REPUBLIC OF KENYA

MINISTRY OF ENVIRONMENT, WATER & NATURAL RESOURCES

NORTHERN WATER SERVICES BOARD (NWSB)

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) PROJECT REPORT FOR PROPOSED KORONDILE WATER SUPPLY PROJECT UNDER NORTHERN WATER SERVICES BOARD

Works carried out under

Contract No.: CWSB/WaSSIP-AF/C/37/2016

Zamconsult Consulting Engineers Limited

DECEMBER 2017

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Disclaimer

This Environmental Impact Assessment report is being submitted in accordance with the terms and conditions of Contract in respect of provision of consultancy services for Environmental Impact Assessment Project Report on the Proposed Korondile Town Water Supply Project. It has been carried out in full observance of the ESIA regulations (Kenya Gazette Notice No. 56 of 13 June 2003) in compliance with the Environmental Management and Coordination (Amended) Act, 2015 and subject to terms and conditions of the National Environment Management Authority (NEMA)

EXECUTIVE SUMMARY

INTRODUCTION

The Government of Kenya in partnership with the International Development Association (IDA) under the titles of Borrower and bank respectively have arranged for credit towards the cost of Water and Sanitation Service Improvement Project – Additional Financing (WaSSIP-AF). This funding is channeled through several water Services Boards of which the Coast Water Services Board and Northern Water Services Boards form part.

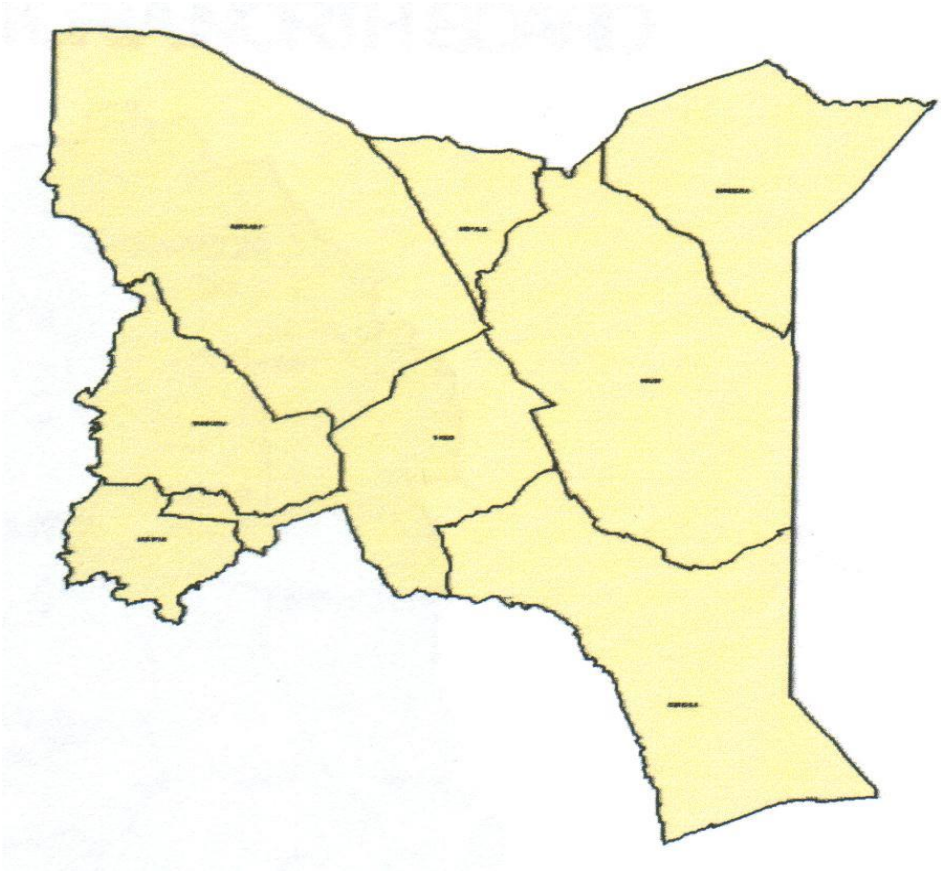
Coast Water Services Board (CWSB) and Northern Water Services Boards are independent Parastatal (Government Owned and Autonomous) created under the Water Act, 2016 but established through separate Gazette Notices. They operate under the Parent Ministry of Water and Irrigation and in accordance with: The provisions and regulations of the Water Act, 2016, The State Corporation Act Cap 446, Other Relevant Provisions of the Laws of Kenya and Rules and Regulations given in form of circulars by the Parent Ministry and Ministry of Finance.

The Northern Water Services Board which is a Parastatal covering seven counties of the Northern Kenya region access this funding through the Coast water services Board which is another agency covering the Coast of Kenya region. This is so because it was decided that the CWSB had the capacity to undertake the project having handled World Bank funded projects before.

The seven counties and sub counties covered by Northern water Serviced Board region are as tabulated in table 1.1 hereunder.

Table 1.1 Counties in the NWSB Region

S/No	County	Sub counties
1	Garissa County	Garissa, Ijara, Daadab, Lagdera and Fafi
2	Wajir County	Wajir South, Habaswein, Wajir East, Wajir North and Wajir West.
3	Mandera County	Mandera East, Mandera South, Mandera North, Mandera West, Lafey and Banissa
4	Marsabit County	Moyale, Marsabit central, Laisamis, Loyangalani,
5	Isiolo	Isiolo, Garbatula and Merti
6	Samburu	Samburu East, Samburu Central and Samburu North
7	Laikipia	Laikipia East, Laikipia West, Laikipia North



Map 1.1 Counties in the NWSB Region

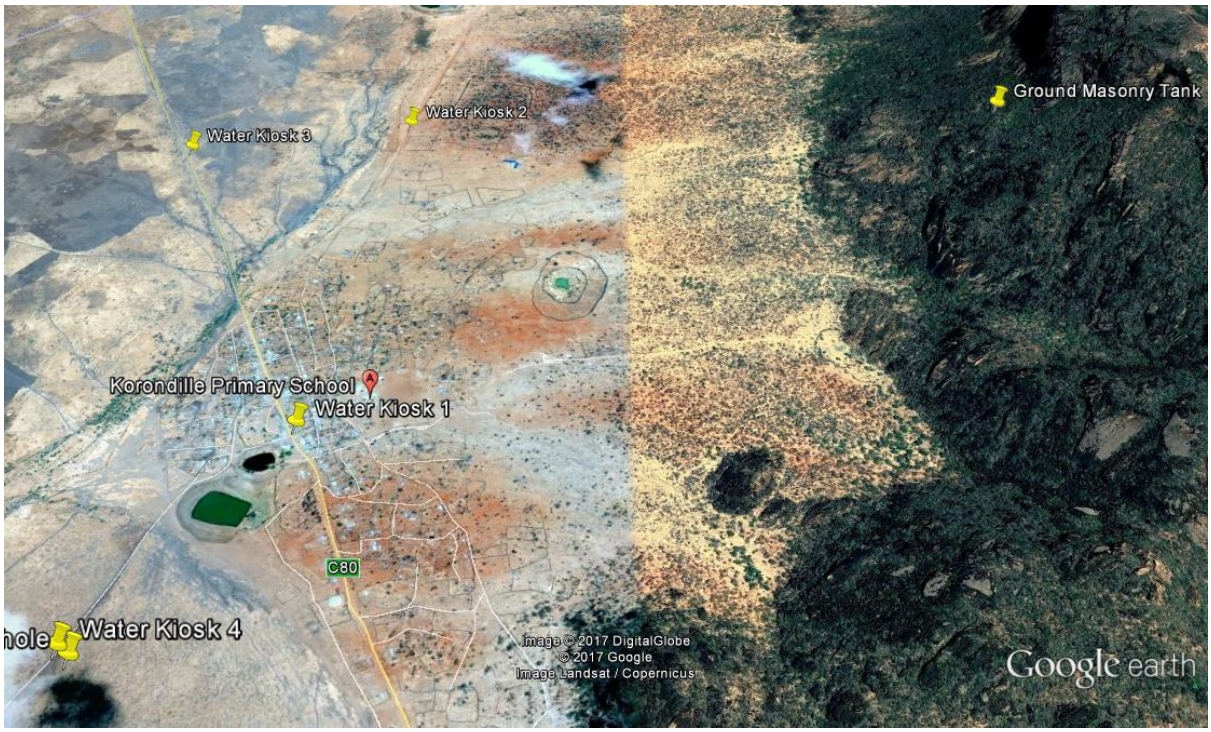


Figure 1-1 Google Image of the project area

The main objective of this project is aimed at improving the access to water for the Korondile people by increasing the water supply by 20m^3 at the end of the project period. For this to be

realized, Equipping of Nyatta borehole with standby Power Generating set, Submersible pump and other accessories, Laying 8km of rising main of 65/75mm GI/uPVC Class D, Laying 4km distribution lines of pipe diameters between 63 mm diameter to 75mm diameter, Construction of 1No 50m3 Ground Masonry Storage Tank at Korondile hills, Construction of 4No. Water kiosks and installation of 10m3 Plastic Tanks on top of their roof slabs needs to be done. The Proposed Korondile Water Supply Project is estimated to cost approximately KES 36,000,000 which 306,000 USD Equivalent.

Korondile experiences perennial drought and hence the need for a sustainable solution to this chronic problem of lack of sufficient safe water. The consulting services will therefore cover the town of Korondile and its environs expected to be along the water transmission routes and around the water source.

Korondile is geographically located at coordinates 02° 59' 42" North and 39° 18' 54" East. The centre is in Koror Odile Sub location, Korondile Location of Buna Division Buna Sub County of Wajir County. The center is located approximately 16km from Buna town which is also approximately140km North West of Wajir Town. On the other hand Moyale is approximately 90km North of Korondile.

In order to address the challenges of inadequate water supply experienced in the Korondile area, NWSB through CWSB engaged ZamConsult Consulting Engineers to undertake an Environmental and Social Impact Assessment in order to acquire a NEMA license before the commencement of the projects. The report is to capture all guidelines that have been provided by the World Bank.

In compliance with the Environmental Management and Coordination Act, the Consultant carried out the Environmental Impact Assessment of the Proposed Project Works in order to develop an ESIA report for submission to NEMA. NEMA would thereafter issue a license in order for the works to proceed

METHODOLOGY

The ESIA was carried out in a manner considered to be commensurate with the scale, technicality and sensitivity of the project. The chief stages in the process included proposal definition, screening, scoping, key informant & household consultations, impact assessment, mitigation, review, decision making and monitoring. To maintain high standards for this ESIA, recommendations have been inculcated into the project development process.

This is meant to serve as a stepping-stone to consent from environmental regulators and financial backers and a management tool for use during project planning and execution. It will also help evade unnecessary impacts, delays and unanticipated costs. By use of a holistic approach, the consultant obtained the necessary baseline data and information on the key aspects of the ESIA study. The following two major data collection and analysis processes were applied to carry out the ESIA.

1. Desktop studies
2. Field investigations

The main purpose of the field investigation was to verify information and data collected during the desktop study and earlier field investigation and collection of any new information that may assist in the assessment of impacts and design mitigation measures.

LEGAL FRAME WORK

There are several laws and regulations that exist that govern issues of environmental concern in Kenya. Some of those relevant to water and sanitation issues include the Environmental Management Co-ordination Act, the Water Act 2016 and the Public Health Act, among others. However, the most significant act that specifically addresses the issues of environmental impacts of development projects, including those on housing development, roads, water and sanitation, is the Environmental Management and Coordination Act (EMCA), 2015.

The Kenya Government's Environmental Policy aims at integrating Environmental Aspects into National Development Plans. The broad Objectives of the National Environmental Policy include:

Optimal use of natural land and water resources in improving the quality of Human Environment; Sustainable use of natural resources to meet the needs of the present generations while preserving their ability to meet the needs of future generations;

Integration of Environmental Conservation and Economic Activities into the process of sustainable development;

Meeting national goals and international obligations by conserving bio-diversity, arresting desertification, mitigating effects of disasters, protecting the ozone layer and maintaining an ecological balance on earth.

Kenya has approximately 77 statutes which relate to Environmental concerns. Most of these statutes are sector specific, covering issues such as public health, soil erosion, protected areas, endangered species, water rights and water quality, air quality, noise and vibration, cultural, historical, scientific and archaeological site, land use, resettlement, etc. Previously, Environmental Management Activities were implemented through a variety of instruments such as policy statements and sectorial laws and also through permits and licenses. For example, the Physical Planning Act of 1996 empowers local authorities to request existing facilities to conduct environmental assessments, while under the Local Government Act of 1998, it is an offence to emit smoke, fumes or dust which may be a source of danger, discomfort or annoyance. With the enactment of the Environmental Management and Co-ordination Bill in December 1999, the institutional framework for environmental management was strengthened.

In addition to the local legislation, the Consultant identified the various World Bank operational policies relevant to the project. Some of these policies include Operational Policy (OP) 4.01, OP 4.04, OP 4.11, as well as the World Bank Policy on Access to Information, 2010

POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS

The general environmental and social impacts which may result from the proposed project is presented in this chapter. The emphasis will be initially on the specific impacts that are likely to result from the nature of works (e.g. trenching, excavation, laying of pipelines and construction of water kiosks) and works category (e.g. water supply).

A minimal range of environmental and social implications will surely arise from the Korondile water supply project, notably along the pipeline routes and also at the borehole site. In general, successful implementation of the project will have high socio and economic benefits to the people and will contribute to the health and wellbeing. Overall, expected negative impacts are related to pipeline and associated works such as construction of the valve chambers, washouts and water kiosks.

These impacts are localized and not considered significant and long-lasting and can be mitigated through appropriate mitigation measures. The severity and duration of these impacts can be minimized by ensuring that the excavation and construction works are limited to short working sections, and that works are carried out rapidly and efficiently.

Nevertheless, environmental impact assessments (ESIA) are now recognized as an essential component in any development project and as an important decision-making tool, and the appropriate procedures were followed.

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

This was prepared to reduce, minimize or altogether eliminate the adverse impacts. Positive impacts are project enhancements and do not require mitigation.

Environmental / Social Impact	**Mitigation Action Plan**	**Responsibility**
Loss of flora and fauna	Site clearance should be limited to the minimum area required for the execution of the works. The records of the number and tree species cut to be kept. Replanting of the trees after the completion of the project. Top soil should be stockpiled separately from the subsoil. After completion of works, the subsoil should be backfilled first then top soil	Contractor Supervisor – project Engineer to consult KFS on appropriate replanting seedlings

Environmental / Social Impact	Mitigation Action Plan	Responsibility
	should be restored on top to facilitate natural regeneration of those areas.	Sub-County Environmental officer
Air pollution	Vehicles and other equipment emissions would be kept to a minimum by servicing and maintaining the equipment to manufacturer's specification. In, addition the contractor to be encouraged to use unleaded and low sulphur content petrol and diesel respectively for all equipment and vehicles The Contractor should also make use of the readily available labor for carrying out construction activities.	Contractor Supervising Engineer
Loss of structures, Loss of livelihoods, Loss of housing	Follow recommendations of the RAP screening report. However, the pipelines are located along within unsettled community land and road reserves with no encroachment of businesses in the pipeline routes as such there will be no loss of housing, livelihoods and land and therefore no need for RAP.	NWSB/County government/National Land Commission
Noise and Dust	Use protective clothing like helmets and dust masks on construction crew. Avoid night time construction when noise is loudest. Avoid night-time construction using heavy machinery, from 22:00 to 6:00 near residential areas; No discretionary use of noisy machinery within 50m of residential areas; Good maintenance and proper operation of construction machinery to minimize noise generation;	Contractor Supervising Engineer

Environmental / Social Impact	**Mitigation Action Plan**	**Responsibility**
	Installation of temporary sound barriers if necessary; and Construction sites and transportation routes will be water-sprayed on dry and windy days up to three times a day, especially if these sites are near sensitive receptors, such as residential areas or institutions.	
Impacts on Cultural Heritage	Use of "chance find" procedures provided in the appendices	Contractor Supervising Engineer County Officer-Water Energy and Natural Resources NWSB Community Leaders Local Administration
Generation of solid and liquid waste	Provide adequate waste disposal facilities. Ensure collection of all solid waste from generation points, safe transportation to a central point where they are sorted out and safely disposed according to type to protect the environmental resources. Put in place adequate and efficient sanitary facilities for handling liquid waste especially waste water to protect the river from pollution. Pit latrines can be used in areas where the other services are not available or feasible	Contractor Supervising Engineer WSP

Environmental / Social Impact	**Mitigation Action Plan**	**Responsibility**
Pollution of water resources	Ensure proper solid and liquid wastes disposal mainly from the construction camps and offices. Ensure proper measures are in place for collection and disposal of spilled oils and lubricants.	Contractor, Supervising Engineer County Water Officer
Health and safety	Provision of Personal Protective Equipment (ear muffs, gloves, dust masks and helmets) for the construction crew Employ a safety and health officer on site. Provide First aid kit and appropriate procedures and safety measures Ensure that all construction machines and equipment are in good working conditions to prevent occupational hazards. Provide workers training on safety procedures and emergency response such as fire, oil and chemical spills, pipe bursts and other serious water loss risks. Sensitize workers and the surrounding communities on awareness, prevention and management of HIV/AIDS through staff training, awareness campaigns, multimedia and workshops or during community Barazas. Provide information, education and communication about safe uses of drinking water. Provide condom dispensers at appropriate locations coupled with awareness campaigns to workers and surrounding communities on HIV/AIDS throughout the construction period	Contractor Supervising Engineer NWSB

Environmental / Social Impact	**Mitigation Action Plan**	**Responsibility**
	Provide enough toilets within the camp Work to minimize or altogether eliminate mosquito breeding sites. Provide appropriate human and solid waste disposal facilities In general comply with operating occupational health and safety law requirements	
Unaccounted For Water (UFW)	Ensure proper and accurate records on production and consumption are kept through metering to detect any UFW in the system. Have a leak detection program to identify aging pipes for replacement to control UFW. Any leakages and bursts to be repaired promptly. If these standards are met the tariffs are likely to be within affordable range.	WSP beneficiaries
Gender balance	Ensure equitable distribution of employment opportunities between men and women Provide toilets and bathrooms for both male and female workers on site	The contractor The Supervising Engineer
Service Delivery	Provide appropriate signage to warn motorists and other road users of the construction activities, diversion routes to ward off traffic accidents. Communicate any intended disruption of the services to enable the people to prepare e.g. by having emergency water storage and provision facilities. Areas being trenched to be temporarily cordoned off to avoid people and animals accidentally falling into open trenches.	The Contractor

Environmental / Social Impact	**Mitigation Action Plan**	**Responsibility**
	In the event that delivery trucks damage parts of the road, repair the spots in consultation with the local authorities. Provide adequate water storage facilities to ensure adequate supplies to meet the new demand. Ensure proper maintenance of the water works Use pipes of good quality materials	

PUBLIC PARTICIPATION

Public participation is a very important component of ESIA studies. For this project, public consultation was conducted at two levels namely:

- Direct interviews with individuals in the project area were done on the 30th may 2017.
- Interviews with key informants in the project area were done on the 30th may 2017.

MONITORING, REVIEW AND EVALUATION

This consists of measures to be used to monitor the effects on a long term basis, including the collection of data, the analysis of data, and the enforcement procedures which are available to ensure implementation of the project as per the ESMP. Appropriate monitoring indicators have also been outlined. These include but not limited to:

- Parameters of ambient air quality (particulates, NO and CO),
- Number of complaints by local people on dust and additional traffic, etc.
- Incidence rates of dust induced lung diseases.
- Levels of air pollution.
- Parameters of EMCA Noise and excessive vibrations Regulations
- Number of complaints by local people on noise and vibrations
- Parameters of EMCA Water Quality Regulations 2006 and others such as WHO Guidelines for Drinking-water Quality.
- Parameters of EMCA Waste Management Regulations 2006 and others such as OSHA.
- Number of occupational related accidents or fatalities over a period of time including police records on injuries and fatality rates.
- Prevalence rates for STI's and HIV.
- Availability of condoms, and contraceptive supply.

Overall, it is recommended that a monitoring team be established to ensure regular monitoring, review and evaluation throughout all the phases of the project.

CONCLUSIONS AND RECOMMENDATIONS

The ESIA concludes that the project will have substantial positive environmental benefits. It will supply sufficient potable water to meet projected future demands of domestic and other uses in the project area. The pipelines will be laid along the road reserves and no structures will be affected and therefore no need for the resettlement action plan. The adverse impacts on the physical and natural environment will be "in sum total," not significant, and can be handled through the recommended mitigation measures. There are incremental costs required to achieve these.

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LIST OF ACRONYMS

AIDS	Acquired Immunodeficiency Syndrome
CBD	Central Business District
CBO	Community Based Organization
EMCA	Environment Management Coordination ACT
ESMMP	Environmental and Social Mitigation and Management Plan
ESMP	Environmental and Social Monitoring Plan
TOR-	Terms of reference
OHS-	Occupation health and safety
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
G.O.K	Government of Kenya
HIV	Human Immunodeficiency Virus
ID No.	Identity Card Number
Kshs.	Kenya Shillings
KFS	Kenya Forestry Service
KWS	Kenya Wildlife Service
NWSB	Northern Water Services Board
CWSB	Coast Water Services Board
NEMA	National Environment Management Authority
NGO	Non-Governmental Organization
PAP	Project Affected Person
PPE	Personal Protective Equipment
STD	Sexually Transmitted Diseases
WRMA	Water Resources Management Authority

WSB	Water Services Board
WSP	Water Services Provider
WSS	Water Supply and Sanitation Services
m^3	cubic metres
M	Meters
Km-	kilometers
P.a-	per annum
Mm-	millimeters

1 INTRODUCTION

1.1 NEED FOR THE PROJECT

Korondile Town depends on ground water for its water needs. The present water production is estimated at 160m3/day which is far below the overall demand. People of Korondile rely on several water pans located within Korondile centre and also Nyatta borehole which is located at approximately 10km from Korondile centre. Unfortunately, the pans normally dry after two to three months after the end of rains. The pans are owned by the community while a few others are privately owned. With the ever growing population, the human water demand has been overworked out. The saline boreholes and water pans have been dedicated to serving the animals of which their water demand will be handled separately.

Tackling the perennial water problem in Korondile by the Northern Water Services Board assisted with the Worldbank will stimulate economic growth thereby bringing about improvements and sustainable infrastructure development.

The proposed Korondile water supply project is targeted at investments on equipping of equipping of Nyatta borehole with standby Power Generating set, Submersible pump and other accessories, Laying 8km of rising main 65/75mm GI/uPVC Class D, Laying 4km distribution lines of pipe between 63mm dia to 75mm diameters, Construction of 1No 50m3 Ground Masonry Storage Tank at Korondile hills and the Construction of 4No. Water kiosks and installation of 10m3 Plastic Tanks on top of their roof slabs.

1.2 TERMS OF REFERENCE

The TOR requires that an ESIA Study of proposed water supply system be carried out. The ESIA study will therefore be a study of potential environmental impacts of the project. An Environmental and Social Management Plan (ESMP) with comprehensive mitigation measures and environmental monitoring plan will be drawn and the proponent advised accordingly. The analysis includes, but not limited to the following:

- Evaluation on the project impacts on flora, fauna, soils, air, water and identification of other impacts likely to be generated by the proposed project
- A description of actions taking place during the main phases of the project (construction, operation, and maintenance) which could lead to environmental damage;
- Preparation of plan drawings which show the location of the facility relative to the local bio-physical and socio-cultural environmental features;
- Identification of the potential impacts of the facility relative to surrounding land use
- Preparation of an action plan for the repair of the damage done and for the prevention of any negative effects resulting from the new work.
- Formulation of a plan to prevent anticipated undesirable impacts from being actualized.
- Evaluation of the relationship of the proposed project to existing policies, legislation and institutional framework;

1.3 ESIA OBJECTIVES

The overall objective of the ESIA is to ensure that all environmental consequences due to the construction and operation of the proposed Korondile town water supply system are evaluated and addressed as part of the mitigation measures incorporated into the proposed Korondile water supply system. The specific objectives of the assignment are:

- Analyzing the physical, biological, and socio-economic environment of the project area with respect to results of the proposed project's preliminary design.
- Screening of potential issues, concerns and impacts relative to siting, construction and operation of various designed components to distinguish those that are likely to be significant for a particular subcomponent and warranting further study.
- Recommending measures to mitigate adverse issues, concerns and impacts, to aid the detailed design process.
- Preparing a preliminary Environmental and social Management Plan indicating impact areas, recommended mitigation measures, and method of monitoring impacts, particularly during construction and operation phases.
- Proposing an Environmental Monitoring Plan (ESMP) and the Institutional Set Up For Implementation of the above Environmental Management Plan.
- To fulfil the legal requirements as outlined in section 58 to 69 of the Act and Regulation 7 of the EIA Regulations.
- To obtain background biophysical information of the site, legal and regulatory issues associated with the project;
- To assess the legal and regulatory framework governing the project;
- To allow for public participation;
- To lower project cost in the long term;
- To compile an ESIA Project Report for submission to NEMA.

Generally, ESIA also aims to ensure that development projects are implemented in a sustainable manner. Sustainable development is increasingly becoming a common synonym to environmental management in infrastructure development. It refers to a pattern of resource use that is aimed at meeting present day human needs while preserving the environment so that these needs can be met in future generations. Sustainable development ties together concern for the carrying capacity of natural systems with the social challenges facing humanity.

1.4 PROJECT LOCATION

Korondile is geographically located at coordinates 02° 59' 42" North and 39° 18' 54" East. The centre is in Koror Odile Sub location, Korondile Location of Buna Division Buna Sub County of Wajir County. The center is located approximately 16km from Buna town which is also approximately140km North West of Wajir Town. On the other hand Moyale is approximately 90km North of Korondile.

1.5 METHODOLOGY

The ESIA was undertaken at a level that was considered to be commensurate with the scale, complexity and sensitivity of the project. The key stages in the process included proposal definition, screening which included key informant & household consultations, impact assessment, mitigation, review, decision-making and monitoring, as part of the preparation of this project report. For this ESIA to be good, recommendations have been integrated into the project development process. This should not be seen as a barrier to development or as an unnecessary cost. As well as being a stepping-stone to consent from environmental regulators and financial backers, it is a management tool for use during project planning and execution and will help avoid unnecessary impacts, delays and unexpected costs.

The consultant used a holistic approach to obtain the necessary baseline data and information on the below-listed aspects of the ESIA. An in-depth desk study, field observation, and wide consultation with stakeholders, key informant interviews and structured socio-economic interviews were carried out so as to obtain the requisite data and information on the following themes:

- Human Environment including; Socio-economic, Socio-cultural and Socio-legal
- Natural Environment including; Flora, Fauna, Soil, Water, Air, Climate and Landscape
- Built environment including; Material Assets, Historical /Archaeological Sites and Monuments and
- Aesthetic Environment

The consultant used the available information to derive or predict or assess impacts and classify them under human, natural and built environment at pre-construction stage, Construction Stage and Operation stage of each project sub-component.

Any negative impact was widely assessed and the most suitable mitigation measure apportioned as a solution to the problem. Positive impacts were noted as such and further reinforced by statements of actions that enhance their productivity and sustainability in the development process during and after the implementation of the project.

ESIA was done for all the stages of the project including planning, construction, and operation and decommissioning.

2 PROPOSED PROJECT DESCRIPTION AND ALTERNATIVES

The project is located at Korondile Town Wajir County:

Figure 2-1 Google image of Korondile the Project area

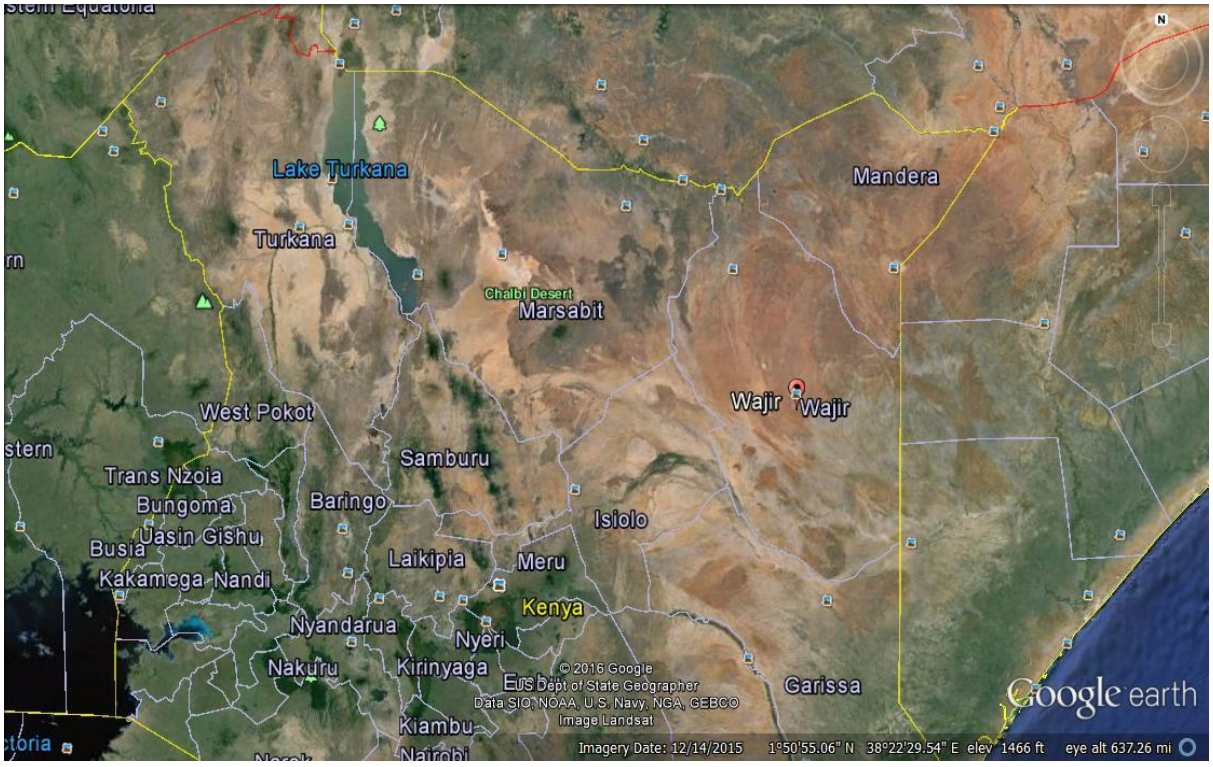

Figure 2-2 Korondile Centre in Wajir County

The project intends to improve the water supply in Korondile town and its environs through

- ✓ Equipping of Nyatta borehole with standby Power Generating set, Submersible pump and other accessories.
- ✓ Laying 8km of rising main 65/75mm GI/uPVC Class D
- ✓ Laying 4km distribution lines of pipe between 63mm dia to 75mm diameters
- ✓ Construction of 1No 50m3 Ground Masonry Storage Tank at Korondile hills
- ✓ Construction of 4No. Water kiosks and installation of 10m3 Plastic Tanks on top of their roof slabs

2.1 THE BACKGROUND OF THE PROPOSED PROJECT

Korondile center just like the entire Wajir County is a perennially water deficient place. There are no rivers and the source of water is through boreholes and water pans which harness surface runoff. Some of the pans are located within town while others are located in the villages far away from town.

The Residents prefer water pans as they offer water that is fresh and devoid of minerals they actually call it sweet water. The other reason is that it is considered free water because there are no mechanisms of collecting revenue.

Most of water pans are owned by the community. Such pans are constructed and periodically rehabilitated by Public funds either through the central Government or county Government. However, a few others are owned by well to do individuals who use them mostly to water their animals.

Pans in Kenya are mostly constructed to offer a 3 month storage. The minimum recommended depth is normally 2.5m to counter the high evaporation rates estimated at over 2.65m per year. Considering that the rain seasons come in March and in November giving a drought period of over 5months it means that there are 2-3months of drought (Mostly severe) in which the communities resort to boreholes and water trucking during these water stress moments.

The Nyatta Borehole 1 which was drilled in the year 2009 by the Kenya Red Cross society has an appropriate safe yield of $8m^3$/hr and gives relatively fresh water compared to a few other boreholes in Nyatta and Korondile Location in general which are saline and low yielding. The Korondile water supply project was designed with the following infrastructure;

- ✓ Nyatta borehole above with a Gen-set, pump and shelter(pump house)
- ✓ 2No 50m3 Masonry Storage Tank for the people of Nyatta
- ✓ 63mm uPVC Class B Rising Main
- ✓ 50m3 Masonry Storage Tank at Korondile Hills
- ✓ 75mm uPVC Class B Gravity Distribution Mains which was never constructed
- ✓ 4No water Kiosks which were never operationalized

In this project, the Nyatta borehole 1 was connected to Korondile hills $50m^3$ Masonry Storage Tank via a 63mm uPVC Class B Rising Main 8km long. Unfortunately, the project never worked due to a poor choice of pipe material class against the pumping head. Effectively no

water was delivered to the Storage Tank and pipes burst massively. This was the case especially for those that were close to the pump.

There exist one number 50m3 Masonry Storage tank located at the Korondile hills which is situated near the town center and at a distance of about 1KM away. This tank is meant to serve as a balancing tank. However, its storage capacity is smaller compared to both the demand requirement and the water supply available. Calculations show that the Water storage requirements should be approximately 100m3 which is about half the Supply capacity estimated at nearly 160m3.

On the other hand, there exist 2No $50m^3$ Masonry storage tanks at the Nyatta borehole site which are meant to serve the Nyatta Community at the borehole source. A 75mm uPVC pipe diameter was proposed to connect the 50m3 Korondile hills and the communal water points commonly known as water Kiosks in Korondile centre. However it was never built.

There are four communal water points otherwise commonly referred to as Water Kiosks. Since they were constructed, they never worked as the Distribution mains from the 50m3 Storage tank was never constructed and the Rising main between the borehole and the Storage Tanks never worked due to reasons elaborated above.

The Water Supply is being run by Korondile Water Uses Association who have committees running the water facilities by source i.e Nyatta borehole has a WUA while each water pan has it is own. It is expected that Nyatta borehole water uses will run the Korondile water supply once it is commissioned. However, the WUA lacks the financial capacity, Human resource capacity and the infrastructure to be vibrant.

Figure 2-3 Nyatta borehole I

Figure 2-4Standby Generator at Nyatta Borehole 1

Figure 2-5 Storage Tank at Nyatta borehole 1

Figure 2-6 Locals Fetching water from the Nyatta borehole 1

Figure 2-7Animals Drinking water at the Nyatta Borehole 1

Figure 2-8 Water Pan at Korondile

2.2 DESIGN COMPONENT

This chapter illustrates the criteria in which the raising mains will be laid together with the distribution mains networks of the water. It also illustrates the places where the tanks are located together with the borehole sites.

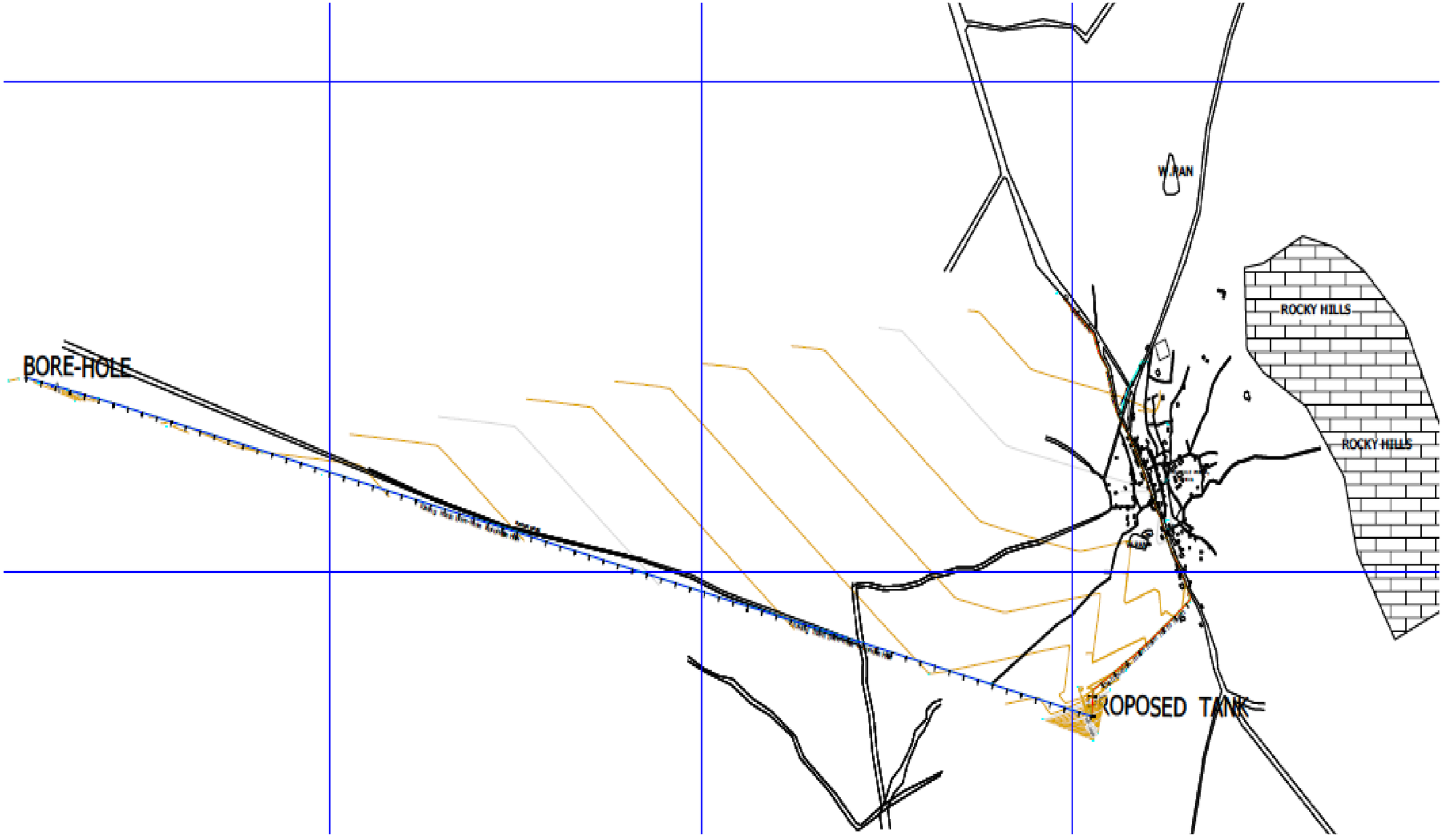

Figure 2-9: Proposed Extensions and Augmentation of Korondile Water Supply

2.3 PROJECT COST

The Proposed Korondile Water Supply Project is estimated to cost approximately KES 36,000,000 which 306,000 USD Equivalent. Table 6 has the details.

Table 2-1 Estimated Capital Cost Required

	SUMMARY PAGE			Amount	
				USD	KES
1	Preliminaries			19,600	1,960,000
2	Genset and submersible Pump			18,000	1,800,000
3	The Rising Main			160,060	16,006,000
4	50m3 Masonry Storage Tank			15,550	1,555,005
5	The Distribution Mains			62,714	6,271,400
6	Cost of ESMP			20,056	2,005,600
	Sub Total			295,980	29,598,005
	All for 15% Contingency			44,397	4,439,700
	Add 16% VAT			54,460	5,446,032
	Grand Total			**394,483**	**39,483,737**

3 ALTERNATIVES TO THE PROJECT

This chapter highlights all the alternatives considered during the design of the improvements, these included looking at different locations as well as technology employed in the design. The following alternatives were considered.

3.1 ALTERNATIVE SITES FOR SETTING UP THE IMPROVEMENTS

This alternative considered the setting up of new raising mains and the distribution networks. The current raising mains and distribution network are laid along the road reserves even though they do not provide water to the water kiosks as they have burst. With this, it was considered wise to lay the lines along the road reserves as they had been previously laid.

An alternative site for the tank was considered, however, its location was prone to cause resettlement issues even though land is communally owned and therefore the present choice of its location.

3.2 ANALYSIS OF ALTERNATIVE DESIGNS

The design arrived at took into consideration the available land. The pipelines will be laid along the road reserves and as such, there is no need for land acquisition. Land acquisition will upscale the cost of the project as compensation will need to be done and thereby also a crises of resettlement will arise. As such there is no design alternative that is foreseen as it will be a cost effective option in the longer term and environmentally sustainable.

3.3 NO ACTION ALTERNATIVE

The No Action Alternative is the future without the planned Project. The alternative entails not equipping the Nyatta borehole, not constructing the raising mains and the distribution network and not constructing the tanks. With this therefore, the people of Korondile will therefore continue to experience the perennial water shortage problem. The immediate and surrounding environment will continue to be negatively impacted due to water scarcity. In the long run, the biodiversity of Korondile will be negatively impacted.

4 DESCRIPTION OF THE PROJECT ENVIRONMENT

4.1 CLIMATE AND VEGETATION

The area is barren and very hot and dry almost throughout the year. The rainfall pattern here is bimodal with the short rains occurring in October and November while the long rains occur between March and May. The mean annual rainfall is estimated to range between 200 and 300mm. High temperatures are recorded in the area throughout the year with the average being about 27o C while the Annual average evaporation rate is estimated at 2630mm.

On the positive note the continuous sunshine in the area gives a high potential for harvesting and utilization of solar energy. The Centre is characteristic of sparse vegetation cover consisting mainly of short scattered trees. Along the laggas are deposits of sand.

Figure 4-1 Vegetation at Korondile

4.2 TOPOGRAPHY

The center lies at an altitude of about 600m above the mean sea level. The terrain of the area is moderately flat with isolated beautiful stony hills.

Figure 4-2: Korondile Hills just behind Korondile town

4.3 GEOLOGY AND SOILS

The Korondile area is characterized by the abundant occurrence of weakly to strongly foliate metamorphosed mafic - ultramafic rocks with the associated meta sediments and massive to weakly foliated granitoids.

There are sporadic layers of metamorphosed acidic volcanic rocks and thin sedimentary derivatives. The mafic - ultramafic rocks generally show wide mineral composition with green schist and amphibolites making the greater part.

Figure 4-3: Rocks at Korondile

4.4 DRAINAGE

The major source of water is from the Nyatta boirehole from which the local fetch water. The water pans also aide the local with water even though the pans dry after a short time. The pans are mostly used for livestock use.

4.5 BIODIVERSITY

The County is surrounded by desert and semi desert rangelands. Boreholes and water pans provide water to the Korondile residents for domestic and livestock consumptions.

	
Camels at Korondile	Goats at Korondile

4.6 ECONOMIC RESOURCE ACTIVITIES

4.6.1 Livestock keeping

Livestock keeping is long held practice by the residents of Korondile of which it does account for the most of the livelihood incomes in the pastoralist lifestyle.

4.6.2 Crop farming

Crop farming is practiced with maize and beans being the most abundant in the area. The surrounding environment is rich in shrubs and scanty bushes. Crop farming is practiced with the aid of irrigation by the borehole water and water from the water pans.

4.6.3 Business

Korondile town also supports a wide range of businesses. These include: retail/wholesale shops, hardware, chemists, agro vets, hawking, book shops, butcheries, open-air markets, groceries, hotels/bars and, among others

4.6.4 Transport industry

Korondile local transport options include:

- Car
- Bus
- Truck
- Camels

4.6.5 Religion

Both Muslims and Christians inhabit Korondile area even though, Islam is the dominant religion.

4.6.6 Water sources

Korondile town is served by the Northern Water Services Board. The people of Korondile have their own Water Users Association which are under NWSB. There is no sewage system in Korondile town. Other sources of water include boreholes, shallow wells, pans for human and livestock consumption.

4.6.7 Water situation

The water situation in Korondile area is highlighted below: The water consumption rates guidelines are also provided in the Appendix 13.2.

	Consumption rate	**Present (2016)**	**Initial (2017)**	**Future (2027)**	**Ultimate (2037)**
Population		12,135	12,863	23,034	41,254
Daily Demand for Water (m^3/day)	20l/capita/day	242.70	257.26	460.72	825.07

Table 4-1 Present Domestic Water Demands (m3/day)

Institution	**Consumption rate**	**Water Demand m^3/day**				
		Current Population	**Present demand (2016)**	**Initial demand (2017)**	**Future demand (2027)**	**Ultimate demand(2037)**
Day Schools	5 l/h/d	1,437	7.19	7.62	13.64	24.43

Health Centre	200l/bed or 5000 Lts Minimum	1	5.00	5.30	9.49	17.00
Administration offices	25 l/h/d	12	0.30	0.32	0.57	1.02
TOTAL			**12.49**	**13.2341**	**23.70**	**42.44**

Table 4-2 Institutional Water Demands (m3/day)

Category	**Rate**		**Water Demand m^3/day**			
		Units	**Present 2016**	**Initial 2017**	**Future 2027**	**Ultimate 2037**
Shops	50 l/d	**18**	**0.09**	**0.10**	**0.17**	**0.31**
Butcheries	100 l/d	**3**	**0.30**	**0.32**	**0.57**	**1.02**
Hotels/Tea shops	150 l/d	**6**	**0.90**	**0.95**	**1.71**	**3.06**
Lodges	500 l/d	**1**	**0.50**	**0.53**	**0.95**	**1.70**
Mosque	300 l/d	**2**	**0.60**	**0.64**	**1.14**	**2.04**
Garages	300l/d	**1**	**0.30**	**0.32**	**0.57**	**1.02**
Total			**2.69**	**2.85**	**5.11**	**9.14**

Table 4-3 Present, Initial, Future and Ultimate Daily Commercial Water Demands (m3/day)

Consumer Category	**Water Demand m^3/day**			
	Present 2016	**Initial 2017**	**Future 2027**	**Ultimate 2037**
Domestic demand	242.70	257.26	460.72	825.07
Institutional demand	**12.49**	**13.2341**	**23.70**	**42.44**
Commercial demand	**2.69**	**2.85**	**5.11**	**9.14**
TOTAL WATER DEMAND(TWD)	**257.88**	**273.34**	**489.53**	**876.65**

Table 4-4 Summary of water demand (m3/day)

	Water Demand m^3/day			
	Present 2016	**Initial 2017**	**Future 2027**	**Ultimate 2037**

Overall demand	**258**	**273**	**490**	**877**
Present production	160	160	160	160
Deficiency Today	**98**	**113**	**330**	**717**

Table 4-5 Comparison of water production against Overall water Demand m3/day

5 ENVIRONMENTAL AND SOCIAL ECONOMIC SURVEY

This Section discusses the baseline situation in respect of climate, topography, air quality, soils and geology, hydrology, terrestrial ecology, cultural heritage sites and socio-economic structure as well as existing infrastructure and utilities such as water, sewerage, transportation network, electricity, air transport and telephone/telecommunications and solid waste management in the region of the proposed project.

5.1 ENVIRONMENTAL AND SOCIAL ECONOMIC SURVEY

The socio-economic situation of the area was captured based on findings of a household survey carried out using a structured questionnaire. A sample group of 100 households, distributed within the project sites was interviewed for purposes of the analysis.

5.2 POPULATION DYNAMICS AND HOUSEHOLD CHARACTERISTICS

The general trend shows that most of the people fall in the 5-18 and 19-35 Yrs age groups as shown in figure 5-1

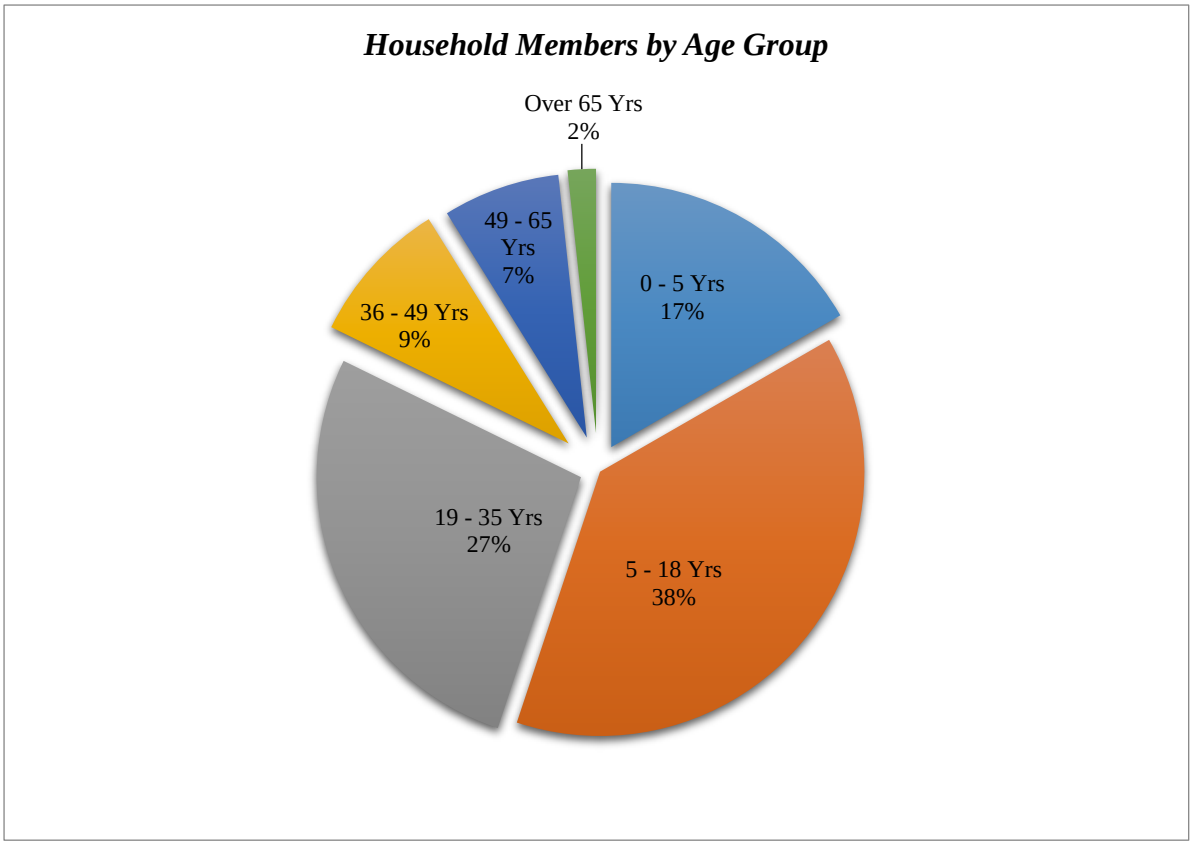

Figure 5-1: Household members by age group

The study established that most residents had attained basic education level as shown in Figure 5-2, Literacy levels were as follows:- Primary level 30%, Secondary level 16%, college /university 9% and no education at all 45%. Therefore the areas have a high literacy level, which is common in urban settings but still more needs to be done to educate the public.

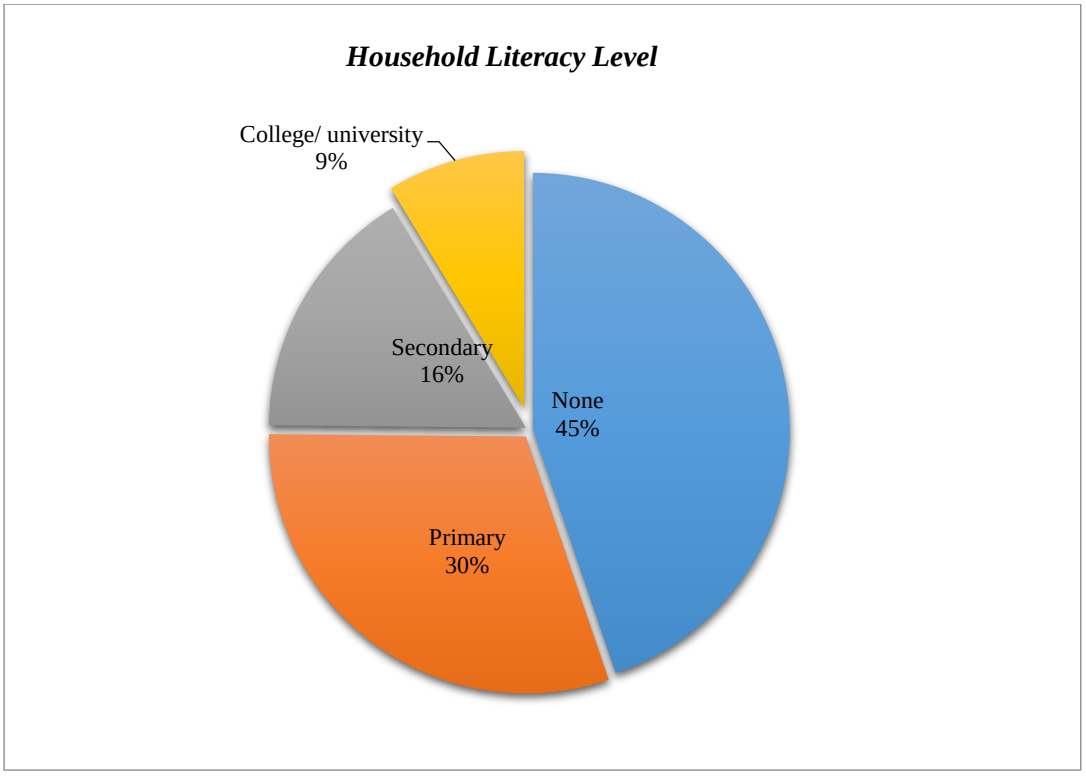

Figure 5-2: Education level of Korondile residents

5.3 SOCIO-ECONOMIC ACTIVITIES AND LAND USE PATTERNS

The main socio-economic activities are livestock farming and crop farming, common to rural settings with 43% and 20% respectively. The other socio-economic activities are shown below:

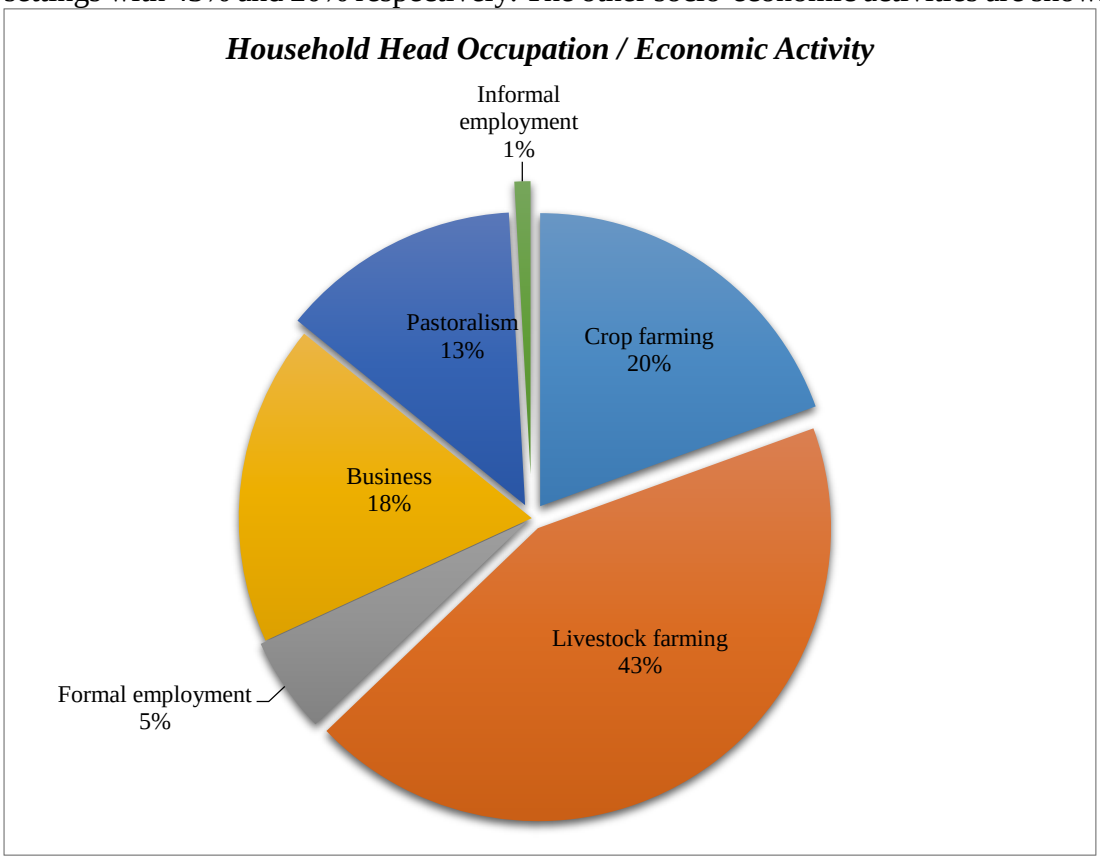

Figure 5-3: Economic activity of the household heads

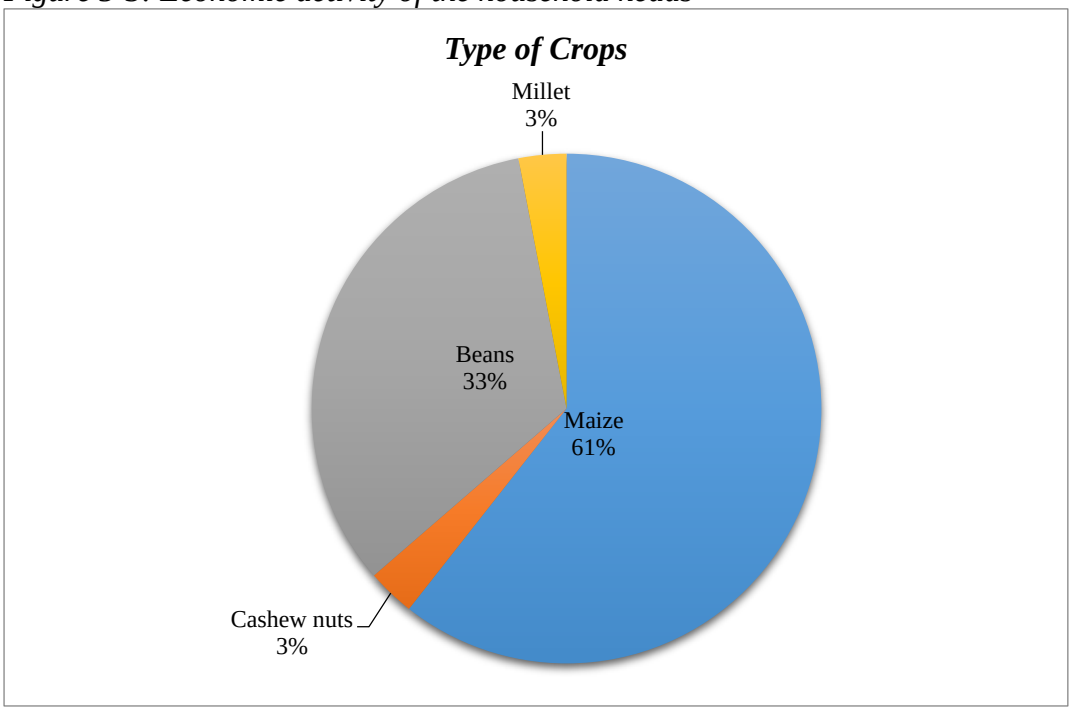

Figure 5-4: Crops grown in Korondile

Maize is the major crop grown at korondile at 61% followed by beans at 33% and cashew nuts at 3%. Goats are the major livestock kept by Korondile residents at 37% as shown in figure5-5 Priority should also be given to other animals kept so that they may not be extinct from Korondile and the major livestock kept should be made a major resource for the area.

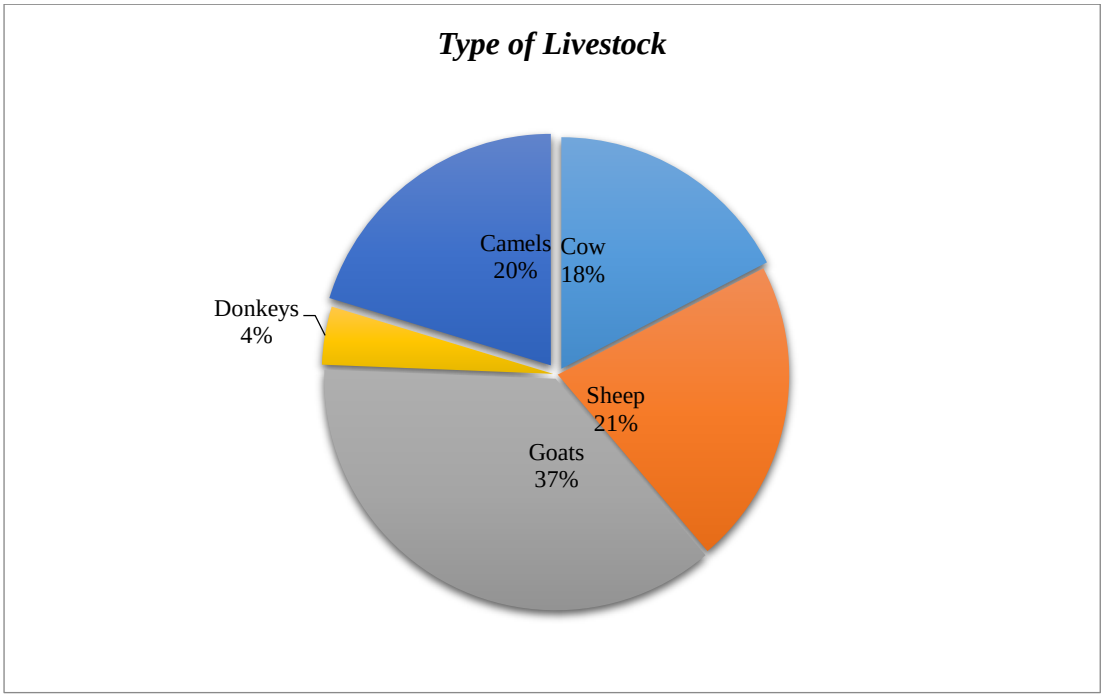

Figure 5-5: Livestock kept in Korondile

Of the total population practising business, (5%) are into the Jua Kali sector while (55%) is onto shops.25% is into bodaboda business. With this trend, there is need for the diversification of the business opportunities to the local residents.

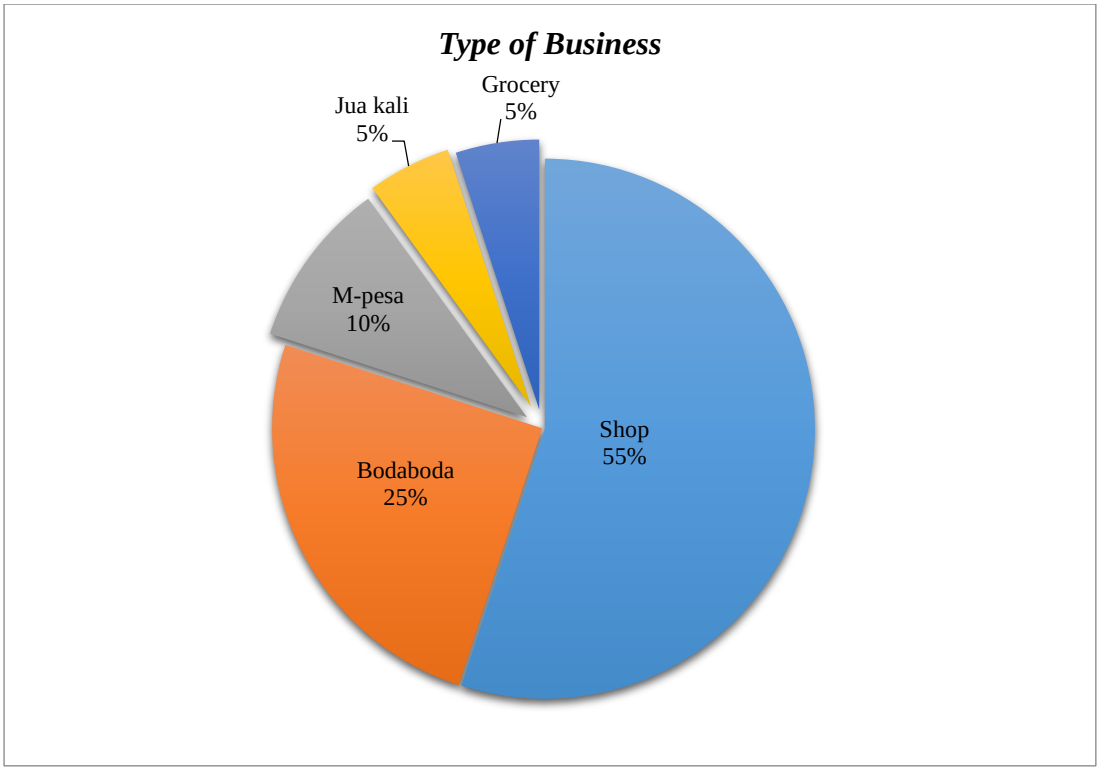

Figure 5-6: businesses conducted in Korondile

Most Korondile residents (73%) earn less than KShs 15,000 while 27% earn above Kshs 15,000 as shown in figure.

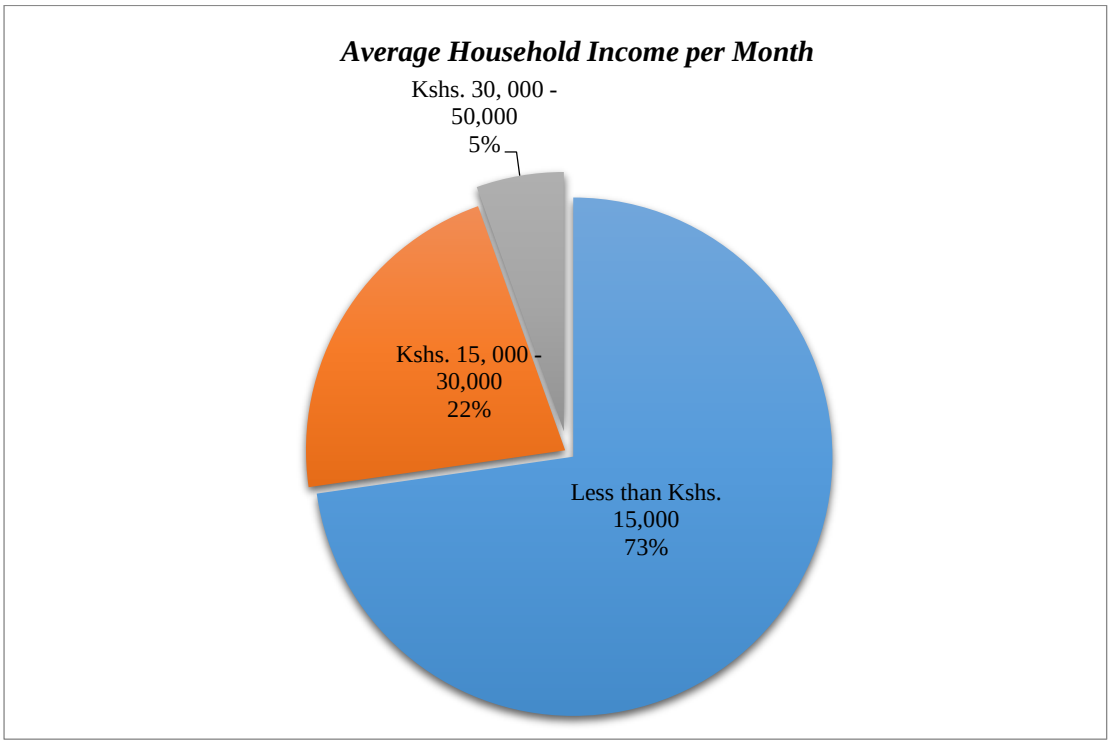

Figure 5-7: Average household income per month

Islam is the major religion practised at Korondile with 99% residents as shown in figure figure 5-8.

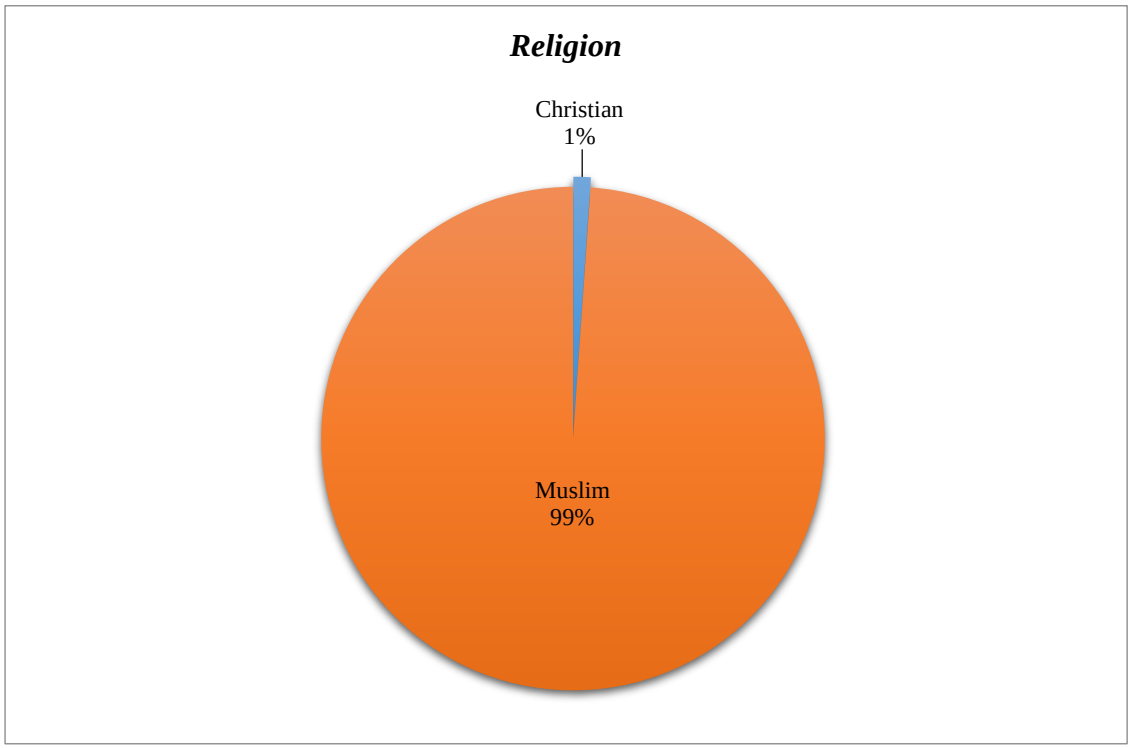

Figure 5-8: Religions practiced in Korondile

Firewood (88%) is the main source of energy for the community. There is need to revise the sources of energy by the community in order to avoid deforestation. The commonly used fuel does not sustain the environmental system hence may lead to expansion of the desert, other economic and environmental friendly fuel are the least used as shown in figure. Korondile residents should be educated and trained on eco-friendly systems to avoid creating a future environment catastrophe

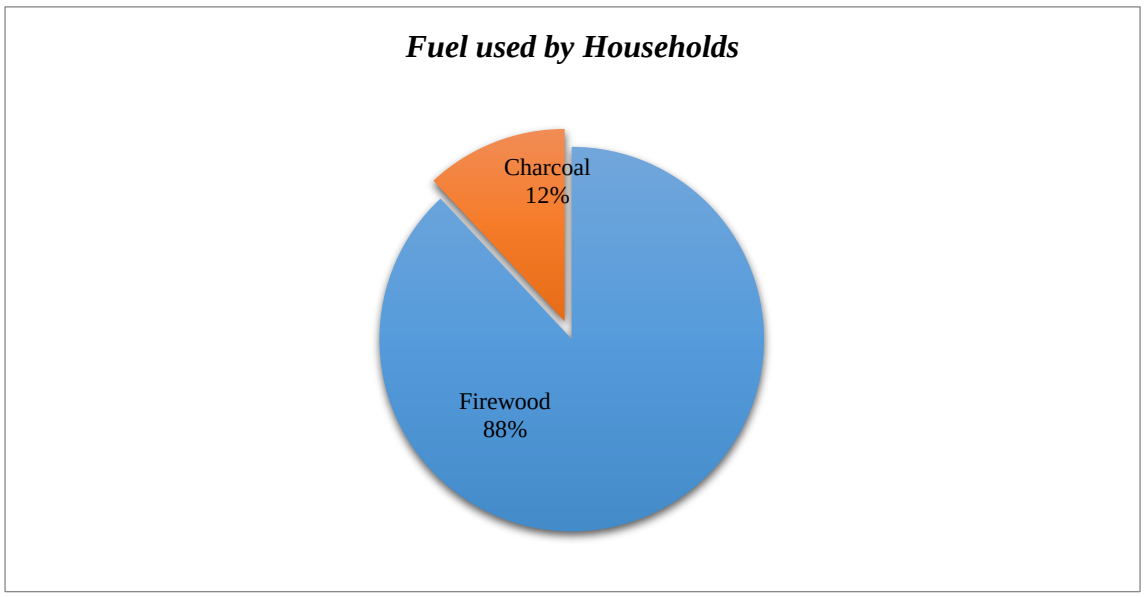

Figure 5-9: common fuel used in Korondile

DRINKING WATER ISSUES

5.4 SOURCES AND QUALITY OF DRINKING WATER

The study established that the common sources of water in Korondile are water pans, Private tab, and public tabs. As indicated in Figure 5-10, 20% of the people are supplied by public taps while 57% rely on water from water pans. This implies that the government needs to put in more efforts to increase fresh water supply to her people.

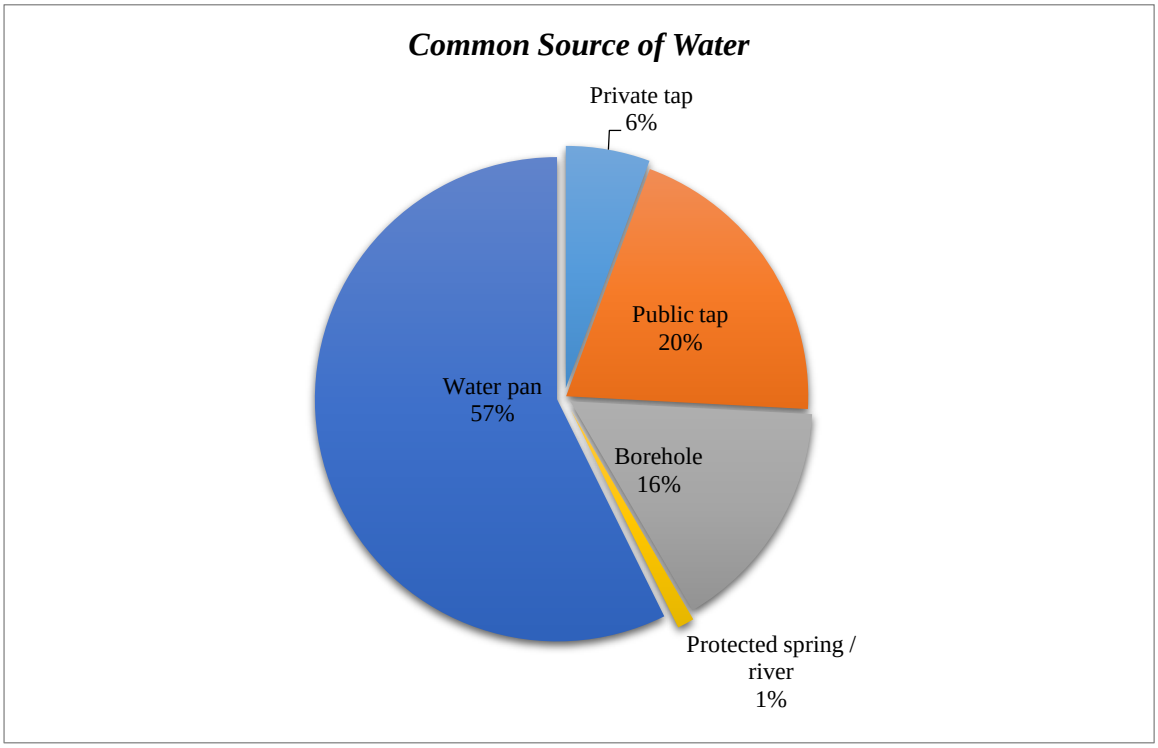

Figure 5-10: common sources of water in Korondile

The water quality is generally fair with 74% of the respondents indicating that the water quality is acceptable. 8% of the respondents find the water to be good while 18% find it to be bad.

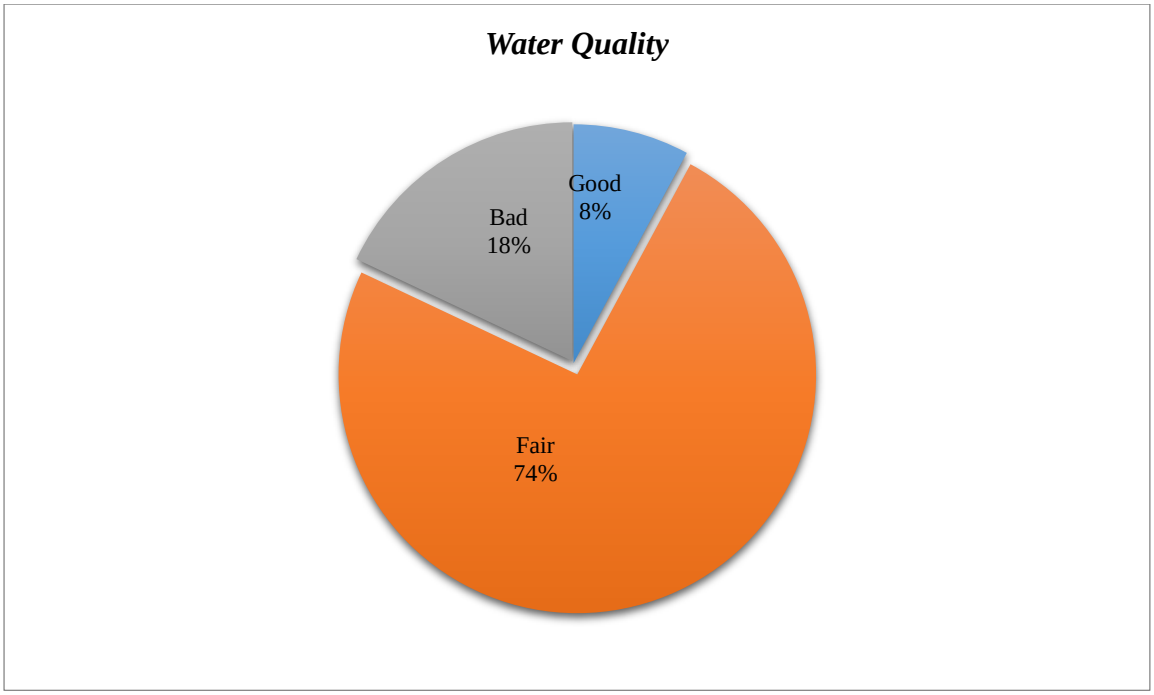

Figure 5-11: Perceived water quality in Korondile

From Figure5-12, the residents of korondile fetch water everyday. The government then should work on redusing the time spent in fetching water daily by ensuring water services are close to the people.

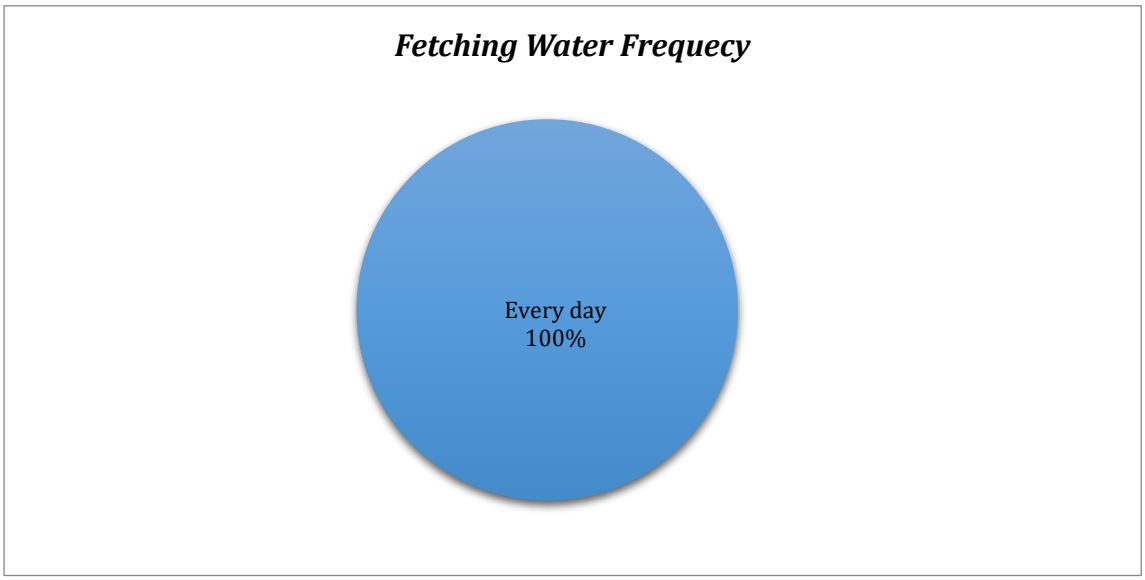

Figure 5-12: Frequency of fetching water in Korondile

The existing water supply is not adequate as from figure 5-13 below indicates, 47% of the responsents felt that the supply of the water is inadequate while 53% indicated that the water supply was adequate.

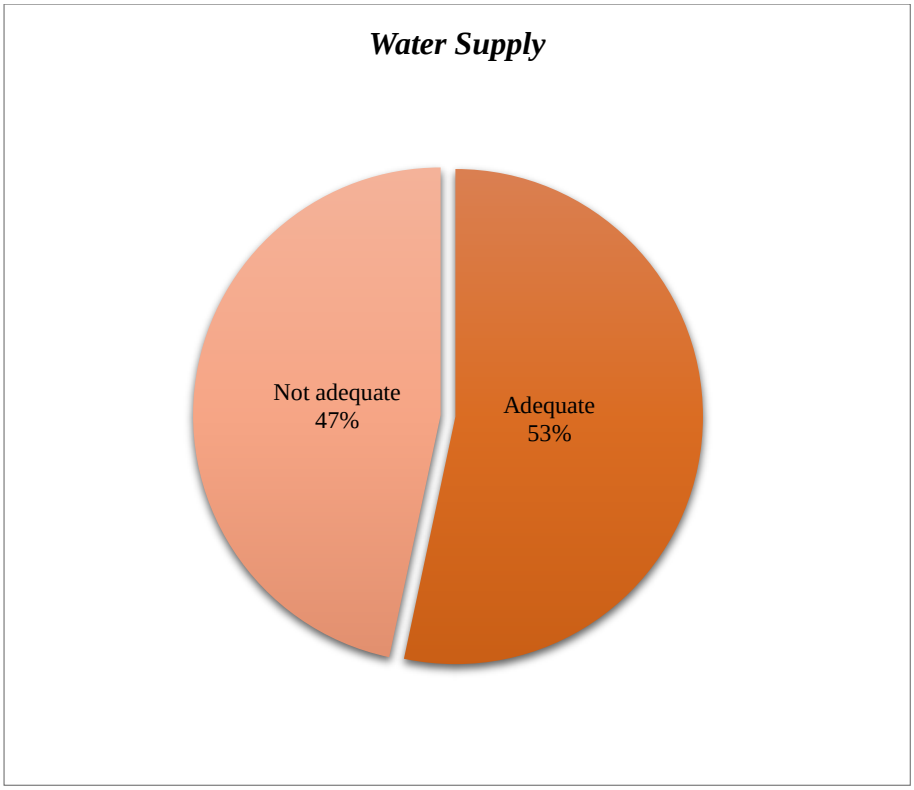

Figure 5-13: Adequacy of water supply in Korondile

5.5 DISTANCE TO AND OWNERSHIP OF DRINKING WATER SOURCES

Varying distances are traversed by the korondile residents in search for the water. Most residents (73%) travel about less than a kilometer to search for water as indicated from figure 5-14 below. This implies that much time and energy is spent in search of water and it is hoped that this challenge will cease upon completion of the water supply project. Figure 5-15 breaks down the water sources they travel to access in terms of their ownership. It is apparent that more than half of the population access public water sources.

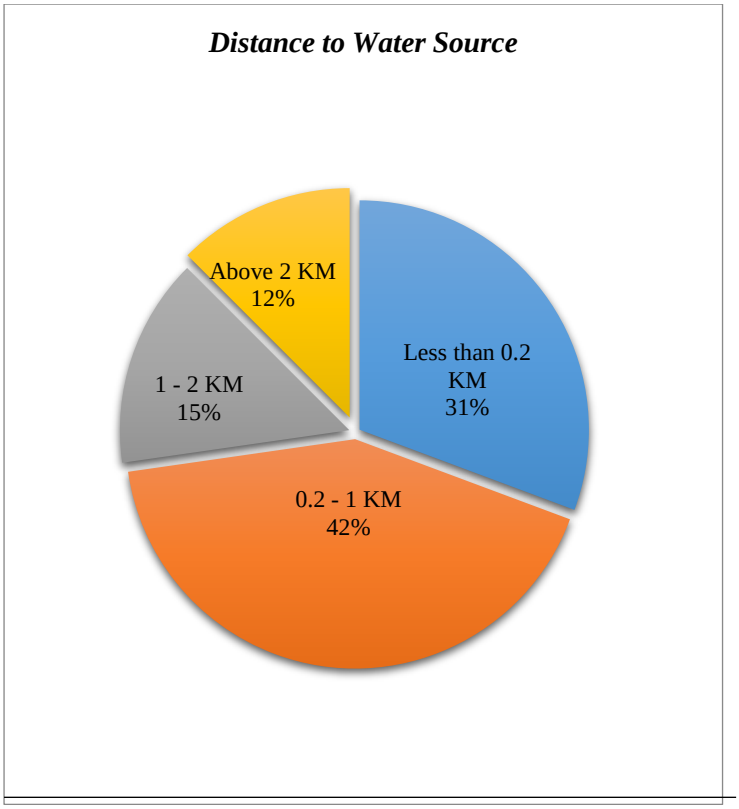

Figure 5-14: distance of the water sources

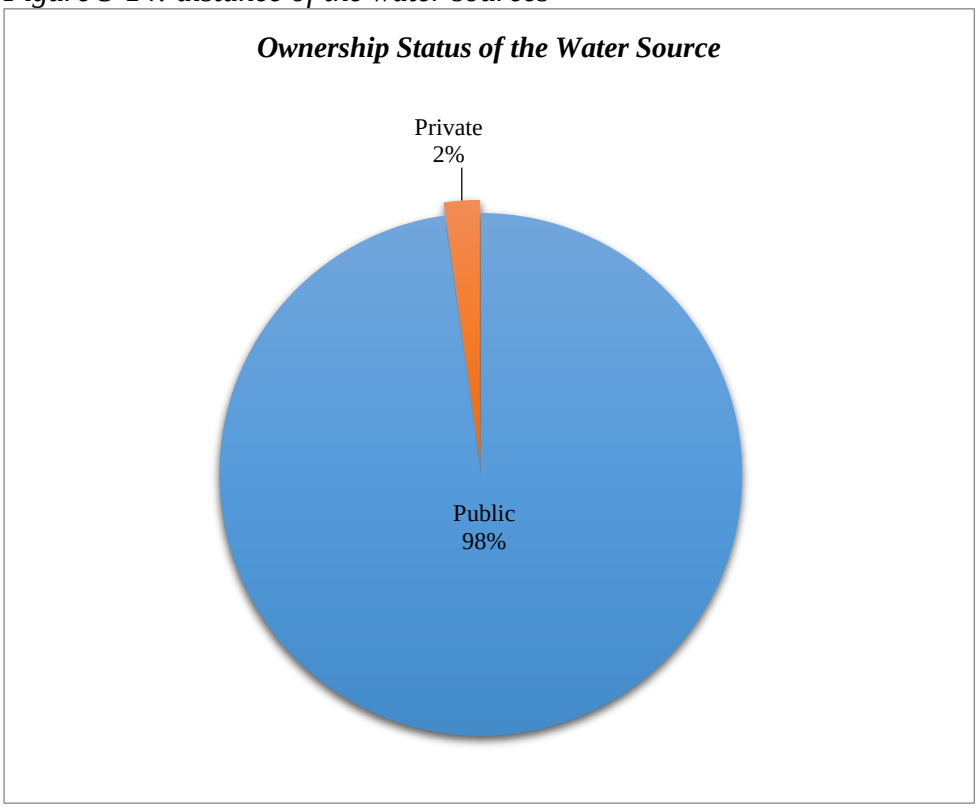

Figure 5-15: ownership of the water sources

5.6 COST OF DRINKING WATER

From the study, about 85% of the residents don't pay for water as indicated in figure 5-16.

As further shown in Figure 5-17, 67% of Korondile residents spend more than Kshs10 for a 20 liter gallon of fresh water. This is quite costly, implying that a families with low income strain a lot to get water. NWSB should ensure that the people get affordable water supply and it is in this light that water supply infrastructure is presently been expanded in the County.

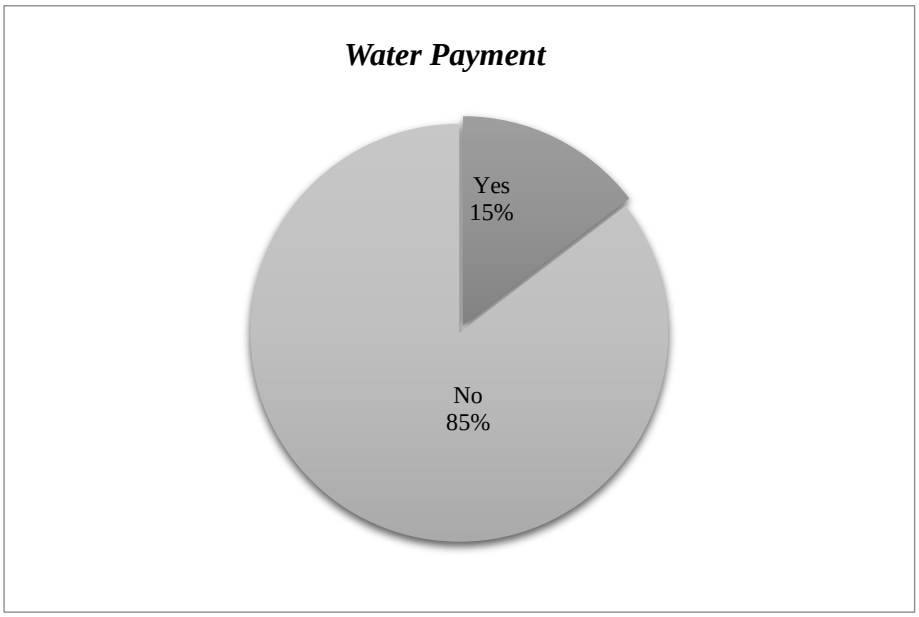

Figure 5-16: payment for water

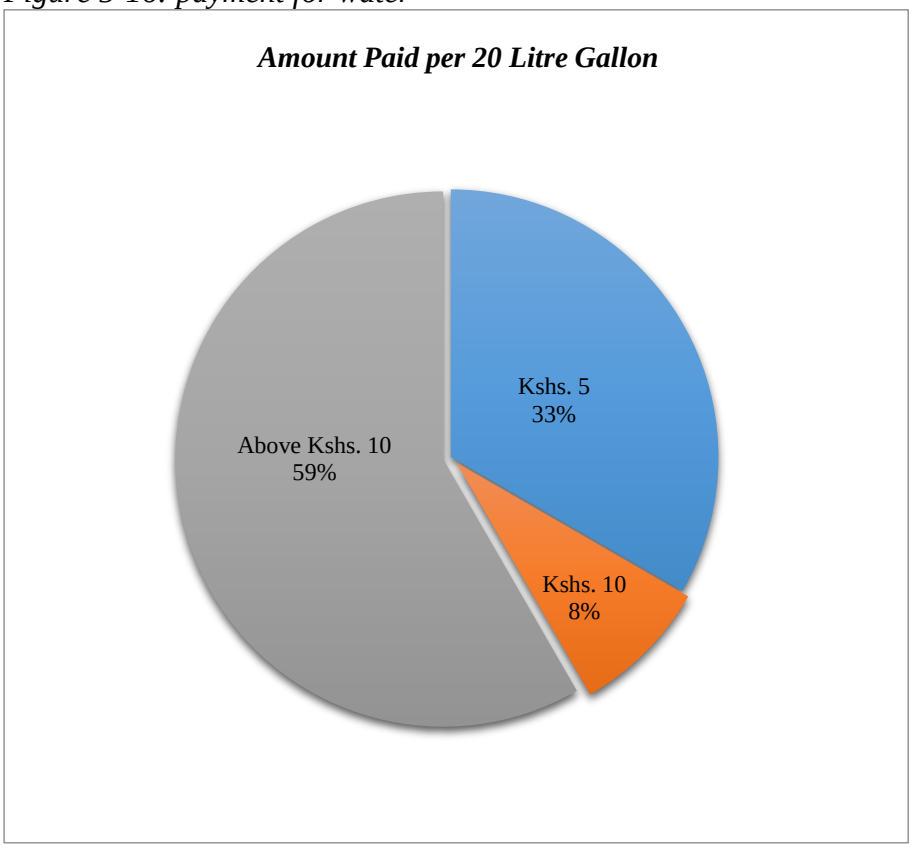

Figure 5-17: Cost of water in Korondile

5.7 COMMON MODE OF TRANSPORTING WATER AND THE CHALLENGES THEY FACE

The common mode of transporting is carrying on the head 36.5%%, Animal drawn carts 15.6%, hand driven carts 22.9% (Figure5-18) .Their is need to provide piped water to avoid tiresome and expensive modes of transporting water ,since the residents also spend by paying for water. The challenges they face are loss of time(56%) fatigue(38%) and as illustrated in Figure5-19 .

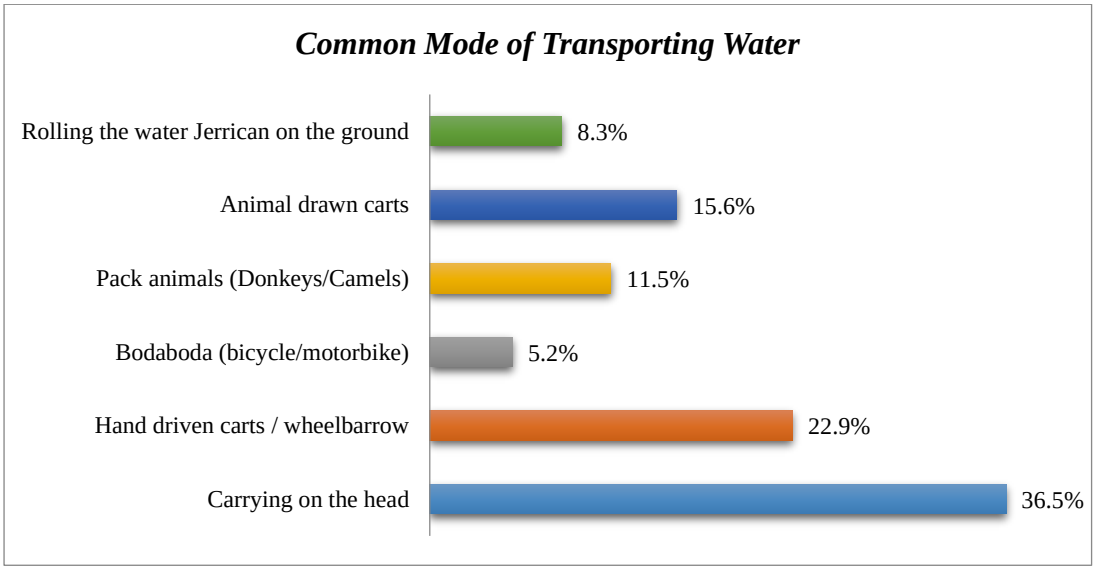

Figure 5-18: Transportation of water in Korondile

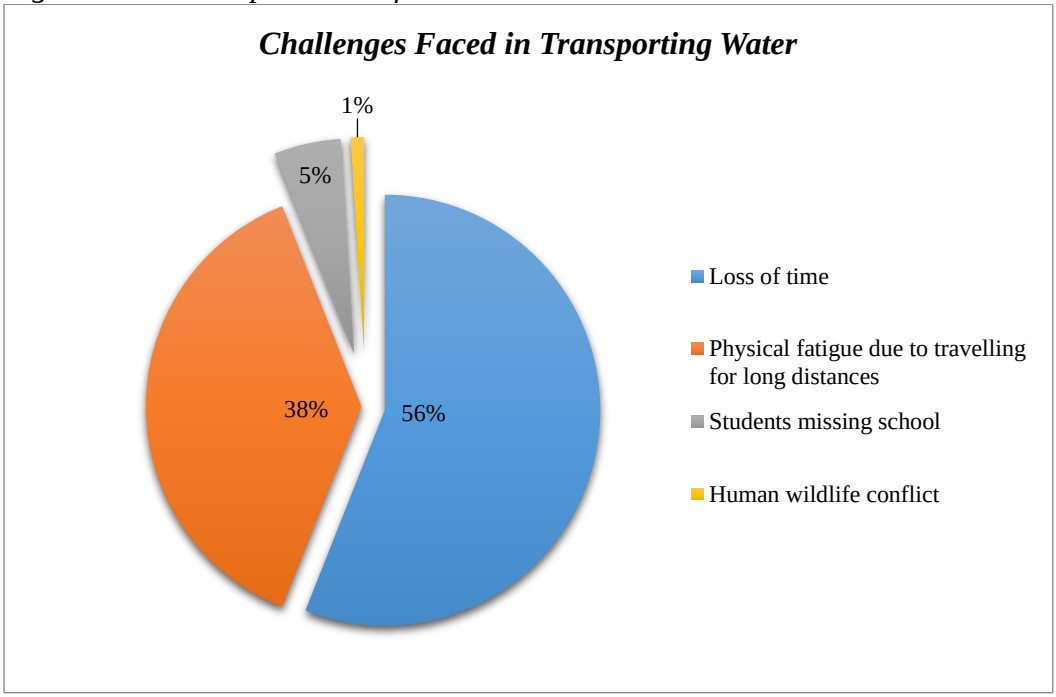

Figure 5-19: challenges faced in transporting water

5.8 WASTE DISPOSAL

5.8.1 Existing Waste Disposal Systems

The study established that burning was the most common waste disposal system for solid waste in Korondile 51% of the respondents burn their solid waste (Figure 5-20). As it is well known, open-air burning is not a sustainable management option for solid waste as it is environmentally unfriendly due to release of GHGs to the atmosphere.

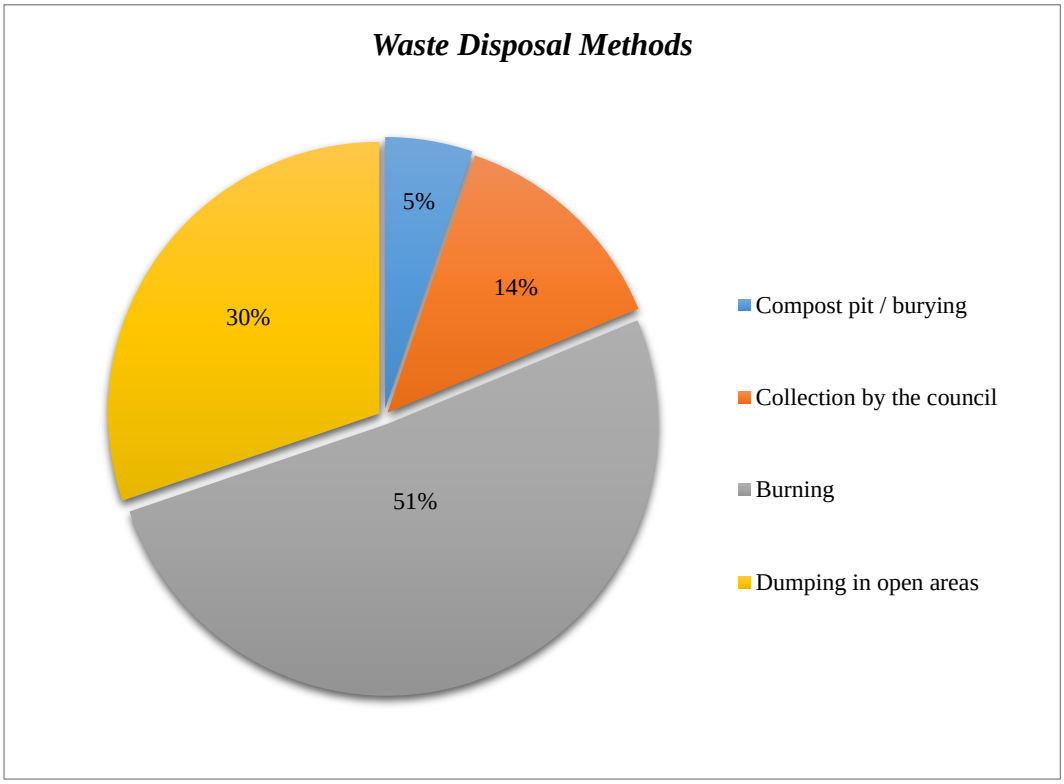

Figure 5-20: methods of disposing waste in Korondile

5.9 AVAILABILITY OF TOILET FACILITIES

The study probed the availability of toilet facilities in Korondile area. It was established that 88% of the people had toilets for their households (Figure5-21), with pit latrine being the most common among 88% of the residents.

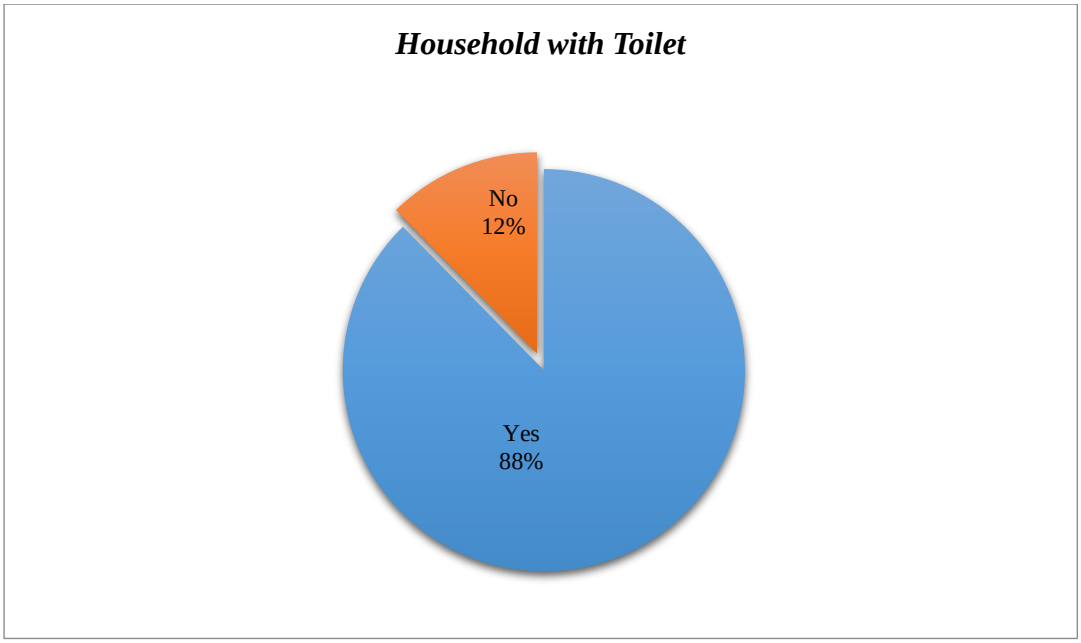

Figure 5-21: households that own toilets

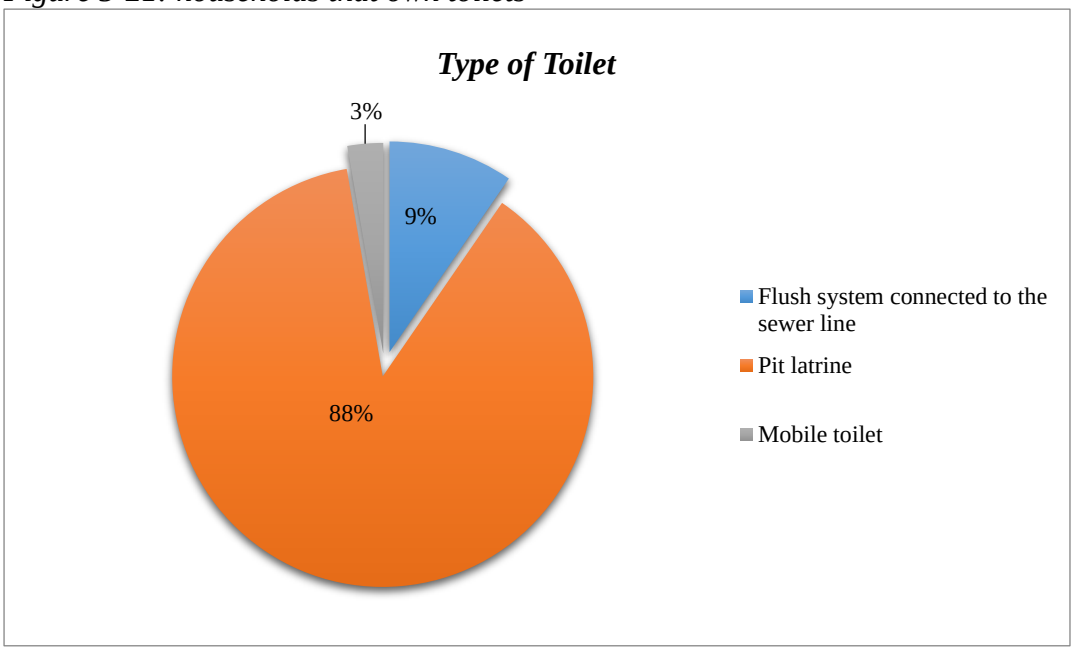

Figure 5-22: The common type of toilet in Korondile

5.10 AWARENESS OF THE PROPOSED PROJECT

Public awareness of any infrastructure project plays a key role in its implementation and success. Thus, this study sought to establish the level of awareness of the proposed project among Korondile residents. As shown in Figure5-23, 55% of the people were not aware of the proposed project, and therefore numerous sensitization efforts need to be put in place by the client and the consultants to aid in the residents sensitization of the project.

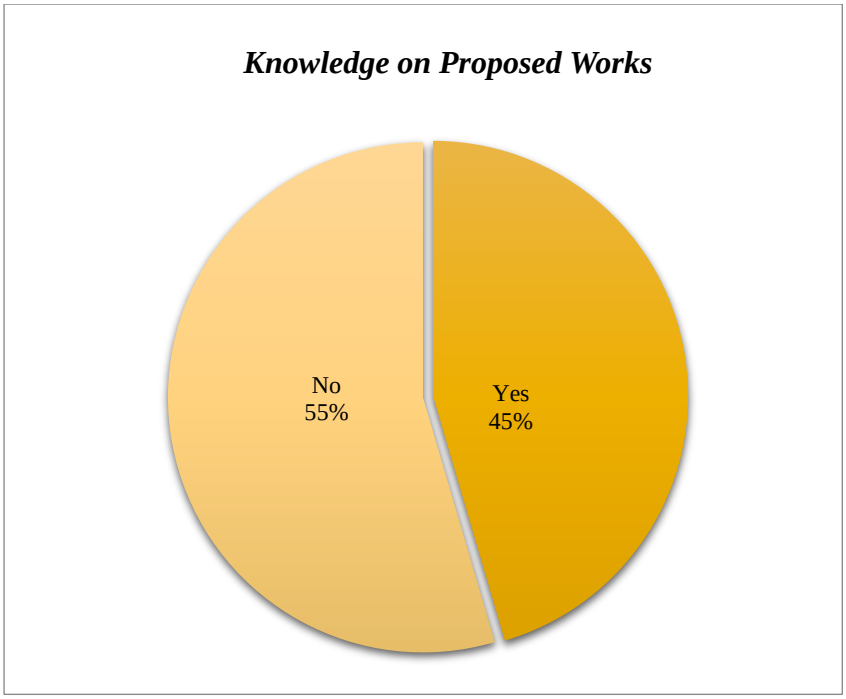

Figure 5-23: knowledge on the proposed project

5.11 PERCEIVED IMPACTS OF THE PROPOSED PROJECT

All infrastructure project have positive and well as negative impacts. In order to probe further their degree of awareness of the project, respondents were challenged to indicate their personal perceptions of how the project would affect them. 75% of the people perceive that the project will affect them positively as indicated in Figure5-24 while the remaining 25% felt that this project would affect them negatively. The perceived positive and negative impacts are shown in Figure5-25 and Figure 5-26, respectively.

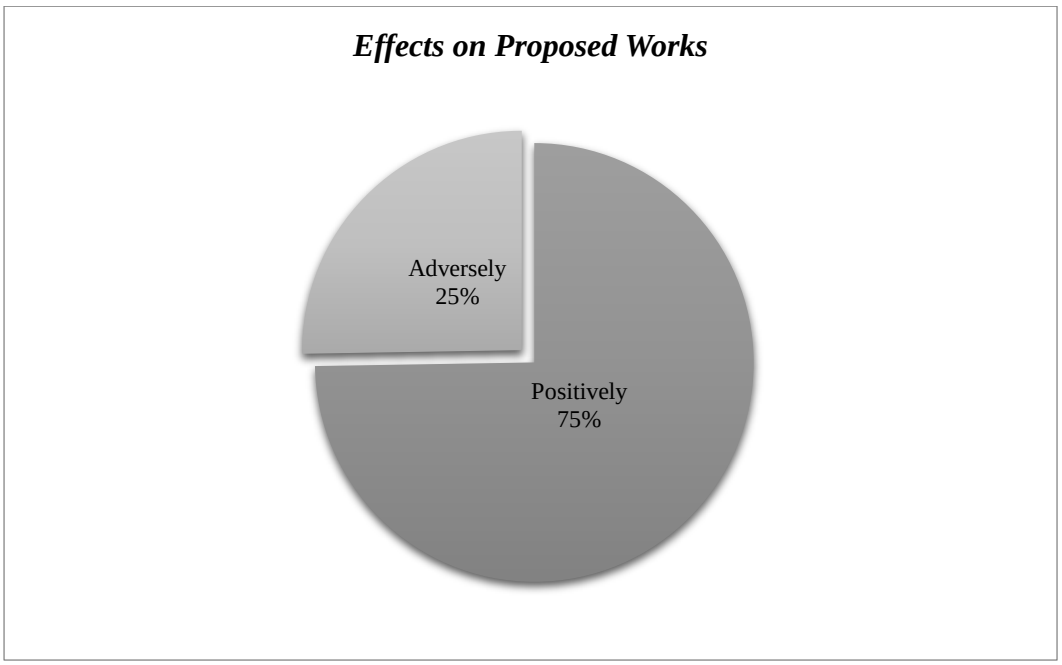

Figure 5-24: The figure shows the effects of the proposed works

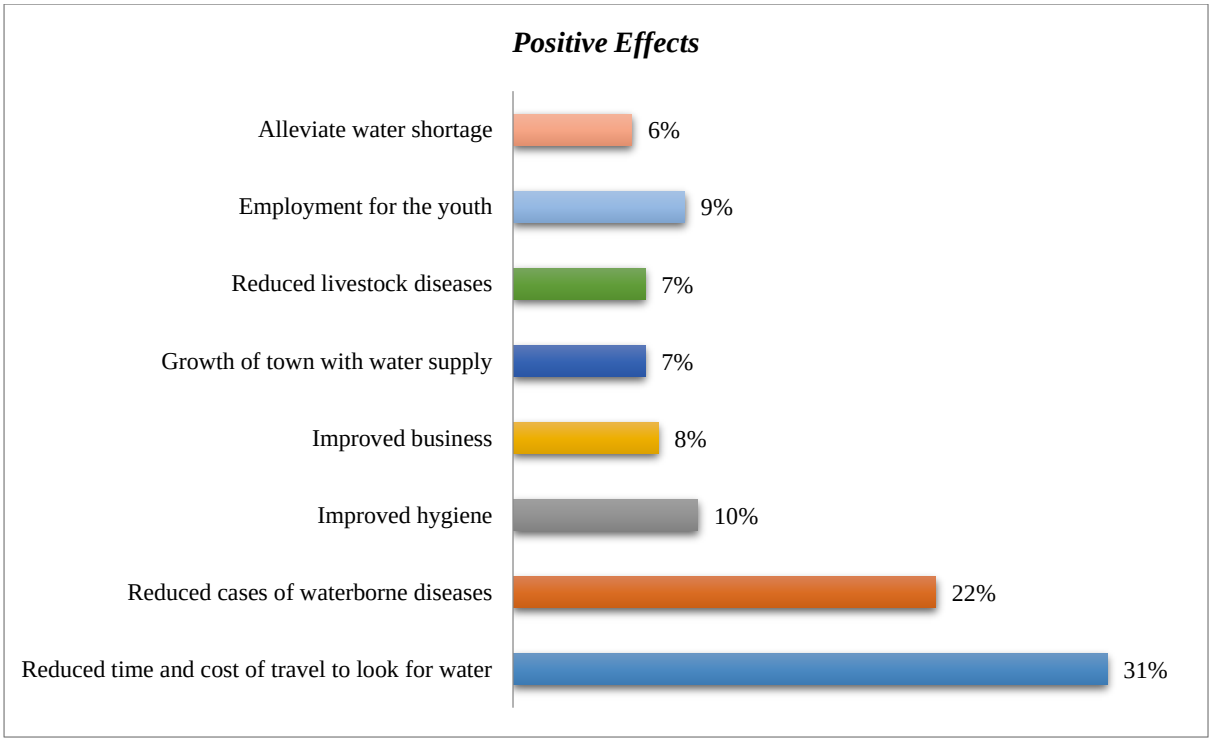

Figure 5-25: positive effects of the project

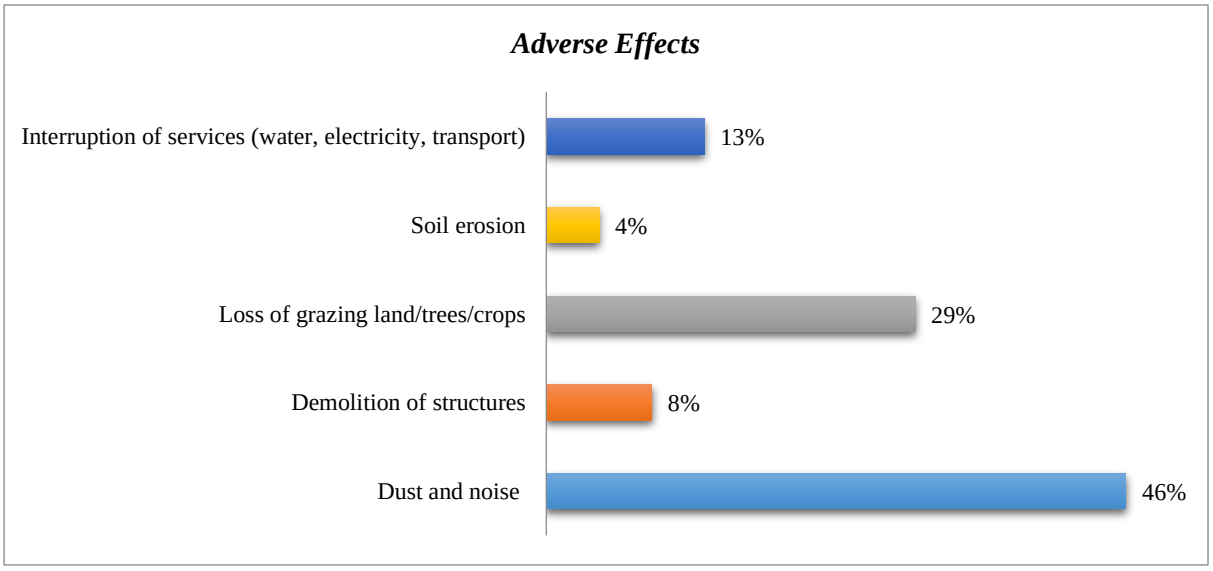

Figure 5-26: negative effects of the project

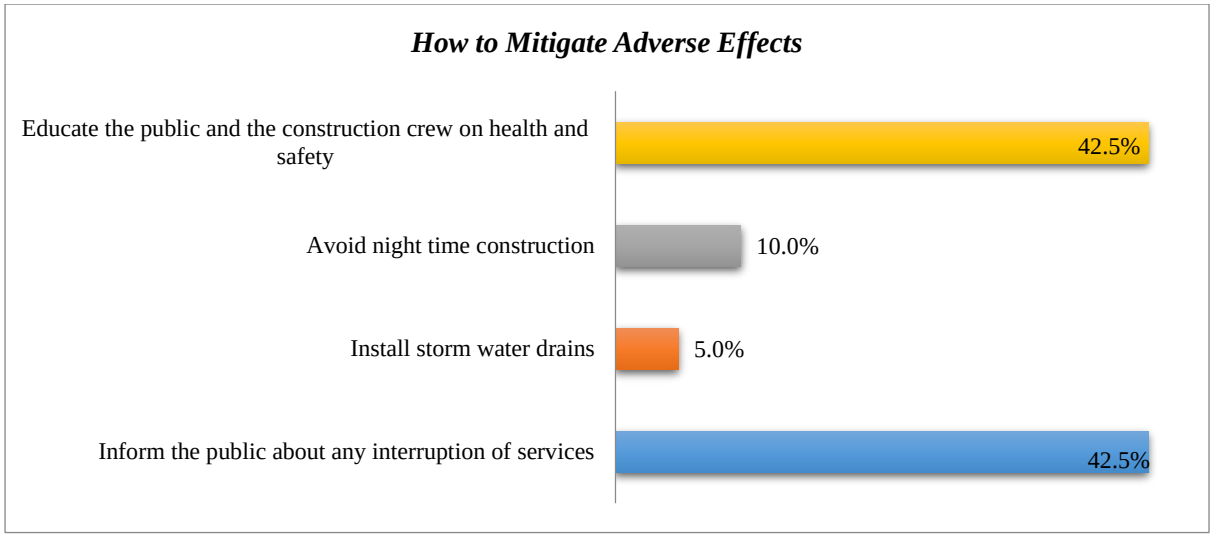

Figure 5-27: mitigation measures that would be undertaken to reduce the negative effects of the project

5.12 COMMON DISEASES & MEDICAL INTERVENTIONS TAKEN

The prevalent diseases in the area are malaria, diarrhea, intestinal worms, cholera and respiratory infections most of which are water based.

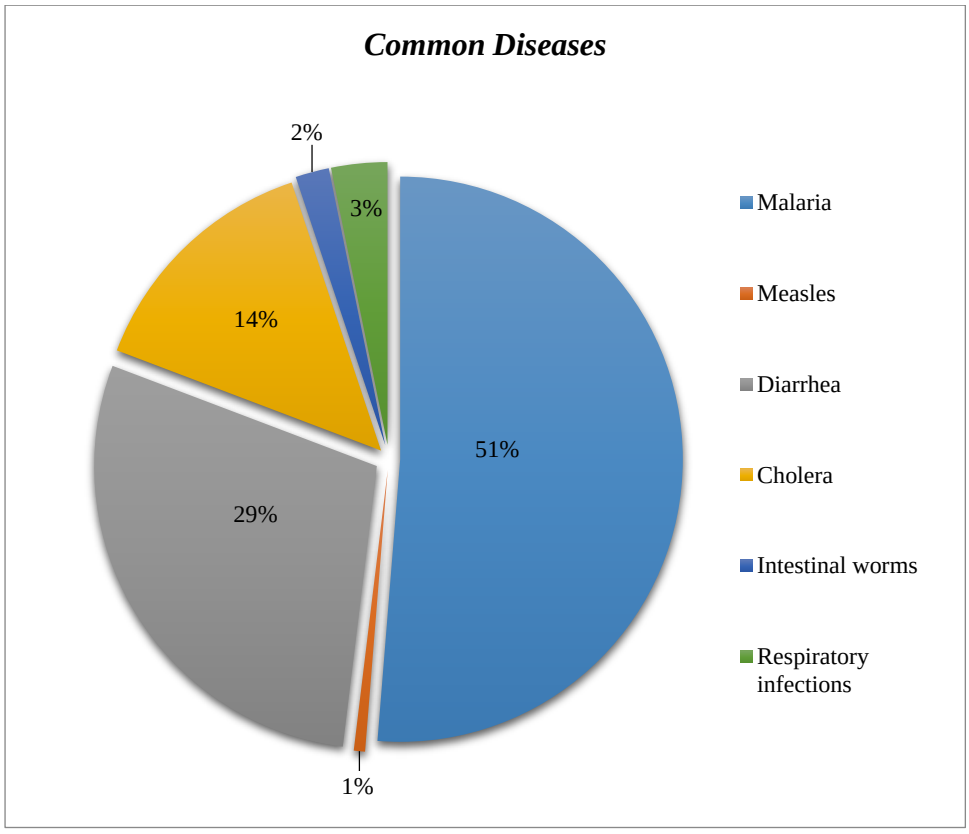

Figure 5-28: common diseases in Korondile

While sick, the respondents take a number of actions. This study established that 75% of the people seek medical attention while the rest either seek prayers, herbal or traditional doctors'

help. This raises concerns of the possible risks posed by non-medical health interventions among a significant proportion of 25% of the population, as shown in Figure 5-29.

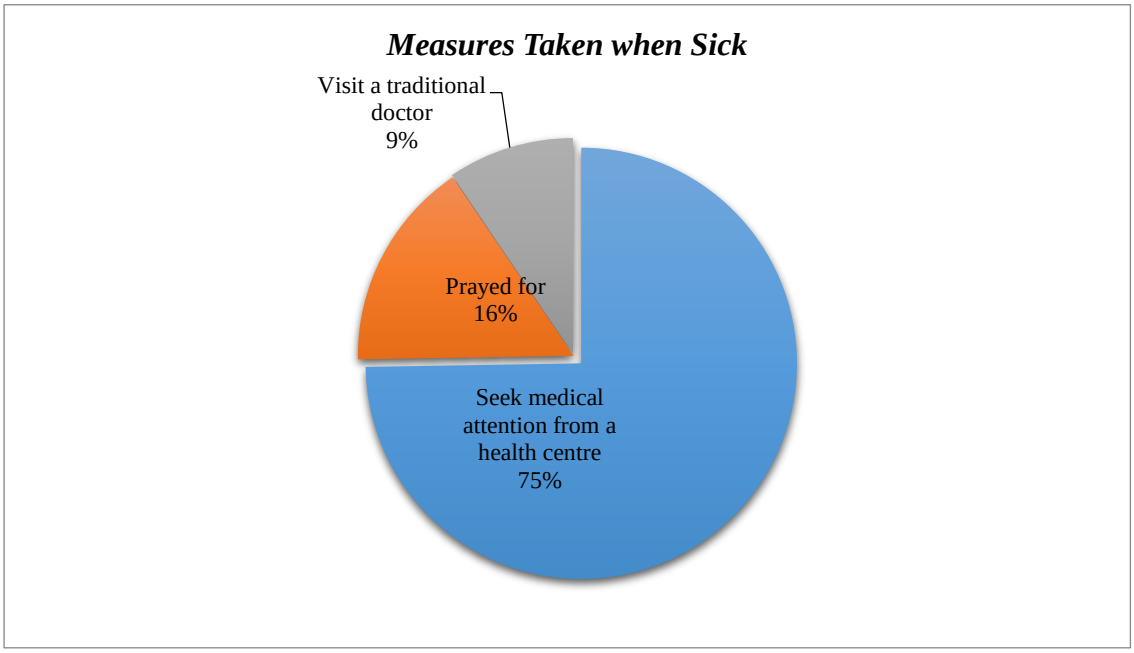

Figure 5-29: The figure shows the measure taken when the Residents are sick

The type/ownership of available health facilities was also probed by this study. The results indicated that majority of the people rely on public health services while about 16% depended on private-health facilities as shown in Figure5-30 . However, as shown in Figure5-31, the distance to the nearest health facilities still remains a challenge, especially in Korondile town. This calls for intensification of health services to such areas.

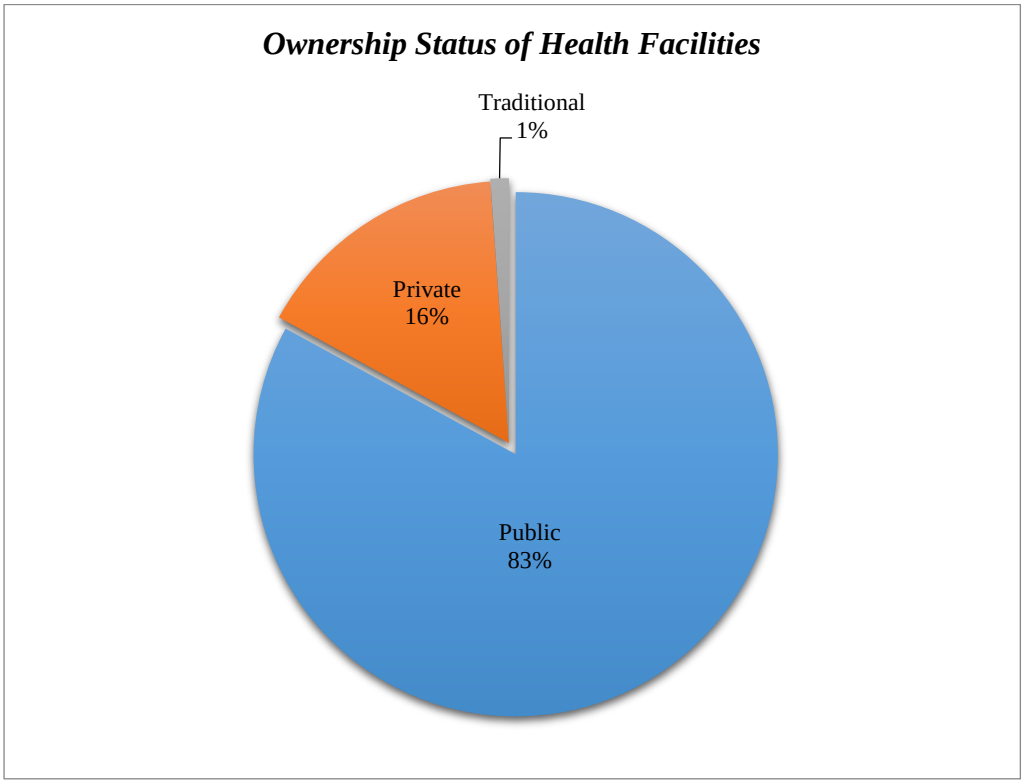

Figure 5-30: ownership status of the health facilities in Korondile

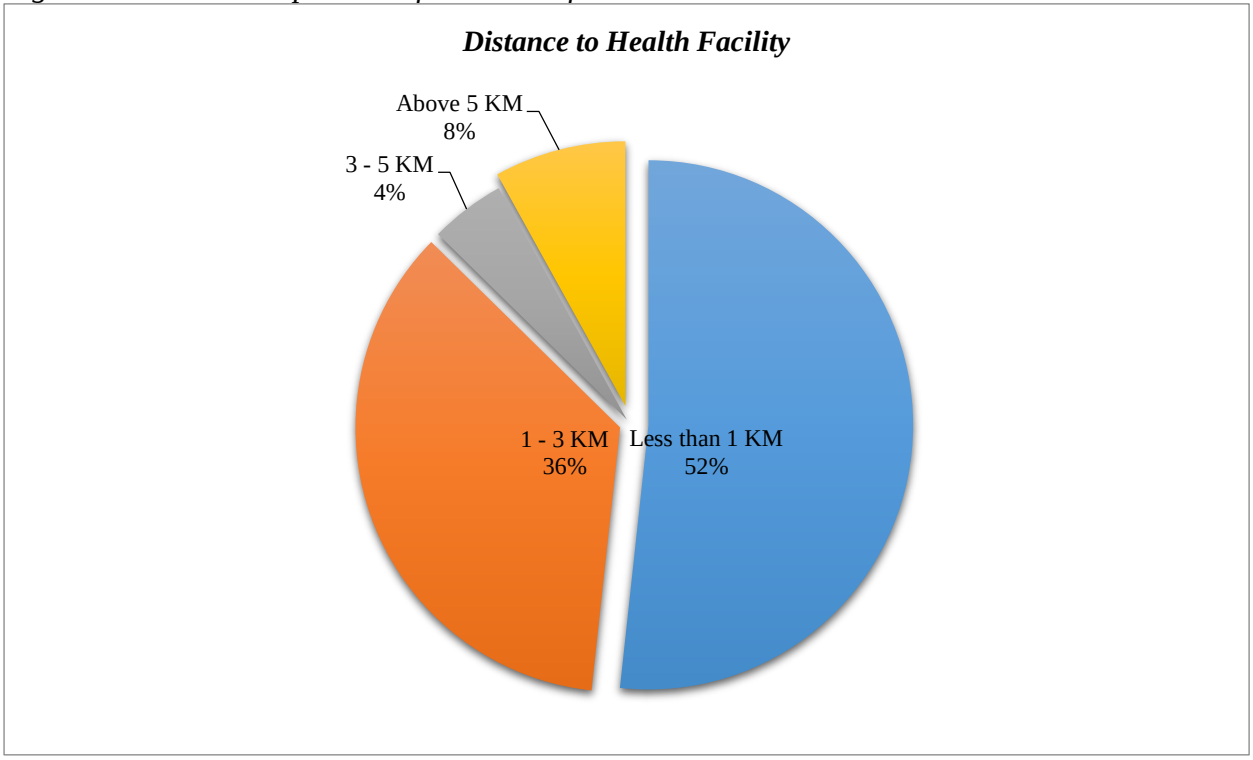

Figure 5-31: distance of the health facilities

5.13 HIV/AIDS ISSUES

5.13.1 Awareness and Sources of Information

HIV/AIDs remains a major health challenge in Kenya and infrastructure projects have been found to have a significant bearing on its spread.

In terms of awareness, this study showed that most of the people (98%) are aware of HIV/AIDS (Figure5-32). As further shown in Figure 5-33, the dominant source of information on HIV/AIDs among Korondile town residents is the media, particularly Radio and TV, health facilities, religious groups although NGO's and families also play a significant role in disseminating such information.

In terms of HIV/AIDs spread. This study established that 99% of the household were not affected by HIV/AIDS as shown in figure 5-34. Only 1% revealed that at least someone in their household has ever suffered from the endemic.

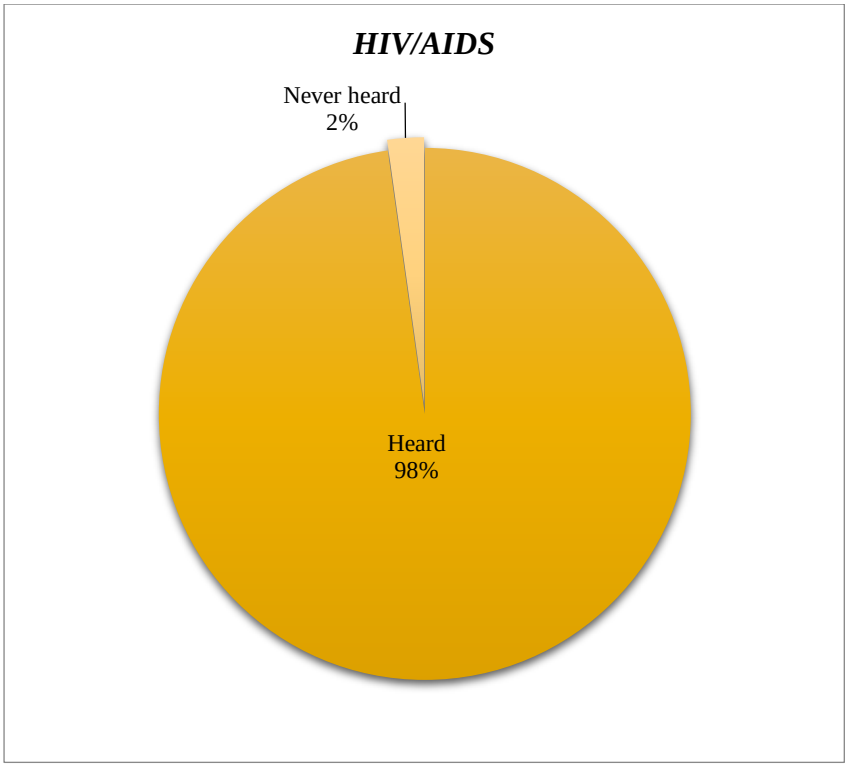

Figure 5-32: awareness of HIV/AIDS in Korondile

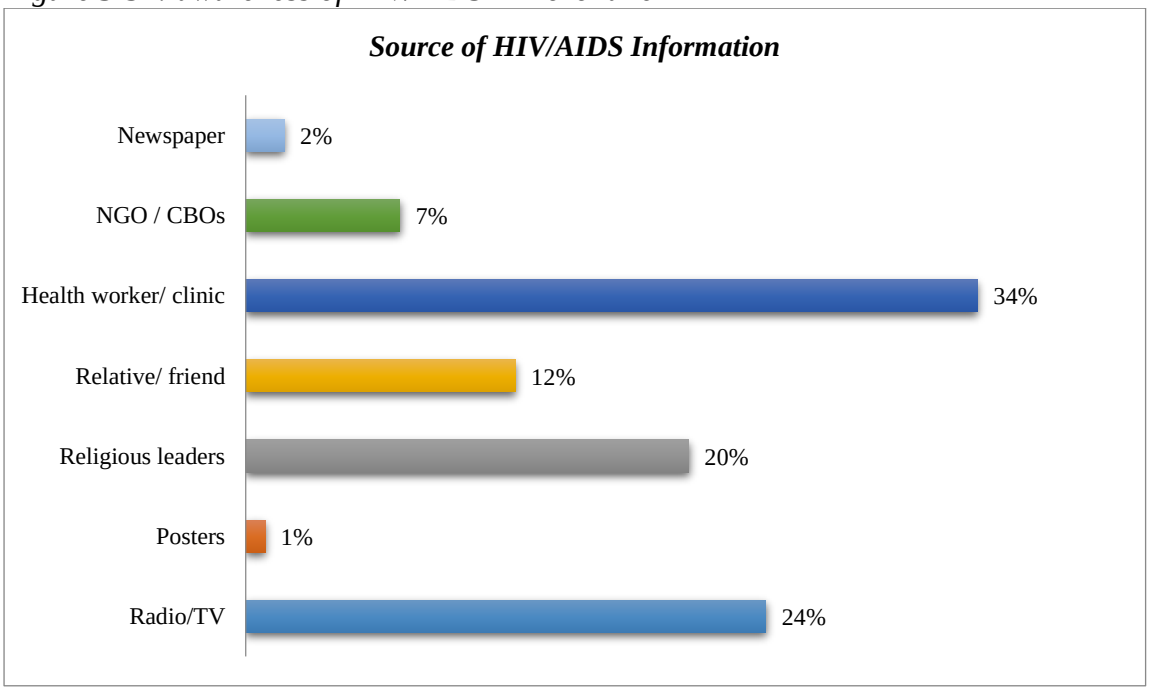

Figure 5-33: sources of HIV/AIDS

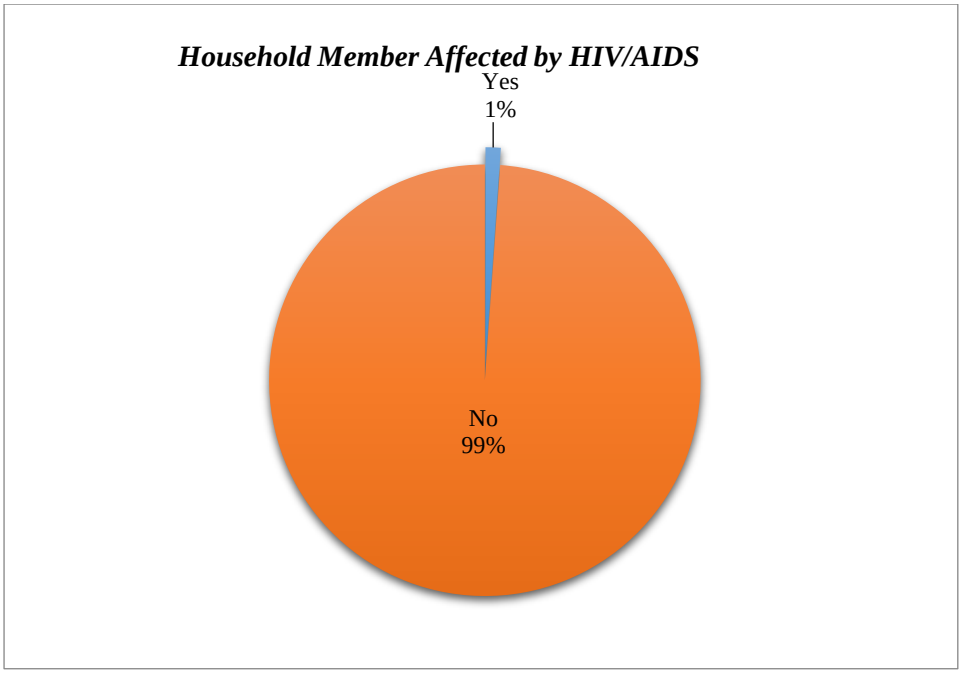

Figure 5-34: household members affected by HIDS/AIDS

5.13.2 HIV/AIDs Testing and Prevention

This study showed that 86% have the knowledge that HIV/AIDS as shown in figure5-35 can be prevented. Although there is a high % of people who are aware of HIV/AIDS prevention there is quite a number who don't know it could be prevented. The government should inform and sensitize the people on methods available for HIV/AIDS prevention. The study also showed that most of the people know where they could get HIV/AIDS voluntary testing and counseling as shown in figure5-36. The people should be encouraged to go for testing in order for them to be aware of their status and be counseled,

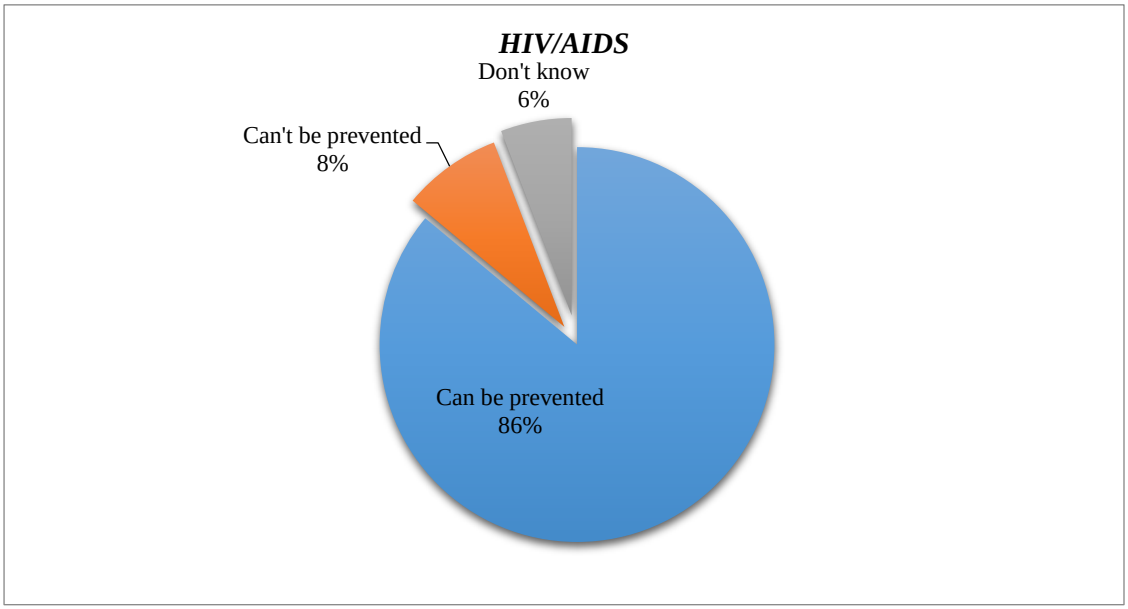

Figure 5-35: The awareness of Korondile residents on the prevention of HIV/AIDS

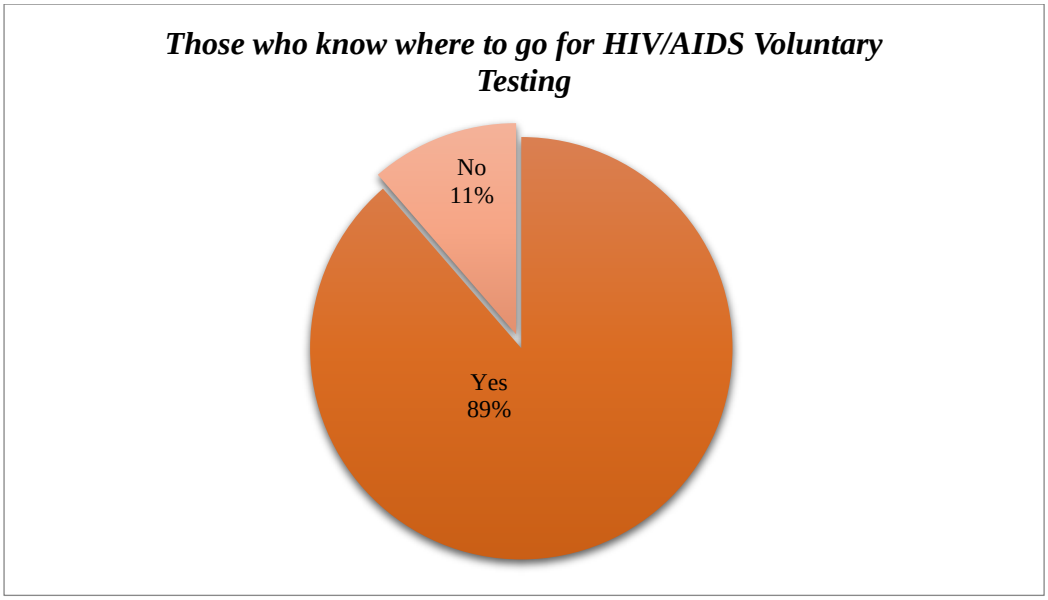

Figure 5-36: awareness of HIV/AIDS voluntary testing areas in Korondile

5.14 ENVIRONMENTAL ISSUES IN THE PROJECT AREA

5.14.1 Key Issues of Environmental Concern

The study established the key issues of environmental concerns as shown in figure5-37 .the government should consider practicing on environmental and sensitize the community on its importance. The environmental issues could help the town note where environmental challenges occur and prevent them

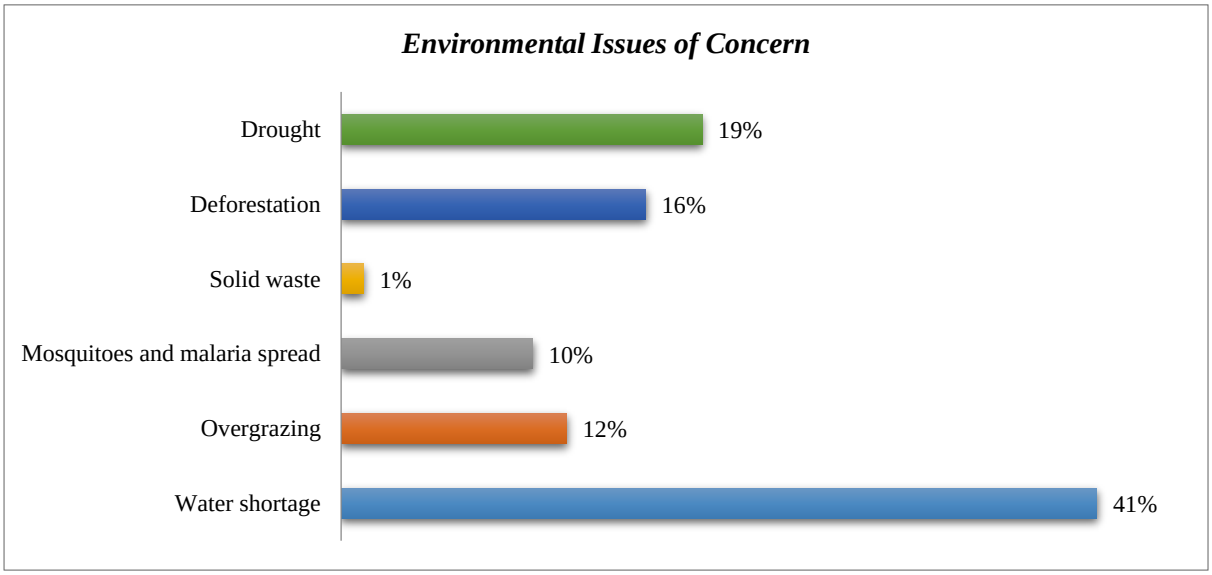

Figure 5-37: environmental issues of concern in Korondile

5.14.2 On-going Environmental Conservation Initiatives

The study established that there were conservation initiatives going on in the town as shown in figure5-38. Tree Planting, educating the public and cleaning of mosquito breeding sites are the

major environment conservation initiatives. The government should encourage and give more option of conserving the environment. The study established that most of the county council were involved with the conservation as indicated in figure5-39. The government should give initiatives to the groups that are mostly involved in conservation programs so as to motivate them. The study established that the project would assist with the conservation as indicated in figure5-40. The project would ensure creativity of conserving the environment by giving new ideas brought in by the professionals .The professionals would be putting up different conservation methods to adhere to NEMA.

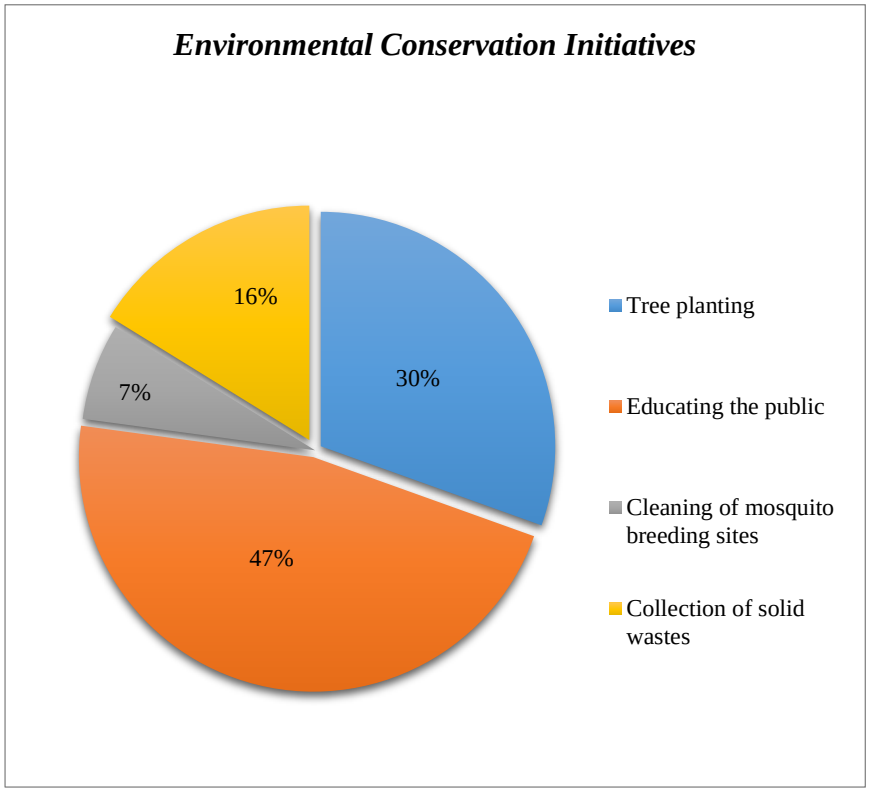

Figure 5-38: environmental conservation initiatives in Korondile

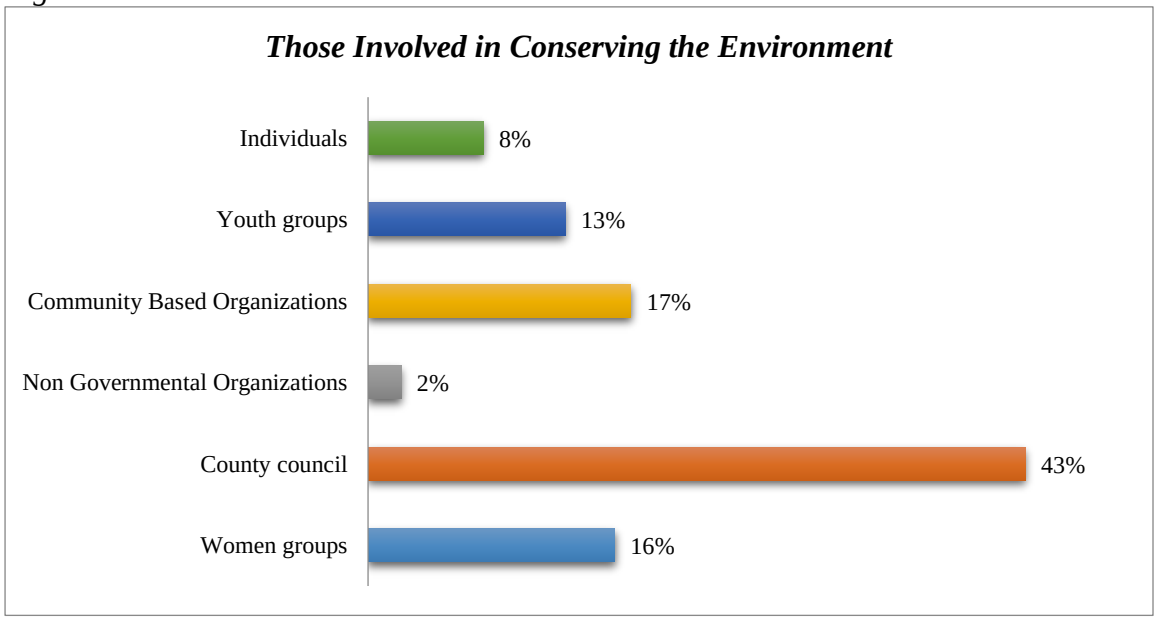

Figure 5-39: The groups involved in conserving the environment in Korondile

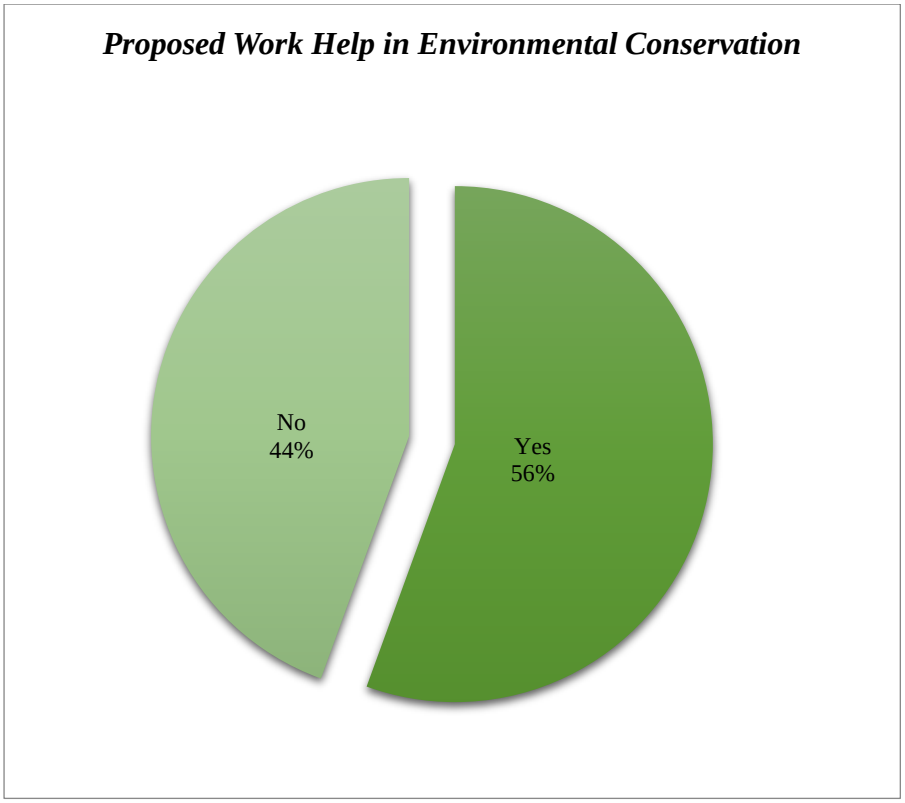

Figure 5-40: How the proposed project will help in conserving the environment

6 RELEVANT LEGISLATIVE/REGULATORY FRAME WORK

There are several laws and regulations that exist that govern issues of environmental concern in Kenya. Some of those relevant to water and sanitation issues include the Environmental Management Co-ordination Act, the Water Act 2016 and the Public Health Act, among others. However, the most significant act that specifically addresses the issues of environmental impacts of development projects, including those on housing development, roads, water and sanitation, is the Environmental Management and Coordination Act (EMCA), 2015.

In addition to the local legislation, the Consultant has identified some World Bank Policies of relevance to the project.

The following is an outline of the legislative, policy and regulatory framework for which the Proponent shall observe and implement in an effort to comply with Environmental Sustainability.

6.1 THE ENVIRONMENTAL MANAGEMENT AND COORDINATION (AMENDED) ACT OF 2015

This Act is an amendment of the Environmental Management and Co-ordination Act of 1999. The amended Act covers virtually all diverse environmental issues which require a holistic and coordinated approach towards its protection and preservation for the present generation without compromising the interests of the future generation to enjoy the same. Consequently, the amended act provides for the legal regime to regulate, manage, protect and conserve biological diversity resources and access to genetic resources, wetlands, forests, marine and freshwater resources and the ozone layer to name a few.

The Environmental Management and Coordination (Amended) Act, 2015 harmonizes the various requirements of the other existing laws and regulations by stipulating that where the provisions of any existing law conflicts with itself, then the provisions of the Environmental Management and Coordination (Amended) Act, 2015 shall prevail. This way, the act is able to minimize any conflicts in enforcement of the various environmental laws and regulations as applied to the relevant sectors. The Environmental Management and Coordination (Amended) Act, 2015 represents the culmination of a series of initiatives and activities coordinated by Government and stakeholders. It accentuates the right of every person in Kenya to live in a clean and healthy environment and obliges each and every one to safeguard and enhance the environment. It is the master plan for the environment in Kenya and contains a National Environment Policy, Framework Environmental Legislation and Environmental Strategy.

The Act gives power to the National Environment Management Authority (NEMA) which is a semi-autonomous government agency mandated to exercise general supervision and coordination over all matters relating to the environment and to be the principal instrument of the Government of Kenya in the implementation of all policies relating to the environment. NEMA is the body in charge of ensuring developments adhere to the policies and frameworks set out by the Authority.

The amended act highlights the need for an ESIA which is presented in this report.

6.2 THE ENVIRONMENT MANAGEMENT AND COORDINATION AMENDED ACT 2015 AND ITS TOOLS

The Act has several regulations that aid in its implementation the relevant regulations are highlighted in the sections below:

6.2.1 Environmental (Impact Assessment and Audit) Regulations 2003

These Regulations stipulate the importance of conducting an ESIA as well as the procedure necessary. The Regulations highlight the various reports and their contents to be submitted to NEMA for licensing. The regulations highlight the ESIA process which includes:

- ✓ Submission of a ESIA project report to NEMA for review or licensing
- ✓ In some cases the Authority will request for a full study report for some projects for which the applicant will be required to prepare a Terms of Reference and submit a study report.

The project and study reports will be conducted before the implementation of the development in question, the reports will be subject to approval by NEMA, which will provide a license after the its review.

The regulations also calls for Environmental auditing and monitoring that will be carried out during the construction or operation of the enterprise, the regulations provide the format of the audit report which will be provided to NEMA.

6.2.2 Water Quality Regulations (2006)

Water Quality Regulations apply to water used for domestic, industrial, agricultural, and recreational purposes; water used for fisheries and wildlife purposes, and water used for any other purposes. Different standards apply to different modes of usage. These regulations provide for the protection of lakes, rivers, streams, springs, wells and other water sources.

These regulations provide the standards for domestic water usage, which will be important for this project as the water will be used domestically by the people of Korondile. Of particular importance is the suspended solids concentration requirements which is a maximum of 30 mg/L. The IFC standards provide a maximum suspended solids quantity of 50mg/l, this is higher than the local standards, and as such the local standards will take precedence.

The water from the boreholes will have to meet the above regulations during its operation. The design has been carried out to meet these standards.

6.2.3 The Environmental Management and Coordination (waste management) Regulation, 2006

The Waste Management Regulations are meant to streamline the handling, transportation and disposal of various types of waste. The aim of the Waste Management Regulations is to protect human health and the environment. The regulations place emphasis on waste minimization, cleaner production and segregation of waste at source.

These regulations will be of great importance particularly during the construction phases of the project. During the Construction, the Contractor will have to meet the requirements of the regulations, by providing solid waste sorting and transportation using a licensed transporter who will dispose of the solid waste to the designated receptacle.

6.2.4 EMCA (Noise and Excessive Vibration Pollution Control) Regulations, 2009

These Regulations determine the level of noise that will permissible in particular during the construction of the improvements, the following factors will be considered:

- ✓ Time of the day;
- ✓ Proximity to residential area;
- ✓ Whether the noise is recurrent, intermittent or constant;
- ✓ The level and intensity of the noise;
- ✓ Whether the noise has been enhanced in level or range by any type of electronic or mechanical means; and,
- ✓ Whether the noise is subject to be controlled without unreasonable effort or expense to the person making the noise.

The Contractor will have to meet the requirements of these regulations particularly during the construction process, where some of the construction activities are bound to make some level of noise. These regulations are summarised in the table below:

Table 6-1 Permissible Noise Level for a Construction Site

Facility		**Local Maximum Noise Level Permitted in Decibels**	
		Day	**Night**
1.	Health facilities, educational institutions, homes for disabled etc.	60	35
2.	Residential areas	60	35
3.	Areas other than 1 and 2 above	75	65

In addition, the IFC regulations for permissible noise levels are summarized in the table below:

Table 6-2 IFC regulations for permissible noise levels

Facility		**Maximum Noise Level Permitted in Decibels**	
		Day	**Night**
1.	Residential; institutional; educational	55	45
2.	Industrial; commercial	70	70

Comparatively both regulations are relatively similar, as such the local regulations will be used.

6.2.5 Draft Environmental Management and Coordination (Air Quality) Regulations, 2009

The objective of the Regulations is to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. It provides for the establishment of emission standards for various sources such as mobile sources (e.g. motor vehicles) and stationary sources such as the rehabilitation of the borehole pumps and generators. The Contractor will have to ensure all his machinery do not exceed the emissions made in the regulations (presented

in the first schedule of the regulations). In addition, the operation of the improvement works will not exceed the requirements set in the third schedule of the regulations

6.2.6 Water act 2016

This Act is an update of the Water Act of 2002. It makes provision for the provision of clean and safe water in adequate quantities and to reasonable standards of sanitation for all citizens.

The Act gives power to Water Works Development Agencies which are charged with:

(a) Undertaking the development, maintenance and management of the national public water works within its area of jurisdiction.
(b) Operating the waterworks and providing water services as a water service provider, until such time as responsibility for the operation and management of the waterworks are handed over to a county government, joint committee, authority of county governments or water services provider within whose area of jurisdiction or supply the waterworks is located.
(c) Providing a reserve capacity for purposes of providing water services where pursuant to section 103, the Regulatory Board orders the transfer of water services functions from a defaulting water services provider to another licensee.
(d) Providing technical services and capacity building to such county governments and water services providers within its area as may be requested; and
(e) Providing to the cabinet secretary technical support in the discharge of his/her functions under the constitution of this Act.

In accordance to Article 152 of the Act, NWSB under whose jurisdiction the project falls, will transition into a Water Works Development Agency. However, this transition has not yet occurred, as such the Consultant will still report to the NWSB.

6.2.7 The public health act (CAP. 242)

Part IX Section 8 & 9 of the Act states that no person/institution shall cause nuisance or condition liable to be injurious or dangerous to human health. Any noxious matter or waste water flowing or discharged into a water course is deemed as a nuisance. Part Xll Section 136 states that all collections of water, sewage, rubbish, refuse and other fluids which permits or facilitates the breeding or multiplication of pests shall be deemed nuisances The Act addresses matters of sanitation, hygiene and general environmental health and safety. This Act will govern the Contractor's activities on site including ensuring the health and safety of employees including providing health services when it comes to venereal diseases. In addition, this law justifies the need for the improvements needed on the boreholes that is currently occurring. The improvements made will aid in the provision of clean water.

6.2.8 The Constitution of Kenya 2010

Article 42 states that every person has the right to a clean and healthy environment. The constitution provides guidance on steps that may be taken in case any of any infringement on these rights. In addition, the constitution provides for the establishment systems for carrying out environmental impact assessment, environmental audit and monitoring of the environment.

In addition to the protection of the environment, the constitution states that the land in Kenya belongs to the people of Kenya collectively as a nation. The constitution classifies the land in Kenya into different categories. These categories will dictate whether compensation will be required for the acquisition of a way leave. The categories include: public (including oceans, land between high and low water marks, all roads and thoroughfares).

The Constitution is critical in identifying the need for this project, since it intends to improve the general environment of the people of Korondile and it will govern the means to ensuring the method in which the project is carried out, by providing an EIA which is provided in this report.

6.2.9 The Land Act, 2012

This Act applies to all land declared as public land in Article 62 of the Constitution and all private land as declared by Article 64 of the Constitution.

The Act identifies all public land, of importance to this project will be on the way leave where the rehabilitation of the pipelines will be laid. The enactment of the Land Act, Sec 157(2), criminalized encroachments on public land as follows:

i) Unlawful occupation of public land is an offence which attracts fines of up to KES 500,000 and if a continuous offence, a sum not exceeding KES 10,000 for every day the offence is continued;
ii) Wrongful obstruction of a public right of way is an offence and attracts a fine of up to KES 10,000,000 and if a continuous offence, a sum of up to KES 100,000 for every day the offence is continued; and
iii) In addition to these criminal sanctions, any rights over land that were obtained by virtue or on account of an offence may be cancelled or revoked.

6.2.10 Physical Planning Act (CAP 286)

The act state that while giving due considerations to the rights and obligations of landowners, there shall be compensation whenever a materials site, diversion or realignment results into relocation of settlement or any change of user whatsoever of privately owned land parcels.

Under the physical planning act, physical development activities are supposed to be carried out according to the physical plans. Accordingly, the processes of physical planning involve two stages; the plan making stage and the development control stage. The former involves drawing up the actual plan to indicate the various activities and zones whereas the later involves the process of determining applications by developers to carry out specific development activities. This ESIA covers the proposed borehole and distribution network rehabilitation.

6.2.11 Occupational Health and Safety Act

This legislation provides for protection of workers during construction and operation phases of the project. This act will provide some of the mitigation measures for any negative impacts in particular those concerning the workers within the site.

6.2.12 The HIV and AIDS Prevention and Control Act

This is an Act of Parliament to provide measures for the prevention, management and control of HIV and AIDS, to provide for the protection and promotion of public health and for the appropriate treatment, counseling, support and care of persons infected or at risk of HIV and AIDS infection, and for connected purposes.

This Act will ensure that the Contractor makes provision for VCT services for employees and locals, as well as promotes public awareness. This will go a long way in ensuring stigmatization of HIV and AIDS is reduced as well as managed during the construction period

6.2.13 National Gender and Development Policy

The National Gender and Development Policy provide a framework for advancement of women and an approach that would lead to greater efficiency in resource allocation and utilisation to ensure empowerment of women.

The National Policy on Gender and Development is consistent with the Government's efforts of spurring economic growth and thereby reducing poverty and unemployment, by considering the needs and aspirations of all Kenyan men, women, boys and girls across economic, social and cultural lines. The policy is also consistent with the Government's commitment to implementing the National Plan of Action based on the Beijing Platform for Action (PFA).

The overall objective of the Gender and Development Policy is to facilitate the mainstreaming of the needs and concerns of men and women in all areas in the development process in the country. This law will be of relevance to the contractor in ensuring that all genders are given an equal opportunity during recruitment during the construction phase and operation phase of the project. The employers will also provide adequate facilities for all genders within the project site.

6.2.14 The Sexual Offences Act, 2006

This Act protects people and employees from any unwanted sexual attention or advances by staff members. This act ensures the safety of women, children and men from any sexual offences which include: rape, defilement, indecent acts. This law will govern the code of conduct of the Contractor's staff and provide repercussions of any wrong doing.

6.2.15 The Children Act, 2001

This Act protects the welfare of children within the Country. The Act identifies Children as a person below the age of 18 years old and protects them from exploitation. Of importance to this project, is section 10, which protects the child from:

- ✓ Economic exploitation.
- ✓ Any work that interferes with his/ her education, or is harmful to the child's health or physical, mental, spiritual, moral or social development.

6.2.16 The County Governments Act, 2012

The promulgation of the 2010 Constitution brought about County Governments. This Act highlights the role of the County Government. The County Government will oversee all development activities within the County, as such will be a major stakeholder for the proposed project.

6.2.17 World Bank Operational Policies

6.2.17.1 Operational Policy (OP) 4.01: Environmental Assessment, 2001

This policy helps ensure the environmental and social soundness and sustainability of investment

projects so as to ensure it doesn't negatively affect the environment. It also supports integration of environmental and social aspects of projects in the decision-making process. The policy requires public consultation and disclosure for Category "A" and B projects which include Sewerage systems. In our case the case project is a category B project as the project impacts are anticipated to be specific to the project site and reversible with implementation of the proposed mitigation measures.

According to the policy, objectives of disclosure & consultation include:

- ✓ To enable affected groups and interested parties (emphasis on NGOs) to understand likely implications of project;
- ✓ To enable affected groups and interested parties have input into project design.

- ✓ Public consultations in this case were done in form of structured questionnaires which were taken from door to door by enumerators and results analyzed by the consultant.

6.2.17.2 Operational Policy 4.04: Natural Habitats, 2001

The policy seeks to ensure that World Bank-supported infrastructure and other development projects take into account the conservation of biodiversity, as well as the numerous environmental services and products which natural habitats provide to human society. The policy Promotes environmentally sustainable development by supporting the protection, conservation, maintenance, and rehabilitation of natural habitats and their functions. The operation of the water supply project will enhance the habitat for trees and other creatures as there will be provision of water in the long run.

6.2.17.3 Operational Policy (OP/BP) 4.11: Physical Cultural Resources, 2006

The objective of this policy is to assist countries in preserving physical cultural resources and avoiding their destruction or damage. PCR are defined as movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious (including graveyards and burial sites), aesthetic, or other cultural significance. PCR may be located in urban or rural settings, and may be above ground, underground, or under water. The cultural interest may be at the local, provincial or national level, or within the international community. This policy applies to all projects requiring a category A or B environmental assessment, project located in, or in the vicinity of recognized cultural heritage sites. Physical cultural resources are important as sources of valuable scientific and historical information, as assets for economic and social development, and as integral parts of a people's cultural identity and practices

6.2.17.4 The Bank's Operational Policy 4.12: Involuntary Resettlement

This is triggered in situations involving involuntary taking of land and involuntary restrictions of access to legally designated parks and protected areas. The policy aims to avoid involuntary resettlement to the extent feasible, or to minimize and mitigate its adverse social and economic impacts.

It promotes participation of displaced people in resettlement planning and implementation, and its key economic objective is to assist displaced persons in their efforts to improve or at least restore their incomes and standards of living after displacement.

The policy prescribes compensation and other resettlement measures to achieve its objectives and requires that borrowers prepare adequate resettlement planning instruments prior to Bank appraisal of proposed projects.

The borehole and the distribution networks are located in public land and along the road reserves and therefore there is no resettlement that will occur.

6.2.17.5 World Bank Policy on Access to Information, 2010

The World Bank policy on access to information sets out the policy of the World Bank on public access to information in its possession. This Policy supersedes the World Bank Policy on Disclosure of Information, and took effect on July 1, 2010. This Policy is based on five principles:

- Maximizing access to information.
- Setting out a clear list of exceptions.
- Safeguarding the deliberative process.
- Providing clear procedures for making information available.
- Recognizing requesters' right to an appeals process.

In disclosing information related to member countries/borrower in the case of documents prepared or commissioned by a member country/borrower (in this instance, safeguards assessments and plans related to environment, resettlement, and indigenous peoples, OP/BP 4.01, Environmental Assessments, OP/BP 4.10, Indigenous Peoples, and OP/BP 4.12 Involuntary Resettlement); the bank takes the approach that the country/borrower provides such documents to the Bank with the understanding that the Bank will make them available to the public.

6.3 INTERNATIONAL FINANCE CORPORATION AND WORLD BANK ENVIRONMENTAL, HEALTH AND SAFETY (EHS) GUIDELINES

These are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). When one or more members of the World Bank Group are involved in a project, these EHS Guidelines are applied as required by their respective policies and standards. These General EHS Guidelines[1] are used in addition to the local guidelines in order to provide mitigation measures for the various environmental and social impacts that will be identified in this report.

[1] WBG – Environmental, Health and Safety Guidelines: http://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/policies-standards/ehs-guidelines

7 PUBLIC CONSULTATION

7.1 LEGAL REQUIREMENT

7.1.1 Government Policy on Public Consultation

The overall objective of the Government is to involve communities in policy formulation and implementation at the local level. More specifically, the Community Action Planning Programme objective is to put in place a durable system of intra-community co-operation through collective action, which creates communal discussion forums for the implementation of development activities.

7.2 PERSONS OR AGENCIENCIES CONSULTED

The key issues which are associated with an establishment of the Korondile water supply project will often relate to pollution, biodiversity, pollution, community safety, communicable diseases and employment and trade opportunities.

Efforts were made to contact all with the information on the following issues.

- ✓ Assessment of the baseline environmental and social conditions
- ✓ Consideration of feasible and environmentally &socially preferable alternatives
- ✓ Requirements under Kenya country laws and regulations, applicable international treaties and agreements
- ✓ Protection of human rights and community health, safety and security (including risks, impacts and management of project's use of security personnel)
- ✓ Protection and conservation of biodiversity
- ✓ Sustainable management and use of renewable natural resources (including sustainable resource management through appropriate independent certification systems)
- ✓ Use and management of dangerous substances and major hazards assessment
- ✓ Labour issues (including the four core labour standards), and occupational health and safety
- ✓ Socio-economic impacts & fire prevention and life safety
- ✓ Impacts on affected communities, and disadvantaged or vulnerable groups
- ✓ Cumulative impacts of existing projects, the proposed project, and anticipated future projects
- ✓ Consultation and participation of affected parties in the design, review and implementation of the project
- ✓ Efficient production, delivery and use of energy
- ✓ Pollution prevention and waste minimization, pollution controls (liquid effluents and air emissions) and solid and chemical waste management.

With that, a cross section of persons were consulted in Korondile on the 30th may 2017 as indicated below.

No	Name	Office	Designation	Contacts
1	Mr. Ibrae Malicha Boru	Korondile Morden Health Centre	Sub-county Public Health Officer	+254712877638
2	Mr. Abdisalan Osman	Water Users Association	Chairman	+254723410350
3	Mr.Elim Mohamed	Sub-County Water Officer	Sub-County Water Officer	+254720103786
4	Mr. Abdinoor Alimed Mohamed	Sub-County Director of Education	Sub-County Director of Education	+254725444046

7.2.1 Overview from the Chairman- Water Users Association

The chairman acknowledged the problem of water shortage. He pointed out that at present, the water available is inadequate to meet the demands of both livestock and humans. He further indicated that the Nyatta borehole ought to be properly equipped to facilitate water pumping. Further, he acknowledged the project thereby anticipating its start and completion as it will aid in averting the problem of water shortage.

7.2.2 Overview from the Medical Officer

The medical officer indicated the dire need for water at Korondile. Within the hospital facility, the medical personnel indicated that they lack water for usage and even for the patients to swallow medicine with. He indicated that the realization of the project will aid in alleviating waterborne diseases.

7.2.3 Overview of Sub-County Water Officer

The Sub-county water officer pointed out that the Nyatta Borehole was drilled by the finances from CDF in the year 2010 but piping was not done as the project was mishandled. Another new borehole was also drilled but it was not successful. He also indicated that the yield of the borehole has dropped to about 7.5m^3/day. At present, water from the borehole is not adequate to fully serve the residents as the yield has dropped due to drought. The sub-county officer also indicated that the users put livestock first before domestic use. According to him, the piping which was done by the Red Cross was of poor quality and eventually bursted. He proposed for more boreholes to be drilled to curb the water shortage together with the water pans. He further pointed out that proposals have been made to the county government for proper hydrological survey to be done in the area.

7.2.4 Overview of the Sub-County Director of Education

The Education officer indicated that there are 20 primary schools and 3 secondary schools in Buna Sub-County. He indicated that previously, there used to be school feeding programs but collapsed due to the inadequate supply of the water from the borehole. He also indicated that there is a lot of absenteeism in schools as the students remain at home and go in search of water.

He anticipated for the realization of the project as this will reduce the problem of absenteeism in schools.

7.3 PUBLIC CONSULTATION

The Consultant carried out public consultation in the form of a consultative meeting where, the Consultant presented the project to the local community, comprised of stakeholders, including representatives of the current residents of the project areas among others. The Consultant held a meeting on 30th May 2017 at the Assistant chief's office in Korondile Location, minutes, photos and an attendance sheet of the meeting are presented in appendix 12.2. The meeting was attended by 20 participants from all the affected project locations. The participants were made up of village elders, youth representatives, a NWSB representative and the local administration.

7.3.1 Findings of the Meetings

The meetings included a presentation by the Consultant on the proposed works, the various environmental and social impacts that may arise from the project. The consultant however pointed out that the Designers had tried their very best to minimize project impacts and that the proposed improvements would be located within along the road reserve. She highlighted the mitigation measures for all the impacts in accordance to the EMP.

Being a public consultation meeting, feedback from the stakeholders was obtained with majority of the stakeholders approving of the project however the needs of the residents in the projects area be looked after. They also noted that water from the Nyatta borehole is inadequate to meet their needs and therefore a new borehole ought to be drilled.

8 ENVIRONMENT AND SOCIAL EFFECTS OF THE PROPOSED PROJECT

This chapter presents the general environmental and social impacts which may result from the proposed project. The emphasis will be initially on the specific impacts that are likely to result from the nature of works including excavation and concrete works.

The construction of the improvements at the existing boreholes and the water distribution networks will greatly benefit the environment, however some of the project activities will have negative effects on the environment.

In general, successful implementation of the project will have high environmental and socio economic benefits to the people and will contribute to the health and wellbeing. Overall, expected negative impacts are related to the improvements to the existing distribution lines including construction of the tank. These impacts are localized and not considered significant and long-lasting and can be mitigated through appropriate mitigation measures. The severity and duration of these impacts can be minimized by ensuring that the excavation and construction works are limited to short working sections, and that works are carried out rapidly and efficiently. Table 2.1 presents a characterization of expected impacts.

Table 8-1Characterization of expected impacts

Aspect	Predicted Impact	Characterization of Impacts								
		Nature		Effect		Time Range			Reversibility	
		Positive	Negative	Direct	Indirect	Short Term	Medium Term	Long Term	Reversible	Irreversible
Ambient Air Quality	Increased local pollutant emissions and trace constituents such as VOCs Increased GHG emissions such as CH_4 and CO_2		X	X		X			X	
	Increased levels of dust and particle emissions from construction vehicles and equipment		X	X			X		X	
soil/water pollution	Contamination of groundwater from oil spills during construction		X	X			X	X		X

Aspect	Predicted Impact	Characterization of Impacts								
		Nature		Effect		Time Range			Reversibility	
		Positive	Negative	Direct	Indirect	Short Term	Medium Term	Long Term	Reversible	Irreversible
	Surface water pollution from construction wastes		X	X			X	X	X	
Noise and vibrations	Increase of noise and vibration levels due to construction activities		X	X		X			X	
Health & Safety	General construction related health and safety risks for workers		X	X		X			X	X
	HIV/AIDS and increased disease risks.		X	X	X	X	X	X		X
Socio-economics	Improvement of local and regional socio-economy	X			X			X		

Aspect	Predicted Impact	Characterization of Impacts								
		Nature		Effect		Time Range			Reversibility	
		Positive	Negative	Direct	Indirect	Short Term	Medium Term	Long Term	Reversible	Irreversible
	Employment and job creation during construction and operation phases	X		X		X	X	X		
solid and liquid waste	generation of both solid and liquid waste at the construction camps and along the project route		X	X		X	X	X	X	
Health and safety	Improvement in public health and sanitation through improved potable water supply.	X		X		X	X	X		

Aspect	Predicted Impact	Characterization of Impacts								
		Nature		Effect		Time Range			Reversibility	
		Positive	Negative	Direct	Indirect	Short Term	Medium Term	Long Term	Reversible	Irreversible
Water	Increased clean water supply to the target WSP areas which could reduce incidences of water borne diseases hence significant improvement on public health	X		X		X	X	X		
	Enhanced water quality, quantity and distribution.	X		X		X	X	X		
	Vandalism and illegal connections/tapping		X		X	X	X	X	X	

Aspect	Predicted Impact	Characterization of Impacts			
		Nature	Effect	Time Range	Reversibility

Aspect	Predicted Impact	Characterization of Impacts								
		Nature		Effect		Time Range			Reversibility	
		Positive	Negative	Direct	Indirect	Short Term	Medium Term	Long Term	Reversible	Irreversible
		Positive	Negative	Direct	Indirect	Short Term	Medium Term	Long Term	Reversible	Irreversible
Ambient Air Quality	Increased levels of dust and particle emissions from construction vehicles and equipment		X	X		X	X		X	
Soil Pollution	Contamination of soil from the oil spills during construction		X	X			X	X		X
Noise and vibrations	Increase of noise and vibration levels due to construction activities		X	X		X			X	
Health & Safety	General construction related health and safety risks for workers		X	X		X			X	X

Aspect	Predicted Impact	Characterization of Impacts								
		Nature		Effect		Time Range			Reversibility	
		Positive	Negative	Direct	Indirect	Short Term	Medium Term	Long Term	Reversible	Irreversible
	HIV/AIDS and increased disease risks.		X	X	X	X	X	X		X
	Improvement in public health and sanitation through reduced use of dirty water.	X		X		X	X	X		
Socio-economics	Improvement of local and regional socio-economy	X			X			X		
	Employment and job creation during construction and operation phases	X		X		X	X	X		
solid and liquid waste	generation of both solid and liquid waste at the construction camps		X	X		X	X	X	X	
Impacts on Flora and Fauna	Loss of flora and fauna within the project site		X	X			X		X	

Aspect	Predicted Impact	Characterization of Impacts								
		Nature		Effect		Time Range			Reversibility	
		Positive	Negative	Direct	Indirect	Short Term	Medium Term	Long Term	Reversible	Irreversible
Gender	Increased harassment of females within and around the site		X	X		X			X	
Crime Management	Increased insecurity around the project sites		X		X		X		X	
Child Labour and Protection	Potential for exploitation of child labour		X	X		X			X	
Labour influx	Risk of social conflict as a result of increase in influx population		x	x	x		x		x	

The general environmental and social impacts which may result from the proposed project is presented in this chapter. The emphasis will be initially on the specific impacts that are likely to result from the nature of works (e.g. trenching, excavation, laying of pipelines) and works category (e.g. water supply).

A vast range of environmental and social implications will surely arise from the Korondile water supply project, notably along the pipeline routes. In general, successful implementation of the project will have high socio and economic benefits to the people and will contribute to the health and wellbeing. Overall, expected negative impacts are related to pipeline and associated works such as construction of the valve chambers, washouts and water kiosks.

These impacts are localized and not considered significant and long-lasting and can be mitigated through appropriate mitigation measures. The severity and duration of these impacts can be minimized by ensuring that the excavation and construction works are limited to short working sections, and that works are carried out rapidly and efficiently.

Nevertheless, environmental impact assessments (ESIA) are now recognized as an essential component in any development project and as an important decision-making tool, and the appropriate procedures were followed.

8.1.1 Impact Identification

The identification of impacts in the ESIA study generally used the following methods:

- Compilation of a comprehensive list of key environmental impacts. These are such as changes in air and water quality, noise levels, wildlife habitats, bio-diversity, landscape, social and economic systems, cultural heritage, settlement patterns, and employment levels.
- Identification of all the sources of impacts such as dust, spoils, vehicles emissions, water pollution, construction camps, etc. using checklists or questionnaires. This was followed by listing possible receptors in the environment (e.g., crops, communities, and migrant labors) through surveying the existing environmental and socio-economic conditions and consultation with concerned parties.
- Identifying and quantifying various environmental and socio-economic impacts through the use of checklists, interaction matrices and overlays.

8.1.2 Impact Prediction

Prediction of impacts technically characterizes the causes and effects of impacts, and their secondary and synergistic consequences for the environment and the local community. It examines each impact within a single environmental parameter into its subsequent effects in many disciplines (e.g., deterioration of water quality and resulting socio-cultural changes). It draws on

physical, biological, socio-economic, and anthropological data and techniques. In quantifying impacts, it employs socio-cultural models, economic models, and expert judgments.

It is worth noting that all prediction techniques of environmental impacts, by their nature, involve some degree of uncertainty.

8.1.3 Mitigation of Impacts

Each predicted adverse impact is evaluated to determine whether it is significant enough to warrant mitigation. This judgment of significance has been based on one or more of the following:

- Comparison with laws, regulations or accepted standards;
- Consultation with the relevant decision makers;
- Reference to present criteria such as protected sites, or endangered species
- Consistency with government policy objectives
- Acceptability to the local community or the general public

8.1.4 Impact Category

First the likely significance of the potential issues of concerns has been determined and ranked according to the following:

- Potential environmental impacts which are deemed to be highly significant and need thorough investigation in the ESIA
- Potential environmental impacts that are deemed to be moderately significant, and will require reasonable investigation in the ESIA
- Potential environmental impacts that are deemed unlikely to be significant, and will need to be listed, and addressed in some way, but which will not require detailed assessment in the ESIA.

Secondly, the following characteristics have been defined for each impact:

8.1.4.1 Nature:

- Positive: applies to impacts that have a beneficial economic, environmental or social result, such as additional economic activity or enhancement of the existing environmental conditions.
- Negative: applies to impacts that have a harmful or economical aspect associated with them such as economical cost, loss or degradation of environmental resources.

8.1.4.2 Effect:

- Direct: applies to impacts which can be clearly and directly attributed to a particular impacting activity.
- Indirect: applies to impacts which may be associated with or subsequent to a particular impacting activity, but which cannot be directly attributed to it.

8.1.4.3 Time Range:

- Short Term: applies to impacts whose effects on the environment will disappear within a 1 year period, or within the construction phase.
- Medium Term: applies to impacts whose effects on the environment will disappear within a 5 year period following the construction phase.
- Long Term: applies to impacts whose effects on the environment will disappear in a period greater than 5 years following the construction phase.

8.1.4.4 Reversibility:

- Reversible: applies to impacts whose significance will be reduced and disappear over time (either naturally or artificially), once the impacting activity ceases.
- Irreversible: applies to impacts whose significance will not be reduced nor disappear over time (either naturally or artificially), once the impacting activity ceases.

8.1.5 Impacts emanating from the proposed project

The impacts are identified in to three stages:

- Pre-construction/planning phase impacts
- During construction and
- Post construction(operation phase)

8.1.6 Planning Phase Impacts

These are commonly associated resettlement of people along the pipeline routes. The proposed project area is located in community grazing land with little or no settlement, and along existing road reserves within the town. In addition the roads within the town have no encroachment onto the road reserve as such the pipelines will be dug with no permanent interference of human activities. The only features that may be affected by the proposed project include:

i) Natural vegetation along the pipeline way leave.

Mitigation measures

- The pipeline runs along roads and footpaths, the extension of the lines will be located along footpaths and roads so as to avoid land acquisition.
- Discussion with the local community on use of community land as part of the RAP screening
- On construction completion, access routes will be reinstated to their pre-project conditions for both people and animals.

8.1.7 Construction Phase Impacts

Most of the potential environmental and social impacts associated with the construction phase will be negative and temporary, and can be mitigated with the use of standard environmental management procedures. The potential social impacts or nuisance will be those typically associated with construction activities involving vehicles, equipment, and workers. The predicted impacts include the following:

8.1.7.1 Site Related Oil Spills

During construction, oil spills may result from construction site equipment and storage.

Mitigation Measures

- The Contractor should ensure that the employees on site are aware of the company procedures for dealing with spills and leaks from oil storage tanks for the construction machinery though induction and safety training;
- In case of spillage the Contractor should isolate the source of oil spill and contain the spillage using sandbags, sawdust, absorbent material and/or other materials approved by the Resident Engineer;
- The Resident Engineer and the Contractor should ensure that there is always a supply of absorbent material such as saw dust on site during construction, readily available to absorb/breakdown spill from machinery or oil storage;
- All vehicles and equipment should be kept in good working order, serviced regularly and stored in an area approved by the Resident Engineer;
- The Contractor should assemble and clearly list the relevant emergency telephone contact numbers for staff, and brief staff on the required procedures.
- All vehicle works should be done in one place to avoid chances of spillage in different parts of the camp

8.1.7.2 Soil-Related Impacts

All construction activities have some minor impacts on the soil. However, these are localized and restricted locally to the excavation of trenches for the water pipes. It is expected that these impacts are also short-lived during construction and mitigation measures are recommended. The key

impacts will revolve around soil erosion, contamination, disturbance of the natural soil structure, piling of soil along public access routes, improper replacement of soil to its original position, mixing of layers and compaction thus reducing the ecological function of the soil.

Mitigation Measures

- The valuable top soil containing organic material, nutrients as well as seeds and the soil fauna would be excavated separately and piled in an adequate manner for re-use.
- In cases where it is identified that during construction there is a danger of increased run-off or erosion of trenches, temporary drainage channels or holding ponds can be employed
- After completion of the construction works, immediate restoration spreading piled top soil and by sowing adequate grass cover and planting of trees will be followed, therefore the impact is temporary and reversible.
- Plan emergency response measures in case of accidental oil spills.

8.1.7.3 Impact on Water Resources

Potential environmental impacts associated with water resources include sedimentation, foreign material spills, pollution slumping, disturbance to drainage and removal of vegetation. Vegetation and solid waste, if allowed to accumulate in water ways, may cause localized pooling and flooding. Improper handling of construction wastes and increased waste water production may cause pollution of the seasonal river. This may affect the river eco-system.

Mitigation Measures

- Construction materials and other debris (lime, cement and fresh concrete, etc.) shall be prevented from entering waterways.
- Ensure protection of the river ecosystem by proper handling of cement during civil works.

8.1.7.4 Social - Economic Impacts

During construction the project will have clear benefits with regard to local employment opportunities. The project will additionally require various skills and services which may not be available on the local level but certainly on the regional level, e.g. masonry workers, plumbers, etc. for which appropriate personnel will be contracted.

The increase in employment will temporarily lead to an overall increase of income directly and indirectly (through increased demand of other local services). Consequently, farmers will also benefit from higher income levels as they sell their products. New businesses will grow such as food vending to construction workers.

With availability of tap water there will be a possibility of increased investor interest in tourism related developments in the area and possible increase in property values for land with access to piped water.

In migration of people from different regions may lead to behavioral influences and this may increase the spread of diseases such as HIV/AIDS.

The land in Korondile is communally owned. The project components will be located within public land (road reserves) and on community land belonging to the Al Juran tribe, who in accordance to the World Bank O.P 4.12, were consulted and have agreed to provide the necessary way leaves and land for the project implementation based on the conditions provided in the community resolution forms and the public consultation meetings

Mitigation Measures

- Unskilled construction and skilled (if available) labor to be hired from the local population as far as possible to minimize on influx of foreigners into the community.
- Use of manual labor during trenching works where possible to ensure more employment of locals and hence ensure project support throughout the construction process.
- Sensitize workers and the surrounding community on awareness, prevention and management of HIV / AIDS through staff training, awareness campaigns, multimedia, and workshops or during community Barazas.
- Ensure effective and matching contractual provisions for contractor to manage labour influx
- Use of existing clinics to provide VCT services to construction crew and provision of ARVs for vulnerable community members
- The Contractor should enforce and maintain a code of conduct for his employees

8.1.7.5 Air Quality

Construction activities of bush clearing, materials delivery, trench excavation and construction traffic will generate a lot of noise and dust especially during the dry seasons. The area is predominantly dry thus dust is already a pre-existing problem.

Vehicular traffic to the proposed sites is expected to increase especially during delivery of raw materials. Vehicular traffic emissions will bring about air pollution by increasing the fossil fuel emissions into the atmosphere. The access roads are earth roads. Trucks with heavy loads will further damage these earth roads.

Mitigation Measures

- Use protective clothing like helmets and dust masks on construction crew.
- Construction sites and transportation routes will be water-sprayed on regularly up to three times a day, especially if these sites are near sensitive receptors, such as residential areas or institutions.
- All the vehicles and construction machinery should be operated in compliance with relevant vehicle emission standards and with proper maintenance to minimize air pollution.
- Digging of trenches should be done manually so as to avoid too many trucks and machines in the area. The use of manual labor will also benefit the community socio-economically.
- Use of other dust palliative measures to reduce dust emissions

8.1.7.6 Construction Noise and vibration

Noise and vibration generated during construction by heavy construction machinery, such as excavators, bulldozers, concrete mixers, and transportation vehicles.

Generally, construction noise exceeding a noise level of 70 decibels (dB) has significant impacts on surrounding sensitive receptors within 50m of the construction site.

Mitigation Measures

- Avoid night time construction when noise is loudest. Avoid night-time construction using heavy machinery, from 2200 to 0600hrs near residential areas.
- No discretionary use of noisy machinery within 50 m of residential areas and near institutions such as schools
- Good maintenance and proper operation of construction machinery to minimize noise generation.
- Installation of temporary sound barriers if necessary.
- Selection of transport routes for large vehicles to avoid residential areas.
- Where possible, ensure non mechanized construction. This includes, employing locals during the trench excavation.

8.1.7.7 Biodiversity and Conservation Impacts

Removal of vegetation as well as trees will lead to loss of plants and animal habitat. The biodiversity affected includes insects such as butterflies and worms, small mammals, reptiles and birds. Water contamination with cement will cause it to be highly alkaline and toxic to plants and animals living in watercourses.

Mitigation Measures

- Re-plant the indigenous vegetation as much as practical once work is completed.
- Spare the vegetation that must not necessarily be removed such as trees.

- ❖ Minimize the amount of destruction caused by machinery by promoting non mechanized methods of construction.
- ❖ Ensure protection of the areal ecosystem by proper handling of cement during civil works.
- ❖ Cement mixing should be done in a designated area away at a safe distance from natural water courses.

8.1.7.8 Public Health, Safety & HIV & AIDS Impacts

Construction staff and the general public will be exposed to safety hazards arising from construction activities. The pipelines are to be placed primarily along the access roads these roads have pedestrian and vehicular traffic and this may cause an increase in the number of accidents. The project works will expose workers to occupational risks due to handling of heavy machinery, construction noise, electromechanical works etc.

Construction activities of bush clearing, materials delivery, trench excavation and concrete mixing and construction traffic will generate a lot of dust and this may affect the respiratory system.

The high temperatures in the area will expose the workers to difficult working conditions. Construction sites may be a source of both liquid and solid wastes. If these wastes are not well disposed these sites may become a breeding ground for disease causing pests such as mosquitoes and rodents.

At the concrete mixing plant the exposure of human skin to cement may lead to damage of the skin.

In migration of people from different regions may lead to behavioral influences which may increase the spread of diseases such as HIV/AIDS.

Improper handling of solid wastes produced during and civil works such as spoil from excavations, scrap metal, mortar, paper, masonry chips and left over food stuff present a public nuisance due to littering or smells from rotting.

Open trenches during the project duration pose a risk to the general public as they access the different sides of the trenches.

Improved clean water supply to the area will lead to improved public health and quality of life through reduced risk of waterborne and water-related diseases; and increased public satisfaction

<u>Mitigation Measures</u>

- ❖ Ensure that all construction machines and equipment are in good working conditions to prevent occupational hazards.
- ❖ Establish a Health and Safety Plan (HASP) for both civil and electromechanical work.

- Appoint a trained health and safety team for the duration of the construction work.
- Use of dust masks while working in dusty environment to avoid respiratory related sicknesses.
- Provide workers with appropriate personal protective equipment (PPE).
- Provide workers with adequate drinking water and breaks.
- Provide workers training on safety procedures and emergency response such as fire, oil and chemical spills, pipe bursts and other serious water loss risks.
- Roads passing through population centers will be water sprayed to reduce dust.
- Sensitize workers and the surrounding communities on awareness, prevention and management of HIV/AIDS through staff training, awareness campaigns, multimedia and workshops or during community Barazas. Provide information, education and communication about safe uses of drinking water.
- Work to minimize or altogether eliminate mosquito breeding sites.
- Provide appropriate human and solid waste disposal facilities
- Provide crossing points along the trenches to allow people to maintain their normal activities, also cautionary signage should be provided along the trenches.
- Provide clean toilets for workers

8.1.7.9 Service Delivery Impacts

The construction activities will cause disruption of services such as water supply and transportation within the project area. Where the water pipe crosses the road, excavation of trenches and laying down of the water pipes may cause disruption of transport within the project area. Trucks with heavy loads of construction materials may damage murram roads during the construction process. The trucks may get stuck on bad road sections (sandy soil is difficult to negotiate through) and these may cause disruption of transport.

The current water storage facilities may not be enough to handle emergencies brought on by the interruption in water supply. Areas of special attention include the learning and health care institutions.

The completion of the water project will alleviate the water problem and ensure better management of water supply as water losses will be detected. Metering will allow better pricing of water resources and could contribute to better water use management by consumers. Improved clean water supply to the area, sanitation and hygiene for residents with access to tap water will lead to improved public health and quality of life through reduced risk of waterborne and water-related diseases; and increased public satisfaction within the project area. This will lead to population growth and informal settlements causing increased waste water production and increased demand for emergency water supply from existing reservoirs

<u>Mitigation Measures</u>

- ❖ Provide appropriate signage to warn motorists and other road users of the construction activities, diversion routes to ward off traffic accidents.
- ❖ The contractor should communicate any intended disruption of the services to enable the people to prepare e.g. by having emergency water storage and provision facilities.
- ❖ Areas being trenched to be temporarily cordoned off to avoid people and animals accidentally falling into open trenches.
- ❖ In the event that delivery trucks damage parts of the road, repair the spots in consultation with the local authorities.
- ❖ Provide adequate water storage facilities to ensure adequate supplies to meet the new demand.
- ❖ Ensure proper maintenance of the water works
- ❖ Use pipes of good quality materials

8.1.7.10 Gender Empowerment Impacts

There is need to promote gender equality in all aspects of economic development and more so in construction. Women roles in construction are mainly confined to supply of unskilled labor and vending of foodstuffs to the construction workers. Where available skilled women will be used.

The increase in the distribution of water to the inhabitants will immediately transform their ways of life, especially for women who are the first concerned when it comes to water supplies. Women who are the main economic players will have more time to spend on other economic activities.

Mitigation Measures

- ❖ Ensure equitable distribution of employment opportunities between men and women
- ❖ Provide toilets and bathrooms for both male and female workers on site

8.1.7.11 Child Labour and Protection

The Children Act of Kenya prohibits contractors from "employing children in a manner that is economically exploitative, hazardous, and detrimental to the child's education, harmful to the child's health or physical, mental, spiritual, moral, or social development. It is also important to be vigilant towards potential sexual exploitation of children, especially young girls. The contractor should adopt a 'Child Protection Code of Conduct'; that all staff of the contractor must sign, committing themselves towards protecting children, which clearly defines what is and is not acceptable behaviour.

Mitigation Measures

- ❖ Ensure no children are employed on site in accordance with national labor laws
- ❖ Ensure that any child sexual relations offenses among contractors' workers are promptly reported to the police

8.1.7.12 Impacts on Cultural Heritage

The Consultant did not identify any potential cultural sites that may be affected by the proposed project, however there is potential of uncovering a buried cultural site during construction and provisions must be made. The cultural sites include archeological sites, historical sites, remains and objects, including graveyards and/or individual graves during excavation or construction.

Mitigation Measures

- Use of "chance find" procedures by the contractor _ See Appendix 12.4 for "Chance Find" procedures

8.1.7.13 Liability for loss of life, injury or damage to private property

Some of the Construction activities may lead to accidents that may be mild or fatal depending on various factors. During the implementation of the proposed project, accidents could be due to negligence on part of the workers, machine failure or breakdown or accidental falls into the trenches. These incidents can be reduced through proper work safety procedures.

In addition, during Construction, there may be damage to private property that may not be foreseen.

Mitigation Measures

- Provision of PPE.
- The workers should receive requisite training especially on the operation of the machinery and equipment
- There should be adequate warning and directional signs.
- Ensuring that the prepared code of conduct for staff is followed to prevent accidents.
- Develop a site safety action plan detailing safety equipment to be used, emergency procedures, restriction on site, frequency and personnel responsible for safety inspections and controls.
- Cordon off unsafe areas
- Provide first Aid kit within the construction site.
- Recording of all injuries that occur on site in the incident register, corrective actions for their prevention are instigated as appropriate.
- Contractor to ensure compliance with the Workmen's Compensation Act, ordinance regulations and union agreements.
- The Contractor to repair any damage done to private property.

Impacts during operation and maintenance

During the operation of the constructed water supply project no substantial negative environmental and social impacts and risks are anticipated.

8.1.7.14 Socio - economic potential positive or beneficial impacts

Numerous socio-economic potential positive or beneficial impacts from successful implementation of the project will include:

- Better access to safe drinking water leading to improved standard of living; and changes in exposure to both communicable and non-communicable diseases;
- Improvements in domestic hygiene and a reduction in health risks that were associated with poor water quality or inadequate access to services, as a result of improvements in drinking water quality and its availability;
- The program will contribute to increase in local development and employment as the local population are likely to be employed during the construction phase and after construction due to water related investments;
- Promote a more sustainable use of water resources with improvements in the infrastructure to reduce losses and introduction of better metering and billing procedures to encourage more efficient use of water;
- A comprehensive metering program (of production and consumers) is expected to keep the on Non-Revenue Water (NRW- technical and commercial losses) at an acceptable level;
- Sanitation will also be promoted with its attendant improvement in the health of the people such as reduced incidence of water borne diseases.
- Improvements in metering and administrative billing procedures;
- The program is expected to contribute to poor communities well-being associated with improved services, stability, and health.
- Employment creation will be the key positive environment impact as operation and maintenance personnel will be required for the rest of the project life. The availability of water and easy access will trigger other developments and businesses.

Other potential impacts typically associated with operation and maintenance activities are such as:

8.1.7.15 Generation of both solid and liquid waste

The establishment of an adequate water distribution system will be mostly beneficial to the local community, however with the provision of water comes the increase in the generation of solid and liquid waste. Water supply will lead to an increase in the generation of solid and liquid waste.

Mitigation Measures

- Provide adequate waste disposal facilities. Ensure collection of all solid waste from generation points, safe transportation to a central point where they are sorted out and safely disposed according to type to protect the environmental resources.
- Put in place adequate and efficient sanitary facilities for handling liquid waste especially waste water to protect the seasonal rivers from pollution.
- Come up with regular trash collection system in the site areas so as to avoid accumulation of waste.
- In the long term the respective WSP should invest in a waste water collection and treatment system for Korondile town to ensure proper handling of waste water. This would also help in protecting local environment from possible contamination with direct sewage.

8.1.7.16 Leaks and burst

During the project duration there may be leaks and bursts caused by various reasons such as excessive pressures, illegal connections, among others

Mitigation Measures

- A program of leak detection to be put in place to identify aging pipes for replacement to avoid major bursts and frequent repairs. In case of unavoidable major repairs, mitigation measures similar to those applied during construction to reduce the impacts of noise, dust, disturbance of flora and fauna.
- Leaks and pipe bursts to be promptly repaired to avoid contamination of water resources especially shallow ground water.
- Constant policing of network to check for illegal connections

8.1.7.17 Noise

Noise nuisance from vehicles and repair equipment. During O&M activities vehicles are required for inspection of pipelines to detect any leakage and repair equipment is required in case need arises and in the process of these activities undesirable noise will be generated.

Table 8-2 Noise Level Guidelines

Noise Level Guidelines		
	One Hour L_{ACQ} (dBA)	
Receptor	**Daytime (07:00-22:00)**	**Nighttime (22:00-07:00)**
Residential; institutional; educational	55	45
Indisutrial;commercial	70	70

Mitigation Measures

- ❖ During normal operations the noise generated from vehicles has insignificant impact. However during major repairs the equipment used can generate unacceptable levels of noise and mitigation measures similar to those applied during construction to be used.

8.1.7.18 Impact on Water Resources

As mentioned earlier the generated solid and liquid waste from the project area will make itself through its natural water courses, including ground water. Thus the entire water system and as a result the ecological system will be negatively affected.

Mitigation Measures

- ❖ Wastewater will be channeled to the sewerage system if available or constructed septic tanks. Pit latrines can be used where sewerage system is not available or where construction of septic tank is not feasible.
- ❖ All solid waste will be collected from generation points, safely transported to the central place where it is sorted out by type and then safely disposed according to type.

8.1.7.19 Socio - Economic Impacts

The expected improvements in metering and administrative billing procedures are likely to cause social and economic impact as this may result in higher water bills

Mitigation Measures

- ❖ The project will make use of the respective WSP approved rates and this impact is not foreseen

8.1.7.20 Impact on flora and fauna.

Impact associated with repair and replacement activities when there are leaks or bursts on pipelines will be loss of vegetation and disturbance flora and fauna.

Mitigation Measures

- ❖ A program of leak detection to be put in place to identify aging pipes for replacement to avoid major bursts and frequent repairs. In case of unavoidable major repairs, mitigation measures similar to those applied during construction to reduce the impacts of disturbance of flora and fauna.
- ❖ Leaks and pipe bursts to be promptly repaired to avoid contamination of water resources especially shallow ground water.
- ❖ After the repair works the land to be levelled to allow vegetation regeneration.

8.1.7.21 Land subsidence

This impact results from the over extraction of the ground water from the borehole.

Mitigation Measures

The pumps at the borehole sites are designed in such a way that ensures safe yields and thus, there is no risk of over extraction.

Impacts during de-commissioning

De-commissioning of the Project is not envisaged. Project components however will be rehabilitated over time having served their useful life.

9 ENVIRONMENTAL AND SOCIAL MITIGATION AND MANAGEMENT PLAN (ESMMP)

By design, the potential positive impacts of the project can readily be optimized while the potential negative environmental and social impacts are mostly restricted to the planning and construction period. These are assessed and considered as minor to medium, being reversible and short-term and can be managed through well-defined mitigation and monitoring measures.

9.1 POSSIBLE ENHANCEMENT MEASURES

Possible enhancement measures of beneficial impacts would include the following:

- Construction should adhere to recommended best construction practices that make effective and economical use of locally available resources including materials, expertise and labor.
- Ensure that the poor and other vulnerable groups adjacent or along the pipeline route will be catered for by the project to safely satisfy their basic water needs in future.
- Ensure that social services provide education on appropriate hygienic conditions and water conservation, taking into consideration gender particular roles and responsibilities.
- Carrying out periodic assessment of different components of the water production, transmission and distribution system to initiate immediate rehabilitation whenever problems are identified to reduce system leakage and bursts losses.

9.2 MITIGATION MEASURES

Mitigation measures have already been discussed in Chapter 8. However, a brief summary is included in the Environmental and Social Mitigation and Management Plan (ESMMP) in Table 9-1: The Proposed Environmental and Social Mitigation and Management Plan (ESMMP). Also considered in this management and monitoring plan are the persons responsible for implementation.

Table 9-1: The Proposed Environmental and Social Mitigation and Management Plan (ESMMP)

Project Phase	**Environmental / Social Impact**	**Mitigation Measure**	**Responsibility**	**Cost (K.Shs.)**
Construction	Loss of flora and fauna	Re-plant the vegetation as much as possible once work is completed. Spare the vegetation that must not necessarily be removed such as trees.	Contractor Supervising Engineer	600.00

Project Phase	Environmental / Social Impact	Mitigation Measure	Responsibility	Cost (K.Shs.)
		Minimize the amount of destruction caused by machinery by promoting non-mechanized methods of construction. The Contractor should ensure that the employees on site are aware of the company procedures for dealing with spills and leaks from oil storage tanks e.g. using dispersants or adding biological agents to speed up the oil breakdown for the construction machinery though induction and safety training (the contractor will propose a method of clean-up which will be subject to approval);	County Officer-Water Energy and Natural Resources	
Construction	Air quality	Use protective clothing like dust masks on construction crew. Construction sites and transportation routes (those that are murram and earth standards) will be water-sprayed on regularly up to three times a day, especially if these sites are near sensitive receptors, such as residential areas or institutions (schools, hospitals, etc.). All the vehicles and construction machinery should be operated in compliance with relevant vehicle emission standards and manufacturer's specification to minimize air pollution.	Contractor Supervising Engineer	Cost included in PPE Cost of water spraying and vehicle maintenance included in Contractor's cost
Construction	Noise pollution	Avoid night time construction when noise is loudest. Avoid night-time construction using heavy machinery, from 22:00 to 6:00 near residential areas.	Contractor Supervising Engineer	Included in Contractor's costs

Project Phase	Environmental / Social Impact	Mitigation Measure	Responsibility	Cost (K.Shs.)
		No discretionary use of noisy machinery within 50 m of residential areas and near institutions such as schools Good maintenance and proper operation of construction machinery to minimize noise generation. Where possible, ensure non mechanized construction to reduce the use of machinery		
Construction	Site Related Oil Spills	The Contractor should ensure that the employees on site are aware of the company procedures for dealing with spills and leaks from oil storage tanks e.g. using dispersants or adding biological agents to speed up the oil breakdown for the construction machinery though induction and safety training (the contractor will propose a method of clean-up which will be subject to approval); even though, no significant use of machinery is expected. In case of spillage the Contractor should isolate the source of oil spill and contain the spillage to the source of leakage before it makes its way into the rivers, using sandbags, sawdust, absorbent material, and/or other materials approved by the Resident Engineer; The Resident Engineer and the Contractor should ensure that there is always a supply of absorbent material such as saw dust on site during construction, readily available to absorb/breakdown spill	Contractor Supervising Engineer	50,000.00

Project Phase	Environmental / Social Impact	Mitigation Measure	Responsibility	Cost (K.Shs.)
		from machinery or oil storage, this can be incinerated after use; All vehicles and equipment should be kept in good working order, serviced regularly in accordance to the manufacturers specifications and stored in an area approved by the Resident Engineer; The Contractor should assemble and clearly list the relevant emergency telephone contact numbers for staff, and brief staff on the required procedures.		
Construction	Soil Related Impacts	In cases where it is identified that during construction there is a danger of increased run-off or at the project site, temporary drainage channels or holding ponds can be employed After completion of the construction works, restoration of the ground by sowing adequate grass cover and planting of trees will be followed, therefore the impact is temporary and reversible. In areas prone to erosion, provision of soil stabilization in form of a retaining wall or planting of trees, subject to approval by the Resident Engineer Plan emergency response measures in case of accidental oil spills.	Contractor Supervising Engineers	Included in the Contractor's cost
	Impacts on Water resources	Ensure proper solid and liquid wastes disposal mainly from the construction camps, sites and offices. Ensure proper measures are in place for collection and disposal of spilled oils and lubricants.	Contractor, Supervising Engineer County Water Officer	10,000.00 50,000.00

Project Phase	Environmental / Social Impact	Mitigation Measure	Responsibility	Cost (K.Shs.)
Construction	Public Health & Safety	Sensitize workers and the surrounding communities on awareness, prevention and management of HIV/AIDS through staff training, awareness campaigns, multimedia and workshops or during community Barazas. Provide information, education and communication about safe uses of drinking water.	Contractor Supervising Engineer NWSB	200,000.00
Construction	HIV & AIDS Impacts	Sensitize workers and the surrounding communities on awareness, prevention and management of HIV/AIDS through staff training, awareness campaigns, multimedia and workshops or during community Barazas. Provide information, education and communication. Use of existing clinics to provide VCT services to construction crew and provision of ARVs for vulnerable community members Provide Condom dispensers at appropriate locations	Contractor Supervising Engineer Isiolo County Government NWSB	Included in sensitisation costs above 150,000.00 50,000.00
Construction	Socio-economic impacts	Unskilled construction and skilled (if available) labour to be hired from the local population as far as possible to minimize on influx of foreigners into the community. Use of manual labour during excavation and construction works where possible to ensure more employment of locals and hence ensure project support throughout the construction process. Ensure effective and matching contractual provisions/obligations (Terms of the contract) for contractor to manage labour influx.	Contractor Supervising Engineer	Included in Contractor's cost

Project Phase	Environmental / Social Impact	Mitigation Measure	Responsibility	Cost (K.Shs.)
		Sensitize workers and the surrounding community on awareness, prevention and management of HIV / AIDS through staff training, awareness campaigns, multimedia, and workshops or during community Barazas. Use of existing clinics to provide VCT services to construction crew and provision of ARVs for vulnerable community members The Contractor should enforce and maintain a code of conduct for his employees		
Construction	Gender empowerment	Ensure equitable distribution of employment opportunities between men and women Provide toilets and bathrooms for both male and female workers on site	The contractor The Supervising Engineer	100,000.00
Construction	Crime Management	Fencing around project area. Working with local committees (e.g. "nyumba kumi) to provide security within the site in addition to the Contractor's own security. Removing any employee who persists in any misconduct or lack of care, carries out duties incompetently or negligently, fails to conform to any provisions of the contract, or persists in any conduct which is prejudicial to safety, health, or the protection of the environment. Taking all reasonable precautions to prevent unlawful, riotous or disorderly conduct by or amongst the contractor's personnel, and to	Contractor Supervising Engineer	Included in contractor's cost

Project Phase	Environmental / Social Impact	Mitigation Measure	Responsibility	Cost (K.Shs.)
		preserve peace and protection of persons and property on and near the site. Prohibiting alcohol, drugs, arms, and ammunition on the worksite among personnel. The contractor and Supervision Consultant should register in a log all events of a criminal nature that occur at the worksite or are associated with the civil works activities. The contractor and Supervision Consultant should report all activities of a criminal nature on the worksite or by the contractor's employees (whether on or off the worksite) to the police and undertake the necessary follow-up. Crime reports should include nature of the offense, location, date, time, and all other pertinent details.		
Construction	Child Labour and Protection	Ensure no children are employed on site in accordance with the law Ensure that any child sexual relations offenses among contractors' workers are promptly reported to the police	Contractor Supervising Engineer Local Administration	
Construction	Gender Equity, Sexual Harassment	The works contractor should be required, under its contract, to prepare and enforce a No Sexual Harassment and Non-Discrimination Policy, in accordance with national law where applicable. The contractor should prepare and implement a gender action plan,	Contractor Supervising Engineer Local Administration	
Construction	Impact on cultural sites	Implementation of chance find procedures see appendix 12.4	Contractor	25,000.00

Project Phase	Environmental / Social Impact	Mitigation Measure	Responsibility	Cost (K.Shs.)
			Supervising Engineer	
Construction	Liability for loss of life, injury or damage to private property	Provision of PPE. To the construction workers at any time they are involved in the construction. The PPE should include clothing, helmets, and goggles. The workers should receive requisite training especially on the operation of the machinery and equipment There should be adequate warning and directional signs. Ensuring that the prepared code of conduct for staff is followed to prevent accidents. Develop a site safety action plan detailing safety equipment to be used, emergency procedures, restriction on site, frequency and personnel responsible for safety inspections and controls. Cordon off unsafe areas Provide first Aid kit within the construction site. Recording of all injuries that occur on site in the incident register, corrective actions for their prevention are instigated as appropriate. Contractor to ensure compliance with the Workmen's Compensation Act, ordinance regulations and union agreements. The Contractor to repair any damage done to private property.	Contractor Supervising Engineer	30,000.00 50,000.00 40,000.00

Project Phase	Environmental / Social Impact	Mitigation Measure	Responsibility	Cost (K.Shs.)
Construction	Miscellaneous Environmental issues	As prescribed by the Environmental Supervisor	Environmental Supervisor	75,000.00
Operation	Generation of solid waste	Sorting of all debris collected by the screens before transport to the relevant facilities. Continuous removal of solid waste to prevent overloading of the system to ensure efficiency in the cleaning of the combined storm and waste water. All transporters used should have a license from NEMA.	NWSB	
Operation	Noise Pollution	All transportation vehicles should be kept in good working order, serviced regularly in accordance to the manufacturers' specifications. All transportation vehicles should be licensed by NEMA	NWSB	
Operation	Increased Tariffs	NWSB incorporates the "pro-poor" policy in its billing.	Kinna WSP	

9.3 ENVIRONMENTAL AND SOCIAL MONITORING PLAN

The purpose of the Environmental and Social Monitoring Plan (ESMP) for the proposed project is to initiate a mechanism for implementing mitigation measures for the potential negative environmental impacts and monitor the efficiency of these mitigation measures based on relevant environmental indicators. The Environmental and Social Mitigation and Management Plan in Chapter 8 identified certain roles and responsibilities for different stakeholders for implementation, supervision and monitoring. The objectives of the ESMP therefore are:

- To ensure that the recommendations in the approved ESIA report are adhered to by the various institutions
- To ensure that the environmental and social mitigation and their enhancement actions are well understood and communicated to all involved stakeholders.
- To ensure that the proposed environmental and social remedial measures are implemented during the project execution stage

- To evaluate the effectiveness of environmental and social remedial measures
- To evaluate the effectiveness of various evaluation techniques and procedures
- To provide the Proponent and the relevant Lead Agencies with a framework to confirm compliance with relevant laws and regulations.

Conversely, environmental monitoring provides feedback about the actual environmental impacts of the project. Monitoring results help judge the success of mitigation measures in protecting the environment.

They are also used to ensure compliance with environmental standards, and to facilitate any needed project design or operational changes. A monitoring program, backed up by powers to ensure corrective action when the monitoring results show it necessary, is a proven way to ensure effective implementation of mitigation measures. By tracking the project's actual impacts, monitoring reduces the environmental risks associated with the project, and allows for project modifications to be made where required.

In order to implement the monitoring plan, the Consultant proposes an additional cost of K.Shs. 150,000.00 per month for and environmental consultant during the construction period.

Table 9-2 presents the indicators that will be used to monitor the implementation of the water supply project. The indicators are selected based on the project and major anticipated impacts.

Table 9-2: Proposed Environmental and Social Monitoring Plan

Area	Environmental Component	Performance Indicators	Monitoring Requirements	Frequency of monitoring	Responsibility	Corrective Action
Construction Camp	Public health and safety	• Prevalence rates of common diseases. • Provision of condoms, contraceptives and mosquito nets. • Conduction of campaign meetings on transmission of diseases like HIV/AIDS and other STDs. • Availability of adequate solid waste bins. • System of safe disposal of both solid and liquid waste in place. • Availability of first aid facilities. • Outpatient attendance registers. • Compliance with the Health and Safety Act.	• Physical inspection • Documentation Number of complaints • Interview with residents	Monthly	Environmental Supervisor	Investigate non-compliance and make recommendations Implement recommendations
	Solid and liquid wastes	• Presence of scattered litter.	• Physical inspection • Number of complaints.	Monthly	Environmental Supervisor Contractor	Implement recommendations

Area	Environmental Component	Performance Indicators	Monitoring Requirements	Frequency of monitoring	Responsibility	Corrective Action
	HIV&AIDS	• Number campaign meetings on transmission of diseases like HIV/AIDS and other STDs. • Number of condom dispensers within the site. • Number of ARVs provided to vulnerable persons	• Inspection of HIV/AIDS prevention services within the site. • Number of condoms, ARVs provided.	Quarterly	Contractor Environmental Supervisor	Implement recommendations
Project Site	Solid and liquid wastes	• Scattered litter • Flow of wastewater on the ground surface. • Provision of sanitary facilities to the construction crews.	• Physical inspection • Number of complaints	Monthly	Environmental Supervisor Contractor	Implement recommendations
	Noise	• Level of noise generated. • Provision of PPE. • Compliance with existing noise standard issued by NEMA.	• Liaise with other stakeholders. • Documentation on complaints about noise	Monthly	Environmental Supervisor	• Implement recommendations
	Air pollution	• Level of dust generated. • Provision of PPE.	• Physical inspection • Interview residents including workers	Monthly	Environmental Supervisor	• Implement recommendations

Area	Environmental Component	Performance Indicators	Monitoring Requirements	Frequency of monitoring	Responsibility	Corrective Action
			• Liaise with other stakeholders			
	Flora and Fauna	• Amount of vegetation removed	• Documentation of uprooted trees • Physical Inspection	Quarterly	Environmental Supervisor	• Implement recommendations
	Gender Empowerment	• Number of female employees • Number of male and female toilets	• Review of company staff records. • Physical Inspection	Quarterly	Environmental Supervisor	• Implement recommendations
	Cultural Heritage	• Records of identified cultural sites	• Review of records	Monthly	Environmental Supervisor	• Implement recommendations
	Crime Management	• Number of reported crimes • Number of complaints	• Review of records • Interviews with staff and local community	Monthly	Environmental Supervisor	• Implement recommendations
	Child Labour	• Record of employees including IDs	• Review of records • Interviews with staff and local community	Monthly	Environmental Supervisor	• Implement recommendations
	Gender Equity and Sexual Harassment	• Number of complaints	• Review of grievance redress forms. • Interviews with local community	Monthly	Environmental Supervisor	• Implement recommendations

Area	Environmental Component	Performance Indicators	Monitoring Requirements	Frequency of monitoring	Responsibility	Corrective Action
	Loss of Life, Damage to Private property	• Record of accidents and damages done	• Review of records • Interviews with staff and local community.	Monthly	Environmental Supervisor	• Implement recommendations

9.4 IMPLEMENTATION ARRANGEMENTS- ROLE AND RESPONSIBILITIES OF EACH ACTOR

9.4.1 Contractor

The contractor has the major responsibility for safety and health during the construction phase on the projects only, and has the duties to plan, manage, monitor and coordinate the construction phase taking into account the general principals of prevention to ensure:

- Safety & Health-the project is carried out without risks to health or safety.
- CPP – to be drawn up as soon as practicable prior to setting up a construction site and updated, reviewed and revised so it continues to be sufficient.
- Coordination of the implementation of the relevant legal requirements to ensure that the employers etc. apply the general principals of prevention in a consistent manner and follow the CPP.
- Contractor training etc. – Ensure the necessary information, instruction, and training is received and appropriate supervision to comply.
- Cooperation with others – cooperate with any other person at the site or an adjoining site to enable others to perform their duties etc.
- Site rules – draw up.
- Welfare – ensure compliance throughout the construction phase.
- Liaison with PD – for the duration of the project and in particular regarding any information which is needed to prepare the H&SF or may affect the planning and management of the pre-construction phase.
- H&SF – is appropriately updated, reviewed and revised from time to time.
- Provide Site Inductions
- Prevent unauthorized access to the site.
- Workforce cooperation – arrangement which will enable the PC and workers to cooperate effectively in promoting and developing measures to ensure health & safety at work and checking effectiveness.
- Workforce consultation – consult workers in good time on matters connected with the project which may affect their health, safety or welfare.
- Workforce communication – ensure workers can inspect and take copies of certain information.
- Display the project notification on the site.

9.4.2 Supervising Engineer

The supervising engineer will assist NWSB in the direct oversight of the water supply project. He assist NWSB in determining the equipment required and justification through conducting feasibility studies. He will also ensure the safety of workers on sight.

9.4.3 County officer (Water, Energy and natural resources)

County officers will have the role in administration and management. They shall be responsible for the coordination, management and supervision of the general administrative functions in the county. They will ensure the facilitation and coordination of citizen participation in the development of policies and plans and delivery of services regarding the water supply project and also in the provision and maintenance of the water supply project. The county officers will also ensure that the project empowers the community.

9.4.4 Northern water services board

On the project NWSB will need to ensure that the following duties have been fulfilled.

Make suitable arrangements for managing a project so that health, safety and welfare are secured.

NWSB will assemble the Project Team and ensure that the functions and responsibilities of the Project Team are clear.

NWSB will Maintain and review the Management Arrangements to ensure they remain relevant throughout the life of the project.

NWSB will Provide Pre-Construction Information. Pre-construction information is information already in the Client's possession (such as an existing health and safety file, survey data, structural drawings, etc) or which is reasonable to obtain. This must be provided as soon as practicable to each Designer (including the Principal Designer) and Contractor (including the Principal Contractor) who is bidding for work on the project or has already been appointed.

A Health and Safety File is only required for projects involving more than one contractor. The Client must ensure that the Principal Designer prepares a Health and Safety File for their project. Its purpose is to ensure that, at the end of the project, the Client has the information that anyone carrying out subsequent construction work on the water supply will require to be able to plan and carry out the work safely and without risks to health.

Where a construction project must be notified, NWSB must submit a notice in writing to the relevant enforcing authority NWSB may, for practical reasons, agree that one of the other duty-holders for the project complete this notification. Where this is the case, NWSB should confirm this in writing with the relevant duty holder.

9.4.5 Local administration

The local administration will aid in ensuring that laws and regulations are adhered to the latter and also that the project goes on smoothly without external interference.

9.4.6 Environmental supervisor.

Environmental supervisor will advise NWSB and the contractor on how to minimize the project impact on the environment and, in some cases, oversee the delivery of impact reduction strategies. HE/SHE will typically develop and then measure the success of the schemes for waste management, recycling, pollution reduction and pollution prevention.

Depending on the role, responsibilities could include:

- implementing environmental policies and practices
- devising strategies to meet targets and to encourage best practice
- devising the best tools and systems to monitor performance and to implement strategies
- ensuring compliance with environmental legislation
- assessing, analysing and collating environmental performance data and reporting information to internal staff, clients and regulatory bodies
- confirming that materials, ingredients and so on are ethically or environmentally sourced
- managing environmental strategy budgets
- liaising with internal staff including senior managers and directors
- Acting as a champion or cheerleader for environmental issues as per the project.
- providing environmental training to staff at all levels
- writing plans and reports
- keeping up to date with relevant changes in environmental legislation and initiatives including international legislation where applicable
- producing educational or information resources for internal staff, clients or the general public
- liaising with regulatory bodies such as the Environment Agency (NEMA)

9.5 GRIVANCES REDRESS MECHANISMS

The table above, shows the performance indicators as part of the monitoring plan. Some of these indicators will be as a result of grievances raised by stakeholders. This section identifies the procedures in which stakeholders can present their grievances for redress. Different grievances require different timeframes for their handling as their nature necessitates their handling by different agencies. However due to their sensitive nature, the stakeholders agreed that three weeks will be enough to address any grievance that arises as a result of the works.

The Consultant proposes that the Supervising Engineer's office be in charge of collecting and forwarding the grievances to the relevant authority of redress.

The filing of grievances for accurate record keeping is important. If the complainant is not able to express his/her complaint in writing, he/she can be assisted by a local leader (Area Chief) to file the complaint at the complaints desk in the project office. To ease follow-up, each complaint will be registered and assigned a unique reference number. The office will then evaluate the application and determine what implementing agency will resolve the issue. The figure below shows a sample of a complaint form:

Table 9-3: Table Showing a Sample Grievance Form

Grievance Form					
Ref. No.	**Complainant's Name**	**Date**	**Description of Grievance**	**Proposed Redress Measure**	**Issue Resolved (Y/N)**

10 CONCLUSION AND RECOMMENDATIONS

As has been alluded in this report, the following can be said in summary.

The implementation of the proposed Water Supply Project has the following benefits:

- There will be an increased supply of clean water to Korondile town and along the pipeline routes. This will in turn lead to an improvement in the public health of the population due to the reduction of water related ailments.
- The water supply to communities through Water Kiosks and pipeline extension will reduce the time required and distance travelled to fetch water. This time so availed can be used in other economic activities thus enhancing the quality of life and living standards in the project area.
- Employment and skills transfer opportunities will be created for the local population; this will improve the general socio-economic wellbeing of the community
- The negative environmental impacts identified are mostly confined to the construction phase of the project. Mitigation measures proposed are adequate and will be monitored and evaluated during project implementation.

The recommendations and issues which arose from public participation and consultation have been effectively highlighted and incorporated in the report after the said public participation and consultation meetings were held.

The ESIA concludes that the project will have substantial positive environmental benefits. It will supply sufficient potable water to meet projected future demands of domestic and other uses in the project area. The adverse impacts on the physical and natural environment will be "in sum total," not significant, and can be handled through the recommended mitigation measures. There are incremental costs required to achieve these.

11 REFERENCES

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12 APPENDICES

12.1 APPENDIX 1 SURVEY QUESTIONAIRE

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PROPOSED WORKS CONTRACTS UNDER NORTHERN WATER SERVICES BOARD

ENVIRONMENTAL AND SOCIAL IMPACT ASSESMENT SURVEY QUESTIONNAIRE

An Environmental and Social Impact Assessment Survey is being carried out for the proposed_____ on behalf of the Northern Water Services Board (NWSB). The aim of this survey is to form a realistic and up to date picture of the Environmental and Social situation in the area. We need your honest and accurate information during this discussion. Your inputs will assist in the understanding of your needs for improvement. The answers you provide will be kept confidential.

SECTION 1 DETAILS

1.1 Name of the Enumerator: .....

1.2 Signature of the Enumerator: .....

1.3 Name of the Respondent.....

1.4 Telephone number of the respondent..... ID Number of the respondent.....

1.5 Date: ..... Time of Interview: .....

1.4 Respondent place of resident: (1) Village..... (2) Location .....

(3)Sub-County -..... (4) County.....

SECTION 2 BASIC HOUSEHOLD SETUP

2.1 Name of the household head? .....

2.2 ID Number of the household Head..... Telephone Number of the Household Head.....

2.3 How many members do you have in this household.....

2.4 How many members of your household fall under each of the following age groups? (tick)

(1) 0 – 5yrs..... (2) 5 – 18yrs..... (3) 19-35yrs..... (4) 36-49yrs.....

(5) 49-65yrs..... (6) Over 65yrs .....

2.5 How many of your household members have attained each of the following education levels? (tick)

(1) None ..... (2) Primary ..... (3) Secondary ..... (4) College/university .....

2.6 What is the occupation /economic activity of the household head

(1) Crop farming ..... (2) Livestock farming ..... (3) Formal employment .....

(4)Business ..... (5) Pastoralism ..... (6) Others (specify) .....

2.7 If crop farming what type of crops? (1) Maize..... (2) Cashew nuts ..... (3) Cassava.....

(4) Mangoes ..... (5) Beans..... (6) Coconut..... (7) Others.....

2.8 If livestock farming how many?

(1) Cow..... (2)Sheep ..... (3)Goats..... (4) Donkeys ..... (5) Camels.....

(6) Others .....

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2.9 If business what kind of business? (tick) (1) Shop ..... (2) Bodaboda (bicycle /motorbike).....
(3) M-Pesa..... (4) Jua kali ..... (5) Grocery ..... (6) Others (specify) .....

2.10 What is the average combined household income per month? (tick) (1)Less than 15,000.....
(2) 15,000-30,000..... (3)30,000-50,000..... (4) Above 50,000 .....

2.11 What's the religion of the Household Head? (tick) (1)Christian..... (2) Muslim.....
(3) Hindu..... (4) Traditionalist ..... (5) Others Specify .....

2.12 Type of fuel mostly used for cooking: (tick)
(1)Firewood ..... (2)Charcoal ..... (3) Kerosene ..... (4) LPG(Gas) .....
(5)Electricity ..... (6) Others (specify) .....

SECTION 3 WATER AND SANITATION

3.1 What is the common source of water in this area?
(1) Private tap ..... (2) Public Tap ..... (3) Bore hole ..... (4) Shallow well .....
(5) Protected spring /river ..... (6) Water pan ..... (7) Others (specify) .....

3.3 What is the general quality of the water? (Tick)
(1) Good ..... (2) Fair ..... (3) Bad .....

3.4 How often do you Fetch water?
(1) Every day ..... (2) Every alternate day of the week ..... (3) Once a week .....

3.5 Is the water Supply source adequate (Tick)
(1) YES..... (2) NO.....

3.6 How far is this water source in km? .....
(1) Less than 0.2km ..... (2) 0.2 -1km..... (3) 1– 2km ..... (4) Above 2km.....

3.7 What is the ownership status of the water source? (Tick)
(1)Public ..... (2) Faith based ..... (3)Private ..... (4) NGO ..... (5) Other (specify) .....

3.8 Do you pay for water (1) Yes..... (2)No.....

3.9 If yes how much per 20 litre jerrican in Ksh.
(1) Ksh. 2..... (2) Ksh. 5 ..... (3) Ksh. 10..... (4) Above Ksh. 10 .....

3.10 What is the common mode of transporting water in this area?
(1) Carrying on the head ..... (2) Hand driven carts/wheelbarrow.....
(3) Bodaboda (bicycle/motorbike)..... (4) Pack animals (Donkeys/Camels) .....
(5) Animal drawn carts ..... (6) Trucks ..... (7) Rolling the water Jerrican on the ground..... (8)Others (specify) .....

3.11 What challenges do you face in transporting water

(1) Loss of time ..... (2) Physical fatigue due to travelling for long distances .....
(3) Students missing School..... (4) Human wildlife conflict..... (3) Others (specify) .....

3.12 How do you dispose of your household waste? (Tick)

(1)Compost pit/burying ..... (2) Collection by the council ..... (3) Recycling .....
(4) Burning ..... (5) Dumping in open areas ..... (6) Others (specify) .....

3.13 Does the household have a toilet?

(1)Yes ..... (2) No .....

3.14 If yes, type of toilet: (tick)

(1) Flush system connected to the sewer line ..... (2) Flush system with Septic tank .....
(3)Pit latrine ..... (4) Mobile toilet ..... (5)Any other (Specify) .....

3.15 Are you aware of the proposed Works under Northern Water Services Board?

(1) YES ..... (2) NO .....

3.15.1 How will proposed Works under Northern Water Services Board affect the community here? (Tick)

(1) Positively ..... (2) Adversely (negatively).....

3.16 If positively, in what way? (Tick)

(1) Reduced time and cost of travel to look for water.....
(2) Reduced cases of waterborne diseases..... (3) Improved hygiene.....
(4) Improved business ..... (5) Growth of town with water supply .....
(6) Reduced livestock diseases..... (7) Employment for the youth ..... (8)Alleviate water shortages..... (9) Others (please specify) .....

3.17 If negatively, in what ways? (Tick)

(1) Dust and noise ..... (2) Demolition of structures ..... (3) Loss of grazing land/trees/crops ..... (4) Soil erosion ..... (5) Interruption of services (water, electricity, transport) ..... (6) Spread of diseases (STD, HIV/AIDS)..... (7) Others (specify) .....

3.18 What do you think should be done to minimize or mitigate these negative impacts?

(1) Inform the public about any interruption of services .....
(2) Install storm water drains ..... (3) Avoid night time construction ..... (4) Educate the public and the construction crew on health and safety..... (5) Compensate the structure/Land /crop/trees owners..... (6)Others (specify).....

SECTION 4 HEALTH,

4.1 Which diseases have members of your household suffered from in the past six months? (Tick)

(1)Malaria ..... (2)Malnutrition ..... (3)Measles ..... (4)HIV/AIDS .....

(5)Eye problems ..... (6)Diarrhea ..... (7) Cholera ..... (8) Intestinal worms .....

(9)Respiratory infections ..... (10)Skin rashes ..... (11)Others (specify) .....

4.2 What do you do when you are sick?

(1)Seek medical attention from a health centre..... (2)Prayed for ..... (3)Take herbs.....

(4) Visit a traditional doctor..... (5)Others (specify) .....

4.3 What is the ownership status of the health facilities attended by your household members? (Tick)

(1)Public ..... (2) Private ..... (3) Faith based ..... (4) NGO ..... (5) Traditional .....

4.4 How far is the health facility visited by your household members in km?

(1) Less than 1km ..... (2) 1 -3km..... (3) 3 – 5km ..... (4) Above 5km.....

SECTION 5 KNOWLEDGE AND ATTITUDE ON HIV/AIDS

5.1 Have you ever heard of HIV/AIDS? (1) Yes ..... (2) No .....

5.2 If yes, what source did you hear it from? (Tick)

(1) Radio/TV ..... (2) Billboards ..... (3) Posters ..... (4) Religious leaders .....

(5) Relative/friend ..... (6) Health worker/Clinic..... (7) NGO/CBOs .....

(8) Newspaper ..... (9) Other (Specify) .....

5.3 Has any of your household members been affected by HIV/AIDS? (1)Yes..... (2)No .....

5.4 Do you think HIV (AIDS) can be prevented? (1)Yes ..... (2) No ..... (3) Do Not Know .....

5.5 Do you know where to go for voluntary counseling and testing for HIV/AIDS?

(1)Yes ..... (2) No .....

SECTION 6 ENVIRONMENTAL

6.1 What environmental issues are of concern to the people of this area?

(1) Water shortage ..... (2) Invasive species ..... (3) Overgrazing ..... (4) Extinction of endangered species ..... (5) Mosquitoes and malaria spread ..... (6) Solid waste .....

(7) Deforestation ..... (8) Drought ..... (9) Others (please specify).....

6.2 What are the environmental conservation initiatives in the area?

(1) Tree planting ..... (2) Educating the public ..... (3) Cleaning of mosquito breeding sites .....

(4) Collection of solid wastes..... (5) Others (please specify) .....

6.3 Who are carrying out these activities?

(1) Women groups ..... (2) County council..... (3) Non-governmental organization .....

(4) Community based organizations..... (5) Youth groups..... (6) Others (please specify) .....

6.4 Will the completion of the proposed Works under Northern Water Services Board help in the conservation of the environment in the area? (1) Yes ..... (2) No .....

6.5 If yes in what ways? .....

12.2 WATER CONSUMPTION RATES GUIDELINES

Table 12-1Water Consumption Rates Guideline

CONSUMER	UNIT	RURAL AREAS			URBAN AREAS		
		High potential	Medium potential	Low potential	High Class Housing	Medium Class Housing	Low Class Housing
People with individual connections	1/head/ day	60	50	40	250	150	75
People without connections	1/head/ day	20	15	10	-	-	20
Livestock unit	1/head/ day	50			-		
Boarding schools	1/head/ day	50					
Day schools with WC without WC	1/head/ day	25 5					
Hospitals Regional District other	1/bed/ day	400 200 100			+ 20 1 per outpatient and day (minimum 5000 1/day)		
Dispensary and Health Centre	1/day	5000					
Hotels High Class Medium Class Low Class	1/bed/ day	600 300 50					
Administrative offices	1/head/ day	25					
Bars	1/day	500					
Shops	1/day	100					
Unspecified industry	1/ha/day				20,000		

Coffee pulping factories	1/kg coffee	25 (when re-circulation of water is used).

12.3 SUMMARY OF PUBLIC CONSULTATION

12.3.1 Minutes of the public consultation meeting held at the Assistant chief's office at korondile location on the 30th May 2016 at 11.30 am

1) *Present*
   - Marion Orina - Zamconsult Consulting Engineers (Consultant)
   - Kevin Morang'a - Zamconsult Consulting Engineers (Consultant)
   - Abdisalan Osman – Water Users Association Chairman
   - Hassam Mohamed- Assistant Chief of Korondile Location
   - General Public

2) *Introduction*

The meeting started at 11.30am and was chaired by the area Assistant chief, who introduced the Consultant to the attendees. He then invited the Consultant to give her presentation.

3) *Presentation on project by the consultant*

The consultant provided an elaborate explanation of the project, its scope and its anticipated outcomes and the laws which govern the Environmental and social process as well as the significance of the public consultation meeting. She also explained about the projects impacts in all the phases both positive and negative.

The consultant explained the need of the project to the general public. She explained that there was need to equip the Nyatta Borehole with a Gen-set and other accessories, laying of the raising mains and the distribution networks, the construction of the 50m^3ground masonry tank and also the water kiosks totaling to 4.

The consultant explained the various phases of the projects with their associated impacts both positive and negative. The phases are planning, construction, operation and decommissioning. The consultant indicated that the planning phase has already been accomplished and the project is at the construction phase. The consultant indicated that there would be no displacement of people as the pipelines will be laid along the road reserves. The consultant further explained the measures to be taken to mitigate the disturbances that will arise as a result of the project and assured the general public that incase the contractor failed to adhere to the set regulations, they could address their concerns to the resident engineer present on the ground for the relevant action to be taken.

4) *Questions, Answers and feedback*

The Consultant then invited the attendees to raise whatever issues they had, in order to have full knowledge on the project.

Q1) Hassan Mohamed, the assistant chief of Korondile Location pointed that they had not been notified of any ongoing construction. He also raised a concern that the water at the Nyatta borehole is inadequate and therefore no reason to do piping. He requested for a new borehole be dug.

The consultant responded articulating the importance of public participation. "It is the reason as to why we are here to notify you of the project that is anticipated to start and we shall channel your concerns to the relevant authorities" the consultant. She further pointed out that NWSB had limited funds to utilize and drilling a new borehole will require substantial amount of funds to be set aside but will channel their concern to NWSB. She however indicated that piping is paramount to bring the water resource close to people as it will aid in alleviating time wasted on traveling plus fatigue in search of the precious commodity (water).

Q2) Haji Hassan Mohammed, started with a vote of thanks to the consultant for holding the public participation meeting. He proceeded to note that there are many areas within the Korondile region that are not served with water and are spread far apart. He also postulated that the water from the Nyatta borehole is not adequate. He also noted that the pipes that were placed by the Red Cross have already burst even though a lot of money was utilized in the project. The locals spend a whole day in search of water. He requested that a new borehole be drilled.

The consultant responded that with the piping, time spent in the collection of water will be drastically reduced. She also articulated that NWSB is looking for ways of providing all of them with adequate water.

Q3) Abdisalan Osman, the committee chairman requested that the locals' opinions be taken into account as their life depends on water.

The consultant reiterated that their views are of utmost significance and they will be taken into account.

Q4) Malim Hassan reiterated on the opinions of the chief and the previous speakers indicating that all they need is a new borehole.

The consultant indicated all their opinions have been noted will be conveyed to the relevant authorities.

Q5) Conclusion

The Consultant asked if the people were in support of the project. The locals, by a show of hands approved of the project, stating that their recommendations given in the meeting should be taken into account. The meeting ended at 12.30 pm with a word of prayer.

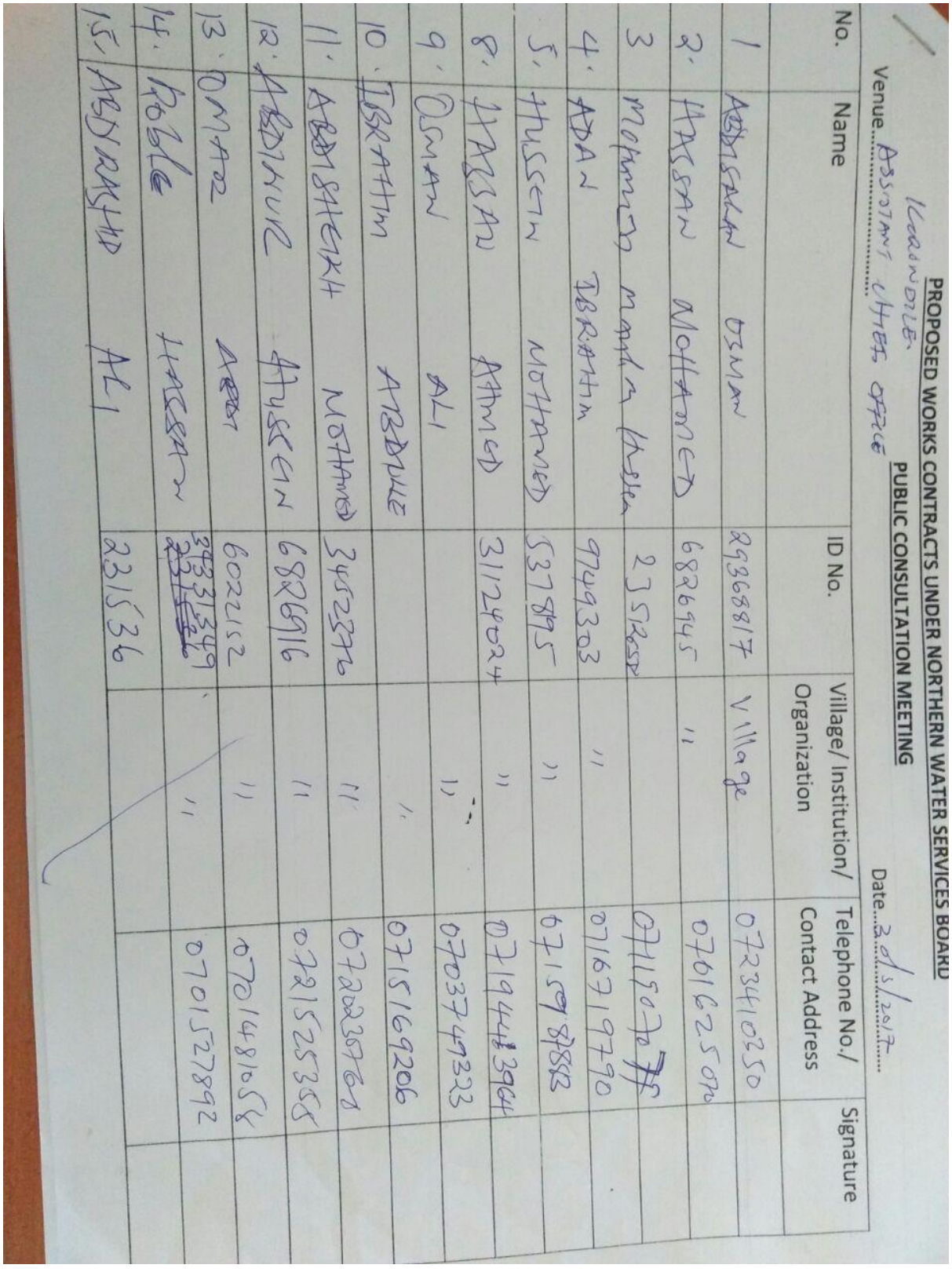
12.3.2 List of Attendance

PROPOSED WORKS CONTRACTS UNDER NORTHERN WATYER SERVICES BOARD

PUBLIC CONSULTATION MEETING

Venue; Korondile Assistant Chief"s Office Date

Name	ID NO	Village/Organization	Telephone No
Abdisalan Osman	29368817	Korondile	723410350
Hassan Mohamed	6826945	Assistant Chief	701625070
Mohamed Maalam Hussein	23512658	Korondile	711909779
Adan Ibrahim	9749303	Korondile	716719790
Hussein Mohamed	5378195	Korondile	715987883
Hassan Ahmed	31124024	Korondile	719443964
Osman Ali		Korondile	703749323
Ibrahim Abdulle		Korondile	715169206
Abdisheik Mohamed	3452376	Korondile	720230760
Abdinur Hussein	6826916	Korondile	721525358
Omar Abdi	6022152	Korondile	701481058
Roble Hassan	34331349	Kororndile	701527892
Abdirashid Ali	23156	Korondile	
Abdi Abdullahi	2152162	Korondile	724409270
Bishar Jinale	2152162	Korondile	714273350
Samow Hussein	9749386	Korondile	741324650
Adaw Hussein	22526150	Korondile	711907079
Malele Hassan Abdi	0177379	Korondile	728297936

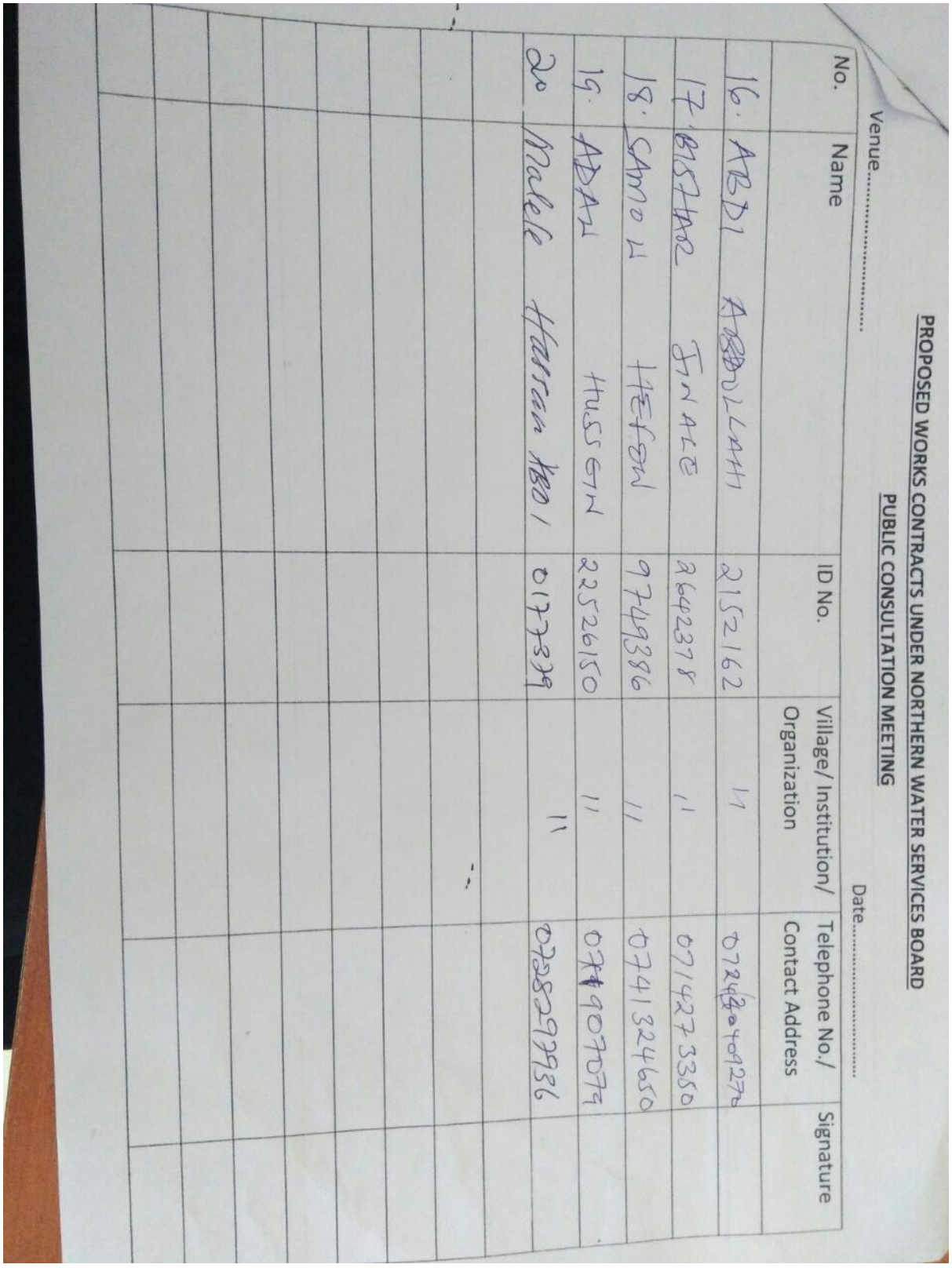


PROPOSED WORKS CONTRACTS UNDER NORTHERN WATER SERVICES BOARD

PUBLIC CONSULTATION MEETING

Venue: KORONDILE ASSISTANT CHIEF OFFICE Date: 2/5/2017

No.	Name	ID No.	Village/ Institution/ Organization	Telephone No./ Contact Address	Signature
1	ABDISALAN OSMAN	R9368817	VILLAGE	0723410250	
2.	HASSAN MOHAMED	6826945	"	0701625070	
3	MOHAMED MAHAD HUSSEIN	2352858		0711507[illegible]	
4.	ADAN IBRAHIM	7749303	"	0716719790	
5.	HUSSEIN MOHAMED	5378915	"	0715978582	
8.	HAGGAI	AHMED	31124024	"	0719447[illegible]3964
9.	OSMAN	ALI		"	0703749323
10.	IBRAHIM	ABDULE		"	0715169206
11.	ABDISHEIKH	MOHAMED	34523776	"	0720230760
12.	ABDINUR	HUSSEIN	6826916	"	0721525355
13.	OMAR	ABDI	6022152	"	0701481058
14.	ROBLE	HUSSEIN	3[illegible]3[illegible]349	"	0701527892
15.	ABDIRASHID	ALI	2215136		



PROPOSED WORKS CONTRACTS UNDER NORTHERN WATER SERVICES BOARD

PUBLIC CONSULTATION MEETING

Venue.....

Date.....

No.	Name	ID No.	Village/ Institution/ Organization	Telephone No./ Contact Address	Signature
16.	ABDI ABDULLAHI	21521162	"	0724[illegible]409274	
17.	BISTHAR JINATE	26423788	"	0714273350	
18.	SAMUEL TEFERI	9749386	"	0741324650	
19.	ADAN HUSSEIN	22526150	"	0[illegible]907079	
20	Makele Hassan ABDI	0173379	"	0725279736	

Figure 12-1Public Consultation Meeting List of Attendance

12.3.3 Public Consultation Photos

Figure 12-2 Consultant giving a presentation on the water supply project

Figure 12-3Assistant Chief seeking clarification

Figure 12-4 The public listening to the consultant

Figure 12-5Member of the general Public raising a concern

12.4 "CHANCE FIND" PROCEDURES

Chance find procedures are an integral part of the project ESMMP and civil works contracts. The following is proposed in this regard, if the Contractor discovers archeological 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 take over;
- ✓ Notify the supervisory Project Environmental Officer and Project Engineer who in turn will notify the responsible local authorities and the Ministry of Sports, Culture and the Arts immediately (within 24 hours or less);

Responsible local authorities and the Ministry of Sports, Culture and the Arts 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 an archaeologist 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 Sports, Culture and the Arts. This could include changes in the layout (such as when finding irremovable remains of cultural or archeological 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.

Construction work may resume only after permission is given from the responsible local authorities and the Ministry of Sports, Culture and the Arts concerning safeguard of the heritage.