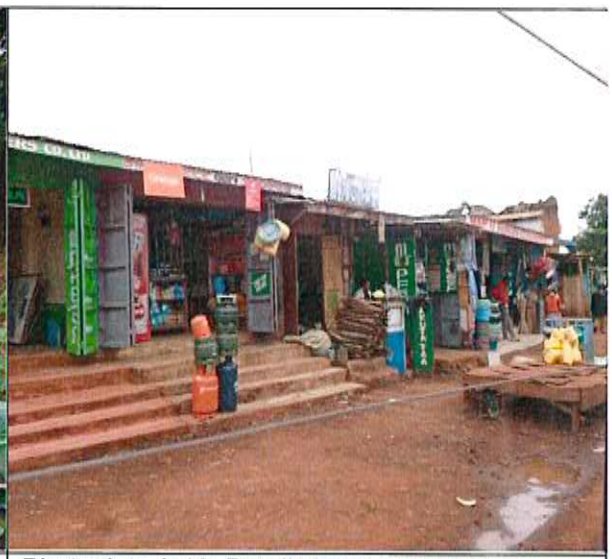
It is estimated that more than 80 percent of the people in the catchment area depend of agriculture. Both cash crops and food crops are grown. Key cash crop is tea and coffee in the area where the proposed raw water pipeline route and a section of the treated water pipeline follows.

Livestock keeping is mainly for milk production through the rearing of dairy cattle and goats. Rearing of dairy cattle is the most popular enterprise in the county. The major breeds are Friesians, Ayrshire, Guernsey's, Jerseys and their crosses. Friesian is the breed preferred by majority of the farmers due to its size and high milk production as compared to the others. Dairy goats have become very popular in the County due to their milk production potential and income generation when sold as breeding stock. The reduction in land holding per household due to sub-divisions has also led to a preference of dairy goats over ventures that require larger land holdings. Zebu cattle are reared by farmers in the lower (semi-arid) parts of the County. They are used for subsistence milk production and meat. Meat goats are mainly kept by farmers in the lower parts of the County.

Other economic activities conducted in the area include retail and wholesale trade, quarrying and sand harvesting. Other forms of employment are mainly found in Murang'a and Thika towns whereby people are employed in hotels and eateries, County Government and National Government Offices.



Photoplate 3-9: Cabbage garden in Kiria-Ini



Photoplate 3-10: Retail shops in Rwagetha

Nairobi City County is the centre of commercial, manufacturing and industrial development in East Africa. The major economic activities in Nairobi City include trade, tourism, manufacturing, service and real estate developments. Like most modern cities, Nairobi has crowded markets and trading areas, middle class suburbs, and spacious mansions.

3.3.10 Labour

According to the Ministry of Labour, skilled labour only accounts to 30% of the total labour population. The limited job opportunities in the formal sector have led to an increase of informal sectors.

Most of the people living in low income settlements within the project area work in low-skilled labour market such as, construction, and in lower end private services, such as security and household services. These jobs are characterised largely by insecure employment and low wages.

The people living in middle income areas within the projects are either employed formally or run middle income businesses and those in the peri-urban areas of Kiambu are cash crop farmers. Some of the crops grown for sale are napier grass, sweet potatoes and coffee.

The people living in high income settlements within the project area either own large businesses and companies or are top managers in skilled labour markets.

The youths within the project area especially those living in low income settlement come out as economically vulnerable. However it is anticipated that the project will create employment in the non skilled sector and that it will absorb some of the youths.

Interventions in the non skilled sector during construction will be important in achieving decent work for both poverty eradication and reducing inequality among the low income habitats.

3.3.11 Agriculture

Muranga

Agriculture is a major economic activity in Muranga County. The main crops grown in Muranga can be categorized as; cash crops, food crops and horticultural crops. Cash crops include tea, coffee and macadamia, Food crops are mainly grown for subsistence purposes while horticultural crops are largely for export market. Coffee production has been on the downward trend over the years due to poor prices at the international market. Yields of subsistence crops have also been on a downward trend because of the high prices of agricultural inputs. However production of horticultural crops has continued to rise because of high income and support to farmers by exporters with farm inputs.

Livestock keeping is also practiced in the county with dairy cattle being widely distributed all over the county with almost no distinctive boundaries. The major breeds are Friesians, Arshires, Guernsey's, Jerseys and their crosses. Friesian is the breed preferred by majority of the farmers due to its size and high milk production as compared to the others. Zebu cattle are reared by farmers in the lower parts of the County. They are used for subsistence milk production, drought and meat. Dairy goats have become very popular in the County due to their milk production potential, sub division of the farms into small households and income generation when sold as breeding stock. They are also found in all the Sub counties in the County. Meat goats are mainly kept by farmers in the lower parts of the County.

Majority of poultry reared by farmers is indigenous chicken and is distributed all over Muranga County. A few farmers do also keep broilers and layers. Very few farmers rear other birds including geese and Turkeys. Apiculture has been on the rise and farmers from all sub counties have had a lot of interest on the same. The main problem has been good quality hives and protective clothing.

Kiambu

Agriculture is the predominant economic activity in Kiambu County and contributes 17.4 per cent of the County's population income. It is the leading sub sector in terms of employment, food security, income earnings and overall contribution to the socio-economic well being of the people.

The land use pattern is mainly for commercial purposes and subsistence and commercial farming. The agricultural practices of the community living in the project area are crop farming and animal keeping. Food crops grown in the area include maize, beans, yams and bananas while the cash crops include tea, coffee and Napier grass. Keeping dairy cattle is the preferred livestock rearing activity. Fruits grown include passion fruits, avocadoes, strawberries, bananas and mangoes and pineapples in Gatundu North and Gatundu South Sub-Counties.

Growth in this sub-sector has been encouraged by a ready urban market in Thika, Ruiru, Kiambu and Nairobi and the availability of local food processing factories such as Farmers' Choice Ltd, Kenchic Co. Ltd, Brookside Dairies, Githunguri Dairies, Ndumberi Dairies, Limuru Milk and Palmside Dairies. There are no ranches within the County.

Irrigation agriculture in the County is carried out mainly in large-scale. Individual farmers have developed their own systems of irrigation especially for export crops such as coffee and horticultural crops.

Kiambu's agriculture is mainly rain-fed and is entirely dependent on the bimodal rainfall. There are two cropping seasons in the sub counties within the Project Zone of Influence. The performance of rain-fed agriculture varies due to the diverse agro-climatic zones. However, the population density in these areas has increased and land has been subdivided into such small sizes that it is becoming uneconomical for farm enterprises. From field observations, some farmers were opting to plant Napier grass as opposed to food crops so as to optimise on the returns from their small farms. In some parts of Kiambu Sub County, the farms were diminishing due to establishment of real estate.

Nairobi

Agriculture in Nairobi is mainly practised in small scale within residential areas. Urban agriculture farms are mainly located along roadsides, in open spaces and parks, along rivers and river valleys, under power lines and within backyards of residential plots. Some of the urban farmers use small scale irrigation to irrigate their crops.

3.3.12 Sanitation

Muranga

Murang`a county has an offsite sanitation system that serves the town areas, the treatment plant is situated at Karii and the waste water is treated using biological means to the standards set by the World Health Organization, such that the water finally released downstream is not harmful.

According to the CPHO, onsite sanitation is the most common in areas outside the town where the topography of the land does not allow for gravitation of the sewage. The mode of onsite sanitation in the county is mostly by use VIP pit latrines which are in majority of the homes.

The CPHO also indicated that, solid waste management has faced major challenges in terms of collection and disposal as there are not enough waste collection receptacles and transport vehicles. He indicated that most of the wastes generated are biodegradable wastes from hotel premises and market centres. He indicated that there is need for education of the public on segregation of wastes at point of generation.

Nairobi

Sanitation in middle class and high income areas is usually contracted to private waste collectors. The main issues therefore arise when these contractors dump wastes on public land such as road reserves and river banks. Unfortunately, this dumping is usually done in middle to low income residential areas. Sanitation in low income areas is of serious concern yet this is where half of the population in the city dwells.

Only a small percentage of slum dwellers have access to their own toilet, Majority of them rely on shared facilities and at least 5% have no access at all and resort to "flying toilets" which poses a serious health hazard.

During transect walks within the project area; there was an observation of toilets draining human waste directly into the rivers as a result of lack of waste water management systems.



Photoplate 3-11: An informal drain blocked by solid waste in low income settlement.



Photoplate 3-12: Grey waste water on a shallow drain behind a school.

Waste management in low income habitat is a major challenge, most of the drains are blocked by waste and therefore water stagnates and poses a health hazard. This necessitate that storm water management in informal settlements must be accompanied by appropriate solid waste management.

The existing sewer network of a total length of about 163km only covers an area of about 208km2, which is less than 30% of the 696km2 area of the city. It is unclear what share of the population is connected to the sewerage system: Estimates vary from 10 to 48%.

There are two wastewater treatment plants in Nairobi: The Dandora stabilisation ponds treat industrial and domestic sewage and have a design capacity of 80,000 cubic meters per day. They constitute the largest pond system in Africa, but as of 1996 only half its capacity has been used. The Kariobangi wastewater treatment plant has a capacity of 32,000 m3 per day and uses the trickling filter technology. The effluent from both plants is discharged into the Nairobi River.

Major industrial establishments discharge effluents into the Ngong River Basin. Waste materials discharged into the Ngong River Basin include domestic sewage, industrial wastes, oils and greases, wastewater from washings (from hides and skin stores, cleaning of factory floors and cleansing of re-

usable packaging material such as bottles), and pharmaceutical waste. Other materials include human waste, raw sewage, garbage, dyes, paints, inks, and Jua Kali wastes. (UNEP, 2002).

Capacity for management of waste water is inadequate and the project will further escalate the situation. Also the River water quality is of serious concern.

Water is interconnected to the MDGs and basic sanitation was added to the catalogue at the 2002 World Summit on Sustainable Development in Johannesburg."To halve by 2015 the proportion of people without sustainable access to safe drinking water and basic sanitation" (*Susanne hesselbarth 2005*).

Water, sanitation and hygiene is important for improving the lives of slum dwellers which in turn will impact positively on sustaining natural resources, such as the rivers in accordance with MDG 7.

3.3.13 Housing and Settlement

Muranga

From observation during the field visits in Muranga County majority of the population have houses with iron sheet roofing, Cemented floors and brick walls. There are also houses that were made of wooden floors and walls. The population in the project area is linear along the roads, nucleated around market centres and dispersed in tea farming areas.

Klambu

According to 2009, Kenya Population and Housing Census, 48.3 percent of all homes in the county are stone-alled, 4.9 percent are brick/block, 4.8 percent are mud/wood. 74.6 percent of the houses have cemented floors and 87.5 percent have corrugated iron sheets and 0.1 percent have other forms of roofing materials.

Nairobi

Within the project zone of influence in Nairobi, housing and settlement varies with majority of the people living in housing estates or private homes. There are only two informal settlements; Githogoro and Kibagare Most of the houses in these slums are made of GCI sheets walls and roof with wooden doors.



Photoplate 3-13: A typical house in the high end area within the PZI.



Photoplate 3-14: Housing in low income settlements in Nairobi: Kibagare slum.

3.3.14 Culture

Nairobi grapples with poverty and inequality in the distribution of wealth and income. For the urban poor, living in Nairobi means dwelling in slums and shantytowns. However, the city is also home to Kenya's elite and to the steadily growing middle class. The project cuts across the different diverse backgrounds.

3.3.15 Religion

Religion is diverse along the project area from Murang'a to Nairobi and characterised by mostly Christians. The predominant churches identified in the area include:

- Muranga-African Inland Church (AIC)
- Kiambu-PCEA and African Independent Pentecostal Church of Africa (AIPCA) churches in
- Nairobi- Protestants and Catholics)

Other religions in the project area include Muslims, and Hindus.

4 PROJECT DESCRIPTION

4.1 Pipeline location and size

The entire pipeline length is approximately 64.8km from Thika dam in Gatanga sub-county, Muranga County to Kabete Reservoir in Westlands sub-count, Nairobi County. The pipeline is divided into two sections namely;

- Raw Water Pipeline; and
- Treated Water Pipeline.

The Raw Water Pipeline runs for 5.5km along Thika River Valley before delivering the water to Kigoro Treatment Plant while the treated water covers a length of 59.3km from Kigoro treatment plant to Kabete reservoir. The treated water pipeline will run through a new route that has to be acquired from Kigoro to Ngethu, approximate length of 12.5km before joining the existing pipeline wayleave at Ngethu.

A summary of the length of the raw and treated water pipeline with their respective pipeline diameter is shown in table 4-1 below.

Table 4-1: Pipeline length and size

Diameter	Length
Raw Water Pipeline	
DN 1200	5.5km
Treated Water Pipeline	
DN1200	48.9km
DN800	10.4km

It should be noted that the existing pipe from Gigiri Pumping Station to Kabete Reservoir will be converted to transfer water by gravity. This pipeline will be utilised to transfer the remaining capacity of treated water from the DN 1200 pipeline.

4.2 Pipeline Design Parameters

4.2.1 Material of pipe

A pipe of DN 1200 made of ductile iron material socket and spigot or Self Anchored Joints has been adopted for Raw Water Pipeline running from the draw-off tunnel, southern of Thika Dam, to the Kigoro Treatment Works.

The pipeline material adopted for the Treated Water Pipeline running from Kigoro Treatment works to Kabete Reservoir will be made of ductile iron for pressure rating PN25 and steel material for PN40 as listed table 4-2 below;

Table 4-2: Pipeline materials and type of joints

Diameter	Length	Pressure rating	Pipeline material and joints
DN 1200	10.6	PN 25	• Ductile Iron (with Socket and Spigot or Self Anchored Joints)
DN 1200	38.3	PN 40	• Steel (Welded Joints)
DN 800	10.4	PN 25	• Ductile Iron (with Socket and Spigot or Self Anchored Joints)

4.2.2 Pipe anchoring

Ductile iron pipes

Socket and spigot flexible joints shall be push-fit type rubber gaskets materials while self anchored flexible joints if used shall be the standard push-fit type joints with modified gaskets incorporating stainless steel toothed inserts.

Steel pipes

Anchoring/jointing for steel pipeline will be through butt jointing which will be carried out outside the pipeline. This will ensure full longitudinal continuity of pipeline strength therefore eliminating the need for thrust and anchor blocks to fittings such as bends.

Flexible joints shall be by bolted sleeve couplings which shall be mechanical type consisting of a centre sleeve, two end ring flanges, two wedge shaped sealing rings of Nitrite rubber, and with galvanised nuts and bolts.

4.2.3 Pipe coating

Ductile iron pipes

Pipes and fittings shall be externally protected by a metallic zinc spray coating and internally lined with cement mortar.

Steel pipes

Buried steel pipes shall be externally protected externally with triple layer polythene coating and above ground pipes, protected by a triple layer polypropylene coating (3LPP) with polypropylene shall be used. While internal protection to steel pipes shall be by fusion-bonded epoxy coating.

Fittings shall be protected externally and internally by fusion-bonded epoxy while flexible couplings shall be protected externally and internally by fusion-bonded.

4.2.4 Pipeline capacity

The Raw water pipeline has been designed to carry a capacity of 172,800 m^3/day. However, only 120,960 m^3/day of water added to the dam by the NCT will be transferred from Thika dam to Kigoro Treatment plant through the Thika-Kigoro-Kabete Pipeline. The remaining pipeline capacity will be preserved for future use when Mathioya dam will be constructed.

The treated water pipeline has a capacity of 138,240 m^3/day of treated water from Kigoro WTW to Gigiri, a distance of 48.9km. However, it should be noted that only 120,960cm3/day of water will be transmitted through the pipeline from Kigoro Treatment Plant. The DN 1200 pipe will then branch at Gigiri to deliver the treated water to a new DN 800pepe and an existing DN700 pipe. The DN 800 pipeline has been designed with a capacity of 81,382 m^3/day of water to Kabete Reservoir. The remaining water capacity will then be transmitted through an existing pipe of DN

700 running from Gigiri Pumping Station to Kabete Reservoir. The existing DN 700 pipe has been has a capacity of 56,858 m^3/day of water to Kabete Reservoir by gravity. The summary of the pipeline capacity is illustrated in table 4-3 below.

Table 4-3: Design Pipeline Capacity

Diameter	Length	Pipe Capacity (m3/day)
DN1200	48.9km	138,240
DN800	10.4km	81,382
DN700 (existing)	8.9 km	56,858

4.2.5 Operating Pressures

The Raw Water Pipeline will be laid along the Thika River Valley so as the water can be transmitted to Kigoro treatment works in Kigoro by gravity. Due to the deep ravines along the river valley, the pipeline will be operated at a pressure rating of PN 16.

The river valleys along the pipeline route are generally deep ravines which will result in considerable variation in operating pressures along the pipeline. Steel and ductile pipes are proposed to be use since they can be best during Pipeline Pressure Rating less than PN25. Table 4-4 below shows the pressure rating that has been determined from the proposed alignment and hydraulic profiles from Thika dam to Kabete Reservoir.

Table 4-4: Pressure rating determined from proposed alignment and hydraulics

Diameter	Length	Pressure rating
DN1200	10.6km	PN25
DN1200	38.3km	PN40
DN800	10.4km	PN25
DN 700 (Existing)	10.4	PN26

4.2.6 Flow Velocity in Pipes

In order to minimize head losses and to reduce the risks of water hammer phenomenon, the maximum flow velocities for raw water pipeline has been limited to 2 m/s.

To minimize head losses and to reduce the risks of water hammer phenomenon for the treated water pipeline, the maximum flow velocities which has been considered is 2 m/s. In order to avoid settlement of sediment / debris in the pipes, the design will ensure that flow velocities are kept, as far as possible, above 0.5 m/s. In summary the flow velocity of DN 1200 pipe from Kigoro to Gigiri will be about 1.42m/s while for DN 800 and DN 700 pipes from Gigiri to Kabete Reservoir has been designed at 1.9m/s and 1.7m/s respectively.

4.2.7 Cover and Slope to Pipes

The depth of cover for both the Raw Water and Treated Water Gravity Mains shall be been kept to a minimum of 1.0m to pipeline crown. To reduce the number of changes in grade, the cover to pipe has been varied from this minimum to a maximum of approximately 3m at a few localized high point sections.

Both the Raw Water and Treated Water Gravity Mains traverse a generally rugged terrain with numerous high and low points, streams, seasonal and permanent rivers. In such scenarios, under river crossings as well as aerial crossings on reinforced concrete piers and steel bridges have been adopted. There are numerous major tarmac, cabro and murram road crossings.

4.3 Appurtenances/Pipeline Infrastructure Accessories

The appurtenances/pipeline infrastructure accessories are described below;

4.3.1 Regulation Valve

The regulation valve for both RWGM and TWGM must be an anti-cavitation valve in order to manage high pressure drop at the valve level hence minimizing various negative effects ranging from noise to the deterioration of the pipeline and equipment integrity. The following are the characteristics of the regulation valve for the Raw Water and Treated Water Pipelines;

Raw Water

The regulation valve must be connected just upstream the Kigoro WTW and should have the following characteristics

- DN 900
- PN16
- Anti-cavitation system to support an index of cavitation sigma of about 1.36 with a flow of 2.0m3/s.
- Combination with a screener upstream the valve in order to protect it against major particles.
- Automatic or manual regulation linked to the flow
- The regulation valve have to be blocked in full closure

Treated water

The regulation valve must be installed few kilometers after the Kigoro Treatment Works. The valve has to be installed close to the road and downstream an air valve equipment hence this valve is likely to be installed at chainage 7380m which is near the road. The characteristic of this regulation valve is summarized below

- DN 900
- PN25
- Anti-cavitation system to support an index of cavitation sigma of about 1.4 with a flow of 2m3/s.
- Combination with a screener upstream the valve in order to protect it against major particles.
- Automatic or manual regulation linked to the flow
- The regulation valve have to be blocked in full closure
- A vacuum break valve must be connected downstream the regulation valve

4.3.2 Overspeed valve

Raw Water

An overspeed valve of DN 900 with minimum pressure rating of PN10 will be connected where the pipe leaves Thika Dam in order to limit flooding in case of a pipe rupture along the RWGM.

Treated Water

An overspeed valve will be connected downstream the connection at the WTP treated water tank of Kigoro in order to limit flooding in case of a pipe rupture along the TWGM. This valve must have a DN 900 and pressure rating of PN 16.

4.3.3 Air valves

Air valves will be connected at all the high point/raised areas, at sudden changes in pipeline slope and at in-line sectional valves along the transmission pipeline to reduce water hammer effects and to discharge air during the initial filling of the pipes. The pipeline will have about 18 air valves connected to the Raw Water Pipeline and 111 air valves for Treated Water Pipeline. These air valves should accept air inside the pipeline in order to break the vacuum and allow air outlet for draining of air pockets.

All Air Valves will be made of DN200 Double Orifice Air Valves (DAV) and shall be provided with a separate isolating gate valves for easy removal and repair of the air valves. The Air Valves shall compose of the anti-shock and anti-surge type.

The intake/discharge area shall be equal to the nominal size of the valve i.e. a 200mm valve shall have a 200mm intake/discharge orifice.

4.3.4 Washouts

Washouts have been located at low points along transmission pipelines. The washouts will be installed at low points in the pipeline profile and shall comprise of a DN200 invert T-Branch from the main pipe and a DN200 gate valve. Approximately 15 washouts will be constructed along the Raw Water Transmission Pipeline while 104 will be place along the treated water pipeline. The location, diameter and amount of water being released by each washout for both RWGM and TWGM are attached in appendix III of this report.

Drainage from washout points will be located so as to avoid erosion of areas around the washout chamber. The Washout will be piped to a suitable stream or discharge point nearby.

4.3.5 Line valves

The purpose of line valves is to limit the length of pipeline to be drained during operation and maintenance purposes and also to limit spillage of water in the event of an emergency such as a pipeline burst / rupture. The line valve will be made of butterfly valve to limit the height of the valve chamber and also the depth of the pipes if the chamber is to be buried. 3 line valves has been proposed along the raw water pipeline and 7 line valve will be constructed along the treated water pipeline.

4.3.6 Swabbing chamber

Swabbing is an internal pipe-cleaning process used to remove biofilms or other foreign matter from inside the water pipes which cannot be removed by pipeline flushing through washouts. Thus swabbing chambers have been provided for this particular purpose so as to maintain the internal condition of the pipeline and also water flow rate.

Swab chamber is comprised of swab launcher and swab catcher chambers. The swab launcher chambers will be situated upstream end of a pipeline section immediately after the line valve while swab catcher chambers downstream end of a pipeline section just before the line valve.

Table 4-5 below shows the location of the swab launchers and catchers chambers along the pipeline;

Table 4-5: Location of swab launchers and swab catchers along the pipeline

Chainage	Pipe diameter	Launcher/catcher	Location
Raw Water Gravity Main			
0+195	DN1200	Swab Launcher (SL1)	Thika dam
5+475	DN1200	Swab Catcher (SC1	Kigoro Treatment Works
Treated Water Gravity Main			
0+003	DN1200	Swab Launcher (SL1)	Kigoro Treatment Works
12+560	DN1200	Swab Catcher (SC1) and Launcher (SL2)	Ngethu
21+860	DN1200	Swab Catcher (SC2) and Launcher (SL3)	Gatundu
31+680	DN1200	Swab Catcher (SC3) and Launcher (SL4)	Kwa-Maiko
42+660	DN1200	Swab Catcher (SC4) and Launcher (SL5)	Kiambu
48+960	DN1200 & DN800	Swab Catcher (SC5) and Launcher (SL6)	Gigiri Reservoirs
59+280	DN800	Swab Catcher (SC6)	Kabete Reservoirs

4.3.7 Sectional Valves

Sectional Valves for operation and maintenance purposes have been placed at a distance apart of about 3km.

Wherever practical, Sectional Valves will be placed in a joint valve chamber with air valves or washouts and upstream of these valves.

4.3.8 Needle Float Valves

The discharge pipeline and the needle float valve have to break a residual pressure of about 1 bar before discharging water in Kabete reservoir. This must be taken into account in the design of the Kabete reservoir and its upstream valve chamber.

4.3.9 Thrust Blocks and Pipeline anchors

(a) Thrust Blocks

In buried pressurized water mains, thrust forces act on the pipe when there changes in fluid velocity, changes in pressure size or changes in pipeline direction occur. This is generally at fittings such as plugs, caps, valves, tees, bends or tapers. Thus thrust blocks prevent by the thrust forces from acting on the pipes especially where the highest pressure occurs. Such thrust blocks are expected at these areas;

- **Raw Water Gravity Main:** 5.5km of DN1200 pipeline with Flexible joints (Socket and Spigot) with in-situ concrete thrust blocks or self-anchored joints without thrust blocks
- **Treated Water Gravity Main:** About 50km of DN1200 pipeline with welded joints without thrust blocks; approx. 10km of flexible jointed DN 800 pipeline with in-situ concrete thrust blocks.

The self-anchored joints as well as welded joints provide a longitudinal continuity of strength, and thus sufficient restraint to thrust force on the pipeline. Thrust blocks will not be installed where at this joints.

(b) Anchor Blocks

Anchor blocks are used to prevent pipeline from slipping in sections where the slope is steeper. Rectangular cross-section with reinforced Concrete anchor blocks have been provided, for both the Raw Water Gravity Main and Treated Water Gravity where the slope is steeper than 1:8. While Reinforced concrete cross fall slip anchors have been allowed in sections where the pipeline is to be laid across slopes steeper than 1:4.

4.3.10 Flow Measurement Meters

Flow measurement along the Raw and Treated Water Gravity Main will be done using electromagnetic meters. This will provide real-time flow measurement in addition to cumulative flow hence help curb any abnormal changes experienced along the pipeline. The meters will placed in areas that ensure that swabbing process is not carried out through these meters. These electromagnetic meters will be placed in the following areas along the pipeline;

Chainage(m)	Pipe Diameter	Location
Raw Water Gravity Main		
0+175	DN1200	Thika Dam
Treated Water Gravity Main		
31+690	DN1200	Kwa Maiko
59+300	DN800	Kabete Reservoirs

The Electromagnetic Flow Measurement meters will be battery powered with a battery of up to five years. The meters will be fitted with a wall mounted weather proof metallic housing for remote display and battery. The meters will also be equipped with the option of GSM radio technology allowing the remote transfer of information using SMS text messages over a mobile phone.

4.3.11 Indicator Posts

These will be provided at relevant locations, like air valves, washouts, line valves, bulk meters, swab chambers Marker posts will also be located where the pipeline alignment changes, at all road crossings and at approximately 500m maximum interval. In those locations where the pipeline does not parallel an existing roadway, marker posts will be placed at the centreline of the pipe or along a line offset from the pipe. The offset distance will be shown on the post.

4.4 Erosion Control and Slope Protection Measures

Due to the high terrain along the proposed pipeline route, it makes the area susceptible to erosion during project implementation. The following are the method adopted in the design report to ensure erosion control and slope structural protection measures along the pipeline wayleave;

Table 4-6: Schedule of Erosion Control and Slope Structural Protection measures

Type of Erosion	Longitudinal Slope	Longitudinal (Primary) Channel	Transverse (Secondary) Channel	Slope Structural Protection	Surface Protection
Type 1	Steeper than 1 in 10 Not exceeding 1 in 4	Plain grass (Channel A)	Surface graded to slope to longitudinal channel	Gabion Protection Works	Grassing to specifications

Type of Erosion	Longitudinal Slope	Longitudinal (Primary) Channel	Transverse (Secondary) Channel	Slope Structural Protection	Surface Protection
Type 2	Steeper than 1 in 4 Not exceeding 1 in 2	Geotextile reinforced grass (Channel B)	Plain grass at 10 centers (Channel D)	Gabion Protection Works	Hydraulic seeding to specifications
Type 3	Steeper than 1 in 2	Concrete interblock (Channel C)	Geotextile Reinforced Grass at 10m centers (Channel E)	Gabion Protection Works	Hydraulic seeding to specifications (with geotextile mesh as required)
Type 4	Other Areas	None	None	None	Grassing to specifications

4.5 River/ Waterways Crossings

The highest pipeline pressures will be realized at river crossings and therefore special care has been taken in the design of the crossings to cater for this impact. River crossings along the project area will include undercrossing and overcrossings of natural rivers, streams, gullies and water courses. The type of crossings and the parameter used is shown in Table 4-7.

Table 4-7: Method of cross employed at each river crossings

River	Chainages	Type of crossing
Raw water Gravity Main		
Thika River	0+100	Overcrossing by piers
Thika River	0+950. 1+010, 1+260,	Undercrossing
Swamp	3+020	Overcrossing by piers
Stream	4+720	Undercrossing
Treated Water Gravity Main		
Valley	1+520	Overcrossing by piers
Stream	3+320	Undercrossing
Stream/swamp	5+340	Overcrossing by piers
Ruamboro River	6+620	Overcrossing by piers
Swamp	7+600	Undercrossing
Kiama River	8+960	Overcrossing by steel bridge
Chania River	10+660	Overcrossing by steel bridge
Stream	11+080	Overcrossing by piers
Karimenu River	14+780	Overcrossing by steel bridge
Ndarugu River	17+300	Overcrossing by steel bridge and piers
Mandume River	18+490	Overcrossing by piers
Ruambura River	19+300	Overcrossing by steel bridge
Kiariga stream	20+850	Overcrossing by piers
Thiririka River	22+190	Overcrossing by steel bridge
Niendu stream	23+330	Undercrossing
Mararo stream	24+280	Undercrossing
Theta River	25+060	Overcrossing by steel bridge
Kamaratu Stream	25+740	Overcrossing by piers
Mugutha stream	26+670	Undercrossing
Komothai River	28+390	Overcrossing by steel bridge and piers

River	Chainages	Type of crossing
Ruiru River	30+280	Overcrossing by steel bridge
Ngewa stream	32+200	Undercrossing
Mukuya River	33+020	Overcrossing by piers
Kianjibbi Swamp	34+280	Overcrossing by piers
Kamiti River	36+280	Overcrossing by piers
Ithuru River	37+427	Overcrossings by piers
Kiu River	39+058	Undercrossing
Gakiamba stream	40+029	Overcrossing by piers
Karigiti River	41+160	Overcrossing by piers
Riara River	41+580	Overcrossing by piers
Gatharaini	43+317	Overcrossings by piers
Ruiruaka River	47+680	Undercrossing
Thigiri River	53+680	Undercrossing
Gitathuru River	54+870	Undercrossing
Mathare River	55+840	Undercrossing

In undercrossings the pipe will be surrounded with mass concrete and protected with approved granular fill material and gabion mattress. The channel sides will be protected by gabions. Additional erosion control measures and drainage channels will also be provided on the valleys to ensure that the pipeline is not exposed.

During overcrossings on rivers the pipeline will be supported by Reinforced Concrete Piers, Steel Bridges or a combination of both. Reinforced concrete piers will be used in areas where the width does not exceed 8m and the maximum pier height will be 4.5m. The pipeline will be supported on a support bracket and held into position by a mild steel strap tensioned through bolting and anchored to a solid ground. Long span crossings will be by steel bridges ranging from 28m to 42m. The bridge will be supported by reinforced abutments that will be constructed on the river banks.

4.6 Road crossings

Road crossing will occur on both the Raw and Treated Water Transmission Main. Thus to ensure adequate protection of the pipe against external loading by traffic on the roads, a minimum cover of 1.5m to the crown of pipe will be maintained at all road crossings. The pipe will also be encased in Class 15/20 mass concrete surround, of minimum thickness 300mm. To ensure flexibility of any flexible joints at the road crossings, the concrete surround will be broken at joint locations. The pipe surface will be wrapped in gauge 1000 polythene sheet prior to casting of the concrete. Backfilling of the trench will be done with approved backfill material in compacted layers of 150mm to a sufficient compaction density.

Reinstatement of the road after being crossed by the pipeline will be done according to the type of road. These will include;

- Bituminous Carriage Way;
- Bituminous Footway and Cycle track; or
- Paving Slab/ Block Construction.

The road crossings along the transmission route are as listed in table 4-8;

Table 4-8: Roads to be crossed by the pipeline from Kigoro WTW to Kabete Reservoir

County	Name of the Affected Road	Chainages
Muranga	Makomboki Tarmac Road	2+230
	Gatanga-Ndakaini tarmac road	3+700
	Kigoro-Githumu murram road	2+960
	Gatanga-Ndakaini road (tarmac)	5+000
	Kigoro-Kiriani road (murram)	7+240
	Gatura-Gatanga road (tarmac)	9+840
Kiambu	Ngethu-Mangu road (murram)	12+020
	Kwa-Maiko - Ruiru Road	31+600
	Kiambu-Nairobi Road	42+700
	Northern Bypass Road	46+720
Nairobi	Runda Drive Road	46+920
	Ruaka Road	47+430
	Magnolia Close Road	48+080,
	United Nations Crescent Road	48+980 and 49+340
	Limuru Road	50+240
	Roselyn Close Road	50+630
	Thigiri Rise Road	51+350
	Red Hill Drive Road	51+760
	Egrets Drive Road	52+240
	Access Road to Nyari Estate	53+280
	Westlands Link Road	53+710, 54+915 and 56+250
	Peponi Road	54+260
	Kitisuru Road	54+610
	Spring Valley Road	55+575
	Lower Kabete Road	55+820
	Loresho Ridge Road	55+970
	Kyuna Road	56+250 and 56+570
	Kibarage Way	57+370 and at Ch.57+700

4.7 Connection to Existing Gigiri Pump Station

The Treated water from Kigoro Treatment Plant will branch at Gigiri reducing the DN1200 pipe to DN800 so as to utilise the existing DN700 pipe at the Gigiri Pump station as a gravity Main. A T-branch will be provided at the DN1200 pipeline before the pipeline diameter is reduced for the connection of existing Gigiri pipeline.

For successful connection, a swab catcher chamber will be provided before the T-branch and a line valve (butterfly valve) and swab launcher chamber for the DN800 will be provided after the T-branch. The connection will comprise of a DN600 branch with a gate valve connecting to the existing main. A DN600 gate valve on the upstream end of the connection will ensure that there is no backflow of water towards Gigiri pumping station.

4.8 Connection to Kabete Reservoir

During the implementation of the Third Nairobi Water Supply Project, provision was made in the existing Tank No. 1 at Kabete for any future connection. The provision was through a 1000mm dia Ferrous pipe with a 700mm dia branch which was connected to the Gigiri-Kabete Rising Main. The point of connection was blanked off. In addition a 700mm dia Ferrous angled branch was also provided on the Rising Main for the future expansion of the Main. During the recent expansion of the Gigiri Kabete Transfer System under the Nairobi Water and Sewerage Emergency Physical Investments Project (NWSEPIP) in 2014, the above mentioned 1000mm dia future connection has been used to connect a new Rising Main transmitting water from the existing Gigiri Reservoirs to Kabete.

As a result of this, modification of the existing inlet arrangement at Tank No. 1 will be carried out by extending the existing DN1000 pipe for connection of the proposed DN800 main through a 450 angled branch.

4.9 Project Cost

The construction of the proposed raw water and treated water pipelines is expected to cost approximately KES 3 Billion with estimated 30 man-months for Raw Water Pipeline construction and 42 man-months for Treated Water Pipeline construction.

5 PROJECT ALTERNATIVES

An ESIA should identify and assesses alternatives to the proposed project. Only the best alternative should be selected based on less negative impacts and cost-benefit analysis. An important alternative to be analysed is the "no project" alterative. This is a very important analysis because it helps the proponents measure the impacts from the project against those which would have taken place without the project.

5.1 No Project Alternative

The alternative is not available for the proposed Thika-Kigoro-Kabete Gravity Water Pipelines project. The 'No Action' alternative in respect to the proposed project implies that the status quo is maintained and nothing can be done to transmit the raw and treated water by gravity from Thika dam draw off tunnel to the proposed Kigoro Treatment Plant in Gatanga Sub County, Muranga County and eventually the treated water to Kabete Reservoir tank.

Without the project, the environmental situation will neither improve nor can it necessarily deteriorate. Development of the project on the other hand will ensure adequate water supply to the residents of Nairobi and 13 satellite towns namely Kikuyu, Ruiru-Juja, Kiambu, Karuri, Githunguri, Mavoko Municipality, Ngong Township, Ongata-Rongai, Thika, Gatundu, Limuru, Lari and Tala-Kangundo.

Accepting the no-project option will however mean that the targeted populations will continue to suffer from inadequate and unreliable water supply. This also means that the local communities will potentially miss out on development opportunities that the project could bring including access to water and economic opportunities through project construction and operation including employment and small business opportunities.

From an environmental and socio-economic perspective the 'No Action' alternative is not a suitable alternative for the affected community and Kenya as a whole.

5.2 Site Location Alternative

Initially, the Raw Water Pipeline was to be laid from Thika dam to the proposed Treatment Plant in Ngorongo, located about 44km from existing Thika dam Draw off tower. The treated water will then be transmitted by gravity via a ferrous main of approximately 17.6km to Kabete Reservoir in Westlands Sub-county, Nairobi County. Thus the Treated Water Pipeline could have been laid along the existing Sasumua and Ruiru Pipeline Wayleave.

However due to challenges that could arose during land acquisition leading to delay in the implementation of the project, the location of the pipeline route and the treatment plant had to be shifted. The treatment plant was changed from Ngorongo to Kigoro, a distance of 5.5km from Thika dam to ensure water transmission to the WTW is entirely via gravity. Pumping over the Thika River Valley has been excluded as one of the options since it will be uneconomical (high energy costs). Alternatives of a gravity pipeline against a short tunnel across Thika Valley have been compared. In order to obtain the required hydraulic heads, the pipe would have to include a pressurised pipeline. Both the options were priced on the basis of outline designs and the gravity pipeline option was found to be more economical. Thus the raw water pipeline will have to be laid along Thika River Riparian from Thika dam Draw off tower to Kigoro WTW. Full Convectional

Treated water transmission route will run from Kigoro to Kabete. The pipeline will thus utilize the existing wayleave from Ngethu to Gigiri to Kabete. This will reduce the impact of land acquisition and also challenges that may arise delaying the project. However, land will still have to be acquired in the following categories;

- From Kigoro WTW to Ngethu WTW– 3 metres permanent wayleave and 6m as construction wayleave
- From Ngethu WTW to Gigiri – Existing 18 metres permanent wayleave to be extended to 21 metres. 3m permanent wayleave expected to be acquired.
- From Gigiri to Kabete – The pipeline will be laid along existing road reserves. All affected roads and road reserves will be restored into their original state or even better after the pipeline has been laid.

Although, from the site visit it was noted that land will also have to be acquired from Gigiri to Kabete because of limited space along the road reserve of the project area i.e. along Runda road, UN Avenue and Kibarage way.

The proposed Ngorongo site, as a start point for the Treated Water Gravity Pipeline to Kabete could have been used, but due to the cost implication of the assets within the proposed site as well as the degree of Socio-economic impacts through displacement would have out weighed the positive impact of the project.

5.3 Pipe Size Alternative

The following were the main components considered to determine the adequate and optimised characteristics of the Raw Water and Treated Water Transmission Mains;

- Pipeline Materials
- Diameter of Pipelines
- Pressure Class: Pipeline Thickness and Material Grade
- Internal Lining

The above four components are described below for Raw Water and Treated Water Transmission Mains respectively.

5.3.1 Raw Water Transmission Mains

(a) Steel Pipeline

Two types of steel pipes have been considered during hydraulic analysis are discussed below;

(i) DN 1000 Option

The maximum acceptable velocity for DN 1000 L235 with a thickness of 7.1 is estimated at 2.5m/s. However such velocity operates in an ideal scenario because when the flow within pipeline is increased to 2.0m^3/s the maximum velocity limit will be exceeded.

On the other hand, the head losses can only be realized if the flow through the pipe to the Water Treatment Works is constantly maintained at 2m^3/s in despite the amount of water level in the Dam

In regards to the above parameters the DN 1000 steel pipeline cannot be used in Raw Water Transmission.

(ii) DN1200 Option 1-One steel grade

The maximum acceptable velocity for DN 1200 L235 steel pipeline with a thickness of 8.8mm must always be kept below 2.5m/s while the flow rate to limit head losses in the pipe from Thika Dam to the Treatment Plant must constantly be at 2.0m^3/s despite the water levels in the Dam.

Although this type of pipeline is adapted to static and dynamic configurations of the RWGM, the remaining head is quite low when the flow is 2.0 m^3/s and the water level in the Dam is minimum (2001 + submergence high). This implies that the security margin to remain 2.0m^3/s in all time is low. There are two options to increase the security margin and they include;

- Slightly increase the lower water level limit to supply the WTP with 2.0m^3/s
- . Increase the RWGM diameter.

However the second option cannot be retained only to increase the security margin as it has an important impact on the total cost of the Project.

(iii) DN1200 Option 2-Two Steel Grades

The velocity through DN 1200 L235 with a thickness of 8mm must be maintained below the maximum velocity of 2.5 m/s. Thus the only difference of this pipeline with option 1 is on the pipe thickness as the head losses in both options are acceptable.

(b) Ductile Iron (DI) Pipeline

(i) DN1000 Option

Internal diameter of DI DN 1000 pipeline with cement lining is 1009mm. Therefore, velocity and head losses with the DN 1000 DI pipeline are very narrow with the DN 1000 steel pipeline because of a very narrow internal diameter.

However, the minimum water level in the Dam in order to achieve a flow of flow 1.6m3/s up to the proposed Kigoro WTP is about 2010m amsl. If the water level is below this limit, the flow through the pipeline will decrease even if all valves are completely opened. While the minimum water level in the Dam for a flow of 2.0m^3/s up to the Treatment Works is about 2024m amsl. If the water level is below this limit, the flow through the pipeline will decrease even if all valves are completely opened.

In consequence of both parameters developed above, the DN 1000 DI pipeline cannot be adapted for the RWGM pipeline.

(ii) DN 1200 Option

The internal diameter of the DN 1200 DI pipeline (1214.4mm) is bigger than that of the DN 1200 Steel pipeline. The velocity through the DN 1200 DI pipeline was found out to be lower than 2.5m/s and the water level in the dam being enough to supply water to the Water Treatment throughout.

Thus the DN 1200 DI pipeline K9 adapted to static and dynamic configurations of the RWGM.

Conclusion

The DN 1200 L235 steel grade pipeline with a thickness of 8mm combined at highest pressure part with a DN 1200 L235 with a thickness of 8.8mm is adapted to static and dynamic configurations of the RWGM hence will be used during Raw Water Pipeline construction.

5.3.2 Treated Water Transmission Main

During the TWTM construction pipeline, only steel pipelines were considered and the different pipe hydraulics analysed.

(i) DN 1200 Option

The DN1200 steel pipeline with a thickness of 12.1mm can accept the static pressure along the TWGM pipeline with a combination of both steel Grades: 50 and 60. However, the maximum velocity must be maintained below 5 m/s.

To curb head losses the water must flow through the pipe up to Kabete Reservoir at constant flow of up to 2.0 m^3/s.

The DN 1200 option is also acceptable for a short term horizon and is undersized for 2.0m3/s whatever the lining type.

(ii) DN 1400 Option

The DN1400 steel pipeline with a thickness of 14.1mm can accept the static pressure along the TWGM pipeline with a combination of both steel Grades: 50 and 60 and with a maximum velocity being below 5m/s.

To curb head losses the water must flow through the pipe up to Kabete Reservoir at constant flow of up to 2.0m^3/s.

The DN1400 option is acceptable but a regulation valve must be connected along the transfer to reduce the residual pressure at the Kabete Reservoir discharge.

Conclusion

The DN1200 steel pipeline will be used during the construction TWTM.

5.4 Pipe Material Alternative

The type of pipes considered to be used in Raw and Treated Water pipeline construction include: Grey Cast Iron (CI), Ductile Iron (DI), Galvanized Mild Steel (GMS), Coated Steel, unplasticized Polyvinyl Chlorine (uPVC), High Density Polyethylene (HDPE), Concrete and some existing Asbestos Cement (AC). The choice of pipe to be adopted for any given case will take into consideration the unit cost, durability, resistance to all external and internal forces it is subjected to, ease of transporting and laying, level of leakage and the overall maintenance requirements.

AC. pipes will not be used due to widespread fears of the consequent effects of health of the asbestos fibres. In addition, AC and CI pipes are brittle and are therefore susceptible to damage.

Ferrous pipes (steel or ductile iron) are commonly used in large diameter transmission mains. The ferrous pipes are normally internally lined with cement mortar or epoxy. While steel pipes used are normal construction steel with chemical composition defined by the carbon, manganese, and silica content. These pipes are categorized as either welded steel or seamless steal.

A few situations in which different materials of pipes will be used are given in the Table 5-1 below:

Table 5-1: Selection of Pipe Types

Pipe Material	Properties	Situation to be Used
Ductile Iron	- Good resistance to corrosion - High strength and rigidity - Durable	- In soils and water of slightly aggressive nature - For larger mains with a high static or dynamic pressure
Steel and GMS	- Moderate resistance to corrosion - Shorter lifespan than DI pipes - Other properties as for DI pipes	- For larger diameter pipes steel is an alternative to DI - Can be used in aggressive soils if suitably protected
uPVC and HDPE	- Very good resistance to corrosion - Liable to degradation by UV light - More flexible than other types - Light, easy to handle, lay and joint	- For smaller diameter pipes - Suitable in more aggressive soils and waters - Ideal for service connections

Due to the large diameter of the pipes, steel pipes were recommended to be used during the construction of the raw and treated water pipeline.

5.5 Proposed development alternative

Under the proposed Thika- Kigoro-Kabete water gravity pipeline project alternative, the proponent (AWSB) would be issued with an EIA license upon submission of the full study report of the proposed project.

In issuing the license, NEMA would approve the proponent's proposed project, providing all environmental conditions to be complied with during construction, operation and decommissioning phases.

Under the proposed development alternative, the raw water and treated water gravity pipelines will boost capacity of the Thika Dam- Kigoro- Kabete water supply to Nairobi hence treated water supply increased and distributed to more people.

6 PUBLIC CONSULTATIONS

6.1 General

Public consultation is useful for gathering environmental data, understanding likely impacts, determining community and individual preferences, selecting project alternatives and designing viable and sustainable mitigation and compensation plans.

Public consultation in the ESIA process is undertaken during the project design, implementation and initial operation. The aim is to disseminate information to interested and affected parties (stakeholders), solicit their views and consult on sensitive issues.

Inadequate public consultation can result in significant information gaps, which could mislead environmental planners undertaking an environmental assessment. Lack of attention to communication and consultation processes can generate individual, community, or regional opposition to a project. This can ultimately be a cause of substantial delays, increased costs, and unsatisfactory compromise solutions, which could have been avoided through earlier consultation.

Participation is a process through which different stakeholders influence and share their views regarding development initiatives and the decisions and resources that affect them. Comprehensive planning is required to ensure that local government; NGOs, project staff and affected men and women interact regularly and purposefully during all stages of the Project.

6.1.1 Objective of Public Consultation Program

The overall goal of the consultation process is to disseminate project information and to incorporate the views of the Community in the planning of the project to achieve the overall objective for the economic social being.

The specific aim of the consultation process is to increase the effectiveness and sustainability of income restoration strategies, and improve economic and social being of the community.

An important element in the process of impact assessment is consulting with stakeholders to gather the information needed to complete the assessment.

The main objectives of community consultations are to:

- Provide clear and accurate information about the project to the communities;
- Obtain the main concerns and perceptions of the population and their representatives regarding the project;
- Obtain opinions and suggestions directly from the affected communities on their preferred mitigation measures; and
- Identify local leaders with whom further dialogue can be continued in subsequent stages of the project.

6.2 Stakeholders Identification

The stakeholders are categorised into two groups of primary stakeholders and secondary stakeholders.

Primary stakeholders are the project proponent (AWSB), beneficiaries of a development intervention or those directly affected (positively or negatively) by it. They include local populations (individuals and community-based organizations) in the project/program area, in particular, poor and marginalized groups who have traditionally been excluded from participating in development efforts.

Secondary stakeholders are those who influence a development intervention or are indirectly affected by it. They include the borrowing government, line ministries and project staff, local governments, civil society.

User participation at the planning and design stages, as well as the provision of extension, marketing, and credit services, can minimize negative impacts and maximize positive ones. Consultations with NGOs can be particularly helpful in minimising adverse socio-economic impacts.

The consultation programme was then developed and implemented taking into account the various areas of influence.

6.3 Previous Consultations

6.3.1 Stakeholder Consultations at Scoping Stage

The study team held introductory meetings with key stakeholders at the scoping stage between 14-25 April, 2014. The purpose of the meetings was to introduce the Thika-Kigoro-Kabete Gravity Water Pipelines to the stakeholders and set the ground for the ESIA and RAP studies.

Consultative meetings at Sub- County and local levels included discussions with Sub- County and Regional Officers, Specialists and Key Informants. These consultations were conducted as direct, Personal Interviews with selected informants from both the County representatives of the national government (former administration representatives) including:

- Deputy County Commissioners and Assistant County Commissioners; as well as
- County Government representatives of all Wards covered by the transmission lines.

The Agenda for these consultations was to:

- Present the proposed project to the community representatives;
- Introduce main project objectives and the consultancy objectives to the leaders; and
- To create a stakeholder map for the transmission lines from Thika Dam in Gatanga Sub County to Kabete Treatment Plant in Nairobi City County.

The main issues of concern at this stage were identification of crucial issues for further consultations during the full ESIA study.

6.3.2 Summary of issues raised during the Scoping stage

Table 6-2 below is a summary of the issues raised by the stakeholders during consultations at the Scoping stage of the studies.

Table 6-1: Summary of issues rose during the Scoping Stage

Consultation with	Designation	Outcome	Relevance of the comments to ESIA report
Mr. Githinji	Production Manager - Ngethu Treatment Plant	The following should be considered if the pipelines will pass through Ngethu Treatment Plant: • That the treatment plant has three phases and is having challenges with the filter system and underground drainage system in Phase 3. This has led to water overflowing into the neighbouring farms thus affecting property. They recommended that this section of the land be acquired and the owners compensated. An open channel can also be constructed to divert the water to Nduache River; • Open channel that diverts waste water to Githo River is a hazard and should be fenced off with stone walls or the channel be covered up. Chain link securing this section has been vandalised; • The sewer system is old and should be rehabilitated. It sometimes overflows into peoples farms; • They have stand pipes that give water free of charge to the neighbouring communities. This is part of their corporate social responsibility (CSR).	Relevant to ESIA for the Kigoro Treatment Plant.
Mr. Clement Kioi	Technical Officer-Ngethu Treatment Plant		
Mr. Mwendwa	Technical Manager-Ngethu Treatment Plant		
Mr. J. G. Kamau	Deputy County Commissioner (DCC) – Kangema Sub-County	• Supportive of the project; • Said that compensation of affected land owners should be considered because houses should not be built on top of the tunnel;	A RAP report prepared under ESIA for NCT.
		• Conservation of the area should be considered.	The ESIA have recommended conservation measures along the project area.

Consultation with	Designation	Outcome	Relevance of the comments to ESIA report
Mr. Charles Langat	Assistant County Commissioner (ACC) – Kigumo Sub-County	• Compensation is always an issue in the area	A RAP report prepared under ESIA for NCT 1
		• The project will result in some social impacts such as the influx of people into the area;	The ESMP for NCT 1 has given mitigation measures of anticipated social impacts.
Mr. David Gichoni	Sub-County Water Officer - Kigumo	The Sub-County Water Officer noted the following: • Interference with the existing infrastructure e.g. water pipes , electricity etc; • Problems with relocation of homes and graves. Negotiating land prices for the wayleave normally takes a long time and its expensive; • Abstraction point for the Northern Collector Tunnel should be below the existing intake for Muranga Bulk Water Project; • Irati River is of interest to them since the intake of the proposed project will be upstream of their intake at Kewambeu for Muranga Urban Water Supply Project.	The issues have been addressed in the ESIA for the Northern Collector Tunnel Phase 1.
Mr. Riungu Laikera	Assistant County Commissioner (ACC) – Gatanga Sub-County	• Does not anticipate any resistance so long as compensation is done well; • There have been little CSR activities at the Ndakaini dam. They expect more and bigger CSR activities done by the dam management.	A RAP report has been as part of the ESIA. More CSR projects have been recommended in the NCT i.e. building of a dispensary for the locals.
Ms. Margaret Kamau	Technical Manager – Gatanga Community Water Scheme	• The scheme is registered as a trust and provides water to upper parts of Gatanga; however the supply is lower than the demand. They provide water to villages and small shopping centres; • Consider providing treated water to the Gatanga people because residents of Gatanga are the ones conserving the environment. This will make them have a sense of belonging since the water being provided by the scheme is inadequate and untreated. The water is sometimes rationed up to between 10-14 days. During the rainy season, the water is very dirty. Their immediate need therefore is the treatment of water.	The NCT tunnel project includes a component for benefit sharing with the community within the project area. The component is packaged as community water supply and one of the target beneficiaries are residents of Gatanga.

Consultation with	Designation	Outcome	Relevance of the comments to ESIA report
		• Kiama- Kimakia water project is being proposed to solve the water problems in lower Gatanga area. • Other water service providers in the area include Ragia scheme serving Kirutara location. They draw the water from Ragia River.	
Ms. Faith Badthi	Service Water Officer – Water Resources Management Authority (WRMA)-Muranga Office	• Water as a resource is not adequate and would have preferred construction of another dam instead of a collector tunnel.	The possibility of conducting Maragua dam at the confluence of Gikigie and Maragua was considered in the ESIA NCT 1. However, it was not possible because of the greatest socioeconomic impacts from displacement and resettlement of numerous households, substantive acquisition of land and associated infrastructure in addition to the expensive capital outlay (more than eight times the cost of tunnel construction).
		• Water conservation is very important and this should be considered before tapping any water. Currently, they are trees are being planted at the catchment through the Water Resource Users Associations (WRUAs). They undertake capacity building in order for the WRUAs to take care of the catchment. They have sub- catchment development plans.	AWSB should become a member of WRUAs integrated management plan to help in conservation of catchment areas.
		• Irati River is already tapped. The hydrologist should therefore undertake studies on the rivers to be tapped by the proposed project taking into account the abstractions within the sub-catchment in order to ascertain if the water will be adequate. The hydrologist should be registered with WRMA.	Hydrology study for NCT has been done for the three rivers including River Irati hence the abstraction of water from River Irati will not have detrimental impacts on ongoing activities in the river.
		• Permit will be issued from Muranga Office.	AWSB will apply for a permit for under-river crossings.

Consultation with	Designation	Outcome	Relevance of the comments to ESIA report
		• The proposed project should take care of the soils so that the soils are not washed into the rivers.	The ESMP recommends the Contractor should apply best practise Soil Conservation measures to reduce the impact of soil erosion during excavation.
Hon. Anderson Muchemi Waweru	Member of County Assembly (MCA) – Kangari Ward	• Need to know the amount of water to be drawn from each of the three rivers. They consider water as a mineral in the County as its becoming scarce; • Project may lead to reduced water levels in the rivers. Studies should be done during the dry season.	The issues have been addressed in the ESIA for the Northern Collector Tunnel Phase 1.
Hon. Caroline Wairimu Njoroge	MCA – Kigumo Ward		
Hon. Charles Mwangi Kirigwi	MCA – Kinyona Ward	• Long-term benefits of the project to the communities should be considered since Ndakaini dam has no returns to the surrounding communities.	The NCT tunnel project includes a component for benefit sharing with the community within the project area. The component is packaged as community water supply and one of the target beneficiaries are residents of Gatanga.
Hon. Peter Irungu Kihungi	MCA – Kanyenyeini Ward		
Hon. David Muhoro Njeri	MCA – Kariara Ward	• Shathanda Water Project is downstream of our proposed intake location at Irati and this might be affected by the proposed project; • The communities upstream of these rivers and who are the owners of this water resource do not have tapped water.	The NCT tunnel project includes a component for benefit sharing with the community within the project area. The component is packaged as community water supply and one of the target beneficiaries are residents of Gatanga.
		• Ndakaini dam has changed the micro-climate in the area leading to cold related diseases e.g. Pneumonia and Arthritis. The project should therefore consider CSR activities such as provision of fully equipped medical facilities.	More CSR projects have been recommended in the NCT i.e. building of a dispensary for the locals.
		• Roads within the proposed project area should be improved to bitumen standard.	Affected roads will be reinstated according to the materials used during construction of the road as recommended in the project design.
		• Consider CSR activities such as building of resource centres and classrooms.	Comment has been forwarded to AWSB for consideration.
		• Labour should not be imported during construction phase except for skilled labour.	The ESMP has recommended the contractor to hire locals to provide semi-skilled labour.
		• Undertake conservation activities i.e.	Individuals along the construction wayleave

Consultation with	Designation	Outcome	Relevance of the comments to ESIA report
		afforestation.	are encouraged to reafforest their land after construction works.
		• Limit destructive activities in the Aberdare forest by providing locals with alternative sources of livelihoods which will reduce encroachment of the forest.	Aberdare forest is a protected forest under the National governmrnt therefore AWSB can only participate in conservation activities and not management activities.
Mr. Jackson Mukeku	Assistant County Commissioner (ACC) – Gatundu North Sub-County	• There is a lot of politics in the area; • Extensive consultations should be undertaken; • Most of the owners of the farms work in Nairobi and Thika town. This means that they might not be available for the public meetings on weekdays; • Support from the Member of Parliament (MP) and MCAs is critical.	Consultation was conducted with stakeholder groups as outlined in the public consultation as part of this report.
		• Resettlement issues is also a problem.	A RAP has been prepared as part of this ESIA study.
Mr. Michael Kariuki	Sub-County Water Officer – Gatundu North	• Proposed project should consider provision of water to the people around Ndakaini area; • There is a lot of politics regarding land in Gatundu North; • There is no water in Karuri/ Ngethu/ Kianganga areas.	AWSB have held meetings with the PAPs resisting the project and come to a common agreement in land take issue.
Mr. Wycliffe Cheplangat	Assistant County Commissioner (ACC)–Githunguri Sub-County	• In support of the project; • Hold public meetings along the pipeline; • During meetings, mention the advantages of the project to the local community.	Public meetings has been held in Githunguri and the relevant issues and concerns raised by the people incorporated into the ESIA report accordingly.
Mr. Mugo Gichiri	Assistant County Commissioner (ACC) – Kiambu Sub-County	• Provide water to the local communities.	Concern forwarded to AWSB for consideration. AWSB should pick up the matter with NCWSC.
		• Ensure compensation is done to those who will lose property.	A RAP has been prepared as part of this ESIA study.
		• Undertake CSR initiatives such as building of dispensaries, improvement of roads etc.	Concern has been forwarded to AWSB for consideration.
		• Tenders should be given to local firms where possible; • Construction workforce should be localised.	Tenders will be awarded according to the Kenya's laws and World Bank and AFD guidelines.

Consultation with	Designation	Outcome	Relevance of the comments to ESIA report
		• There might be problems with the three county governments as each may want a share of the water proceeds.	
Mr Ngumo Karuku	Deputy County Commissioner (DCC) – Gatundu South Sub-County	• Extra land acquisition will be problematic and chiefs should be involved in this instance.	Local administration was involved in conducting of public meetings to inform people about the project and expected compensation measures.
Mr. Joseph Kiai Gitau	Sub-County Water Officer – Gatundu South	• The community is more interested in the direct benefits of the project e.g. water for schools etc.	Concern forwarded to AWSB for consideration. AWSB.
Mr. Simon K Ngugi	Gatundu South Water Company	• The projects that have been earmarked by AWSB such as Karumenu dam which feasibility studies have been undertaken and Theta dam should be hastened so that the communities can appreciate and welcome the proposed project.	Concern forwarded to AWSB for consideration. AWSB should pick up the matter with NCWSC and WRMA.
Mr. Stephen Njuguna	Sub-County Irrigation Officer – Gatundu North and South	• The project should consider supporting irrigation projects e.g. construction of water pans.	Water for domestic supply is treated and considering water volumes involved is not feasible for irrigation. In addition AWSB mandate is for water supply for domestic purpose and not irrigation.
Hon. James Mburuti	MCA – Komothai Ward	• They will not allow water to pass through Kiambu County if the water is not going to benefit the county; • They were not given water from Ruiru. They only got it from the Sasumua pipeline; • Most people who work in Nairobi live in Kiambu, this means therefore that Kiambu should be given water due to the high demand; • People who lost their land in 1971 when the first pipeline was being constructed were not compensated. The people of Kiambu should therefore benefit with the proposed project through provision of water; • Provision of water will ensure that the neighbouring communities will own the project and will be responsible for securing it which	AWSB have held meetings with the PAPs to discuss about the allegations of inadequate compensation on acquiring the previous pipeline wayleave. The minutes and agreement made during the meetings are attached in Appendix IV.
Hon. Lawrence Mwaura	MCA – Tinganga Ward		
Hon. James Njenga	MCA – Kiambu Township Ward		

Consultation with	Designation	Outcome	Relevance of the comments to ESIA report
		will reduce cases of vandalism. Provision of water will therefore improve both agribusinesses and security in the area.	
Mr. Peter Mwangi	Chief – Highridge Location	• The proposed project will affect Parklands, Highridge and Kitisuru locations in Westlands Sub-County; • Will provide support during the full studies; • Will link the consultant with the relevant resident associations within their locations.	
Mr. Evans Katonya	Chief – Parklands Location		
Ms Leah Mburu	Assistant Chief – Loresho Sub-location		
Ms Mary Njeri	Assistant Chief – Karura Sub-location		
Hon. Jaffer A. W Kassam	MCA – Parklands/Highridge Ward	• Is in support of the project since it will bring more water to the residents of Nairobi; • Will use the resident associations to invite residents to the public meetings; • Requested for drawings for better understanding of where the water pipeline will traverse.	
		• Indicated that the project will also affect Kangemi and Karura wards and that he will inform the respective MCAs.	The project will not pass through Karura and Kangemi wards.
Mr. Methu Daniel	General Manager – Runda Water Company Ltd	• The project should consider giving the company more water since what they have is not enough; • They informed the consultant that the residents may complain if the proposed project leads to a lot of digging within the estates.	Concern forwarded to AWSB for consideration. AWSB should pick up the matter with NCWSC and WRMA.

6.4 Stakeholder Consultations during ESIA and RAP

6.4.1 Approach to stakeholders and public consultations

(a) Preliminary Activities

The public consultation exercise begun by determining the area needed to be covered during the public consultations meetings.

In general, the following steps were followed in carrying out the entire public consultation process:

- Identification of institutions and individuals interested in the process and compiling a database of the interested and affected parties;
- Administration of questionnaires to different target groups and local community members within the proposed project site; and
- Public / Technical Meetings at various levels and with different target groups.

(b) Meeting with Secondary Stakeholders

Secondary stakeholders were directly interviewed for their comments on the project after which minutes of the discussion were sent to them for review and approval. Other Stakeholders where one on one meeting were not able to be carried out were briefed about the project in writing and questionnaires on the possible impacts that could arise from the project sent to them.

The Agenda for all the consultations was;

- Present the proposed project to the stakeholders;
- Obtain views from the authorities on their concerns on environmental and socio-economic impacts of the proposed project;
- Obtain views from the public and incorporate them into the mitigation measures as necessary; and
- Discuss the role of each stakeholder on the proposed project.

Matters discussed during the meetings have been highlighted and a copy of the minutes attached on Appendix IV.

(c) Public Consultation meetings

Public consultation meetings were conducted to inform the affected local community about the project and collate their views. Minutes of the meetings were recorded and sent to the local administration representative present during the meeting for review and approval.

The Agenda for the consultations was;

- Presenting the proposed project to the stakeholders and
- Obtaining views from the public through public consultation of their concerns environmentally and socially in regards to the proposed project.

A total of nineteen (19) public meetings were held along the entire project area in several sub-counties with seven (7) meetings in Gatanga sub-county Muranga County, five (5) meetings in Gatundu North, two (2) meetings in Gatundu South, one (1) meeting in Githunguri, two (2) meetings in Kiambu and two (2) meetings in Westlands sub-county. The location and dates of meetings in each sub-county are presented in table 6-3 below.

Table 6-2: List of Public Meetings and the Venues

County	Sub County	Location	Venue	Date
Muranga	Gatanga	Ndakaini	NCWSC offices	2/5/2015
		Ndakaini	NCWSC offices	13/6/2015
		Kigoro	Kanunga Chiefs office	5/5/2015
		Ndunyu Chege	Kagongo Tea Buying Centre	6/5/2015
		Ndunyu Chege	Ndunyu Chege Tea Buying Centre	14/5/2015
		Kiriai- Ini	Chief's Office	4/5/2015
		Gatanga	Tea Buying Centre	10/5/2015
Kiambu	Gatundu North	Ngethu	Ngethu social hall	19/5/2015
		Ngethu	Chiefs office (social hall)	29/5/2015
		Ngorongo	Ngorongo Social hall at Assistant county commissioners offices	15/5/2015
		Kamwangi	Kamwangi DC Grounds	22/5/2015
		Kamwangi	DCC's office	12/5/2015
	Gatundu South	Ng'enda	Chiefs Camp	14/5/2015
		Kiamwangi	Kiamwangi Social Hall	15/5/2015
	Githunguri	Komothai	Chief's Camp	13/5/2015
	Kiambu	Kamiti	Chief's office	5/6/2015
		Kirigithi	Kirigithi stadium	6/5/2015
Nairobi	Westlands	Githongoro	Runda Baptist Church	5/5/2015
		Kibarage	Kibagare Social Hall	9/6/2015

The primary stakeholders such as Land Owners, property owners, residents and business owners within the project site were informed and sensitized about the proposed project and their views and comments noted.

6.4.2 Stakeholders groups consulted

The following stakeholder groups were consulted during the study:

Murang'a County

The primary and secondary stakeholders consulted in Muranga County are listed in table 6-4 below

Table 6-3: Stakeholder groups consulted.

Stakeholders		Consultation tools
Primary stakeholders	**Residents of:** • Ndakaini location • Kigoro location • Ndunyu Chege location • Kiria Ini location • Gatanga location	Seven (7) Public meetings were conducted on from Ndakaini to Gatanga location; the meetings were spaced 3km apart to ensure adequate sensitization of the people living within the project zone of influence. Each location had at least one public meeting with the exception of: • Ndakaini Location • Ndunyu Chege Location Which had longer stretches (of more than 5Km) of the proposed pipelines passing through them. Informal interviews were held with area residents especially the village elders who have knowledge of the area from day of the past to date. Questionnaires were used to collect household data to describe the household characteristics of the people living in the project area.
	Institutions These include those institutions that run their daily operations or manage infrastructure in proximity to the project site • Water Resource Management Authority; • Water Resource Users Association (WRUA); • Gatanga water and Sewerage Company; and • Muranga Water and Sanitation Company.	• One on one meetings and minutes of the meetings taken.
Secondary stakeholders	**Government Agencies** The following stakeholders identified and consulted on the proposed project were: • National Administration;(Deputy County Commissioner Muranga County, Area chief and assistant	These stakeholders were consulted through: • One on one meetings, and • Round table meetings.

Stakeholders		Consultation tools
	chiefs of each location); • County director of Public health; • Water resource management authority; • County Registrar; • Constituency roads officer KeRRA • County Director of Physical planning; • Deputy county Surveyor; • County Director Agricultural officer; • County Director of Environment; • County Water Director; • County Fisheries Officer;and • County Forest Officer.	

Photo showing some of the meetings held at the different levels of consultations during the ESIA and RAP studies in Gatanga Sub-County, Muranga County are attached in Appendix I.

Kiambu County

A total of ten (10) Public meeting were held along the project area in Kiambu County with five (5) meetings held in Gatundu North, two (2) meetings in Gatundu South, one (1) meeting in Githunguri and two (2) meetings in Kiambu sub counties. The primary stakeholders within the project area were sensitized about the proposed pipeline project and there view and comments noted. However meetings were not able to be convened in some parts of Kiambu County due to large scale ownership of lands having coffee plantations. These PAPs had to be notified about the project through letters. Copies of letters sent to the land owners are attached in the appendix IV of this report.

The following Key informants were consulted;

i. County Government Stakeholders

- Planning and Development;
- Education, Youth, Culture and Social Services;
- Agriculture, livestock and fisheries;
- Water, Environment, and Natural Resources;
- Health Services.

ii. National Government Stakeholders

- County Director of Education;
- Kiambu County Commissioner;
- Senior ACC 1 representing Deputy County Commissioners for Gatundu North;
- Deputy County Commissioners for Githunguri ;
- Deputy County Commissioners for Gatundu South.

Nairobi County

A total of two (2) Public meeting were convened on 6th of May 2015 at Githongoro, Karura Location Nairobi County and 9 June 2015 at Kibagare, Kitusuru Location, Nairobi County where the primary stakeholders such as Land Owners, property owners, residents and business owners

within the project site were informed and sensitized about the proposed project and their views and comments noted.

See photographic plates and list of participants and minutes of the meetings in the Appendix section):

The following Key informants were consulted;

- Sub County Social Development and Gender Officer
- Sub County Administrator
- Deputy County Commissioner
- Sub County Education Officer
- Sub County Public Health Officer
- Kenya National Highway Authority
- Kenya Urban Roads Authority
- Kenya Rural Roads Authority
- Ministry of Environment and Mineral Resources
- Ministry of Environment, Water and Natural Resources
- Director of Water Services, Ministry of Water and Irrigation
- Health Services, Nairobi City County
- Land, Housing and Physical Planning, Nairobi City County
- Nairobi Water and Sewerage Company

Consultations were done at specific offices except where the informants were not available. In such cases Informants were briefed about the project in writing and questions on the possible impacts that could arise from the project, according to NEMA regulations, these forms have a validity period of 10 days from the date of issue after which it was assumed that the stakeholder had no concerns on the project.

6.5 Issues Arising from Stakeholders and Public Consultations

Matters discussed during the institutional meetings have been highlighted in this section and a copy of the signed minutes presented in appendix IV.

6.5.1 Issues and Concerns arising from key institutional consultation in Muranga, Klambu and Nairobi Counties

(a) Water pollution and quality management

WRMA officers in Muranga, Kiambu and Nairobi sub-region officers noted that there will be interference with the quality of water during construction. This will arise from excavation process, movement of excavated materials and also accidents from oil spills or leakages. They suggested that the vehicles should be regularly serviced and all excavated materials should be stored away from the riparian.

The County Public Health Officer (CPHO), Muranga indicated that the excavated soil when left around the riparian land will likely pollute the water sources when the loose soil is swept into the river. The construction activity should therefore be timed to coincide with the dry months to avoid siltation of the rivers through surface run-off of eroded/excavated soils.

(b) Vegetation clearance and Natural resources

Vegetation clearance is unavoidable along the project area. However, revegetation of the cleared area should be done after construction as recommended by the WRMA officers and Forest officers in all the three counties.

The CAO and the County Irrigation Officer (CIO) Muranga County, advised minimal destruction of the trees. This is because some of the trees have taken many years to mature, some are for economic purpose, some provide feeder to livestock.

The County Water Officer Muranga (CWO) stated that the proposed pipeline should not destroy eye of springs in the area and if inevitable, then communal water points should be constructed.

(c) Impact on Fisheries activities

County Fisheries Officer (CFO) in Muranga and Kiambu and District Fisheries Officer Westlands Sub-County stated that there are no major fisheries activities along the rivers. However some farmers have fish ponds located near the rivers and some have created small canal to direct water to their ponds. Thus any affected farmers should be notified in advance to allow them harvest mature fish.

The officers also mention tilapia as the main type of fish found in rivers and ponds in the three counties and a good source of source of proteins among the local people in the area. CFO Muranga pointed out the possibility of existence of trout fish in Thika and Chania River since the two rivers have been gazetted as Trout Rivers in the Fisheries Act.

(d) Interference with WRMA RGS

Surface Water Officer (SWO) WRMA in Muranga, Kiambu and Nairobi sub-regions raised concerns on the possibility of interfering with the river monitoring gauge station situated along the rivers. Thus in case their RGSs are found along the project area WRMA should be notified for relocation or if already interfered with then replacement should be done. The cost for relocation or replacement of the RGSs will be borne by the project. They also indicated the RGS can only be handled by WRMA technical staff.

(e) River crossings

Since the pipeline is expected to cross several rivers, WRMA officers in Muranga, Kiambu and Nairobi indicated that AWSB will have to apply for permits to allow the pipeline to be laid under the river. The permits should be applied at the sub-region offices. They also said that the public should be notified in advance on the dates of river crossings and the riparian area should be revegetated immediately after construction.

(f) Compensation

The County Agriculture Officer (CAO) Muranga stated that the county is currently developing a comprehensive price list for all the crops grown in the area that will be presented to the county assembly for approval, the price list should form the basis of al compensation rates for the proposed project. The income from crops should be compensated for the number of years it takes the new crop to mature and start producing yields.

In realization of this, the methodology for valuation for the RAP for the project is based on full replacement cost. It is therefore expected to be in compliance with the proposed price list.

(g) Employment

The Assistant County Commissioners (ACC) said that it will be beneficial to the residents of the project area to get employment from the project; this will also ensure that the project runs smoothly without any protests.

Ministry of Labour and Social Security, Nairobi County was in support of the project since it will provide employment for skilled and semi-skilled people hence raising the living standards of the people who majorly depend on low wages from informal sector. He therefore emphasised that the contractor adhere to the OSHA requirement during construction so as to boost Government social protection.

The employment criteria should also be in line with the government laws i.e. Labour laws and observed the third rule gender role in employment.

(h) Location of contractors site

The County public health officer stated that the contractor's site to be established in a location will not contaminate water sources and cause noise in human settlements. This will ensure that the impacts are minimised.

The ACC said that since the project covers 3 counties, it's important that the contractor's camp be located in a central place to ensure ease of reach in case of complaints and equal opportunities for all residents of the 3 counties.

(i) Repair of damaged roads

The Constituency Roads Officers KeRRA stated that the roads that will be damaged by the pipeline should be repaired to original standards, a 30% cost of the repair cost in form of a bankers cheque is left at the KeRRA offices as guarantee that the roads will be repaired by the applicant.

The CAO stated that the roads are crucial for transportation of tea to tea factories and thus all the all the roads that have been damaged by the project should be repaired in the shortest time possible.

Operations Manager, Runda Water indicated that during the previous construction the contractor left debris along the roads and blocked drainage as well as destroying the roads. The manager recommended that during the construction phase of the current pipeline the proponent should ensure the contractor replaces any damaged property, roads and collect all the waste material.

(j) Change of lifestyle

There will be a tendency of the Project Affected Persons living beyond their means after they have been compensated, it is therefore important that the PAPs be counselled before given the money and if possible, the money be issued to them in stages.

(k) Consultation

The County Lands Registrar (CLR) Muranga County, recommended that the project team should consult widely especially with the county governments to avoid the project being opposed at the last minute.

Consultations and sensitization among the affected be people has been conducted in regards to expected impacts arising from the project and land-take for pipeline wayleave.

(l) Living standards of people

The communities are very positive about the proposed project as it will come with numerous benefits. One of the positive aspects is that it will uplift the living standard of the people through providing markets for locally available material such as gravel and quarry stones. Food vending business will also earn income for the locals especially women who will sell food to the labourers.

(m) Environmental protection

The DAO, DIO and the CPHO were concerned about soil erosion and massive soil movement that they said is a big problem during rainy season. The project design team should devise a way of mitigating this challenge i.e. building check dams long the course of the river, terracing and erecting gabions on the lands prone to soil erosion and soil movement.

The contractor should be advised on the possible ways to reduce dust during construction.

(n) Rain water harvesting

The County Director for Agriculture and the CWO stated that the project would be beneficial for the county as water is life and that a lot of water is wasted when it rains leading to heavy soil erosion that increases turbidity of the rivers, this water could be conserved and used especially when there is less rain.

(o) Land use and tenure

According to the County Surveyor, there is no idle public land in Muranga due to population pressure, developments have moved out to freehold land where land has been subdivided into very small pieces. Majority of the lands have titles which have been subdivided and not updated in the cadastral Maps therefore, one land with a title could be have more than one owner.

Kiambu County CEC for Land and Planning indicated that land uses in Kiambu County varies from tea and coffee farming to subsistence and real estate developments. Most of the land in the area is privately owned.

(p) Illegal connections and vandalism

The technical manager Muranga Water stated that there are cases of illegal water connections and feels that the pipelines could also face a similar problem.

Kiambu County Officer for Gender and Social services indicated that water connection to the community is the main priority. If the community does not benefit from the project, they might interfere with the pipeline by vandalizing as they try to connect the water illegally.

(q) Encroachments

The Chief Ngethu indicated that the wayleave in his location has not been encroached as compared to the other areas in the county. Some areas people have encroached because they have issues with the agreements that were made earlier on in 1971.

(r) Preservation of water catchment areas

The CIO and County Environmental Officer (CEO) stated that the rivers have been reducing in size due to deforestation in the Aberdare's, this has led to reduced rainfall and increased surface runoff in Muranga county. The project should therefore aid in catchment preservation activities such as tree planting to restore the Aberdare forest.

(s) Cooperate Social responsibility

The technical Manager Muranga Water stated that it would be a good gesture to the local community if they were to be provided with water from the project, schools and dispensary built since they are the ones suffering most of the negative impacts.

(t) Increase in domestic waste

WRMA officer Kiambu and Nairobi sub-regions indicated that increase in water supply will eventually lead to increase in domestic waste effluent. With the congested sewage system in Nairobi region the waste mainly ends up in Nairobi Rivers and eventually in Athi River.

They recommended that AWSB should expand the sewerage network in Nairobi and also increase the capacity of the treatment plant in Ruai so as to cater for the increased domestic waste generation.

(u) Gender and Social issues

Kiambu county CEC for Gender and Social services said that the main social problem being experienced in the area are unemployment, insecurities and lack of access to piped water especially to the youths in the area.

She also added that women and youth are considered as the most vulnerable groups in Kiambu County.

(v) Water sources and water issues

From the figure given by the Kiambu County Chief officer for Water, Environment and Natural resources water supply from all the water sources in Kiambu County versus the Water demand, the current water supply is higher than the demand. Water is available though the percentage of piped water to the households varies from one Sub County to another. Rain water harvesting is done ion a low scale. Athi Water through the county is promoting rain water harvesting in schools through donations of storage tanks.

It was added that Athi Water through World Bank is doing a drought mitigation programme in all the Sub Counties. There are various community managed water supply projects. These projects cannot sustain themselves and have been requesting for help from the count from time to time. In order to provide a long term solution, the county plans to have a maximum of two water companies to manage the supply of water.

Operation Manager, Runda Water stated that Runda Water was started 1973,as a result of Nairobi water failing to supply them with adequate water their main source of water is River Ruaka. He indicated that only 300m3/day of water is supplied to Runda people

from Kabete Reservoir. This water only serves New Runda, Old Runda, Mimosa and Evergreen areas. However, since the water is not adequate they hope to benefit from the new pipeline because agreement had been made between Runda Water and Nairobi water for them to be given additional supply but that has not happened yet.

(w) Health facilities and disease prevalence

Sub-County Medical Officer (SCMO) Westlands mentioned that there seven (7) public hospitals within Westlands Sub-County situated in Karura, Kabete, Kangemi, Westlands, Mji wa Huruma, and Kari. All them are level 3 hospitals (health centres) which provide primary health care services. She started uptake of medical insurance is very low with only 10% of the total population who can afford.

The SCMO also pointed out lifestyle diseases being common problem in the elite living in Westlands Sub-County.

(x) Excavated soils

Sub-County Forest Officer, Westlands suggested that excavated soils should be given to nurseries farmers and landscaping firms for free instead of it being left lying on the ground. This will improve the landscape view of the area.

6.6 Issues Arising from Public Meetings

The following were the issues address from the public meetings held in respective Counties along the project area:

6.6.1 Issues and Concerns from the public consultation meetings in Muranga

Issues raised from the public meetings are presented in Table 6-5. Minutes of the meetings held, attendance list and copies of questionnaires are appended to this report.

Table 6-4: Feedback from the public meetings in Muranga

Issue	Comments	Response
Water Supply	• We do not have piped water in most parts of Muranga County will this project provide us with water? • We give our water to Nairobi county, what are we getting in return?	• Water service provision in Nairobi is under AWSB that is also responsible for Muranga and Kiambu and not Nairobi County Government. • Gatanga water under Athi Water has an ongoing project to increase supply of water to the residents of the project area.
Compensation and relocation issues emotive	• The project should offer good rates for crop values for cooperation from farmers otherwise it will cause delays in project start date. • The people who do not wish to be relocated should be given alternative land elsewhere.	• The crops will be valued by a licensed land and asset valuer who`s rates are either equal or slightly higher than government valuer`s rates.
Community goodwill	• The team should organize a meeting for land and asset owners only to ensure all the issues raised by project affected persons are covered. • The community is happy with the project and will give maximum help where they can;	• All the land owners have been invited to public meetings to capture all their concerns and sensitize them on the RAP.
Land Ownership	• There is not enough land in Muranga and Kiambu, where will the residents get land after theirs has been taken especially for those whose lands will be injuriously affected. • The project took 6m of our land of which we were never compensated for. The PAPs want to be compensated first for the 6m before we allow the surveyor to pass through our farms.	• The Project Affected Persons will be compensated for the land that will be taken up by the project. • AWSB will be advised by the RAP that for the lands that are injuriously affected such that the remaining land has lost economic value, the whole land be compensated.
Effects to businesses	• The project will create more business opportunities in the area. • Business along the proposed	• Involvement of all stakeholders is important for the success of this project.

Issue	Comments	Response
	pipeline will be interrupted during construction which will hamper revenue collection for the County.	
Employment and Livelihood	• Tea farming is the main source of livelihood in the area acquiring land for construction of the pipeline will negatively affect people's livelihoods. • The project should employ locals to ensure that the project benefits the area residents; • The youth in the project area lack employment yet they have university degrees; • Will employees be sourced from outside the catchment area or they will be sourced from the locality. • Working with heavy machinery is risky, will employees be insured incase of injuries.	• The study team responded by informing that insurance cover for all workers was provided for under the occupational health and safety act and thus all he workers were entitled to one. The terms and conditions of work however were dependent on the contract that the workers would sign with the contractors. • The unskilled laborers will be sourced from the project area, skilled laborers will be employed based on the contractor's preference i.e. experience. • The tea farmers shall be compensated as per what they have lost and the incomes expected to be lost for the period the project is ongoing.
Information flow and propaganda	• Flow of information is very fast in this area and the study team should guard against this by clarifying claims before they become propaganda. • Most project fail due to poor information flow.	• Public meetings have been held after every 3 km to ensure the people living in the project area are well informed about the project.
Safety	• The trenches that will be dug will be very deep and thus the contractor should ensure that the trenches are not left open overnight; • Steep ended benches created by the contractor should bé reinstated to earlier states or better to avoid landslides; • The heavy vehicles might cause accidents by hitting animals or pedestrians and thus the contractor should be ready to pay for any damages should this occur.	• The environmental impacts that might occur from the project have been mitigated against in the ESIA report, the ESMP in the report shall provide monitoring parameters for the supervising agency to ensure that the contractor adopts the best management practices; • Adequate measures will be made to ensure safety of the community and road users.
Social decline	• Alcoholism and prostitution among the youth will be a challenge in the area as more youth are employed and others compensated for loss of property and assets. This will lead to destruction of the social structure through disruption of families in the area.	• The RAP will propose a RAP implementation team that will have a sociologist to help the project affected persons manage their compensation money for the betterment of their lives;

Issue	Comments	Response
Damages to crops	• The excavated soil will destroy the soil profile of the land and thus affecting the crop yields.	• The excavated soil will be used in backfilling the trenches dug and that which remains on the surface will be levelised on the surface.
Flooding due to water from washout valves	• The washout valves releases a lot of water that destroys our crops and creates gulleys on our land, how will this project ensure that our lands and crops are not affected.	• The Washout valves will be situated along natural water courses to ensure the water flows into the river and not into farms.
Water supply	• We want the project to supply water to us before it goes to Nairobi because we do not have water.	• Gatanga water has been facilitated with finances to expand the water supply to the people living in the project area.
Road destruction due to heavy equipment	• The community raised issues on the impact of heavy trucks and equipments being carried on the existing road network within the project area during construction. They noted that the roads are very important to the community as they use them to transport their tea.	• The contractor will ensure the roads are maintained in proper condition and alternative traffic arrangements are made when necessary.
Soil conservation	• The project area has deep soil that easily collapses when not held together by tree roots, of gabions, the construction activities may weaken the soil leading to massive soil movements, does the project have any measure it has put in place to ensure soil conservation.	• Gabions have been proposed in the design documents to help reinforce the soil among other measures such as planting trees and terracing to conserve the soil.

6.6.2 Issues and Concerns from the public meetings in Kiambu County

The issues and concerns raised by the public during the meetings in Kiambu are found in table 6-6 below and the minutes and attendance of the meetings are attached in Appendix IV of this report

Table 6-5: Feedback from the public meetings in Kiambu

Issue	Comments/issues raised by the community	Response	Recommendation
Wayleave acquisition	• The Land that is going to remain after wayleave acquisition will not be economically viable therefore the land owners requested AWSB to buy the whole land inclusive of the area under easement; • The PAPs whose entire land and or almost 90% of land being acquired said that they should be compensated with land elsewhere; • Section of land that will be acquired may interfere with graves and other physical resources and they will need compensations for them. • The remaining parcels of land within the area are too fragmented and therefore the wayleave acquisition will affect them further. • That land under which the pipelines pass is not economically viable to the project affected persons as they are restricted on how to use it. Constriction or tree planting is not allowed. Therefore most of the respondents were requesting for permanent land acquisition of the wayleave. • Some respondents inquired what happens if one doesn't want to sell his land. • Some respondents wanted to know if AWSB will get titles for the 3m wayleave and if that is the case, they wanted to know what happens to the rest of the land left. Will it be fenced off? Will access be restricted? • The previous acquisition was by compulsory acquisition which was turned into forceful	• Compensation will be done for the newly acquired land • Based to the issues arising on previous wayleave acquisition additional meetings were arranged between Athi Water Service Board and the Project Affected People to discuss on the issues; • To solve the existing wayleave issues, AWSB said they will consult former Nairobi City County (currently, Nairobi County Government) and get the details of agreement previously made before committing on the way forward with the PAPs. Nairobi City Council was the ones who conducted acquisition of the previous wayleave and the documents are not yet handed over to AWSB. • Enumeration and valuation will be done to establish the extent of effect on each PAPs property and determine the kind of compensation required. Whereby the remaining piece of land is too small for economic gain the RAP will advice Athi water to compensate for the whole land at full cost. • Whereby one does not want to sell his land, AWSB will negotiate with the Project Affected Persons where necessary.	Compensation for the 3m permanent wayleave and 6m temporary wayleave will strictly follow the requirements of WB OP 4.12 on resettlement and all the categories of PAPS identified will be compensated.

Issue	Comments/issues raised by the community	Response	Recommendation
	eviction. What makes them believe they will be paid for this new 3m wayleave required? • Compensation for previous pipelines was for an easement of 12m, not 18m as claimed by AWSB. The project affected persons will not allow a further 3m to be acquired when there is no agreement with community on the earlier claimed 6m. • Permanently acquire the working space as well as well or use the existing easement since the land will become useless afterwards.	• Compensation for the new acquisition will be for the affected land and assets at full market value.	
Project acceptance	• Based on the issues above most of the PAPS in Gatundu North and South section said that they will not accept the project until AWSB addresses the issues they have raised and gives them assurances that they will be compensated. • The Project Affected Persons in Githunguri area were generally receptive to the project on condition that previous compensation issues are resolved and that they get benefits in terms of employment and access to piped water.	• The problem was forwarded to AWSB who responded by organizing for additional meetings with the grieved PAPs in Gatundu North and Gatundu South to discuss further on the issue of wayleave acquisition and come up with a way forward with the PAPs.	
Employment opportunities	• The local community would like to be given job opportunities in the construction site according to their skills.	• The Contractor will be advised to give priority to the locals where possible during staff recruitment. • Skilled labour will be sourced locally and if none meet the set criteria and standards, the labour force will have to be sourced regionally.	The Employment must also follow the government's one third gender rule.
Social Decline	• During construction the workers contribute to social decline in the community by siring children irresponsibly since they have money. Who should the complaints be directed to during construction?	• The complaints should be directed to the contractor and AWSB.	The contractor will be required to prepare code of conduct for staff and attach it to the terms of employment. The Community should also be sensitized on how to engage with the Contractor with regard to sexual health

Issue	Comments/issues raised by the community	Response	Recommendation
			issues.
Compensation for crops	• There are crops that take up to six years to mature when planted for example macadamia and avocado trees. Compensation for these crops should consider the duration of the project and the losses incurred between this period and the time it takes for the crops to mature.	• Compensation will be done before construction. Valuation will also be done by a Registered Land Valuer.	Ensure that valuation for compensation is done at full replacement cost. This will ideally cover economic losses in the interim period before livelihood restoration.
Damage by the contractor beyond the acquired wayleave	• During phase 3 of the previous pipelines construction, the contractor was to work on the existing wayleave only but ended up causing destruction beyond the agreed space but the community was never compensated. • What happens to the damages done beyond the 9 meters? When the air valves are opened during flashing (done twice a week for at least two hours), the water which flows with high pressure destroys land and assets where it is not channelled into rivers. There were complaints of destruction on a house, school field, roads and crops. • What will happen if our houses which are not the acquired 9 m but close by develop cracks due to the heavy machinery? • Maintenance of the land occupied by the pipelines has been neglected and erosion has extended beyond the wayleave causing harm to the adjacent land. • In Githuya sub-location, Gatundu south, one PAP expressed that he was afraid to begin construction of his house as he did not want to be impacted by soil erosion which would eventually extend to his land. If the pipes were to be constructed closer to his existing house, the Impacts of erosion would cause his house to collapse.	• The Contractor will be expected to work within the project foot print. Any damage to private property will be illegal and the contractor will ordered to pay for damages; • The Community will need to report to the project Resident Engineer and AWSB any destruction outside the acquired land; • The contractor will be required to use appropriate machinery and in the event that cracks occur they will be required to compensate the affected.	The contractor will be required to compensate for any property beyond the project area of 9 m destroyed during construction. If there is proof that the destruction was as a result of the project activities. The contractor will be required to use appropriate machinery and in the event that cracks occur they will be required to compensate the affected. Gabions have been proposed in the design documents to help reinforce the soil among other measures such as planting trees and terracing to conserve the soil.

Issue	Comments/issues raised by the community	Response	Recommendation
Water supply issues	• The people living along the current existing pipes have no piped water yet the pipes passes through their land. To access water some fetch from the river and other have sunk boreholes. They do not see the benefits of having the pipes on their land. • The people living along the current existing pipes had earlier been promised water but have not received anything. The water connections they previously had were disconnected though they were paying for them. • There seems to be discrimination in the access to water by the project affected persons as people living in Githunguri have water connections while those living in Gatundu do not have. • The project affected people should be given water from the breathers for free.	• The Consultant forwarded the request to AWSB.	AWSB should look at the grievances raised by these respondents and thereafter find amicable solution so that the Kiambu PAPs do not feel cheated with the project.
Safety issues	• Manhole covers made of metal have been stolen leaving children exposed to the danger of falling. Previous complaints have not been addressed. • Close proximity to the pipes means that any damage to the pipes puts them at risk since the water is released with high pressure and may cause fatalities. • In a past incident where a pipe burst, soil was washed away creating a deep gulley and rendering the land useless. • Some sections of the existing pipes are exposed due to erosion. The community residents fear that incase it bursts, there may be massive destruction as well as fatalities.	• The environmental team has made these observations and will recommend appropriate actions to be taken by the contractor to ensure that these safety hazards are adequately mitigated against. • The contractor will ensure that there is safety at the project site at all times. This will include barricading off the open trenches to avoid accidental falls.	Adequate mitigation measures have been provided in the ESIA Report which the Contractor will need to comply with.

6.6.3 Issues and Concerns from the public consultation meetings in Nairobi County

The following were the issues and concerns raised during the public meetings in Nairobi County

Table 6-6: Feedback from the public consultations meetings in Nairobi

Issue	Comments/issues raised	Response	Recommendation
Grievarances from people who were not compensated during the previous pipeline wayleave acquisition.	Majority of the people within the pipeline route raised complaints that they were not paid their compensations from previous damages that were caused when the Ngethu-Gigiri pipeline was laid in 2012. They were forced to bear cost of repair for their damaged land and properties As a result they had no faith in how that implementation of compensation from this current pipe would be done and hence they are not receptive to the project	AWSB was informed about the public grievances who inturn organized for additional meetings with the people to discuss and agree on the issues.	In order for the current pipeline to be installed smoothly AWSB will have to look into the unresolved social issues from the previous installation, to ensure that the construction of the current pipeline is not interfered with once commenced.
Employment and labour during construction	Stakeholders living in low income settlements inquired if they could be offered job opportunities during construction phase, as this will minimize theft, alcoholism and vandalism from their counterparts who are unemployed and struggling to make a living In addition the stakeholders mentioned that there be gender representation during such employment as women to could do the jobs	The consultant representative responded that they would recommend to the client that the contractor to provide employment to locals and consider gender representation.	The implementing agency during construction should consider employing the locals especially in unskilled labor category as this will foster a good relationship between the contractors camp and the residents along the pipeline especially in low income settlements The contractor should be advised to give equal considerations when it comes to employment of skilled and unskilled labourers to both men and women. This should be in consideration to the weight of the task to handle as men will tend to be more effective in handling tasks that require a lot of energy input.
Access culverts	The stakeholders who were going to be impacted during construction in areas where the pipeline will cut across their residences sort clarification on whether access culverts would be provided	The consultant will recommend that access culvert be provided in areas where access to residences or public amenities and resources will be affected	The contractor should ensure where access is blocked there is provision of temporary access.
Water Supply	Stakeholders inquired if they will benefit from the pipeline by getting water served to them	Stakeholders were informed that the pipeline was intended to start distribution once it reached Kabete	If the design allows for distribution channeling along the pipeline, ASWB should liaise with Nairobi water and sewerage company and

Issue	Comments/issues raised	Response	Recommendation
		reservoirs, however the proponent would be advised to look into the options of serving people along the line	distribute clean water to the residents along the pipeline route, especially those living in low income settlements who have no access to clean and safe water In some areas where there are water supply system, it is still not adequate therefore making water supply demand along the pipeline route high
Sewer lines	In some areas along the pipeline route the sewer line is either non-existent or not defined can the project address such issues	The consultant will recommend to the client to address these issues as they are also the proponents in sewer lines and their implementation.	There is need for piped sewer collection system as well as decentralized or septic tanks collection systems, which will impact the project a long term basis.
Storm water drains and Drainage system	A stakeholder wanted to know if the project can benefit them by making trans drainage, as they recalled that the previous drainage works had left them in a poor drainage state The state of storm water drains is wanting and most of them have been blocked by solid waste especially in the low income areas where the pipeline is passing, the public inquired if Athi water was going to look into that	Storm water drains and solid waste management goes hand in hand therefore improvement in both will go along way to solve drainage issues both short term and long term	The storm water drains and drainage system in general should be adequate in terms of capacity to solve the current issues and future issues that will arise as a result of the project It is anticipated that with increased water supply there will also be an increase in waste water and therefore adequate systems should be put in place to mitigate the impact.
Project wayleave	There was concerns from the people living along the pipeline route that the current existing wayleave had not officially been acquired by AWSB yet they had been informed that they could not build or use their land where the pipelines were passing, they sort to know if Athi water would buy the wayleave permanently as it is not of benefit to them economically.	The consultant assured the meeting that they will countercheck with AWSB on the wayleave issues who indicated that the previous wayleave was an easement made between the PAPs and Nairobi City Council. AWSB organized for additional meetings with the grieved PAPs to come to a common ground regarding the issues arising from the previous wayleave acquitted by NCC	AWSB should resolve the issues arising from the previous wayleave acquisition to ensure smooth running of the construction works.
Interruption of services during construction	The meetings inquired about the project start date and the duration of the construction period as they were afraid in some areas in would interrupt with their current	The contractor will be advised to minimise disruption of existing public utilities such as water supply and roads	We recommend that the Contractor to work with the people on the ground to minimize disruption of normal services. In some

Issue	Comments/issues raised	Response	Recommendation
	operations and services	and in the event that this is inevitable they should repair immediately	areas such as the UN avenue junction and estates along the road.
Resettlement	Kibagare slum dwellers voiced their fear about being resettled elsewhere	In the event that people would have to be resettled elsewhere there would be further discussions during the RAP disclosure on how it can be achieved with minimal impact on the livelihoods of the PAPs	In the event that some people have to be permanently displaced, land should be sourced elsewhere for resettlement
Compensation	The public sort clarification on who was eligible for compensation in the event of displacement	The people eligible for compensation are those who have formal legal rights to land or other assets recognized under the laws of Kenya, those who may not have formal legal rights to land or other assets at the time of census but can prove that they have a claim such as land or assets that would be recognized under the customary laws of the country.	Eligibility criteria used in the RAP included those with no titles. This group is to receive assistance to relocate in accordance with the World Bank Operation Policy OP 4.12
Burst Pipes and leakages	In the event of burst pipes or leakages from the existing and the proposed pipeline what was going to be done The public were afraid that the pressures with which the water is transmitted via the pipes was very high and such burst or leakages could have adverse negative effect on their lives	The consultant will recommend for an operation and maintenance team on the ground who will be patrolling the pipelines from time to time to monitor and leakages	During the operation and maintenance phase, there will be need to employ staff to monitor, operate and repair the pipes whenever there is occurrence of burst pipes and leakages.
Public Health	Dust and noise pollution during construction will impact the health of the residents	The response from the consultant's side was that during the construction the site will be watered to keep dust down.	During the construction, the contractor should work within the stipulated Noise limits as indicated within the NEMA regulations and adhere to the ESMP recommendations.
Sanitation	Current sanitation in low income areas is wanting and residents inquired how the project can assist them as there is no system of solid waste collection hence dump sites have mushroomed everywhere and in Githongoro, the dumping site on top of the pipelines.	The consultant will recommend that the client establish proper solid waste management.	Client should establish solid waste collection points both for the residential and contractor's campsite and make elaborate arrangements for solid waste collection and transportation by a refuse transporter who is licensed by City council and NEMA.

6.7 Summary of Critical Issues from the Public Meetings

The following are some of the critical issues discussed during the additional public meetings organized by AWSB, Consultant and PAPs.

Table 6-7: summary of critical issues arising from the public meetings

Issue	Comments	Response during the meetings	Recommendations to AWSB
Additional land take that was not compensated	During the first phase of the project, in 1971, the farmers agreed to allow for easement of 12m through their lands. In 2002, the wayleave was extended to 18m to allow for an additional pipeline, this 6m was not compensated for nor was it acquired through a consultative process, we want to be compensated for the 6m.	The Easement agreement was between land owners and the then Nairobi County Council, AWSB has written to Nairobi City County to inquire about the additional 6m. Should it occur that the farmers were not compensated for the land, they will be compensated.	Once the documentation of the agreements between the then Nairobi City Council and the land owners have been obtained, the people who were not compensated should be compensated.
Compensation for assets destroyed during the laying of the pipes.	The contractor promised to compensate us for the assets he destroyed during the laying of the pipes but he left the site without compensating for damages to their assets.	The damaged assets should have been compensated for by the contractor, the matter should have been reported to NCC that was in charge of the project back then before the contractor completed the project.	Since the previous phases were completed without the contractor being penalized for lack of site restoration, in the memorandum of Understanding between the land owners and AWSB, the contractor will restore sites that were not restored in the earlier phases of the project.
Washouts damage to crops and land	The washout valves release a lot of water that destroy our crops and creates gulleys on our land. The 3m that was taken on lease has been eroded to over 12m due to the force of the water. This has destroyed crops, degraded the land and claimed lives, we have complained to NCWSC, NEMA, and AWSB but to no avail. We want the entire 12m section to be bought by AWSB.	AWSB will have an in house meeting and deliberate on the issue.	AWSB should permanently acquire the 3m corridor set aside for the effluents during the cleaning process, the site should be restored to its earlier state and soil conservation measures done to avoid the gulley erosion.
Compensation for land Injuriously affected	The wayleave has divided some of our lands into two and one part in not economically viable as some are on the edge of river banks while	AWSB will have an in house meeting and deliberate on the issue.	For the sections where the land has been determined to be injuriously affected leaving one portion

Issue	Comments	Response during the meetings	Recommendations to AWSB
	others on edges of cliffs. We want the entire piece of land that is not economically viable to be bought by AWSB. Land is unavailable in Muranga and Kiambu, some of us prefer land for land compensation, and AWSB should buy us alternative of similar acreage that they have acquired.		uneconomically viable, AWSB should buy the entire piece of land and either compensate cash for land or land for land.
Cost of amending the Title Deed	The wayleave will divide our land into distinct parts, we want AWSB to cater for the cost of producing the Title Deeds and AWSB should deliver the titles to the respective land owners.	The cost will be shouldered by AWSB and the titles will be delivered to the PAPs	The mutations done to the land will require that the title be amended, this has a cost implication which AWSB should bear. To avoid the Landowners spending their time and money following up on the titles AWSB should acquire the Title deeds on behalf of the farmers and take to them.

6.8 Project Acceptance

Project acceptance by the local community is important because it ensures smooth running of the proposed project during construction and operational phases. Project perception of the locals towards the Thika-Kigoro-Kabete Pipelines in Muranga, Kiambu and Nairobi Sub-county varied from one sub-county to the other along the route. Most PAPs in Gatanga sub-county were receptive to the project and indicated that they will allow the pipeline works to commence once they are compensated. This response was attributed to fresh wayleave acquisition of new pipeline route from Thika dam to Ngethu. PAPs in Githunguri sub-county also indicated that the project can proceed on condition that the previous compensation issues on the acquired wayleave are resolved. They also indicated that the locals in the area should benefit in terms of employment and access to piped water.

Majority of PAPs in Gatundu North, Gatundu South and Kibagare slums resisted the commencement of the pipeline works unless the historical wayleave acquisition issues are resolved and the destructive impacts caused by washouts are addressed. This called out for a second round of meeting between the PAPs, AWSB and the Consultants to discuss on the way forward in regards to the raised issues. The agreement made between AWSB and the PAPs during this meeting are as listed in table 6-7 above (Section 6.7) and the minutes of the meeting are attached in Appendix IV of this report. After the meeting, the PAPs in these areas allowed the Consultant to continue undertaking the studies, however it was agreed that the construction works will not start until the previous wayleave issues have been resolved by AWSB.

7 IMPACTS ASSESSMENT AND PROPOSED MITIGATIONS

7.1 Introduction

The Environmental and Social Impact Assessment (ESIA) has been systematically conducted to determine whether or not the proposed project will have adverse impact on the environment.

An environmental impact is any change to the existing condition of the environment caused by human activity or an external influence. Impacts may be:

- Positive (beneficial) or negative (adverse);
- Direct or indirect, long-term or short-term in duration, and wide-spread or local in the extent of their effect.

Impacts are termed cumulative when they add incrementally to existing impacts. In the case of the proposed Thika- Kigoro- Kabete Water Transmission Pipeline Project, potential environmental impacts would arise during the construction, operations and the decommissioning phases of the project and all the three stages positive and negative impacts would occur.

The following sections will look at the anticipated positive and negative impacts of the proposed Thika-Kigoro- Kabete Water Transmission Pipeline at the following levels of the project:

- Construction Phase;
- Operation phase; and
- Decommissioning phase.

7.1.1 Impact Assessment Scoring

To systematically identify, predict, evaluate and determine the significance of impacts resulting from the project construction and operation, a generic criteria developed by Haug *et al* (1984) was adopted as presented in table 7-1 below. Precautionary principle was used to establish the significance of impacts and their management and mitigation i.e. where there is uncertainty or insufficient information, the Environmentalist erred on the side of caution.

Table 7-1: Criteria for assessing significance

SEVERITY OF IMPACT	RATING	
Insignificant / non-harmful / less beneficial	-1/ +1	
Small/ Potentially harmful / Potentially beneficial	-2/ +2	
Significant / slightly harmful / Significantly beneficial	-3/ +3	
Great/ harmful / beneficial	-4/ +4	
Disastrous/ extremely harmful / extremely beneficial	-5/+5	
SPATIAL SCOPE OF IMPACT	RATING	
Activity specific	-1/ +1	
Right – of – way specific (within right – way)	-2/ +2	
Local area (within 5km of the project)	-3/ +3	
Regional	-4/ +4	
National	-5/+5	CONSEQUENCE
DURATION OF IMPACT	RATING	
One day to one month	-1/ +1	
One month to one year	-2/ +2	
One year to ten years	-3/ +3	
Life of operation	-4/ +4	
Post closure	-5/+5	
FREQUENCY OF ACTIVITY / DURATION OF ACTIVITY	RATING	
Annually or less / low	-1/ +1	
6monthly / temporary	-2/ +2	
Monthly / infrequent	-3/ +3	
Weekly/ life operation/ regularly / likely	-4/ +4	
Daily / permanent / high	-5/+5	
FREQUENCY OF IMPACT	RATING	
Almost never/ almost impossible	-1/ +1	
Very seldom / highly unlikely	-2/ +2	
Infrequent / unlikely/seldom	-3/ +3	
Often / regularly/ likely/ possible	-4/ +4	
Daily / highly likely/ definitely	-5/+5	LIKELIHOOD

Table 7-2: Significance rating matrix

CONSEQUENCE (Severity+ Spatial Scope + Duration)															
LIKELIHOOD (Frequency of activity + Frequency ...	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90
	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105
	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120
	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150

Table 7-3: Mitigation ratings

Significance Ratings	*Value*	*Negative Impact Management Recommendation*	*Positive Impact Management Recommendation*
Very High	126-150	Improve proposed management	Maintain proposed management
High	101-125	Improve proposed management	Maintain proposed management
Medium - High	76-100	Improve proposed management	Maintain proposed management
Low - Medium	51-75	Maintain proposed management	Improve proposed management
Low	26-50	Maintain proposed management	Improve proposed management
Very low	1-25	Maintain proposed management	Improve proposed management

The following is a detailed assessment of impacts anticipated to stem from implementation of Project.

7.2 Positive Impacts during Construction

Anticipated positive impacts from implementation of the project implementation will include but not limited to:

7.2.1 Employment opportunities

The construction phase will require direct recruitment of labourers to work with the contractor. This will include both skilled and unskilled labour that will be engaged for about 2.5 years. Indirect economic opportunities will also be created through persons selling different domestic requirements to the construction staff. These will improve economic situation in the project area and temporarily reduce unemployment levels.

It is projected that there will also be an influx of new people into the project area in search for employment. An increase in population of this magnitude will create a corresponding increase in demand for goods and services such as food for construction workers, housing, healthcare and need for transport. These needs will be satisfied by people living within the project area where local women will provide food vending services, homes will rent out accommodation spaces for the new population and shops will also benefit from increase of sales. All these avenues are bound to create new employment opportunities.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*+4*
Spatial scope of impact	*+4*
Duration of impact	*+4*
Frequency of activity / duration of activity	*+5*
Frequency of impact	*+5*
Result	***+120 Very High***

Recommendations/Enhancement measures

- The contractor should comply with the legal requirements for employment and working conditions as prescribed by Kenyan Law. He should also strive to adopt international best case practice as recommended by the International Labour Organisation;
- The contractor should develop a human resources policy and communicate it to his temporary and permanent workers in oral and written format. The information to be

disclosed should include policies on working hours, wages, grievance mechanisms, overtime compensation and benefits;

- The proponent should emphasize the use of local unskilled labour by any engaged contractor as far as feasible to enhance benefits for the local population;
- The Contractor should ensure that third parties e.g. sub- contractors abide by the same policies and standards when hiring staff to work on the project. This should include setting of sanctions against sub-contractors who contravene Kenyan Laws and the Contractor's Policies;
- Establishment of a strong quota system of allocation of jobs for persons living in the projects primary zone of impact, secondary zone of impacts and other immigrant workers;
- Gender sensitivity and consideration for persons with disabilities during recruitment. This can be done through profiling of employment opportunities for men, women and persons with disabilities then setting and achievement of quotas for preferential hiring of these groups for specific opportunities;
- Liaise with local civil society organisations, social groups and technical colleges to access workers data bases and promote employment of local youth;
- Capacity building and training for women and youth on specialised labour that will be required during construction;
- Establishment of support programs / interventions to facilitate vulnerable groups among the community to provide services to the project staff hence earn an income from the project;
- To manage expectations on employment by the local community, the Contractor should establish a community liaison system that includes communication on available employment opportunities.

7.2.2 Creation of marketing opportunities for construction materials

The proposed project will require construction materials, some of which will be sourced locally and some internationally. These materials include: cement, reinforcement iron bars, sand, pipes and appurtenances. Although the impact is limited to construction period, these will provide a ready market for suppliers' locally and outside the country hence increased economic benefits to participating traders which will in turn boost government revenues. This will ensure highest benefit to the local suppliers.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*+4*
Spatial scope of impact	*+5*
Duration of impact	*+3*
Frequency of activity / duration of activity	*+4*
Frequency of impact	*+4*
Result	***+96 Medium - High***

Recommendations/Enhancement Measures

- Bidding should be in compliance with the legal requirements stipulated in the Kenyan law and international standards.

7.2.3 Desirable Social Change

During construction phase it is expected that there will be an influx of workers from varied cultures and social practices. The project area on the other hand can be categorised into rural, peri-urban and urban settlements hence resulting in a range of cultures from homogenous conservative communities to metropolitan communities in the major towns and Nairobi City.

Interaction with the project staff can therefore lead to positive influences in the form of promotion of diversity in ways of thinking, experience of new cultures and exposure to new expectations in goals and achievements. On a higher level, these influences can result in adoption of new trends in social interaction, modes of dress, leisure time activities and spending habits.

Impact Analysis Matrix

Impact Without Mitigation	
Severity of impact	*+3*
Spatial scope of impact	*+3*
Duration of impact	*+3*
Frequency of activity / duration of activity	*+3*
Frequency of impact	*+4*
Result	***+51 Low***

7.2.4 Improved infrastructure

Construction of the pipeline will improve create more local access roads, associated bridges and new short roads to project work areas. These will be an advantage to the locals as they will have improved transport and communication networks. Transportation of tea and coffee from the farms to the tea buying centres and factories will especially benefit the tea and coffee industries since they will sometime incur lower cost in maintenance of roads and in delay of product delivery. Transportation of timber from the project area will also be made easier with access to heavier trucks to the area made possible with improved roads.

Construction of the treatment plant in Kigoro, Gatanga Sub-county will also open up the area to urbanisation and the growth of the trading centre. Better infrastructure such as roads to the treatment plant, housing and communication networks will be established in the area. This is likely to attract more people and investors to the area hence significantly spurring the growth of an urban centre. For instance construction of Ngethu treatment plant spurred up the growth of Ngethu urban centre thus the same impact is expected at Kigoro where the new treatment plant will be situated.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*+3*
Spatial scope of impact	*+3*
Duration of impact	*+4*
Frequency of activity / duration of activity	*+4*
Frequency of impact	*+5*
Result	**+ 90 *Medium-High***

Recommendation/Enhancement measures

- The local government of Muranga should put in place measures to ensure control development and urbanisation. This will curb the possible growth of informal settling and lower standard housing at Kigoro.
- AWSB should ensure that the concerned roads are also maintained throughout the construction period and any damages are made good before the contractor demobilises from site.

7.2.5 Income Generating Opportunities for Women

During construction phase women in the affected and neighbouring communities to the project site will get an opportunity to start small income generating activities such as: sale of food to the construction staff; and opening up shops to sell basic necessities to the construction staff(especially at the contractor's campsite and the treatment plant). This will increase and diversify income streams for women living in/near the communities hosting the project hence improving socio-economic status of their families.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*+2*
Spatial scope of impact	*+3*
Duration of impact	*+3*
Frequency of activity / duration of activity	*+4*
Frequency of impact	*+4*
Result	***+64 Low - Medium***

Recommendations/Enhancement measures

- It is recommended that the Contactor in each site develop catering services premises with cooking allocation and dining area for use by the service women mentioned above and their staff. The site will be dependent on the number of workers each construction site has;
- It is proposed that potable water should be provided at the catering area through a Water Tank or stand pipe for sanitary purposes; and
- Women who want to participate be advised to get clearance from local Public Health offices.

7.3 Negative Impacts during Construction Phase

The proposed project will be associated with a number of negative impacts including the following:

7.3.1 Wayleave acquisition

Land will be acquired from the affected community to pave way for the proposed way- leave for Thika-Kigoro-Kabete Transmission Main. Land take will either be temporal or permanent. A 3m permanent wayleave will acquired for the laying of the Thika-Kigoro-Kabete Pipelines while a 6m temporary wayleave will be acquired for the duration of the construction phase.

However during the public consultations the PAPs informed the consultant that they were dissatisfied with the compensation mode for easement of 12m and 6m width of land for the previous pipeline wayleave. The PAPs indicated the whole of 18m wayleave easement will have to be permanently acquired and PAPs fully compensated before lating of another 3m wayleave for the new pipeline wayleave. The project resistance from the local community was encountered in Gatundu North, Gatundu South and Kiambu sub-county in Kiambu County and Kibagare slums, Westlands sub-county. Majority of the PAPs in Gatundu North and South section said they will not accept the project until AWSB addresses the issues they have raised and gives them assurances that they will be fairly compensated to allow construction works to commence.

Thus the cumulative impacts of land acquisition on the existing wayleave correspond to the acquisition of 21m of private land from Ngethu to Kabete. For small properties of 50m by 100m

this cumulative impact will be significant and would result to loss of the economic value of the affected land.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-5*
Spatial scope of impact	*-5*
Duration of impact	*-4*
Frequency of activity / duration of activity	*-5*
Frequency of impact	*-5*
Result	***-140 Very High***

Mitigation

- AWSB should resolve previous wayleave acquisition issues before commencement of the project;
- Implement the RAP to enable compensation payment and resettlement of PAPs prior to the contractor taking possession of any construction site.
- AWSB should ensure that compensation has been done fairly and all the PAPs are satisfied before embarking on construction.

7.3.2 Disturbance to neighbouring land owners

Construction activities and construction personnel on site, as well as construction vehicles moving to and from site would cause some disturbance to landowners adjacent to the various sites including destruction of uncompensated crops and trees. However, the existing high residential densities in Kiambu Town, Kirigithi and Westlands areas may have slight significance impact on surrounding landowners.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-5*
Spatial scope of impact	*-4*
Duration of impact	*-4*
Frequency of activity / duration of activity	*-5*
Frequency of impact	*-5*
Result	***-130 High***

Mitigation

- Adjacent landowners must be informed of the commencement of construction activities;
- A Community Liaison Officer (CLO) will be appointed to be an intermediate between the project team and the surrounding community; and
- The Contractor should stick to the existing construction way-leave to prevent unwanted destruction of the surrounding assets;
- Any damages outside the designated wayleave should be immediately reported to the Resident Engineer and prompt compensation paid by the contractor in accordance with the principles of RAP and in agreement with the affected parties.

7.3.3 Interruption of existing installations

The proposed Thika Dam-Kigoro-Kabete Gravity water transmission pipeline will start within Thika dam compound, then exit to pass through peoples' land that will be acquired as well as the residential areas, roads and communication networks and other water service providers'

pipelines. Some of the identified existing installation likely to be interrupted with include the following but not limited to;

- Thika dam s
- southern access road;
- Culverts and storm water drains;
- Roads
- WRMA River Gauging Stations (RGS)
- Possible telephone and internet wiring within residential areas.

Chances may occur during construction of the pipeline that some of these installations will be damaged during excavation. Workers may also be exposed to hazards such as electric shock, high pressure from damage pipes, suffocation, or explosions if they unexpectedly come in contact with utility lines.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-5*
Spatial scope of impact	*-4*
Duration of impact	*-4*
Frequency of activity / duration of activity	*-4*
Frequency of impact	*-5*
Result	***-117 High***

Mitigation

- A notice should be put up in good time to inform the affected communities/people of the interruptions likely to be cause as the pipeline in laid at specific public utilities;
- Capacity building and training should be conducted among the construction workers on the way they can protect themselves from exposed dangers during construction;
- The contactor should try as much as possible to restrict the construction activities to the mapped out area to avoid increase disturbance of existing installations in the area.
- In case of interruption of WRMA RGS on the Target Rivers, ASWB should inform WRMA early for relocation of the device, if already destroyed for replacement purposes. From the consultations with WRMA, the cost of relocation or replacement of RGS is incurred on the project proponent. The apparatus are only handled by WRMA technical staff;
- Project surveyor should assist in development of an updated map showing location of public services and utilities thus reducing the risk of accidental damage, incidents or accidents.

7.3.4 Soil erosion and increased sedimentation

Activities associated with vegetation clearing, preliminary works and construction earthworks all have potential to contribute to or cause adverse impacts through erosion and sediment transfer. The hilly undulating terrain and heavily weathered volcanic soils in the project area predisposes it to soils erosion. Major earthworks will take place during construction including: creation of new roads, excavation of soils for laying of pipeline, repairs to existing roads; works at the treatment plant Soil materials from these activities will also be stockpiled in the locality. These are bound to result in significant amounts of loose soil materials prone to erosion through surface runoff, especially during rainy seasons.

The eroded materials and sediments from earthworks and stockpiled soil may readily find their way into rivers and streams through surface run-off if not properly controlled. Unprecedented increase in sediment loads in the rivers can affect both riverine aquatic life and other uses (including downstream domestic usage and livestock watering) downstream the project areas.

Though limited to construction period, the impacts could be amplified and recur even in post-construction period if control erosion method and revegetation is not properly done.



Photoplate 6-6: Ongoing soil erosion along the existing pipeline wayleave where land has been left bare.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-5*
Spatial scope of impact	*-3*
Duration of impact	*-3*
Frequency of activity / duration of activity	*-5*
Frequency of impact	*-5*
Result	***-110 High***

Mitigation

- Contractor should abide to the proposed soil erosion and slope structure compensation measures proposed in section 4.4 of Chapter 4 of this report and the design report.
- Contractor should use the soil conservation best practise method in laying of the pipes along the undulating terrain so as to reduce the amount of soil being eroded downstream;
- Contractor must ensure clear delineation of construction work areas to avoid unnecessary vegetation clearance and soil loosening;
- The contractor must implement planned erosion control measures to avoid erosion in areas that are prone to erosion, e.g. steep slopes and drainage lines;
- Topsoil stockpiles will be vegetated to prevent erosion;
- Planting of vegetation cover such grass along the pipeline wayleave to curb soil erosion after construction works.
- No topsoil to be utilized during any construction activity;
- Implement soil conservation measures at stockpiled sites;
- Where feasible, topsoil must be reinstated and rehabilitated on top of sub soil;
- All excavation works must be properly backfilled and compacted;

- Ensure downstream water users are informed about any unprecedented release of heavily silted water into the river;
- Where possible, construction activities should be scheduled to occur outside of the rainy season, to reduce the anticipated volume of runoff during construction; and
- Sediment traps and barriers must be employed due to steep terrain.

7.3.5 Occupational Health and Safety Hazards

All construction sites are inherently unsafe and for those employed on the project the risks are varied and omnipresent. They are however well understood and documented, and providing normal, accepted Health and Safety procedures are followed they are easily minimized.

Risk of accidents and incidents will be heightened with the construction activities. Construction workers will be in direct contact with heavy machinery and equipment hence being exposed to risk of accidents and injuries resulting from accidental falls, injuries from hand tools and construction equipment. However, this risk is activity specific and will only be within the construction area.

Heavy Good Vehicles (HGVs) such as excavators might be of risk while;

- Moving and strikes a pedestrian, particularly while reversing;
- Slewing trapping a person between the excavator and a fixed structure or vehicle; or
- Working when the moving bucket or other attachment strikes a pedestrian or when the bucket inadvertently falls from the excavator.

Health, safety and security are important aspects through all the stages of the proposed project.

Specific mitigation measure to HGVs

- **Exclusion:** People should be kept away from areas of excavator operation by the provision of suitable barriers. Most excavator related deaths involve a person working in the vicinity of the excavator rather than the driver. Bunting or fencing can be used to create and maintain a pedestrian exclusion area;
- **Clearance:** When slewing in a confined area the selection of plant with minimal tail swing is preferred. Clearance of over 0.5m needs to be maintained between any part of the machine, particularly the ballast weight, and the nearest obstruction;
- **Visibility:** Excavators with the best view around them directly from the driver position should be selected. Excavators should be equipped with adequate visibility aids to ensure drivers can see areas where people may be at risk from the operation of the machine;
- **Signaller:** A signaller should be provided in a safe position to direct excavator operation and any pedestrian movements;
- **Bucket attachment:** Quick hitches can be used to secure buckets to the excavator arm. A number of deaths have occurred in recent years when the bucket has fallen from the machine;
- **Drivers:** should be trained, competent and authorised to operate the specific excavator. Training certificates from recognised institutions help demonstrate competence and certificates should be checked for validity;
- **Signallers:** should be trained, competent and authorised to direct excavator movements and, where possible, provided with a protected position from which they can work in safety; and
- **Pedestrians:** should be instructed in safe pedestrian routes on site and the procedure for making drivers aware of their presence.

The general public may also be exposed to dangers like falling into uncovered trenches/adits/shafts, drowning in unprotected river banks and accidents involving construction vehicles. Many settlements in the project area are sited along the roads and most locals will be exposed to speeding construction vehicles.

AWSB has incorporated as contract condition, a requirement that the Contractor shall appoint an accident prevention officer at the Site, responsible for maintaining safety and protection against accidents. This person shall be qualified for this responsibility, and shall have the authority to issue instructions and take protective measures to prevent accidents. Additionally, the proponent has made it a requirement for bidding contractors to include in their bidding documents, provision of:

- A medical clinic with wards (3 each for males and females);
- At least two ambulances;
- First aid huts/stations; and
- Trained first aiders, 1 for every group.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-5*
Spatial scope of impact	*-3*
Duration of impact	*-3*
Frequency of activity / duration of activity	*-4*
Frequency of impact	*-5*
Result	***-108 Medium-High***

Mitigation

- Contractor must develop Construction Safety and Health Policy in compliance with OSHA, World Bank and international best practice e.g. IFCs Environmental, Health and Safety Guidelines. The policy should be approved by Environment, Health and Occupation Officer from AWSB and DOSH;
- Registration of the workplace by the Director, Directorate of Occupational Safety and Health (DOSH) forming the basis of his work statistics;
- Qualified Health and Safety auditor should be contracted to conduct annual Health and Safety (H&S) and a registered Fire Auditor to undertake a fire audit and develop relevant policy for the site;
- Include a specific and independent task in the supervision contract concerning H&S supervision and compliance, together with the staff resources to carry this out;
- Establish and enforce a strict code of conduct for all project drivers including outside suppliers delivering materials. The code should focus on safety, especially speed, and loading, especially banning all carriage of staff, workers and passengers except in seats;
- Implement the specified H&S programme throughout the construction period;
- The contractor should establish an emergency response procedure and display on all work areas during construction activities;
- Contractor must secure licenses and adhere to their requirements for handling explosives by the Department of Mines and Geology;
- Construction sites should be adequately barricaded from the general public and conspicuous warnings posted in national and local languages;
- The contractor should ensure compliance with all standards and legally required health and safety procedures in line with OSHA, 2007, Mining safety rules, explosives act and their associated rules and regulations.
- The Contractor should ensure provision of appropriate Personal Protective Equipment (PPE) for project;

- The Contractor should train the workers on use of construction machinery such as site vehicles, and drillers; and
- The Contractor should provide first aid tools and training to all construction workers.
- Maintain an incident/accident register, in accordance with the OSHA 2007 and report incidences to the respective DOSH;
- The Contractor should provide adequate sanitary facilities for the workers;
- Contractor should provide adequate fire fighting equipment capable of fighting all classes of fire and train workers on how to use them;
- Put "No smoking signs" in areas where inflammables are stored;
- The Contractor should provide clean drinking water to the construction workers at all times;
- The contractor should rehabilitate excavated sites as soon as construction is completed to prevent any accidents that may arise from open trenches
- The Contractor should initiate HIV/AIDS awareness, prevention and training for the workers and community

7.3.6 Impacts from Contractor's camp

A contactor's camp must be established near the project area at a site yet to be selected. The construction camp will consist of site offices, workshops, stores, vehicle parking, and staff accommodation. The camp site is bound to have high human activity posing the problem of hygienic arising from disposal of sewage, household waste and refuse as well as general insecurity challenges. Others include waste from construction material areas and fuelling stations. All these are potential pollution agents for surface and underground water and soils and need adequate management.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-4*
Spatial scope of impact	*-4*
Duration of impact	*-4*
Frequency of activity / duration of activity	*-4*
Frequency of impact	*-5*
Result	***-108 High***

Mitigation

- The Contractor will be required to undertake stand alone ESIA for his camp and related facilities once the site is selected.

7.3.7 Testing and commissioning

Testing and commissioning of the pipeline will have to be undertaken before the operation is authorised. Large quantities of water will have to be used during testing so as to remove any debris/sediment inside the pipeline and to check the pipeline operating pressure is at the recommended level. Raw water will be used during testing of the Raw water pipeline from Thika dam to Kigoro while treated water with higher content of disinfectants such as chlorine will be used in testing and disinfecting the treated water pipeline from Kigoro Treatment works to Kabete Reservoir. The waste water will be released into a nearby river course. This may lead to erosion if the velocity of water from the pipeline is not regulated downstream, flooding of the adjacent land, destruction of river banks and also destruction of crops. Moreover, water with high concentration of disinfectant will also burn the crops in the adjacent land, compromise the quality of water being used for domestic purposes and death of aquatic life.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-5*
Spatial scope of impact	*-4*
Duration of impact	*-3*
Frequency of activity / duration of activity	*-4*
Frequency of impact	*-5*
Result	***-108 High***

Mitigation

- A notice should be put up to inform members of the date and time the pipeline will be tested and expected impacts;
- Residents along the target river should be sensitize and educated on impact of chemicals being used during testing;
- If possible testing should be timed to coincide with the dry months when the river are not flooded to reduce the project zone of impacts of induced floods;
- Contractor should get a permit from WRMA before releasing water with chemicals into the any river in the project area;
- A well constructed channel should be put up so as to reduce the velocity of water downstream hence minimize the impact of high pressure water to the river course and also minimise erosion;
- Contractor should sensitize workers on the impacts of direct contact with the chlorine;
- Contractor should provide works with PPEs before handling of any chemicals.

7.3.8 Impacts from River crossings

The pipeline is expected to cross over several rivers either through overcrossing by bridges or piers or under crossings as tabled below. Rivers plays an important ecological role to the ecosystem and provides ecosystem services to the local communities. During construction some of the rivers along the project area will be interfered with. The major impact expected where the pipeline will be laid under the river. Some of the impacts include water pollution from excavated soils and oil spills, interference with the river bed and aquatic life and reduction in water quality.

Communities that depend on river for water may be temporarily affected during construction since the quality of the water is compromised hence render it unfit for domestic use.

There is possible collapse of river banks at the areas where the bedrock and the soils are weak and loose during river crossings. Continuous erosion of this soil may also erode the river banks resulting to collapse of the river banks. This is likely to interfere with the laying of the pipeline across the river through collapse of the steel bridges or the supporting piers.

Method of cross employed at each river crossings

River	Chainages	Type of crossing
Raw water Gravity Main		
Thika River	0+100	Overcrossing by piers
Thika River	0+950. 1+010, 1+260,	Undercrossing
Swamp	3+020	Overcrossing by piers
Stream	4+720	Undercrossing
Treated Water Gravity Main		
Valley	1+520	Overcrossing by piers
Stream	3+320	Undercrossing
Stream/swamp	5+340	Overcrossing by piers
Ruamboro River	6+620	Overcrossing by piers

River	Chainages	Type of crossing
Swamp	7+600	Undercrossing
Kiama River	8+960	Overcrossing by steel bridge
Chania River	10+660	Overcrossing by steel bridge
Stream	11+080	Overcrossing by piers
Karimenu River	14+780	Overcrossing by steel bridge
Ndarugu River	17+300	Overcrossing by steel bridge and piers
Mandume River	18+490	Overcrossing by piers
Ruambura River	19+300	Overcrossing by steel bridge
Kiariga stream	20+850	Overcrossing by piers
Thiririka River	22+190	Overcrossing by steel bridge
Niendu stream	23+330	Undercrossing
Mararo stream	24+280	Undercrossing
Theta River	25+060	Overcrossing by steel bridge
Kamaratu Stream	25+740	Overcrossing by piers
Mugutha stream	26+670	Undercrossing
Komothai River	28+390	Overcrossing by steel bridge and piers
Ruiru River	30+280	Overcrossing by steel bridge
Ngewa stream	32+200	Undercrossing
Mukuya River	33+020	Overcrossing by piers
Kianjibbi Swamp	34+280	Overcrossing by piers
Kamiti River	36+280	Overcrossing by piers
Ithuru River	37+427	Overcrossings by piers
Kiu River	39+058	Undercrossing
Gakiamba stream	40+029	Overcrossing by piers
Karigiti River	41+160	Overcrossing by piers
Riara River	41+580	Overcrossing by piers
Gatharaini	43+317	Overcrossings by piers
Ruiruaka River	47+680	Undercrossing
Thigiri River	53+680	Undercrossing
Gitathuru River	54+870	Undercrossing
Mathare River	55+840	Undercrossing

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-5*
Spatial scope of impact	*-3*
Duration of impact	*-3*
Frequency of activity / duration of activity	*-4*
Frequency of impact	*-5*
Result	***-99 High***

Mitigation

- The Contractor should adhere to WRMA regulations and Water Act in regards to river crossings
- Notice should be given to the affected communities early enough indicating the dates of works on the river crossings
- AWSB should apply for diversion permits on all under river crossings
- The Contractor should plant trees and grasses at the riparian once the construction works are completed.
- The river should be restored to its normal flow after under river crossings. This will prevent erosion of the river banks.

7.3.9 Impacts due to road crossings

The laying of the proposed Thika Dam-Kigoro-Kabete gravity water pipeline will cross several roads hence leading to cutting of tarmac or murram roads along the project area to enable laying of the pipes. This will have an impact on the flow of traffic along the affected routes. This may also lead to creation of diversion routes along the respective roads to enable traffic to flow continuously. This may negatively affect the road side vegetation along the roads.

Storm water drains, guard rails and culverts along the roads are likely to be interfered with road crossings or when the pipeline is being laid along the road. Excavated soils may pile up along the storm water drains blocking the flow surface run-off flow along the road during the rainy season. Destroyed guard rails and culverts will also pose a danger of accidents to motorist and pedestrian using the affected roads.

The pipeline will cross or be laid along the following roads as listed below and illustrated below.

County	Name of the Affected Road	Chainages
Muranga	Makomboki Tarmac Road	2+230
	Gatanga-Ndakaini tarmac road	3+700
	Kigoro-Githumu murram road	2+960
	Gatanga-Ndakaini road (tarmac)	5+000
	Kigoro-Kiriani road (murram)	7+240
	Gatura-Gatanga road (tarmac)	9+840
Kiambu	Ngethu-Mangu road (murram)	12+020
	Kwa-Maiko - Ruiru Road	31+600
	Kiambu-Nairobi Road	42+700
	Northern Bypass Road	46+720
Nairobi	Runda Drive Road	46+920
	Ruaka Road	47+430
	Magnolia Close Road	48+080,
	United Nations Crescent Road	48+980 and 49+340
	Limuru Road	50+240
	Roselyn Close Road	50+630
	Thigiri Rise Road	51+350
	Red Hill Drive Road	51+760
	Egrets Drive Road	52+240
	Access Road to Nyari Estate	53+280
	Westlands Link Road	53+710, 54+915 and 56+250
	Peponi Road	54+260
	Kitisuru Road	54+610
	Spring Valley Road	55+575
	Lower Kabete Road	55+820
	Loresho Ridge Road	55+970
	Kyuna Road	56+250 and 56+570
	Kibarage Way	57+370 and at Ch.57+700

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-4*
Spatial scope of impact	*-3*
Duration of impact	*-3*
Frequency of activity / duration of activity	*-4*
Frequency of impact	*-5*
Result	***-90 Medium-High***

Mitigation

- Liaise with relevant roads authorities to minimize any service disruptions;
- Ensure advance notice to all of any planned disruptions
- AWSB should reinstate the road according as stated in laws and regulations of Kenya i.e. KeNHA and Kenya Roads Act and its regulations.
- The contractor should abide to the instructions of road reinstatement as illustrated in the detailed Design Report.
- Contractor should ensure that the excavated materials are properly carried to the designated disposal area so as to avoid them piling at the storm water drains.
- Any affected culverts and guard rail along the target roads should be reinstated immediately after construction (within 48 hours)
- Warning signs, warning tapes and notices should placed at each road crossings to notify motorist and pedestrians of ongoing construction works and possible dangers;
- Contractor should provide an alternative route to motorist during pipeline road crossings and reinstatement of the road.

7.3.10 Water supply interruptions

During construction of Thika-Kigoro-Kabete Gravity water supply mains, there may be interruptions of the normal water supply to Nairobi as the pipes are expected to criss-cross at some places along the existing. Presence of other services such as individual water pipes within the project area was established during socio-economic survey and they are likely to be affected during the construction of the pipelines.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-4*
Spatial scope of impact	*-4*
Duration of impact	*-3*
Frequency of activity / duration of activity	*-4*
Frequency of impact	*-4*
Result	***-88 Medium-High***

Mitigation

- A notice should be issued to affected supply chain about the water supply interruptions with schedule period of time.
- The affected pipes should be fixed at the shortest time possible to allow for quick restoration of normal water supply.
- Disruption of any services within the project area by the contractor should be repaired before continuation of excavation

7.3.11 Interference with flora and fauna

This involve removal or clearing of the existing terrestrial and riparian vegetation within the project area. This may be achieved through the manual or mechanized removal of vegetation using industrial equipment or any other method (i.e. manual) that results in the alteration of vegetation. During the construction phase, vegetation clearance will be unavoidable to pave way for the raw and treated water transmission pipelines and the treatment plant. However, no habitat of critical conservation significance or gazetted conservation area was established along the project area therefore the anticipated impacts will not be very significant. Additionally, construction of the pipeline and Treated Plant Works will affect various woodlots and cash crops at different growth stages. This will lead to loss of green cover associated with the woodlots, tea and coffee plantations in addition to economic losses to affected farmers.

It was also established that one of the identified species, *Ficus thoningii*, locally known as Mugumo tree is sacred and cutting it is culturally abhorred.

The animals dependent on the vegetation in project area such as rodents, reptiles and amphibians are likely to be destroyed during land clearance. Such species will be affected during the construction phases due to the loss of privacy and serenity leading to change in their daily movement patterns and their habitats. This is however short term and should not lead to a permanent change in movement or migration patterns of the fauna along the proposed raw and treated water pipelines.

There is risk of quick spread of invasive species such *Lantana camara* and colonizing species such as Tarconanthus camphorates along the project area if the area is left bare after construction. This will be harbour growth of many native species in the area. *Lantana camara* was noted to be widely spread in the area and some instances planted along the fence line.



Photo plate 6-1: Water pipeline reserve near Karura Forest, Nairobi County (on the left of photo)



Photo plate 6-2: A section of cleared wayleave of the existing transmission pipeline in Nembu location, Kiambu County.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-4*
Spatial scope of impact	*-3*
Duration of impact	*-2*
Frequency of activity / duration of activity	*-4*
Frequency of impact	*-4*
Result	***-72 Low - Medium***

Mitigation

- Contractor must ensure clear delineation of construction work areas to avoid unnecessary vegetation clearance;
- The affected commercial tree farmers should be notified in advance to harvest their trees and also compensation should be done according to the World Bank guidelines;
- Contractor should avoid cutting down of Mugumo trees in the area. where feasible the consent of KFS and local leaders should be soughted out;
- Contractor should plant grasses that curb soil erosion along the pipeline wayleave;
- Tree farmers along the construction wayleave be encourage to plant after construction works is completed;
- The trees to be planted should also be pipeline friendly so at the roots may not end up damaging the pipes when the trees mature.

7.3.12 Soil compaction

Construction activities like portal earthworks and associated traffic especially the heavy trucks and earth movers within the project area will lead to compaction of the soil structure. The net result would be reduced percolative and infiltrative capacity of the soil leading to reduced soil-water balance in the affected soils. This is anticipated to affect mainly at the treatment plant and areas near the project area.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-4*
Spatial scope of impact	*-2*
Duration of impact	*-3*
Frequency of activity / duration of activity	*-3*
Frequency of impact	*-4*
Result	***-72 Low-Medium***

Mitigation

- Vehicles must be kept on existing/designated access roads/tracks where possible;
- Minimize compaction during stockpiling by working the soil in the dry state;
- Split compacted areas to reduce runoff and re-vegetate where required;
- All topsoil and other soil profiles must be managed strictly.

7.3.13 Noise generation and vibration

Construction and laying of the proposed pipelines will most likely result in noise emissions and vibration as a result of the heavy machines that will be used during excavation and construction vehicles delivering materials to site. Excessive noise, particularly when experienced continuously, outside normal working hours and on rest days, can be a nuisance to both workers and the public. In extreme cases, it may become a health hazard. Typical noise emissions for construction machinery and equipment is likely to be deployed in the construction of the WTW and water supply mains are listed in Table 7-4 together with international standards and the NEMA noise limit.

Table 7-4: Noise Emission Levels for Construction machinery

Type of machinery	Distance between Plant and Observer			Typical International Standard dB(A)		NEMA Standard dB(A)
	5 m	20 m	50 m	Day	Night	
Loader	70	90	78	75	55	75-65
Grader	90	78	70	75	55	75-65
Vibration Roller	86	74	66	75	55	75-65
Bulldozer	86	74	66	75	55	75-65
Generator	98	86	78	75	55	75-65
Impact Drill	87	75	67	75	55	75-65
Concrete Mixer	91	79	71	70	55	75-65
Pneumatic Hammer	84	86	78	75	55	75-65
Concrete Pump	85	70	62	70	55	75-65

The effect of noise pollution on human beings, animals and property are as follows:

- Decrease in efficiency;
- Lack of concentration;
- Fatigue;
- Abortion is caused;
- Increase in blood pressure;
- Temporary or permanent deafness.

According to NEMA, the scope of works and the machinery to be used in this project would have to adhere to the noise and excessive vibrations regulations as indicated in the table below.

Table 7-5: Facility Maximum Noise Level Permitted (Leq) in dB (A) for Day and Night

	Day	Night
(i) Health facilities, educational institutions, homes for disabled etc	60	35
(ii) Residential	60	35
(iii) Areas other than those prescribed in (i) and (ii)	75	65

Time Frame: Day: 6.01 a.m. – 6.00 p.m. (Leq, 14 h)
Night: 6.01 p.m. – 6.00 a.m. (Leq, 14 h)

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-3*
Spatial scope of impact	*-3*
Duration of impact	*-3*
Frequency of activity / duration of activity	*-4*
Frequency of impact	*-4*
Result	***-72 Low- Medium***

Mitigation

- Noise levels shall be kept within acceptable limits preferably as stipulated within the Environmental Management and Coordination Act (Noise and Excessive Vibration Pollution) Control Regulations, 2009 and construction activities shall, where possible, be limited to normal working hours;

- Contractor must be required to monitor noise and vibration in sensitive locations (hospitals, teaching facilities, churches) near the project area to ensure the NEMA requirements regarding noise and vibration are met and if the standards are exceeded measures must be taken to reduce noise and vibration;
- Equipment should be maintained regularly to reduce noise as a result of friction;
- Workers exposed to high-level noise must wear personal protective equipment (PPE);
- Use of silencers on the construction plant, where applicable, should be encouraged;
- Residents in close proximity should be given at least 24 hours notification of any abnormal noise source e.g. planned blasting; and
- Institute a community complaints/redress mechanism to identify and respond to any unanticipated noise/vibration related complaints.

7.3.14 Spoil

Large quantities of soil materials will be excavated from the pipeline construction hence having a negative impact on the surrounding environment if not adequately disposed. The excavated material is prone to erosion through surface water runoff, especially during rainy seasons and may even impede rivers meant for water supply. Spoil dumps left bare encourage the establishment of fast colonising plants including invasive species.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-4*
Spatial scope of impact	*-3*
Duration of impact	*-3*
Frequency of activity / duration of activity	*-3*
Frequency of impact	*-4*
Result	***-70 Low - Medium***

Mitigation

- Maximise the re-use of excavated materials in the works as far as feasible to ensure that no permanent spoil dumps are created;
- The spoil materials can be used elsewhere as recommended by the county government such as in road constructions and rehabilitation. From consultations it is recommended that the spoils may be given to farmers with tree nurseries or landscaping agencies for free;
- Properly dispose off the spoil in the identified by the design team and approved by the confirmed land owners;
- Care should be taken to avoid spoil location in land that could otherwise be used for productive purposes; and
- Ensure the contractor formulate and implement erosion and siltation management measures at chosen spoil locations.

7.3.15 Pollution of water resources (surface and ground)

Apart from the rivers that will be directly affected during pipeline river crossings, many other small streams that exist in the project area will also be affected. During the construction, sediment from earthworks, wet cement, detergents, paints and other chemicals, accidental oils and fuels spills and leaks from deployed equipment may find their way into the river directly or indirectly through surface run-off if not properly controlled. This will contribute to degradation of the river water quality and may affect the downstream users negatively. At worst, aquatic organisms may be drastically affected too.

The type of sediments expected to pollute surface waters that are rivers and streams include suspended load, river bed load, and dissolved loads. These sediments will to be generated during construction phase especially at the river crossings and along Thika River. Thika river water quality will be the worst affected due to the construction of the raw water pipeline along the 5.5km riparian land starting from the draw off tunnel, southern of Thika Dam.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-4*
Spatial scope of impact	*-4*
Duration of impact	*-3*
Frequency of activity / duration of activity	*-3*
Frequency of impact	*-3*
Result	***-66 Low - Medium***

Mitigation

- Implement Standard Operating Procedures (SOPs) for working in water, including checks on equipment condition (especially leaks of oils, fuel, hydraulics), refuelling protocols (at safe location away from water, availability of spill kits and knowledge of their use, and emergency spill procedures);
- Any on site/camp storage areas for fuels, oils or other liquid chemicals should be stored away from surface water drains. They must have an impermeable base and bund with a capacity of 110% and would not drain directly into the surface water drains. Where practicable, drainage from storage compounds would be passed through oil interceptors prior to discharge;
- Apply standard best practice site sediment control procedures (e.g. settling ponds and silt barriers) to minimise sediment in site drainage waters returning to the river;
- Ensure that all construction equipment and vehicles are serviced off site at licensed garages;
- Stock piled soils should be banked at the base to avoid the soil being swept away by the storm water;
- Any contaminated soil should be handled properly as hazardous waste and removed form site for safe disposal;
- Careful management of the sites and education of all construction staff would curtail the risk of pollution spills
- Water from the abolition blocks and toilets should be channeled into the septic tank;
- The soak pits of the septic tanks should be deep to avoid surface flows that will pollute the surface water.

7.3.16 Spread of Invasive Alien Species

Some of the invasive alien species like *Lantana camara* and *Thevetia peruviana* were noted within the project area *Lantana camara* was observed across the project area while *Thevetia peruviana* was noted within Westland sub-county. Transportation of earth materials to and from the project area can lead to spread of some of these invasive species from the project area to other regions or introduction of new ones into the project area. This can cause undesirable ecological competition with indigenous species in affected areas reducing plant biodiversity and negatively affecting soil properties.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-2*
Spatial scope of impact	*-3*
Duration of impact	*-2*
Frequency of activity / duration of activity	*-4*
Frequency of impact	*-4*
Result	***-56 Low - Medium***

Mitigation

- Ensure that all equipment required for project construction and maintenance is clean and completely free of plant parts and mud, before entering or leaving one sub-county to the other;
- Materials such as sand and stone should, wherever possible, be sourced from areas which are free of alien plants; and
- Any weeds found on the site, will not be mulched, but bagged and removed from the site.
- The species should be uprooted along the way-leave and should not be used to revegetate the area.
- Vegetation should be planted immediately after laying of the pipes to prevent establishment of invasive/colonizing species to establish in the area since they are regarded as quick colonizers of disturbed/bare areas.

7.3.17 Interference with the physical setting

The development of the proposed project could result into the following negative impacts to the physical setting:

- Change in local topography during site grading;
- Blockage of natural drainage systems;
- Creation of access routes and related structures;
- Creation of squatting spaces; and
- Development of informal business on the way- leave especially in dense populated areas (refer to photo plates 6-1 and 6-2 for photos of an informal structure being constructed at Kibagare Slum near the Kabete Reservoir and across Kiambu Kirigiti road respectively).



Photo plate 6-4: Ongoing construction of an illegal structure on top of the existing pipeline wayleave as the pipelines enter Kabete Reservoir.



Photo plate 6-5: Business structures on top of the Kiambu- Gigiri section of the existing transmission pipeline (across road in picture).

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-2*
Spatial scope of impact	*-3*
Duration of impact	*-2*
Frequency of activity / duration of activity	*-4*
Frequency of impact	*-4*
Result	***-56 Low - Medium***

Mitigation

- The Contractor should ensure restoration of the affected area to almost as it were before the construction works began or even in a better state
- Trees and grasses should be planted along the project area to improve the aesthetic view and landscape of the area
- AWSB should continually manage their wayleave to ensure there no informal settlements cropping up along the wayleave after the construction is completed
- Gabions should be constructed on hilly terrains to prevent deep erosion of the effected area caused by high speed surface run off down the valley
- The contractor must implement planned erosion control measures to avoid erosion in areas that are prone to erosion, e.g. steep slopes and drainage lines.

7.3.18 Increased water demand

During the construction phase of the proposed project, both the construction workers and the construction works will create demand for water in addition to the existing demand. Water will be mostly used in the construction of the anchor blocks, air releases and wash out chambers and for wetting surfaces or cleaning/ curing completed structures. It will be used by the construction workers to wash, cook and drink as well.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-3*
Spatial scope of impact	*-1*
Duration of impact	*-3*
Frequency of activity / duration of activity	*-4*
Frequency of impact	*-4*
Result	***-56 Low-Medium***

Mitigation

- The contractor should use water from the rivers sustainably to limit the amount of water being abstracted from the river for construction purposes. Adherence to the WRMA regulations should be observed.
- Clean water for drinking, cooking and other domestic water use should be provided to workers on site and at the contractor's campsite. The water quality provided to the workers must be in compliance with national regulations. This will prevent a possible outbreak of water borne diseases among the workers.

7.3.19 Wastewater generation

During the construction phase, various liquid wastes including grey and black water (respectively washing water and sewage), concrete washings, runoff from camp and workshop areas, and various liquid waste streams from washing construction vehicle and equipment washing will be

generated. These wastes pose real toxicity and quality threats to the soil and ground water, as well as the numerous rivers and streams.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-3*
Spatial scope of impact	*-2*
Duration of impact	*-3*
Frequency of activity / duration of activity	*-3*
Frequency of impact	*-4*
Result	***-56 Low - Medium***

Mitigation

- All grey water runoff or uncontrolled discharges from the site/working areas (including wash-down areas) to water courses should be contained and properly channelled;
- Water containing such pollutants as cements, concrete, lime, chemicals and fuels shall be discharged into a conservancy tank for removal from site;
- Potential pollutants of any kind and in any form shall be kept, stored and used in such a manner that any escape can be contained and the water table not endangered;
- Grey and black waste water from sanitation facilities and ablutions should be treated on-site through facility approved by the Resident Engineer;
- Care should be taken to ensure no risk of pollution of water courses in the vicinity of the approved treatment system;
- Wash areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas (including surface water bodies) are not polluted; and
- The contractor must act promptly on remedying any pollution incidents on site.

7.3.20 Soil pollution

Construction will involve use of large fleet of machinery powered by fossil fuels and requiring regular maintenance with other hydrocarbon-based substances like oil, grease etc. Improper handling or accidental spillage of these is likely to result in pollution of any receiving soils. This will affect both biophysical and chemical properties of the soils rendering them unsuitable for agricultural production as currently practised.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-3*
Spatial scope of impact	*-2*
Duration of impact	*-4*
Frequency of activity / duration of activity	*-3*
Frequency of impact	*-3*
Result	***-54 Low-Medium***

Mitigation

- No vehicle/plant maintenance shall take place on undesignated site. In case of emergency, a drip tray shall be used to avoid diesel and / or oil spills;
- Concrete mixing shall not be done on bare soil. Concrete must be mixed on mortarboards, a large metal sheet or concrete slab. The slabs for concrete mixing shall be removed on completion of construction works;
- Excavated material shall be stockpiled at a demarcated site, within the construction zone;

- Once the construction activities have terminated, rehabilitation of the area should be done including the area excavated soil was stockpiled.

7.3.21 Solid waste generation

Solid waste management is already a key problem in Kenya which streams down to all the counties. There is a challenge being experienced in disposal of solid waste hence some of the waste if not burnt or buried may litter all over and end up in the river ecosystem. Implementation of the project is expected to generate solid waste from construction materials, excavated materials and from the contractor's campsite. Solid waste generated include: debris generated as a result of demolition of buildings along the proposed way- leave, clearing of vegetation and trimmings off materials among others. Dumping around the site by construction workers will also interfere with the aesthetic status and has a direct effect on the surrounding community especially within the residential areas.

Poor disposal of solid wastes off- site by the construction workers and the contractors will also be an environmental and social hazard to the surrounding community. The off-site effects could be pest breeding, pollution of physical environment including water resource, invasion of scavengers, informal recycling by communities and reduction of aesthetic quality of the environment

Solid waste may also find its way into the river either through direct disposal or indirectly through surface run off leading to compromise of the rivers' water quality.

Solid waste will be generated from various construction activities. These will include among others waste metals, packaging for construction materials, office wastes and disused materials. Liquid wastes may include runoff water contaminated with spilled oils from construction equipment and other construction processes. All these waste will need to be properly managed and disposed discretely so as not to pollute the environment.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-3*
Spatial scope of impact	*-3*
Duration of impact	*-3*
Frequency of activity / duration of activity	*-3*
Frequency of impact	*-3*
Result	***-54 Low-Medium***

Mitigation

- The contractor shall formulate and implement suitable Waste Management Plan in line with Waste Management Regulations, 2006. The plan must cover both hazardous and non-hazardous wastes;
- For waste handling the contractor should provide litter collection facilities such as bins;
- Final disposal of the site waste should be done at a location that shall be approved by Resident Engineer in accordance with the Waste Management Plan after consultation with the relevant stakeholders, including the County Administration and local community;
- Any hazardous wastes generated must be handled appropriately and disposed of only by licensed hazardous wastes handlers only; and
- Ensure full compliance with the waste Management Regulations, 2006.

7.3.22 Negative social change

During construction phase it is expected that there will be an influx of workers from varied cultures and social practices. The project area on the other hand can be categorised into rural, peri-urban and urban settlements hence resulting in a range of cultures from homogenous conservative communities to metropolitan communities in the major towns and Nairobi City.

Interaction with the project staff can therefore lead to positive influences in the form of promotion of diversity in ways of thinking, experience of new cultures and exposure to new expectations in goals and achievements. On a higher level, these influences can result in adoption of new trends in social interaction, modes of dress, leisure time activities and spending habits.

These interactions can however lead to negative attitudes if it is perceived that the new trends have resulted in vices and deviant behaviour among community members.

Impact Analysis Matrix

Impact Without Mitigation	
Severity of impact	*-3*
Spatial scope of impact	*-3*
Duration of impact	*-4*
Frequency of activity / duration of activity	*-3*
Frequency of impact	*-4*
Result	***-51 Low***

Mitigation

- The Contractor should establish a community liaison system to handle complaints from the community. This system should include a community liaison desk that is easily accessible by the community representatives and their leaders;
- Ensure there is adequate security and reasonable controlled access to project offices and residential quarters of immigrant staff;
- The contracts for project employees should include codes of conduct with regard to interaction with the local community, use of public and social amenities in the locality, handling of complaints from the local community
- Establish a grievance management system to handle internal complaints from project staff;
- For complaints from the community concerning project staff, ensure that the RE's Office is appraised with the issues at hand and resolution measures taken;
- Establish and maintain contact with the local security officials from the Ministry of Interior such as the Deputy District Commissioner and the Area Chief

7.3.23 Shifting of unskilled labour force from agriculture to construction

During the construction phase, the project will create a huge opportunity for unskilled labour for several man months. When wages offered are considerably higher than prevailing rates in agricultural sector, this can result in significant shift of the unskilled labour currently engaged in tea and coffee picking to construction activities. Tea and coffee farming are the main economic activity in the project area in Gatanga sub-county and Kiambu County respectively. Thus such shifting can result in reduced tea and coffee and delivery of fresh products to the local factories leading to reduced output and associated losses to farmers and in export revenues. However, hiring at the local level is not expected to cause any overwhelm in the local labour market or to significantly affect the availability of casual workers to serve the tea and coffee plantations and other businesses within the project area.

Additionally, wages offered at the construction sites may lure some in the school-going age-groups who may then opt to drop out of school to gain from the project. When employment is granted by the contractor, this can lead to temporary increase in school drop-outs in the project area over the construction period lasting about three years.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-2*
Spatial scope of impact	*-3*
Duration of impact	*-2*
Frequency of activity / duration of activity	*-4*
Frequency of impact	*-3*
Result	***-49 Low***

Mitigation:

- The contractor should offer wages within the prevailing market rates Kenya; and
- Contractor must abide by local labour laws international best practice and avoid any employment of underage individuals.

7.3.24 Air pollution (Dust and exhaust fumes emissions)

During construction, excavation would lead to loosening of the soil that would eventually lead to the production of dust that would pollute the air. This is pollution by particulate matter. The particulate matter will settle on most plants and stationary apparatus found in the area. Heavy vehicles and machinery used during construction may emit exhaust fumes to the air. Thus, people living within the affected area are predisposed to an increased risk of respiratory diseases such pulmonary exacerbations, lung infections, asthma among others.

The following areas were cited to be most critical when it comes to controlling Air pollution:

- Urban/town centres where the area buzzes with traders and consumers, hence plenty of activities will be on-going in such places even during the construction period
- At the district, hospital staff and patients will be affected by dust from the excavation of trenches for pipe laying.
- Farmers who carry out their daily operations at the farmlands will be affected by particulate matter emissions such as dusts and smoke.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-2*
Spatial scope of impact	*-3*
Duration of impact	*-3*
Frequency of activity / duration of activity	*-3*
Frequency of impact	*-3*
Result	***-48 Low***

Mitigation

- Regular sprinkling of water should be done at least thrice a day during the construction phase.
- The cleared area should be revegetated immediately after construction to prevent airborne dust to wind gust
- Reduce truck speeds to avoid stirring up the dust;
- Situate the contractor's campsite away from dense populated areas;

- Turn off machines that are idle reduce air emissions;
- Workers at the construction site should be issued with PPEs such as dust masks to reduce their direct interaction with dust and vehicle emissions.

7.3.25 Oil spills/leaks

Improper handling or storage of fluids from the machines used during construction may lead to accidental oil spills along the project area. Thus the most likely impact will be contamination of soil, surface waters and sometime ground waters. Contaminated soil is injurious to plant growth and must be removed. Contamination of water is potentially more serious since pollutants may move fast destroying aquatic life such as fish and rendering water unsafe for domestic and livestock use.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-3*
Spatial scope of impact	*-3*
Duration of impact	*-2*
Frequency of activity / duration of activity	*-3*
Frequency of impact	*-3*
Result	***-48 Low***

Mitigation

- There should clarity in labeling and storage of fluids in secure place (such as containerization or burying of tanks) with minimal ease of contamination in case of spills or leaks
- Implement Standard Operating Procedures (SOPs) for working in water, including checks on equipment condition (especially leaks of oils, fuel, hydraulics), refuelling protocols (at safe location away from water, availability of spill kits and knowledge of their use, and emergency spill procedures);
- Any on site/camp storage areas for fuels, oils or other liquid chemicals should be stored away from surface water drains. They must have an impermeable base and bund with a capacity of 110% and would not drain directly into the surface water drains. Where practicable, drainage from storage compounds would be passed through oil interceptors prior to discharge;
- Vehicle maintenance should be done on purpose-built impervious concrete platforms with oil and grease traps;
- Any on site oil and fuel storage must be well bunded and located away from natural drainage and storm water channels;
- Ensure that all equipment are in good condition, clean and free from leaks;
- Oil spill containment and cleanup equipment should be kept at the contractor's camp. The Contractor shall construct oil skimming tanks at the locations directed and in accordance with details approved by the Engineer. Oil recovered from the skimming tanks shall be stored in drums and removed from the site for safe disposal.
- Contractor shall monitor effluent discharge from the oil skimming tanks. Effluent discharge shall not exceed 25 mg/litre or the limit specified by the NEMA.

7.3.26 Immigration and settlement

The creation of employment opportunities during the construction phase of the project is going to attract immigrants regionally into the project area. The projected increase in population will create more pressure on the existing social utilities such as medical centres in the project area. The new immigrants with diverse cultures will also expose the area to different Kenyan cultures; the project is mainly inhabited by members of the Kikuyu community.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-2*
Spatial scope of impact	*-3*
Duration of impact	*-3*
Frequency of activity / duration of activity	*-2*
Frequency of impact	*-4*
Result	***-48 Low***

Mitigation

- Monitor the trend of migration during the project implementation and adjust the required utilities accordingly.
- Engage a community liaison officer with knowledge on local cultures and social structures to facilitate smooth engagement between the local community and project staff from different cultures; and
- Sensitize the project workers on local culture.

7.3.27 Growth of unplanned settlements

High immigration of people for work purposes will strain local resources especially accommodation and may lead to emergence of unplanned settlements.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-2*
Spatial scope of impact	*-2*
Duration of impact	*-3*
Frequency of activity / duration of activity	*-2*
Frequency of impact	*-4*
Result	***-42 Low***

Mitigation:

- As much as feasible, the unskilled labour should be obtained from amongst the locals;
- Liaise with respective county government of Muranga, Kiambu and Nairobi to control developments in the area and ensure provision of adequate services

7.3.28 Cultural and archaeological sites

Presence of any physical cultural and historical sites within the project area was not identified along the project area during socio-economic survey. However, presence of sacred *Mugumo* trees was confirmed by ecological surveys and whenever encountered, these will have to be avoided as far as feasible. Chance finds of physical cultural and historical sites may occur during construction and such sites may be damaged by excavation activities.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-2*
Spatial scope of impact	*-2*
Duration of impact	*-2*
Frequency of activity / duration of activity	*-3*
Frequency of impact	*-3*
Result	***-36 Low***

Mitigation

- Sacred Mugumo trees encountered within the project area should be avoided wherever feasible. These should be identified by the contractors' environmentalist;
- Contractor should sensitize all staff on local cultures and discuss with local community whenever a Mugumo tree has to be cut; and
- The contractor should develop and implement a chance find procedure in case archaeological sites are found during the construction process. Such procedure must incorporate liaison with the National Museum of Kenya.

7.3.29 Traffic and transport inconvenience

Traffic flow will be disrupted mainly at the areas where the pipeline is being laid along/across the road reserves hence construction vehicles are likely to increase the traffic jam around these areas. Inconvenience will also arise from obstruction of one side of the lane due to movement of construction vehicles. This will reduce the width of the road to be used by the motorist through temporal closure of lane(s) resulting to traffic inconvenience.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-3*
Spatial scope of impact	*-1*
Duration of impact	*-2*
Frequency of activity / duration of activity	*-3*
Frequency of impact	*-3*
Result	***-36 Low***

Mitigation

- The contractor should restrict the constructions works to the time of the day when there is limited traffic flow along the affected roads i.e. restrict pipeline construction works from 11am to 3pm.
- Contractor/AWSB should put up a notice to inform the affected road users on the likely inconvenience with specified dates and length of time for the construction works
- Contractor should stick to the area designated for construction works to prevent the likelihood construction vehicles obstructing the whole road.
- Contractor should ensure excavated materials are not being hauled on the pavements or along the road. The materials should be deposited at designated site.

7.3.30 Increase in HIV/AIDS incidence

National Aids Control Council estimated the HIV/ AIDS prevalence in Muranga, Kiambu and Nairobi counties stands at 5.2%, 4.4% and 8.6% respectively. Nairobi was noted to have the highest HIV/AIDS prevalence compared to Muranga and Kiambu.

The influx of people working on the construction from other towns may increase risk of new infections rates. Researchers have indicated that HIV prevalence rates are higher among spouses who stay work away from town and spend away from home for more than a week. This group of individuals are mostly truck drivers and other employees who work for the contractor and are brought in as skilled labourers.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-2*
Spatial scope of impact	*-1*
Duration of impact	*-3*
Frequency of activity / duration of activity	*-2*
Frequency of impact	*-3*
Result	***-30 Low***

Mitigation

- Offer HIV/AIDS sensitization to the skilled and semi-skilled construction staff in collaboration with local health facilities;
- Provide condoms at strategic points within the contractors camp, dispensers near lodges and hospitals where people are likely to pick them;
- Offer VCT services to the community with the help of local health facilities;
- As far as possible, hire local community members in the semi-skilled category. Interventions to support this may include training of local community members to enhance their qualifications.

7.4 Positive impacts during operations

The following are some of the potential positive impacts of the proposed Thika-Kigoro-Kabete Gravity Water Pipelines during the operation phases.

7.4.1 Creation of job opportunity

During the operation phase, there will be employment opportunities, especially for those who will be employed to manage the, maintain and scout the proposed pipeline right from Thika dam to Kabete Reservoir in Westlands Sub County, Nairobi City County as NCWSC will require people to monitor the pipeline at different locations to reduce impacts of vandalism and illegal connections..

Employment opportunities created during the project operation will definitely improve the living standard of the surrounding local community

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*+5*
Spatial scope of impact	*+5*
Duration of impact	*+4*
Frequency of activity / duration of activity	*+5*
Frequency of impact	*+5*
Result	***+140 Very High***

Recommendation

- All construction workers should be employed and remunerated in accordance with the provisions of Kenyan labour laws and best international practices as contained in ILO and IFC Performance Standard 2: Labour and Working Conditions;

7.4.2 Achievement of MDG goal 7a

Water provision is one of the Millennium Development Goals (goal No. 7a) for the world and definitely for our developing nation of Kenya as well as it is enshrined in the Vision 2030 development blueprint. Quick access to clean water has been identified as one of the key pillars for alleviation of poverty. It is therefore envisaged that the continued existence of the proposed project will promote the improvement of water supply in the project areas within which the proposed project will operate.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*+5*
Spatial scope of impact	*+4*
Duration of impact	*+4*
Frequency of activity / duration of activity	*+5*
Frequency of impact	*+5*
Result	***+130 Low - Medium***

7.4.3 Increased access to clean portable water by Nairobi residents

Water supply to Nairobi is less than the water demand from the booming Nairobi population. Currently the water supplied to Nairobi is estimated at 540,000m^3/day against the existing demand estimated at about 750,000m^3/day. Additional water drawn from Thika dam through the Thika-Kigoro-Kabete Transmission pipeline will increase the availability of clean water to the residents of Nairobi. The pipeline is projected to increase the water supply by 120,960m^3/day.

Piped water should also be provided to 60% population living in the informal settlements and slums through water points. This will ensure this people get clean and uncontaminated water hence boosting their hygiene and reduce the risk of water borne diseases among the communities. This development can be done through WASSIP project which build abolition blocks and water points to the residents living in slum areas around Nairobi.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*+5*
Spatial scope of impact	*+4*
Duration of impact	*+4*
Frequency of activity / duration of activity	*+4*
Frequency of impact	*+5*
Result	***+117 High***

Access to clean water will reduce the level of poverty and water borne diseases among the residents of Nairobi.

7.4.4 Increased revenue

The proposed development will ultimately provide revenues to the government and expand the wealth base for the nation as a whole through payment of water bill as the water will be distributed to various people.

The proposed project will contribute towards the boosting of Government revenue in the form of Pay As You Earn (PAYE) and Value Added Tax (VAT) for the operating licenses and corporation tax at 30% of net income.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*+4*
Spatial scope of impact	*+4*
Duration of impact	*+5*
Frequency of activity/duration of activity	*+4*
Frequency of impact	*+5*
Result	***+81 Medium- High***

7.4.5 Improved sanitation

Availability of water is key in achievement of high sanitation standards world over. It has been demonstrated that with the availability of potable water, hygiene is assured and public health received a boost. Water delivered to users in distribution systems, such as those that will be served by the proposed Thika-Kigoro-Kabete water gravity pipelines, is considered the safest means and will ensure improved human and environmental health.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*+5*
Spatial scope of impact	*+4*
Duration of impact	*+4*
Frequency of activity / duration of activity	*+5*
Frequency of impact	*+5*
Result	***+130 Very High***

7.4.6 Spurred Growth of Rural Centres

With the operation of the Kigoro Treatment Plant it is expected that some of the rural centres like Kigoro and Kanunga are going to experience increased economic activities. The plant operation will improve the infrastructure and housing system around this area as offices and houses will have to establish for the peoples working at the treatment works. Thus a need for a better shopping centre will spur the growth of the mentioned areas. Additionally, such growth will lead to improvement in provision of social services by the Government e.g. construction of new schools and hospitals and administrative activities.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*+4*
Spatial scope of impact	*+3*
Duration of impact	*+5*
Frequency of activity/duration of activity	*+5*
Frequency of impact	*+5*
Result	***+120 Low - Medium***

Growth of such centres should be promoted through provision of commensurate public facilities including water and sanitation services.

7.4.7 Boosting transmission capacity of water from Thika Dam to Nairobi City

With the operation of the proposed Thika-Kigoro-Kabete gravity water transmission pipeline, which includes connection to the Kigoro Treatment Plant in Gatanga Sub County, the gravity mains will boost the water supply carrying capacity from Thika (*Ndakaini*) dam hence more water will be distributed to more people in Nairobi.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*+5*
Spatial scope of impact	*+2*
Duration of impact	*+4*
Frequency of activity / duration of activity	*+4*
Frequency of impact	*+5*
Result	***+99 Medium- High***

7.5 Negative Impacts during operation phase

The following are negative impacts associated with the proposed Thika-Kigoro-Kabete Treated Water Gravity Pipeline.

7.5.1 Increased domestic wastewater generation

The proposed project will result in increased waste water generation since more people in Nairobi are expected to get access to water for domestic activities such as washing, cooking and flushing toilets. According to the socio-economic studies in Nairobi the current amount of domestic waste cannot be supported by the existing sewerage networks and worse the treatment plant located in Dandora and Kariobangi area. Therefore as more waste is generated statistics show that that is about 80% of the 145,000 m^3/day water supplied will be used thus water will eventually be generated as waste water however Nairobi currently does not have space to store and treat additional domestic waste. This means that ore wastewater will be released into the rivers degrading the status of the river ecosystem even further. The rivers that will be directly affected are those along the Nairobi River Basin which form tributaries of Athi River hence affecting the quality of water downstream of Athi River. Thus, lack of improper sewerage system in Nairobi and its environs is likely to pollute rivers more once the new water supply pipelines become operational.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-4*
Spatial scope of impact	*-4*
Duration of impact	*-4*
Frequency of activity / duration of activity	*-4*
Frequency of impact	*-4*
Result	***-96 Medium-High***

Mitigation

- Expansion of the sewerage system and the sewer treatment works to cater for the increase wastewater likely to be generated by increased water supply.
- Informal settlement should be encouraged to connect their toilets to the nearby sewerage line.

7.5.2 Vandalism of the gravity pipeline

During the transect walk along the pipeline, it was observed that most of the washout and air valves coves had been stolen while some of the chambers vandalised as shown in photoplate 6-7 below. Thus this means that means there is likelihood of vandalism of pipeline infrastructures especially manholes for the washouts, air valves and swabs and other chambers along the pipeline. During the interview, this activity was associated to lack of income or poverty level among people in the community hence looking for different methods of earning an income. Vandalism of pipeline infrastructure will lead to high maintenance cost.



Photoplate 6-7: Vandalism of pipeline appurtenances observed along the existing wayleave

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-4*
Spatial scope of impact	*-4*
Duration of impact	*-4*
Frequency of activity / duration of activity	*-4*
Frequency of impact	*-4*
Result	***- 96Medium- High***

Mitigation

- Use of cement closing chambers for the respective manholes compared to the metallic ones;
- Continuous surveillance of the pipeline reserve to reduce the rate of vandalism along the pipeline;
- Employ local people to monitor a respective area along the pipeline to deter vandalism currently taking place.

7.5.3 Pollution of rivers and destruction of crops

The proposed project will require swabbing of the pipeline after some time during the operation phase. The waste water from the pipes may significantly affect the surrounding farms next to the swabbing chambers and pollute the rivers that they will be discharged into if proper channels are not provided. This impact has been recorded in the current operations.

The released water can destroy crops and accumulate in ponds posing a hazard to the neighbours. Repair and maintenance of the pipeline can also lead to pollution of the rivers especially if the area to be repaired is near a river.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-4*
Spatial scope of impact	*-3*
Duration of impact	*-4*
Frequency of activity / duration of activity	*-4*
Frequency of impact	*-4*
Result	***-88 Medium - High***

Mitigation

- NCWSC should ensure that the discharge from the treatment plant is treated to the recommended standards in the Water Act before being released to Thika River.
- Trees and grass should be planted around the swabbing chambers to reduce the velocity of the water downstream during the pipe cleaning
- Papyrus reeds should be planted where the washed out waters from the swab chambers enters the river. This will help in purification of the discharged water.

7.5.4 Destruction of land/assets by washout

The washouts will release substantial amount of water during regular cleaning of the pipe. However this water can be a hazard if released in large quantities over unprotected terrain, i.e. at the steep slopes of land close to Ngethu Treatment Plant as noted by some of the stakeholders. (Refer to Chapter 6 for summary of comment(s).

From field observations it was noted that some of the washouts (more than 50) will be constructed at areas that are far from river or streams and some are located in very small streams that cannot withhold the amount of water being released (see diagram below) hence flooding the surrounding areas will likely occur as has been witnessed with the current installations. These have led to continuous destruction of crops and even structures along the way.

Washout water could also be consumed directly by local residents and this could pose as a health hazard to the users for untreated water.



Photoplate 6-8: Water being released from the washout at high pressure through a channel constructed from the washout to the river. (Right location of washouts).



Photoplate 6-9: Washout located on a very small steam (less than 1m wide). The crops planted are often flooded when the washout is opened.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-4*
Spatial scope of impact	*-2*
Duration of impact	*-4*
Frequency of activity / duration of activity	*-4*
Frequency of impact	*-4*
Result	***-80 Medium - High***

Mitigation

- Washout channels to the rivers/valleys should be created in such a manner that the water velocity is almost the same as that of the river to avoid degradation of the river banks or the valley;
- Canals leading to a river channel should be created at all washouts. Those that are not located near river system, land should be acquired to constructs washout canals up to the nearby river;
- Regular maintenance of the washouts should be carried out;
- NCWSC should ensure the channels are in good conditions to minimize the quantity of stagnant water around the washout. This will reduce health hazards associated with stagnant waters.

7.5.5 Risks as a result of tempering with the pipeline

Those tempering with valves on the pipeline are likely to be hit by high pressure within the transmitted water pipeline leading to death and injuries of those tempering with the valves. The valve chambers were observed to be dangerously deep; this could pose as a hazard especially to young inexperienced people living around the chambers who may opt to play close to them.

Although the risk of pipe burst is insignificant due to pipe material used and the high technology involved in the construction of the pipeline, this may likely arise especially at areas where excess mechanical pressure is applied on the pipe i.e. during road constructions.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-4*
Spatial scope of impact	*-2*
Duration of impact	*-4*
Frequency of activity / duration of activity	*-3*
Frequency of impact	*-4*
Result	***-70 Low - Medium***

Mitigation

- Capacity building and community awareness should be created among the locals on the dangers of tampering with the pipeline;
- NCWSC should employ a person among the communities for local surveillance of the pipeline within a certain area.
- Flow measuring meters have been provided at specific areas along the pipeline to monitor any abnormal flow of water along the pipeline. This will easily detect the defect hence action will be taken to ensure minimal destructions of life or assets.

7.5.6 Safety of the community leaving near the pipeline

During the field study, it was observed that some of the residence living along the pipeline use the pipes or the steel bridge constructed across the river to support the pipelines crossing from one side of the river to the other. Some of the locals were seen riding bicycles on top of the pipeline while children were seen playing along the pipes (running to and fro on top of the pipes). This my leads to risks of accidents of the people since one may trip and fall off into the river, breakage of grills used to build the bridges and incase of the pipe being faulty it may break and the high pressure water may cause death

In the areas where the terrain is high, there is rapid soil; erosion hence exposing the pipes to the agent of erosion. Exposure of the pipeline to the agent of erosion i.e. high speed surface runoff during rainy season will degrade the status and eventually cause it to burst. The high pressure water will destroy the surrounding land, crops and may even cause death of anyone found near the area of impact.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-4*
Spatial scope of impact	*-3*
Duration of impact	*-4*
Frequency of activity / duration of activity	*-3*
Frequency of impact	*-3*
Result	***-66 Medium-High***

Mitigation

- AWSB should fence out the pipeline wayleave immediately after construction to prevent encroachment into the pipeline;
- ASWB should fence out the areas where the pipeline is exposed to prevent people from using the pipe as the bridge;
- Sensitize the locals on the expected dangers of using the pipeline as a bridge;
- AWSB can build a bridge as alternative way of during locals from using the pipe to cross over to the other side of the river.

- Pipeline wayleave should be revegetated with grass to prevent soil erosion hence reducing the possibility of the buried pipes being exposed.

7.5.7 Illegal connections

Illegal connections are likely to occur along the pipeline especially where there are informal settlements. For instance, pipes were observed to be illegally connected to the washouts found at Kirigithi informal settlement, Kiambu municipality. Such connection leads to increase quantity of unaccounted for water and sometimes may result to destruction of pipeline and unaccountable losses.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-3*
Spatial scope of impact	*-2*
Duration of impact	*-4*
Frequency of activity / duration of activity	*-4*
Frequency of impact	*-3*
Result	***-63 Low - Medium***

Mitigation

- Regular audit should be contacted to ensure the pipeline is well maintained and there no illegal connections created along the pipeline;
- Awareness should be carried out among the locals living along the pipeline on the impacts of interference with the pipes;
- Penalty should be passed upon individuals/groups that have establish an illegal connection to the pipeline;
- Workers should be employed to strictly manage and monitor the pipeline wayleave to prevent people from malpractices behaviour.

7.6 Impacts during decommissioning phase

Decommission refers to the formal process of removing something from the operational status. It requires time in order to properly deal with potential hazards and risks that may be encountered.

Decommissioning a water supply system or section of the system (as may be applicable) means takes several steps that should be taken in to account to avoid any catastrophic impacts during the activities involved.

A typical decommissioning phase involves water evacuation from the pipe, securing of air valves and washouts among others. Decommissioning impacts are closely related to the reason for undertaking the decommissioning itself, which may include, but not limited to the discussed anticipated impacts.

7.7 Positive Impacts during decommissioning phase

7.7.1 Employment Opportunities

Decommissioning of both the pipeline and the treatment plant will create job opportunity for both the skilled and unskilled people at the project area. The activities will entail removal/destruction of

the materials used, auditing the process and handling of the chemicals used. Several workers including casual labourers, plumbers and engineers are expected to work on site for a period time.

Indirect economic opportunities will also be created through persons selling different wares to the workers at the plant. These will improve economic situation in the project area and temporarily reduce unemployment levels.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*+3*
Spatial scope of impact	*+3*
Duration of impact	*+2*
Frequency of activity / duration of activity	*+4*
Frequency of impact	*+5*
Result	***+72 Low - Medium***

7.7.2 Site Rehabilitation

Decommissioning phase will lead to rehabilitation of the site that was cleared to pave way for construction of the Thika-Kigoro-Kabete pipeline. This will ensure that the environment is left as natural as possible close to or better than before.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*+4*
Spatial scope of impact	*+2*
Duration of impact	*+5*
Frequency of activity / duration of activity	*+5*
Frequency of impact	*+5*
Result	***+110 High***

7.8 Negative Impacts during decommissioning phase

7.8.1 Loss of portable water to residents

During decommission period, the pipeline will be rendered dysfunctional hence leading to loss of portable water to Nairobi residents. This will affect a good percent of Nairobi population and its environs since there will be difficult in access of clean water, loss of income for water vendors and increase in water-related diseases due to poor hygiene.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-4*
Spatial scope of impact	*-2*
Duration of impact	*-5*
Frequency of activity / duration of activity	*-4*
Frequency of impact	*-4*
Result	***-88 Medium - High***

Mitigation

- AWSB should provide an alternative access to portable water before the operation period of the pipeline and treatment plant expires;
- Awareness should be carried out early in advance to inform the people on the decommissioning period and its anticipated impacts.

7.8.2 Noise and vibration

Dismantling, excavation and destruction of the pipeline will generate excessive noise to the people living at or near the project area. Noise pollution from the machinery and explosives used during decommissioning exercise is likely to be experienced. Thus excessive noise, particularly when experienced continuously, outside normal working hours and on rest days, can be a nuisance to both workers and the public. In extreme cases, it may become a health hazard.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-4*
Spatial scope of impact	*-3*
Duration of impact	*-2*
Frequency of activity / duration of activity	*-4*
Frequency of impact	*-4*
Result	***-72 Low - Medium***

Mitigation

- The exercise shall be carried out during the day when most people are out of their homes
- Noise levels shall be kept within acceptable limits preferably as stipulated within the Environmental Management and Coordination Act (Noise and Excessive Vibration Pollution) Control Regulations, 2009 and construction activities shall, where possible, be limited to normal working hours;
- Contractor must be required to monitor noise and vibration in sensitive locations (hospitals, teaching facilities, churches) to ensure the NEMA requirements on noise and vibration are met and if the standards are exceeded measures must be taken to reduce noise and vibration;
- Workers exposed to high-level noise must wear personal protective equipment (PPE);
- Use of silencers on the construction plant, where applicable, should be encouraged;
- Residents in close proximity should be given at least 24 hours notification of any abnormal noise source e.g. planned blasting.

7.8.3 Generation of waste

It is expected that large amounts of solid waste material arising during decommissioning will include: glass panels, stones, pipes, wood, metal, paper, plastic, equipment, vegetation, etc. The proper disposal of these materials is critical.

Although demolition waste is generally considered as less harmful to the environment since they are composed of inert materials, there is growing evidence that large quantities of such waste may lead to release of certain hazardous chemicals into the environment. In addition, even the generally non-toxic chemicals such as chloride, sodium, sulphate and ammonia used in the water treatment process may be released as a result of leaching of demolition waste leading to degradation of surface and ground water quality.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-3*
Spatial scope of impact	*-2*
Duration of impact	*-2*
Frequency of activity / duration of activity	*-3*
Frequency of impact	*-4*
Result	***-49 Low***

Mitigation

- Disposal of solid waste in compliance with EMCA 2006 Waste Management Regulations;
- Segregation of waste to encourage reuse and recycling;
- Ensuring that the contracted waste collector is registered with NEMA to collect and dispose wastes.
- Chemical should be disposed according to the set;
- Careful disposal of chemical waste from the treatment plant.

7.8.4 Dust/fume emission

Dust emissions are expected demolishing of structures and excavation of Thika-Kigoro-Kabete water pipelines. Fumes from exhaust of the vehicles used during decommissioning will be experienced in the area. This will affect demolition staff as well as the neighbouring residents.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-3*
Spatial scope of impact	*-3*
Duration of impact	*-2*
Frequency of activity / duration of activity	*-3*
Frequency of impact	*-4*
Result	***-56 Low - Medium***

Mitigation

- Practice dust management techniques such as watering the project area during drier period;
- Provide and enforce the appropriate use of PPE against dust.

7.8.5 Occupational safety and health hazards

If demolition process is not handled with care it may lead to exposure of the workers and surrounding communities to chemicals resulting to health risks situations. Machinery and equipment also used during the process may also pose as danger to the workers if not handled well and with the correct PPEs.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-4*
Spatial scope of impact	*-2*
Duration of impact	*-2*
Frequency of activity / duration of activity	*-4*
Frequency of impact	*-4*
Result	***-64 Low - Medium***

Mitigation

- Provide the correct PPE for the workers when conducting the demolition activities;
- Conduct training on health and safety procedures to the workers prior to commencement of demolition;
- Proper plans should be made prior to demolition so as to contain waste water that poses as health risk to human beings and the environment, to prevent the workers and surrounding communities from contact with it.

7.8.6 Loss of source of income

The people that will be employed to operate and maintain the water supply system will lose their jobs immediately after the closure of the project. The loss of jobs will have far reaching impacts as it will lead to loss of income and social stress.

Mitigation

- Notify the employees in advance on the project closure date and adequately compensate them;
- Dismissal procedures to be compliant with Employment Act, 2007;
- Provide counselling & alternative skills for alternative activities;
- Employer should find alternative means of livelihood for the staff who were employed at the solar power plant.

7.8.7 Social deviance

Loss of jobs may lead to increase of social deviance behaviour among the people. This may increase number crime case and HIV prevalence in Kigoro.

Impact Analysis Matrix

Impact without Mitigation	
Severity of impact	*-3*
Spatial scope of impact	*-2*
Duration of impact	*-4*
Frequency of activity / duration of activity	*-3*
Frequency of impact	*-3*
Result	***-54 Low - Medium***

Mitigation

- Employer should find alternative means of livelihood for the staff who were employed at the treatment workers and those who used to conduct surveillance along the proposed pipeline.
- Notify the employees in advance on the project closure date and adequately compensate them.

7.9 Cumulative Impacts

Cumulative impacts relate to the aggregate of past, present and future actions, and may also arise from additional factors or developments related to the construction of Thika-Kigoro-Kabete Pipelines. Effects from different activities may also interact to cause additional effects not initially apparent when considering the individual developments or changes, and there may also be synergistic interaction between different factors. The following cumulative impacts are anticipated from implementation of Thika-Kigoro-Kabete Gravity Water Pipeline.

7.9.1 Cumulative impacts on wastewater management in Nairobi City

When Thika-Kigoro-Kabete Pipelines becomes operational, there will be increase in water supply to Nairobi residents as the pipeline is estimated to add about 120,960m^3/day to Nairobi. Currently the water supplied to Nairobi from Ngethu WTW stands at 540,000m^3/day against the demand of 750, 000m^3/day. This implies that the more the water available per household the more the usage hence the higher the amount of domestic waste generated.

The existing sewer network covers an area of about 208km^2, which is less than 30% of the 696km2 area of the city. It is unclear what share of the population is connected to the sewerage system but estimates vary from 10 to 48%. Moreover the two wastewater treatment plants in Nairobi treat about 112,000m^3/day of waste. Dandora stabilisation ponds treat industrial and domestic sewage and have a design capacity of 80,000 cubic meters per day. They constitute the largest pond system in Africa, but as of 1996 only half its capacity has been used. The Kariobangi wastewater treatment plant has a capacity of 32,000m^3 per day and uses the trickling filter technology. The effluent from both plants is discharged into the Nairobi River.

More than 80% of clean water result into domestic waste water inform of sewage. Adversely, only 36% of households in Nairobi are connected to the sewer systems thus the remaining 64% either use septic tanks, pit-latrine or nothing. According to statistics the largest proportion of the 64% of households are found in the informal settlements and slums. Some of the wastes are released directly to the surrounding river or storm water drains and some septic tanks are abandoned or opened up for the waste to be carried off the surface run-off during rainy seasons.

These wastes both domestic and industrial mainly end up in Nairobi River Basins which lead to BOD conditions hence eutrophication of river system. The impact of poor sanitation is eventually felt at the lower end of Athi River Basin and eventually Tana River affecting the aquatic life and domestic water use.

Therefore with the increased water supply in Nairobi ii is likely that the impact of grey water due to domestic and industrial waste presence in rivers will increase since the existing sewerage system cannot even cater for the current domestic and industrial waste water being channelled to the treatment plant.

Recommendation

- AWSB should expand the sewerage system to cover more households and in tandem expand the treatment plant in Dandora and Kariobangi. If possible AWSB can also construct a new treatment to take care of the increased water supplied to Nairobi residents. These will meet MDG goal 7 and also Kenya Vision 2030.
- Through WaSSIP sanitation blocks encompassing of toilets, bathrooms and taps with clean water can be put up informal settlement and connected to the sewerage network. This will ensure the population in the informal settlement has access to clean water and also better sanitation hence reducing the impact of direct waste being released to the

rivers

- AWSB should expand their pipeline networks to cater more for the low and middle income population to ensure more people have access to water during the better part of the week. This will highly improve the sanitation conditions of such area
- The number of exhaust vehicles used to empty septic tanks that are full should be increased so as it can cover a larger population
- Better roads should be constructed in the informal settlements to ensure easy access of exhaust vehicles to most parts of the areas especially in informal settlements and slums hence this the amount of untreated sewage being directly released /channelled into the river ecosystem
- Education awareness should be carried out to train the people on the impact of releasing raw sewage into the rivers ecosystem and the threat the residents are exposing themselves to.

7.9.2 Wayleave acquisition

With the construction of Ngethu Treatment Plant, so as to supply water to Nairobi, a pipeline wayleave had to be acquired to allow laying of the pipeline from Ngethu to Kabete Reservoir in Nairobi. Therefore; in 1971 a first pipeline wayleave of 12m had to be acquired to pave way for the pipelines. The 12m wayleave was then extended by 6m in 2002. This sums up the width of pipeline wayleave from Ngethu to Kabete to 18m. The acquisition of this wayleave has had several impacts to PAPs. These impacts include the following;

- The continuous sub-division of PAPs plot into two sections and reduction of land to tiny plots has rendered some of the land along the pipeline wayleave uneconomically viable. Therefore, acquiring the additional 3m wayleave may leave some of the land owners with no land and very small plots that may barely yield any proceeds;
- Inadequate compensation of land during the previous wayleave acquisition has caused PAPs to resist the project until they come into agreement with the AWSB on the proper compensation of previous 18m wayleave before allowing the acquisition of the additional 3m wayleave.
- Poor restoration and revegetation of pipeline wayleave in Kiambu has led to continuous soil erosion creating gulleys which has affected the lands and assets adjacent to the pipeline wayleave

Recommendation

- AWSB should sought out the issues concerning the previous wayleave acquisition before the start of the construction works;
- AWSB should permanently acquire the 3m land for the pipeline wayleave and compensate PAPs according to the RAP;
- AWSB should ensure proper revegetation of the area is done to curb the impact of soil erosion.

8 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

8.1 Introduction

The Environmental and Social Management Plan (ESMP) is prepared to show how site specific concerns and mitigation measures are addressed through the engineering, procurement, construction and operation phases of the project. It provides a link between the impacts of project activities and the mitigation measures put in place to minimize expected negative impacts and enhance the positive impacts.

At completion of construction, ownership of the project will be transferred from AWSB to NCWSC who will be responsible to implement environmental management measures associated with operation phase of this project.

8.2 Responsibilities of the ESMP

In order to ensure sound development and effective implementation of the ESMP, it is necessary to identify and define the responsibilities and authority of the various persons and organisations that will be involved in the project. Entities that should be involved in the implementation of this ESMP include but are not limited to the following:

- AWSB;
- NCW&SC;
- Contractor (s);
- Ministry of Environment, Water and Natural; resources;
- NEMA;
- WRMA;
- Directorate of Occupational Safety and Health;
- Department of Mines and Geology;
- KFS and KWS;
- County government of Murang'a;
- County government of Kiambu;
- County government of Nairobi and
- Local administration.

(a) AWSB / Project Implementation Unit (PIU)

The project implementing agency is AWSB under the Ministry of Environment, Water and Natural Resources. AWSB has set up a Project Implementation Unit (PIU), with a Technical Manager.

AWSB should co-ordinate all aspects of the environment during project implementation and operations (with involvement of NCWSC). This should include following the construction to monitor, review and verify the implementation of the project's ESMP.

(b) Project Contractor (s)

A project contractor will be appointed by AWSB. The contractor must be required to comply with the requirements of the ESIA, the ESMP within this report, any ESIA licences

conditions as may be issued with NEMA as well as all relevant legislations.

(c) Ministry of Environment, Water and Natural Resources

All key government environmental and water management and conservation agencies are under the Ministry of Environment, Water and Natural Resources. The ministry is responsible for overall policy direction and is hence better placed to ensure coordination of the said agencies for the conservation and management of the available natural resources within the Aberdare and Athi tower and ensure that a clean environment is sustained throughout the project life.

(d) Water Resources Management Authority (WRMA)

WRMA's regional office and sub-regional office associated with the Upper Tana Catchment in Muranga and Upper Athi Catchment in Kiambu and Nairobi region will be involved in the project through its issuance of project permits and regulations on river crossings especially under river crossings.

(e) NEMA

The responsibility of the National Environment Management Authority (NEMA) is to exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of government in the implementation of all policies relating to the environment.

(f) Directorate of Occupational Safety and Health

Directorate of Occupational Safety and Health (DOSH) will be responsible for registering the project site as a work station and subsequent enforcement of relevant provisions in occupational safety and health in line with occupational safety and Health Act, 2007.

(g) Department of Mines and Geology

Licensing of any explosives and ensuring safe handling and use

(h) County Government of Murang'a, Kiambu and Nairobi

Respective County governments are responsible for various environment and public health management issues as iterated in section 2.5.11 and should be incorporated to help enforcement of proposed mitigation and monitoring activities within the project.

The county governments are better placed in dissemination of project information to the local levels through the members of county assembly and ward administrators. Continuous liaison between AWSB and the county government is thus recommended.

(i) The Local Administration

The relevant local administrators should be called upon where necessary during project implementation to provide the necessary advisory services and support to the project implementers.

8.3 Environmental and Social Management

An Environmental and Social Management Plan has been prepared to identify and sequence environmental activities that are needed in order to complete a required construction process.

Prior to commencement the Contractor will be required to prepare own Environmental and Social Management Plan that is in line with the project ESIA and also meets all ESIA license conditions.

8.3.1 Method statements

Method statements would be completed on behalf of the Main Contractor or Sub Contractor by an Occupational Safety and Health Officer and qualified Environmentalist or other appropriate experienced personnel, in consultation with AWSB environmental staff and, where necessary, environmental consultants. Their production would include a review of the environmental and safety and health risks and commitments, as identified in the ESMP and risk assessment, so that appropriate control measures are developed and included within the construction process.

Method statements would be reviewed by PIU, the Main or Sub Contractor's appointed environmental manager and, where necessary, by an appropriate environmental specialist. Where necessary, all method statements would be submitted to the enforcement agencies as appropriate. Method statements would contain as a minimum:

- Location of the activity and access/egress arrangements;
- Works to be undertaken and methods of construction;
- Equipment including any machinery and materials to be used;
- Labour and supervision requirements;
- Safety ,Health and environmental considerations; and
- Any permit or consent requirements including registration of the work place and approval of deployed equipment where required e.g. of cranes.

8.3.2 Control of construction processes

(a) Training, awareness and competence

The raising of environmental awareness is viewed as a crucial element in the appreciation and implementation of the Construction Environmental Management Plan. Consequently, all staff would undergo environmental awareness training, initially by way of the pre-start induction process. A project specific training plan that identifies the competency requirements for all personnel allocated with environmental responsibilities would be produced and would be contained within the EMP. Training for all personnel identified in the training plan would be completed before commencement of the associated construction activities. Line managers and supervisors would ensure that all personnel engaged in activities that may have an impact on the environment are competent to carry out their duties or, where necessary, arrange for suitable training to be undertaken.

(b) Supervision of construction activities

All construction activities including those carried out by subcontractors and suppliers would be supervised, or regularly checked through the completion of site inspections by the Contractors Environmental Manager, to ensure that requirements identified in risk assessments or method statements have been implemented. The frequency and extent of this supervision would vary according to the degree of competence displayed by the workforce and the level of risk to the environment.

(c) Inspection of other operational impacts

Appointed environmental representatives would carry out weekly inspections of their respective construction areas, to verify that housekeeping or supporting controls are being implemented effectively. These inspections would utilise the site environmental standards as the minimum standards that should be achieved, with necessary actions being recorded and raised at weekly progress meetings. Subsequent inspections would commence with a review of all outstanding actions from previous reports to verify that they have been completed.

(d) Inspections by the environmental team

Environmental deliverables required by the CEMP would be subject to regular independent inspections by either the Environmental Manager or the relevant environmental specialists. These inspections would be used to confirm that:

- Construction works are progressing in accordance with the agreed method statements';
- Agreed protection or mitigation measures are in place, prior to or during the implementation of construction activities;
- Construction works have been completed in accordance with the design and;
- Commitments made during the statutory process.

(e) Environmental inspection and reporting

The Contractors Environmental Manager would carry out an assessment of the Project's environmental performance, based upon the reports from the environmental management representatives during the period, reports from the environmental specialists and from his own site inspections. This would be carried out at a frequency at no greater than monthly intervals but could be held more regularly depending on the nature of the construction activity. An assessment of the performance over the month would be made and quantified. A periodic report detailing performance for the period would be provided to the AWSB's Project Manager and would include a summary of environmental inspections completed, audits undertaken, complaints, and incidents.

(f) Control of non-conformance

Non-conforming products or processes would initiate a Non-Conformance Report, which would identify the nature of the problem, the proposed corrective action, action taken to prevent recurrence of the problem and verification that the agreed actions have been carried out.

8.3.3 Environmental and social due diligence during construction

During the construction phase, environmental due diligence will be incorporated into the Project implementation mainly to:

- Control the residual risk of accidental environmental damage; and
- Prevent the negative environmental impacts during construction.

The contractor and supervising engineer will have the primary responsibility for the due diligence. The supervising Engineer must be required to include environmental considerations in the monthly progress reports and indicate progress in the implementation of mitigation measures as outlined in the ESMP.

The Construction risks to be monitored will include, but not be limited to the following issues:

- Movement of machinery;
- Management of borrow and spoil areas including soil erosion;
- Sedimentation of watercourses;
- Collection and disposal of wastes;
- Handling of any hazardous materials including hydrocarbons as part of construction activities;
- Management of pollution incidents;
- Safety and health management at construction sites; and
- Addressing local community concerns on the project implementation activities.

Table 8-1 and 8-2 gives a summary of the Environmental and Social Management Plan during Construction and operation phases of the project.

8.3.4 Chance Find Procedures

Chance finds procedures are an integral part of the project ESMP and civil works contracts. If the Contractor discovers archaeological sites, historical sites, remains and objects, including graveyards and/or individual graves during excavation or construction, the Contractor shall:

- Stop the construction activities in the area of the chance find;
- Delineate the discovered site or area;
- Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be arranged until the responsible local authorities or the Ministry of State for National Heritage and Culture take over;
- Notify the supervisory Project Environmental Officer and Project Engineer who in turn will notify the responsible local authorities and the Ministry of State for National Heritage and Culture immediately (within 24 hours or less);

Responsible local authorities and the Ministry of State for National Heritage and Culture would then be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures. This would require a preliminary evaluation of the findings to be performed by the archaeologists of the National Museums of Kenya. The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage, namely the aesthetic, historic, scientific or research, social and economic values.

Decisions on how to handle the finding shall be taken by the responsible authorities and the Ministry of State for National Heritage and Culture. This could include changes in the layout (such as when finding irremovable remains of cultural or archaeological importance) conservation, preservation, restoration and salvage.

Implementation for the authority decision concerning the management of the finding shall be communicated in writing by relevant local authorities.

8.4 Environmental and Social Monitoring Plan for Construction Phase

The following are the ESMPs to be adhered to during the Thika-Kigoro-Kabete Construction Phase

Table 8-1: Construction Environmental and Social Management Plan

Project Activity/ environmental and social concern	Possible Impacts	Mitigation Measures	Institutional Responsibility	Time Frame	Estimated Costs (KES)
Acquisition of way-leave for raw and treated water pipeline	Loss of land and assets; and Economic displacement.	• Implement the RAP to enable compensation payment and resettlement of PAPs prior to the contractor taking possession of any construction site. • Ensure that compensation has been done fairly before embarking on construction. • Previous issues on compensation alleged by the PAPs from previous wayleave acquisition should be addressed early in advance so as the contractor can have a smooth and uninterrupted time during construction phase.	AWSB, Nairobi County Government.	Before construction	In line with RAP report
Disturbance of neighbouring land owners	Destruction of uncompensated assets adjacent to the construction sites	• Adjacent landowners must be informed of the commencement of construction activities; • A Community Liaison Officer (CLO) will be appointed to be an intermediate between the project team and the surrounding community; and • The Contractor should stick to the existing construction way-leave to prevent unwanted destruction of the surrounding assets; • Any damages outside the designated wayleave should be immediately reported to the Resident Engineer and prompt compensation paid by the contractor in accordance with the principles of RAP and in agreement with the affected parties.	Contractor	Construction	Determined in the BOQ

Project Activity/ environmental and social concern	Possible Impacts	Mitigation Measures	Institutional Responsibility	Time Frame	Estimated Costs (KES)
Interruption of existing installations	Interference with existing telephone wiring and existing WSP pipeline.	• A notice should be put up in good time to inform the affected communities/people of the interruptions likely to be cause as the pipeline in laid at specific public utilities; • Capacity building and training should be conducted among the construction workers on the way they can protect themselves from exposed dangers during construction; • The contactor should try as much as possible to restrict the construction activities to the mapped out area to avoid increase disturbance of existing installations in the area.	County Government of Kiambu, County Government of Muranga, County Government of Nairobi, KPLC, Kenya Postal Corporation, affected WSP	Construction	Determined in the BOQ
	Interruption of WRMA RGS.	• In case of interruption of WRMA RGS on the Target Rivers, ASWB should inform WRMA early for relocation of the device, if already destroyed for replacement purposes. From the consultations with WRMA, the cost of relocation or replacement of RGS is incurred on the project proponent. The apparatus are only handled by WRMA technical staff.	WRMA, AWSB, Contractor	Construction	
Soil erosion and sedimentation	Excavated materials, soil disposal at the wrong place and clearance of vegetation leads to soil erosion and sedimentation.	• Clear delineation of construction work areas to avoid unnecessary vegetation clearance and soil loosening; • Implement planned erosion control measures to avoid erosion in areas that are prone to erosion, e.g. steep slopes and drainage lines; • Topsoil stockpiles will be vegetated to prevent erosion; • Where feasible, topsoil must be reinstated and rehabilitated on top of sub soil; • All excavation works must be properly backfilled and compacted; • Ensure downstream water users are informed	Contractor	Construction	No additional cost to project cost

Project Activity/ environmental and social concern	Possible Impacts	Mitigation Measures	Institutional Responsibility	Time Frame	Estimated Costs (KES)
		about any unprecedented release of heavily silted water into the river; • Where possible, construction activities should be scheduled to occur outside of the rainy season, to reduce the anticipated volume of runoff during construction; and • Planting of vegetation cover such grass along the pipeline wayleave to curb soil erosion after construction works.			
Occupation Health and Safety hazards	Health of the workers and risk of accidents.	• Registration of the workplace by the Director, Directorate of Occupational Safety and Health (DOSH) forming the basis of his work statistics; • Establishment of a Health and Safety Committee for the project team as per the Health and Safety Committee Rules 2004 of the OSHA Act; • The Contractor shall present a Health and Safety Policy for approval by the Engineer prior to commencement of work; • Qualified Health and Safety auditor should be contracted to conduct annual Health and Safety (H&S) and a registered Fire Auditor to undertake a fire audit and develop relevant policy for the site; • Provision of appropriate Personal Protective Equipment (PPE) for project; • Maintain an incident/accident register, in accordance with the OSHA 2007 and report incidences to the respective DOSH; • Provide adequate sanitary facilities • Basic training on Environment, health and safety; • Provide first Aid kit at all work areas and site	Contractor	Construction	No additional cost to project cost

Project Activity/ environmental and social concern	Possible Impacts	Mitigation Measures	Institutional Responsibility	Time Frame	Estimated Costs (KES)
		and maintain it equipped; • Provide adequate fire fighting equipment capable of fighting all classes of fire; • Put "No smoking signs" in areas where inflammables are stored; • Provide clean drinking water to the construction workers at all times; • Rehabilitate excavated sites as soon as construction is completed; • Initiate HIV/AIDS awareness, prevention and training for the workers and community			
	Safety of the public	• Along pipeline routes, warning signs, warning tapes and notices will deter access to trenches; • The excavation of trenches ahead of pipe laying and backfilling shall be limited such that the period from the time of opening a trench to temporary reinstatement shall not normally exceed 48 hours unless exceptional circumstances agreed with the Engineer prevail; • Work crews on roads shall include flagmen to provide for the safe passage of traffic and all work sites shall be adequately watched and lit during the hours of darkness • Construction truck drivers should observe due care at all times for their safety and that of the public during the construction • All works which may pose a hazard to humans and domestic animals are to be protected, fenced, demarcated or cordoned off as instructed by the Project Manager. If appropriate, symbolic warning signs must be erected;	Contractor	Construction	No additional cost to project cost

Project Activity/ environmental and social concern	Possible Impacts	Mitigation Measures	Institutional Responsibility	Time Frame	Estimated Costs (KES)
Testing and commissioning	Generation of large amount of waste water Use of a higher concentration of chemicals during testing of the treated pipeline Flooding of the surrounding areas in case the waste water is not properly released Possible contamination of ground and water resources during disposal of high content chemicals used during testing of the treated water pipeline.	• A notice should be put up to inform members of the date and time the pipeline will be tested and expected impacts; • Residents along the target river should be sensitize and educated on impact of chemicals being used during testing; • If possible testing should be timed to coincide with the dry months when the river are not flooded to reduce the project zone of impacts of induced floods; • Contractor should get a permit from WRMA before releasing water with chemicals into the any river in the project area; • A well constructed channel should be put up so as to reduce the velocity of water downstream hence minimize the impact of high pressure water to the river course and also minimise erosion; • Contractor should sensitize workers on the impacts of direct contact with the chlorine; • Contractor should provide works with PPEs before handling of any chemicals	Contractor, WRMA	Construction	No additional cost on the project
River crossings	Pollution of rivers; Destruction of water banks and riparian areas; Sedimentation of river beds.	• Contractor should abide to Water Act and WRMA regulations; • AWSB should apply for permits before conducting any under river crossings; • Reinstate the river system to the way it were before construction works or even in a better state; • Restoration of any WRMA RGS interfered with during construction; • Revegetate the river bank and the riparian areas.	Contractor, AWSB, WRMA	Construction	No additional cost on the project

Project Activity/ environmental and social concern	Possible Impacts	Mitigation Measures	Institutional Responsibility	Time Frame	Estimated Costs (KES)
Road crossing/use of road reserves	Cutting of roads to allow laying of the pipeline will disrupt normal traffic flow at the affected roads; Use of one lane of the road by the construction vehicle will lead to congestion along the road disrupting normal traffic flow; Possible danger of accidents to occur when motorised are not aware of the on-going construction activity; Destruction of culverts and water storm drain during road crossings or when the pipeline is laid along the road reserve. This may also lead to blockage of the storm water drain due to packing of soil eroded and excavated during trenching.	• Liaise with relevant roads authorities to minimize any service disruptions; • Ensure advance notice to all of any planned disruptions • AWSB should reinstate the road according as stated in laws and regulations of Kenya i.e. KeNHA and Kenya Roads Act. • The contractor should abide to the instructions of road reinstatement as illustrated in the detailed Design Report. • The contractor should restrict the constructions works to the time of the day when there is limited traffic flow along the affected roads i.e. restrict pipeline construction works from 11am to 3pm. • Contractor/AWSB should put up a notice to inform the affected road users on the likely inconvenience with specified dates and length of time for the construction works • Contractor should stick to the area designated for construction works to prevent the likelihood construction vehicles obstructing the whole road.	AWSB Contractor, KeNHA, KURA, KeRRA, County Government of Kiambu, County Government of Muranga, County Government of Nairobi,	Construction	To be added in the BOQ
Water supply interruptions	Possible interruption of water supply to Nairobi due to criss-crossing of the new pipeline along the previous pipelines	• A notice should be issued to affected supply chain about the water supply interruptions with schedule period of time. • The affected pipes should be fixed at the shortest time possible to allow for quick restoration of normal water supply. • Disruption of any services within the project area by the contractor should be repaired before continuation of excavation.	Contractor	Construction	No additional cost on the project

Project Activity/ environmental and social concern	Possible Impacts	Mitigation Measures	Institutional Responsibility	Time Frame	Estimated Costs (KES)
Vegetation clearance	Loss of vegetation such as woodlots and cash crops during laying of the pipeline and construction of the treatment plant.	• Contractor must ensure clear delineation of construction work areas to avoid unnecessary vegetation clearance; • Tree farmers should be compensated and those along the construction wayleave be encourage to plant after construction works are complete; • Contractor should avoid cutting down of Mugumo trees in the area. where feasible the consent of KFS and local leaders should be soughted out; • The trees planted should be pipeline friendly to protect the pipe from being destroyed by mature/penetrative roots; • Tree farmers should be notified in advance to harvest their trees	Contractor AWSB	Construction	No additional cost to project cost
Soil compaction	Use of Vehicle such heavy trucks and earth movers during construction.	• Vehicles must be kept on existing/designated access roads/tracks where possible; • Minimize compaction during stockpiling by working the soil in the dry state; • Split compacted areas to reduce runoff and re-vegetate where required; • All topsoil and other soil profiles must be managed strictly.	Contractor	Construction	No additional cost to project cost
Noise generation and vibration	Heavy machines and construction vehicles will result to noise pollution. Excessive noise, particularly when experienced continuously, outside normal working hours and on rest days, can be a nuisance to both workers and the public. In extreme cases, it may become a health hazard.	• Noise levels shall be kept within acceptable limits preferably as stipulated within the Environmental Management and Coordination Act (Noise and Excessive Vibration Pollution) Control Regulations, 2009 and construction activities shall, where possible, be limited to normal working hours; • Monitoring of noise and vibration in sensitive locations (hospitals, teaching facilities, churches) near the project area to ensure they	Contractor	Construction	No additional cost on the BOQ

Project Activity/ environmental and social concern	Possible Impacts	Mitigation Measures	Institutional Responsibility	Time Frame	Estimated Costs (KES)
		are at acceptable standards; • Equipment should be maintained regularly to reduce noise as a result of friction; • Workers exposed to high-level noise must wear personal protective equipment (PPE); • Use of silencers where applicable, should be encouraged; • Residents in close proximity should be given at least 24 hours notification of any abnormal noise source e.g. planned blasting.			
Spoils generation	Excavation of materials to pave way for the pipeline; The excavated materials are prone to erosion through surface water runoff during rainy seasons and may even end up in rivers. Spoil dumps left bare encourage establishment of fast colonising plants and invasive species.	• Maximise the re-use of excavated materials in the works as far as feasible to ensure that no permanent spoil dumps are created; • The spoil materials can be used elsewhere as recommended by the county government such as in road constructions and rehabilitation. From consultations it is recommended that the spoils may be given to farmers with tree nurseries or landscaping agencies for free; • Properly dispose off the spoil in the identified by the design team and approved by the confirmed land owners; • Care should be taken to avoid spoil location in land that could otherwise be used for productive purposes; • Ensure the contractor formulate and implement erosion and siltation management measures at chosen spoil locations.	Contractor, AWSB	Construction	No additional cost to the project
Water quality	Pollution of water resources Sediment from earthworks, wet cement, detergents, paints and other chemicals, accidental oils and fuels spills and leaks from	• Implement Standard Operating Procedures (SOPs) for working in water and application of best practice on sediment control and soil stockpiles. • Apply for a water discharge license and	Contractor		No additional cost to project cost

Project Activity/ environmental and social concern	Possible Impacts	Mitigation Measures	Institutional Responsibility	Time Frame	Estimated Costs (KES)
	deployed equipment may find their way into the river through surface run-off if not properly controlled leading to degradation of the water quality.	ensure that the conditions of the license are observed; • Provide proper measures to direct effluent to silt removal facilities like earth bunds / U-channels; • Ensure that the u-channels and manholes are free of silt and sediment; • All manholes on-site should be covered and sealed; • Sandbags/earth bund should be adopted to prevent washing away of sand/silt and wastewater to drains, catch pit, public road and footpath; • Storage areas for fuels, oils or other liquid chemicals should be far away from surface water drains and all vehicle be serviced off site • Direct domestic waste water to septic tanks.			
Spread of invasive species	Invasive species such as *Lantana camara* and *Thithonia diversifolia* may quickly spread in area if the area is left bare after construction. Borrowed soil from another place to the may have propagules of an invasive species hence being a threat to native vegetation.	• Materials and equipment used during construction should not contain propagules of species from another area • All invasive species/weeds along the project area should be destroyed and none of the species should be replanted in the area • Trees and grasses should planted in the area immediately after construction	Contractor	Construction	No additional cost on the project
Visual impact	Construction of access road and clearance of vegetation; Excavation and spoils will also change the visual appearance of the area; Development of informal	• Restoration of the affected area to almost as it were before or even in a better state • Planting grasses along the pipeline wayleave to curb soil erosion and improve the aesthetic view of the area; • Continuous monitoring of the pipeline wayleave to ensure there no informal	Contractor AWSB	Construction	No additional cost to project cost

Project Activity/ environmental and social concern	Possible Impacts	Mitigation Measures	Institutional Responsibility	Time Frame	Estimated Costs (KES)
	business depending on the intensity of labour needed.	settlements are cropping up in the area			
Solid waste generation	Generation of solid waste at the contractor's campsite, workshop, broken construction materials and vehicle parts along the wayleave.	• Formulation and implementation suitable Waste Management Plan in line with Waste Management Regulations, 2006. The plan must cover both hazardous and non-hazardous wastes; • Final disposal of the site waste should be done at a location that shall be approved by Resident Engineer • Any hazardous wastes generated must be handled appropriately and disposed of only by licensed hazardous wastes handlers; • Provide sanitation facilities such as toilets and bathrooms; • The sanitation facilities should be approved by the relevant authority; • Develop a waste management plan to handle temporary storage, transport and disposal of hazardous waste; • Disposal of all surplus construction materials and debris shall be carried out in accordance with the EMCA 2006 Waste management regulations; • Strategically place skips and bins within the camp sites and construction sites; • Empty the skips and bins regularly to avoid overfilling; • The sanitation facilities must be approved by relevant authorities • Re-use and recycle recyclable wastes • Provide oil drums and plants/equipments with drip trays;	Contractor	Construction	No additional cost to project cost

Project Activity/ environmental and social concern	Possible Impacts	Mitigation Measures	Institutional Responsibility	Time Frame	Estimated Costs (KES)
		• Present proposal of the camp site layout for approval by the relevant authorities			
Liquid waste generation:	Liquid wastes including grey and black water, concrete washings, runoff from camp and workshop areas, and various liquid waste streams from washing construction vehicle and equipment washing generated pose real toxicity and quality threats to the soil and ground water, numerous rivers and streams. Waste water generation during testing and commissioning of the pipeline.	• All grey water runoff or uncontrolled discharges from the site/working areas (including wash-down areas) to water courses should be contained and properly channelled; • Water containing such pollutants as cements, concrete, lime, chemicals and fuels shall be discharged into a conservancy tank for removal from site; • Potential pollutants of any kind and in any form shall be kept, stored and used in such a manner that any escape can be contained and the water table not endangered; • The contractor must act promptly on remedying any pollution incidents on site.	Contractor	Construction	No additional cost to project cost
Soil pollution	Improper handling of fluids such as oil grease and other hydro-carbons lead to spills and leakages.	• No vehicle/plant maintenance shall take place on undesignated site. In case of emergency, a drip tray shall be used to avoid diesel and / or oil spills; • Concrete mixing shall not be done on bare soil but rather on mortarboards, a large metal sheet or concrete slab. The slabs for concrete mixing shall be removed on completion of construction works; • Excavated material shall be stockpiled at a demarcated site, within the construction zone; • Once the construction activities have terminated, rehabilitation of the area should be done including the area excavated soil was stockpiled.	Contractor	Construction	No additional cost to project cost

Project Activity/ environmental and social concern	Possible Impacts	Mitigation Measures	Institutional Responsibility	Time Frame	Estimated Costs (KES)
Influx of workers into the project area	Growth and mushrooming of unplanned developments; Possible increase in social deviance behaviours.	• As much as feasible, the unskilled labour should be obtained from amongst the locals; • Provide adequate accommodation for non-local workforce • Liaise with respective county governments to control developments in the area and ensure provision of adequate services	Contractor	Construction	No additional cost on the project
Shift of unskilled labour force from agriculture to construction works	There is likelihood of people shifting from their agricultural practises such as tea and coffee picking to construction works due to the high wages offered. This will affect the quantity and amount of tea and coffee delivered to the local factories	• Wages should be offered within the prevailing market rates Kenya • Employment should be offered in line with the local labour laws international best practice and avoid any employment of underage individuals.	Contractor	Construction	No additional cost on the project
Air quality	Air pollution from emissions from construction equipment (carbon, hydrocarbons, particulate matter, etc.) – earth movers and excavators, vehicles and trucks; Dust emissions from excavation works and vehicles accessing the construction areas and contractor's campsite.	• Maintain all plant and equipment at the manufacturers specification; • Regular sprinkling of water e at least thrice a day • Stockpiled materials (sand and aggregate) should be maintained dump to prevent dust emissions • Cement debagging process will be undertaken in sheltered areas; • The cleared area should be revegetated immediately after construction to prevent airborne dust to wind gust • Reduce truck speeds to avoid stirring up the dust through installing of speed limit • Turn off machines that are idle reduce air emissions;	Contractor	Construction	No additional cost to project cost

Project Activity/ environmental and social concern	Possible Impacts	Mitigation Measures	Institutional Responsibility	Time Frame	Estimated Costs (KES)
		• Workers at the construction site should be issued with PPEs i.e. dust masks			
Risks of Oil spills/leaks	Contamination of soil, surface waters and sometime ground waters. Such contamination is danger to plant growth, aquatic life such as fish and domestic use.	• There should clarity in labelling and storage of fluids in secure place with minimal ease of contamination in case of spills or leaks • Implement Standard Operating Procedures (SOPs) for working in water, including checks on equipment condition (especially leaks of oils, fuel, hydraulics), refuelling protocols (at safe location away from water, availability of spill kits and knowledge of their use, and emergency spill procedures); • Vehicle maintenance should be done on purpose-built impervious concrete platforms with oil and grease traps; • Ensure that all equipment are in good condition, clean and free from leaks; • Oil spill containment and cleanup equipment should be kept at the contractor's camp.	Contractor	Construction	No additional cost to project cost
Immigration and settlement	Increased population which may lead to unplanned developments in the area.	• Monitor the trend of migration during the project implementation and adjust the required utilities accordingly. • Engage a community liaison officer with knowledge on local cultures and social structures to facilitate smooth engagement between the local community and project staff from different cultures; and • Sensitize the project workers on local culture. • As much as feasible, the unskilled labour should be obtained from amongst the locals; • Liaise with respective county governments to control developments in the area and ensure provision of adequate services.	Contractor, County Government of Muranga, County Government of Kiambu, County Government of Nairobi	Construction	No additional cost to project cost

Project Activity/ environmental and social concern	Possible Impacts	Mitigation Measures	Institutional Responsibility	Time Frame	Estimated Costs (KES)
Cultural sites and archaeological sites	Felling of *Ficus thonngii* (Mugumo tree) which is regarded as sacred among the Kikuyu community; Possible damage of any cultural and archaeological sites which may be sited during excavation activities.	• Cutting of Mugumo tree along the project area should be avoided. If necessary, the consent of Kikuyu elders should be sought before felling the tree. • Development and implementation of a chance find procedure in case archaeological sites are found during the construction process.	Contractor, NMK, ASWB.	Construction	No additional cost to project cost
Increased HIV/AIDS incidence	Increased risk of HIV prevalence due to influx of people to work for the contractor.	• Offer HIV/AIDS sensitization to the skilled and semi-skilled construction staff in collaboration with local health facilities; • Provide condoms at strategic points within the contractors camp, dispensers near lodges and hospitals where people are likely to pick them; • Offer VCT services to the community with the help of local health facilities; • As far as possible, hire local community members in the semi-skilled category. Interventions to support this may include training of local community members to enhance their qualifications.	Contractor	Construction	To be included in the BOQ

8.5 Environmental and Social Monitoring Plan for Operation Phase

The following are the ESMPs to be adhered to during the Thika-Kigoro-Kabete Operation Phase

Table 8-2: Environmental and Social Management Plan for Operation Phase

Project Activity/ environmental concern	Possible Impacts	Mitigation Measures	Institutional Responsibility	Time Frame	Estimated Costs (KES)
Increase of domestic wastewater generation	Increase in water supply in Nairobi will increases availability of portable piped water hence generation of more waste water as a by product which cannot be supported by the existing sewer networks and the treatment plants in Kariobangi and Dandora	• Expansion of the sewerage system and the sewer treatment works to cater for the increase wastewater likely to be generated by increased water supply. • Informal settlement should be encouraged to connect their toilets to the nearby sewerage line • Construction of community toilets that connected to the sewer system through WASSIP project.	AWSB	Operation	No additional cost on the project
Cleaning of the pipes through washouts and swabs	The waste water from the pipes may significantly affect the nearby farms and also pollute and destroy the rivers and its banks that the discharged is directed into. This is possible if proper channels are not provided.	• Discharge from the treatment plant should be well treated to the recommended standards as stipulated in the Water Act before being released to Target River. • Trees and grass and papyrus reeds should be planted around the swabbing and washout chambers and along the provided channel to reduce the velocity of the water downstream during the pipe cleaning	NCWSC, ASWB	Operation	No additional cost on the project
Vandalism of pipeline infrastructure	Vandalism of manholes for the washouts, air valves and swabs and other chambers along the pipeline will lead to high maintenance cost of the pipeline	• Use of cement closing chambers for the respective manholes compared to the metallic ones • Continuous surveillance of the pipeline reserve to reduce the rate of vandalism along the pipeline • Employ local people to monitor a respective area	AWSB, NCWSC	Operation	No additional cost on the project

Project Activity/ environmental concern	Possible Impacts	Mitigation Measures	Institutional Responsibility	Time Frame	Estimated Costs (KES)
		along the pipeline			
Increase in communicable diseases	If waste water from the washouts and swabs are not well drained, they will form stagnant pools at the areas leading to spread of communicable diseases. Leakage of water from the washout chambers may woe people to use the collected water at the chamber domestic purpose hence risk of water-borne diseases among the affected communities	• Conduct health and sanitation education for farmers on importance of using irrigation water for its irrigation purpose only, importance of water treatment and how to treat water for domestic use; • Ensure proper maintenance of proposed drainage works and prompt repairs on any leakages and bursts on pipelines; and • Partner with Ministry of Health to enhance malaria and other waterborne diseases prevention measures in the project area e.g. supply of mosquito nets at a subsidised cost.	NCWSC, Ministry of Health	Operation	No additional cost on the project
Safety of the communities living near the pipeline	Use of the pipe to cross from one side of the river to the other pose a safety hazard to the locals Exposure of the pipeline because of erosion	• AWSB should fence out the pipeline wayleave immediately after construction to prevent encroachment into the pipeline; • ASWB should fence out the areas where the pipeline is exposed to prevent people from using the pipe as the bridge; • Sensitize the locals on the expected dangers of using the pipeline as a bridge; • AWSB can build a bridge as alternative way of during locals from using the pipe to cross over to the other side of the river; • Revegetate the pipeline wayleave with grass to reduce the impact of erosion.	AWSB,	Operation	No additional cost on the project
Illegal connections	Likely to occur along the pipeline especially where there are informal settlements. For instance, pipes were observed to be illegally connected to the washouts found at Kirigithi informal settlement, Kiambu	• Regular audit should be contacted to ensure the pipeline is well maintained and there no illegal connections created along the pipeline • Awareness should be carried out among the locals living along the pipeline on the impacts of interference with the pipes	NCWSC	Operation	No additional cost on the project

Project Activity/ environmental concern	Possible Impacts	Mitigation Measures	Institutional Responsibility	Time Frame	Estimated Costs (KES)
	municipality. Such connection leads to increase quantity of unaccounted for water and sometimes may result to destruction of pipeline.	• Penalty should be passed upon individuals/groups that have establish an illegal connection to the pipeline • Workers should be employed to strictly manage and monitor the pipeline way-leave to prevent people from malpractices behaviour			
Death and injuries as a resulting of tampering with the pipes	Tampering with the pipeline connections in order to get water illegally may result to adverse impacts to the	• Continues monitoring of the pipeline to ensure there no illegal connections • Creation of awareness among the local communities on the impacts of tampering with the pipes	NCWSC	Operation	No additional cost on the project

8.6 Environmental and Social Monitoring Plan during Decommissioning

The following are the ESMPs to be adhered to during the Thika-Kigoro-Kabete during decommissioning

Table 8-3: Environmental and Social Management Plan during Decommissioning

Project Activity/ environmental concern	Possible Impacts	Mitigation Measures	Institutional Responsibility	Time Frame	Estimated Costs (KES)
Loss of portable water to residents	The pipeline will be rendered dysfunctional leading to loss of portable water to residents of Nairobi and its environs. This will lead to difficulty in accessing clean water, loss of income for water vendors and increase in water-related diseases due to poor hygiene.	• Provide an alternative access to portable water before the operation period of the pipeline and treatment plant expires; • Awareness should be carried out early in advance to inform the people on the decommissioning period and its anticipated impacts;	AWSB, NCWSC	Decommissioning	To be determined
Noise pollution and vibration	Dismantling, excavation and destruction of the pipeline will generate excessive noise to the people living at or near the project area.	• The exercise shall be carried out during the day when most people are out of their homes • Noise levels shall be kept within acceptable limits preferably as stipulated within the Environmental Management and Coordination Act (Noise and Excessive Vibration Pollution) Control Regulations, 2009 • Monitoring of noise and vibration in sensitive locations (hospitals, teaching facilities, churches) to ensure the NEMA requirements on noise and vibration are met and if the standards are exceeded measures must be taken to reduce noise and vibration; • Workers exposed to high-level noise must wear personal protective equipment (PPE); • Use of silencers on the construction plant, where applicable, should be encouraged;	Contractor	Decommissioning	To be determined

Project Activity/ environmental concern	Possible Impacts	Mitigation Measures	Institutional Responsibility	Time Frame	Estimated Costs (KES)
		• Residents in close proximity should be given at least 24 hours notification of any abnormal noise source e.g. planned blasting			
Generation of waste	Large amounts of solid waste material including: glass panels, stones, pipes, wood, metal, paper, plastic, equipment, vegetation is likely to be generated.	• Dispose solid waste in compliance with EMCA 2006 Waste Management Regulations; • Segregation of waste to encourage reuse and recycling; • Ensuring that the contracted waste collector is registered with NEMA to collect and dispose wastes. • Chemical should be disposed according to the set • Careful disposal of chemical waste from the treatment plant	AWSB	Decommissioning	To be determined
Demolition of structures and excavation of pipes	Dust emissions and exhaust fumes	• Practice dust management techniques such as watering the project area during drier period; • Provide and enforce the appropriate use of PPE against dust	Contractor	Decommissioning	To be determined
Occupation and Health hazards	Demolition may lead to exposure of the workers and surrounding communities to chemicals resulting to health risks situations. Machinery and equipment also used during the process may also pose as danger to the workers.	• Provide the correct PPE for the workers when conducting the demolition activities; • Conduct training on health and safety procedures to the workers prior to commencement of demolition; • Proper plans should be made prior to demolition so as to contain waste water that poses as health risk to human beings and the environment, to prevent the workers and surrounding communities from contact with it.	Contractor	Decommissioning	To be determined

Project Activity/ environmental concern	Possible Impacts	Mitigation Measures	Institutional Responsibility	Time Frame	Estimated Costs (KES)
Loss of source income	The people that will be employed to operate and maintain the water supply system will lose their jobs immediately after the closure of the project. The loss of jobs will have far reaching impacts as it will lead to loss of income and social stress.	• Notify the employees in advance on the project closure date and adequately compensate them; • Dismissal procedures to be compliant with Employment Act, 2007; • Provide counselling & alternative skills for alternative activities; • Employer should find alternative means of livelihood for the staff who were employed at the solar power plant.	NCWSC, AWSB	Decommissioning	To be determined

8.7 Environmental and Social Monitoring

The overall objective of environmental and social monitoring is to ensure that mitigation measures are implemented and that they are effective. Environmental and social monitoring will also enable response to new and developing issues of concern. The activities and indicators that have been recommended for monitoring are presented in the ESMP.

Environmental monitoring is also carried out to ensure that all construction and operation activities comply and adhere to environmental provisions and standard specifications, so that all mitigation measures are implemented. The contractor shall employ an officer responsible for implementation of social/environmental requirements. This person will maintain regular contact with PIU and the respective County Environmental Officers. The contractor and PIU have responsibility to ensure that the proposed mitigation measures are properly implemented during the construction phase.

The environmental monitoring program will operate through the construction, and operation phases. It will consist of a number of activities, each with a specific purpose with key indicators and criteria for significance assessment.

Monitoring includes:

- Selection of environmental parameters;
- Visual observations; and
- Regular sampling and test measurements of these parameters.

Periodic ongoing monitoring will be required during the life of the Project and the level can be determined once the Project is operational.

Monitoring will be done in three fronts:

- Physical monitoring;
- Biological monitoring; and
- Social monitoring.

8.7.1 Internal monitoring

It is the responsibility of the proponent, AWSB through the PIU , to conduct regular internal monitoring of the project to verify the results of the Contractor and to audit direct implementation of environmental mitigation measures contained in the ESMP and construction contract clauses for the Project.

The monitoring should be a systematic evaluation of the activities of the operation in relation to the specified criteria of the condition of approval.

The objective of internal monitoring and audit will be:

- To find out any significant environmental and safety and health hazards and their existing control systems in force; and
- Meeting the legal requirements as stipulated in the Environmental Management & Coordination Act, EMCA-1999 and OSHA, 2007.

8.7.2 External monitoring and evaluation

It is recommended that a consultant be hired to carry out Annual Environmental Audits in line with NEMA requirements. NEMA has the overall responsibility for issuing approval for the Project and ensuring that their environmental guidelines are followed during Project implementation. Its role therefore is to review environmental monitoring and environmental compliance documentation submitted by the implementing authorities and they would not normally be directly involved in monitoring the Project unless some specific major environmental issue arose.

AWSB through the consultant will therefore provide NEMA with reports on environmental compliance during implementation as part of their progress reports and annual environmental auditing reports. Depending on the implementation status of environmentally sensitive project activities, NEMA may perform annual environmental reviews in which environmental concerns raised by the pro ject will be reviewed alongside project implementation.

Table 8-4: Monitoring Plan

Environmental Component	Parameter	Standard	Location	Frequency	Implementation	Supervision
Wayleave acquisition	Signed consent forms and compensation paid as per land and crop valuation	Valuation roll	Transmission Mains and Treatment Works	Monthly until construction is complete	AWSB	AWSB Sociologist
Noise levels	Complaints; and Noise levels on dB (A) scale	EMCA guidelines on Noise	Selected Sites	As directed by the supervision consultant	Contractor	Supervision Consultant
Air Quality	Total suspended particles, H_2S, CO_2, CH_4	EMCA and WHO guidelines	Populated areas	Monthly	Contractor.	AWSB
Soil Quality	pH ECe Exchangeable sodium percentage (ESP) Sodium adsorption ratio (SAR) Organic matter Cation Exchange Capacity (CEC) Nitrates P, K, Ca status	FAO and Soils Report	Composite samples from mineral soil at 5-30 cm depth, each sample to represent ~16 ha	Quarterly	Contractor	AWSB
Groundwater depth	Depth to groundwater	WRMA Guidelines	Existing boreholes and wells	Monthly	O&M Contractor	AWSB and WRMA

Environmental Component	Parameter	Standard	Location	Frequency	Implementation	Supervision
Groundwater quality	pH Salinity (EC) Nitrates Phosphorous Pesticide residues	WRMA Guidelines	Existing boreholes and wells	Monthly Monthly 6 months 6 months if indicated by drainage or surface water tests	O&M Contractor	AWSB and WRMA
Surface water width	Width of the rivers	WRMA Guidelines	Rivers and streams	Monthly	O&M Contractor	AWSB and WRMA
Surface water quality – intakes and receiving waters	pH Salinity (EC) Nitrates Phosphorous Pesticide residues Coliforms BOD COD	EMCA Guidelines	Intake points and selected points downstream of irrigation areas	Monthly Monthly 6 months 6 months Monthly Monthly Monthly Monthly	O&M Contractor	AWSB
Solid waste	Spoils, domestic refuse, metallic scraps, sludge	Disposal sites	Quarterly	Daily	AWSB and Contractor.	Supervision Consultant
Soil Erosion	Turbidity in rivers and storm water	NEMA guidelines	Site, Marjory on river bank and high terrain	During and after the rainy seasons	Contractor	Supervision Consultant
Rehabilitation of work sites	Monitoring to ensure all work sites are progressively rehabilitated	ESMP	Site	As required	Contractor	Supervision Consultant
Accidents	Occupational safety and health adviser engaged; Safety procedures; Safety training for workers, accident reports, community consultations and feedback	ESMP	Project area	Quarterly	Contractor	AWSB and DOSH
Health	Project Health facilities Project Ambulances Signs, posters displayed,	ESMP	Project area	Monthly	Contractor	AWSB

Environmental Component	Parameter	Standard	Location	Frequency	Implementation	Supervision
	health awareness campaigns conducted,					
Vegetation and habitats	Vegetation structure, species density, diversity, fuel wood usages, commercial forestry and illegal logging incidences	ESMP	Project area and environs	Annually	Contractor	AWSB
Aquatic environment/River crossings	Flow velocity Wetted perimeter PH Depth Salinity Turbidity Habitat connectivity	ESMP	All affected rivers	Quarterly	Contractor	AWSB
Efficiency at waste water treatment works for the Nairobi City County	Effluent quality indicators	Design specifications and Water Quality standards	All waste water treatment works	Quarterly	AWSB	NEMA

9 CONCLUSIONS AND RECOMMENDATIONS

The primary objective of this project is to increase the supply of clean and safe water to the people of Nairobi and its satellite towns. To achieve its objectives and to ensure sustainability of the project, environmental and social issues and their respective mitigation measures mentioned in this report and others to be identified through project monitoring should be adhered to. Strict implementation of the Environmental Management and Monitoring Plan will mitigate and/or prevention potentially adverse environmental impacts resulting from project construction, operation and decommissioning phases.

Diligence on the part of the Contractor and proper supervision by the Proponent will be crucial for ensuring success of the ESMP and for ensuring that the recommended measures are implemented throughout the design, construction, and operational phases in order to avert any negative impacts. To meet the monitoring requirements of the Environmental Management and Co-ordination Act (1999), and the Environmental (Impact Assessment and Audit) Regulations (2003) among others, it is recommended that an environmental audit/monitoring report be produced quarterly after the commencement of the project to enable gauge the changes in the project area's baseline conditions and also the adherence to the ESMP and NEMA condition of approval.

The study has indicated that, the benefits related with the proposed project supersede the negative impacts and hence its justification. Recommendations for corrective measures for the potentially significant and/or adverse environmental impacts, and safety risks, have been provided as an integral part of this ESIA study report

AWSB should resolve the issues arising from previous wayleave acquisition of 12m and 6m before the start of construction works. This will prevent disruption of the construction activities which is likely to affect the anticipated time for pipeline operations.

The Resettlement Action Plan prepared alongside this ESIA study report be implemented before mobilisation of contractor to site and any additional land requirements by the contractor not covered under the RAP are included in the updated version of the document, consultations made with appropriate PAPs and stakeholders and implemented before actual construction begins.

AWSB should undertake separate Environmental Audit (EA) and Annual Occupational Safety and Health audits of the project, as required by the NEMA Regulations twelve (12) months after completion and OSHA, 2007 respectively. These can be done by seeking the services of a Consultants who should be Lead Agents registered by NEMA and advisers registered by DOSH. The team should consist of the following experts as a minimum:

- Lead Environmental Consultant (Senior Environmentalist/Team leader);
- Sociologist; and
- Occupational safety and health advisor.

AWSB should also consider expanding the current sewerage network and the capacity of the treatment plant and if possible build a new sewage treatment works to cater for the increase domestic waste water that will be released when the new pipeline becomes operational. This will curb the cumulative impacts of waste water being released directly to the rivers along Nairobi and Ngong River Basins.

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APPENDICES

Appendix I:	Photoplate
Appendix II:	Pipeline Drawings
Appendix III:	Location and Capacity of Washouts
Appendix IV:	Public Consultation Records
Appendix V:	Response Matrix to Worldbank Comments

Appendix I: Photoplates

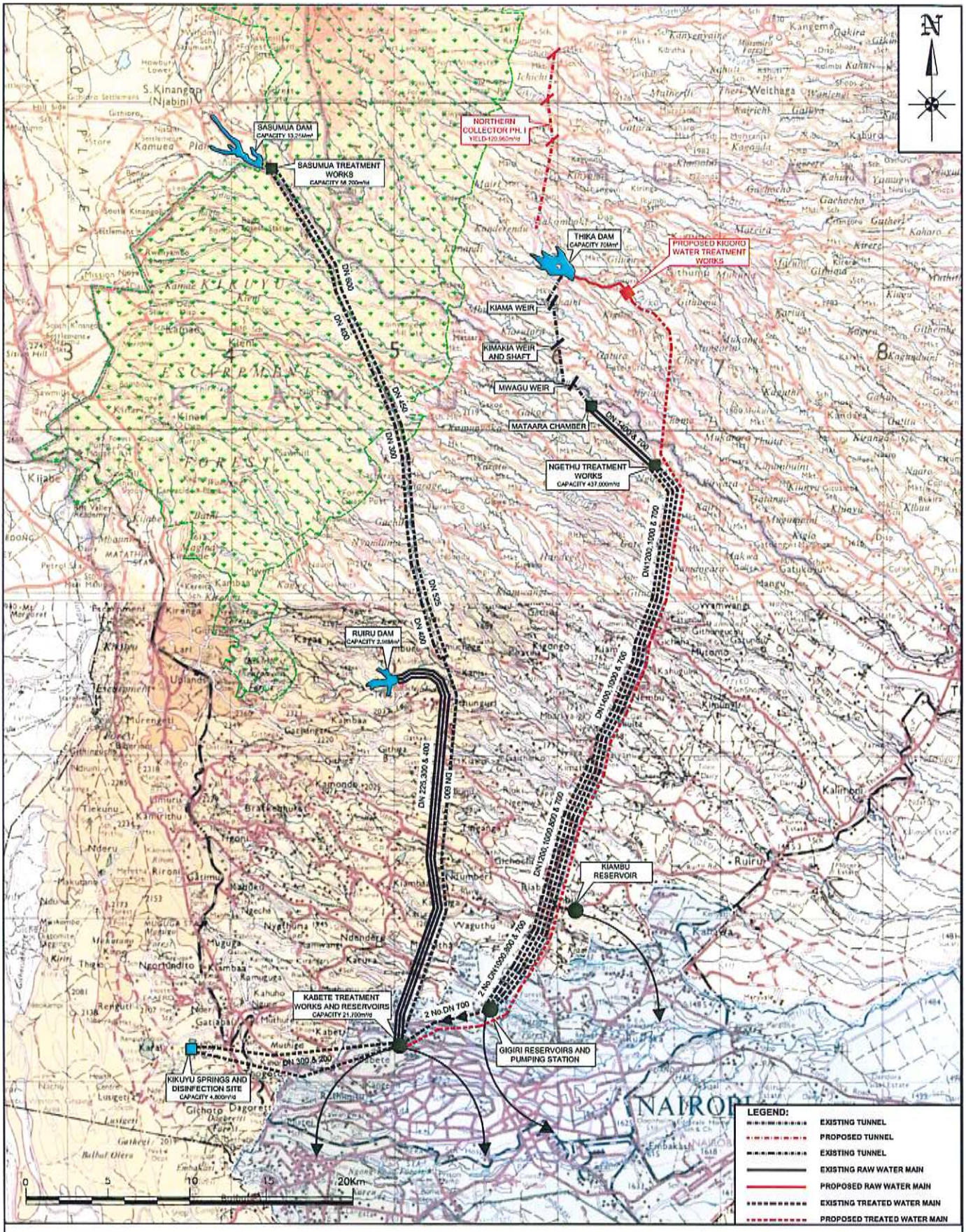
Plate	Description	Photos
Plate 1	Draw off Tunnel for Thika-Kigoro-Kabete Gravity Water Pipelines	
Plate 2	Vegetation at the Southern part of Thika Dam compound along Thika River	
Plate 3	Land with tea to be acquired to pave way for Kigoro Treatment works.	

Plate	Description	Photos
Plate 4	Public meeting at Kanunga Chiefs camp in Gatanga Sub-county	
Plate 5	Public meeting held at Ndakaini NCWSC dam office	
Plate 6	Public meeting held at DC grounds in Gatundu North	

Plate	Description	Photos
Plate 7	Public meeting held at Komothai chiefs camp	
Plate 8	Existing pipeline wayleave from Ngethu Treatment Plant	
Plate 9	Pipeline aupported by steel bridge and piers (columns) as it crosses Ndarugu River	

Plate	Description	Photos
Plate 10	River crossings by piers only along Kamiti River	
Plate 11	A new building beind constructed along the existinng pipeline wayleave	

Appendix II: Pipeline Drawings



DETAILED DESIGN AND SUPERVISION OF NORTHERN COLLECTOR SYSTEM RAW WATER AND TREATED WATER PIPELINES

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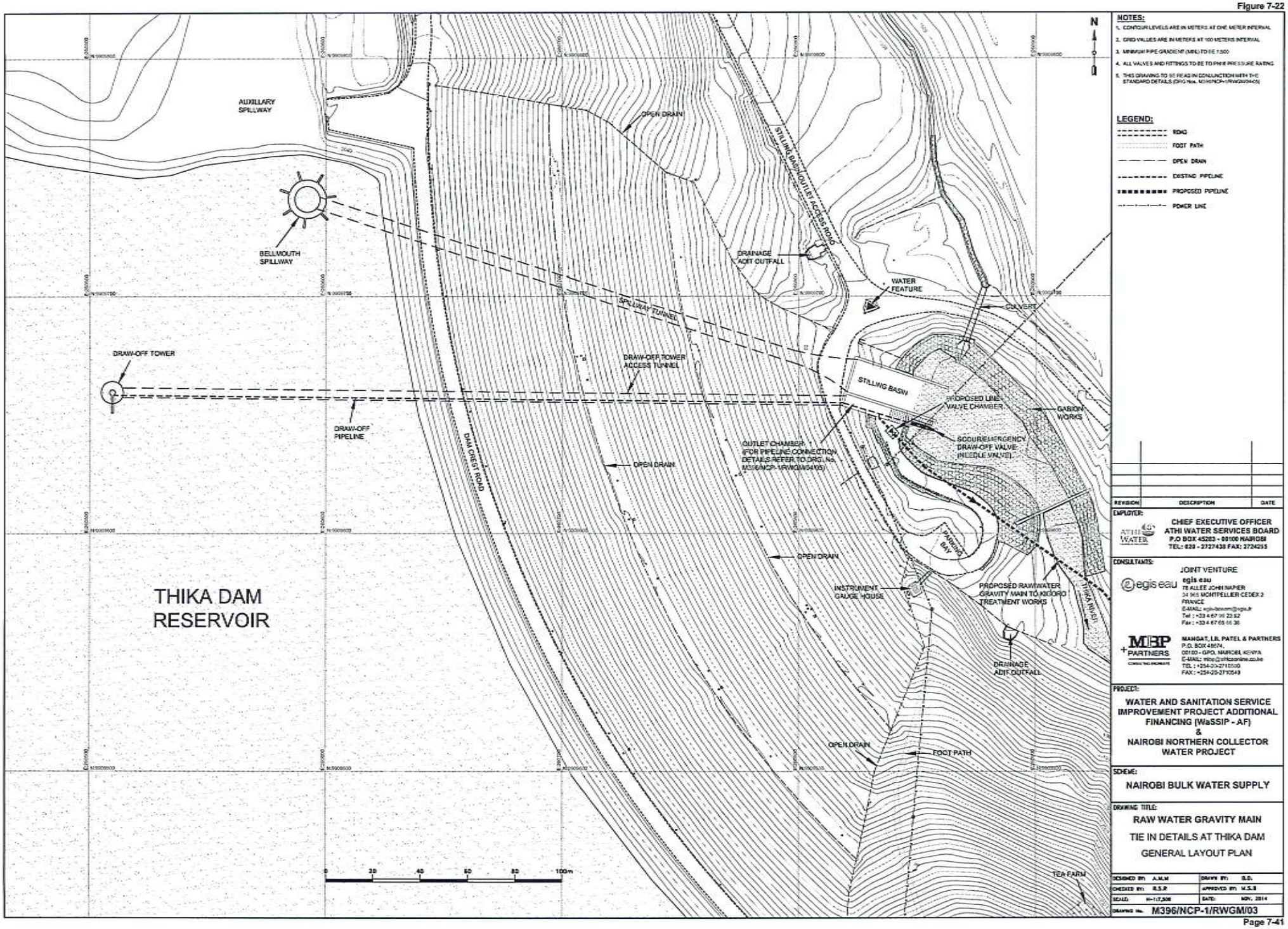
DRAWING TITLE:

EXISTING NAIROBI CITY WATER SOURCES AND THE PROPOSED NORTHERN COLLECTOR PHASE I

DATE: JAN. 2015	SCALE: NOT TO SCALE	FIGURE 1-3

Figure 1-3

Figure 7-22



NOTES:

1. CONTOUR LEVELS ARE IN METERS AT ONE METER INTERVAL
2. GRID VALUES ARE IN METERS AT 100 METERS INTERVAL
3. MINIMUM PIPE GRADIENT (MIN.) TO BE 1:500
4. ALL VALVES AND FITTINGS TO BE TO PN16 PRESSURE RATING
5. THIS DRAWING TO BE READ IN CONJUNCTION WITH THE STANDARD DETAILS (DRG Nos. M396/NCP-1/RWGM/04/05)

LEGEND:

- ROAD
- FOOT PATH
- OPEN DRAIN
- EXISTING PIPELINE
- PROPOSED PIPELINE
- POWER LINE

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PROJECT:

WATER AND SANITATION SERVICE IMPROVEMENT PROJECT ADDITIONAL FINANCING (WaSSIP - AF)
&
NAIROBI NORTHERN COLLECTOR WATER PROJECT

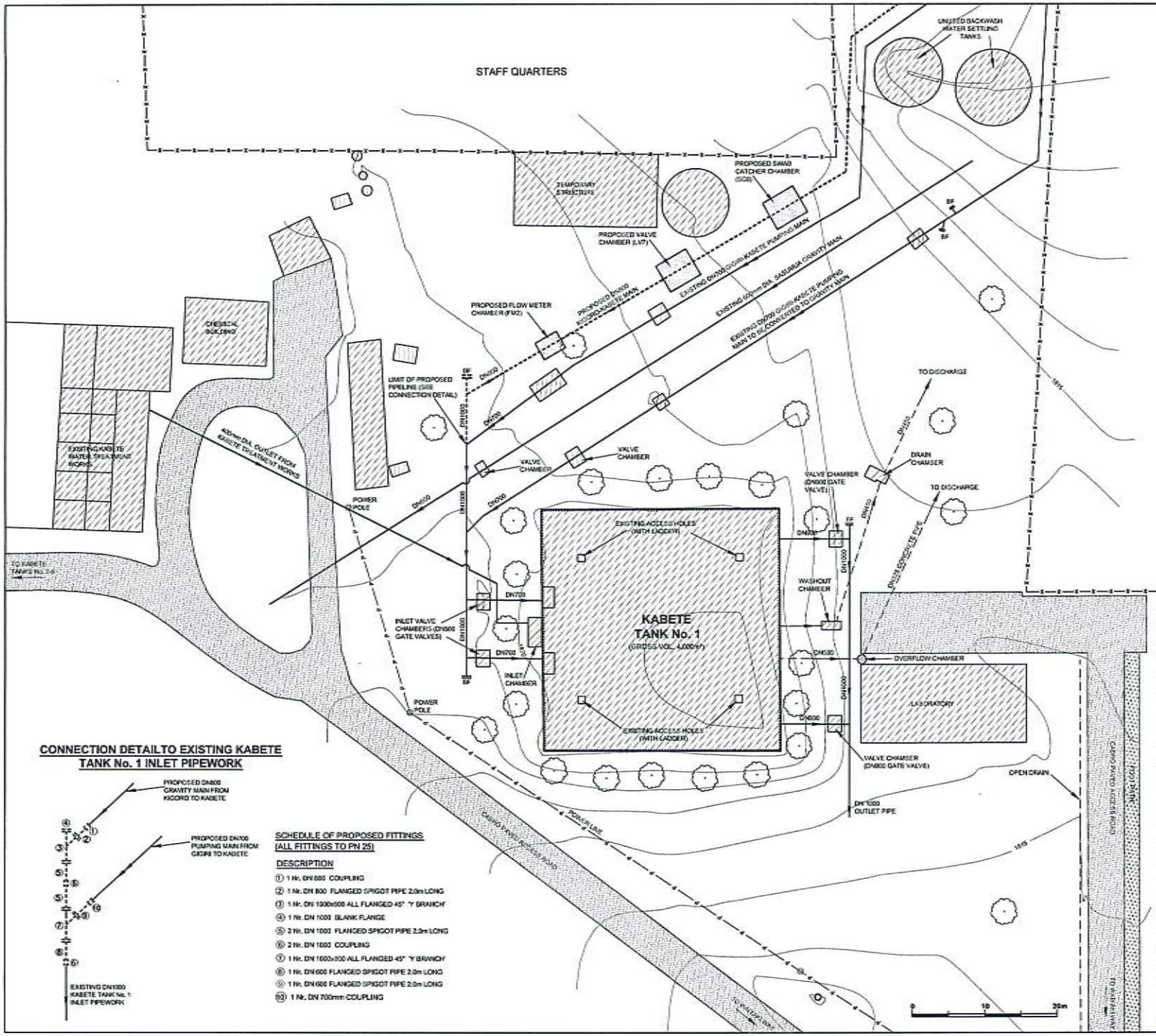
SCHEME:

NAIROBI BULK WATER SUPPLY

DRAWING TITLE:

RAW WATER GRAVITY MAIN
TIE IN DETAILS AT THIKA DAM
GENERAL LAYOUT PLAN

DESIGNED BY:	A.M.M	DRAWN BY:	B.D.
CHECKED BY:	R.S.R	APPROVED BY:	M.S.B
SCALE:	H-1:7,500	DATE:	NOV. 2014
DRAWING No.	M396/NCP-1/RWGM/03		



CONNECTION DETAILTO EXISTING KABETE TANK No. 1 INLET PIPEWORK

SCHEDULE OF PROPOSED FITTINGS (ALL FITTINGS TO PN 25)

DESCRIPTION

① 1 Nr. DN 600 COUPLING
② 1 Nr. DN 600 FLANGED SPIGOT PIPE 2.0m LONG
③ 1 Nr. DN 1000x600 ALL FLANGED 45° 'Y BRANCH'
④ 1 Nr. DN 1000 BLANK FLANGE
⑤ 2 Nr. DN 1000 FLANGED SPIGOT PIPE 2.0m LONG
⑥ 2 Nr. DN 1000 COUPLING
⑦ 1 Nr. DN 1000x300 ALL FLANGED 45° 'Y BRANCH'
⑧ 1 Nr. DN 600 FLANGED SPIGOT PIPE 2.0m LONG
⑨ 1 Nr. DN 600 FLANGED SPIGOT PIPE 2.0m LONG
⑩ 1 Nr. DN 700mm COUPLING

NOTES:

1. CONTOUR LEVELS ARE IN METERS AT ONE METER INTERVAL
2. THE LOCATION OF EXISTING PIPEWORK DETAILS SHOWN ON THE DRAWING IS APPROXIMATE. THE CONTRACTOR TO VERIFY THE DETAILS ON SITE
3. THIS DRAWING TO BE READ IN CONJUCTION WITH DRAWING No. M396/NCP-1/TWGM/82 & 76-78

LEGEND:

- PROPOSED PIPELINE
- EXISTING GRAVITY PIPELINE
- EXISTING PUMPING PIPELINE
- EXISTING DRAIN PIPELINE
- TREES / SHRUBS
- EXISTING CHAMBERS & STRUCTURES
- PROPOSED CHAMBERS
- EXISTING FENCE LINE
- EF — BLANK FLANGE

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PROJECT:
WATER AND SANITATION SERVICE IMPROVEMENT PROJECT ADDITIONAL FINANCING (WaSSIP - AF)
&
NAIROBI NORTHERN COLLECTOR WATER PROJECT

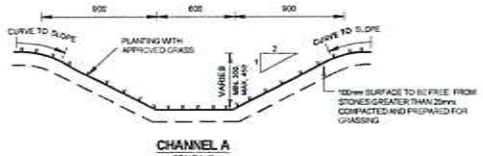
SCHEME:
NAIROBI BULK WATER SUPPLY

DRAWING TITLE:
TREATED WATER GRAVITY MAIN
KABETE TANKS
TIE IN DETAILS TO TANK No. 1

DESIGNED BY:	A.M.M	DRAWN BY:	B.O.
CHECKED BY:	R.S.S	APPROVED BY:	M.S.S
SCALE:	1:500	DATE:	NOV. 2014
DRAWING No.	M396/NCP-1/TWGM/86		

EROSION CONTROL TYPE	LONGITUDINAL SLOPE	LONGITUDINAL (PRIMARY) CHANNEL	TRANSVERSE (SECONDARY) CHANNEL	SLOPE STRUCTURAL PROTECTION	SURFACE PROTECTION
TYPE 1	STEEPER THAN 1 IN 10 NOT EXCEEDING 1 IN 4	PLAIN GRASS (CHANNEL A)	SURFACE GRADED TO SLOPE TO LONGITUDINAL CHANNEL	GABION PROTECTION WORKS / REMEDIAL WORKS TO EXISTING GABIONS	GRASSING TO SPECIFICATIONS
TYPE 2	STEEPER THAN 1 IN 4 NOT EXCEEDING 1 IN 2	GEOTEXTILE REINFORCED GRASS (CHANNEL B)	PLAIN GRASS AT 10m CENTRES (CHANNEL D)	GABION PROTECTION WORKS / REMEDIAL WORKS TO EXISTING GABIONS	HYDRAULIC SEEDING TO SPECIFICATIONS
TYPE 3	STEEPER THAN 1 IN 2	CONCRETE INTERBLOCK (CHANNEL C)	GEOTEXTILE REINFORCED GRASS AT 10m c/c (CHANNEL E)	GABION PROTECTION WORKS / REMEDIAL WORKS TO EXISTING GABIONS	HYDRAULIC SEEDING TO SPECIFICATIONS WITH GEOTEXTILE MESH AS REQUIRED
TYPE 4	OTHER AREAS	——	——	——	GRASSING TO SPECIFICATIONS

SCHEDULE OF EROSION CONTROL MEASURES



CHANNEL A
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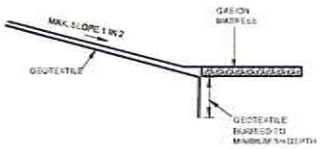
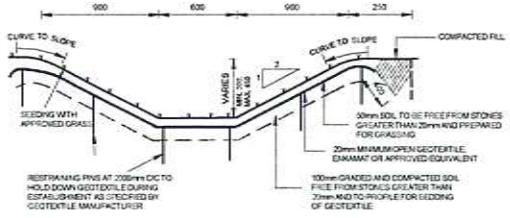


TOE DETAIL - CHANNEL B
N.T.S



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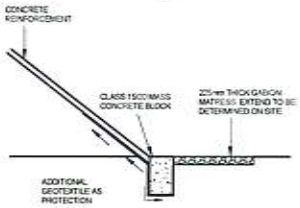

TOE DETAIL - CHANNEL C
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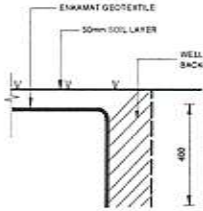
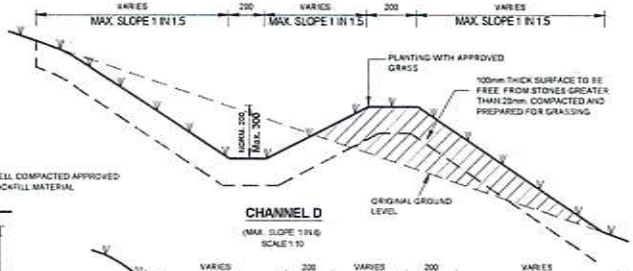
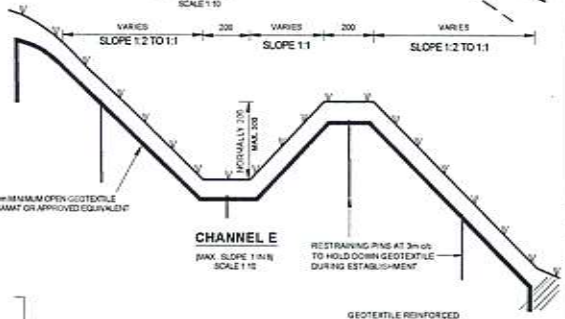


DETAIL FOR ANCHORING GEOTEXTILE
SCALE 1:20



CHANNEL D
(MAX. SLOPE 1 IN 6)
SCALE 1:10



CHANNEL E
(MAX. SLOPE 1 IN 6)
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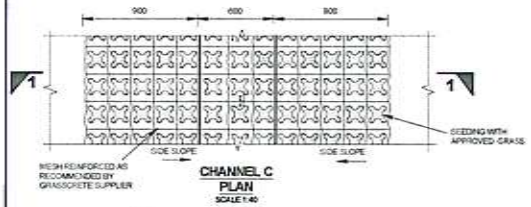

CHANNEL C
PLAN
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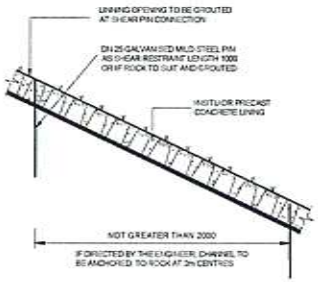

LONGITUDINAL SECTION ALONG CHANNEL C
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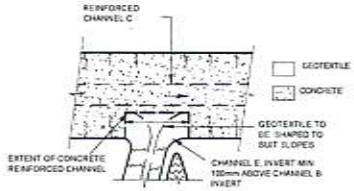
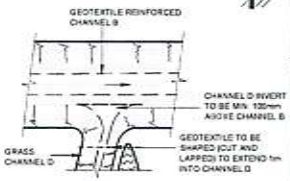


TYPICAL CHANNEL CONNECTION DETAIL FOR CHANNELS E TO CHANNEL C
N.T.S



TYPICAL CHANNEL CONNECTION DETAIL FOR CHANNEL D TO B
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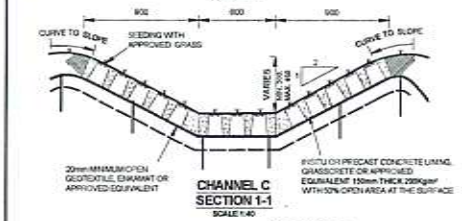
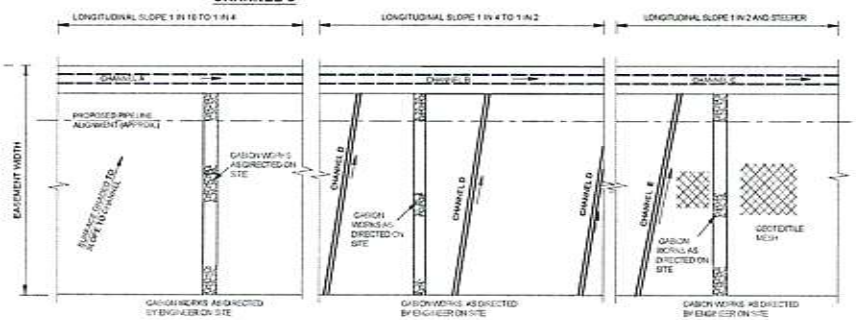
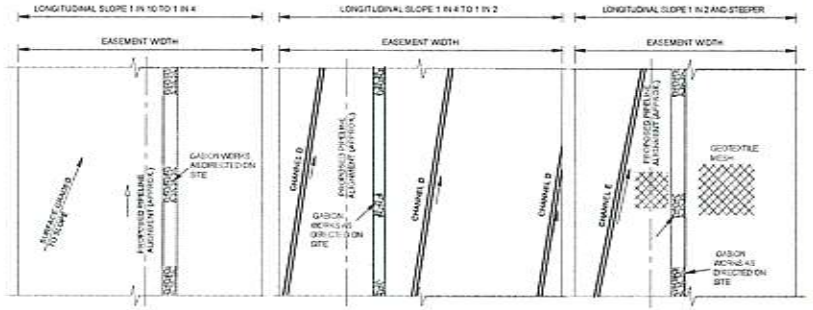


CHANNEL C
SECTION 1-1
SCALE 1:40

CHANNEL C



SCHEMATIC DRAWING OF EROSION CONTROL MEASURES FOR PIPELINE THE ALONG SLOPE
N.T.S



SCHEMATIC DRAWING OF EROSION CONTROL MEASURES FOR PIPELINE ACROSS THE SLOPE
N.T.S

NOTES:

1. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SPECIFIED

ABBREVIATIONS

mm	-	MILLIMETRES
FGL	-	FINISHED GROUND LEVEL
DIA	-	DIAMETER
FRL	-	FINISHED ROAD LEVEL
C/C	-	CENTER TO CENTRE

REVISION	DESCRIPTION	DATE

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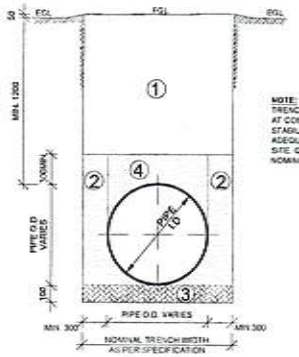
PROJECT:
WATER AND SANITATION SERVICE IMPROVEMENT PROJECT ADDITIONAL FINANCING (WaSSIP - AF)
&
NAIROBI NORTHERN COLLECTOR WATER PROJECT

SCHEME:
NAIROBI BULK WATER SUPPLY

DRAWING TITLE:
TREATED WATER GRAVITY MAIN
STANDARD DETAILS
EROSION CONTROL AND SLOPE STRUCTURAL PROTECTION MEASURES

DESIGNED BY:	J.W.K	DRAWN BY:	J.M.K
CHECKED BY:	R.S.P	APPROVED BY:	M.S.B
SCALE:	N.S	DATE:	DEC. 2014
DRAWING No.	M396/NCP-1/TWGM/84		



NOTE:
TRENCH SIDE SLOPES AND EXTENDED WIDTH AT CONTRACTOR'S DISCRETION DEPENDING ON STABILITY OF EXCAVATED SURFACE TO ENSURE ADEQUATE SAFETY TO LABOUR AT WORK ON SITE. QUANTITIES TO BE MEASURED BASED ON NOMINAL TRENCH WIDTH

STANDARD TRENCH WIDTH

PIPE DIA (mm)	TRENCH WIDTH (mm)
800	1400
1000	1600
1200	1800
1400	2000
1500	2100

TYPICAL NORMAL TRENCH DETAILS FOR WATER MAINS (FERROUS PIPES)

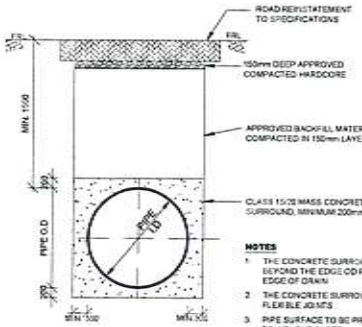
SCALE 1:100

ZONE ① SOIL TO BE USED MAY INCLUDE FREE DRAWING COARSE SAND, GRAVEL, LOAM AND SOIL OF A FRIABLE NATURE PARTICAL SIZE NOT TO EXCEED 25mm. BACKFILL IN LAYERS NOT EXCEEDING 300mm UPTO FINISHED GROUND LEVEL EACH LAYER BEING WELL COMPACTED TO LIMIT VOIDS. MECHANICAL COMPACTION EQUIPMENT MAY BE USED IF APPROVED BY ENGINEER.

ZONE ② BACKFILL WITH SOIL APPROVED BY THE ENGINEER IN LAYERS NOT EXCEEDING 200mm THOROUGHLY COMPACT SOIL TAMPING EQUALLY ON EITHER SIDE AND ALONG LOWER EDGE OF PIPE. ONLY HAND TAMPING TO BE USED.

ZONE ③ IF SHARP ROCK PROJECTIONS, TREE ROOTS OR OTHER UNSUITABLE MATERIAL IS ENCOUNTERED AT TRENCH INVERT LEVEL A FURTHER 100mm DEPTH OF MATERIAL IS TO BE EXCAVATED.
BACKFILL WITH SOIL APPROVED BY ENGINEER UPTO TRENCH INVERT LEVEL. THOROUGHLY COMPACT SOIL BY HAND TO GIVE A UNIFORM GRADIENT ALONG PIPE TRENCH. LEAKING PROCESSES FOR PIPE JOINTS

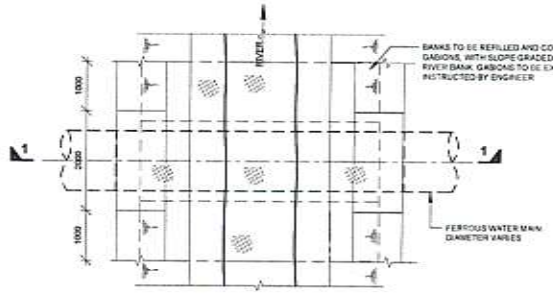
ZONE ④ SIMILAR REQUIREMENTS TO ZONE 2 EXCEPT NO EXCESS TAMPING IS PERMITTED OVER PIPE.



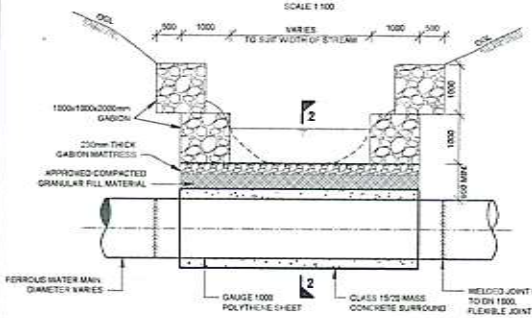
NOTES
1. THE CONCRETE SURROUND TO BE EXTENDED 1m BEYOND THE EDGE OF PAVEMENT OR IF APPLICABLE EDGE OF DRAIN.
2. THE CONCRETE SURROUND TO BE BROKEN AT FLEXIBLE JOINTS
3. PIPE SURFACE TO BE PROTECTED WITH GAUGE 1000 POLYTHENE SHEET

TYPICAL TRENCH REINSTATEMENT DETAIL AT ROAD CROSSINGS

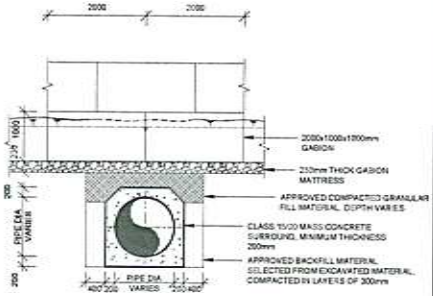
SCALE 1:100



PLAN
SCALE 1:100

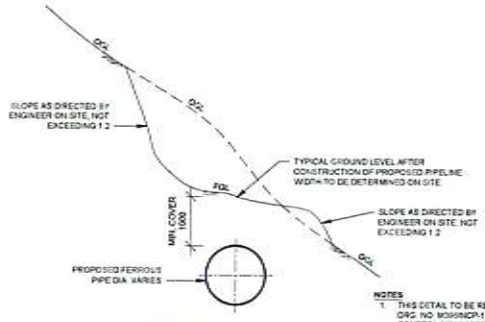


SECTION 1-1
SCALE 1:100



SECTION 2-2
SCALE 1:100

TYPICAL UNDER- RIVER CROSSING



NOTES
1. THIS DETAIL TO BE READ IN CONJUNCTION WITH ORG. NO. M396/NCP-1/TWGM/84 FOR EROSION CONTROL MEASURES ALONG THE PIPELINE ROUTE

TYPICAL BENCHING ON SLOPING TERRAIN

SCALE 1:100

NOTES
1. ALL DIMENSIONS IN mm UNLESS OTHERWISE STATED
2. THE DEPTH OF THE JOINT SEALANT SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS FOR THE JOINT SEALANT
3. ALL PIPE SURFACES IN CONTACT WITH CONCRETE TO BE WRAPPED IN GAUGE 1000 POLYTHENE SHEET
4. FOR EROSION CONTROL MEASURES ON PIPELINE ROUTE, SEE DRG. No. M396/NCP-1/TWGM/84

ABBREVIATIONS

mm	-	MILLIMETRES
FGL	-	FINISHED GROUND LEVEL
EGL	-	EXISTING GROUND LEVEL
O/G L	-	ORIGINAL GROUND LEVEL
DIA	-	DIAMETER
FRL	-	FINISHED ROAD LEVEL
℄	-	CENTER LINE

REVISION	DESCRIPTION	DATE

EMPLOYER:
ATHI WATER
CHIEF EXECUTIVE OFFICER
ATHI WATER SERVICES BOARD
P.O BOX 45283 - 00100 NAIROBI
TEL: 020 - 2727438 FAX: 2724295

CONSULTANTS:
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egis eau
78 ALLEE JOHN NAPIER
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MBP PARTNERS
MANGAT, I.B. PATEL & PARTNERS
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00100 - GPO, NAIROBI, KENYA
E-MAIL: mbp@africaonline.co.ke
TEL: +254-20-2710505
FAX: +254-20-2710548

PROJECT:
WATER AND SANITATION SERVICE IMPROVEMENT PROJECT ADDITIONAL FINANCING (WaSSIP - AF)
&
NAIROBI NORTHERN COLLECTOR WATER PROJECT

SCHEME:
NAIROBI BULK WATER SUPPLY

DRAWING TITLE:
TREATED WATER GRAVITY MAIN
STANDARD DETAILS
PIPE TRENCH AND CONCRETE SURROUND

DESIGNED BY:	J.M.K	DRAWN BY:	J.M.K
CHECKED BY:	R.S.P	APPROVED BY:	M.S.B
SCALE:	AS SHOWN	DATE:	DEC. 2014
DRAWING No.	M396/NCP-1/TWGM/82		

Appendix III: Location of Washout

NAIROBI BULK WATER SUPPLY - CONSTRUCTION OF RAW WATER GRAVITY MAIN
LIST OF WASHOUTS

Washout Type & No.	Location		Chainage (m)	Length to be Drained (m)	Pipeline Diameter (mm)	Approx. Vol. of Water to be Drained (m^3)
	X	Y				
WO T1-01	260901	9909594	87	242	1200	273
WO T3-02	261182	9909482	396	316	1200	357
WO T3-03	261477	9909404	718	319	1200	360
WO T4-04	261774	9909424	1,033	557	1200	629
WO T4-05	262202	9908967	1,831	585	1200	661
WO T4-06	262502	9909111	2,202	387	1200	437
WO T3-07	262858	9908964	2,604	236	1200	266
WO T3-08	262923	9908946	2,673	224	1200	253
WO T1-09	263139	9908712	3,051	341	1200	385
WO T3-10	263356	9908918	3,354	275	1200	310
WO T2-11	263571	9909032	3,600	300	1200	339
WO T2-12	263896	9909123	3,953	285	1200	322
WO T2-13	264087	9909046	4,169	306	1200	346
WO T1-14	264417	9908881	4,564	293	1200	331
WO T3-15	264434	9908697	4,754	393	1200	445
WO T2-16	264598	9908154	5,350	373	1200	422

NAIROBI BULK WATER SUPPLY - CONSTRUCTION OF TREATED WATER GRAVITY MAIN
LIST OF WASHOUTS

Washout Type & No.	Location		Chainage (m)	Length to be Drained (m)	Pipeline Diameter (mm)	Approx. Vol. of Water to be Drained (m^3)
	X	Y				
WO T1-01	264994	9907815	369	588	1200	665
WO T1-02	265156	9907468	806	452	1200	511
WO T1-03	265533	9907422	1,272	313	1200	354
WO T1-04	265692	9907403	1,432	166	1200	188
WO T1-05	265842	9907319	1,604	158	1200	178
WO T2-06	265979	9907295	1,747	177	1200	200
WO T1-07	266189	9907289	1,957	470	1200	532
WO T2-08	266802	9907005	2,687	693	1200	783
WO T3-09	266855	9906382	3,342	511	1200	577
WO T4-10	266853	9906020	3,708	459	1200	519
WO T4-11	266922	9905474	4,260	831	1200	939
WO T2-12	267020	9904387	5,369	774	1200	875
WO T3-13	266992	9903950	5,807	458	1200	518
WO T2-14	266960	9903473	6,285	412	1200	466
WO T1-15	266927	9903131	6,631	251	1200	283
WO T2-16	266935	9902976	6,786	478	1200	541
WO T3-17	266975	9902176	7,587	601	1200	680
WO T2-18	266996	9901776	7,988	273	1200	309
WO T2-19	267003	9901631	8,133	216	1200	244
WO T2-20	267037	9901346	8,420	420	1200	475
WO T5-21	267060	9900795	8,973	521	1200	589
WO T2-22	267075	9900304	9,461	560	1200	633
WO T2-23	267080	9899677	10,093	590	1200	667
WO T5-24	267147	9899135	10,640	497	1200	562
WO T2-25	267014	9898727	11,087	496	1200	561
WO T1-26	267014	9898188	11,632	574	1200	649
WO T3-27	267047	9897587	12,234	592	1200	670
WO T3-28	267119	9897023	12,816	465	1200	526
WO T2-29	267083	9896677	13,164	399	1200	451
WO T3-30	267019	9896231	13,614	362	1200	409
WO T3-31	266973	9895961	13,888	441	1200	499
WO T3-32	266881	9895462	14,496	457	1200	517
WO T5-33	266815	9895061	14,802	397	1200	449
WO T2-34	266723	9894582	15,290	475	1200	537
WO T3-35	266660	9894125	15,752	398	1200	450
WO T2-36	266618	9893793	16,086	474	1200	536
WO T3-37	266550	9893185	16,700	596	1200	674
WO T5-38	266580	9892609	17,278	644	1200	728
WO T3-39	266587	9891901	17,988	617	1200	697
WO T2-40	266522	9891381	18,511	459	1200	519
WO T3-41	266482	9890991	18,905	400	1200	452
WO T5-42	266447	9890587	19,311	711	1200	804
WO T4-43	266452	9889586	20,326	779	1200	881
WO T1-44	266280	9889073	20,869	488	1200	552
WO T1-45	266174	9888657	21,302	406	1200	459
WO T3-46	266105	9888287	21,680	429	1200	485
WO T5-47	265931	9887842	22,160	550	1200	622
WO T3-48	265668	9887283	22,780	586	1200	662
WO T3-49	265493	9886760	23,331	749	1200	847
WO T3-50	265237	9885852	24,277	852	1200	964
WO T5-51	265023	9885133	25,035	544	1200	615
WO T3-52	264883	9884831	25,365	356	1200	402
WO T2-53	264732	9884480	25,746	418	1200	472
WO T3-54	264590	9884050	26,200	460	1200	520
WO T3-55	264437	9883611	26,665	397	1200	448
WO T3-56	264337	9883298	26,993	558	1200	631
WO T3-57	264090	9882552	27,780	685	1200	774

NAIROBI BULK WATER SUPPLY - CONSTRUCTION OF TREATED WATER GRAVITY MAIN
LIST OF WASHOUTS

Washout Type & No.	Location		Chainage (m)	Length to be Drained (m)	Pipeline Diameter (mm)	Approx. Vol. of Water to be Drained (m^3)
	X	Y				
WO T5-58	263855	9882019	28,362	508	1200	574
WO T3-59	263651	9881639	28,795	340	1200	385
WO T3-60	263540	9881418	29,042	381	1200	431
WO T3-61	263291	9880968	29,557	439	1200	497
WO T4-62	263122	9880647	29,920	369	1200	417
WO T5-63	263035	9880287	30,294	442	1200	499
WO T3-64	262961	9879783	30,803	422	1200	477
WO T3-65	262913	9879454	31,137	695	1200	786
WO T3-66	262579	9878456	32,193	738	1200	835
WO T3-67	262348	9878111	32,613	411	1200	465
WO T1-68	262254	9877720	33,015	574	1200	649
WO T3-69	262024	9877018	33,760	608	1200	687
WO T2-70	261802	9876604	34,230	379	1200	428
WO T3-71	261640	9876371	34,517	362	1200	409
WO T3-72	261389	9876027	34,954	469	1200	530
WO T3-73	261175	9875573	35,455	471	1200	532
WO T3-74	261054	9875149	35,895	399	1200	451
WO T2-75	260942	9874809	36,253	595	1200	672
WO T3-76	260684	9874020	37,084	587	1200	664
WO T2-77	260578	9873694	37,427	310	1200	351
WO T3-78	260483	9873434	37,704	314	1200	355
WO T3-79	260371	9873101	38,055	690	1200	780
WO T3-80	260194	9872108	39,083	987	1200	1,116
WO T2-81	259978	9871213	40,029	1,059	1200	1,197
WO T2-82	259800	9870057	41,200	752	1200	850
WO T2-83	259713	9869738	41,532	605	1200	684
WO T3-84	259495	9868891	42,409	704	1200	796
WO T3-85	259264	9868414	42,940	454	1200	514
WO T1-86	259100	9868076	43,317	493	1200	558
WO T3-87	258818	9867536	43,926	682	1200	771
WO T3-88	258384	9866938	44,680	937	1200	1,060
WO T4-89	257749	9866044	45,800	1,180	1200	1,335
WO T4-90	256749	9865700	47,040	940	1200	1,063
WO T4-91	256681	9865066	47,680	689	1200	779
WO T4-92	256608	9864343	48,417	790	1200	894
WO T4-93	256361	9863547	49,260	1,192	800	599
WO T4-94	255102	9863936	50,800	1,119	800	563
WO T4-95	254838	9864511	51,498	1,150	800	578
WO T4-96	253445	9864386	53,100	1,093	800	549
WO T4-97	252915	9864171	53,684	670	800	337
WO T4-98	252620	9863511	54,440	598	800	300
WO T4-99	252605	9863079	54,879	463	800	233
WO T4-100	252871	9862694	55,366	486	800	244
WO T4-101	252609	9862296	55,851	1,085	800	545
WO T4-102	251341	9861785	57,536	1,018	800	512
WO T4-103	251316	9861452	57,887	792	800	398
WO T4-104	250321	9861045	59,120	807	800	405

Appendix IV: Public Consultation Records

a) Stakeholders Consultation
b) Public consultation

a) Stakeholders Consultation Records

Muranga County

Notes for the meeing held with THE COUNTY DIRECTOR OF FISHERIES AND FISHERIES OFFICER IN MURANGA FOR ESIA FOR THIKA DAM - KIGORO - KABETE PIPE GRAVITY WATER SUPPLY PIPELINE ON 5/5/2015 AT 9:30 am AT FISH

Attendance

1 John Gitonga Rauni - Director of Fisheries.
2 Stephen Baengetrny - Fisheries Officer.
3 Meave Omuruli - Environmentalist.
4 10
5 11
6 12

Agenda:

Introduction of the project.
Issues / Concerns / Recommendations arising from the proposed project

Notes:

- Introduction of the project to the fisheries officer.
- Irati, Gikigie and Maragua Rivers are gazetted trout rivers.
Gazetted trout river is known to have trout fish and if people can be given a licence to fish in the rivers.
Chania River are gazetted trout River.
In Fisheries Act, Chania, Kimakia, Maragua, Mathioya North and South and Thika are declared as gazetted trout River.
The population of trout species has diminished over time due to human activities along the river and poaching.
Trout migrate upstream to breed on the upper sources of the river and move downstream after hatching to feed and to grow.
Trout usually migrate during cold season around July-June to July
Trout migration is annually hence diverting of river within a year will only interrupt fish migration for a year. This will not be a big problem.

Notes drafted by: Meave Omuruli **Confirmed by:** RAUNI J.G.

Signature: [signature] **Signature:** [signature]

Date: 5/5/2015 **Date:** 05-05-15

COUNTY DIRECTOR OF FISHERIES
MURANG'A COUNTY
P. O. Box 147-10200
MURANG'A

Notes continued:

Discharge of construction materials into the river should be avoided ie wastes, chemicals (tar) and soil should not be discharged to river because it highly affects the thriving of fish species.

In case of fish loss due to discharge of waste, the river should be re-stocked after construction. This cost should be in-corporated in the project design once the river is disturbed. The river and fish species should be rehabilitated (include in ESMP).

Any time a river is obstructed, by-ways must be provided for the fish and other water species to pass through the weir.

Other type of fishes include Catfish, Tilapia, Carps, N Eels, Labiatae, Elephant snout fish.

Most people use hooks for fishing. Some use fish poison to catch the fishing. This an illegal fishing activities.

Most people divert small streams water into the pond.

Most people use the river and stream water for drinking.

Common carp ~~wh~~ has been introduced in these rivers.

Crayfish are also found in the rivers within Tana sub-catchment.

~~Fishes are defined~~ Fisheries is defined as finned fish and shelle fish.

Fish is an important source of proteins among the locals in the area. Some people families could eat fish 3 to 5 times a week.

Crayfish which was introduced in Sagana River is largely increasing in the rivers ~~fou~~ ~~fo~~ ~~otho~~ found along Tana catchment.

Notes drafted by: Meave Omoruki

Signature [signature]

Date 5/5/2015

Confirmed by RAUNI J.G.

Signature [signature]

Date 05-05-16

COUNTY DIRECTOR OF FISHERIES
MURANG'A COUNTY
P. O. Box 147-10200
MURANG'A

Notes for the meeing held with WATER QUALITY AND POLLUTION CONTROL OFFICER, WARMA ON 20/4/2015 AT 2:30 PM IN WARMA OFFICE.

Attendance

1 Wangombe Thuku	7
2 Meare Omuruli.	8
3	9
4	10
5	11
6	12

Agenda:

1 Introduction of the Thika-Kigoro-Kabete Granty Water Supply Pipelines
2 Issues / Concern from ~~WARMA~~. WRMA, Muranga County.

Notes:

- Pollution / Siltation due to piling of soil near the river hence sand being swept near the river. The sand should be deposited far away from the riverine ecosystem. WARMA Regulations 119-205 : PART 9.
- Restoration of riparian ecosystem to the way it was before construction.
- Riparian user (LASWA) must come up with a soil and water conservation measures as per WRMA rules of 2007.
- The WARMA has staff gauge in every river. Incase of interference of the gauge, the client must notify ~~them~~ WARMA for relocation and also are expected to help WARMA in relocation. (Cost and labor)
- A public notice should be put to notify all users downstream indicating the dates the pipes will cross the river.
- Oil spills and machine breakdown may be occur ~~resulted~~ during construction. Incase of the spillage the oil has to be cleaned. (Polluter-pay principal).

Mitigation: Machines and storage equipment should be outside the riparian area.

WARMA has the Catchment Management Plan for the the rivers.

RUA (River User Association) has ~~[illegible]~~ plans for management of each river

Notes drafted by: Meare Omuruli **Confirmed by:** Wangombe Thuku

Signature: [signature] **Signature:** [signature]

Date: 20/4/2015 **Date:** 20/4/2015.

WATER RESOURCES MANAGEMENT AUTHORITY
UPPER TANA SUB-REGION
P.O. Box 304 – 10200, MURANGA
TEL: 020-2304211, 0714-799476
Email: wrmauppertana@yahoo.com

Notes continued:

If effluent is produced into the river the resolent authority should apply for effluent ~~because~~ discharge permit.
The ASWB should give the details of the standard of the effluent plant.
There is a risk of underground water pollution
-The effluent water should be treatment to the ~~same level as the~~ specified standard before the discharge is released to the river.
- Awsb needs to specify where their solid waste is being deposited
- Excessive additive in the water (discharge) is a threat to the species in the rivers.
- The ~~water~~ effluent being released to the river should be regulated to be almost at the same flow rate as the river flow to avoid erosion.
- Permits is a must and entails the direction for the river crossings and immediately the diversion is completed and the river restored the ~~earlier~~ permit should be cancelled. (Restoration of riparian areas).
- The An alternative abstraction point should be given to the person abstracting water at the area of river diversion. This should catered for by ASWB.
If the riverbed is rocky, the area of diversion should be cleared with concrete. Gabions placed at the river bank for river protection.
NRUA covers all the tributaries - Thika has 3WRUA, Chania, 1WRUA in Murang'a; Kiama River - Kiama WRUA.
There is a sub-catchment management plan for every WRUA.
- ASWB should develop a joint management plan with the stakeholder ~~for that area~~ for the required period of time.
Staff gauge (staff monitoring station) should reinstall/relocated accordingly with the set standards. The reinstallation/relocation is only done by technical staffs of WRMA.
WRUA sub-catment management plan is a collaborative plan hence the should be adapted and implemented.
The application of river permit diversion is key before commencement of works.

Notes drafted by: Moore Omondi
Signature
Date 20/4/2019

Confirmed by
Signature
Date 20/04/2019

WATER RESOURCES MANAGEMENT AUTHORITY
UPPER TANA SUB-REGION
P. O. Box 304 - 10200, MURANG'A
TEL: 020-2304211, 0714-799476
Email: wrmauppertana@yahoo.com

Notes for the meeing held with MURANGA ECOSYSTEM COORDINATOR IN ECOSYSTEM COORDINATOR OFFICE MURANGA TOWN AT 10 AM.

Attendance

1 James Githongo - Ecosystem Conservator
2 Meave Omondi - Environmentalist.
3 9
4 10
5 11
6 12

Agenda:

Introduction of the project (Thika dam - Kigoro rw - Kabete County Pipelines)
Issues / Concerns / Mitigation arising from the proposed project

Notes:

The pipeline is outside the conserved forest area but along the pipeline there is a community / Private.
The community forest is for the purpose of conservation and economic activities
Compensation for community trees
Clearance of trees leads to soil erosion hence need for mitigation measures
The gradient of the area, hence the more trees are uprooted they should revegetate the area -
Control the gradient, pipeline should be laid where the gradient is not steep.
Every A area has trees, grasses, tea farms hence revegetation should be done
Rather than compensation of wood / trees for money the affected people should be compensated in kind trees.
The tree coverage in Murang'a is much - need to increase the cover,

Notes drafted by: Meave Omondi
Signature:
Date: 21/4/2015

Confirmed by: J. M. Githongo
Signature:
Date: 21/4/2015

ECOSYSTEM CONSERVATOR
MURANG'A COUNTY

Notes continued:

Some farmers grows woodlots ie eucalyptus, some agroforestry hence prefer grevillea, cypress and pines, some grow wattle for fuel wood.
Some places farmers are practising conservation using indigenous trees (hence should be compensated with indigenous) → ie along the rivers or steep gradient.
Recommendation : Partial Conservation in kind/cash to ensure conservation.
Most of the trees are planted trees.
The forest office are encouraging the people to plant bamboo trees along the rivers.
The project area is near the forest, hence categorized as AF2 1 (tea zones) an altitude of above 2,000m.
Conservation of Aberdare forest is done by stakeholders hence ASWB should also facilitate the conservation of the forest to mitigate the forest threats. This ~~the~~ threat include clearance of forest wood, climate change challenge.
The level of rivers in the Aberdares forest have gone done in a great extend.
Disturbance of the forest has accelerated the reduction of water level ~~in~~ of the rivers in the Aberdares.
Conservation of the forest should be paid for by the beneficiaries
Energy conservation stoves can be included as part of the conservation to affected ~~in~~ families to conserve fuel wood.
The stove reduce the ~~conserva~~ consumption of fuel wood to 40-50%.
AWSB can strengthen the local water service providers.

ECOSYSTEM CONSERVATOR
MURANG'A COUNTY

Notes drafted by:	Meave Omunia	**Confirmed by**	T.M. Leitonga
Signature	[signature]	**Signature**	[signature]
Date	21/4/2015	**Date**	21/4/2015

Notes for the meeing held with DISTRICT FOREST OFFICER, GATANGA SUB-COUNTY, MURANGA COUNTY on 28/4/2015.

Attendance

1 John Mahiuha	7
2 Meave Omuruli	8
3	9
4	10
5	11
6	12

Agenda:

1. Introduction of the project
Issues / Concern / Recommendation

Notes:

The project will affect the largest percentage of farmers with tea and planted woodlots.
The people in the area practise agroforestry. The main tree used are Grevellia and Arocados
Woodlots are mainly Eucalyptus, wattle trees, Grevillia.
There also scattered indigenous trees along the project area.
They main ones Podocarpus, Meru oak (Vitex kinensis), few species of Prunus.
The planting of tree tomato is also being embraced in the area.
Most people have planted fodder such as Napier grass along the project.
Some farmers plant grasses in the land.
There is alot of water harvesting through terracing and strip planting of Napier grass
RFs have done alot of capacity building among the communities in the area to ensure replanting of Trees

Notes drafted by: Meave Omuruli
Signature:
Date: 28/4/2015

Confirmed by: John M. Mahiuha
Signature:
Date: 28/4/2015

DISTRICT FOREST OFFICER
GATANGA DISTRICT
P.O. BOX 1197
THIKA

Notes continued:

Gatanga is the major supply of tree materials to other areas such as Thika and Limuru.

Before cutting a tree, the farmers are given certificate of origin which is free. However if tree is felled for home use there is no need for the certificate.

If the tree is for transportation, a movement permit is required. ~~depen~~ The amount charged depends on the tonnes per trip (rest ranges from ~~ksh~~ ksh 1000 - 2000).

Some people are accepting to plant bamboo along their farmland. Bamboo has diverse ~~[illegible]~~ importance to the people. It is best on soil conservation along the riverine, use for timber, charcoal burning, furniture making, construction, food (edible species).

The baskets for tea harvesting are made from bamboo.

The major challenge along the riparian is cultivation along the area.

The community needs a lot of capacity building in ~~[illegible]~~ regards to ~~of~~ acquiring the riparian land.

There is a rule being imposed on tea farmers to plant trees along the riparian and in their land (Rainy Green Forest). The tea farmers give their farmers seedling to plant on their land.

Planting of exotic trees is rampant because of the availability of ready market ie timber industries, oil industries, firewood, KPLC

Notes drafted by: Meave Omoruli

Signature [signature]

Date 28/4/2015

Confirmed by John M. Mahinha

Signature [signature]

Date 28/4/2015

DISTRICT COURT OFFICER
GATANGA DISTRICT
P.O. BOX 115
THIKA

Notes for the meeting held with... Ephantus Maina the Technical Manager MURIASCO on 22/4/2015

Attendance

1. Ephantus Maina	5.
2. Newton Stower	6.
3.	7.
4.	8.

Agenda

Notes

Muriasco obtains its water from irati that has its intake at irati river. It currently the T works is situated at Kinwambehu and has a capacity of 12,000 m³/d.

During the dry period, the water levels in River Irati is very little and if the water is over abstracted it will impact the water intake at the downstream of the water abstraction point

The water company has connected about 9000 household (54,000 people)

Muriasco has a sewerage system that discharges into river Karic. The T works is about 2000m³ capacity

Notes drafted by: Newton Stower ***Confirmed by:*** Ephantus Maina

Designation: Project Environmentalist ***Designation:*** Technical Manager

Signature: ***Signature:***

Project Name: .....

Project Code......

Date of meeting: ...../...../ 2014

GIBB International

CONSULTING · DESIGN · MANAGEME

Notes for the meeting held with...

Notes continued....

The water coverage in Murang'a Town stands at about 70% while sewerage is at about 25%.

Notes drafted by: Newton Stower

Confirmed by: Ephantus Maina

Designation: Project Environmentalist

Designation: Technical Manager

Signature:

Signature:

Project Name: .....

Project Code.....

Date of meeting: ...../...../ 2014

GIBB Internation

CONSULTING · DESIGN · MANAGEME

Notes for the meeting held with... County Director of agriculture Murang'a county at the county offices on 20/4/2015

Attendance

1. Daniel N. Gitahi	5.
2. Newton Stower	6.
3.	7.
4.	8.

Agenda

Discuss the possible environmental & social impacts of the proposed pipeline to Nairobi & treatment works.

Notes

There are no gazzetted rates for the produce that are produced in the county the former agricultural boards which have been ~~dissolved~~ dissolved with devolution ~~boards which~~ the approved market rates ~~which have since been abolished~~.

The rates currently available are not gazetted and are only provisional and are based on the current market rates.

- coffee	- young - 200 - 0-1 yr	Avocado	- Young - 400
	- Medium - 1000 - 1-2 yrs		Medium - 1000
	- mature - 3000 - 3 yrs		Mature - 1400
Tea -	Young - 500	Macadamia	- Young - 200
	Medium - 800		- Medium - 1000
	Mature - 1400		Mature - 2300
Bananas	- Young - 200	Maize	- Napier
	Medium 500	Napier charged per square meter - 50	
	Mature 1400	Hedges - 1500, Cyprus & Kei apple, 1000	

Notes drafted by: Newton Stower **Confirmed by:** Daniel N. Gitahi

Certified True Copy of the Original

Designation: Project Environmentalist **Designation:**

Signature: **Signature:** CDA-MURANG'A COUNTY 20/4/2015

Project Name: .....

Project Code.....

Date of meeting: ...../...../2014

GIBB International
CONSULTING · DESIGN · MANAGEME

Notes for the meeting held with...

Notes continued....

semi permanent fence - 250/m ft
Maize - cost per plant - 10 shilling (any stage
sweet potato vine - 40 kshs, 13 cans 10 ksh per plant
Kales - 20 per plant, cabbage - 40 kshs

-- The farmers who are most likely to be affected live on on high potential lands. there is high dependence on cash crops, such as coffee which takes time to build and as such there are possibilities of people being impoverished.

Most of the social structures such as hospitals, schools maybe communal effort and the issue of relocation of people to a new area might not fit in the new social set up.

linkages of the project affected persons to their other investments is crucial as moving a person might affect their access to their investments.

The project needs to be all inclusive, the people needs to be sensitized before the implementation of the project. This will allow the locals to have time to deliberate on the effects of the project.

Notes drafted by: Newton Stower *Confirmed by:* Daniel N. Citelli

Designation: Project Environmentalist *Designation:* Certified True Copy of the Original

Signature: *Signature:* .....

CDA-MURANG'A COUNTY
26/4/2015

Project Name: .....
Project Code.....
Date of meeting: ...../...../ 2014

GIBB Internation
CONSULTING · DESIGN · MANAGEME

Notes for the meeting held with... Isaac Wainaina the Deputy District Survey officer Muranga County

Attendance

1. Isaac Wainaina
2. Newton Stower
3.
4.
5.
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8.

Agenda

To discuss the impacts of the proposed Nathan collector phase 1 water project.

Notes

The issue of land parcels ending in the centre of the river is only shown in Registered index maps that show general boundaries, however details of the wayleaves, reserves and property boundaries are shown in the survey plans that show fixed boundaries and the reserves.

Gatanga cadastrals are within Thika survey departments and a few others are in Nyeri. This is because in the land offices were centralised at the provincial headquarters.

The most common least subdivisions in Muranga around Gatanga is 1/8 of an acre. Most of the land within the area are shown in the RIMS which have been ammended.

Before to get the land searches, the people on the ground will give us there land parcel number; the parcel number will be given to the registry and 500 KES

Notes drafted by: Newton Stower

Confirmed by: Isaac Wainaina

Designation: Project Environmentalist

Designation: Land Survey Assistant 1.

Signature:

Signature:

Project Name: .....

Project Code.....

Date of meeting: ...../...../ 2014

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Notes for the meeting held with...

Notes continued....

Land in Muranga is scarce and finding alternative land for resettlement may be difficult.

The land tenure is private and freehold titles. Most of Reserves are not shown in the cadastrals, this should be done with the survey of roads so as to maintain the acquired wayleave.

Notes drafted by: Newton Stower *Confirmed by:* Isaac Wanaina

Designation: Project Environmentalist *Designation:* Land Survey Assistant 1

Signature: *Signature:*

Project Name: .....

Project Code.....

Date of meeting: ...../...../ 2014

GIBB Internation

CONSULTING · DESIGN · MANAGEM

Notes for the meeting held with...

Notes continued....

Notes drafted by: Newton Stower

Confirmed by:

Designation: Project Environmentalist

Designation:

Signature:

Signature:

Project Name: .....
Project Code.....
Date of meeting: ...../...../ 2014

GIBB Internation
CONSULTING · DESIGN · MANAGEME

Notes for the meeting held with... Richard Mambugu (Assistant regional manager) KeRRA on 22/4/2015.

Attendance

1. Richard Mambugu
2. Newton Stower
3. Erick Njeru.
4.
5.
6.
7.
8.

Agenda

Notes

The authority to use the road reserves comes from the central office.

Most of the KERRA roads are gravel and earth which are D & E

The pipe should be laid very deep to avoid being affected by the roads. Most on a road the storm water drains are the lowest points and as such the laid pipe should be atleast 1m below.

KeRRA usually tasks the surveyor to mark the boundaries of the road reserve.

For cases where the pipe will cut through the road the contractor will be required to pay the cost of reinstating

Notes drafted by: Newton Stower | **Confirmed by:** R.K. Mambugu

Designation: Project Environmentalist | **Designation:** Ass. Regional Manager (KeRRA)

Signature: | **Signature:**

Project Name: .....

Project Code.....

Date of meeting: ...../...../2014

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Notes for the meeting held with...

Notes continued....

Two bankers cheques are raised one of which is submitted to KeRRA HQ and the other to the local office. Once the road has been registered, the contractor is given his bankers cheque at the regional office

Notes drafted by: Newton Stower

Confirmed by: R. K Wambugu

Designation: Project Environmentalist

Designation: Ass. Regional Manager (Kebs)

Signature:

Signature:

Project Name: .....

Project Code.....

Date of meeting: ...../...../ 2014

GIBB Internation

CONSULTING · DESIGN · MANAGEME

Notes for the meeting held with... Fredrick Irungo (operations and Maintainance officer KPLC Muranga.

Attendance

1. Fredrick Irrungo
2. Newton Stower
3.
4.
5.
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8.

Agenda

Notes

For the areas that power line will be affected, a letter should be written to KPLC and a firm to request for cerating and attach drawings of areas where the power lines will be affected.

The designer will from KPLC will go and look at the areas and raise a ~~[illegible]~~ quotation.

All the power lines are within the KPLC way leaves. Most of the time KPLC doesnt charge for loss of revenue.

KPLC will also have to spend on putting newspaper adverts on power interruptions. ~~[illegible]~~

The invoice once paid to KPLC regardless of the office it will ~~[illegible]~~ go straight to the central KPLC financial mangement

Notes drafted by: Newton Stower | **Confirmed by:** Fredrick Irungo

Designation: Project Environmentalist | **Designation:** In charge O&M

Signature: [signature] | **Signature:** [signature]

Project Name: .....

Project Code.....

Date of meeting: ...../...../2014

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CONSULTING · DESIGN · MANAGEME

Notes for the meeting held with... the county irrigation officer Murranga County

Mr. on 23/4/2015

Attendance

1.
2. Newton Stower.
3.
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8.

Agenda

To discuss the impact of the 1.5 M diameter pipeline from Ndakaini dam to Kabete on the irrigation activities within the county.

Notes

There are irrigation activities within the county and the majority horticultural crops & subsistence crops.

Horticultural crops include French beans, tomatoes, bananas, pumpkin, onion and subsistence crops such as maize, beans and napier grass.

The county has a project under NIB of about 2000 hectares that is dependent on river Maragua that will be committed.

Over abstraction will impact negatively on the irrigation scheme.

For the crops that might be impacted along the river banks, will be well defined by an agriculturalist who is trained to determine the value of crop depending on the age, size and type.

Notes drafted by: Newton Stower

Confirmed by: Josphat Rukunga

Designation: Project Environmentalist

Designation: County Director - Irrigation

Signature:

Signature:

Project Name: .....
Project Code.....
Date of meeting: ...../...../ 2014

GIBB Internation
CONSULTING · DESIGN · MANAGEME

Notes for the meeting held with...

Notes continued....

The tree crops that are around the Thika river are Macadamia, blue gum, grawlia, wattle trees, Eucalyptus, cash crops such as coffee, Tea, avacado and Bananas are also along the riparian

NIB is currently implementing 2 irrigation schemes one of which is Nyanjiga and Mericho Mureka. Nyanjiga is in Kangema of 1000 hectares on river Mathioya. Mericho Mureka is within river Maragua and is 2000 hectares.

Notes drafted by: Newton Stower

Confirmed by: Josphat Rukunya

Designation: Project Environmentalist

Designation: County Director - Irrigation

Signature:

Signature:

Project Name: .....

Project Code.....

Date of meeting: ...../...../2014

GIBB International

CONSULTING · DESIGN · MANAGEME

Notes for the meeting held with... the District lands Registrar Muranga County on 20/4/2015

Attendance

1. Nancy Njeng (District lands registrar
2. Newton Stower project Environmentalist
3.
4.
5.
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Agenda

1

Notes

The project area is under private ownership and the people own titles. For roads there is the issue of compulsory acquisition and the land owner is compensated.

There is need for land parcels numbers and do searches to determine the owners. The lands within the Ndakaini dam is mostly inherited from the ancestors.

land in the area has been bought by land buying companies which have subdivide land to its members.

A government valuer and a surveyor are key in the compensation of the project affected persons.

Notes drafted by: Newton Stower

Confirmed by: NANCY NJENGA

Designation: Project Environmentalist

Designation: D/LAND REGISTRAR

Signature:

Signature:

N.N. Njenga *087

Project Name: .....

Project Code.....

Date of meeting: ...../...../2014

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Notes for the meeting held with...

Notes continued....

The land registrar ~~will be~~ is tasked with making amendment to the titles and cadastral maps.

For Kaylaaves such as pipeline, easements are normally registered.

People living along the riparian land are aware that they should leave space for the riparian reserve

Notes drafted by: Newton Stower

Confirmed by: NANCY NJENGA

Designation: Project Environmentalist

Designation: D/LAND REGISTRAR

Signature:

Signature:

Project Name: .....

Project Code.....

Date of meeting: ...../...../2014

N.N. Njenga *087

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INSTITUTIONAL STAKEHOLDERS CONSULTATION LIST

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR PROPOSED NORTHERN COLLECTOR PHASE 1

DATE: N/A VENUE: N/A

	Name	Designation	Contacts Telephone/ Email Address	Signature
1.	Daniel N. Cutahi	County Director of Agriculture	0722801504 cclamurangja@yahoo.com	[signature]
2.	NANCY N. NJENGA	DISTRICT LAND REGISTRAR	0722304945 njengarancy88@gmail.com	[signature]
3.	Isaac Wainaina	Deputy District Surveyor	0722662699	[signature]
4.	Egra Ngange	County Director of Sm (NEMA)	0725753581	[signature]
5.	Mekrich Mwiha	In charge O&M-KPLC	fmwiha@kplc.co.ke 0722-804787	[signature]
6.	R.K. Wambugu	Assistant to Regional Manager (KERRA)	rkamunyo@yahoo.com 0722603706	[signature]
7.	Eric N. Nthiga	Procurement Officer.	nenthiga69@gmail.com 0720540331	[signature]
8.	Ephantus Maina	Technical Manager	0724 291 248 eumaina@yahoo.com	[signature]
9.	Josphat Rukenya	County Director Irrigation	0722924411	[signature]
10.	JOB KIHAMBA	DAM COORDINATOR, NDAKAINI DAM	0726-215848	[signature]
11.				

STAKEHOLDERS ATTENDANCE LIST, MURANGA COUNTY

NAME	DESIGNATION	CONTACT	EMAIL	SIGNATURE
1. James M. Gitanga	Ecosystem Conservator Murang'a	0722331025	zonalmanagermurang'a@yahoo.com	[signature]
2. Peter M. Mahinha	Sub-County Forest Officer Gatanga	0721498719	jogembu@gmail.com.	[signature]

PROJECT NO: 000897

PROJECT NAME: FIA C RAP FOR THIKA DAM - KIGORO TW - KABETE GRAVITY WATER SUPPLY

STAKEHOLDERS CONSULTATION FOR THIKA DAM-KIGORO-KABETE RAW AND TREATED WATER GRAVITY SUPPLY PROJECT

STAKEHOLDER CONSULTATION LIST, MURANGA COUNTY

NO.	NAME	DESIGNATION	ORGANIZATION	CONTACT	EMAIL	SIGNATURE
1.	JOHN G. RAUNI	COUNTY DIRECTOR OF FISHERIES	FISHERIES DEPT	BOX 147-10200 MURANGA	jrauni@yahoo.com	
2	Stephen K. Kangethuny	SENIOR Fisheries Officer	Fisheries Dept	"	stephkangethuny@yahoo.com	

Kiambu County

Notes for the meeing held with COUNTY FISHERIES OFFICER, KIAMBU COUNTY ON 11/5/2015".

Attendance

1	Olive Theuri	7	
2	Meave Omondi	8	
3		9	
4		10	
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6		12	

Agenda:

1. Introduction of the project.
Issues and recommendation arising from proposed project.

Notes:

Fisheries in Kiambu is mostly done through pond/farm fishing. fish farming

Most places in Kiambu, farmers construct ponds (earthen ponds) next to the river.

A challenge being experienced in Ngethu, there is no canal to drain the water from the washout during pipe clean up. The water from the washout destroy the ponds found along the area.

A warning should be placed among the locals so that people are aware of the activity and some be given time to harvest mature fish.

A well build canal should be constructed from the washout to the valley.

Type of fish in Kiambu are Tilapia and catfish.

There is minimal fish harvesting along the river. The river have Tilapia and catfish.

Notes drafted by: Meave Omondi

Signature:

Date: 11/5/2015.

Confirmed by: Olive Theuri

Signature:

Date: 11/5/2015.

KIAMBU COUNTY GOVERNMENT
LIVESTOCK AND FISHERIES OFFICER

Notes continued: (Potential is high)

Fishing / fish farming is considered as the ~~main type of economic~~ income activity and food protein in the area.
~~The farmers should be compensated once~~
Compensation should be done to all affected fish farms found along the project area.
Harvesting of fish from the ponds should be done through the use of nets.
Fish farming is a viable income generating activity in the county.

Notes drafted by: Meave Omuculi
Signature
Date 11/5/2015.

Confirmed by: Olive Ingati
Signature
Date

KIAMBU COUNTY GOVERNMENT
LIVESTOCK AND FISHERIES OFFICER

Notes for the meeing held with ZONAL FOREST OFFICER, KIAMBU COUNTY on 27/4/2015

Attendance

1 Antony Kinyanjui - Zonal forester, Thika East and West
2 Meave Omuoli
3
4
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Agenda:

Introduction of the project
Issues / Concerns / Recommendation regarding the proposed project

Notes:

Brief introduction of the project area running from Morongo (Ndakaini) to Kigoro to Kabete.
Most of the project are are farmland composed of trees
There is need for compensation of the affected trees.
Most of tree planting include: Gravellin, Eucalyptus, Arocadus, Mangus.
The determinant factor for planting agroforestry trees is that they coexist well with crops.
Important source of income are the trees such as Grivellin and Eucalyptus (for timber and firewood)
Farmers willingly plant trees hence farmers have been the freedom to plant and fell trees at their own convinience.
Farmers must be given movement permit (government tax) to move them outside Nairobi
The lowest tax 1000/- using vehicle less that 5 tonnes, if 7 tonnes 1500/- (Ksh), and if it is a transit / lorries more than

Notes drafted by: Meave Omuoli
Signature:
Date: 27/4/2015

Confirmed by: A.K. Kinyanjui
Signature:
Date: 27th/04/15

KENYA FOREST SERVICE
ZONAL FOREST MANAGER - THIKA
P. O. Box 1197 - 01000, THIKA
TEL: 067 - 30045

Notes continued:

is tonnes the owner pays Ksh. 20,000 -
If the project passes through the forest ~~ASE~~ AWSB should seek consent of Kenya Forest Service.
Thika has 2 stations Kieni and Kimakia.
Kieni and Kimakia are gazetted forested hence need to follow The Forest Act.
Most people prefer planting Latana along the fenceline (farmland to Kay apple (mostly Kay apple bring transboundary problems of ~~tim~~ trimming the plant due to the thrones).
Challenges of managing a catchment area
- Kimakia is more than 7,000 ha.
- Challenges - maintain the forest at the same area
- Increased population hence encroachment
- The service conflict due to increased population.
- Community needs ie firewood, land.
- Swampy areas should be conserved and management plan be established.
- Reclamation of swampy area for construction is one of the key problems affecting catchment areas.

Notes drafted by: Meave Omuuli
Signature [signature]
Date 27/4/2015

Confirmed by A. Ko Kinyamazi
Signature [signature]
Date 27th/04/15

KENYA FOREST SERVICE
ZONAL FOREST MANAGER - THIKA
P. O. Box 1197, 01000, THIKA
TEL: 0[illegible]

Notes for the meeting held with... SUB-COUNTY ~~FISHERIES~~ FOREST OFFICER, KIAMBU COUNTY ON 20/5/2015

Attendance

1. James Thairu
2. Meave Omoruli.
3.
4.

Agenda

1. Introduction of the projects
2. Issues / Concerns / Recommendation arising from the proposed project

Notes

The trees along the wayleave are own by farmers.
Common trees for commercial forestry in the area include Eucalyptus and grevillea.
In some areas such as Riabai farmers have planted trees (encroached) at the wayleave.
The two forest found in Kiambu sub-county include Kamiti forest and Kiambu forest. These forest will not be affected by the pipeline
The Forest office have several projects to encourage people to plant trees to increase the forest cover in Kiambu.
The forest cover for Kiambu county is approximately 16.8%
There is no major area of ~~conservation~~ forest conservation along the project area.
ASWB can allow farmers to plant agricultural crops along the wayleave. Grasses should be planted at very steep areas.
Commercial farmers have to pay for transportation permits

Notes drafted by: Meave Omoruli ***Confirmed by:*** James G. Thairu

Designation: Environmentalist ***Designation:*** Sub-County Forest Officer (KBC

Signature: ***Signature:***

DISTRICT FOREST OFFICE KIAMBU

Project Name: ESIA and RAP for Thika dam-Kigoro-Kabete Water Supply Pipelines
Project Code: 000987
Date of meeting: 20/5/2015

GIBB International
CONSULTING · DESIGN · MANAGEMEN

Notes for the meeting held with...

Notes continued....

to transport timber to the declared market.
Nairobi and Thika are the ready market for the timbers i.e Bridge, tea factories, and timber industries.

Notes drafted by: Mecive Omondi *Confirmed by:* James G. Thaïm

Designation: Project Environmentalist *Designation:* Sub-County Forest Officer K

Signature: *Signature:*

DISTRICT FOREST OFFICER KIAMBU

Project Name:ESIA and RAP for Thika dam-Kigoro-Kabete Water Supply Pipelines
Project Code: 000987
Date of meeting: ...../...../ 2015

GIBB International
CONSULTING · DESIGN · MANAGEMENT

Notes for the meeing held with THE UPPER ATHI CATCHMENT MANAGER ON THIKA DAM-KIGORO-KABETE WATER SUPPLY PROJECT ON 7/5/2014 AT 11am IN THE MANAGER OFFICE, WARMA UPPER ATHI CATCHMENT KIAMBU.

Attendance

1	7
2	8
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4	10
5	11
6	12

Agenda:

Notes:

All the rivers in Kiambu sub-region form part of Athi River.

The pipeline should address the issue of water pollution. The by-product of water consumption in Nairobi ends up as sewage in Nairobi River thereafter in Athi River.

WARMA has flow monitoring stations along the rivers.

The largest problems experience is leaving of excavated materials near the river and also the other apparatus be tampered with by the contractor are not repaired / replaced.

The The trenches should be filled and the dumps be taken somewhere else.

There should be no materials left along the river after construction.

No piling of soil on top of the pipeline for nature to take its course.

In under river crossing the river should be returned to the normal flow as possible. Channel

The natural environment of the river should be maintained as much as possible.

WATER RESOURCES MANAGEMENT AUTHORITY
P. O. Box 1961, 00606 NAIROBI
UPPER ATHI SUB REGION

Notes drafted by:	Mercie Omondi	**Confirmed by:**	L-N. Njogu
Signature:		**Signature:**	
Date:	7/5/2014	**Date:**	7/5/2014

Notes continued:

In case of oil spills, the contractor should clean up the area according to the polluter pay principle.
A permit is required for any river diversion to be conducted.
The permit should be applied from WARMA.
A civic education should be conducted among the land owners where the pipeline is passing.
A notice should be given to the affected communities with specified ~~at~~ dates during ~~river crossings~~ pipeline ~~cross~~ construction.
Compensation should be paid on the affected owners.
The minimum riparian of a river is 6m.
The riparian of large rivers differ according to their ~~width~~ width (The riparian is determined by measuring the width of a river). This can only be determined by a WARMA inspector.
WRUA have their own catchment, Mgt Plans and they apply for funds to management
The rivers with WRUAs in Kiambu include Ndarugu, Mandome, Ruabora, Thiririka, Theta, Ruiru and Kamiti.
The sewage should be treated to the acceptable level
ASWB can provide community water points along the way at a cost.
The cost of the repair for flow monitoring apparatus ~~offs~~ (River gauging stations, RGS) affected by the project should be borne by the project.

Notes drafted by:	Maare Omoruli	**Confirmed by**	L.N. [illegible]
Signature	[signature]	**Signature**	[signature]
Date	7/5/2015.	**Date**	7/5/015

WATER RESOURCES MANAGEMENT AUTHORITY
P.O. Box 1854 - 00200, KIAMBU
07 MAY 2015
UPPER ATHI SUB REGION

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PUBLIC STAKEHOLDERS CONSULTATION LIST

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR PROPOSED NORTHERN COLLECTOR PIPELINES

DATE: _____ **VENUE:** KAMITI LOCATION.

	Name	Designation	Contacts Telephone/ Email Address	Signature
1.	RAPHAEL KIMANI	FARM MANAGER (NGURUNIT)	0724504270	
2.	HENRY MWAI NJOKA	FARM MANAGER (KAMITI)	0725165464	
3.	WILFRIDA JUMA	House-help (Kilanjibbi)	0734832446	
4.	BEATRICE WANJA	(Gathuma Farm Manager	0723325502	
5.	Peter Kamau	Mgui Kamiti	0706860857	
6.	Ngigi Kimani	Manager (Jokim Ranch)	0723-227078	
7.				
8.				
9.				
10.				
11.				

STAKEHOLDERS CONSULTATION LIST, KIAMBU COUNTY

	NAME	DESIGNATION	TELEPHONE	EMAIL	SIGNATURE
1.	Anthony K. Kinyanjui	ZFM	0721723989	akimani191@yahoo.com	

STAKEHOLDERS CONSULTATION FOR THIKA DAM-KIGORO-KABETE RAW AND TREATED WATER GRAVITY SUPPLY PROJECT

STAKEHOLDER CONSULTATION LIST, KIAMBU COUNTY

NO.	NAME	DESIGNATION	ORGANIZATION	CONTACT	EMAIL	SIGNATURE
1	Leonard Njiru Njogu	Surface Water Officer	Water Resources Management Authority	0202626072	kiambuwrma1@gmail.com	[signature]
2.	Oline W. Thieuri	County Fisheries Officer	Kiambu County Dept Agri, Livestock & Fisheries.	0724600880	oliwaitha@yahoo.com	[signature]
3.	James G. Thairu	Sub-County Forest Officer-(KBU)	Manga Forest Service	0720901847	jgthairu88@gmail.com	[signature]

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STAKEHOLDER CONSULTATION GUIDE

GENDER AND SOCIAL DEVELOPMENT

Introduction

The aim of this study is to collect information at household level and from stakeholders for the purposes of impact analysis and development of mitigation measures.

1. What NGOs and Community Based Organizations (CBO's) and Faith Based Organizations (FBOs) operate within the project area?

~~Afri~~ Action for Children in Conflict

2. Which groups are considered vulnerable in the community? (With emphasis on the community around the raw and treated water pipeline site)

Everyone but youth and women groups are the most vulnerable

3. What are the main social problems in the project area?

Water connection to the community is key priority otherwise the pipes will be vandalized as they try to connect the water illegally. Unemployment, insecurity, lacks piped wate

4. What programs do you have in place to solve the above mentioned challenges

Youth and women empowerment programs on entrepreneurship, civic education on 30% procurement rule and use of Uwezo and ~~Bin Bia~~ Kiambu Biashara Fund.

5. What economic and social activities are the vulnerable members of the community involved in?

Vulnerable group	Economic and Social activity
Youth	Business casuals in projects rabbit keeping, Agribusiness
Women	Merry go round, buying youts and chairs for hire, green farming

6. What support or welfare do you have in the project area?

Educating and providing revolving funds. Kiambu Biashara Fund very key. Ensure contractors use casuals from the locality.

7. What are the socio-cultural norms that guide property ownership specifically Land within the project area?

Inheritance, County Government land can not purchasing land

8. Gender Issues

a) Resource ownership: Indicate sex (M/F)

Resources	Who buys	Who owns	Who controls	Who uses
Land	Willing buyer	Individual/family, widow	family	Ind/family
Trees and Forest	"	" /Govern	Ind/gove	"
Livestock	Anyone	Individual	Ind/family	All
Crops	Anyone	Ind/family	"	"
Household property	"	"	"	"
Cars motorcycles and bicycles	"	"	Indi/family	"

b) Gender roles: Who does the following? (Tick where applicable)

Activity	Men	Women	Boy	Girls
Digging	✓	✓	✓	✓
Cooking		✓		✓
Food collection	✓	✓	✓	✓
Vegetable collection	✓	✓	✓	✓
Fetching water		✓		✓
Washing utensils		✓		✓
Collecting firewood		✓		✓
Looking after animals	✓		✓	
Washing clothes		✓	✓	✓
Total task	4	8	5	9

9. Are you aware of any site of historical / Archeological importance to the community in the project are?

Fourteen Falls,

10. Are there NGO's and / or CBOs/FBOs in the project area? If Yes, Please List them and their roles

Yes

11. Do you foresee any negative impacts from the proposed development of the geothermal power plant Bulk Water Supply to Nairobi City – Northern Collector Tunnel?
Yes or No, if yes what impacts do you see
i. During construction

Laying of pipes will affect roads and farms

ii. During operation

Yes

12. If your answer to No. 7 is Yes, please suggest how the anticipated negative impacts can be mitigated.

i. During construction

Compensation in case of interference with farms. Repair of any roads affected

ii. During operation

If the community does not benefit from the project they might interfere with the pipeline

13. What are your comments on this exercise?

It is a good one as long as the communities affected are sensitized.

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Stakeholder Contacts:

Name:	ESTHER NDIRANGU		
Contacts:	**Tel:** 0724 353545	**Mobile:**	**e-mail:** endirangu@cec.kiambu.go.ke
Organization Represented:	KIAMBU COUNTY		
Designation:	CEC for		
Locality:	KIAMBU		
Date:	2/06/2015		
Signature:			
Official Stamp: (if available)	EXECUTIVE MEMBER * RECEIVED 12 JUN 2015 * EDUCATION CULTURE & SOCIAL SERVICES		

GIBB contacts:

GEORGE OWUOR/CATHERINE JUMA

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Fax: +254 20 2210694
gowuor@gibbinternational.com; cjuma@gibbinternational.com .

Nairobi County

Notes for the meeting held with... NAIROBI CITY WATER AND SEWARAGE COMPANY LTD

Attendance

1. Dr. Namisi
2. JOYCE OWINO
3. ALUNEL MALEYO
4.
5.
6.
7.
8.

Agenda 1. Introduction
2. Questions and answers
3.

Notes

Min 1. 25/5/2015: Introduction

Ms Joyce Owino introduced us as a team from GIBB international who have been commissioned by AKWB to carry out an ESIA and RAP consultancy for the Thika dam - Kiganjo - Ruiru - Kiambu treated water pipeline and have come to consult with Nairobi ~~County Company~~ health sub-county offices as one of their key informants.

Min 2. 25/5/2015 Questions and answers

Q1 How many health facilities are currently in Westlands sub-county private : public and the services they offer

public are 7 private are about over 60 in number

Public : (Kawira, Kabete, Kangemi, Westlands, Mji wa huruma, Kariobangi

They are all level 3 health centres.

They provide Primary health care

Notes drafted by: *Confirmed by:* Dr. Namisi

Designation: Project Environmentalist *Designation:* SCMOH - Westlands

Signature: *Signature:*

Project Name: .....

Project Code.....

Date of meeting: ..../5./2015

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Notes for the meeting held with...

Notes continued....

Qn 2: Any remand on lifestyle diseases e.g hypertension
Response: It is common
Qn 3: What is the uptake of insurance
Response: Very low ABOUT 10%.

Qn: Remarks on emergency
Response: Very poor. We do not have a service.
Qn. Any referral hospitals around
Response: Pumwani, Mbagathi, KNH
Qn. Remark on use bicycles bodaboda.
Response: They are upcoming but not as many as in Eastleigh. Within town, there are many motorcycles

Qn. MDG goal 7 - will be emailed

Notes drafted by: Newton Stower *Confirmed by:*

Designation: Project Environmentalist *Designation:*

Signature: *Signature:*

Project Name: .....
Project Code.....
Date of meeting: ...../...../ 2014

GIBB Internation
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STAKEHOLDER INVOLVEMENT QUESTIONNAIRE

1 Will the proposed development impact your operations? Yes/No ✓

If yes, in what way?

a) Current Operations No impact on the current operations ~~and~~ unless during the connections into Kobete W.T.W.

b) On future (immediate) operations It will have a great impact as it will increase the available water for distribution. This will mean revising the current water distribution regime.

c) Recommendations It is requested that the project be fast tracked as the water situation in the city is far below demand.

2 Do you have any comments concerning the following issues in relation to the proposed project?

ISSUE	COMMENTS
Water distribution	There is need to evaluate the distribution mains (existing) to see if they will handle the same supply
Sanitation	Most water for the city will impact sanitation
Solid waste Management	NONE
Waste Water Management	There is need to rehabilitate the sewer reticulation in the city to handle the extra waste water
Occupational and Community Health and Safety operations at the proposed site during construction	No Comment.

3 Do you have any other comments either positive or negative about the proposed development?

There is need to involve the water operations in undertaking the project as the WSP will have to operate the system once its complete

GIBB International
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Name:	Khalid Lucheha Mwanjia
Organization Represented:	Nairobi City Water & Sewerage Co. Ltd
Designation:	Operation & Maintenance Manager
Signature:	[signature]
Official Stamp:	
ID Number:	9381192

GIBB contacts:

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JAowino@gibbinternational.com

NAIROBI CITY COUNTY

Telephone 020 344194
Web: www.nairobi.go.ke

City Hall,
P. O. Box 30075-00100,
Nairobi,
KENYA.

COUNTY HEALTH SERVICES

MAURICE NAMIINDA
DIRECTOR
GIBB INTERNATIONAL
P.O. BOX 30020 – 00100
NAIROBI

9th June 2015

Dear Sir,

REF: ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR THIKA DAM – KIGORO-GIGIRI-KABETE RAW AND TREATED WATER PIPELINES.

Attached herein, please find response to the ESIA questionnaire on the above named project.

We anticipate that the inputs and recommendations will be considered during the implementation of the project

GIBB AFRICA LTD.
RECEIVED
11 JUN 2015
ATTN: SERIAL NO: L 366
DEPT: FILE No:

Yours Sincerely,

DR. BERNARD MUIA
COUNTY EXECUTIVE COMMITTEE MEMBER HEALTH

GIBB International
CONSULTING · DESIGN · MANAGEMENT

STAKEHOLDER INVOLVEMENT QUESTIONNAIRE

1 Will the proposed development impact your operations? Yes/No

If yes, in what way?

a) Current Operations

1. Generation of dust
2. Generation of noise.
3. Loss of biodiversity.

b) On future (immediate) operations

1. Occupational Health and safety hazards.
2. Water borne diseases

c) Recommendations

1. Ensure minimum destruction of vegetation. If possible all project related activities should be done with the project area.
2. Rehabilitate borrow and gravel pits to avoid potential health hazards.
3. Ensure workers occupational health and safety standards are maintained through capacity building, proper training, providing protection clothing and managing their residential campses up to the required health standards.

2 Do you have any comments concerning the following issues in relation to the proposed project?

ISSUE	COMMENTS
Water distribution	Reduce availability of river water downstream (especially during dry season) to users.
Sanitation	Connect to an on-site septic/soak-away system then to a local sewerage system
Solid waste Management	Solid waste generated from excavation works to be reused to backfill while the rest to be disposed off to designated areas.
Waste Water Management	Waste water from operations and sanitary facilities to be drained into a waste treatment plant. The contractor to develop a waste management plan to address this issue.
Occupational and Community Health and Safety operations at the proposed site during construction	It is anticipated that most unskilled and semi-skilled workers will be recruited locally so that there will be no significant influx of workers into the project area. The incidence of diseases will be limited. This will enhance buy-in of the project by Local Community

3 Do you have any other comments either positive or negative about the proposed development?

Positive Impact: Increase in portable water supply that is essential to human health hence increase productivity.

Negative Impact: Health and safety of the residents from possible enhanced vector breeding, attraction of wildlife and water contamination. Accidental drowning into the dam sections is a potential occurance affecting children, the aged as well as animals.

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Name:	Dr Bernard Muli
Organization Represented:	NCCG
Designation:	C Ecm - Health
Signature:	
Official Stamp:	COUNTY EXECUTIVE MEMBER HEALTH SERVICES
ID Number	19436

GIBB contacts:

JOYCE OWINO

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JAowino@gibbinternational.com

11 JUN 2015
ATTN: [illegible] 8367
DEPT: [illegible] FILE No:

MINISTRY OF ENVIRONMENT, WATER AND NATURAL RESOURCES

Telegrams:"MAJI" Nairobi
Telephone: Nairobi +254 20 2716103
Fax: Nairobi +254 20 2728703
E-mail: ps@water.go.ke

STATE DEPARTMENT OF WATER
MAJI HOUSE
NGONG ROAD
NAIROBI

Ref. No. WD/3/3/1371/(13)

Date: 3rd June 2015

Mr. Maurice Namiinda
Director
GIBB International
P.O. Box 30020 – 00100
Nairobi

Dear Sir,

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR THIKA DAM-KIGORO-GIGIRI-KABETE RAW AND TREATED WATER PRIPELINES

CONSULTATIONS FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

Please refer to your letter Ref. 000987/JAO/L31055 of 27th May 2015 on the above mentioned subject.

Forwarded is a duly filled questionnaire for your necessary action.

Eng. SAO Alima
For: DIRECTOR OF WATER SERVICES

Encl.

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STAKEHOLDER INVOLVEMENT QUESTIONNAIRE

1 Will the proposed development impact your operations? Yes/No ✓

If yes, in what way?

a) Current Operations

It will not impact our current operations in any way, negative; but we shall increased systems that we shall oversee their operation & maintenance

b) On future (immediate) operations

There will not be any negative impact

c) Recommendations

I recommend the project

2 Do you have any comments concerning the following issues in relation to the proposed project?

ISSUE	COMMENTS
Water distribution	N/A
Sanitation	Once the project is implemented there will be more water delivered to Nairobi; There is need to expand sewerage system in Nairobi
Solid waste Management	N/A
Waste Water Management	There is need for expansion of sewerage system in Nairobi due to expected increase in flows.
Occupational and Community Health and Safety operations at the proposed site during construction	There is need to observe occupational & community Health &

3 Do you have any other comments either positive or negative about the proposed development?

The project will help meet the water demand in Nairobi; future expansion of sewerage system in Nairobi city is recommended.

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Name:	Eng. S.A.O Alima
Organization Represented:	MINISTRY OF WATER AND IRRIGATION
Designation:	DEPUTY DIRECTOR OF WATER SERVICE
Signature:	
Official Stamp:	
ID Number	12 2287

MINISTRY OF ENVIRONMENT WATER AND NATURAL RESOURCES
State Department of Water
Director Water Services
P.O. BOX 49720, NAIROBI

GIBB contacts:

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Fax: +254 20 2210694
JAowino@gibbinternational.com

Notes for the meeting held with... ~~MDOEO~~ MEETING WITH WESTLANDS EDUCATION OFFICER ON 21/5/2015

Attendance

1. MR. ~~MBURU~~ KIMANDO
2. Ms JOYCE OWINO
3. MS AGNES MALE-O
4.
5.
6.
7.
8.

Agenda 1. Introduction
2. Questions and answers
3.

Notes Min 1. 21/5/2015 : INTRODUCTION

Ms Joyce introduced us as a team from GIBB International, who have been commissioned by AKWB to carryout an ESIA-RAP consultancy for Thika dam studies "Kigoro - Gigiri - Kabete treated water pipeline. Westlands Educational sub-County DUMCF Office has been identified as one of our key informants and it is for this purpose that the consultation meeting has been set.

Min 2. 21/5/2015 Question and answers

Q1. What are the current school going population, 1st 2nd data of children and the number of education centres

Response;

The DEO ~~want~~ asked for a clarification of the pipeline route because some of the schools are not registered. He said we can get an estimate. in the attached documents on school enrolment. About the number of centres, it is challenge because ECD is still within the local County govern't except for the primary & secondary schools. Most private schools in Westlands don't offer the local curriculum. 8 4 4 system what they have is what they are trying to get from schools as they get established to date.

Notes drafted by: ~~Newton-Stower~~ Joyce Anino *Confirmed by:* Julius Mburu Kimando

Designation: Project Environmentalist *Designation:* DEO

Signature: *Signature:*

Project Name: .....
Project Code.....
Date of meeting: 21/05/2015

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Notes for the meeting held with...

Notes continued....

Qn. Are there faith based schools around?

Responce. The schools they have are privately managed for example St. Martins under the Catholic

Qn Do you have a teacher student ratio?

Response: No ~~that~~ because this is purely the work of the teacher ~~se~~ service Commission (TSC) but there's shortage of teachers in some schools.

Qn What is the
Karura forest
Lower Kalete

Do you have

Qn What are drop out rates and its cause

Response: Yes we have especially in the slums and the route cause is the fire outbreaks in the slums causes them to relocate to areas within outher slums.

Qn. Do you think alcohol/drugs

Response Yes. It contributes

Qn. Teenage pregnancies and FGM cases

Response: No reported cases of such

Qn. In regard to the project are there cases of waster shortages

Response: Mr. Mburu responded that he may not be in a position to answer that but all their school ~~water~~ have piped water in water shortage seasons they source from vendors.

Notes drafted by: Newton Stower Joyce Owino *Confirmed by:* Julius Mburu Kimanda

Designation: Project Environmentalist *Designation:* DEO

Signature: [signature] *Signature:* [signature]

Project Name: .....

Project Code.....

Date of meeting: ..21../..05../2015

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Notes for the meeting held with...

Notes continued....

Qn. What is the ratio of boy : girl ratio in schools
Response. Mr. Mburu clarified that is in most cases 50:50 or around 48:52 ration or so.

Qn. What are other challenges you have?
Response: Infrastructure is a key challenge in urban schools and they are trying to fix. Lack of officers is another challenge; and the challenge between the national and the local government after devolution.

Qn. Do you have a gender officer in this office
Response: It is a challenge because we are two officers in this office and only male and a female. But for the sub-county there is an officer.

Qn. Do you have water in this office.
Response: No those facilities don't exist here. Only one tap of water and even toilets do not exist. It is only the DC's office which has a private toilet but the rest of us has to make arrangements.

Qn. Why are this facilities missing
Response: The Woshanda DC, sub county but was to be put up in Loresho where there is a 7 acre piece of land but they have not because of communal issues

Notes drafted by: ~~Newton Stower~~ Joyce Okiro *Confirmed by:* Julius Mburu Kimaelo

Designation: Project Environmentalist *Designation:* DEO

Signature: *Signature:*

Project Name: .....
Project Code.....
Date of meeting: 21/05/2014

GIBB Internation
CONSULTING · DESIGN · MANAGEME

Notes for the meeting held with... RUNDA WATER

Attendance

1. Mr. Cleopas Agingu
2. Joyce Owino
3. Agnes Maleyo
4.
5.
6.
7.
8.

Agenda 1. Introduction
2. Questions and answers on water sources within Runda and supply
3. Adjournment

Notes

@ Min 1: 18/5/2015: Introduction.
Ms Joyce introduced the meeting that we had come here last time and now we needed clarifications on the water supply programme in the area

Min 2: 18/5/2015: Questions and answers
Qn. Ms Joyce asked for a brief history and services they offer. as Runda water
Response:
RWA was started in 1973. Main sources of water is Ruaka and a borehole. In 2012 they were given small amount of 300 m^3 from the Kabete water treatment plant. RW came because of failure of NW to supply water.
Qn. Do you sell water to outsiders
Response.
No the water we only serves the blocks in Runda, New Runda, Old Runda, Mimosa, The Ever-green. ~~estate~~

Notes drafted by: Joyce Owino *Confirmed by:* Cleopas Agingu

Designation: Project Environmentalist *Designation:* Commercial manager

Signature: *Signature:*

Project Name: .....
Project Code.....
Date of meeting: ...../...../2015

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Notes for the meeting held with...

Notes continued....

Qn. Is your water supply enough and can you get some from NW

Response.

No our supply is not enough during the dry spell though what they have now is added. Mr. Cleopas added that They had agreed with NW to be given some supply but They have not communicated anything so far.

Qn.

Ms Joyce asked if They have other projects do be dev'd which may need large supply of water.

Response:

Mr Cleopas responponded that They don't have other projects because of space. They cannot allow other projects like farming. It is clear That the law does not ~~Neer~~allow ~~that~~ any kind of farming within The City

Qn.

Ms Joyce asked if water recycling & rainwater harvesting is done?

Respone

Mr Cleopas responded that they do water recycling and no rainwater harvested.

Qn.

Ms Joyce wanted to know their current water demand?

Response

Mr Cleopas responded that their daily demand is $3000m^3$ and the projected demand is $4000m^3$

Qn

Will you need some water from this pipeline project

Response:

Yes we need ~~a~~ to be supplied with water from the pipeline sau

Mr. Cleophas

Notes drafted by: ~~Newton Stower~~ Joyce Ariro *Confirmed by:* Cleopas Agingu

Designation: Project Environmentalist *Designation:* Commercial Manager

Signature: [signature] *Signature:* [signature]

Project Name: .....

Project Code.....

Date of meeting: ...../...../2014

GIBB International

CONSULTING · DESIGN · MANAGEME

Notes for the meeting held with...

Notes continued....

Qn:

Mrs Joyce asked if they are the ones making the lawns and who is maintaining them?!

Response:

Mr Cleopas said that the lawns outside are done by Runda Water and they are the ones maintaining. Even drainage and their lawns which is done by them and not the County ~~Council~~ government. Even the Selun barriers they put it at their own ~~Rental~~ Local arrangements within Runda

Min 3. 15/5/2015: Adjournment

There being no other business the meeting adjourned at 1308 hours.

Notes drafted by: ~~Newton Stower~~ Joyce Ohind *Confirmed by:* Cleopas Agingu

Designation: Project Environmentalist *Designation:* Commercial Manager

Signature: [signature] *Signature:* [signature]

Project Name: .....

Project Code.....

Date of meeting: ...../...../ 2014

GIBB Internation
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Notes for the meeting held with... Mr Ogeri at the ~~Hotel~~ Ministry of Labour & Social Security

Attendance

1. MR. Ogeri
2. Ms Joyce Owino
3. Ms Agnes Maleyo
4.
5.
6.
7.
8.

Agenda 1. Introduction
2. Questions and answers /Discussion

Notes

Min 1. 12/5/2015: Introduction

Ms Joyce owino introduced us as GIBB team who have been commissioned by ANLB to carry out ESIA and RAP report for Thika Dam - Kigoro - Engin - Kabete Abeline and We are looking for relevant information from the ministry

Min 2. 12/5/2015 ~~Importance of the Project and~~ Questions and answers / Discussion

Qn 1 Ms Joyce asked him to briefly explain the importance of the project as far as Water is concerned

Response: Mr. Ogeri clarified that water is a key resource globally and infrastructure for investment.

Q2 Are you affected by water shortage

Response: Mr. Ogeri responded That water scarcity is real and needs to be fixed.

Q3. In terms of employment how is this project going to affect the economy.

Notes drafted by: JOYCE OWINO **Confirmed by:** William Ogeri

Designation: Project Environmentalist **Designation:** Ag. Assistant Director Employment

Signature: **Signature:**

Project Name: .....
Project Code.....
Date of meeting: ...../...../ 2015

GIBB Internation
CONSULTING · DESIGN · MANAGEME

Notes for the meeting held with...

Notes continued....

Response: Mr. Ogen said the project will attract great employment right from the skilled (professionals) to the unskilled eg ~~to~~ or the general like the welders, securing men among others are going to benefit the larger public

Q3.

Ms Joyces asked for the statistics of employment

Response:

It is not their mandate to take statistics and they are intending to do that in future. However they carry sectoral man-power survey. He referred us to the KNBS statistics

The informal sector is leading and formal employment sector is low such employments include guards, artisans

ICT are continually people but generally the formal sector creates less roughly 60,000 people compared to about 40 million Kenyans. In the government there are decent jobs unlike in the informal sector where there is securing and ~~exposure~~ occupational exposure

Qn.4.

Ms Joyce asked for OSHA regulations as far as the project

Response:

Mr Oken replied that we need to be advised on the OSHA 200 guideline in terms of safety. The consultancy need to ~~be~~ guide the contractor on protective gear so as to boost the government of social protection.

Notes drafted by: Newton Stower *Confirmed by:*

Designation: Project Environmentalist *Designation:*

Signature: *Signature:*

Project Name: .....

Project Code.....

Date of meeting: ...../...../ 2014

GIBB Internation

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Notes for the meeting held with...

Notes continued....

Project input Mr. Ongeri continued to explain on the input of the ministry in the

* The ministry of labour is dealing with employment, social security, poverty and they are partnering with UN in coming up with a work plan (2014-2018) where social protection & security is among key areas of social impact and social benefit analysis

Ms Joyce also clarified that the social aspect also captures on the resettlement of the PAPs or give an alternative like re-routing where the impact is great.

Notes drafted by: Newton Stower *Confirmed by:*

Designation: Project Environmentalist *Designation:*

Signature: *Signature:*

Project Name: .....

Project Code.....

Date of meeting: ...../...../2014

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Notes for the meeting held with... SUB-COUNTY FISHERIES OFFICER, WESTLANDS

ON 20 MAY 2015 AT 3PM.

Attendance

1. Peter Kiiru - Sub County Fisheries Officer
2. Meave Omondi.
3.
4.

Agenda

Notes

There are several farmers (2 farmers) who pump water from Ruiru river. There is also one farmer at Gigiri farmer.
No fish ponds are found along Mathare river.
Study still to be on Kamiti River and Gathiruini River.
Most farmers use borehole water.
Water from Ruiru and Gigiri River are fresh.
Fish farming is majorly found in schools
Fish farming in Westlands include Tilapia, Catfish.
The rivers do not have native fish and no river has been stocked with any fish.

Notes drafted by: Meave Omondi.

Designation: Environmentalist.

Signature:

Confirmed by: PETER KIIRU MUTISO
NO OBJECTION AT ALL.

Designation: SUB-COUNTY FISHERIES OFFICER

Signature:

0722-432144.

Notes for the meeting held with... DISTRICT FOREST OFFICER, WESTLANDS SUBCOUNTY ON 19/5/2016 AT 9am.

Attendance

1. Reuben Musa
2. Meave Omuruh
3.
4.

Agenda

1. Brief introduction of the proposed project.
2. Issues arising from the proposed project.
3. Recommendations

Notes

- The main challenge being faced in Karura forest is land grabbing
- Sometime the pipeline laged in an area restrict the farmers on the type of trees to plant ie trees with deep penetrates deep. Therefore it leads to change of trees planted.
- Commercial farming is done mainly along the Karura forest.
- Karura is regarded as a catchment forest.
- Commercial farming is also done in wetlands and Dagoretti.
- The mayor commercial trees harvested in are Jacaranda and Eucalyptus.
- Major indigenous trees in the area Mukuyu, Ficus family, Podocarpus sp.
- Conservation measures undertaken in the area include tree planting; terracing along hilly places.
- the main market of harvested trees are Kawangware and Kaggemi.
- fruit trees include Avocado (main), few mangoes

Notes drafted by: Meave Omuruh *Confirmed by:* Reuben M. Musa

Designation: Environmentalist *Designation:* Forester Westlands

Signature: *Signature:*

DISTRICT FOREST OFFICE
WESTLANDS

Project Name:ESIA and RAP for Thika dam-Kigoro-Kabete Water Supply Pipelines
Project Code: 000987
Date of meeting: 13/5/2015

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Notes for the meeting held with...

Notes continued....

Most farmers who own nursery depends on soil for the activities.
- The soil can be given to the farmers for free. The soil excavated can also be given for free for landscaping purposes.
- The public should be largely engaged during the process. The views of the farmers should be ~~sorted~~ sought and corporated in the report recommendations.
- Some trees are considered of important cultural values.
- Replanting of trees along the projecte area.
- Besides compensation in cash, some money can be used for conservation exercise ie buying trees for replanting at the affected areas.

Notes drafted by: Meave Omuruli

Confirmed by: Dluben M. Musa

Designation: Project Environmentalist

Designation: Forester / Westlands

Signature:

Signature:

DISTRICT FOREST OFFICE
WESTLANDS

Project Name:ESIA and RAP for Thika dam-Kigoro-Kabete Water Supply Pipelines
Project Code: 000987
Date of meeting: 19../5../2015

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ESIA FOR THIKA-KIGORO TREATMENT WORKS-KABETE GRAVITY WATER SUPPLY PIPELINES

Stakeholders Consultation

Introduction

The Government of Kenya has received funds from Agence Francaise de Development (AFD) and additional financing from the Word Bank for the Water and Sanitation Serivices Improvement Project (WASSIP). The proposed three phased bulk water supply project transversing Muranga, Kiambu and Nairobi County are part of WASSIP projects which aim to provide water to Nairobi and its environs (satellite towns). The three phase water supply in this project includes;

- The Northern Collector Tunnel, Downstream Works (~~Already~~ ESIA already completed).
- The Thika Dam-Kigoro Raw Water Gravity Pipelines
- The Kigoro Treatment Plant Works and
- The Treated Water Gravity Pipeline to Kabete Reservoir

The aim of this study is to ciollect information at household level and from stakeholders for the purposes of impacts analysis and development of mitigation measures

Thus, we kindly request for your opinion to facilitate the issues listed below to facilitate the development of our ESIA report.

Open Ended Questions

1. What is the main source of water for communities living along the project area?

   Nairobi water and sewerage Company.

2. The pipeline is expected to cross River Riara (Overcrossing by piers) and River Ruiruaka, Thigiri River, Karura River, Gitathuru River and Mathare River (Under River Crossing). What are the likely impacts of the pipeline to the rivers?

   a) Over crossings

   Increase in turbidity

   Compromise of water quality due to waste around the river.

WATER RESOURCES MANAGEMENT AUTHORITY
NAIROBI REGION
20 MAY 2015
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b) Under River crossings

- Increase in turbidity
- Compromise of water quality because of the waste around the river.
- Disruption of water supply to downstream people and aquatic life.

3. What are the WRMA guidelines in regards to River crossing?

Athi Water should obtain an authorization for in-stream works (trenching the river channel)
Seek an approval to the relevant office when laying pipes along it in the riparian

4. Do you foresee any positive impacts from the proposed water supply pipeline development?
Yes No ✓, if yes what are the impacts

a) During construction

~~have~~ No.

b) During operation

Yes.
When water is supplied to the people in Nairobi, it will raise the standard of living.

Increase of vegetation cover if water is used for irrigation of plants used for beautification of the city.

5. Do you foresee any negative impacts from the proposed water supply pipeline development?
Yes No , if yes what are the impacts

a) During construction

Interference with vegetation along the riparian
Disruption of aquatic life.

b) During operation

Increase of effluent after use of clean pipet-water.

c) What are the mitigation measures that should be put in place during
a) Construction phase

Restoration of riparian vegetation
Restoration of the river channel to its original state.

b) Operational phase

~~Lase~~ In line with increased water supply, the sewer networks and sewer works ~~shou~~ capacity should be increased to handle the increased effluent load.

d) Who are the water river users association of the affected named rivers? What are their roles in regards to management of the Rivers

Kinchwa WRUA (Roara River
Gatharaini WRUA (Ruiruaka River
Gitagwi - Gitathuru WRUA (Gitathuru River).
Role of WRUA - addresses conflicts among water resource users. It is also involved in conservation of catchment, management of water resources

Stakeholders Contact

Name:	MICHAEL MURIUKI MUTURI		
Contacts:	Tel	Mobile 0723854038	Email muchaagjabiahan@gmail.com
Designation	S.W.O.		
Organization	WRMA.		
Locality	INDUSTRIAL AREA		
Signature	[signature]		
Date	20/5/2015		
Official stamp if available	WATER RESOURCES MANAGEMENT AUTHORITY NAIROBI SUB REGION P.O. Box 18150 - 00500, NAIROBI		

Notes for the meeting held with... SURFACE WATER OFFICER, WARMA - NAIROBI REGION AT THEIR OFFICE.

Attendance

1. Michael Mutuni
2. Meave Omondi
3.
4.

Agenda

1. Introduction of the project
2. Issues arising from the proposed projects and recommendations
3. Conclusion

Notes

The main source of water for communities around the river is Nairobi Water and Sewerage Company.
River crossings will increase turbidity & compromise the quality of water due to more waste being driven to the river
function of WRUA.
1) Conservation of catchment.
2) Addresses conflicts among water resource users.
- The project should be in harmony with the natural environment. It should conserve the natural environment so that the negative impact should be implemented
- ~~The~~ After laying of pipes, the areas should not be left bare but rather replanted by trees.

Notes drafted by: Meave Omondi *Confirmed by:* MICHAEL M. MUTUSI.

Designation: Environmentalist *Designation:* S.W.O.

Signature: *Signature:*

WATER RESOURCES MANAGEMENT AUTHORITY
NAIROBI SUB - REGION
P. O. Box 18150 - 00500, NAIROBI

Project Name:ESIA and RAP for Thika dam-Kigoro-Kabete Water Supply Pipelines
Project Code: 000987
Date of meeting: ...../...../ 2015

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STAKEHOLDERS CONSULTATION FOR THIKA DAM-KIGORO-KABETE RAW AND GRAVITY WATER SUPPLY PIPELINES PROJECT

STAKEHOLDERS CONSULTATION LIST, NAIROBI COUNTY

NO.	NAME	DESIGNATION	ORGANIZATION	CONTACT	EMAIL	SIGNATURE
	Reuben M. Musa	Forester	KFS	0721994379	musare62@gmail.com	[signature]
	MICHAEL MUTURI	S.W.O.	WRMA.	0723854035	muchungiabrama@gmail.com	[signature]
	PETER KIILU MUTISO	SUB-COUNTY FISHERIES OFFICER	MOAF	0722432144	Mutisopkiilu@yahoo.com	[signature]

MINISTRY OF ENVIRONMENT, WATER AND NATURAL RESOURCES
RECEIVED
29 MAY 2015
Director Water Services Office
P.O. BOX 49720, NAIROBI

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1st Flr, Kaka House, Maua Close, off Parklands Rd
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Email: gibb@gibbinternational.com
Website: www.gibbinternational.com
Dropping Zone No. 47 (Revlon Plaza - 2nd Flr, Tubman Rd)

Our Ref: 000987/JAO/L31055

27 May 2015

Director, Water Services, Rm 526,
Ministry of Water & Irrigation, Maji House,
Off Ngong Road,Nairobi
P. O. Box 49720 Kenya.

For the attention of Engineer Alima

Dear Sir,

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR THIKA DAM-KIGORO-GIGIRI-KABETE RAW AND TREATED WATER PIPELINES.

CONSULTATIONS FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT.

Athi Water Services Board (AWSB) has commissioned GIBB Africa Limited, a firm of experts registered by the National Environment Management Authority (NEMA),to conduct an Environmental and Social Impact Assessment (ESIA)for Thika Dam-Kigoro-Gigiri-Kabete Raw and Treated Water Pipelines in compliance with the Environmental Management and Coordination Act (EMCA), 1999.

Section 17-1 of The Environmental-Impact Assessment and Audit Regulations, 2003 requires us to seek the views of any persons who may be affected by the project. You have been identified as a key stakeholder and as such, your views will be greatly appreciated.

We have attached here with a brief description of the project for which we request you to present your views, opinions and any concerns that you may have regarding the proposed project by filling in the stakeholder involvement questionnaire.

We would appreciate it if you would communicate your response within **10 days** from the date of receipt, after which we shall assume you have no comments.

Please note that NEMA has requested you to furnish us with your name, ID number and signature.

For any queries, kindly get back to us through the contact information provided at the end of the stakeholder involvement questionnaire.

Yours faithfully
for GIBB Africa Ltd

Maurice Namiinda
Director

Anastasia Ngatti
Operations Manager

Encl

DIRECTORS: P KAREKEZI* (Managing) BSc MBA (RUS) MBA (UCLA) CEng REng MIEK MCIArb MICE; S MAMBO* BSc MSc REng MIEK MIHT MASCE; M B NAMIINDA* BSc REng MIEZ MIEK
*Kenyan

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29 MAY 2015
OFFICE OF THE
EXECUTIVE COMMITTEE MEMBER
FOR PLANNING, LANDS AND HOUSING

Our Ref: 000987/JAO/L31055

27 May 2015

County Executive Committee Member,
Land, Housing and Physical Planning,
Nairobi City County,
City Hall, Second Floor,
P.O Box 30075-00100 Nairobi Kenya

Dear Sir,

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR THIKA DAM-KIGORO-GIGIRI-KABETE RAW AND TREATED WATER PIPELINES.

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Anastasia Ngatti
Operations Manager

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Our Ref: 000987/JAO/L31055

27 May 2015

NAIROBI CITY COUNTY
COUNTY EXECUTIVE (HEALTH)
HEALTH SERVICES
RECEIVED ON: 29/05/2015
REG NO:
FORWARDED TO:

County Executive Committee Member,
Health Services,
Nairobi City County,
City Hall Annex, 3rd Floor,Room 305
P.O Box 30075-00100 Nairobi Kenya

Dear Sir,

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR THIKA DAM-KIGORO-GIGIRI-KABETE RAW AND TREATED WATER PIPELINES.

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Maurice Namiinda
Director

Anastasia Ngatti
Operations Manager

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29 MAY 2015

Our Ref: 000987/JAO/L31055

29 May 2015

County Executive Committee Member,
Ministry of Environment, Water and Natural Resources,
Nairobi City County,
City Hall, Second Floor,
P.O Box 30075-00100 Nairobi Kenya

Dear,Sir,

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR THIKA DAM-KIGORO-GIGIRI-KABETE RAW AND TREATED WATER PIPELINES.

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Yours faithfully
for GIBB Africa Ltd

Maurice Namiinda
Director

George Owuor
Operations Manager

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Our Ref: 000987/JAO/L31055

27 May 2015

The Permanent Secretary,,
Ministry of Environment and Mineral Resources,
Nhif Building 12th Floor,
Ragati Road, Upperhill
P.O Box 30126-00100 Nairobi Kenya

Dear Sir,

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR THIKA DAM-KIGORO-GIGIRI-KABETE RAW AND TREATED WATER PIPELINES.

CONSULTATIONS FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT.

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Yours faithfully
for GIBB Africa Ltd

Maurice Namilnda
Director

Anastasia Ngatti
Operations Manager

Encl

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*Kenyan

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Website: www.gibbinternational.com
Dropping Zone No. 47 (Revlon Plaza - 2nd Flr, Tubman Rd)

Our Ref: 000987/JAO/[illegible]

KENYA URBAN ROADS AUTHORITY
RECEIVED
29 MAY 2015
DIRECTOR GENERAL
P.O. Box 41727 - 00100, NAIROBI

27 May 2015

Director General,
Kenyan Urban Roads Authority,
5th Avenue, Ngong Road,
P.O. Box 42267-00100 Nairobi Kenya

For the attention of General Manager Design and Construction

Dear Sir/Madam,

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR THIKA DAM-KIGORO-GIGIRI-KABETE RAW AND TREATED WATER PIPELINES.

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Maurice Namiinda
Director

Anastasia Ngatti
Operations Manager

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NAIROBI CITY WATER
& SEWERAGE Co. LTD.
02 JUN 2015
RECEIVED
OPERATIONS & MAINTAINANCE DEPT.

Our Ref: 000987/JAO/L31055

27 May 2015

Nairobi Water and Sewerage Company,
Kampala Road, off Enterprise Road.
P.O. Box 30656-00100 Nairobi, Kenya

For the attention of Operations Manager

Dear Sir,

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR THIKA DAM-KIGORO-GIGIRI-KABETE RAW AND TREATED WATER PIPELINES.

CONSULTATIONS FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT.

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Please note that NEMA has requested you to furnish us with your name, ID number and signature.

For any queries, kindly get back to us through the contact information provided at the end of the stakeholder involvement questionnaire.

Yours faithfully
for GIBB Africa Ltd

Maurice Namiinda
Director

Anastasia Ngatti
Operations Manager

Encl

DIRECTORS: P KAREKEZI* (Managing) BSc MBA (NUS) MBA (UCLA) CEng REng MIEK MCIArb MICE; S MAMBO* BSc MSc REng MIEK MIHT MASCE; M B NAMIINDA* BSc REng MIEZ MIEK
*Kenyan

REGISTERED OFFICE
GIBB AFRICA LIMITED
KENYA - RE TOWERS
UPPERHILL, OFF RAGATI ROA
P O BOX 44286 NAIROBI
00100, GPO - KENYA

KENYA RURAL ROADS AUTHORITY
BLUE SHIELD TOWERS
RECEIVED
DATE: 29/5/2015

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CONSULTING · DESIGN · MANAGEMENT

GIBB AFRICA LIMITED
1st Flr, Kaka House, Maua Close, off Parklands Rd
P. O. Box 30020, Nairobi, 00100 GPO, Kenya.
Tel: +254 (0) 20 3245000
+254 (0) 20 3749267 / 3749359
Fax: +254 (0) 20 3749579 / 3749561
Cellphones: +254 (0) 722 206876
+254 (0) 733 333024
Email: gibb@gibbinternational.com
Website: www.gibbinternational.com
Dropping Zone No. 47 (Revlon Plaza - 2nd Flr, Tubman Rd)

Our Ref: 000987/JAO/L31055

27 May 2015

Director General,
Kenyan Rural Roads Authority,
BlueShield Towers 6th floor,
P.O. Box 48151-00100 Nairobi, Kenya

For the attention of General Manager Design and Construction

Dear Sir/Madam,

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR THIKA DAM-KIGORO-GIGIRI-KABETE RAW AND TREATED WATER PIPELINES.

CONSULTATIONS FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT.

Athi Water Services Board (AWSB) has commissioned GIBB Africa Limited, a firm of experts registered by the National Environment Management Authority (NEMA),to conduct an Environmental and Social Impact Assessment (ESIA)for Thika Dam-Kigoro-Gigiri-Kabete Raw and Treated Water Pipelines in compliance with the Environmental Management and Coordination Act (EMCA), 1999.

Section 17-1 of The Environmental-Impact Assessment and Audit Regulations, 2003 requires us to seek the views of any persons who may be affected by the project. You have been identified as a key stakeholder and as such, your views will be greatly appreciated.

We have attached here with a brief description of the project for which we request you to present your views, opinions and any concerns that you may have regarding the proposed project by filling in the stakeholder involvement questionnaire.

We would appreciate it if you would communicate your response within **10 days** from the date of receipt, after which we shall assume you have no comments.

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Yours faithfully
for GIBB Africa Ltd

Maurice Namiinda
Director

Anastasia Ngatti
Operations Manager

Encl

DIRECTORS: P KAREKEZI* (Managing) BSc MBA (NUS) MBA (UCLA) CEng REng MIEK MCIArb MICE; S MAMBO* BSc MSc REng MIEK MIHT MASCE; M B NAMIINDA* BSc REng MIEZ MIEK
*Kenyan

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KENYA - RE TOWERS
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00100, GPO - KENYA

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Email: gibb@gibbinternational.com
Website: www.gibbinternational.com
Dropping Zone No. 47 (Revlon Plaza - 2nd Flr, Tubman Rd)

NAIROBI CITY WATER & SEWERAGE Co. LTD.
02 JUN 2015
RECEIVED
OPERATIONS & MAINTAINANCE DEPT.

Our Ref: 000987/JAO/L31055

27 May 2015

Nairobi Water and Sewerage Company,
Kampala Road, off Enterprise Road.
P.O. Box 30656-00100 Nairobi, Kenya

For the attention of Operations Manager

Dear Sir,

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR THIKA DAM-KIGORO-GIGIRI-KABETE RAW AND TREATED WATER PIPELINES.

CONSULTATIONS FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT.

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Section 17-1 of The Environmental-Impact Assessment and Audit Regulations, 2003 requires us to seek the views of any persons who may be affected by the project. You have been identified as a key stakeholder and as such, your views will be greatly appreciated.

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We would appreciate it if you would communicate your response within **10 days** from the date of receipt, after which we shall assume you have no comments.

Please note that NEMA has requested you to furnish us with your name, ID number and signature.

For any queries, kindly get back to us through the contact information provided at the end of the stakeholder involvement questionnaire.

Yours faithfully
for GIBB Africa Ltd

Maurice Namiinda
Director

NAIROBI CITY WATER & SEWERAGE CO. LTD.

Anastasia Ngatti
Operations Manager

Encl

DIRECTORS: P KAREKEZI* (Managing) BSc MBA (NUS) MBA (UCLA) CEng REng MIEK MCIArb MICE; S MAMBO* BSc MSc REng MIEK MIHT MASCE; M B NAMIINDA* BSc REng MIEZ MIEK
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KENYA - RE TOWERS
UPPERHILL, OFF RAGATI ROA
P O BOX 44286 NAIROBI
00100, GPO - KENYA

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN (RAP) STUDIES FOR THE PORPOSED THIKA DAM-KIGORO-GIGIRI-KABETE RAW AND TREATED WATER PIPELINE

Project background

Athi Water Services Board (AWSB), the Proponent, provides Water and Sewerage services in Nairobi City County and some of its satellite towns, whose water demand is increasing rapidly due to population increase into the City coupled with increased water demands from the industries. Nairobi is the country's largest economic centre and generates 45% of the country's GDP, in the process employing 43% of all Kenya's urban workers (Oxfam, 2009). It is also the largest industrial centre and food, beer, vehicles, soaps, textiles and chemicals are all produced or processed in the city.

The combined yield of the developed Water sources for Nairobi Water Supply is about 540,000m^3/day against the current demand estimated at about 750,000m^3/day *(Source: AWSB)*.

Project description

The project is derived from Nairobi Water Master Plan for Developing New Water Sources for Nairobi and 13 Satellite Towns namely Kikuyu, Ruiru-Juja, Kiambu, Karuri, Githunguri, Mavoko Municipality, Ngong Township, Ongata Rongai, Thika, Gatundu, Limuru, Lari and Tala-Kangundo.

In order to bridge the existing supply gap and meet the projected future demand, a Feasibility Study and Master Plan for Developing New Water Sources for Nairobi and Satellite Towns up to the year 2035 was commissioned by AWSB and concluded in 2012 by Consultant Egis Bceom International in association with Mangat I.B. Patel & Partners. From the study, a number of sources were identified as future water sources for Nairobi City including The Northern Collector Tunnel Phase 1 (the Project). The project includes the following components:

- Transfer of water from Maragua River, Irati River and Gikie River to Thika /Ndakaini dam (Separate ESIA studies for this section have been concluded);
- Construction of raw water gravity main from Thika dam to the proposed Kigoro Water Treatment Plant 6km downstream of Thika dam;
- Construction of Kigoro Water Treatment Plant 6km downstream of the dam;(Under a different contract) and
- Construction of 58 km Treated Water gravity main from Kigoro Treatment Works up to Kabete reservoirs (capacity 1.60m^3/s) via Ngethu and Gigiri Water Treatment Plants to meet the city's year 2017 water demand.

Gibb Africa Limited is currently conducting ESIA and RAP studies to develop mitigation measures for the expected project impacts during construction, operation and decommissioning phases of the project. The proposed pipeline starts from Thika dam in Murang'a County, passes through Kiambu County and ends at Kabete Water Treatment Works in Nairobi County.

b) Public Consultation Records

FIRST ROUND OF MEETINGS

Muranga County

Notes for the meeting held with the public of Nairobi city Water and sewerage company officers at Ndakaini Location.

Attendance

1. Job Kihamba (Dam coordinator)
2. Joseph Ndungu (Environmentalist (AIXSB)
3. Newton Stower (Project Env' GIBB)
4. Florence
5.
6.
7.
8.

Agenda

To discuss potential environmental and social impacts of the project in the project area and set a cut off date for the valuation of the affected assets

Notes

The meeting started with a word of prayer from Madam Euginia who was invited by the area chief to offer a word of prayer.

The chief apologized for the late start of the public meeting that she attributed to the bad weather and people working on farms.

The chief invited the Dam coordinator Mr. Job Kihamba to invite the guests who had requested for the meeting.

Mr Job Kihamba welcomed the public to the NCWSC thanked the team from Athi water and GIBB international. He indicated that the project will be highly beneficial to Nairobi city water in helping it fulfill its Mandate. He stated that the people within Ndakaini who have relatives

Notes drafted by: Newton Stower

Confirmed by: FLORA MWANGI

Designation: Project Environmentalist

Designation: CHIEF NDAKA-INI LOCATION SIGN:.....

Signature:

Signature:

Project Name: .....

Project Code.....

Date of meeting: ...../...../ 2014

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Notes for the meeting held with...

Notes continued....

in Nairobi will have him witness that these friends or relatives who live in Nairobi suffer from insufficient water supply.

The chief indicated that a total of 15 household will be affected within the location he told the public that the meeting concerns Environmental impact assessment & Resettlement action plan. He advised the audience to ask as many questions as they can so as to insure that the project meets its end goals. The chief invited Mr. Ndungu to from Athi water to address the audience. He told the audience that Athi water intend to increase supply of water to Nairobi by an additional pipeline of 1.5 Mr diameter to Nigeria T works and from there to Kabete treatment works & water supply. He told the audience that the project environmentalist will give more details on the EIA & RAP exercise.

The project Environmentalist from GIBB told gave an account of the project details to the audience. He indicated that the EIA is important in determining the impacts of the project on the ~~people~~ ~~living~~ Bio-physical environment

Notes drafted by: Newton Stower

Confirmed by: FLORA MWANGI

Designation: Project Environmentalist

Designation: CHIEF NDAKA-INI LOCATION

Signature:

Signature:

Project Name: .....

Project Code.....

Date of meeting: ...../..... / 2014

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Notes for the meeting held with...

Notes continued....

Question 1: The Valuation date should be made public to the affected people to ensure that none of the people whose assets will be affected miss out on the valuation.

Response: The Enumeration date will be on 12th May 2015 and the cut off date shall be on: 15/5/2015

Question 2: How wide is the way leave to be acquired.

The wayleave is to be 6m, 6m will be for the construction wayleave while 3 meters will be for laying the pipes. However this will be affected confirmed once the Surveyor has Pegged the riparian boundaries to determine the amount of private land to be taken

Question 3: Which side of the river will it be.

The pipe will be on the right side of river for the first three 3 Km after which it will shift to the left side of river.

Question: Once the dam was built the area became very cold due to a lot of water in the areas. How will the project ensure that the crops are still viable in the area with the climate change?

Notes drafted by: Newton Stower

Confirmed by: FIDES MUSANGI

Designation: Project Environmentalist

Designation:

Signature:

Signature:

Project Name: .....

Project Code.....

Date of meeting: ...../...../ 2014

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Notes for the meeting held with...

Notes continued....

Question: How will the project benefit the locals in terms of water supply. Having the water taken from the area and the locals have no water, He want the project to give us water.

Response: The water is supplied in the area is supposed to come from Gatanga water supply, the water from the dam is ~~supposed~~ designed to supply water to Narok and finance have been put to cater for water supply within the area.

Question: If a portion of my land from the bigger part of the land because the river meanders how will I be helped.

Response: If the land separated is ingeniously affected the land will be fully acquired by the project. There will be for the areas where the pipe passed over the land ~~and~~

Question: If I have a grievance on the value put on my assets, what do I do.

Response: A grievance resolution mechanism will be proposed ~~from~~ in the report and it will be carried out by a RAP implementation committee that will consist of RAP representatives. During valuation photos of assets will be taken and a description which will be signed by the PAP. Valuation will be done based on the current market rates and will not be lower than the government value.

Notes drafted by: Newton Stower

Confirmed by: FLODA MWANGI

Designation: Project Environmentalist

Designation: CHIEF NDAKA-INI LOCATION

Signature:

Signature: SIGN:

Project Name: .....

Project Code.....

Date of meeting: ...../...../2014

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Notes for the meeting held with...

Notes continued....

Question: This dam cannot handle additional water from another dam will increase flooding in the area how will this be managed.

Response: The water being tapped from the proposed Maragua dam will only collect flood waters once the current flood capacity has been reached. The water from the Maragua dam shall not be channeled to Kenyatta Dam.

Question: How will tenants be compensated for loss of their assets

Response: Tenants will only be compensated for the affected crops and not for the land but the land owner shall be compensated for the land.

Question: Will we get employment from the project or it will employ people from outside. The chiefs should not be neglected to ensure the jobs are equally distributed.

Notes drafted by: Newton Stower **Confirmed by:** FLORA MWANGI

Designation: Project Environmentalist **Designation:** PROJECT AFFECTED PERSON

Signature: **Signature:**

Project Name: .....

Project Code: .....

Date of meeting: ...../...../ 2014

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PUBLIC CONSULTATION MEETING ATTENDANCE LIST

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: _____ VENUE: NWSC Offices

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	FLORA W. MWANGI	CHIEF NDAKAINI LOC.	0727 602496	[signature]
2.	JOHN M. KAMAU	ASS. CHIEF NDAKAINI	0725412044.	[signature]
3.	GEOFFREY M. MUNYUA	ASS. CHIEF KIMANDI	0726 942300	[signature]
4.	JOB KIHAMBA	DAM COORD, THIKA DAM (NCWSC)	0726-215848	[signature]
5.	JOSEPH NDUNGU	ENVIRONMENTALIST	jndungu@nwsboard.go.ke	[signature]
6.	NEWTON STOKEL	PROJECT ENVIRONMENTALIST	Pstokel@gibbinternational.com	[signature]
7.	SAMMY M. MUKUNA	FARMER	0723022088	[signature]
8.	SAMUEL GATURI KAMAU	FARMER	0717978876	[signature]
9.	JANE W. MWANGI	FARMER	0721 913 068	[signature]
10.	JOSEPH K. GICHINI	FARMER	0720098261	[signature]

CHIEF
NDAKA-INI LOCATION
SIGN: [signature]

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PUBLIC CONSULTATION MEETING ATTENDANCE LIST

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: _____ VENUE: NWSC Omoi

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	JACINTH WANJIRU	AGRICULTURALIST NA	0710961766	[signature]
2.	BETH KIHONGE	PLANT OPERATOR	0719204546	[signature]
3.	VIRGINIA W. NJENGA		0726325425	[signature]
4.	Naomi Wanjugu		0716885084	[signature]
5.	Margaret Waithira		0719584632	[signature]
6.	Rosemary Njeri		0715003911	Rose
7.	Francis Kinyua Mukuna		0713591758	[signature]
8.	Joseph KABU KAMAU	FARMER	0729688919	[signature]
9.	Johnson Karanja	FARMER	0734426670	[signature]
10.	John Njoroge	Worker	0726580252	[signature]

CHIEF
NDAKA-INI LOCATION
SIGN: [signature]

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PUBLIC CONSULTATION MEETING ATTENDANCE LIST

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE:_____ VENUE: NWSC Offices

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	Nicholas Otiero	Security supervisor, (NCWSC)	0729915636.	[signature]
2.	Benson. M. Mahugu	Farmer	~~0728~~ 0723269747	[signature]
3.	Isaac M Marenge	Farmer	0724 492 328.	[signature]
4.	Macharia Gerald	[illegible]	2014035	[signature]
5.	James M. Karanja	Farmer	0726-649523	[signature]
6.	Simon Maina	Catchment Supervisor	0723-956459	[signature]
7.	Gilbert Omweri	HR- Officer - Thika Dam	0722465081	[signature]
8.	James K. Mukuna	Farmer	0733868898	[signature]
9.	David Mbugua	Tec. Sup. Thika Dam	0721544450	[signature]
10.				

Notes for the meeting held with... the public at Kagongo tea buying centre in Ndungu chiefs location.

Attendance

1. Job Kitrambo
2. Newton Stower
3. Peter Ndungu
4. Francis N. Waiaiina
5.
6.
7.
8.

Agenda

To discuss potential environmental and social impacts of the project and set a cut off date for the relocation of these affected assets.

Notes

The meeting started with a cut of prayer from Mudan the A-chief of Ndungu chiefs.

The Asst chief invited the public to the meeting and thanked the audience for prompt attendance of the meeting.

The chief introduced the GIBB team to the audience and gave them a brief overview of what the meeting was all about.

He went ahead to invite the GIBB team to give a description of the project and inform the public about the RAP exercise.

The GIBB ~~[illegible]~~ personnel thanked the public for attendance of the public meeting and went ahead to give a description of the project and set the cut of date as the first day of enumeration of the enumeration exercise.

Notes drafted by: Newton Stower **Confirmed by:**

Designation: Project Environmentalist **Designation:**

Signature: [signature] **Signature:**

Project Name: .....

Project Code.....

Date of meeting: ...../...../ 2014

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Notes for the meeting held with...

Notes continued...

He ~~[illegible]~~ elaborated that the cut off date is set to avoid people laying claims on property that was built after the valuation exercise.

He indicated that it is important for the PAPs to be present during the enumeration and valuation exercise so as to ensure that their details are taken and that their socio-economic status taken.

He indicated that for those PAPs who will not be available shall be required to leave a respondent behind to give their details. He ~~[illegible]~~ told the public to ask questions on areas they did not understand.

Question: The current dam is always full, do you intend to expand the dam

The dam shall not be increased in size, the extra water will only be channelled into the dam to maintain levels but during floods the tunnel shall be closed, this will help ensure that the flood is not transferred from one area to the other.

Question: I dee dont know exactly what extent of the our lands will be taken

AKLIP intends to acquire 3m wayleave permanently for laying the pipe and a 6m temporary construction wayleave that will be returned to owner after construction.

Notes drafted by: Newton Stower | *Confirmed by:*

Designation: Project Environmentalist | *Designation:*

Signature: | *Signature:*

Project Name: .....

Project Code.....

Date of meeting: ...../...../ 2014

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Notes for the meeting held with...

Notes continued....

The crops on the wayleave shall be ~~[illegible]~~ valued and submitted to AWSB.

- How wide will the treated water pipeline be and how long will the pipe be.

The pipeline has been proposed to be 1200mm diameter and 6.6 km long. It shall start from Ndakaini to Kigoro where there will be a treatment works then it proceeds to Kabete passing through catanga & launch as it heads to Kabete treatment & supply works.

The treated water will be about 60 km and the raw water will be 5.8 km

Question: If the pipe is to pass through my land and affect my house, will the line be diffted.

The main purpose for the RAP, is to identify all the assets to be affected by the project and in so doing, critical assets such as houses and institutions are prey to be avoided as much

Notes drafted by: Newton Stower | *Confirmed by:*

Designation: Project Environmentalist | *Designation:*

Signature: | *Signature:*

Project Name: .....

Project Code.....

Date of meeting: ...../...../2014

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Notes for the meeting held with...

Notes continued....

as possible because the magnitude of the impact is heavy on the project proponent interms of cost and the PAP interms of livelihood disruption. Therefore houses will be proposed to be avoided. Where it's not possible it will be provided that titles compensates for the houses.

Question: I do not have a title for my land, how will I be helped if my whole land is to be affected

Yes PAPs who own land but do not have titles, shall be remunerated as everyone else. but will need to get titles from the area chiefs ascertaining that the land belongs to the PAP. Further to this, the Surveyor shall carry out land searches to determine the land owner, to ensure the rightful owner is recorded

Question: Who are the persons affected by the pipeline within the lowland

The persons who will be affected by the project shall be clearly known after the surveyor pegs the proposed pipeline, the meeting required land owner beneficiary or PAP be called for the meeting but the pipe shall be contacted during the survey exercise.

Notes drafted by: Newton Stower *Confirmed by:*

Designation: Project Environmentalist *Designation:*

Signature: *Signature:*

Project Name: .....
Project Code.....
Date of meeting: ...../...../ 2014

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Notes for the meeting held with...

Notes continued....

Question: Are we allowed to use the wayleave after the project has been completed.

The wayleave after compensation is property of the XWLSB who have proposed that no developments such as structures, deep rooted crops & trees should be put on the wayleave. Minimal use such as planting pappier may be allowed depending XWLSB choice.

Question: When the valuation is on, will the farmers be involved in determining the value for affected assets.

The farmers shall be called to attend the valuation exercises, their photo of their assets shall be taken and they shall be asked to sign against the assets that are seen to be within the proposed wayleave.

Question: The chiefs should accompany the valuer, surveyor and owner of the lands.

The chief together with the valuer shall walk from one asset to the next to ensure no PAP is left out

Notes drafted by: Newton Stower

Confirmed by:

Designation: Project Environmentalist

Designation:

Signature:

Signature:

Project Name: .....

Project Code.....

Date of meeting: ...../...../2014

GIBB Internation

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Notes for the meeting held with...

Notes continued....

Notes drafted by: Newton Stower

Confirmed by:

Designation: Project Environmentalist

Designation:

Signature:

Signature:

Project Name: .....

Project Code.....

Date of meeting: ...../...../2014

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PUBLIC CONSULTATION MEETING ATTENDANCE LIST

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 06/05/2015 VENUE: KAGONGO TEA BUYING CENTRE

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	Ephantus Kiarie	KAGONGO	0723 990 379	
2.	Giluthi Korai	KAGONGO	—	
3.	Margaret gathoni	KAGONGO	0722 92 92 64	
4.	ABRAHAM MWANGI	KAGONGO	078-550801	
5.	STEPHEN MBUGUA	KAGONGO	0724 746399	
6.	DANIEL NJOROGE	KAGONGO	—	
7.	SIMON MWANGI	KAGONGO	0722 474950	
8.				
9.				
10.				

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PUBLIC CONSULTATION MEETING ATTENDANCE LIST

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 06/05/2015 VENUE: KAGONGO TEA BUYING CENTRE

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	JOHN KANIARU KANYUTU	FARMER	0701564061	[signature]
2.	PRILISILA W. KANIARU	"	0710410908.	[signature]
3.	STEPHEN N. NJUGUNA	"	0725511592	[signature]
4.	JANE W NGURU	"	0710749758.	[signature]
5.	RAPHAEL N. MUHIA	"	0724629701	[signature]
6.	DAVID N KANYUTU	"	0720497094	[signature]
7.	Muchiri Njoroge	"	0726206864.	M. Njoroge
8.	PETER NDUNGU	CHIEF	0735530733	[signature]
9.				
10.				

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PUBLIC CONSULTATION MEETING ATTENDANCE LIST

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 06/05/015 VENUE: KAGONGO TEA BUYING CENTRE

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	KIMUTHU NJOROGE	FARMER	P.O. BOX 1768 - THIKA	Kimuthu
2.	JOHN EDWARD GITHU	FARMER	0729538341 Box 84 TKA	
3.	HANNAH NDUTA	FARMER	0713129606 - Box 1768 THIKA	
4.	HANNAH WAMBUI	FARMER	Box 718 THIKA -	
5.	RECHAEL MARIMU NJITHIA	FARMER	0717362925 - 718 THIKA	R W N.
6.	ALICE WANJIKU KINYANJUI	FARMER	0717531474 - 1768 THIKA	
7.	FRANCIS N. WAINAINA	ASST. CHIEF - CHOMO	0722986221 - 916 THIKA	
8.				
9.				
10.				

Notes for the meeting held with... the public at Kiarigi tea buying center on the propose Mika - Kigoro Kabete pipelines

Attendance

1. Samuel Thuo
2. Newton Stower
3. Members of public.
4.
5.
6.
7.
8.

Agenda

To discuss potential environmental and social impacts of the project to the Bio physical & social environment of the project area.

Notes

The meeting started with a word of prayer from the chief Nduyu Chege who then invited the public to the meeting.

The chief apologised for the late start of the public meeting as he was finishing up with another meeting. The chief told the members in the audience that a team sent from GIBB Kenya consultants had been contracted by KWSB to carry out RAP & EVIA studies for the proposed pipeline. He stated that it is therefore crucial that many questions are asked for clarification to avoid misunderstanding later when the project is being implemented.

The chief invited the GIBB team to address the audience and state the the main purpose of the visit.

Notes drafted by: Newton Stower **Confirmed by:** SAMUEL K THUO

Designation: Project Environmentalist **Designation:** CHIEF

Signature: **Signature:**

Project Name: .....

Project Code.....

Date of meeting: ...../..... / 2014

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Notes for the meeting held with...

Notes continued....

The project team thanked the audience for the prompt attendance of the meeting, he stated that GIBB africa had be contracted by AWSB to carry out RAP & ESIA for the pipelines to Kabete from Ndakaini.

He went ahead to state that it is required by law that all projects before implementation go through public consultations to ensure people are informed of the proposed developments, the comments are therefore used to influence better design of the project. He also stated that the project also include RAP which was done to know the person assets that are expected to be affected by the project the rightful owner determined and a valuation roll developed that shall be submitted to the client. The roll will be used by the client should be choose to use the proposed wayleave. He stated that the last day of the enumeration will be the cut of date for eligibility for valuation and enumeration.

Question 1: Will we be compensated before or after the project?

Response: Affected persons are to be compensated before the start of the project. By AWSB following the guidelines set by Worldbank policies on on resettlement action plan, this will help the PAPs restore their lives faster

Question: Will we get jobs?

Response: The project is expected to source unskilled labour from the local community and might have to source for skilled labour elsewhere should

Notes drafted by: Newton Stower *Confirmed by:* SAMUEL K-THUO

Designation: Project Environmentalist *Designation:* CHIEF

Signature: *Signature:*

Project Name: .....

Project Code.....

Date of meeting: ...../...../ 2014

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Notes for the meeting held with...

Notes continued....

Question : When will the project start.

Response : The project will start once the project has gotten approval from NEMA and a contractor awarded the contract. The project must go through the tendering process stipulated in the Kenyan laws

Question : What criteria will be used in valuing crops.

Response : The project has contracted a licensed land and asset valuer to value the crops. The proposed values should not be lower than the government valuers. This might be informed by the market rate for the affected assets.

Question : Will the valuation rates be provided before the works start

Response : The rates of the assets affected shall be generated by the licensed valuer. After he has compiled his rate in the valuation roll, the PAPs will be called for the disclosure. This is when the PAPs will comment on the given rates.

Question : I have a fish pond that will be affected, how will I be compensated.

Response : All affected assets will be valued as at ie on the day of valuation and will be documented in the valuation roll. Should NWSB choose to compensate as indicated in the valuation roll

Notes drafted by: Newton Stower

Confirmed by: Samuel K-Thuo

Designation: Project Environmentalist

Designation: SHEF

Signature:

Signature:

Project Name: .....

Project Code.....

Date of meeting: ...../..... / 2014

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Notes for the meeting held with...

Notes continued....

Then the fish ponds will be compensated

Question : When will survey work start?

Response The survey work will start once the sow PAPs agree that the surveyor should put beacons (wooden) on their lands to mark the pipe's alignment.

Question : The terrain is very steep in the area, should there soil collapse on the lands below will they be compensated

Response : The contractor has a duty to restore the site to its previous state or leave it in a much better state than it was before the project. The contractor should be reported if he does not rehabilitate the sites as agreed

Question : Will we benefit from the water?

Response The residents allowing have piped water within the area and only need to pay the connection fee for the water to be distributed to their homes

Question : During construction, damages caused during construction activities who shall compensate them

Response : Damages within the acquired wayleave shall be compensated for ~~but all~~ ~~damages~~ by KWSB but damages during construction

Notes drafted by: Newton Stower

Confirmed by: SAMUEL K-THUO

Designation: Project Environmentalist

Designation: CHIEF

Signature:

Signature:

CHIEF
CHEGE LOCAT

Project Name: .....

Project Code.....

Date of meeting: ...../...../2014

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Notes for the meeting held with...

Notes continued....

Phase shall be compensated for by the contractor as he progresses with works

Question: There is a supply line from Gotanga water that will be affected, how will I we be compensated for that.

Response: Gotanga Water is under NHSB that is also in charge of the project and thus if any damages will be done to the water supply lines they will be rehabilitated to ensure supply.

Question: How long will it take for before my property is taken what is the period of notification.

Response: The report will suggest a notification of 2 months before the project start date to ensure adequate time for the PAPs to re-establish their livelihoods elsewhere before the project starts.

Question: If I don't have a title but was allocated land that in framing in, how will I be compensated.

Response: The compensation figure will be allocated to the original title owner, who if deceased will be indicated and the beneficiaries stated with their respective assets under the title. During compensation everyone will be compensated as per the affected assets.

Question: Will the surveyor walk with a guide to ensure all the right people and enumerated.

Response: Yes the surveyor will move around with

Notes drafted by: Newton Stower

Confirmed by: SAMUEL KETHAO

Designation: Project Environmentalist

Designation: CHIEF

Signature:

Signature:

CHIEF
CHECK LOCATION

Project Name: .....

Project Code.....

Date of meeting: ...../..... / 2014

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Notes for the meeting held with...

Notes continued....

a village elder to ensure that everyone knows here the pipe will pass on their lands during the process, respective land owners shall also be identified.

Question: The tea & coffee supply to the factory shall affect the factory how will this project ensure that the project factory is not affected

Response: The project is being restricted to the riparian and where the alignment follows through a plantation a corridor of 3m is being acquired

Question: What CSR package are we receiving from the project

Response: The water distribution budget for Gatanga water has been increased to ensure that more water is sheared and supplied to different areas

Question: What happens if a graveyard is to be affected

Response: The project has tried as much as possible to avoid the graveyards but in cases where a grave cannot be avoided then a compensation package will be proposed to for the burial ceremonies involved with exhuming & burying the dead

Question: Comp [illegible] ground.

Notes drafted by: Newton Stower

Confirmed by: Samuel Kishiw

Designation: Project Environmentalist

Designation: CHIEF

Signature:

Signature:

CHIEF
[illegible] CHIEGE LOCATION

Project Name: .....

Project Code.....

Date of meeting: ...../...../2014

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 14/05/15 VENUE: KIAIREGI TEA R. CENTRE (GITIRI SUB LOC)

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	ZIPPORAH W. MWAVRA	farmer	0714892659	[signature]
2.	JAMES NDUNGU MAINA	farmer	0716341144	[signature]
3.	MARY WANTIRU NTOROGE	Farmer	0716 143278	[signature]
4.	WINFRED MUIKARI KUHUNYA	farmer	0715962541	[signature]
5.	BEATRICE WATIHIRA KIMANI	farmer		[signature]
6.	Philomena M. KARANJA	Farmer	0722 224 546	[signature]
7.	Judy M. Gachia	Farmer	0729 609 821	[signature]
8.	Simon Muturi	"	0713 734666	[signature]
9.	Mary Ngonyo	"	0724969175	[signature]
10.	Samuel Macharia	Farmer	0711 141 603 ~~0746 711141~~	[signature]

SAMUEL KITHUO
[signature]

CHIEF
NDENYU CHEGE LOCATION

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 14/05/15 VENUE: NAIREGI TEA. B. CENTRE (GITIRI SUB. LOC)

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	JULIAH MUGUPE	Farmer	0715095587	[signature]
2.	Josphat mkkumani	Farmer	0721205662	[signature]
3.	GEOFFREY MAINA MACHARIA	Farmer	0706920708	[signature]
4.	PETER KIMANI MUGAI	Farmer	0720265342	[signature]
5.	Luciah mumbi mwangi	farmer	0720982611	[signature]
6.	Cilelien munganjuguna	Farmer	0727517867	[signature]
7.	Joseph Gatua Mwangi	farmer	0727425937	[signature]
8.	Paul Njoroge Kahiu	Farmer	0706391692	[signature]
9.	Stephen Macharia	Farmer	0729975063	[signature]
10.	Charles Mahihu	Farmer	0723389728	[signature]

Samuel Kiltuo

[signature]

TITLE
VENUE CHIEF LOCATION

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 14/05/15 VENUE: KIAMBU TEA B. CENTRE

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	GILBERT MWAURA MUIGAI	FARMER	0723219216	
2.	Naftali Kamau Githuku	Farmer	0721444987	
3.	Simon Muigai Kabugi	Farmer	0720 798 785	
4.	GEOFFREY NDUNGU M.	FARMER	0701 565 085	
5.	Stephen Githuku Karanki	Farmer	0722-897586	
6.	Davis Ngunga Kungu	Farmer	—	
7.	MARGARET W. GACHIA	FARMER	0720 428 400	
8.	LOISE WANGARI MUCHINA	FARMER	0725 103 223	
9.	MICHAEL M. MWANGI	Boda Boda	0726778685	
10.	PETER NGANGA MURUITHIA	FARMER	0718 138 355	

SAMUEL K. TIFFO

HEF
D CHEGE LOCATION

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 14/05/15 VENUE: KAIREGI TEA B. CENTRE

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	Rebecca W. Mwanda	Farmer	—	[signature]
2.	Joice Wairimu	Farmer	0726174075	[signature]
3.	Noom Wangari	Farmer	—	[signature]
4.	Joel Ngunga Kungu	Farmer	—	[signature]
5.	Johnson Kamau Ndungu	/	—	[signature]
6.	Michel Gachau	Farmer Gachau	—	[signature]
7.	Hungo Gachia	Farmer	0701 560 853	[signature]
8.	Geoffrey Gachia		—	[signature]
9.	[illegible] Kimani	Farmer	0727786790	[signature]
10.	JECITA KAMAU ~~Jecita Wangari~~		0727564207	[signature]

SAMUEL K. THUO
[signature]

HEF
CHEGE LOCATION

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 14/05/15 VENUE: KIAIREGI TEA B. CENTRE

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	Amos Mwangi Kamau	Farmer	0724 389607	[signature]
2.	James Maina Muchiri	Farmer	0708494496	[signature]
3.	Geoffrey Kamau Kamiki	Farmer	0726031263	[signature]
4.	JOSEPH MUKABANGUGI	FARMER		[signature]
5.	Job - maina	FARMER	0722 572 530	[signature]
6.	Peterson Gachukia	Farmer	0721408141	[signature]
7.	James Igecha	Farmer	0701268068	[signature]
8.	Paul Kaman	Farmer	0722601339	[signature]
9.	WILSON MWANIKI		0719 299 537	[signature]
10.	Anne Wambui	Farmer	0711 401 344	[signature]

Samuel Kaithuo
[signature]

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DATE: 14/05/15 VENUE: KIAIREGI TEA B. CENTRE

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	James M Ngonyo	Farmer	0724 389 609	[signature]
2.	Francis M Ngambura	Student	0727 266 137	[signature]
3.	Jamleck M Ndugung	Farmer	0712 546 253	[signature]
4.	JANEI WANGARI KIAMA	FARMER	0704353995	[signature]
5.	Ester Njoki Ngánga	Farmer	0713 363 757	[signature]
6.	WANGARI MACHARIA	Business lady	0727 461 805	[signature]
7.	John Chege Macharia	farmer	0721 325 711	[signature]
8.	Daniel Maina Kuhunya	farmer	0715 641 958	[signature]
9.	Hungo Kagutha	farmer	0713 410 573	[signature]
10.	Rose Muthoni K.	farmer	0711 561 646	[signature]

Samuel K. Thuo
[signature]

CHIEF
NDENYU - CHEGE LOCATION

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 14/06/11 VENUE: KIAIREGI TEA B- CENTRE

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	Elizabeth Wambui K.	Farmer	0728 593117	Enkuruinja
2.				
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SAMUEL K. THUO

HEF
LAND CHEGE LOCATION

Notes for the meeting held with... the public in Kigoro to discuss the potential impacts of the proposed Thika-Kigoro-Kabete pipelines at Lanning.

Attendance

1. Onesmus Maina
2. Newton Stower
3. Members of the public
4.
5.
6.
7.
8.

Agenda

To discuss the possible positive and negative impacts of the proposed pipeline to the biophysical and social environments of these area.

Notes

The meeting started with a word of prayer from the a member of the audience who was requested by the chief.

The chief then welcomed the people to the meeting after which he introduced the project team to the meeting audience. He urged the audience to ask as many questions as possible to avoid any misunderstanding in the future.

He invited the GIBB team to address the audience on the purpose of the meeting.

The project environmentalist welcomed the audience to the meeting and thanked them for the good turn out. He gave the project description of the proposed pipelines and indicated that its part of the ESIA process. He indicated that is also necessary that due to the impact of land acquisition and destruction to assist a RAP is to be done. He set the cut off date for the RAP as the first day of [illegible]

Notes drafted by: Newton Stower **Confirmed by:** ONESMUS MAINA

Designation: Project Environmentalist **Designation:** CHIEF KIGORO

Signature: **Signature:**

CHIEF KIGORO LOCATION

Project Name: .....

Project Code.....

Date of meeting: ...../...../2014

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Notes for the meeting held with...

Notes continued....

Questions: If have 2 parcels of land and I have not be notified which one will be affected and why have I not been notified.

The chief was walked through the line and provided a list of homes who the owners will be affected. The chief then went ahead to call you all for the meeting. Further consultations will be done with the PAPs during the [illegible] survey work, enumeration and valuation exercise in days to come.

Question: Will we be compensated before or after the project start at what stage.

KNSB will be advised to compensate before the construction works begin to ensure PAPs restore their livelihoods before they are ~~relocated~~ project starts. This is with regards to the KTs policy on involuntary resettlement.

The compensation will be done after the set up of the PAPIC, and disclosure of the entitlements to the PAPs. After this, the PAPs will be served with notices of pending works.

Question: If we are not contented with the compensation package what can we do, can we appeal

Notes drafted by: Newton Stower *Confirmed by:* ONESMUS MAINA

Designation: Project Environmentalist *Designation:* CHIEF KIGORO

Signature: [signature] *Signature:* [signature]

CHIEF KIGORO LOCATI

Project Name: .....

Project Code.....

Date of meeting: ...../...../2014

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Notes for the meeting held with...

Notes continued....

In case the PAP feels the amount allocated is not equal to the value of his property he will lawed a complaint to the 1st level of grievance, resolving mechanism proposed in the PAP report, if he still feels the problem is not resolved he moves to the next level. When all the levels within the project implementation have not been addressed the issues, he will move to court and pursued his complaints against the project.

Question: Kelly dont we give the values our rates before the valuation exercise begins

It will not be professional if a valuer goes by the values suggested by the PAP, valuation is based on a number of factors the valuer considers before he assigns value to an asset. The PAP will be only sign on a paper giving the detailed description of the assets to be affected.

Question: Kilon is the cut off date.

The first day of enumeration will be the cut off date for enumeration eligibility or for compensation.

Notes drafted by: Newton Stower

Confirmed by: ONEJIMUS MAINA

Designation: Project Environmentalist

Designation: CHIEF KIGORO

Signature:

Signature:

CHIEF KIGORO LOCATION

Project Name: .....

Project Code.....

Date of meeting: ...../...../2014

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Notes for the meeting held with...

Notes continued....

after this is to ensure that people do not erect structures after the valuation and start laying claims during the project has been implementation.

All the assets noted during the enumeration exercise are what will be valued during the valuation exercise. any modification or additional structures shall not be valued

Question: Which land parcels have been affected.
This will be determined after the surveyor has been mobilised to peg the center line of the pipeline. This will then be followed by measurements from the center line to determine for what extent an asset is affected.

Question: What size will the wayleave be?
KNSB intends to acquire 6m temporarily for construction and 3 m for laying the pipeline. the 3m will then belong to KNSB but the 6m returned to the PAP after the construction.

Notes drafted by: Newton Stower *Confirmed by:* ONESMUS MAINA

Designation: Project Environmentalist *Designation:* CHIEF KIGORO

Signature: *Signature:*

CHIEF KIGORO LOCATION

Project Name: .....

Project Code.....

Date of meeting: ...../...../2014

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Notes for the meeting held with...

Notes continued....

Question: If I had future plans to develop the land will I be compensated for that.
Only the assets valued are subject to reduction compensation, any developments made after the cut off date shall not be eligible for valuation.

Question: Why didn't the team come with the cadastral map to show which land parcels will be affected.
The cadastral maps shall be availed during the valuation exercise. This is only possible after the surveyor has pegged the land and land parcels are determined. This will then help in acquisition of the right land parcels that the line will be overlaid on.

Question: If the pipe cuts across my shamba will I be allowed to use the remaining part of my shamba.
The project will acquire 3m on permanently but the 6m will be repossessed by the PAP, the 3m will KWSB's property. But the PAP only has rights to use his property but the 3m is dependent on agreement with KWSB.

Notes drafted by: Newton Stower

Confirmed by: ONEIMUS MAINA

Designation: Project Environmentalist

Designation: CHIEF KIGORO

Signature:

Signature:

KIGORO LOCATION

Project Name: .....

Project Code.....

Date of meeting: ...../...../2014

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Notes for the meeting held with...

Notes continued....

Question: We were never compensated with the KETRCO power lines who left the site without compensation.
The KETRACO project was under a different project and organisation, KWSB requested for the RAP so that it can help them decide on the best routes for the pipeline and the costs

Question: We were consulted earlier on the treatment works, how is the different from the other.
The T works act Kigoro is under a different consultancy, GIBB is only interested in carrying out consultation for the ESIA & RAP for the pipelines.
the consultation for the ESIA T works may not have captured issues related to the pipeline.

Notes drafted by: Newton Stower *Confirmed by:* ONESMUS MAINA

Designation: Project Environmentalist *Designation:* CHIEF KIGORO LOC

Signature: *Signature:*

CHIEF KIGORO LOCATIO

Project Name: .....

Project Code.....

Date of meeting: ...../..... / 2014

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE:_____ VENUE:_____

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	Peter M. Karanga	Farmer	0729385694	[signature]
2.	Samuel K. Ngorop	Farmer	0720925978	[signature]
3.	WILFRED M. MWANIKI	Farmer	0722165108	[signature]
4.	Jonge N. Ngorogo	Farmer	0713613191	Nyambura
5.	JOSEPH N. KAFINY	Farmer	0724297129	[signature]
6.	Kiman Cathulan	Farmer	0727936185	[signature]
7.	Nganga Njai	Farmer	—	Nganga
8.				
9.				
10.				

OK, [signature]
CHIEF
KIGORO LOCATION

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PUBLIC CONSULTATION MEETING ATTENDANCE LIST

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 5/5/2015 VENUE: KANUNGA CHIEFS CAMP.

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	Cecilian Kaitterero	Farmer		
2.	Easter Muthoni K.		07219254922	Esther
3.	Eunice Wangari H.	Farmer	0723 290 875	[illegible]
4.	Easter Wanjiru M.	Farmer	0716005113	[illegible]
5.	CHARLES MWANIKI	FARMER	0721352812	[illegible]
6.	JOSEPH MWANIKI	FARMER	—	[illegible]
7.	Loise Wangari M.	Farmer	0725 103 223	
8.	Peter Kimani M	Farmer	0720 265 342	Kimani
9.	Lucy Muigai	Farmer	0726 272783	[illegible]
10.	WILFRED KIGO NJIIRI	FARMER		[illegible]

OK [signature]

CHIEF
KIGORO LOCATION

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PUBLIC CONSULTATION MEETING ATTENDANCE LIST

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 5/5/2014 VENUE: KANUNGA CHIEF'S CAMP

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	PETER NJOROGE NJUGUNA	FARMER	0711 78-7536	
2.	HENRY KINYUA NJUGUNA	FARMER	0726 062 713	
3.				
4.				
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CHIEF
KIGORO LOCATION

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PUBLIC CONSULTATION MEETING ATTENDANCE LIST

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 5/5/2011 VENUE: KANUNGA CHIEF'S CAMP

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	PHILIP MG'ANGA	WELDER	0721 363 926	
2.	ROSE WANGIKU	FARMER	0727 961 115	
3.				
4.				
5.				
6.				
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OK

CHIEF
KIGORO LOCATION

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PUBLIC CONSULTATION MEETING ATTENDANCE LIST

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 5/5/2015 VENUE: KANUNGA CHIEF'S CAMP

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	Stephen Gitthinku Kirinki	Farmer	0722-897586	[signature]
2.	ZIPPORAH W. MWAURA		0714892659	[signature]
3.	JOHN K. KAGIO	MoE	~~2012~~ 0724389373	[signature]
4.	James N. Kiarie	Farmer	0727951927	[signature]
5.	[illegible]	[illegible]	2015540	[illegible]
6.	JOHANA C MAOROSE	FARMER	0728933108	[signature]
7.	Esther [illegible]	Farmer	0727517867	[signature]
8.	GILBERT MWAURA MUIGAI	FARMER	0723219216	[signature]
9.	Muigai Kamau	FARMER	0723132950	SAMUEL M.
10.				

[signature]

CHIEF
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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 5-5-2015 VENUE: KANUNGA CHIEF'S CAMP

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	JOHN N. KAMAU	KANUNGA	0727461[illegible] 1670 THIKA	
2.	PAUL N. MWANGI	KANUNGA	0726 06*176 612 THIKA	
3.	PETER KAMAU	KANUNGA	0723 918225	
4.	Hana Mugure	KANUNGA		
5.	Samuel K. Bonje	Kanunga	0726 654635	
6.	JAMES N. BORONJE	KANUNGA	0717729448	
7.				
8.				
9.				
10.				

OK

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 5/5/2015 VENUE: KANUNGA CHIEF'S CAMP

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	WILSON MWANIKI M.	TEACHER	0723335803	
2.	FRANCIS MWITI M.	FARMER	0748881592	
3.	CYRUS KAGIRA NJUGUNA	FARMER	0722-884644	
4.	SOLOMON KAGIRA N.	FARMER	0714265427	
5.	ALICE WAIRIMU K.	FARMER	0722991807	
6.	ESTHER M MUIGAI	FARMER	0710668078	
7.	WANJIRU KINUTHIA	TEACHER	0727759190	
8.	NSUCTUNA	KABU		
9.				
10.				

OK

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 5/5/2011 VENUE: KANUNGA CHIEFS CAMP

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	Paul M Kagira	Farmer	0722360991	[signature]
2.	Simon M Kagira	Farmer	0710368241	[signature]
3.	James Philip Riavie	Farmer	0716083050	[signature]
4.	Kimia Njeroge	Farmer	0726420030	[signature]
5.	Kimia [illegible]	Sarah	2018603	[signature]
6.	FRANCIS MWANGI KIMARI	FARMER/TEA EXTN ASST NJUNJI	0722 369698	[signature]
7.	JOSEPH KARANJA MUKUNA	FARMER	0728-200335	[signature]
8.	PETER NGANGA MURUITHIA	FARMER	0718138355	[signature]
9.	Roachel Wambui Nyambura	Farmer	0710687274	[signature]
10.	Karanja Mwaniki	Farmer	0720985250	[signature]

OK. [signature]

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 5/5/15 VENUE: KANUNGA CHIEF'S CAMP

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	SIMON N. NGANGA	Businessman	0728888212	[signature]
2.	JOSEPH GATUA M.	TEACHER	0727 425 937	[signature]
3.	CHARLES M. KARIUKI	FARMER	0723 389 728	[signature]
4.	Grace Mjoki Mukora	Farmer	0727004694	[signature]
5.	Samuel KIARII KAGIRA	Farmer	0721575714	[signature]
6.	CHARLES MAINA NYA	FARMER	0723837327	[signature]
7.	JAMES MAINA MUCHI	FARMER	0722885 0913	[signature]
8.	DPOLO MIDANGI NDUATI	FARMER	—	[signature]
9.	MWANGI NJUGUNA	FARMER	—	Mwangi Njuguna
10.	SAMMY NGENGA	FARMER	0725709298	[signature]

OK. [signature]

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 5/5/2016 VENUE: KANUNGA CHIEF'S CAMP.

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	ONESMUS MAINA	CHIEF KIGORO	0724480366	[signature]
2.	PETER MWANGI KAMAU	A/CHIEF KANUNGA	0733200937	[signature]
3.	PAUL MAINA NGANGA	A/CHIEF GIACHUKI	0735704569	
4.	HELINA WANGARI K.		0723 490 286	
5.	DAVID NJEROGE KAGIRA	FORMER CHIEF / DIRECTOR	0725 585241	[signature]
6.	BERNARD KUHUNYA	AJUNU TEA FACTORY	0723 478742	
7.	J.P.M. Kagira	Farmer	0722960885	[signature]
8.	DEVAN M. KARANJA	FARMER	0700704171	[signature]
9.	GEORGE K. KARANJA	FARMER	0705142248	[signature]
10.	Pharis Kamau	FARMER	0722459053	[signature]

OK. [signature]

CHIEF
KIGORO LOCATION

Notes for the meeting held with...the public at Ndunyu chege tea buying centre for comments on the proposed Thika - Kigoro - Kabete Pipelines

Attendance

1. Newton Stower	5.
2. Samuel Thuo	6.
3. Member of the public	7.
4.	8.

Agenda

To discuss the proposed Thika - Kigoro - Kabete pipeline and collect comments on the project. To set the cut off date for the Eligibility of PAPs.

Notes

The meeting started with a word of prayer from the audience who was invited by the area chief.

The chief thanked the audience for their prompt attendance despite the late start of the meeting. He introduced the leaders from the provincial administration and the GIBB team. He invited the assistant chief to welcome the people and the GIBB team.

The Assistant chief urged the audience to be patient and listen to the GIBB and any questions they feel they really need answers to, they ask. He indicated that its crucial that questions are all answered satisfactorily since there is the issue of land take.

He indicated it good that nowadays the government is courteous enough to consult land owners and project affected persons unlike before when the government used to compulsorily acquire land without consulting the public.

Notes drafted by: Newton Stower **Confirmed by:** SAMUEL K - THUO

Designation: Project Environmentalist **Designation:** CHIEF NDUNYU - CHEGE LOCATION

Signature: **Signature:**

Project Name: .....

Project Code.....

Date of meeting: ...../...../ 2014

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Notes for the meeting held with...

Notes continued....

The chief invited the GIBB team to address the public. The project environmentalist started by thanking the audience for attending the public meeting and then went ahead to give the project description. He indicated that the project is expected to generate both negative and positive impacts on the area. He stated that it is necessary that the audience gives their comments & opinions of the project so as to determine the impacts. This will allow for determination of mitigation measures for the negative impacts & a way to improve the positive impacts.

He also talked about the component of RAP that is as a result of land acquisition. He informed the audience that the cut off date for eligibility is on the first day of enumeration and that any asset not included in the exercise shall not be valued.

Question: Where is the land acquisition plan

The land acquisition plan will be availed during the valuation exercise to show the PAP to what extent his/her land will be affected. The exercise is preceded by the surveyor first of all pegging where the pipelines will pass.

Question: The land that will be permanently acquired will it be the same value as that for temporary acquisition

Land that will be permanently acquired shall be valued as per the Government Valuers rates or

Notes drafted by: Newton Stower *Confirmed by:* SAMUEL K. THUO

Designation: Project Environmentalist *Designation:* CHIEF ... CHEGE LOCATION

Signature: *Signature:*

Project Name: .....

Project Code.....

Date of meeting: ...../...../ 2014

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Notes for the meeting held with...

Notes continued....

which the higher land the land that affected temporarily shall not be bought but except that the affected crops shall be compensated for, land temporarily acquire for a two months be compensated.

Question: will I be allowed to use my land after the pipe has been laid

Once the pipe has been laid, the temporarily acquired land shall be returned by the owner but the wayleave (3m) shall be NWSC's property, thus its use will be NWSCs discretion

Question: How deep will the pipe be laid.

The pipe will be deep in some cases and above ground in some areas depending on the topography of the land. There is no standard depth that the pipe will be laid.

Question: When is the project start date.

The project is expected to start once the NEMA licence has been issued for the project.

Notes drafted by: Newton Stower

Confirmed by: SAMUEL K. TIRO

Designation: Project Environmentalist

Designation: Other

Signature:

Signature:

Project Name: .....

Project Code.....

Date of meeting: ...../...../ 2014

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Notes for the meeting held with...

Notes continued....

Question: The dust that will come from the project will affect tea & coffee

The contractor shall use the ESMP in the project ESIA report to ensure best management practices. The ESMP shall out line how the contractor shall potential impacts and what the contractor should do to minimize the effects.

Question: What will the crop basis of crop valuation will the crops be valued the same.

The crops will be valued as per the government rates, each crop has a different value from the other thus valuation will be dependent of type and age of crop.

Question: Will the compensation be done before or after the project.

Ideally WB policies require that the PAPs be compensated before project start date. AHSB shall be advised to use the WB policy guidelines when implementing the RAP.

Question: If the wayleave expands past what is intended to be acquired, will it be compensated.

If the contractor goes beyond what was acquired, it will be outside the pre existing RAP budget and thus considered as damages by the contractor who shall pay for the damaged assets.

Notes drafted by: Newton Stower

Confirmed by: SAMUEL K-THUO

Designation: Project Environmentalist

Signature:

Designation: CHIEF

Signature:

CHIEF
EDUCATION - CHEGE LOCATIO

Project Name: .....

Project Code.....

Date of meeting: ...../...../2014

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Notes for the meeting held with...

Notes continued....

The access road to the construction site, will it be compensated? for areas with very steep slopes

The contractor road to be used is outside the scope of the RAP and thus if a road is to be acquired, the contractor an AKISB shall contact the property owners and agree on the assets to be affected.

Question: Will houses that are affected be compensated.

The project aims to avoid any demolition of houses, public institutions or cultural & religious grounds. However, should any of them be affected, AKISB shall be advised to follow WB policies by compensation & sub restoration of livelihoods.

Question will a road be constructed during the project.

Access road to the construction site might need to be constructed but it outside the scope of the ESIA and RAP

Question: for lands that have low lying rocks, will the rocks be backfilled in the or left on the surface.

The contractor is expected to reinstate all the site that he will have used, it is outlined in the project ESIA report that the construction site be reinstate to an earlier state or better.

Notes drafted by: Newton Stower

Confirmed by: SAMUEL K TIHUO

Designation: Project Environmentalist

Designation: CHIEF

Signature:

Signature:

CHIEF
NDENYU - CHEGE LOCATION

Project Name: .....

Project Code.....

Date of meeting: ...../...../2014

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Notes for the meeting held with...

Notes continued....

Question If the project affects two different property ie one tempory acquisition and the other permanent.
All the affected assets shall be valued as they are, all land shall be valued and paid incase its held by two different people it shall be calculated as correspond to each persons share of affected property

Question: The soil erosion resulting from the construction exercise, how will it be managed
Soil erosion prevention mechanisms such as terracing, gabions and planting of cover vegetation shall be proposed in the ESIA report in the ESMP that shall be used by the contractor to reduce the impact of soil erosion.

Question: Where the ~~construction~~ laying of the pipe passes above land will I be compensated - how will children be protected.
The land below shall be acquired and will belong to NCWSC this will allow for future operation and maintainance activities

Question: If the pipe bursts later after the construction & destroys my crops will I be compensated & by whom NCWSB will hand over the pipeline to NCWSC after project completion, therefore NCWSC shall be responsible for subsequent damages

Notes drafted by: Newton Stower

Confirmed by: SAMUEL K-THU

Designation: Project Environmentalist

Designation: CHIEF

Signature:

Signature:

CHIEF
NCWSC - CHEGE LOCATION

Project Name: .....
Project Code.....
Date of meeting: ...../...../2014

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Notes for the meeting held with...

Notes continued....

Question: will I get employment.

The project will source casual labour locally which mostly be unskilled labour, as for skilled labour, the contractor shall interview persons from the area and pick one who is qualified. If he finds none qualifies, he shall source for the skilled labour elsewhere.

Question Where the pipe passes through a grave, will it be exhumed, will I be compensated.

The LXP strives to avoid any burial grounds therefore the first priority will be to realign the pipeline but if the design dont allow then KNSB shall come to an agreement on the assistance required to relocate the grave.

Question: Where need information on the land parcels to be affected.

The information shall be availed during the survey exercise as the beacons will be put.

Notes drafted by: Newton Stower *Confirmed by:* SAMUEL K. THUO

Designation: Project Environmentalist *Designation:* CHIEF

Signature: *Signature:*

CHIEF
THUVU CHIEGE LOCATION

Project Name: .....

Project Code.....

Date of meeting: ...../...../2014

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 14/05/15 VENUE: NDUNYU CHEGE TEA BUYING CENTRE (NDUNYU CHEGE SUB LOC)

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	Solomon Ngugi-M.	A/CHIEF	0720757139	[signature]
2.	Samuel K. Thuo	A/CHIEF	0724609910	[signature]
3.	PAUL M. NGANGA	A/CHIEF	0735 704569	[signature]
4.	Miriam Muthoni S.	A/chege / Mkwinani	0723562366	[signature]
5.	James Njoroge Muthoni	Resident.	0700836150	[signature]
6.	Margaret Wambui Muthoni	Farmer	0720075403	margaret
7.	Naina Njoroge	Farmer	0715645144	[signature]
8.	Jotham Muigai Phinehas	farmer	0726628044	[signature]
9.	Peter Njoroge chege	Farmer	0722214516	PNC
10.	HENEY. K. Kabute	farmer	0720298808	HKabute

SAMUEL K. THUO
[signature]

CHIEF
NDUNYU CHEGE LOCATION

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 14/05/15 VENUE: NDUNYU CHEGE TEA BUYING CENTRE

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	Nakasan Maina Njanja	farmer	0722950689	NM
2.	Peter Kamau Njoroge	farmer	0722907358	[illegible]
3.	Henry Chege	farmer	0729993696	[illegible]
4.	JOHN MWANGI	Farmer	0725257794	[illegible]
5.	JANE NJERI	FARMER	0729351563	[illegible]
6.	JANE NJERI CHEGE	FARMER	0728544056	JANE
7.	ISAAC NJENGA CHEGE	FARMER	0724498429	[illegible]
8.	DAMIEL MAINA CHEGE	FARMER	0713685690	[illegible]
9.	Pascal Kamande chege	FARMER	0711320015	[illegible]
10.	JULIUS NDUGI CHEGE	FARMER	0720779755	Julius

Samuel K. Thu

HEF
NDUNYU - CHEGE LOCATION

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 14/05/15 VENUE: NDUNYU CHEGE TEA BUYING CENTRE

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	Peter Macharia Mugai	Farmer	0713410570	[signature]
2.	DAVID Nduati Mungai	Farmer	0724148532	[signature]
3.	Geoffrey Kimani	Farmer	0701737846	[signature]
4.	JAMES MAINA	Farmer	0724611320	[signature]
5.	FRANCIS GITHINJI	Farmer	0725461445	[signature]
6.	ISAAC KURIA DANIEL	Farmer	0719257897	[signature]
7.	JAMES MAINA MUCHINA	FARMER	0722885003	[signature]
8.	John Mwenyi Wandiri	Farmer	0711199390	[signature]
9.	Njorogemaina Kamau	FARMER	0720503850	Njoroge
10.	ZJ MWANGI	ECONOMIST	0725219512/0733712500	[signature]

SAMUEL K. THUO
[signature]

CHIEF
NDUNYU CHEGE LOCATION

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 14/05/15 VENUE: NDUNYU CHEGE TEA BUYING CENTRE.

35

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	Peter Mama Kamau	Farmer	0720003210	
2.	DANIEL M- KAMAU	FARMER	0723389011	
3.	Ezra Cutau D.W Kamau	Farmer	—	E Cutau
4.	Peter Njooge Cutau	Farmer	—	P Njooge
5.	Henry Nyuguna Mathenis	Farmer	0700692332	
6.				
7.				
8.				
9.				
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SAMUEL K. THUO

CHIEF
NDUNYU - CHEGE LOCATION

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 04/05/2015 VENUE: KIRIA-INI LOCATION

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	DAVID. M. NJOROGE	FARMER	0702868365	
2.	BONIFACE M. KAMAU	"	M/L	
3.	STANLEY M. KAGIRA	"	0716260024	
4.	ELIJAH M. KAMWALU	"	0727426177	
5.	SAMUEL M. KIEMJE	"	0711706091	
6.	WILSON KAMAU THETHURI	"	0726054333	
7.	JOYCE W. KIARIE	"	0710874694	
8.	TABITHA M. ~~WAITA~~ MWAURA	"	MoM	
9.	FRANCIS C. RUBELIA	"	"	
10.	ESTHER N. MJITHIA	"	0728567795	

CHIEF
KIRIA-INI LOCATION

Confirmed
J.N. Mwaura.

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 04/15/2015 VENUE: KIRIAINI LOCATION

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	Geoffrey K. Kimani	farmer	0722441393/NIL	G.K.Kimani
2.	DANIEL K. NJAU	"	0728215278 "	
3.	JOHNSON K MAINA	"	0727966949	
4.	ALICE WAMBUI NDUATI	"	0725388162	
5.	JOHN MWANGI NDUATI	"	0720275263	
6.	MWANGI KIMATHIA	"		m K.
7.	RAEL W-MWANGI	"	0700495825	
8.	JAMES K. MWANGI	"	NIL	
9.	GIDEON M-KAMAU	"	0726930662	
10.	PETER K. KAGIRI	"	0725345554	

Confirmed
J.N. MWAURA
CHIEF
KIRIA-INI LOCATION

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 04/05/2015 VENUE: KIRIAINI LOCATION

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	JACKSON MUIRURI	FARMER	0713829760 1162 THIK	[signature]
2.	JOSEPH KINYANJUI NJOROGE	"	0728251330/219 GATURA	[signature]
3.	STEPHEN NJOROGE	"	027538355 (1162 THIK	[signature]
4.	Julius KAMAU	"	0713 139543 (1162 Th	[signature]
5.	Geoffrey Gathuru Ngugi	"	0723318858 (219 Gatura)	[signature]
6.	JACOB NJOROGE	"	0727096495 (1162 THIKA)	[signature]
7.	HEZEKIAH MWAURA	"	0729813105 (1162 Thik	[signature]
8.	Arest Muigai M	"	0704442507 (1162 Thika)	[signature]
9.	Francis Chegejubecha	"	1162 Thika	[signature]
10.	ELINJAH GACINJU		0720665897	[signature]

Confirmed
J.N. Mwaura

CHIEF
KIRIA-INI LOCATION

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 4/5/2015 VENUE: KIRIA-INI LOCATION

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	FRANCIS NYOKO	Famers	1162 Thika	[signature]
2.	SAMUEL NGANGA	FAMERS	1162 THIKA	[signature]
3.	SCRAM KIENSE	FAMERS	1162 THIKA	[signature]
4.	Mr. David KAMAU M	FAMERS	1162 THIKA	[signature]
5.	SAMUEL Maina Macharia	FARMOR	1162 Thika	maina
6.	Partrik Kariuki Mwangi	Formor		[signature]
7.	SAMSON MAINA MWANGI	Formor	74 GATURA	[signature]
8.	DAVID CHESE	Farmer	1162 THIKA	[signature]
9.	ALLAN MWANGI MAINA	FARMER	0724831498 BOX 1162 THIKA	[signature]
10.	FREDRICK NDICHU	BUSSINAMEN	0725319108 1162 THIK	[signature]

CHIEF
KIRIA-INI LOCATION
[signature]

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DATE: 04/05/2016 VENUE: KIRIA-INI LOCATION

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	ALICE M. KURIA	FARMER	N/L	ALICE M. KURIA
2.	JOHN N. MWAURA	ADMINISTRATOR	0723454053	[signature]
3.	JOSEPH NDUNGU	Environmentalist-AWSB	0720863626	[signature]
4.	PRISCILLA W. NYANJU	ADMINISTRATOR	0725244739	[signature]
5.	Reachel Njeri Njoroge	Farmer	0725307050	[signature]
6.	Daniel Mbogo Chege	Farmer	0714488008	[signature]
7.	Peter Mainaina	Farmer	0705096108	[signature]
8.	J.K. NJOROGE	ASSISTANT CHIEF	0721-693615	[signature]
9.				
10.				

Confirmed
J.N. Mwaura

CHIEF
KIRIA-INI LOCATION

Kiambu County

Notes for the meeting held with...the Public at Ngorongo community hall at the Assistant county Commissioners office in Ngorongo sub-location

Attendance

1. Newton Stower	5.
2. Chief Vincent Mwaura	6.
3. Members of the public	7.
4.	8.

Agenda

Discuss the impacts of the project to the project area and collect views on the project. The meet was also used to sensitize the public on the RAP and set a cut off date.

Notes

The meeting started with a word of prayer by a member of the audience.

The chief then invited the GIBB team to the meeting and introduced them to the audience. He told the audience that he will address them in Kiswahili ~~Vata~~ and later, he will translate in Kitaiyo for the elderly to understand the project.

The chief invited the RAP expert to address the audience on the project details.

The RAP & ESIA expert thanked the audience for their prompt attendance of the attendance meeting. He stated that the project is expected to have both negative and positive impacts to the project area and thus it is necessary for an ESIA to be carried out to generate most likely impacts of the project and

Notes drafted by: Newton Stower — *Confirmed by:* VINCENT W. MWAURA

Designation: Project Environmentalist — *Designation:* ASSISTANT CHIEF

Signature: — *Signature:* ASST. CHIEF NGORONGO SUB-LOCATION

Project Name: .....

Project Code.....

Date of meeting: 15/5/2018

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Notes for the meeting held with...

Notes continued....

impose mitigation measure. He said that for those persons whose assets will be affected shall be subjected to enumeration exercise to determine their socio-economic status and list all their affected assets afterwards a valuer will be mobilised to value all the assets within the wayleave that are expected to be affected. He said it is important for a cut off date to be set to avoid people claiming assets that were not there during the valuation. He set the cut off to be the 1st day of [illegible]

Question: This water initially took 12 m and later took 6m that was not compensated for. He wasn't to first of all be paid for the 6 m that was taken

The agreement made back then was not AKISB but but with the then municipal councils, however the issue concerning the wayleave shall be submitted to AKISB to give advise on the way forward. A meeting shall be organised with AKISB to discuss the issues raised concerning the wayleave.

Question: Why are you doing survey work without involving the land owner.

The survey work has not yet begun but when it starts, the chief shall be requested to

Notes drafted by: Newton Stower *Confirmed by:* VINCENT W. MWAURA

Designation: Project Environmentalist *Designation:* ASSISTANT CHIEF

Signature: *Signature:* ASST. CHIEF NGORONGO SUB-LOCATION

Project Name: .....

Project Code.....

Date of meeting: ..15../..5../ 2014

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Notes for the meeting held with...

Notes continued....

- contact the assets owners at least a few days before the surveyor goes to the site. All these owners of the affected assets shall be present and informed during the survey and valuation exercise.

Question: Will the pipeline be on the surface or be underground.

In some areas, depending on the terrain of the land, the pipe shall be on the surface and in some instances, it shall be in the ground. Areas with steep valleys / river crossings shall have the Pipeline on the surface.

Question: We were proposed water by Kenyatta, as community appreciation for accepting the project. We want the water returned before the project is implemented.

① The project area has an already running water supply system but the locals have not gone ahead to apply for the water connection. The project will supply water to Nairobi but but the local areas shall be supplied with water from the local water company. Akiba is incharge of supply bulk water to the water service provider.

Notes drafted by: Newton Stower *Confirmed by:* VINCENT W'MWAURA

Designation: Project Environmentalist *Designation:* ASSISTANT CHIEF

Signature: *Signature:*

ASST. CHIEF ADMINISTRATIVE OFFICER

Project Name: .....

Project Code.....

Date of meeting: ..14./.5./ 2014

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Notes for the meeting held with...

Notes continued....

Question: Back then I was paid 39 shillings, there was daylight robbery, we dont refuse the pipeline to pass but we want proper compensation

Your sentiments shall be presented in the report as said the assets shall be valued as they are and value awarded. The value awarded shall be as per the government values, it shall not be lower than the government value but equal or slightly higher.

Question: The GIBB team should assess and know how the extra 6 m was paid to.

The sentiment concerning the wayleave shall be presented to AWSB and the response shall be communicated to the community through the chiefs

Notes drafted by: Newton Stower

Confirmed by: VINCENT W. MWAURA

Designation: Project Environmentalist

Designation: ASSISTANT CHIEF

Signature:

Signature:

ASST. CHIEF
NGORONGO SUB-LOCATION

Project Name: .....

Project Code.....

Date of meeting: ..11./..5./2019

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Notes for the meeting held with...

Notes continued....

Comment: We have very little ranche, if our 3m is acquired we will not be able to use the lands. So we want land for land compensation and not cash compensation

-During the RAP study one of the option the PAP be is to request to be compensated by land for land where the PAP is given an alternative land elsewhere of equal or higher value. When the land affected is insignificantly affected, it will be proposed that the entire land be acquired.

Question: Where will the excavated soil be put after the construction process of the pipeline.

One of the reasons as to why KPLC requires lands to acquire 6m construction wayleave is to ensure that there is enough working space that includes room for storing the excavated top soil. The top soil will then be used in back filling.

Notes drafted by: Newton Stower

Confirmed by: VINCENT W. MUKAURA

Designation: Project Environmentalist

Designation: ASSISTANT CHIEF

Signature:

Signature:

ASST. CHIEF
NGORONGO SUB-LOCATION

Project Name: .....
Project Code.....
Date of meeting: ..15../..N../ 2014

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Notes for the meeting held with...

Notes continued....

Question: How will we benefit from this project

The project will be a source of employment to the locals it will offer market for locally available goods & services such as hotels that will eventually build the economy of the area.

Question: The water from the treatment works destroys our crops when air valves are opened and we are never compensated.

The water valves have been proposed to be constructed in natural water courses so that the water does not flow into peoples lands destroying crops and reading soil.

It will be proposed to KIWASB that the water be channelled into water courses such as rivers & streams

Question: What happens when land is injuriously affected and not economically viable

We shall Recommend to KIWASB that land that has been injuriously affected be fully compensated to

Notes drafted by: Newton Stower

Confirmed by: VINCENT W. MWAURA

Designation: Project Environmentalist

Designation: ASSISTANT CHIEF

Signature:

Signature:

ASST. CHIEF
NGORONGO SUB-LOCATION

Project Name: .....

Project Code.....

Date of meeting: ...15/.5../2018

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Notes for the meeting held with...

Notes continued....

reduce impacts on the weather hardihood of the pap and ensure they restore their lives as before or to a much better status.

Question: Where will the construction soil be dumped because the 3 m is very narrow for heavy machinery?

The soil shall be put within the 6 m construction wayleave and shall be used as backfilling of the excavated area.

Notes drafted by: Newton Stower

Confirmed by: VINCENT W. MWAURA

Designation: Project Environmentalist

Designation: ASSISTANT CHIEF

Signature:

Signature:

ASST. CHIEF
NGORONGO SUB-LOCATIO

Project Name: .....

Project Code.....

Date of meeting: ..15../..5../ 2014

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PUBLIC CONSULTATION MEETING ATTENDANCE LIST

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 15/05/2015 VENUE: NGORONGO SOCIAL HALL

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	RUTH WANJIRU KAMAU	FARMER		
2.	KAMAU KIRINU	"	0727575944	
3.	KIRA GACARI	"		
4.	Samson Muriu	Farmer	0726159783	
5.	Mary Njeri Mbugua	Farmer	Nil	
6.	ESTHER KIRUMBI GA	FARMER	0721713720	
7.	TIMOTHY WAMWEA KAMAU		0719397539	
8.	BETH KIMANZI	Farmer	0720685581 Bethwanjiru 277@gmail.com	
9.	JOHN GITHOGO	FARMER	0710726479	
10.	Dorcas Wambui M.	FARMER.	0727753433.	

VINCENT W. MWAURA
ASST. CHIEF
NGORONGO SUB-LOCATION

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PUBLIC CONSULTATION MEETING ATTENDANCE LIST

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 15/05/2015. VENUE: NGORONGO SOCIAL HALL.

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	JOHN MUIGAI GITAU	FARMER	0703948241	
2.	JOHN THIMO KAMAU	"	0723279013	
3.	JOSEPH GATOWYE	"	0720859726	
4.	JOHN GATHI NGANGA	"	0715 037700	
5.	PATRICK KAMAU NGANGA	"	0722787604	
6.	Paulina Kalura	071773882		
7.	Rose Muthoni		0704189331	
8.	Martha Wambu Macharia		0720373989	
9.	W MARY NAGHEMA	"	0726277947	[illegible]
10.	NJERI CHINGARE PILI	"		

VINCENT W. MWAURA
ASST. CHIEF
NGORONGO SUBLOCATION

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PUBLIC CONSULTATION MEETING ATTENDANCE LIST

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 15/05/2015 VENUE: NGORONGO SOCIAL HALL

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	MARY W Ngenge	Farmer	0723829428	
2.	Leonard Mingo	farmer	0726037347	
3.	BENEDETA NJUHI	farmer	0713200150	
4.	JULIA WAMBUI	farmer	0723326151	JW
5.	Peter Wanauna	Farmer	0717136870	
6.	MARY MUITHUNGU	farmer	0726585031	
7.	John Ndungu Njoroge	Farmer	0719366616	
8.	florence w olego	farmer	0710207897	
9.	GEOFREY KIHARA K	"	0700810668	
10.				

VINCENT W. MWAURA
ASST. CHIEF
NGORONGO SUB-LOCATION

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PUBLIC CONSULTATION MEETING ATTENDANCE LIST

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 15/5/15 VENUE: NGORONGO SOCIAL HALL

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	Joseph Kavaja Kaviuki	Farmer	0728172362	
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

VINCENT W. MWAURA
ASST. CHIEF
NGORONGO SUB-LOCATION

Notes for the meeting held with... number of the public in Ngethu to discuss potential impacts of the Rukai-Kigoro-Kabete pipline

Attendance

1. Peter Newton Stower
2. Anthony Njoroge
3. Members of the public.
4.
5.
6.
7.
8.

Agenda

To discuss the possible positive and negative impacts of the proposed piplines to the Bio-physical ~~environment~~ and socio environment.

Notes

The meeting started with a word of prayer from the chief who later invited the members of the public to the meeting.

He thanked the audience for being patient even after the meeting started late. The chief told the audience that the GIBB team will communicate in English and afterwards he will translate the message to the locals who do not understand Kiswahili well.

The chief invited the GIBB team to address the audience and give the public the description of the project.

The GIBB Environmentalist rodi told the audien of the proposed 1.2 dia pipline from Ndakaini to Kigoro Tworks all the way to Kabete. He indicated that the proposed project is expect to have an number of environmental impacts both negative and positive and encourage the audience to ask as many

Notes drafted by: Newton Stower **Confirmed by:** ANTONY NJOROGE W.

Designation: Project Environmentalist **Designation:** A/CHIEF

Signature: **Signature:**

ASST. CHIEF OFFICE NGETHU SUB-LOCATION

Project Name: .....

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Notes for the meeting held with...

Notes continued....

Questions as they can. ~~depending~~ He indicated that the project will require about between 6-18 m out of which 3 meter will be acquired on permanent basis. He stated that it will WBs O.P 4.12 that the public have to be sensitized on the project and a cut off date set. He explained that a cut off date is where all affected assets and persons are recorded in a census and any other development, or immigration of persons in the project zone of impact past that date are not considered eligible for compensation. He set the ~~cut~~ cut off date on the first day of enumeration. ~~[illegible]~~

After elaborating on the project details, the Gibb personnel invited questions from the audience. The chief gave a translation of what had been said and asked members of the public to ask questions.

Question: When acquiring the 3 m I'd like to be paid as a plot, let all the land be consolidated.

- The land to be acquired will be paid valued as per the acreage to be acquired, if one owns more than one parcel each parcel still be valued separately and the total land value still be calculated.

Notes drafted by: Newton Stower *Confirmed by:* ANTONY NJOROGE N

Designation: Project Environmentalist *Designation:* ALCHIEF

Signature: *Signature:* [illegible] THIEF OFFICE NGETHU SUB-LOCATION

Project Name: .....

Project Code.....

Date of meeting: ...../...../ 2014

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Notes for the meeting held with...

Notes continued....

Question: If you take 6m temporarily for construction, will we be paid for compensation during maintainance
- Currently, the GIBB team is working on a combined TOR to acquire 2m permanent and 6m for construction during construction phase during maintainance, the client shall organise to meet the land owners to discuss how the matter will be handled. During this study, crops growing along the construction wayleave shall be valued and presented to the client (AHSB)

Question: When the surveyor & valuer are on site we want to be involved during the exercise
- During the survey work, the surveyor will be accompanied by village elders appointed by the chief, the same shall also be done during valuation except that during valuation, the valuer will require the land owner to be present or at least have his representative around to give his/her details

Question: The previous lines have cause landslides, this project will increase loss of arable land.
- During the construction exercise works, the contractor will be required to carry out soil conservation measures as proposed in the mitigation measure for massive soil

Notes drafted by: Newton Stower *Confirmed by:* ANTONY NJOROGE W

Designation: Project Environmentalist *Designation:* A/ CHIEF

Signature: *Signature:*

ASSIST. CHIEF OFFICE
NGETHO SUB-LOCATION

Project Name: .....
Project Code.....
Date of meeting: ...../..... / 2014

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Notes for the meeting held with...

Notes continued....

movement. After construction exercise, monitoring and evaluation will be done to ensure the project zone of influence has been restored to its initial state or a much improved state. Areas that have been left out should be reported to the Resident Engineer for appropriate ah to be taken.

Question: We lost springs during construction phase and now we don't have water.

During the Environmental study, all the springs along the project footprint will be mapped and the contractor brought to the attention of their location so as to avoid damaging the eye of the springs.

Question: How will we be compensated for loss of income from crops

The project will be implemented as per WB OP 4.12, The affected rates will be valued by the valuer who will ensure that his rates are not below the governments record of market rates. The values will either be equal to the government market rate or slightly high depending on a number of factors that bring about variation

Notes drafted by: Newton Stower

Confirmed by: ANTONY NJOROGEW

Designation: Project Environmentalist

Designation: ALCHIEF

Signature:

Signature:

ASST. CHIEF OFFICE
TEETA SUB-LOCATION

Project Name: .....

Project Code.....

Date of meeting: ...../...../2014

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Notes for the meeting held with...

Notes continued....

Question: How will the issue of soil destroying crops be handled

The contractor shall implement dust TSMP in the EMP report to ensure that the impacts on soil & crops will be reduced. This will be by restricting the construction works to the construction anywhere to ensure the adjacent area are affected.

Question: Will we get water.

AWSB is only responsible for bulk supply and provision of the infrastructure but supply is from the water companies. The water supply company has supplied water but most people are resident to pay for connection. Creating perforations in the water supply line will lead to water losses and pressure loss

Question: will we get employment.

The contractor will be advised to source for unskilled labour locally and give priority to any skilled labourer within the project area. If no skilled labourer

Notes drafted by: Newton Stower

Confirmed by: ANTONY NDOROGE W.

Designation: Project Environmentalist

Signature:

Designation: ASSISTANT CHIEF OFFICE AGETHI SUB-LOCATION

Signature:

Project Name: .....

Project Code.....

Date of meeting: ...../...../2014

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Notes for the meeting held with...

Notes continued....

is available in the area, then they will be sourced from elsewhere.

Question: Who will cater for the expenses incurred during for amending the titles.
The cost of amending the titles will be proposed and include in the disturbance allowance, this will help cater for the costs of amending the titles and getting the title deeds.

Question: This project has been slowly by slowly taking my land. We suggest that KHSB you buys the entire land.
KHSB shall be informed of your proposal and the a meeting response shall be communicated to the PAPs through the chiefs.

Notes drafted by: Newton Stower

Confirmed by: ANTONY NJOROGE W.

Designation: Project Environmentalist

Designation: A/ CHIEF

Signature:

Signature:

ASSOCIATE OFFICE
MEETHU SUB-LOCATION

Project Name: .....

Project Code.....

Date of meeting: ...../...../2014

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PUBLIC CONSULTATION MEETING ATTENDANCE LIST

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 19.05.2015 VENUE: NGETHU SOCIAL HALL

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	GATHUNGO CHEGE	FARMER		
2.	Solmon Mugni	Ndungu	0727782627	
3.	PETER MUAMBU	FARMER	0724638289	
4.	PETER NDUNGU	FARMER	0705506763	
5.	JOHN KAMOGE	FARMER	0725555270	
6.	GEORGE NDUNGU	FARMER	0728406288	
7.	MICHAEL KIMANI	FARMER	0726668270	
8.	STEPHEN MWAURA	FARMER	0701088319	
9.	JOHN GITAU MAINA	FARMER	ID 27255503	
10.	JANE WANJIKU MOIKE	FARMER	0723209189	

SECT. CHIEF OFFICE
NGETHU SUB_LOCATION

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PUBLIC CONSULTATION MEETING ATTENDANCE LIST

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 19/05/2015 VENUE: NGETHU SOCIAL HALL

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	JOSEPH NJUGUNA NYOIKE	FARMER	0726135411	
2.	Mary Wanja Muitungu	farmer	0726585031	[illegible]
3.	Maria Njeri Njoroge	farmer	0727444064	[illegible]
4.	TERESIA Wangari Gachathi	farmer	0728111405	Wangari
5.	MARTHA W. NYOKE	FARMER	0720329888	[illegible]
6.	FAITH WANGARI	FARMER	0711310129	[illegible]
7.	RUTH WANGARI	FARMER	0707434250	
8.	DANSON KIMANI GACHINE		ID. 2253920	
9.	STEPHEN Njoroge Mwangi	FARMER	0725773799	[illegible]
10.	JAMES MBUGHA	FARMER	0714771797	[illegible]

ASST. CHIEF OFFICE
NGETHU SUB-LOCATION

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 19/05/2015 VENUE: NGETHU SOCIAL HALL

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	PETER	FARMER	0798782472	
2.	AGATHA N. JAKOMA	Farmer	0711588330	Agatha
3.	Alex N. Maina		0716975531	
4.	Gabriel Gachahi	Farmer	0726763405	
5.	PATRICIA WAIRIMU	FARMER 0723611669	0723611669	
6.	PHILAPHIAN MWAURA	Farmer	CF	
7.	EUNICE NJERI	Farmer	0716085572	
8.	Martha Wanjiku	Farmer	0720329858	
9.	peter mburu	Farmer	—	—
10.				

ASST. CHIEF OFFICE
NGETHU SUB-LOCATION

Notes for the meeting held with... the public at Komothai Chief's Office - Githunguri Sub county. ON WEDNESDAY 13/05/15 AT 10AM.

Attendance

1. Public from Ngewa Location
2. Public from Komothai Location
3. Public from Kiratina location.
4. Chiefs apart from the affected locations.
5. - GIBB Africa project environmentalist.
6.
7.
8.

Agenda

To inform the public from Ngewa, Komothai and Kiratina Locations in Githunguri Sub County of the proposed Pipeline Project and to discuss potential environmental and social impacts of the project on the project area.

Notes

The meeting began with a word of prayer from one of the attendants followed by an introduction by Chief Kago of Komothai Location. The chief introduced the chiefs who were present ie Chief Ngewa - Micheal K and Chief Kiratina - D.N Karanja. He also introduced the members of public present according to locations represented.

After a brief introduction of the project and the reason for the gathering, he advised the audience to ask as many questions as possible inorder to understand the project. Chief Kago then introduced the project environmentalist from GIBB Africa and invited her to continue with the presentation.

The project environmentalist, Catherine Juma, described the project and displayed maps showing the project area. She then introduced the agenda of the meeting which was Environmental Impact Assessment and Compensation Resettlement Action Plan for the affected land Owners. After explaining what these entail and the importance

Notes drafted by: Catherine Juma **Confirmed by:**

Designation: Project Environmentalist **Designation:** CHIEF'S OFFICE KOMOTHAI LOCATION

Signature: **Signature:** J. N. KAGO

13/05/2015

Project Name: .....

Project Code.....

Date of meeting: 13/05/15

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Notes for the meeting held with... THE PUBLIC AT KOMOTHAI CHIEF'S OFFICE - GITHUNGURI SUB COUNTY ON WEDNESDAY 13/05/15 AT 10AM

Notes continued....

of conducting them, she explained the processes that were to follow. These are
- Surveyor would peg the alignment.
- Enumeration to collect data (baseline Socio Economic Data) as well as Consent of the affected people
- Valuation by a registered valuer.

The environmentalist also explained that during the mentioned processes some of the required details will include details of land and the land owner including photographic identification. The valuation was to be for the property on the land to be acquired as of the cut off date (First day of enumeration)

ISSUES RAISED.

Issue: The current 18m already affects land owners since availability of space is limited. What will affected families do if it affects takes up more land?

Response: If land is acquired, the affected land owners will be compensated at full cost.

Issue: Previous land acquired was not paid for. Land Owners raising issues as previous agreements stated that only 12m and not 18m was acquired.

Notes drafted by: Catherine Juma **Confirmed by:** 13/05/2015

Designation: Project Environmentalist **Designation:** KOMOTHAI LOCATION

Signature: **Signature:**

Project Name: .....
Project Code.....
Date of meeting: 13/05/15

GIBB Internation
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Notes for the meeting held with... THE PUBLIC AT KOMOTHAI CHIEF'S OFFICE - GITHUNGURI SUB COUNTY ON WEDNESDAY 13/05/15 AT 10 AM

Notes continued....

Response: The client (AWSB) will be consulted to clarify on this issue.

Issue: The people living next to the existing pipes, whose land was already acquired complained that they are unable to cultivate on the land though it still belongs to them. This is because there are restrictions on what can be planted also on the wayleave. They (the affected people) said that that they wanted compensation for the 18m wide piece of land.

Response: The compensation that the environental team was concerned with was that of the new pipe (3m) and additional 6m working space - Their concerns about acquisition of the 18m would be communicated to the client.

Issue: The people on whose land the first phases of the pipelines pass through were concerned that their families have grown and the available land has shrunk. They requested that since they cannot settle on the existing 18m, they should be compensated with land elsewhere. Their current land which is not economically viable to them should be acquired.

Response:

Notes drafted by: Catherine Juma **Confirmed by:** 13/05/2015

Designation: Project Environmentalist **Designation:** CHIEF'S OFFICE KOMOTHAI LOCATION

Signature: **Signature:**

Project Name: .....

Project Code.....

Date of meeting: 13.../05.../15

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Notes for the meeting held with... THE PUBLIC AT KOMOTHAI CHIEF'S OFFICE GITHUNGURI SUB COUNTY ON WEDNESDAY 13/05/15 AT 10 AM

Notes continued....

Issue: What will happen to our assets and property which is not within the 3m permanent acquisition but but will be destroyed during construction?

Response: A temporary working space of 6m will be acquired and the assets and property on this 6m will be compensated for during the construction period.

The land owners want arbitration for previous disputes concerning the pipelines that exist before the new project commences. They stated that they wanted all the pipeline land to be permanently acquired instead of using their land as an easement.

Notes drafted by: Catherine Juma

Confirmed by: 13/05/2015

Designation: Project Environmentalist

Designation: CHIEF'S OFFICE KOMOTHAI LOCATION

Signature:

Signature: J. N. KAGO

Project Name: .....

Project Code: 00987

Date of meeting: 13/05/15

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Notes for the meeting held with... THE PUBLIC AT NGENDA CHIEF'S OFFICE IN GATUNDU SOUTH ON THURSDAY 14/05/2015 AT 2.00PM.

Attendance

1. Residents from Ituru location
2. Residents from Ngenda location
3. Residents from Kiamuyu location.
4. Chiefs and assistant chiefs from the area.
5.
6. GIBB AFRICA LTD environmentalist
7.
8.

Agenda

- Public consultation on the proposed pipeline from Thika dam - Kigoro - Gigiri - Kabete.

Notes

After a word of prayer from a member of public in attendance. The Chief welcomed everyone to the meeting and thanked them for attending. After an introduction as to what the meeting was about he invited the GIBB Africa environmentalist, Catherine Juma to take over. Catherine Juma introduced herself and the company she works for and further explained that she was there on behalf of Athi Water Service Board to conduct an Environmental and social Impact assessment for the proposed Thika dam - Kigoro - Gigiri - Kabete pipeline which is part of the Northern Collector Tunnel phase 1. The area residents were shown a map of where the pipeline was proposed to pass. Since the map showed a general representation, a surveyor would come on a date to peg the proposed alignment on the ground to show exactly where the pipe would pass.

Notes drafted by: ---

Designation: Project Environmentalist

Signature:

Confirmed by: SENIOR CHIEF JOSEPH NJIRAINI N. NGENDA LOCATION P.O. BOX [illegible]

Designation:

Signature:

Date: 14/5/2015

Project Name: .....

Project Code: .....

Date of meeting: ...../...../

GIBB International
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Notes for the meeting held with... THE PUBLIC AT NGENDA CHIEFS OFFICE IN GATUNDU SOUTH ON THURSDAY 14/05/15 AT 2.00 PM

Notes continued....

After establishing where the line is actually passing on the ground, a Social team from GIBB Africa together with enumerators would go round collecting data from the identified affected persons. The details to be taken during enumeration include baseline socio economic data through questionnaires, photos of the paps and their affected property followed by issuing of PAP identities.

The Public was then invited to ask questions or issue comments on the proposed pipeline project as this was an integral part in the impact assessment process of the project.

Issues Raised

Question 1: During the laying of the existing Pipelines, compensation was only paid for crops on 12m piece of land where the easement is. No compensation was paid for Land. Will Athi Water Service Board pay for land as well this time?

Response: Compensation for Land will be paid where there is new land acquisition.

SENIOR CHIEF
JOSEPH NJIRAINI N.
NG'ENDA LOCATION
P.O Box [illegible]
Sign.....
Date: 14/5/15

Notes drafted by: _____ Confirmed by: _____

Designation: Project Environmentalist Designation:

Signature: Signature:

Project Name: .....

Project Code.....

Date of meeting: ...../...../

GIBB Internation
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Notes for the meeting held with... THE PUBLIC AT NGENDA CHIEFS OFFICE IN GATUNDU SOUTH ON THURSDAY 14/05/15 AT 2:00 PM

Notes continued....

Issue: Will compensation for the new acquisition be done before or after construction begins?

Response: It will be done before the project begins.

Issue: Does the existing easement measure 12m or 18m? This needs to be clarified since the information coming in about an existing 18m easement is contradictory to the records of agreement we signed for 12m.

Response: We shall seek for clarification of the disparity with the client when we go back to the office.

Issue: The residents want to be compensated fully for all land including land on which the existing easement lies. They also donot want to continue living next to the pipelines and therefore an additional pipeline increases the risks that they face. Many are afraid that the pipes which are exposed from time to time may burst leading to the risk of death and destruction of property (by the high pressured water) for the people living in close proximity to the pipes.

Notes drafted by: _____

Confirmed by: SENIOR CHIEF JOSEPH NJIRAINI N. NGENDA LOCATION P.O. Box 61 Sub-Loc. GATUNDU Date: 14/5/2015 Sign:

Designation: Project Environmentalist

Designation:

Signature:

Signature:

Project Name: .....

Project Code.....

Date of meeting: ...../...../

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Notes for the meeting held with.... THE PUBLIC AT NGENDA CHIEF'S OFFICE IN GATUNDU SOUTH ON THURSDAY 14/05/2015 AT 2.00PM

Notes continued....

Issue: From the initial agreements with the PAPs, (during the previous phases of the pipelines) the PAPs claim they were promised water from the breathers for free but as it is now, they have to pay for water connection. They therefore want expressed that they want water for the community from the breathers as agreed earlier.

Issue: The residents expressed that they wanted the properties affected by the pipeline breathers to be maintained. They explained that in the existing pipelines the water which is released from the breathers frequently is not channeled and has led to the distruction of roads, school playgrounds and private farms. For future this should be taken more seriously.

In Summary, the residents concluded that they ~~Issue~~ wanted

- Water for the community especially the land owners as previously agreed.
- A new agreement with Athi Water Service Board concerning the easement.

They were stated categorically that they wanted the records of agreement harmonised to clearly

Notes drafted by: _____ *Confirmed by:* SENIOR CHIEF JOSEPH NJIRAINI N. NG'ENDA LOCATION P.O. Box 6 GATUNDU

Designation: Project Environmentalist *Designation:*

Signature: *Signature:*

Date: 14/5/2015

Project Name: .....

Project Code.....

Date of meeting: ...../...../

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Notes for the meeting held with... THE PUBLIC AT NGENDA CHIEFS OFFICE IN GATUNDU SOUTH ON THURSDAY 14/05/15 AT 2:00 PM

Notes continued....

Show whether the easement was 18m or 12m. Further to this they wanted the issues raised concerning the first 12M to be addressed and the land compensated for before further discussions on the new proposed pipeline.

The cut off date for enumeration was set as the first day of enumeration.

SENIOR CHIEF
JOSEPH NJIRAINI N.
NGENDA LOCATION
P.O. BOX 6[illegible], GATUNDU
Date 14/5/2015 Sign

Notes drafted by: Catherine Juma

Confirmed by:

Designation: Project Environmentalist

Designation:

Signature:

Signature:

Project Name: NORTHERN COLLECTOR TUNNEL PHASE I (THIRA - KIGORO - KABETE PIPELI

Project Code.....

Date of meeting: ...../...../

GIBB International
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Notes for the meeting held with... the public at Kiamwangi social hall - Gatundu South Sub County. ON FRIDAY 15/05/2015 at 11 am

Attendance

1. Local Residents from Kiamwangi
2. Location
3. Local residents from Karembu,
4. Gathage and Nombu village.
5. Local area chiefs.
6. GIBB Africa LTD environmentalist.
7.
8.

Agenda

Public consultation on the Environmental and Social Impact Assessment and RAP for the proposed Thikadam - Kigoro - Kabete pipelines.

Notes

The meeting began with a word of prayer and introductions by the area chief, Paul Mwangi. The project environmentalist from Gibb Africa, Catherine Juma, then gave the community a description of the project and informed them of the purpose of the meeting. The project was proposing to acquire 3m (permanent) of land for the new pipeline where necessary and 6m working space temporarily. The processes involved included.

- A surveyor to map out where the pipeline will pass;
- Enumeration of the affected people and filling of the baseline socio economic survey questionnaire for the general public;
- Valuation by a licensed valuer (Land and assets)

Cut off date for the enumeration was set as the first day of enumeration.

Issues raised were answered as follows.

Notes drafted by: Catherine Juma

Designation: Project Environmentalist

Signature: [signature]

Confirmed by: SALOME W. KABUCHUA
ASST. CHIEF
KIAMWANGI SUB-LOCATION

Designation:

Signature:

Date: 15/05/15 Sign: [signature]

Project Name: .....

Project Code.....

Date of meeting: 15/05/15

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Notes for the meeting held with... THE PUBLIC AT KIAMWANGI SOCIAL HALL - GATUNDU SOUTH SUB COUNTY ON FRIDAY 15/05/2015 AT 11:00AM

Notes continued....

Q: The initial agreement was for a 12M easement, however the existing pipes occupy 18M. The wayleave is not economically useful and has also involved dividing peopleshomes. Can this whole land be bought out?

A: Compensation will be for the affected 3M(Permanent acquisition) and temporary 6M acquisition. Valuation of the affected land will be done to determine the extent of damage/affect and where land left is not economically viable, it will all be acquired

Q: The pipeline may cause displacement of people's homes. What compensation will be given?

A: Whoever is affected will be compensated either in cash or in land, at full cost inorder to rebuild the affected property.

Q: Many residents havent transfered titles from their parents names. Who in this case will be compensated?

A: Whereby land is affected, the Land owner will be compensated. Whereby property is affected but not land, the property owner will be compensated.

Q: Did the same company put the other three pipelines?

A:

Q: If a resident doesnt want the pipeline to pass through their land what happens?

Notes drafted by: Catherine Sama

Designation: Project Environmentalist

Signature:

Confirmed by: SALOME W. KABUCHI
ASST. CHIEF
KIAMWANGI SUB-LOCATION

Designation:

Date: 15/05/15 **Signature:**

Project Name:

Project Code:

Date of meeting: 15/05/15

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Notes for the meeting held with... THE PUBLIC AT KIAMWANGI SOCIAL HALL - GATUNDA SOUTH SUB COUNTY ON FRIDAY 15/05/2015 AT 11:00AM

Notes continued....

Q: When will construction begin?
A: Construction will begin after the project has been approved by all relevant authorities.

Q: We were not compensated for the previous land used and therefore are not willing to give up an extra 3M.
A: Where 3M of land need to be newly acquired, the owner shall be compensated at full cost following negotiation with Athi Water Service Board.

Q: Why dont we have access to tapped water yet the pipeline is passing through our land?
A: The pipeline is meant to serve consumers in Nairobi. Water Service provision in Gatundu is the responsibility of the area Water Service Provider.

Q: What will happen when damage occurs during construction?
A: There will be a temporary acquisition of land for working space during construction. Compensation will be paid for damages caused in this 6M.

Q: When will compensation be done?
A: Compensation will be done before construction.

Notes drafted by: Catherine Jimo
Designation: Project Environmentalist
Signature:

Confirmed by: SALOME W. KABUCHU
ASST. CHIEF
KIAMWANGI SUB-LOCATION
Designation:
Signature:
Date: 15/05/15 Sign:

Project Name:
Project Code:
Date of meeting: 15/05/15

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Notes for the meeting held with... THE PUBLIC AT KIAMWANGI SOCIAL HALL- GATUNDU SOUTH SUB COUNTY ON FRIDAY 15/05/2015 AT 11AM

Notes continued:...

Q: Why is there discrimination as to who gets water and who doesnt get?

A: The area water service provider is indharge of distributing water in the area and should be able to answer this.

Q: Will they fence off the land after acquisition?

A: We cannot tell that for certain at this point. Once acquisition is done the client will decide what to do with the land.

In conclusion, the residents said that they wanted the previous agreements to be reviewed as they were suffering under it. They also requested that the flushed water to be channelled in a way that it doesnt damage property ie crops, land, roads etc.

Notes drafted by: Catherine Juma *Confirmed by:* SALOME W. KABUCHI ASST. CHIEF KIAMWANGI SUB-LOCATION

Designation: Project Environmentalist *Designation:*

Signature: *Signature:*

Date: 15/05/15

Project Name: .....

Project Code.....

Date of meeting: 15/05/15

GIBB Internation

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Notes for the meeting held with... THE PUBLIC AND PAPS FROM GATHAITE AND KAMWE LOCATION AT KAMWANGI DCC'S GROUND. ON FRIDAY 22/05/15 AT 10AM

Attendance

1. ~~Public~~ Local residents from Gathaite location.
2. local resident from Kamwe location.
3. Chiefs and assistant
6. chiefs from Kamwe and
7. Gathaite locations
8. GIBB AFRICA LTD Environmentalists

Agenda

Notes

The meeting started with a word of prayer by one of the area residents. The Senior Chief started the ~~inst~~ meeting of. There was a challenge of translation but the chief offered to intervene. The residents were introduced to GIBB AFRICA. The meeting was then handed to the Chief for Kamwe. She told the residents that we were there to inform them of the intention to pass another pipeline through their lands. She encouraged them to ask their questions & concerns freely so as to get accurate information.

Catherine Juma then took over the meeting. She started by introducing herself and the Company she works for. She was there to DO an environmental impact assesment which

Notes drafted by: ...

Confirmed by:

Designation: Project Environmentalist

Designation:

Signature:

Signature:

Project Name: .....

Project Code.....

Date of meeting: ...../...../

JOSHUA K. KUNG'U
SENIOR CHIEF
GATHAITE LOCATION
P.O. BOX 60, KANJUKU

GIBB Internation
CONSULTING · DESIGN · MANAGEME

Notes for the meeting held with... THE PUBLIC AND PAPS FROM GATHAITE AND KARIRE LOCATIONS AT KAMWANGI DC's GROUNDS ON FRIDAY 22/05/15 AT 10 AM.

Notes continued....

Questions.

i Which side will the pipeline pass vis a vis the already laid down pipelines.?
Response: The pipeline will alternate sides depending on what lies in its path. The path will be known after the survey has been done.

ii The already laid down pipelines were not paid for. Will the current compensation incoporate all the pipelines
Response: The set compensation is for the said 3m However the matter of compensation for the previous metres will be raised.

iii The land remaining is very little in some places. Do the residents have to agree for the extra metres to be taken or can they refuse.
- These cases will done on individual basis.

iv How long will the project (construction) take?
The matter will be raised and answer communicated to the residents. At the time of meeting, it was not clear how long it would take.

Notes drafted by: _____ **Confirmed by:** _____

Designation: Project Environmentalist **Designation:** _____

Signature: _____ **Signature:** _____

Project Name: .....
Project Code.....
Date of meeting: ...../...../

JOSHUA K. KUNG'U
SENIOR CHIEF
GATHAITE LOCATION
P.O. BOX 60, KANJUKU
CELL: 0720 - 715 407

GIBB International
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PUBLIC STAKEHOLDERS CONSULTATION LIST
VENUE: KOMOTHAI CHIEF'S OFFICE DATE 13/05/15

NAME		Tel. No.
1. Donimic ~~Kinyai~~ Njoroge Karanja		0723126901
2. George Karanu Mungai		0723126901
3. Joseph Karanja Kangethe		0722754773
4. William Muchai Kangethe	Kwamaiko	0722374455
5. Samuel Kiarie	Ngindori	0727917318
6. Phillis Ngina	Ngewa	07
7. Stanley Githo	Kimbichoi	0720693521
8. Robert Kangethe Karanja	Ngewa	0711942529
9. George Ngatho Njonge	Ngewa	0726755854
10. Wallace Mungai	Ngewa	0711351574
11. [illegible]	Ngindori	0721451810
12. Paul Njoroge Kahuria	Kibichoi	0722880940
13. Julius Njoroge "	Kibichoi	0729707789
14. Samson Njuguna "	Kibichoi	0736393365
15. Joseph Kaguri Churu	Kibichoi	0731306589
16. William Kariuki Karanja	Ngewa	
17. Amos Thairu	Thuita	
18. David Kangethe Gitau	Ngewa	0725659927
19. John Kimani Kangethe	"	0724454324
20. John Thiongo Mairanga	Thuita	—
21. Gacii Kibui	Thuita	—
22. James Gacigua	Raiyani	0718902935
23. John Thuo Kangata	Raiyani	0729158037
24. Peter Kamau Kariu	Raiyani	07
25. James Kangata Nganga	Raiyani	—
26. John Muiruri Nganga	Raiyani	—
27. Simon Mihiu Nganga	Raiyani	—
28. Edith Wanjiku Nganga	Raiyani	—
29. Samuel Karuma Churu	Kibichoi	0717209728

13/05/2015 J.N. KAGO
CHIEF'S OFFICE KOMOTHAI LOCATION

PUBLIC STAKEHOLDERS CONSULTATION LIST
DATE: 13/05/15 VENUE: KOMOTHAI CHIEFS OFFICE

13/05/15 J.N. KAGIO
CHIEFS OFFICE
KOMOTHAI LOCATION

NAME	VILLAGE	TEL. NO.
9. Joseph Mdicu Kangethe - Kwamaiko		
0. Daniel Kimani Kangethe	Kwamaiko	—
31. STEPHEN KAMAU WAWERU	NGENIA	0721353037
2 WAWERU GITAU		0727613339
3. JOHN KIBUE NDUNGU		0702145971
4 MARY WANGUI MBAA	Kibichoi	0727402238
5 Issabella Waninga Mbau	Kibichoi	0727465105
6 Joshua Nyabe Mbau	Kibichoi	0720715359
37 BERNARD MWIHIA GITHIRU	NGENIA	0720122880
38 AMOS KAMAU MUROKI	NGENIA	0722826931 (0722826931)
39 JOHN NJOROGE MBUGUA	NGEWA	0710174474
40 Hannah Wambui Kangethe	NGEWA	0727585867
41 Mary Wanjiku Njanjo	Raiyani	0725385716
42 Kamura Githu Stanley	Kibichoi	0720693521
43. Francis Kangethe Mungai	Ngewa	0717121794
44 ACK ST-MARYS RAIYANI	NGEWA	0714-146221
~~45. Lucy Mando Mt~~		
45. Kangi Nganga	Raiyani	—
46. Regina Ngendo Kamwari	Kibichoi	0724852032
47. Mary Waithira Waicinge	Ngindu'i	0729-581830
48. Samuel Karanja Kahuria	Kibichoi	0722880940
49. George Njoroge Gicuhi	Ngewa	0737947458
50. Ancate Wairimu Mbugua	Ngewa	0725889469
51 ALEX Mwangi	Ngewa	0703971554 — ref
52 CHARLES KINYARI KAMOCHE		0722-850927
53 George Mbugua Mwaura	Mbanyangi	0715-542383
54 Bonface Kavaja Kamonye	Ngewa	0722-756795
55 ENDWARD KANGETHE WANYOIKE	NGEWA	0702-745811
56 BERNARD KARANJA WANYOIKE	NGEWA	0724-660882
57 Peter Mbugua Kangethe		0727585867
58 John KURIA KANYINGE		0728131682

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PUBLIC STAKEHOLDERS CONSULTATION LIST

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR PROPOSED NORTHERN COLLECTOR PIPELINES

DATE: 14/5/15 VENUE: NGENDA CHIEFS OFFICE (GATUNDU SOUTH)

	Name	Designation	Contacts Telephone/ Email Address	Signature
1.	JOHN KIHIU NJAHE	CHIEF - ITURU.	0723850561	[signature]
2.	STEPHEN KANGETHE	ASS CHIEF WAMUANGI	0720448942	[signature]
3.	Duncan Gaturu	Farmer	0726346948	
4.	PETER KAIR	Farmer	0724242448	
5.	Joseph Gaalingu	Farmer	0724242448	
6.	Esthers Wanjingu	KAIRU	0722818617	
7.	Jane Warun	Njaugicheru	0723220410	
8.	DANIEL KAMAU	DRIVER	0724357634	
9.	JAMES KIMANI REN	FARMER	0725860958	
10.	MARY NJERI	FAMER	0716509643	
11.	JANE MIRIGO NGORU	FARMER	0720707317	

SENIOR CHIEF
JOSEPH NJIRAINI N.
NGENDA LOCATION
P.O. Box 67 - 01030 GATUNDU
Date: 14/5/2015

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PUBLIC STAKEHOLDERS CONSULTATION LIST

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR PROPOSED NORTHERN COLLECTOR PIPELINES

DATE: 14/5/15 VENUE: NGENDA CHEF'S OFFICE

2

	Name	Designation	Contacts Telephone/ Email Address	Signature
1.	Peter mugo Njagiri	Githuya	0728791679.	[signature]
2.	Boniface K. Chege	Githuya	0722712380	
3.	Eunice Ngendo Kamau	Gatei		
4.	Peter Njuru Mwangi	Ichaweri	0734797641	
5.	Wanjiru Ndirangu	Ichaweri		
6.	Joseph Kihuha	Itunru	0713463287	
7.	Gitene Ngandu	Gatei		
8.	Kibunja Ngandu	Gatei	0712779919	
9.	Simon Njoroge	Gatei	0710199321	
10.	Joseph Kibicho	Itunru	0703898385	
11.	Peter Kinuthia Gathiru	Kirangari	0702219878	

SENIOR CHIEF
JOSEPH NJIRAINI N.
NG'ENDA LOCATION
P. O. Box 61-10103, GATUNDU
Date 14/5/2015

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR PROPOSED NORTHERN COLLECTOR PIPELINES

DATE: 14/5/15 VENUE: NGENDA CHIEF'S OFFICE

3

	Name	Designation	Contacts Telephone/ Email Address	Signature
1.	JOHN NJENGA CHEGE	FARMER	0720 922 986	
2.	MICHAEL GITAU	FARMER	0727564141	
3.	Paul Karengo		0733578614	
4.	Kibaru Chege	FARMER	0729-421267	
5.	PETER Njenjakihu	FARMER	0727957493	
6.	NGUGI MAMBO	Teacher	0714427195	
7.	MBURU Chege	Farmer	N/A	
8.	Peterson J.N. Mburue	"	0720547710	
9.	JOSEPH M. CHEGE	"	0726640873	
10.	Catherine Juma	Gibb Africa	0722 706 876	
11.				

SENIOR CHIEF
JOSEPH NJIRAINI N.
NG'ENDA LOCATION
P.O. Box 61, [illegible] CATUNDU
Date: 14/5/15 Sign: [signature]

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PUBLIC STAKEHOLDERS CONSULTATION LIST

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR PROPOSED NORTHERN COLLECTOR PIPELINES

DATE: 14/5/15 VENUE: NGENDA CHIEF'S OFFICE

	Name	Designation	Contacts Telephone/ Email Address	Signature
1.	Stephen Mbogo Mwaji	Gatei	0706-395977	
2.	John Kamau	Gatei	0706-890192	
3.	Mary Wanjiru	Gatei	0716-879747	
4.	Elud Kiarii	Ithuri	0712-178672	
5.	Peter Nyengi	Kariuga-ini	~~N/A~~ 0713-042950	
6.	Maria Wanjuru	Ithuri	N/A.	
7.	Stephen Muchucha	Gatei	0722 469132	
8.	Susan Wambui N.	Gatei	~~0~~ 0721-055-698	
9.	Charles Kihu W.	Gatei	0713-200180	
10.	John Nwauna	Kaweria	0724 784 501.	
11.	John Kihiu N.	Gakindu	0717164696	

SENIOR CHIEF
JOSEPH NJIRAINI N.
NG'ENDA LOCATION
P. O. Box [illegible]
Date: 14/5/15 Sign

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR PROPOSED NORTHERN COLLECTOR PIPELINES

DATE: 14/5/15 VENUE: NGENDA CHIEFS OFFICE

	Name	Designation	Contacts Telephone/ Email Address	Signature
1.	GEOFHREY KAHIRO	OFFICER Health	0738013669	
2.	MOSES KIBE	OFFICER	0722632545	
3.	Ruth Nyambura Njuguna	Karera		
4.	Hanna Wanjiru Mugo	Githuya		
5.	Felista Mugure Njuguna	Karera		
6.	Michael Murari	Gatei		
7.	Michael Njomo Macharia	Gatei	0724257965	
8.	Veronica Wambui Chege	Gatei	0722611190	
9.	Hanna Wanjiku Chege	Gatei	0716879747	
10.				
11.				

SENIOR CHIEF
JOSEPH NJIRAINI N.
NG'ENDA LOCATION
P.O. Box 61 - 01[illegible] GATUNDU
Date: 14/5/15 Sign: [signature]

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR PROPOSED NORTHERN COLLECTOR PIPELINES

DATE: 15/05/2015 VENUE: KIAMWANGI SOCIAL HALL

	Name	Designation	Contacts Telephone/ Email Address	Signature
1.	SALOME KABUCHUA	ASST. CHIEF	0723 440770	[signature]
2.	SAMUEL GITAU	ASST. CHIEF	0724 631 731	[signature]
3.	ANNE M.W. NJUGUNA	FARMER	0726-596175	[signature]
4.	MUKAÇU NJUGUNA	FARMER (NEMBU)	0724-929227	[signature]
5.	JEMIMAH WAMUKU WAITHAKA	FARMER (NEMBU)	0711-565025	[signature]
6.	NAOMI WANJIKU NJOROGE	FARMER (NEMBU)	0716-609672	[signature]
7.	FIDELIS Muthoni	FARMER (Karembu)	0727-927267 0727-963 782	[signature]
8.	Zacharia K. Kirikcu	farmer (Nembu)	0763 822410	[signature]
9.	Nganga marai	farmer Nembu	0712230826	[signature]
10.	SAMUEL MWAURA NDERI	FARMER (NGENDA)	0722398590	[signature]
11.	JOSEPH NJOROGE-M.	FARMER (NEMBU)	0714 121 206	Joseph

SALOME W. KABUCHUA
ASST. CHIEF
KIAMWANGI SUB-LOCATION
Date: 15/05/15 Sign: [signature]

4

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR PROPOSED NORTHERN COLLECTOR PIPELINES

DATE: 15/05/15 VENUE: KIAMWANGI SOCIAL HALL

	Name	Designation	Contacts Telephone/ Email Address	Signature
1.	JANE JOY KATHUBE	Farmers (NEMBU)	0711 366908	[signature]
2.	Hellen W Gathu	Farmer (Ng'enda)	0724 930772	[signature]
3.	Teresiah M. Mema	Farmer (Ng'enda)	0728483412	[signature]
4.	Beth W. Kimani	farmer (Karembu	0710312152	
5.	ISAAC Njoroge	farmer (Karembu	0721390840	[signature]
6.	Starnely Wanyoike	farmer (Karembu	0721588828	[signature]
7.	Mary Njakio	farmer (Karembu		
8.	JOSEPH G. MUGUARIA	SPHO (CIVIL SERVANT KIRIKO)	0722772815	[signature]
9.	KIRAGO Daniel ITURU	FARMER (Karembu	0705298509	
10.	[illegible]	Karumbi	Nembu	[signature]
11.	JOSEPH K. KIBERA	FARMER, NEMBU	0713639077	[signature]

SALOME W. KABUCHUA
ASST. CHIEF
KIAMWANGI SUB-LOCATION
Date: 15/05/15 Sign: [signature]

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR PROPOSED NORTHERN COLLECTOR PIPELINES

DATE: 15/05/2015 VENUE: KIAMWANGI SOCIAL HALL

	Name	Designation	Contacts Telephone/ Email Address	Signature
1.	John Kamau Karanju	Farmer - Kanemba	0727566922	[signature]
2.	Peter Karani Karanja	Farmer - Kanemba	0720-210748	[signature]
3.	Stephen Gitau Kimani	Farmer	0705195647	[signature]
4.	Peter Kamau Ngugi	Ngenda Farmer	07[illegible]	[signature]
5.	Margaret Njambi Njonga	Farmers	0724790801 Nembu	[signature]
6.	JUDY NDUTA KARANJA	Farmers	700118114 Nembu	[signature]
7.	WANJIRU Njoroge	Farmers (NEMBU)	0716609672	[signature]
8.	LUKA NGOTI KAMANI	Ngenda Farmers	0713544848 0720887666	[signature]
9.	FRANCIS KABORO	Ngenda Wanyoike Farmers	0726592461 0727250909	[signature]
10.	FLORA MUTHONI	Nembu Farmers	0711602883	[signature]
11.	HANNA NJOKI	Ngenda Wainyjoike Farmers	0728505058	[signature]

SALOME W. KABUCHUA
ASST. CHIEF
KIAMWANGI SUB-LOCATION
Date: 15/05/15 Sign: [signature]

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PUBLIC STAKEHOLDERS CONSULTATION LIST

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR PROPOSED NORTHERN COLLECTOR PIPELINES

DATE: 15/05/15 **VENUE:** KIAMWANGI SOCIAL HALL

	Name	Designation	Contacts Telephone/ Email Address	Signature
1.	JOCE KAJUMBI	FARMER NEMBU		
2.	SAMUEL MURIGI	FARMER NEMBU		
3.	PAUL KARUMBI NGUG	FARMER NEMBU	0702-016-274	
4.	John Karuga	farmer.	0727269660	
5.	Paul gitari K	farmer KAREMBU	0711104788	
6.	Mary Njoki Gathoga	Farmer KAREMBU	0726969574	
7.	Jane Njeri Karanja	Farmer KAREMBU	0723261699	
8.	Joseph Kibaara	KE Farmer	0704607345	
9.	DAVID K. KIBERA	NEMBU	0729727278	
10.	DAVID MBURU MARAI	NEMBU	0708891206	
11.				

SALOME W. KABUCHUI
ASST. CHIEF
KIAMWANGI SUB-LOCATION
Date: 15/05/15 Sign:

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR PROPOSED NORTHERN COLLECTOR PIPELINES

DATE: 22/05/15 VENUE: KAMWANGI DC'S GROUND

	Name	Designation	Contacts Telephone/ Email Address	Signature
1.	Edward Chege Kimani	Resident	0721-473574	[signature]
2.	Andrew Mbuggii Kabau	Resident	0700-286044	[signature]
3.	Christop Maiyu	Resident	0725-290273	[signature]
4.	PETER KABU-MYARARI	Resident	0700-286044	[signature]
5.	JOSEPH Kr. GAKUMU	Resident	0727-0557106	[signature]
6.	JOSEPH MBURU KIMANI	Resident	0723-665657	[signature]
7.	LUCY MYAMBURA M	Resident	07102-337765	[signature]
8.	John Mutleee Mpuyuna	Resident	0726-229268	[signature]
9.	Joseph Mburu	(Residents)	07235461	[signature]
10.	FRANCIS Njonga	Kithuru (Residents	0727655834	[signature]
11.	Gabriel Njoroge	" Residents	0700932783	[signature]

JOSHUA K. KUNGIU
SENIOR CHIEF
CATHAITE LOCATION
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CELL: 0720 - 716 407

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR PROPOSED NORTHERN COLLECTOR PIPELINES

DATE: 22/05/2015 VENUE: KAMWANGI DC's GROUNDS.

	Name	Designation	Contacts Telephone/ Email Address	Signature
1.	Patricia W. Ngang'o	CHIEF KARURE	0721914969	Patricia
2.	Joshua K. Kung'u	SNR. Chief GATHAITE	0720716407	
3.	George Muneneh K.	SNR. MCHGE-KAMWANGI	0736294930	
4.	Ruth Wanjiku Mwigai	Resident	0729311406	
5.	Hannah Nyokanyua Ndungu	Resident		H.N.
6.	Hannah Nduta Gachanja	Resident	0707560501	ANDA
7.	Moses Mochu Kibuba	Resident		
8.	George Kang'ethe Kamuiki	Resident	0724093616	
9.	Paul Gicharu Njoroge	Resident	0720224148	P.G.N.
10.	David Kariuki Muiam	Resident	0727508539	
11.	Juliana Wambui Nduati	Resident	0725052139	

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR PROPOSED NORTHERN COLLECTOR PIPELINES

DATE: 22/05/15 VENUE: KAMWANGI DC'S GROUND

	Name	Designation	Contacts Telephone/ Email Address	Signature
1.	GABRIEL KAMAU	Kamwangi (Residents)	0714397493	KAMAU
2.	HANNAH KABURAK	TURU-INI (Residents)	0718518058	HKK
3.	MARY W. KARIUKI	TURU-INI (Residents)	0704970533	mwk
4.	ESTER W. KARABA	RIAMBU AREA (Residents)	0723702054	W.K.
5.	ALICE KANJIKU	RIAMBU AREA (Residents)	0701047989	[illegible]
6.	MARY Kenthiwa	Residents	0702838230	[illegible]
7.	Esther Wangeni Mambo	Residents	0715466769	Wangini
8.	Ruth Njeri	Residents	0729925519	Rn
9.	FAITH NJEROGE	RESIDENT (TURUINI)	0734178105	[illegible]
10.				
11.				

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR PROPOSED NORTHERN COLLECTOR PIPELINES

DATE: 22/05/15 VENUE: KANWANGI DCI GROUND

	Name	Designation	Contacts Telephone/ Email Address	Signature
1.	Beth Wangari ~~Ruth Njeri~~	Resident		
2.	James Gitau	Resident	0727 351197	
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
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JOSHUA K. KUNG'U
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GATHAITE LOCATION
P. O. BOX 60, KANJUKU
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Nairobi County

MINUTES FOR THE PUBLIC MEETING FOR AN ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT AND RESETTLEMENT ACTION PLAN (RAP) FOR THIKA DAM-KIGORO-GIGIRI-KABETE RAW AND TREATED WATER PIPELINES

Runda Baptist Church on 5th May 2015.

Attendance.

See attached attendance form.

Agenda

1. Introduction
2. Presentation of the project by GIBB team
3. Question and Answers Session
4. Adjournment.

Min1/5/2015.Introductions.

The meeting started at 1030hrs after an opening prayer from Sheikh Mohamed and also from a Christian member who was present. Mr. Wamalwa Chairman for the Karura slum then welcomed everyone who was present. He mentioned that the chief would be joining us and he introduced the elders from the sub-location. He then welcomed the Sheikh based in the area mosque. He also welcomed the youth and emphasized on the importance of involving the public in the early stages of project planning as enshrined in the new constitution and urged them to be open and to give all their concerns and opinions. He further emphasized on the need for the consultants' team to be more effective in giving out their responses and informed the meeting that an integrated master plan will harmonize various sectors of development for an improved quality of life for the public. He then welcomed ms Joyce Owino from GIBB Africa Ltd, who has been commissioned by the Athi Water Service Board (AWSB) to carry out consultancy services for them to introduce the project.

Min2/5/2015.Presentation

Ms. Joyce Owino a social environmentalist from GIBB Africa Ltd thanked the members present for availing themselves for the meeting and encouraged them to fully participate in the discussions. She then proceeded with the presentation of the pipeline project by the Athi Water Services Board (AWSB).

Ms Owino informed the meeting of the AWSB project as vital component for development and emphasized on cooperation with the public to enhance sustainable development at large. She also informed the meeting that the AWSB is meant to bring together all the sectors and to coordinate their development strategies. She also assured them that their views and contributions will be analyzed and included in the project report as according to the different sectors. She then gave a presentation on the impacts of the project as to affect:

- Structures such as houses along the way leave
- Road side businesses
- Farms

Joyce emphasized on the importance of involving the locals as the primary stakeholders in the planning stage of a project. She assured them that their views and opinions were very important as they will direct the project implementation process

She then thanked the attendants for listening to the presentations and opened the question answer session from the participants.

Min 3/5/2015.Question and Answers Session

Q1

One member from the location complained of the previous pipeline works by the AWSB that they were not compensated; their time was wasted as the project took longer than expected and sought clarification on possible rerouting of the pipeline? The member insisted on MOU by all the stakeholders before the project kicks off.

Response

Joyce assured the members present that they will be compensated and that re routing of the pipeline will be addressed after the surveyor pegs the route of the pipeline and the actual PAPS and project impacts identified.

Q2

A member wanted to know the duration for the project.

Response

Joyce explained that the project will be in three stages: studies, Valuation and public disclosure during which all issues will be disclosed including compensation of PAPS before the project implementation. She added that GIBB as a consultant are expected to submit their report to AWSB by June after which they will approve and the project starts.

Q3

The Chairman sought clarification on measures that will be put in place for the affected church plot as it is usually used as a way leave for pipeline works. He expressed his regrets for having bought the plot because it is not serving them as they expected because of the pipeline way leave passing there. He also insisted that the MOU must state that 30% of their youths be incorporated in the project casual tasks as they are left with no alternative but to engage in vices such as theft and robbery in order to meet their needs. He was also asking if the government cannot get another way leave for the pipeline.

Response

Joyce informed the meeting that one of the components of the project is capacity building as a way of addressing social issues. She further requested for their youths to participate as enumerators during enumeration exercise. She again emphasized that the issue of re routing will be suggested during the public disclosure stage of the project

Q4

The sheikh present was wondering why we were doing this study which is similar to what other companies like Howard Humphreys have done before.

Response

Ms. Joyce informed the meeting that it is a requirement by *EMCA 1999* and World Bank guidelines that for any project to be implemented there has to be stakeholder consultations on environmental and social impact assessment of the proposed project. This will give them opportunities to give their views in as far as the AWSB project is concerned. She also assured them that more public meetings will be held during the study to ensure that all the locals' views and opinions are captured and included in the report

Q5

Another member sought clarification on whether they can access the report for records

Response

Ms Joyce also assured the meeting that the report was public and everyone can access it through the secretariat at the Nairobi County Government located at City Hall in order to familiarize themselves with the project.

Q6.

One member was concerned of the issue of storm water drainage, sewer lines and access culverts along the pipeline. They wanted to know if the project can benefit them in making of Tran's drainage and trans sewers because they recalled that the previous drainage works had left them in a poor drainage state. He was seconded by most members present in the meeting

Response

Ms Joyce assured the meeting that all their grievances including the drainage issue will be addressed in the report for the client to implement.

Q7

One member, a florist, wanted to know if they can benefit from the water supply for their flower and tree nursery farming business along the road side since they depend on the business for their livelihood.

Response

Ms Owino assured her that her concerns will be noted for further discussion and possible action by the project proponent.

Q8

Youth representatives promised to co operate with us and urged us to ensure gender representation during employment.

Response

Ms Joyce confirmed that gender representation during employment is a requirement by the constitution of Kenya 2010 and it has to be adhered to during project implementation.

Min 4/5/2015. Area MCA address

The area MCA thanked the GIBB team for the consultations prior to project implementation as required by various environmental guidelines. He mentioned that he has three concerns he is seeking clarification:

- Kindly requested us to fully represent their views, those who will be affected, impacts of the project, compensation and mitigation measures.
- He also seconded the issue of poor drainage especially around the mosque area.
- He mentioned on the issue of corporate social responsibility and stressed on youth representation and engagement in the projects activities.

Response

Ms. Joyce assured him of full representation of their views in the report. She also added that compensation of the PAPS and the mitigation of impacts arising from project implementation will be addressed adequately.

Min 5/5/2015 Chief's address

The area chief MS Mary Mwangi sought clarification on how the following challenges will be addressed under the AWSB project

- Displacement of slum dwellers during the implementation stage;
- Storm water drains and other drainage systems;
- Clarification on youth employment during the project implementation stage to curb social issues.
- Also concerned of lack of cooperation from government officials and area leaders including the MCA in addressing community initiatives in trying to address some of the challenges faced by the community.

Response

Ms Joyce informed the meeting that proper methods will be put in place to ensure that all those affected by the project will not experience adverse effects from the exercise. She also said that proper mobilization will be employed to ensure that they are aware of the intended actions in order to allow

She further clarified to the public that protection and maintenance of public property is a shared responsibility of all stakeholders.

With this the session was finalized and he informed the meeting that further comments and suggestions should be addressed in the subsequent meetings.

He returned the meeting back to Violet to lead the attendants to the next item on the programe which was to conduct an opinion survey of the presentation and discussions.

Min6/5/2015.Adjournment.

There being no other business, the meeting ended at 1300hrs with a word of prayer from one of the members before departure.

Prepared by: Joyce A. Owino

Signature: .....

Date: 5/05/2015

Confirmed as true minutes of the meeting held:

.....

Ms. Mary Mwangi

Senior Chief Karura Sub location

Date.....

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PUBLIC STAKEHOLDERS CONSULTATION LIST

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RAP FOR PROPOSED NORTHERN COLLECTOR PHASE 2

DATE: 5/5/2015 VENUE: KARURA

	Name	Designation	Contacts Telephone/ Email Address	Signature
1.	Francis Nolungumbua	Director Muuinga Co.	0721494774	[signature]
2.	Baard Kogi	" "	0724-889687	[signature]
3.	Jane Khangu		0725511162	[signature]
4.	Abdi Abdiwashid nyencho	" "	0728-059-057	[signature]
5.	Paul Oponyo	"	0725393698	[signature]
6.	Mukhti Celestine	Community Health Volunteer	0729765384	[signature]
7.	HELLEN MAZITOH	CHV	0714575380 ~~0714575~~	[signature]
8.	ABDI OSMAN	" "	0721314679	[signature]
9.	HASSAN DALACHA		0720588184	[signature]
10.	MOHAMMED ISAIK		0725276124	[signature]
11.	Duba Jillo Kampare	Member	0716 010338	DUBA

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RAP FOR PROPOSED NORTHERN COLLECTOR PHASE 2

DATE: 5/05/2015 VENUE: KARURA

	Name	Designation	Contacts Telephone/ Email Address	Signature
1.	Sheikh Muhammad Khan	Principal Imam & Administrator	0733647733 m.bannuri@yahoo.com	[signature]
2.	HON. KAMAU THIIO	MCA KARURA	0710-313-552 kathuuo@yahoo.com	[signature]
3.	Richard Hamalwa	Chairman Kitogoro village	0724960777	[signature]
4.	Ibrahim Mburu	Chairman Borana	0714070789	[signature]
5.	AHMED SHANU	BORANA	0713240617	[signature]
6.	JATIAN GUFU	TOABO	0722281975	[signature]
7.	Abduba Boru		0700745819	[signature]
8.	ADAN MOHAMED	MEMBER	07240736	[signature]
9.	DIKA DIMALA	"	0727803740	[signature]
10.	AMINA IBRAHIM	"		
11.	DID ARERO	"	0700 98 825	[signature]

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RAP FOR PROPOSED NORTHERN COLLECTOR PHASE 2

DATE: 5/05/2015 VENUE: KARURA

	Name	Designation	Contacts Telephone/ Email Address	Signature
1.	Tari Ali Buku	Mzee wa Kijiji	0711731580	
2.	Wako Walenso		0727405735	
3.	Liban Yaya Dambe			
4.	Mio Sillo Galicha		0710694910	
5.	Hulla Galgalo	Mama wa Kijiji	0707810651	
6.	Hawo Ali		0708723255	
7.	Duma Malele	Mzee wa Kijiji	0716608998	
8.	Guyato Galgalo		0713507424	
9.	Abi Hako		0726055062	
10.	Liban Boru		0710407420	
11.	Guyo Boru		0717551904	

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RAP FOR PROPOSED NORTHERN COLLECTOR PHASE 2

DATE: 5/05/2015 VENUE: KARURA

	Name	Designation	Contacts Telephone/ Email Address	Signature
1.	Ayon M. Jump	Stick Lobbler	0710420929	[signature]
2.	MOHAMED ALI		0700783754	[signature]
3.	GEORGE MWAURA	STAKE HOLDER	0712694753	M N
4.	NGAI NGAO SORA	" "	" "	
5.	JACKSON MUNGAI	PASTOR	0729 261414	[signature]
6.	ABDI OSMAN	" "	0721314679	[signature]
7.	Brian Bohl	" "	0740700789	[signature]
8.	Mohamed ISACK	" "	0725276124	[signature]
9.				
10.				
11.				

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RAP FOR PROPOSED NORTHERN COLLECTOR PHASE 2

DATE: 5/05/2015 VENUE: KARURA

	Name	Designation	Contacts Telephone/ Email Address	Signature
1.	WARIO ALI	MEMBER	0706244318	
2.	DUB HALAKE	MEMBER	0711476248	
3.	Guyo DIDA	MEMBER	0712466985	
4.	SADIA IBRAM	MEMBER	0701587050	
5.	HABADASA BULE	MEMBER	0724666740	
6.	DALACH WAKO	MEMBER	0721303684	
7.	TUME ALI	MEMBER	0722441536	
8.	LIBAN HALAKE	MEMBER	0722664163	
9.	DID SORA Guyo	MEMBER	0714480891	
10.	GALGALO KULA	MEMBER	0728330167	
11.				

MINUTES FOR THE PUBLIC MEETING FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT AND RESETTLEMENT ACTION PLAN (RAP) FOR THIKA DAM-KIGORO-GIGIRI-KABETE RAW AND TREATED WATER PIPELINES

KIRIGITI CHIEF'S OFFICE ON 6TH MAY 2015 AT 10.00 AM

Present

See attendance attached

Agenda

1. Introduction
2. Project presentation
3. Question and Answers Session.
4. Adjournment.

Minute 1/6/2015-Introduction

The meeting began at 10.00 am with a word of prayer from one of the members. The area chief Mr. Kinyua welcomed all the members present, he encouraged the members to fully participate in the meeting and to raise all their issues, he then invited the Gibb Africa team.

Minute 2/6/2015-project presentation

Ms. Joyce Owino a social environmentalist from GIBB Africa Ltd thanked the members present for availing themselves for the meeting and encouraged them to fully participate in the discussions. She explained the purpose of the meeting that Gibb Africa ltd was consulted by athi water service board to carry out an environmental and social impact assessment and resettlement action plan for that project. And she explained that the consultancy were there to get their concerns about the project

Joyce emphasized on the importance of involving the locals as the primary stakeholders in the planning stage of a project. She assured them that their views and opinions were very important as they will direct the project implementation process .

Minute 3/6/2015-questions and answers

Q1

One of the members wanted the Gibb Africa team to identify the possible impacts the project will cause

RESPONSE

Ms Joyce informed the meeting that the possible impact includes:

- clearance of coffee farms
- houses will be demolished
- businesses affected

She however informed the meeting that those affected will be compensated.

Q2

Another member wanted to know if the project area will remain 18m or it will go beyond.

RESPONSE

Ms Joyce informed the meeting that the project area will only be expanded if the space required will not be enough. Some areas will require 3m extra land. She informed the meeting that a surveyor will come and do the exact mapping so that the project affected people can have a clear figure.

Q3

Another member complained about the impacts of the project that includes:

- Crop destruction
- House demolition
- Domestic water pipes destruction
- Destruction of graves
- No construction activity can take place in that piece of land where the pipes passes
- During construction of the pipe they interfere with land boundaries creating a lot of issues with neighbors
- Putting up of beckons without the knowledge of the locals

Q4

Another member informed the meeting that a lot of corruption was there during compensation of the previous phases, the additional meters that the project took in the other phases have not been compensated and land owners were not happy at all on how the project has been handled before

Response

Ms Joyce informed the meeting that all those affected in this phase will be compensated before the commencement of the project

Q5

Another member clarified to the meeting that this phase was installing the 5th pipe. He informed the meeting that their land was grabbed, causing a lot of fights, destruction of properties even beyond the 18m.in the other phases there was no proper procedures that was followed.

Response

Ms Joyce confirmed to the meeting that this phase was installing the 5th pipe.

Q6

Mr. Kariuki wainaina suggested that the land valuation should involve the owners and inform every land owner the value of their land and assets and should agree on the valuation before the project proceeds.

Response

Ms Joyce informed the meeting that a surveyor will map the exact area where the pipe will pass and all those project affected persons will be included in the valuation report.

Q7

Mr. Raphael Gitau informed the meeting that the 3rd pipe passed through his land but he was not compensated. He wanted to know where he can seek compensation. He also informed the meeting that athi water service board was not involved in compensation.

Response

Ms Joyce informed the meeting that the valuation will be based on current price and the members will be informed through a public disclosure and if the locals will not agree with the report of compensation they are allowed to petition.

Q8

Another member informed the meeting that there was no proper land valuation; the only thing valued was crops i.e. bananas

Q9

Another member informed the meeting that the land valuation is always high but they are given little compensation. The member suggested that the constructors should use the space between the 1st and 2nd pipe instead of encroaching their lands, he suggested that Athi waters should use the same land and not add more land.

Response

Joyce informed the meeting that the pipe will pass between the 1st and 2nd pipes only where there is no space the land will be expanded.

Q10

Bernard Njuguna complained that during the construction of the first phase they were told that they could be allowed to cultivate but that is not the case because when they cultivate they are warned that their crops will be cut down. This member informed the meeting that they wanted to be bought for another land where they can develop and construct permanent structures.

The members suggested having a meeting with representatives from Athi water and World Bank who will compensate them. They do not have faith with Athi water service board. They requested for a fair compensation.

Response

Ms Joyce recommended that the members should develop a grievance committee that should help them deal with complains they have about the previous phases. She also informed the meeting that the consultancy will get a representative from Athi waters in the next meeting.

Q11

Another member's concern was the beckons that are already in the ground and the area is not clear and wanted surveyors from Athi water to identify the boundaries, he requested for a fresh mapping.

Response

Ms Joyce informed the meeting that a surveyor will come for a fresh mapping. And she also informed the meeting that 18 meter way leave has been acquired by the government parmanently.she requested the members to allow the surveyor to do mapping.

Other comments

Another member wanted the Athi water service board to be paying them annual revenues since they are the shar:holders of the project, the members made reference to safaricom company ,when they install boosters on someone's land, the person gets compensated and paid again annually. They wanted the Athi water board to do the same.

Another member did not see the benefit of the project, he complained that they do not have water in their homes yet water passes in their land, he requested that the water should be channeled to their homes too.

Another member informed the meeting about the issue of storm water drainage and sewage that passes through her land.

Another member requested that the consultancy should involve their chief in all the project progress so that they can be updated on all the project progress.

Adjournment.

The chief gave a closing remark by emphasizing on the public interests discussed; he asked the members to form their grievance committee .he then thanked all the members for participating.

There being no other business the meeting ended at 11.50 am with a word of prayer from one of the members.

Prepared by: Joyce A.Owino

Signature: .....

Date: 6/5/2015

Confirmed as true minutes of the meeting held:

.....

Mr. John Kinyua

Senior Chief Kirgiti

Signature: .....

Date: 6/5/2015

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RAP FOR PROPOSED NORTHERN COLLECTOR PHASE 2

DATE: 06/05/2015 VENUE: KIRIGITI STADIUM

	Name	Designation	Contacts Telephone/ Email Address	Signature
1.	JOSEPH KUNGU G.	RIABAI	0719263012	
2.	STEPHEN KAMAU WAWERU	NGENIA (KAMBUI)	0721353037	[signature]
3.	MARY MUMBI GIONGA	RIABAI	0725911028	[signature]
4.	Kennedy Muturi	Riabai	0724-315888	[signature]
5.	KAMAU MARTIN.	RIABAI	0788 37 99 76	[signature]
6.	JOSEPH MANYARA	KIRIGITI	0726-21 60 76	[signature]
7.	FRANCIS CHEGE	KIRIGITI	0726-300449	
8.	SIMON NJUGUNA	THATHINI	0721 755266	
9.	FELISTERS NJAMBI	KIRIGITI	0725 283173	
10.				
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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RAP FOR PROPOSED NORTHERN COLLECTOR PHASE 2

DATE: _____ VENUE: KIRIGITI (PROPOSED GRIEVANCES COMMITTEE.

	Name	Designation	Contacts Telephone/ Email Address	Signature
1.	PATRICK KARIUKI WAHINYA	RIABAI	0724311796	
2.	JOSEPH KARIE KAMIRI	RIABAI	0711585928	
3.	MARY MUMBI GITONGA	RIABAI	0725914028	
4.	LILIAN MURIGI	KIRIGITI		
5.	FRANCIS CHEGE	KIRIGITI		
6.	GEORGE MATUTHU MWANGI	"	0714685340	
7.	JOSEPH GITAU	THATHINI		
8.	BENARD NJUGUNA	"		
9.	NANCY WANJIRU	"	0724589714	
10.				
11.				

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RAP FOR PROPOSED NORTHERN COLLECTOR PHASE 2

DATE: 6/5/15 VENUE: KIRIGITHI

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5.	PETER KAMAU KABI	KIRIGITI	0735266409	[signature]
6.	DAVID NJUGUNA NGO'I	KIRIGITI	0722530721	[signature]
7.	JAMES MWANGI (ADD.)	KIRIGITI	0722316388	[signature]
8.	MOSES NDONGO NGOGI	RIABAI	0721248482	[signature]
9.	GRACE KIOI	THATHINI	0722325284	[signature]
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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RAP FOR PROPOSED NORTHERN COLLECTOR PHASE 2

DATE: 6/5/11 VENUE: KIRIGITI CHIEFS OFFICE

	Name	Designation	Contacts Telephone/ Email Address	Signature
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2.	Hannah Wanjiru Wachira	Riabai	0704208334	HW
3.	PRISCILLAH WANJIRU	Riabai	0729483430	
4.	Mary Waketa Gatui	Kirigiti	0722356788	
5.	JOSEPH WANYUGI WAINAINA	RIABAI	0713 417 669	
6.	CATHERINE WAIRIMU	Kirigiti	0716277888	
7.	Margaret Wanjiku	Kirigiti	0702868870	
8.	Pitylis Nyokabi	Kirigiti	0721515542	Pitylis
9.	JOSEPH KINGI	RIABAI	0714827166	
10.	Paul Kaneka W.	Riabai	0724431196	
11.	PETER NGANGA THUO	Kirigiti	0726790670	

(Thuo chege)
died.

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RAP FOR PROPOSED NORTHERN COLLECTOR PHASE 2

DATE: 6/5/11 VENUE: KIRIGITI

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1.	JOSPHAT RIAKIMI	RIABAI	0724-538017	[signature]
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3.	JOSEPH GITAU KABAT	THATHUNI	0722-941329	[signature]
4.	BERNARD NJUGUNA G	THATHUNI	0714-087818	[signature]
5.	PE LOMI GA NJOKI KIMARI	"	0716-668177	NJOKI
6.	TERESIA W'KINYANJUI	KIRIGITI / RIABAI	0722-260685	[signature]
7.	Raphael Gitari Kiro	Riabai	0727 862189	[signature]
8.	JOSEPH JOHN MAKIMI	Riabai	0724416502	[signature]
9.	ESTHER Wambui	Raibai PR. Shead	0716554269	[signature]
10.				
11.				

MINUTES FOR THE PUBLIC MEETING FOR AN ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT AND RESETTLEMENT ACTION PLAN (RAP) FOR THIKA DAM-KIGORO-GIGIRI-KABETE RAW AND TREATED WATER PIPELINES

KIBAGARE SLUM ON 9/6/ 2015 AT 12.00 NOON

Present

See attendance sheet attached

Agenda

1. Introduction
2. Project presentation and cutoff date
3. Question and Answers Session.
4. Adjournment.

Minute 1.9/6/2015-Introduction

The meeting began at 12.00 noon with a word of prayer from one of the members. After the a word of welcome and introduction of slum youth leaders and elders by the village chairman, assistant chief Ms Leah Mburu was welcomed after which she welcomed the senior chief Mr. Runo Gitonga. The senior chief welcomed all the members present; he encouraged the members to fully participate in the meeting and to raise all their issues and concerns. He then introduced the AWSB pipeline project and he invited the Gibb Africa team to do a presentation on the same.

Minute 2.9/6/2015 - Project Presentation and the Cutoff Date

Ms. Joyce Owino a social environmentalist from GIBB Africa Ltd thanked the members present for availing themselves for the meeting and urged them to fully participate in the discussions. She explained AWSB) to carry out an environmental and social impact assessment and resettlement action plan for Thika Dam – Kigoro – Kigiri – Kabete treatment pipeline project. The project is derived from the Nairobi water the purpose of the meeting that Gibb Africa Ltd was consulted by Athi Water Service Board (master plan for developing new water sources for Nairobi and 13 satellite towns. In order to bridge the existing gap, Athi Water Service Board (AWSB) has proposed to construct a new pipeline project.

Joyce emphasized on the importance of involving the locals as the primary stakeholders in the planning stage of a project. She assured them that their views and opinions were very important as they will direct the project implementation process. She added to that, by

informing them that the enumeration process and valuation were scheduled to begin on Monday the 8th of June, 2015 and this marked the cutoff date of asset inventory.

In addition, MS Joyce stated to them that when the surveyor was pegging of the pipeline route they realized that there is only five meter way leave on the road yet they need an extra temporary way leave which will be used as working space by the contractor when the pipe is being laid. She informed them that the project is going to affect some of the slum dwellers, whose social and economic data will be collected through an enumeration process for purposes of resettlement action plan (RAP). Those affected will be compensated and temporarily displaced for the duration of the project.

She opened the ground for questions and answers.

Minute 3.9/6/2015-Questions and Answers

Qn 1

One member wanted to know whether they will be required for the enumeration job and any other labour arising from the pipeline project.

Response

Ms Joyce answered that the GIBB team will need some enumerators when we will be collecting the environmental social economic baseline survey and also the RAP survey. Labour during the laying of the pipe will be determined by the contractor who will be on the ground.

Qn 2

One member asked whether compensation will be made to the tenants or the landlords

Response

The chief answered them that it will depend on who between the tenant and the land lord will be affected. Demolition of structures will affect landlords only while displacement of tenants will affect tenants.

Qn3

Pastor Amos, one of the PAPS requested for adequate considerations of re-routing the pipe

Response

The chief answered that it is subject to discussion between them and the design

Qn 4

One member Mrs. Njeri commented that the issue of compensation should not bring a lot of complaints in the slum and that every one will not be a PAP

Response

The chief stated that only those who will be compensated will be affected and are not on the road reserve will be compensated

Qn5

Bw Godana requested that the chief to really identify the PAPS

Response

The chief assured them that the elders tomorrow will have to scout through the slum to identify PAPS and asked them to co-operate

Qn 5

One member, Charles asked Joyce to clarify the way leave route

Response

The pipe will take 3 m on the road reserve and said they will only affect any one within the radius of 7.5 m on the right hand side.

Qn6

Another member asked for the fate of a recently installed pipe made of PVC . in the event that this pipe will be affected during construction their will be disease outbreaks. During the previous construction there has been similar problem of pipe breakages. What is going to happen?

Response

For any construction, the contractor has BOQ contingency budget which will cater for any emergency damage which will arise. That question is valid and very important in regards to water and sanitation programs to control the disaster.

Qn7

One member requested for a sewer line and drainage to be constructed for them

Response

The chief said they will have to note it for recommendation and implementation

Qn 8

One member, a teacher, Mr. Kingori requested that because of children and drunkards that they become careful and even get guards to avoid disasters from arising. Again if the chief is pleading that we become compensated, the AWSB to really help us know if it is right to build on the way leave.

Response

Joyce clarified that the pipe will be on the middle of the road reserve at 1.2 m diameter, 6m way leave on the road is a temporary working space, so they will be temporarily displaced after they are tallied. To avoid wrong PAPS they will have to work with the elders.

The chief also clarified that those who have encroached on the road, pipeline is all about local arrangements as no one has the legality of staying there.

Other comments/social issues arising

Nyumba kumi initiative

Elderly fund

Insecurity

Estate slum tension

Drugs

Illegal possession of arms

Another member informed the meeting about the issue of storm water drainage and sewage that passes through her land.

Minute 4.9/6/2015: Adjournment.

The chief gave a closing remark by emphasizing on the public interests discussed and then thanked all the members for participating.

There being no other business the meeting ended at 1518hrs with a word of prayer from one of the members.

Prepared by: Joyce A. Owino

Signature: .....

Date: Kd 09/2015

Confirmed as true minutes of the meeting held:

.....

Mr. Runo Gitonga

Senior Chief Kitusuru Location

Signature: ..... CHIEF KITUSURU LOCATION KANGEMI DIVISION WESTLANDS DISTRICT

Date: 14/09/2015

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RAP FOR PROPOSED NORTHERN COLLECTOR PHASE 2

DATE: 9/06/2015 VENUE: KIBAGARE

	Name	Designation	Contacts Telephone/ Email Address	Signature
1.	Dickens Onyango		0726571438	[signature]
2.	CALEB OMINDE	NYAMBA KUMI	0736-348762	[signature]
3.	TERESIO MURUTHI	Nyamba Kumi	0725125133	[signature]
4.	PATRICK MAYU	NYUMBA KUMI INITIATIVE	0718876278	[signature]
5.	JOHN [illegible]	Nyumba Kumi	0721420277	[signature]
6.	DAN S. OMOLO		0720232582	[signature]
7.	HARKON NDOGA	NYUMBA KUMI ~~NDOAKA~~	0753-972195	[signature]
8.	David Nyagah	Nyumba Kumi L	0724313372	[signature]
9.	Peter Shivashi	Chairman Kibagare	0720-742499	[signature]
10.	Pastor Amos Okolo	Pastor/DPC Kibagare/[illegible]	0721166572	[signature]
11.	John Kioko	Old persons Kibagare	0725509151	[signature]

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RAP FOR PROPOSED NORTHERN COLLECTOR PHASE 2

DATE: 04/06/2015 VENUE: KIBAGARE

	Name	Designation	Contacts Telephone/ Email Address	Signature
1.	Rose Mwirabi	B/O Gas Group	—	Rose
2.	Leah Waiyaki	BAWA WAITRES Group	0717854115	
3.	Lucy Nyongesa	K.N.H Saving Group	0727 427 926	
4.	Oliver Maiga	Nyagitinge Group	0721269310	
5.	Charles Okinda	KCBO Secretary	0742274500	
6.	G. MUMBI		0716385319	
7.	Sophia Sasy	Bawa Waitress Group	0713710973	
8.	SIMON NYAMBURA	K.N.T.F	0726918464	
9.	Andrew Kamau	K.N.T.F	0729334062	
10.	PATRICK MAINA	KCBO V/Secretary	0729579729	
11.				

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INSTITUTIONAL STAKEHOLDERS CONSULTATION LIST

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR PROPOSED NORTHERN COLLECTOR PHASE 2

DATE: 9/6/2015 VENUE: KIBAGARE

	Name	Designation	Contacts Telephone/ Email Address	Signature
1.	LOISE KODUOL-ALLAN	ADMINISTRATOR - LSRA	loreshosouth@outlook.com 0713 027 110	[signature]
2.	GITONGA RUNO	SNR. CHIEF	0722 757659	[signature]
3.	LEAH MBURU	A/CHIEF	0721 512193	[signature]
4.	ROBERT NGUGI	BOARD MEMBER - LSRA	0733 872 378	[signature]
5.	Agnes Maleyo	GIBB	0720319202	[signature]
6.	GALGALO GUYO	[illegible] KUMI	0722100195	[signature]
7.	Betty Hamud	Westy wpgd	0722279481	[signature]
8.	Joyce Orina	GIBB	0723 584 543	[signature]
9.				
10.				
11.				

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RAP FOR PROPOSED NORTHERN COLLECTOR PHASE 2

DATE: 9/6/2015 VENUE: KIBAGARE

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1.	PETER N RUBAGI	Kibagare residence.	0721614985	
2.	Josephats Gatu	Kibagare	0722 86 56 45	
3.	JOSPHAT MUDAKI	Kibegare	25625146	
4.	MUSA ISMAIL	Kibagare	177	
5.	ALEX JOSIA	Kibagare	177	
6.	GEORGE Simiyu	Kibagare	0726268947	
7.				
8.				
9.				
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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RAP FOR PROPOSED NORTHERN COLLECTOR PHASE 2

DATE: 09/06/2015 VENUE: KIBAGARE

	Name	Designation	Contacts Telephone/ Email Address	Signature
1.	ABDIHAKIM AHMED	C.H.W KIBAGARE	0701639069	~~ABDI~~
2.	Abdikadir German	Evangellist	0713912954	[signature]
3.	Maliga Fora	former German	07 / / / / / / /	[signature]
4.	Tom MBOYA	J.C.W.M	0724819963	[signature]
5.	Geoffrey Omolo	Humanitarian worker	0732335501	[signature]
6.	DANISON MWANG, Kumi	NYUBA KUMI	0717465779	[signature]
7.	BONFACE OBARE	NYUMBA KUMI	0726839344	[signature]
8.	JAWET WAMBEGI	NYUMBA KUMI	0723707400	[signature]
9.	MOSES WAFULA JUMA	Residence	0712835593	[signature]
10.	Peter Mwangi, K		~~[illegible]~~	[signature]
11.	BERNARD K.O	Residence	0713447156	[signature]

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RAP FOR PROPOSED NORTHERN COLLECTOR PHASE 2

DATE: 9/6/2015 VENUE: KIBAGARE

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2.	Samuel Cathinji		0718469924	[signature]
3.	[illegible]		0721 244150	[signature]
4.	FRANCIS MWANGI		0725079298	[signature]
5.	[illegible]		071788392	[signature]
6.	[illegible]		0721764190	[signature]
7.	Gideon Mbinya		0722403528	[signature]
8.	EDWIN OCHOLI		0718044539	[signature]
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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RAP FOR PROPOSED NORTHERN COLLECTOR PHASE 2

DATE: 9/6/2015 VENUE: KIBAGARE

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2.	DIBA Bonaya	10 Huoses	0721 430863	[illegible]
3.	Jane Karimi	C.H.W.	0721986841	[illegible]
4.	Mary Njoki		0718321917	Mary
5.	Marian Wainima		0711645654	[illegible]
6.	Priesilla Njeri		0723915568	[illegible]
7.	Salome Muthoni		0710339063	[illegible]
8.	Lilas Moraa		0722323325	[illegible]
9.	Mary Nyambura		0711-775326	[illegible]
10.	Margaret Waleke			
11.	Rose Nyambura			

SECOND ROUND OF MEETINGS

NOTES FOR THE MEETING HELD WITH AWSB AND PAPS AT THE NGEWA SOCIAL HALL IN GITHUNGURI ON 21-07-2015

Present

- PAPS from Ngewa location
- Representatives from AWSB
- Consultants from GIBB Africa

Agenda

Clarification by AWSB on issues raised by the Project Affected Persons (PAPS) before allowing work by GIBB Africa to continue.

Notes

Introduction

The meeting was chaired by Mzee Karanu, a Village elder on behalf of the chief who was away for a different assignment. After a word of prayer Mzee Karanu briefed the PAPs on the reason for the meeting. He reminded the meeting of the request which was made by them during enumeration to have a meeting with AWSB before allowing GIBB Africa environmental tem to proceed with the valuation exercise.

Loise from AWSB did a brief introduction of the mandate of AWSB . She informed the meeting that AWSB is a parastatal under the National Government whose mandate is to provide infrastructure for supplying water to the different Water Service Providers within Nairobi, Kiambu and parts of Muranga County. Before AWSB was formed the water supply to Nairobi was the mandate of the Nairobi County Council.

There was a brief session of introductions of officers from AWSB and GIBB Africa Limited. This was done by Loise from AWSB. Due to communication challenges the locals requested to speak in mother tongue so that they can all understand. After it was agreed that Loise would translate to them in mother tongue where required, all the PAPs identified themselves as well.

George from GIBB Africa Limited briefed the meeting on the minutes from the previous meeting held with the same locals at Komothai Chief's Camp. He reminded them of the proposed new land acquisition as well as the issues previously raised by the locals. He then invited them to ask questions after all the issues previously raised had been addressed.

Issue 1: From the previous meeting, the PAPs wanted to know whether compensation would be for the entire 18 m and if not, whether AWSB could permanently acquire the entire 18 m where the pipes currently pass?

Response: Kezziah from AWSB responded by clarifying that the land was an easement of 12m not a Way Leave and that compensation for the crops was done during the laying of the first pipe. She assured the PAPs that previous issues concerning the acquisition of an extra 6m to make the easement 18m were being looked into by AWSB in consultation with the Nairobi City County (NCC) formerly Nairobi City Council whom the PAPS made the easement agreement with. She informed them that AWSB was awaiting communication from the NCC but will pay for he proposed new acquisition.

Michael M. Mbugua 11/9/2015.
.....
CHIEF
NGEWA LOCATION

Matters arising

Question 1 A question was raised by a PAP immediately after Kezziah spoke. The PAP was concerned that he only had 2m of land left since 18m of his 20m was occupied by the pipelines. Since what he is left with is not economically viable and he also cannot construct a house there, his request was that the easement be acquired as a permanent way leave.

He also pointed out that if the ownership of the pipelines was transferred from NCC to AWSB then there must have been an agreement when transferring the ownership. He went on to explain his dissatisfaction and complaint about the first agreement they had for a 12m easement which he likened to land that is being rented but the rent is not paid. He also wanted to know what would be compensated for the existing 18m easement since compensation was said to be for the 3m new permanent acquisition.

Response: Loise from AWSB explained that compensation done in 1972 was for crops only not land. She also explained that the enumeration done was only for crops and not land and that land would be valued by a Valuer. She clarified to the locals that the ESIA and Resettlement Action Plan (RAP) studies being conducted were to be reviewed by NEMA and World Bank before approval is given. She assured them that there are laws in place to shield the PAPS and that the RAP would consider the economic gain / loss of the affected persons before recommending compensation.

Question 2: The pegs marking the alignment for the new pipe are within the existing way leave. Will AWSB compensate for the 3m new acquisition even if it's on the existing 12m easement? Why not extend the compensation to the rest of the 12m?

Also the agreement was only for 12m, why do you want to extend it to 21 m?

Response: The AWSB officer responded by explaining that a conclusion could not be arrived at during that meeting but that the wishes of the locals would be communicated in the RAP report. After the report is compiled, there would be another meeting to disclose the findings and conclusions to the public for acceptance.

Question 3: When NCC handed over their mandate to AWSB, AWSB should also have taken the records of the previous agreements the PAPs had with NCC.

Response: The records of agreements had not yet been handed over by NCC but AWSB had already requested for them. Since the NCC got burnt down, the copies of agreements could have been lost and so copies of the agreements from the PAPS would be important in tracing the records at NCC.

Comments from the PAPs

Comment 1: Compensation has recently been paid to those affected during the Mau Mau. AWSB should as well pay for the existing easement land since whatever remains is of no value to to the PAPS.t. Also valuation should be done properly and fairly. Issues raised should be well documented in the report.

Comment 2: PAPs were of the opinion that AWSB should just purchase and acquire permanently all the easement land and fence it off once and for all.

Comment 3: The PAPs wanted the number of meetings held with them minimized since they were costing them in terms of time. They wanted their issues to be sorted out once and for all to avoid having several other meetings.

Michael M. Mbugua 11/9/2015
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NGEWA LOCATION

Comment 4: In order to ensure that issues addressed during meetings are properly documented, the PAPs requested that before the next meeting is held all the minutes are read to them.

Question 4: The PAPs wanted to know whether compensation would be done before or after the issues raised are resolved.

Response to question 4: Kezziah from AWSB assured them that construction would not commence before compensation is done.

Question 5: The pipeline keeps expanding its easement size either from the initial agreed 12m to the current claimed 18 and now to a proposed further 21m. The current size of 18 m was without consultation or permission from the land owners. Compensation of land should be done before anything is done. Moreover we want the entire land under easement be acquired.

Question 6: One PAP was concerned that the entrance to his home was cut off by the existing pipelines forcing him to access his home through his neighbor's compound. He wanted to know how he could be compensated and new access to his compound created.

Response to questions 5 and 6: The AWSB officer responded by informing the PAPs that Public disclosure would be done after the study is completed. He then requested them to let the Consultant complete the studies so that they can get to know the magnitude of the problem as the issues being raised would all be captured in the report. He then assured them that even before the compensation process can start, the report with the findings would have to be accepted with no objection by the World Bank. This means that it would be in line with the World Bank Operational Policies for Involuntary Resettlement.

Point of contention

Question 7: At this point one of the PAPs pointed out some difference in interests saying that AWSB were only concerned with the new 3m acquisition yet the PAPS were concerned with the compensation for the existing 18m. They requested that valuation for all the existing easement as well as the new proposed 3m acquisition should be consolidated and compensation done once for all of them. The PAPs were categorical that they did not want to be compensated for only 3m as this would be a fraud to them.

Comment 5: The PAPs were categorical that they did not object to the project being done but only on condition that the valuation is for 18m as well and not only for 3m as is proposed.

Response from AWSB to question 7 and comment 5: The PAPs were assured by AWSB Officers that everything being discussed was being recorded in writing and that whatever was recorded in the report would be disclosed later during the public disclosure meeting. The AWSB Officer assured the PAPs that no construction would commence before AWSB and PAPS come to an agreement. AWSB Officer explained that before compensation is arrived at, value and enumeration would have to be done first to capture the issues. The Officer clarified that the permanent acquisition for the new pipeline was 3m but during construction damages beyond the additional 6m working space would be compensated by he contractor.

Comment 6: The PAPS insisted that they wanted compensation for the entire land not the 3m new acquisition.

Michael M. Mbugua
.....
CHIEF
NGEWA LOCATION
July 2015
1/9/2015

Response from AWSB: The PAPs were reminded that in 1972 they made an agreement with the then city council. As at now the mandate had been transferred to AWSB who had already began consultations with with NCC to establish the records of those affected. After the report has been written, the recommendations made shall be communicated through a public disclosure meeting.

From 1972 when the first agreement was made, there have been many changes in legislation and even Constitution has changed to the benefit of a common man. All these have to be put into consideration before a final decision is made about the compensation for the existing 18m wayleave.

Comment 7: the PAPS wanted a clear specification of the limits of our study and valuation.

Comment 8: Some PAPs were concerned that the longer the valuation exercise took to start, the higher the likelihood we would not find crops to value since the dry season would soon be approaching. They also did not want a scenario like in the past where they were compensated only for coffee berries and not for the coffee crop.

Question 9: A PAP was concerned that since 1972 up to now he had not planted anything on his land as it was forbidden. He wanted to know who would compensate for the loss he had incurred since then.

Question 10: A PAP was skeptical about whether the grievance mechanism would yield any results. Her concern was that the grievances she raised about the water channels being created during opening of wash out valves from the existing pipelines were previously recorded but she has not been compensated till now yet the water channel she complained about was still destroying her crops.

Response from AWSB for question 8 and 9: The PAPs were answered same as in response 5 to 7.

Question 11: A PAP whose details were not well captured during enumeration wanted to know how she could correct the information another one who was absent also had the same concerns.

Response: GIBB Africa team assured her that during valuation exercise her details would be captured again.

Question 12: Issues of succession were also raised and they were as follows:

- What if I have bought land and have not finished the succession process, who will be compensated?
- Husband died before succession was done will the death certificate be adequate?
- I bought the plot and the title is at the NCCK Nairobi. Will I still be given the compensation?

Response from AWSB: The AWSB responded that on succession the records will be followed up by various responsible government and land officers and the PAPS need to not worry. On family succession issues where husband has died the PAPS were informed that the local administration will be used to confirm the information.

Comment 10: one of the PAPs expressed his desire for the youth in the area to be employed once the construction work begins.

Response from AWSB: The contractor shall be asked to give priority to the qualified youths from the area when hiring workers.

Michael M. Mbugua 11/9/2015
CHIEF
NGEWA LOCATION

Feedback:

Question 12:- One of the PAPs wanted to know when they would receive answers to the questions asked during this meeting.

Response from AWSB: AWSB responded that they shall communicate and convene another meeting once they have received information from the City County and also during the disclosure of the findings. However the PAPS were reminded that they are free to call AWSB anytime they have a complaint or something to discuss with them.

The meeting was then concluded with a word of prayer.

Notes drafted by : GIBB Africa Ltd Environmentalist

Name : Catherine Juma

Signature : Date: 21/7/15

Confirmed by : AWSB representative

Name :

Signature : **Date**

Confirmed by : PAP representative

Name GEORGE KARANU MUNGAI

Signature : **Date** 10/9/2015

Michael M. Mbugua
.....
CHIEF
NGEWA LOCATION
11/9/2015

PREPARATION OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA) AND RESETTLEMENT ACTION PLAN (RAP) FOR NORTHERN COLLECTOR TUNNEL CONTRACT NO.AWSB/WASSIP-AF/COMP.1/CS-03/2012-THIKA -NGORONGO PIPELINES

ATTENDANCE LIST- MEETING HELD AT NGEWA COMMUNITY HALL

S/NO.	NAME	AREA	ID NO.	TEL. NO.	SIGN
1	GEORGE OWOR	GIBB AFRICA	11197486	0712196549	[signature]
2	Keziah Adhiambo	AWSB	22071632	0720352697	[signature]
3	Bonnie Nyandwaro	AWSB	23345438	020-2724292/3	[signature]
4	NEWTON STOWER	GIBB AFRICA	25454476	0726326599	[signature]
5	JOSEPH MWANGI	AWSB	8336748	0721398791	[signature]
6	Catherine Juma	GIBB Africa	24874085	0724899564	[signature]
7	Francis Mwaura	AWSB	9333977	0722724473	[signature]
8	Loice Kamau	AWSB	9726982	0722306296	[signature]
9	Mohamed K Koelh	AWSB	22492356	0722-218894	[signature]
10	Daniel Mbugua	AWSB	11669547	0713404167	[signature]
11	George K. Mungai	Ngewa	5711839	0723126981	[signature]
12	CHARLES K. MWANGIKI	NGEWA	4859591	0700871982	[signature]
13	William M Kangethe	NGEWA	3437241	0722374455	[signature]

DATE 18/9/2015

14	John Kinyari	Ngewa	7320442	0715517234	[signature]
15	Kangi Nganga	Raiyani	6746283	—	[signature]
16	Ngatho NTOroge	Ngewa	0726755854	5992572	[signature]
17	Anncate Mbugua	Ndithiati	0725889469	—	[signature]
18	Peter Kamau				
19	Joseph Ndicha	Ngewa	—	—	[signature]
20	Joseph Karanja	Ngewa	0722754773	4870613	[signature]
21.	CHARLES MUSO MWANG	NGEWA	0723060815	10/7344537	[signature]
22	Peter Mbugua Kangetha	Ngewa	0727585807	3456262	[signature]
23	Samuel Kageni		0702671682		[signature]
24	JOYCE WANJIRU MWANG	NGEWA	0702657534	0514958	[signature]
25	Teresia Zuzan Njau Karanja	Ngewa	0724010799	13163478	[signature]
26.	Daniel Mbugua Karanja	Ngewa	—	—	Daniel
27	John Kangetho Kimindi	NGewa	0702418558	0727286062	[signature]
28	Joseph Kimonde Wangoike	Ngewa	6712711 ~~0728024370~~	0728029370	[signature]
29	JOHN KIBARA MUNGAI JOKIMU ESTATE	LIOKI	0722654230	11D 191001	[signature]
30	Teresia Wanjiru Karanja	Ngewa	0728674161	30272683	

[signature] 10/9/2015

31	James Kangara Nganga	Raiyani	0519884	0722170517	
32	[illegible] Mungai Mugo	Ngewa	238 215 25 0703 971554	0703971554	[illegible]
33	Edith Wanjiku Nganga	Raiyani	5709 187	—	Edith
34	Lucy Mandu Muriu	Raiyani	5709 156	—	Lucy Muriu
35	James Gachigua Kangara	Raiyani	1897085	0718 902 935	[illegible]
36	Edward Kangethe Wanyoike	Ngewa	11055266	0702 745 811	[illegible]
37	Rose Wambui Mbugua	Ngewa	6585 243	0711 671 433	[illegible]
38	STEPHEN KAMAU WAWERU	NGENIA	21598661	0721353037	[illegible]
39	David Kangethe	Ngewa	64256881	0722563060	[illegible]
40	Domine Njoroge Kamanya	Ngewa	0980955	0704072064	[illegible]
41	FRANCIS KANGETHE Mungai	Ngewa	0717121794	ID 4872152	[illegible]
42	Hannah Wambui Kangethe	Ngewa	ID 5708865 ~~[illegible]~~	0727585867	[illegible]
43	Wallace Mungai Kimani	Ngewa	28756524	0727585867	[illegible]
44	BONIFACE M. KAMONYE	NGENIA	5175506	0722756795	[illegible]
45	David Kangethe Gitau	Ngewa	9266085	0725659927	[illegible]
46	JOHN THUO KANGARA	RAIYANI	13828264	0729158034	[illegible]
47	Mary Wanjiku Njanja	RAIYANI		0725385716	[illegible]

10/9/2015

48	JOSOAYE NGINA KAMAU GITHIRU	[illegible]	5709881	0714 194938	J. N. K.
49	BERNARD MWIHIA	NGENIA	11148249	0733417846	[illegible]
50	WILLIAM KERIUKI	WAKACA	5700800	0722890565	[illegible]
51	PHYLIS NGINA MBUGUA	NGEWA	5709371	0710471774	Ngina
52	Jonesser Ngeni mbugua	Ngenia	2819739	0725452930	[illegible]
53	PETER MANYEKI	NGEWA	26155535	0733932627	[illegible]
54	NGANYA KIMUNDU	NGAYANI	14816482	0708594295	[illegible]
55	Hannah Wambui Kangethe			0727585867	[illegible] for Wambui
56	Anton Kangethe Ngoro		5709379		[illegible]
57	Ngan Mbugua Kalunia				
58					

NOTES FOR THE MEETING HELD WITH AWSB AND PAPS AT THE KIAMWANGI SOCIAL HALL IN GATUNDU SOUTH ON 22-07-2015

Present

- PAPS from Nembu and Karembu
- Chiefs and Assistant Chiefs from the area
- Representatives from AWSB
- Consultants from GIBB Africa

Agenda
Clarification by AWSB on issues raised by the PAPS before allowing work by GIBB Africa to continue

Notes

Introduction

Assistant chief Samuel Munene from Karembu opened the meeting with a word of prayer and then introduced the Chiefs present at the meeting. These were; Assistant Chief John Kiiru from Nembu, assistant chief Samuel Gitau from Gathange sub location and Acting Chief from Kiamwangi location- Stephen Muritu.

He also introduced the Project Affected Persons (PAPS) present and promised to inform those who were not present during the Chief's weekly barazas.

Mr. Simeon Mwaniki, from AWSB introduced the AWSB team and GIBB Africa Limited. The team included Daniel Mbugua, Kezziah Adhiambo and Mohamed Koech from AWSB and George Owuor and Catherine Juma from GIBB Africa Limited. He then informed the meeting that that he would speak Swahili and translates it to kikuyu for those who do not understand.

Catherine Juma briefed the residents on past events that have taken place from May when they had the 1st public meeting to date. Issues that made the meeting be called were then raised and addressed one by one.

Issues addressed during the meeting

Simeon from AWSB explained to the public the project and why the need for the meeting. He asked them to feel free to ask all the questions as his team has gone there to answer them.

Question 1 by Joseph Thiriti from Nembu: Explained that the current easement agreement was made in 1972 when the current generation was too young and a lot of changes have taken population including rapid increase in population in the project area. He mentioned that the land in question even though is still in their names is value less and moreover they are not allowed to use it for anything including building or planting anything on the land. He said the land is of no use to them and AWSB should just buy the land from them. He informed the public that the community will only accept the project if the old easement agreement is reviewed. He also asked AWSB to state whether they have any agreement with them concerning the extra 6m wayleave they are alleging.

In response AWSB asked to be given time to go and check with County Government of Nairobi the old agreements so that they can discuss with the Community. In the meantime he asked the Community to give GIBB Africa opportunity to complete the current assignment so that they can understand the magnitude of the problem. He informed the community the Community all the work will be done transparently and according to the law,

SALOME W. KABUCHUA
ASST. CHIEF
KIAMWANGI SUB-LOCATION
Date: 22/07/15 Signed:

Question 2 by Joseph Thiriti from Nembu: Mr. Thiriti posed the question that if the 99 year lease for land can be reviewed downwards, why can't the PAPs review their agreement with the AWSB who currently own the infrastructure to consider that the land has been useless to the people for the past 43 years

Question 3 by Joseph Gathenge from Nembu: Mr. Gathenge informed the meeting they are moving way ahead with the questions that cannot be answered at the time of the study. He posed the following questions as pertinent at this stage of the study.

- How long will the work take before the project begins?
- When does it start so that we can know when to plant and harvest?
- Can we communicate with everyone who is affected?
- Can the impact assessment be done first before we discuss the land compensation issues? The impact has to be determined first before the emerging land issues are taken

Response from AWSB:

- Impact assessment should be complete within 1 month if you agree to let GIBB Africa Limited work. The procedure is that the report will be reviewed by AWSB and World Bank and then the report is brought back to you and publicly disclosed before it is implemented. The Report will then be forwarded to NEMA for approval. .
- The work is likely to begin beginning of next year. However this depends on the success of this study;

Question 4 by Peter Kunyita – Karembu. He asked AWSB whether the compensation will be paid in cash or kind.

Response from AWSB:

The PAPS were informed that from enumeration of the PAPS the Consultant shall determine who wants to be paid in cash or kind.

Question 5 by Peter Stephen Gitonga Kimani: Mr. Kimani informed the meeting that they were young when the pipe line was laid the first time, and it looks like they gave out there land. Then he asked AWSB whether they will be be compensated before the construction is done and for what and also who will be compensated in areas that several subdivions has taken place among siblings?

Response from AWSB:

We shall work with the Chief to establish who the owners are and they will then be compensated as per their land and according to the Valuation.

Question 6 by Peter Stephen Gitonga Kimani: Is there someone else who will do valuation for those affected when the construction is on going as from History the Contractors usually destroy areas that has not been paid for?

Response from AWSB:

The valuation we shall do is for the 3m permanent acquisition and 6m working space and this will be compensated. If the contractor destroys anything outside the agreed 9 m he shall compensate the affected person. The contractor is also responsible for safety and health measures for the community during construction and will compensate in case of any injury or death.

SALOME W. KABUCHUA
ASST. CHIEF
KIAMWANGI SUB-LOCATION
Date: 22/07/15 Sign

Question 7 by Peter Stephen Gitonga Kimani What if we were not enumerated?

Response:

Enumeration will be carried out a fresh in the areas where there were challenges. We shall communicate the dates through the Chief.

Question 8: If succession is not yet done who will stand on their behalf?

Response
We shall ask for a copy of original title and a letter from the Chief verifying that those claiming to own the land are genuine. Ministry of lands also has to confirm who owns the land before payment is made.

Question 9 by Muragu Njuguna – Nembu:

Mr. Njuguna started by informing the meeting that no adequate public awareness was done and therefore the majority of PAPS might not be aware of the project. He then asked whether the project can be stopped to sort out the issues of the three previous pipes?. He said that there should be no secrecy in the manner that the valuation and enumeration exercises are being conducted.

He said that the PAPs and the County Government have to be adequately informed and involved. Legal experts should also be involved so that those doing valuation can do it in a sober manner (this is because the PAPs think their forefathers were duped into signing an agreement whose implications they were not fully aware of).

He also requested AWSB to in future provide lunch and refreshments at the meeting because the meeting took long..

Responses:

AWSB informed the meeting of the following:

- Public awareness for this project is ongoing. This is through the public meetings that were held previously with the members of the public as well as continuous communication with the affected people through the chiefs and village elders. Even the meeting we are having now is to make the public aware. More meetings will continue being held even in the future. We also have information on the issues raised from the previous agreements and it is being sorted by NCC.
- During the first meeting we took your concerns and recorded the impacts of what will be affected. This together with other observations made during the study including the issues raised during the study will go into the final report.
- Valuation uses registered Government Valuers who use standard procedures and guidelines. The ministry of lands also has to validate the valuation process and standard procedures to ensure that what has been proposed is in accordance with the guidelines. During disclosure, we shall inform individuals on the findings which will be open.
- In future we shall look into the issue of refreshments.

Question 10 by Marai Nganga:

Mr. Nganga asked AWSB why they don't want to use the existing space instead asking for more while Land Parcels in Kiambu are very tiny.

Response:

AWSB responded by saying that the project uses the existing space in a number of areas however there are a number of areas where it is inevitable to acquire more land.

SALOME W. KABUCHU
ASST. CHIEF
KIAMWANGI SUB-LOCATION
Date: 22/07/15 ...Sign:

Closing Remarks by Chief Munene:

Bwana Mathenge mentioned that the questions being asked will come at an advanced stage as they cannot all be sorted right now. It will take time. He informed the meeting that the The Chiefs are also anticipating problems such as:

- Due to succession someone may claim what is not theirs since they are not being compensated.
- People wanting to bribe so as to be included in the way leave.

He asked the PAPS to allow the work to be done and thereafter can ask questions during compensation,. He informed the meeting that AWSB will follow up on the 18m way leave and get back to them in good time before the project starts. He reminded that during the KETRACO wayleave there are people who opposed but when they saw the benefits of compensation they wanted to be included in the project. He AWSB and GIBB that they will inform those who are not present in the meeting of the deliberations. He told the gathering that in future adequate notice of between 3 – 5 days will be given prior.

Prayer by Chief Munene.

Notes drafted by	: GIBB Africa Ltd Environmentalist	
Name	: Catherine Juma	
Signature	:	Date: 22/07/15
Confirmed by	: AWSB representative	
Name	:	
Signature	:	Date
Confirmed by	: PAP representative	
Name	: SALOME W. KABUCHU, ASST. CHIEF	
Signature	: KIAMWANGI SUB-LOCATION Date:22/07/15.....Sign:	Date 22/07/2015

ATTENDANCE LIST

PREPARATION OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA) AND RESETTLEMENT ACTION PLAN (RAP) FOR THIKA –KIGORO KABETE PIPELINES

MEETING HELD AT GATUNDU EDUCATIONAL HALL WITH THE NDARUGU - NGENDA WATER PIPELINE RIPARIAN COMMUNITY

DATE: 22ND SEPT 2015.

S/NO.	NAME	AREA	ID NO.	TEL. NO.	SIGN
1	Mohamed K Kode	AWSB	22492356	0722-218894	[signature]
2	Symon Mwanika	AWSB	0809212	0723 975644	[signature]
3.	Daniel Mbugua	AWSB	11669547	0713 404151	[signature]
4	Keziah Adhiambo	AWSB	22071632	0790312697	[signature]
5	JULIUS [illegible] Ungara		4243274	0722436978	JM.
	Lucy WAITHITHI NGA	IITHINGU			

ATTENDANCE LIST

PREPARATION OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA) AND RESETTLEMENT ACTION PLAN (RAP) FOR THIKA –KIGORO

KABETE PIPELINES

MEETING HELD AT GATUNDU EDUCATIONAL HALL WITH THE NDARUGU - NGENDA WATER PIPELINE RIPARIAN COMMUNITY

DATE: 22ND SEPT 2015.

S/NO.	NAME	AREA	ID NO.	TEL. NO.	SIGN
	James K. Mwangi	Ichaweri		0725860958	✓
	Peter NJURU Mwangi	Ichaweri		0734797641	
	Kibunja Ngandu		25707970	0712779919.	
	EDWARD MORERA	Ituru.		0727240090	
	Janen Njoki Njai	Ituru		0720100298.	
	Teresia Nyambura Mburu	Githuya.	14572050.	0729800287.	[illegible]
	MAUGHE HAMBUS MUNGAI	ICHAWERI	28197774	0728768766	[illegible]
	JOSEPH KIMUNA GINTERU	ITURU	1018252	0713453287	[illegible]
	Mary Wanjiru	Gatei	8664564	0716879747	[illegible]
	Veronica Wambui CEGE	Gatei	4919885	0722611190	V. Wambui
	Eunice Ngendo Kamau	Gatei			
	George Kahoro	Gatei	11482914	0714516140	

ATTENDANCE LIST

PREPARATION OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA) AND RESETTLEMENT ACTION PLAN (RAP) FOR THIKA –KIGORO

KABETE PIPELINES

MEETING HELD AT GATUNDU EDUCATIONAL HALL WITH THE NDARUGU - NGENDA WATER PIPELINE RIPARIAN COMMUNITY

DATE: 22ND SEPT 2015.

S/NO.	NAME	AREA	ID NO.	TEL. NO.	SIGN
	ELIZABETH WAMBUI MUCHEMI	MUIRIA/THIRIRIKA		0723804497	[illegible]
	MICHAEL MURURI	GATEI	6606434	N/A.	MURURI
	Jane njeri Kariu	Huru	10141574	0725014508	Jane njerikariu
	Maria wanyoro	Huru	1021433	0725697040	[illegible]
	Michael Mburu chege	GATEI	33512045		M. chege
	Mary waithira muruku	Huru	4918492	0718924573	[illegible]
	Joyce Nyambura	Huru	9167930	0703898385	
	Margret Wanjiku	Huru	~~54~~ 8554115	0717889636	
	JOHNSON NG'ORA NJURU	KHAWERI	13534551	0723717823	[illegible]
	DAVID K. MBUTHIA	KIRANGARI	13223686	0710377283	[illegible]
	ELIUD ~~Kinyanjui~~ Kinie Kege	ITURU	1022200	0712178672	[illegible]
	KARANJA NJUGUNA	GATEI	4923234	0716738	[illegible]

ATTENDANCE LIST

PREPARATION OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA) AND RESETTLEMENT ACTION PLAN (RAP) FOR THIKA –KIGORO KABETE PIPELINES

MEETING HELD AT GATUNDU EDUCATIONAL HALL WITH THE NDARUGU - NGENDA WATER PIPELINE RIPARIAN COMMUNITY

DATE: 22ND SEPT 2015.

S/NO.	NAME	AREA	ID NO.	TEL. NO.	SIGN
	SIMON NJAU NGANGA				
	DOMINIC NJUGUNA MUGWIMI				
	MOHY NJERI				
	PAUL MACHARIA KURIA				
	LUSIA WANJIKU ngengi				
	PETER GICHERU KAIRU	ITURU	9924856	0722566035	[illegible]
	JORAM NGERE MUURURI	ITHINGU			
	JANE MIRIGO NGORU	ITHINGU			
	FRANCIS KABIUKI K.	ITURU	4918767	071337291	
	[illegible]				
	KAMAU MUNGAI	ITHINGU			

ATTENDANCE LIST

PREPARATION OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA) AND RESETTLEMENT ACTION PLAN (RAP) FOR THIKA –KIGORO KABETE PIPELINES

MEETING HELD AT GATUNDU EDUCATIONAL HALL WITH THE NDARUGU - NGENDA WATER PIPELINE RIPARIAN COMMUNITY

DATE: 22ND SEPT 2015.

S/NO.	NAME	AREA	ID NO.	TEL. NO.	SIGN
	HANNAH KABURA	ITHINGU	27706521	0707837489	H.K
	Kiamii WAINAINA	ITURU	1021527	07053849 98	
		~~1021527~~			
	JOSEPH MBUGUA	GATEI	4927175	0726644873	[signature]
	Simon Njoroge	Gatei	2570954 ~~2570954~~	0710199321	[signature]
	Raphael Kariuki	Gatei	8495757	0722.280393	[signature]
	Joseph Njoroge Chege	GITHUYA	0799665	0725501063	[signature]
	Veronica Wanjiku Njoroge	GITHUYA	1872729 ~~1872729~~	0720486970	V. Wanjiku
	Peter Njomo Chege	GATEI	1023887	0726069844	[signature]
	P.C.E.A. ITURU	Ituru	1018807	0712884774	[signature]
	Peter Kimitha Gathiri	Ituru	1022474	0702219878	[signature]
	Joseph Njoroge Ngainga	Ituru		0723116007	J.N

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PREPARATION OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA) AND RESETTLEMENT ACTION PLAN (RAP) FOR THIKA –KIGORO KABETE PIPELINES

MEETING HELD AT GATUNDU EDUCATIONAL HALL WITH THE NDARUGU - NGENDA WATER PIPELINE RIPARIAN COMMUNITY

DATE: 22ND SEPT 2015.

S/NO.	NAME	AREA	ID NO.	TEL. NO.	SIGN
13.	MARY NJERI GACERU	ITURU		0703336169	
14	FRANCIS MAINA KABIRU	ITURU	0312050	0721286234	
15	Wilfred MUGO NJOROGE	KIRANGARI	0954190	0722820404	
16	JOHN NJENGA CHEGE	GATEI	0951694	0720922982	
17	GRACE NYOKABI MUCUCA	GATEI	6712327	0713238405	
18.	BERNADETTE NDUTA NJENGA	GATEI	3066249	0725 085698	
19	ELIZABETH W. GITAU	ITHINGU	4313174	0725575202	
20	NJERI GITHIU	ITHINGU	3366557		
21	ALEXANDER WAWERU	GATUNDU	13533490	0718303365	
22	Ribaru Ohuge	Gatei	4918338	0729421267	Ohuge
23	Joseph Ciachiengu	ITURU	27445974	0705298574	[illegible]
24	Esther Wanjiku Kairu	ITURU	49222675	0723968617	EW

ATTENDANCE LIST.

PREPARATION OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA) AND RESETTLEMENT ACTION PLAN (RAP) FOR THIKA –KIGORO

KABETE PIPELINES

MEETING HELD AT GATUNDU EDUCATIONAL HALL WITH THE NDARUGU - NGENDA WATER PIPELINE RIPARIAN COMMUNITY

DATE: 22ND SEPT 2015

No.	Name	AREA	ID Number	TEL NO	Sign
1.	PETER NJENGA KIHO	GATEI	1020402	0727957493	Peter Njenga Kiho
2.	MARTIN MWIRIGI KAMAU	ITHINGU	10177200	0715550757	MMK
3.	JOHN KIMANI KAMANJA	ITHINGU	21739096	0729146655	JKK
4.	STEPHEN NJOROGE KAMAU	ITHINGU	8615729	0713385312	[illegible]
5.	MICHAEL MWANGI K	ITURU		0705852662	[illegible]
6.	JACINTA WAIRURI KARIUKI	ITURU	4817787	0723220410	J.Wai
7.	GEORGE OWUOR	GIBB AFRICA LTD	11497486	0712196549	[illegible]
8.	Catherine Juma	GIBB AFRICA	24414085	0722499564	[illegible]
9.					
10.					
11.					
12.					

ATTENDANCE LIST

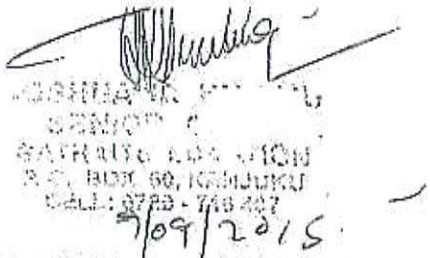
PREPARATION OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA) AND RESETTLEMENT ACTION PLAN (RAP) FOR THIKA –KIGORO

KABETE PIPELINES

MEETING HELD AT GATUNDU EDUCATIONAL HALL WITH THE NDARUGU - NGENDA WATER PIPELINE RIPARIAN COMMUNITY

DATE: 22ND SEPT 2015.

S/NO.	NAME	AREA	ID NO.	TEL. NO.	SIGN
1	PAUL KARUGO KARIUKI	ITURU		0733578614	✓
2	Boniface Chege	Githugo		0722712380	✓
3	Charles Kihu Wanivu	GATEI		0713300180	✓
4	James Kamau Ngoru	Githingu		0700868688	✓
5	Duncan Gaturu Nderi	Gatundu		0726346978	
6	JOHN KIRAGO KAGECHA	ITURU		0346552	
7	JOHN KAHIGA KARANJA	ITURU			
8	JOHN NGANGA GATHARU	ITURU		0706703784	
9	FRANCIS KAMAU MURAI	GATUNDU		0708653277	✓
10	GABRIEL KAMAU GITAU	ITURU	0583874	0720261986	[signature]
11	STANLEY NAIRANGU	ITURU	6458950	0725132993	[signature]
12	AMOS KIMANI KIBUNYI	ITURU		0710398703	



NOTES FOR THE MEETING HELD WITH AWSB AND PAPS AT THE KAMWANGI DCC GROUNDS IN GATUNDU NORTH ON 23-07-2015

Present

- PAPS from Ndarugo and Karimenu
- Chiefs and Assistant Chiefs from the area
- Representatives from AWSB
- Consultants from GIBB Africa
- Area MCA

Agenda

- Clarification by AWSB on issues raised by the PAPS.
- Requesting the PAPs to allow GIBB Africa Limited consultants to continue with their work.

Notes

Meeting was chaired by Mr. Ndungu who is a village elder and PAP representative. Mama Waithera opened the meeting with a word of prayer.

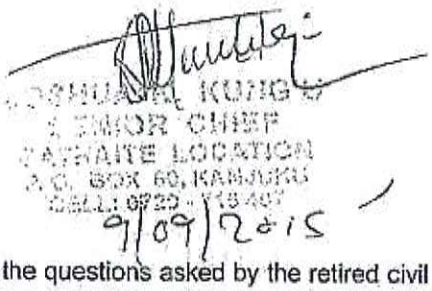
The PAPs were welcomed to the meeting followed by an introduction of the guests. Immediately after introduction the PAPS asked why the Nairobi County Council representative was not present at the meeting as per their earlier request. Kezziah from AWSB reported that she had contacted the County Government the predecessor of NCC and they said they would look for the records of land ownership for the 18m easement before discussing further the issues raised by the PAPs during the last meeting.

Mr. Koech from AWSB explained that AWSB is under the Ministry of Water and is responsible for providing water infrastructure to the different Water Service Providers it serves.

A PAP who identified himself as a Retired Civil Servant voiced his concern that all the concerned bodies i.e. NCC , Nairobi Water and AWSB should have worked together and be present at the meeting so that the PAPs don't have to deal with different people all the time. Otherwise their grievances about the existing 18 m easement would never be resolved as no specific body was taking responsibility. He raised the following issues of concern;

- The easement land belongs to the PAPs yet there are restrictions on how to use the land,
- They pay land charges to the council for the 18 m easement yet the land is of no economic value to them,
- They do not have any benefits for allowing the pipelines to pass through their land. Only liabilities. The title of the land belongs to the PAPs and yet they are paid nothing for the usage of the land.
- They were planning to take the council to court because of the issues concerning the existing 18 m wayleave

Before embarking on answering the questions raised, Catherine from GIBB brought everyone up to date with what was discussed at the previous meeting and highlighted the issues that came up leading to the convening of the second meeting. Most of the issues were concerning the existing 18 m easement and the PAPs mentioned that they preferred to meet with AWSB and NCC directly. Kezziah from AWSB answered the questions on land raised from the earlier meeting.



Response: To the questions asked by the retired civil servant earlier, Kezziah from AWSB responded by saying that the infrastructure i.e. the pipelines now belonged to AWSB and were therefore their liability but the records of ownership of the easement and agreements made were yet to be handed over to them by NCC. However, they had notified the NCC to avail the records and were awaiting a response before further discussing the issues raised. It is from this feedback that AWSB would be able to explain clearly the disparity between the 12 m agreement that the PAPs have and the 18m easement that AWSB claims is theirs.

Since the PAPS were not yet convinced, Koech from AWSB further clarified that the laws keep changing and what was previously the local governments are now County governments. He stated that according to the Water Act 2002 assets that previously belonged to the council were transferred to AWSB and that the Council hadn't yet given records of ownership. AWSB was still following it up. He then made it clear that the council doesn't have titles and AWSB also would not be obtaining titles but only agreements for the pipelines to pass.

Question: Mr. Andrew from Ndarugo stated that they have an issue with the NCC because of phase 1, 2 and 3. He asked AWSB to follow up and clarify with proof the alleged claim that NCC compensated them for 18m instead of 12m. He insisted that AWSB follows up on the ownership issues from the first agreements and give the PAPs the report before being allowed to carry out studies on the proposed new pipeline.

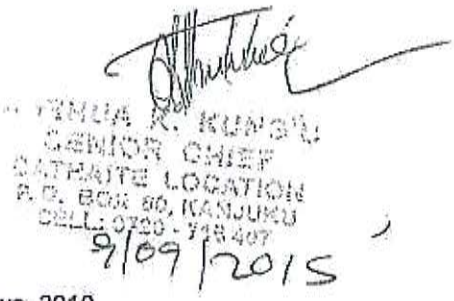
Kezziah from AWSB responded by saying that an ESIA and RAP report had to be prepared to establish the extent of the damage and compensation due from the proposed new pipeline. She then reassured them that construction would not begin before compensation was done. She requested the PAPs to allow the ESIA and RAP study to be carried out while awaiting the response from NCC. This was with the promise that the findings will be included in the final report.

A PAP who referred to himself as a retired civil servant enquired as to whether money for compensation for the 3m had been set aside and whether they should follow it up with NCC.

In response Kezziah from AWSB informed the PAPs that the government had not yet set aside money for the project and that it was from this RAP report that the affected persons would be identified and the compensation due to them estimated and recommended to be budgeted for. She said that the RAP Report will recommend compensation and then the money shall be budgeted for. It will recommend that the previous issues be looked into as well. It will document the issues raised and from there it will be easier AWSB to follow up.

Mr. Andrew from Ndarugo insisted that the current studies are put on hold until the report with the findings from NCC be availed and presented to them.

George Owuor from GIBB Africa responded by reiterating that the 3m for the new pipeline pipes was to be acquired permanently and that AWSB was waiting for records of acquisition of the existing 18 m from NCC from council. He further clarified that since the PAPs have records for 12 m, the records from NCC would clarify about the extra 6m that was not accounted for. He informed the PAPs that GIBB Africa had purchased cadastral maps which would enable them to know who will be economically displaced. From there, recommendations would be made on the how compensation should be done. In addition to those recommendations, The World Bank would have to obtain a no objection form before accepting these recommendations. He further assured the PAPs that the report would be in line with;



- Land act
- Constitution of Kenya ,2010
- Word Bank's Operational Policies on involuntary resettlement.

The question of when the project construction would begin had been raised in the previous meeting and Kezziah from AWSB responded by saying that the project was still in the planning phase whereby details emerging from the study could influence the designs. Therefore it was not known for certain when the project construction would begin. She then reassured them that they could still use their land even after the cutoff date had been set, up until when the project begins.

During the last meeting also, the question of the actual land acquired had been raised. Since it was mentioned that 3m would be permanently acquired for the pipe while 6m would be acquired as working space, the enquiry was about who would compensate for damages done beyond the acquired 9m.
To this Kezziah from AWSB answered that the contractor would pay for damages caused by the project activities beyond the agreed 9 m.

From the response given by AWSB, another question was raised. The concern was that during construction, the machinery used by the contractor will degrade and destroy the 6m working space as well which will render that land useless to the owner yet permanent acquisition will only be done on the 3m used to lay the pipe. The PAP suggested that instead of acquiring 6 extra m as working space, the existing wayleave is big enough and can be used .He also emphasized that the land should be reinstated to its original state.

Mr. Koech from AWSB assured the PAPs that when the contractor is on the ground, a sociologist will work with him to ensure that he follows the recommendations made in the ESMP of the ESIA report. This is because those recommendations will cover all the social and environmental impacts expected by the project.

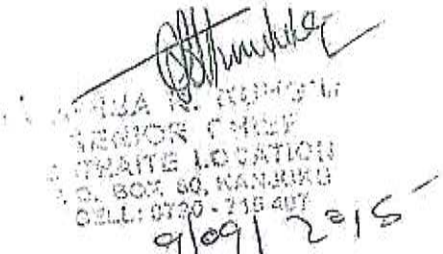
One of the PAPs wanted to know whether we had put cement beacons in between the existing pipelines even after they asked us not to survey the area until a meeting was held with AWSB. This, he informed us, had raised suspicion about our intentions since it seemed we were going behind their backs to forcefully mark and take their land.

Catherine from GIBB Africa assured the PAPs that the pegs the surveyor was using were wooden. She also informed them that surveying work stopped immediately the PAPs raised the issue and that AWSB was informed of their request for a meeting.

Kezziah from AWSB promised to look into the issue to find out who was responsible for the new beacons and to revert within a week. In addition to that, she reminded the PAPs the reason for the day's meeting. It was clear that although their concerns were about the proposed new pipeline, the other underlying issues had been exposed and would be looked into.

Mr Kiragu responded by saying that the PAPs don't protest new project but first want to be compensated for the existing three phases before the fourth pipeline project is introduced.

Mr. Koech from AWSB requested the PAPs to allow the GIBB Africa environmentalist to carry out the ESIA study first in order to establish the extent of the impact since the issues being raised are part of the impacts and would be captured in the report for future reference and further action.



Mr. Andrew from Ndarugo felt that there should be a committee by the PAPs ad representing the PAPs should be formed to handle the issues raised instead of calling everyone for a meeting every time we need to discuss something. He was also opposed to involving the chief and not the people affected directly.

Mr. Koech for AWSB responded that the role of the chiefs is to ensure there is transparency especially during compensation where imposters may try to pose as the land owners.

Though Mr. Andrew still insisted that the ESIA should not be carried out until the report from the NCC is presented to the PAPs, they were informed that City council have no information since they already handed over to AWSB but the documentation required will be searched for if time is allowed. They were then asked to let the process for acquisition start first and the.documents from NCC availed later.

Finally the PAPs agreed for the GIBB Africa environmental team to be allowed to conduct the ESIA and RAP studies as it will expose the underlying issues. They acknowledged that in the first place, though the issues existed,. they didn't have an avenue to highlight them and it is the ongoing study that provoked the PAPS into finally taking action about the three existing pipeline within the 18 m easement. It would therefore be beneficial to them if the underlying issues are identified and captured in the report for further action. However they were categorical that they wanted a committee for transparency in negotiating for compensation to avoid being short changed.

Before the meeting was concluded, Mr.Koech welcomed the area MCA to give his remarks.

Final remarks by the MCA

He expressed his gladness for having made it to the meeting albeit late. He then acknowledged the importance of Public Consultation while pointing out that sometimes, the public might oppose a project for no good reason if they are not well informed about it.

He went on to highlight the key issues that may arise with the new project including, issues of land acquisition, displacement, lack of compensation, destruction and unfulfilled promises made to the PAPs during the initial stages of the project.

The MCA highlighted some significant environmental and social impacts from projects previously done in the area as follows;

- In Ngethu the high pressured water released from breathers previously led to the death of 4 people, yet, there was no compensation paid;
- Siltation has led to depositing of harmful chemicals from pesticides on peoples farms;
- There are water pipes passing through the PAPs compounds yet they have no access to water in their homes.

The following were his suggestions and comments:

- AWSB should pay the PAPS for the land they want to acquire as well as for the existing 18 m easement corridor in order for the PAPs to benefit in the long term.
- The PAPs be given access to water since the pipelines are passing through their land.
- During valuation, the Valuer should the updated lists of the costs of crops and land as well as the current market value and not the government rates which are very low.

He emphasized that the County Assembly shall cooperate to see that the government realizes its goals to provide water to its citizens. He warned the PAPS not to sign agreements since they may be duped. He also requested the study team to walk with someone who can translate to people who may only understand mother tongue. He suggested that AWSB should involve the county government at every stage of their activities.

The meeting was adjourned after a word of prayer by Mama Mathu.

Notes drafted by	: GIBB Africa Ltd Environmentalist	
Name	: Catherine Juma	
Signature	:	**Date:** 03/8/15
Confirmed by	: AWSB representative	
Name	:	
Signature	:	**Date**
Confirmed by	: PAP representative	
Name	: Joshua K. Kunga	
Signature		**Date** 9/09/2015

JOSHUA K. KUNGA
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HAITE LOCAT
P.O. BOX 60, KANJU
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PREPARATION OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA) AND RESETTLEMENT ACTION PLAN (RAP) FOR NORTHERN COLLECTOR TUNNEL CONTRACT NO.AWSB/WASSIP-AF/COMP.1/CS-03/2012-THIKA -NGORONGO PIPELINES

JOSHUA K. KUNG'U
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09/09/2015

ATTENDANCE LIST- MEETING HELD AT GATUNDU DCC GROUNDS

S/NO.	NAME	AREA	ID NO.	TEL. NO.	SIGN
1	Mohamed K. Roch	AWSB	22492356	0722-218894	[signature]
2.	Keziah Adhiambo	AWSB	22071632	0720352697	[signature]
3.	GEORGE OLIVER	GIBB	11197486	0712196599	[signature]
4.	Anchor Mchungu	KAMWANGI	16208723	0700286044	[signature]
5	Andrew Mamba Gakumo	KAMWANGI	3428571	0725-672031	[signature]
6	CHRISTOPHER MAIYO	Kamwangi	6248677	0725290273	[signature]
7	JOSEPH WAITHAKA	KAMWANGI	0322012	0727055776	[signature]
8	Edmond Chege	Kamwangi	3110340	0721473374	[signature]
9	Miriam Kagure	Kamwangi	4949093	0713047729	[signature]
10	Alice Wanjiku	Kamwangi	3351833	0726621803	[signature]
11	ANTHONY MACHARIA K. GATHATTA	KAMWANGI	0206173	0721711934	[signature]
12	MARTIN GAKUMO GACHANJA	KAMWANGI	20592867	0711777023	[signature]
13	MARTIN NJUGUNA MUGURE	KAMWANGI	21529544	0729472470	[signature]

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9/09/2015

14.	KEVIN NJOROGE WACHIRA	KAMWANGI	25184550	0726629417	[signature]
15	TERESIA WAMBUI KIBUBA	KAMWANGI	–	–	[signature]
16	HANNAH KABURA KARIUKI	KAMWANGI	2570639	–	[signature]
17.	RUTH NTERI	KAMWANGI		0729925519	
18	MARY WAITHEREDO KAMAU	KAMWANGI		0714397493	
19	ONESMAS KARANJA	Kamwangi	9530033	0705923485	Mary
20	JOHN MUTHEE NJUGUNA	KAMWANGI		0726229268	[signature]
21	JAMES GITHAIGA	KAMWANGI		0722658725	[signature]
22	Joseph Muigai Gitau	KAMWANI	4919016	0729333106	[signature]
23	HANNAH NYAKAAYWE	Kamwangi	3367196		H.N
24	Lucy Nyamburu	Kamwangi	5252396	0712337765	[signature]
25	BENSON GITHINJI GITAU	Kamwangi	2571783	0713503365	[signature]
26	Joseph Njenga	"	"	0715469386	[signature]
27	Gabriel-Njoroge-Kimani	Kamwangi	13674127	0700932783 ~~07009832~~	[signature]
28	Joseph Mburu	Kamwangi	–	Thika Po box 754	[signature]
29	Paul Njenga	KAMWANGI	11817732	0715173971	[signature]
30	PETER MUIGAI KIBUBA	Kamwangi	3366932	0716810516	[signature]

31	JOSEPH MAUTA KIMANI	Kamwangi	0436609	0723665657	—
32.	Kabui mwaura	Kamwangi	1571782	—	—
33	JOHN GITHUA	Kamwangi	1868611	0720975129	—
34	JAMES GITAU	Kamwangi	~~07~~	0707351197	—
35	FRANCIS KARIUKI	Kamwangi	13843285	0729001767	
36	Juliana Nduati	Kamwangi	3060243	0725052135	
37	George N Mothuc	MCA	0721228205	0721228205	—
	[signature]				
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	9/09/2015				

PREPARATION OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA) AND RESETTLEMENT ACTION PLAN (RAP) FOR NORTHERN COLLECTOR TUNNEL CONTRACT NO.AWSB/WASSIP-AF/COMP.1/CS-03/2012-THIKA -NGORONGO PIPELINES

ATTENDANCE LIST- MEETING HELD AT KIAMWANGI SOCIAL HALL

S/NO.	NAME	AREA	ID NO.	TEL. NO.	SIGN
1	Mohamed K Rogle	AWSB	22492356	0722218894	[illegible]
2.	Daniel Mbugua	AWSB	11669547	0713404157	[illegible]
3.	Keriah Adhiambo	AWSB	22071632	0720352697	[illegible]
4.	George Omar	GIBB	11174486	0712196599	[illegible]
5	SAMUEL MUNENE	ASST Chief Nembu	10182027	0712117491	[illegible]
6.	Catherine Juma	GIBB Africa	24814085	0724899526	[illegible]
7	JOHN K. GITHU	ASS-CHIEF NEMBU	8614258	0720433087	[illegible]
8	STEPHEN M. MURITU	ASS-CHIEF THIKA	9267558	0712592056	[illegible]
9	[illegible]	Nembu	10182812	0701389335	[illegible]
10.	JOSEPH K. KIBERA	NEMBU	3430651	0713639077	[illegible]
11	SAMUEL MUNGI	NEMBU	23860049	0712954875	SAM
12	DAVID MBORU MARAI	NEMBU	0352268	070889206	[illegible]
13	Peter Kinyatu Nyanga	KARENGU	0434216	0727214508	[illegible]

SALOME W. KABUC
ASST. CHIEF
KIAMWANGI SUB-LOCA
Date: 22/07/15 Sign

14	STEPHEN NYORO WAIRIUKO	Nembu	4812659	0721554441	[signature]
15.	JOSEPH GATHENGE MUTHARIA	NEMBU KIRIKO	1194768	0722772815	[signature]
16	DANSON MBURU KIBUE	NEMBU	1018493	0729961511	[signature]
17	MURAGU NGUGUNA	NEMBU	21943598	0724929727	[signature]
18	PAUL MUTURI	NEMBU			
19	Teresiah Memia	Ngenda	9325584	0728483412	[signature]
20	Paul Karumbi Ngugi	Nembu		0702016224	[signature]
21	Flora Muthoni	Nembu	10629583	0711602883	[signature]
22	STEPHEN GITAU KIMANI	KAREMBU	14401968	0705195647	[signature]
23	JANE JOY KATAURE	NEMBU		0711366908	[signature]
24	Ngonga Marai	Nembu	3369973	0712230926	[signature]
25	Zachariah Kiereini	Nembu	22565677	0763832010	[signature]
26	Wanjiru Ntoroge	Nembu	4303957		[signature]
27	Francis Chege	Nembu	3367325	0717553432	[signature]
28	JOHN KABERA	Nembu	1839205		[signature]
29	JOSEPH KARAJA NGUGI	NEMBU	10517704	0700118114	[signature]
30	JOSEPH KABUMBI	Nembu	22429203		KAUM

SALOME W. KABUCHIA
ASST. CHIEF
KIAMWANGI SUB-LOCATION
Date 22/07/15 Sign [signature]

31	Joseph Njoroge Muchamba	Nembu	10977853	0714121206	[illegible]
32	Samuel Gitau Mwania	A/Chief Gathage	13219994	0724631731	[illegible]
33	Salome W. Kabuchwa	A/Chief Kiamwangi	11309518	0723440770	[illegible]
34	Sa Kirago Kagecha	Karembu	10182027	0712117491	[illegible]
35	Hadaa Njoki Wanyoike	Gathage	14453057	0727250909	[illegible]
36	Isaac Njoroge	Karembu		0721390840	[illegible]
37	Stanely Wanyoike	Karembu		0721588828	[illegible]
38	John Karuga	Karembu		0727269666	[illegible]

SALOME W. KABUCHUA
ASST. CHIEF
KIAMWANGI SUB-LOCATION
Date 22/07/15 Sign [illegible]

Notes for the meeting held with... the Project affected Persons from Ngatho sublocation regarding the Thika Kigoro on 30/7/2015

Attendance

1. Mohammed Koech
2. Samuel Mwanik
3. Annastacia Ngathi
4. Newton Stower
5. Anthony Wambui
6. Vincent
7.
8.

Agenda

Notes

The meeting started with a word of Prayer from a member of the audience, the chief went ahead to thank the member in the audience for their audience present attendance. He welcomed the GIBB and AKISB team to introduce themselves.

The GIBB team thanked the audience for their attendance and went ahead to reiterate the contentious issues that were raised during the initial meeting.

He stated that the issues that were contentious and were the details the size of land that was acquired (12m) but was amended to 18 without their knowledge, the effects of noise pollution, the environmental distruction. He welcomed the chief to translate the issue that were raised and allowed the audience to ask other questions that were not included in the previous meeting

Notes drafted by: Newton Stower | **Confirmed by:**

Designation: Project Environmentalist | **Designation:**

Signature: | **Signature:**

Project Name: .....

Project Code.....

Date of meeting: ...../...../ 2014

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Notes for the meeting held with...

Notes continued....

What will be done about the noise pollution during the construction phase.

Mr Muwanika responded by saying that the locals will be given first priority in getting the jobs. The unskilled labour will be sourced from the project locality, but for skilled labour, he will source it from the locality but if non is available, the contractor will use skilled labour that will execute this task as he feels fit

Employment: Will our children be employed in the project during the implementation and construction phases

Notes drafted by: Newton Stower *Confirmed by:*

Designation: Project Environmentalist *Designation:*

Signature: *Signature:*

Project Name: .....

Project Code.....

Date of meeting: ...../...../ 2014

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Notes for the meeting held with...

Notes continued....

Administration said that initially the agreement between the then Nairobi county council requested for 18m that was given but since then the land has been reclaimed unusable. We therefore propose that the native 9 m proposed for the project be acquired because when its under easement, they are not allowed to use the land fully.

Land in Mukuru is unavailable thus idea of resettlement may not be possible unless a PAP is willing to move to a far off area, the stated that even acquiring land from the people in the locality will be a problem because they might not be willing to move out of the area. A PAP is allowed to source for a piece of land elsewhere and be helped acquire it.

Mr Mwaniki gave an example of a project in Kariobangi where PAPs were not compensated and did not use the compensation money to buy the lands. But when the project starts, he is then left without land to build a house.

Mr. Mwaniki said that the values will come and look at the assets affected by the project then assign values to it

Notes drafted by: Newton Stower *Confirmed by:*

Designation: Project Environmentalist *Designation:*

Signature: *Signature:*

Project Name: .....

Project Code.....

Date of meeting: ...../...../ 2014

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Notes for the meeting held with...

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Question, Pits were dug on our land and were never covered, why where they never covered? Ans

Response: The pits were dug during the geotechnical survey to asses the soils within the proposed pipeline areas, However it is recommended that the land be reinstated to its, earlier estate before the acquisition of the soil samples. The surveyor who will come for the survey work will not dig holes but put beacons that will be wooden Pegges hammered to the ground.

Question: We want to know how the Km to be acquired on lease will be paid.

Response Mr. Mwaniki responded by saying that AKISB will acquire 3m on a permanent basis and will belong to AKISB but the 6m will be acquired on lease and will be given back to the owners after the project construction phase

Notes drafted by: Newton Stower *Confirmed by:*

Designation: Project Environmentalist *Designation:*

Signature: *Signature:*

Project Name: .....
Project Code.....
Date of meeting: ...../..../ 2014

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Notes for the meeting held with...

Notes continued....

Question: Who will take care of the expenses to incurred during the mutilation of the title deeds, since 1972 some of us have not been able to get our title deeds since then. Some of us have had a problem in getting out title deeds, so we want to know who will bear the cost.

Response: Mr. Mwamuki responded by saying that AKSB will take cater for all the expenses incurred during the processing of the titles and for the previous titles, AKSB will follow up with the know what issues the status of the titles that the owners have not received.

Question: The washout has destroyed lands that was acquired to drain water into the lakes; the land is in accessible in most of the areas where the washout is. The river have made claimed people lives since it has been deepened by the large volumes of water flowing from the pipelines.

Response: Mr. Mwamuki responded by saying that he is happy to have such issues raised and said that the issues have been taken up by the environmental team that will mitigate

Notes drafted by: Newton Stower

Confirmed by:

Designation: Project Environmentalist

Designation:

Signature:

Signature:

Project Name: .....

Project Code.....

Date of meeting: ...../...../2014

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Notes for the meeting held with...

Notes continued....

against all the issue raised based on the comments raised.

Question: Has anyone in the audience gone to see where the washouts have degraded the land and the environment.

Response: Mr Mwanki indicated that NKSB have not visited the area that the washout has destroyed.

Question: The NCKSC has not stated clearly how it will compensate for the addition 6m that was acquired, we want all the 6m to be acquired.

Notes drafted by: Newton Stower

Confirmed by:

Designation: Project Environmentalist

Designation:

Signature:

Signature:

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Project Code.....

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Notes for the meeting held with...

Notes continued....

Question: The river has become very wide and has cut off children attending Nyatitu primary school, we had walls and farm crops such as arrow roots, potatoes all along the peripheries of our land that have all been swept away by the water, we therefore want a bridge to be built and the 5m acquired fully. The wash out only acquired 3m but the banks have eroded expanded beyond the 8m to over 12 m.

Notes drafted by: Newton Stower *Confirmed by:*

Designation: Project Environmentalist *Designation:*

Signature: *Signature:*

Project Name: .....

Project Code.....

Date of meeting: ...../...../ 2014

GIBB Internatic

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Notes for the meeting held with...

Notes continued....

Question: the locale need assurance that their concerns about their earlier complaints will be taken into account, therefor it will be imperative that some sort of agreement such a a signed document i.e an Memorandum of understanding before the work begins.

When the final report by the consultant will be accepted and approved, their will be a MOU drafted and signed btwn AKSB, the PAP and chief also witnessing but this will not be possible if GIBB is not allowed to take account of all the ~~dat~~ assets and persons affected that will enable the completion of the report; therefore AKSB requests that the PAPs allow the consultant (GIBB Africa) to carry out the survey work and valuation exercise so as to complete the project.

Comment: the chief asked the Mmoeb audience to allow the project team entry onto their lands to ~~also~~ assess the assets that will be affected and where the pipeline is proposed to pass. He stated that this meeting was not to make written agreements but as a way to communicate the concerns to AKSB who will respond later make agreements based on the outcomes of the report done by the consultant

Notes drafted by: Newton Stower

Confirmed by:

Designation: Project Environmentalist

Designation:

Signature:

Signature:

Project Name: .....

Project Code.....

Date of meeting: ...../..... / 2014

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Notes for the meeting held with...

Notes continued....

Notes drafted by: Newton Stower

Confirmed by:

Designation: Project Environmentalist

Designation:

Signature:

Signature:

Project Name: .....

Project Code.....

Date of meeting: ...../...../ 2014

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Notes for the meeting held with...

Notes continued....

Notes drafted by: Newton Stower

Confirmed by:

Designation: Project Environmentalist

Designation:

Signature:

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Project Name: .....

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PREPARATION OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA) AND RESETTLEMENT ACTION PLAN (RAP) FOR NORTHERN COLLECTOR TUNNEL CONTRACT NO.AWSB/WASSIP-AF/COMP.1/CS-03/2012-THIKA -NGORONGO PIPELINES

ATTENDANCE LIST- MEETING HELD AT NGORONGO DO'S OFFICE

DATE: 30TH JULY 2015

S/NO.	NAME	AREA	ID NO.	TEL. NO.	SIGN
1	Mohamed K Kore	AWSB -	22492356	0722218894	[signature]
2	Simon Mwaniki	AWSB --		0723 975646	[signature]
3	PETER STOWER	GIBB	25454476	0726326599	
4.	Anastasia Ngath	GIBB	22475837	0728203970	[signature]
5.	Vincent W. Mwaura	ASST. CHIEF	12521362	0723317697	[signature]
6.	SAMSON NJDROGE	GIBB	9166804	0712113648	[signature]
7	Patrick Kamau Nyanya	Kanewa	3058506	0722787604	[signature]
8	John M. Gitera	Centre	3058006	0703948241	[signature]
9	EZEKIEL K. NTEMGA	CENTRE	12521451	0721713720	[signature]
10	NAMU WAMWEYA S	"	1843661	0701626049	[signature]
11	[illegible] KEBENU	"	6715485	—	[signature]
12	Peter Ndungu		08912273		[signature]

13	RUTH WANJIRA KAMAU	CENTRE	3058668	—	
14	MARY WAMBUI NYANGA	"	23594913	0723829428	[illegible]
15	MARY NEGERE CHANGANI	"	3059727	0714434596	[illegible]
16	JULIA WAMBUI MUCHAI	"	13409398	0723326151	[illegible]

PREPARATION OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA) AND RESETTLEMENT ACTION PLAN (RAP) FOR NORTHERN COLLECTOR TUNNEL CONTRACT NO.AWSB/WASSIP-AF/COMP.1/CS-03/2012-THIKA -NGORONGO PIPELINES

ATTENDANCE LIST- MEETING HELD AT NGETHU SOCIAL HALL

DATE: 30TH JULY 2015

S/NO.	NAME	AREA	ID NO.	TEL. NO.	SIGN
1	Mohamed K Poeh	AWSB	22492356	0722-218894	[signature]
2	ANTONY NJOROGE W.	ASSI/CHIEF NGETHU S/Hall	11878592	0729387814	[signature]
3	Gabriel G MYDIKE	Ngethu	3058378	3760	[signature]
4	JOHN NJENGA MUTUNGU	NGETHU		0722726895	[signature]
5	GATHUNDO CHEGE	NGETHU			
6	PETER NJETHA	NGETHU	8174873	—	[signature]
7	PETER MUNYAMBU	NGETHU	07961430	0724638289	[signature]
8	PETER MBURU	NGETHU			[signature]
9	JOSEPH KIBUGI	NGETHU			Joseph
10	Antony N MWURIRI	NGETHU	13409394	0715455214	[signature]
11	MICHAEL KIMANI	NGETHU	8173641	0726668270	[signature]
12	RUTH WANGARI M	NGETHU	—		

13	George Ndunju Wabara	NGETHU	11881612	0728406288	[illegible]
14	STEPHEN Njoroge M.	NGETHU	7545947	0725773799	[illegible]
15	Samon Mungai	Ngethu	9539998	0727782627	[illegible]
16	John Kiriga	Ngethu	3061577	0702069120	[illegible]
17	John Kamoro Njori	Ngethu	26195802	0725533270	[illegible]
18	Maria Njori Njoroge	Ngethu	9137213	0727[illegible]14	[illegible]
19	Agatha Nyakomu	Ngethu	3060229	0711588350	
20	TERESIA Wangari	NGethu	1199569	0728111405	Wangari
21	JOHN MUANGI K	NGETHU	8240661	0727979659	[illegible]
22	JOHN ~~G~~ Gitau	NGETHU	—	—	[illegible]
23	Ndunju A	Ngethu			[illegible]
24	FAITH WANGARI	NGETHU	22104178	0711310129	[illegible]
25	Joseph M. Kinyanjui	NGETHU	07657494	0729898152	[illegible]
26	Simon Nwaiki	AWSB		0723975646	[illegible]
27	Anastasia Ngati	GIBB	22473837 ~~0728203970~~	0728203970	[illegible]
28	Newton Gower	GIBB	26454475	0726326599	[illegible]

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PUBLIC CONSULTATION MEETING ATTENDANCE LIST

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 30/7/2015 VENUE: NGORONGO DO'S OFFICE

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	Mohamed Koech	Assistant Community Officer	MKoech@awsboard.go.ke	[signature]
2.	Simon Mwaniki	SISDO	SMwaniki@awsboard.go.ke	[signature]
3.	Nincent W. Mwaura	ASST. CHIEF-NGORONGO	0723-317697	[signature]
4.	Pauline Kahura			Kahura
5.	PATRICK MUHIA MBUGUA	[signature]	0712193944	
6.	CANCLAS MUIGAI NJORGE			[signature]
7.	JOHN NJEHA CHANGARI	FARMER	0717700081	[signature]
8.	GEORGE NHUHI	"	0722178387	[signature]
9.	PAUL GITAU MWANGI	FOMER	0728962986	[signature]
10.	SAMSON NGUI	Ngorongo Enterprises	0726159483	[signature]

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PUBLIC CONSULTATION MEETING ATTENDANCE LIST

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) AND RESETTLEMENT ACTION PLAN FOR PROPOSED THIKA-KABETE RAW AND TREATED WATER PIPELINE

DATE: 30/7/2015 VENUE: NGORONGO DO'S OFFICE

	NAME	DESIGNATION	Contacts Telephone/ Email address	SIGNATURE
1.	Mary Wainaina		0726277947	[signature]
2.	STANLEY WAINAINA	KIHINGO	0721678610	[signature]
3.	JOHN NDUNGU	CENTER	0721	[signature]
4.	SIMON KAMAU	KIHINGO	0729482810	[signature]
5.	KIRA GACHEKI	KIHINGO	0700677638	[signature]
6.	Joseph Mburu	Kihingo	0726418936	[signature]
7.	Joseph Ndukagu	Karaga	0716975532	[signature]
8.				
9.				
10.				

Notes of Meeting Held at Muthithi Gardens on 27th July 2015 between Muthithi Gardens Estate, Gibb Africa Ltd and Athi Water Services

Location: Muthithi Gardens Society Estate		**Minute Rapporteur:**Joyce Owino
Date: 21.05.14	**Time:** Start: 11:45hrs Finish: 12:30hrs	**File Ref:**0000987
Purpose	**Consultation meeting regarding RAP for Thika-Kigoro-Gigiri-Kabete Pipelines**	
Attendance	1. Allan Njoroge - Chairman Muthithi Gardens Estate 2. Nancy Njambi – Manager Muthithi Estate 3. Simon Mwaniki–Senior Community Development Officer AWSB 4. Mohamed K Koech–Assistant Community Development Officer AWSB 5. George Owuor– Operations Manager Environment Gibb 6. Joyce Owino–Social Environmentalist Gibb	
Minute Number	**Matters discussed**	
GIBB 01-01 -15	**Issue 1: Security of the Society when laying the pipes.** • Mr. Njoroge expressed his concern, that during construction, as they had previously experienced, they shall have areas in there perimeter estate fence opened up and this will attract intruders in the state, they request AWSB to provide two extra guards with a dog or have provision to allow them to add the guards with a dog for both day and night. This will discourage those that may want to take an opportunity to intrude. • AWSB also committed to provide security during construction.	
GIBB 02-01-15	**Issue 2: The moving and compensation of the Flowers along the pipeline** • There is a farmer who has botanical garden planted and there are flowers that need to be moved. Although he has started the move, the estate chairman requested that compensation be given to the man growing the flowers, as his livelihood will be interrupted during the pipeline construction. • The consultant mentioned that during valuation the disturbance of the flower farmer would be captured under temporary easement and compensation would be in lieu of this.	
GIBB 03-01-15	**Issue 3:The Road Repair** • The last pipe laid, by the Chinese Company that did construction, promised to repair the damage on the estate roads once they were done. The estate was left with the cost of repairing the damaged roads, as the contractor disappeared without repairing the damaged roads. They, expect that their roads will be repaired and a letter of commitment be given by Athi Water on the same in regards to the pipeline. • Simon Kariuki from AWSB expressed his regret and assured the chairman that in the next phase the contractor and appointed supervising consultants will follow up on previous injustices and comply during the current restoration	
GIBB 04-01-15	**Issue 4: Removal and reconstruction of the Guard Tower** • The estate has a guard tower which will have to be removed as a temporary easement during project construction .This will have to be rebuilt after the pipe installation. • Mr. Simon mentioned that the board will commit to restore any damages on properties done. AWSB advised the Consultant to put some budget on the ESMP. And Mr. Koech would liaise with the contractor ensure restoration.	
GIBB 05-01-14	**Issue 5: Ensuring that when the pipes are done that barriers will be put on all pipes to stop people using them to cross** • Mr Allan expressed concerns that people are using the pipes to cross. He requested that all pipes crossing the river to have barriers put to ensure they are not used as bridges and pathways for pedestrians and cyclists who use the pipes to cross to the other side. • Across the river, you may have to secure your way leave to ensure that there will be no encroachment.	
GIBB 06-01-14	**Issue 6:Njathaine Road within the estate** • ensure that there will be a usable all weather detour to allow vehicles that use the road to utilize during construction	
	Mr. George Owuor, Consultant mentioned that since the past historical injustices had been done by the contractor and this spoils for AWSB when they come on the ground to implement different phases of the project, the Consultant would recommend that in the next phase the Contractor and supervising Consultants follow through on the recommendations of the current RAP report Having no other business to discuss the meeting ended at 12:30Hrs.	

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR PROPOSED NORTHERN COLLECTOR PIPELINES

DATE: 27/07/2017 VENUE: Muthithi Gardens

	Name	Designation	Contacts Telephone/ Email Address	Signature
1.	GEORGE OLIVER	DDM - ENVIRONMENTAL	GIBB AFRICA LTD	[signature]
2.	Simon Mwaniki	SCDO - AWSB	smwaniki@awsboard.go.ke	[signature]
3.	Mohamed K Koell	ACDO - AWSB	MKoell@awsboard.go.ke	[signature]
4.	ALLAN MTOROGE	Chairman Muthithi Gardens	muthithigardenskiambu@gmail.com	[signature]
5.	Nancy Njambi	Manager Muthithi Gardens	0710 563385	[signature]
6.				
7.				
8.				
9.				
10.				
11.				

Appendix V: Response Matrix to Worldbank Comments

RESPONSE TO THE WORLDBANK COMMENTS FOR ESIA FOR THIKA-KIGORO-KABETE PIPELINE PROJECT

No.	World bank Comments	Response/Action	Chapter/ Page
1.	Cosmetic issue - there are pages #23 in the report	Cosmetic issues addressed	Addressed in the whole report.
2.	What is the timeline for the review of the dam safety and emergency preparedness plan will be done?	AWSB is in the process of procuring a consultant to undertake the dam safety review and prepare emergency preparedness plan. This consultancy for Thika Dam Remedial and Safety Measures is under WASSIP-AF and is at Technical evaluation stage	Not part of the ESIA report
3.	What are the specific mitigation measures to ensure construction at river and swamp crossings is done in a way to avoid disruption to fish movement.	Rivers will not be obstructed but rather diverted during under-river crossings hence allowing continuous fish movement upstream and downstream the diverted section.	Refer to section 7.3.8 of Chapter 7, Page 7-13 and 7-14
		Swamp crossings will be through placing pillars at intervals along the swamp hence this activity is not anticipated to affect fish movement if any in the swamp.	Refer to section 7.3.8 of Chapter 7, Page 7-13 and 7-14
4.	Did baseline review include the groundwater levels in the area?	No. Although the review has now been included from existing literatures across the three countries traversed by the pipelines	Refer to Chapter 7, Section 3.1.7, Page 3-7 and 3-8
5.	Provision of water to locals, including schools has come strongly during consultations, what can the project update in its design to address this? Indicate the measures in the project description (with the review of the project budget).	There will be temporary provision of water by water bowsers to the residents in the unlikely event of disruption to water supply in the areas.	Addressed by the Client in reference to detailed Design documents.
	What about temporary provision of water by AWSB/contractor to mitigate any water shortages during undercrossing construction. Pages 7-14, 7-16, 8-10, and 8-11.	There is likely to be no water shortage during river under crossings because the design report has adopted diversion technique to be used at the target rivers. Therefore the waters will not be obstructed rather diverted ensuring continuous flow of water downstream.	Refer to section 7.3.8 of Chapter 7, Page 7-13 and 7-14
		The ESIA report has also recommended that the contractor should notify the locals of any under-river crossings in the area	Refer to section 7.3.8 of Chapter 7, Page 7-13 and 7-14

No.	World bank Comments	Response/Action	Chapter/ Page
		early in advance. The notice should also state the period construction is likely to take at each affected river.	
6.	Are there any planned project specific material sites? If so, provide a list or a map of identified locations.	No project specific materials sites have been proposed in the design report.	Will be addressed by the client at tender stage
7.	Was the location of the construction camp identified (if so, show on the map)?	The construction campsite is not yet identified or mapped out.	Will be addressed by the client at tender stage
8.	Page 7-18 - mention Mugumo tree significance and requirement to avoid damage to such trees.	This has been added.	Refer to section 7.3.11, page 7-18; section 7.3.28, page 7-30.
9.	Page 8-10 -mention construction during approved periods to avoid disruption of fish movement.	Disruption of fish movement during construction along the river is likely to be insignificant since the river is not going to be obstructed rather diverted.	Refer to page 8-10 on river crossings-mitigation measures

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CLIENT: ATHI WATER SERVICES BOARD (AWSB)

PROJECT: ENVIRONMENTAL IMPACT ASSESSMENT (EIA) AND RESETTLEMENT ACTION PLAN (RAP) FOR NORTHERN COLLECTOR TUNNEL PHASE 1 AND THIKA-NGORONGO-KABETE PIPELINES

JOB NO: JK000987

TITLE: FINAL ESIA STUDY REPORT FOR THE PROPOSED THIKA-KIGORO-KABETE GRAVITY WATER PIPELINES

	Prepared by	Reviewed by	Approved by
ORIGINAL	NAME: Meave Omuruli	NAME: Aggrey Kwadha	NAME: Maurice Namiinda
DATE: 02.06.2016	SIGNATURE	SIGNATURE	SIGNATURE

REVISION	NAME	NAME	NAME
DATE	SIGNATURE	SIGNATURE	SIGNATURE

REVISION	NAME	NAME	NAME
DATE	SIGNATURE	SIGNATURE	SIGNATURE

REVISION	NAME	NAME	NAME
DATE	SIGNATURE	SIGNATURE	SIGNATURE

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