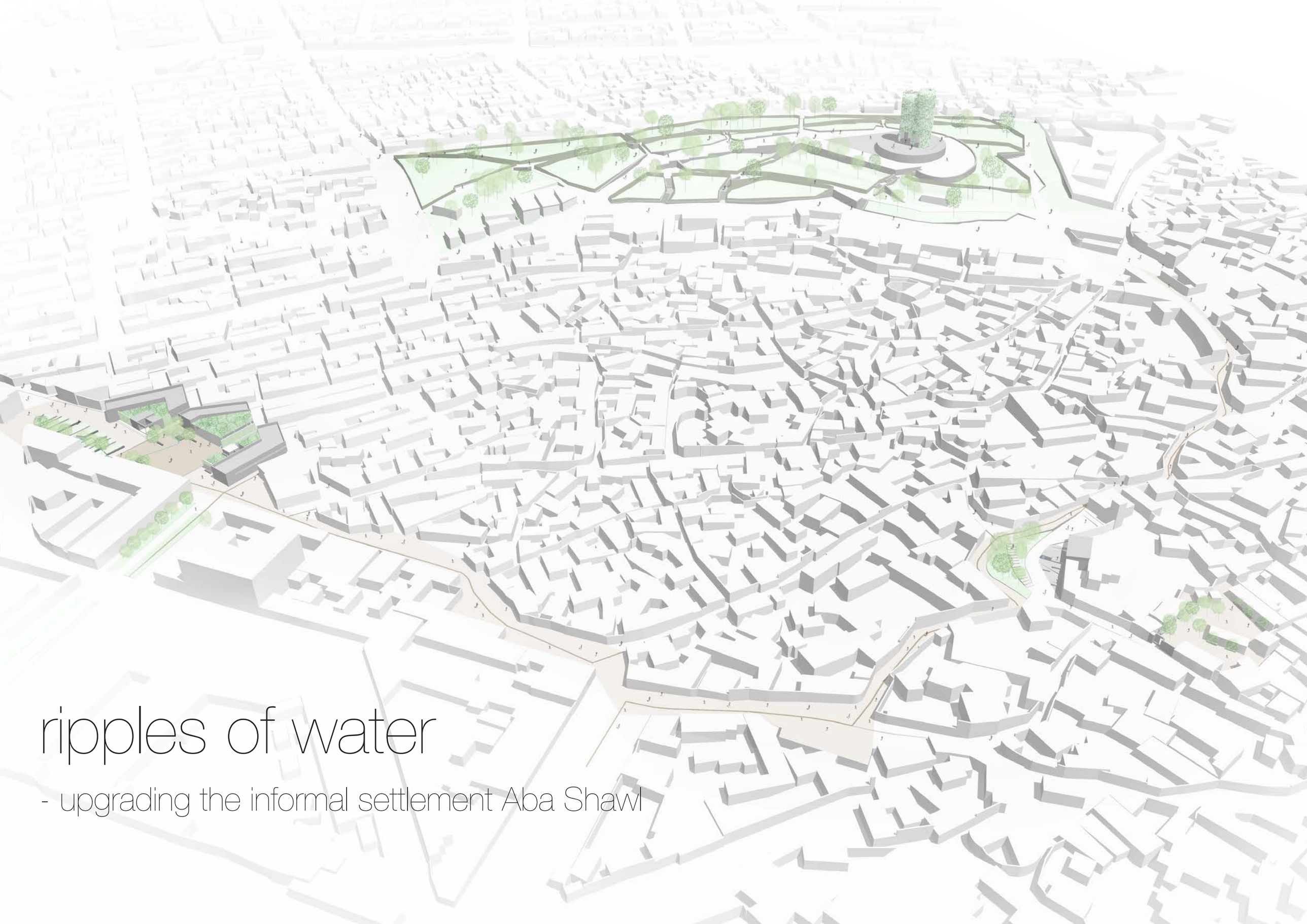


ripples of water

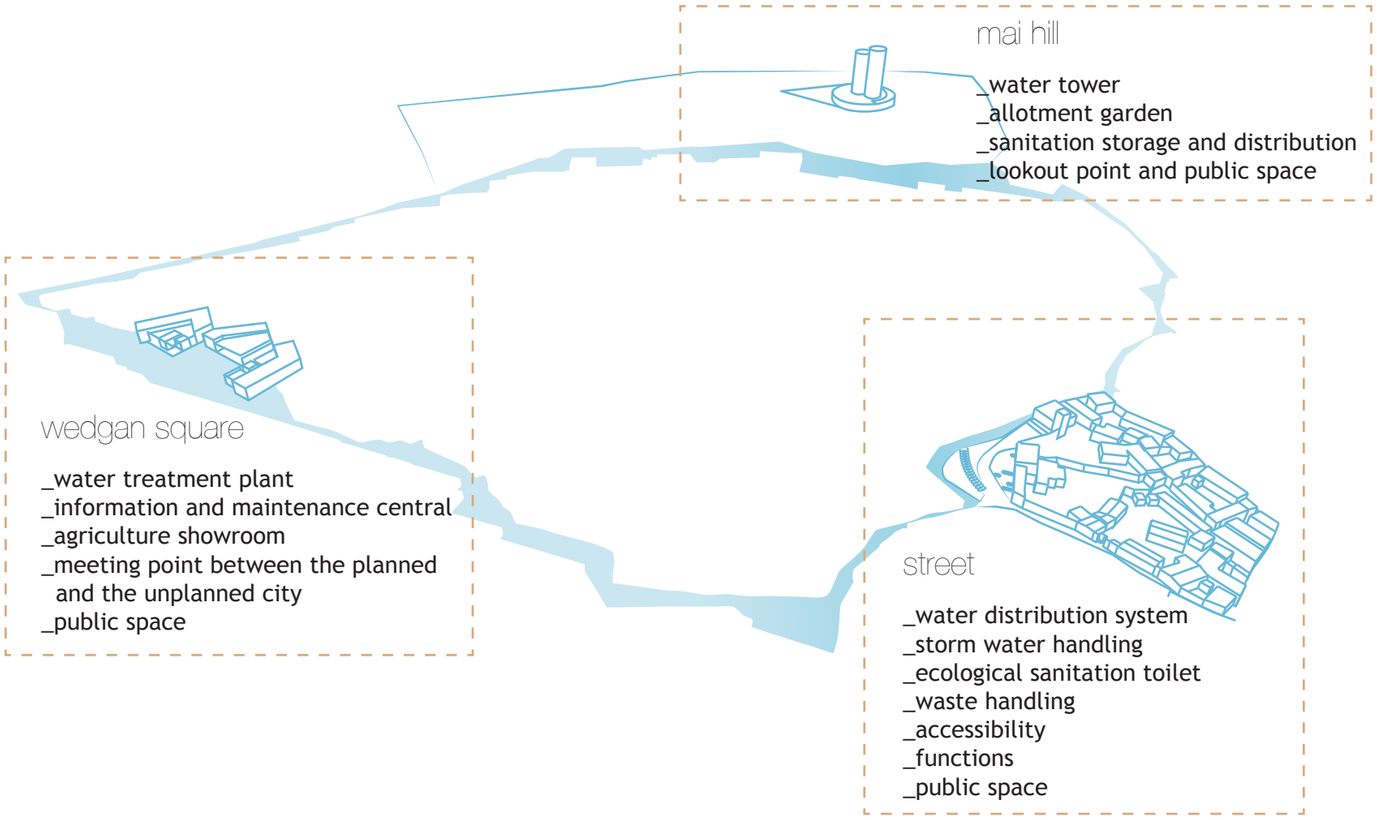
- upgrading the informal settlement Aba Shawl

what?

Aba Shawl is the indigenous part of Asmara, possessing/holding the genuine identity of the town. Few measures have been taken to upgrade it, and big challenges burden the area.

This project proposes a possible strategy for the future development, focusing on improving the daily life of the residents. Our strategy aims to keep and strengthen the qualities found in the area, concurrently with giving an answer to its challenges. We encourage a sustainable approach to the different measures needed, and hope to present an inspiring attitude towards upgrading.

Water is a human right, and affects our life in every way. We have looked at the ripple effects created by implementing water, and zoomed in on three strategic points:



who?

Kjersti Os Mathisen_Silje Høyem_Amundsen NTNU May 2011

aerial photo

background aba shawl

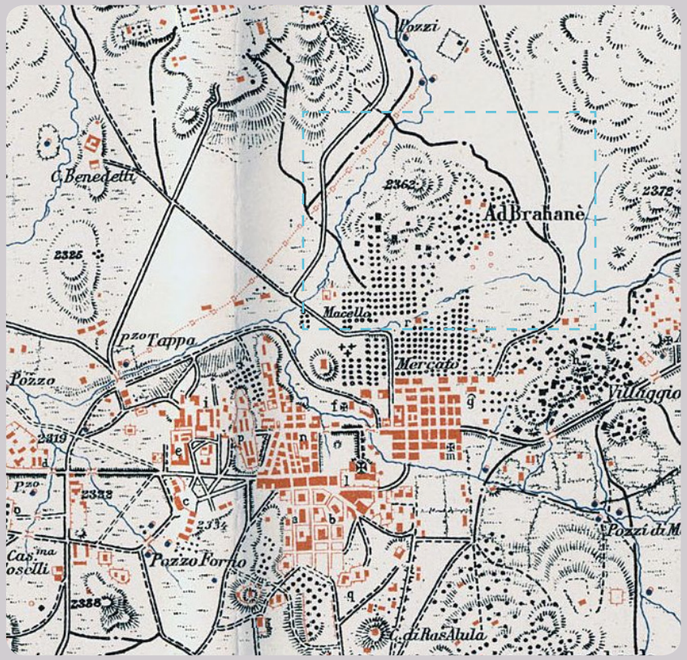
Aba Shawl is an informal settlement in Asmara. The winding streets and small houses make it a unique area in the city. The atmosphere is strong and lively and you do not have to walk far to meet children playing or mothers doing their laundry in the streets. The poverty in the area is impossible to ignore, but the clearly visible social network and big smiles overshadow the poor living conditions and makes the area vibrant and fascinating.

Aba Shawl is also an important part of the history of Asmara. The area can be found on maps dating back to 1906 and you can find families that have been living in the area for more than 130 years. The street network is left almost untouched in all these years, making it a living remembrance of past times.

The settlement is located just to the north of Afabet Street, which marks the limit of the historic perimeter of the city. During the Italian colonisation, Aba Shawl was part of what was called the indigenous zone. The city was strongly segregated and this northern part was designated to the Eritreans. In contrast to other parts of the city this part was left unplanned and neglected.

Some parts of the northern area of Asmara received a strict plan to develop into industrial purposes in 1908. This controlled the further development of the area and has pushed the borders of the planned city straight into the unplanned city, leaving a clear border between the two. Aba Shawl is situated in a hillside, and the rigid pattern of the city plan did not suite this uneven topography, leaving this area untouched.

The Italian planned city received a regular pattern in the North-South direction. Before the Italians were overthrown during the Second World War, the European areas of Asmara were provided with water supply, sewage disposal, broad paved streets and health care. Aba Shawl still has none of these. With no urban planning or provision of services, it evolved in a different way than the rest of the city. No formal street plan or infrastructure existed to ensure sufficient healthcare, education, communication or sanitary facilities for the inhabitants. There is still no running water in the houses and the electrical distribution network has only been improvised by the inhabitants, leaving it an unstable and dangerous system.



The small houses have been arranged without any strict underlying regulation or planning. However, some sort of arrangement between the inhabitants must have existed. There is a structure based on blocks and shared backyards that can only have been build up through some sort of common understanding. The houses have been gradually maintained or rebuilt and kept in good condition by their owners.

Aba Shawl is still Asmara's poorest area and has been neglected by the following administrations until the independence of Eritrea. However, the fact that these native quarters still exist together with the Italian planned city gives the city its unique identity.

Asmara is understandably a city keen on developing. Poverty is still a big problem and a major part of the city's population lack basic infrastructure and proper facilities. It is important to have this in mind, and be realistic when making the priorities of the future urban planning of Asmara and Aba Shawl. Eritrea has the chance to learn from other countries where irresponsible planning has taken place, with decisions not properly thought through. It is said that the best way of creating wealth, is by developing human settlements in a sustainable way. This can be an important aspect in the future development of Asmara.

situation

inhabitants

The density in the area is 1 100 to 1 500 persons per hectare, which is the highest population density in Asmara. The area we are looking at is about 10 hectares, which means that there is in-between 11 000 and 15 000 inhabitants.

Women generally have the role as homemaker and child-taker. They make the food, collect fuel necessary for its preparation, in addition to sweeping and caring for the home and providing primary healthcare for family members who fall sick. They are also responsible for collecting water. Large parts of the male population are in national service. This means that a high amount of the households are run by women on a daily basis and the street life mainly consists of women, children and elder men. A system of shared backyards provide strong social networks and the responsibility of looking after the children is often shared between the neighbors.

Aba Shawl is mainly a Muslim area, but has also some Christians.

structure

Aba Shawl consists of an intricate system of small houses. Each family have their own house or a small room. One family often have as much as seven members, and often up to ten families can share the same backyard. Others have been able to upgrade their house and now have a private backyard. The social structure of the semi-private backyard is very important to the inhabitants. There is a high degree of interaction with your neighbours. They share responsibilities and the safety such arrangements provide are important aspects to keep. A rough count suggests that the area we have selected in Aba Shawl consists of about 420 backyards.

The houses often have one facade facing the street. They lie in an irregular pattern and the fences are used as a mediator between them, making a continuous street. The backyards are structured together into blocks with a system of main streets and side streets. The chaos has its own order.

functions

You find the highest concentration of shops in the outskirts of the area. Within Aba Shawl, the density is high and there is little space left for such functions. It is mainly a residential area, with little economical activity. There are a few shops and beauty salons in the south-western part close to Wedgan Square. These shops have the public function towards the street, while the private home is placed at the back.

meeting between planned and unplanned

Aba Shawl lies in the meeting between the planned Italian city and the unplanned. A strict regular pattern in triangles meets the informal city with its irregular contour and small and winding streets.

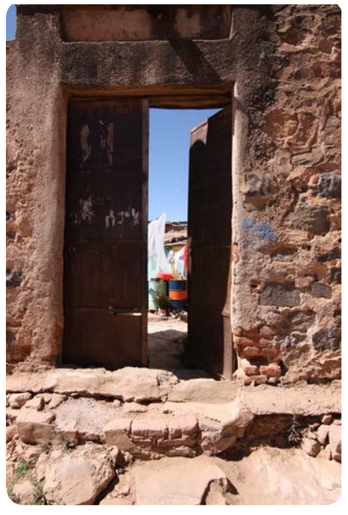
housing standard

The buildings in Aba Shawl are one storey high and made of mud, stone or occasionally brick. You can still find examples of the traditional housing typology of the hidmo and the round agdo, where especially the agdo influences the shape of the street. High fences surround the backyards, keeping this semi-private zone out of sight for any by-passers, however the doorway is usually kept open and gives you a quick glimpse of the daily life inside.

Aba Shawl is in constant change and development. As families evolve through generations, they slowly upgrade their homes, piece by piece. Others get a higher income level and can even build new homes with a quite high standard. This is clearly visible in the streets of Aba Shawl. Suddenly new facades face the street and even the cover of the street is upgraded.

ownership arrangements

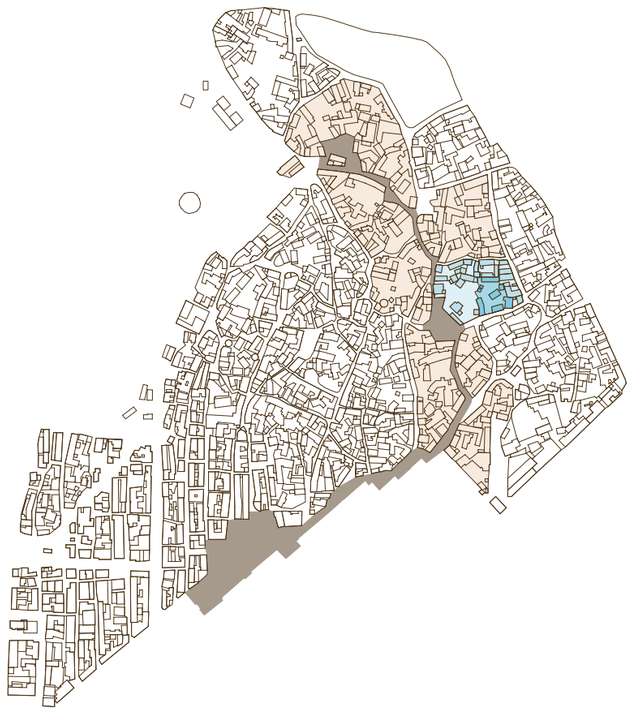
The inhabitants of Aba Shawl own their own properties and the houses built on them. This means that there is a legal obligation to compensate for any impacts the new formal interventions will have on their private properties. Families that are forced to move, have to get compensation for their loss and given the feeling that they are given back something of a grater value than what they had.



structure

buildings

blocks



from block to backyard

residents

Every Monday the municipal crane close by has water. Then I go and fetch water for the following week. It is hard work, but there is enough water for everybody. We are eight persons living together, so I have to go many rounds.

I work at a sanitary station. The government pay me 600 Nakfa per month. I clean daily, and fill the water tanks inside once a week. I get water from the water truck. Normally there are about 60 persons using it daily, and then it is enough water. But sometimes there come many more, and then I run out of water.

We don't know anybody with a private shower. It is not normal here. Some have a private toilet, but we don't. We use the public ones. They cost 25 Nakfa.

We have a water tap inside our backyard, but it functions only once every month. Sometimes it functions for days, and sometimes just for minutes. When it doesn't work, I have to fetch water from the truck. The truck comes once a week, and then I almost have to fight with all the others to get what I need. Kids and women get prioritized, but it is seldom enough. I have to go at least ten times back and fourth.

All the men in the family are in national service. The women don't have jobs. The mother of the house has kidney problems, but we can't afford to pay the bills. The father of the house died when he was nineteen years old.

I help my mother to fetch water every time the water truck comes. I would much rather play with the other kids, but my mother says I can't. I wish we had a proper playground.

I share a backyard with 60 persons, but my family and I have our own building. The oldest member of the family is 70 years, and the youngest just got born. This has been our family's plot the last 130 years. We are so lucky to have water taps inside our backyard, but they only function a couple times a week.

qualities

identity

The streets of Aba Shawl are winding and narrow, always changing and giving new spatial experiences. Every street is unique with every wall built in different ways of brick, stone or mud. The walls follow old borderlines and the typography of the terrain and are a remembrance of old times. It is a part of the areas history. In addition there is a mix of new houses with satellite dishes and the traditional typology of the agdo and hidmo. It is like walking in both the past and the present at the same time. The palette of materials has a natural rhythm of earth colours, often with a door or a window in a contrasting shade of blue. It is also the contrast to the Italian planned city that makes Aba Shawl unique and in this way an important part of Asmara. It is a part of its identity and history.

step by step development

The houses in Aba Shawl are in constant change. Some places new facades face the street and even the cover of the street is upgraded. This upgrade has happened without conflicting with the existing street network and shows that it is possible to get a better living standard step by step without going trough with a “tabula rasa” project.

social network

The social structure of Aba Shawl is to complex for us to fully understand, but that the social relations are strong is clear. The social aspects of the shared backyard seem to be very important to the women and children living there. Often, they share the responsibility of looking after the children and can even have a common kitchen. It gives a sense of security, in addition to strong social relations. They depend on each other in their daily life. One should interfere with these social structures as little as possible. It is of great interest for the inhabitants to keep this network, and moving people by force is to remove them from their safe social environment.

challenges

water

Today, water is distributed from trucks. They leave big barrels at distribution points where it is collected by the inhabitants. They use small tanks that they can carry on their backs. This is very time consuming and hard work. They have to take about 10 to 15 trips to fill the barrel in their own backyard. A few backyards have a pump system for water, but this system is not reliable and gives no solution for grey water. There also exist a few public tap stations. Some families have as little as 5 to 10 litres per capita per day.
There is a big risk of the water getting contaminated when it is left in open barrels. Grey water is usually thrown out into the streets.

accessibility

Narrow and winding streets make it almost impossible for a car to enter the area. Some places streets are only one meter broad, and in addition, the rainwater has washed away much of the ground cover and made the surface rough and uneven. This makes it a challenge for even bikes to get around.

The poor accessibility makes it difficult to get things in and out of the area, such as waste, goods and ambulances. The fire safety is also very bad.

sanitation

Public sanitary stations provide toilets and showers. Most of the stations are more than 25 years old and in bad condition. A fee has to be paid to use the facilities and the stations provide jobs for the inhabitants. A few backyards close to access roads have private toilets. These are connected to a septic tank or the sewage system. The ones having a septic tank rely on big trucks for collecting the waste.

surface water

Heavy rains in July and August wash the streets bare of gravel and dirt. It erodes the street cover, leaving it difficult to use a bike or even walk.

density

The density in Aba Shawl is very high. 1100 to 1500 persons per hectare in one-storey high buildings give high numbers. Often, a room of 3 meters x 3 meters is shared by a family of 7 persons. In addition, the population in Asmara is expected to double within the next 20 years.

lack of functions

Today, there is a lack of public functions in the area. Aba Shawl is mostly a residential area and there is little space left for other functions. But there is a big need for this, especially schools, kindergartens and health stations.

lack of public space

Some places the narrow streets widen up and create small open spaces. These spaces have no sort of urban development, but often there is a public function placed in connection to it.

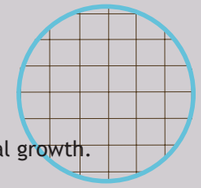
economy

Aba Shawl is the poorest area in Asmara. Most men are working in national service, while the women are caretakers in the household and usually do not work. More functions that can provide jobs for the inhabitants are necessary.

approach

Something must be done to increase the living conditions for the inhabitants of Aba Shawl. In cooperation with the Department of Infrastructure in Asmara, we have discussed three possible strategies for how this can be done.

3 possible strategies



1_demolishing and rebuilding

_accessibility: The area will be fully accessible. Public spaces and functions can be planned and this is a basis for economical growth.
_identity and history: will be lost.
_social structure: people will be forced to move, at least for some time. Much of the social structure will be lost and the impact on the inhabitants is high.
_ownership arrangements: the inhabitants own their own houses and have legal rights in this process. It will be almost impossible to ensure that everyone's rights are preserved/maintained. The strategy does not take into consideration that not everyone will have the financial ability to rebuild their house at the same time.
_sustainable development: this strategy is not consistent with a sustainable development.

2_adding a few access roads

_accessibility: The accessibility will be better. Public spaces and more functions and services can be added and be a basis for economic growth. The strategy is more robust for a future development of Aba Shawl, and will also network the unplanned city into the rest of the city. The degree of accessibility and impact is dependent on how broad the new streets are.
_identity and history: Some of the history and identity will be lost. Depending on how close these access streets are added there will be a conflict in how the existing street network and the new streets meet.
_social structure: this strategy will have a big impact on some of the inhabitants since they most likely will have to move. This will remove them from their safe social network.
_ownership arrangements: some of the inhabitants will have to move and get some sort of compensation. It will most likely not be possible to replace everyone within the immediate distance of Aba Shawl. This has an impact on the distance to the rest of the city and their workplace.
_sustainable development: this strategy is more consistent with a sustainable development.

3_keeping the existing street network

_accessibility: the only upgrading of the accessibility will be to change the street cover. This will make it easier for people to walk or use bikes or trolleys. It might also be possible to use other means of transportation to access the area. Studying the existing structure one can find open plots that can be suitable for new functions and public spaces.
_identity and history: this will keep the street network and historical base of Aba Shawl untouched. This is valuable, as Aba Shawl is a part of what makes Asmara unique, both in structure and in a historical setting.
_social structure: this strategy does not conflict with the existing social structure.
_ownership arrangements: this strategy does not conflict with the existing plot structure. It leaves the possibility of letting the inhabitants gradually upgrade their homes and in a natural process increase the living conditions.
_sustainable development: this strategy is more consistent with a sustainable development. Planning a development based on existing qualities will also make it more robust for future influential forces.

conclusion

_Strategy 01 points out as the one with the most negative consequences. It has a big impact on the inhabitants and the existing structure. In addition it totally destroys the historical base of the area. Both strategy 02 and 03 are more in line with today's urban development theories and maintains more of the qualities found in the area today.

We have chosen to look into a strategy that is a mix between strategy 02 and 03. We want to keep as much of the existing street network as possible, but we also want to increase the accessibility in the area. We take it as a starting point that other means of transportation can solve a part of the problem, as it does in many old medieval towns, such as San Gimignano in Italy or Gamla Stan in Stockholm, Sweden. Some houses must probably be moved, but the degree of impact on the inhabitants can be kept to a minimum.

It will also be possible to add a water distribution network in the existing streets, which will increase the living conditions for the inhabitants. Getting a better housing standard can happen gradually, especially if one facilitates a development where the inhabitants will create and get more resources.

how?

Measures must be taken to increase the standard of living in Aba Shawl and to give the inhabitants an easier daily life. We wish to do this without destroying the quality, identity and history of the area.
How can we take advantage of the measures taken and get even bigger ripple effects than the actual intervention?

water

Access to safe water and sanitation is acknowledged as a fundamental human right (UN – 2002). It is not a luxury, but a basic requirement in the everyday life. Securing a constant and sustainable water supply is also a starting point for triggering development. Water is the life nerve in any society (and the issue of water cannot be taken lightly).

In Asmara, the shortage of water is a challenge. Today, the city is entirely depending on surface water from three existing dam reservoirs. The distribution network does not work continuously over the week, and in some areas people rely on water trucks once a week. Water then has to be stored in tanks until the next supply of water appears.

Creating a stabile and sustainable water supply is therefore crucial for the future development of Asmara. Also, the population of Asmara is expected to grow and so will the demand of certain resources. In order to prevent shortage, the waste produced needs to be reintegrated back into the system, creating a circuit.

ripple effects

The technical intervention required for installing a water distribution system and sewage can have big ripple effects. Adding pipes in the streets gives the possibility to at the same time upgrade the street cover and public spaces. This will increase the accessibility, which again has extended effects.

By adding a wastewater handling system, a wastewater plant, the water can be used twice. This water can then be used for agricultural or industrial purposes. If used for some type of farming, it will be a valuable contribution for the inhabitants. Also the possibility of rainwater harvesting would transform a hazard into an asset.

Organic waste is possible to recycle. By using an ecological sanitation system it can become an important contributor to agricultural purposes as fertilizer and soil.

water

The water sources are unstable and the collection of water is time consuming. When having to store the water in barrels there is also a risk of contamination.

RECYCLING

Water can be divided into three categories:

_clean water
need access to a water source

_grey water
contains food waste, soap
leftovers and such
possible to recycle

_black water
water from flush toilet
difficult to recycle

By removing the black water from the sewage, it is possible to recycle and reuse the water from the household. This grey water can go through a wastewater treatment plant and be reused for watering plants and vegetables, washing and industrial purposes.

With this solution, the black water needs to be handled by a different system. If one uses a system based on ecological sanitation, this waste can also become a valuable resource as soil and fertilizer.

These are sustainable solutions and they create resources that today are in short supply.

DISTRIBUTION

To add a water distribution and sewage system it is necessary to find existing streets with good slope conditions for transporting grey water. They must also provide an as high coverage for inlaid water as possible. The grey water needs a minimum slope of 1 % to avoid sedimentation. Pumps must be installed where slope conditions are not good enough.

Where it is not possible to get water into the houses, tap stations will be provided at strategic points. These can also function as the main distribution system in a transition period before water is installed in the backyards.

WATER TOWER

The topology on the site can be used as a means for transporting water. By taking advantage of the fact that Aba Shawl is situated around a hilltop, gravitation can give the pressure necessary to get running water in the streets and houses of Aba Shawl. Gravitation provides long-term and consistent water management, and are systems that need little maintenance compared to pump-systems.

By adding a water tower at the hilltop, we get a system based on gravitation. In addition, by adding a safety factor to the size of the tank, we can obtain a constant water pressure even when the rest of the city does not have water. A pump-system is necessary to get water from the existing water network in the city and up to the hilltop.

WASTEWATER TREATMENT PLANT

The natural slope conditions also decide where the water ends up. A water treatment plant has to be placed at the bottom of the hillside to take advantage of the gravitation. We have chosen to look at Wedgan Square as a possible site for the treatment plant. The cleansed water will be reused at the hilltop for agricultural purposes in the allotment gardens and in backyards. In this way it gives a direct contribution back to the inhabitants and the circuit is complete. Surplus of water can be sold to the rest of the city to keep it green or to farmland in the outskirts of Asmara. In this way it also can become a source of income for the community of Aba Shawl.

measures

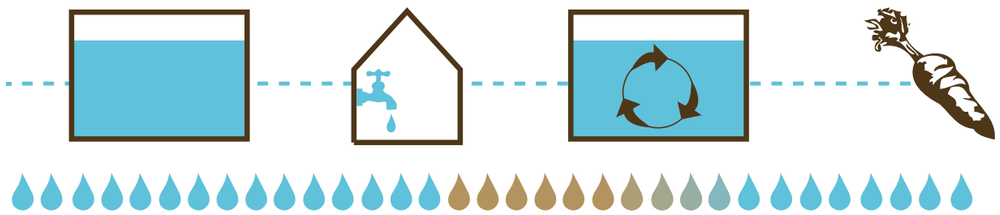
_water distribution system
_water tower
_water treatment plant

STREET SECTIONS DISTRIBUTION NETWORK

The length of the following sections are scaled down to emphasize the differences. Brown dotted line is where it doesn't slope enough.

WATER DISTRIBUTION NETWORK

The blue dotted line is where it doesn't slope enough. This might look much, but most places it can be solved by regulating the height of the pipes in the street section. Most problem areas lie around 30 - 40 cm too high, while the worst case is 2 meters. There it is necessary with a pump.



accessibility

It is absolutely essential with some kind of upgrade of the street network to improve the everyday life of the inhabitants in Aba Shawl. This will solve problems concerning transporting things in and out of the area, such as waste and goods. Improving accessibility also leads to the development of new services, which again will give economical growth.

The two main issues concerning the accessibility are the cover and the width of the streets. The cover of the streets can be upgraded at the same time as pipes for the water distribution system is added in the streets. In Asmara, granite cobblestones is a cheap and sustainable solution. This upgrade also increases the esthetical qualities of Aba Shawl.

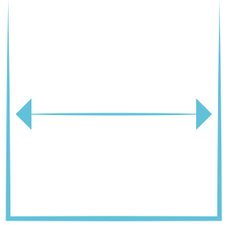
The streets width varies from one meter and up to ten meter. The broadest streets run in the outskirts of the area, while the narrowest often run in the east-west direction. Most streets are about two meters wide. A challenge is that the width of the streets varies a lot within the same street, leaving very few streets accessible in their full length. Giving a normal car access to the area is therefore unrealistic, as this would mean many and large operations. However, the new service systems of Aba Shawl require that a car or cart can access the backyards to collect the trash and toilet waste. This means that these vehicles must be of a smaller size than the normal car. When we visited Asmara, we observed many three wheeled Piaggios with a width between 1,20 meters and 1,50 meters. These would function very well in Aba Shawl. We have therefore based our waste-systems on the 1,50 meters wide Piaggio, and looked at where the streets width must be changed in order to fit it. Some places a fence or a wall will have to be moved or torn down to give room to the street. If the impact is big, this can be compensated with a new house at a different location. Another solution is to upgrade the existing house to a better living standard. Two storey high buildings can also be introduced. If the impact only affects the size of the backyard a possible solution is to give a larger plot in the allotment gardens. If there are longer stretches with a width under 1, 50 meters, it must be considered to keep them car-free. This can only be done if there is an accessible street in close range.

The new service system in Aba Shawl will also include public services such as ambulance, police and fire trucks. At Meddeber Market piaggioes for these purposes can be custom made. Concerning fire safety, fire hydrants are placed within the area, each handling a radius of 50 meters.

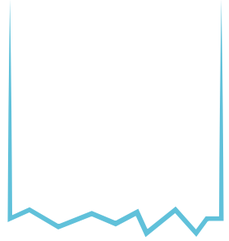
A bus stop is also added to the network. The bus does a loop through the area, stops by the hilltop, and then continues on the rest of the rout.

measures

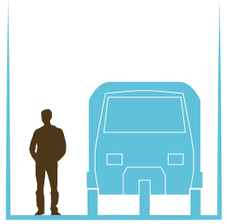
_upgrading street cover
_making the street section broader in problem areas
_adding fire hydrants



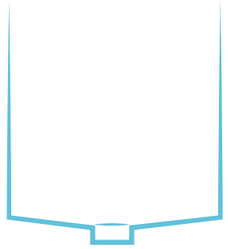
Challenge today _narrow streets



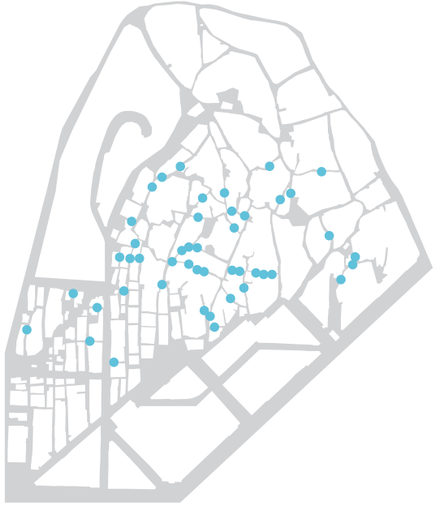
Challenge today_rugged street cover



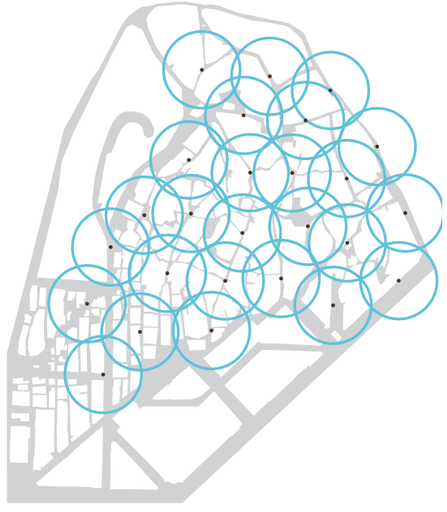
Solution accessibility_small service cars



Solution stormwater_street groove



Map_streets narrower than 1,50 meters



Map_suggested fire hydrants

Map_new bus loop

sanitation

When the black water is not to be mixed with the grey water, a different system is necessary to introduce.

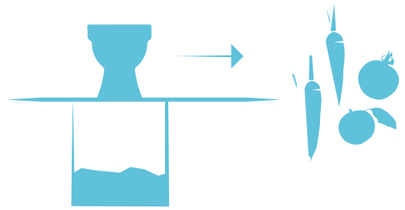
With flush toilets, another set of pipes would have to be laid in the streets and a lot of water needs to be added to get rid of the waste. This method will therefore use more resources than it creates benefits. Water-born collection systems are also a major component of water pollution.

An ecological sanitation system is based on an ecosystem approach and treats human waste as a valuable resource to be recycled. It is a sustainable solution in addition to being an affordable system that easily can be installed and maintained. A positive feature is that this system functions without water.

Sanitizing and recycling human waste creates a circuit and important resources, especially in areas where soil fertility is as low as it is in Aba Shawl. It can be used for agricultural purpose, which can be of great benefit for the inhabitants there, both when it comes to health issues and economy.

For this system to function in such a large scale, a service system needs to be established. The waste will have to be collected by service workers and then stored at a storage space at the hilltop before it is taken into use in the allotment gardens or in the backyards. Surplus of soil and fertilizer can be sold to the farmland in the outskirts of Asmara.

To ensure that the system is functioning properly, it is necessary with educational facilities and a showroom for how to take advantage of the new resources provided in the best possible way. These services are placed at Wedgan Square and take part in a public space in connection to the rest of the city.



PRIVATE UPGRADE

We are proposing a strategy where every backyard gets its own toilet based on the system of ecological sanitation. But this means that we are interfering with the arrangements of the private household and are implementing systems that have to be solved within every backyard. Upgrading the backyards is a sensitive theme, as it must happen on the residents' premises. The residents will have to want the changes, and fully understand it, in order for it to function. Forcing rules upon them, is not an approach we desire, but with the upgrade some regulations still follow. If you choose to build an ecological sanitation toilet for example, you can't send the waste in the pipe system. Choosing what material you build the toilet in, is however free for the inhabitants to decide.

Sanitary stations are still provided for those who do not have the possibility of adding this system to their household. The existing stations are kept as long as necessary and possible. These stations also provide showers.

measures

_principle solution for ecological sanitation
_allotment gardens
_storage
_sanitary station
_maintenance system

Existing sanitary stations that should be kept as long as it is a need for it

Every backyard gets a toilet to share

density

The houses and backyards in Aba Shawl are in constant change as families grow, new generations take over and people move. But since the population of Asmara is expected to double within the next 20 years, some sort of regulation must be made if the area is not to become even denser. The natural step-by-step development in the area today can be used to regulate a process where the goal is to end up with less people sharing one backyard. This regulation can state rules for a more efficient area use and by starting to build two-storey high buildings. Solving density through a vertical growth can be an effective measure.

How these regulations should be carried out is not something we feel qualified for solving. We are only stating that some sort of regulation controlling the future development is necessary, not only to control the density, but also to make sure that the qualities and identity of Aba Shawl is not lost.

We have used one typical block and backyard as a case study of the structure and area use in Aba Shawl. In the selected backyard the density is 0,09 persons per square meter.
The DoI has developed a low cost housing standard to be used in such dense neighbourhoods. This is a one family house with private backyard and has a total area use of 70 sqm. If one assumes that one family consists of six persons, you will get the same density as in the backyard we have looked into. The low cost housing also has the second largest percent of built up area compared with all the backyards in our selected block. Directly translated this means that it is possible to achieve the same building standard within the existing network of Aba Shawl, but less strict rules for housing typologies might be necessary. The suggested low cost housing also does not take into consideration the existing social networks of the shared backyard.

AREA CALCULATIONS

BLOCK

_total area: 3 208 m2

BACKYARDS

	Total area	Built area	%
_1:	1 206,0 sqm	319,7 sqm	26,5 %
_2:	776,4 sqm	326,9 sqm	42,1 %
_3:	63,4 sqm	35,4 sqm	55,8 %
_4:	116,8 sqm	89,4 sqm	76,5 %
_5:	137,9 sqm	90,5 sqm	65,6 %
_6:	113,2 sqm	77,5 sqm	68,4 %
_7:	267,9 sqm	103,5 sqm	38,6 %
_8:	161,0 sqm	89,1 sqm	55,3 %
_9:	365,2 sqm	218,0 sqm	59,7 %

LOW COST HOUSING

70,0 sqm	48,0 sqm	68,6 %

BACKYARD NO.2

Families/houses: 12
Persons: 70
Total sqm: 776

70 persons/776 sqm = 0,09 p/sqm

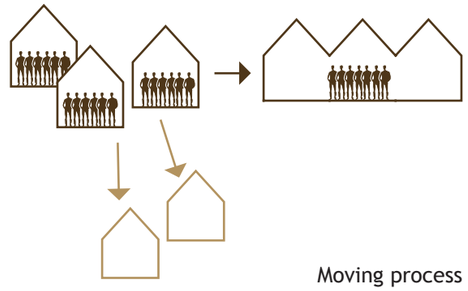
LOW COST HOUSING

Families/houses: 1
Persons: 5 - 6
Total sqm: 70

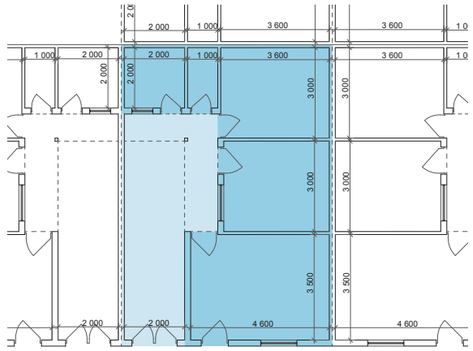
6 persons/70 sqm = 0,09 p/sqm

measures

_propose regulation



Moving process



Low cost housing, DoI

Block of study

surface water

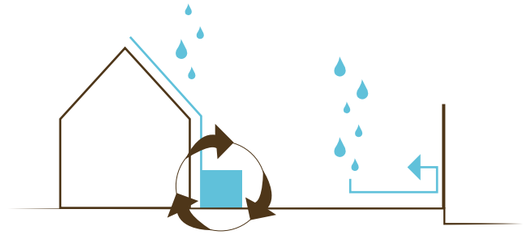
The rainwater is more of a hazard than a resource; it floods the streets and washes away the street cover. If collected and handled properly it can be of great value, especially when water resources are scarce.

An important part of solving the problems concerning rainwater is to make room for it in the street section. A water groove is placed in the middle of the street and the two sides of the street receive a small tilt of 1 - 2 % to lead the water into the groove. The groove is placed in the middle of the street to avoid the water eroding on the walls and fences along it.

The surface water from the streets is too polluted to be used directly by the households or for agricultural purposes and it is not sustainable to dimension the wastewater treatment plant to handle the rainwater when it only occurs a few weeks a year. The

water is lead into infiltration basins where it has the time and space to infiltrate into the ground. (More information about infiltration basins is found on “Edaga Hamus, Public space”)

Solving the storm water issue inside each backyard is an important part of minimizing the problems it creates in the streets. If each backyard handles as much as possible of the rain falling on their property, less water will flood the streets. Rainwater harvesting is a cheap and easy method to help this problem. The roofs in Aba Shawl are



made of corrugated plates, often slightly tilted, which make a good starting point for harvesting the rainwater. The barrels previously used for storing drinking water can easily be placed under the roof and used for harvesting rainwater. The water can later be used for watering plants and vegetation in the backyard.

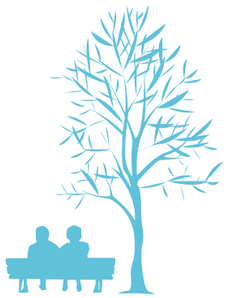
measures

_water groove in the streets
_purposed regulation of rain water harvesting in the backyards

lack of public space

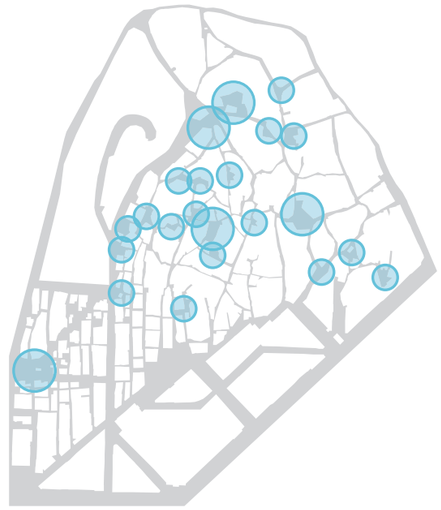
The open spaces within the city tissue of Aba Shawl have no type of urban character, but have a great potential in becoming informal meeting places for the inhabitants, giving them the possibility of socialising outside their private home.
Often there is a public function placed in connection to these open spaces, and this would be a desirable principle to follow. When mapping the structure of Aba Shawl to find the space for new functions, one should try to connect these functions to existing open spaces. By upgrading these spaces and facilitate for activities to take place, one invites people to spend time there. This will in turn promote economic activity and safety.

Upgrading such public spaces will also increase the esthetical value of the area. The spaces are already unique and have an individual character because of the ever-



changing street network. These qualities should be reinforced and a focus on the human scale should be maintained.

Map to the right shows where there are small or open spaces that with an upgrade can become recreational spots.



measures

_upgrade of public space within the street network

lack of functions

There is a lack of public functions and services in Aba Shawl. Certain functions have to be planned, while others will emerge as the area gets more accessible.

When executing the upgrade it is natural to assume that the streets being upgraded first, will start attracting service professions, and become important social and commercial areas. The space facing the streets will quickly develop into simple shops, barbers, beauty saloons, butcher, bakery, pharmacies, cafés and such, as the habit is in Asmara. This is a process that the inhabitants have control over, but implementing other bigger functions must be decided from the top. However, since Aba Shawl lies very close to the Planned city centre and the market areas in Edaga Hamus and around Medeber, many functions are already in close range. Functions that should lie inside Aba Shawl are more of a

municipal character, such as public health centres, educational functions, police station, shower stations and water taps. Because the street tissue is so tight, a thorough mapping of where it is possible to build new buildings or re-use old buildings should be done in order to be able to prioritize these municipal functions. In areas where it is impossible to build new structures, one should take use of the vertical free space. Adding new functions, both planned and unplanned, will increase the economical activity and provide jobs for the residents.

measures

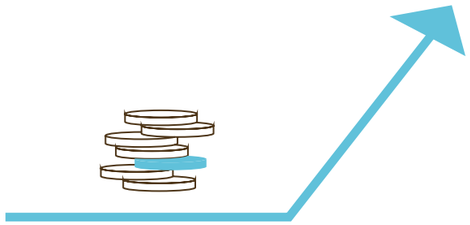
_increasing the accessibility is to facilitate the emergence of functions

economy

We are proposing a sustainable strategy for the future development of Aba Shawl. When the community itself creates some of the resources it is a consumer of, this becomes an economic advantage. The establishment of allotment gardens and a bigger possibility of growing your own food affect the economy of the private household in a direct and positive way. Being able to sell the excess water, soil and fertilizer also gives an income that can be used to maintain the systems within Aba Shawl.

As the accessibility gets better and shops and other public functions follow, this will stimulate an economic growth in the area. It will provide jobs for the inhabitants and thereby a higher income level.

Upgrading the water distribution network, increasing the accessibility and the emergence of new functions will also increase



the status of the area. The same accounts for the sustainable strategy chosen. Aba Shawl will be a pioneer within a sustainable development and the rest of the city can look at their solutions as an ideal.

measures

_all previously mentioned measures affect the economy

measures

realism

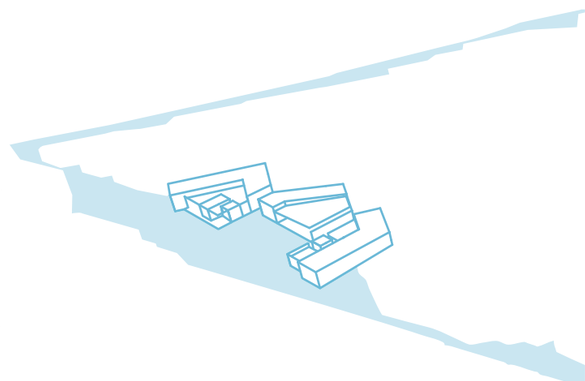
Aba Shawl is in the big context a very small part of Asmara. Areas north of Aba Shawl have many of the similar features, and people live under difficult circumstances. The difference is that they are organized in big straight blocks, and often have inlaid water. But the standard is low, and these areas are also in need of an upgrade. Our project aims to give transferrable solutions that can be implemented in these areas as well, but some measures are of course site specific.

As Eritrea is a poor country, we have focused on making robust strategies and designs. In order to be a serious contribution, this is necessary. Economy, technology, and materials available are issues that have affected our choices, as well as the will to exploit the local knowledge. Keeping the balance between this and making inspiring and innovative projects is both challenging and exciting.

To achieve these goals we have worked with different levels of feasibility in the different projects. We have emphasized the need for low-tech solutions in our technical proposals, and collaborated with professionals to make sure that our answers are realistic. In the parts meant as inspiration, we aim to suggest principles they would want to follow. To illustrate those principles we have proposed a building design for each of the different parts. The principles are however more important than the design. It is more about what a building does, than what it is.

WEDGAN SQUARE

The implementation of a new water and sanitary system requires information, maintenance and a consistent supervision. We have developed a strategy for establishing this new system and how to run it properly, resulting in an operation central and water treatment plant on Wedgan square. The square holds a strategic location, as it is connected to the planned city.

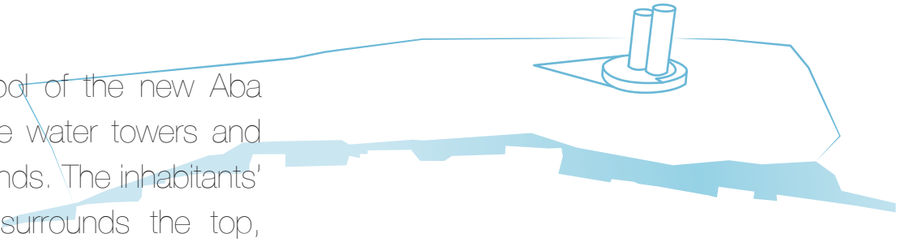


STREET UPGRADE

The most significant upgrade for the inhabitants is in the street tissue and the backyards, which is why we have focused on solving these challenges with realistic and technical solutions. We have chosen a typical street in order to exemplify the specific measures and their impact on the residents' daily life. The solutions we present are transferrable to the rest of Aba Shawl and similar areas in Asmara.

MAI HILL

Mai hill is the symbol of the new Aba Shawl, with its three water towers and green covered grounds. The inhabitants' allotment gardens surrounds the top, with a public vein stretching itself through the area and up to the highest point.



street upgrade

water use

The most significant upgrade for the inhabitants is in the street tissue and the backyards, which is why we have focused on solving these challenges with realistic and technical solutions. We have chosen a typical street in order to exemplify the specific measures and their impact on the residents' daily life. The solutions we present are transferrable to the rest of Aba Shawl and similar areas in Asmara.

identity

_the characteristic street tissue tells a different part of Asmara's history, and is worth preserving

sustainibility

_preservation is a sustainable approach to upgrading
_local materials are used as far as possible
_adapting for infiltration
_growing own food

technical features

_adding distribution pipes requires special materials and knowledge
_ecological sanitation toilets are low-tech, but learning how to use it is essential to avoid failure

functions

_water distribution system
_storm water handling
_ecological sanitation toilet
_waste handling
_accessibility
_functions
_public space

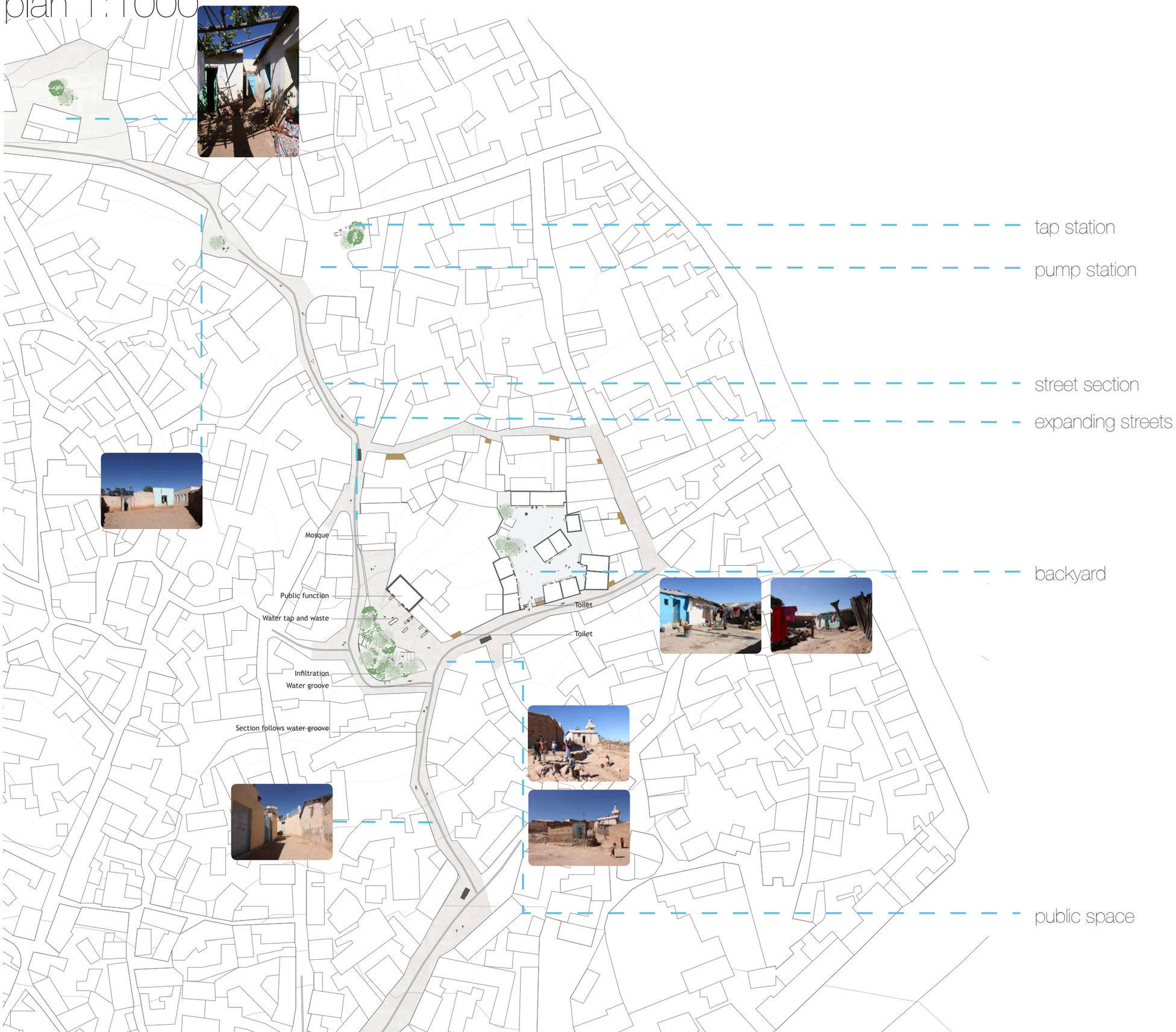
top-down

_water distribution
_accessibility upgrade
_creating and maintaining public spaces
_adding municipal functions
_waste collection services

bottom-up

_adding commercial functions
_sanitary system
_waste segregation and recycling
_water collection on roofs
_growing food in vertical gardens

plan 1:1000


tap station
pump station
street section
expanding streets
backyard
public space
Mosque
Public function
Water tap and waste
Toilet
Toilet
Infiltration
Water groove
Section follows water groove

pump station

There should be a minimum slope of 1 % in order for the water to run through the pipes and be distributed to the different households. The greywater contains more particles, and further pressure is required in order for the water to flow properly. In some parts of Aba Shawl, the slope conditions are not sufficient to provide the necessary pressure. In these situations it will be necessary to install booster pumps. In some cases, an installation inside a house or backyard of an affected area can be necessary.

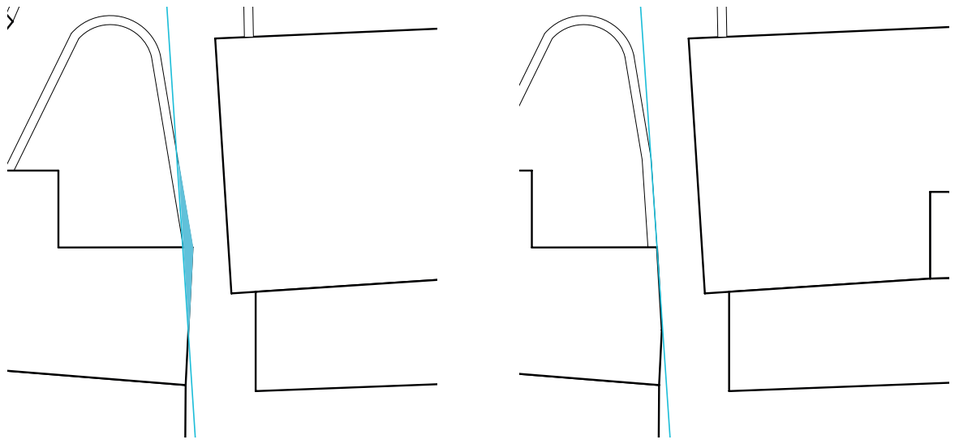
The pumps will require some sort of energy source. Since batteries are expensive in Eritrea, pumps run on solar- or wind energy can be used. Rechargeable batteries are also an alternative. The pumps should be placed inside pumping stations to be protected against rain and flooding.

Booster pumps might be an expensive solution, but it is important to find a solution for the areas with low pressure, in order for the system to function properly. However, in some of the affected areas, an advisable solution might be to excavate more land and put the pipes further down in the ground to create the needed slope.

expanding streets

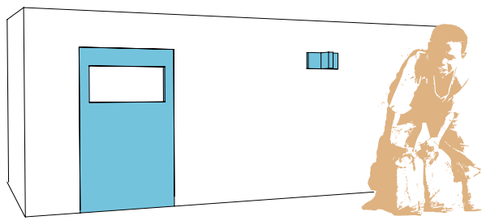
At this point the street is less than 1,50 meter, over a stretch of 5,5 meters. On the east side there is a building along the entire stretch, while it on the west side is a mix of building and fence. Building a new fence is not as big a convenience as building a new part of the house, which is the reason for choosing to move the building and fence to the west. This operation steals 0,9 m2 of the plot, which will be given back in the allotment garden. The work should be financed by the government or if not, by the profit from the operation station's services.

If relocation of a family is necessary, a possible site is an open plot in the outskirts of Aba Shawl. It is about 1 600 sqm and could house several families. The plot could also be used for a public function, but it is important to give some of the families affected by the upgrade the possibility of getting new plots in the same neighbourhood.



tap station

Adding a water distribution system for all the inhabitants in Aba Shawl is a long process. When implementing water in a street, water taps should therefore be spread throughout the structure. It will be a step up from being dependent on a truck that comes once a week, and will function good as a starting point.



public space

We have developed a design for one of the open spaces along the chosen street of study.

Main principles controlling the design has been:
_upgrade cover
_add function
_create meeting places, place to linger
_handling surface water

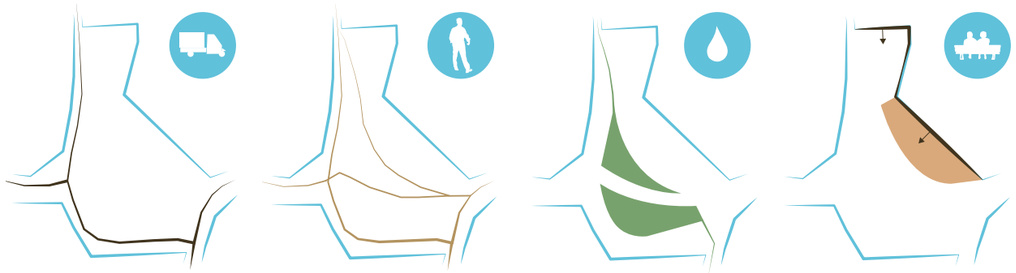
On the site there is already a mosque. This function attracts people, but we propose to also add a new function because of a large undeveloped site available at the neighbour plot. Many functions of a municipal character are missing in the area, such as health station and tap station, and these would be suitable programmes to add here.

A former sanitary station on the site has been transformed into a residential house. This we choose to relocate, as Aba Shawl then gains a bigger square inside the street tissue. Procedures for this relocation is mentioned in “extended streets”.

Granite cobblestones are chosen as ground cover as in the rest of the streets. Benches of granite are arranged at different levels shaped by the terrain.

A green zone is added to the space. This increases the esthetical value in addition to give shade from the sun and being an infiltration basin for surface water. An infiltration basin consists of gravel, bushes and threes. The gravel infiltrates the surface water while the trees make the soil porous. (For more information about infiltration basins: Edaga Hamus, Public space)

In Asmara, planning by creating conditions for activity to take place is essential. Making sure a space has a central location and some type of furnishing can be enough to make a space an important meeting place for the inhabitants. A design with focus on simple solutions is fundamental.



Flow of vehicles | Flow of people | Water and vegetation | Recreational zone

street section

When implementing water it is easiest to put the pipes in the existing streets. As this is quite a big operation, it is natural to do the rest of the upgrade at the same time. This means lighting, making it possible to put all technical wires underground, adjusting the street height according to the backyards, making storm waterways and making the street cover even and stabile.

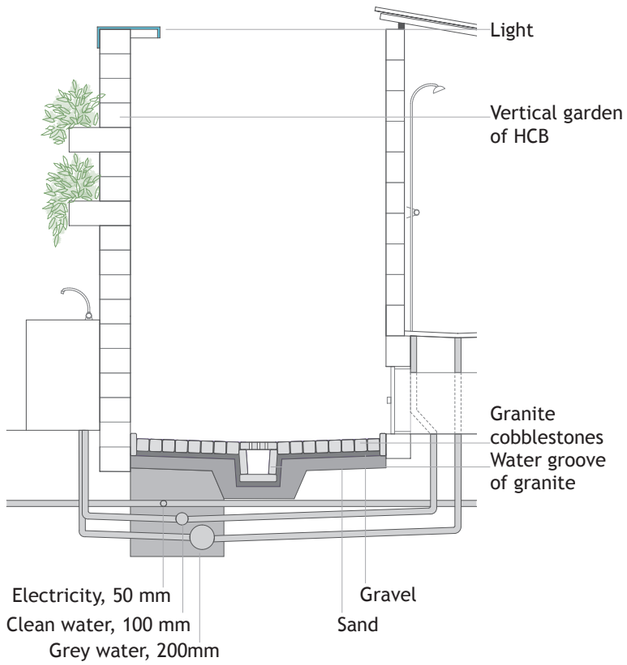
The pipes should be of PVC-plastic, as they require little maintenance and are possible to import. We visited a construction site during our stay in Massawa, where they had very good experiences with using this type of pipes. As there will not be heavy traffic in the streets, it is sufficient to put the pipes 50 centimetres under ground level. The different pipes should not be collected in one small culvert, but put down separately.

The street cover should be upgraded to a more solid one than dirt roads, as they tend to be washed out during the rainy season. Granite cobblestones are a good option, as is both cheaper and aesthetic better than asphalt and similar options. The small size of the stones (10 cm x 10 cm x 10 cm) also suits the small scale of the area. The water groove should be put in the middle of the street, so that the storm water is led away from the houses. To avoid dangerous situations with road users, the groove should be covered. We suggest a thick granite slab, perforated with small holes.

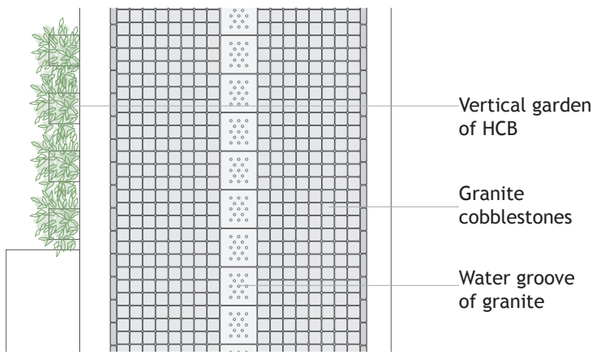
The area has bad or no lighting today. This makes it more dangerous at night, in terms of both crime and the difficulty to walk on the uneven street without stumbling. When implementing lighting it is important to keep the light source under the backyard walls, as the light then isn't disturbing for the residents close by. The lighting can be made at Medeber market, and attached to the top of the backyard walls.

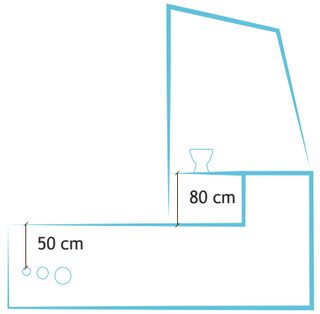
Most backyards lie today higher than the street level, probably to avoid the storm water coming into their backyard. This is also the preferred situation in the new street section, where the toilet tank should be on street level, while the toilet itself is raised 80 centimetres above street level. The height difference between the backyard and toilet can be adjusted with stairs. This means that in total, the height difference between the pipes and the toilet should be 1, 30 meters. Some places this is already the situation, in which digging isn't necessary. Other places one need to dig the pipes down and add stairs to the toilet.

Street_section, 1:50

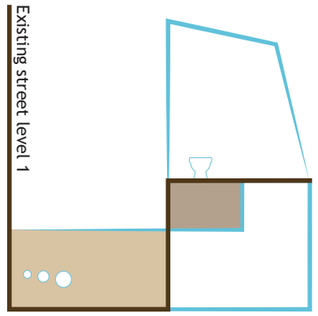


Street_plan, 1:50

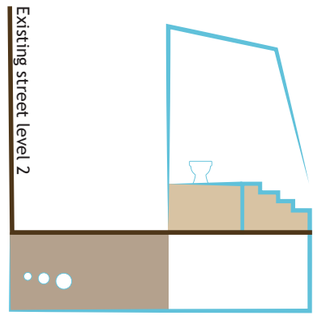




Wanted situation: Height difference between the street level and toilet height is 1, 30 meters.



Existing situation: the difference between the street level and backyard is 1,30 meters or over.



Existing situation: the street level and backyard is on the same level.

Street cover today

New cover:
granite cobblestone

New cover:
granite watergroove

Material for lighting from Medeber market

New street design

backyard

To illustrate what an upgrade of a backyard means, we have looked at what should be proposed as minimum requirements, and how a design could be shaped around them. In order to be more specific, we have chosen one backyard along our street as an impact area. The main issue is the implementation of a new building, the toilet, but finding solutions for rainwater harvesting and waste also affects the backyards.

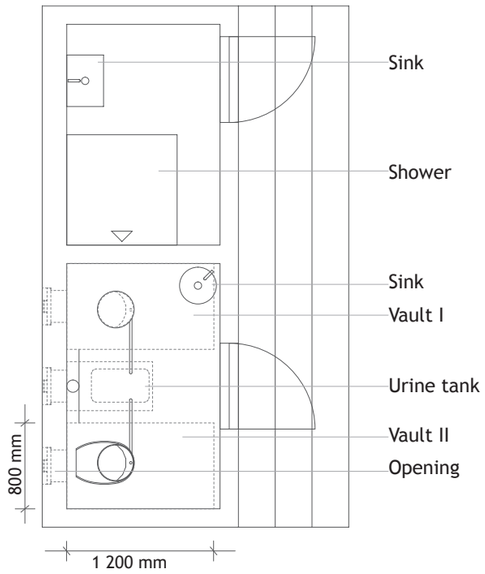
toilet description

The ecological sanitation toilet type we have chosen is the LASF (letrina Abonera Seca Familiar) dehydrating toilet often used in Central America and Mexico. This type is successfully tested in many similar areas, and meets our strategy requirements. It consists of two vaults, where each has a volume of 0.6 - 0,9 cubic metres, depending on how many people are sharing the toilet. After using the toilet a dry material is sprinkled over. When the first vault is full, you seal it and start using the other. When this is also full, you need to switch back. The time this take, depends on how many users it has. A household of 5-6 persons will change toilet once a year. Turning the faeces into ready-to-use fertilizer takes about six months. If there are more users and the vaults get full before it is fully sanitized, it must get collected and go through a secondary treatment before it is used in the allotment gardens. This is also the case for backyards where there is not enough room for a double vault system. Here we propose a single vault of 0,5 cubic metre that has to emptied every 4 months. This is also depending on how many users it has.

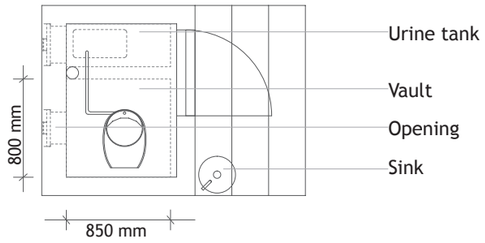
The urine is separated from the faeces, into its own tank. This needs to be collected every week. The urine contains as much as 90% of the fertilizer value in human excreta, and is also the easiest to use as fertilizer by the inhabitants themselves. The excess urine, and the urine from the inhabitants not wanting to use it on-site, is collected weekly. This urine is stored in the storages on the hilltop, and then sold to farmers or used in the parks of Aba Shawl or in the allotment gardens.

The street section is important in the design of the toilets. The waste should be easily accessible from the street so that it can be collected without the workers having to enter the backyards. In most situations, there is also quite a big height difference (from 0,2 m up to 1 m) between the road outside and the ground level of the backyards. This can be exploited to minimize the height difference between the floor of the toilet and the ground level in the backyards. If it is not a possibility to build a toilet along the street walls, it is still possible to build it inside the backyard elsewhere. This does however mean that you instead of a vault have a transportable tank that can be rolled out for collection.

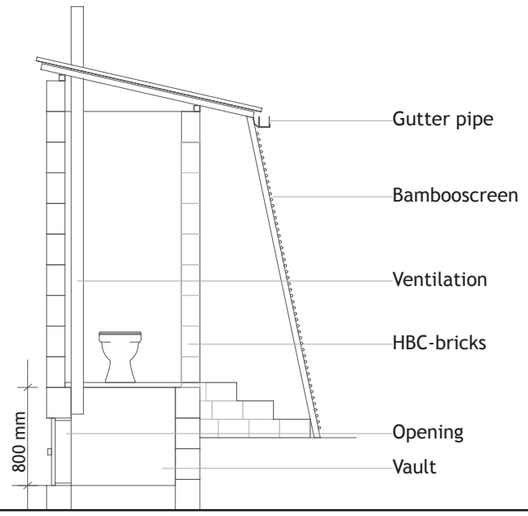
Proposal_large, 1:50

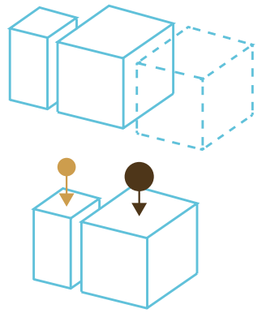


Proposal_small, 1:50

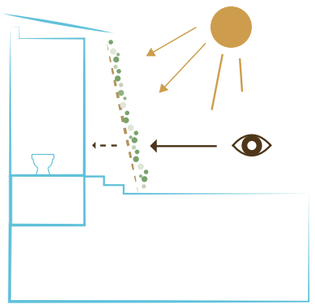


Proposal_section_small, 1:50

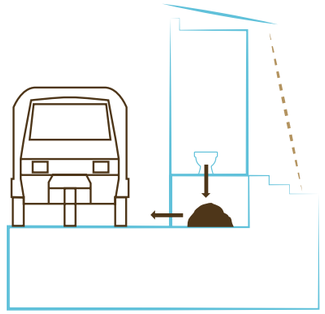




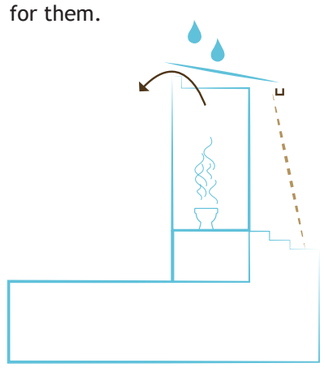
Proposed regulation: Each toilet vault must be between 0,5 - 0,9 m3, with an urine tank nwxt to it. Faces and urine must be separeted.



Proposed toilet design: A light wall is put up in front of the entrance of the toilet. This provides shading, but also privacy by shielding the entrance. The screen is made of bamboo and can be used for climbing plants and be a green wall inside the backyard.



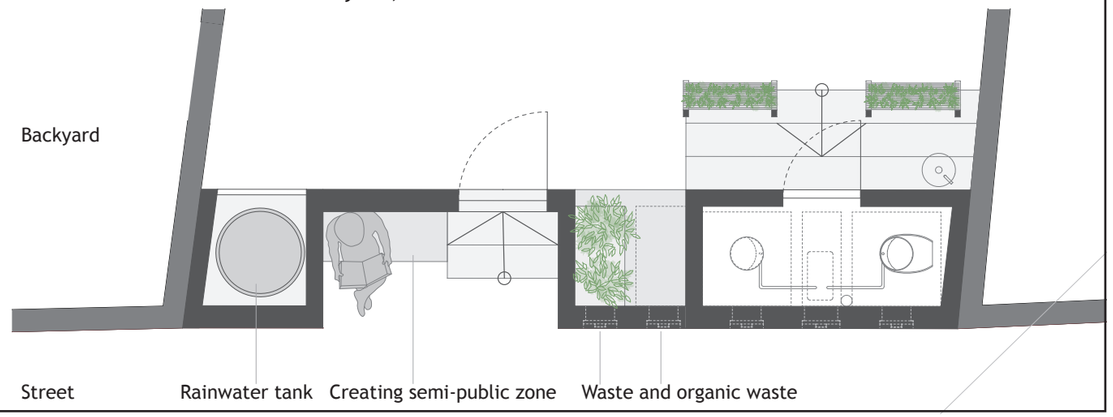
Proposed regulation: Toilet waste must be accessible from the street. This is to avoid the workers having to go into the backyard, and to ease the work for them.



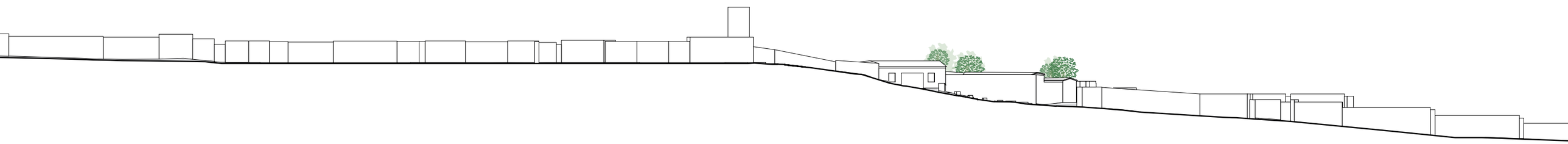
Proposed toilet design: The roof has a tilt towards the backyard so that the water in the rainy season can be collected in the backyard instead of flooding the streets.

There is also an opening between the walls and the roof so that the toilet is easily ventilated.

Toilet solution in selected backyard, 1:50



section 1:500



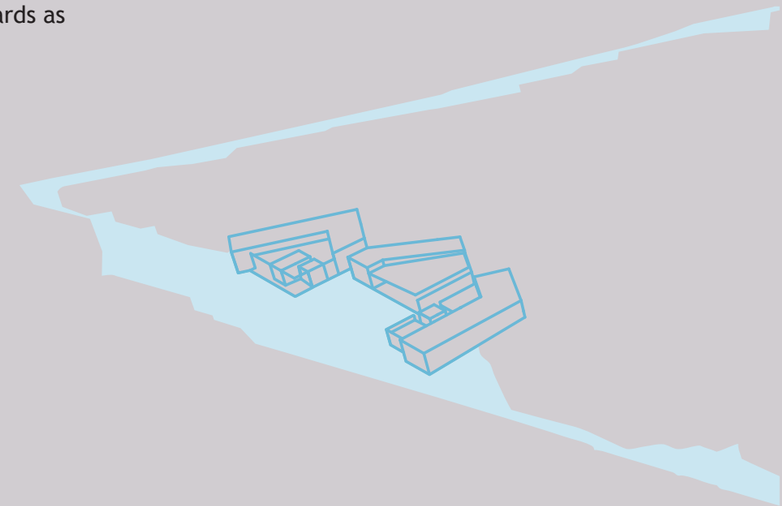
wedgan square

water recycle

The implementation of a new water and sanitary system requires information, maintenance and a consistent supervision. We have developed a strategy for establishing this new system and how to run it properly, resulting in an operation central and water treatment plant on Wedgan square. The square holds a strategic location, as it is connected to the planned city.

identity

_design following the same structural principles of volumes and backyards as in Aba Shawl



sustainibility

_recycling of water
_handling storm water
_adding green public spaces

technical features

_the waste water treatment plant is low-tech compared to western standards, but requires qualified staff
_some materials must be imported

functions

_water treatment plant
_information and maintenance central
_agriculture showroom
_meeting point between the planned and the unplanned city
_public space

top-down

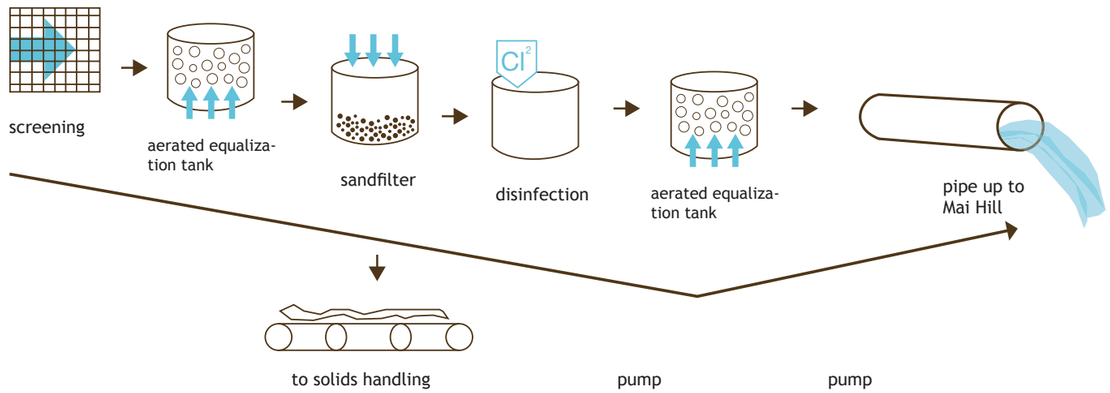
_ recycling water
_ waste collection services
_ maintaining public spaces, streets and sanitary stations
_ provide information

bottom-up

_decide usage of the common areas
_adding commercial functions

water treatment plant

The water situation in Asmara is poor, both because of the leaking pipe network and the bad access to water of good quality. However, the leaking pipe network is the only existing, and we therefore wish to connect Aba Shawl to it. But by treating the water and then using it a second time, we reduce the amount needed.



The plant itself is constructed underground. This will likely give higher costs than a plant above ground, due to expenses connected to the excavations. However, in this case, due to limited space and the negative consequences for the neighbouring habitation when constructing above ground, it is necessary that parts of the plant are placed underground. It is therefore important that the constructing underground is watertight, so it does not interfere with the groundwater. The plant is constructed in such a way, that the treatment area slopes downwards. Gravitation will then send the water through the different treatment steps, reducing the need for booster pumps. Pumps is necessary on the last step, transporting the water up to Mai Hill.

Water treatment step-by-step

As the access to materials and technology is difficult in Eritrea, we have focused on easy treatment processes. The operating equipment of the plant should be easy to operate and maintain, with indigenously available spare parts as far as possible. The different solutions and type of materials chosen for the different treatment units are meant to reflect this way of thinking and the conditions of Eritrea.

The treatment job is done step-by-step, beginning with a screening process. The biggest particles are removed here. The next step of the treatment process will be an aerated equalization tank, where the screened water will be stored before moving on to the next treatment step. The water will then be sent through sand filters for filtration, before going into the disinfection tank. When the water has gone through the different treatment steps it will be stored in an aerated equalization storage. The water is then pumped up to the greywater tower, where it is distributed to the allotment gardens. Before the pipe is built, it can get transported up to the water tower by trucks.

Staff

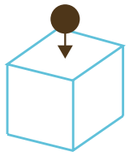
Ideally, in order to run the plant successfully, a mechanical engineer and a chemist are needed at the plant. In addition are mechanics and electricians desirable staffing for the operation of the plant. However, a majority of the various operation tasks connected to the different treatments units does not necessarily require skilled staff; such as tasks connected to cleaning or simple maintenance. The plant requires workers that can work on shift, and it is therefore suitable to live close by. In this way the plant is likely to provide work for some of the people of Aba Shawl. The amount of workers depends on the length of the shifts, and how big the tasks of the different workers are given. Labour is however not expensive in Eritrea and by providing new workplaces, the plant in itself is giving something positive back to the community. The plant will share an administration with the operation central.

operation central

waste system

A safe and clean environment is essential when striving to keep a city healthy. We propose that Aba Shawl has its own maintenance system, independent of the rest of the city.

_urine is stored in smaller tanks and emptied every week. The workers exchange the full tank with an empty one.



_faeces is collected when the vault is full. The ideal situation is to have a two-vault system, which means that the toilet waste is fully sanitized when collected. Not everybody has the possibility to have this solution, meaning the toilet waste must be collected before it is sanitized. The workers shovel the waste out from the vault.

_organic waste is kept in special containers, which are collected weekly by the workers.

_trash must also be handled, but it is not normal to produce big amounts of trash in Eritrea. When the organic waste is stored in its own container, smell is not a problem. It is therefore only collected once a month.

_medeber market will handle the special waste, and also provide the custom-made cars and containers needed.

information

Using human toilet waste for agricultural purposes can in many societies be a taboo, and is easily thought of as unhygienic and unpleasant. Even though it is custom in many cultures, it is not easy accessible knowledge. Educating the residents is for that reason of the essence, with the intention of preventing wrong use and dissatisfaction.

staff

It is desired that the inhabitants of Aba Shawl get the jobs the central provides. This will not only allow them to take part of the extended effects, but also secure that they are motivated to take the upgrade seriously. Ensuring that the word on the street is positive is very important, especially when implementing the new toilet system. It is easy to be sceptical about such solutions, and if the most respected people in Aba Shawl spread that they don't want to take part in the system, others may follow. It is therefore important that the workers are people from the inside that can control such affairs.

The number of people working there must be adjusted according to the need. During busy times and in the start up phase there will be more people working there, but with time it will stabilize.

sanitation

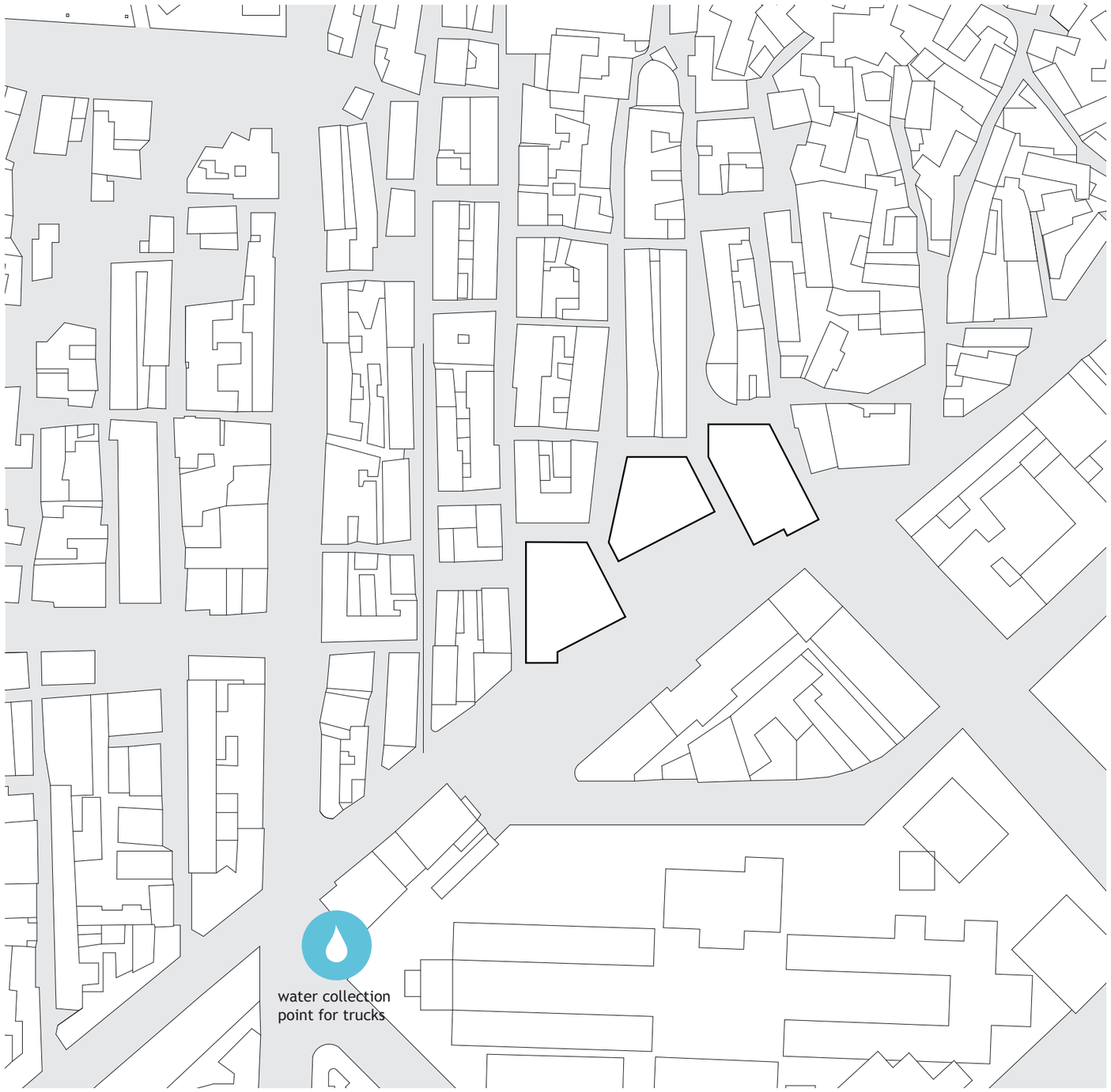
The implementation of the new systems will probably be stretched over many phases, and take a long time. Showers are also a luxury most people won't have the ability to get. Because of this we have accommodated for the possibility to build a sanitary station with showers in connection to the square.

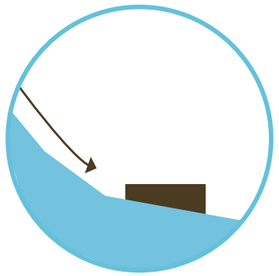
By contributing to the new system I get many advantages. The new toilet in the backyard is odour-free and practical. When it is full, the operation station collects the waste. They secure that it is fully sanitized, and distribute it along the service path in the allotment gardens. There I can use it as fertilizer in my part of the allotment garden. I share a unit with the same people as I live with in my backyard, and we help each other with the daily chores. The food I grow I either take home or sell on the market in Edaga Hamus.

I mix the urine with water and give it to the plants I keep in my vertical garden in the backyard. Yesterday the operation central held an information event, where I learned that plants fertilized with urine grow more rapidly, larger and healthier than those grown with conventional agricultural techniques, and that less water is needed. They were testing spinach in the showroom, and it gave particularly good results, so I bought a plant from the neighboring shop. It tasted delicious. “

site

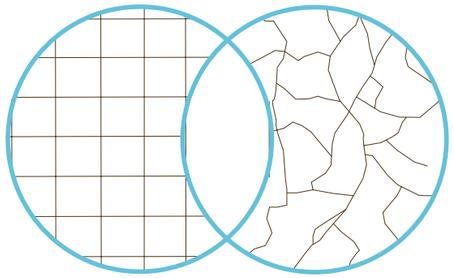
situation plan 1:1000





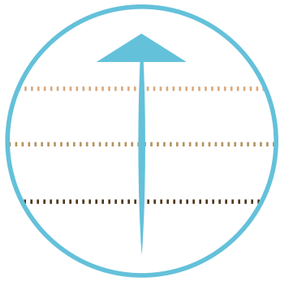
slope

The water treatment plant must be placed at the lowest point, but at the same time be close to Aba Shawl.Wedgan Square both has the right slope conditions and offers available plots.



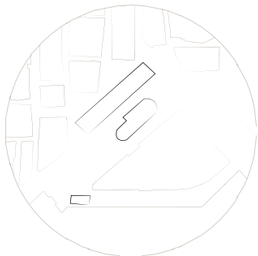
interaction point

Wedgan square lies between the planned and the unplanned city. We aim to make it a meeting point for both sides.



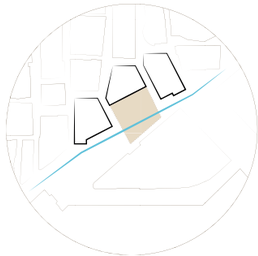
structure

Aba Shawls structure is built up of different levels of privacy. We aim to follow this principle in our design.



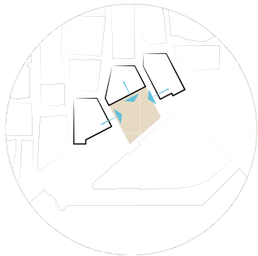
existing

Today a big sanitary station lies as a hindrance in the middle of the square. North of the square lie an old, ruinous building housing a chili shop. We demolish these in our proposal. The sanitary station in front of the prison we keep as long as it is needed.



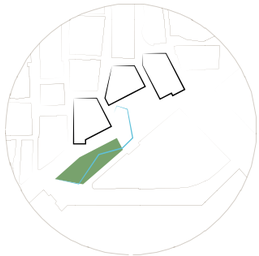
flow

Today the main stream of people goes right through the square. We wish to lead this stream through our centre point, and provide zones with different functions.



centre point

Our suggested three volumes turn to a common space, which can be used as a space for bigger gatherings.



showroom

Urban agriculture boxes and a small stream of water give the square character, simultaneous as displaying the new attributes of Aba Shawl.


A
bath tub for the kids
showers
dressing room
women
kitchen
outdoor café
indoor café
storage
class room
ticket
showers
dressing room
men
filtrate light
candy factory entrance
manual elevator for supplies
delivery entrance
administration
water groove
bicycle parking
meeting room
service cars parking
infiltration basin
A
filtrate light
water treatment plant
water stream
urban agriculture
_showroom for agricul-
tural benefits
seed store
existing culvert
_can be opened as in the
Edaga Hamus project
prison

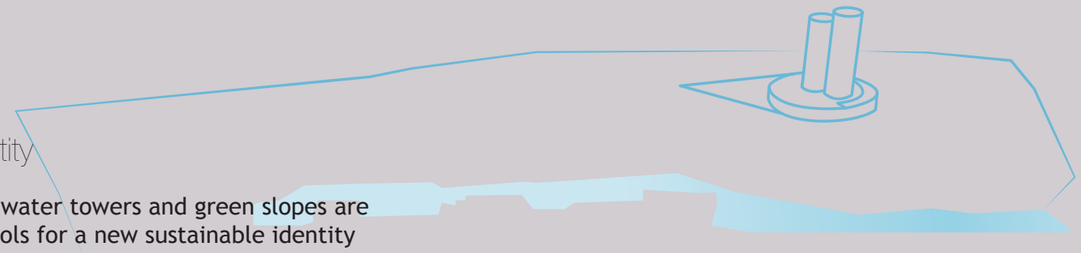
plan 1:500

section 1:200

mai hill

water outset and reuse

Mai hill is the symbol of the new Aba Shawl, with its three water towers and green covered grounds. The inhabitants' allotment gardens surrounds the top, with a public vein stretching through the area and up to the highest point.



identity

_the water towers and green slopes are symbols for a new sustainable identity

sustainibility

_reuse of toilet waste and water
_produce own food
_fertilizing earth
_adding green spaces that helps handling the stormwater

technical features

_the water towers require qualified staff
_some materials must be imported

functions

_water tower
_allotment garden
_sanitation storage and distribution
_lookout point and public space

top-down

_water tower and pipe system
_maintenance and storage of toilet waste
_sanitized waste and treated greywater distribution

bottom-up

_grow own food in the allotment gardens
_maintenance of the allotment gardens
_further development of the allotment gardens' function

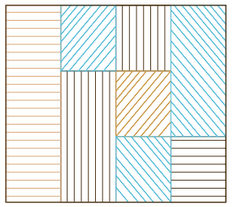
allotment gardens

Mai Hill is visible from most parts of Asmara. The existing restaurant lies in an axis stretching from the main street in Asmara, Harnet Street, through the Mercato Market area, and up to Mai Hill. It is one of the few public viewing points, and one can easily imagine it as a strategic point for the city. But today there is little activity there. The restaurant has seen better days and the rest of the park has no sort of development. It is mostly used as a toilet for by inhabitants in the area and is not an attractive place to stay. It is not the symbol of Aba Shawl like it has the potential to be.

New pathways

measures

The allotment gardens surround the hilltop, claiming it as the property of the residents of Aba Shawl. Pathways make the area more accessible, connecting roads on both sides of the hill. The main road leading up to the top is kept public. It leads you up to the new water tanks and café where you can admire the view over the city.

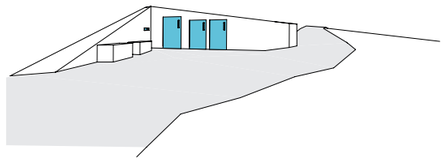


Structure of allotment gardens

allotment gardens

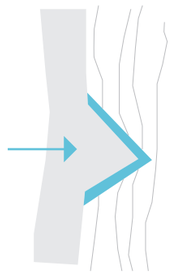
Through the wastewater treatment plant and the ecological sanitation system, the inhabitant of Aba Shawl creates new resources that can be used to improve their lives. Water, soil and fertilizer give the possibility to grow your own food. This can be both health improving and an economical benefit for the community.

The allotment gardens are structured into areas shared by one or more backyards. The system is based on the existing social structure of the area and the gardens become social meeting points for the residents. The inhabitants themselves decide how they want to use the system and develop the area further.



Service stations in the allotment gardens

In the allotment gardens, the area of land you get is based on how many family members you have and whether you have the possibility to grow vegetables in your own backyard or not.
If one subtracts the area needed for communication and common functions, an area of about 17 000 sqm is left for the allotment gardens. We suggest a minimum plot size of 20 sqm per family. This gives the possibility of developing 850 gardens. A rough count suggests that Aba Shawl consists of about 420 backyards. This means that it is possible to develop the system to also cover other areas of the unplanned city in the future.

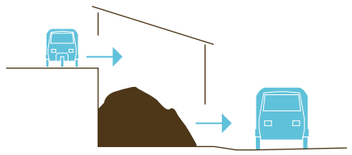


Pushing into the terrain

Some sort of enclosure of the gardens is necessary to prevent theft and vandalism. Fences made of bamboo could be both a cheap and aesthetical solution. The bamboo can be grown at parts of the hilltop or at the agricultural showroom at Wedgan Square.

Functions such as tool shed, waste collectors, water taps and small storages for soil and fertilizer are necessary for the allotment gardens to function properly. These distribution points are spread out over the area where they create small meeting places.

The sloping terrain is exploited to create these small stations. Blocks are either pushed into the terrain or used to build up an extra plateau to make extra space in steep slopes in connection to the new pathways.



Section for storage space

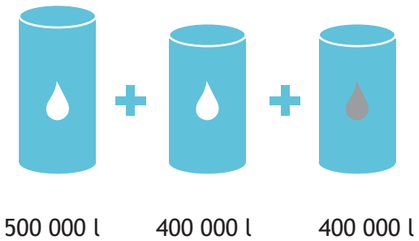
Storage space for soil and fertilizer from the new ecological sanitation system is added at Mai Hill. The section is exploited to make the delivery and collection of the waste as easy as possible. One of the buildings also function as a service central for the allotment gardens.

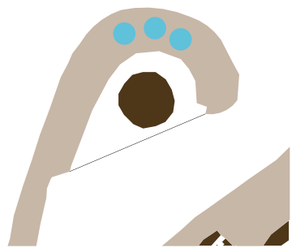
water tower

Three water towers are placed on Mai Hill. Two of the towers provide clean water to the new water distribution network in the streets of Aba Shawl, while the third supplies the allotment gardens with greywater.

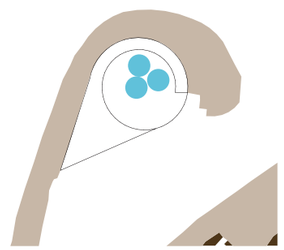
We have based our calculations for the volume of the water tanks on a daily consumption of 50 liters per capita per day. Today, many of the inhabitants of Aba Shawl have as little as 5 to 18 liters per day. The new water distribution system gives better access to water, and together with an assumed increase in wealth, this will give a higher consumption level. With 15 000 people living in Aba Shawl today, this gives a daily consumption of 750 000 liters per day. A security factor of 20 % is added to handle the unstable water distribution network in Asmara. This gives a volume of 900 000 liters.
It is necessary to elevate the tanks an additional 8 meters from the top level of the hilltop to get the required water pressure for distributing water to the inhabitants of Aba Shawl. This gives guidelines for the design.

The existing restaurant at the hilltop is in bad condition and today only serves a few types of beverages to the small number of visitors. A possible solution when constructing the new water tanks at Mai Hill would be to arrange them in interaction with this building and assume a continued activity at the restaurant. Another option is to demolish the restaurant and build the new water towers, bases on them symbolizing the new Aba Shawl. We have chosen to propose a design for the last alternative.

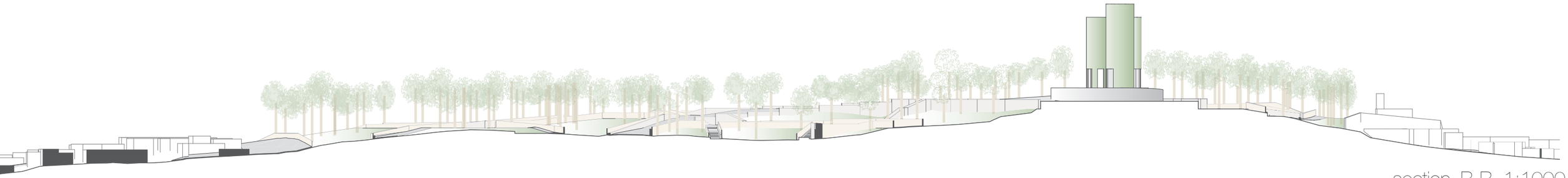




Keeping restaurant and adding watertowers



Demolishing restaurant and placing new water towers



section_B-B, 1:1000


B
Existing kindergarten
Small playground
Green walls covering the water towers
Café under the elevated water towers
Existing sanitary station
Allotment gardens
Distribution point
Storage and service centre
Seed shop
Existing sanitary station
B