

Spatial Water Management in Paraisópolis

Delft University of Technology
Urbanism
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Foreword

Throughout the years of my education at the Delft University of Technology, I developed an interest in informal neighbourhoods. I have become interested in the urbanism of these neighbourhoods. It seems to me that a lot of improvement can be made with limited recourses. For my graduation project, I wanted it to be involved in improving the situation in one of these informal neighbourhoods.

Many of the current projects for informal neighbourhoods are focused on social aspects of the neighbourhood, such as community building or legalisation efforts. Or they are more of an architectural nature, like sanitation, community centres or shelters for floods/storms.

Less attention is given to how the urban structure of an informal neighbourhood might contribute to its improvement. Those projects are of a physical nature, but on a greater scale than projects for buildings.

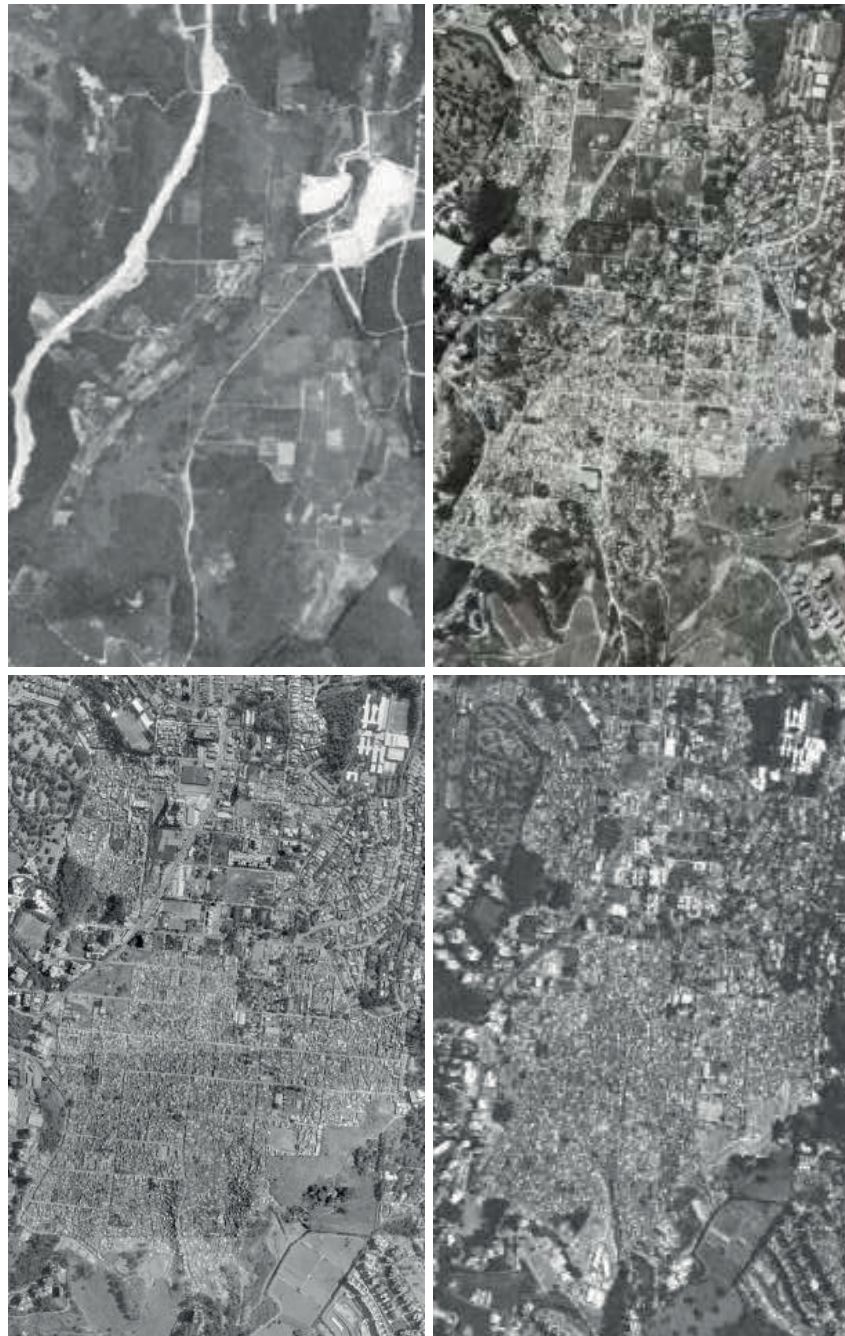
Problem analysis

Problem analysis

The informal neighbourhood for this graduation project will be 'Paraisópolis' in São Paulo, Brazil. I have visited this neighbourhood in May 2014. It is a neighbourhood with a history and complexity. Adding value to an informal neighbourhood is also complex. For this graduation project, I have limited the research and design to water and waste management. Water and waste is managed imperfectly, because of its physical and social situation.

Historic background

Paraisópolis is one of the earlier favelas in São Paulo. When it was formed, it was disattached from the city, but nowadays it lies relatively close to the city centre, compared to most other favelas. It was built on a farm. A grid was superimposed on the area and for the most part the road structure follows this grid, except where the terrain is too steep.



Figures 1 - 4: Paraisópolis in 1954, 1994, 2004 and 2010

Problem overview

The problems in Paraisópolis are numerous, but these are the main problems concerning water and waste. São Paulo has a climate with a wet and a dry season. During the wet season, floods occur throughout the city, including Paraisópolis. But in the dry season, the entire city suffers from drought. This drought has intensified over the last years, because of climate change: the wet season has shortened and less rain falls each year. Because Paraisópolis is an informal neighbourhood, infrastructure is not regulated as it is in the rest of the city. Most houses are connected to the water grid, but not all connections are legal and safe. Likewise, not all houses are connected to the sewerage. Many connections are home-made and there's also open sewerage, running through some streets, only covered with a grid. Also, solid waste is not always collected and the open sewerage is getting clogged with this solid waste. These various problems interfere with each other. Because of the open sewerage, during flooding, waste material from lavatories is taken up and washed into the streets. Because of the street pattern and the height differences in the neighbourhood, this can effect a large area.

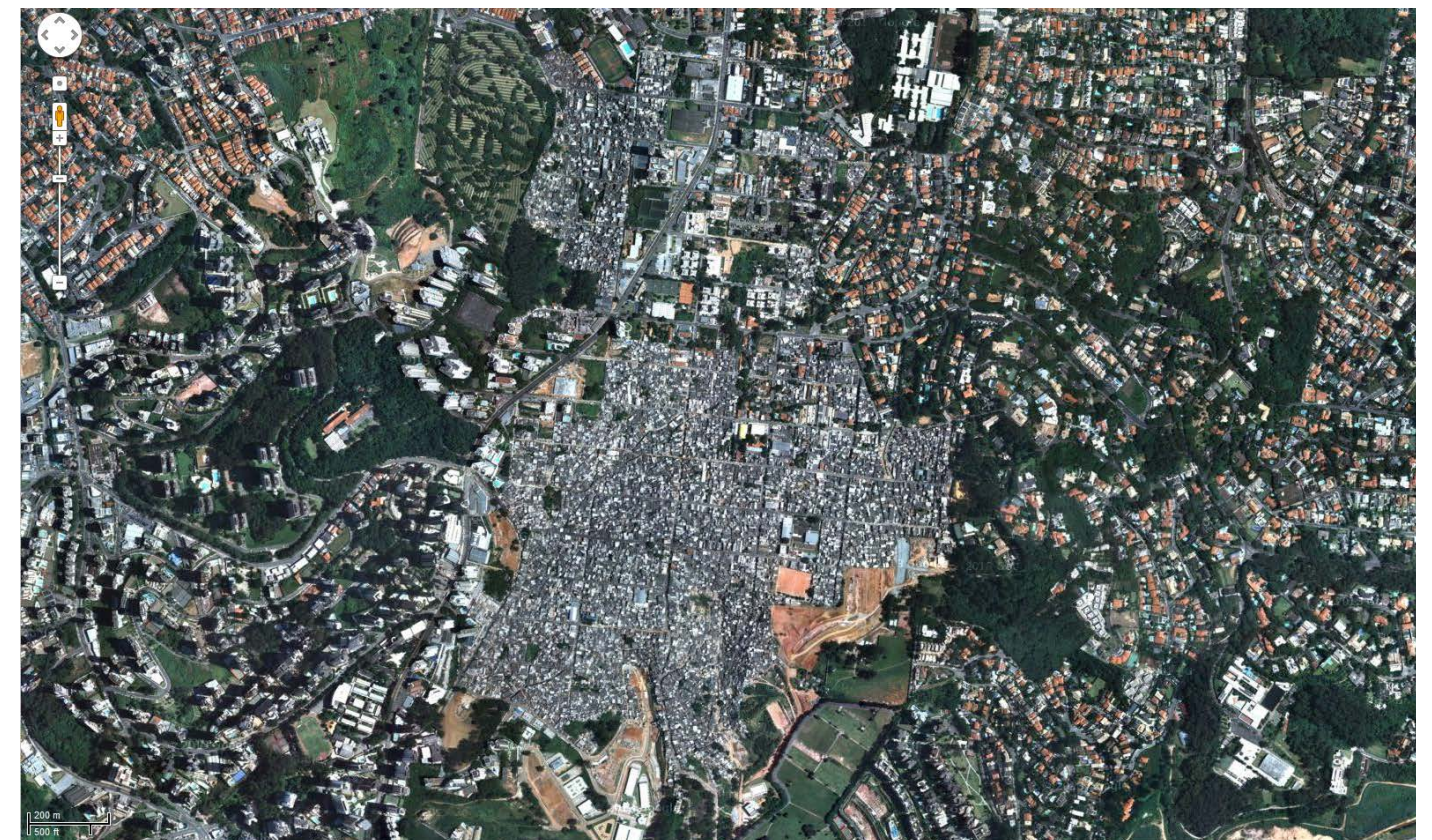


Figure 5: areal view of Paraisópolis

Flooding

Paraisópolis is built in a location with great height differences, ranging from under 700 till above 800 m above sea level. Some areas are relatively flat, but others are very steep. These steep areas are mostly in the south and northwest. Most of the area of Paraisópolis is taken up by one single valley, running southwest to northeast. The southern and eastern ends run off in their own direction. Flooding occurs when all the water in a valley collects at the bottom of that valley in a very short time.

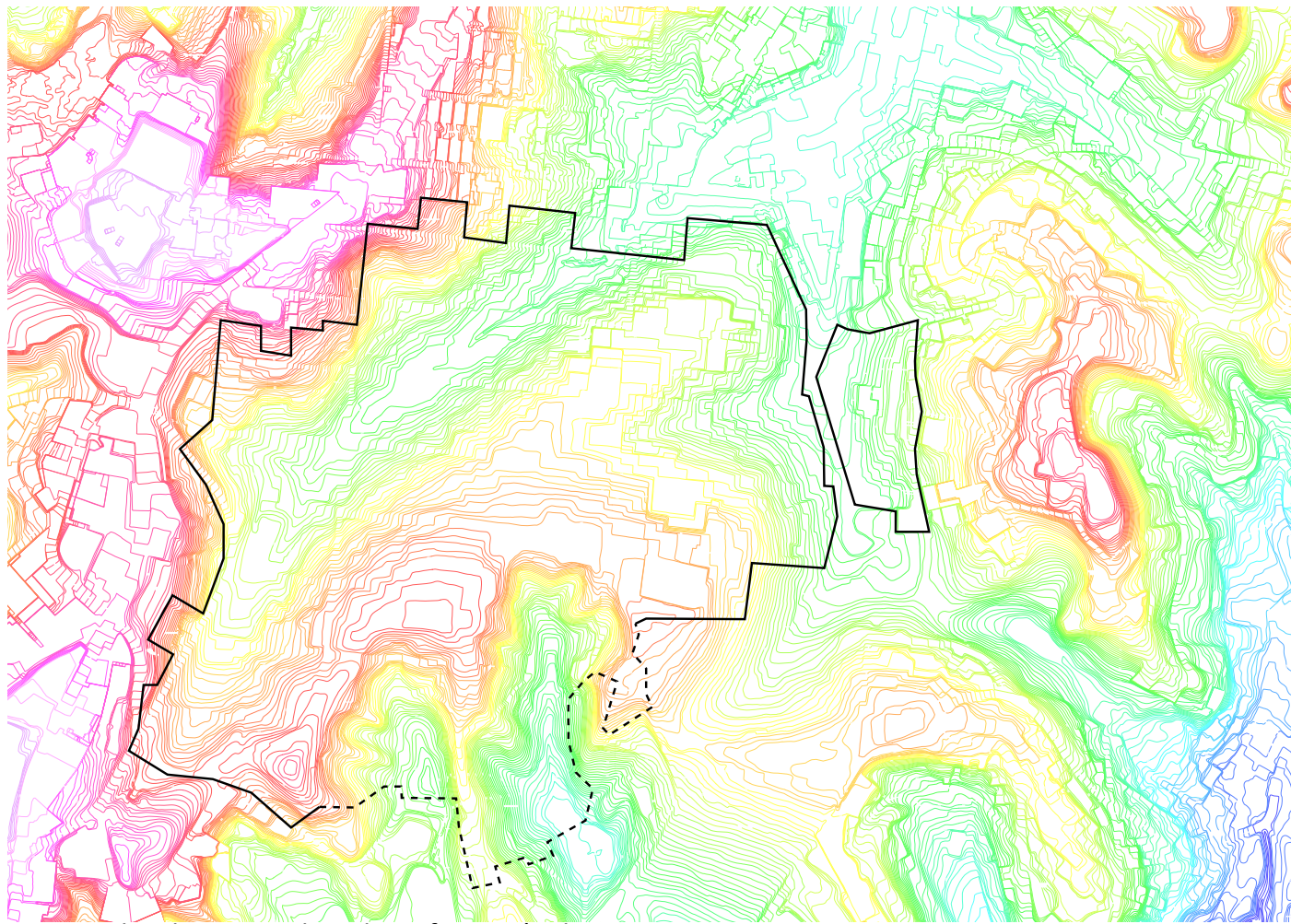


Figure 6: height map with outline of Paraisópolis



Figure 7: 2009 flooding in Paraisópolis



Figure 8: map showing the direction of runoff in part of the main valley

This map shows where the risks are of flooding and of landslides. Both these risks are concentrated in the valleys. The lowest areas of the valleys face flooding risks, with the highest risk in the densely built area in the top (south) of the main valley. This area is surrounded by slopes and is the first point where all the rain that falls in this area comes together. The risk of flooding gradually comes down as the valley continues, but the risk persists. The flood risk in the southern valleys is sort of reversed. The lower risk is in the top of the valley, as these valleys are smaller. The risk increases further south, as the water catchment area of these valleys increases as well.

The risk of landslides is in the slopes in the valleys. In most of the main valley the risk is minimal, but in the southern valleys the risk is medium to very high. These risks cannot be ignored and have to be addressed when improving this area.

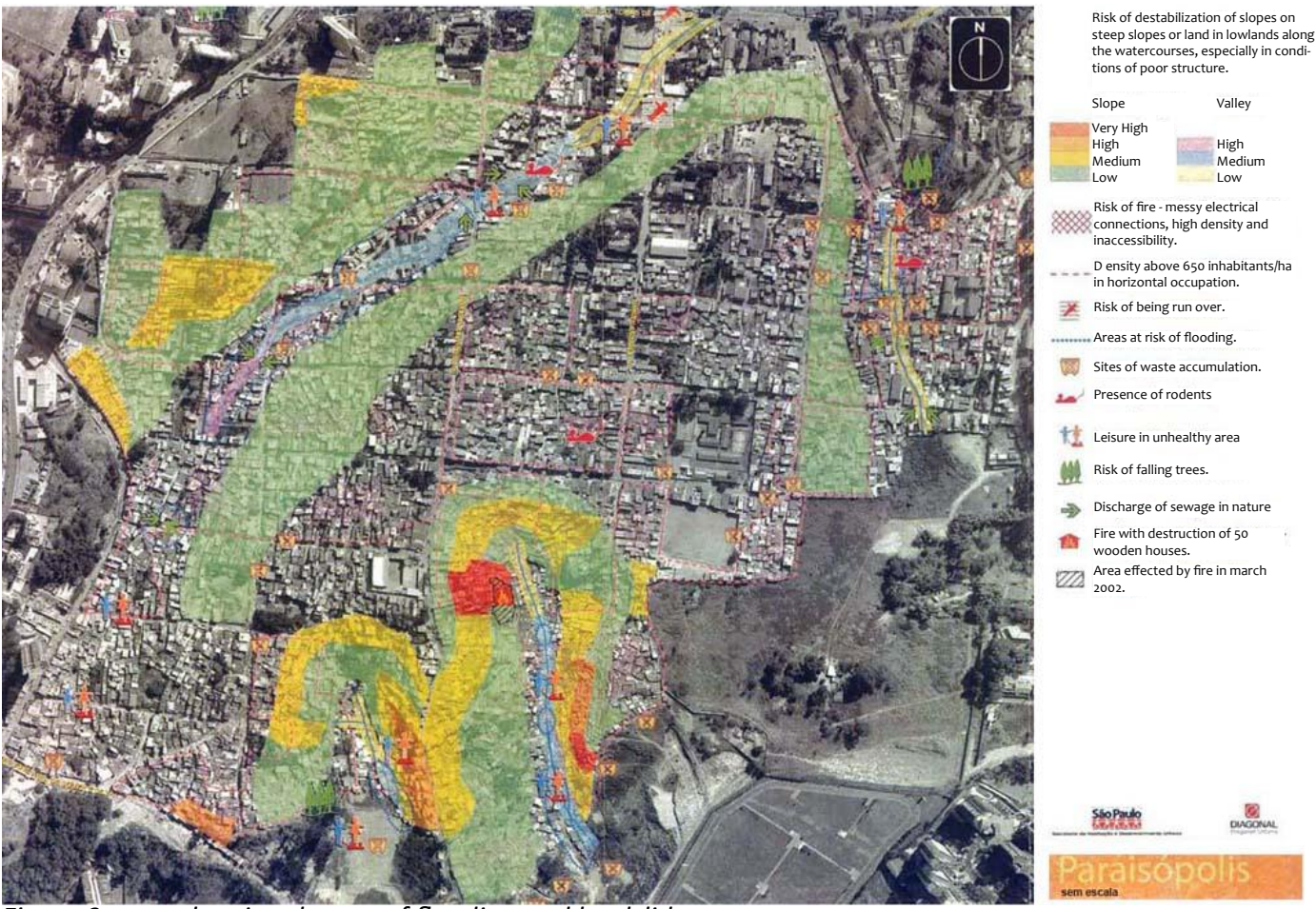


Figure 9: map showing danger of flooding and landslides

Public and private green

Because Paraisópolis is a favela, the development of building new houses was/is not regulated. This has led to a lack of public green in Paraisópolis. There are hardly any open spaces, and even fewer trees. In the southeast is a football field. Figure 15 shows the green area around Paraisópolis, but most of it is not publicly accessible. It is owned by private households or companies, such as a school and a cemetery.

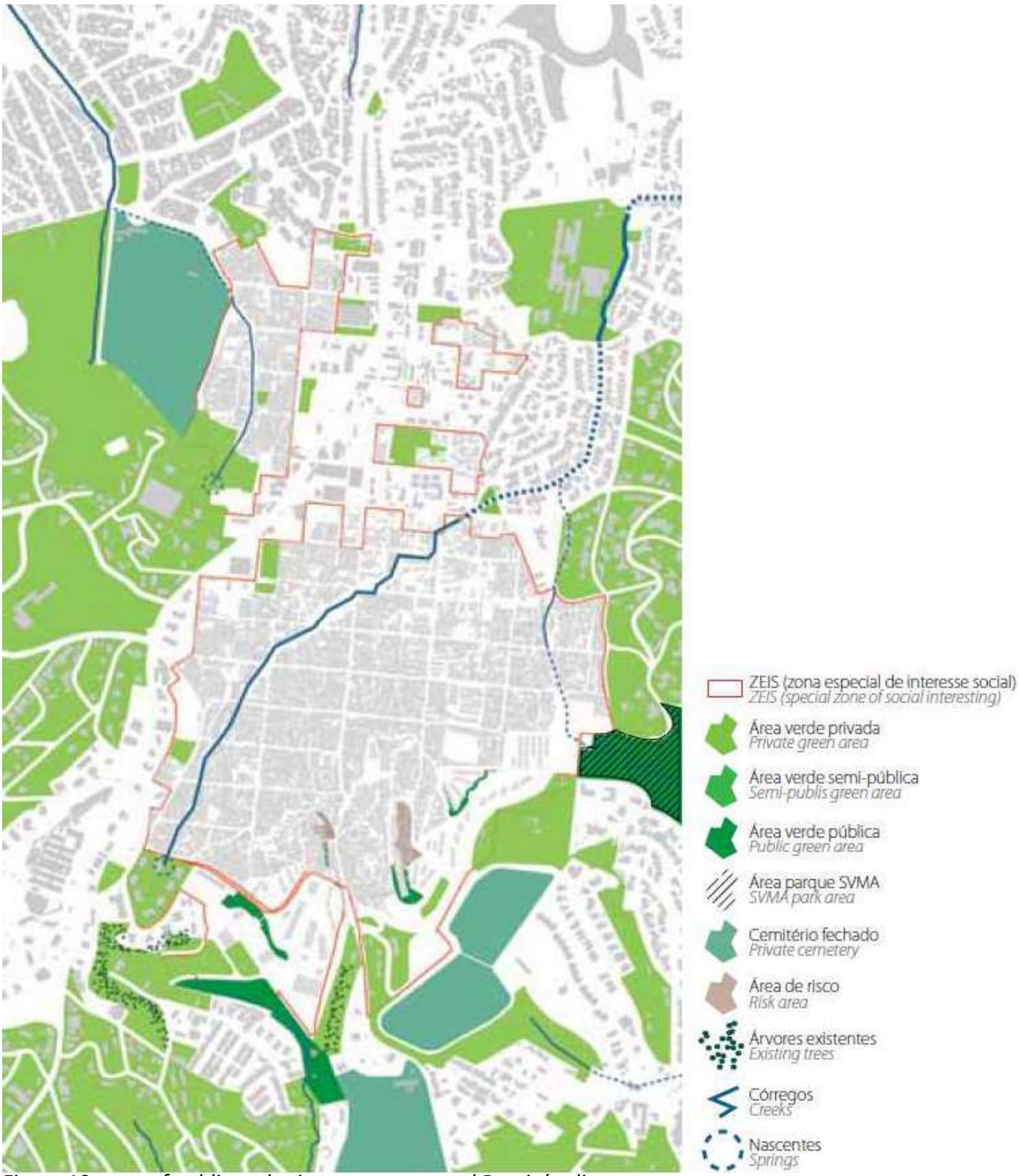


Figure 10: map of public and private green around Paraisópolis

Drought

The whole of the city of São Paulo is dealing with a severe drought in the last couple of years. This is partly caused by climate change, which makes the seasons less predictable. But the severity of this drought is worsened by the bad state of the water distribution in São Paulo. A lot of water is lost in the pipes systems. Further, most of the rain that falls on the city is not collected. Throughout the city, rain runs off the large stretches of paved and build surfaces and is discharged through the sewerage. When the rain is too heavy, this leads to wide spread flooding, even though the drought persist.



Figure 11: water depletion of the Jaguari Reservoir

Housing

These maps show the state of housing in Paraisópolis. It is a patchwork of dense and less dense areas, with various degrees of building standard. The direction of expansion is to the south, away from the city centre of São Paulo. There, in the south, are the newest houses located, with the worst quality. In the valley in the centre of Paraisópolis, people had time to improve their homes and build more, so there the density is

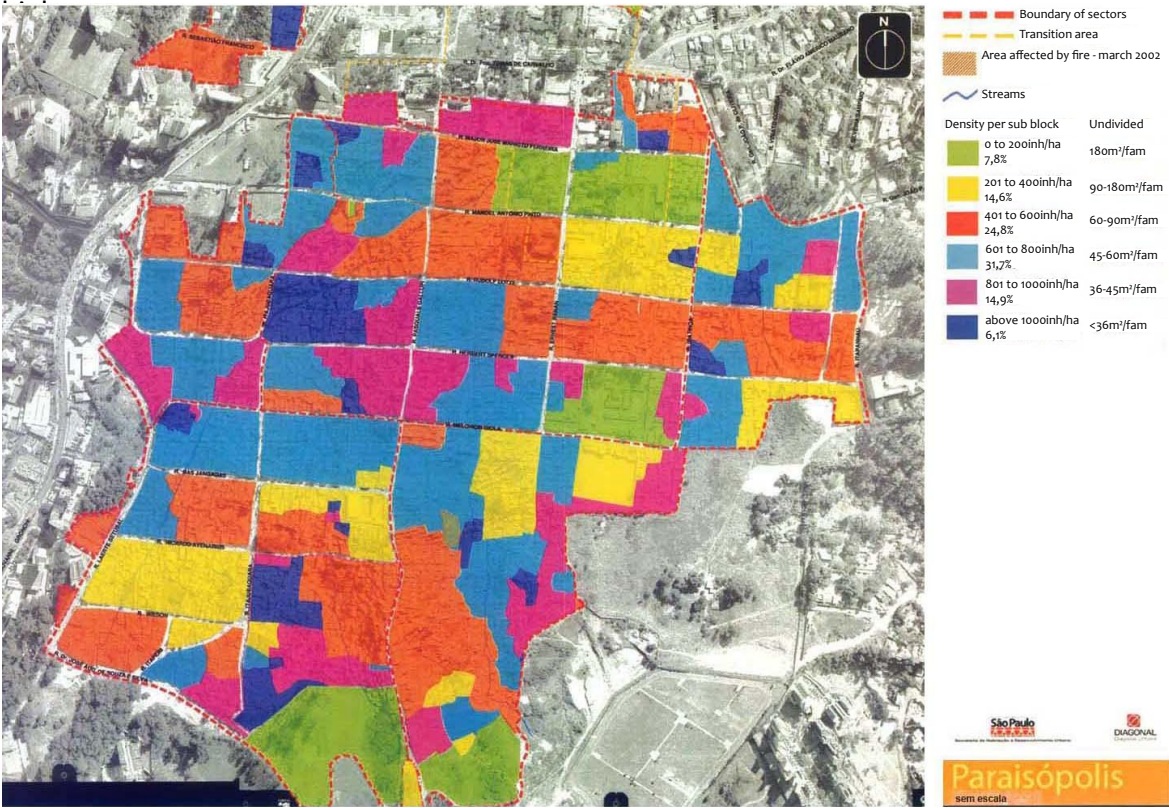


Figure 12: map of housing density

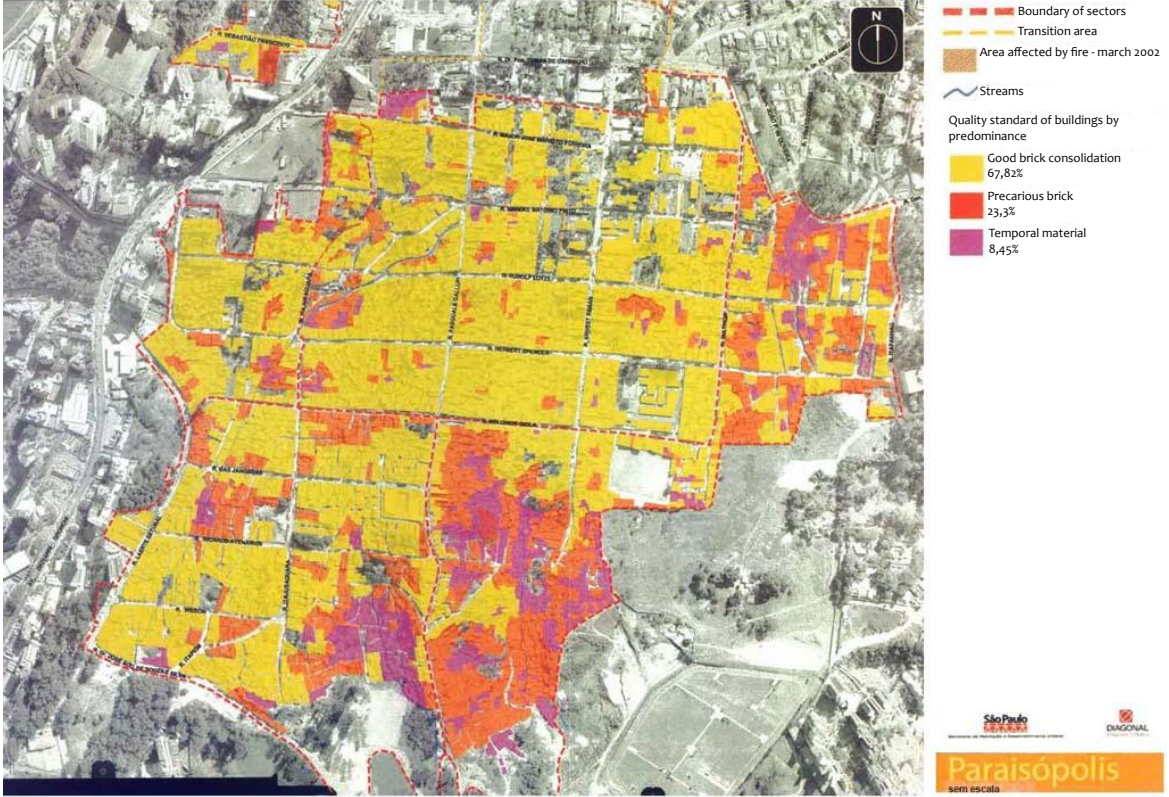


Figure 13: map of the quality of houses

Waste collection

Currently, two companies collect waste in São Paulo, both operating in Paraisópolis, Loga and ECO URBIS. There are designated locations where solid waste is collected from. But these locations do not have facilities containing the waste. In heavy rain, when water is running through the streets, nothing is preventing the waste from being taken up by the water and washed away.

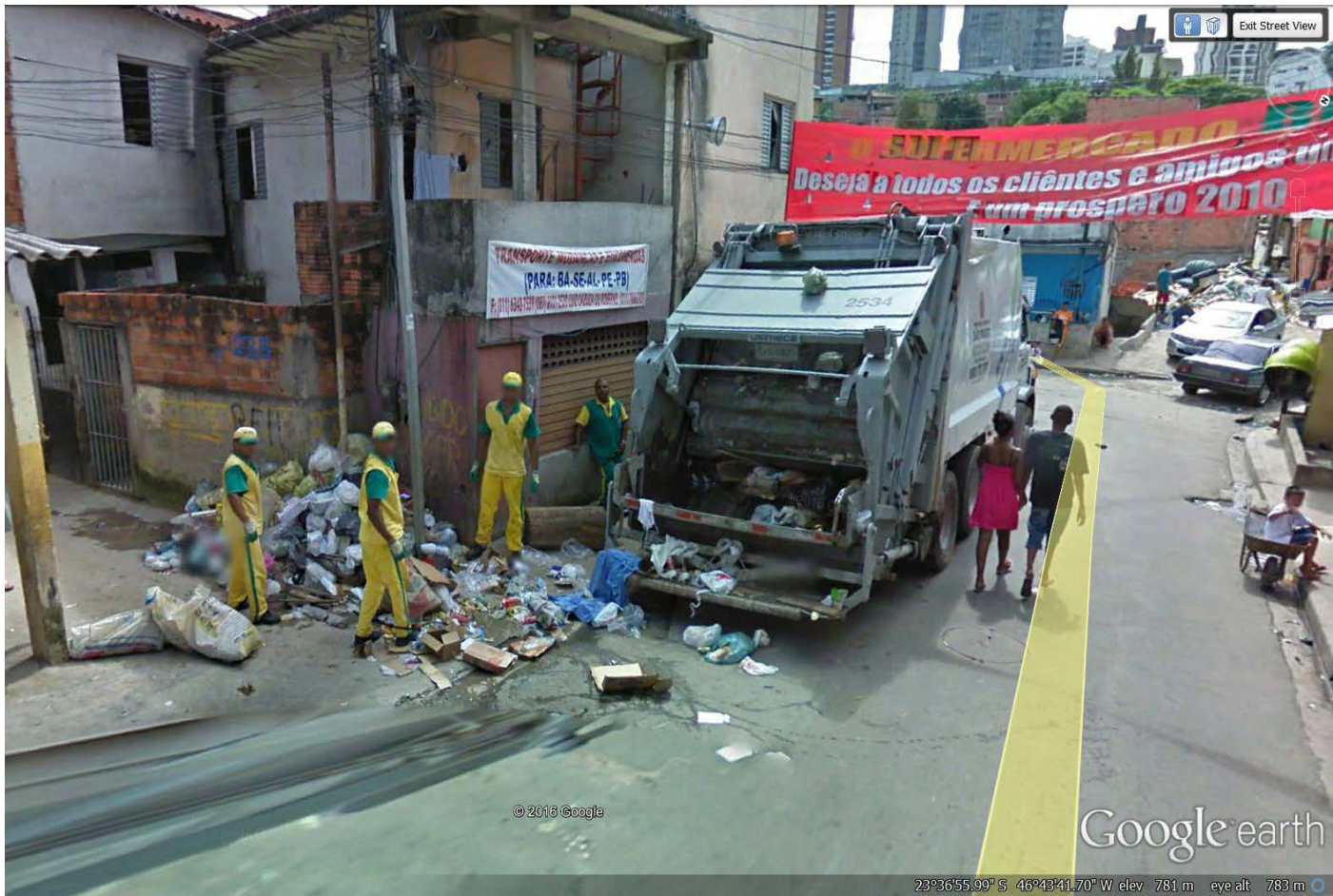


Figure 14: waste collection

Sewerage

This map shows the situation of the sewerage system in Paraisópolis. Some houses have sewerage, but not always it is connected to a closed system. Houses facing the street often are connected, but the houses in the middle of blocks only have informal sewerage. Pipes coming from these houses often end in streets and gutters and is washed down into the rivers running through the valleys. The water in these rivers is of very bad quality. The map also shows that many areas are poorly accessible by car or on foot. There are only narrow and winding streets and staircases. This puts more pressure on the informal sewerage and also restricts the room the sewerage can take up.

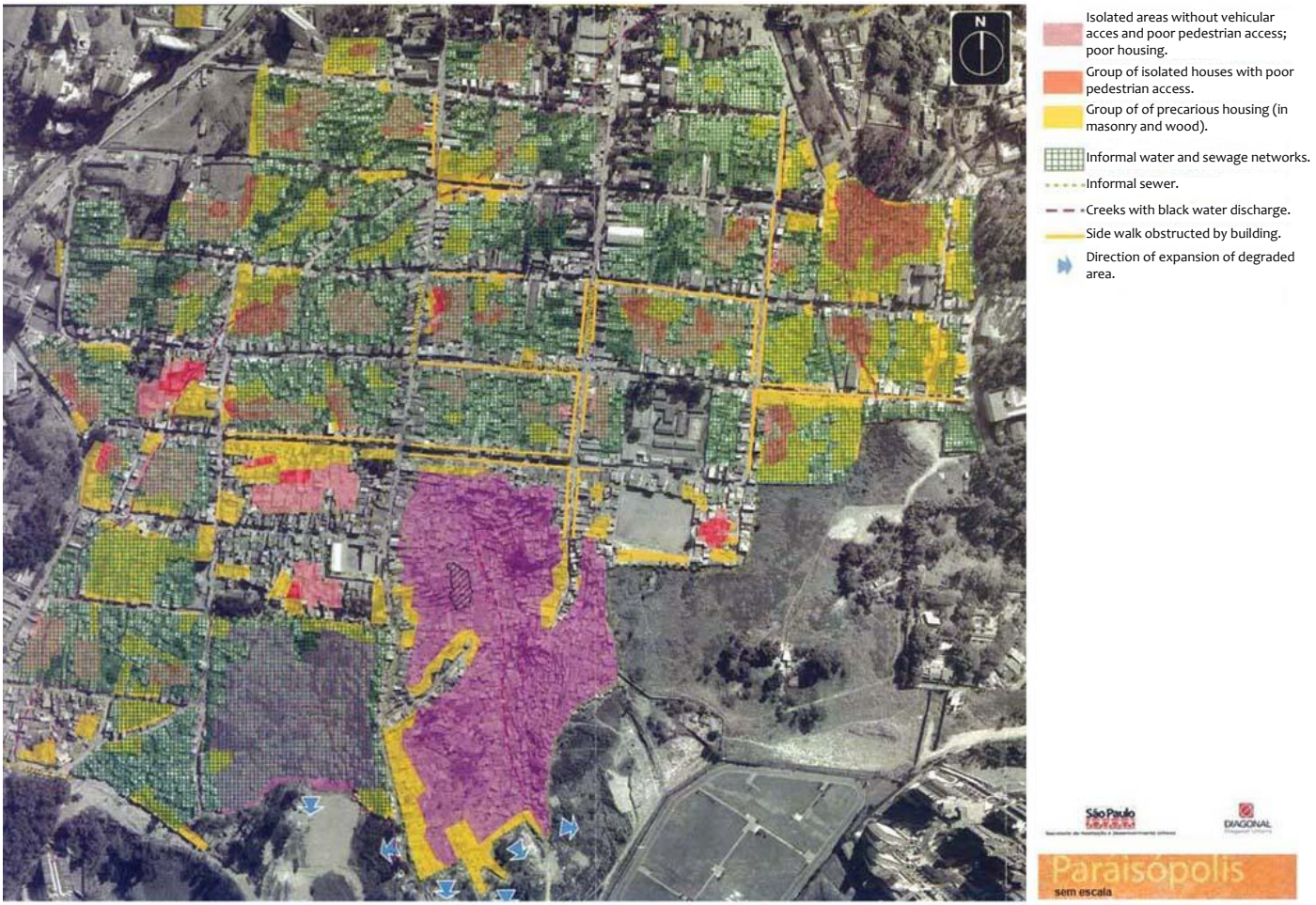


Figure 15: map of sewerage system and coverage



Figures 16, 17: water discharge through open sewerage

Social complication

To address flooding and droughts, the area needs a water buffer. Grid integration improves accessibility to clean water and helps with treating more waste trough the sewerage. Solid waste have to be collected. But these adaptations cannot just be applied in Paraisópolis. Collectively they have a physical requirement.

To facilitate the physical adaptations, public space is needed. A water buffer against floods and droughts requires a certain area. Waste collection and recycling has to be done somewhere. And it has be possible to add infrastructure supporting clean water distribution and waste treatment.

But in Paraisópolis is a lack of public space. The only areas that aren't built up are the streets and the football field. Due to the informal housing structure of an informal neighbourhood, there is great pressure on all available areas to build new houses. This leaves no area for public space. But new public space have be created to adapt Paraisópolis to cope with its problems.

Do deal with the social complications of people building new houses (shacks) in any possible open space, the new public space has a social requirement: the public spaces have to have a certain/minimum quality. Somebody needs to prevent the new public space form being built over. Depending on who that is, a specific public space should have qualities connected to them. These qualities include, but are not limited to, water use, greenery, unique elements and space for specific activities.

How to shape and design these qualities, can be found through theory, especially trough Urban Metabolism for water and connectivity to the formal city for waste, although during the project this distinction between water and waste will be less clear. I further explain this in *Theoretical Framework*.

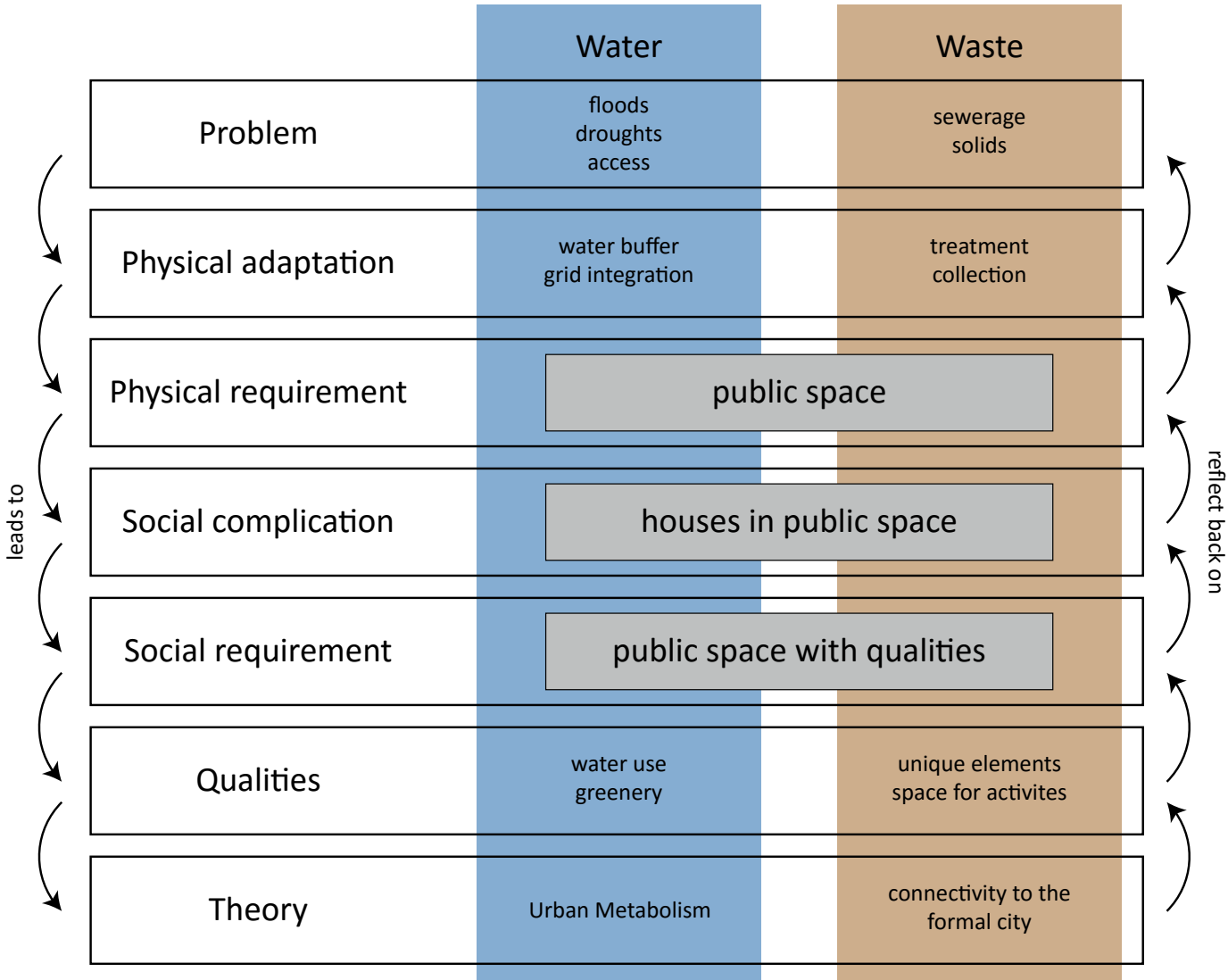


Figure 18: problem analysis diagram

Theoretical framework

Theoretical framework

The theoretical framework has four parts. The first tow have to do with the project in general, the last two with finding the qualities required for the new public spaces.

The pivotal point of this graduation project are the new public spaces. These have to come in Paraisópolis, and therefore it must be know what kind of informal neighbourhood Paraisópolis is and what its historical development was (1).

There is a history of urbanism in informal neighbourhoods. Throughout this history theories on how to practice urbanism best in these neighbourhoods has been developed. I position myself in this network of theories. (2)

The qualities that the new public spaces require are not just found. I use two principles to find these qualities, namely Urban Metabolism and connectivity to the formal city as formulated by Flavio Janches. (3 and 4)

1. Background of Paraisópolis

The first element of the framework is there to better understand Paraisópolis as an informal neighbourhood. As is shown in recent publications, the characteristics of informal neighbourhoods vary widely by country. High density is a common phenomenon, but the use of the structure and area differ greatly, as is the interaction between the various actors. (Davis, 2006; Neuwirth, 2005; Saunders, 2010)

In ‘Illegal Cities’ the historical background for the informal neighbourhoods in Brazil is discussed. Looking at the future, it emphasizes participation of inhabitants in the social and political processes in the city. (Fernandes & Rolnik, 1998)

2. Urbanism in informal neighbourhoods

SAHEB Municipality of São Paulo and IABR looked at informal neighbourhoods practically. They focus on improvement of infrastructure. Water, waste, green and sewerage all contribute to a liveable neighbourhood. But the infrastructure should also facilitate social structures in the form of open areas and infrastructure for travel in and out the informal neighbourhood. (SEHAB & IABR, 2008)

McFarlane compared literature of theories of urban fabric, also with regards to informal neighbourhoods. He promotes a broadening of the definition of ‘urban fabric’, to also include government, infrastructure, production and distribution. This way, more opportunities are found to empower the local social structures of inhabitants who, when involved, can contribute to the best fitting improvements. In all this, governance and infrastructure on the local level are narrowly connected. So in order to change the infrastructure, the governance has to change as well. (McFarlane, 2008; McFarlane & Rutherford, 2008)

Jaffe, Klaufus and Colombijn also compared literature, concerning physical, social and imagined movement of inhabitants of informal neighbourhoods and the connection with the urban fabric. They argue for a ‘mobility turn , combining views on urban fabric from the perspective of supporting economic activities and the perspective of people giving meaning to areas. From that point, they note the importance of the freedom for inhabitants of informal neighbourhoods to choose their mobility, so they can actively shape their surroundings. (Jaffe, Klaufus, & Colombijn, 2012)

3. Qualities through Urban Metabolism

The situation in Paraisópolis is complex and layered. In the Netherlands, an approach for complex and layered projects has proven to be effective: Urban Metabolism. This is a design strategy in which certain ‘flows’ are mapped, like water, energy, traffic, food, waste and others. With these mapped layers, interesting or conflicting areas can be found. Or they can be used to find added quality to an existing project. (Tillie, 2014)

Ultimately, Urban Metabolism aims to reduce the amount of valuable recourses that need to be imported into a certain area (a city, a neighbourhood) and reduce the waste that comes out of that area. Therefore the flows are split up and quantified. Then it can be studied better where to take action. However, the theory of Urban Metabolism has not been studied extensively in the context of informal neighbourhoods. I want to use Urban Metabolism to find where the flows in Paraisópolis are out of balance. If in such a place a new public space would be designed, the requirements to balance the flows there will provide the direction of the qualities of that public space.

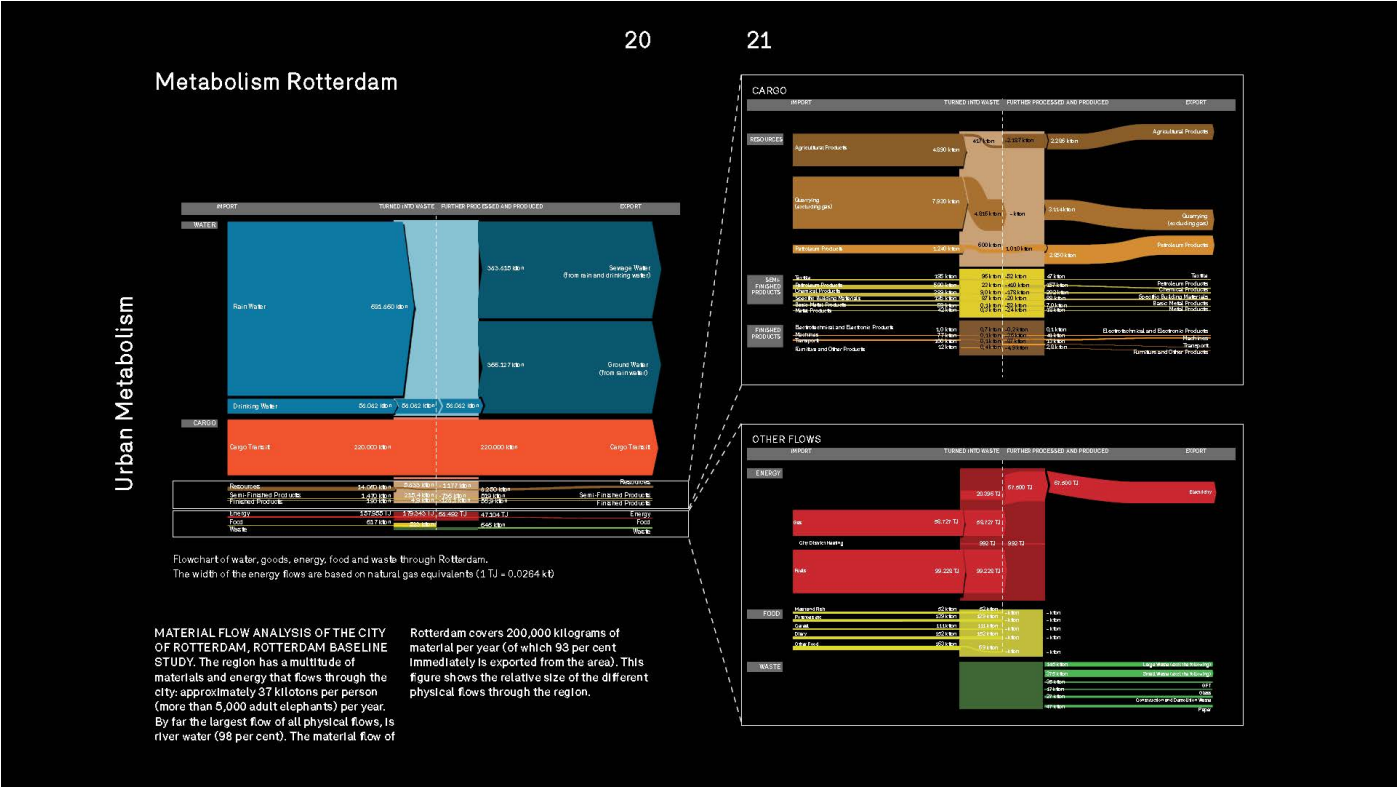


Figure 19: the flows of Urban Metabolism mapped and related to each other for the city of Rotterdam

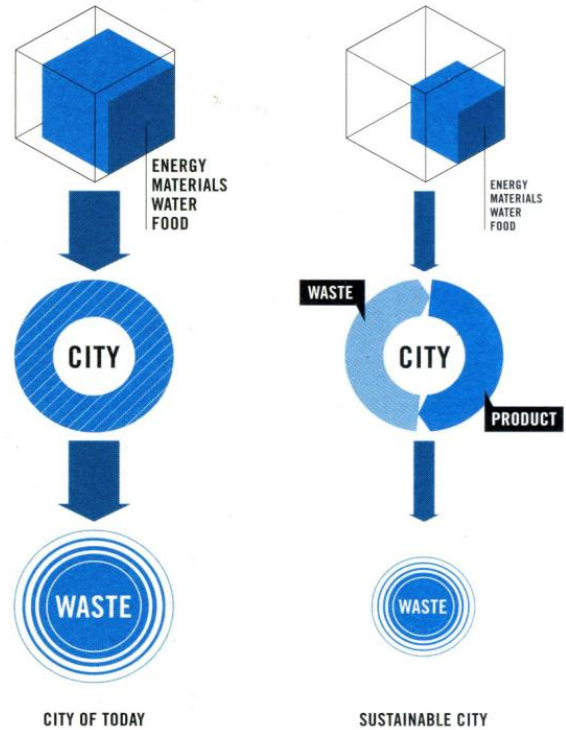


Figure 20: reduce resources and waste production by increase re-use within

4. Qualities through connectivity to the formal city

Through a lecture given by him, I was introduced to the practices of Flavio Janches. His view on working on informal neighbourhoods inspired me. A network of public spaces of increasing seize should connect the neighbourhood to the surrounding city. In his promotional study into South American projects, Janches looked at ways to use a network of public spaces to develop the existing social and urban structures even further, in order to use it as a base to increase the living standard in informal settlements. The way inhabitants make use of the new open areas in and next to their neighbourhood, gives room to better connect the informal to the formal part of the city and integrate them in a more balanced way. (Janches, 2010, 2011)

The way Janches adds public space is exemplary to how I might add public space in Paraisópolis. By studying his design approach and theory, and applying that on Paraisópolis, it will be possible to add qualities that connect to the social structure of the neighbourhood and connect the public space to other places/spaces in the formal city.

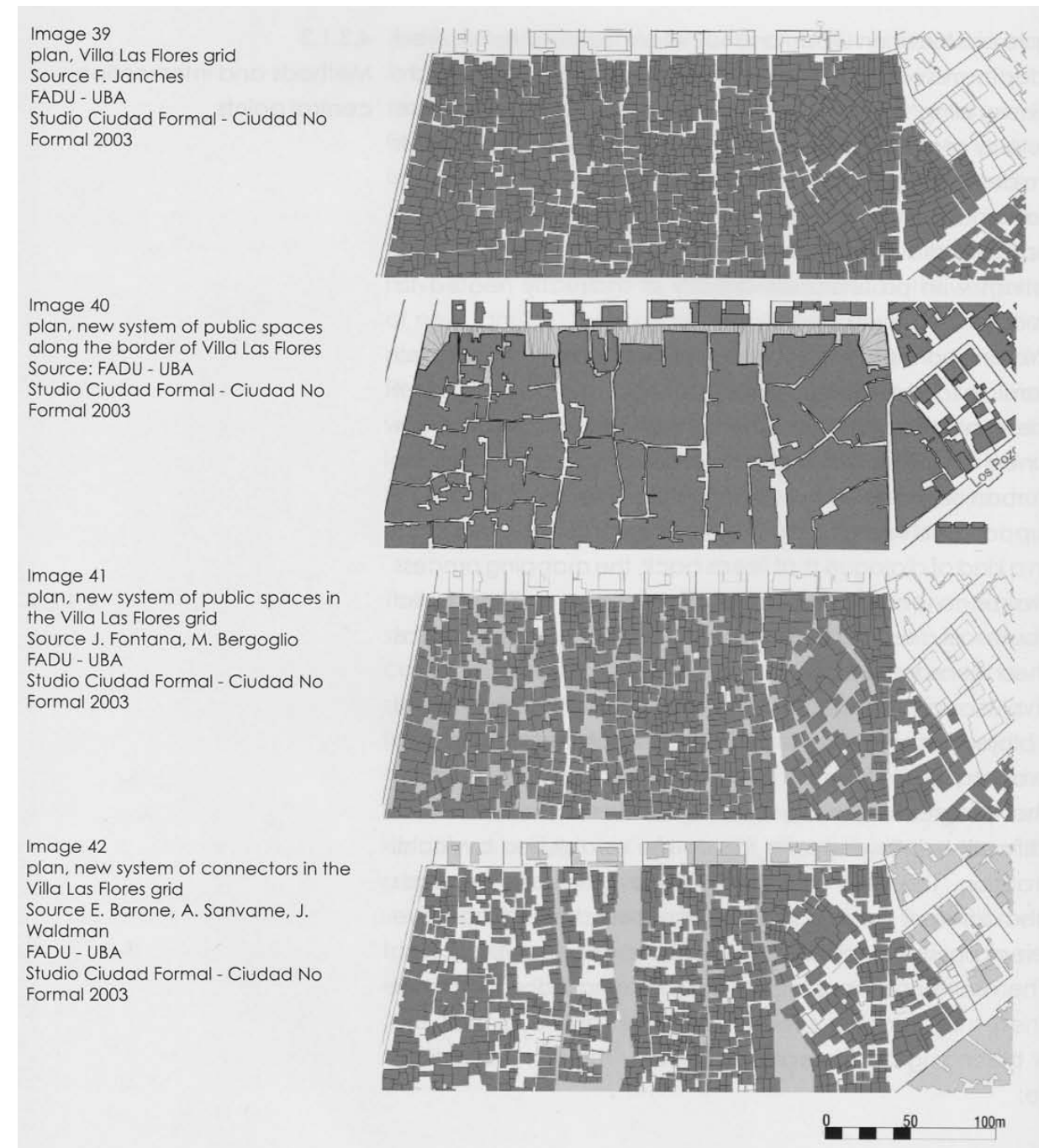


Figure 21: process of adding public spaces by Janches

Research question

Research question

To effectively find an answer to the varied problems present in Paraisópolis, I cannot just start drawing and designing. When I clearly state the problem, I can formulate the research question. This question will be the leading question in the research: both research and design should be focused on trying to find an answer to this question.

Problem statement

The problems in Paraisópolis are numerous, but these are the main problems concerning water and waste. São Paulo has a climate with a wet and a dry season. During the wet season, floods occur throughout the city, including Paraisópolis. But in the dry season, the entire city suffers from drought. This drought has intensified over the last years, because of climate change: the wet season has shortened and less rain falls each year. Because Paraisópolis is an informal neighbourhood, infrastructure is not regulated as it is in the rest of the city. Most houses are connected to the water grid, but not all connections are legal and safe. Likewise, not all houses are connected to the sewerage. Many connections are home-made and there's also open sewerage, running through some streets, only covered with a grid. Also, solid waste is not always collected and the open sewerage is getting clogged with this solid waste. These various problems interfere with each other. Because of the open sewerage, during flooding, waste material from lavatories is taken up and washed into the streets. Because of the street pattern and the height differences in the neighbourhood, this can effect a large area.

This web of problems leads to this hypothesis: creating new public space with specific qualities will create the space required to address the problems of water and waste in Paraisópolis. These qualities must be found through Urban Metabolism and theory regarding the connectivity to the formal city. Possibilities to create extra improvements for the neighbourhood via the new public spaces should not be ignored.

To address both the physical and social situation of Paraisópolis, a plan needs to be made, consisting of a design and a process: a spatial strategy.

Research question

What is an effective spatial strategy to improve water management in Paraisópolis, by increasing quality of life and improving the quality of public space?

Sub-questions

What are the current problems with water and waste management in Paraisópolis?

What are the possibilities for new public space in Paraisópolis?

How can public space and water and waste management positively influence each other in Paraisópolis?

Relevance

Last year, UN HABITAT published a report saying there are now over one billion people worldwide living in informal or squatted neighbourhoods. The impact of these cities on economics, politics, demography and health are still lacking thorough research. (United Nations Human Settlements, 2013) I have enjoyed education in urbanism on one of the best institutes for urbanism, the Delft University of Technology. The knowledge and experience I have gained I want to use for the benefit of many. The best way for me to contribute to improving cities is to look at informal neighbourhoods: their number is growing, their problems are significant and many possibilities are still unexplored.

I make use of new public space with specific qualities for water and waste management and connections to the formal city. This is a new way of changing the urban structure of an informal neighbourhood. The benefits that follow from this design can be applied to other informal neighbourhoods (bearing in mind the differences between informal neighbourhoods in different countries).

Also, the research field of Urban Metabolism, is relative new. Especially so in case of its view on informal neighbourhoods. This research expands the experience of urban metabolism in the workspace of informal neighbourhoods and contributes to the body of practical 'pulleys and levers'. (Koolhaas, Ulrich, Kayoko, & James, 2011)

Interventions

Interventions

The research into and the analysis of Paraisópolis has shown what and how the problems are in Paraisópolis. To address these, I have set up a kind of toolbox with interventions. These interventions vary in scale and complexity, but they all contribute to resolve the problems of water and waste, focuses on the public space.

Waste collection locations

Currently, waste is collected by truck throughout Paraisópolis. The collection locations are spread out, including in flood areas and on steep slopes.

I propose not to moved the current waste collection locations, to add stone containers to store the waste. UN Habitat has developed various systems for waste collection in informal neighbourhoods. One of these is the container depicted in here. It keeps the waste together, prevents it from being flushed away and it is still possible to abstract the waste. I have differentiated between three regions: the lower valley, slopes and on the hills. The latter is not so special, but on the slopes, the containers have to be built horizontally, and in the valleys extra attention is needed to water discharge.

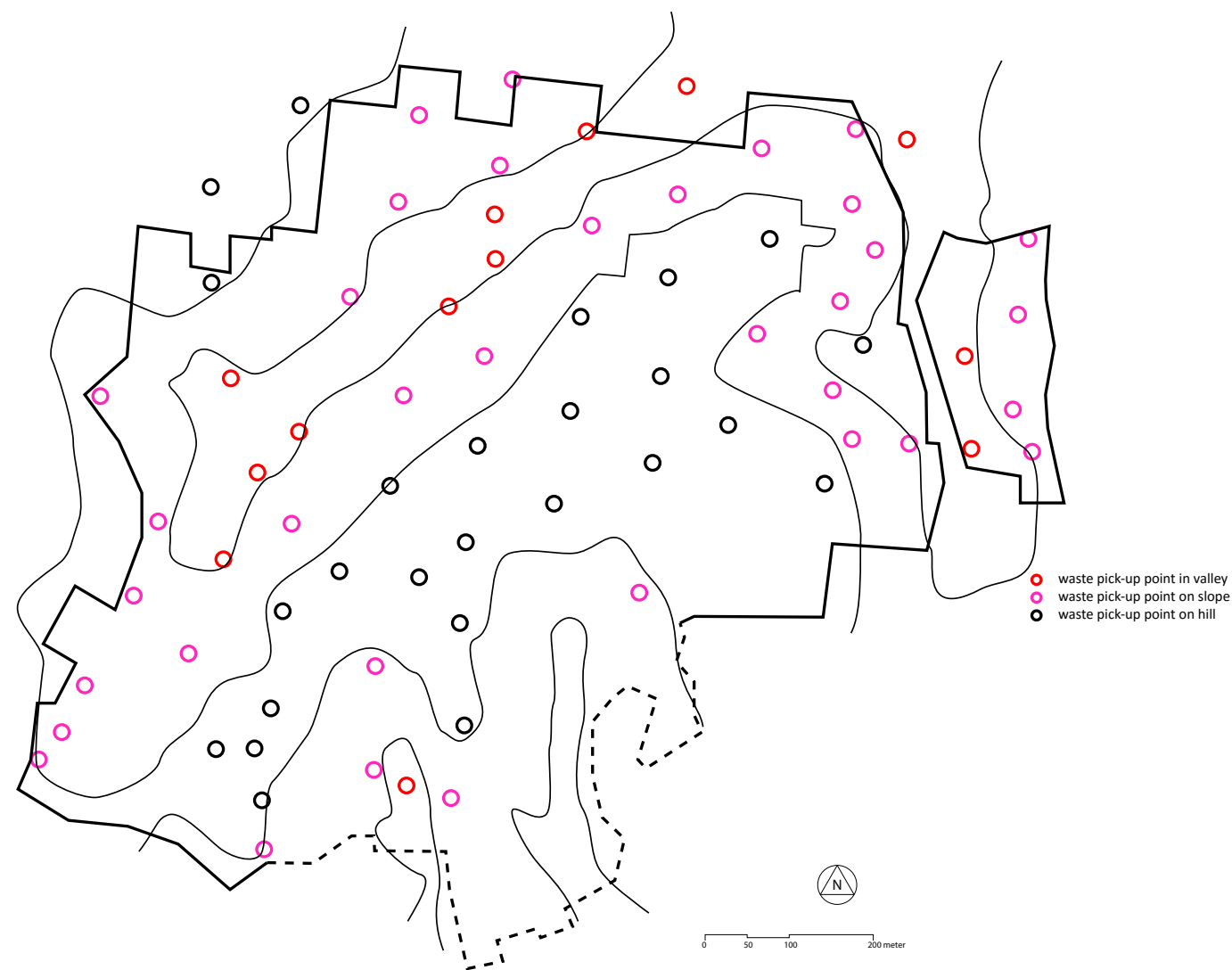


Figure 22: map of waste collection locations

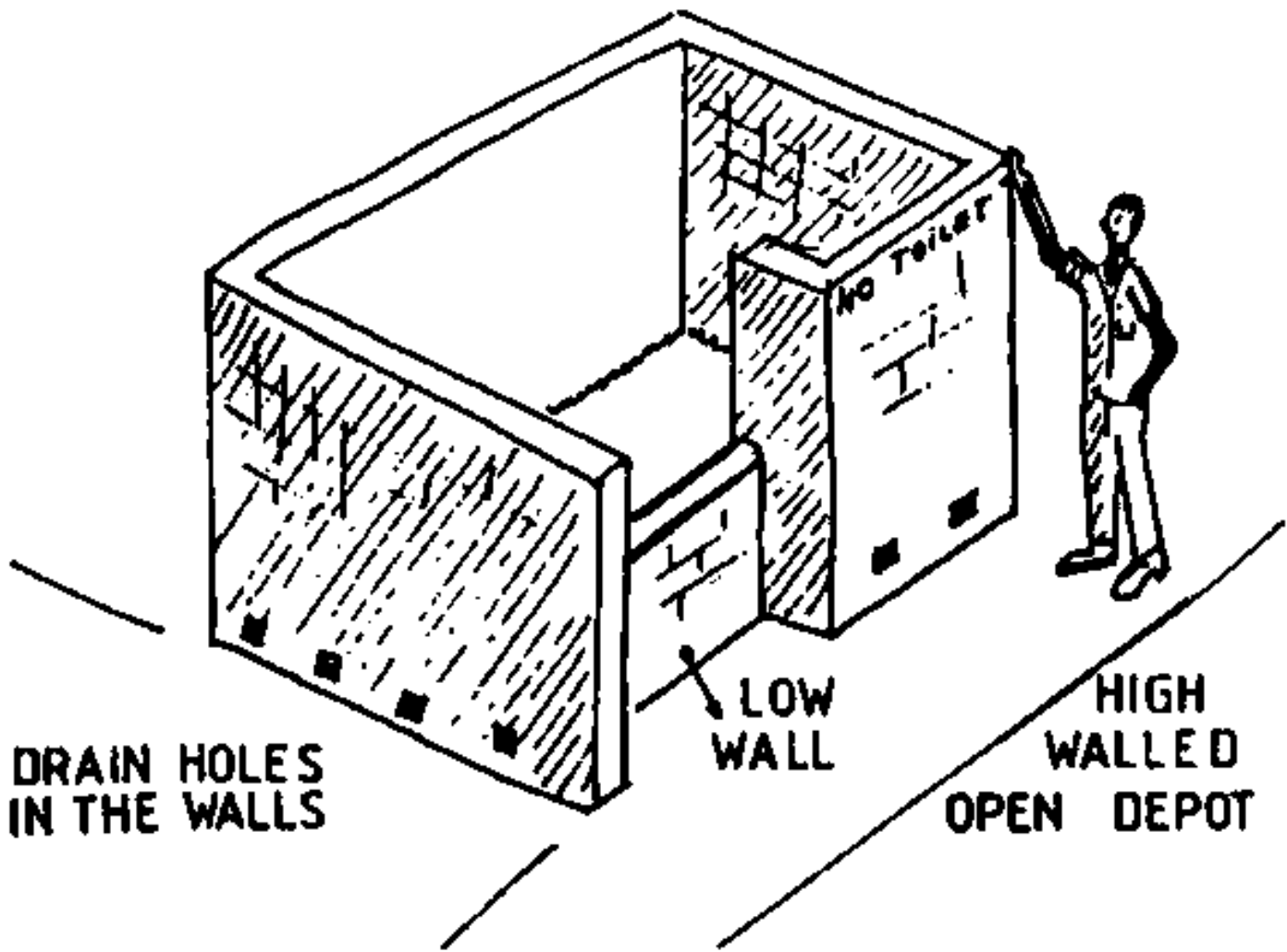


Figure 23: communal waste depot

Permeable pavement

Paved roads in Paraisópolis are made of concrete or asphalt. Combined with the high density of houses leaves this very little room for water. Surfaces are paved and water cannot reach the earth beneath. So all the water runs off directly, causing flooding in the lower valleys. By making more pavement out of permeable asphalt or other stone, water will be able to penetrate to the earth. This reduces the amount of water that needs to be discharged, replenishes the aquifers and contributes to a better ground quality for plants and trees.

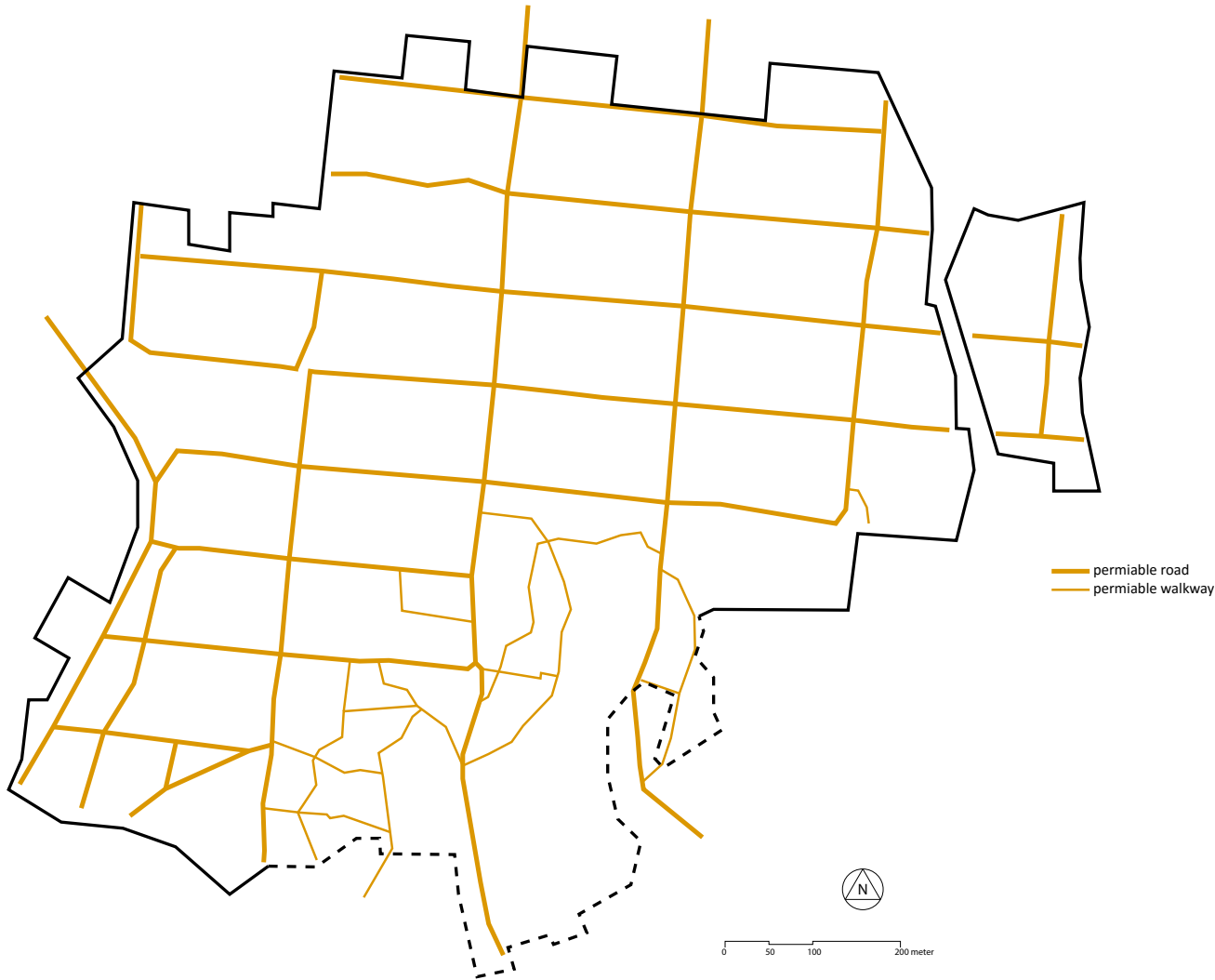
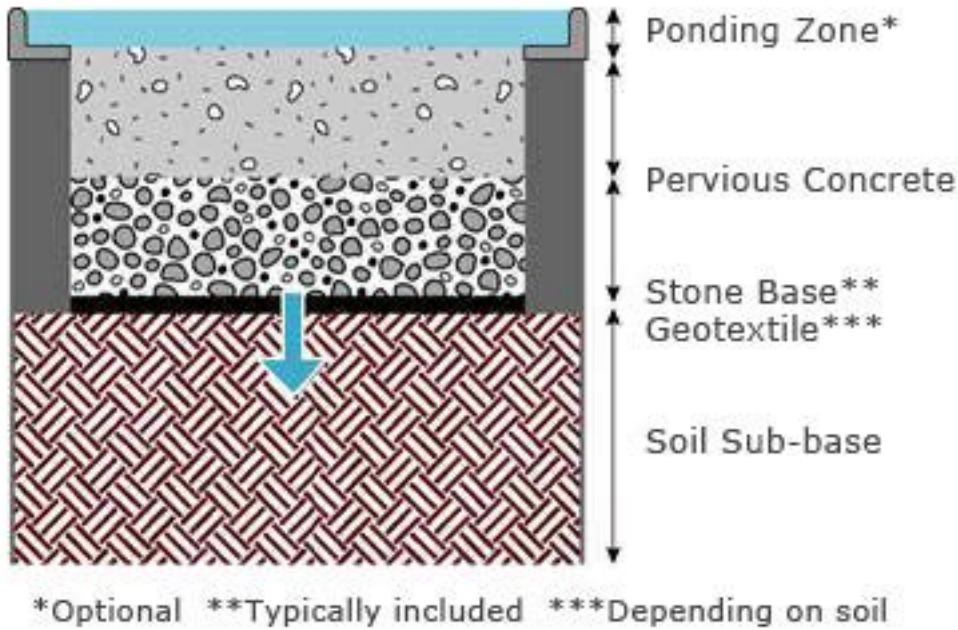
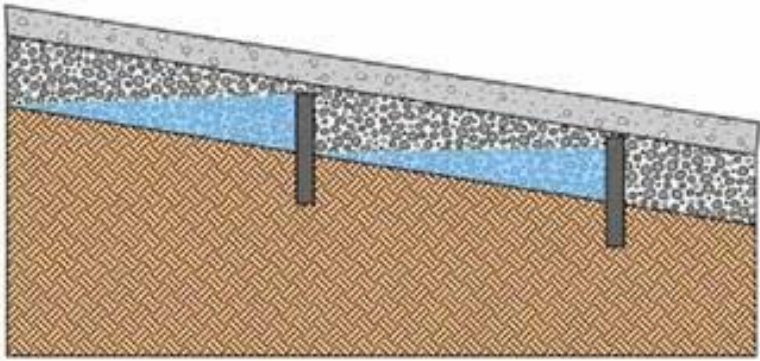


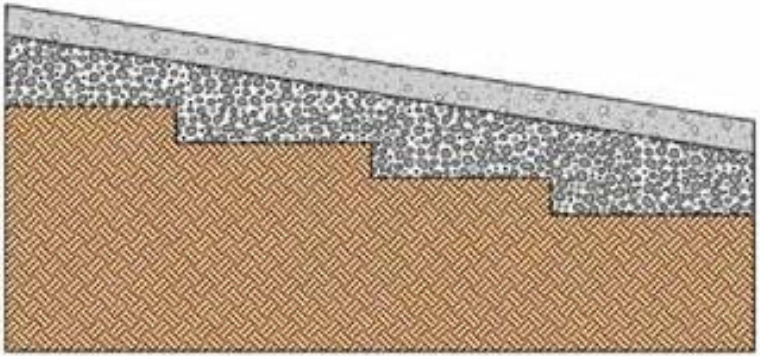
Figure 24: map of streets and walkways with permeable pavement



Example cross section of a pervious concrete pavement system. Curbs (on both sides) will increase the storage capacity.



A "check dam" approach may be useful in long sloped pavements.



Terraces in pervious concrete pavement system with long slopes.

Figures 25, 26: cross section of permeable pavement, across the street and along a slope

One-way streets

Already some streets in Paraisópolis are one-way. This is because of the steep slopes at these locations. By expanding this system, more space is freed up for water and trees in the streets.

Most streets in Paraisópolis are narrow. Often, two cars can only just pass each other, and the sidewalks are sometimes blocked by buildings. The interventions I propose in the streets require space. When the streets are one-way, space becomes available for these interventions. When I expand the amount of one-way streets, routing may become more complex and a bus route running through Paraisópolis has to be redirected to one street parallel.

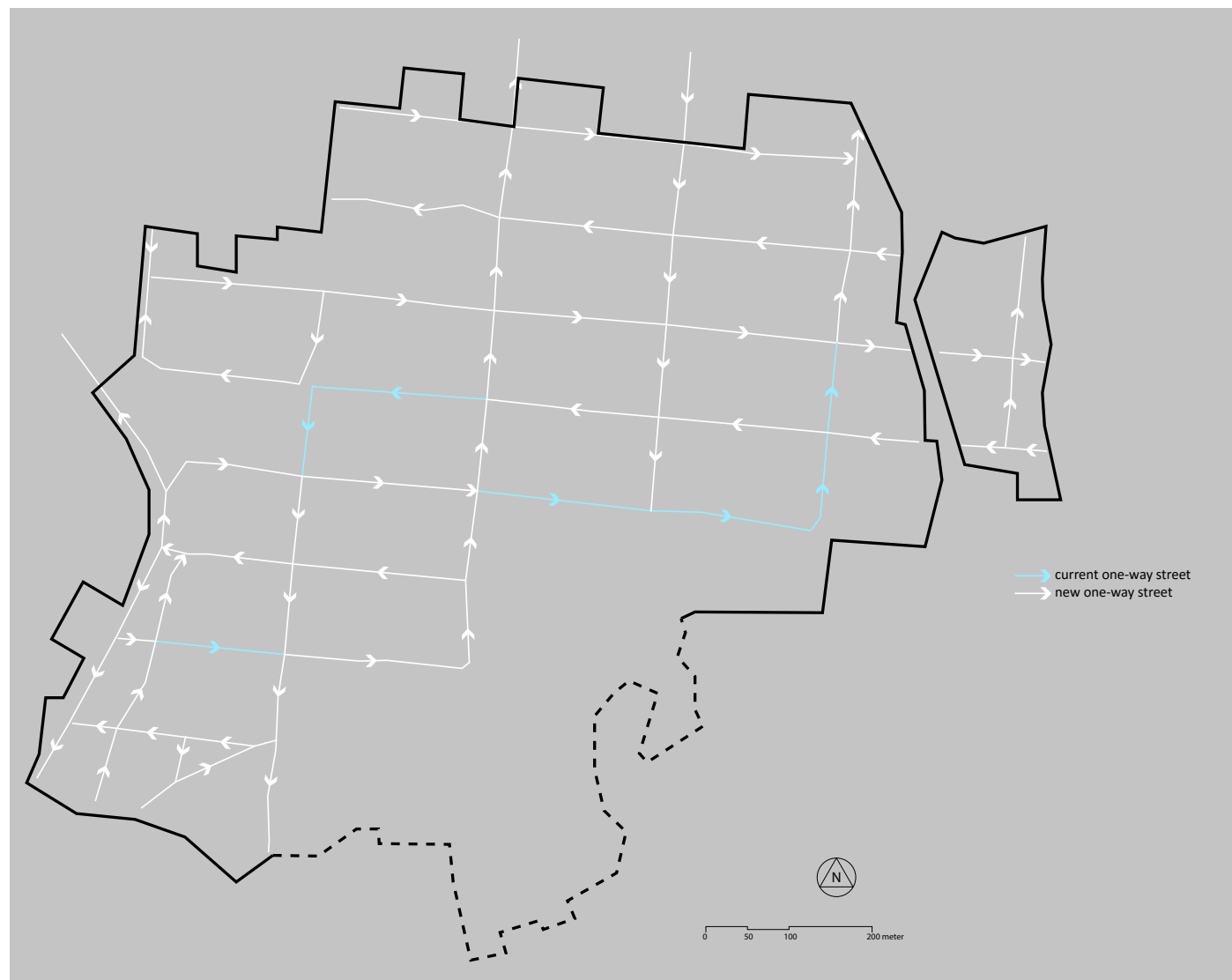


Figure 27: map of one-way streets



Figure 28: looking into a one-way street

Bio swales

Bio swales are ditches next to a road, which lets rain water into the ground and filters it as well. They are a way to store water in streets, even if they lay on an incline and also provide an area for grass and trees to grow. A bed of earth and pebbles stores and filters rain water. This water is taken up in the earth or can be discharged trough a pipe system.

By implementing the one-way streets, there will be space to create these bio swales.

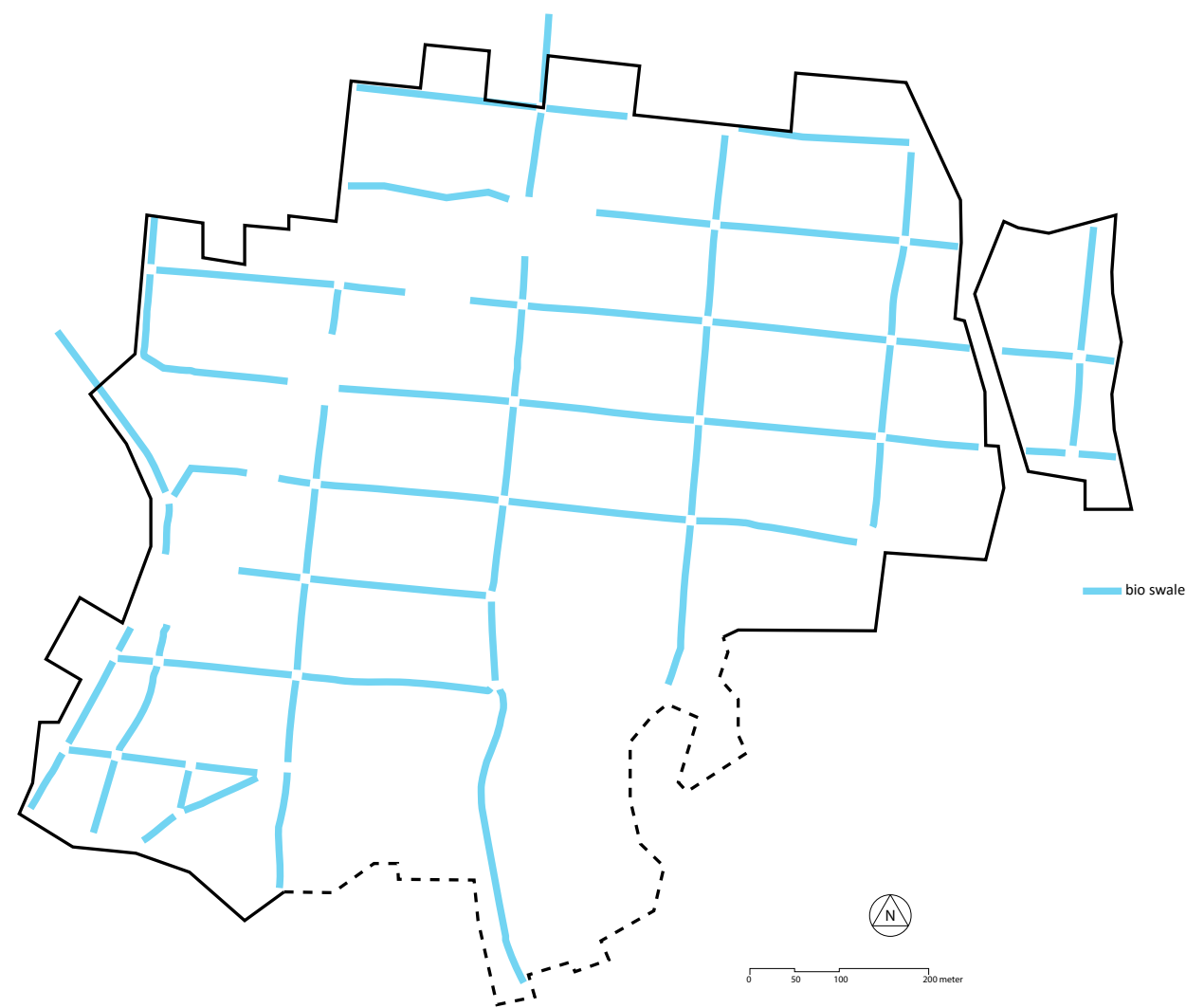


Figure 29: map of bio swales

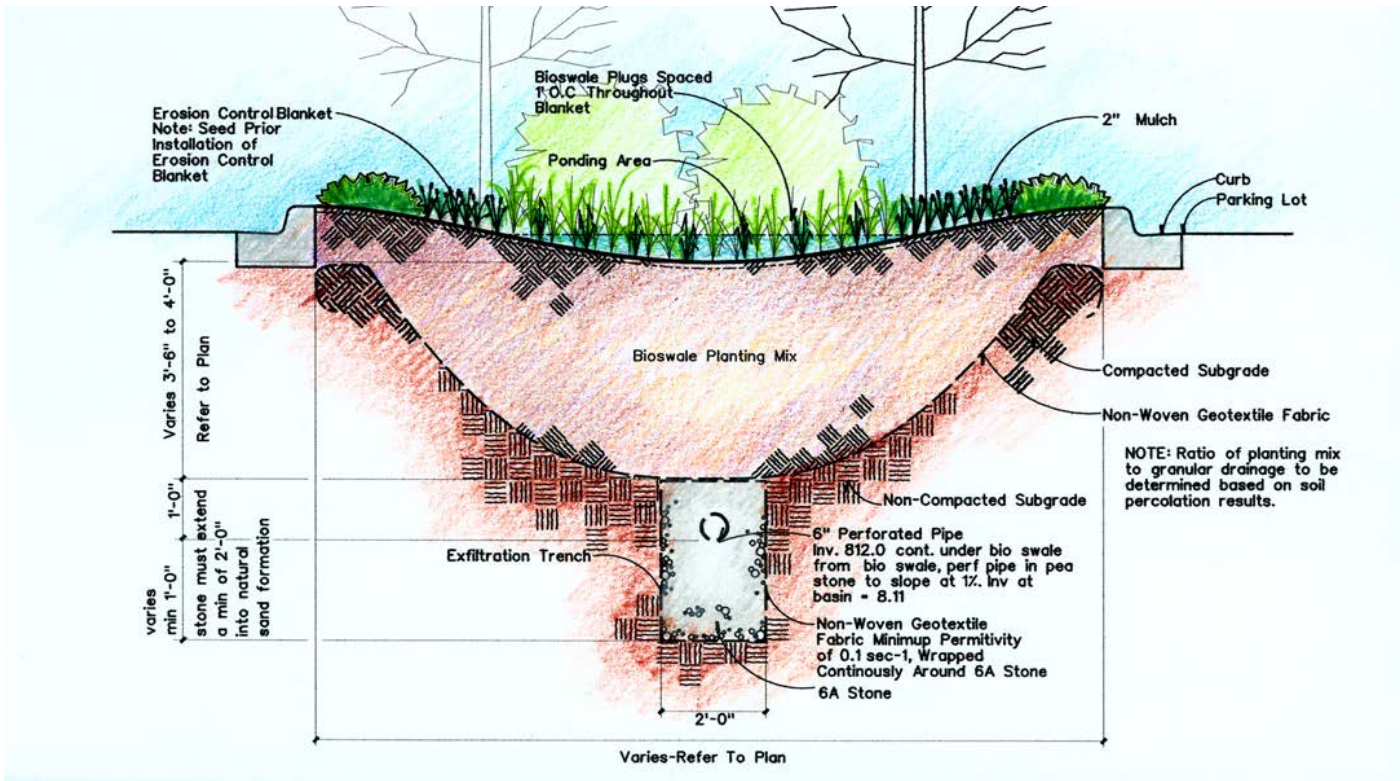


Figure 30: section of bio swale

Wadi

‘Wadi’ comes from the Arabic word for dry riverbed. A wadi is similar to a bio swale, except that it is designed also to function both when it is dry or wet. It is a long ditch, running through the valley. It can be used just as any other grass land. But during heavy rain, it collects water, preventing flooding elsewhere. It gradually releases the water it has collected into the surrounding earth or it can be discharged in a pipe system. Long periods of standing water do no harm to a wadi.

The wadi will run through a square. There, the form will be slightly different, but it will keep its functionality.

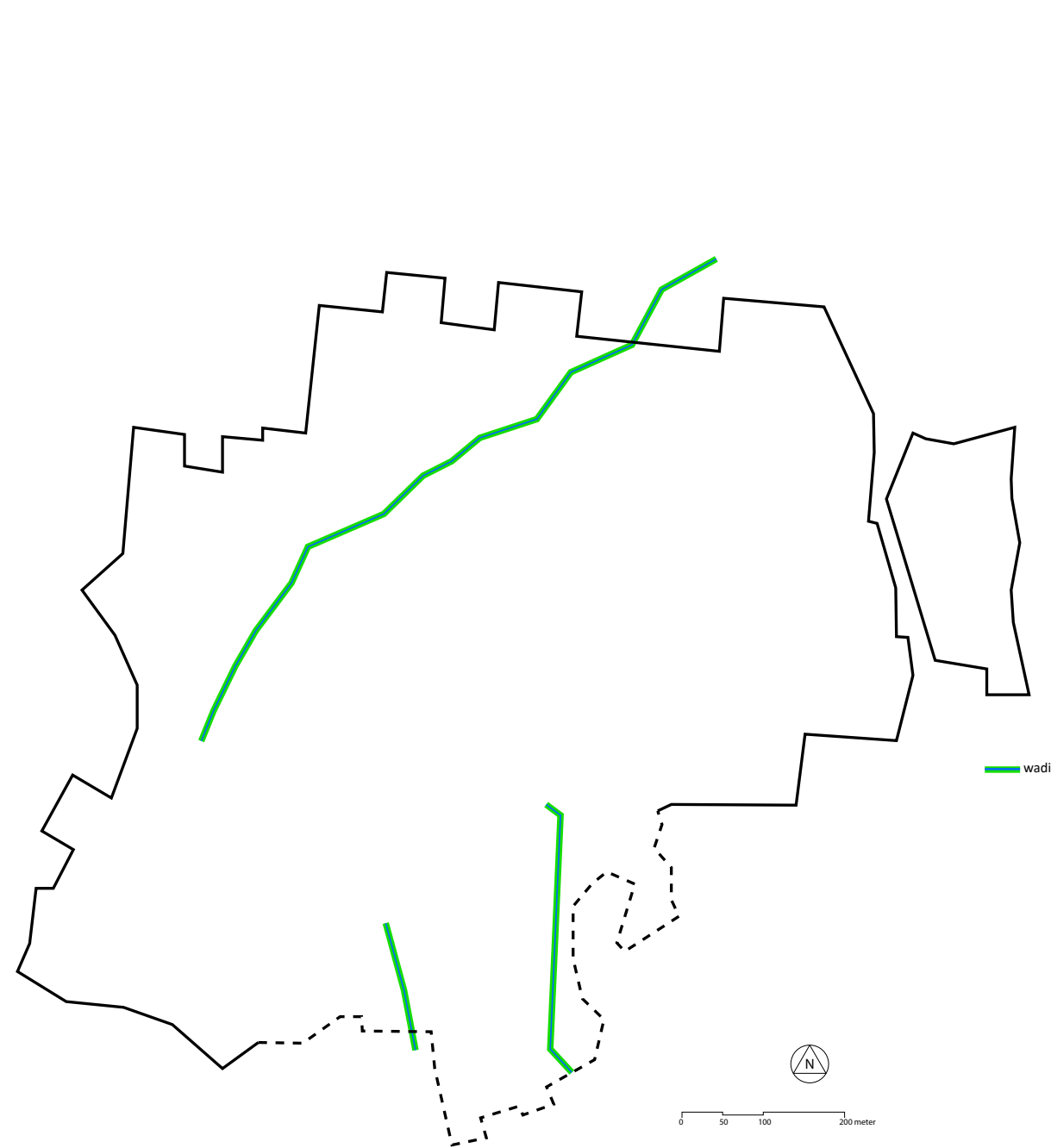
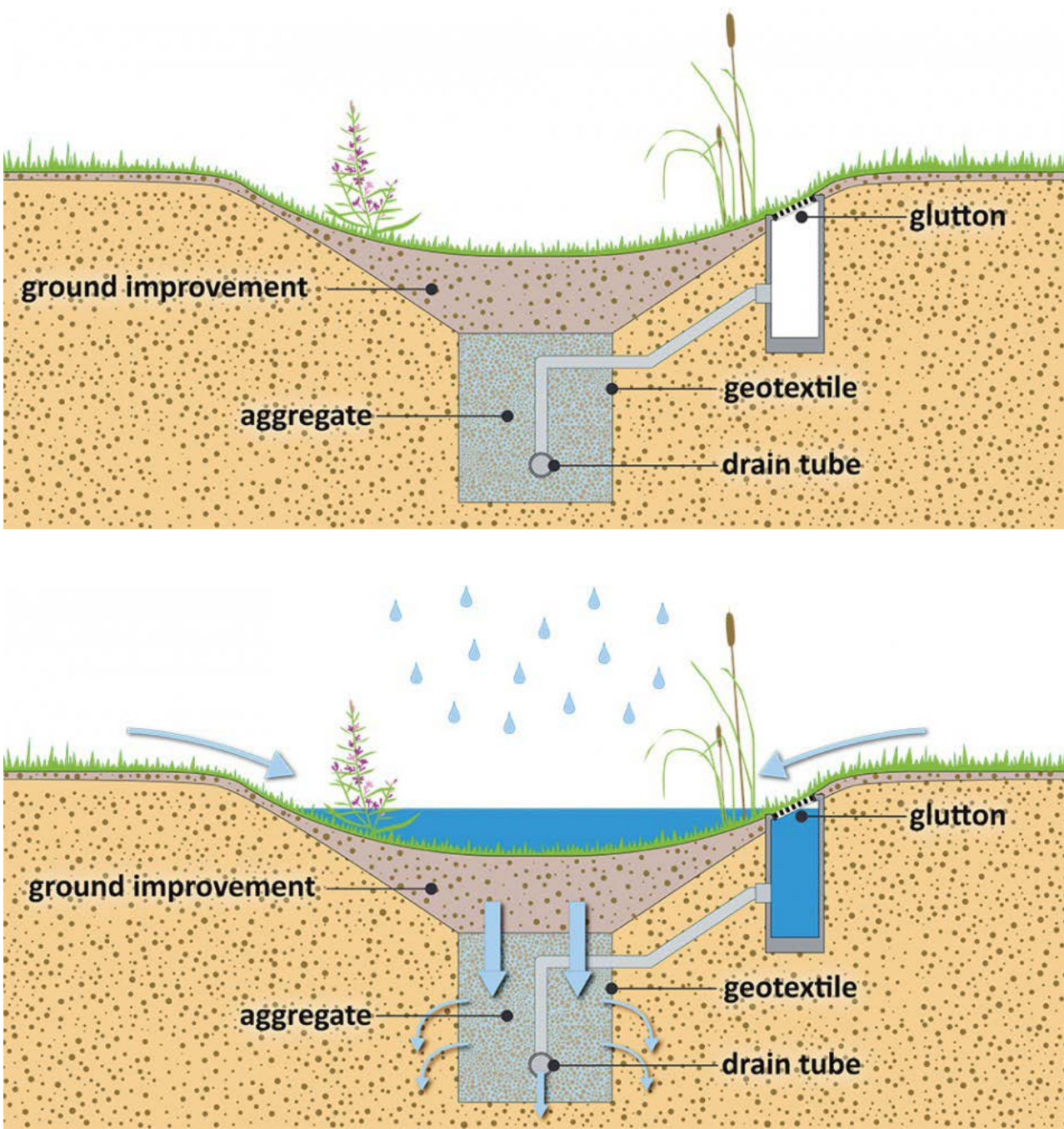


Figure 31: map of wadi's



Figures 32, 33: wadi when dry and when wet

Trees

Currently, there are very view trees in Paraisópolis. But trees can store water in their leaves and roots, give shelter from the sun, release water to the surrounding earth and air during dry periods and structure and sturdiness of the earth. All these properties benefit the management of water. Trees need a minimum space go grow. In Paraisópolis they can be placed in the bio swales in one-way streets and next to wadi's in the valleys. Native trees of São Paulo include the Cambuci, the Copaiba, the Palm tree and the Ipê Amarelo, Brazil's national symbolic tree.



Figure 33: map of trees in streets and in parks.



Figures 34-37: trees in São Paulo: Cambuci, Copaiba, Ipê Amarelo, Palm tree

Squares and parks

Currently, Paraisópolis is a very dense neighbourhood with little public space. The streets are narrow and squares are scarce. To address the water problems in the city, new open areas become available. To keep these areas open and to add to the living quality in Paraisópolis, these open areas will be designed as public spaces. By also removing the houses with the worst sewerage situation and building quality, these new public spaces start to form a network.

Here, I have listed the new public spaces:

- 1 area cleared for flood risk
- 2 broadest part of flood area
- 3 across the road form shopping centre
- 4 connection area
- 5 unused open space
- 6 area in middle of Paraisópolis, containing precarious housing
- 7 area in middle of block, containing precarious housing
- 8 area between road and public football field
- 9 open area, just outside Paraisópolis, in the middle of flood risk area

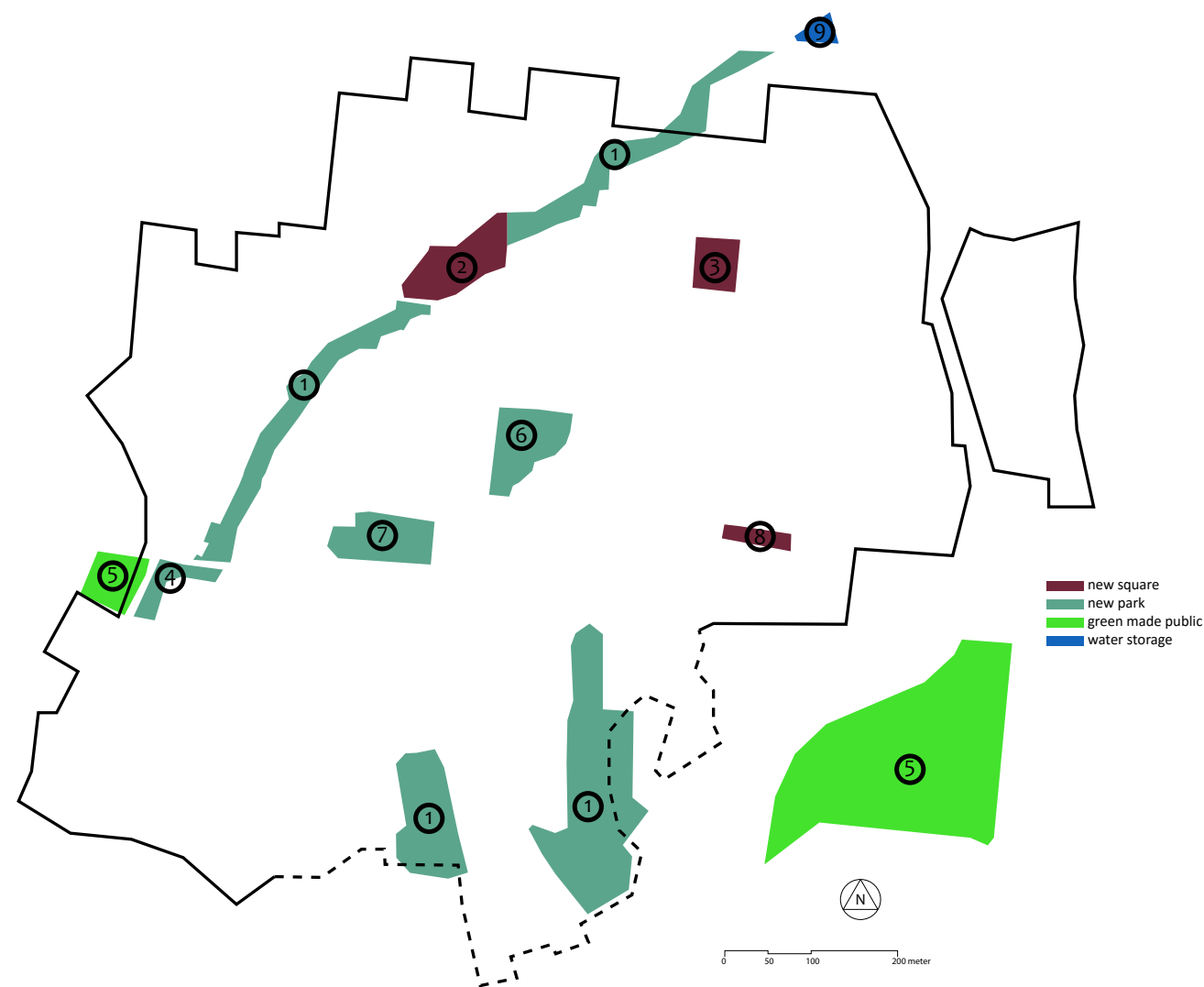


Figure 38: map of squares and parks in and around Paraisópolis

Escalators

Areas with steep slopes can form a barrier between parts of the neighbourhood. In places where there are steep slopes and a connection is necessary, I propose to make elevators. They make traversing these slopes easier and can form a place of social interaction, as various walk flows here come together.

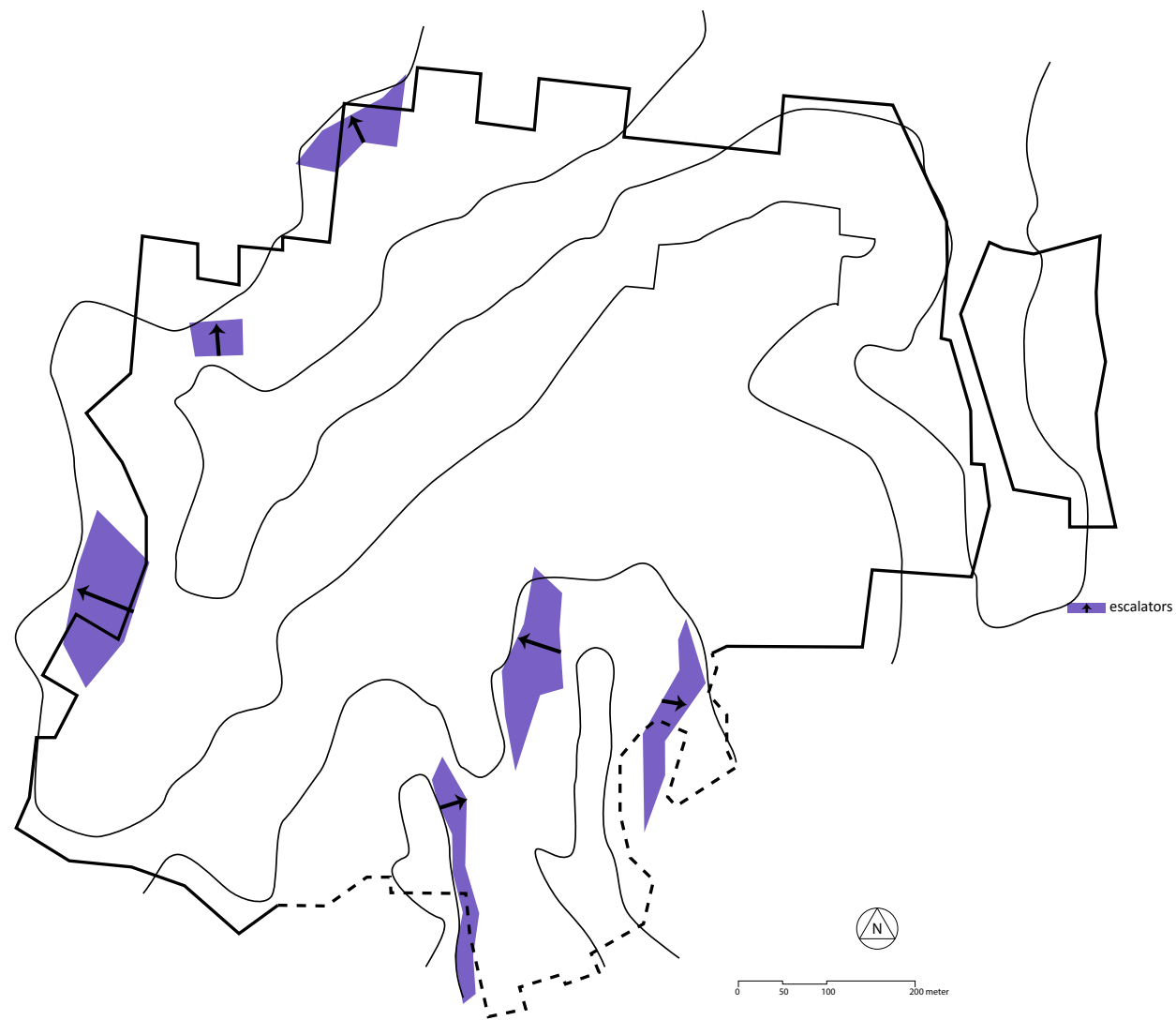


Figure 39: map of escalator locations



Figure 40: escalator project in Medellin, Colombia

Sewerage

About 25% of Paraisópolis currently has sewerage that is being treated. As the sewerage system is incomplete, I propose to expand the current system to the houses directly behind the houses facing the streets. As the streets will get new pavement, it will be possible to add extra pipes for sewerage. If these are executed with sufficient capacity for growth, the sewerage system can gradually be expanded into the whole blocks. But in the meantime (and on difficult to reach places), stand-alone systems can be installed. Multiple households can be connected to a single unit. It works on solar energy, converting urine into water and solid waste into methane (for energy production) and manure. One such a system is developed by RTI International.

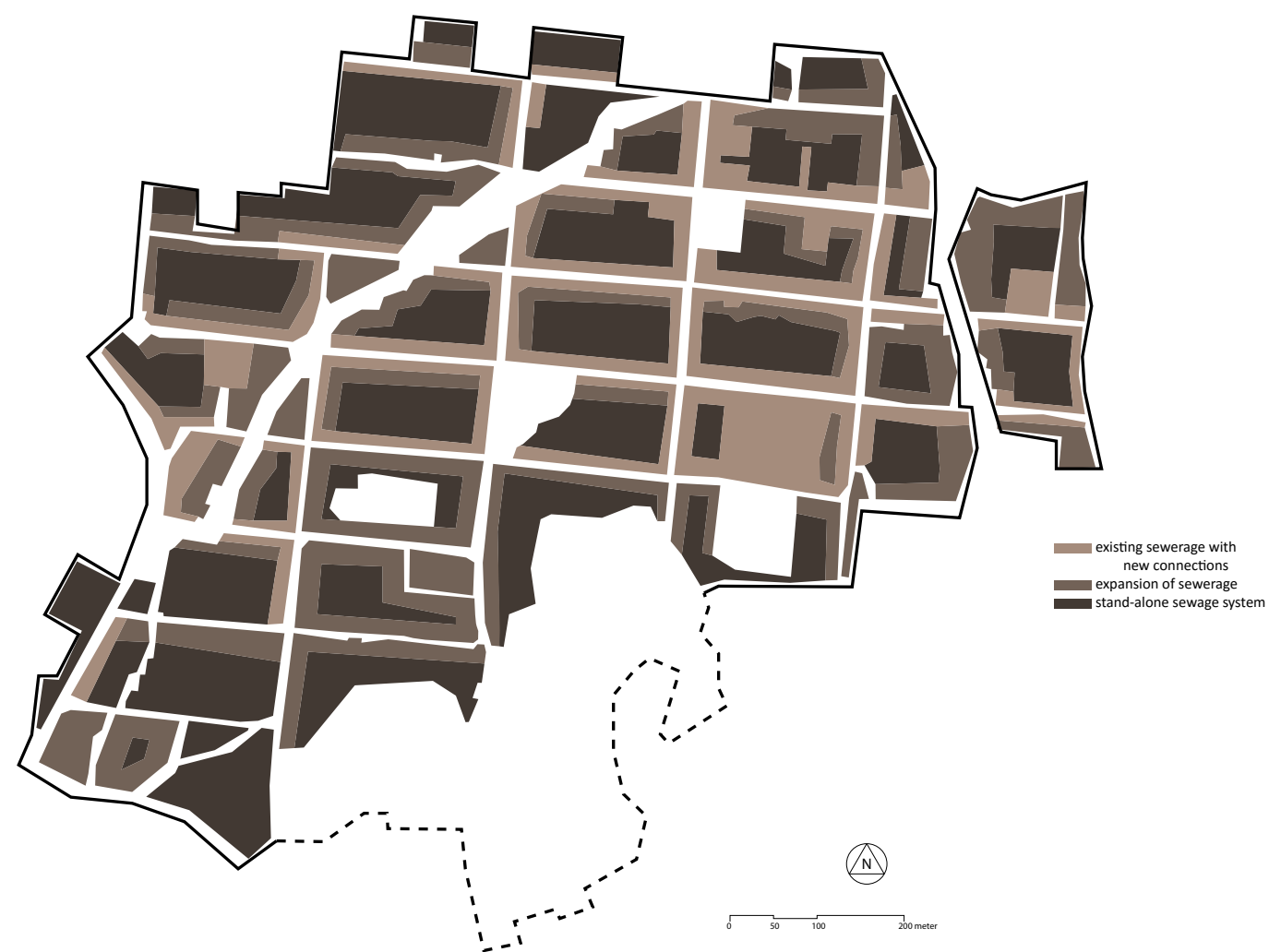


Figure 41: map of proposed sewerage system



Figure 42: current sewerage connection

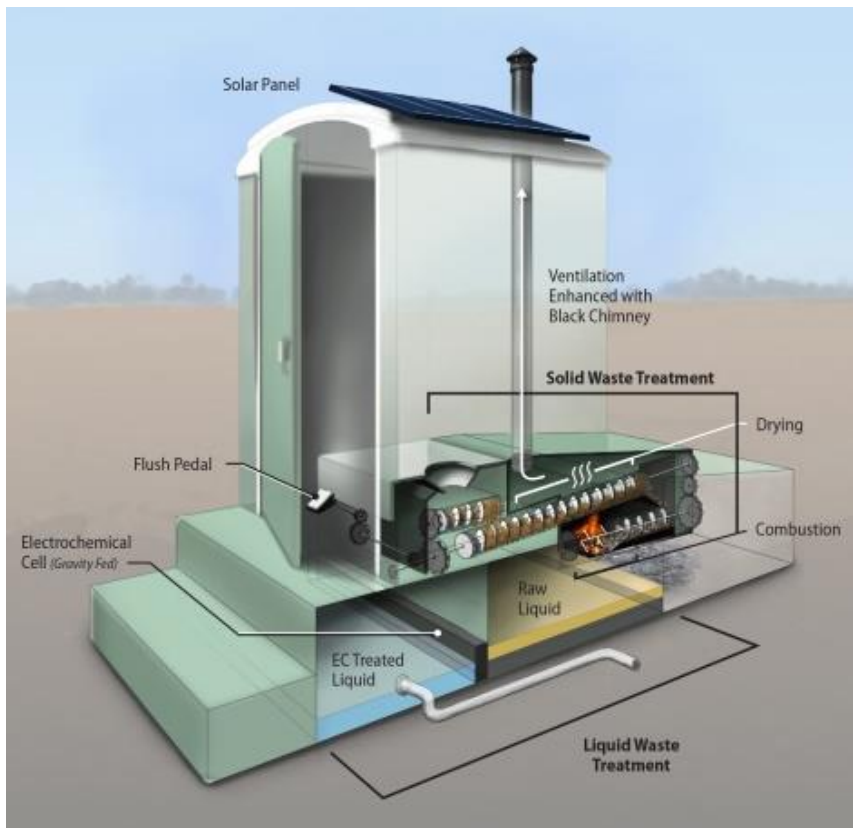


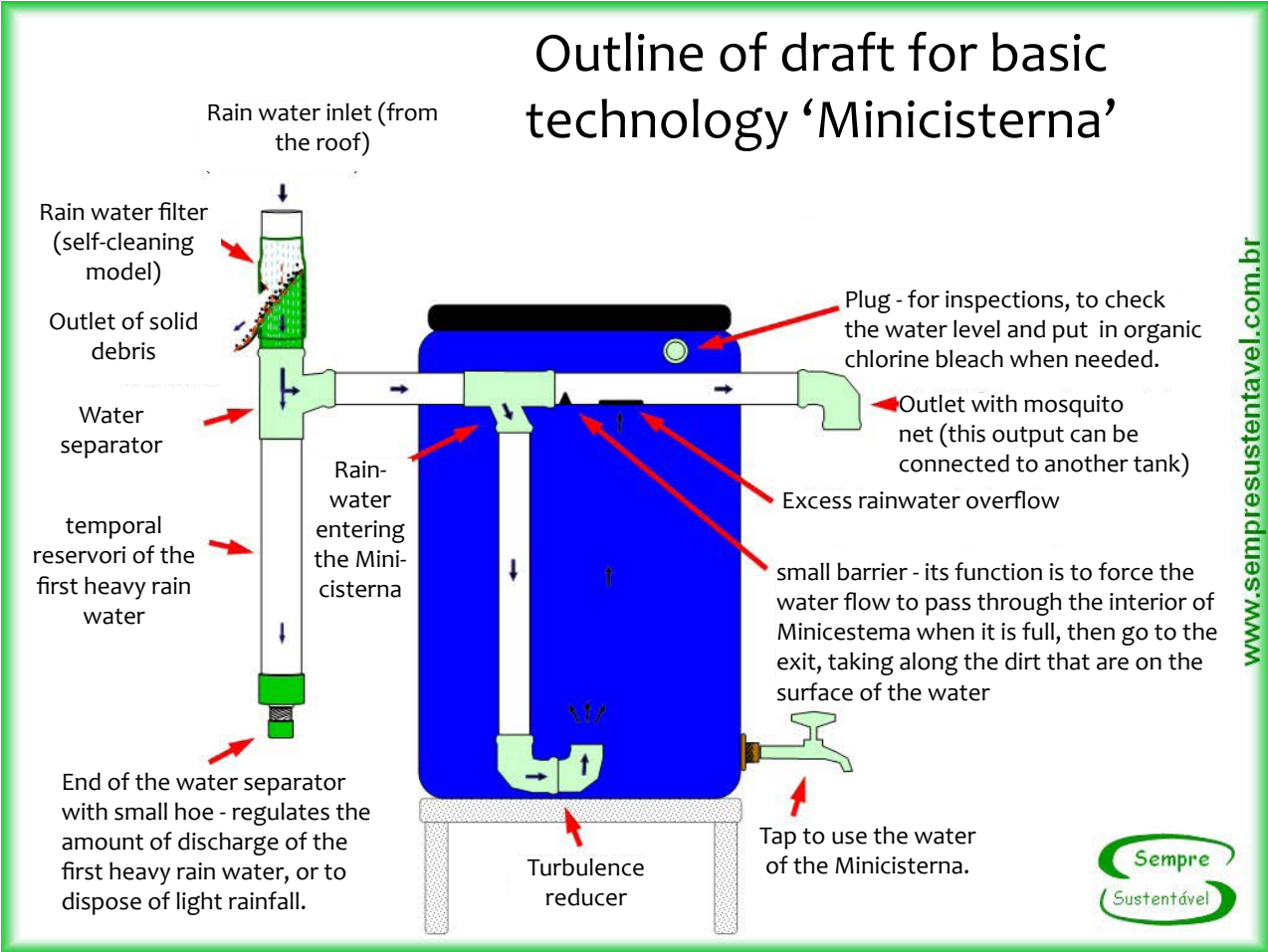
Figure 43: stand-alone sewerage systems from RTI International

Water barrels next to houses

To alleviate the water shortage caused by the recent drought, and to help prevent floods, households can collect rain water in barrels. Already, some houses have water barrels, but often they are open to the air. Insects can enter the water, as well as other contaminants. If done safely, the collected water can be used for non-drinking purposes, like washing or for watering plants. There are already good designs for water barrels, like Minicisterna, developed by ‘Sempre Sustentável’.



Figure 44: map of locations for water barrels next to houses



Figures 45, 46: the Minicisterna project: homemade water barrels

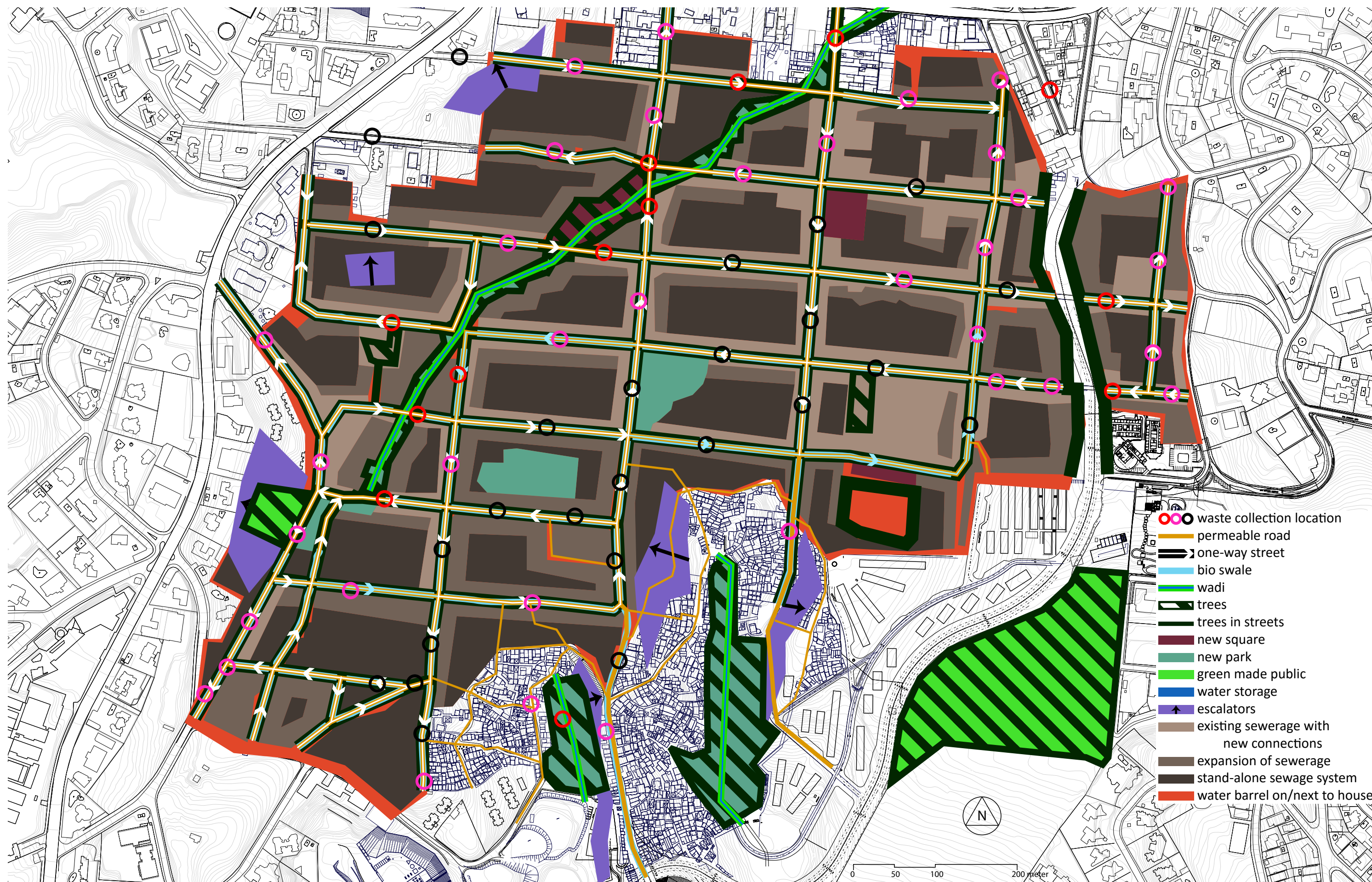
Design

Design

All the interventions together form the basis for the design for Paraisópolis. The next map shows that design. On this scale, details are hard to see. When zooming into certain areas, more details become apparent.

This chapter zooms in on 3 locations. There is a map with more detail and an impression of how the current situation might transition into a future one. There are 2 sets of sections too, also showing this transition.

The water and waste problems have been addressed. The interventions together should solve them, or, at least, lessen their effect. But the new public space the interventions are not yet secured from being taken over by new houses. There are functions that the residents of Paraisópolis daily perform and for which they need certain spaces. For now it is yet unclear what these activities specifically are, so further research into that is necessary.



Location: Valley Park

To help prevent floods, the Municipality of São Paulo has proposed to remove the bad houses in the bottom of the main valley. This is a prime opportunity to make a long park, running the length of Paraisópolis. This map shows this long park, intersected by a central square. In the southwest, it connects to an existing body of trees, and it adds to its quality.

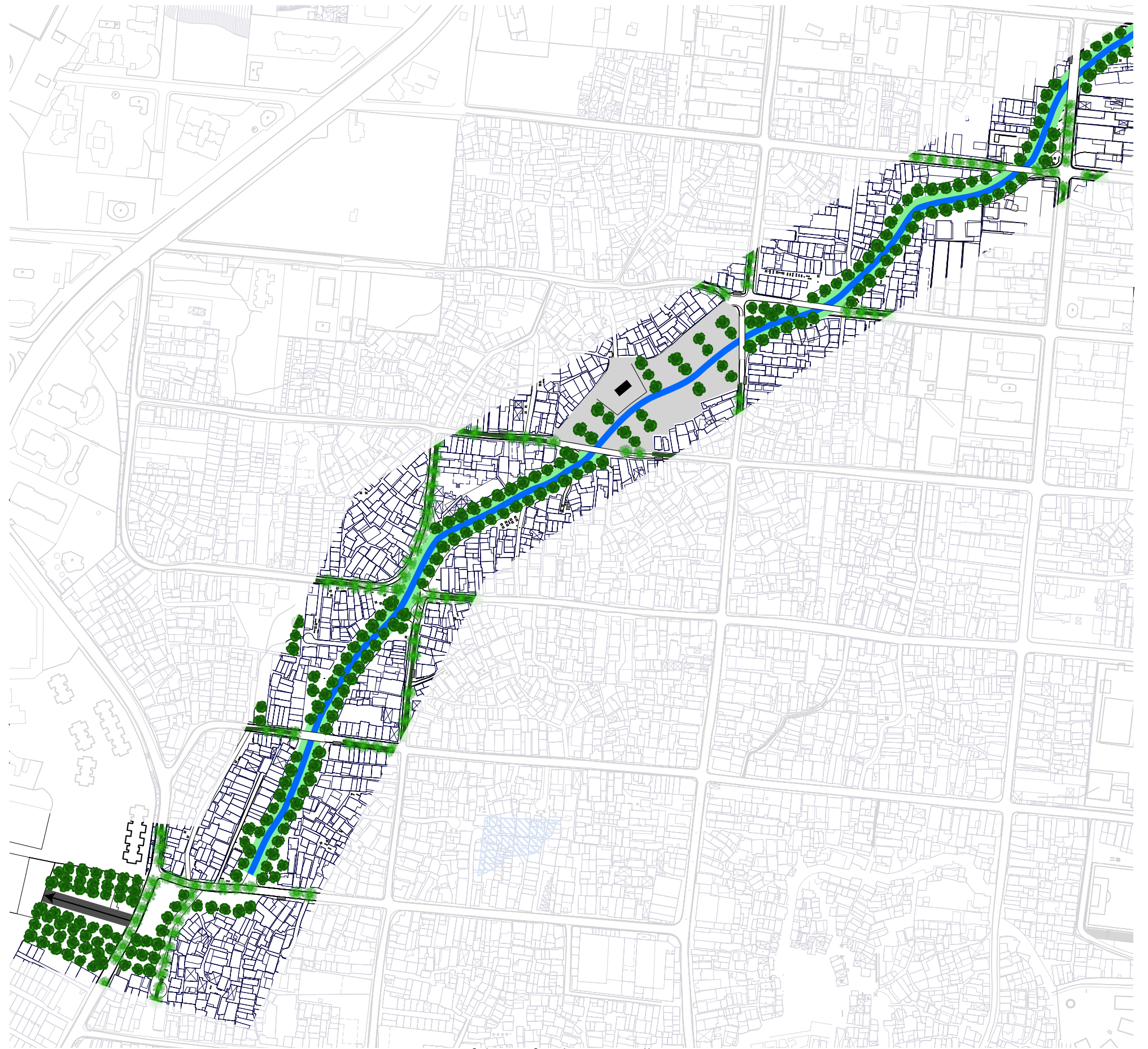


Figure 48: map of design for the main valley

Location: Valley

The square in the main valley lies there where the new open space is broadest. The area of the square is informally divided by using Copaiba trees. On the north bank is room for a restaurant or other food service location. Both river banks are paved with permeable pavement. Steps lead down to the river, which gives room for the river to swell up without flooding.



Figure 49: map of design for square in the main valley



Figure 50: current situation

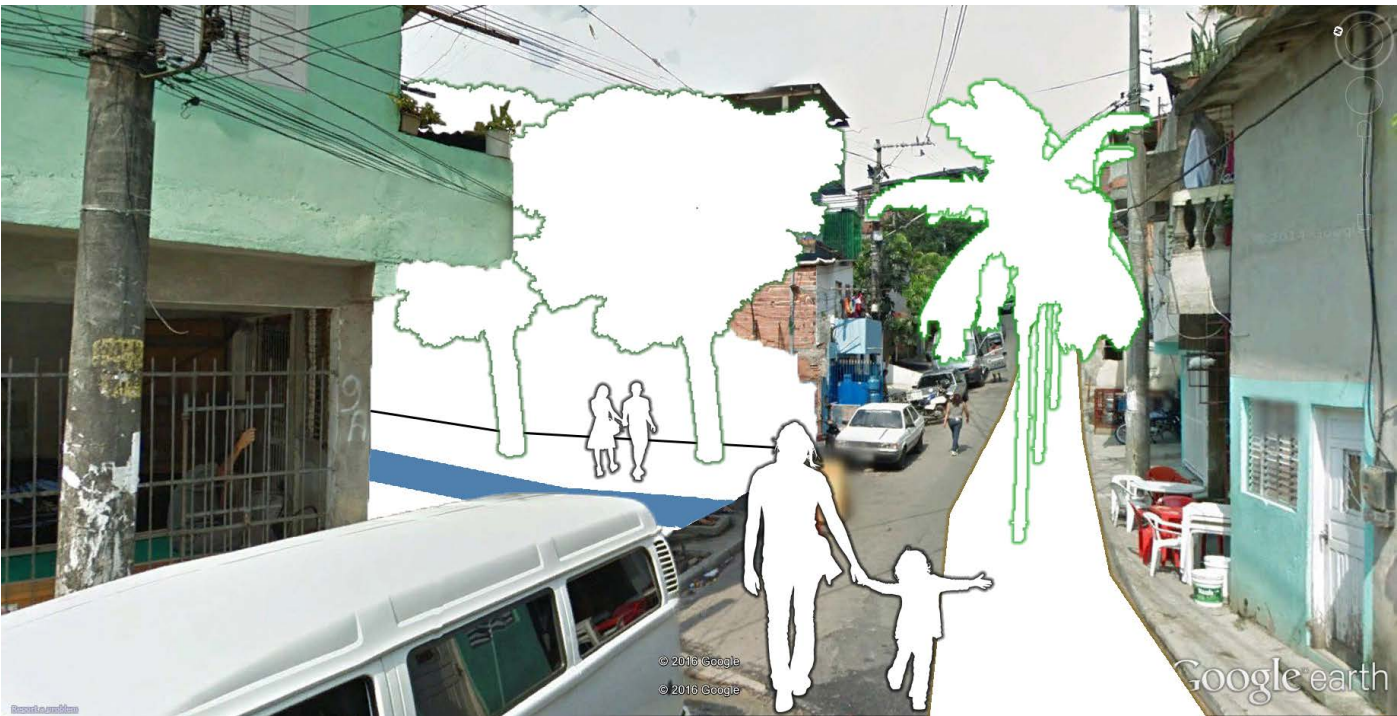


Figure 51: impression of the new situation

Section of Valley

The top section shows the current situation. There is poor housing in lowest area of the main valley and therefore no room for water when flood risk is high.

In the new situation (bottom section) the wadi helps to adapt to peak discharge of rainwater and therefore to prevent floods. It is an open area with new trees.

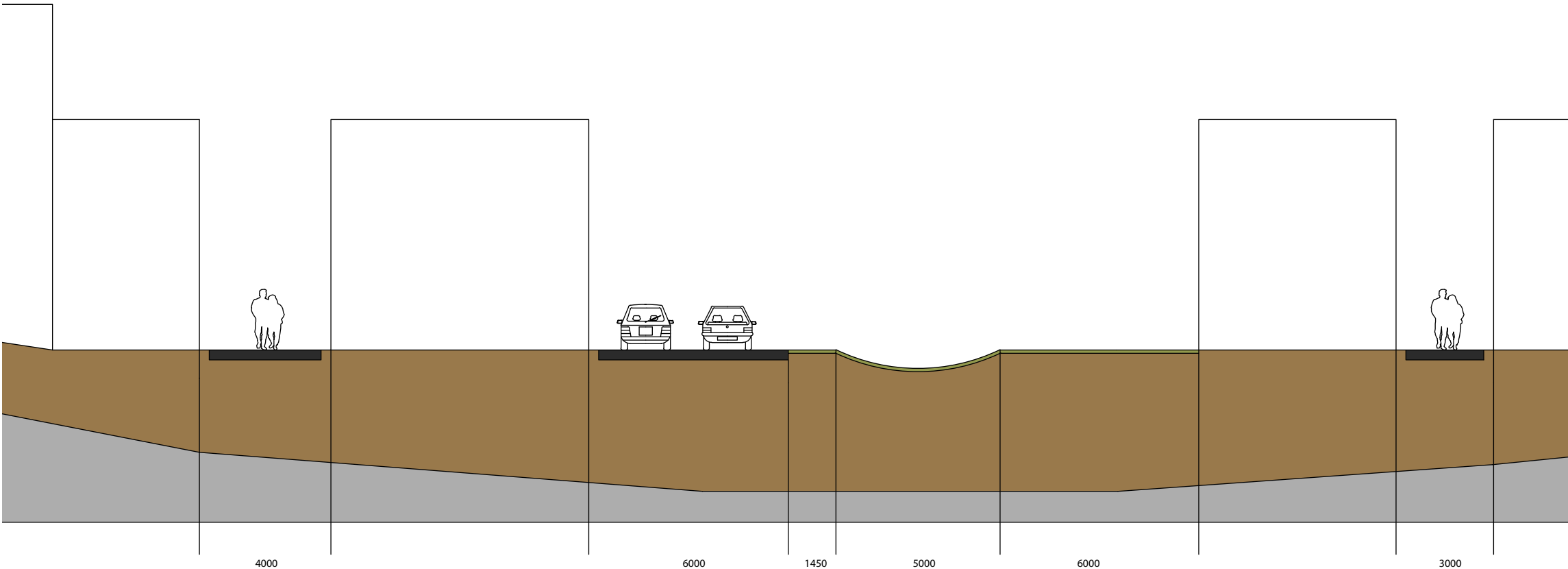


Figure 52: current situation

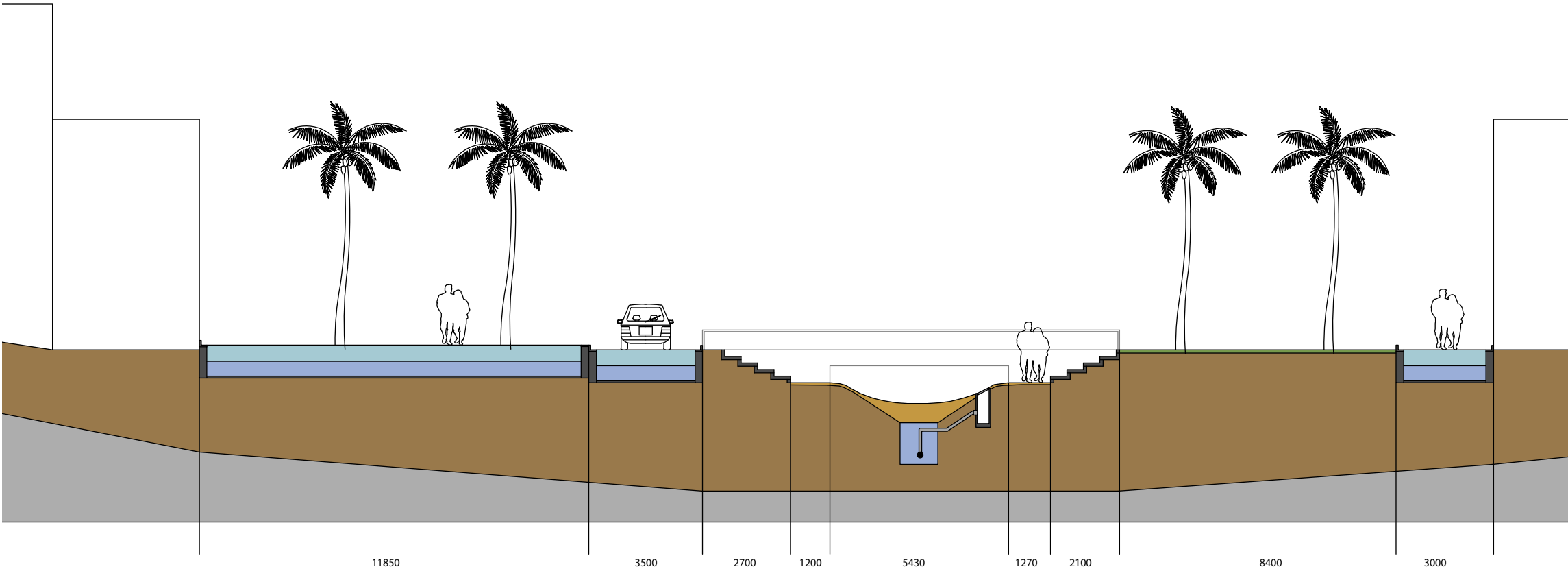


Figure 53: new situation

Location: Inner Block

The interior of a block in Paraisópolis is hardest to connect to a sewerage system. Here, the hygiene situation is bad. In some places those houses are of substandard building quality too. The location of this design is one such interior of a block. By removing the houses, making multiple good connections to the surrounding streets and adding a specific function to the new square, it gives new meaning to this part of Paraisópolis. It contains a football field, which doubles as a water square: in times of heavy rain it can store rain water. Afterwards it slowly releases its contents.

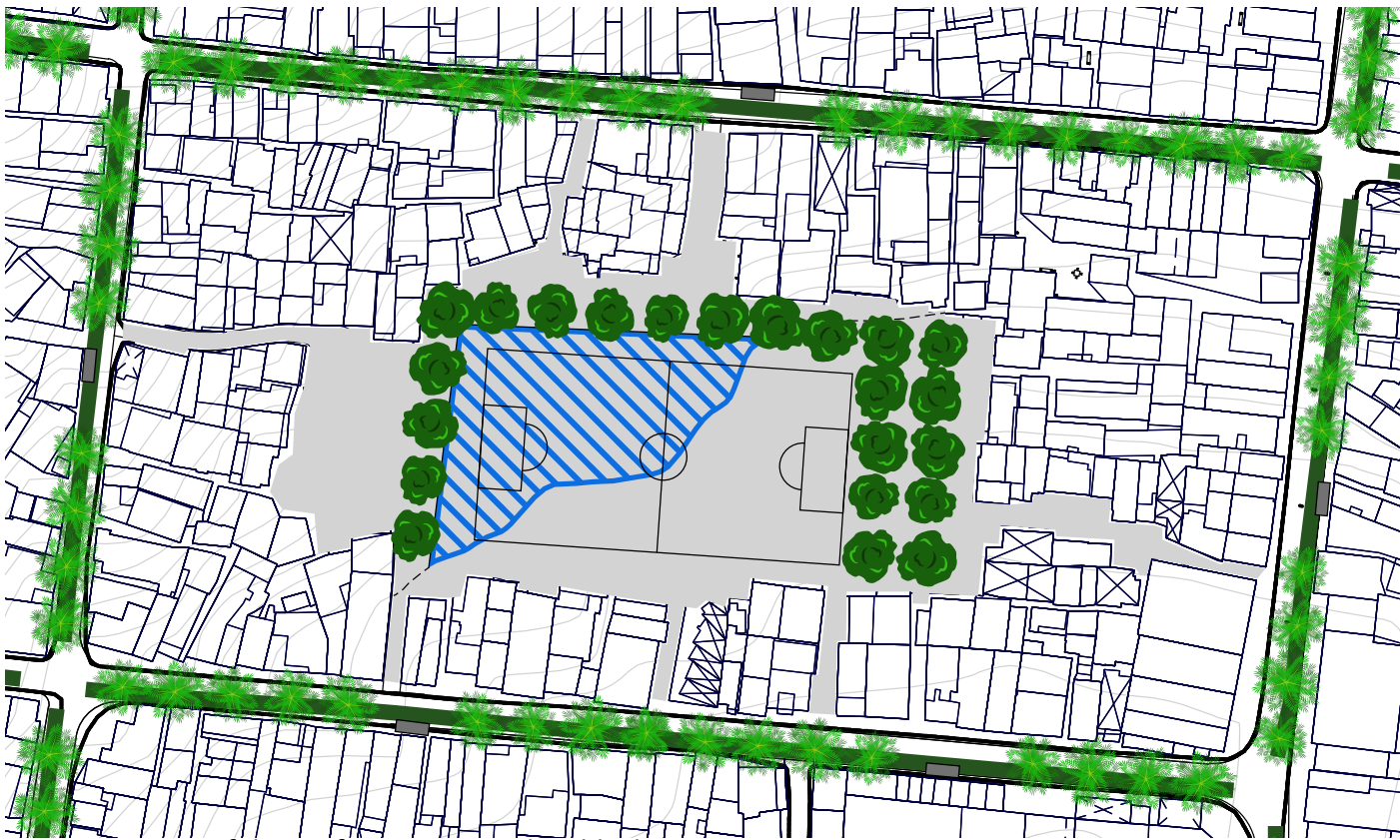
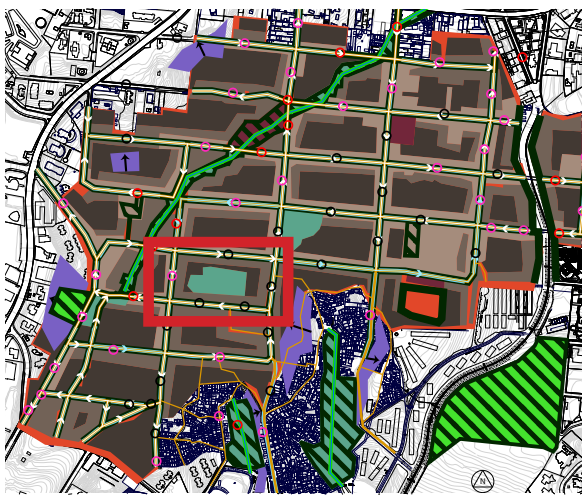


Figure 54: map of design for square inside a block

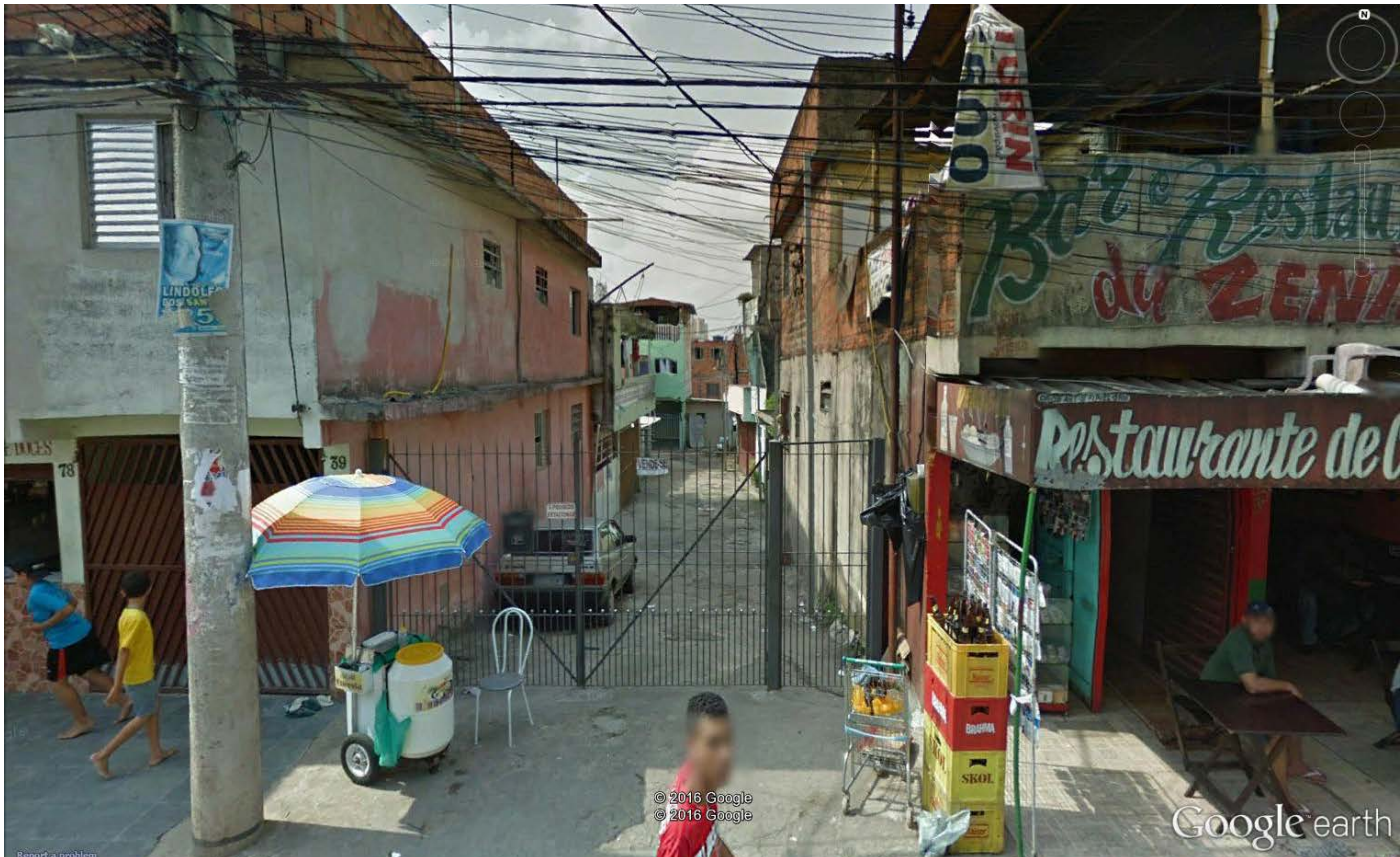


Figure 55: current situation



Figure 56: impression of the new situation

Section of a typical street

The top right section shows the current situation of a typical street. It is narrow, garbage bags are collected on the street and the soil cannot receive rainwater due to the type of pavement.

In the new situation garbage is collected in the collection location and is kept of the streets. The use of permeable pavement allows for rain water to penetrate the soil. New sewerage pipes in the underground allows for a proper expansion of the sewerage system. And new trees are added.

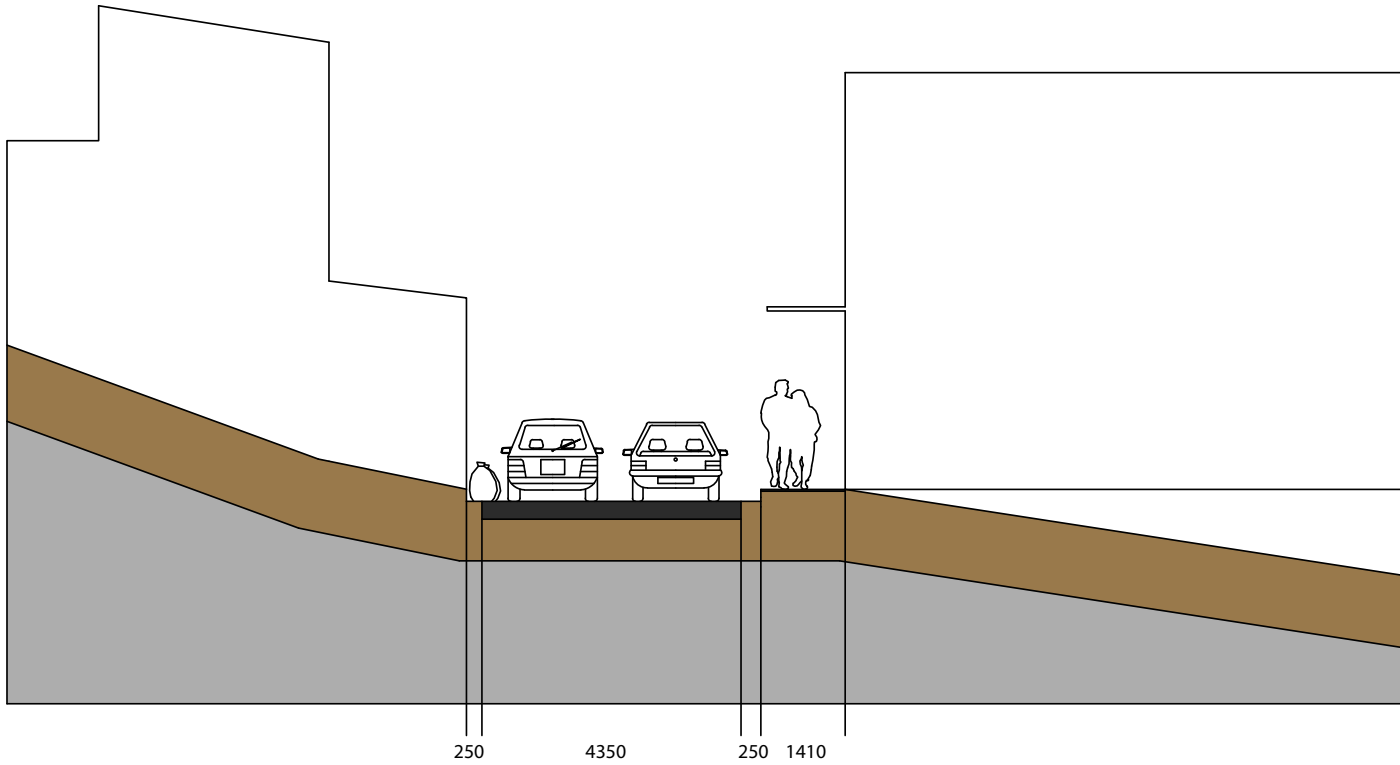


Figure 57: current situation

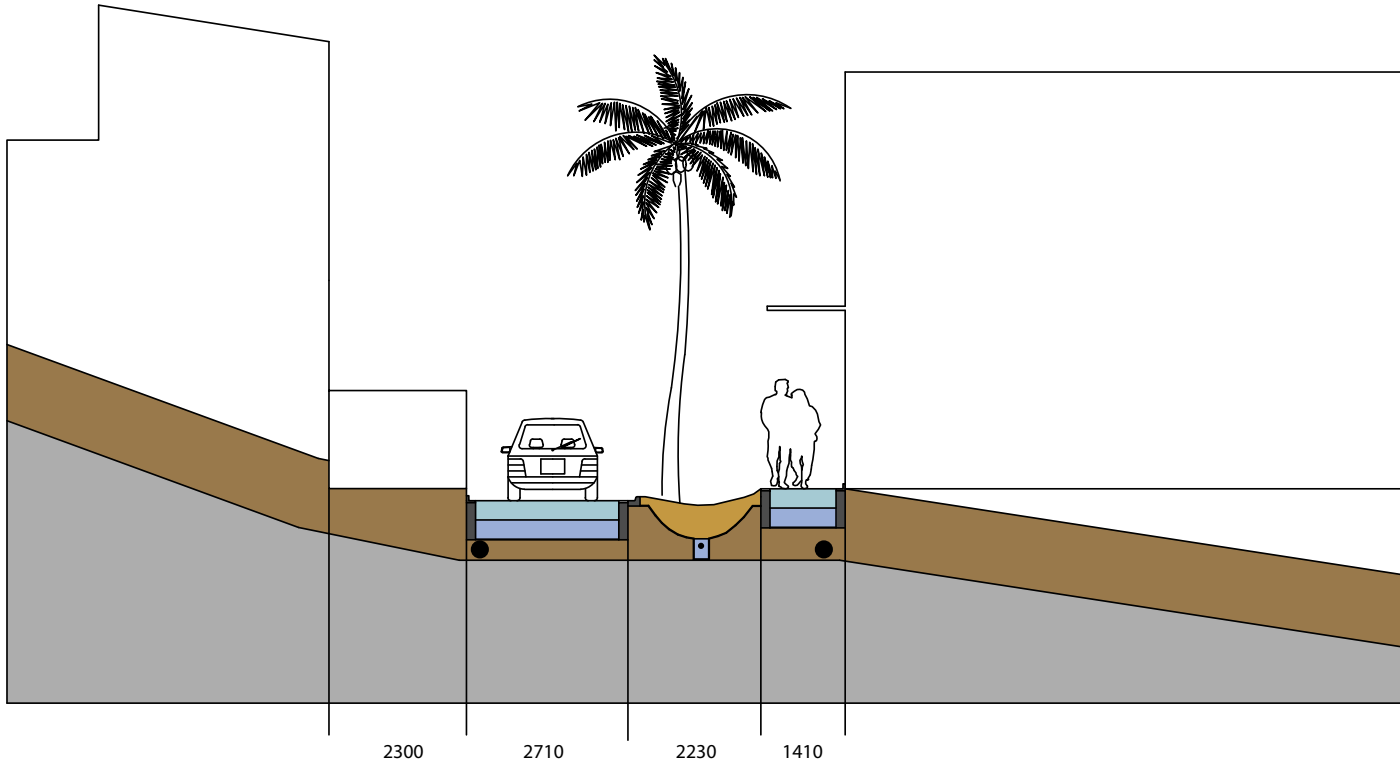


Figure 58: new situation

Location: South side

The south of Paraisópolis is where the newest unofficial houses appear. This area has houses with bad building quality, low accessibility by car and on foot and high risk of flooding, land slide and fire. Where in the rest of Paraisópolis, there is enough quality in the current situation to upgrade it, here it is better to remove and built something new.

The lowest part of the south valleys are water parks. On the slopes come new apartment houses, with a distribution following the old street pattern.



Figure 59: map of design for south side



Figure 60: current situation



Figure 61: impression of the new situation

Governance

A design for Paraisópolis doesn't guarantee an improved situation in Paraisópolis. Many people and groups are involved in implementing a design. Looking at governance helps to find those people or groups that are willing to help this project and those who might oppose to it.

All people involved fall into one of three groups: public sector, private sector or civil society.
The public sector are all branches of government. In this project, the Municipality of São Paulo is the dominant branch of government and the departments involved are Housing, Infrastructure and Urban Constructions, and Urban Development.
The private sector are companies trying to make a profit. This includes big and small entrepreneurs, shops and private service providers, such as the bus company SPTrans.
Civil society are all groups that represent a specific audience and are active in society. These include the Hospital Albert Einstein, the community center and the various schools in Paraisópolis.

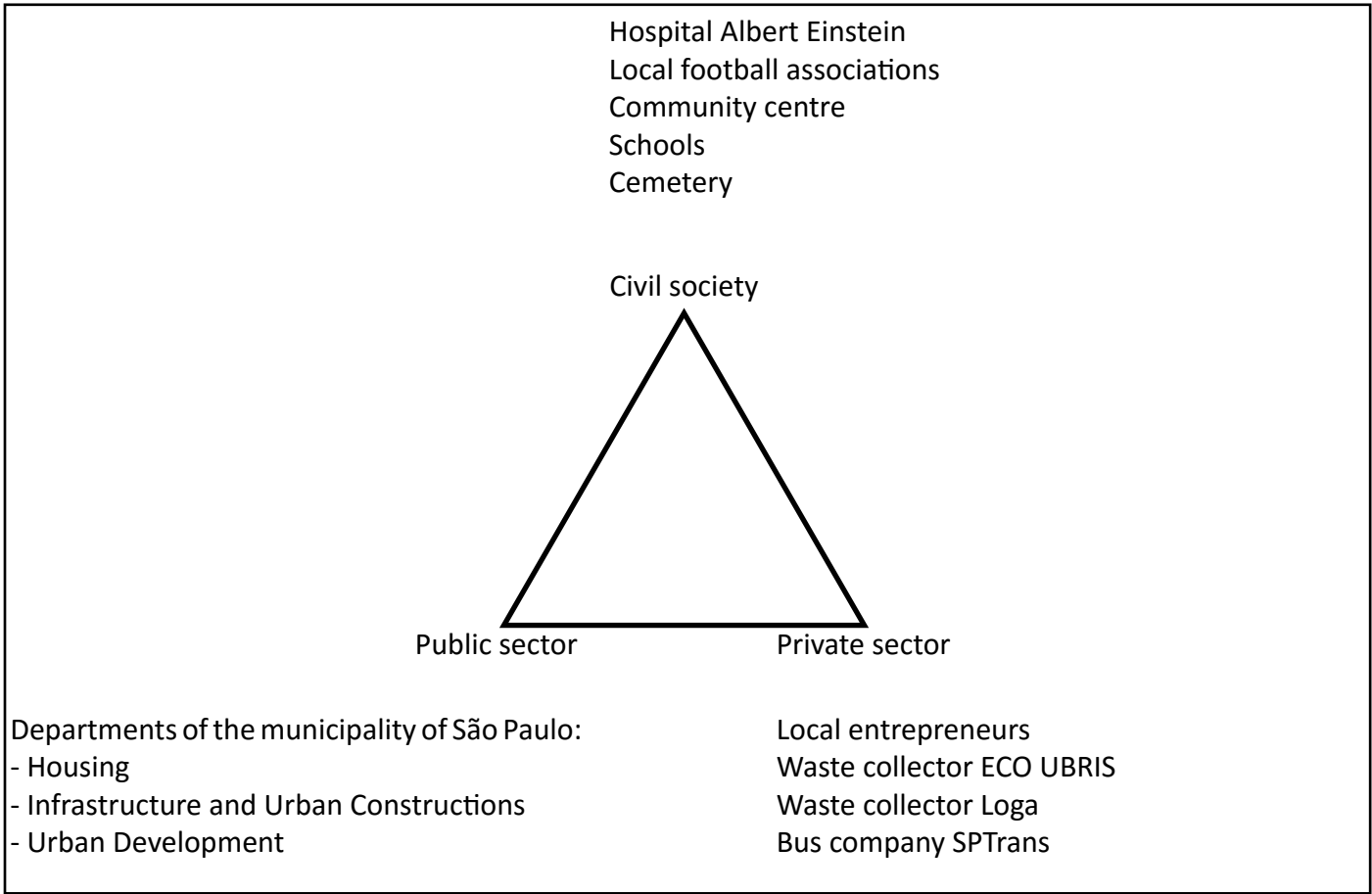


Figure 61: scheme of governance in Paraisópolis

The different people involved fall into three different groups, but they can also compared using their relative power over and interest into the project. Powerful groups with little interest must be kept satisfied. Interested groups with power require much interaction as to keep them on my side. Smaller interested players are best kept well informed. They can create support for my project and contribute to its quality. Groups with little power or interest are monitored. They pose little danger, but do play a role in the project.

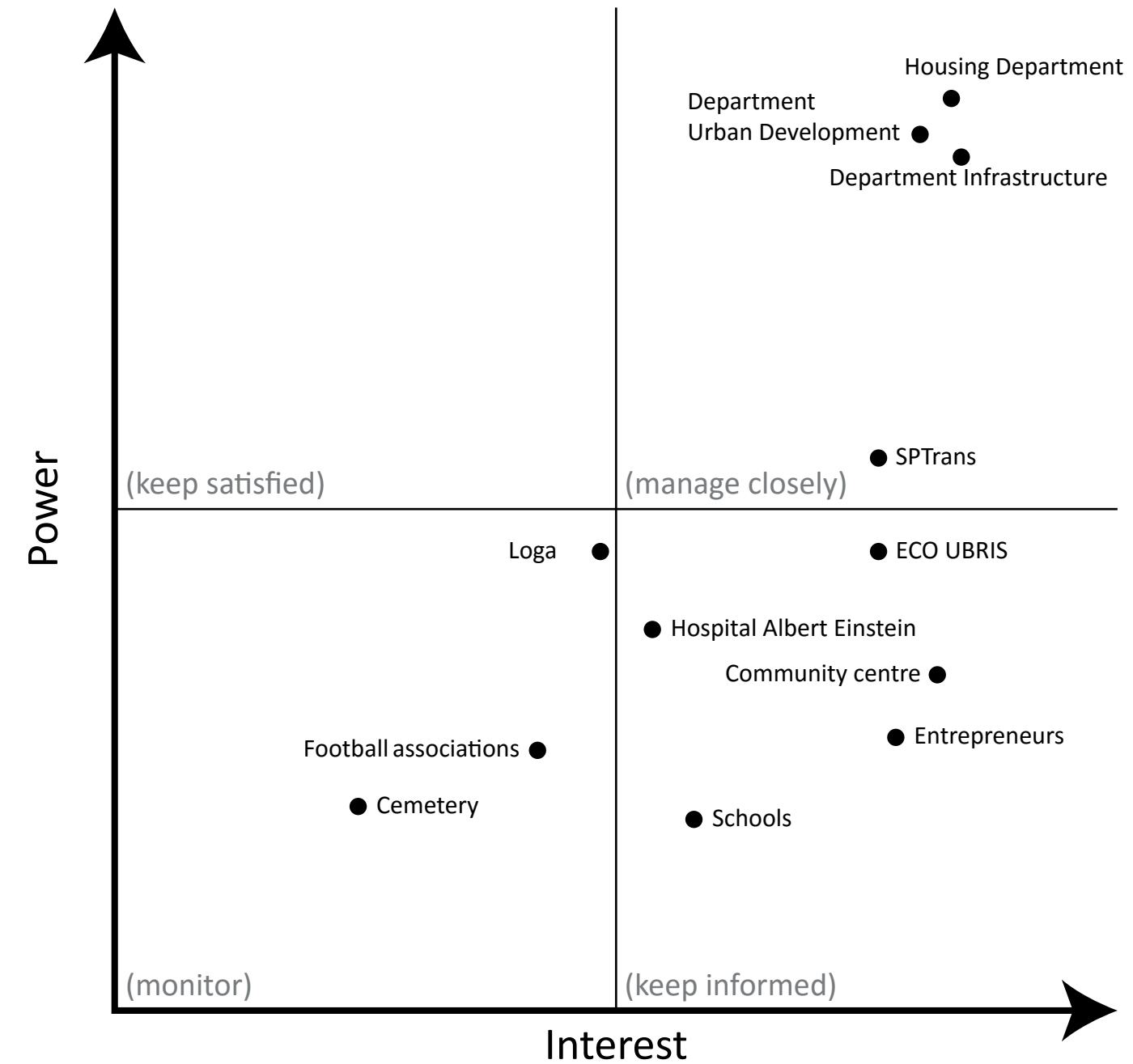


Figure 62: governance analysis scheme

Conclusion

Conclusion

As research question driving this project and design I asked: What is an effective spatial strategy to improve water management in Paraisópolis, by increasing quality of life and improving the quality of public space? The resulting design forms the answer to this question.

In the process of finding out how to address living quality the public space in Paraisópolis, I focused on the water and waste processes. I have sought for spatial interventions to address them. These interventions are the driving force behind the design. Together they form the new public spaces and give them meaning. Addressing only water or waste problems would only improve the situation in Paraisópolis very limited. Adding new public space to Paraisópolis would not guarantee improving the living quality there, nor might the public spaces be lasting on the long term. Only when combined (water, waste and public space) a new perspective opens on an improved living quality in Paraisópolis. The design as it is now shows one of the possible ways to combine them. Yet the design is well studied and the reasons behind its creation are based on facts and analysis.

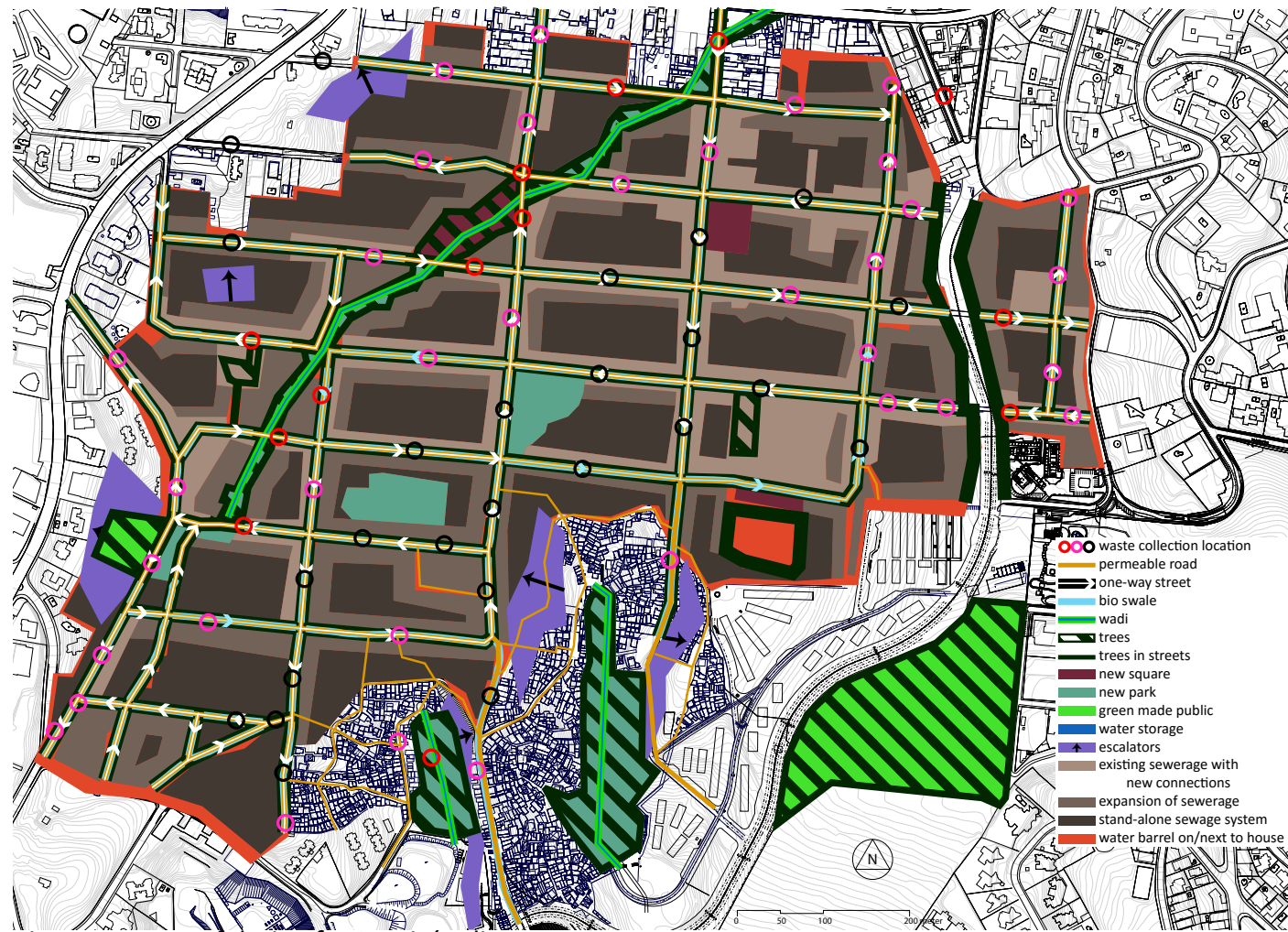


Figure 47: map of design for Paraisópolis

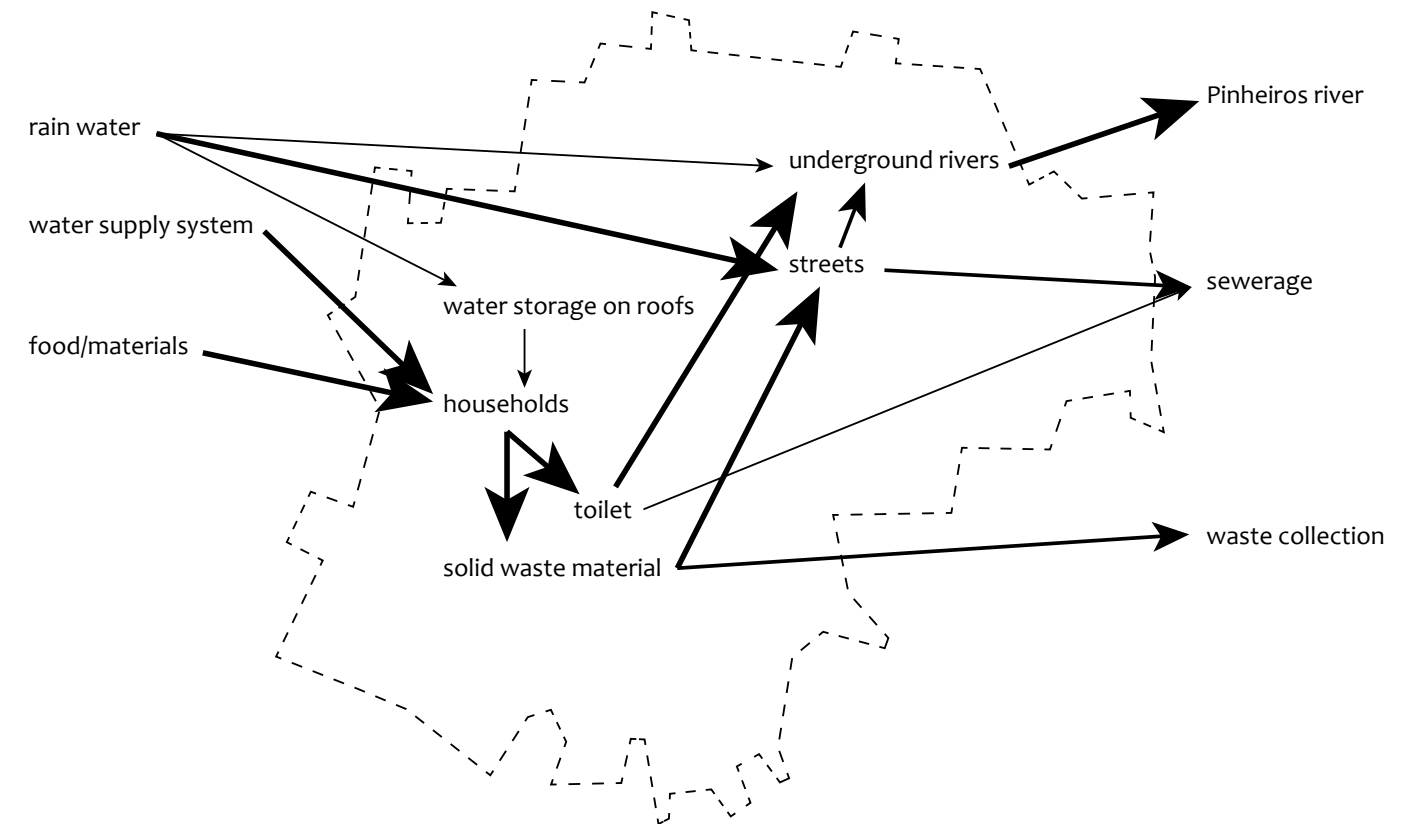


Figure 63: current situation

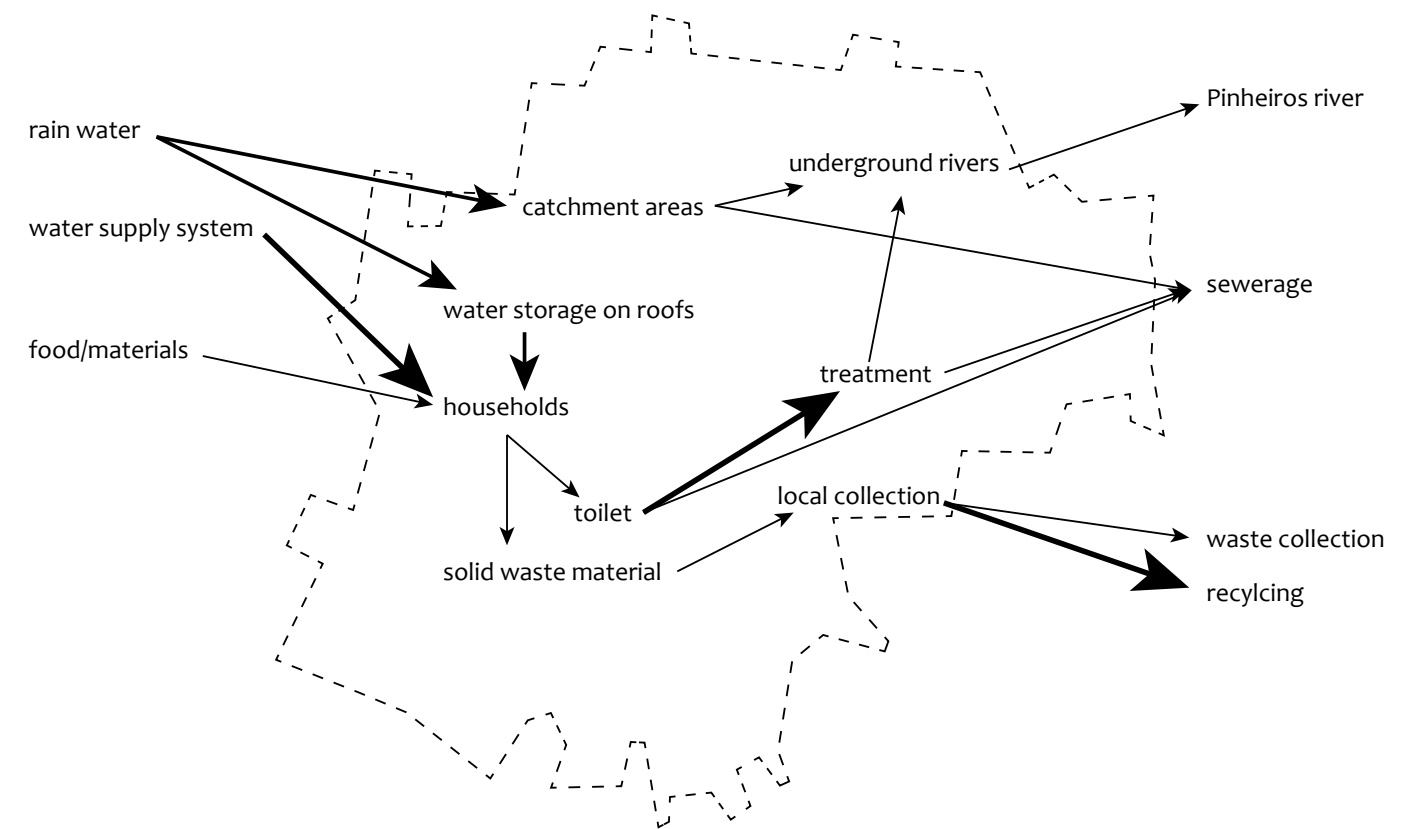


Figure 64: new situation

Relationships in the graduation process

The relationship between research and design: my graduation project started with research focused on analysis of the location and the issues. Now that the project has developed, all the information gathered is coming together into a design. But to work out the design properly, I have to research specifics about the location and the issues. First, research carried the project, now design is the leading force.

The relationship between the theme of Urban Metabolism and water management in Paraisópolis: addressing water management in a favela like Paraisópolis could have been done from multiple perspectives. The perspective from Urban Metabolism offers a way to add value to the necessary interventions. And, Urban Metabolism has not yet been applied much on informal neighbourhoods. So it can bring new views on Urban Metabolism.

The relationship between the methodical line of approach of Urban Metabolism and the method chosen by the student for Paraisópolis: Urban Metabolism both looks at 1) flows to maximise re-use within a system (in this case Paraisópolis) and minimise flows going in and out of a system and 2) seeks ways to combine flows to add value to interventions. My project so far has looked more at how to add value to public space (the interventions) and less at minimise flows going in and out of Paraisópolis.

The relationship between the project and the wider social context: Informal neighbourhoods need more research from the perspective of Urbanism in general. There is scientific experience on how to improve the architecture and the sanitation there. But less on how to make use of the public space. This project contributes to the experience of Urbanism. But, in general, Paraisópolis is quite well studied, though. So this project might offer less new analytical information, but it is well comparable to other non-Urbanism designs already made for Paraisópolis.

Reflection

This graduation project was educational. I felt a real connection with the situation in informal neighbourhoods and am very happy that I have done my graduation project with that as source material. At the same time, the project has been a great struggle. Most difficult was it to self-manage and self-discipline. I work best in teamwork and with plenty opportunities to discuss with other designers involved. I have had great help from many people, without whom this project would have gone very differently. Finishing this project gives me self-confidence that I can work hard and finish great tasks, but it also shows how much I still have to learn.

Time management

For the P2 I made the time schedule shown here. It is planned in weeks and in general terms. Now, looking back at the entire graduation time, I must conclude that I did not quite follow the schedule. This was partly because this schedule was not very clear. A more detailed schedule might have helped better, although I’m not sure it was possible to make it back then. I found it hard to look forward during this graduation time and to assess what detailed steps I should take. This more general time schedule allowed me to adapt to the continually changing graduation project.

On the other hand, this past year, have I been battling against my not-productive study habits. I see that I have made quite some personal development, with the finish of this graduation project as an exhibit. But personal growth takes time. This also contributed to my deviation from this schedule. In the future, a schedule with general descriptions suits my, but periodically (maybe weekly), I should try to fill in more detail for that (short) period.

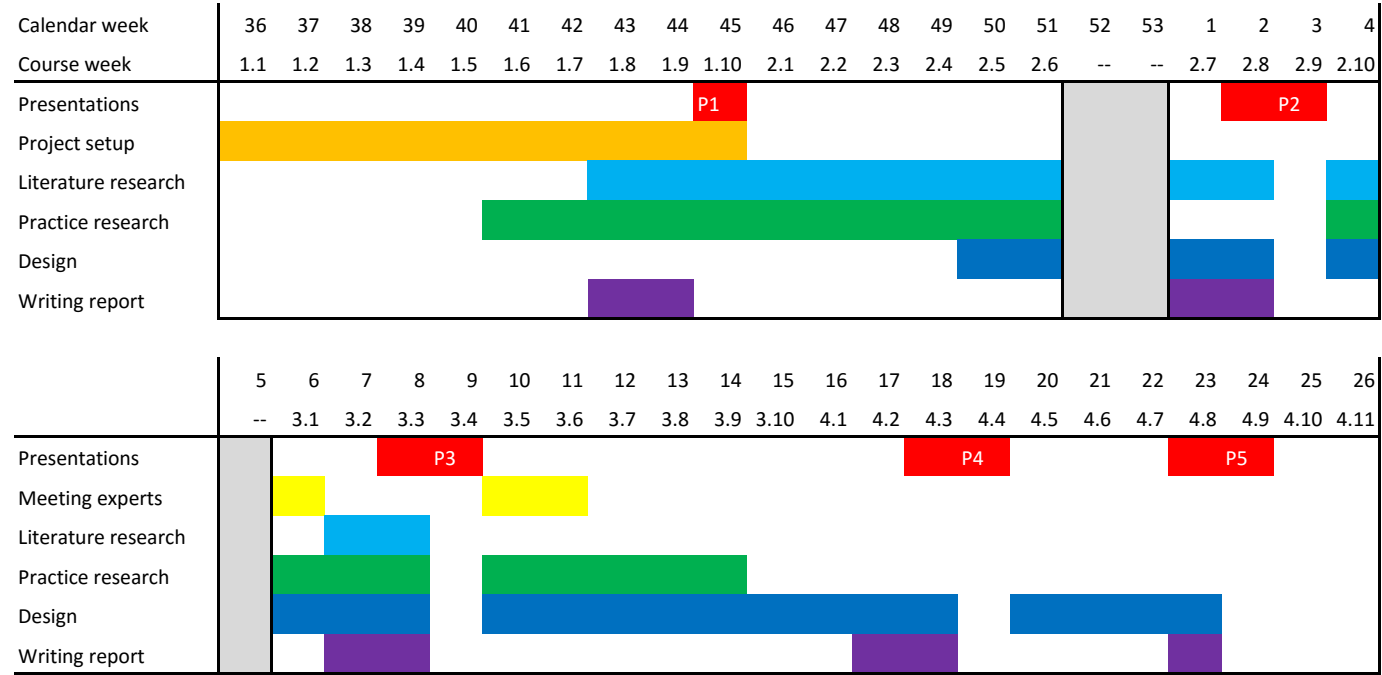


Figure 65: original time schedule

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Literature

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Figure 66: view on Paraisópolis

image: own image