FÖRDERVEREIN UGANDA-HILFE PRÜM

# PROGRESS REPORT FOR THE CONSTRUCTION OF A MINI PIPED WATER SUPPLY SCHEME AT NABINENE PRIMARY SCHOOL

Prepared for:
**NABINENE PRIMARY SCHOOL**

Prepared by:
**LIVING WATER TECHNOLOGIES LIMITED**

+256-752-501471 / +256-781-460613
stantonioslivingwater@gmail.com
P.O BOX 34448, Kampala-Uganda

Table of Contents

# 1 Introduction

## 1.1 Background

**Living Water Technologies Limited** (the Contractor) was engaged by **Nabinene Primary School** to design and implement a mini-piped water supply scheme within the school premises. The piped water supply scheme is intended to supply reliable water to meet the daily water demand of the school.
This report presents the progress of the works completed to date, which include the following key activities:

1. **Hydrogeological Investigations;**
   Hydrogeological investigations to identify and assess suitable groundwater sources.
2. **Drilling and Borehole Construction;**
   Drilling and construction of the borehole water source, including installation of uPVC casing, gravel packing, well development, and casting sanitary sealing and construction of protective chambers at the borehole source.
3. **Test Pumping and Aquifer Evaluation;**
   Test pumping to establish the appropriate pump installation depth, safe yield and aquifer characteristics of the borehole.
4. **Storage System Installation;**
   Fabrication and erection of a 6-meter-high steel tank stand, installation of a 5000-liter Gentex plastic water storage tank and completion of all associated plumbing works.
5. **Water Collection Points;**
   Construction of 2 concrete tank stands that will serve as the water collection points for the school.

# 2 Borehole drilling and construction

## 2.1 Drilling operations

Drilling operations were conducted between June 3rd and 5th, 2025. The borehole was drilled to a total depth of 42.65 meters with an 8" down-the-hole (DTH) hammer. The main lithologies identified during drilling included clayey soils and sandy weathered formations.
Water-bearing zones were encountered at depths of 20 meters and 29 meters. A full casing design was adopted and 5" permanent PVC casings were installed up to 36.65 meters. The casings did not reach the bottom of the well because of boulders that were encountered between 37 and 43 meters. The annular space between the borehole wall and casing was packed with 60 bags of gravel, and a sanitary seal was constructed using cement. The borehole produced an estimated airlift yield of 4,000 litres per hour.

*Table 1:Summary of drilling results*

| DWD No | Drill Depth | Depth To Bedrock | Drilling Yield Estimate($m^3$/hr) | Design | Development time (Hrs) | Permanent casing depth(m) | No. of Screens | No. of plain casings |
|---|---|---|---|---|---|---|---|---|
| N/A | 42.65m | N/A | 4 | Shallow well design | 1 | 36.65 | 4 | 9 |

*Figure 1: Borehole drilling*

## 2.2 Borehole development/Blowing

This involved cleaning the borehole to remove native silts, clays, cuttings and drilling fluid residues deposited on the borehole walls during the drilling process. This was done at the end of the drilling process. Proper well development is important and if done well, can increase the yield by 20-30%. If the development process is not well done, the results could be opposite and decrease the yield by 20-30%. Well development also ensures that all fine particles are cleared through the gravel pack. The borehole was cleaned by airlift pumping and surging method where compressed air was injected via the airline to drive water upwards within the drill pipe with no water being forced back into the formation. Development was done for one hour and the supervisor was contented that the water was clear and free of any particles. After well development, a sanitary seal was cast using cement grouting and this was to prevent the borehole water contamination. A protective chamber was also constructed at the borehole source.

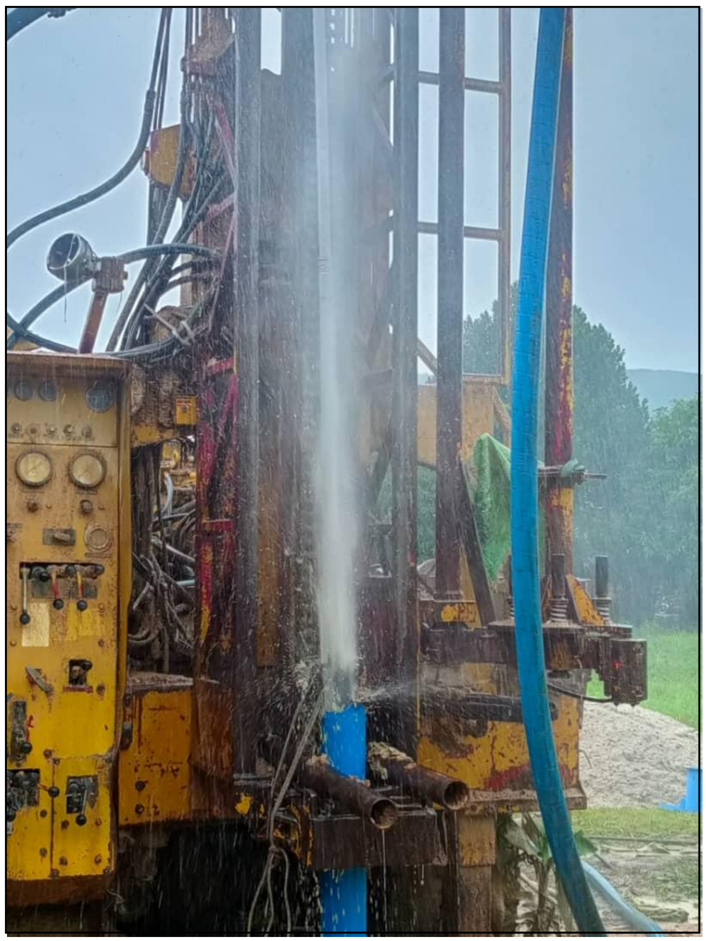


*Figure 2: Borehole development*

## 2.3 Driller's yield estimation

The yield was estimated whenever a water strike was encountered during drilling. This was done by channelling the water away from the borehole through a casing and into a container of known volume and then obtaining the time taken to fill that container in seconds. Finally, during the well development, the final driller's yield estimate was ascertained to be **4 m3/Hr.**
Borehole log is attached in the annexes

# 3 Test pumping

## 3.1 Test pumping operation

The main objective of test pumping is to determine the safe sustainable yield of the borehole and optimum installation depth of the pump. Therefore, for every successfully drilled borehole, it is important to carry out a pumping test as this will provide data on aquifer performance and the quantity of water that can be drawn out in a given time. The data is also used to determine the optimum depth at which to place the pump.

A 6-hour constant test was carried out, at the start of test pumping, the following was done;

- Taking the measurement point of the casing above the ground level.
- Measurement of static water level of the borehole.
- Installation of the submersible pump at an appropriate depth into the borehole.
- Carrying out constant discharge for 6 hours.
- Carrying out recovery test.

Constant discharge test; this determines the aquifer's ability to yield sufficient water under constant pumping conditions. The results were used to determine the optimum installation depth and pumping hours.

Recovery test; which is used to determine how fast the aquifer responds after pumping stops, was monitored. This was also considered when determining the installation depth and optimum pumping hours.

*Figure 3: Test pumping of the borehole*

## 3.2 Evaluation of the Borehole Potential

The constant discharge test was done to establish the long-term yield that can be considered suitable for the borehole.
In determining the safe yield, the following was put into consideration;

- The maximum drawdown achieved at the climax of the test
- The recovery rate of the borehole
- The extent of the drop in water level during the test

It should be noted that Installing a pump deeper than necessary does not add any performance benefit by increasing the yield or improve performance, installing it too close to the bottom actually risks pumping sand or sediment which could damage the pump impellers and consequently reduce the pumps lifespan. It also unnecessarily increases the cost because you now need more riser pipework and more electrical cable. On the other hand, installing the pump too close to the dynamic water level can lead to dry running of the pump, therefore, an optimum installation depth must be ascertained for efficient and safe performance. This installation depth is ascertained by analyzing the drawdown curve during the constant discharge. The pump must be installed at a depth well below the maximum dynamic water level, below the depth at which the curve flattens and a buffer zone allowance of about 10 meters must be allowed. Test pumping logs are attached in the annex.
The safe yield of the well was ascertained to be **3m$^3$/Hr** and the optimum pump installation depth to be **31m.**

*Table 2: Summary of test pumping results*

| | |
|---|---|
| **Borehole Depth** | 42.65 |
| **Static Water Level** | 6.28m |
| **Pump Installation Depth** | 31m |
| **Available Drawdown** | 24.22m |
| **Driller's Yield Estimate** | 4m$^3$/Hr |
| **Constant Discharge Yield** | 3.2m$^3$/Hr |
| **Draw Down after constant Discharge** | 11.89m |
| **Dynamic Water Level after Constant Discharge** | 18.17m |
| **Recovery After Constant Discharge** | 95.1% after 30 minutes |

*Table 3: Production capacity of the borehole*

| **Pump Installation Depth** | **Operation** | | **Production** | |
|---|---|---|---|---|
| | Day/year | Hour/Day | m$^3$/Hr | m$^3$/Day |
| 32m | 365 | 10 | 3 | 30 |

# 4 Storage Reservoir Installation

The tank stand is a robust, elevated steel structure designed to support a **5,000-liter plastic Gentex water storage tank** for gravity-fed distribution. Standing at a height of **6 meters**, the structure is fabricated from rectangular hollow steel sections, assembled and welded on-site. The design features four vertical support columns reinforced with diagonal cross-bracing to ensure structural stability against both vertical loads and lateral forces such as wind. A steel platform forms the tank's base, bordered by a safety railing to facilitate secure access during maintenance. The entire stand is anchored onto a reinforced concrete plinth foundation, providing a stable base and preventing settlement or tilting over time. During construction, the steel members were cut, assembled, and joined by arc welding, forming a sturdy rectangular frame that was then erected and secured. After anti-corrosive paint was applied, the **5,000-liter Gentex tank** was lifted and carefully installed on the platform. Additionally, **plumbing works** were completed to connect the tank to inlet and outlet pipes, enabling it to function as a reliable, gravity-fed water supply system for the school. The elevated height ensures adequate water pressure at distribution points while protecting the tank from contamination and unauthorized access.

*Figure 4: Construction of the steel tank stand*

*Figure 5: Installation of the Gentex 5,000 litre plastic tank.*

# 5 Concrete tap stands

Two concrete tap stands were constructed as part of the mini piped water supply system at the primary school, each equipped with two taps. These tap stands are strategically positioned to ensure easy access for students and staff. Built from reinforced concrete, the structures are designed for durability and hygiene, featuring a sloped base to allow efficient drainage and reduce standing water. The tap stands are fed by the elevated 5,000-liter Gentex tank mounted on a 6-meter-high steel tower, ensuring a reliable gravity-fed flow of water. This setup provides a clean and accessible source of water for drinking and sanitation, significantly improving the school's water infrastructure and promoting better hygiene practices among pupils.

*Figure 6: Installation of concrete tap stands*

# 6 Recommendations and Conclusions

## 6.1 Recommendations

- **Routine Water Quality Testing**: Once the system is operational, water quality should be tested regularly to ensure it meets national drinking water standards. Initial testing should be done immediately after commissioning to establish a baseline.
- **Preventive Maintenance Plan**: A maintenance schedule should be developed in anticipation of system use. This includes regular checks on the borehole chamber, steel tank stand, plumbing connections, and future pump servicing.
- **Training for School Staff**: Training should be conducted for selected school staff or community representatives on basic operation and maintenance tasks, including safe pump operation, leak checks, and tap hygiene.
- **Install Safety and Security Features**: To protect the infrastructure from theft or vandalism, particularly the submersible pump and tank valves, security measures such as lockable borehole chambers, fencing, or camera surveillance (if feasible) should be considered.
- **Drainage Enhancement at Tap Stands**: Ensure proper drainage systems (e.g., soak pits or channels) are finalized around the tap stands to prevent waterlogging and erosion, which could damage infrastructure and create sanitation hazards.

## 6.2 Conclusions

The mini piped water supply infrastructure at Nabinene Primary School has reached an advanced stage of implementation. Major civil and structural components, including borehole drilling, well development, test pumping, construction of the elevated tank stand, and installation of the storage tank and tap stands, have been successfully completed. These works have laid a strong foundation for the delivery of a reliable and gravity-fed water supply system within the school.

Continued collaboration between the contractor, school administration, and local authorities will be essential to ensure successful commissioning, sustainability, and long-term functionality of the system.

The elevated tank and tap stand infrastructure ensure safe water access, promote hygiene, and significantly reduce the time and effort previously spent by pupils fetching water from off-site sources. By improving access to clean water, the project is poised to positively impact the health, attendance, and learning environment at the school.

Going forward, emphasis should be placed on regular system maintenance, user training, and water quality assurance to sustain the benefits of this vital infrastructure.

# ***Annex 1: Drilling results***

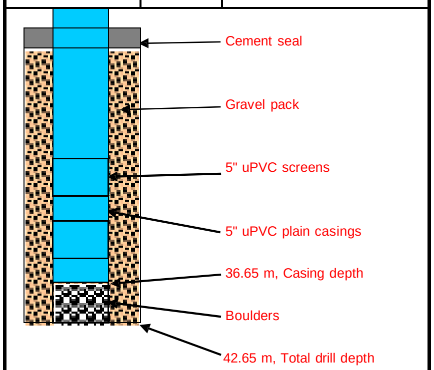
# Borehole completion data

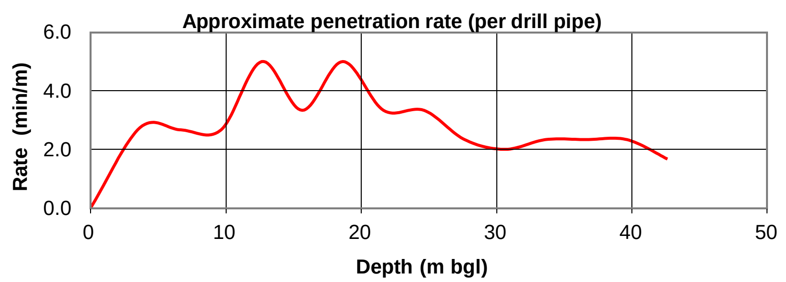
**Drilling Contract No.:**

| | | | | | |
|---|---|---|---|---|---|
| **DWD ref. no.** | DWD N/A | **NABINENE P/S** | **Company reference number:** | | |
| **Final Depth (m)** | 42.65 | **District** | KIBOGA | **Altitude** | 1122 m amsl |
| **Airlift yield ($m^3$/hr)** | 4.00 | **Sub-County** | BUKOMERO | **GPS E** | 392609 **UTM Grid** |
| **SWL (m bgl)** | | **Parish** | KAKUKYU WARD | **GPS N** | 77056 WGS84, 36N |
| **Date started** | 3 06 2025 | **Date completed** | 5 06 2025 | **Drilling Unit** 1 | **VES** |

| Drill pipe | Depth (m bgl) | Penetration time (min) | Geology | Aquifer type | WSL (m bgl) | Yield (l/hr) |
|---|---|---|---|---|---|---|
| 1 | 3.65 | 10 | TOP CLAYEY SOIL | | | |
| 2 | 6.65 | 8 | BROWNISH CLAY | | | |
| 3 | 9.65 | 8 | BROWNISH CLAY | | | |
| 4 | 12.65 | 15 | BROWNISH CLAY | | | |
| 5 | 15.65 | 10 | BROWNISH CLAY | | | |
| 6 | 18.65 | 15 | BROWNISH CLAY | | | |
| 7 | 21.65 | 10 | SANDY WEATHERED FORMATION | | 20.00 | O |
| 8 | 24.65 | 10 | SANDY WEATHERED FORMATION | | | |
| 9 | 27.65 | 7 | SANDY WEATHERED FORMATION | | | |
| 10 | 30.65 | 6 | SANDY WEATHERED FORMATION | | 29.00 | O |
| 11 | 33.65 | 7 | SANDY WEATHERED FORMATION | | | |
| 12 | 36.65 | 7 | SANDY WEATHERED FORMATION | | | |
| 13 | 39.65 | 7 | SANDY WEATHERED FORMATION | | | |
| 14 | 42.65 | 5 | SANDY WEATHERED FORMATION | | | |
| | | | | | Total airlift yield: | 4000 |
| | | | | | Main water strike: | 29 |

| Design | Depth (m bgl) | Details / Remarks |
|---|---|---|
| | | |




**Materials used**

| material | unit | Qty est. | Qty. act. | remarks |
|---|---|---|---|---|
| cement | 50 kg bags | 1.00 | 1.00 | |
| gravel pack | 100 kg bags | 60.00 | 60.00 | |
| gravel pack | liters | 1200.00 | 1,200.00 | |
| backfill | liters | | - | |
| screen | lengths (nrs) | | 4.0 | |
| screen total length | meters | | 11.60 | |
| screen | broken pieces | | - | |
| casing | lengths (nrs) | | 9.0 | |
| casing total length | meters | | 26.10 | |
| casing | broken pieces | | - | |
| bottom plugs | material | | PVC | |
| seal material | Cement | | Cement | |
| development | hours | | 1 | |

**INSTALLATION DATA**

| Drilling | Depth | | BHD | | Drilling method |
|---|---|---|---|---|---|
| | 0.00 | 42.65 | 203 | | DTH |
| | 42.65 | | | | |
| **Equipment** | **Depth** | | **ID** | **OD** | **Diameter and type** |
| | 0.00 | 19.12 | 127 | 140 | PVC plain casing |
| | 19.12 | 24.96 | 127 | 140 | PVC screen casing |
| | 24.96 | 27.88 | 127 | 140 | PVC plain casing |
| | 27.88 | 33.72 | 127 | 140 | PVC screen casing |
| | 33.72 | 36.65 | 127 | 140 | PVC plain casing |
| | 36.65 | | | | |
| **Annular space** | **Depth** | | **Volume (l)** | | **Fill type** |
| | 0.50 | 3.00 | 50 | | cement seal |
| | 3.00 | 36.65 | 1200 | | Gravel |
| | 36.65 | | | | |

*BHD, ID, OD, size are diameters in mm, depths in meters*

GENERAL REMARKS:

**The borehole was drilled to a total depth of 42.65 meters with an 8" down-the-hole (DTH) hammer. The main lithologies identified during drilling included clayey soils and sandy weathered formations. Water-bearing zones were encountered at depths of 20 meters and 29 meters. A full casing design was adopted and 5" permanent PVC casings were installed up to 36.65 meters. The casings did not reach the bottom of the well because of boulders that were encountered between 37 and 43 meters. The annular space between the borehole wall and casing was packed with 60 bags of gravel, and a sanitary seal was constructed using cement. The borehole produced an estimated airlift yield of 4,000 litres per hour.**

| | |
|---|---|
| **DRILLING COMPANY** | LIVING WATER TECHNOLOGIES |
| **DRILLER** | Charles |
| **CONSULTANT** | |
| **SUPERVISOR** | James |

# *Annex 2: Test pumping results.*

# 6 HOUR CONSTANT RATE TEST DATA SHEET

| | |
|---|---|
| UTM X | 392609 |
| UTM Y | 77056 |
| Location/Village | NABINENE P/S |
| Parish | KAKUKYU WARD |
| Sub-County | BUKOMERO |
| County | KIBOGA EAST |
| District | KIBOGA |
| Client | NABINENE P/S |

| | | | | | | |
|---|---|---|---|---|---|---|
| Q-air | 4 | Q-planned | 3.2 | Q-actual | 3.2 | |
| Supervisor | | JAMES | | | | |
| Date start : | 10 06 2025 | Time: | 08:00 | Top of screen 1 | | mbgl |
| Date end : | 10 06 2025 | Time: | 14:00 | Available drawdown | 24.22 | m |
| Casing inner diameter | 127.00 | mm | | | | |
| Total depth of well: | 42.65 | m | | datum level (dl) | 0.5 | magl |
| Depth of pump intake: | 31.00 | mbdl | | reported water strikes: 1 | N/A | mbgl |
| Type of pump: | Submersible | | | 2 | N/A | mbgl |
| SWL: | 6.28 | mbgl | | 3 | N/A | mbgl |
| DWL: | 18.17 | mbgl | | 4 | | mbgl |
| Yield indicator: | 17 | liters | | 5 | | mbgl |

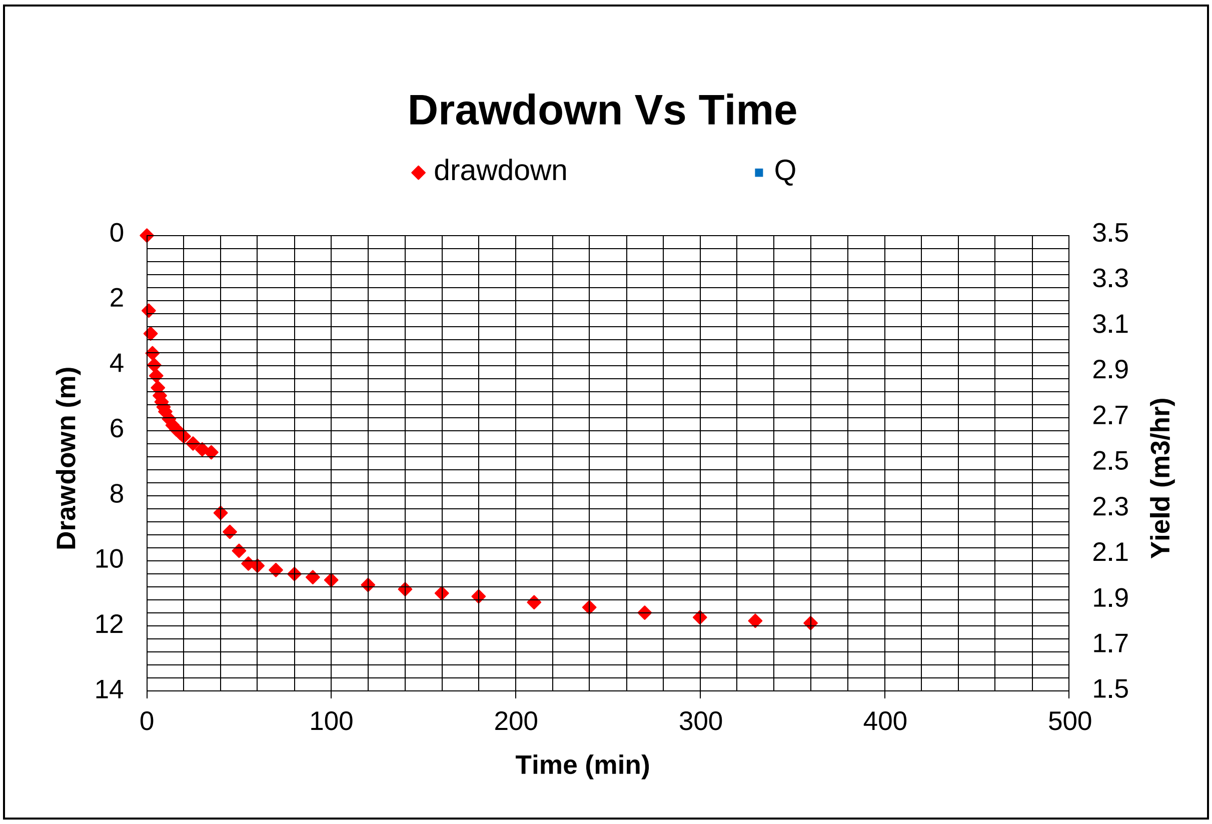
| **Time elapsed** | | **Water level** | **Time to Fill** | **Yield** | **Remarks** |
|---|---|---|---|---|---|
| min. | hour | mbgl | Seconds | m3/h | Discharge starts off turbid |
| **0** | 0:00 | 6.28 | 25.00 | 2.45 | |
| **1** | 0:01 | 8.58 | 25.00 | 2.45 | |
| **2** | 0:02 | 9.29 | 25.00 | 2.45 | |
| **3** | 0:03 | 9.89 | 25.00 | 2.45 | |
| **4** | 0:04 | 10.25 | 25.00 | 2.45 | |
| **5** | 0:05 | 10.58 | 25.00 | 2.45 | |
| **6** | 0:06 | 10.95 | 25.00 | 2.45 | |
| **7** | 0:07 | 11.19 | 25.00 | 2.45 | |
| **8** | 0:08 | 11.38 | 25.00 | 2.45 | |
| **9** | 0:09 | 11.54 | 25.00 | 2.45 | |
| **10** | 0:10 | 11.68 | 25.00 | 2.45 | Still turbid |
| **12** | 0:12 | 11.90 | 25.00 | 2.45 | |
| **14** | 0:14 | 12.10 | 25.00 | 2.45 | |
| **16** | 0:16 | 12.23 | 25.00 | 2.45 | |
| **18** | 0:18 | 12.34 | 25.00 | 2.45 | |
| **20** | 0:20 | 12.44 | 25.00 | 2.45 | |
| **25** | 0:25 | 12.66 | 25.00 | 2.45 | |
| **30** | 0:30 | 12.84 | 25.00 | 2.45 | |
| **35** | 0:35 | 12.93 | 25.00 | 2.45 | |
| **40** | 0:40 | 14.79 | 19.00 | 3.22 | |
| **45** | 0:45 | 15.37 | 19.00 | 3.22 | |
| **50** | 0:50 | 15.95 | 19.00 | 3.22 | |
| **55** | 0:55 | 16.34 | 19.00 | 3.22 | |
| **60** | 1:00 | 16.41 | 19.00 | 3.22 | |
| **70** | 1:10 | 16.54 | 19.00 | 3.22 | Discharge starts to clear |
| **80** | 1:20 | 16.66 | 19.00 | 3.22 | |
| **90** | 1:30 | 16.76 | 19.00 | 3.22 | |
| **100** | 1:40 | 16.85 | 19.00 | 3.22 | |
| **120** | 2:00 | 17.00 | 19.00 | 3.22 | |
| **140** | 2:20 | 17.13 | 19.00 | 3.22 | |
| **160** | 2:40 | 17.25 | 19.00 | 3.22 | Clear discharge |
| **180** | 3:00 | 17.35 | 19.00 | 3.22 | |
| **210** | 3:30 | 17.53 | 19.00 | 3.22 | |
| **240** | 4:00 | 17.69 | 19.00 | 3.22 | |
| **270** | 4:30 | 17.85 | 19.00 | 3.22 | |
| **300** | 5:00 | 17.99 | 19.00 | 3.22 | |
| **330** | 5:30 | 18.10 | 19.00 | 3.22 | |
| **360** | 6:00 | 18.17 | 19.00 | 3.22 | Pumping stopped for recovery |
| | | | | | |
| | | | | | |

# 6 HOUR CONSTANT RATE RECOVERY DATA SHEET

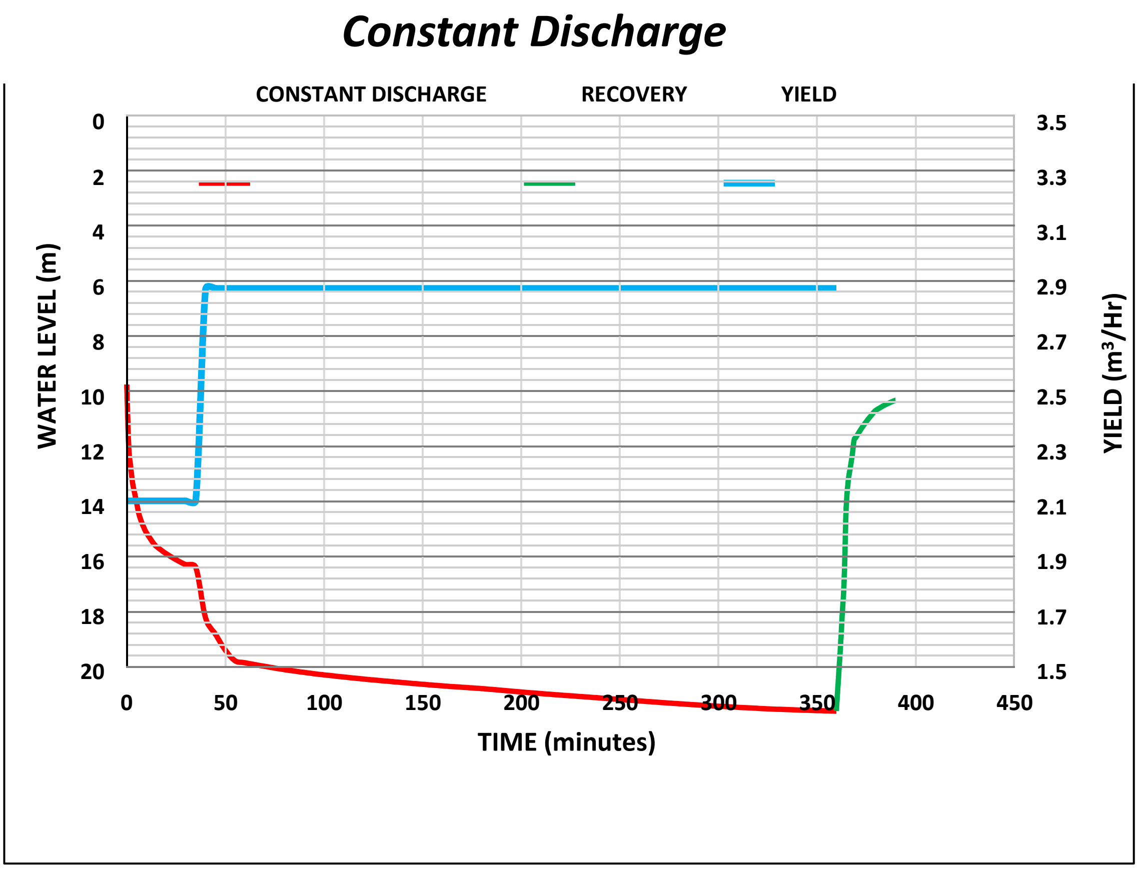
| | |
|---|---|
| UTM X | 392609 |
| UTM Y | 77056 |
| Location/Village | NABINENE P/S |
| Parish | KAKUKYU WARD |
| Sub-County | BUKOMERO |
| County | KIBOGA EAST |
| District | KIBOGA |
| Client | NABINENE P/S |

| | | | | | | |
|---|---|---|---|---|---|---|
| Q-air | | Q-planned | | Q-actual | 3.2 | |
| Supervisor | JAMES | | | | | |
| Date start : | 10 06 2025 | Time: | 14:00 | Top of screen 1 | | mbgl |
| Date end : | 10 06 2025 | Time: | 14:30 | Available drawdown | 24.22 | m |
| Casing inner diameter | 127.00 | mm | | | | |
| Total depth of well: | 42.65 | m | | datum level (dl) | 0.5 | magl |
| Depth of pump intake: | 31.00 | mbdl | | reported water strikes: 1 | N/A | mbgl |
| Type of pump: | Submersible | | | 2 | N/A | mbgl |
| SWL: | 6.28 | mbgl | | 3 | N/A | mbgl |
| DWL: | 18.17 | mbgl | | 4 | | mbgl |
| Yield indicator: | 17 | liters | | 5 | | mbgl |

| **Time elapsed** | | **Water level** | **% Recovery** | | |
|---|---|---|---|---|---|
| min. | hour | mbgl | | | |
| **0** | 0:00 | 18.17 | 0.0% | | |
| **1** | 0:01 | 17.07 | 9.3% | | |
| **2** | 0:02 | 15.97 | 18.5% | | |
| **3** | 0:03 | 14.67 | 29.4% | | |
| **4** | 0:04 | 13.38 | 40.3% | | |
| **5** | 0:05 | 10.79 | 62.1% | | |
| **6** | 0:06 | 9.83 | 70.1% | | |
| **7** | 0:07 | 9.36 | 74.1% | | |
| **8** | 0:08 | 8.90 | 78.0% | | |
| **9** | 0:09 | 8.33 | 82.8% | | |
| **10** | 0:10 | 8.20 | 83.9% | | |
| **12** | 0:12 | 7.97 | 85.8% | | |
| **14** | 0:14 | 7.76 | 87.6% | | |
| **16** | 0:16 | 7.56 | 89.2% | | |
| **18** | 0:18 | 7.39 | 90.7% | | |
| **20** | 0:20 | 7.23 | 92.0% | | |
| **25** | 0:25 | 7.02 | 93.8% | | |
| **30** | 0:30 | 6.86 | 95.1% | | **95.1% recovery after 30 minutes** |



Drawdown Vs Time
drawdown
Q
Drawdown (m)
Yield (m3/hr)
Time (min)
0
2
4
6
8
10
12
14
3.5
3.3
3.1
2.9
2.7
2.5
2.3
2.1
1.9
1.7
1.5
0
100
200
300
400
500

Constant Discharge
CONSTANT DISCHARGE
RECOVERY
YIELD
WATER LEVEL (m)
YIELD (m³/Hr)
TIME (minutes)
0
2
4
6
8
10
12
14
16
18
20
3.5
3.3
3.1
2.9
2.7
2.5
2.3
2.1
1.9
1.7
1.5
0
50
100
150
200
250
300
350
400
450

# *Annex 3:*

# *Final Installation of the AC pump stainless.*

# *Annex 4:*

# *Hand over the water source.*



_File and Compiled by_:

**Field Operational Manager**
FLORENCE BASEKA