

REPUBLIC OF KENYA



ENVIRONMENTAL IMPACT ASSESSMENT
**SUMMARY PROJECT
REPORT**

THE PROPOSED WATALII/ TELESGEI (IILERET)
SHALLOW WELL

PROJECT IN BALES SARU SUB-LOCATION, BALES
SARU LOCATION, DUKANA WARD, NORTH
HORR SUB COUNTY, MARSABIT COUNTY

**(GPS COORDINATES: LATITUDE N: 4.109386,
LONGITUDE E: 37.040034)**



Proponent:

PROJECT COORDINATOR,
MINISTRY OF AGRICULTURE, LIVESTOCK,
FISHERIES AND COOPERATIVES; PROGRAM TO
BUILD RESILIENCE FOR FOOD AND NUTRITION
SECURITY IN THE HORN OF AFRICA (DRSLP)

P.O. BOX 30028- 00100

NAIROBI.

Done on **September, 2021**

Pursuant to the provisions of the
Environmental Management and
Coordination Act, CAP 387 and
the Environmental (Impact
Assessment and Audit)
(Amendment) Regulations, 2019
and Submitted to the National

CERTIFICATION AND SUBMISSION

The following experts conducted the assessment and prepared this Summary Project Report for submission to the National Environment Management Authority (NEMA) as per the Environmental Management and Coordination Act Cap 387 and the Environmental (Impact Assessment & Audit) Regulations, 2003.

LEAD EXPERT

NAME	NEMA REG. NO.	SIGNATURE
Eng. Ongeru Abel Kiana	9019	

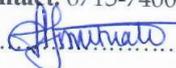
ASSOCIATE EXPERT

Mutua Kinyili

NEMA Associate Expert Reg. No. **10754**

P.O BOX 260- 90200, KITUI

Mobile Contact: 0715-740019 / 0787798537

Signature...  Date... 7/9/2021

Proponent Details:

MINISTRY OF AGRICULTURE, LIVESTOCK, FISHERIES AND COOPERATIVES;
PROGRAM TO BUILD RESILIENCE FOR FOOD AND NUTRITION SECURITY IN
THE HORN OF AFRICA (DRSLP)
P.O BOX 30028- 0 0100, NAIROBI.

Signed:  Date: 7/9/2021

Name: Janet Othoke

Designation: Environment and Climate Change Specialist

EXECUTIVE SUMMARY

The Environmental Social Impact Assessment (ESIA) Summary Project Report has been prepared for the proposed Arab Trees Shallow Well Project in Bales Saru Sub-Location, Dukana Ward, North Horr Sub County, Marsabit County. The proposed project falls under the IGAD member states focusing on sustainable livelihoods component of the IGAD drought disaster resilience and sustainability initiative (IDDRSI) - an African Development Bank financed project that is being implemented by the Ministry of Agriculture, Livestock, Fisheries and Cooperatives (MOALF & C) for the Government of Kenya (GoK). Specifically, the project objectives in Kenya are: (a) increase, on a sustainable and resilient basis, the productivity and agro-sylvo-pastoral production in the Horn of Africa; (b) Increase income from agro-sylvo-pastoral value chains, and; (c) Strengthen the capacity of populations to better adapt to the risks of climate change.

The main objective of the ESIA study was to identify the possible negative environmental impacts that may result during the project's construction, operation and decommissioning phases and propose appropriate mitigation measures. The methodology involved both desk study (scoping) and fieldwork. During the scoping stage, the potential impacts relevant to projects of this nature were identified and categorized. During the actual fieldwork the ESIA Team carried out field observations, informal and formal interviews, and discussions/meetings with the neighbors and relevant authorities. This provided opportunities to stimulate the concerns of various stakeholders, as well as, solicit their opinion on the mitigation measures. The Environmental and Social Impact Assessment Project Report of the proposed shallow well is prepared in accordance with section 58 of the Environmental Management and Coordination Act (EMCA) No. 8 of 1999 and Environmental (Impact Assessment and Audit) Regulations (2003) that requires that all enterprises and project must undergo an Environmental and Social Impact Assessment. The purpose is to predict all possible positive and negative impacts that the project may have on both human and natural environment and suggest mitigation measures for the significant negative impacts before the project is implemented. Location of the Proposed Shallow Well. This Environmental and

Social Impact Assessment was commissioned on 4th September, 2021 by DRSLP (hereafter The Proponent) to assess the biophysical and human environments, including negative and positive impacts of the proposed drilling of a shallow well at Bales Saru Location, Bales Saru Sub Location, Dukana Ward, North Horr Sub County, Marsabit County. The proposed project GPS coordinates are N: 4.109386, E: 37.040034. The project cost is Ksh. 10 million. The study has proposed adequate mitigation measures for the identified adverse environmental impacts. A major output of the ESIA process and a component of this ESIA report are the Environmental Management and Monitoring Plan, the benchmark for the implementation of the mitigating measures and monitoring the environmental performance of the shallow well. This ESIA took into consideration the existing environmental regulatory framework (Environment Management and Coordination Act of 1999 and the Environmental (Impact Assessment and Audit) Regulations of 2003, Occupational Health and Safety Act (2007), The Water Act (2002), environmental standards, and sustainable use of natural resources. The ESIA techniques and methodologies applied for this study have been adapted and refined from various methodologies and case studies used for projects elsewhere without losing sight and focus on the unique conditions and settings of the area. This ESIA identified both positive and negative impacts of the proposed project activities and for the negative ones, proposed mitigation measures. The following present the positive and negative impacts of the proposed shallow well project:

Possible Positive impacts

- Participation of the neighbours
- Enhanced Co-operation and harmony
- Inclusion of community neighbors' concerns in the design phase
- Incorporation of environmental considerations in the project
- Increased secure and reliable quality water source/supply
- Enhanced Health Standards -improved hygiene, reduced Water Borne Diseases
- Promotion of economic status of the community
- Good time Management

- Inter-clan conflicts on water management reduced due to establishment of an inclusive management committee

Possible negative impacts

- Debris deposition
- Noise pollution
- Accidents and other occupational health
- Air pollution from fuel emissions
- Disposal of wastes near shallow well
- Possible overexploitation/depletion of ground water resource degradation of the aquifer

This report concludes that the proposed shallow well will have insignificant adverse environmental and social impacts which will be adequately mitigated against. In addition, foreseeable potential impacts will be forestalled before they occur thereby considerably limiting future environmental damage and ensuring the existence of a clean and healthy environment, as spelt out in the Kenyan constitution. Therefore, it is important that the mitigation and monitoring measures recommended in the report are incorporated in the implementation and operation design process. The drilling contractor and the supervising hydro-geologist should ensure that the mitigation measures proposed for the construction phase are adhered to while the proponent is responsible for subsequent monitoring as proposed by the ESMP.

Accordingly, as per Section 58 of EMCA and Part II, 10 (2) of Environmental (Impact Assessment and Audit) Regulations, 2003, we recommend that the proponent be issued with an **Environmental and Social Impact Assessment approval for the Shallow Well Development.**

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LIST OF SYNONYMS, ACRONYMS, AND ABBREVIATIONS

ASAL	Arid and Semi Arid Lands
DRSLP	Drought Resilience and Sustainable Livelihoods Program
ESIA	Environment and Social Impact Assessment
EMCA	Environmental Management and Coordination Act
EMC	Environmental Management and Coordination
ESMP	Environmental Management and Social Management Plan
GPS	Global Positioning System
GOK	Government of Kenya
HoA	Horn of Africa
IDDRSI	IGAD Drought Disaster and Sustainability Initiative
LMP	Labour Management Procedures
MOALF & C	Ministry of Agriculture, Livestock, Fisheries and Cooperatives
NEMA	National Environment Management Authority
WRA	Water Resources Authority

Chapter One: Introduction

1.0 Project Background

The IGAD drought disaster resilience and sustainability initiative (IDDRSI) – an African Development Bank financed project that is being implemented by the Ministry of Agriculture, Livestock, Fisheries and Cooperatives (MOALF & C) for the Government of Kenya (GoK). The project will assist the MOALF & C in addressing the urgent need to build resilience to environmental and socio-economic shocks, through investing in sustainable development and optimizing the productivity of available resources. The general objective of the IGAD member States that is also specific in each member State is to address the negative impact of recurrent droughts in the Horn of Africa Region through improving living conditions, food, and nutrition security in the Horn of Africa. Specifically, the project objectives in Kenya are: (a) increase, on a sustainable and resilient basis, the productivity and agro-sylvo-pastoral production in the Horn of Africa; (b) Increase income from agro-sylvo-pastoral value chains, and; (c) Strengthen the capacity of populations to better adapt to the risks of climate change.

In order to address the challenges of drought in ASAL, DRSLP has identified projects in six arid and semi-arid counties namely Baringo, Isiolo, Marsabit, Samburu, Turkana and West Pokot. The projects are distributed in four (4) components as follows: **Component 1:** Strengthening the resilience of drought prone areas and Pastoral and Agro-Sylvo-Pastoral Production systems to Climate Change; **Component 2:** Supporting Agribusiness Development; **Component 3:** Strengthening Adaptive capacity to Climate Change and **Component 4:** Program Coordination and Management.

It was therefore towards this end that the project commissioned environmental and social impact assessment to be carried out for the proposed Sagante Community Shallow Well.

Scope objective and criteria of the Environmental and Social Impact Assessment (ESIAs)

Scope

The Kenya Government policy on all new project, programmes or activities requires that an Environmental and Social Impact Assessment is carried out at the planning stages of the proposed project to ensure that significant impacts on the

environment are taken into consideration during the design, construction, operation and decommissioning of the facility. The scope of this ESIA, therefore, covered:

- The baseline environmental conditions of the area,
- Description of the proposed project,
- Provisions of the relevant environmental laws,
- Identification and discuss of any adverse impacts to the environment anticipated from the proposed project,
- Appropriate mitigation measures,
- Provision of an environmental management plan outline.

The overall objective of the study on the other hand is to ensure that all environmental concerns are integrated in all the development activities in order to contribute to the sustainable development. Specifically, the objectives are: -

- To identify potential environmental impacts, both direct and in direct.
- To assess the significance of the impacts.
- To assess the relative importance of the impacts of relative plans designs, and sites
- To propose preventive mitigating and compensative measures for the significant negative impacts of the project on the environment.
- To generate baseline data for monitoring and evaluation of how well the mitigating measures are being implemented during the project cycle.
- To present information on impact of alternative.
- To present the results of the ESIA that can guide informed decision making and
- To prepare ESMP for the proposed project and decommissioning plan

1.1 ESIA Methodology

Environmental and Social Impact Assessment (ESIA) is a systematic examination conducted to determine whether or not a programme, activity or project will have

any adverse impacts on the environment. This activity is done to ensure that any project being undertaken complies with the legislative and statutory requirements of EMCA (1999)

1.2 ESIA Terms of Reference

The proponent and ESIA Expert agreed to the following terms of reference:

- i. To hold meetings with the project proponent to establish the procedures, define requirements, responsibilities and a time frame for the proposed project.
- ii. To understand the need and objectives of the proposed shallow well development project
- iii. Review the statutory and legislative conditions for implementation of the project.
- iv. Review literature to compare relevant cases of such projects.
- v. Identify and analyze the potential environmental impacts of the project
- vi. Propose mitigation measures for the significant negative impacts of the project on the environment.
- vii. Assess the project options, including alternative sites.
- viii. Develop an Environmental and Social Management Plan.
- ix. Produce an Environmental and Social Impact Assessment report.

1.3 Contents of the report

The project assessment investigates and analyses anticipated environmental impacts of the proposed development in line with the Environmental and Social Impact Assessment and Audit (2003) regulations. Consequently, the report will provide the following information: -

- a) Nature of project
- b) The location for the project including the physical area that may be affected by the project's activities.
- c) The activities that shall be undertaken during the project construction and operation and design of the shallow well project

- d) The materials to be used, projects and by-products and by-product including waste to be generated by the project and the methods of disposal
- e) The potential environmental impacts of the project and mitigation measures to be taken during and after the implementation of the project.
- f) An action plan for prevention and management of possible accidents during the project cycle
- g) A plan to ensure the health and safety of the workers and the neighboring communities
- h) The economic and social cultural impacts to local community and the nation in general
- i) The project budget
- j) Any other information that the proponent may be requested to provide by NEMA

1.4 Reporting and documentation

The ESIA report was compiled in accordance with the guidelines issued by NEMA. The ESIA Team ensured constant briefing of the client during the exercise.

1.4.1 Responsibilities and undertaking

The output from the expert includes the following: -

- An Environmental and Social Impact Assessment Summary project report comprising of an executive summary, study approach, baseline conditions, anticipated impacts and proposed mitigation measures.
- An environmental social management Plan that also forms part of the report recommendations

1.5 Methodology Outline

Since the proposed site is located within an area with no rich natural resource whose total effect to the surroundings could not be adverse and noting that the intended development and use of the facility will be in line with what exists in the surrounding areas, an environmental project report would be seen to be adequate.

The general steps followed during the assessment were as follows: -

Environmental Screening

The step was applied to determine whether an ESIA was required and what level of assessment was necessary. This was done in reference to requirements of the EMCA, 1999 and specifically the second schedule. Issues considered included the physical location, sensitive issues and nature of anticipated impacts.

Environmental Scoping

The scoping process helped narrow down onto the most critical issues requiring attention during the assessment. Environmental issues were categorized into physical, natural/ecological and social, economic and cultural aspects.

Desktop study

This included documentary review on the nature of the proposed activities, project documents, designs policy and legislative framework as well as the environmental setting of the area among others. It also included discussions with the proponent as well as interviews with neighbours.

Site assessment and public participation

Field visits were meant for physical inspections of the site characteristics and the environmental status of the surrounding areas to determine the anticipated impacts. To ensure adequate public participation in the ESIA process, questionnaires were administered to the site neighbors' and persons within the project area and the information gathered was subsequently synthesized and incorporated into the ESIA project report.

1.6 Reporting

In addition to constant briefing of the client, this report was prepared with utmost diligence. The contents were presented for submission to NEMA as required by law.

Chapter Two: Relevant Legislative and Regulatory Framework

2.0 Introduction

There is a growing concern in Kenya and at global level that many forms of development activities cause damage to the environment. Development activities have the potential to damage the natural resources upon which the economies are based. A major national challenge today is how to maintain sustainable development without damaging the environment. The Environmental and Social Impact Assessment is a useful tool for protection of the environment from the negative effects of developmental activities.

According to Sections 58 and 138 of the Environmental Management and Coordination Act (EMCA) No. 8 of 1999 and Section 3 of the Environmental (Impact Assessment and Audit) Regulations 2003 (Legal No. 101), dams require an Environmental and Social Impact Assessment project/study report prepared and submitted to the National Environment Management Authority (NEMA) for review and eventual Licensing before the development commences. This was necessary as many forms of developmental activities cause damage to the environment and hence the greatest challenge today is to maintain sustainable development without interfering with the environment.

2.1 Policy Framework

The Kenya Government has in place an environmental policy for harmonizing environmental conservation with its development plans. Using this combination, it becomes easy to sustainably use available natural resources to better the quality of human life. It is aimed at conserving biodiversity, arresting desertification and mitigating effects of disasters, all of which are aimed at maintaining an ecological balance. This balance will lead to food self-sufficiency and a quality life for man and other animals.

2.1.1 National Environmental Action Plan (NEAP)

The National Environmental Action Plan (1994) was formulated to mitigate the negative impacts on the ecosystem that arise from the socioeconomic and industrial development Programmes. Under NEAP, it was found necessary to formulate new policies and harmonize those already in place but are scattered amongst various statutes to protect the environment. Environmental and Social Impact Assessments

were introduced under NEAP to ensure that all development projects that could affect the environment in any way are subjected to ESIA so that mitigation measures could be instituted in time to avert environmental disasters.

2.1.2 National Policy on Water Resources Management and Development (1999)

The objective of this policy is to promote water infrastructural development to enhance socioeconomic progress. In the process of achieving the foregoing however, wastes are produced in form of wastewater. To forestall this, the policy prescribes appropriate sanitation systems to prevent institutional pollution and hence protect water resources and people's health. All water developments are therefore required to be preceded or accompanied by waste management systems to handle all wastes resulting from the said developments, including wastewater. It costs to develop and maintain water infrastructure and this cost has been passed on to the consumer.

The projects must also undergo thorough ESIA studies to predict adverse environmental, economic and social impacts to make it possible to prescribe mitigation measures. To endure a sustained adherence to the standards set, EMCA, 1999, demands that annual environmental audits be done for every project/programme of development that is ongoing.

2.1.3 National Poverty Eradication Plan (NAPEP) and the Poverty Reduction Strategies Paper (PRSP)

The NAPEP has an objective of reducing the incidences of poverty in both rural and urban areas by 50 percent by the year 2015 as well as strengthening the capacities of the poor and vulnerable group to earn an income. It also aims at narrowing the gender and geographical disparities and at creating a healthy, educated population and prepared in line with the goals and commitments of the World Summit for sustainable Development (WSSD) of 1995. According to the proponent, the outputs of this project are in line with the four focuses of the WSSD themes of poverty eradication, reduction of unemployment, social integration of the disadvantaged people and the creation of an enabling economic, political and cultural environment. In addition, the international community recognizes the inter-relatedness of poverty and the environment, and views environmental quality as a key factor achieving sustainable development. These include the goal number seven of the United

Nations Millennium Development Goals (2000), which highlights the need to ensure environmental sustainability to efficiently combat poverty and support sustainable development.

Moreover, developing and industrialization countries have ratified various multilateral agreements that recognize the need for trans-boundary cooperation on regional and global environmental issues including:

- The Kyoto on the United Nations Framework Convention on Climate Change
- The United Convention to Combat Desertification
- The Convention on Biological Diversity of,
- The Ramsar Convention on Wetlands, among others.
- The World Commission on Environment (the Brundtland commission of 1987)

2.1.4 The National Poverty Eradication Plan (NPEP) and (PRSP)

The NPEP has the objective of reducing the incidence of poverty in both rural and urban areas by 50 percent by the year 2015, as well as strengthening the capabilities of the poor and vulnerable groups to earn an income. It also aims at narrowing the gender and geographical disparities and at creating a healthy, educated and more productive population. This plan has been prepared in line with the goals and commitments of the World Summit for Social Development (WSSD) of 1995. According to the proponent and beneficiaries of project, the resultant output of the project are in line with the four focuses of the WSSD themes of; poverty eradication, reduction of unemployment, social integration of the disadvantaged people and the creation of an enabling economic, political, and cultural environment.

2.2 Legal Framework

Kenya has 77 statutes that deal with environmental matters. However, the statutes are sector specific and are scattered in such sectors as public health, soil conservation, endangered species, protected areas, water rights and water quality, air quality, noise and vibration, cultural, historic, scientific and archeological sites, land use resettlement and many others. In line with this, environmental management was conducted through various instruments like policy statements, sectoral laws, permits and licenses. The local government act of 1998, for example,

stipulates that it is an offence to emit smoke, fumes, or dust that may be a source of danger, discomfort or annoyance.

The current situation though is different. The enactment of Environmental Management and Coordination Act Bill in December 1999 has provided for the strengthening of the institutional framework for environmental management. This act provides for the establishment of a National Environment Management Authority, which became operational in 2002. It was given the statutory mandate to coordinate all environmental activities. The Environmental (Impact Assessment and Audit) Regulations, 2003 provide the basis for procedures for carrying out Environmental and Social Impact Assessment (ESIAs) and Environmental Audits (EAs).

2.2.1 The Constitution of Kenya

The Constitution of Kenya (2010) is explicit on the matters of environmental management. According to Chapter 5 Part 2, the Constitution provides for the State to “..... Establish systems of Environmental and Social Impact Assessment, environmental audit and monitoring of the environment....”. The Constitution also provides for public participation by making it a duty for every person to cooperate with state organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources.

2.2.2 The Environment Management and Coordination Act, 1999

Part II of the Environmental Management and Coordination Act entitles every person in Kenya to a clean and healthy environment. It seeks to safeguard and enhance the sustainability of the environment. The act is a consolidation of the various sectoral laws on environmental conservation, which had hitherto made it difficult to coordinate environmental protection. In the act are provided guidelines on issues of environment and stipulated offences and penalties for failure to adhere to the act. This project report has been researched, compiled and written in accordance with the Environmental and Social Impact Assessment and Audit Regulations, 2003, regulation 7 (1) and the second schedule. It will be submitted to NEMA which has the overall responsibility of enforcing this act. The Act also lists the type of projects, which must be subjected to the ESIA process. The proponent

appoints ESIA experts to conduct the ESIA and produce a project report to comply with and meet the requirements of this legislation

2.2.3 Factories and Other places of work Act (Cap 514)

The standards and requirements to be maintained during contractions are specified under the Factories (Building Operations and Works of Engineering Construction) Rules 1984. This act requires developers of facilities to notify the Director of Occupational Health and Safety of their Plans before the developments start. The Act also sets minimum standards that are to be maintained in such work places to safeguard health, safety and welfare of the workers. The act further makes it mandatory for occupiers or employers to provide personal protective clothing and equipment and all practicable means to prevent injury to workers who are exposed to potentially harmful substances and conditions.

2.2.4 Public Health Act (Cap 242)

Part IX, section 115, of the act states that no person shall cause nuisance or condition liable to be injurious or dangerous to human health, injury to workers who are exposed to potentially harmful substances and conditions. Section 129 states that it shall be the duty of every local authority to take all lawful, necessary and reasonably practicable measures for preventing any pollution dangerous to health of any water supply in which the public within the district has a right to use and does use for drinking or domestic purposes. Section 136 states that all collections of water, sewage: rubbish, refuse and other fluids, which permit or facilitate breeding or multiplication of pests, shall be deemed to be nuisances and are liable to be dealt with as provided the Act.

2.2.5 Forest Act 2005

The Forest Act ,2005 recognizes that forest play a vital role in the stabilization of soils and ground water, thereby supporting the conduct of reliable agricultural activity, and that they play a crucial role in protecting water catchment in Kenya and moderating climate by absorbing greenhouse gases. The act also recognizes that forest provide the main locus of Kenya's biological diversity and major habitat for wildlife.

2.2.6 Water Act, 2002

Part III, section 18, of the Water Act 2002 provides for national monitoring and information system on water resources. Following on this, sub-section 3 allows the Water Resources Authority (WRA) to demand from any person or institution, specified information, documents, samples or materials on water resources. Under these rules, specific records may require to be kept by a facility operator and the information thereof furnished to the authority.

The Water Act 2002 vests the rights of all water to the state, and the power for the control of all body of water with the Minister, the powers is exercised through the Minister and the Director of Water Resources in consultation with the Catchment Area Advisory Committees. It aims at among others:

1. Provision of conservation of water and
2. Appointment and use of water resources.

The Minister is given the power to appoint undertakers of water supply and in most cases are Town, Municipal and City Councils. Further, in order to provide security and supply of water the Minister can declare a catchment's area of particular source of water as protected area and restrict activities in those areas. Such orders must be publicized in Kenya gazette.

Pollution of any watercourse is an offence and the Act prohibits whoever throws, conveys, cause or permits throwing of rubbish, dirt, refuse, effluent, trade waste to anybody of water. It enhances the Ministry's capacity to enforce the Act by reviewing the water user fees.

2.2.7 The Work Injuries Benefits act, 2007

An Act of parliament to provide for compensation to employees for work related injuries and diseases contracted in the course of their employment and connected purposes.

2.2.8 Occupational Health and Safety Act 2007

An Act of parliament to provide for safety, health and welfare of workers and all persons lawfully present at workplaces, to provide for the establishment of the National Council for Occupational Safety and Health and connected purposes.

2.2.9 Occupiers Liability Act (Cap 514)

Under the common law, the proponent has a duty to take care for workers, visitors and other persons, who enter the site legally or with his consent, in this case at the housing site.

2.3 Regulatory Framework

2.3.1 Environmental (Impact Assessment and Audit) Regulations, 2003

The Environmental (Impact Assessment and Audit) Regulations, 2003, provide the basis for procedures for carrying out Environmental and Social Impact Assessments (ESIAs) and Environmental Audits (EAs). The Environmental and Social Impact Assessment and Audit regulations state in Regulation 3 that “the regulations should apply to all policies; plans; programmes; projects and activities specified in Part IV, Part V and the second schedule of the Act”.

Regulation 4(1) further states that:

“...no proponent should implement a project:

- (a) Likely to have a negative environmental impact; or
- (b) For which an Environmental and Social Impact Assessment is required under the Act or these regulations; unless an Environmental and Social Impact Assessment has been concluded and approved in accordance with these Regulations....”

2.3.2 EMCA (Waste Management) Regulations 2006

These are described in Legal Notice No. 121 of the Kenya Gazette Supplement No. 69 of September 2006. These Regulations apply to all categories of waste as provided in the Regulations. These include: Industrial wastes, hazardous and toxic wastes, pesticides and toxic substances, biomedical wastes and radioactive substances. These regulations outline requirements for handling, storing, transporting, and treatment/disposal of all waste categories as provided therein.

2.3.3 EMC (Water Quality) Regulations 2006

These are described in Legal Notice No. 120 of the Kenya Gazette Supplement No. 68 of September 2006. These regulations apply to drinking water, water used for agricultural purposes, water used for recreational purposes, water used for fisheries and wildlife and water used for any other purposes. This includes the following:

Protection of sources of water for domestic use;

- Water for industrial use and effluent discharge;
- Water for agricultural use.

These regulations outline;

- Quality standards for sources of domestic water;
- Quality monitoring for sources of domestic water;
- Standards for effluent discharge into the environment;
- Monitoring guide for discharge into the environment;
- Standards for effluent discharge into public sewers;
- Monitoring for discharge of treated effluent into the environment

2.3.4 Conservation of Biological Diversity (BD) Regulations 2006

These regulations are described in Legal Notice No. 160 of the Kenya Gazette Supplement No. 84 of December 2006. These Regulations apply to conservation of biodiversity which includes Conservation of threatened species, Inventory and monitoring of BD and protection of environmentally significant areas, access to genetic resources, benefits sharing and offences and penalties.

2.3.5 Fossil Fuel Emission Control Regulations 2006

These regulations are described in Legal Notice No. 131 of the Kenya Gazette Supplement no. 74, October 2006. The regulations include internal combustion engine emission standards, emission inspections, the power of emission inspectors, fuel catalysts, licensing to treat fuel, cost of clearing pollution and partnerships to control fossil fuel emissions. The fossil fuels considered are petrol, diesel, fuel oils and kerosene.

2.3.6 Noise and Excessive (Pollution) Vibration Control Regulations, 2009.

Section 13 91) says, where defined works of construction, demolition, mining or quarrying is to be carried out in an area, the Authority may impose requirements on how the work is to be carried out including but not limited to requirements regarding.

- Machinery that may be used and the permitted levels of noise as stipulated in the Second and Third Schedules to these Regulations.

- The relevant lead agency shall ensure that mines and quarries where explosives and machinery used are located in designated areas and not less than two kilometers away from human settlements.
- Any person carrying out construction, demolition, mining or quarrying work shall ensure that the vibration levels do not exceed 0.5 centimeters per second beyond any source property boundary or 30 meters from any moving source.

On Permissible noise levels, section 5 say No person shall make, continue or cause to be made or continued any noise in excess of the noise levels set in the first schedule to these regulations, unless such noise is reasonably necessary to the preservation of life, health, safety or property.

2.4 Institutional Framework

2.4.1 Institutions under EMCA 1999

The Government established the following institution to implement the EMCA 1999

- National Environmental Management Authority
- County Environmental Committees
- National Environmental complaints committee
- National Environment Tribunal

2.5 International Convention and Treaties

Kenya has ratified or acceded to numerous international and conventions. Those that have implications on the project are described below:

Convention on Biological Diversity (CBD) 1993: The CBD adopts a broad approach to conservation. It requires Parties to the Convention to adopt national strategies, plans and programmes for, the conservation of biological diversity, and to integrate the conservation and sustainable use of biological diversity into relevant sectoral and cross-sectoral plans, Programmes and policies. The proposed project is expected to conserve biodiversity in the project area and its environs in compliance with the Conservation of Biological Diversity Regulations, 2006.

United Nations Framework Convention on Climate change 1992: Sets an ultimate objective of stabilizing greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic (human-induced) interference with the climate system. Development projects in Kenya such as the proposed project are

expected to take climate change consideration into account, to the extent possible, in their relevant social economic and environmental policies and actions.

United Nations Convention to Combat Desertification 1994: Addresses the problem of the degradation of land by desertification and the impact of drought, particularly in arid, semi-arid and dry semi-humid areas. This convention is demonstrated in EMCA 1999 via Section 46 where District Environment committees are required to identify areas that require re-forestation as well as to mobilize the locals to carry out these activities.

The World Commission on Environment (the Brundtland Commission of 1987)

This international policy recommends development that produces no lasting damage to the biosphere and to particular ecosystems. Economic sustainable development is the development for which progress towards environmental and social sustainability occurs within available financial resources.

2.6 Applicable African Development Bank Operational Safeguards (OSs)

The Operational Safeguards	Application
OS1: Environmental and Social Assessment	<p>The HoA Program has been proposed as a category 2 Program</p> <p><i>Relevance:</i> There is need for ESIA's to be undertaken during the program execution level.</p>
OS2: Involuntary Resettlement, Land acquisition, Population Displacement and Compensation	<p>This safeguard consolidates the policy commitments and requirements set out in the Bank's policy on involuntary resettlement, and incorporates a number of refinements designed to improve the operational effectiveness of those requirements</p> <p><i>Relevance:</i> The proponent shall undertake procedures for voluntary land donations or Land Donation Consent, the African Development Bank 'No Objection' would be sought in case of VLD.</p>

<p>OS3: Biodiversity and Ecosystem Services</p>	<p>This safeguard aims to conserve biological diversity and promote the sustainable use of natural resources. It also translates the commitments in the Bank's policy on integrated water resources management into operational requirements</p> <p><i>Relevance:</i> The proponent shall ensure beneficiary communities are sensitized about prohibited practices that interfere with the functioning of ecologically sensitive areas.</p>
<p>OS4: Pollution Prevention and control hazardous materials and resource efficiency</p>	<p>This safeguard covers the range of key impacts of pollution, waste, and hazardous materials for which there are agreed international conventions, as well as comprehensive industry-specific and regional standards, including greenhouse gas accounting, that other multilateral development banks follow</p> <p><i>Relevance:</i> The proponent shall ensure community beneficiaries have a duty to prevent waste, avoid contamination and deal responsibly with the waste</p>
<p>OS5: Labour conditions, health and safety</p>	<p>This establishes the Bank's requirements for its borrowers or clients concerning workers' conditions, rights and protection from abuse or exploitation. It also ensures greater harmonization with most other multilateral development banks.</p> <p><i>Relevance:</i> The proponent shall prepare Labor Management Procedures (LMP) it shall be applied to all project workers and volunteers whether fulltime, part-time, temporary or</p>

	<p>seasonal. During Implementation of project activities, the respective Contractors shall prepare Occupational Health and Safety Plans (OHS) and the Community Health Management Plans to manage related risks.</p>
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Chapter Three: Proposed Project Design, Works and Alternatives

3.0 Introduction

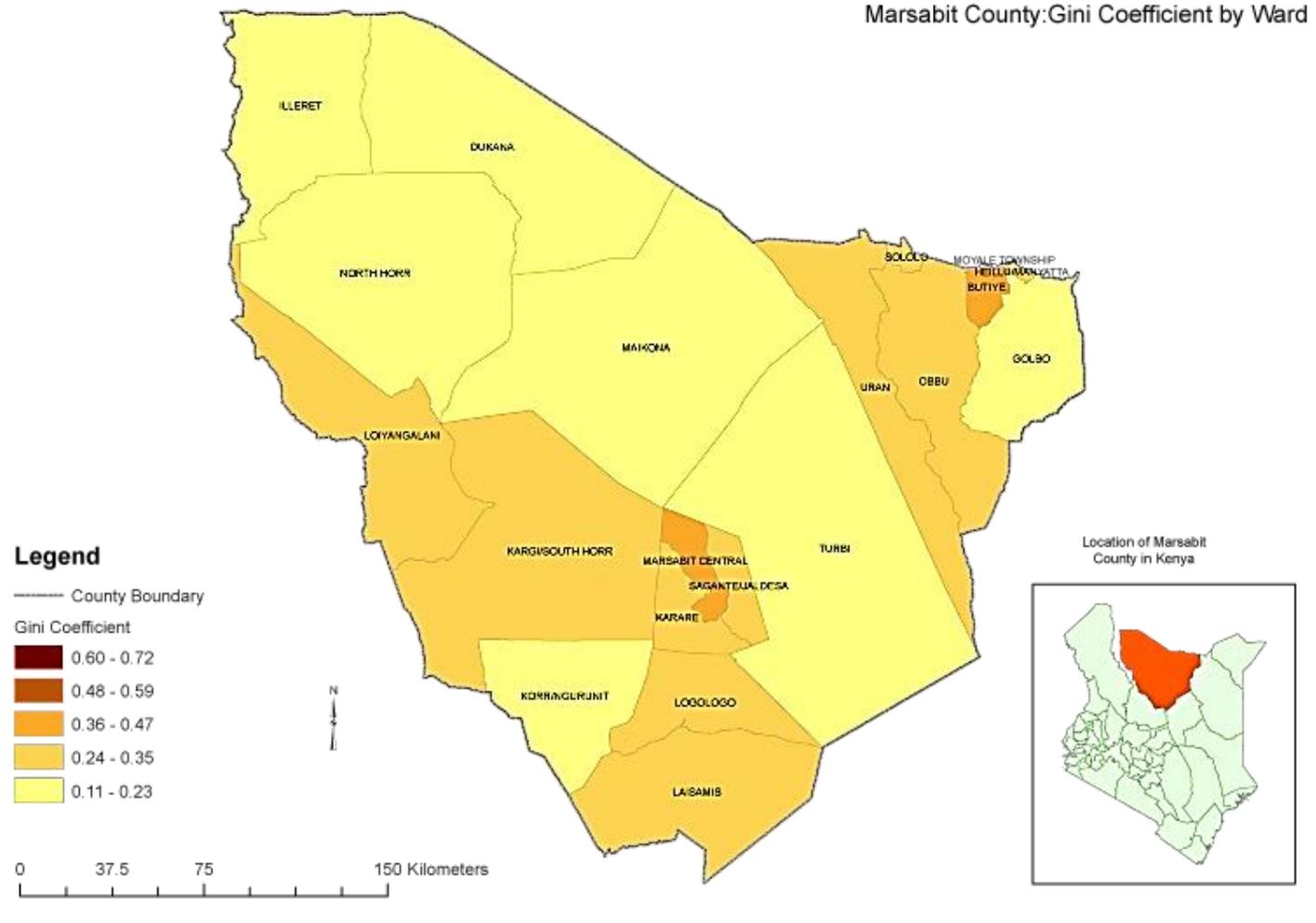
This Environmental and Social Impact Assessment was commissioned on 4th September 2021 by DRSLP (hereafter The Proponent) to assess the biophysical and human environments, including negative and positive impacts of the proposed drilling of a shallow well at Dukana Ward, Bales Saru Location, Bales Saru Sub location of North Horr Sub County, Marsabit County. The shallow well is purposed to provide domestic water to residents of Sagante community and their livestock.

The study has proposed adequate mitigation measures for the identified adverse environmental impacts. A major output of the ESIA process and a component of this ESIA Report are the Environmental and Social Management Plan (ESMP), the benchmark for the implementation of the mitigating measures and monitoring the environmental performance of the shallow well.

3.1 Location of the project site

The Proposed shallow well is located at Dukana Ward, Bales Saru Location, Bales Saru Sub location of North Horr Sub County, Marsabit County. The shallow well is purposed to provide domestic water to about 2000 residents of Sagante and 13500 herd of combined livestock. The site is on GPS coordinates **N: 4.109386, E: 37.040034**.

Marsabit County: Gini Coefficient by Ward



3.2 Groundwater Survey

This process is a prerequisite in drilling of a shallow well. Before the drilling of the shallow well, a groundwater survey should be conducted by a registered hydro-geologist with the Ministry of Water. This was already done and provided the groundwater survey report that was used for the purposes of acquisition of a drilling permit from the Water Resources Authority. The report also provided part of the literature review, giving various alternatives and the basis of the feasibility study indicating the prospects of groundwater and the indicative depth of the shallow well. This survey is very important as it also gives a guide on the best drilling method amongst other advantages.

This report is based on data and information gathered within the **vicinity** of the proposed shallow well site and the **actual** site with special attention given to information from previous sunk shallow wells close to the site. Hydrological maps were also used to obtain various data and information. The survey indicated that there is sufficient underground water to meet the proponent's water requirements.

3.3 Authority

In compliance with the Water Act, 2002, a hydro-geologist conducted a groundwater survey and the report was submitted to Water Resources Authority (WRA). Before drilling commences, Authorization to sink/drill well/borehole permits should be obtained from the Water Resources Authority (WRA), Ewaso Nyiro Catchment through the Sub-regional Office in Marsabit.

3.4 Site Preparation

The shallow well-sinking site is open within a public land located in Dub Gindole-Sagante community and the compound is easily accessible from the main road without any modifications to the existing ecosystem.

3.5 Well Design

To monitor and control groundwater abstraction and static water level measurements, a water meter and an airline will be installed respectively. An airline

consists of an open tube or several pipes connected together and attached to the pump's drop pipes. The water meter and airline are required for the purposes of determining the relationship between the rate of groundwater abstraction and the static or dynamic water level in the shallow well at any given time.

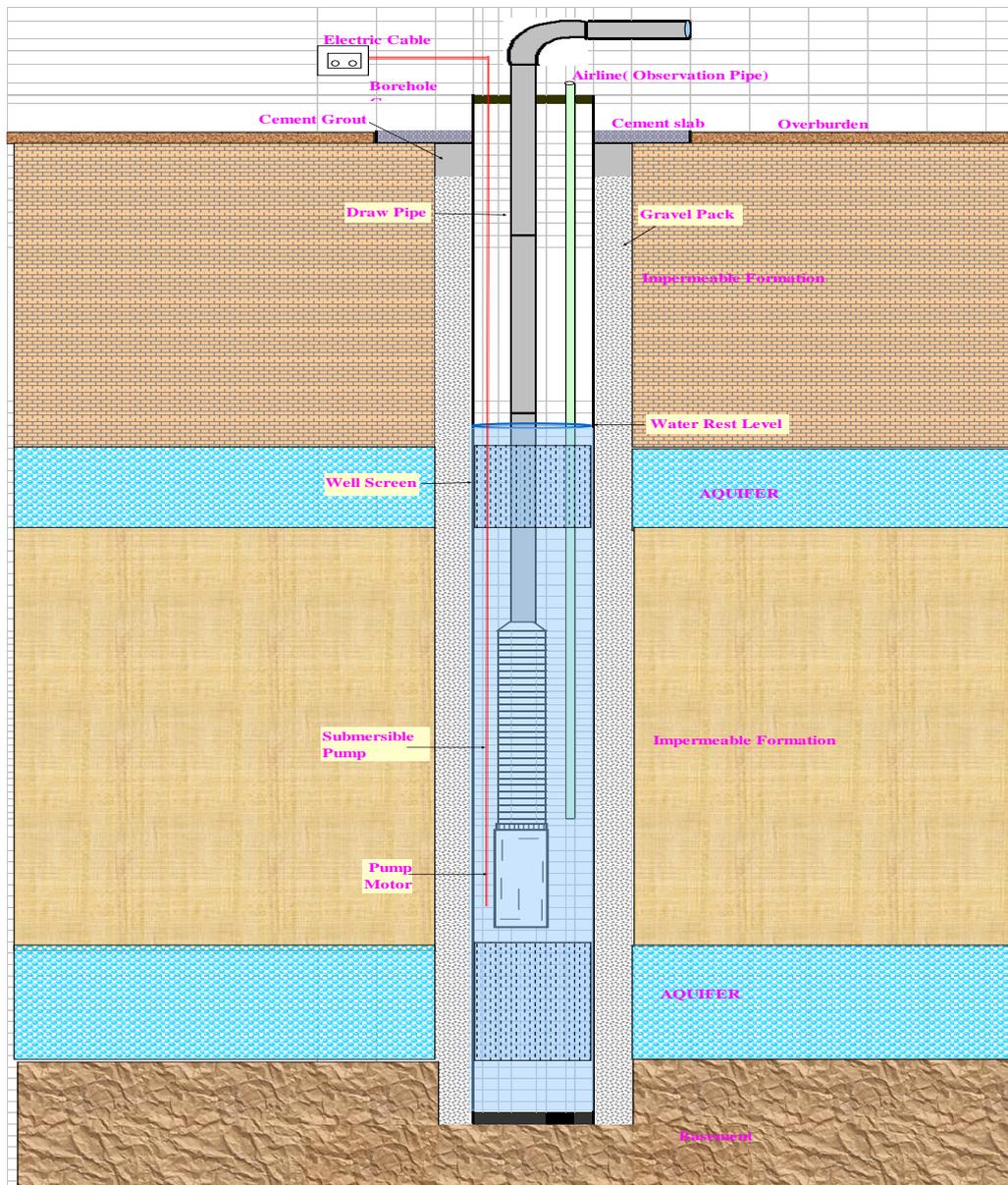


Figure 3. 1: Standard Shallow well Design

3.6 Drilling

There are several methods of drilling and the choice depends on the geological conditions of the shallow well site. To reduce costs and protect the geological structure, careful consideration is required. During drilling, geological rock samples

shall be collected progressively at every 2 meters interval and logged by the project geologist. The contractor shall record water struck and water rest levels. The contractor shall be held solely and entirely responsible for the completion and safety of the works and shall indemnify the proponent against all claims that may arise as a result of carrying out the works.

The shallow well to be drilled will take a circular shape, being drilled to a depth of 20 meters as recommended by the hydro-geologist. It is important that the proposed diameter not to exceed 1.5m since there is no great advantage derived by increasing the diameter.

3.7 Well Casings

Well casings serve the following purposes; they support the shallow well, protect the aquifer from contamination, house the pumping equipment and serve as the vertical conduit for water flowing upward from the aquifer to the pump intake.

An open shallow well provides an avenue where vertical migration of contaminants may occur from contaminated fracture zones to clean fractures. To prevent this potential migration and cross-contamination and while maintaining the preliminary shallow well a plug will be installed. The selection of casing material should be based on the water quality, well depth, cost, shallow well diameter, and the drilling procedures. Steel is most commonly used, although thermoplastic materials can be used especially in areas where groundwater is highly corrosive. For such a case, thermoplastic material is chosen if the depth is less than 150 meters.

Plastic (PVC) casings are desirable for many installations where high strength is not required because they are corrosion resistant, light in weight, relatively low in cost, easy to install and are resistant to acid treatment. These require careful centering in the shallow well before backfilling or filter packing is completed. Any voids in the backfill or filter pack may lead to collapse of the earth formation against the casing, causing it to break. Careful consideration is required in selection of materials for any well deeper than 90 meters, especially for large diameter wells. Plastic casings exhibit some characteristics that may present a hazard to drinking water in areas where groundwater contamination has occurred. If volatile organic chemicals exist

in groundwater near a shallow well above the intake section of the well, some of these chemicals might still move into the discharge by passing through the wall of the casing, as some plastics casings are permeable in the presence of certain chemicals. Section to be grouted depends on the water well codes, aquifer structure and water quality.

3.8 Screens

The type and material of screens to be selected depends on the water quality, presence of iron bacteria and the strength requirements. Water quality analysis may show whether the groundwater is corrosive, incrusting or both. Incrusting water deposits materials on the screen's surface and in the pores of the formation just outside the screen. These deposits plug both the screen's openings and the formation. A similar plugging effect can be caused by iron bacteria through the production, accumulation and oxidation of slimy material of gel-like consistency, precipitating to minerals that can plug the well completely within a short time.

The design of water wells for potable water should include those features that provide continuous sanitary protection. Contaminated water from surface drainage or low quality water encountered in the well can move downward through the annulus between the casing and shallow well wall. Therefore, the annulus around the casing must be sealed off with a cement or bentonite grout.

3.9 Grouting

This is the act of injecting certain substances into the void of the earth materials to reduce or eliminate their permeability, and to consolidate them or increase their strength. Although this is not always part of a well, gravel packing is often used in addition to the well screens. Grouting, which is the cementing of the well casings involves filling the annular space between the casing and the drilled hole with suitable slurry of cement or clay. The length of the shallow well section to be grouted depends on the water well codes, aquifer structure and water quality.

3.10 Plumpness and Alignment

Water wells should both be straight and plumb, although in practice, any shallow well of substantial depth may not be perfectly straight or plumb. A well bore may be straight but not plumb. A deviation from plumpness by two-thirds of the well's inside diameter per 30 meters is reasonable considering the difficulties of drilling. Straightness of the well bore is important, because it determines whether the casings and the design pump can be installed in to the desired depth.

3.11 Shallow well Development

All drilling methods cause some plugging of the fractures or crevices in rocks. Shallow well development is designed to maximize the well yield by repairing the damage done to the formation during drilling so that natural hydraulic properties are restored. Shallow well development also alters the basic characteristics of the aquifer near the shallow well so that water may flow freely to the well. To achieve this, some form energy is applied to the screen and formation and this is usually confined to the zone immediately adjacent to the well, where the natural formation has been disturbed by the well construction procedures or adversely affected by the drilling fluid. **The undisturbed part of the aquifer just outside the damaged zones can be reworked physically during development to improve its natural hydraulic properties.**

All new shallow wells should be developed to achieve sand-free water at the highest possible specific capacity. Development procedures have the following benefits:

1. Reduce contamination and inter-mixing of grain sizes produced during drilling by removing fine materials from the pore space.
2. Increase the natural porosity and permeability of the previously undisturbed formation near the shallow well by selectively removing the finer fractions of aquifer materials.
3. Remove the filter cake or drilling fluid film that coats the shallow well and remove much or all of the drilling fluid and natural formation solids that have invaded the formations for the well to yield sand-free water.

Explosives are sometime used in an attempt to develop greater specific capacity. Good results can be obtained if blasting procedures are appropriate for the rock type and the size and depth of the rock. However, the use of explosives still remains inconclusive and they should be used with caution.

3.12 Pumping test data

Pumping tests are normally conducted to determine the performance characteristics of the well, the hydraulic parameters of the aquifer and the specific yield of a particular aquifer or several aquifers i.e. the yield of the well and the draw down. This information is vital for determining the water supply available from the well, for selecting the type of the pump and for estimating the pumping costs.

In well performance test, the yield and draw down are recorded so that the specific capacity is calculated. Data is usually taken under controlled conditions giving a measure of the productive capacity of the well and providing information needed for the selection of the pumping equipment.

The main objectives of pumping tests include:

- Determining the hydraulic characteristics of the aquifers or water bearing layers. This is normally referred to as the aquifer test as it is the aquifer rather than the pump or well which is tested. Such testing provides basic information that helps solve many regional and local ground water flow problems.
- Providing the well yield and draw down for determining the specific capacity or the discharge draw down ratio of the well for selecting the pump type and for estimating the cost of the pumping. The specific capacity gives the measure of effectiveness or productive capacity of the well. Such testing is sometimes referred to as well test.

Aquifer tests are useful for predicting the effect of the new withdrawals on the existing well, the future draw down at different discharges and the radius of the cone of influence for individual or multiple wells.

There are two types of aquifer tests namely; the constant rate test and the step-draw down test. In the constant rate test, the well is pumped for a significant length of

time at one rate whereas the well is pumped at successively greater discharges for relatively short periods. The results of properly conducted tests are a vital tool in groundwater investigations. The measurements of water levels after the pump is stopped (recovery) are extremely valuable in verifying the aquifer coefficients calculated during the pumping phase of the test.

The pumping test should be conducted for a continuous period of 24 - 72 hours depending on the type of aquifer. The accuracy of the draw down data taken during the pumping test depends on the following:

- Maintaining of a constant yield during the test.
- Measuring the draw down carefully in the pumping well and in one or two properly placed observation wells.
- Taking draw down readings at appropriate time intervals
- Determining changes in barometric pressures, stream levels affect the draw down data.
- Comparing recovery data with draw down data taken during the pumping phase of the test
- Continuing the test for 24 hour for a confined aquifer and 72 hours for unconfined aquifer during constant rate tests.

3.13 Hydraulics

A well is a hydraulic structure which when properly designed, constructed and developed permits the economic abstraction of water from an aquifer. Successful wells are designed and constructed by using materials that provide efficient well with a long service life and taking maximum advantage of the hydro-geologic conditions while applying the principles of hydraulics in a practical way to analyze the wells and aquifer performance.

During pumping, water flows from every direction towards the well. As the water moves close to the well, it moves through imaginary cylindrical sections that are successively smaller in area. As the pump removes water, an area of low pressure develops near the shallow well. This causes water to move from the formation into

the well to replace the water being drawn out by the pump. When pumped, all wells are surrounded by a cone of depression. The size and shape of this cone depends on the pumping rate, pumping duration, aquifer characteristics, slope of the water table and recharge within the cone of depression. The factors contributing to excessive draw down or inefficiency are related primarily to the choices made in the design and construction of wells.

The following factors must be given careful consideration:

Design Factors:

- The choice of well screens with insufficient open areas makes the entrance velocities too high resulting into greater-than-normal entrance head losses.
- Poor distribution of screen openings may cause excessive convergence of flow near the individual openings, and may produce twice as much draw down as it is necessary.
- Insufficient length of well screen may result into partial penetration of the aquifer and hence distort the flow pattern for some distance around the well.
- Improperly sized filter packs or those made from angular or plate like materials can restrict flow into the well screen. Particle shape, size and grain size distribution affect the hydraulic conductivity of the pack.

Construction factors:

- Inadequate development of the well may leave so much drilling fluid and small particles in the formation around the screen that reduce the original permeability of the formation and screen
- Improper placement of the well screen may put it at a depth that does not correspond to the best water-bearing stratum.

Water Level Recovery: when pumping is stopped, the well and aquifer water levels rise towards their pumping levels. The recovery rate provides a means for calculating the coefficients of transmissivity and storage. The time - draw down measurements taken during the pumping period and the time- recovery measurements taken during the recovery period provide two different sets of information from a single aquifer test. The water recovery level for the shallow well

must be recorded as well as the intake and pumping water levels of the pump water abstraction.

3.14 Water Quality

The primary purpose of water analysis is to determine the suitability of water for the proposed use, which may fall into three main classes of water use: domestic, agricultural and industrial. A water supply intended for public use may include all the three main classes and accordingly require a general standard of quality higher than that needed by any one of the classes. Water required for a particular industry may need a quality that is substantially higher than the one required by a public supply.

Occasionally, more than one water-bearing formation is encountered in a well and the composition of the respective water may vary drastically. Under such conditions, it may be desirable to exclude the poor quality water from the principal supply by grouting. Bacteriological quality of a water supply is determined by analyzing for coliform bacteria. The coliform group of organisms is used to indicate dangerous contamination levels. Samples of water must therefore be collected and taken for analysis by a most recognized laboratory before water is used for any purpose. The analysis must include the physical, chemical and bacteriological characteristics.

3.15 Materials

3.15.1 Temporary Materials

These include those that facilitate the drilling work such as water, drilling foam, diesel and lubricants.

- **Drilling water** (as a check for water quality and effect on natural surrounding environment) should not come from wetlands or seasonal swamps in the environs of the shallow well site. Such water is likely to harbor pathogenic and iron bacteria and their subsequent growth in the shallow well can cause severe problems on both human health and the installed shallow well equipment. Drilling water should be clean and of good quality. Apart from affecting the water quality, drawing water from these sources may interfere with that local ecosystem and hence cause ecological imbalance.

- **Drilling foam** is associated with the introduction into the air of a surfactant mixed with water but an ionic soap mainly comprising of sodium alkyl ether will be used. The foam will be used to enhance the rate of cuttings removal by preventing them from aggregating so that they are easily lifted to the surface. The foam has higher solids carrying capacity, the ability to lift large volumes of water, reduced air volume requirements, reduced erosion on poorly consolidated formations, effective dust suppression and increased shallow well stability. The foams used are slightly viscous amber colored fluids with a Biological Oxygen Demand/ Chemical Oxygen demand (BOD/COD) ratio greater than 0.1 which is readily biodegradable, **hence not a cause of alarm**. One cubic meters of the injection fluid is required per one cubic meters of the groundwater removed.
- **Lubricants** and **diesel** are important for the running of the engines of the drilling machines, mud pump and generator just within the period of implementing the project.

3.15.2 Permanent Materials

These include all the materials that are installed after drilling is completed such as casings and screens, gravel pack, bentonite, cement, steel casing, inert material and pipes among others;

- **Casings** and **Screens** made of mild steel pipes will be installed in the shallow well as shown in the figure below. These are not corrodible hence least likely to affect water quality. To improve the lifespan of the bore the use of Johnsson™ screens in the intake is emphasized. However, it must be noted that their prohibitive costs hinder their widespread use. In their place, plasma slotted pipes with enhanced density of slots can be used.
- **Gravel Pack:** Grain size ranging within 2 – 5 mm rounded to well granules of 95% siliceous material should be adopted. This material is locally available in places with sand deposition such as in riverbanks. The gravel pack should be installed in the annular space (1" round space between the shallow well wall and the casings) of the shallow well. The activity is conducted to ensure the

infiltration of sediment and silt free groundwater to the shallow well. Any fines in the gravel should be removed through washing or sieving off.

- **Bentonite:** This material is mixed with water and used in the construction of the shallow well to seal some sections of the annular space for sanitary purposes.
- **Cement** grout in the annular space and slab on the surface will be used for sanitary purposes as shown in the figure 2.
- **One meter (1m) steel casing:** This is used for the shallow well cap to avoid entry of surface water into the shallow well. It is fitted with a cap at its top to prevent anybody from throwing foreign material into the hole.
- **Pipes:** These will be class 'C' steel rising main to be connected to the submersible pump and class 'C' steel pipes to connect water supply to the storage tank.
- **Inert Material:** The drilled material will be reused by filling a section of the annular space during the shallow well construction.
- **Dipper line:** It is a legal requirement under the Kenya Water Act, 2002 that every shallow well sunk should be fitted a dipper line i.e. a 25 mm diameter uPVC airline attached to the rising main in order to monitor the water level using water deeper around seasons and whenever such need arises. This is a long-term exercise and is vital because the owner or any stakeholder can assess the performance of a shallow well by observing the pumped water level and static water level after the safe recommended yield is pumped for the recommended length of time.

3.16 Analysis of project alternatives

3.16.1 Overview

Since the introduction of the ESIA process and subsequent development of ESIA methodologies and legislative provisions, the analysis of alternatives has been one of the main tenets of ESIA policy and procedures. Indeed, a thorough, unbiased and transparent assessment of investment alternatives from an environmental and social perspective (as well as a technical and economic standpoint) is one of the most important contributions ESIA can make in improving decision-making. Alternatives

analysis in ESIA is designed to bring environmental and social considerations into the “up-stream” stages of development planning, project identification and earlier, as well as the later stages of site selection, design and implementation.

In the assessment of the project alternatives, this study considered three main scenarios namely: Status quo or no action scenario; surface and rainfall water harvesting or sourcing from other existing shallow wells. In this study a scenario is considered to mean the “description of a possible future situation and the development from the current situation to this future stage” (Huber and Opondo, 1994). The development of scenarios involved analyzing the current situation, discerning the relations and links to the environment, influencing factors, existing and potential strengths, opportunity and threats.

3.16.2 Alternative Water Sources

Alternative water source is from the rain water harvesting which is not reliable due to inadequate rainfall in the area. Residents have no storage facilities and most houses are grass roofed. This option is not viable.

3.16.3 ‘No Action’ Alternative

This proposition implies that the proposed action will not take place, i.e. maintenance of the status quo. Failure to drill the proposed shallow well will mean that the proponent will not be able to access adequate water since the cost of transporting water from other sources will be inefficient and this may be uneconomical. Daily ferrying of water from other sources will be cumbersome and this will lead to great losses and inefficiencies. A standby source of water need to be available since the development cannot run without enough water for its population.

3.16.4 Drilling Technology

The proponent has chosen to employ the services of the rotary, Down-The-Hole Hammer (DTH) technique as explained earlier. In terms of technology the alternative to this drilling technique is the Cable Tool or percussion drilling method.

Wells drilled by the cable tool or 'wire line' method are constructed with a drilling rig, a string of tools (cable, rope socket, set of jars, drill stem and drilling bit), and a bailer or a sand pump. Drilling is accomplished by regularly lifting and dropping the string of tools. The bit, at the end of the rope, with its sharp "chisel" edge loosens the material. The bit rotates a few degrees between each stroke so that the cutting face of the bit strikes a different area of the hole-bottom with each stroke. The reciprocating action of the tools mixes the loosened particles with water to form slurry at the bottom of the shallow well (water may need to be added to form this slurry). Slurry accumulation increases as drilling proceeds and eventually it reduces the drilling efficiency. When the penetration rate becomes unacceptably low, slurry is removed at intervals from the shallow well by the sand pump or bailer. Though this method is cheap compared to the rotary method, it is extremely slow.

Chapter Four: Baseline Information and Environmental Setting

4.0 Location of Bales Saru Community Shallow Well

The proposed project is located in Bales Saru Sub-Location, Dukana Ward, North Horr Sub County, Marsabit County GPS Coordinates: Latitude N: 4.109386, Longitude E: 37.040034

4.1 Physical and Topographic Features

Most of the county constitutes an extensive plain lying between 300m and 900m above the sea level, sloping gently towards the south east. The plain is bordered to the west and the north by hills and mountain ranges and is broken by volcanic cones and calderas. The most notable topographical features of the county are: Ol Donyo Ranges (2066m above sea level) in the South West, Mt. Marsabit (1865m above sea level) in the central part of the county, Hurri Hills (1685m above sea level) in the North Eastern part of the county, Mt. Kulal (2235m above sea level) in the North West and the mountains around Sololo-Moyale escarpment (up to 1400m above sea level) in the North East.

4.2 Soils and climatic conditions

The study area is covered by grey alluvial and light brown sandy soils, derived from the deposition of eroded Basement rock material from higher areas to the far south. The best soils in the County are the deep red soils of plateau and the dark deep well drained clay loam soils on mountain ranges. Otherwise soils are poor with shallow, rocky and stony soils on the volcanic hills and central plains, which only support sparse vegetation. The latter soils have suffered much from erosion

Temperatures are relatively very high with a minimum of 24°C in July and a maximum of 42°C in February. Variation in altitude brings differences in temperatures across the county where places near Laisamis constituency experiences low temperatures due to neighbouring highlands in Doinyo Lengai. Locally, rainfall is scanty and unpredictable averaging 255mm. The long rains fall in the months of April and May while the short rains fall in October and November Most parts of the county experiences long hours (approximately 11) of sunshine a day. This causes high evaporation rates, withering of the vegetation before maturity occurs frequently. The continuous sunshine in the county has a potential for harvesting and utilization of solar energy for vegetation, land use, land cover and alternative livelihood. The vegetation in the area is mainly thick low

thorn shrub with open grassland except near dry river courses and at the foot of the hills, where occasional large trees grow. Vegetation on the plains is noticeably less dense and traversing is consequently easier than on the hills.

4.3 Forest Vegetation

The soil is generally sandy and rocky and the climate hot and dry in most of the county. This reflects the type of vegetation found in the county. The county has two indigenous forests – Mt. Marsabit and Mt. Kulal – with a size of 152.8km² and 167.3km² respectively. The only gazetted forest in the county is Mt. Marsabit forest, also a national park. Mt. Kulal forest is not gazetted. Mt. Marsabit forest has various tree species such as *Olea* spp, *Croton* spp, *Stombosia* spp, *Cassia* spp, *Cordia* spp, *Jakaranda* spp, *Acacia* spp and *Moringa* spp. The forest also acts as a fall-back grazing area during the dry season for livestock and has potential for tourism. The proposed site has minimal vegetation hardly scattered acacia trees mainly along the seasonal water channels (*lagga*). The rest of the vegetation is composed of dwarf shrubs that form the bulk of feed for goats and camels.

4.4 Marsabit Livelihood Zones

The pastoral production system forms the bulk of the main livelihood zones in the county and includes about 80% of the population. The other type is agro-pastoral livelihood system which accounts for about 16% of the population. Other minor livelihood zones include formal employment and fish folk found around lake Turkana. Arap Trees community area falls under the pastoral livelihood zone.

4.5 Administrative and Political Units

Administratively, the county is divided into four administrative sub-counties being Laisamis, Saku, North Horr and Moyale. The project is located in Saku Sub-County.

4.6 Infrastructure and Access

4.6.1 Road Network

The total road network in the area is 2,423km which consist of 397 km gravel surface and 2,034 km earth surface. Most of the roads are however impassable during the rainy

seasons. The county has a single tarmac road running through from Isiolo to Moyale. Bales Saru village is covered by gravel surface road.

4.6.2 Postal and Telecommunication Service

Marsabit County has two post offices located in Marsabit and Moyale towns. The project area has moderate coverage of mobile network.

4.7 Financial Institutions

There are four banks in the County and one microfinance institution (MFI). The banks are based in Marsabit and they include Kenya Commercial Bank, Equity Bank, Co-operative Bank and First Community Bank. The Kenya Women Finance Trust is the only MFI also located in Marsabit. The County has only one SACCO, situated in Marsabit town, mainly serving teachers. The project site is within Saku Subcounty that hosts all these institutions.

4.8 Energy Access

The main source of energy is firewood. Electricity coverage is only found in urban centres of Marsabit and Moyale towns. Bales Saru community area has no electricity and mainly relies on solar energy for all their electronic facilities.

4.9 Markets and Urban Centres

The main goods traded in the urban centres and local markets include: livestock, fruits, vegetables, maize, beans, wheat, teff and millets. Majority of the maize and beans come from other counties whereas some fruits and vegetables come from Ethiopia through Moyale town.

4.10 Housing

The proportion of households living in mud/wood walled houses stand at 34.2% (KNBS, 2009). There also exists a significant proportion of temporary structures in Bales Saru Sub Location.

4.11 Environment and Climate Change

Environmental degradation in the county is mainly as a result of deforestation and forest encroachment due to dependency on firewood, charcoal burning and overgrazing. There is also inadequate solid waste collection and its disposal coupled with lack of sewerage system. Besides unsustainable management practices of ecosystems and their inherent biodiversity are major contributors to environmental degradation in the county. Other contributors to environmental degradation include non-compliance to relevant environmental management legislation due to weak enforcement, careless disposal of non-biodegradable materials like plastics and polythene, low levels of environmental awareness and low social responsibility at individual and community levels on environmental matters.

4.12 Hydrological survey recommendations

A hydrological survey was carried out in March 2018 and the following recommendations concerning the drilling of a shallow well at Dub Gindole village made:

- i) That one 1.5m diameter shallow well be sunk at the selected site at a depth of 20 metres and should be sunk
- ii) That aquifer(s) struck at less than 5 metres below ground level should be sealed off completely with neat cement grout and/or bentonite.
- iii) A qualified hydro geologist should **supervise the drilling**, construction and test pumping of the proposed shallow well.

Chapter Five: Public Participation

5.0 Objectives of public consultation

The objectives of public consultation for an ESIA exercise are to ensure that:

- All stakeholders and interested parties are fully informed on the operation of the project and have an opportunity to raise their concerns. Any issue arising from their views may be incorporated in the ESIA report to help the management/proponent in current and future operations.

5.1 Legal requirement

It is a Government policy that the public should be involved at all levels of project design, implementation and operation

5.2 Analysis and results of the public consultation

To ensure adequate public participation in the ESIA process, questionnaires were administered to seek public views towards the proposed project and any anticipated impacts of the project to the surrounding.

The interviews with the neighboring community members were carried out to;

- Identify the possible socio-economic and cultural profile effects that may arise on implementation of the proposed project within the surrounding environs.
- Gather basic information necessary for the assessment of key impact indicators on the local environment during implementation and operations of the proposed project.

The main challenges faced by the community include water scarcity during dry spell due to competition with livestock. There is usually an increase in human and livestock herd numbers, including from other regions, at the watering points during droughts periods. The community experiences frequent droughts and erratic rainfall. Inadequate water has led to poor hygiene conditions. There is also lack of opportunities to do business. However, the main source of livelihoods in the area include livestock, farming, casual work and small businesses. To address these challenges, the community suggests that a borehole be drilled to avail enough water

that can be pumped to the village, an improvement of all the wells and raising of concrete embankments

The **anticipated positive impacts** of the proposed project noted by the public include:

- Improved water supply
- Increased employment and business opportunities during entire project lifespan.
- Improved incomes for the suppliers of services and goods.
- Better land use.
- Save on time spent on looking for clean water for domestic use

Some of the **anticipated negative impacts** are:

- Increased solid wastes generation
- High levels of sound and dust production during the drilling phase
- Loss of aesthetic beauty due to removal of vegetation
- Possible injuries to the workers

Chapter Six: Projected Environmental Impacts and Mitigation Measures

6.0 Introduction

The project implementation will bring about both positive and negative impacts on the environment and community at large. The negative impacts will be minimal and last only for the time of implementation of the project, with a few during the operation in the long-term. Therefore, the impacts can be categorized into; *Construction phase* and *operation phase* impacts.

6.1 Positive Impacts

6.1.1 Water Supply

The Community gets water from existing shallow wells which serve for domestic and livestock. This leads to long waiting time especially during drought when livestock population increases due to influx from other regions. The water gets dirty and unhygienic. The development of proposed Arab Trees Community Shallow Well in Bales Saru Sub Location will assist in separating the sources for domestic and livestock.

The proposed shallow well whose water will be portable will be reliable, clean and adequate for the local community's water requirements.

6.1.2 Promotion of economic status of the community

The Marsabit town residents are business people while the local communities have the subsistence cropping and livestock keeping especially cows, camel, sheep and goats as their economic mainstay. The number of livestock decrease tremendously when they die partly due to lack of water and pasture. Now with the sinking of the shallow well the livestock numbers will multiply and increase and therefore directly enhance the economic status of the local community in terms of milk, meat and cash provision.

6.1.3 Good time Management

Much time has been wasted on the issue of water provision. Sometimes waiting time at watering point is far too long. All this time which was being used to bring water will be used for other needy issues.

6.1.4 Enhanced Health Standards

The provision of clean, adequate and portable water from the shallow well will promote positively general health and hygiene of the beneficiary communities.

6.1.5 Enhanced Co-operation and harmony

The water Act has provision for the owners of the boreholes/shallow wells to share water with the neighbors if the yield of the source can meet the extra water demand and if the neighbors do not have an existing water supply. In the process of sharing this water resource commodity, in whatever arrangement, will enhance the cooperation among the local community and which can have a multiple effect and also stimulate cooperation in other fields beneficial to the local people.

6.1.6 Reduced Water Borne Diseases

It is a requirement under laws of Kenya that no well or borehole water should be used before a physical, chemical and bacteriological analysis of the water has been carried out. The proposed shallow well water will reduce and has the capacity to end the prevalence and occurrence of the water borne diseases like typhoid.

6.1.7 Promotion of agricultural development

With the provision of water through the sinking of the well will stimulate micro-irrigation for enhanced food security and nutrition.

6.1.8 Promotion of education

The development of this well will supply water to for domestic leaving the current one for livestock and thus reduce the time taken to fetch water and this time will be used in other educational advancement activities.

6.2 Construction Phase: Projected Negative Impacts and Mitigation Measures

6.2.1 Noise and Vibration

Continuous exposure to noise levels above 85 dB may cause damage to hearing leading to occupational deafness. Noise and vibration produced during drilling may have some temporary negative impacts to the immediate residents. These may

include impairing of verbal communication, temporary hearing problems/temporary threshold shift (TTS), noise annoyance or even interference of the normal behavior of domestic and wild animals near the site being drilled.

Proposed mitigation and management measures to control the generation of noise and ensuring compliance with relevant noise standard include:

- Use of suppressors or silencers on equipment (underground drum silencer to the generator) or noise shields proposals for instance corrugated iron sheet structures
- Provision of Personal Protective Equipment (PPE) including earmuffs for ear protection

6.2.2 Air Quality

The potential sources of air pollution include traffic; stockpile drilling rig, compressor, and generator. This is a short-term negative impact and will last within the actual drilling period.

The **proposed mitigation and management measures** include:

- Locating haul roads, tips, and stockpiles away from sensitive receptors and take into account prevailing wind directions.
- If applicable, provision of dust removal system to the drilling plant
- Use of water sprays and mists as dust suppression measures
- Carry out suitable maintenance on all machinery to be used to avoid emission of noxious gases.
- Provision of suitable PPE such as nose masks to the workers and staff on site.

6.2.3 Fuels and Lubricants

Any oils and grease spillage on the ground may seep into the ground and thus contaminate the soil and ground water.

Proposed mitigation and management measures are:

- Scooping the affected earth and disposing of contaminated material soundly.

- Proper handling, storage and disposal of oils and greases and their wastes during construction.
- Proper maintenance of vehicles, drilling plants and other equipment (using petroleum products) to avoid fuels and lubricants spills at the project site.

6.2.4 Solid Waste

This may comprise of waste packets/bags of cement, bentonite, gravel packs and other bags with materials and equipment to be used during implementation of the project. There will be minimal excavation during drilling and completion of the shallow well. Some of the drilling cuts material will be used during the shallow well construction by refilling the annular space. All excavated material from the trenches for power cables and water supply line will be used to refill them.

The **proposed mitigation and management measures** are as follows:

- The Supervising Engineer will ensure that all solid wastes either paper, polythene bags, cement bags, bentonite bags, gravel pack bags, excavated materials and remaining gravel packs are disposed off in a sensible manner before commissioning the shallow well and at the approved dumpsite.

6.2.5 Drilling Foam and Waste water

The drilling foam is associated with the introduction of into the air of a surfactant mixed with water but an ionic soap mainly comprising of sodium alkyl ether will be used. The foam is used to enhance the rate of cuttings removal by preventing them from aggregating so that they are easily lifted to the surface. The foam has higher solids carrying capacity, the ability to lift large volumes of water, reduced air volume requirements, reduced erosion on poorly consolidated formations, effective dust suppression and increased shallow well stability.

During drilling, this foam is released to the atmosphere or environment in form of mist or wastewater and can cause some negative impacts.

The **proposed mitigation and management measures** include:

- The foam to be used is lightly viscous amber colored fluid with a Biological Oxygen Demand/Chemical Oxygen Demand (BOD/COD) ratio greater than 0.1, which is readily biodegradable.
- Traces of remaining drilling foam from the shallow well will be pumped out during test pumping and development of the shallow well. Generally, the foam will have no environment impact.

6.2.6 Ground Excavation and effect on Land Use

Ground excavation will involve the sinking of the shallow well up to 20 meters deep. The proposed project location is currently an open area within a lagga.

The **proposed mitigation and management measures** include:

- After drilling, the shallow well will be installed with mild steel casings and screens, siliceous gravel, bentonite, cement slurry and inert material.
- The drilling cuts may be used to fill up depressions in the compound. The drilled material is entirely inert and this will help to stabilize the shallow well walls to avoid destabilization of the ground and consequently the buildings next to it.
- Solar power will be installed and the power cables will be covered with 'hatari' tiles, then the trench be refilled using the excavated earth material.

6.2.7 Visual Impacts

Closing of the views and the incompatibility of the drilling rig with the surrounding area are only temporary impacts. The rig will be at the site only during the drilling period while the mild steel casing and slab will be the only items that will remain visible on the ground. This will not affect views across it. The rest of the casings and screens will be underground as a component part of the shallow well. These items will also not cause visual impacts on the area.

6.2.8 Health and Safety

The Supervising Engineer will oversee that the contractor adheres to the rules set by the authorities for the protection of his workers. Power connections shall be carried

out between the power mains, the submersible pump in the shallow well and the pumping control panel.

The **proposed mitigation and management measures** are:

- Provision of suitable protective gear – PPE. The drilling contractor should provide overalls, helmets, safety boots, earmuffs, nose masks and gloves to the workers.
- The contractor should ensure that there are no spills of petroleum, no smoking, no sources of ignition and proper use of warning signs in explosive environment.
- All project participants should have insurance and workmen's compensation.
- Provision of fully equipped first aid kit at the site.
- Ensure the availability of Emergency contacts for police, ambulance etc.
- Emergency plans should be communicated and well understood.
- Warning signs and electrical safety should be properly displayed and observed.

6.3 Operation phase: Projected impacts and mitigation measures

6.3.1 Groundwater Pollution

Domestic water should be of high quality and wholesome. Poor water quality could be of great concern to human and animal health. The water that seeps into the ground may be contaminated and eventually affects the quality of the groundwater and shallow well water. Percolation of water from sanitary systems i.e. toilets and refuse disposal sites poses a serious threat to the preservation of groundwater quality. Protection of groundwater quality depends on the well design, materials and method of construction. Some of the deficiencies in well construction are:

- Insufficient or substandard well casing
- Inadequate seal between the well casing and the shallow well
- Poor welding of casing joints
- Lack of sanitary protection at wellhead
- Use of well pits.

The **causes of groundwater pollution** include:

- Poisonous substances including compounds of lead, cadmium, chromium cyanide, fluoride or mercury.
- Chemicals for protection, herbicides, pesticides and plant growth regulators.
- Sewerage, refuse or garbage.
- Detergents, fats, petroleum products
- Coloring agents such as dyes, paints and aromatic substances
- Metabolic and decomposition by-products of microorganisms and fertilizers
- Acids, alkalis and salts.

In addition, a shallow well should certainly be located as far as possible from the following sources of danger:

- Plants and installations, especially those that release radioactive substances or those that can impair the quality of water, sewerage waste, gaseous and particulate emissions etc.
- Manufacture, transportation, usage, storage and deposition of substances, which can impair the quality of water.
- Transportation, utilization, storage and deposition of garbage, refuse or scrap metals
- Hospitals, sanatoriums, hotels and cemeteries.
- Sewage seepage into the ground through septic tanks, injection of sewerage or other dissolved and un-dissolved substances into the ground surface water.
- Pipelines for substances which can impair the quality of water.
- Polluted water bodies.
- Parking and washing of motor vehicles.
- Washing and leachates from the soil, organic fertilizers (liquids manure, barnyard manure, sludge, garbage compost) and mineral fertilizers.
- Use of chemical substances of plant protection, herbicides, pesticides and growth regulators.

Groundwater pollutants from different sources of danger can reach the groundwater and the abstraction point either by seepage through sinks, infiltration, leaching, sluicing or capillary action.

The **potential mitigation measures** include the following:

- Safeguarding ground water quality by conducting a correct territorial planning and protection of surface waters is important. These are strictly linked to groundwater resources.
- Ensuring that all the potential sources of pollution are eliminated for example by ensuring that the sewage disposal systems are well protected and does not leak even during exhaustion.
- The proponent will adhere to the regulations set by the ministry of water resources, management and development on the amounts to be extracted from a shallow well and the number of pumping hours. This helps to reduce wastage and misuse of this resource.
- Wastewater will be disposed through the recommended and approved channels
- Water quality test must be carried out before the shallow well water is used. The results should be used to guide on the appropriate treatment to make the water suitable for drinking and other uses. Drinking water standards such as the **WHO** standards should be used to analyze the results and recommend remedial action if the water is not wholesome and fit for human consumption.

6.3.2 Social Economic Environment

The implementation of this project will serve as a lasting solution to the project proponent as it will provide enough water for the domestic use. Other advantages accrued to this development are that it may facilitate other projects such as the growing of food crops, planting of trees and even watering of animals promoting productivity.

During and after the implementation of the project, there will be no evacuation of people or any rerouting of any infrastructure including roads, underground power, telephone or water supply lines or relocation or closing down of social amenities. The social conflicts expected to rise as a result of the implementation of the project is on management of the resource if the agreed composition is not implemented. All activities related to the project will be carried out within the communal land plot.

The project will thus provide a conducive environment to achieve social-economic development for the proponent and the surrounding community at large.

6.3.3 Groundwater Depletion

Continuous and excessive abstraction of groundwater may result to groundwater depletion. The **mitigation and management measures** for reducing this phenomenon include:

- The installation of a water meter and an Airline/Piezometer to monitor groundwater abstraction and to facilitate regular measurements of the static water level in the shallow well, respectively.
- WRA Abstraction permit recommendations will be adhered to.

Table 6. 1: Summary of proposed project impacts (both positive and negative)

Project Component	Project Activities	Positive Impacts	Negative Impacts
Planning & Design Phase			
Preparation for the SW project	Consultations with the community, ESIA Activity	<ul style="list-style-type: none"> - Awareness creation of proposed project activities - Documentation of community concerns - Conflicts mitigation - Incorporation of community concerns in project design and management, - Integrating environmental issues in all the project phases 	<ul style="list-style-type: none"> - High expectations and demands from the neighboring community

Construction Phase			
Preparation for the SW project	Site preparations and hydro geological surveys	<ul style="list-style-type: none"> - Creating employment - Boosting local economy 	<ul style="list-style-type: none"> - Soil erosion - Altering the landscape quality
	Site selection, clearing and putting up of drilling plant	<ul style="list-style-type: none"> - Creating employment - Boosting local economy 	<ul style="list-style-type: none"> - Soil erosion - De-vegetation
SW development	Actual SW drilling	<ul style="list-style-type: none"> - Creation of employment - Boosting local economy 	<ul style="list-style-type: none"> - Air pollution from diesel powering unit emissions & dust - Noise pollution from powering unit - Debris deposition - Accidents and other occupational hazards
	Water supply installation	<ul style="list-style-type: none"> - Employment creation - Provision of supplemental water to the Project proponent & neighboring community consumption (enhanced water security) 	<ul style="list-style-type: none"> - Possible health risks due to increased mosquito breeding and water related diseases - Accidents and other occupational hazards
Operation Phase			
Water supply	Daily water supply/ abstraction for use	<ul style="list-style-type: none"> - Enhanced water security for Project proponent operations - Neighboring community benefiting from water 	<ul style="list-style-type: none"> - Possible health risks due to increased mosquito breeding and water related diseases. - Excessive continuous abstraction may result to

		supply/availability in time of acute water crisis.	decline of ground water aquifer and subsequent land subsidence - Possible sediments fall into the SW and clogging screens requiring regular checks and maintenance.
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Chapter Seven: Environmental and Social Management Plan (ESMP)

7.0 Introduction

The Environmental and Social Management Plan (ESMP) will provide the basis for the implementation of the mitigation measures and provide a benchmark for the monitoring of the environmental performance through internal audits. The ESMP as it were, has the important advantages of improving operational efficiency, promoting competitive advantage, improving risk management, reducing liabilities and improving business performance.

7.1 The Proponent

To comprehensively implement the ESMP, the proponent should put in place a mechanism to regularly update the ESMP and undertake any necessary changes. It is further recommended that a task force (or its equivalent) be created to implement project activities, co-ordinate and do follow-up management and monitoring of the mitigation measures for the project. The ESMP is presented in Table 8 below.

Table 7. 1: Summary of ESMP for Adverse Impacts

Project Activity	Impact	Mitigation measures	Monitoring indicators	Budget (KES)	Responsible Party	Time Frame
<i>Construction Phase:</i>						
Actual shallow well drilling	Land clearing	<ul style="list-style-type: none">- Clear only the necessary area- Avoid unnecessary machinery movement on site.- Define a different area to plant tree and grass	<ul style="list-style-type: none">- - Vegetation density around project site- Number of vegetation establishment sites- Environmental Audit	30,000	Proponent / Drilling Contractor	During land clearance

	- Debris deposition	- Ensure separation of biodegradable and non-biodegradable wastes. - Encourage use of recyclable materials. - Provide adequate waste collection bins and ensure appropriate disposal.	Different bins for non-biodegradable and biodegradable wastes, type of wastes generated, number of waste collection bins.	10,000	Proponent / Drilling Contractor	During construction works
	- Accidents and other occupational health hazard's	- Provide workers with Protective Personal Equipment (PPEs) - Ensure occupational safety measures are upheld, including a First Aid Box - Train workers on occupational health and safety	- Number of ear plugs and protective clothing bought, - medical records -	10,000	Proponent/ Drilling Contractor	During construction works
	- Air pollution from fuel emissions	- Ensure efficiency of drilling equipment through regular checks and maintenance - Keep fuel usage at a minimum	- Regularity of maintenance and checks, amount of fuel used, state of equipment and machinery		Proponent/ Drilling Contractor	During construction works
Operations Phase						
Water supply Within	- Disposal of wastes near the shallow	- Install sanitary seals during shallow well	Presence of sanitary seals, water quality reports, state of	50,000	Proponent	During construction and

the premises	well	<ul style="list-style-type: none"> - construction - Monitor water quality periodically - Erect a fence around the shallow well 	the shallow well site			operation phase
	<ul style="list-style-type: none"> - Possible overexploitation/depletion of ground water resource 	<ul style="list-style-type: none"> - Monitor water levels - Ensure efficiency in proponents' household by minimizing unnecessary wastage - Alternate groundwater use with harvested rain water 	<ul style="list-style-type: none"> - Water levels - Water monitoring records - Amount of water used in the production - Water storage facilities 	20,000	Proponent	Through operation phase
	<ul style="list-style-type: none"> - Degradation of the water aquifer 	<ul style="list-style-type: none"> - Protection of the catchment for improved infiltration of the runoff through control of soil erosion. 	<ul style="list-style-type: none"> - Regularity of shallow well yield monitoring, monitoring data 	10,000	Proponent	Through operation phase
Water Use	<ul style="list-style-type: none"> - Conflict on water management 	<ul style="list-style-type: none"> - Distribute the membership to the management committee to reflect inclusivity of the three manyattas 	<ul style="list-style-type: none"> - A member committee with representatives from the manyattas to be constituted 	-	Community	Through operational phase

7.2 Decommissioning Phase

If need for the decommissioning arises, the management and operation of the shallow well's role will be passed over to the area's Water Services Board that is mandated with design and supply of water in the region. However, before the project decommissioning is considered, The Proponents will carry out a review of the project after five to seven years when the project operations start. In between this period, mini reviews will be done on annual basis, whose results will contribute to the final resolutions on the fate of the project.

The shallow well either developed or not can be handed over to the next land user on as-where-is basis. In case of abandoning, then a decision should be made on whether to cap it or backfill the entire shallow well and remove the submersible pump and other installations.

Alternatively, the shallow well may be used as an observation well for monitoring of water levels and water quality in the study area.

7.3 Conclusion and recommendations

This ESIA has attempted, in an integrated manner, to cover all the components of the proposed project. It has identified the adverse impacts and as appropriate, recommended feasible and attainable mitigation measures. In this light, it is imperative that the Environment and Social Management Plan be fully implemented. The Plan should also feed into The Proponent's evident commitment to environmental conservation.

In conclusion, on the basis of the results of this ESIA, it is apparent that with the adoption and implementation of the Environmental and Social Management Plan, the adverse impacts will be adequately mitigated against. In addition, foreseeable potential impacts will be forestalled before they occur thereby considerably limiting future environmental damage and ensuring the existence of a clean and healthy environment.

The lead expert submits the report with the understanding that the proponent pursues the **Water Resources Authority's permit** for purposes of sinking the shallow well.

Accordingly, as per Section 58 of EMCA and Part II, 10(2) of Environmental (Impact Assessment and Audit) Regulations, 2003, we recommend that the proponent **DRSLP** be issued with an **Environmental and Social Impact Assessment License for the Shallow Well Water Supply Development.**

References

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Annexes

Photo annexes of consultation and public participation



COMMUNITY RESOLUTION FORMS – DROUGHT RESILIENCE AND SUSTAINABLE LIVELIHOODS PROGRAMME (DRSLP)

Community Resolution on Identification/Selection of structure sites i.e.

Shallow well

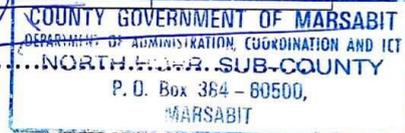
We, the beneficiaries of Arabs trees (dukane).. Have discussed and agreed that Arabs trees will be the site for the 5 shallow wells in North-Horn Sub county, Dukana Ward, Bales-Samu Location, Bales-Samu Sub-location.

We, on behalf of the beneficiaries (beneficiaries' representatives) confirm the above information be true.

(names of three (NO) Beneficiaries' representatives)

S/NO.	NAME	ID/NO.	SIGNATURE
1	Galgabo wato	11387967	WATO
2	Denge umuro	28472034	Denge
3	Talaso Ramata	12432049	Ramata

Witnessed By: Roda Koto



Chief office (Stamped)

NAME	P/NO.	DESIGNATION	SIGNATURE

CDA'S OFFICE (Stamped)

NAME	P/NO.	DESIGNATION	SIGNATURE
<u>HASAN CHARFI</u>	<u>1987052606</u>	<u>DCA</u>	<u>Charfi</u>

County Government (Stamped)

(County Executive for Agriculture and Irrigation)

NAME	ID/NO.	SIGNATURE
<u>SORA J. DANSO</u>	<u>0213466</u>	<u>Danso</u>

(NB: Please add any other relevant information)



Minutes of ESIA Public Participation Meeting held in 4/09/2021 at the Project in Bales Saru Sub-Location, Bales Saru Location, Dukana Ward, North Horr Sub County, Marsabit County (GPS COORDINATES: Latitude N: 4.109386, Longitude E: 37.040034)

PRESENT

- | | | |
|-----|-------------------|--------------------------|
| 1. | Abel Kiana Ongeri | Lead Expert, Team Leader |
| 2. | Mutua Kinyili | Associate EIA Expert |
| 3. | Dido Guyo | Community Member |
| 4. | Katello Elle | Community Member |
| 5. | Dulacha tune | Community Member |
| 6. | Boru Wario | Community member |
| 7. | Gurati Dima | Community Member |
| 8. | Dalacha Duba | Community Member |
| 9. | Jarso Dabaso | Community Member |
| 10. | Guracha Abudo | Community Member |
| 11. | Diba Dabello | Community Member |

AGENDA

1. Opening prayer
2. Welcoming remarks.
3. Objectives of the mission
4. ESIA assessment
5. Adjournment and closing prayer

MIN 1: OPENING PRAYER

The meeting was called to order at 9:00 am with a word of prayer Dido Guyo

MIN 2: WELCOMING REMARKS.

Mrs. Jarso Dabaso welcomed the community and thanked them for coming and asked Boru Wario to lead introductions of those who had accompanied him, and also introduced the community members. Afterwards, he welcomed the Lead expert to take the floor and steer the process.

MIN 3: OBJECTIVES OF THE MISSION

The Lead expert elaborated the purpose of the meeting was to undertake an Environmental and Social Impact Assessment for the proposed construction of Bales Saru Sub-Location, Bales Saru Location, Dukana Ward, North Horr Sub County, Marsabit County, which was to be implemented by Ministry of Agriculture through DRSLP, an African Development Bank funded project being implemented in Marsabit County. The lead expert explained to the participants that it is a requirement by law to undertake environmental and social impact assessment for such a project, hence asked the community to express their views freely regarding the proposed project on how it would impact the community both socially and environmentally. He also called on them to suggest measures that would be mitigation and management the foreseeable negative impacts.

MIN 4: ESIA ASSESSMENT

Mr. Abel Ongeri took the participants through a brief history of the proposed project which had been proposed for construction under DRSLP, informing participants that the scope of work entailed excavation, installation of a drop system, construction of both gent and ladies latrines, fencing of the dam, installation of a silt trap, and construction of a cattle watering trough among other works.

In order to understand the area under consideration better, the Lead expert asked the entire gathering to proceed to the project site to familiarize with the site. On coming back for plenary, an ESIA team member took members through a questionnaire developed for the purpose of collecting participant's views. As they filled responses elaborations were made where necessary and translation done with an aim of making respondents to understand the questions better. This would elicit objective responses from a point of understanding. Below are a summary of the issues raised by community members;

(Filled questionnaires are annexed).

Summary of Impact as raised by the community

Positive

1. Availability of water for domestic use and for irrigation farming.
2. Improved hygiene and sanitation since water will be close and available to the people.
3. Reduced distance to water sources will save time for other activities
4. Job creation and employment opportunities for the local community during water reservoir construction and operation phases
5. Increased ground water recharge in the area

6. There will be conservation of the catchment area through practicing of sustainable land management activities
7. Economic and business development through practicing of small scale farming.
8. Improved roads networks in the area because of movement of machinery and vehicles to the site
9. Youth will be engaged hence idling, drug abuse and crime rates will go down
10. The local market will expand hence currency circulation will increase.

Negative

- Soil erosion
- Destruction of vegetation.
- Risk of accidental drowning.
- Sexually transmitted diseases
- Danger of dam wall collapsing.
- Pollution from oil spills and other solid wastes
- Noise pollution
- Air pollution
- Dust generation
- Creation of burrow pits.
- Accumulation of debris and other solid wastes
- Human waste accumulation
- Air pollution from movement of vehicles in and out of the site in the roads
- Water use conflicts
- Exposure of workers to occupational health and safety risks
- Soil erosion and siltation of the reservoir.
- Encroachment into reservoir riparian
- Downstream erosion
- Disease vectors and other water borne diseases
- Changes in water quality of the impounded reservoir/water pollution

Other sources of water

- Shallow wells and boreholes are alternative source of water

Suggestion on how to mitigate negative impacts

1. The workers to be employed should be 18 years and over
2. First aid equipment's to be provided
3. Creation of awareness on HIV/AIDS

4. Law and order to be enforced
5. Priority to be given to the youth in the provision of labour
6. Workers to be provided with Personal Protective Equipment
7. Sensitization on moral values

MIN 5: ADJOURNMENT AND CLOSING PRAYER

Members were thanked for availing themselves to the meeting and also for responding to questions appropriately. They were asked to support the project as they would be the direct beneficiaries upon successful implementation of the project. With no any other business, the meeting was closed with a word of prayer led by Dido Guyo at 1:00 pm.

Minutes prepared by Mr. Abel Ongeru and confirmed by:

Mr. Abel Ongeru	Sign:.....	Date:.....
Dulacha tune	Sign:.....	Date:.....



MINISTRY OF AGRICULTURE, LIVESTOCK, FISHERIES AND COOPERATIVES
STATE DEPARTMENT FOR CROP DEVELOPMENT AND AGRICULTURAL RESEARCH
DROUGHT RESILIENCE AND SUSTAINABLE LIVELIHOODS PROGRAMME (DRSLP)



Government of Kenya (GoK)

African Development Bank (AfDB)

LIST OF PARTICIPANTS

ACTIVITY: ARAP TREES SHALLOW WELL-BEIA AT DUKANA VILLAGE
.....
DUKANA WARD, NORTH HERR SUB-COUNTY, MARSABIT
.....
COUNTY

DATE: 4/9/2021

S/NO	NAME	GENDER	ORGANIZATION/DEPLOYMENT	PHONE NO. AND E-MAIL ADDRESS	SIGN
1.	Jarso Dabaso	M	COMMUNITY	24384831	
2.	Dalacha Duba	M.	COMMUNITY	11369240	
3.	Gurati Dima	M	COMMUNITY	21483621	
4.	Bory Wario	M.	COMMUNITY	24386814	
5.	Dalacha Tyne	M.	COMMUNITY	21483641	

FORM 7



nema
mazingira yetu | uhai wetu | watoto wetu

(r.15(2))

Boa for the proposed part

**NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)
THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT
ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT (EIA/EA) PRACTICING LICENSE**

License No: NEMA/EIA/ERPL/13989

Application Reference No: NEMA/EIA/EL/18134

M/S Mutua Kinjili
(individual or firm) of address

P.O. Box 260-90200, KITUI

Swells

is licensed to practice in the

capacity of a (Lead Expert/Associate/Expert/Firm of Experts) **Associate Expert**
registration number **10754**

in accordance with the provision of the Environmental Management and Coordination Act Cap 387.

Issued Date: 2/10/2021

Expiry Date: 12/31/2021

Dikang

Signature...

Mutua Kinjili

(Seal)

Director General
The National Environment Management
Authority

September 2021

P.T.O.





EIA for Proposed Arambor (Arambor Swells)

**NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)
THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT**

ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT (EIA/EA) PRACTICING LICENSE

License No : NEMA/EIA/ERP/13990

Application Reference No: NEMA/EIA/EK/18593

M/S **ONGERI KIANA ABEL**
(individual or firm) of address

P.O. Box 10337-00100, NAIROBI

Duram Farm Area, Marsabit County

is licensed to practice in the
capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Lead Expert**
registration number **9019**

in accordance with the provision of the Environmental Management and Coordination Act Cap 387.

Issued Date: **2/10/2021**

Expiry Date: **12/31/2021**

Signature.....

(Seal)

**Director General
The National Environment Management
Authority**

September, 2021

**SOCIAL SITE ASSESSMENT QUESTIONNAIRE FOR ENVIRONMENTAL IMPACT ASSESSMENT
(EIA) SUMMARY PROJECT REPORT**

PROPONENT: MINISTRY OF AGRICULTURE, LIVESTOCK, FISHERIES AND COOPERATIVES

STATE DEPARTMENT FOR CROP DEVELOPMENT AND AGRICULTURAL RESEARCH -
DROUGHT RESILIENCE AND SUSTAINABLE LIVELIHOODS PROGRAMME (DRSLP)

Pursuant to the provisions of the Environmental Management and Coordination Act, CAP 387 and the Environmental Impact Assessment and Audit) Regulations, 2003 and in pursuance of sustainability and harmony, we kindly request for your views, opinions and recommendations regarding the proposed OLTUROT AT OLTUROT VILLAGE, LOINYANGALANI WARD, LAISAMIS SUB-COUNTY, MARSABIT COUNTY.

Date:

4/9/2021

Respondent's details: -

Name of contact person (Respondent): Jarso Dabaso

Distance from the project site: 200 meters

Mobile No/ ID NO: 24384831

Please indicate your views about the proposed project including general comments:-

Good Project

...Please tick below on expected negative impacts to existing environmental conditions and other considerations such as pollution to soil, water, air, noise, dust, solid waste and health in relation to the proposed project:

Explain where applicable

Solid waste Yes No

Wastewater Yes No

Dust Yes No

Noise Yes No

Other pollution Yes No N/A

Please propose what can be done to overcome the negative impacts if any:-

Undertake watering

To your opinion do you support the proposed project? YES No

Please give details.....

Signature: 

Note: These details are required for the purposes of authenticity. Thank you for filling in the questionnaire. Kindly return the filled questionnaire to Mutua Kinyili (NEMA Registered Associate Expert - 0715740019 or email. mutuakinyili1996@gmail.com)

**SOCIAL SITE ASSESSMENT QUESTIONNAIRE FOR ENVIRONMENTAL IMPACT ASSESSMENT
(EIA) SUMMARY PROJECT REPORT**

PROPONENT: MINISTRY OF AGRICULTURE, LIVESTOCK, FISHERIES AND COOPERATIVES
STATE DEPARTMENT FOR CROP DEVELOPMENT AND AGRICULTURAL RESEARCH -
DROUGHT RESILIENCE AND SUSTAINABLE LIVELIHOODS PROGRAMME (DRSLP)

Pursuant to the provisions of the Environmental Management and Coordination Act, CAP 387 and the Environmental Impact Assessment and Audit) Regulations, 2003 and in pursuance of sustainability and harmony, we kindly request for your views, opinions and recommendations regarding the proposed ARAP TREES SHALLOW WELL AT DUKANA VILLAGE, DUKANA WARD, NORTH HERR SUB-COUNTY, MARSABIT COUNTY.

Date:

4/9/2021

Respondent's details: -

Name of contact person,(Respondent): Dalacha Duba

Distance from the project site: 200 metres

Mobile No/ ID NO: 11369240

Please indicate your views about the proposed project including general comments:-

..... Nice
...Please tick below on expected negative impacts to existing environmental conditions and other considerations such as pollution to soil, water, air, noise, dust, solid waste and health in relation to the proposed project;

				<i>Explain where applicable</i>	
Solid waste	Yes	<input type="checkbox"/>	No	<input checked="" type="checkbox"/>
Wastewater	Yes	<input type="checkbox"/>	No	<input checked="" type="checkbox"/>
Dust	Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>
Noise	Yes	<input type="checkbox"/>	No	<input checked="" type="checkbox"/>
Other pollution	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>

Please propose what can be done to overcome the negative impacts if any:-

..... Water site

To your opinion do you support the proposed project? YES No

Please give details..... N/A

Signature: 

Note: These details are required for the purposes of authenticity. Thank you for filling in the questionnaire. Kindly return the filled questionnaire to Mutua Kinyili (NEMA Registered Associate Expert - 0715740019 or email: mutukinyili1996@gmail.com)

**SOCIAL SITE ASSESSMENT QUESTIONNAIRE FOR ENVIRONMENTAL IMPACT ASSESSMENT
(EIA) SUMMARY PROJECT REPORT**

PROPONENT: MINISTRY OF AGRICULTURE, LIVESTOCK, FISHERIES AND COOPERATIVES
STATE DEPARTMENT FOR CROP DEVELOPMENT AND AGRICULTURAL RESEARCH -
DROUGHT RESILIENCE AND SUSTAINABLE LIVELIHOODS PROGRAMME (DRSLP)

Pursuant to the provisions of the Environmental Management and Coordination Act, CAP 387 and the Environmental Impact Assessment and Audit) Regulations, 2003 and in pursuance of sustainability and harmony, we kindly request for your views, opinions and recommendations regarding the proposed ARAP TREES SHALLOW WELL AT DUKANA VILLAGE, DUKANA WARD, NORTH HORN SUB-COUNTY, MARSABIT COUNTY.

Date: 4/9/2021

Respondent's details: -

Name of contact person (Respondent): Guraci Dima

Distance from the project site: 150 metres

Mobile No/ ID NO: 21483621

Please indicate your views about the proposed project including general comments:-

Good
.....
...Please tick below on expected negative impacts to existing environmental conditions and other considerations such as pollution to soil, water, air, noise, dust, solid waste and health in relation to the proposed project;

				<i>Explain where applicable</i>	
Solid waste	Yes	<input type="checkbox"/>	No	<input checked="" type="checkbox"/>
Wastewater	Yes	<input type="checkbox"/>	No	<input checked="" type="checkbox"/>
Dust	Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>
Noise	Yes	<input type="checkbox"/>	No	<input checked="" type="checkbox"/>
Other pollution	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>

Please propose what can be done to overcome the negative impacts if any:-

Undertake watering
.....

To your opinion do you support the proposed project? YES No

Please give details..... N/A.....

Signature:.....

Note: These details are required for the purposes of authenticity. Thank you for filling in the questionnaire. Kindly return the filled questionnaire to Mutua Kinyili (NEMA Registered Associate Expert - 0715740019 or email. mutuakinyili1996@gmail.com)

**SOCIAL SITE ASSESSMENT QUESTIONNAIRE FOR ENVIRONMENTAL IMPACT ASSESSMENT
(EIA) SUMMARY PROJECT REPORT**

PROPONENT: MINISTRY OF AGRICULTURE, LIVESTOCK, FISHERIES AND COOPERATIVES
STATE DEPARTMENT FOR CROP DEVELOPMENT AND AGRICULTURAL RESEARCH -
DROUGHT RESILIENCE AND SUSTAINABLE LIVELIHOODS PROGRAMME (DRSLP)

Pursuant to the provisions of the Environmental Management and Coordination Act, CAP 387 and the Environmental Impact Assessment and Audit) Regulations, 2003 and in pursuance of sustainability and harmony, we kindly request for your views, opinions and recommendations regarding the proposed ARAP TREES SHALLOW WELL AT DUKANA VILLAGE, DUKANA WARD, NORTH HORN SUB-COUNTY, MARSABIT COUNTY.

Date:

4/9/2021

Respondent's details: -

Name of contact person (Respondent): Dulacha Tune

Distance from the project site: 300 metres

Mobile No/ ID NO: 21423641

Please indicate your views about the proposed project including general comments:-

Nice Project
.....
...Please tick below on expected negative impacts to existing environmental conditions and other considerations such as pollution to soil, water, air, noise, dust, solid waste and health in relation to the proposed project;

Explain where applicable

Solid waste Yes No

Wastewater Yes No

Dust Yes No

Noise Yes No

Other pollution Yes No NONE

Please propose what can be done to overcome the negative impacts if any:-

Water the Site
.....

To your opinion do you support the proposed project? YES No

Please give details.....

Signature: 

Note: These details are required for the purposes of authenticity. Thank you for filling in the questionnaire. Kindly return the filled questionnaire to Mutua Kinyili (NEMA Registered Associate Expert - 0715740019 or email. mutuakinyili1996@gmail.com)

**SOCIAL SITE ASSESSMENT QUESTIONNAIRE FOR ENVIRONMENTAL IMPACT ASSESSMENT
(EIA) SUMMARY PROJECT REPORT**

PROPONENT: MINISTRY OF AGRICULTURE, LIVESTOCK, FISHERIES AND COOPERATIVES
STATE DEPARTMENT FOR CROP DEVELOPMENT AND AGRICULTURAL RESEARCH -
DROUGHT RESILIENCE AND SUSTAINABLE LIVELIHOODS PROGRAMME (DRSLP)

Pursuant to the provisions of the Environmental Management and Coordination Act, CAP 387 and the Environmental Impact Assessment and Audit) Regulations, 2003 and in pursuance of sustainability and harmony, we kindly request for your views, opinions and recommendations regarding the proposed ARAP TREES SHALLOW WELL AT DUKANA VILLAGE, DUKANA WARD, NORTH HERR SUB-COUNTY, MARSABIT COUNTY.

Date:
4/9/2021

Respondent's details: -

Name of contact person (Respondent): Katello Elle

Distance from the project site: 300 METRES

Mobile No/ ID NO: 21483691

Please indicate your views about the proposed project including general comments:-

Nice Project
.....
...Please tick below on expected negative impacts to existing environmental conditions and other considerations such as pollution to soil, water, air, noise, dust, solid waste and health in relation to the proposed project;

				<i>Explain where applicable</i>	
Solid waste	Yes	<input type="checkbox"/>	No	<input checked="" type="checkbox"/>
Wastewater	Yes	<input type="checkbox"/>	No	<input checked="" type="checkbox"/>
Dust	Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>
Noise	Yes	<input type="checkbox"/>	No	<input checked="" type="checkbox"/>
Other pollution	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>	<u>NONE</u>

Please propose what can be done to overcome the negative impacts if any:-

Undertake Watering
.....
.....

To your opinion do you support the proposed project? YES No

Please give details.....

Signature: [Signature]

Note: These details are required for the purposes of authenticity. Thank you for filling in the questionnaire. Kindly return the filled questionnaire to Muna Kinyili (NEMA Registered Associate Expert - 0715740019 or email. mutuakinyili1996@gmail.com)

