OLARE OWANG AND OLOIKA WASH PROJECTS

TOPOGRAPHICAL SURVEY DRAFT REPORT

Submitted to:

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Table of Contents

Table of Tables

Table of Figures

1. INTRODUCTION

1.1 Background

The maps available for the Study Area from Survey of Kenya are in 1:50,000 scale that were prepared in the 1970s. Although the some of the maps have been updated, the changes are limited and not appropriate for pipeline route design work especially for a gravity flow pipeline system.

The sub-consultant will be responsible for conducting a detailed topographical survey capable of design and setting out of a pipeline route for the water supply for Olare Owang and Oloika villages.

The product of the survey exercise will be a topographical map and pipeline route survey data which will be useful to the water engineers for the design of the water pipeline route. A pipeline route survey is carried out to collect data and information of the features and elevations along the main and minor pipeline routes. The data collected will be primary used for the design of the pipeline routes, pipe sizes, pipe types, fittings, gravity flows, air valve and gate valve points.

1.2 Main objectives

The main objectives of the study include;

- To carry out topographical survey to identify highest point within the area
- To plot the surveyed data and produce topographical maps that include the main profile.
- To identify the best route for location of the pipelines and water towers for water to flow via gravity

1.3 Study phases

In order to successfully meet the objectives, the survey was divided into the following phases;

- Reconnaissance -Phase 1
- Survey Control establishment- Phase 2
- Topographical survey and Data collection- Phase 3
- Data processing, Plotting and Reporting-Phase 4

2. EQUIPMENT AND SOFTWARE

2.1 Equipment

The following equipment was used during the topographical survey

- Stonex S3II GNSS Receivers RTK equipment
- Garmin Handheld GPS
- 50m Tape Measure
- Metallic tripod and Assorted staff

2.2 Software

The following software was used during the topographical survey and data processing

- Field Genius software
- MapSource
- Microsoft Excel
- AutoCAD Civil 3D
- Global Mapper

3. SCOPE OF WORK

The survey has been conducted by local consultants with proficiency in water surveys. The scope of work specified in the Technical Specification part include;

1. Reconnaissance
2. Topographical survey of additional pipeline route for the 2 sites; Olare Owang and Oloika villages
3. Survey report to include survey control points, levels, profile and layouts

4. GROUND CONTROL SURVEY

4.1 Datum

The following datum was used for the survey

The datum parameters are;

Grid: UTM Zone 36 M (South)
Projection: Transverse Mercator
Ellipsoid: WGS84
Unit of Measurement: Meter
Central Meridian: 33 Degrees East of Greenwich
Latitude of Origin: Equator 0.0000
Scale Factor at origin: 0.9996
False Coordinate of Origin:
False Easting = 500,000 m
False Northing= 10,000,000 m
Datum: WGS84

4.2 Establishment of Survey Control Points

The established control points were used for extension of pipeline routes. The point had been successfully selected and installed on the ground away from canopy, electric lines, structures or obstacles. This is necessary to ensure the GPS satellites signals are not obstructed during the survey. The points are established and concreted using a metallic rod and mixed concrete. The point name is inscribed on the face of the benchmark.

4.3 Survey Control Points/Benchmarks

Site Benchmarks are as shown in the Table below. Benchmarks are given in UTM coordinates with a WGS84 datum Zone 36M.

Table 1: Site Benchmark Information

Benchmarks	Northing	Easting	Elevation	Description	Remarks
1	9854926.831	737613.005	1559.139	BMW1	Olare Owang Primary School - benchmark at the borehole
2	9874819.401	785561.745	1924.633	BMK1	Oloika Primary School – benchmark at the fence corner

5. GPS DATA COLLECTION

The data was collected using GNSS Equipment that utilizes satellites for navigation. During the survey Stonex S3 II RTK equipment was used with a horizontal accuracy of 0.015 m and vertical accuracy of 0.030m. The equipment utilizes a 2Watt UHF radio that has a range of 10km for a clear site.

The Olare Owang site has a borehole already drilled and a solar structure. There is a location for a proposed water tower to be constructed. The school currently has no provision of water available. There is no distribution line to the village for the available water. The route was surveyed from the location of the proposed water tower to the proposed site for water kiosk 2.

The Oloika site has an existing borehole already drilled. It also has a location for a proposed water tower that is yet to be constructed. The Oloika school will get the water to serve the school and the VIP toilets. There are proposed two water kiosks such that water will be distributed from the water tower to the kiosks

The survey of the pipeline routes was done on 11th to 16th November 2024.

5.1 Olare Owang Pipeline Route

Olare Owang Comprehensive primary school is located on geographic coordinate 1° 18' 39.00" S 35° 08' 07.01" E. The school has insufficient water sources heavily relying on rain water and gutters to feed water to the existing tanks. The school is located at an elevation of 1560 m ASL which is approx. 1 metre above the elevation at the borehole.

5.1.1 Rising Main: Borehole to Tanks/Water Tower

The proposed water tower is located on geographics coordinates 1° 18' 40.97"S 35° 08' 07.60"E. It's the proposed source for all the waters to water kiosk 2 and also the proposed location for Water Kiosk 1. Its elevation is 1559.2 mASL. The horizontal distance between the borehole and the water tower is a short distance of 35 metres. The vertical difference between the borehole and the water tower is 0.2m.

The line can also be plotted as a graph as shown in the figure.

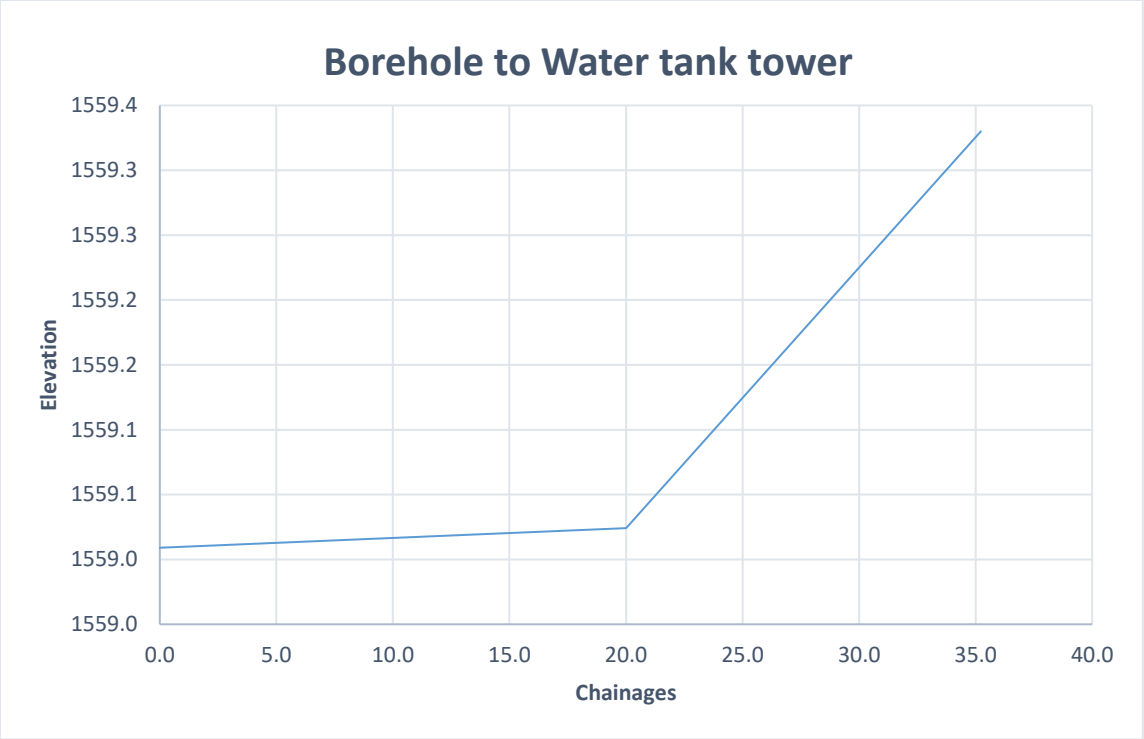

Figure 1: Borehole to Water Tank Tower

5.1.2 Tanks to Water Kiosk 2

The pipeline route from the proposed tank location to the proposed water kiosk 2 is approx. 1365 metres. The elevation at the proposed water kiosk 2 is 1565.1 mASL. The proposed water kiosk 2 is at geographic 1° 18' 56.96"S 35° 08' 29.34"E.

The line start at an elevation of 1559.3 mASL drops by 3.5 metres to an elevation of 1555.8 mASL at KM0+600 where there the road junction turns to the East. The elevation starts to rise for the next approx. 800 metres. The elevation difference between the location of the proposed water tanks tower and proposed water kiosk 2 is a rise of 6 metres. The elevation difference and the frictional loss along the pipeline route means water cannot flow via gravity. A raised water tower or a solar water pump would be used for water to flow to water kiosk 2.

The graphical representation of the line is as below

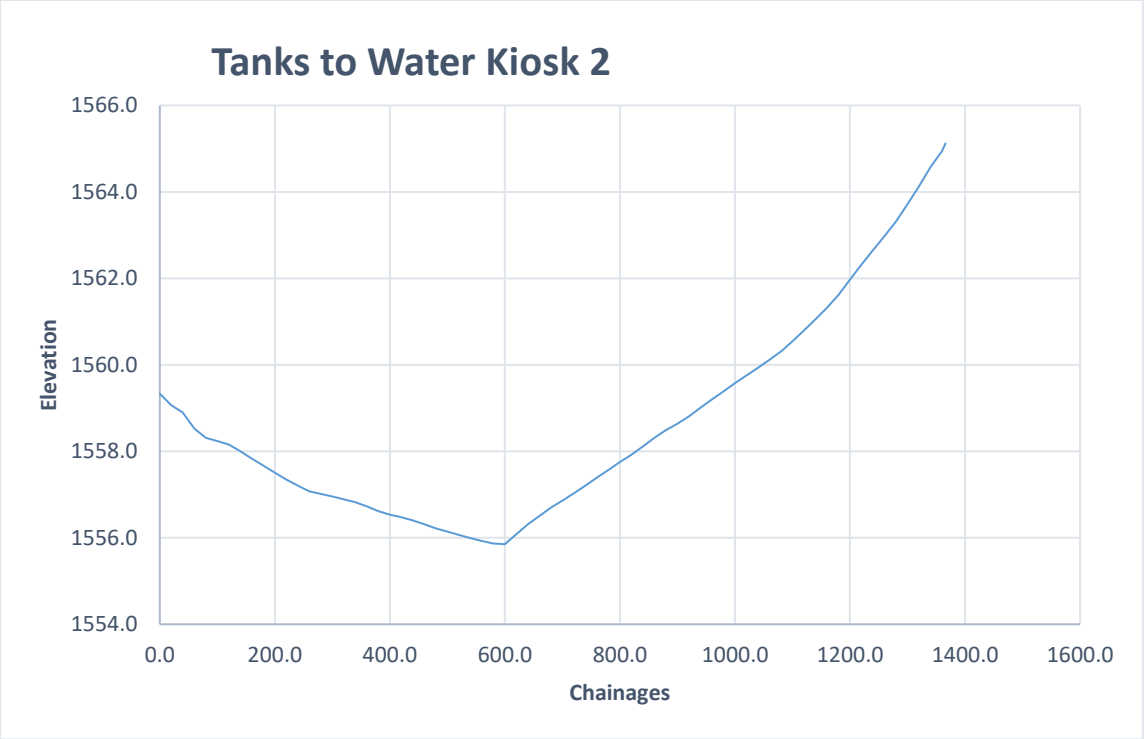

Figure 2: Tanks to Water Kiosk 2

5.2 Oloika Pipeline Route

Oloika primary school is located on geographic coordinate 1° 07' 55.62"S and 35° 34' 00.76"E. The school doesn't have provision for sufficient water source. A borehole has been drilled on a site near the school. There is a site identified for a proposed water tanks tower that will supply water to water kiosk 1 and water kiosk 2.

5.2.1 Rising Main: Borehole to Tanks/Water Tower

The borehole for the Oloika Wash Project is located on geographic coordinates 1° 07' 52.15"S 35° 34' 00.30"E. The horizontal distance between the borehole and the proposed location for the water tanks is approx. 306 metres.

The elevation at the borehole is 1923 mASL while at the proposed tank site is 1924 mASL. The vertical difference between the borehole and the tank site is an increase in 1m. The water will be pumped to the elevated tanks.

The graphical representation of the line is as below

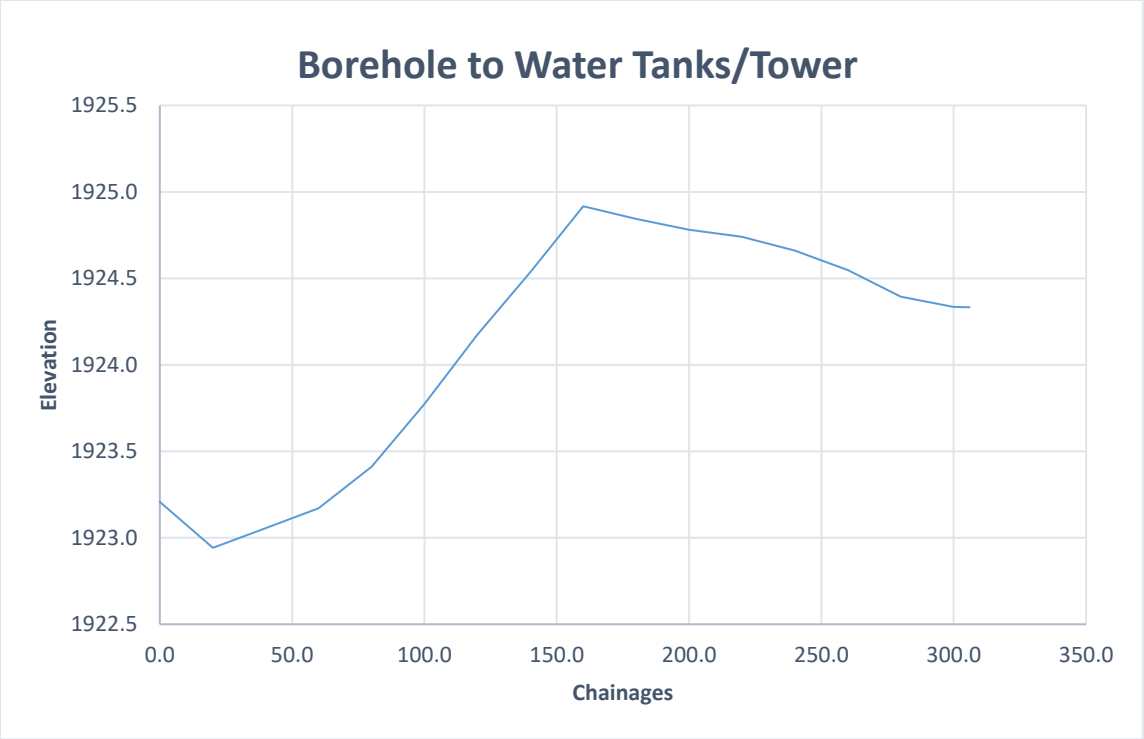

Figure 3: Borehole to Water Tanks/Tower

5.2.2 Distribution lines

There are two distribution lines to water kiosk 1 and water kiosk 2. The distribution lines are designed according to the population of the area focusing in areas with residents. The water kiosk are centrally placed such that the locals can access it as near to the homesteads as possible.

5.2.2.1 Water Tanks/Tower to Water Kiosk 1

The pipeline route from the proposed water tanks/tower location to proposed water kiosk 1 is approx. 1614 metres. Water Kiosk 1 is located northward of the school area and is accessible by the Oloika community. The geographic coordinates of the proposed water kiosk 1 is 1° 07' 18.77"S 35° 34' 29.20"E.

The elevation at the proposed water kiosk 1 is approx. 1909 mASL. The vertical difference between the proposed tank location and the water kiosk is 15 metres. The decrease in elevation as the pipeline route goes towards water kiosk 1 means there is sufficient head for water to flow via gravity.

The line can be represented as

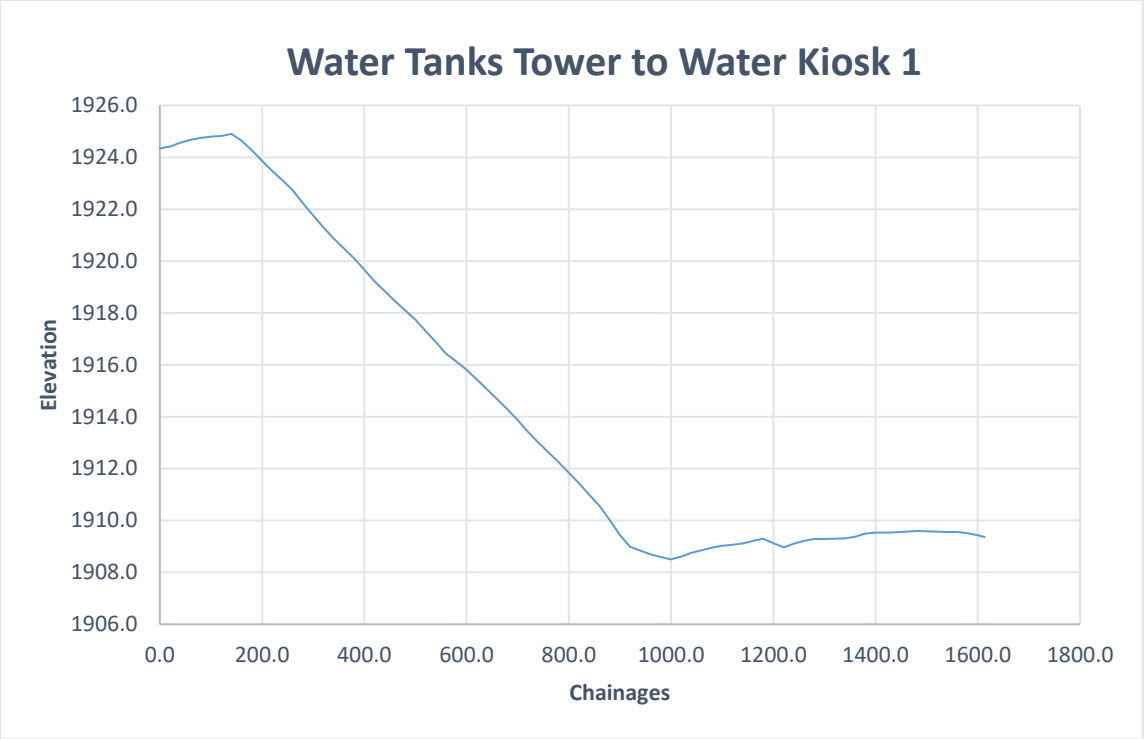

Figure 4: Water Tanks Tower to Water Kiosk 1

5.2.2.2 T-junction to Water Kiosk 2

The T-junction is located on KM0+150 of the pipeline route from the tanks to water kiosk 1. The horizontal distance from the T-junction to proposed water kiosk 2 is 1914 metres. The geographic coordinates of water kiosk 2 is 1° 08' 24.35"S 35° 34' 37.27"E.

The elevation at water kiosk 2 is approx. 1920.2 mASL while that at the T-junction is 1924.8 mASL. The elevation at the water tank is 1924.2 mASL. The elevation difference is approx. 4 metres, this is a decline towards water kiosk 2. The elevation increases up to KM0+280 to a high of 1928.2 mASL at the fence corner towards proposed water kiosk 2. This elevation is suitable for placement of a water tower. Design calculation that consider frictional loss should be to determine the height of the proposed elevated tank or pump specifications to be determined.

The graphical representation of the line is

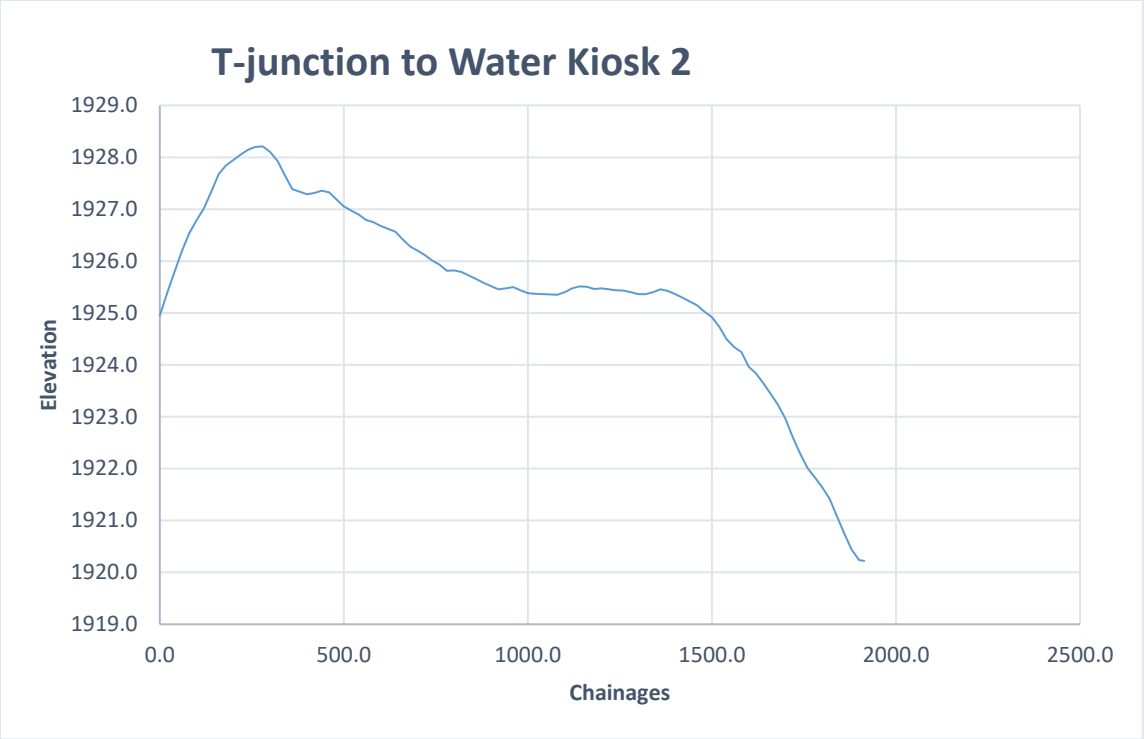

Figure 5: T-junction to water kiosk 2

6. AUTOCAD SITE LAYOUT

From source to site on Google Earth View

Figure 6 : AutoCAD maps

7. DIGITAL ATTACHMENTS

The following files are available with regards to this report

- Olare Owang and Oloika Survey Report.docx — This report;
- Olare Owang and Oloika Survey Report.pdf — This report;
- Olare Owang Layout — AutoCAD dwg
- Oloika Layout — AutoCAD dwg
- Olare Owang Survey data + Graphs — Excel
- Oloika Survey data + Graphs — Excel