

**RDO – MDABULO**

**TIN No. 116-681-064**

**NGOs Reg. No. 00005134**



Kontakt: Mr. Fidelis Filipatali  
P.O.Box 65 Mafinga/Iringa  
Tel: +255(0) 784834245  
e-mail: [ffilipatali@yahoo.com](mailto:ffilipatali@yahoo.com)

[www.eineweltgruppe.at](http://www.eineweltgruppe.at)

**eineweltgruppe**  
Schlins | Rös

Kontakt: DI Franz Rauch  
Torkelweg 11, 6824 Schlins  
Tel: 05524 / 2570  
e-mail: [einewelt@gmail.com](mailto:einewelt@gmail.com)

[www.eineweltgruppe.at](http://www.eineweltgruppe.at)

# 2014 WATER PROJECT MDABULO WARD

**PUBLIC WATER SUPPLY IN THE VILLAGES  
KIDETE | IKANGA | LUDILO | MLEVELWA**



PROJECT IMPLEMENTATION | PART 2



## CONTENTS

1.	DRINKING WATER – COLLECTIVE CONSCIOUSNESS OF CHANGES OF PEOPLE IN THE PROJECT AREA	3
2.	FROM SOURCE TO MAIN TANK IN THE VILLAGE	9
3.	CONSTRUCTION OF THE MAIN TANK IN LUDILO.	11
4.	MAIN LINE LUDILO / KIDETE	17
5.	KIDETE TANK	20
6.	FURTHER PLANING	20
7.	SPECIFICATIONS AND PLANS	22
8.	WORK PERFORMANCE OF THE INGIENOUS POPULATION (VOLUNTEER WORK)	37
9.	PROFESSIONALS FROM VORARLBERG AND SPEZIALICED COOPERATION LOCALLY IN TANZANIA	38
10.	THANKS TO THE PROVINCIAL GOVERNMENT OF VORARLBERG IN AUSTRIA	39
11.	THANKS TO EMIL NACHBAUR – NACHBAUR REISEN	39



## **1. DRINKING WATER – COLLECTIVE CONSCIOUSNESS OF CHANGES OF PEOPLE IN THE PROJECT AREA**

Three years ago, when we conducted the first Water- Source, we could not have foreseen that a very positive attitude change in the population of our project region would develop on the topic of water.

First, it is the quality of water that can be reached by a competent source version. To our astonishment, good drinking water quality has been repeatedly compared to the quality of the in-sale mineral water in plastic bottles. So no one could imagine that a good quality of drinking water can be obtained in the rural environment from existing sources.

Many responsible persons in the villages were suddenly aware of a certain amount of the liabilities attitude to the water, which was visible in the loveless and partly negligent maintenance of existing water holes.



Fig. Traditional the water holes are created in the villages in this way





Fig. Water hole below the village Ibwanzi

Another huge effect was the free community work in the implementation of water projects. There were days when up to 400 people were employed in digging and transport of pipes.

The work must be explained before and during work time and again, as in this rural life world hardly complex work processes occur which require a pre-or thinking along the desired result. This had a tremendous training effect for the recognition of relationships, work organization, value of water and a sense of community and solidarity in the community in retrospect.



Fig. Educational work with students. Our WATA – officer Batista during an excursion on site

At the same time, another aspect in the project region is raised awareness of the population, namely the increasing child labor in relation to water transport. Due to inflation and rising cost of living, the amount of work in a subsistence economy is growing. This increased work effort affects mainly the field work and other sideline work. In our view, especially the women are heavily loaded in overall agricultural activity. The workload in procurement of fire wood and carrying water is increasing due to longer distances.





Then there is the very heavy, labor-intensive transport of wood, which is precipitated in part inaccessible union remote woodland. Transporting boards on the head is to achieve the only possibility of additional income for women mostly. So it has arisen in the course of recent years that the transport of water from the waterholes partly removed to the village, is exclusively assigned to children. You can see children at the

sometimes very steep paths in droves in the morning, noon and night with a load of 20 kg, several times on the way to provide a day to feed their families with water. Mothers are often aware of the overtaxing of their children, so that of course women use vehemently for our water projects.







Fig. Works are mainly done by women and young girls: field work, firewood procure, washing clothes at the water hole. It must be carried over long distances, usually on the head heavy loads. Right: this house is near a new village well in the village Ludilo, the laundry can be hung and washed nearby the house now.

In the village Ludilo that is already supplied with water outlets, it can already be seen clearly that the children are relieved tremendously by our water project.

Our main concern from the beginning was the sustainability of both the maintenance and the expansion of the existing or planned water projects. This is ensured by the establishment of the water cooperative WATA that was founded within the institutions of our partner NGO Organization RDO Mdabulo.

This cooperative WATA takes on enormous importance. On one hand, they must receive the maintenance and operation upright, on the other hand a permanent funding has to be secured. Although the people in the project region know that water has to be paid in the cities regularly, otherwise the water is turned off. However, in their consciousness they separate widely between town and country and it must be added that they have never had to worry about costs or expenses for water. For this reason, a lot of educational work has to be done. The people also have little awareness and experience with sustainable maintenance of technical equipment.



The RDO - leaders and especially the coordinator, Mr. Fidelis Filipatali had to hold countless meetings to inform about the responsibilities and tasks of the water cooperative.



Fig. Up to 400 volunteers/day from the villages were involved at the excavation of the water lines.

In December of 2013, a delegation of 8 senior Ministry staff from the Water Resources Department and from Dar es Salaam came to Mdabulo. This water project is known in Tanzania as it has been repeatedly described in the media. Also, we have found that the responsible politicians of the region and the political functionaries in the villages mention the water project in their reports in the first place also to representing their work. The delegates of the Ministry were very impressed. They reported that there would be a new legal basis for such projects. The Tanzanian law also provides for the creation of cooperatives which have the technical facilities and are thus also responsible for the maintenance. In the executive bodies of cooperatives no active politician may held a function neither of village level or regional level. The idea has to do with anti-corruption prevention. These officers will assist and help us with the registration of our cooperative in Dar es Salaam.





We could also find that with the inclusion of the water project, our partner organization Rural Development Organisation (RDO) as an NGO in the consciousness of the population is much clearer seen as their own organization. They can now better distinguish their own institution, in contrast to – from- outer-coming political or religious organizations very well. Obviously, it also seems to have succeeded in that people can identify better with the cause if they have a say in the decisions.





## 2. FROM SOURCE TO MAIN TANK IN THE VILLAGE

In April, we began with the laying of the main line from the source to the main container (buffer Tanç) in Ludilo. The distance is 2.9 km. The grounds of the topography forth very difficult for excavation work, because the line along side slopes must be performed. This side slopes are traversed by deep trenches. Moreover, we had repeatedly sections which were permeated with granite rocks. The pipeline route was originally used by the surveyors of the water - out-measure department of Mafinga. For measuring they exclusively relied on GPS.



Much of the route had been dug upon our arrival in April. To our chagrin, we found that the measured data were not correct, and in part the route was 20 meters above the source.

Fig. Granite stones are laboriously dig during excavation work with bows - and smashed with the help of simple mallets.

We then decided to move the tubes under running water. Thus we could be sure that the gradient is sufficient. We divided the work into three teams:

One team put the route ahead with the help of a builder's level in advance about the distance of 200 - 300 m. The next team of about 50 people dug the trench in which the pipe could be laid. The third smaller team pimped out lines and laid the pipes with a laterite earth.

So we could run about 200 - 300 meters per day. In the deeper trenches we had to install cleaning valves (called washouts). In three larger increases over which we came, we had to put the pipe venting valves (air valves).

As we moved the whole line under the water flow in the pipes, we were always confident that we had achieved the necessary slope. The line consists of PVC pipes in the size of 110 mm with sockets couplings. In the sections with difficult - granite interspersed areas we needed to work with bows.

The highest pressure in the line in the deepest trench is 4 bar. The line is designed for 10 bar.



After two weeks of intensive work, we reached the place of the main tank near the village Ludilo . This was a great relief for everyone involved because the people could hardly imagine that water can be transported over such a large distance without pumps. The parties and many people from the village Ludilo organized a spontaneous party in which we were able to celebrate our success.





### 3. CONSTRUCTION OF THE MAIN TANK IN LUDILO.

The main vessel was built in the village Ludilo in May 2013. The gap between this source and the main tank at a distance of 2,9 km is 28,1 m. This gap is after deducting the friction loss in the pipes enough, so that the entire source water can be transported plus possible reserves.

The main tank is also placed in a way, so that the entire village area of Ludilo can be supplied with water. For the construction of the container there were three design options to be discussed:

I. The easiest and fastest design includes a concrete floor plate on which the plastic tanks ranged in size from 5,000 liters are connected on in series. A disadvantage of this technique, the large number of exterior surfaces is at the temperature to rise. There is also a danger that the water is too little circulated and thereby it may determine a long time in the plastic tank. In addition, little is known about the durability of the plastic.

II. The second - very common - option is to run in the direction of the container by means of brick masonry that is also built on a concrete slab . With brick walls, there are both static and sealing problems, which have different strengths especially in wood burnt bricks. The tightness of a brick container can be guaranteed only by the plaster is however difficult to seal at cracking.

III . Ultimately, we decided to run in concrete. But we had also to consider the possibilities of knowledge (know how) of masons in the villages. Concrete is usually mixed in the villages by means of vanes, with larger amounts of a different consistency of the mixture in there. We decided therefore to create a concrete mixer with diesel engine. In cooperation with the experienced craftsmen in the concerned villages, we have elicited the following formwork possibility and also executed.





The container is in the base square with a wall height of 2 m. When the container is situated in the gently sloping terrain, it can be completely buried in the earth. Only on the downward side, it is about 1 m above the surface. On clean leveled laterite base - a floor plate with 25 cm thickness is applied.

The reinforcement is made of steel mesh 6 or 8 mm with 12 mm structural steel rods supplement reinforcement. The bottom plate is carried out in the enclosure with a spring, on which joints can be used on. An outlet pipe in the bottom plate made of galvanized steel is introduced with a diameter of 4 inches.

For the internal formwork we have made of 2 mm sheet steel, a reusable concrete formwork with screw connection. The formwork is mounted inside and supported by wood. At a distance of 10 cm from the formwork a steel mesh is also introduced with reinforced steel reinforcement.

Particular attention is paid to the reinforcement of the corners with angles. The gap is then filled with concrete and compacted. Lack concrete compaction equipment it is compressed with wood. A stone wall is then completed up to 2 m. The gap is poured with intermediate casing and the stone wall with concrete.

The following day the internal formwork is canceled, the concrete wall must be cleaned and on the bottom plate a smooth plaster is attached with groove. In further consequence the smooth plaster is carried out on the base plate.





The roof is made of steel construction with corrugated iron. The transitions from concrete walls to the roof are carried out with tile gradients. The input pipe or overflow pipe is also housed in this masonry. The increased tendency of the roof maintenance door is still installed.

The tank in Ludilo took about a month to complete and was successfully completed. Work with the outer masonry took a lot of time. Experience has shown that, despite sheet covering the water stays very cool, and the square shape of the container is sufficient and good circulation of drinking water is ensured.

The experience of the first tank in this water project were very encouraging and simplify the further container built both in Kidete, Ikanga and Ibwanzi and in other future water projects. The exact determination of the main case in Ludilo showed a capacity of 75 m<sup>3</sup> of drinking water.



Fig. A reusable steel formwork for the construction of all water tank was produced in the RDO – Metal Workshop





Fig. In the background - the finished paved container with corrugated iron roofing



Fig. Arrival of water from the source



From June to September 2013, the drinking water supply in the village Ludilo was tackled. The rough draft of water supply Ludilo was created by means of Google aerial images. Using these images, the distances and the quantities of pipes and wells locations could be determined relatively accurately. The determination by means of aerial photographs had the advantage that it was not necessary to discuss with concerned parties to standard questions. It had to be negotiated locally, so that only fine-tuning in the village-site was required.

The water supply based on Ludilo polyethylene pipes of varying diameters. The main lines are made of pipes with 63 mm and 50 mm lines , which lead to the direct water points in 32 mm diameter tubes.

The water points have been executed in concrete. The transitions of polyethylene pipes in steel pipes and the associated isolation valves are covered with steel shafts. The water intakes are designed with the possibility of two taps, but is currently only a check valve mounted.

Taps with a screw thread have not proved successful in practice because they were not up to the task on time. Especially when turning off the faucet, the rubber seal was stamped again and again. As a result, we have equipped all water points with ball valves, and it is very important that the valve lever is provided with a solid stop. It also shows that the children can use the ball valve better, and turn these reliable also in contrast to valves with screw cap.







Fig The village fountain in the center of the village Ludilo / Picture below traditional water-carrying

In the now several months of practice, it appears that the maintenance of water supply must deal primarily with the wear by removing the valves. Each tapping point has a group leader and this must also be supported by the Cooperative again. He must ensure that he has the expertise to identify actions for negligence or careless handling of the water device or this.

It is in the nature of things that our first view from the outside in conjunction with water is the view on the drinking water. However, it has been found that especially women are very relieved with their daily workload, particularly in laundering, cleaning utensils and household, beer brewing and so on. Especially due to the large water demand needed for construction of houses it is a great relief. The quality of life, especially of women and children could thus have improved significantly.





#### 4. MAIN LINE LUDILO / KIDETE

In the original plan, the supply line to Kidete was planned after the fountain of supply in Ludilo. In the detailed planning, we decided to apply regardless of the water supply of the village Ludilo. The advantage we saw in the simplified handling and overall management of the plant or in the consistent responsibility of the individual villages. Moreover the direct connection is not more expensive because the distance is not increased.

However, the direct line runs halfway through a protected forest (primary forest) in possession of the Multi Group UNILEVER . The management of UNILEVER gave us willingly consent to the relocation of the water line. The transfer in this forest was a big challenge, especially since the measurement due to lack of foresight was very difficult, we are also encountered repeatedly on large granite rocks that had to be laboriously worked with hammer and chisel. For the construction of these lines, we needed three intensive weeks.

Due to the hollows of up to 120 m height difference, we had to inserting reinforced tubes . In the deep pipes, we could just polyethylene pipes with the pressure capacity PN16 inserting. These tubes had to be welded on site across difficult terrain.

When excavation work more than 500 people were over several days together in use. In the work classification of this large number of people those responsible showed extremely great skill. For us is confirmed by the large participation of the population in this water project that people identify with the matter, and that they see this project as theirs. This gives us confidence that the people also feel responsible for the maintenance of facilities.



Fig The most difficult route for the water pipeline: Protected forest interspersed with blocks of granite





Fig. Side rough terrain challenged the workers as well as the persistent rain







Fig Pipelaying on the ground - the picture below: In the valley floor, the stronger pipes must be welded







Fig. For pipes welding a specialist squad from the provincial capital of Iringa has to be requested.

## 5. KIDETE TANK

The construction of the water tank in Kidete started in January 2014. This water tank is identical with the main tank in Ludilo. The Construction Engineering in Ludilo has proven itself, and is therefore also used in Kidete. The bottom plate is already finished, and these days the masonry is built. This reservoir will have a capacity of 72 m<sup>3</sup>. The initiation of the water in the container is controlled by a float valve. The tank is expected to be completed in February 2014.

## 6. FURTHER PLANING

Currently, we are busy with the detailed planning of water supply in Kidete - Village. We create the rough draft by google-air images. The measurement of the pipeline routes will happen in the course of February. The supply line to Ikanga container is introduced simultaneously with the Kidete water supply.

Currently, a team is busy with the marking of the existing pipeline routes. Sustainable mark consists of plants of Nabia grass along the pipelines. Nabia grass is permanently visible as it is clearly visible



in the landscape due to its nature and its growth height of about 1 m. Furthermore, all 50 m concrete piles with colour coding are introduced. At points where the pipes due to rocks can not be covered with earth a metal cover for UV protection is applied.

The previous schedule we were able to keep very good.



Fig. Concrete piles to mark the water lines in the terrain



Fig. Nabia grass is planted along the pipelines. Recognizable to display the progress in the landscape



## 7. SPECIFICATIONS AND PLANS

### (1) DETAILS OF INDIVIDUAL WATER SUPPLY

Main tank village Ludilo  
Supply Line

**Length 2 900 m**

**Capacity 75 m<sup>3</sup>**

PVC Pipes  $\phi$  110 mm PN 10

6 Cleaning Valves (Washouts)

4 Pipe venting valves (Airvalves)

Highest pressure 4 bar

Main tank village Kidete  
Supply Line

**Length 3 460 m**

**Capacity 72 m<sup>3</sup>**

PVC Pipes 110 mm PN 10

PVC Pipes 110 mm PN 12

PE Pipes weldet PN 16

4 Washouts

3 Airvalves

Highest pressure 12 bar

Water supply Village Ludilo

28 Fountains

Main Line PE 63 mm PN 10

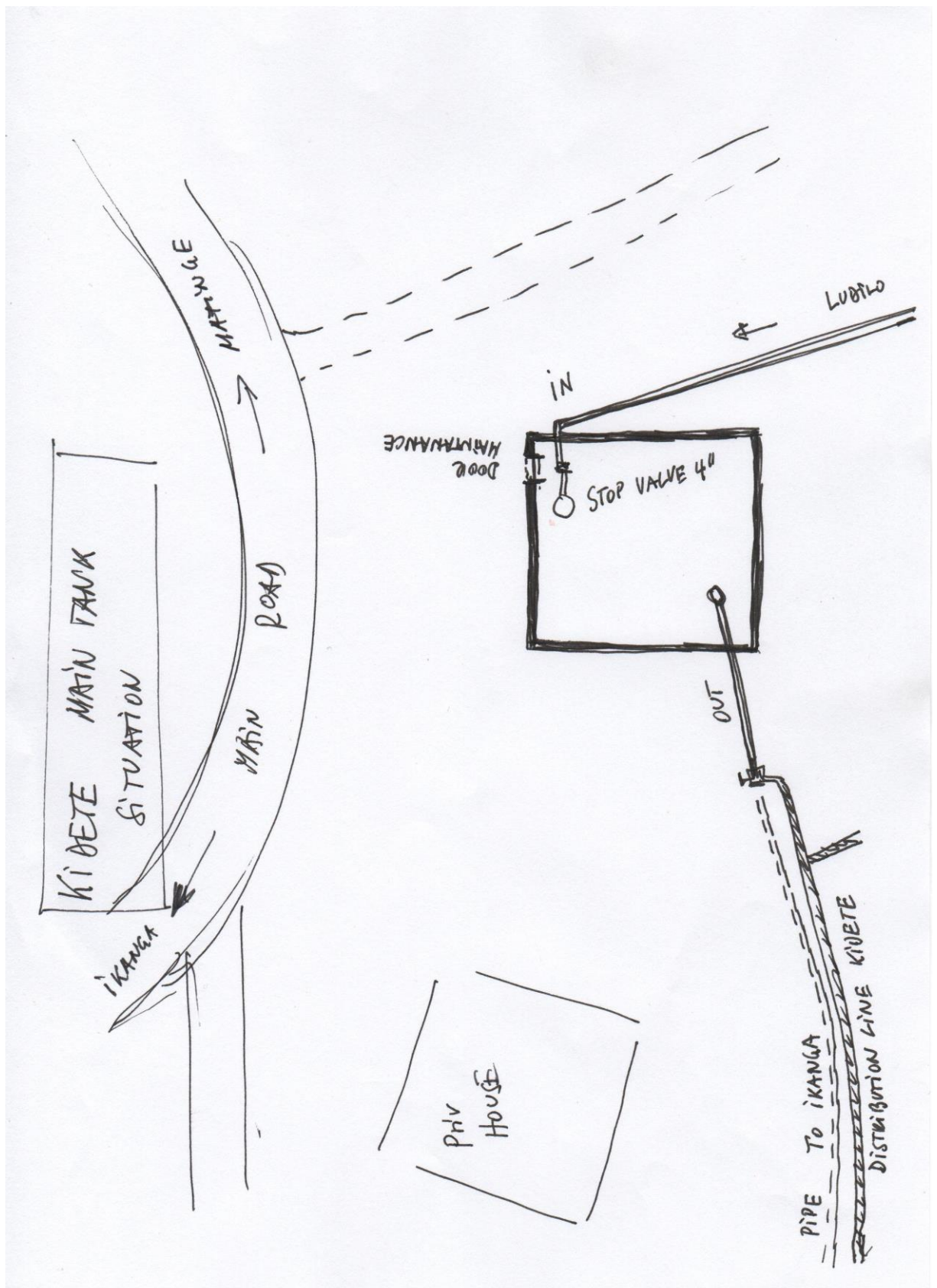
Secondary Line PE 50 mm PN 10

Supply Lines PE 32 mm PN 10



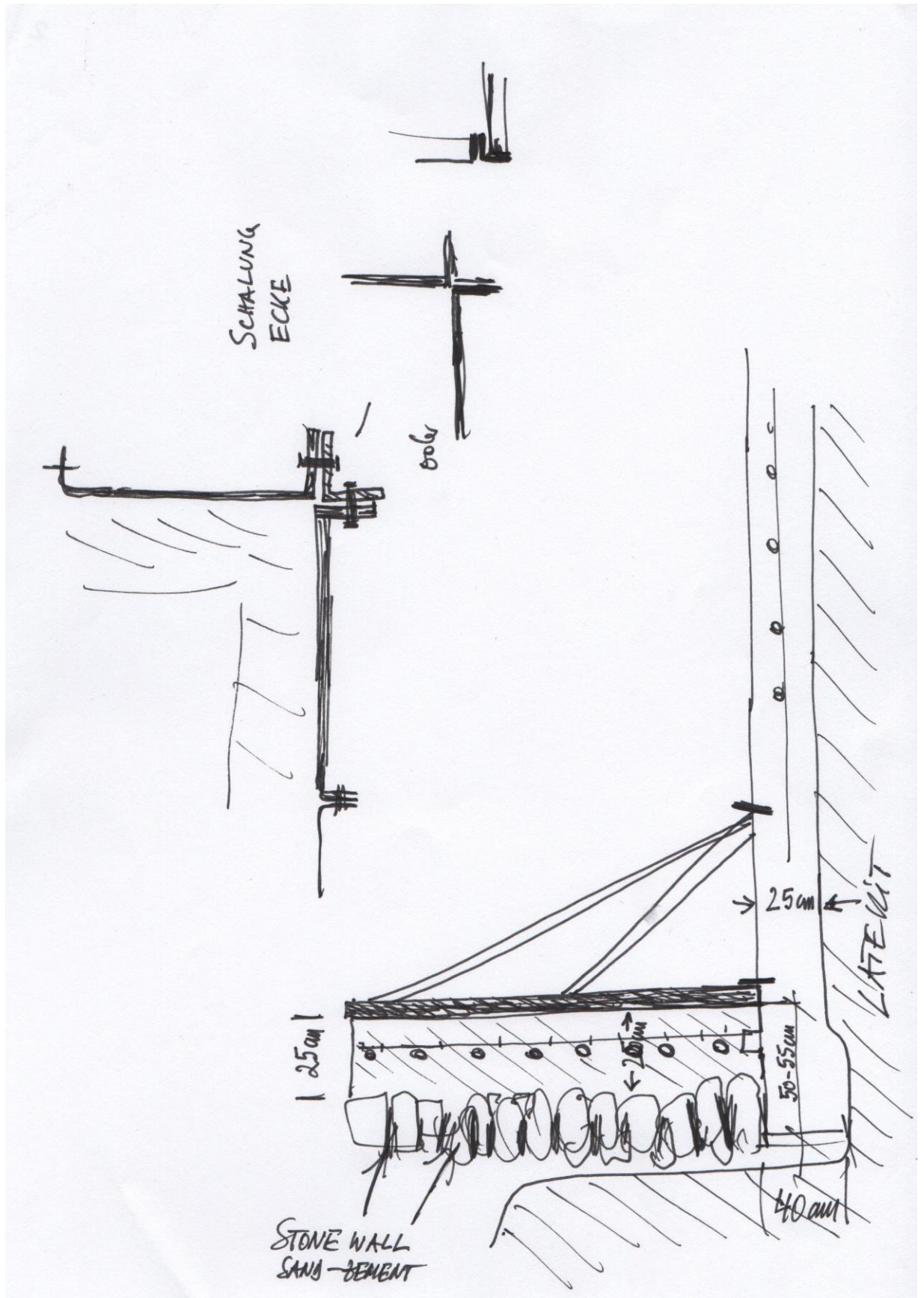
## (2) PLANS | DRAWINGS

### LOCATION MAP MAIN TANK KIDETE





# FORMWORK FOR ALL TANKS

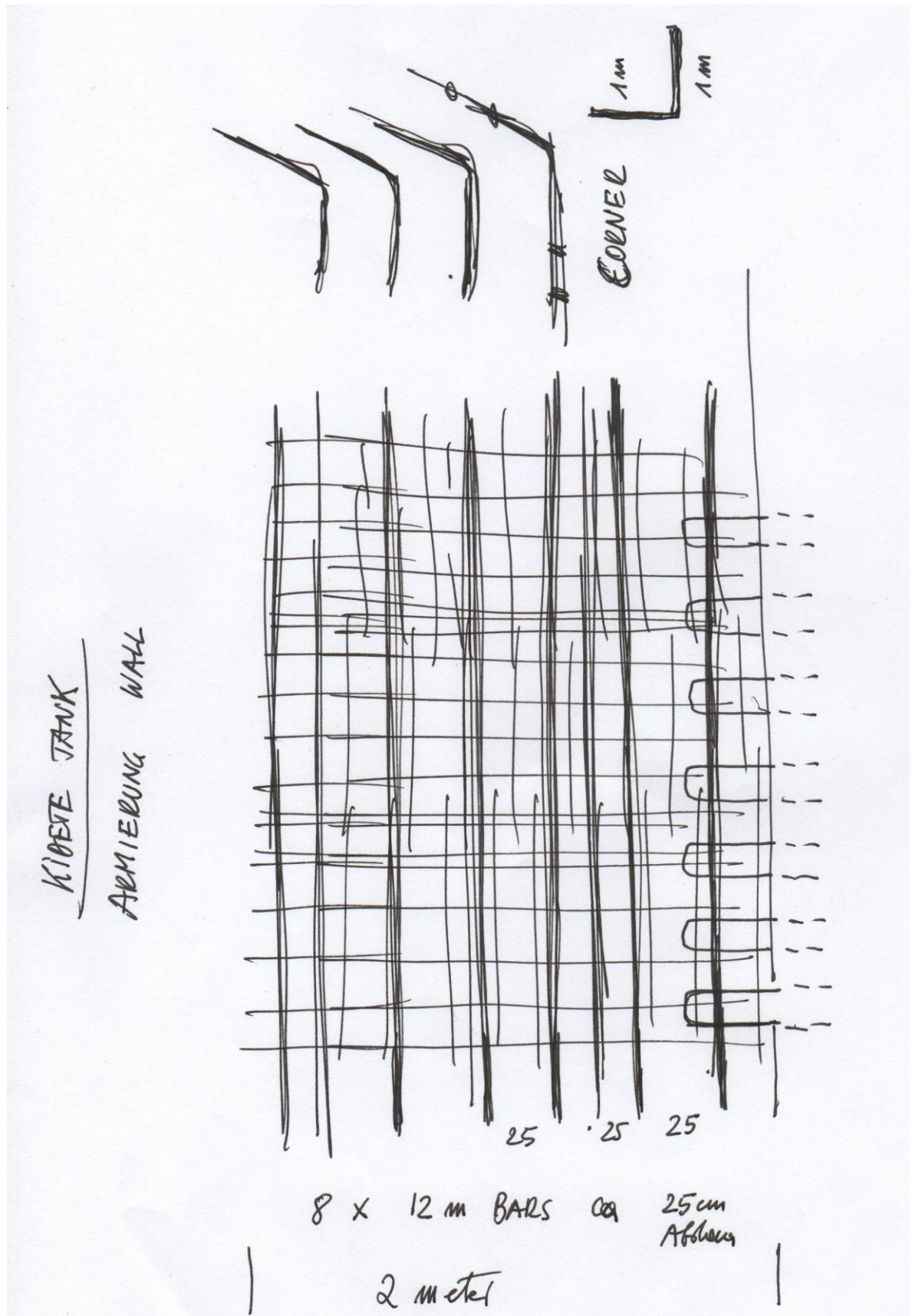




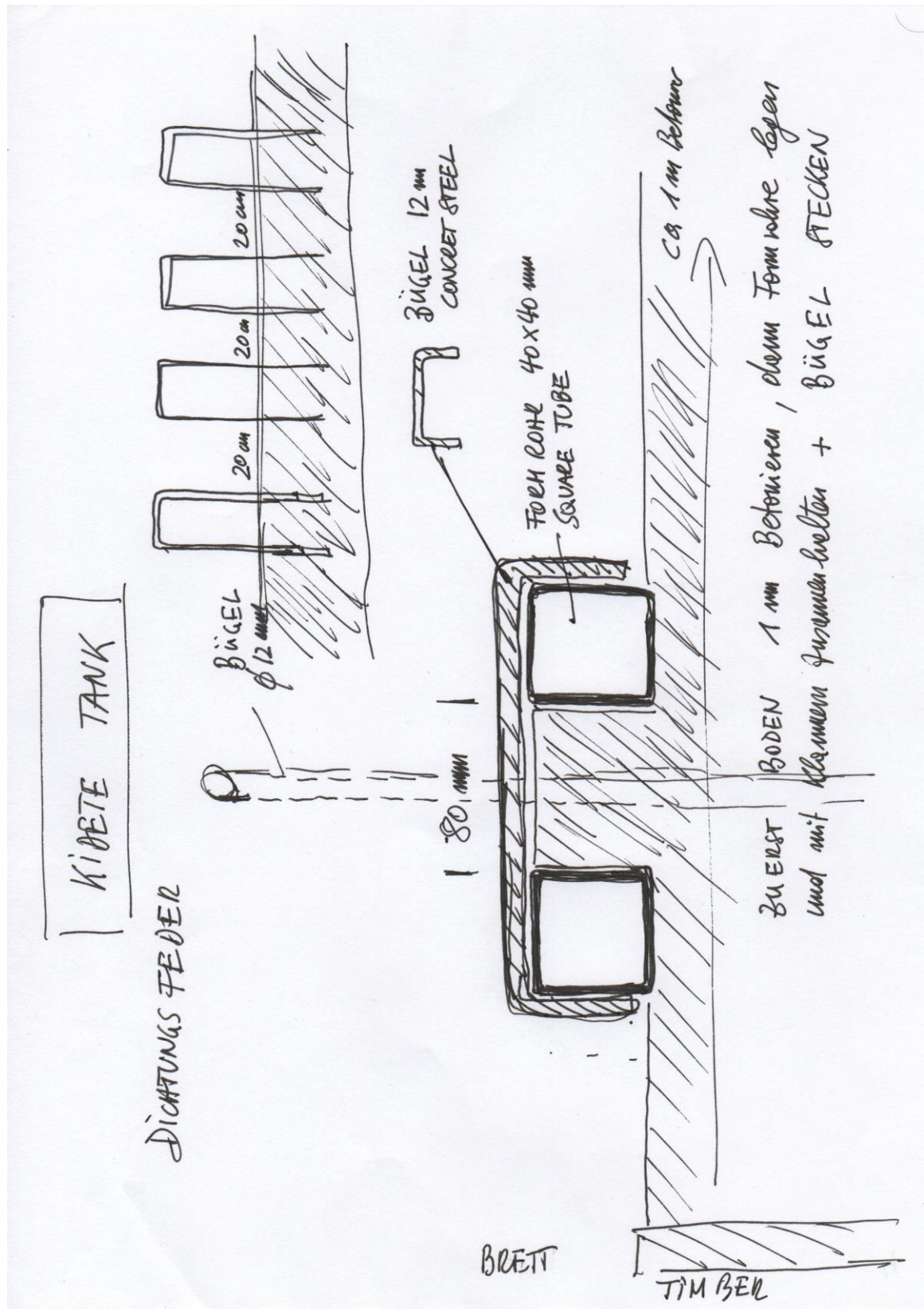




KIDETE TANK | REINFORCEMENT - WALL

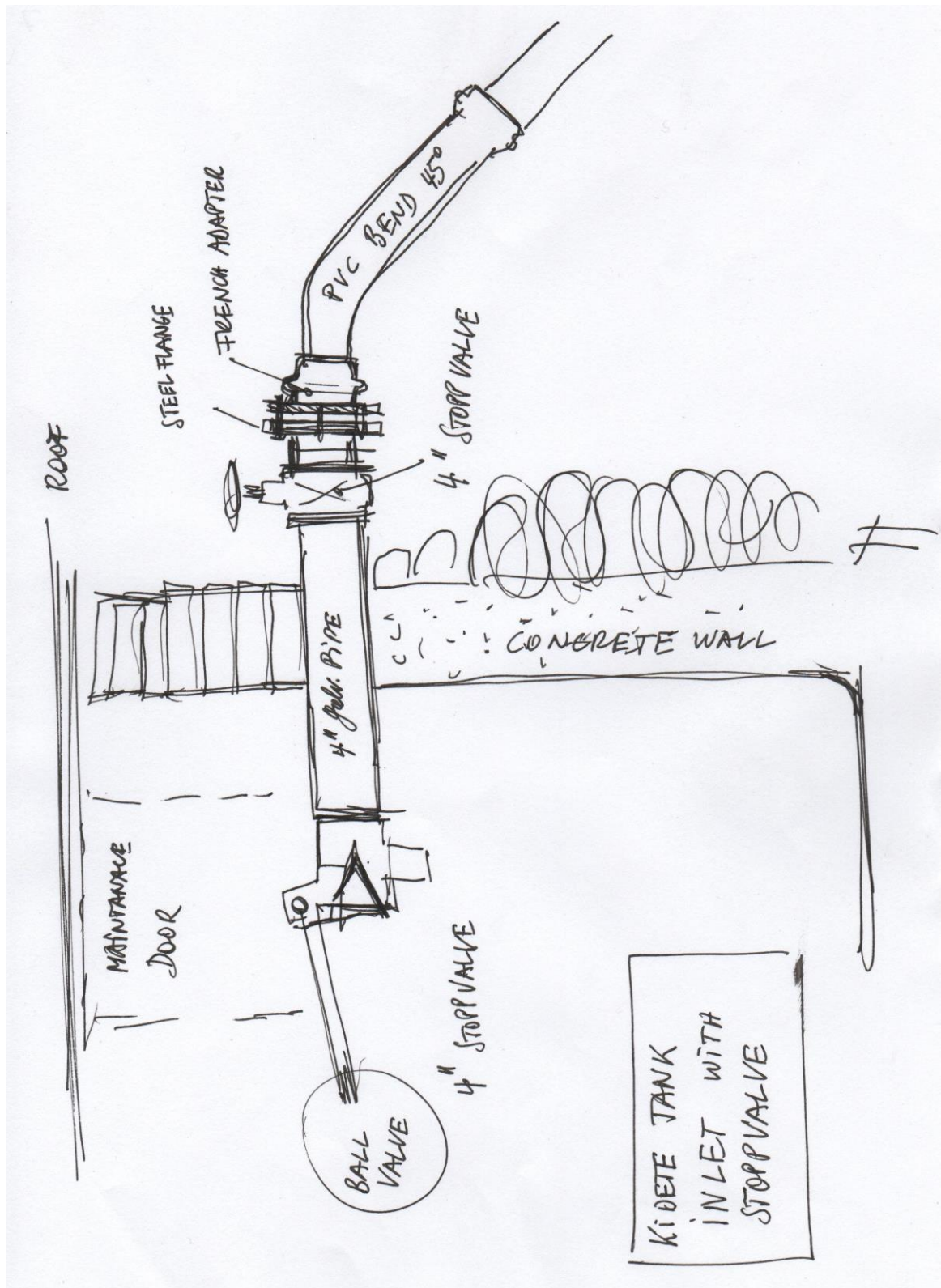




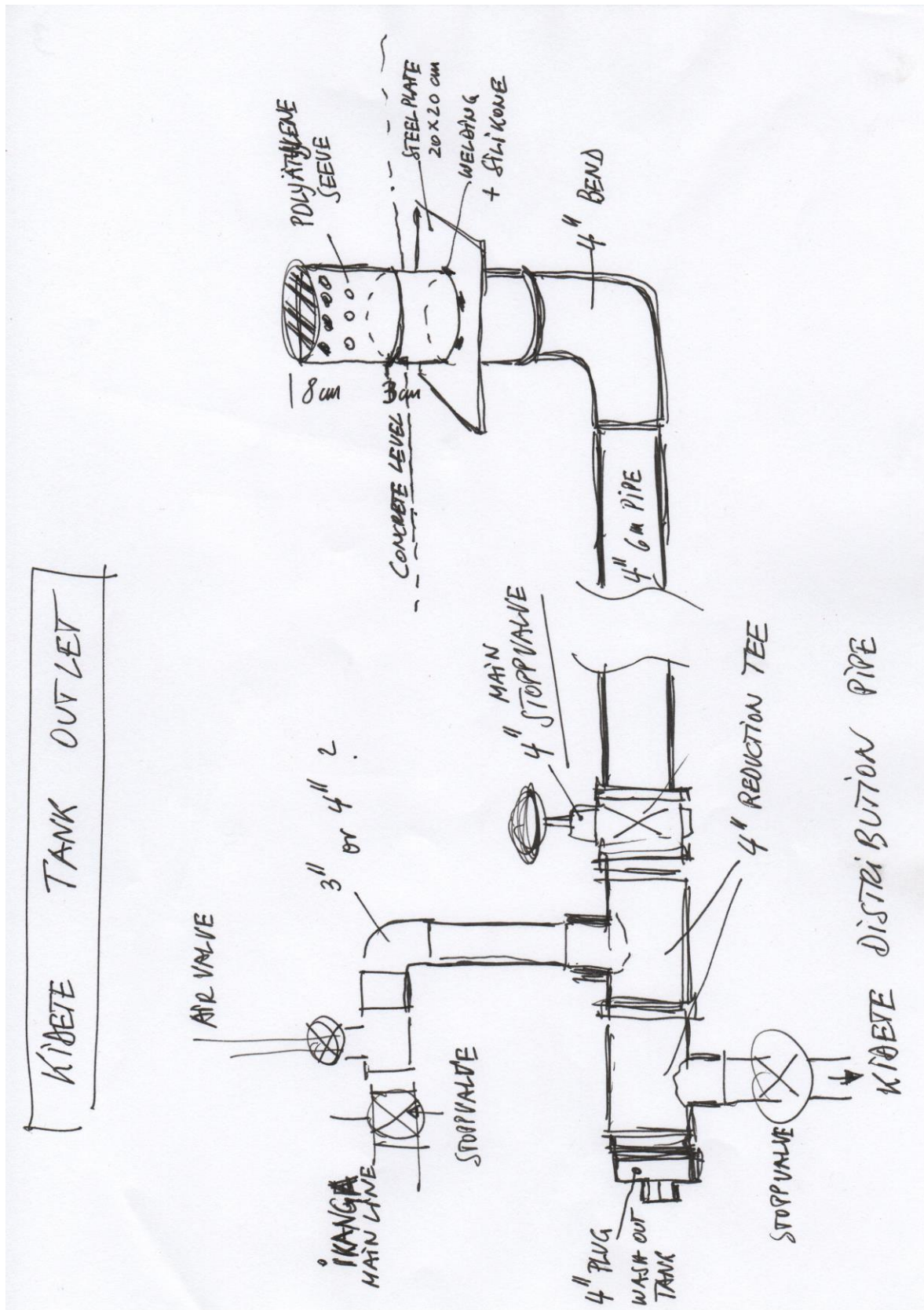




KIDETE TANK | SUPPLY WITH VALVE









### **(3) SURVEY DATA GOOGLE EARTH**

WATER SUPPLY KIDETE AND MAIN LINE IKANGA

MAIN LINE LUDILO – KIDETE

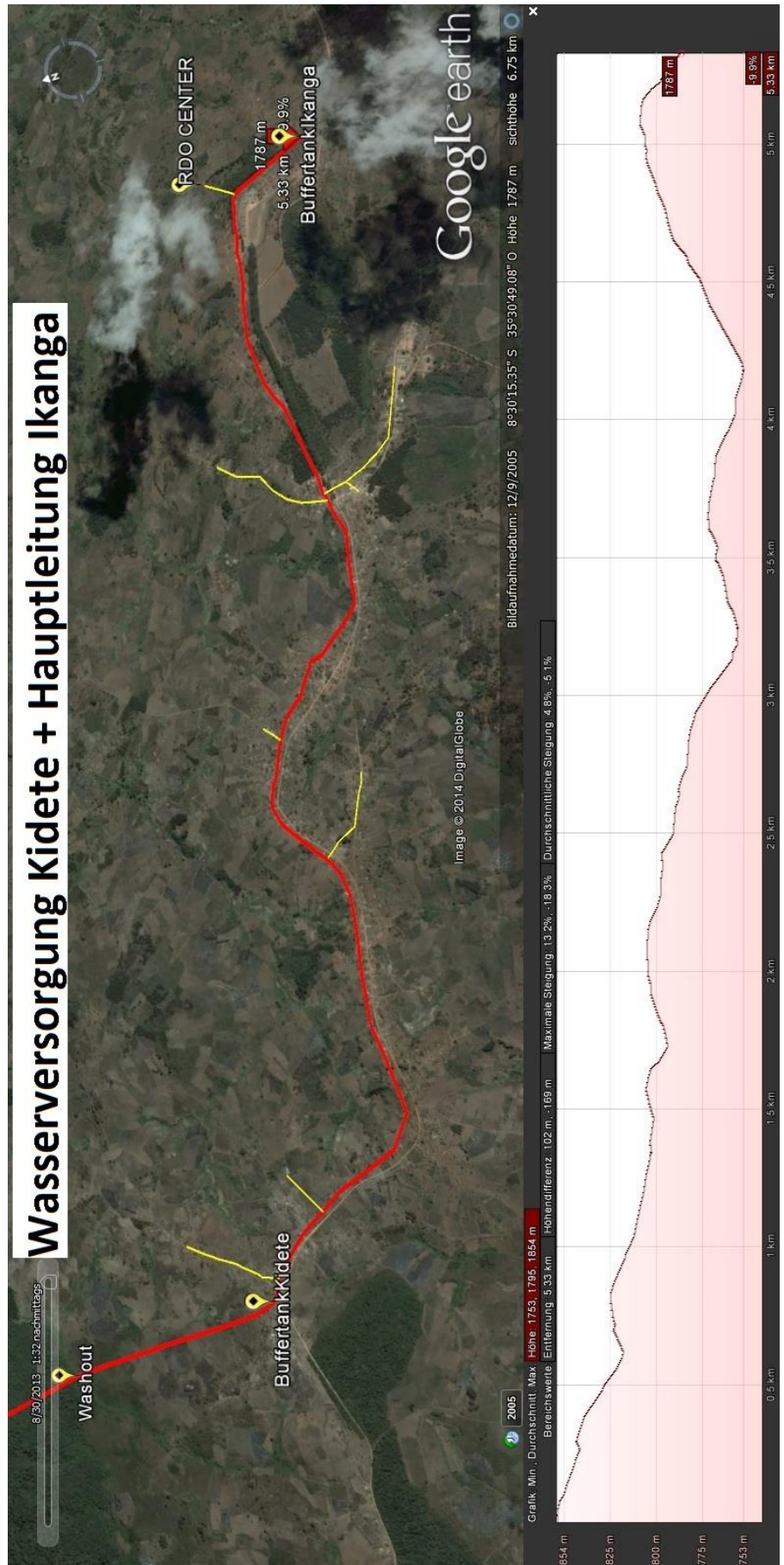
OVERVIEW MAIN LINE TO KIDETE

LUDILO WATER SUPPLY

KIDETE WATER SUPPLY

MAIN LINE SOURCE – TANK LUDILO







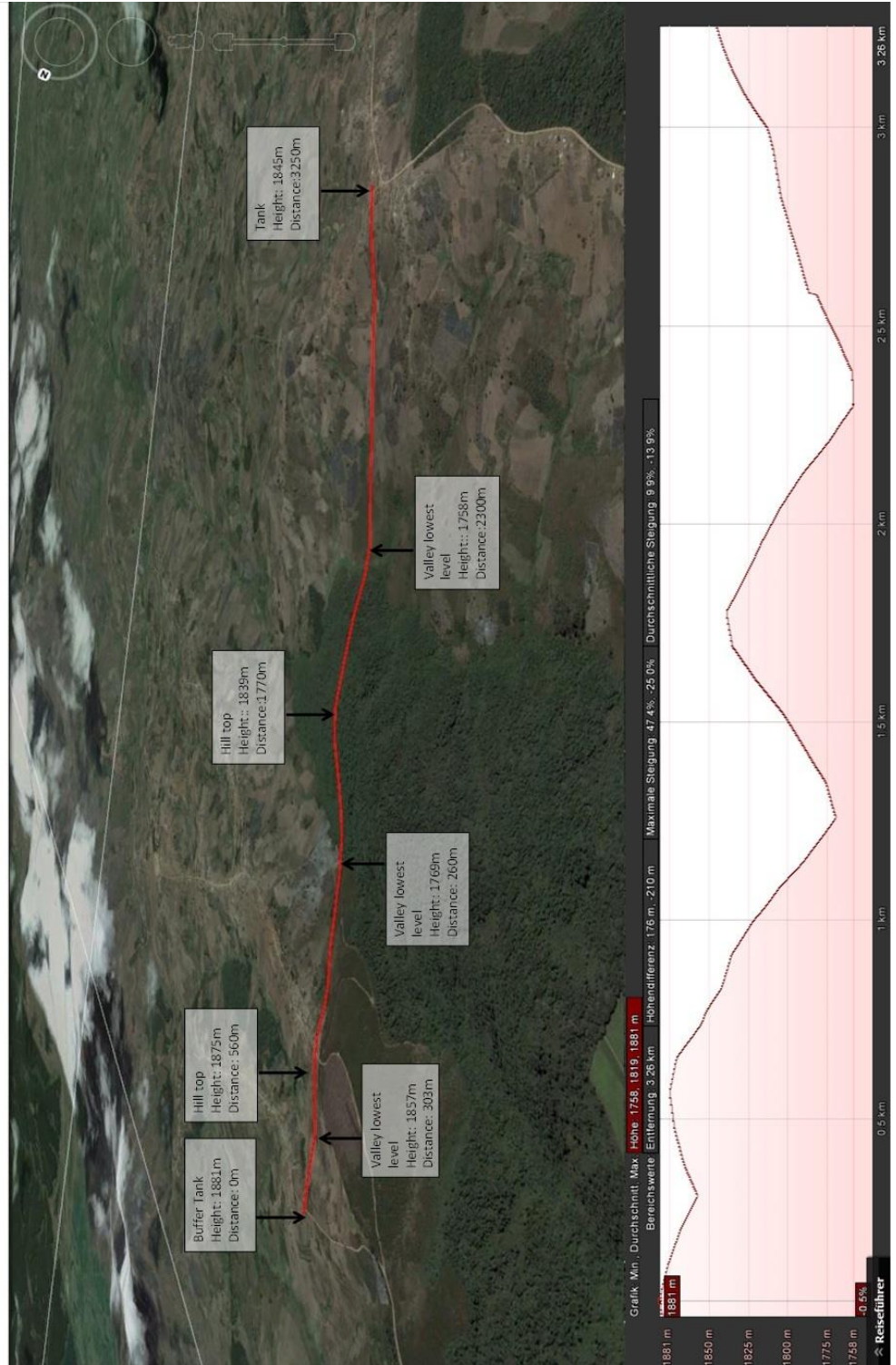








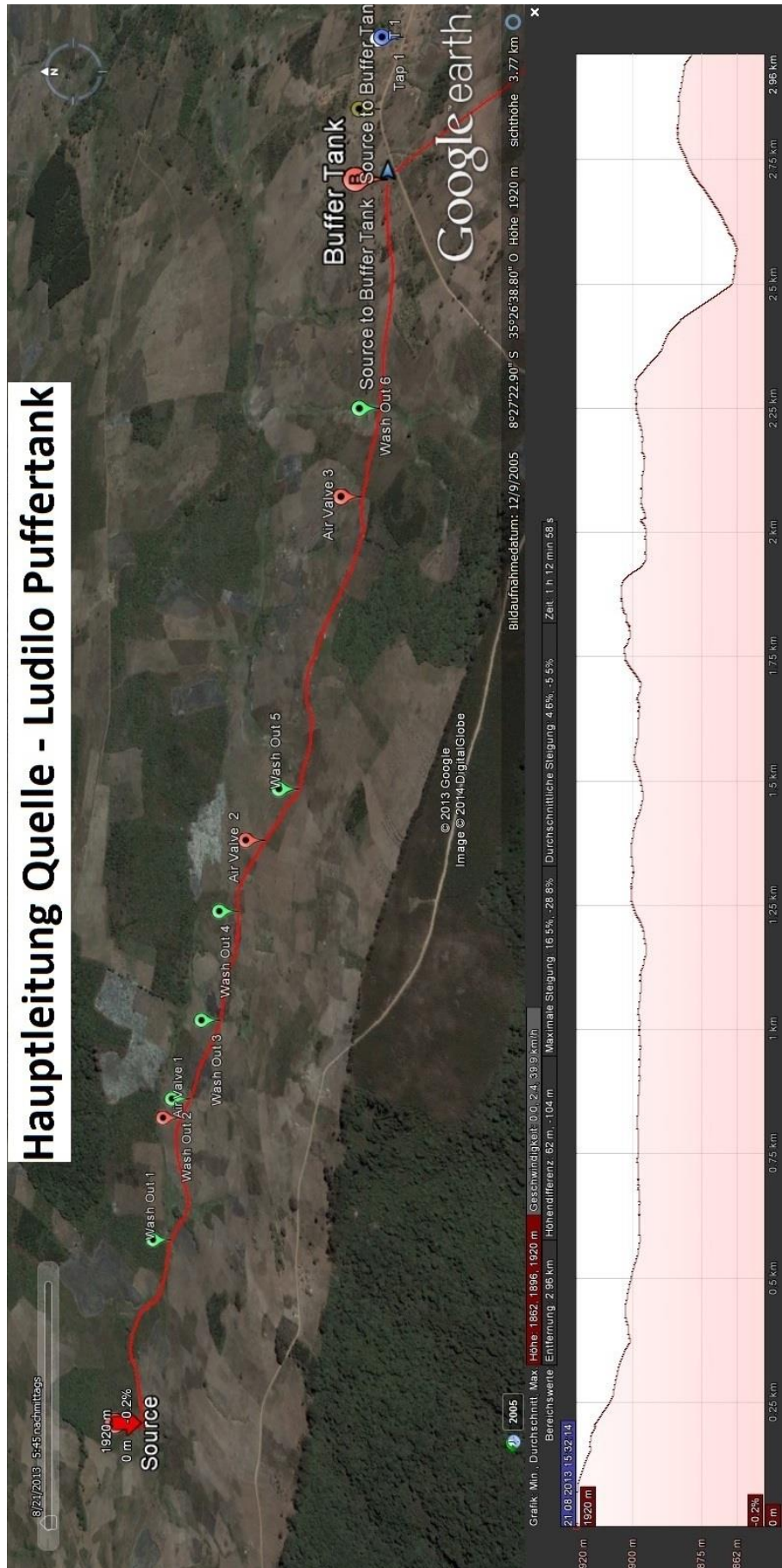
## Overview main line to Kidete













## 8. WORK PERFORMANCE OF THE INGIENOUS POPULATION (VOLUNTEER WORK)

List of unpaid work performed by the native population

### Source

Excavation Work	Fundis –Teams (Local Artisans)	2. 400 h
Excavation Work	Women, Men, Youths	3. 260 h
Break Stones for Gravel	All	2. 100 h

### Main Line 1

Excavation Work	Women, Men, Youths	4. 500 h
Laying Pipes	Fundis – Teams	2. 700 h
Transport of Pipes	Population	650 h

### Ludilo Tank

Excavation Work	Population	900 h
Concrete- and Stonework	Fundis + Assistants	2. 400 h
Roofing- and Metalwork	Fundis + Assistants	200 h

### Ludilo+Kidete

Measurements + digging Trasse	Experts + Assistants	900 h
Excavation Work + Laying Pipes	Population	6. 300 h

### Ludilo Village

Excavation Work + Laying Pipes	Population	6. 000 h
Fountain building	Fundis + Assistants	3. 000 h



## 9. PROFESSIONALS FROM VORARLBERG AND SPEZIALICED COOPERATION **LOCALLY IN TANZANIA**

<b>Design, Management, Organisation Waterprojects</b>	DI Franz Rauch	Schlins, Project Management
	Mag. Johannes Rauch	Schlins, Project Management
	DI Lukas Tomaselli	Schlins, Waterengineering
<b>Advice</b>	Di Bruno Fussenegger	Dornbirn, Waterengineering
	Peter Türtscher	Dornbirn, Master Metal Technologie
	Hubert Vogel	Fa. Haberkorn, Wolfurt
<b>Cooperation Preparation</b>		Employees Water Station Dornbirn (volunteers)
<b>Operations On Site</b>	DI Franz Rauch	Foundation WATA, Coordination, Project Management
	Mag. Johannes Rauch	Construction Management, Coordination, Documentation
	DI Lukas Tomaselli	First Source Base, Cooperation Design
	DI Albert Rauch	Erste Source Base
	Hanno Makowitz	Fotodocumentation first Source Base
	DI Adrian Rauch	Measuring, Lineconstruction
	Peter Türtscher	Metalworks, Technical Advice Reusable Steel formwork
	ING Clemens Türtscher	Tank building, Steel formwork
	Mathias Prates	Volunteer
	Doris Filzmaier	Fotodocumentation Source Base Ibwanzi
	Marko Schwabl	Google Earth Datas
	Sylvia Ritter	Planting Nabia Grass, Concrete Piles
	Mag.(FH) Ulrike Türtscher	Documentation, Folder, Posters, Communication



#### **10. THANKS TO THE PROVINCIAL GOVERNMENT OF VORARLBERG IN AUSTRIA**

As part of our project - working locally, we designate in meetings with local political person responsible (government officials, Commissioners, village leaders, committees, etc.) always the source of funding namely the Provincial Government of Vorarlberg.

We would like to thank at this point in the Vorarlberg State Government for the great promotion and support. In many applications this is very valuable to us not only in financial terms. It gives us volunteer workers in a country that is struggling with corruption and insecurity, personal support and the feeling of moral support from home.

#### **11. THANKS TO EMIL NACHBAUR – NACHBAUR REISEN**

Another special thanks to our long-time conveyer and sponsor, Mr. Emil Nachbaur, who always supported us in different projects. For this project he initiated the construction of the aqueduct financed "his" Kindergarten Ludilo from the main tank to the Kindergarten which can now be directly supplied with clean water.





