The Humane School

- A Steiner school in Kenya

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'We do not educate the child for the age of childhood,
we educate him for his whole earthly existence.'
- Rudolf Steiner

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Content

Can I have your attention please?

- Introduction

Introduction

My diploma project is a design proposal for a Rudolf Steiner school in Sirende, a village 12 km outside Kitale Town, Kenya.

The Kenyan Steiner school The Humane School opened in Sirende in year 2008 on initiative taken by the Swedish anthroposophical association Föreningen Sofia. Today the school is in very bad condition with overcrowded classrooms and poor sanitary conditions. The need for a new school building is urgent and this project is my proposal for a new Humane School. My research for the project is focused on the Steiner pedagogy and architecture, building solutions in poor rural areas, and the east African architecture and culture. I have gathered information through literature readings, interviews, observations and study visits. Most part of the process has taken place in Lund, Sweden, except October, which was spent on a study trip in Kenya.

There are many challenges with this project. First of all I had to adapt the school design to the, for me, unknown Kenyan climate and weather conditions. I also had to translate the western Steiner architecture into the Kenyan community without forcing western culture on the locals. By doing this project I wanted to investigate how the Steiner architecture can be combined with the African architecture and culture within a very low budget. I hope my work will help to create a viable school that will contribute to the development of Kenya.

The Humane School project is a cooperation between *ASF Sweden*, *The Humane School Board of Education* in Kenya and the anthroposophical association *Föreningen Sofia in Järna*, Sweden.

LUND UNIVERSITY

The Organizing Partners

Föreningen Sofia is a Swedish anthroposophic association that supports anthroposophical projects for sustainability in developing countries. Many projects are financed with government funds, but the association also arrange fund-raisers (Föreningen Sofia, n.d).
The Humane school project started in 2008 as an initiative by *Föreningen Sofia*. Today they are responsible for the operation of the school and economical support for the schooling. The support mainly comes from monthly donations by families in Sweden. The project leader, and Steiner teacher, *Anja Varis* is an active member of the association and has been working with the project since 2014[1].

The Humane School Board of Education is a group of local teachers and parents in Sirende that make sure that the school is successfully driven in the village. They are responsible for the education of the students, distributing the funds from Sweden so that it covers salaries for the teachers, porridge for the students, maintenance etc[1]. One of the members of the board is *Juliet Mia*, a Steiner teacher that hosted me during my stay in Sirende, Kenya.

ASF Sweden (Architecture Sans Frontières Sweden, aslo called *Architects without boarders*) is a non-profit organization and part of *ASF International*'s global network of national voluntary groups of architects. The organization was established in Sweden in year 2006. Today ASF Sweden has 150 members who work both locally and globally with supporting projects for a better built environment (ASF Sweden, n.d).
Sabine Lepére, architect and member of ASF Sweden, got contacted by *Föreningen Sofia* to help design the school. She started developing the design and made the project into an ASF-project[1].
In Mars 2019, I got in contact with ASF-Sweden when searching for a possible diploma project. After talking to Sabine, she asked me to continue with designing the school. My design is therefore developed from the work Sabine started (see "Sabine's proposal" and "Sabine's workshops", page 72-81 to read more).

Freunde der Erziehungskunst is an anthroposophic organization in Germany. They can be seen as Germany's equivalence to *Föreningen Sofia* in Sweden. The difference is that the organization is much bigger and don't only support German based projects, but projects from all over the world (Freunde der Erziehungskunst, n.d).
Today *Freunde der Erziehungskunst* is the biggest sponsor for the building of the new Humane School and therefore has a big influence in the project[1].

1. Varis, Anja (Steiner teacher and project leader) (2019-09-22) Phone interview, Lund

Main goals with the project

- Create a school with good educational conditions.
- Have a low environmental impact.
- Improve the hygienic and sanitary conditions.
- Create good indoor comfort.
- Involve locals and support the community.
- Keep influences from the African culture and architecture.

2

Listen to Steiner for a minute

- Anthroposophy and Steiner pedagogy

Anthroposophy

Anthroposophy is a philosophy that developed in the beginning of the 20th century. Rudolf Steiner (1861-1925) founded the anthroposophy after having dedicated many years of his life to the *theosophy**. Today anthroposophy is established in both religion, art, medicine, biodynamic farming, architecture and education. Anthroposophy means ”wisdom about human” and focuses mainly on the human senses, development and well-being. As a summary, the anthroposophists believe in the human ability to self develop, both spiritually, physically and mentally.
The anthroposophy came to Sweden in the 1930’s and was widely spread during ”the green wave” in the 1970’s, when people moved out from the cities to the countryside to get closer to nature. This was a reaction against the 30’s and 40’s big scale city planning, the 60’s brutalism, the million program and the demolition of the old districts, such as *Klarakvarteren* in Stockholm. People where tired of the stressful and grey city life and saw the anthroposophy as a new alternative. This led to a big expansion of the anthroposophic center in Ytterjärna, 50 km outside Stockholm. Since then the center has been an attraction to everyone from tourists and students to politicians and scientists. The main anthroposophic architect in Sweden was the Danish architect Erik Asmussen (Ferring, 2011).

**Theosophy is a religious philosophy based on a developmental theory that applies to both humans and the universe. (Nationalencyklopedin, 2020)*

Main building, The Anthroposophical center in Järna, Architect: Erik Asmussen

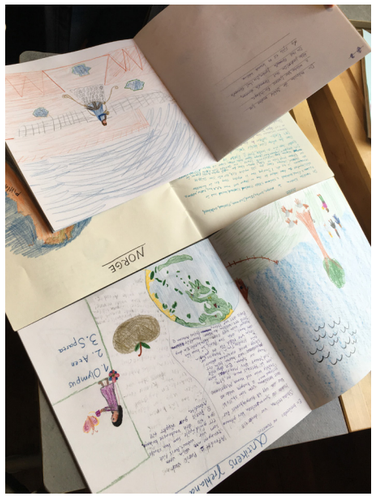
Steiner pedagogy

The Steiner pedagogy is developed from the anthroposophy and there are more than 1500 Steiner schools around the world today (antroposofi.info, n.d. a). The Steiner school system offers classes from kindergarten to high school and the goal is to raise strong independent individuals. The pedagogy doesn't only focus on providing the students with knowledge, but also to support the students as individuals through their life development. Steiner states that children learn naturally through their curiosity about the world. The school's task is therefore rather to guide the children to knowledge instead of forcing knowledge on them.
The Steiner learning strategy is based on the human and the subjects are divided into 3 groups that stimulates different parts of the individual: intellect, emotion and will. In the morning the students have theoretical subjects - works with the intellect, the brain, because then the brain is most awake. In the midday it's time for artistic subjects - works with emotion, the soul, for an example eurythmy*. In the afternoon it's time for practical subjects - working with the will, the body, for an example in sports. Many hours are spent out in the nature and there is little use of technical equipments, such as computers. In the younger grades the students get to create their own school material. For example, they often use interactive "work books" instead of ordinary school books, which Steiner teachers claim have positive impact on the learning process[1]. Some people also claim that the Steiner pedagogy is a good alternative for children with diagnoses that otherwise can have difficulties with the ordinary school learning system (Liljeroth, Naeser, Dahlin, 2006). This is due to the IEP (Individual Education Programs), that the Steiner schools develop to support every student individual needs d(The Association of Steiner Waldorf Schools in the UK and Ireland, 2009). Play and creativity is also an important part of the Steiner pedagogy and are present in all grades.

1. Varis, Anja (Steiner teacher and project leader) (2019-05-04) Interview in Järna, Stockholm
** Eurythmy is an expressive movement art in the Steiner pedagogy. It can be described like a dance that express the soul, creativity and energy (antroposofi.info, n.d. b).*

The teacher writes on a chalkboard

Steiner doll - The children decide the mood of the doll



Work books

Color

Rudolf Steiner, the father of anthroposophy, studied Johann Wolfgang Von Goethes work and was inspired by his theory of colors (Ferring, 2011). Goethe meant that all colors have an energy that has different impact on us. For instance, he claimed that yellow is refreshing and makes us happy, blue makes us calm and green is satisfying, since it's a mix of yellow and blue. Red indicates danger, but also love and heat. Shades of the color and the lightning also have important impact on the experience. Intense yellow has a seductive impact while a dirty, dull yellow is associated to filth and disgust. Goethe also writes that the size of the colored surface, in proportion to the surrounding and other colors also impact us. A small yellow dot on the wall does not have the same impact as if the whole wall was yellow (Goethe, 1810). Even though Goethe's theory of colors was published in the beginning of the 19th century, we still base many of our color choices on his theories. For example, we can often see intense yellow or red colors being used in commercials to catch our attention, while libraries and waiting areas often have shades of blue. This theory was further developed by Steiner and brought into the anthroposophy. For instance, Steiner concluded that different colors are suitable for different ages based on their impact[1]. One example of how color is a part of the Steiner pedagogy can be seen at the Steiner school *Örjanskolan* in Järna. The school was designed by Erik Asmussen in year 1981. The school has grades from kindergarten to high school and every grade has their own building (except the High School). Asmussen focused on how the different development stages of the childhood can be experienced in the architecture (Ferring, 2011). Every grade building has therefore been painted in a color that is appropriate for the maturity of the students. For instance, the kindergarten is a pink building with a pink interior, a color that the young children can associate to the uterus, something familiar that make them feel safe[1]. Steiner also states that children, before grade nine, don't only experience the colors visually, but also experience the complementary colors on a psychological level. As an example, grade one have a red classroom, which adults can experience as intense, but the seven year old instead experience the complement color green, which is satisfying and calming (Ahlin, 2016). The older the students get the more they experience the colors like adults. The colors of the classrooms therefore get cooler in the higher grades; green and yellow in middle school and blue and purple in high school. The placement of the buildings at Örjanskolan is also related to the Steiner pedagogy and the children's development. The idea is that the younger students will learn and get inspired by the older and the older students will remember and reflect while looking at the younger students. The outdoor spaces for the different grades are therefore often in

1.Varis, Anja (Steiner teacher and project leader) (2019-05-04) Interview in Järna, Stockholm

Örjanskolan, Järna

The blue studio, Järna

Örjanskolan, Järna

Shape

Steiner focused much on how our environment impact our thinking and learning. He did not only conclude that colors are important, but also the shape. For instance he criticized the functionalism for its strict shapes and plain facades by claiming they are limiting for our minds. Steiner states that our innovation and creativity get limited when we, for example, are in a room with only 90-degree corners and straight walls. Maybe it can be hard to ”think outside the box” when you sit in an actual box? The anthroposophical architecture is therefore often soft and organic and can rarely be associated with a known geometrical shape. Another reason for the organic shape is the connection to the nature. The idea is based on Goethes *Metamorphosis of Plants*, which focus on plants cyclic metamorphosis. Steiner states that the shapes that naturally occurs in the plants metamorphosis are ”natural” and good for our development and well-being (Ferring, 2011).

We can find interesting examples of anthroposophic architecture in many Steiner schools. For instance, Örjanskolan in Järna, have rooms with sloping ceilings, wide angled corners and tilting walls.

Örjanskolan, Järna

Örjanskolan, Järna

Cultural Center, Järna

Material

The anthroposophists put a lot of importance in the materiality because different materials, just like colors, have different impact on us. For instance, Steiner states that the materialistic world, the industrialism, commercials and consumption bring out ”the souls most evil forces” and is a threat against us. Instead he advocates the medieval city where handicraft and natural material speak to the soul and develop us. Anthroposophical buildings are therefore often both interiorly and exteriorly dressed in medieval materials such as wood and plaster. A lot of focus is put on handicraft and the buildings are often ornamented. Plastic is seen as a material strongly connected to the consumption society and the 1960’s plastic was rejected by the anthroposophists. Plastic colors were therefore excluded and the anthroposophic houses were instead painted with lasure colors (Ferring, 2011). The kindergarten children also don’t play with plastic toys, like in many other ordinary kindergartens. Instead they play with toys made of wood, paper and fabric. The interior is also free from plastics and other chemical materials.

The ceiling in Solvikskolan, Järna

Örjanskolan, Järna

Solvikskolan, Järna

Outdoor space

Rudolf Steiner states that nature is an important source to knowledge. Though nature children explore, discover and learn about seasons, animals, plants and our human existence. They also start respecting the environment and everything it provides for us. For instance, common tasks in Steiner schools are to help grow food or make toys out of wool and wood. Close contact to nature is therefore very important in the Steiner education. Another Stainer belief is that young children learn and develop in everything they do, not only when attending classes. One important learning moment, where children can develop in their own pace and way, is the *play*. For instance, playing improve children's social skills and empathy, when interacting with each other, and their creativity skills, when using their imagination. They also develop physically when moving around, climbing, jumping, running etc. A safe space to play is therefore very important in the Steiner education. The design of the space needs to encourage play but based on the children's own initiative and creativity. A strictly designed space can have a controlling impact on the play which is negative for the children's development. The space should also attract mixed ages so that the students can interact over the age limits (The Association of Steiner Waldorf Schools in the UK and Ireland, 2009). The Danish anthroposophic architect *Erik Asmussen*, meant that this encourages younger students to learn from the older students, while the older students reflect on their past by watching the younger students (Ferring, 2011).

Reflections

In order for me to design a successful outdoor space for the Humane School I need to combine the Steiner ideas with the local, Kenyan ideas. To better understand the Kenyan view of a good outdoor space I arranged a workshop about the subject (see workshop 6, page 88).

- Good safety
- Close to nature
- Ecological farming
- Encourage free play
- Spacious enough

3 Hakuna matata

- Study trip to Kenya

Study trip

In order to develop a good design for the school I felt it was important to visit the site, meet the students, parents and teachers, to understand their needs and culture. I also wanted to learn about traditional Kenyan architecture in order to make the school feel like a part of the Sirende community and not like a ”Scandinavian spaceship”. I therefore decided to travel to Kenya together with my twin sister *Sara Sundström Konradsson* to do research. The trip lasted for 4 weeks in October 2019 and included visits to the *Mbagathi Steiner School* in Nairobi, the traditional building museum *Bomas of Kenya* in Nairobi, the village *Sirende*, *Eco Moyo Education Center* in Kilifi, and much more.

Kenya

The republic Kenya is an equatorial country located in East Africa. In year 1963 Kenya became independent from the British colonists and was seen as a democracy until year 2007. During the elections in year 2007 electoral rigging was discovered. Conflicts between different tribes led to the death of thousand people and over 300 thousand people had to leave their homes. In year 2013, after 6 years of turbulence, the president *Uhuru Kenyatta* managed to take control over the situation and he is today facing many difficult challenges. For instance, the threat from the terrorist group *Al-Shabaab*, poverty, corruption, diseases like HIV and malaria and contaminated drinking water (Globalis, n.d. a). Also, one 3rd of the 50 million Kenyan population lives under the poverty line (lives on less than 1.9 dollar/day). Over half of the population live in slum areas and the country has an unemployment rate of 10%. The country's biggest export is tea and coffee, 60% of the population works with agriculture and 73% of the population lives in rural areas. (The Worldbank Group, n.d. a).

Facts:

Capital:	Nairobi	
Population:	51.4 milj	(2018)
Urban population:	13.9 milj	(2018)
Urban slum population :	56.0 %	(2014)
Unemployment:	9.1 %	(2018)
Population living under the poverty line (earn less than 1.9 $/day):	36.8 %	(2015)
Life expectancy:	67.1 år	(2017)
Primary school enrollment:	81.8 %	(2012)
Malnourished population:	24.2 %	(2016)

(The Worldbank Group, n.d, a)

Water and hygiene

Water is vital for humans survival and one of our most important resources on earth. Today 59% of the Kenyan population lack access to basic water services. Ten percent of the population practice open defecation and 9.4 million people get their drinking water from contaminated surface water. Only 14 % of the population have soap and hand-washing facilities at home (Unicef, n.d. a). The lack of clean water, poor sanitary and hygiene conditions, has a big impact on humans health since it increases the spreading of diseases (WHO, UNICEF, 2017). The worst affected are the children, where millions die every year because of diarrhea diseases, related to poor hygiene and bad drinking water (MSF Sweden, n.d.). Another group that is strongly affected by this are women. There are many cases of women that can't work because of poor hygienic conditions at their workplace, especially during their menstruation. In some cases girls also have to quit school when they get their menstruation because of poor toilets or lack of washing possibilities at school. Also, in 8 of 10 families women have the responsibility for collecting water, which can be a time consuming process what makes it hard to find time for school and work. This demonstrates that the access to clean water and good hygiene has a big impact on equality in countries. The access to toilets is also a safety issue, especially for girls and women. In areas with no toilets, girls and women often have to wait until dark to do their needs invisibly. Being alone in the dark comes with a higher risk of getting assaulted (WHO, 2017).

Reflection

It's important that The Humane School have good toilets and sanitary conditions. Hygenic toilets can reduce the spreading of diseases and improve the girls possibility to go to school in the village. In Sirende today, there are no sewage systems and most people get their water from private wells or communal water collecting points. Most houses have ordinary pit latrines (see next spread), but some have built their own water toilets. These toilets are built just like the pit latrines, but with a toilet seat and flushing system that flushes water into the pit. The water then filters through the earth while the solids stays in the pit.

Pit latrines

The pit latrine is a very common toilet solution in the slum areas and rural parts of Kenya (including Sirende) (Gudda, Moturi, Oduor, 2019). The biggest reason for it's popularity is that the pit latrine doesn't require sewage and water and is very cheap to construct.

A pit latrine is basically a pit in the ground, covered with a concrete floor with a hole in it. Users do their needs in the hole and after some years, depending on the size of the pit and the use, the pit is full. When he pit is full it's either being emptied and reused or closed and abandoned. Unfortunately the pit latrine doesn't sanitize the excreta properly, which can effect our health. The bacteria in the excreta can spread with surface- or ground water to wells and springs nearby. There are also some parasites that spread from the excreta, through the soil, and infect people through the skin, without help from the water. One example is the *hook worm* that has eggs that can survive up to 5 month in wet sandy soil (Carroll, Bitten, 1992).

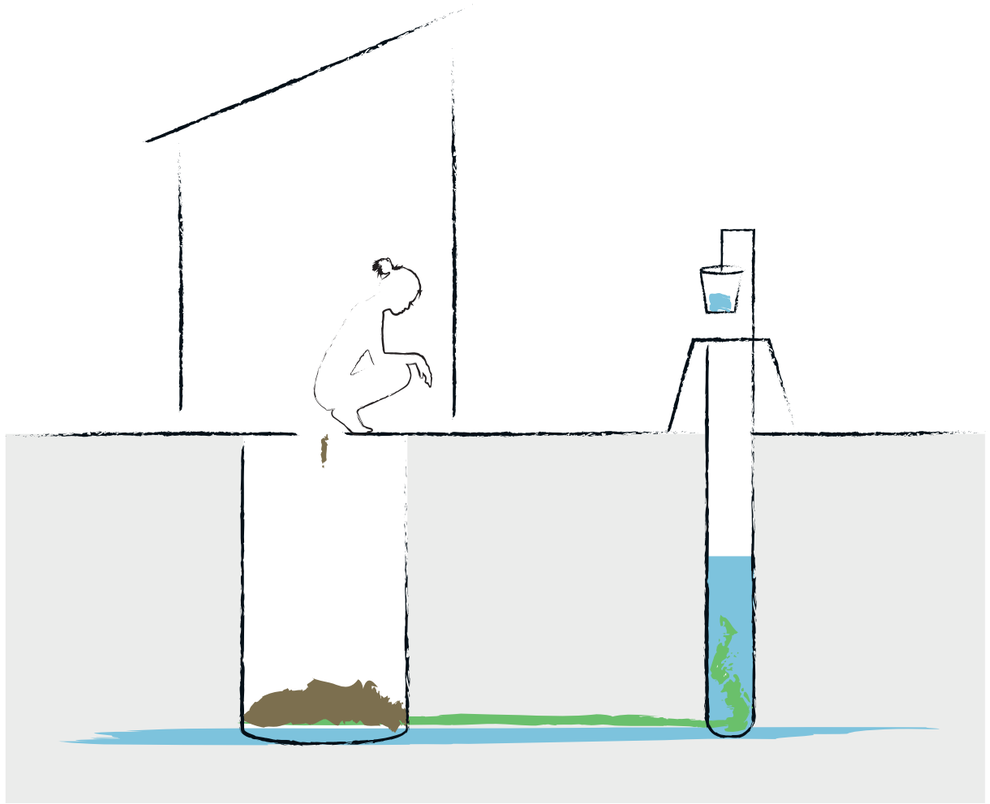


Illustration of how the bacteria can spread from the excreta to a well with help of the ground water.

School system in Kenya

There are 3 types of schools in Kenya: public schools, private schools and *Harambee schools*. The public schools are owned and funded by the government and free for everyone, except school uniforms and meals. The private schools are funded by organizations or private people and requires families to pay for the education. The Harambee schools are a combination of local fundraisers and support from the government. These schools are not popular anymore because of their bad reputation. The quality of the learning was often low and many schools had stagnated because of lack of political sponsorship or corruption. Today the Harambee schools have been taken over by the government, but their reputation hasn't changed (Kigotho, 2018).

Since year 1985 Kenya had a school model called 8-4-4, which included 8 years in primary school, four years in secondary school, and 4 years in undergraduate school. In 2019, the government decided to change the system to a 2-6-6-3 CBC-system. This includes 2 years in pre-primary school, 6 years in primary school, 6 years in secondary school and at least 3 years in undergraduate school. The biggest change with the CBC-system is that it's a competence-based curriculum. The grades had earlier only been based on exams, but now the students' technical skills and talent in creative subjects are being evaluated as well. The grading system in Kenya is A to F (F is a failing grade).

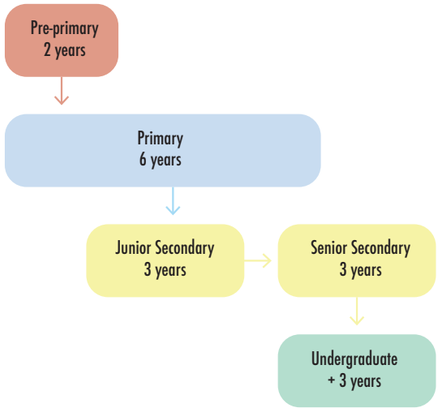
Physical punishment has been forbidden in schools since year 2001, but there are still teachers using physical punishment in schools today (Mweru, 2010). This statement was unfortunately confirmed by many people I spoke to during my study trip in Kenya.

The children start school at age five and hopefully finish at the age of eighteen or twenty one (depending on the level of education). In year 2003 the primary education was made free for everyone and the result was a 40% rise in school enrollment, from 5.9 million to 8.2 million students (Clark, 2015). Despite the increase, there are still 1.2 million children that don't attend primary school in Kenya today (Unicef, n.d. b). In year 2008 the secondary education was also made free which increased the education level in the country. These changes have also affected the enrollment at university level, which almost doubled from 2012 to 2014 (the time the 2003 primary school students reached university level). All this is a result of a big investment from the Kenyan government (Clark, 2015). Unfortunately it hasn't been enough and as a result many schools in Kenya are overcrowded, have inadequate latrines, and poor water and meal supplies. For instance, only 2 % of the primary school students use soap when washing their hands, even though it's a requirement by the *Kenyan Ministry of Education* (Unicef, 2012).

Steiner schools

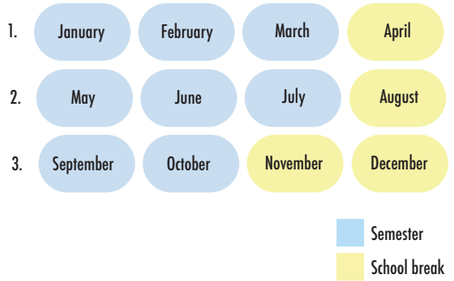
Today there are 3-4 Steiner Schools in Kenya. All of them are private schools with different tuition fees. Most of the schools are funded by Steiner organizations that substitute the intuitions fees for poor families. This makes it possible for children from different income groups to go to the same school, which is uncommon in other private schools in Kenya[1].

CBC school system



School Calendar in Kenya

3 semesters:



1. Mia, Juliet (Steiner teacher and member of The Humane School Board of Education). (2019-10-08) Interview in Sirende, Kenya

African tribes and culture

Todays Kenya has been inhabited by humans and our ancestors for thousands of years. Both African nomads, Arabs, Ottomans, and British has conquered the area throughout history (SAHO, 2019). Today Kenya is a country of strong culture and tradition, with influences from the whole world. 42 different nomad tribes have been recognized as the indigenous population (Ministry of EAC and Regional Development, 2019). The indigenous lifestyle, culture, and religion is still apparent in the country today. For instance, the old traditional house making techniques are still used when building houses, especially in the rural areas of Kenya. These houses are developed from hundreds of years of knowledge and practice and were, for a long time, optimal for the Kenyan climate. The traditional house building techniques changed when the country was colonized by the British in the end of the 19th century. The western influences, together with the innovation and new techniques from the industrialization, changed the Kenyan way of living. The Kenyans' will to install fridges, air conditioners and water toilets started to challenge the African house building tradition. The western architecture, with apartment complexes, malls, and villas started spreading over the country and is, even today, seen as something luxury and modern. While the cities were changing, the rural parts of Kenya, with a more poor population, still lived in traditional African huts[1].

Today the architecture, even in the rural parts, are developing into a mix between African tradition and western modernity. The village Sirende is a typical example of that. As I walked around in the village I could see many wattle and daub houses, but made after modern designs, with glass windows and spacious rooms.

1. Guide at the Museum Bomas of Kenya (2019-10-04) Study visit at Bomas of Kenya, Nairobi.

Traditional hut

Colonial hut / White Settlers hut (19th century)

Modern building with traditional influences

I believe that in order to create a viable school, that the locals can maintain, I have to make it relate to the village culture. If I don't anchor the design into the culture the risk is that the locals will sense the school as a "spaceship from Europe", and not something that belongs to them. In order to understand their traditional architecture I have studied the huts of the two biggest tribes in Sirende; Luhya and Kalenjin[2] at *The Museum of Kitale* (see next spread).

2. Mabele, Sammy (farmer at the Humane School in Sirende) (2019-10-08) Interview in Sirende, Kenya

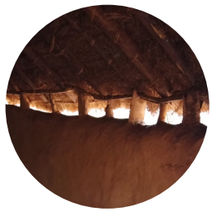
Straw roof

Wattle doors

Traditional hut materials and details:

Wooden structure

Wattle and daub walls



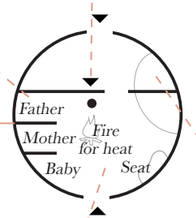
Light and ventilation gap between the roof and the ceiling

Kalenjin Settlement

Floor plan (no scale)

Stair up to the loft

Sleeping space



Main hut

2 doors to ensure an escape way if enemies attack.
Loft used for storage and hiding when enemies attack.

Cooking hut

Used as a kitchen during the day and sleeping place for children during the night.

Granary

Storage for dry cereals. Sits on poles to avoid water and parasites to get into the granary from the ground.

Hatch from the loft to jump down on enemies.

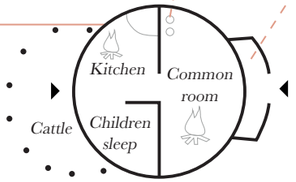
Storage

Luyha Settlement

Floor plan (no scale)

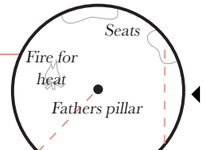
Place for warm pots

Place to hide when attacking enemies



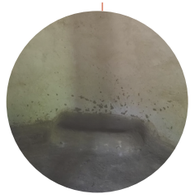
Main hut

2 doors to ensure an escape way if enemies attack.



Sleeping hut

Only for mother and father. When father dies the family break the middle pillar to show that they lack a father.



Shrine

Prayer hut, only used by the oldest in the tribe.

Granary

Storage for dry cereals. Sits on poles to avoid water and parasites to get into the granary from the ground.

Study time 4

- Reference projects

Mbagathi Steiner School

During my Kenya trip I wanted to learn how Steiner schools in Kenya operate and investigate if they have any architectural similarities with the Swedish Steiner schools. I therefore stayed 3 days at the *Mbagathi Steiner School* in Nairobi to observe and learn.

The Mbagathi Steiner School is the first Steiner school in East Africa and was built in year 1989. Today the school is located 20 km south of Nairobi and contains both kindergarten, boarding school and day school (Rudolf Steiner School, n.d). The kindergarten is divided into 4 kindergarten groups with 20-30 children in each, years 3-4 in one group and 5-6 in the other. In total the school has 325 students and 114 of them are in boarding school. The education goes up to 9th grade and there are around 30 students in each class. The school kitchen prepare one meal of corn and beans everyday to the students. Most students come from poor families in the area and get to school with the school bus[1].

1. Brown, Judith (Principal at Mbagathi Steiner School, Nairobi) (2019-10-02) Study visit at Mbagathi Steiner School, Nairobi.

Water and electricity

The school has electricity and gets most of its water from a borehole. By pumping and storing water in water tanks they get a relatively stable water supply. The school also collects rainwater from the roofs to use for farming or when the pump is out of order. Sanitation is very important at the school and therefore they have installed water toilets. The lack of sewage in the area has lead to an alternative way of handling the black and grey water*. Unfortunately this solution isn't 100 % sanitary, but based on the circumstances of the plot, it's considered a good alternative.

There is one tap in the dining hall that filters the tank water and makes it drinkable for the staff and students.

**Black water is the water from the toilets and grey water is water from taps, showers, kitchen etc.*

Farming

The farm on the site provide the school with fresh fruit and vegetables. These are used for cooking to increase the nutrition value in the student meals. In case of over production the excess harvest is sold to the community and generates an income to the school. The farm also serve a pedagogic purpose by letting students help out on the farm. This way they learn about nature, biology, the environment and our ecosystem, which is important in the Steiner education.

The organic waste is collected for composting and decompose into high nutrition soil that can be used for farming [1].

1. Farmer at the Mbagathi Steiner School (2019-10-02) Study visit at Mbagathi Steiner School, Nairobi.

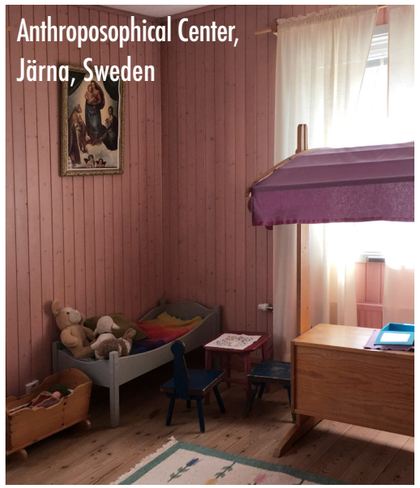
Students are helping out with the farming

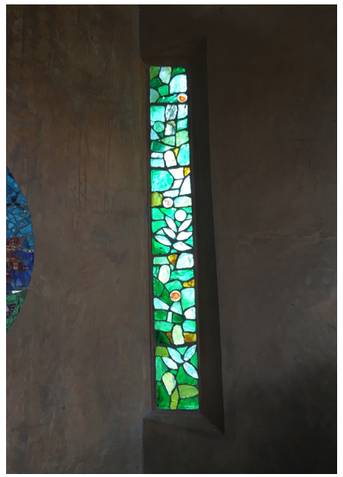
The compost

Similarities with European Steiner Architecture

Surprisingly I found the architecture at Mbagathi Steiner School very similar to the architecture at the *Anthroposophical Center* in Järna, Stockholm. Even though the Steiner school *Örjanskolan* (part of the Anthroposophical Center) and the Mbagathi School, are built far from each other, on two very different locations, in two completely different societies, they still have some architectural concepts in common:

- Both schools try to work with organic shapes and have very few square-shaped classrooms.
- The pink color, used as a connection to birth, are used for the interior in the kindergartens of both schools.
- Both schools try to use little plastic and chemical materials in the interior. Focus is on natural materials, such as wood and stone.
- Colored glass and glass art can be found in both Järna and at the Mbagathi School. Ornamented doors and windows is also common.
- A lot of effort has been put into handicraft and details.





Eco Moyo Education Center

To get inspiration for my own project many people recommended me to visit *Eco Moyo Education Center*. Even though the school was located on the other side of the country I decided to travel there to get a better understanding of the building possibilities and the concerns.

Eco Moyo Education Center is located on the East Coast, in the small village *Nzunguni*, outside Kilifi Town. It opened in year 2015 and today 131 students are enrolled, with 15 being in boarding school. The school has one kindergarten class and primary classes from grade 3 to 6. The goal is, within a few years, to stop with the boarding and have a full curriculum with classes all the way from kindergarten to grade 6.

The school is an initiative by *Lindsay Sanner*, a Norwegian woman, that has built the whole school with help of sponsors and different student groups. Most buildings have been designed by architecture students from *AHO* and *NTNU* in Norway. This has resulted in a creative, playful and modern design of the school, but with respect for the local culture[1].

1. Sanner, Lindsay (owner of Eco Moyo Education Center) (2019-10-21) Study visit at the Eco Moyo Education Center, Kenya.

Teachers room

Classroom

Water tank with tap outside the toilets

Water and toilets

Just like at the Mbagathi Steiner school, there is no sewage system and no stable access to water at the school. They have built some taps that are connected to the communal water points, but in order to be able to provide water for 131 students they have focused on rain water collection from the roofs. Almost every roof is designed so that the rainwater collects to a tank. The tank water can later be used for hand washing and cleaning or as a supplement when the communal water is out.

The school has pit latrines (also called ”long drops”) as toilets. See page 32 for more information about the pit latrines.

Pit latrine

Water collecting from the roof

Material

The walls are made of coral blocks. It’s a cheap, durable, easy accessible and local available material. Unfortunately it’s not environmentally friendly since the coral blocks are being carved out from coral stone, a limited resource on earth. In Kenya, quarries are also often left unreclaimed and unfilled after the quarrying, which creates dangerous land areas that can’t be used for anything (Macoloo, 1994). The use of cement in between the blocks also has a negative impact on the environment. To give a more traditional ”red earth look” to the buildings, the walls have been plastered and painted in red ochre.

The majority of the roofs are made out of corrugated steel sheets and timber. The buildings with more traditional African design have straw roofs, braided in the Kenyan traditional way. Another connections to the African building tradition is the gap between the wall and the roof. This gap is created to ventilate the buildings, just like in the old traditional African huts[1] (see page 37).

1. Guide at the Museum Bomas of Kenya (2019-10-04) Study visit at Bomas of Kenya, Nairobi.

Sourse: www.meteoblue.com

5

Enough traveling, start working

- Research and workshops

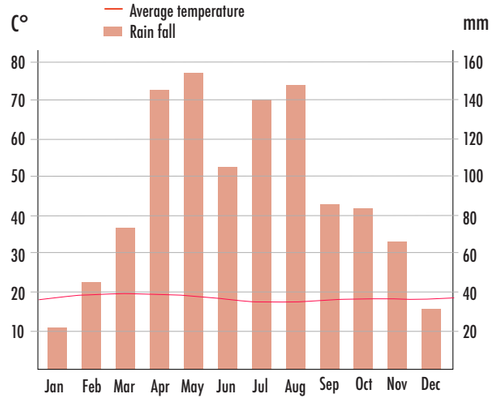
Sirende

The existing Humane School is located in Sirende, a village in the *Trans Nzoia County*, located between the cities *Kitale Town* and *Elodret* in Western Kenya. I spent two weeks in the village to meet the people, visit the school and get to know the teachers and pupils to understand their needs, expectations and wishes. I also visited the site for the new school.

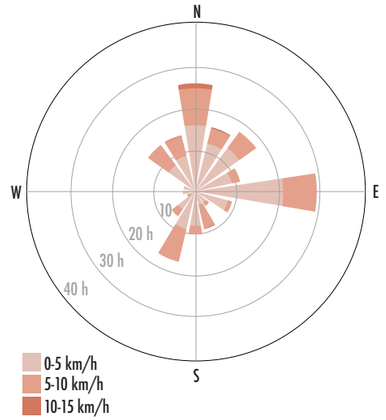
There is no official number of habitants in Sirende, but the locals estimate that there are around 2800 people living in the village. Most of the people are small scale farmers or small scale shop keepers and have an income between 1-3 $ a day. The locals estimate that most people live on the poverty line (earns 1.9 $ a day). 90 % of the children start primary school, but many have to drop out in high school because of difficulties to afford school fees (such as school uniforms, lunch etc.)[1].

The climate in Sirende is dry during December to February and rainy during April to August. September to November and March are considered stable months with less rain but not dry. The day temperature is around 25° all year around (Climate-data, 2019).

1. Mia, Juliet (Steiner teacher and member of The Humane School Board of Education). (2019-10-08) Interview in Sirende, Kenya



Temperature and rain fall diagram, Sirende
Sourse: Climate-data.org



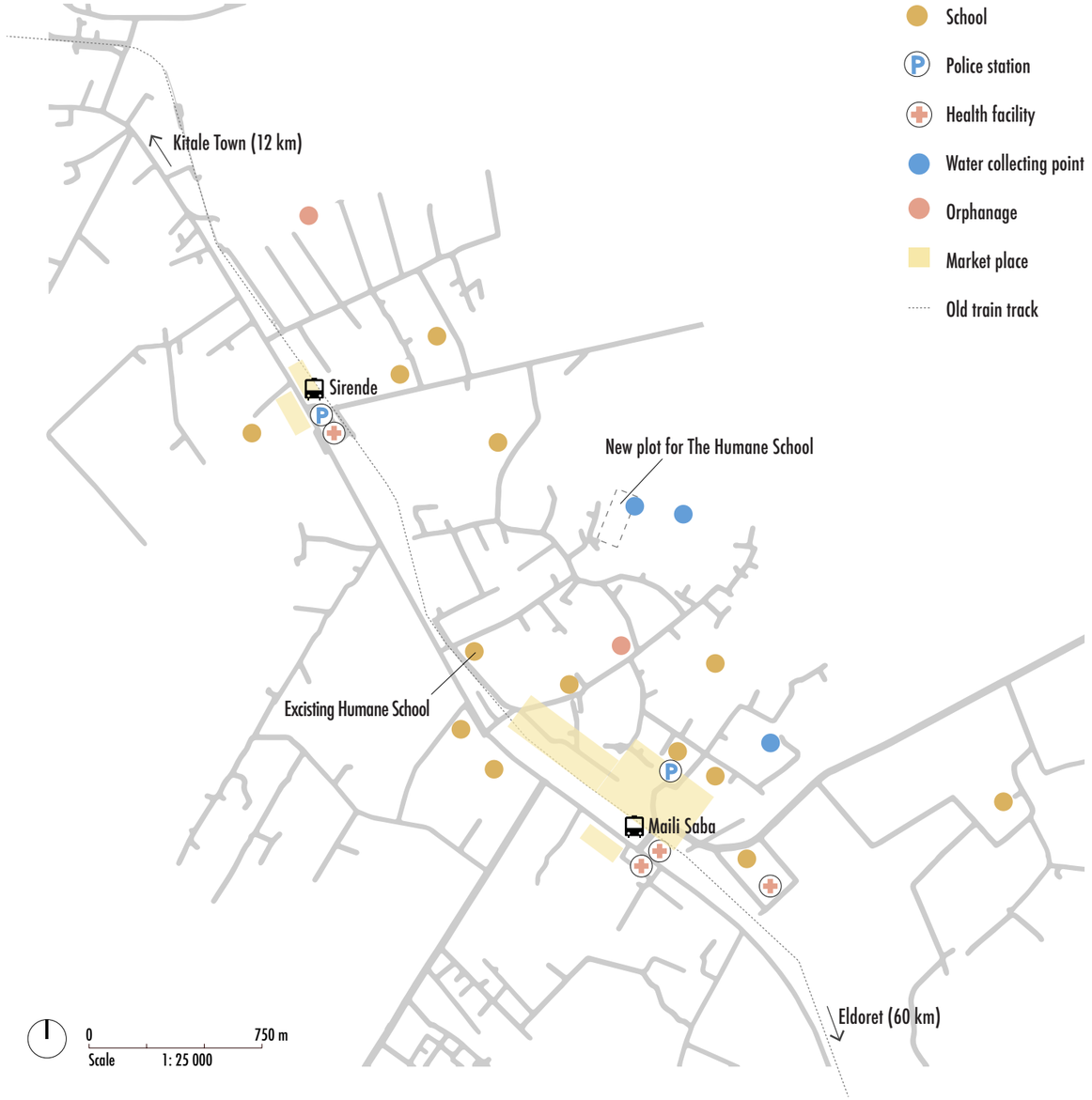
Wind rose, Sirende. Shows wind speed and direction.
Sourse: Climate-data.org

Road to the Humane School, Sirende

Sirende map

Since Sirende is a small, rural village it was difficult to find information about it. I therefore decided to learn about the village with help of the locals. I brought a map to a group of locals and asked them to point out all schools, police stations, health facilities and water collection points etc. in the village. They were very proud of their community and claimed that Sirende is a village where everyone feels safe everywhere. On the other hand, they mentioned that there is corruption and crime, but less than in other villages.

Maili Saba area, Sirende



The Humane School today

The Humane School opened in year 2008 and today consists of 2 kindergarten groups and primary classes from 1st to 8th grade. The school has around 135 students with 7-16 children in each grade. These are very small classes compared to the classes in public school where one class can have up to 50-60 students[1]. Having small classes makes it possible for the teachers to focus on the individual learning process of each student. Many students, that earlier have been enrolled in public schools, state that another difference between the Humane School and public schools is the relationship between teachers and students. The teachers at the Humane School are seen as family for the students and not like distant authorities. One girl also shared her public school experience of physical punishment by the teachers, something that she claims never happens at the Humane School.

During my stay in Sirende, on the 8th of October, the school inspection came to visit the school. The school inspectors concluded that the school was in too bad shape for being open and gave the school less than two months to improve the poor conditions. Their main concerns were the lack of outdoor space for the students, lack of permanent structure for the facilities, and the lack of proper teacher education (the Steiner teacher education isn't approved as an education in Kenya). This came as a chock for both me, the teachers and the rest of the community. There is no way a new school with permanent structure can be built in less than two months. I realized that the need for a new school was more urgent than I first expected.

1. Mia, Juliet (Steiner teacher and member of The Humane School Board of Education). (2019-10-08) Interview in Sirende, Kenya

Classroom

School building

Materials

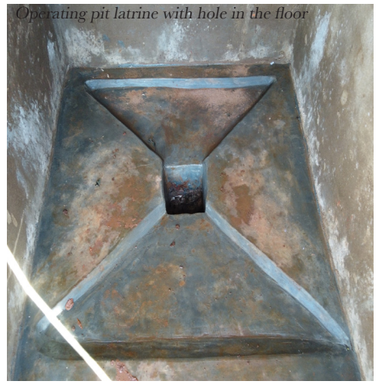
The school is made out of wattle and daub and built in a traditional African way. The surface was once plastered, but much of the plaster has fallen off because of heavy rain falls. The pitched roof is made out of corrugated steel sheets, a material that is used for most roofs in the rural areas of Kenya.

Toilets and water

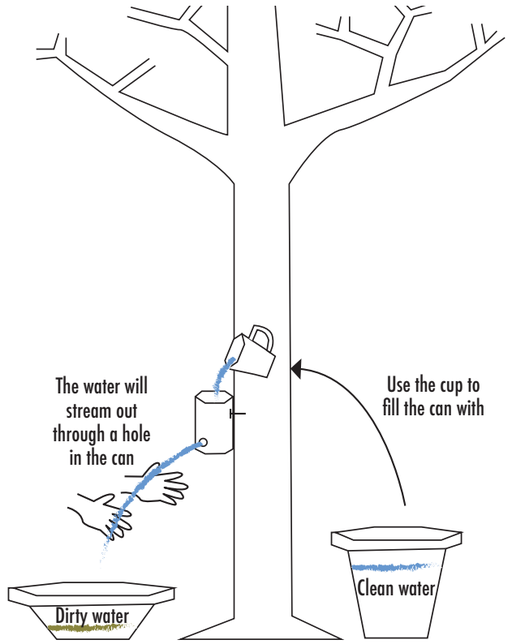
There is only one tap on the plot that is supplies the whole school with water. The water gets pumped from a small well that often dries out because of its under-sizing for the demand. The water is therefore mainly used for cooking. Since there is no sewage system in Sirende, like in most rural areas, the school has solved the toilet issue with pit latrines. Ideally a pit latrine should be emptied when full, but in many cases it's cheaper to just build a new one. Therefore the school has covered the old pit latrines with cement and dug new pit latrines next to it. This has resulted in that several abandoned cement sheds are spread out over the plot. These can't be removed or used for anything, which is a waste of space on the already overcrowded plot.

The old pit latrines at the Humane School

Cement covered pit latrine floor



Operating pit latrine with hole in the floor



Hand Wash Workshop

Me and my twin sister Sara had a talk about the toilets with two girls in grade 8. Both of them expressed that the lack of possibility to wash their hands after the toilet visit was a big issue, especially during their menstruation. Me and Sara started thinking about how we could solve the issue and came up with a cheap and easy solution (see drawing). We went to the market and bought 4 pots, 3 empty cans and 2 cups. Later that afternoon we had a workshop with the students and together we built 3 hand washing stations, one for the girls, one for the boys and one for the kindergarten children. The workshop was very successful and, not only did the school end up getting better hygienic conditions, but the students also improved their self confidence in being able to accomplish something on their own.

Financing

Kenya is today a country that relies on financial aid from other countries (Globalis, n.d. b). This explains why it's also difficult for the Kenyans to run the Humane School without financial aid. The school support mainly comes from sponsors in Sweden. Each sponsor pays 200 Swedish Krona every month and it covers one month education for one child, including rent, teacher salaries and one meal. Today there are around 88 sponsors that will continue to help finance the run of the new school[1].

The construction of the new school is a big expense that needs bigger sponsors. The work with finding sponsors is in full swing, but it's a complicated and time consuming process. The Humane School is therefore planned to be built in phases, where each phase starts when enough money is collected. The result of this is that part of the new school can be built and used while waiting for funding of the remaining phases.

1. Varis, Anja (Steiner teacher and project leader) (2019-05-04) Interview in Järna, Stockholm

Expected program of the school:

- 2 kindergarten classes*
- 6 school classes (grade 1-6)
- Ecological farming + cattle
- Dining hall
- Kitchen
- 10 Toilets (Based on recommendation from *Tanzania Ministry of Health (Carrol, Britten, 1992)*
- Outdoor space/Play ground
- Teachers room
- Office and Reception
- Eurythmy hall
- Sport fields

Staff and students:

- 50 kindergarten children*
- 150 students (25 in each grade)
- 6 teachers
- 2 preschool teachers*
- Caretaker
- Chef
- Watchman (only during after school hours)

Total: 200 enrolled children and 11 employed

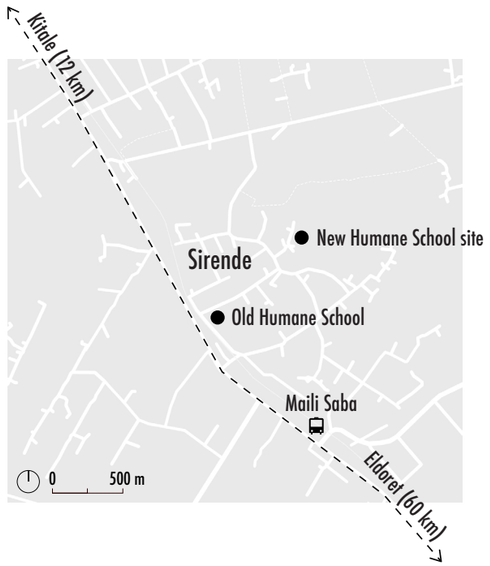
* Sabine Lepére, architect and member of ASF Sweden, has already made a design proposal for the kindergarten (read more about it in "Sabine's proposal" page 72-73 . All *-marked things has therefore been taken care of in her work and won't be processed in my proposal.

The information is based on Sabine Lepére's research, 2018

The new site

The location of the old school is very central, next to the big *Maili Saba* market. This location is optimal and makes it possible for all children to safely walk to school every day. The best scenario would be for the new school to be built on the existing site. The problem is that the site consists of several plots that are owned by different people with different interests. These people have so far rented out their property to the school, but now some of them want to sell. This creates an uncertainty for the school's future existence. To eliminate the risk of getting kicked out from the site, the focus has been to buy a plot elsewhere in Sirende, since ownership of the plot provides stability. The criteria for the new plot was:

- Central location so that teachers and students can walk to school
- Reasonable price
- Big enough for the program of the school
- Close to water to enable water collection for the farming.



After evaluating many sites the interest fell on the *Nderitu farm*, north east of the existing school. Today half of the plot is filled with coffee plantation and the other half is a kitchen garden with 2 small mud houses. This generated an idea that the mud houses can be used as a kindergarten before the building of the new school starts. Since the existing school didn't have funds to buy the plot on their own the solution became that the German anthroposophical organization *Freunde der Erziehungskunst* bought it, with the agreement that the school can rent it for free. The price for the plot landed on 208 000 $ and today only 2/3 of the plot is paid for. The last part of the plot is planned to be purchased in year 2021[1].

1. Varis, Anja (Steiner teacher and project leader) (2019-05-04) Interview in Järna, Stockholm


1. South path


5. Coffee plants


2. Gate + Watchman's house


6. Woods


3. Mud Houses

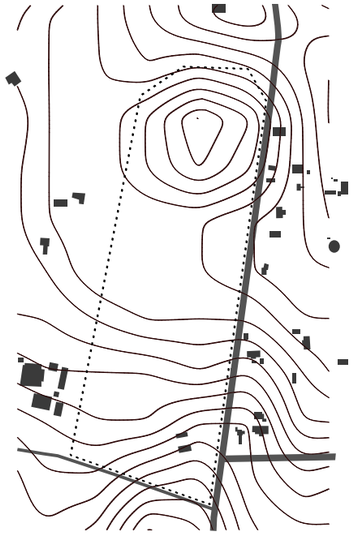

7. Water collecting point


4. East road

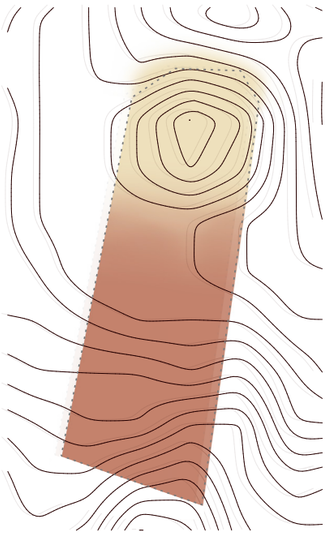

8. Spring

Plot analysis

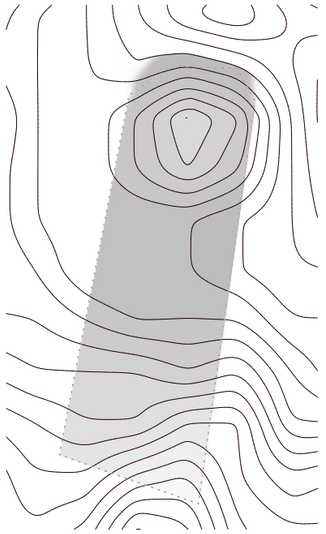
The Plot



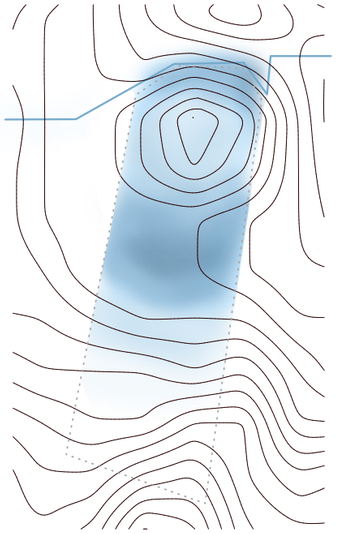
Roads and buildings



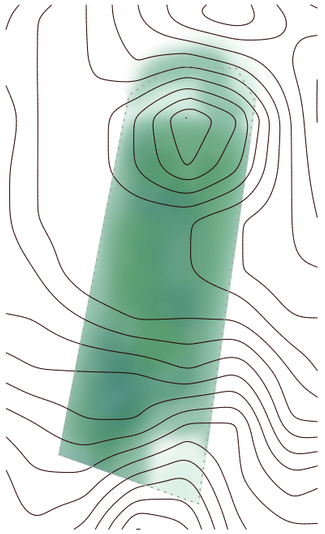
Soil types



Topography



Flood risk areas



Vegetation

Farming

Farming is a part of the curriculum at the Humane School, just like at the Mbagathi Steiner school. Since today's plot is small and only have very little space for farming, the farm has expanded to Juliet's plot (a school teacher that lives neighbour to the school). Almost every day school classes take turn to take care of the chickens or prepare the harvest. In this way the students learn about farming, nature, environment, biology and ecosystems. Inspired by the Mbagathi Steiner School, the teachers want to develop the farm at the new school site. They hope that a bigger farm can provide food for the students and generate an income to the school.

After talking to Sammy Mabele, the farmer at the school, I learned that there are two types of soil on the new plot:

- 1/3 of the plot is sandy soil, which is bad for farming.
- 2/3 of the plot is red soil which is excellent for farming.

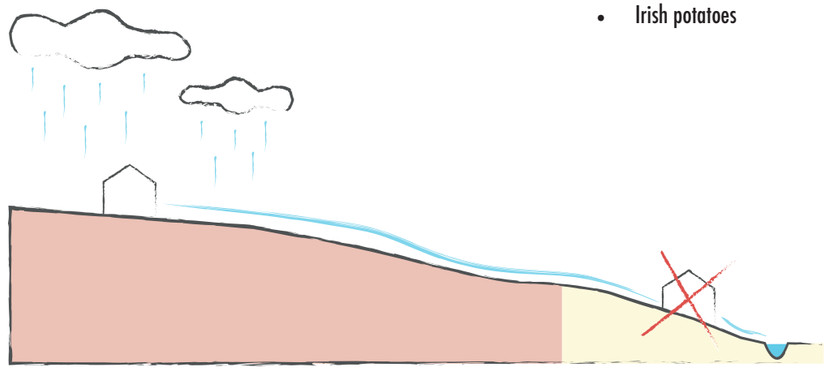
Ideally the new school buildings would be located on the sandy soil, since that ground is harder to use for farming. What makes it complicated is that the whole plot is sloping towards the spring, and the sandy soil is closest to the spring. This means that if the school is located at the end of the slope, the big flow of surface water will increase the risk of flooding the buildings. The best way to avoid flooding is for the school to be located on the highest point of the plot instead, where it's dry. Unfortunately the highest point is also where the best farming soil is. These conditions made it difficult for me to decide where to locate the school. After talking to Sammy Mabele I found out that there are some plants that can successfully be farmed in sandy soil. Based on this information I decided to place the school on the high part of the plot.

Sandy soil plants

- Sweet potatoes
- Peanuts
- Spinach
- Cabbage
- Kale
- Bananas
- Arrow roots
- Sugar Cane

Red soil plants

- Coffee
- Maize
- Beens
- Avocado
- Lemon
- Mango
- Paw paw
- Zucchini
- Cauliflower
- Broccoli
- Trees
- Irish potatoes

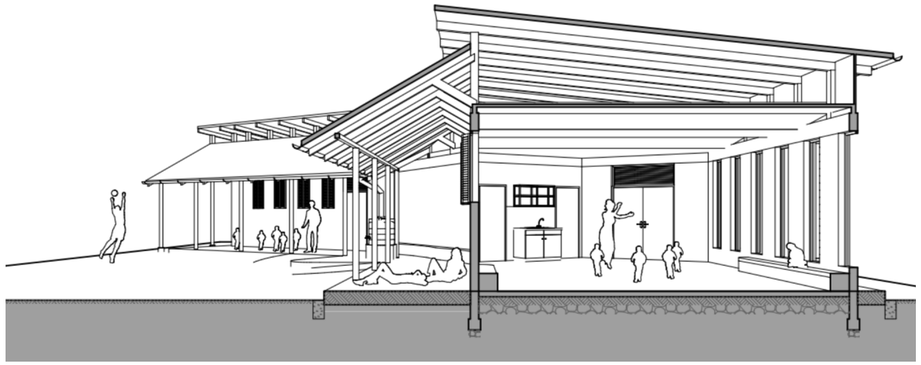


Sabine's proposal

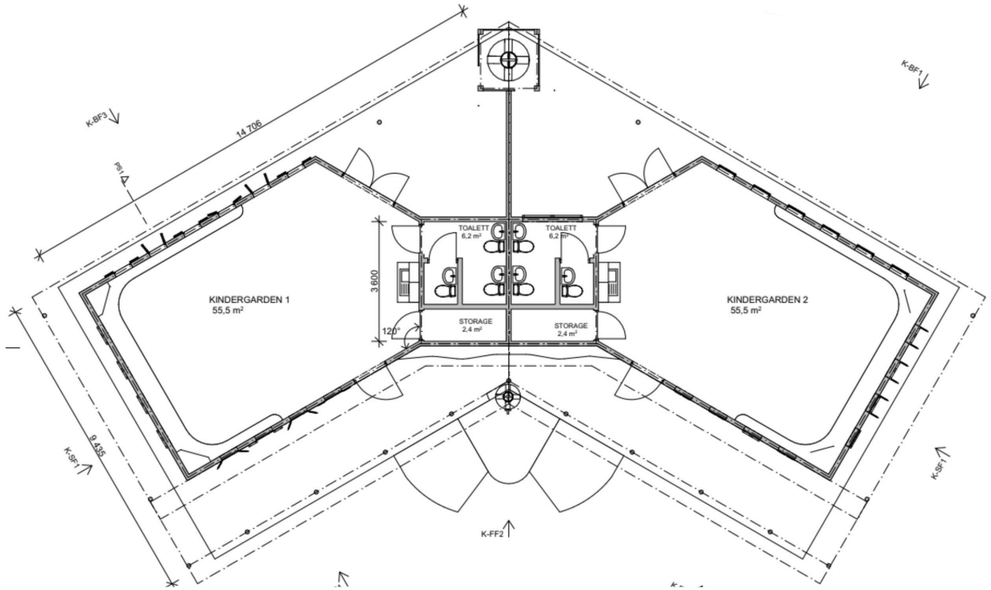
Sabine Lepére, architect and member of ASF Sweden, started with a design proposal for the kindergarten in year 2018. The kindergarten is designed for 2 classes, with 25 children in each class. Since the plot wasn't purchased when Sabine made the design, the building doesn't have a set location yet. This means that my task also includes finding the right location for the kindergarten on the new site. After sharing Sabine's drawings with the organization *Freunde der Erziehungskunst* (big sponsors of the project), the proposal got criticized to be "too expensive" and concerns that the locals might see it as a "gift" from Sweden rather than their own project. Their biggest concern was the cost for installation of water pipes and drainage system for the toilets. The message from Nana Göbel, member of the executive board at *Freunde der Erziehungskunst*, was clear: water toilets are unreasonable, you have to come up with another solution.

Reflection

The critic of Sabine's proposal was very valuable for me. It gave me a better understanding of what challenges I had to face in order to create a reasonable proposal for the school. After some research I realized that the toilet situation won't be easy to solve on my own, and if I don't find a good toilet solution this whole project might go wasted. This is when I reached out to my twin sister, civil engineer Sara Sundström Konradsson, and asked her to help me find a good toilet solution for the school. Sara accepted the task and did a lot of research on toilets during our trip to Kenya.



Drawing of Sabine's kindergarten



Floor plan of Sabine's kindergarten

Sabine's workshops

Sabine Lepére made several workshops with different target groups during her stay in Sirende, summer 2018. I have gone though all of Sabine's work in order to avoid making the same workshops as her during my visit in the village. I have decided to summarize the result of three of her workshops what will be used, together with my own workshops, as a basis for my design of the new school.

Picture of Sabine's workshop, taken by Sabine Lepére, June 2018

Picture of Sabine's workshop, taken by Sabine Lepére, June 2018

Workshop 1: Building materials

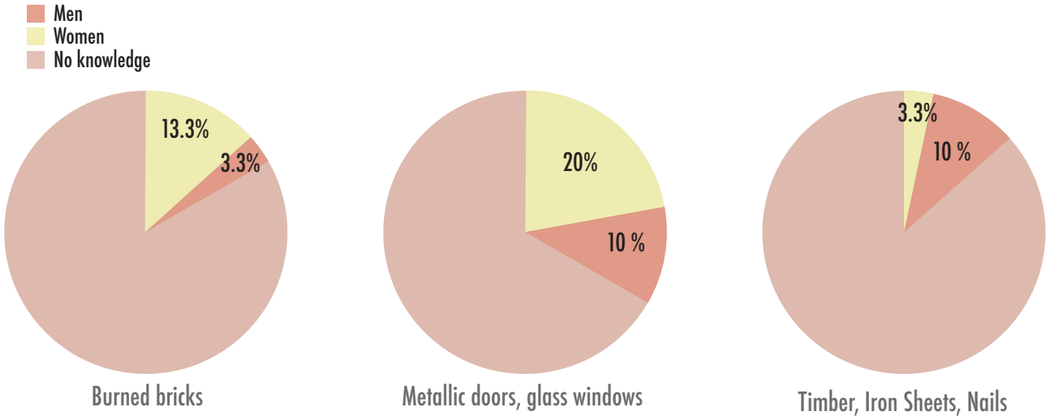
In the first workshop Sabine gathered 30 locals and asked them to write down all the materials they knew on post-IT notes. Through a discussion and with help of a rose-template, they identified which materials are best suitable for the school buildings. They also identified how many of them could produce the material, had the knowledge to build with it, or knew anyone else that had experience with the material.

Date: 8/7 2018
Place: Sirende
Participants: 30 locals
Lead by: Sabine Lepére

Comment

I use the result of the workshop as a representation of the material knowledge of the village population. I know there are some risks with this conclusion since the people in the workshop weren't carefully selected to make sure they made a reliable representation of the whole village. Some participants may also have wrongly claimed they know the material in hope of getting a future job.

Result: Material knowledge:

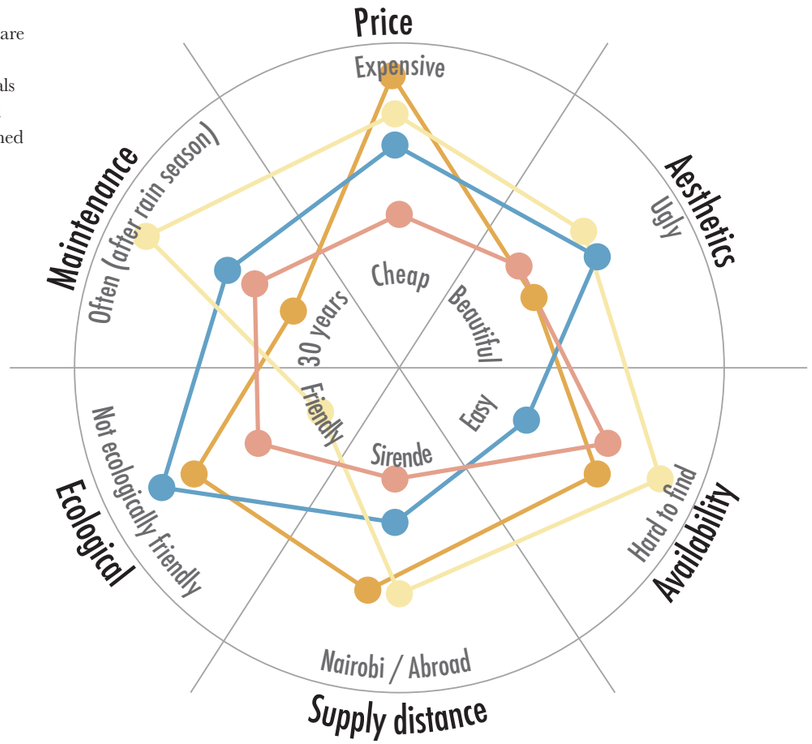


Material Rose

The result from the rose shows that the locals think burned brick is the most suitable material for the school since it's cheap, beautiful, locally and easy available, ecological friendly, and requires little maintenance.

Reflection

Unfortunately only a few materials are included in this rose. It would have been valuable to have more materials evaluated. For example, timber and iron sheets, since they were mentioned in the material knowledge.



Workshop 2: Identifying design principles, programmatic elements and qualities of spaces.

Date:	9/7 2018
Place:	Sirende
Participants:	13 teachers
Lead by:	Sabine Lepére

In the second workshop Sabine collected a group of teachers and asked them to write down important criteria for the school on Post-IT notes. Each teacher then had to go through his/her criteria and put the notes up on a black board. Many teachers had written similar criteria on their notes and after an open discussion they compiled a list of the most important ones.

Result: Important criteria:

- Animals and organic farming
- Big playground far from classrooms
- Availability of water
- Enough space and natural light
- Security
- Kitchen with dining hall + multipurpose room
- Toilets
- Use of local materials
- Waste management
- Landscape and space between buildings

Quotes from the teachers:

Workshop 3: Layout and relations

Date: 26/6 2018
Place: Sirende
Participants: 13 teachers
Lead by: Sabine Lepére
Material: Black board, chalks, pencils, Post-IT notes

In the 3rd workshop Sabine focused on the landscape and the relation between the buildings and functions on the site. The teachers were divided into two groups (6 in each). They were then asked to write the functions from the program of the school (see page 65) on Post-IT notes. A drawn squares on the ground symbolized the site and each group placed the functions on the site, based on the most sensible layout. The two groups then presented their layouts and identified what elements they had in common. The common elements were written down so that it could be used as a guide to a good layout of the school.

Result: Common elements:

- Watchman's house by the gate.
- Office + reception near the gate and visible from it.
- Short distance between the kitchen and the office.
- Kitchen and hall together
- Placement of the classrooms: arranged around an open courtyard. Lowest classes closest to the outhouse toilets, located on the backside.
- Garden and farm beside each other and separated from the rest.

Pictures from the workshop, taken by Sabine Lepére. June 2018

My Workshops

After going through Sabine's material I realized that there are more information I want to collect from the locals. I therefore decided to arrange my own workshops during my stay in Sirende. The goal with these workshops was not only to gather information, but also to strengthen the local involvement in the project. I believe that the more involved the locals feel the more they will relate to the school as theirs. This is an important aspect in order to anchor the project in the community and make it last[1].

Method

The methods for my workshops are inspired by Sabine's workshops in Sirende and from another ASF-project called *In Situ Studio Bhubaneswar Cuttack* (Selberg, Lepère, 2018). The idea is to involve the participants in the project and, in a creative and playful way, make them discuss the topics. I hope that the playfulness makes the participants relax which increases the probability that they will share their thoughts with me. The goal is to get independent and spontaneous thoughts from the participants and not having them say what they think that I want to hear. This is a challenge, but creating a safe, non judging environment for the workshop is the key to success.

Tools and material

I believe that using tools that the participants are familiar with makes them feel more comfortable to participate in the workshop. I mean, we all know how uncomfortable we feel every time we need to present something using an unfamiliar technical tool. Using their own local tools also facilitate my job by not having to carry material and tools all the way from Sweden. Sabine's workshops are great examples, because in her workshops she used their black board, the ground as sketch paper for the site, and Post-IT notes to write on. I have therefore decided to use the same tools in my workshops. By using the same tools I also hope that I can clarify to the locals that my work is a continuation of Sabine's.

1 Varis, Anja (Steiner teacher and project leader) (2019-08-12) Meeting in Järna, Stockholm

Workshop 4: Generating income

In the paragraph about finance (page 64), I mentioned that the schooling is mainly funded by monthly donations from Swedish families. The donations are collected in Swedish Krona and then converted to Kenyan Shilling. Depending on the exchange rate, the school gets different amounts sent from Sweden every month. Significant changes in currency exchange rates can therefore create an uncertainty in the amount of funding. The budget collected from Sweden also doesn't include extra costs that could occur from unpredictable events, such as weather damage etc. In order for the school to become more economically stable they need to find an income that enable savings. These savings can later fill in the budget gap of the currency changes or extra costs. Unfortunately corruption is a common issue in Kenya and storing saved money in an organization can always be a risk (Worldbank Group, 2018, b). This is something Föreningen Sofia is aware of and will prevent in the future.

Goal

The goal of the workshop was for the teachers to come up with ideas that could generate an income to the school. I felt it was important that the initiatives came from them, and not from me, in order to strengthen the local involvement in the project. Before I even started the workshop I briefly asked around if the teachers had thought about income strategies. It turned out that it was a well discussed subject and an income strategy was already developed for the school. I therefore cancelled the *Income workshop* and instead focused on helping my twin sister with the toilet workshop (see next spread).

Income strategies

- Sell the excess crops, vegetables and fruits from the garden, just like they do at the Mbagathi Steiner School.
- Have a tree farm where the students, together with the locals, plant trees one day every year. The goal is both to sell the timber but also to encourage the locals to plant trees and educate them about the benefits. Trees both help reduce the carbon dioxide in the atmosphere and decrease desertification and soil erosion. Today only 7.6 % of Kenya is covered with forest, which is 2.4 % less than the target level. The Kenyan government is therefore working with extending the tree plantation in the country (Ohage, 2018). The tree farm is the Humane School's contribution to the program.
- Save some of the existing coffee plants and try to sell coffee beans to The *Kenyan Coffee Board*.

Workshop 5: Toilet solution

At first pit latrines seemed like the easiest and cheapest toilet solution for the school, but after consulting with sanitation experts from *A2T (a Swedish sanitation company)*, we concluded that pit latrines are a very risky option. The biggest concern is that the bacteria from the excreta can contaminate the spring on the plot. The fact that the plot is sloping towards the spring increases the contamination risk even more because the slope can help the water to transport the bacteria. We also found out that 1/3 of the soil on the plot is wet, sandy soil, which is perfect habitat for the *hook worms** (Carroll, Bitten, 1992). Based on the conditions of the plot, pit latrines aren't a sanitary option. Me and my twin sister Sara therefore had to investigate other toilet options. After contacting several companies and hearing about their alternative toilet solutions we decided to ask the teachers what they thought would be the best alternative for the school. We also believed that this was a good opportunity to involve the users in the project and on the same time get a better understanding of their needs.

Date:	8/10 2019
Place:	Sirende
Participants:	12 teachers
Lead by:	Sara Sundström Konradsson
Material:	Black board, chalks, pencils,
Workshop:	notebooks, Post-IT notes

- Sara compiled the most relevant alternatives and gathered 12 teachers from the Humane School.
- She then held a presentation of each alternative and its costs by drawing the alternatives on the black board.
- After the presentation the teachers were divided into 3 groups (4 teachers in each group).
- Each group then discussed the different alternatives for 10 minutes to identify their favourites.
- The results of each group was then presented by letting every group put up Post-IT notes on the black board, next to the drawings of their favourite solutions.
- Later the discussion continued in a bigger group discussion, with the goal to identify the positive and negative aspects with the solutions.

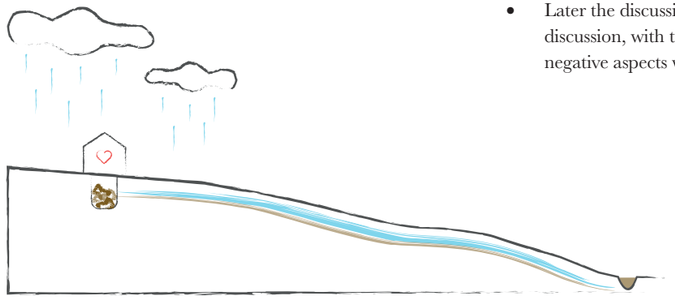
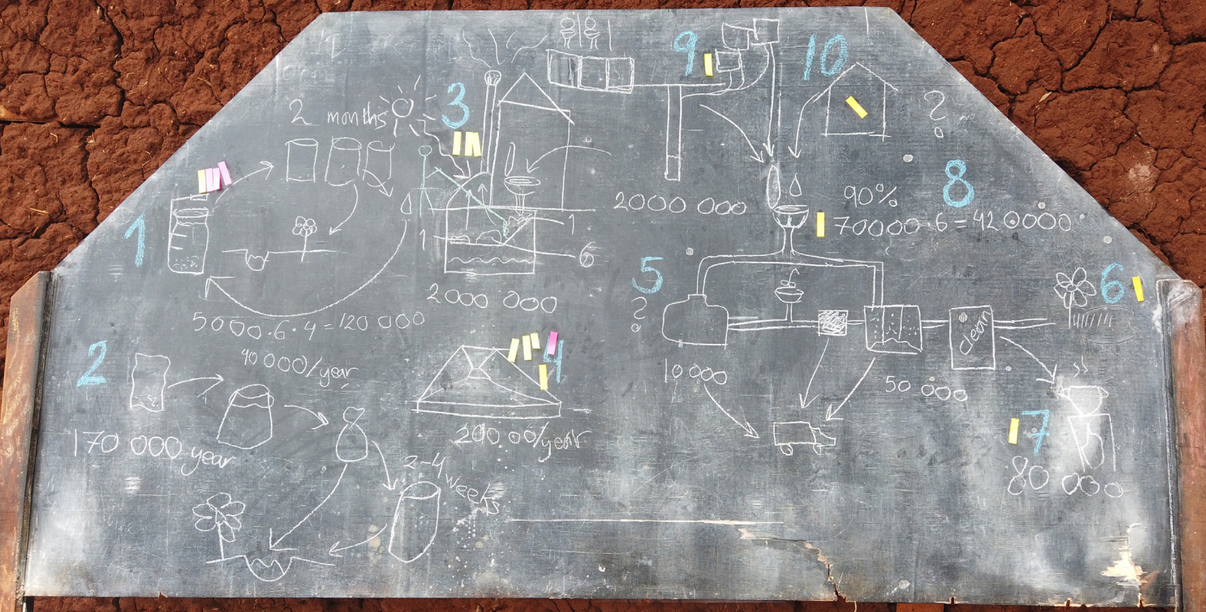


Illustration of how the bacteria contaminate the spring

Toilet alternatives:

1. **SaniTrin:** The Swedish companies IAS and A2T developed a toilet tank that sanitizes and decomposes the excreta to soil with help of Trinibakt powder[1].

2. **PeePoo:** A Swedish company that developed a biodegradable plastic bag with Urea powder. The bag should only be used for solids and the powder decomposes the excreta into soil in 2-4 weeks. This solution is often used in slum areas[2].



3. **Enviro Loo:** Developed by a Kenyan company. The liquids gets separated from the solids and by letting the sun heat the container the liquids vaporize and the solids decompose[3]. More about this solution can be read on the next spread.

4. **Pit Latrine:** Traditional toilet solution that consists of a pit in the ground. Pit latrines has been used in Kenya for generations and is a well known product. Read more about it on page 32.

5. **Biodigester :** The excreta goes to a tank system under ground that separates solids from liquids and uses bacteria to decompose the solids into soil[4].

6-10. More advanced biodigester solutions where the residual soil can be used for farming, or the residual bio gases that gets created during the process can be used for cooking etc[5].

1. Zetterlund, Andreas (Chief Operating Officer at International Aid Services in Sweden (IAS) (2019-09-30) Meeting in Stockholm, Sweden.
2. Wilhelmson, Anders (Founder of PeePoople) (2019-09-23) Meeting in Stockholm, Sweden.
3. Wanjiku, Lucy (Lead Engineer at Enviro Lodgic LTD) (2019-10-04) Meeting in Nairobi, Kenya.
4-5. Brisson, Muia (Professor at Nairobi University, Dept. og Clinical Medicins and therapeutics) (2019-10-04) Meeting in Nairobi, Kenya.

Result

In the beginning it was difficult to get the teachers to speak up and share their thoughts. The reason for that might have been the taboo of the subject or that they didn't feel comfortable with speaking English in front of us. After some time, and some encouraging comments from Sara, they carefully started commenting the toilet solutions. During the discussion the teachers agreed on following:

- Pit latrines are the best option due to the affordable price and the students familiarity with it. Unfortunately the solution isn't sanitary because of the risk of bacteria spreading from the excreta to the soil and water.
- Ordinary water toilets will be too expensive because of the requirement of sewage system (which don't exist in the village).
- Using soil made from human excreta for growing pasture for the animals is a good idea.
- Biodigesters are good, but expensive and who is going to maintain the toilets? Who is going to handle the excreta during the decomposition process? Biodigester toilets also require a lot of water which can be an issue since there is no stable water source on the site.
- The Enviro Loo is interesting, but once again: who is going to handle the excreta?
- Drilling a bore hole to secure the access of water is a good but very expensive idea.
- Using Peepoo bags can be too complicated for the younger children and the school might get issues with the deliveries of the bags.

Reflection

Based on the discussion we could tell that the pit latrine was the teachers' favourite toilet option. Sara and I still decided to not propose it for the new school because of the known contamination risk. In general the teachers didn't seem to understand the consequences of using the pit latrines and showed very little interest in other options. I think it mostly depended on the fact that they were familiar with the pit latrines and hadn't used anything else in their whole lives. They had also never experienced any complications with the pit latrines and therefore had trouble to understand the serious impact the bacteria can have on the spring. Me and Sara instead decided to further investigate the Enviro Loo solution since it lives up to our expectations: it can be cheaply built, don't require any water, sanitizes the excreta and decomposes it into soil that can be used for farming.

Enviro Loo

The solids get separated from the liquids with help of a perforated metal sheet that allows liquids to pass to the bottom of the container while the solids stay. The sun heats the plastic hatch which increases the temperature in the container to 70 C°. At this temperature the bacteria dies and the solids will decompose to soil. The liquids will naturally evaporate through an outlet placed high up, preventing bad smell. The system need maintenance since the solids need to be moved three times. The first time is after a year when the solids is shuffled from place 1 to place 2. It stays at place 2 for six months before it is moved to place 3 where it stays for one month. After this time only 20% of the original size of the solids are remaining. Then the solids are free from bacteria and can be picked up and used for farming[1].

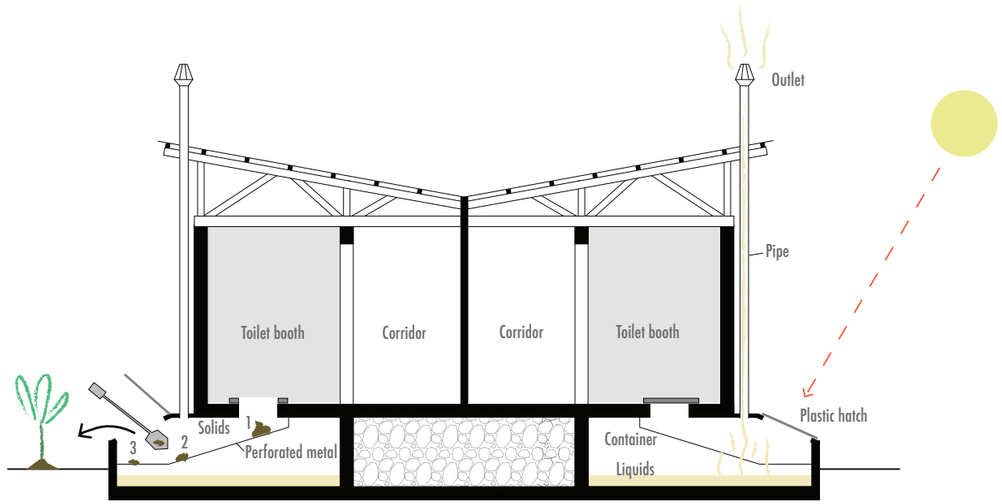


Illustration of Enviro Loo.

1. Wanjiku, Lucy (Lead Engineer at Enviro Lodgic LTD)(2019-10-04) Meeting in Nairobi, Kenya.

Workshop 6: Site Layout and outdoor space

On the 8th of October 2019, the school inspection concluded that the outdoor space at the Humane School didn't live up to the school regulations. To stop the shut down of the school one of the criteria was to enable more outdoor space for the students. We all new this was going to be impossible to accomplish on the existing plot, since it was already fully exploited. On the other hand, the new plot is four times bigger than today's plot, which means that the problem solves once the school moves. I asked myself what all the new outdoor space could be used for? In order to create a good layout of the plot I needed to know the students and teachers use of outdoor space. I therefore decided to arrange a workshop with them.

Date:	9/10 2019
Place:	Sirende
Participants:	12 teachers
Lead by:	Astri Sundström Konradsson
Material:	Black board, chalks, pencils, notebooks, Post-IT notes

Workshop

I gathered 11 teachers and divided them into two groups. I then asked them to come up with possible uses of outdoor space, not necessarily connected to the new plot. After a 10 minutes discussion, each group presented their ideas. The groups mentioned following:

- Farming
- Playground
- Sport (basketball, football, volleyball etc.)
- Brick making (making bricks for the school walls)
- Swimming pool
- Fish pond
- Water point (for collecting water)
- Compost
- Pasture for animals
- Cattle (supply of eggs and milk)
- Car parking

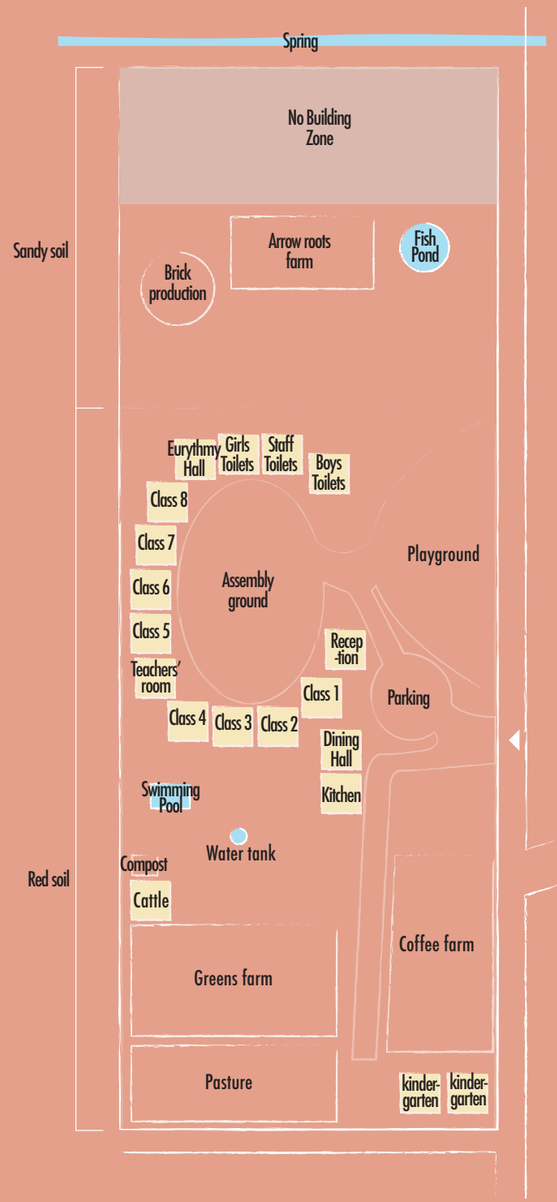
Once we had the possible uses in mind, the next step was to find the right space for them on the new plot. Since the teachers know best about the daily routine at the school, I decided to let them create a layout for the facilities and the outdoor functions on the site. The idea was to get an understanding of how the school facilities need to be placed for the most functional and practical use by the staff and students. Since all the teachers were present at Sabine's layout workshop in summer 2018 (see page 80), I decided to use the same method as Sabine, since it was already familiar to them.

- First I went through practical information about the new site, such as topography, size, soil etc.
- After the presentation of the site I drew two big rectangles on the ground, one for each group, representing the plot.
- I then gave them Post-IT notes with the facilities that had been decided at Sabine's previous workshop and asked them to write down the outdoor functions on empty Post-IT notes.
- The groups then had 15 minutes to discuss and layout the facilities and outdoor functions on the site.
- When the groups were finished with their layouts they presented it for each other.
- After going through the proposals the groups gave each other feedback and discussed the solutions.

Reflection

The results (shown on the next spreed) gave me a better understanding the teachers' habits and usage of school space. The workshop was a way for them to share their preferences and ideas. Their inputs were very valuable to me and has been taken into account in the design proposal of the new school.

NOTE! During this workshop the program of the school was 2 kindergarten groups + grade 1-8. Later that changed because of new regulations. The correct program; 2 kindergarten groups + grade 1-6 is therefore not processed in this workshop.



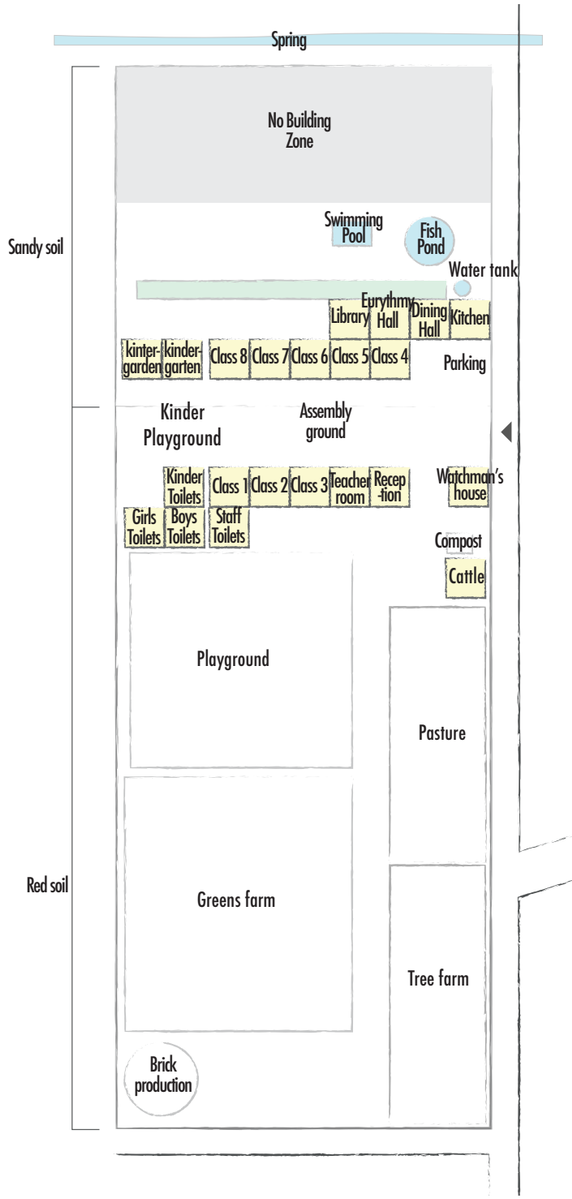
Result Group 1

+

- Grow arrow roots on the sandy soil.
- Kindergarten away from the rest of the school.
- Water tank close to kitchen and farm.
- Compost close to kitchen and farm.
- Coffee farm as an income for the school.
- Fish pond as a stormwater pond.
- Brick production where the soil is sandy.

-

- Toilets close to the spring, can lead to contamination of the water.
- Kindergarten too far away?
- The school is located on the red soil. That soil can be used for farming instead.
- Dead space behind the toilets?



Result Group 2

+

- The school is located partly on the sandy soil.
- Farming along the main road as a sound buffer.
- Watchman's house close to the school.
- Fish pond as a storm water pond.
- Vegetation as a border for the children not to cross.
- Toilets away from the spring.
- Compost near the cattle.
- Water tank close to the kitchen.
- Tree farm to improve the environment.

-

- Parking outside the kitchen.
- Kindergarten children need to pass the whole school.
- Compost far away from kitchen.

Deadline 6
- Design Proposal

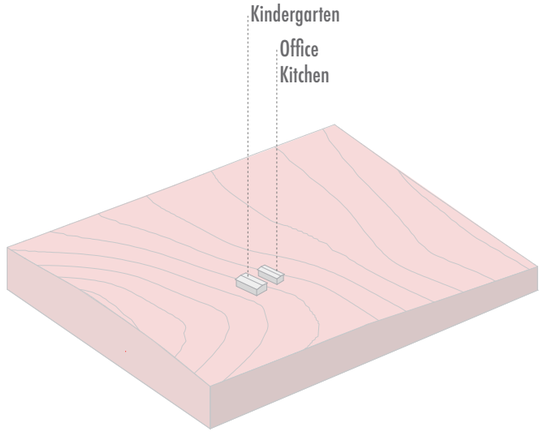
Site plan

The new site layout and school design are based on ideas from the workshops in Sirende (see pages 74-91). The school buildings are located on the south side of the plot because of the lower risk of flooding and the shorter distance to the *Maili Saba Market*, where lots of students live. There are two entrances to the school, one for cars and one for pedestrians. Both entrances are placed close to the crossing where many students pass. The flat part of the plot is most likely to become a storm water lake during heavy rainfalls. It is therefore turned into a football field that can't get water damaged. Closer to the spring, in the "no building zone", are pastures for the cattle to graze undisturbed.

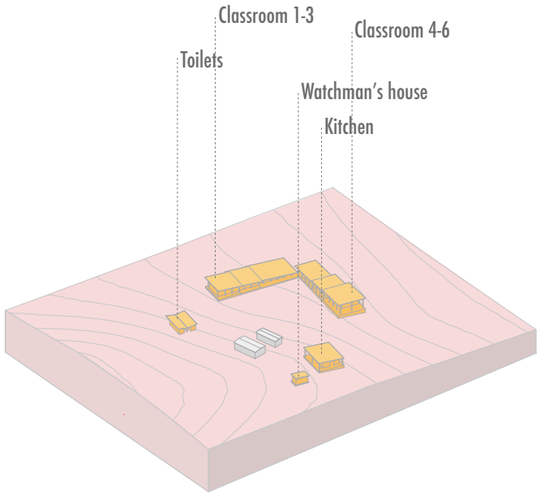
Program of the school:

- 2 kindegarten classes
- 6 classrooms (grade 1-6)
- Sports fields
- Cattle
- 2 Pastures
- Farms
- Eutythmy hall
- Reception /office
- Kitchen
- Watchman's house
- Toilets
- Playgrounds
- Assembly ground
- Parking

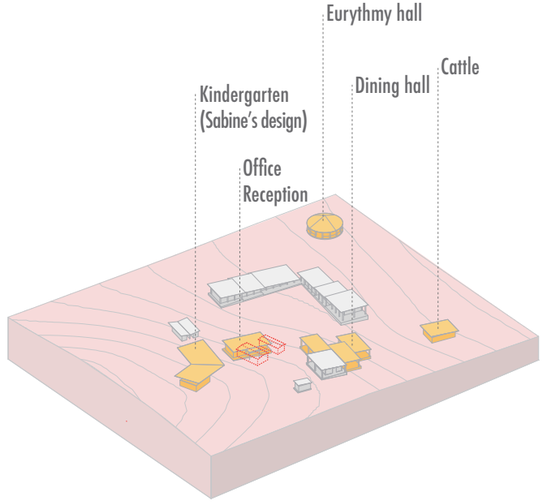
Building phases



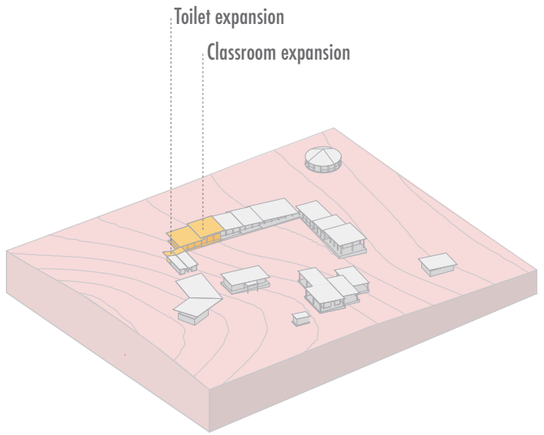
Phase 1:
The two existing mud houses on the plot will be used as kindergarten and kitchen/office while waiting for the building of the new school.



Phase 2:
Classroom 1-6, toilets, watchman's house and the kitchen are being built.



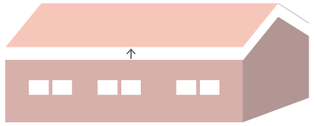
Phase 3:
The existing mud houses are demolished to make space for the new office/reception building. A dining hall, cattle, eurythmy hall and a new kindergarten are being added to the plot.



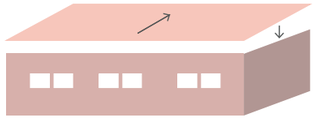
Phase 4:
More classrooms and toilets can be added if the school wants to expand in the future.

Building typology development

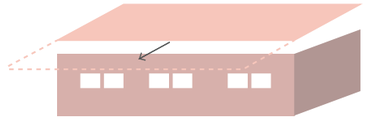
Typical Kenyan school building.



Lift the roof from the wall to create a light and ventilation gap.



Create a sightly sloping pent roof to collect water on only one side.

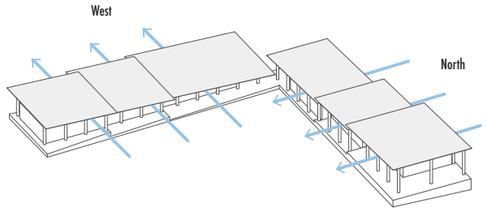


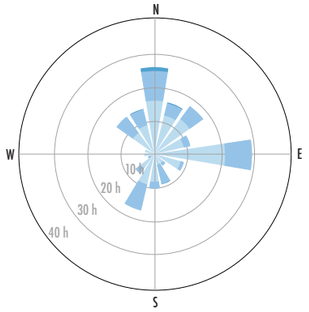
Extend the roof to create a shaded terrace that will cool the external wall.

Extend the window openings to let in more daylight and ventilation.

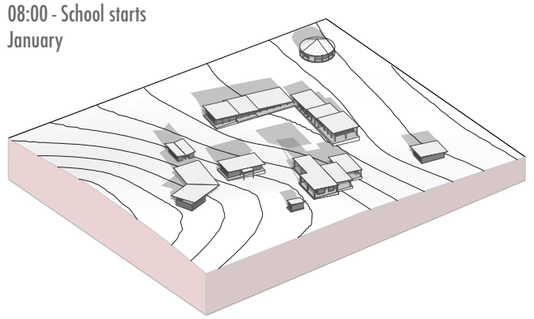
Shade and ventilation

The buildings location and design are developed to ensure a cool indoor climate. For instance, the roof overhang shades the external walls which prevent them from getting heated so that less heat radiate inside. The buildings are also placed and rotated to ensure shaded external walls during school hours (8 am - 15 pm). The rotation is also developed according to the best natural ventilation possibilities. Since most wind comes from the north and east, the long sides of the classroom buildings are placed perpendicular to the wind directions.

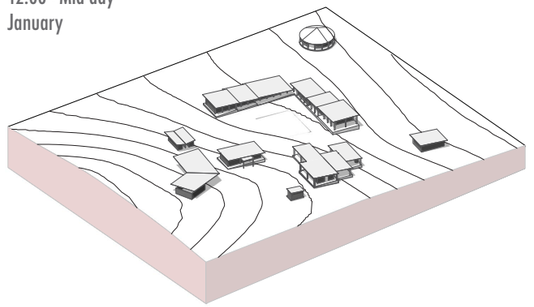




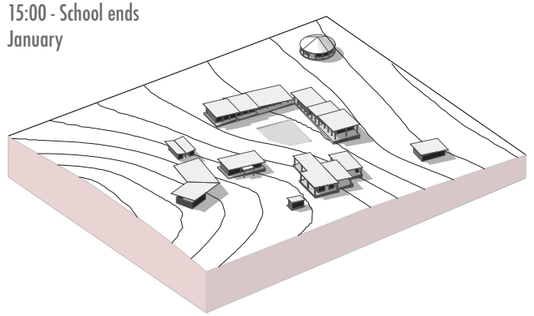
08:00 - School starts
January



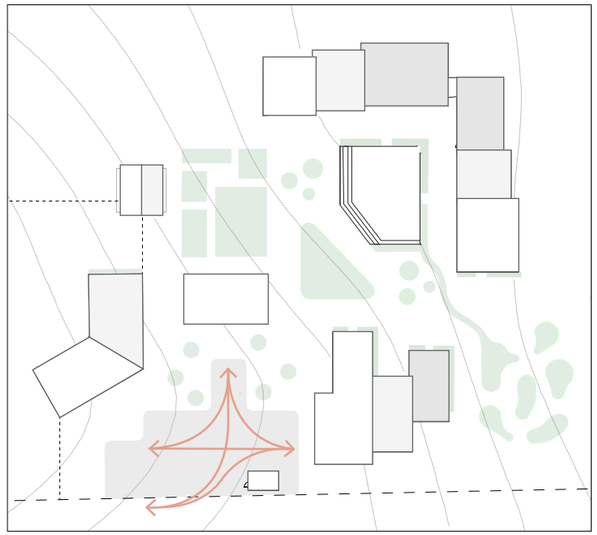
12:00 - Mid day
January



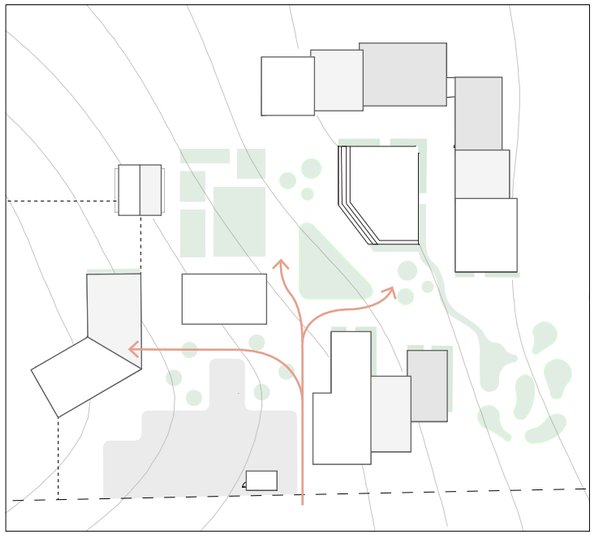
15:00 - School ends
January



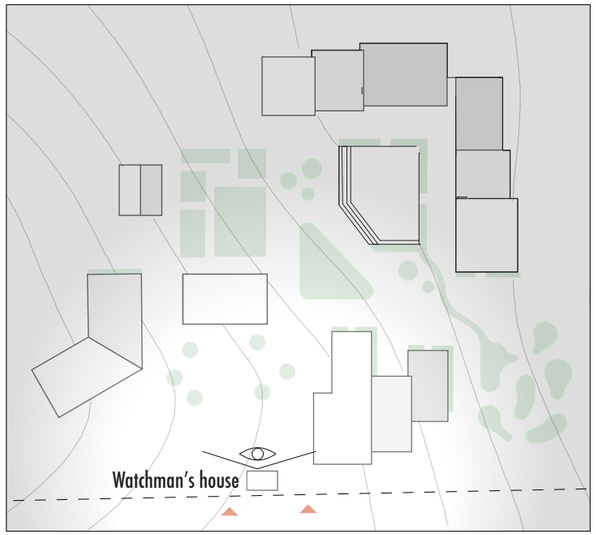
Car and bus access



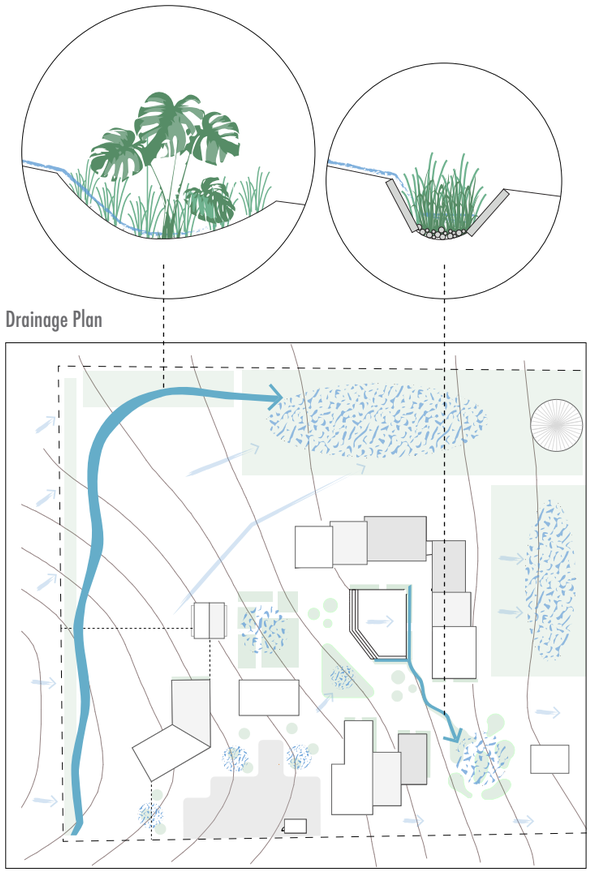
Pedestrian access



The Watchman has a good overview of the property, parking and entrance

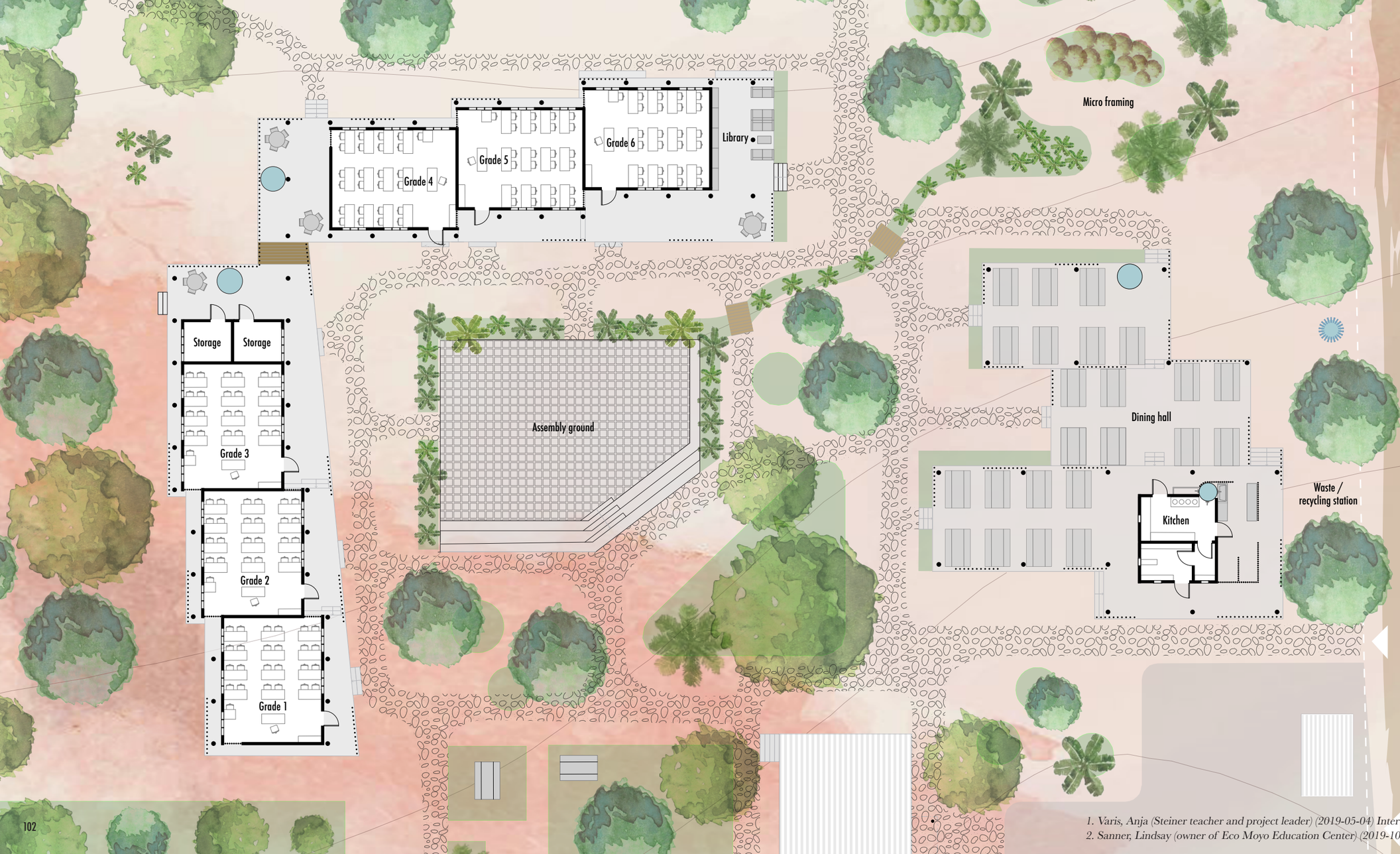


Drainage Plan

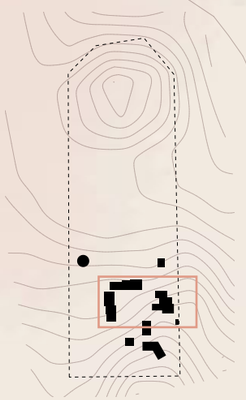


The rain can be heavy in Sirende during the rain period. To avoid flooding of the site I have developed a drainage strategy.

- All the buildings have elevated floor levels to avoid surface water to flow inside.
- The rainwater is led through channels to the green areas where it can be absorbed by the greenery.
- The channels are filled with vegetation that helps absorb the water, slow down the water flow and stabilize the ground. The smaller channels have extra support for the walls to prevent them from collapsing.



The classrooms are placed in a L-shape, opposite to the dining hall, to create an embracing feeling in the yard. In the Steiner pedagogy it's important that the children feel safe[1] and I believe that one feels safe when one is embraced. As I wrote in the paragraph *"Shape"* (page 18), the Steiner pedagogy advocates non square rooms because it promotes our thinking. The school buildings would therefore ideally be organically shaped. Unfortunately organic buildings often requires more complicated building techniques that can also add to more costs. For instance, curved roofs requires special curved gutters etc[2]. Since the locals aren't well educated in building organic shapes and the budget of the school is very tight I have decided to make the buildings square shaped, but with sloping ceilings. Each classroom has a locker where the teacher can lock in school material after school hours.



Water tank *Well*

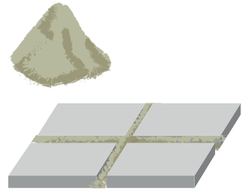
0 15 m
Scale 1:250

1. Varis, Anja (Steiner teacher and project leader) (2019-05-04) Interview in Järna, Stockholm
2. Sanner, Lindsay (owner of Eco Moyo Education Center) (2019-10-21) Study visit at the Eco Moyo Education Center, Kenya.

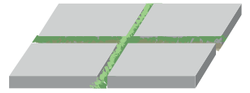
Assembly ground

My layout workshop with the teachers (page 88-91) made me understand that an assembly ground has much importance for the school. The assembly ground is a place where the students gather for common activities. For instance, during announcements, school performances for the parents, school endings, or for the national anthem singing on Monday mornings. It is also a collecting point in case of emergency. The sloping terrain makes it possible to build bleachers where the students or audience can sit during gatherings.

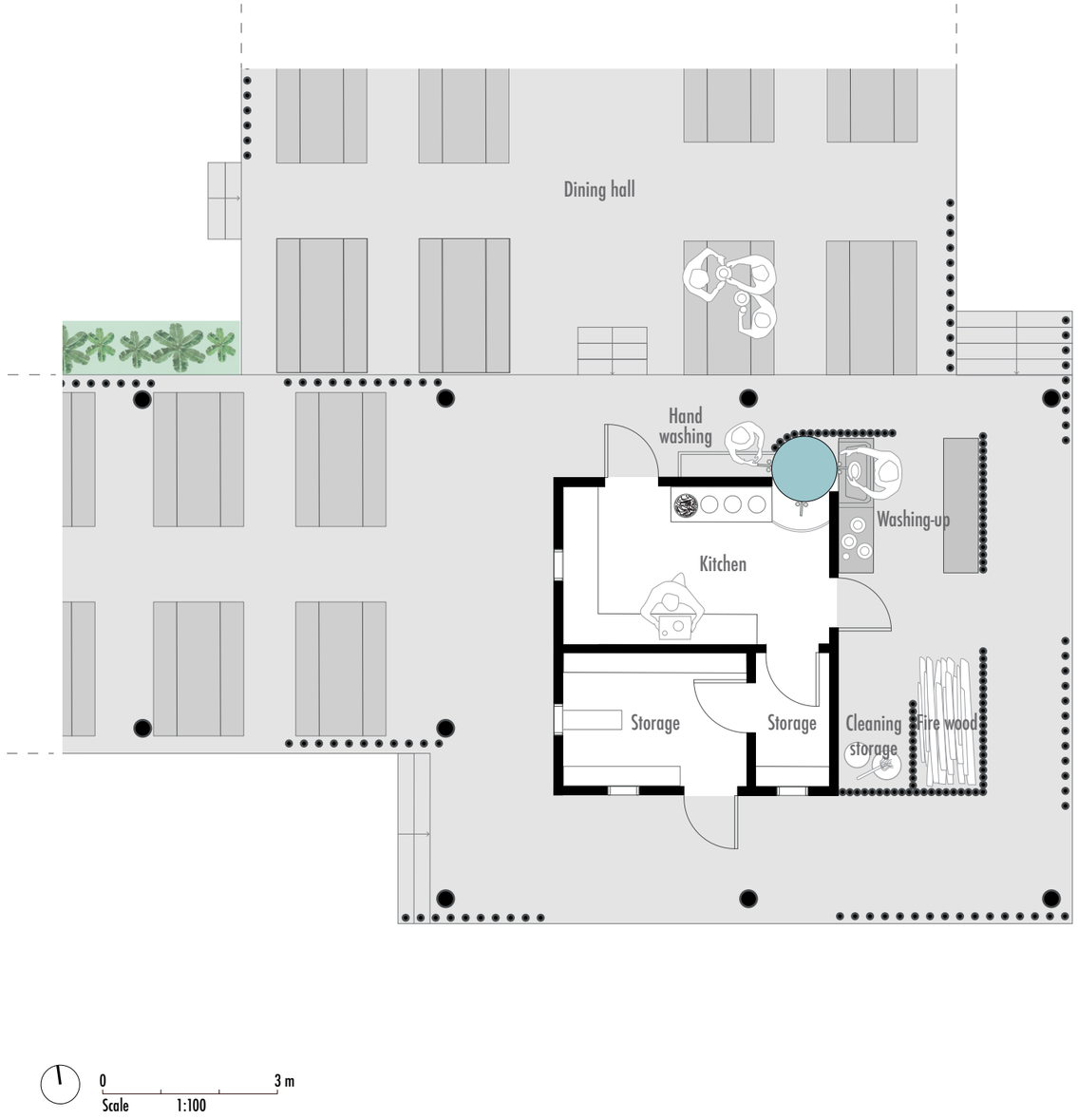
The ground is covered with concrete blocks so that rainwater can drain through the gaps to avoid flooding.



The gaps are filled with sand to make an even surface to avoid people from tripping.



Over time weed will start growing in the gaps which can either be taken away or kept as an green element that bring some color to the grey surface.



Kitchen and dining hall

The kitchen is located close to the parking to enable easy delivery of kitchen goods. The design of the school kitchen is based on an interview I had with the chef from the existing Humane School. She showed me the existing kitchen, a small adobe house, filled with smoke from the firewood. She explained that she felt comfortable with using firewood and wished for the new kitchen to also have a firewood stove. Unfortunately cooking with firewood is bad for the climate and environment. I also found out that the chef had problems with her lungs, symptoms that can be caused by the thick fire smoke. In order to improve the health of the chef and reduce the environmental impact I have proposed an *Energy Efficient Firewood Stove* for the new kitchen. This stove still burns firewood, but it's up to 70% more efficient with the energy and also ventilates out the smoke (Botto-Solar, n.d).

The new kitchen is designed with many kitchen counters, something that the old kitchen didn't have. This creates a more ergonomic working position for the chef and also enable more storing space for kitchen ware etc.

Rainwater from the roof is collected to a tank with three taps. One goes to the kitchen, one goes to the washing-up and one goes to the hand washing. The hand washing is for students to wash their hands before lunch to improve the hygiene conditions.

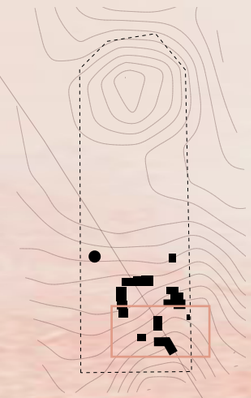
Energy Efficient Firewood Stove, Eco Moyo Education Center

The existing school's fire wood stove

The dining hall is divided into three platforms, on different elevations, that floats out on the school ground. The students sit and eat in an open pillar hall, with only the roof as a protection for the rain. This creates an open feeling and allows for the students to connect and interact with their surrounding. I believe this is a great environment contrast to the more restricted shaped classrooms. Not using any walls will also save on material cost.

The dining hall is not only used during lunch time, but also as a gathering point when the assembly ground can't be used (for instance during bad weather), as a study area, or as an outdoor classroom space for farming lessons etc.

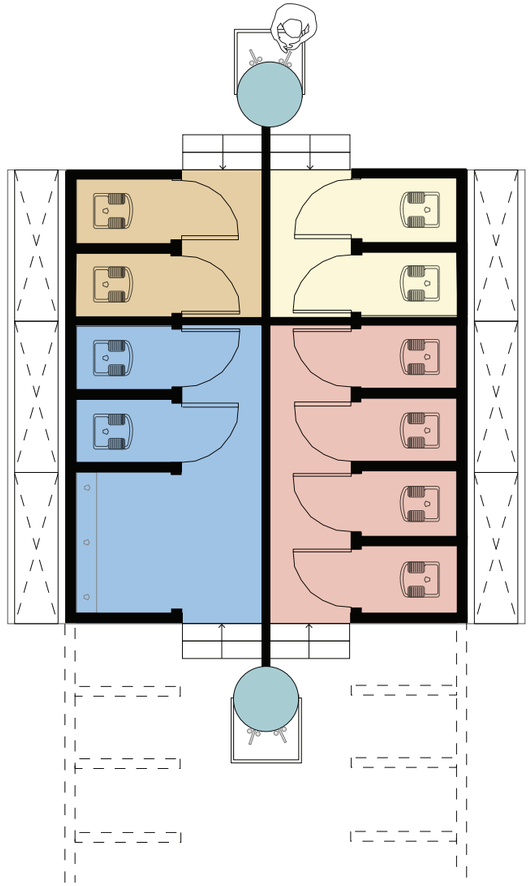
Today all children walk to school, but in the future there might be school buses taking the children to school. The parking is therefore designed with space for two school buses to park. The reception is located right in front of the parking to make it easy for visitors to locate and get information. The reception building also contains a principal office and a teacher office where the teachers can work undisturbed. On the back of the building there is a terrace where teachers can sit in the shade and have a good overview of the school yard.



Water tank

0 15 m
Scale 1:250

Floor plan: Toilets



Boys
Girls
Kindergarten
Staff

0 3 m
Scale 1:100

Toilets

The toilets are located on the high part of the plot, far away from the spring, to avoid contamination. All toilets are concentrated to one unit to facilitate cleaning and maintenance. The toilet type is a modified Enviro Loo system (se page 86-87). The unit consists of 10 toilet booths and 1 urinal, which are divided into 4 sections, with separate entrances.

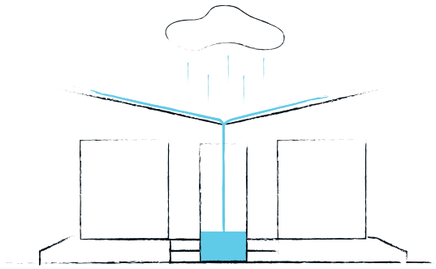
The sections are:

- 4 toilets for female students (ca 75 students).
- 2 toilets for the male students and 1 urinal (ca 75 students).
- 2 Staff toilets, one female and one male (ca 11 staff members).
- 2 Kindergarten toilets (ca 50 children).

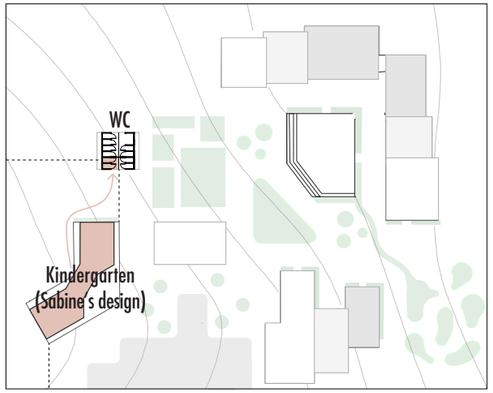
The number of toilets per user group is based on standards from the *Kenyan Ministry of Education* (Republic of Kenya, Ministry of Education, 2010). NOTE: The girls are provided with one more toilet than recommended to ensure more convenience during their menstruation.

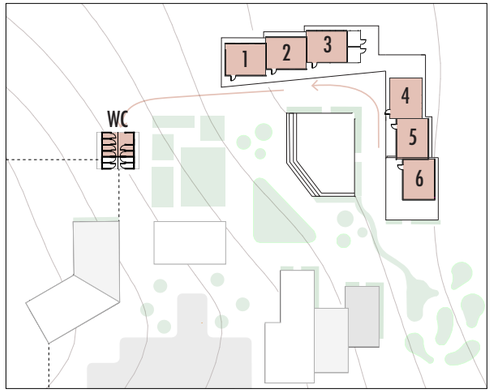
The users can wash their hands with rainwater that has been collected from the roof.

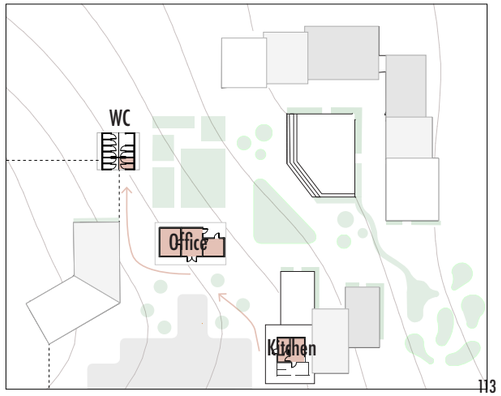
When the school is expanding with more classes, the water tank can be moved and new toilet booths can easily be added to the unit.



Rain water collecting strategy for the toilet unit



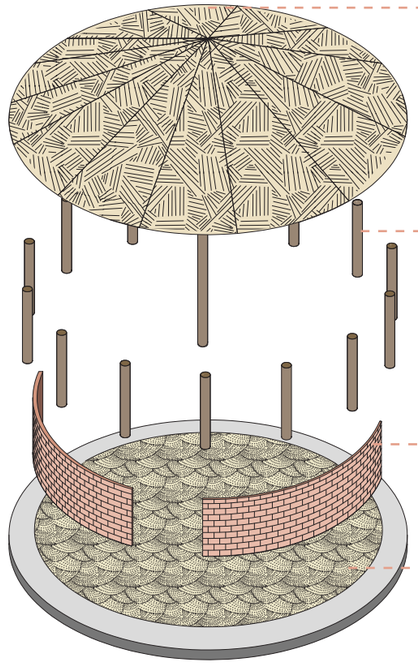




Eurythmy hall

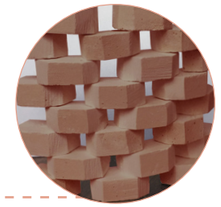
The eurythmy hall is placed in the tree farm, away from the other school buildings. The idea is that when the students get away from the school environment they can focus better on the dance and music. The music and dance also won't disturb the ongoing lessons because of the distance to the classrooms.

The open pillar structure is surrounded by trees which give the students a moment to connect with nature. The materials and cylindrical shape of the hall is influenced by the traditional Kenyan tribe huts (see page 38-39). This creates an opportunity for the students to also connect to the Kenyan culture and heritage.



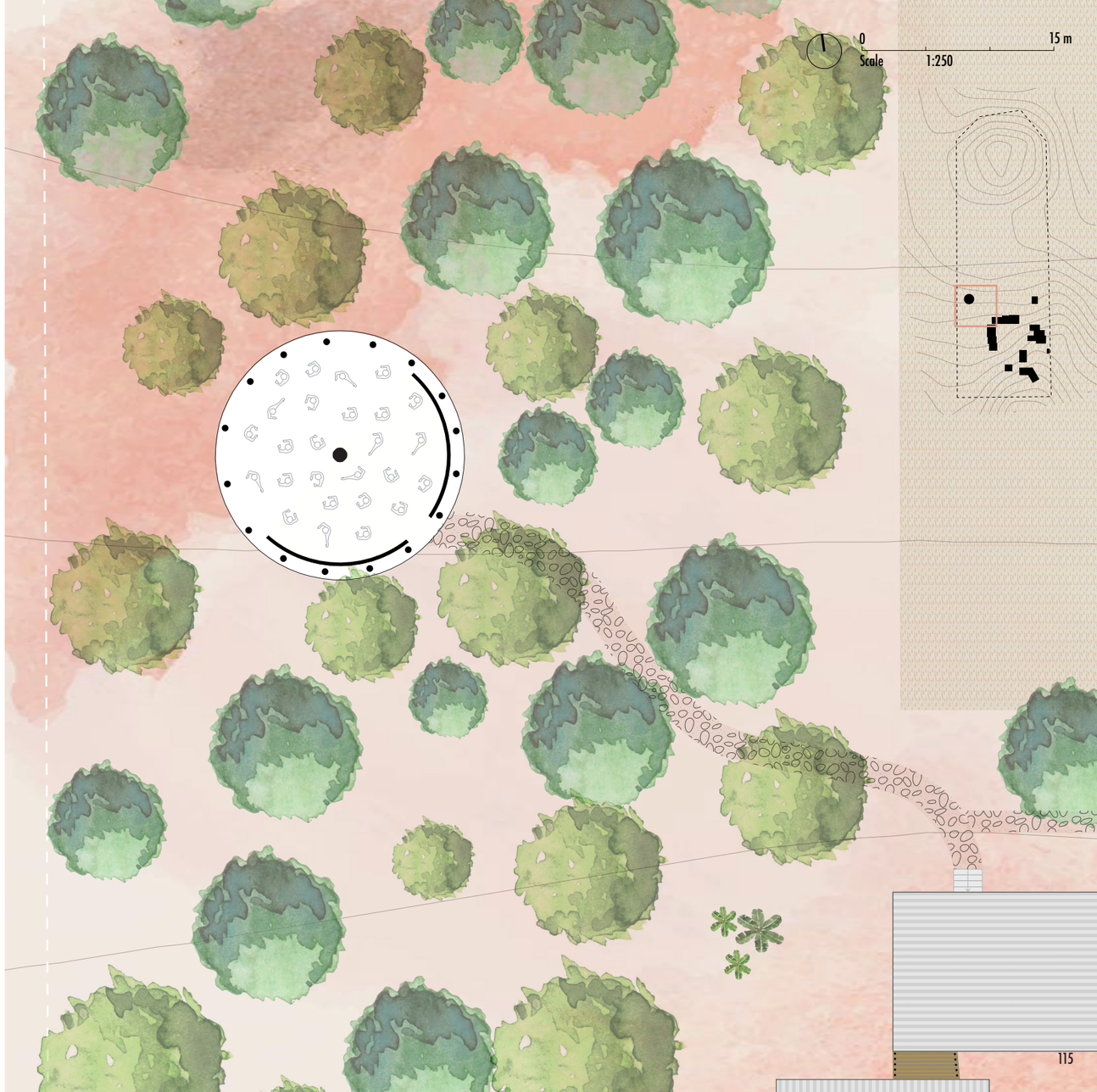
Straw roof
Traditional style.

Round wooden pillar
Heath treated wood.

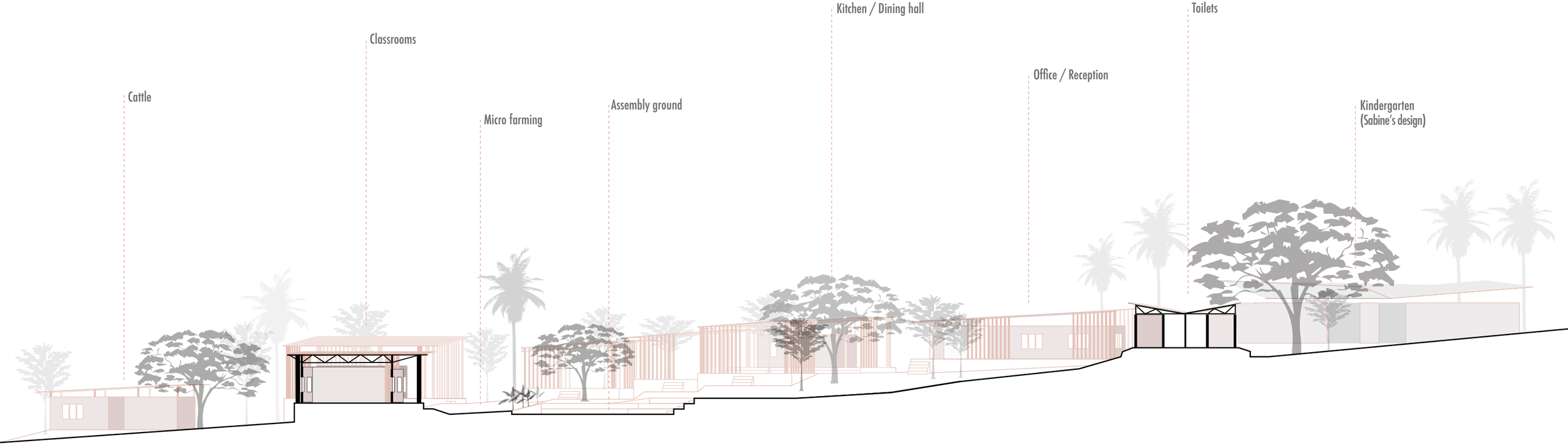


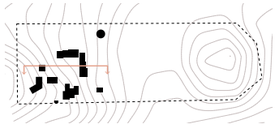
ICEB
Assembled with a gap between the blocks to create a transparency.

Traditional woven Kenyan rug
Creates a softer surface for the students to dance on.



Site section

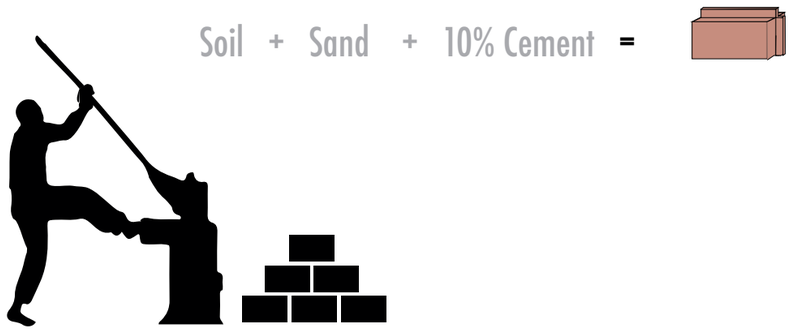




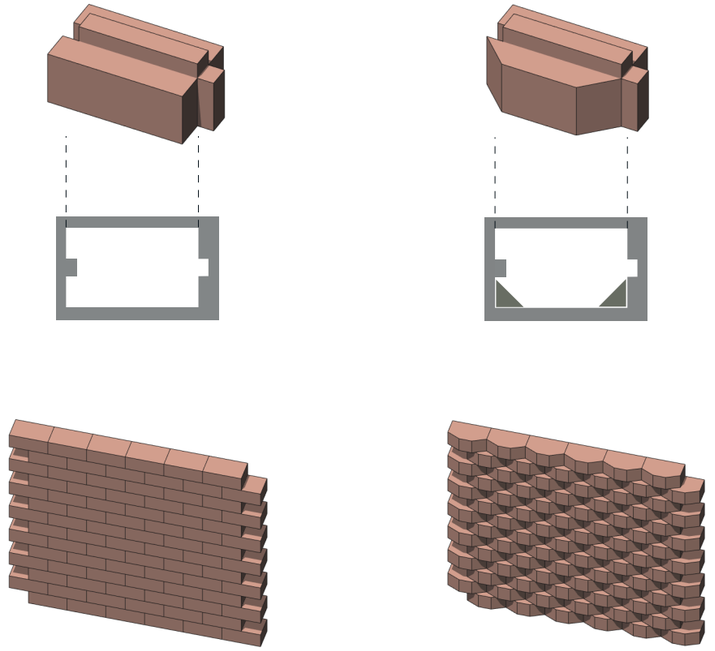
0 15 m
Scale 1:250

Interlocking Compressed Earth Blocks (ICEB)

The locals preferred burned bricks as building material for the school, based on several parameters from Sabine's material workshop (see page 77). The positive side is that the locals know how to produce the bricks and the production could therefore generate an income to the community. On the negative side, the production is very energy consuming, because of the burning, and therefore not good for the environment. A more environmentally friendly alternative is raw bricks, but they require more maintenance and are more complicated to produce. A more durable and stronger type of raw bricks are *Interlocking Compressed Earth Blocks* (ICEB). These are made from soil (the red soil that is accessible on the new plot), sand and cement. The cement is not environmentally friendly, but it stabilizes the blocks and makes them more durable, so that they resist the heavy rainfalls in Sirende. The blocks are made with a press that is operated manually. The press can be purchased to the school for the production of the bricks. After the completion of the buildings it can continue to be used by locals to build their houses, to a small cost. This will generate an income to the school and become an asset to the community.

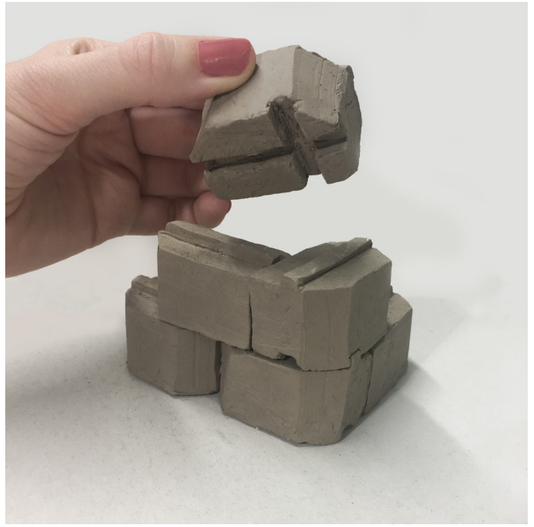


The ICEB press produce square shaped blocks from a mold. Wedges can be put into the mold to modify the shape of the blocks and create a more vibrant facade.

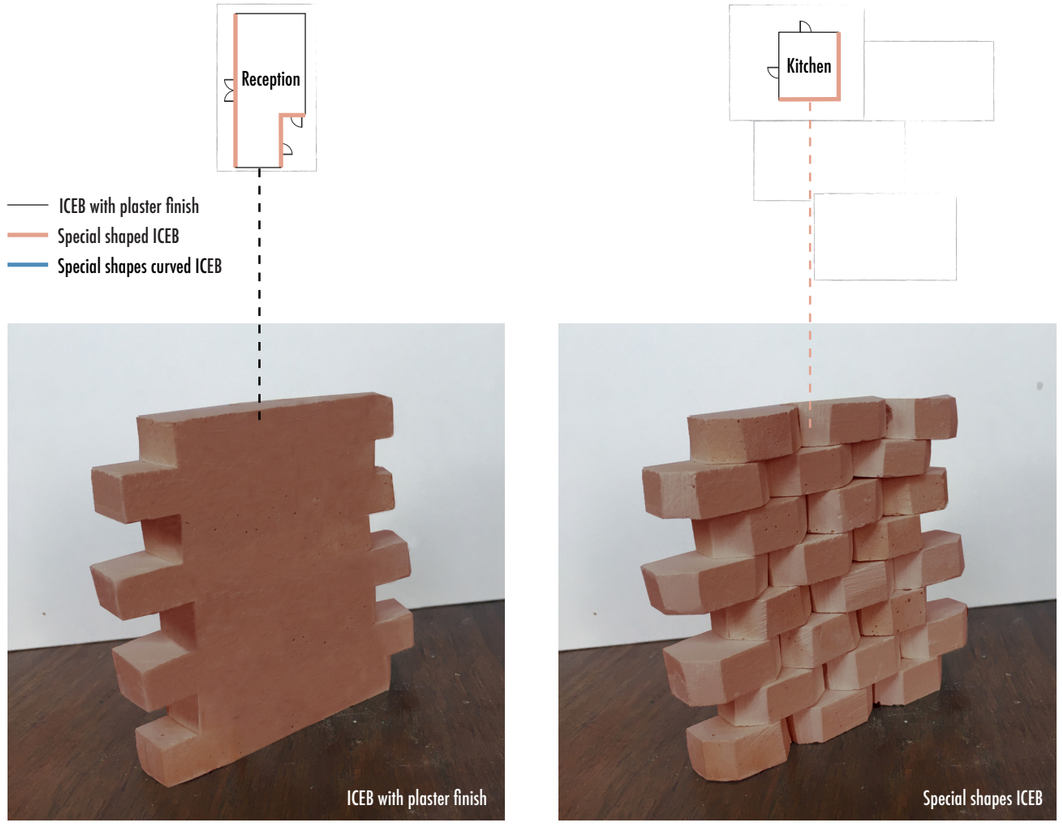


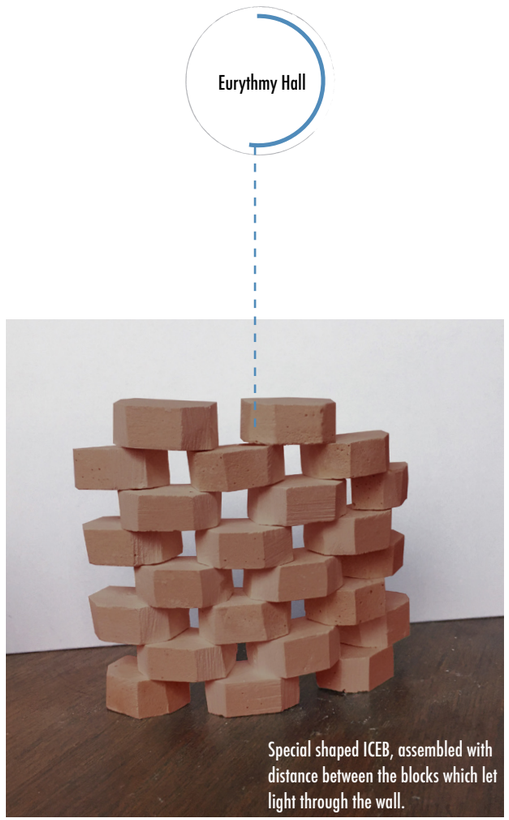
The ICEBs are created in a shape that makes them interlock each other. In this way almost no mortar is needed, which is good for the environment and speeds up the assembly process.

Model scale 1: 5



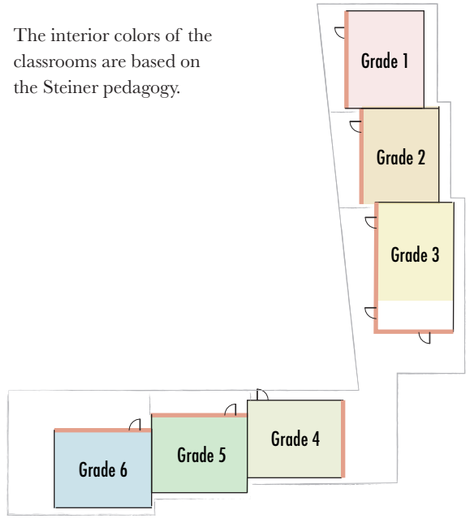
Wall types





ICEB should be plastered in order to resist water. Plaster adds extra costs to the project and I therefore only use plaster on the external walls that are exposed to rainwater. The interior walls have different pigmented plasters depending on the grade. The other two wall types in the project are *Special ICEB* and *Special ICEB assembled with distance between the blocks.*

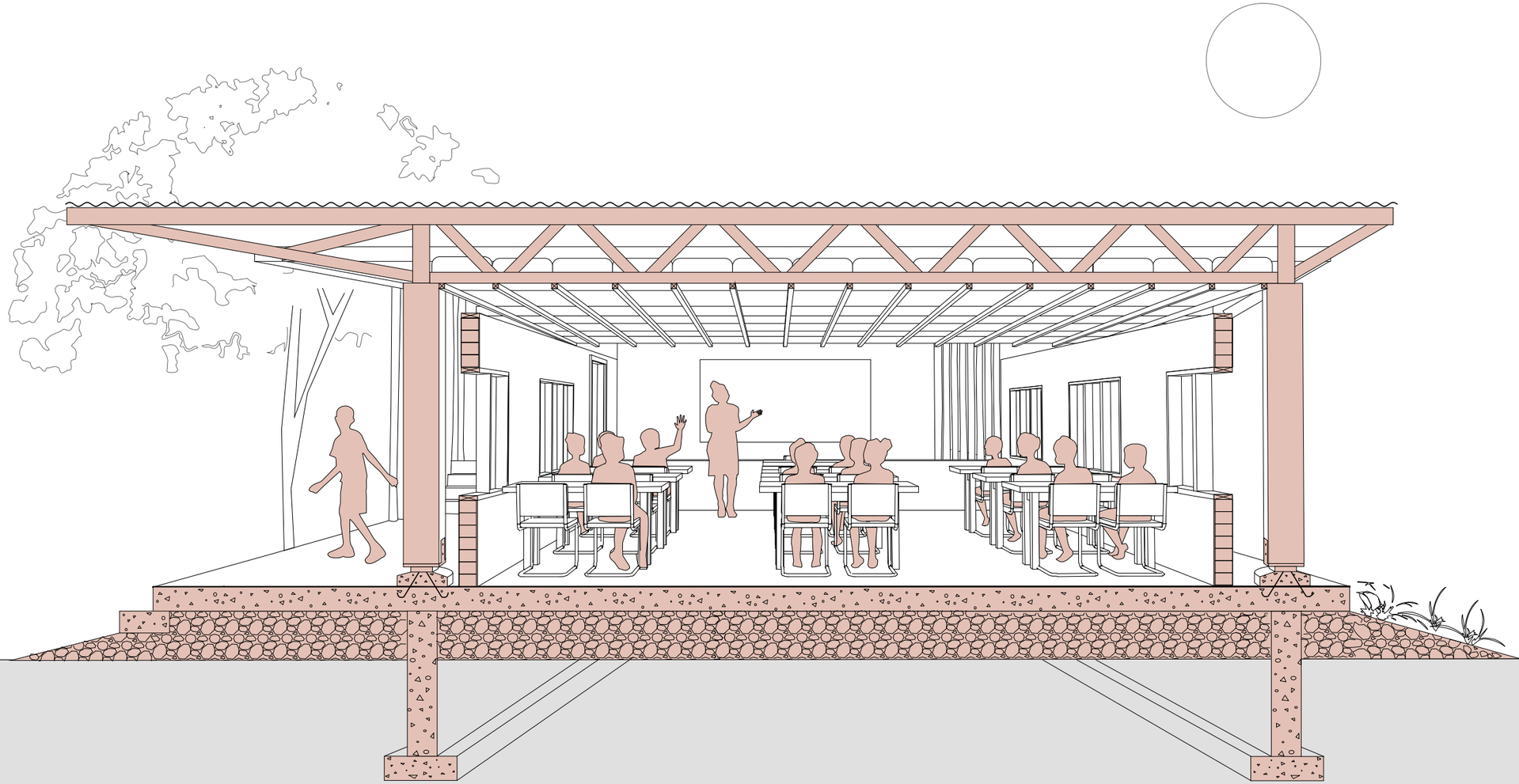
The interior colors of the classrooms are based on the Steiner pedagogy.



Facade: West classroom building

0 3 m
Scale 1:100

Section: Classroom

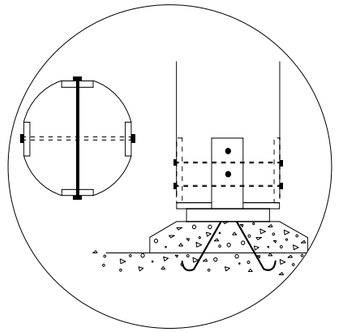


0 1 m

Scale 1:40

Maize bales

- Helps mute the noise of raindrops landing on the steel roof. This creates better acoustic in the classroom.
- Absorbs moisture during the night that evaporates during the day when the steel roof gets heated from the sun. The evaporation cools the roof which creates a cooler indoor climate.
- The maize bales need to be covered with insect nets to avoid insect damage.



Concrete pillar base

Steel sheets

The corrugated profiles transport the rainwater to the water collection point.

Wooden framework structure

ICEB (Interlocking Compressed Earth Blocks)

Plastered on the inside of the classroom

Wooden plank

Supports the ICEB over the window openings

Round wooden pillar

Heath treated wood

Concrete slab

Gravel

Concrete blocks

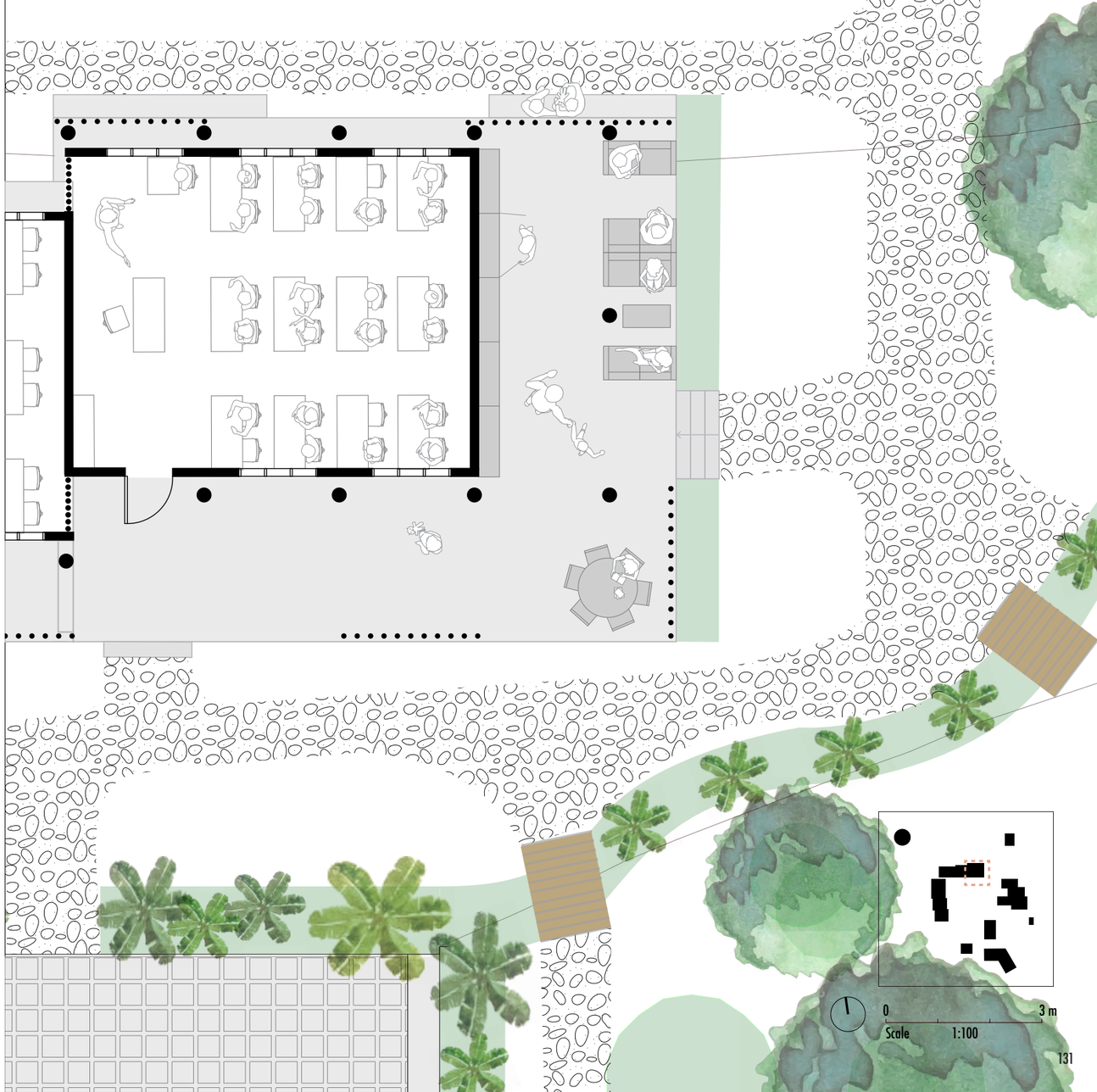
Strip Foundation

0 0.5 m

Scale 1:25

Library

Many students come from busy homes where it can be difficult to study. The school therefore has a library where the students can hang out, study and read without getting disturbed. The library is placed outdoor on the terrace outside the classrooms. The books are stored in lockers that can be locked during night to avoid theft.



A typical school day

08:00
Location: Assembly ground
Activity: Singing the national anthem

09:00
Location: Classroom
Activity: Lesson

13:00
Location: Dining hall
Activity: Lunch

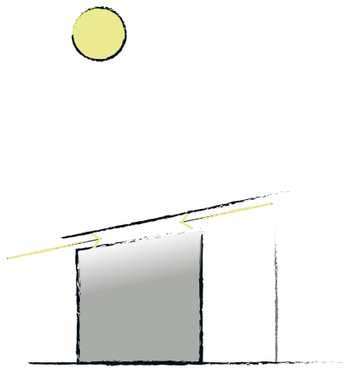
13:30
Location: Playground
Activity: Break

14:00
Location: The farm
Activity: Farming lesson

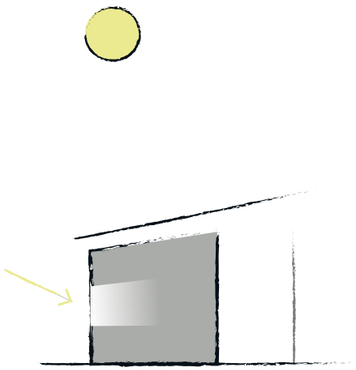
15:00
Location: Library
Activity: Reading after school

Light and electricity

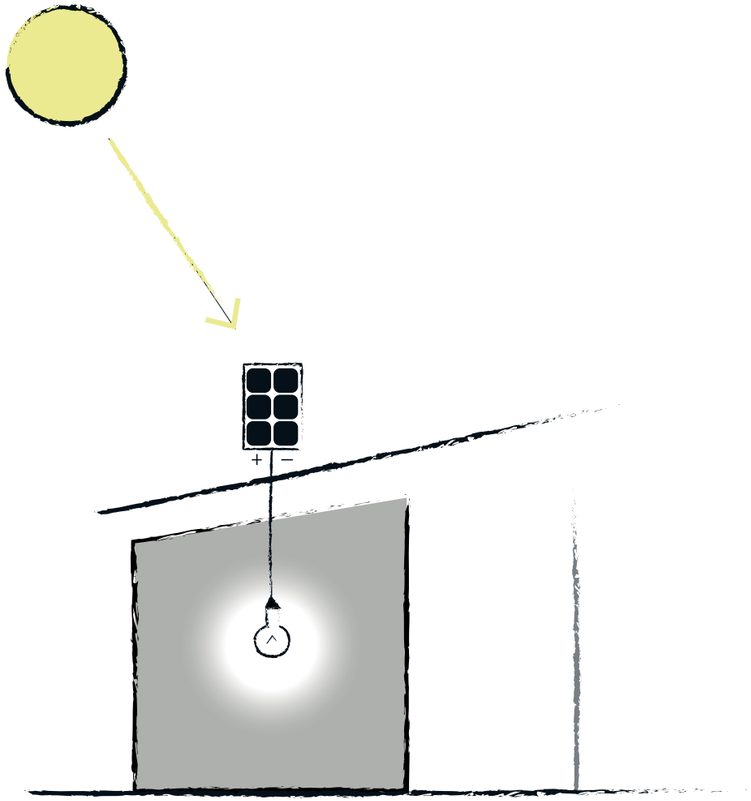
The school activities take place during the day, which provide perfect conditions for using daylight instead of electric lighting in the buildings. The design of the buildings are therefore developed to provide a good use of daylight. The classrooms have windows on both sides and a gap between the wall and the roof to ensure a bright indoor environment. The effective use of daylight makes it possible for the school to save money on electricity by not using lamps. The electric lighting that is necessary, for example in the watchman's house (since it will be used during dark hours), can be produced with solar panels. In case the solar panels wouldn't provide enough energy, the school can have a connection to a neighbour's power line as a supplement.



Light gap between the wall and the ceiling



Light from the window openings



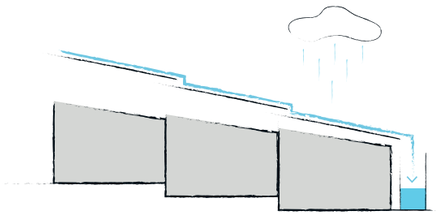
Solar panels for electric lighting

Water access

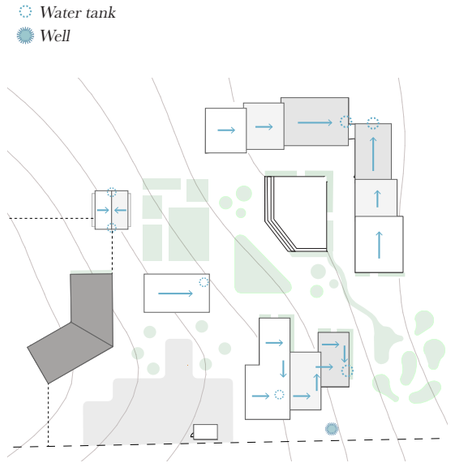
Making a bore hole is the most safe way to secure water access on the plot, but it comes with a big cost. The tight budget for the school requires a cheaper water solution. After some research on water sources I've come to the conclusion that collecting rainwater is the cheapest and most sustainable option. The design of the school buildings are therefore developed so that rainwater can be collected from the roofs. The idea is that rainwater can be used for washing hands, doing the dishes and cleaning. To access water during dry season (December to February), when there is less rain, water can be collected from the communal water collecting point (on the north east side of the plot). The water from the communal water collecting point is connected to a filter, which makes it drinkable. To facilitate the access to drinking water there is an additional well outside the kitchen (much cheaper than a bore hole). The well will also ensure water access during dry season and when the communal water collection point is out of order.

Rain water collecting strategy

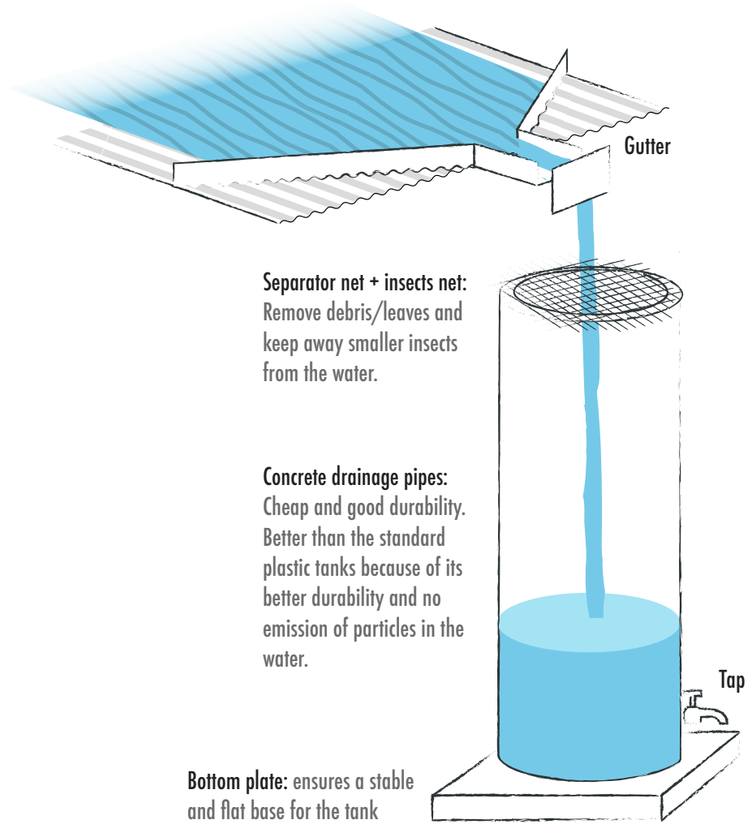
The rainwater flows on the corrugated sheet roofs. The roofs are sloping and overlap each other to lead the water to the concrete tanks. The tanks must be dimensioned for 1 week of rainfall during May (the most rainy month in Sirende).



Rain water collecting flows



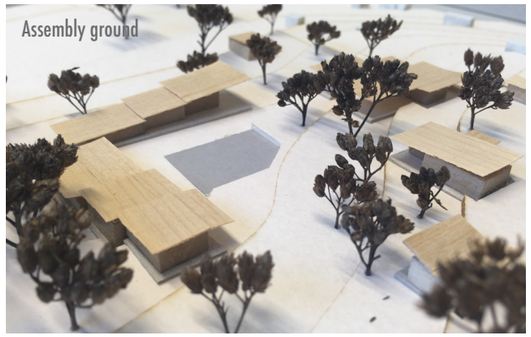
Rain water collecting detail

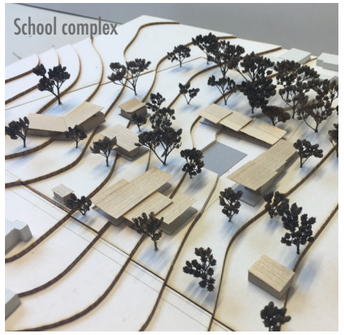


Window openings

The classroom walls are provided with window openings that provide extra light and ventilation to the classrooms. These window openings don't have any glass to minimize costs and maintenance. Glass also store heat which then radiates into the classrooms and can create hot areas close to the windows. In order to avoid animals and unauthorized people to enter the buildings during night, the window openings are covered with braided wattle shutters. There is a known braiding culture in Kenya, where women have been braiding hair, baskets, carpets, doors, etc. for generations (WIPO, n.d). These braided wattle shutters will therefore give the school a traditional Kenyan identity. The idea is that the shutters will be made by locals to support the community.

Model pictures


Assembly ground


School complex


Classroom building


Eurythmy hall

Scale 1:500

School's out
- Reflections

7

Reflections

This project has been both challenging, fun and developing. I have learned about Kenyan culture, life and architecture, Steiner education and anthroposophy. Working with a reality-based project improved my understanding of my role as an architect, in relation to the others involved. Being part of an ASF-project also made me understand how voluntary organizations work and operate.

My goal with this project was to design a low budget, Kenyan Steiner school with respect for the Kenyan culture. Traveling to Kenya to experience the country and meet the people was very valuable for the process. The things I learned, saw and experienced became the basis for my design. For instance, I got an understanding of the culture, the locals' use of material and what realistic expectations I could have on the project. I think my proposal for the new school would have been less realistic if I hadn't been in Sirende and seen the real conditions.

Even though I had a wonderful trip and met lovely people I still found some things difficult. For example, I had problems to understand how the Kenyan building process worked and how to use their building standards. Much information was written in Swahili and only limited information was provided in English. This made it hard for me to ensure that my project follows the Kenyan building standards and will be approved by the Kenyan authorities.

Back in Sweden, my plan was to continuously send my sketch proposals to Sirende to get feedback from the locals during the process. Unfortunately I think the locals had difficult to see the attachments in my emails, because I didn't get any response on the drawings, only on my written questions. This was a pity because I think their comments would have been valuable for the development of the project. If I had done this project again, I would have tried to establish a better way of communicating with the locals while being back in Sweden.

Another challenge I experienced was the budget. It was difficult to create a quality design on such small means. I often had to give up my ideas because they would be too expensive to accomplish. For example, in the beginning of the process I had intentions of making a more organically shaped school, since that's what the Anthroposophists advocate (see page 18). These ideas were dropped after recommendations from others, saying that organic shapes require more advanced building skills and often cost more. I instead tried to avoid the strict square impression by using strategies to break up the shape. For instance, I made big window openings to create a feeling that the room extend beyond the wall. The gap between the roof and the wall (see section on page 126) also opens up the shape and creates a less captured feeling.

Looking at the result, I ask myself if I shouldn't have skipped the budget restrictions and created a more organic design instead? On the other side, the finesse with my project is that it can be built on limited resources. After all, the challenge with this project was to see if the combination of Steiner architecture and Kenyan architecture can be accomplished on a tight budget. The result might not be the most spectacular design, but I do think it's well combined. The school layout and design is adapted to the Steiner curriculum, but also have a lot of traditional Kenyan influences. For instance, the interior classroom colors follow the Steiner color scheme and there are no plastic and chemical materials. All the materials

are also commonly used in Kenya, and details such as braided wattle shutters etc. roots the project in the Kenyan culture. I also manage to reduce costs by using local materials and make sure the building construction is based on the locals' construction skills.

As in every project, time is a critical aspect. In this project the time limit forced me to prioritize what to focus on. If I had more time I would have liked to further investigate the drainage situation and work more with the landscape and outdoor areas. I would also have stayed in Sirende for longer and maybe tried to produce some ICEB's with the locals. I also wish to spend more time on creating a stronger Steiner and Kenyan identity for the project. I believe there are many undeveloped details that could strengthen the identity of the school.

During this project I have also realized that there are much that I, as an architect, can contribute to the Kenyan construction and design industry. I can help make projects more environmentally friendly, improve climate comfort, improve light conditions and create more space efficient layouts. As long as I'm aware, respect the Kenyan culture and stay delicate in my approach I believe I can accomplish great improvements.

Last I want to mention the most valuable insight this project gave me, not only as an architect, but as an individual. Working with people from a whole different culture taught me to put aside my preconceptions and really listen. There is so much we can learn from other cultures around the world. It's a mistake to assume that we always know best.

Thanks

During the process I have received help and support from wonderful people. I especially want to thank my tutor Laura Liuke and my examinator Johnny Åstrand at *Lund University* for their guidance and input. I also want to thank Sabine Lepére at *ASF Sweden*, and Anja Varis at *Föreningen Sofia* for their feedback and support. Last I want to thank my twin sister Sara Sundström Konradsson for her toilet work in Sirende and the great companionship in Kenya.

Sources

Ahlin, Bengt (2016) *Vilka erfarenheter och reflektioner har konstnärer och waldorflärare omkring de färgade rummens betydelse?* Oslo: Rudolf Steiner University College, 2016

Antroposofi.info (n.d) *Waldorf*
a. Source: http://www.antroposofi.info/utbildning/waldorf/ [2019-09-09]
b. Source: http://www.antroposofi.info/kultur/eurytmi/ [2019-09-12]

ASF Sweden (n.d) *Om Arkitekter utan gränser*
Source: http://www.arkitekterutangranser.se/om-arkitekter-utan-granser [2019-09-18]

Botto-Solar (n.d) *2 Burner Mama Safi Stove*
Source: https://www.bottosolar.com/home/?page=2-burner-mama-safi-stove [2020-01-07]

Carrol, Ron & Britten, John (1992). Non-sewered sanitation for housing and institutional buildings. Lund: Lund University, Lund Centre for Habitat Studies.

Clark, Nick (2015) *Education in Kenya*
Source: https://wenr.wes.org/2015/06/education-kenya [2019-09-18]

Climate-data (2019) *Kitale Climate*
Source: https://en.climate-data.org/africa/kenya/trans-nzoia/kitale-919/ [2019-09-18]

Ferring, Mari (2011). *Den levande väggen: färg och arkitektur i svenskt 1970-tal.* Diss. Stockholm : Kungliga Tekniska högskolan, 2011

Freunde der Erziehungskunst (n.d) *Freunde der Erziehungskunst*
Source: https://www.freunde-waldorf.de/ [2019-09-18]

Föreningen Sofia (n.d) *Om oss*
Source: https://foreningensofia.org/om-os/ [2019-09-18]

Globalis (n.d). *Kenya*
a. Source: https://www.globalis.se/Statistik?country=262#group-by-letter
b. Source: https://www.globalis.se/Laender/Kenya [2019-09-09]

Goethe, Johann Wolfgang von (1976). *Goethes färglära* [Ny utg.] Järna: Kosmos

Gudda, F.O., Moturi, W.N., Oduor, O.S. et al. *Pit latrine fill-up rates: variation determinants and public health implications in informal settlements, Nakuru-Kenya.* BMC Public Health 19, 68 (2019)
Source: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-019-6403-3#citeas [2019-11-12]

Liljeroth, Ingrid, Naeser Monica, Dahlin, Bo *(2006) Waldorfpedagogiken och elever med inlärningssvårigheter och funktionshinder.* Karlstads Universitet, 2006
Source: https://waldorfanswers.org/Dahlin6-September2006.pdf [2019-09-12]

MSF Sweden - Médecins Sans Frontières Sweden (n.d) *Diarrésjukdomar*
Source: https://lakareutangranser.se/vad-vi-gor/vara-arbetsomraden/diarre [2019-09-11]

Macoloo, G . Chris (1994) *The environmental impact of building materials choice for low income housing in Kenya*. Univeristy of Nairobi.
Source: *https://www.irbnet.de/daten/iconda/CIB_DC24909.pdf* [2019-11-12]

Ministry of EAC and Regional Development (2019), *Kenya people and cultures.*
Soruce: https://meac.go.ke/kenya-peoples-and-cultures/ [2020-01-27]

Mweru, Maureen. (2010). *Why Are Kenyan Teachers Still Using Corporal Punishment Eight Years After a Ban on Corporal Punishment?.* Child Abuse Review. 19. 248 - 258. 10.1002/car.1121.

Nationalencyklopedin (2020) *Teosofi.*
Source: http://www.ne.se.ludwig.lub.lu.se/uppslagsverk/encyklopedi/lång/teosofi-(teosofiska-samfundets-system) hämtad [2020-01-26]

The Association of Steiner Waldorf Schools in the UK and Ireland (2009) *Guide to the Early Years Foundation Stage in Steiner Waldorf Early Childhood Settings*
Source: https://www.foundationyears.org.uk/files/2011/10/Guide_to_the_EYFS_in_Steiner_Wardorf_settings1.pdf [2019-09-22]

The Wordbank Group (2019) *Kenya*
a. Source: https://data.worldbank.org/country/kenya [2019-09-09]
b. Source: https://data.worldbank.org/indicator/IQ.CPA.TRAN.XQ?locations=KE [2019-09-26]

WHO - World Health Organization, UNICEF (2017) *Progress on Drinking Water, Sanitation and Hygiene*
Source: https://www.unicef.org/publications/files/Progress_on_Drinking_Water_Sanitation_and_Hygiene_2017.pdf [2019-09-09]

Unicef (2012) *Water, Sanitation and Hygiene (WASH) in Schools*
Source: https://www.unicef.org/publications/files/CFS_WASH_E_web.pdf [2019-11-18]

Unicef (n.d)
a. *Water, Sanitation and Hygiene*
Source: https://www.unicef.org/wash/schools/files/Snapshot_of_WASH_in_Schools_in_Eastern_and_Southern_Africa(1).pdf [2019-11-18]
b. *Quality Education*
Source: https://www.unicef.org/kenya/quality-education [2019-11-18]

Republic of Kenya, Minestry of Education (2010) *Primary School Design.*

Rudolf Steiner School (n.d) *The Rudolf Steiner School, Mbagathi*
Source: http://www.steinerschoolmbagathi.co.ke/ [2019-09-20]

South African History Online, SAHO (2019), *Kenyan Timeline*
Source: https://www.sahistory.org.za/article/kenyan-timeline [2019-09-26]

Selberg, Teres, **Lepère**, Sabine (2018) *In Situ Studio Bhubaneswar Cuttack.* ASF Sweden, 2018

Kigotho, Wachira (2018) *Is Uhuruâ€™s Government forcing back harambee school system on parents?* Standard Digital 2018, Kenya
Source: https://www.standardmedia.co.ke/article/2001275952/is-uhuru-s-government-forcing-back-harambee-school-system-on-parents?fbclid=IwAR37b9ZOnGgqVtMpjpvGvp1Yig7hvYmbK6D2yJD69OltWUlM8lCw8aDz9uk [2019-10-07]

Ohaga, John (2018) *IKenyaâ€™s ambitious tree planting goal achievable.* Standard Digital 2018, Kenya
Sourse: https://www.standardmedia.co.ke/article/2001289227/kenya-s-ambitious-tree-planting-goal-is-achievable-with-these-three-lessocs [2019-10-12]

World Intellectual Property Organization (WIPO), (n.d) *Weaving a Way Forward*
Source: https://www.wipo.int/cooperation/en/funds_in_trust/japan_fitip/taita_basket_branding.html [2019-12-23]

All pictures and diagrams are made by Astri Sundström Konradsson, unless nothing else is stated.

Tack!