LEPOLOSI PROJECT
PRELIMINARY DESIGN

1. ABOUT LEPOLOSI, NAIKARRA

In Lepolosi Village, water scarcity is increasing and is resulting to the escalating poverty, persistent poor harvest as a result of dry spells and droughts, and poor farming practices, limited sources of income, and landlessness. Achieving sustainable water resource use, harnessing the productive potential of water and limiting its destructive impacts, has been a constant struggle since the origins of human society. Lepolosi community intends to abstract water from Enkiuosoito springs as they emerge to form Lepolosie stream. These Enkiuosoito springs feed into Lepolosie stream and further feeds into Okejo Rongai and finally into the Mara River. Lepolosi community thus engaged a consulting hydrologist to carry out a hydrological assessment with the purpose of ascertaining availability of water for continued sustainable abstraction and effective planning of the resource in the catchment. The abstraction point is located at Enkiuosoito springs Lepolosi Village, Leshuta sub-location, Naikara, Location, Narok West Sub-County, Narok County. The abstraction will be done within a well conserved wetland and riparian land managed by the community.

2. LEPOLOSI SPRING HYDROLOGY

The water source of the spring is rainfall that seeps into the ground up hill from the spring outlet. While springs may seem like an ideal water supply in Lepolosi, it needs to be selected with care, developed properly, and tested periodically for contamination. The spring water moves downhill through soil or cracks in rock until it is forced out of the ground by natural pressure. The amount, or yield, of available water from springs may vary with time of year and rainfall. Groundwater obtained from the spring is similar to water pumped from shallow wells, Like shallow wells, springs may be contaminated by surface water or other sources on or below the ground surface.. The objective of spring development is to collect the flowing water underground to protect it from surface contamination and store it in a sanitary spring box.

2.1. GUIDELINE NOTES CONSIDERED IN SPRING LOCATION SELECTION

- **a)** A point source is the ideal situation. A point source is one where the water emerges from a single location.
- **b)** A “horizontal seep line” spring area requires more work and has a higher degree of risk of contamination from surface water.
- **c)** It’s important to collect the spring water at its point source, not down gradient where surface contamination is likely. The source of the spring is usually at the uphill edge of the saturated area.
- **d)** The degree of slope is important. Generally steeper slopes are more desirable. You get depth of cover quicker digging into a steep slope.
- **e)** If possible, avoid spring sites that are covered by growths of deep rooted trees, bushes, etc., because greater maintenance is required to keep the tree roots out, The decaying dead root systems provide channels underground which may allow surface water to pollute the spring.

2.2. CATCHMENT CHARACTERISTICS

Hydrological characteristics of the Catchment Lepolosie stream form part of the source waters for Longaianiet (Sand River) River which drains into the Mara River. It originates at Enkioosoito hills and flows westwards. Because of the rock and soil type in the area, the stream get joined by several springs to form Lepolosie stream. This stream together with the others in the area flows under the sand and thus the name of the main tributary, that is, Sand River. The main tributaries joining downstream include: Anoliwo, Ladooru, Olositan, Olchoro Laboritai, Nolane, Irpoori, Lairako, Idepes, Orngaeenet, Enekoiireroi, Olormotioo, Olonkosuai, Olkojuasar, Olngaeene, Olodaaale, Nekiboitai among others. However, most of these tributaries are seasonal and others have underground water flowing through the sand and thus appearing dry. The streams which are just next to Lepolosie are Narutarakua and Entargotua. For management purposes, the drainage where abstraction is intended to take place is proposed to be managed by Water Resource Users Association (WRUA) called Morijo. Morijo watershed will take the upper parts of the Sand River sub basin. This WRUA is not yet formed, however, when it will be formed it will take tributaries such as: Analiwa, Nasateretet, Ladooru, Enenkolireroi, Olormotioo, Olonkosuai, Ol Ongaianiet, Entargotua, Olodare and Kiboitai. This watershed will cover an area of 611.42km2

2.3. HYDROLOGICAL CHARACTERISTICS AND ANALYSIS

Lepolosie springs lack any form of a gauging station which is important to generate a flow duration curve. At the specific point there is no reliable rainfall station and thus Keekorok rainfall stations was considered for analysis for this task. Keekorok station is about 40km away from the point of abstraction but in the same climatic zone and inside the game reserve. The stations receives a mean annual rainfall of about 820mm.

In fact the off take is to be at the spring eyes which may not be accurate if rainfall modelling is carried out. It is for this reason that volumetric method was used to determine the spring's yield. It is critical to know how much water coming out of the spring. This is particularly crucial over dry seasons when levels drop and demand remains high and for planning for development/ abstraction. To achieve this goal, a Bucket method was used to determine the yield. The Bucket method is a simple way to measure the flow rate using household items. It requires a stopwatch, a large bucket, and preferably two to three people. To measure the flow rate using the bucket method the following procedure was used:

- The volume of the bucket was measured.
- Determined appropriate point to make measurement, which included two outlets.
- With a stopwatch, timed how long it takes the outlet to fill the bucket with water. Start the stopwatch simultaneously with the start of the bucket being filled and stop the stopwatch when the bucket fills.
- Recorded the time it takes to fill the bucket.
- Repeated steps two and three six times and take the averaged
- The flow rate is the volume of the bucket divided by the average time it took to fill the bucket.

- Volumetric method of discharge measurement used at project site Using the data obtained, the volumetric flow rate (Q) was calculated as the volume of the bucket (V) divided by the average time (t). This gave Q=18.1m3/day

Lepolosie springs have a discharge of 18.1m3/day 17 For spring abstraction, it is recommended that 5% of the spring production remains as the environmental flows. The 5% of discharge of Lepolosie is 0.905m3/day. Therefore, the available water for allocation is 17.195m3/day. (Refer to hydrological report).

3. PRELIMINARY DESIGN CALCULATIONS

Design Factor of Safety = 1.5 to cater for rainy season

Available Water for Collection = 17.195 m3/day

Maximum Storage Capacity = 1.5 *17.195 = 25.8 m3/day

From the volumetric flow analysis:

Spring 1, S1 = 2.43 m3/day
Spring 2, S2 = 1.96 m3/day

Average Flow = (S1+S2)/2 = (2.43+1.96)/2 = 2.195 m3/day

No. of Springs to Develop = (25.83/2.195) = 11.8

Estimated No. Spring Eyes in the Catchment = 8No.

Permanent No. of Spring Eyes = 12 No. (Represents 40%)

(**Source: Community**)

4. CONCLUSION

Based on the preliminary design calculation, the following is concluded:

- Provide for construction of a 25 M^3 storage tank;
- Provide for 12 No. permanent springs at the eye;
- Provide for reticulation to the school and community
- Provide for fencing for spring protection;

5. Recommendation

The following are recommended:

- Extensive monitoring of the catchment to determine exact no. of permanent springs;
- Carry out a detailed design of the catchment;
- Protection of the spring as early as possible;