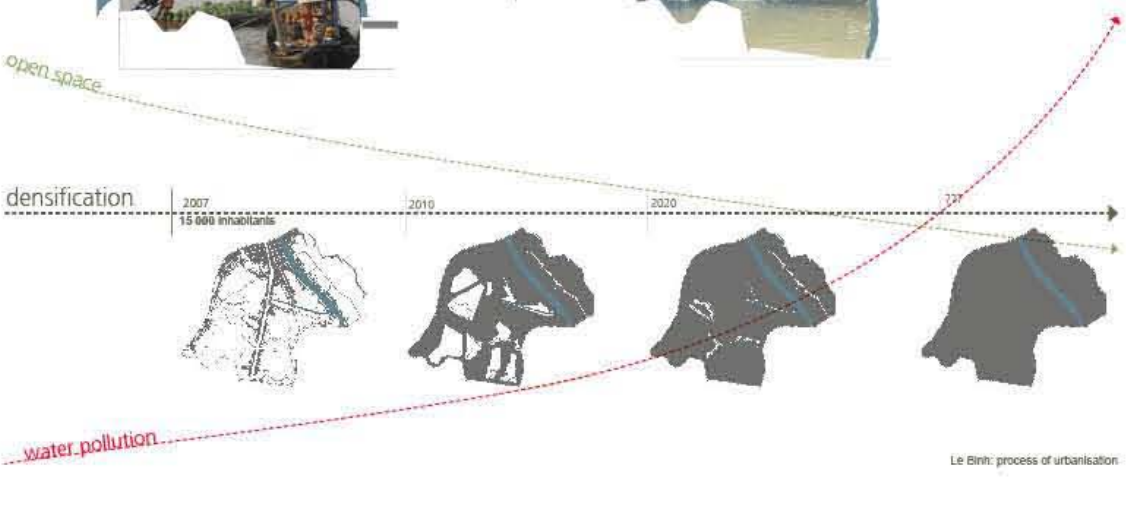
GREEN LINES - RED DOTS

Combining waste water infrastructure, nutrient recycling and urban landscape development in Le Binh I Can Tho - Vietnam I

The project Green Lines – Red Dots creates an open space system for peri-urban areas in the Mekong-Delta in South Vietnam which will contribute to a high quality of the waters, benefit the urban development and create positive social and economic impacts.
Today, almost all the domestic waste water in the Mekong Delta reaches the rivers and canals without adequate treatment. Many of the urban water bodies have degenerated into smelly cloacas. The rapid growth of the urban population in the Delta, will further these problems in the future. At the same time the process of the urbanisation leads to a densification in the cities and the loss of open space.

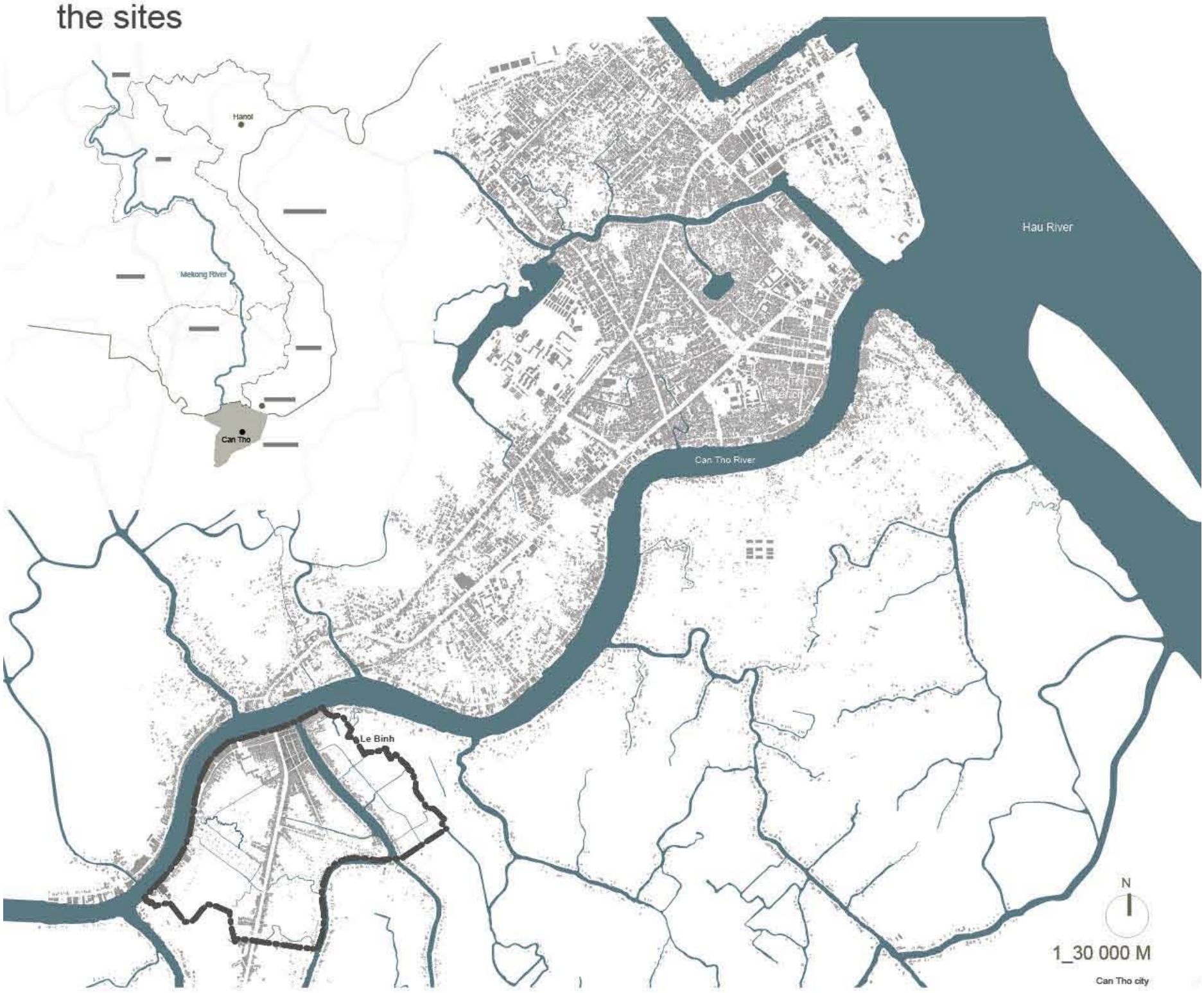
The question is how to establish a sustainable, functioning and affordable sewage system for urbanising areas in the Mekong-Delta.

Green Lines – Red Dots combines the challenges of water and open space. The project suggests a system of green infrastructure with an integrated decentralised waste water treatment, where the nutrients are being recycled instead of just eliminated. The work builds upon the German- Vietnamese research project Sansed, which develops site-adapted decentralised water treatment solutions for peri-urban areas in the Delta. Important techniques are biogas plants, urine-diverting systems and soil filters.
The project site Le Binh is a peri-urban sub-district of Can Tho, an extremely fast growing city in the Mekong Delta. There are plans for the whole sub-district to become a new housing development in the near future. With the expected growth of population the pressure on the natural water system and the existing water infrastructure will increase enormously.
Sansed had already collected valuable information about Le Binh in order to investigate whether a decentral waste water treatment is suitable.
One important aim of the project Green Lines - Red Dots is to put the approved technologies of Sansed in the larger context of urban development in Le Binh. The guiding concept is to work with lines and dots. The Green Lines, a net of green infrastructure, provide open space for water treatment measurements as well as leisure activities and create a frame work for the urban growth in Le Binh. The Red Dots describe strategic points for nutrient recycling within the system like biogas plants or city farms.



Le Binh: process of urbanisation

the sites



Mekong Delta

Area: 319,721km²
Population:16.500.000

The Mekong Delta in South Vietnam covers an area of almost 40.000 sqkm and is the third largest estuary in the world. It includes seven big Mekong arms and a river net of 5000 km. The 4500 km long Mekong River starts in the Tibet Plateau and runs through Laos, Cambodia and Vietnam before it flows into the South China Sea.
Today 17 million of Vietnam's 82 million inhabitants are living in the delta which is with more than 400 inhabitants per km² the most densely populated region.

Can Tho city

Area: 14,5km²
Population: 355.000

Can Tho, a young, vibrant, water-based city represents the political, social and economical centre of the Mekong Delta. The distance to Ho Chi Minh City, Vietnam's biggest city, is about 150 kilometres . Can Tho borders on the Hau River (width 900-1800m), the most southern Mekong arm, approximately 75 km distance from the coast and is the gateway to the whole downstream area of the Mekong River. With a population of about 350.000 and an area of 14,5 km² Can Tho is the biggest city in the delta.

project area Le Binh

Area: 2,46km²
Population: 15.000

Le Binh, the project area, is a sub-district of Can Tho. It is located on the edge of the city, on the border zone, where urban landscape meets countryside. About 15.000 people are living in Le Binh on an area of 2,46 km², which makes a population density of 6100 pers/km².

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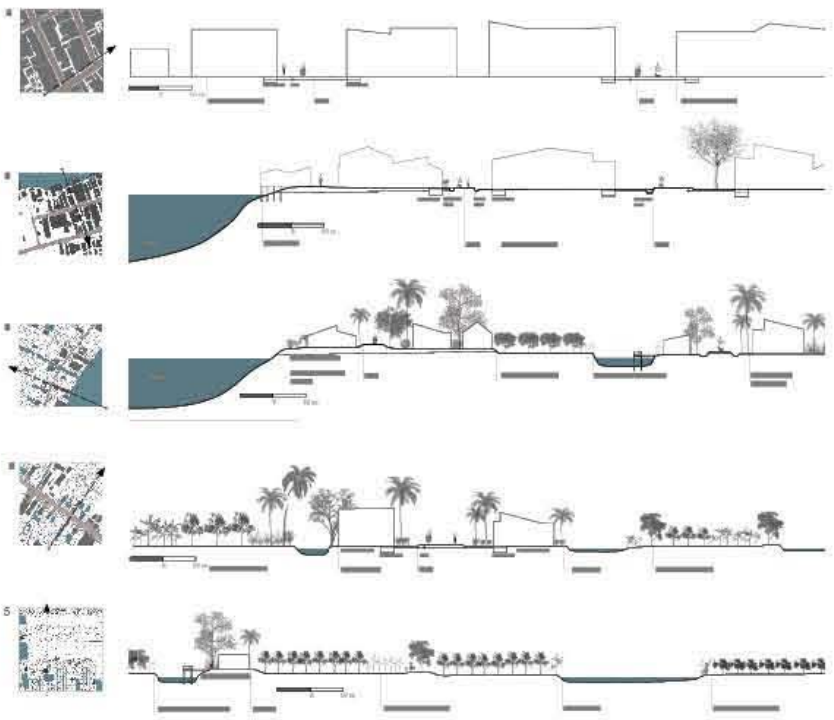
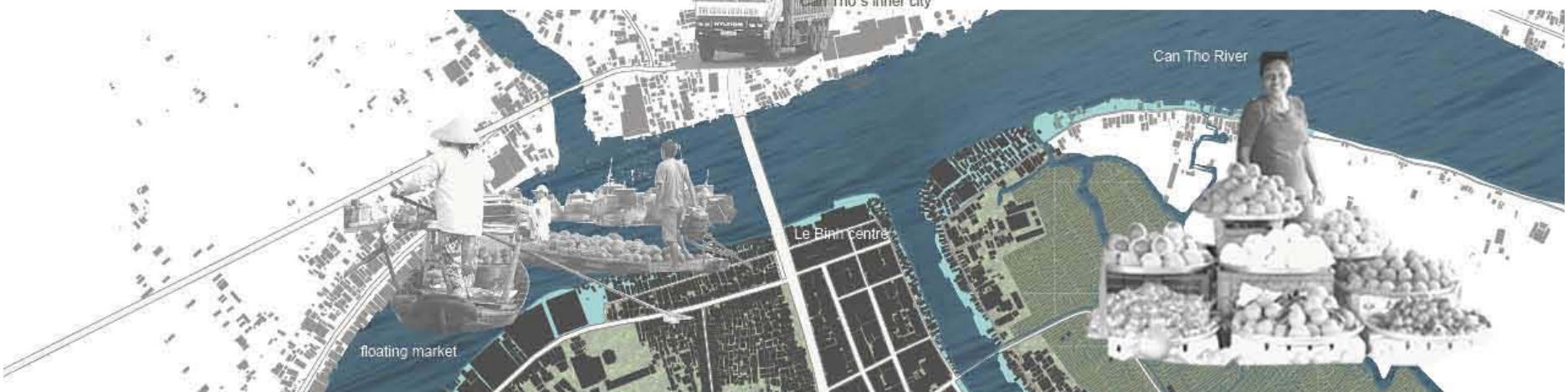
Project area Le Binh

The peri-urban sub-district Le Binh represents the traditional rural character of the Mekong Delta and Can Tho's urban growth in equal measure.
The rapid development has already reached the northern part, which is the closest to Can Tho's downtown. An urban centre with new five-storey apartment houses, hotels and restaurants is developing, and modern lifestyle finds its way into every day life. It is the most densely populated area of Le Binh. Towards the South, the urban centre is extended with dense linear settlement of two-storey houses, bars and small companies along Le Binh's main road.
The big road is leading through the whole district. In the North it connects Le Binh with down town Can Tho and in the South it accesses the Mekong Delta. The urban centre and the big road are both built on artificial highland and connected to an underground sewage system. In contrast to the North of Le Binh the lowlands in the South are very sparsely populated and characterised by small scaled rural landscape. Small family houses and cottages built on dwelling mounds are arranged in linear structures along smaller roads. Most of the people of the Countryside Type are farmers, their houses are surrounded by productive gardens with fish ponds and directly behind follow small-scaled vegetable fields, paddies and plantations. Waste water disposal in the lowlands is carried out decentrally. Traditional fish ponds with latrines on top is the most common solution to deal with black water.
Between the urban North and the rural South exist areas with different structures and densities. Typical are linear settlements along small streets. The streets and the adjoining family houses are built on artificial land in contrast to their surrounding gardens.
Le Binh is enclosed by rivers, the Can Tho River (150-200 m wide) in the North and the North West, the Ba Lang Ward in the South and the Hung Thanh Ward in the West. The bordering natural highlands are densely populated in the North and sparsely populated in the South. Domestic waste water flows on the shortest way into the natural water system.

Le Binh: landscape patterns

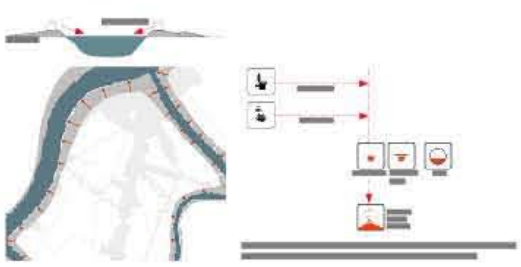


the peri-urban state of Le Binh

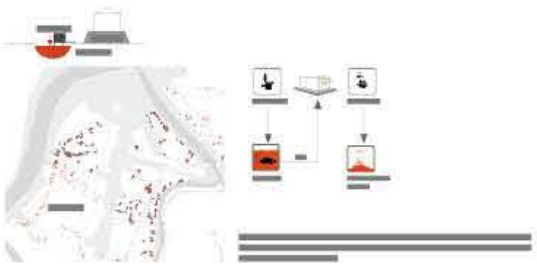


Le Binh today: waste water infrastructure

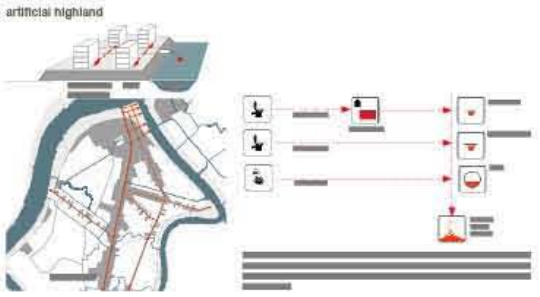
natural highland



dwelling mound



artificial highland



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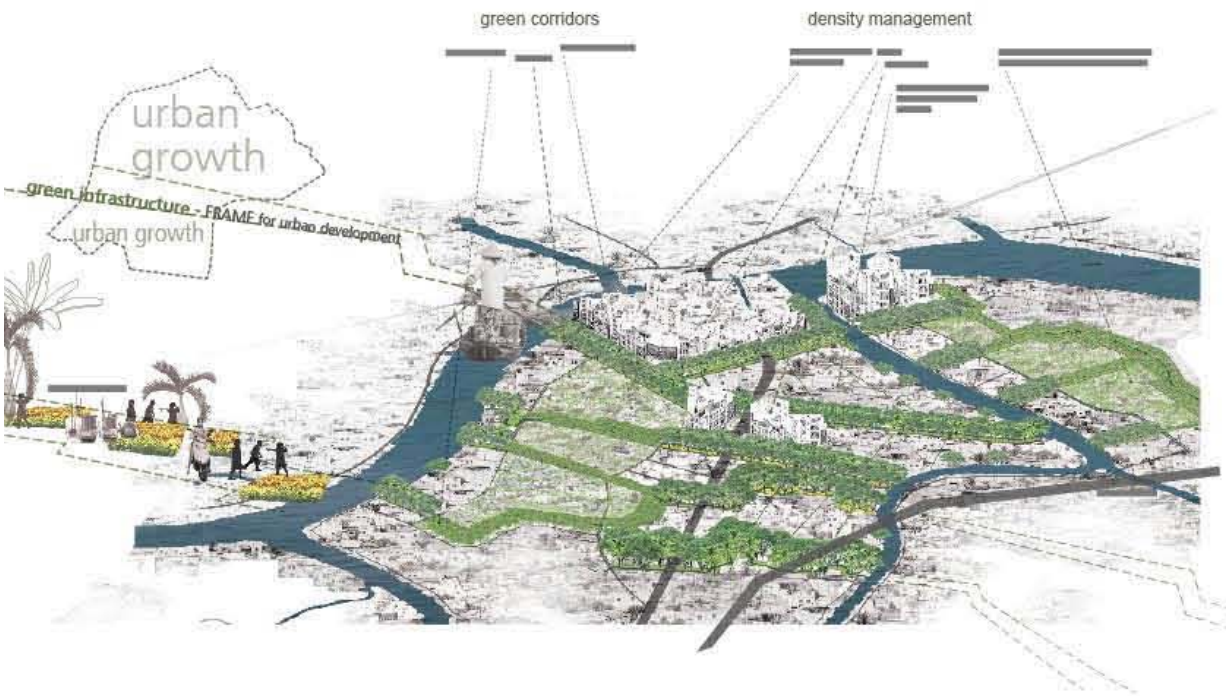
Le Binh´s urban future

spetial vision



concept

highland - lowland

The concept of Green Lines – Red Dots builds upon the existing system of natural water courses and man-made water infrastructure for both sewage and rainwater. In order to provide a safe water run-off, the system has to be extended at some points. The concept does not aim for a centralised high-tech treatment plant but for a simple strategy, making use of natural processes and the natural hydraulic gradient between highland and lowland.

\+ waste water treatment

The domestic waste water in Le Binh will be transported to the Green Lines by an underground pipe system. Within the lines the polluted water is treated decentrally in linear constructed wetlands which is cheap and easy to handle. Afterwards it flows together with the rainwater through a system of open canals and ditches into the river. Vegetation in the canals supplies a subsequent cleaning.

\+ nutrient recycling _ RED DOTS

In the Red Dots, the nutrients are being recycled - these represent biogas plants or city farms. In this way the already existing valuable nutrients stay in the system instead of just getting flushed away. Gas extracted in biogas plants can be used for cooking and recyclable and unpolluted nutrients replace artificial fertilisers in agriculture. The income from biogas and organic food contributes to maintain the green lines.

\+ open space

In order to make the green lines attractive for the citizens of Le Binh, a multi-functional net of green infrastructure including public parks is developed which combines the engineering methods with design considerations. The accessible soil filters give space for leisure activities and a complex network of paths follows the canals and ditches.

= FRAMEWORK for URBAN DEVELOPMENT

Green Lines – Red Dots will create a frame work for urban development in Le Binh. It provides safe waste water infrastructure, ecological and economical benefit from nutrients being recycled and space for recreation at the same time. Its shape will be a strong element in the urban fabric of the growing district which is able to cope with the pressure that new development brings to the city. Green lines - Red Dots does not aim for an absolute control of the urban development, but for a strategy to guide and to frame the urban sprawl.

masterplan

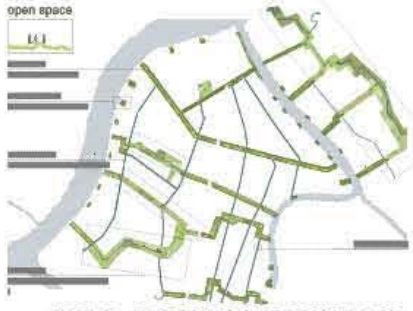
Green Lines - Red Rots gives the urban landscape of Le Binh a new face. The complex system of green infrastructure will be omnipresent in the densely populated sub-district. Soil filters with lush park vegetation and open water bodies constantly break up the closeness of buildings.
The system of lines and dots will be the backbone for the sustainable urbanisation process. It creates an open space system, which will contribute to a high quality of the waters and benefit the urban development. The design and the single techniques for waste water treatment and nutrient recycling (Red Dots) are closely connected to the urban structures and the upcoming needs of the residents.

densities management

highland - lowland

waste water treatment

open space



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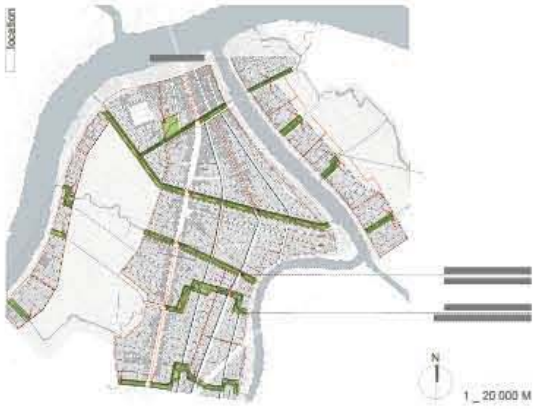
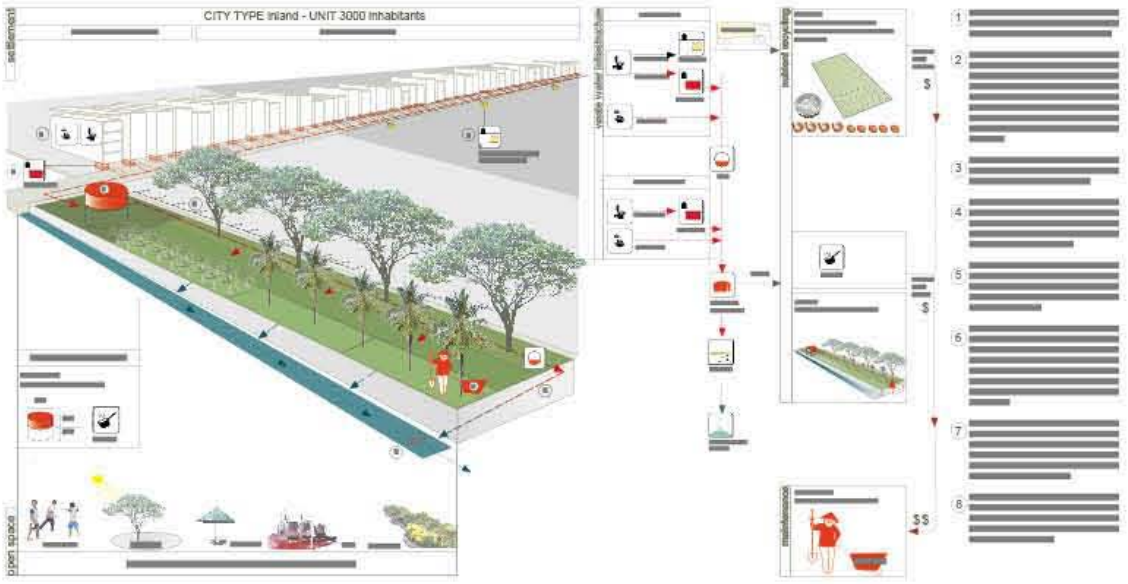
NEW CITY TYPE inland

The high density building area on the artificial highlands of the New City Type inland covers more than two thirds of Le Binh. Modern apartment houses, bars and restaurant and an integrated infrastructure system form the new urban landscape. Green linear parks which include accessible soil filters and road greenery along rain water run-off ditches, open up the high density of the buildings. Biogas plants (Red Dots) combine technical functions with design considerations and give the New City Type inland a special identity.

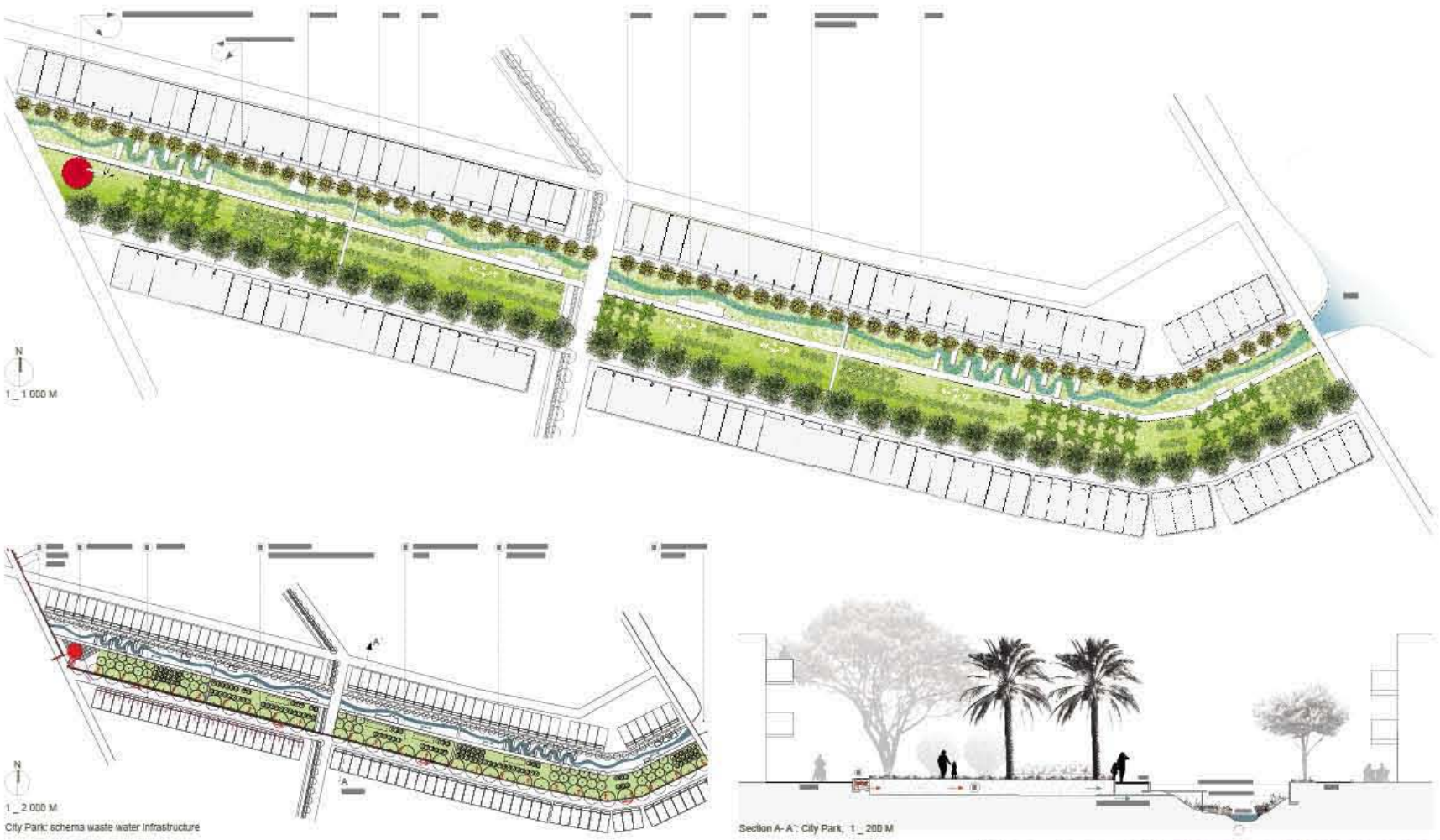




City Park design

Not only the Green Lines but also the Red Dots are to be used as public space. A beautiful scenery of palm trees, greenery, water and vibrant social life can be enjoyed from the top of the biogas plant. The canal, together with the soil filter give the City Park its linear shape. Big trees which frame the park offer shadow and support a pleasant climate. Different kind of green rooms are formed by vegetation of various height and density. A foot and cycle path, bordered with seating facilities, follows the whole Green Line between the soil filter and the canal. A series of concrete elements and boardwalks on the side of the canal makes it possible to experience the water.

The canals, which are 8 m wide and 2 m deep, fulfil with their volumetric capacity an important draining function during rain season. As the water level constantly varies, it is important to use soil and hydrophilic plantings which are able to deal with this. Also the design is adapted to the extreme variation of water levels during high tide and low tide as well as rain season and dry season.



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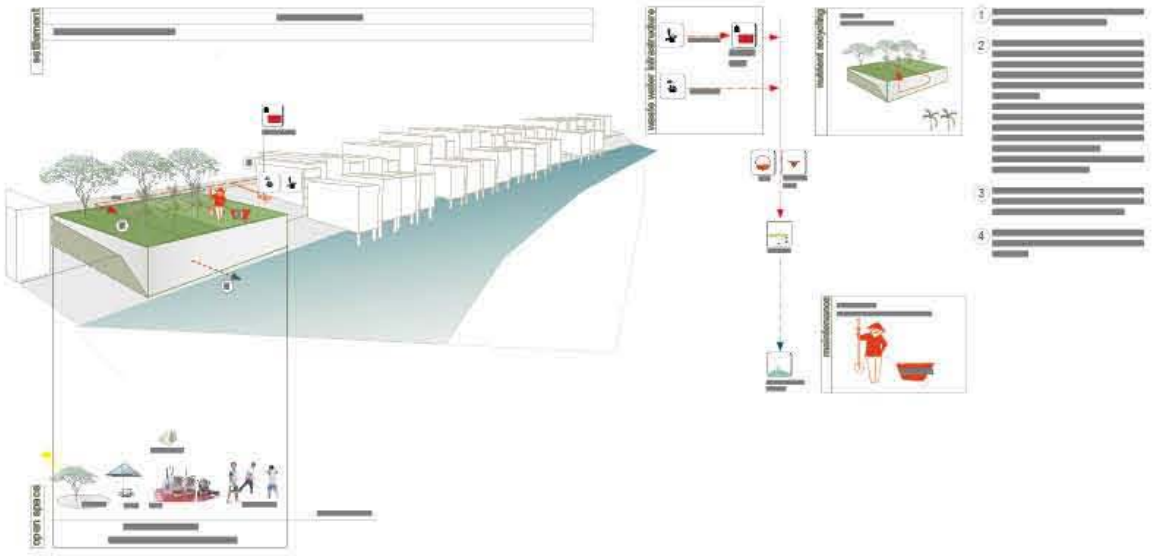
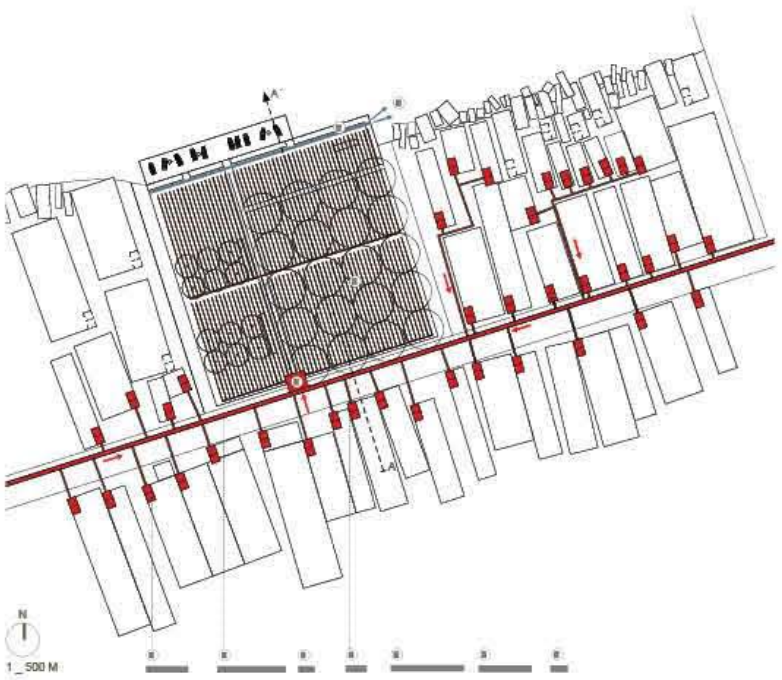
NEW CITY TYPE riverside

The New City Type riverside is a high density building area, like the New City Type inland. In regular distances soil filters open up the dense settlement structures along the water front.



Green Pocket design

Along the riverside, the dense settlement is broken up by Green Pockets. These fulfil similar functions as the City Parks, water treatment and recreation. A green square with palm trees and flowerbeds between the apartment houses creates an intimate room for the neighbourhood.
A boardwalk with deck chairs at the water front is the perfect spot for enjoying a coffee while overlooking the activities of the floating market.



Green Pocket - schema waste water infrastructure

Section A- A`: Green Pocket, 1 _ 200 M

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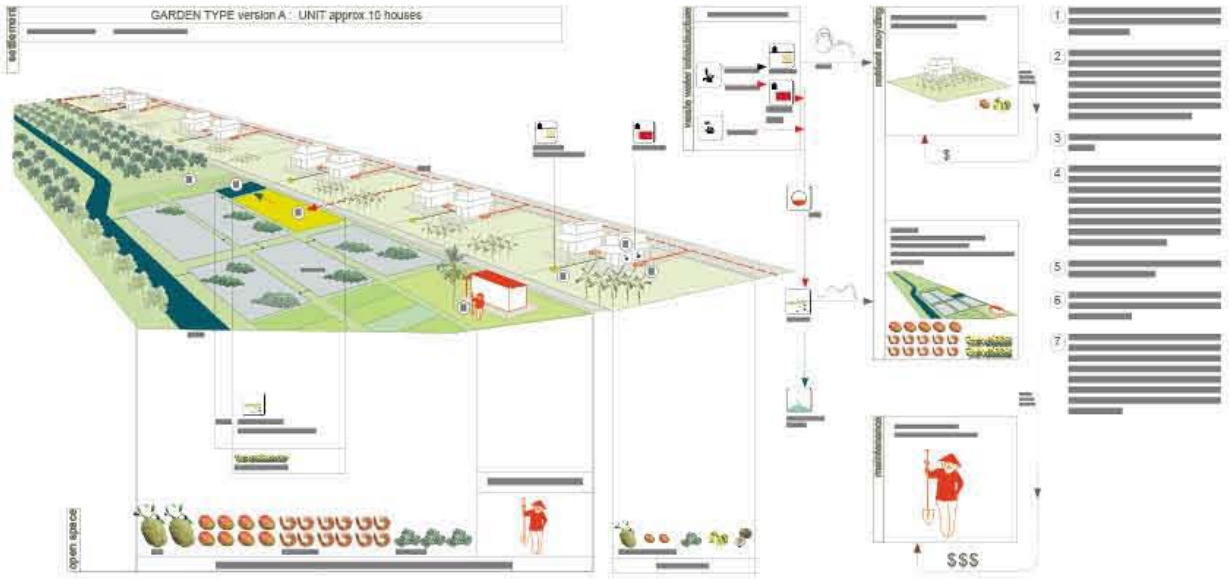
NEW GARDEN TYPE version A

New Garden Type version A represents family houses where the waste water is treated within the Green Lines.



City Farm design

In the sparsely populated areas of Le Binh, the Green Lines remind of the countryside. A little bit of traditional Mekong Delta life is preserved in the City Farm. Small scaled fields and fish ponds bring an interesting diversity into the sub-district which combine the production of biological food and a nice scenery. Here, the soil filters can be overgrown with flowers and the purified water is used for aqua and agriculture. Together with the surrounding gardens a lush green environment is created.

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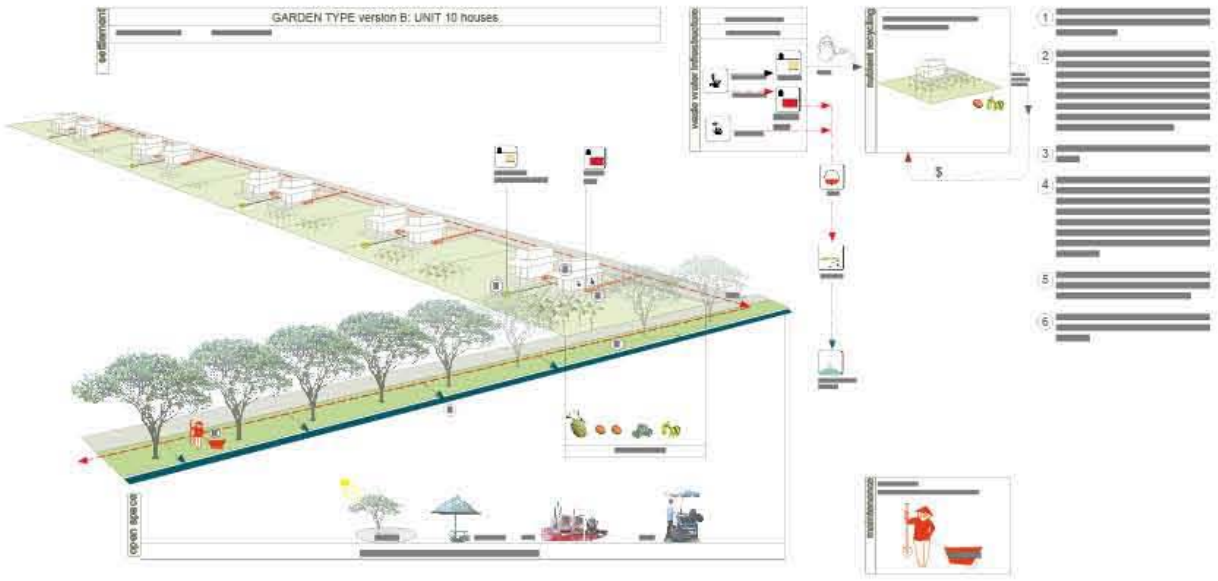
NEW GARDEN TYPE version B

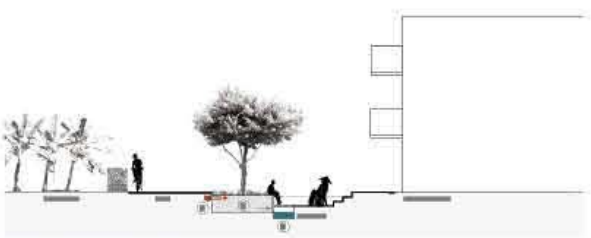
New Garden Type version B contains family houses where the waste water is treated in linear filters along the border to the New City Type.



Green Alley design

Between the high and low density areas, Green Alleys are introduced. The soil filter along the road is planted with a line of trees and their wide canopies offer shadow and greenery. Cleansed water is lead into a small canal which is covered under a grid. In the normal case the nearby area can be used by the residents for various activities, the steps on the side serve as seating facilities. During rain season the water almost comes up to street level and the water-filled canal creates a new environment. The Green Alley forms a platform for street life as well as an efficient rainwater run-off system.

Green Alley: schema waste water infrastructure



Section A- A': Green Alley, 1 _ 200 M

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