DESIGN
INVESTIGATIONS

DIRTY ANTWERP

Re-engineering flows, editing the 20th century belt

Landscape Urbanism Thesis Studio Spring 2015, Campine Region, Belgium
Authors: Caterina Rosso, Carmen Van Maercke
Promoter: Bruno De Meulder

dI
DESIGN
INVESTIGATIONS

DIRTY ANTWERP

Re-engineering flows, editing the 20th century belt

2015 K.U.Leuven, Master of Urbanism and Strategic Planning, European Postgraduate Masters in Urbanism

Landscape Urbanism Thesis Studio Spring 2015, Campine Region, Belgium

Authors: Caterina Rosso, Carmen Van Maercke
Promoter: Bruno De Meulder

LANDSCAPE URBANISM THESIS STUDIO

PROMOTER

Bruno De Meulder

TUTORS

Cecilia Furlan

Julie Marin

Matteo Motti

MORE INFO

MAHS / MAUSP / EMU Master Programs

Department ASRO, K.U.Leuven Kasteelpark

Arenberg 1, B-3001 Heverlee, Belgium

Tel: + 32(0)16 321 391

Email: paulien.martens@kuleuven.be

All images in this booklet are, unless credits are given, made or drawn by the authors (Water Urbanism Studio Banjarmasin, 2015).

MaHS MAUSP

KATHOLIEKE UNIVERSITEIT LEUVEN

european postgraduate masters in urbanism

strategies and design for cities and territories

UPC Barcelona | TU Delft | KU Leuven | IUA Venezia

ACKNOWLEDGEMENTS

In this way we want to thank our thesis promoter Bruno De Meulder and assistants Julie Marin, Matteo Motti and Cecilia Furlan for providing constructive comments and evaluation at every stage of the thesis process.

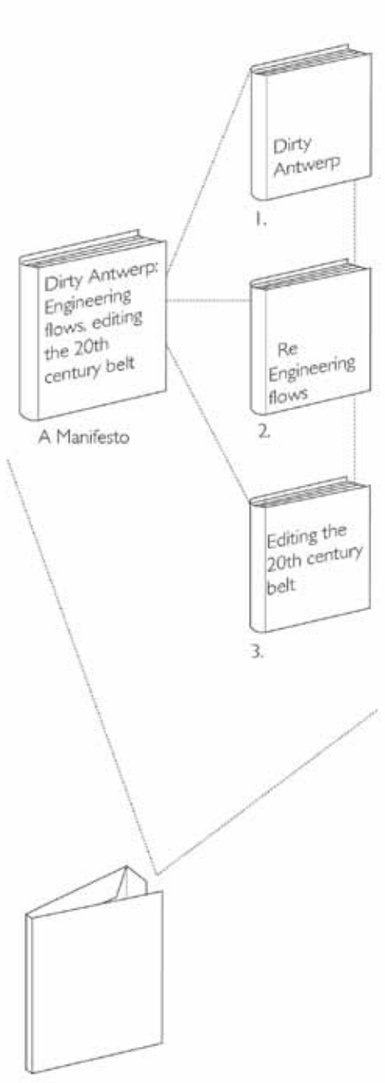
Moreover they delivered insights that guided and challenged our thinking, substantially improving the finished product.

We also want to thank Laila Landtmeters and Ben Dillen, from the city of Antwerp, who gave us essential information about sanitation in the city and the recent projects of the municipality regarding waste.

Special thanks to Stefano Rosso, who corrected our English texts and gave linguistic advice; Andrea Marzolla and Raphaël Den Dooven for encouragement and practical aid, and Anastasia, Yufei, Fitri and Piedad for mental support during the year.

Finally, we wish to thank all our family and friends for the help throughout the overall thesis process.

STRUCTURE OF THE THESIS



Manifesto

1. Dirty Antwerp:
    - Waste through history
    - The space for waste in Antwerp
        - The city as producer of waste
        - The city as processor of waste
        - Initiatives in the city
        - The city as node in wasteflow

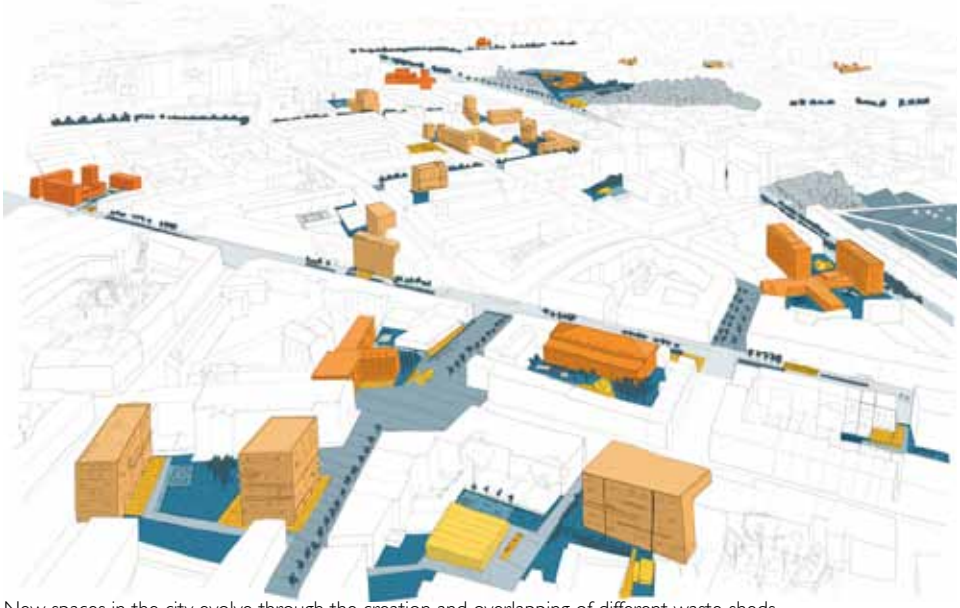
2. Re-engineering flows
    - The test-site
    - The economy of scales
    - Rain water flow
    - Black water flow
    - Grey water flow
    - Waste paper flow
    - Biodegradable waste
    - Residual waste

3. Editing the 20th century belt
    - The 20th century belt
    - Underlayer, network, acupuncture
    - Underlayer: Housing block
    - Networks: Steenweg and lei
      Landfills
    - Acupuncture: Supermarket
      School

Bibliography

DIRTY ANTWERP: RE-ENGINEERING FLOWS, EDITING THE 20TH CENTURY BELT

The projected demographic growth of the City of Antwerp necessitates to face important challenges in terms of ecology, infrastructure and programming. In the last decades, most investments and planning were concentrating on the centre. Only recently the attention is partially redirected to the 20th century belt, an amorphously grown patchwork that basically dates after the second world war and has not undergone major transformations since its urbanisation. As the patrimony is becoming outdated, it seems ready to go through a second investment wave. Labo XX explores spatial strategies for the further development of the 20th century belt.



New spaces in the city evolve through the creation and overlapping of different waste-sheds.

A PHOENIX ARISES, OUT OF ITS OWN FILTH

A shift in waste practices is needed. It can be at once a tool to restructure Antwerp's 20th century belt. A new Antwerp potentially arises out of its own debris, pollution, garbage, waste, dirt, filth.

This pamphlet tackles challenges differently than the conventional propositions (mobility, landscape, …) of Labo XX that resonate rather the 20th than 21st century issues. Here the perspective is waste. Waste is something that commonly is moved into unconsciousness, into what does not change the reality; however we live and work amidst the waste we continuously produce and reproduce. We tend to forget that consumption, which has become a predominant element of our lives, results in waste. Waste is everywhere. Consequently we propose a paradigm shift in how to look at and deal with waste. In this thesis we propose to look at waste as a resource. Trash can become an opportunity for ecological valorisation and local economies. In general the idea is to shift from a linear pattern of production and consumption to a more cyclical pattern of recycling. When one starts considering with how much flows, clouds and plumes of waste we are surrounding ourselves day in and day out, then it becomes clear that the necessary shift in waste practices willy nilly has a systemic dimension. One does not have to be a genius to understand that, at the same time, this opens the door to use this necessary conversion simultaneously as a tool to restructure Antwerp's 20th century belt. When this is done by taking also the new housing, service and job demands into account, a new Antwerp potentially arises out of its own debris, pollution, garbage, waste, dirt, and filth.

20th century belt view

FROM DIRTY TO DIRTIER

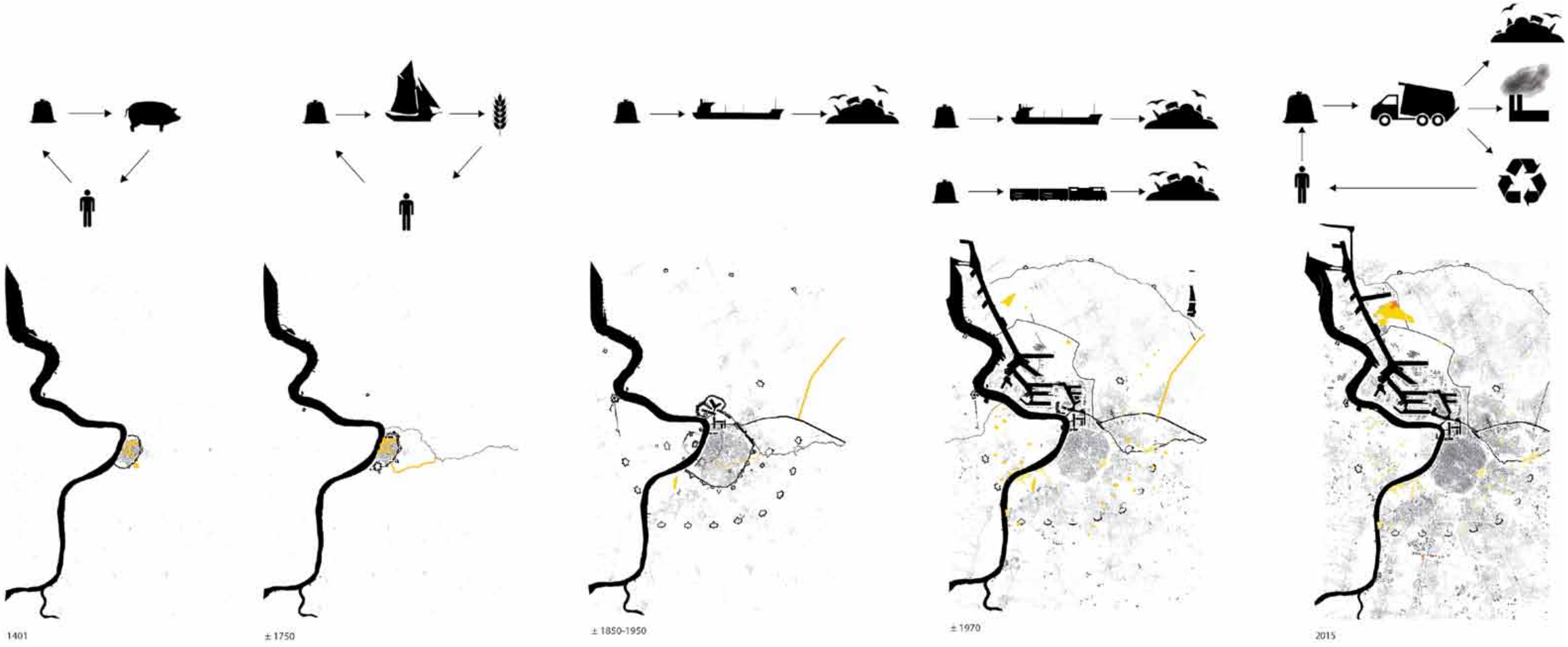
A systematic re-conceiving and remodelling of the waste infrastructure is used as catalyst for a spatial transformation process that restructures the urban environment in a more qualitative way than the past.

Firstly we need to comprehend the current system and the logics that have shaped it over time. As in nature, waste has not always existed. The first practices related with 'waste' were developed during the late Middle Ages. Beside chickens and pigs, which were functioning as a living waste (cleaning by eating) infrastructure, the *moorsmyderij* was developed; the first profession related with collecting and selling waste (Poulussen, 1987). In this period, waste was not yet considered problematic; on the contrary, according to the concept of 'waste equals food,' an economic trading market was linked with it, that is trading waste for agricultural (human excrements) or construction (building material) purposes (Poulussen, 1987).

However this process was distorted during the 19th century. Hand in hand with the industrial revolution, the production of waste increased and this generated a rupture of the circular process. The amounts exceeded the demand. This is when dump sites were introduced. Circular process were broken into a linear chain. Moreover, by inventions such as chemical fertilizers, waste lost its meaning for agriculture from the beginning of 1900 on. Consequently its trading market collapsed, independent professions disappeared, and since waste was no longer considered as valuable, but instead became a problem of public hygiene and health, public authorities started to deal with it (Loordbach, 2007). Waste policy and management grew organically and not always with a lot of environmental concerns. In 1980 a public waste management company was founded to rationalize and modernize and centralize waste management (Begets, 2015). OVAM regulated waste streams and initiated waste prevention, and above all practices of recycling (Begets, 2015). Currently a transition towards a circular process is deployed. The mass disposal is replaced by mass recycling, which in turn also demands for a critical appraisal of the relationship between production, waste and urbanism (Belanger, 2007). Circular waste processing returned on the agenda and waste itself is again seen much more as a resource than as something that has to be disposed of.

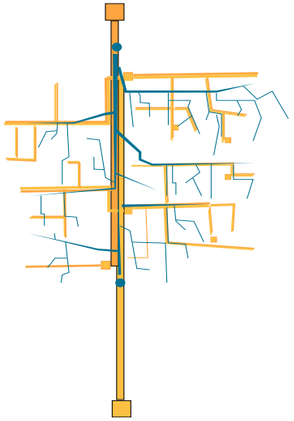
All this implies that waste-infrastructure has to be reconceived and remodelled systematically. The question then is if this is done in a sectorial way as in the industrial management and policy logic of the 20th century, or rather with an integral approach; in it, the reconversion and requalification of the waste infrastructure is used as leverage and catalyser for a spatial transformation process that restructures the urban environment in a more sustainable and qualitative way than in the past.

Future?

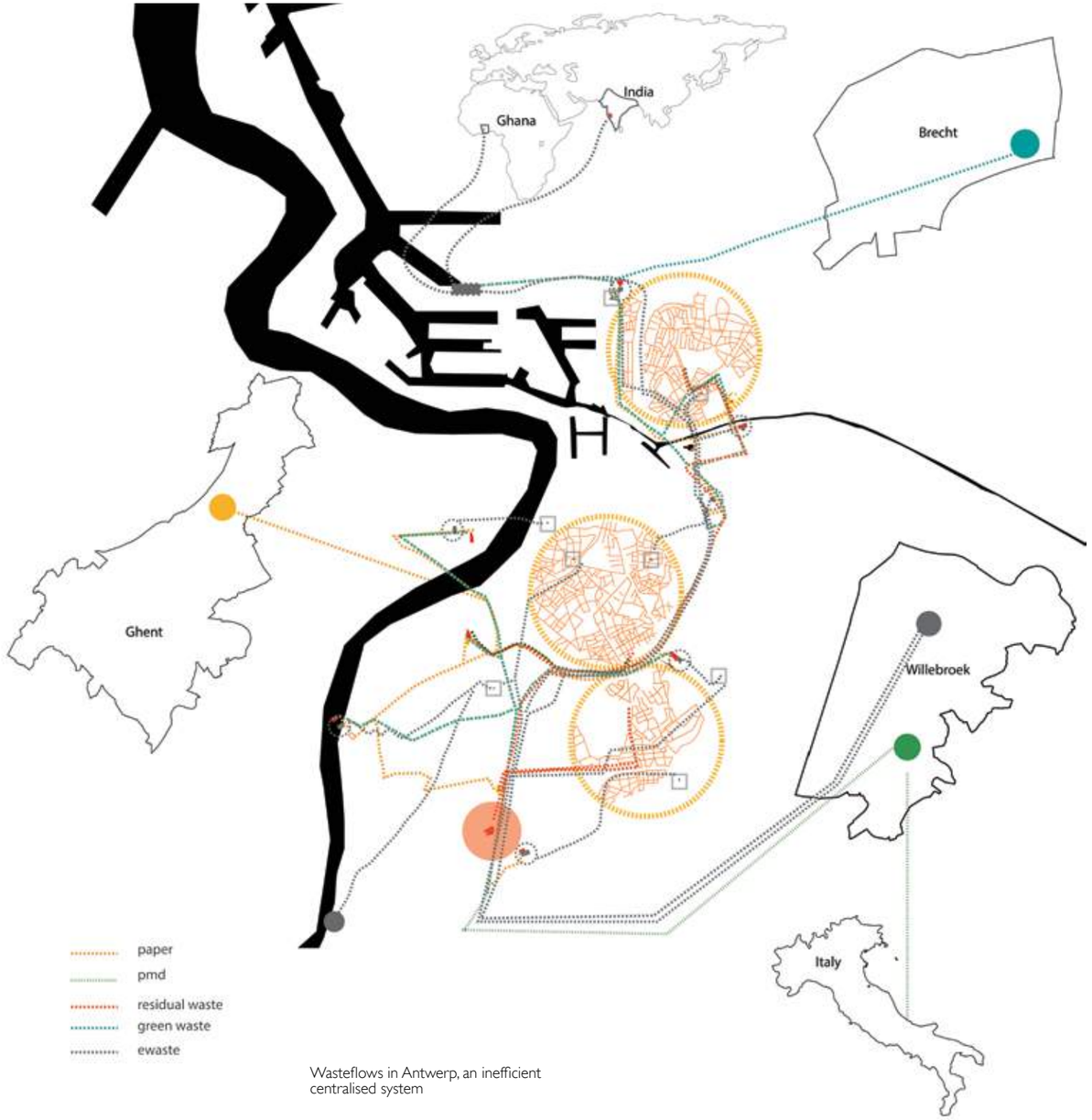


Waste through history

THE CITY IS NOT A TREE! TOWARDS A NEW URBAN FORM



Current centralised system, operating as a tree



Wasteflows in Antwerp, an inefficient centralised system

The waste geography developed in this thesis unravels several layers and practices. It demonstrates relationships between trash and space throughout its network. Trash produced in Belgium travels, for instance, long distances before getting processed. In this Antwerp, as the second largest sea harbour of Europe, is an essential node on the filthy routes of dirt. Besides being a hub for national trash, also larger waste-flows, such as plastic which is transported to Italy or Europe's electronic waste, are passing through Antwerp's port on their way to Ghana or India (Davidson, 2008). The long distance travels and related energy consumption can be considered a dissipation and the question is if there are any sustainable alternatives.

Modern waste management systems have been elaborated incrementally over the last two centuries and they resonate to a large degree with the industrial logic that pervaded so many domains in that period. The engineering behind the system that is usually centralised and hierarchical very often makes use of a tree-model. Ever since Christopher Alexander's seminal essay written half a century ago, everyone understands the evident consideration that 'the city is not a tree'. Nevertheless, a lot of the engineered infrastructure that forms the backbone of urban development is still articulated as a tree structure. This goes for traffic and so many other infrastructures, amongst others the waste infrastructures such as sewage and solid waste disposal systems.

The centralised and tree shaped waste infrastructures are becoming more and more problematic. It is expensive, usually very environmentally unfriendly, costly inefficient (despite its claims of rationality and efficiency), and quite vulnerable.

The engineering behind the waste management system that is usually centralised and hierarchical very often adapts a tree-model.

These current engineered, centralised systems are inert and induce a path dependency. Incineration is currently still prioritized with the weak argument that besides being a means to dispose of waste, it also generates energy. Subsequently it blocks transition to recycling processes. Anyway, centralised systems have reached a culmination: they are no longer able to deal with the scale and intricacy of waste flows (Belanger, 2007).

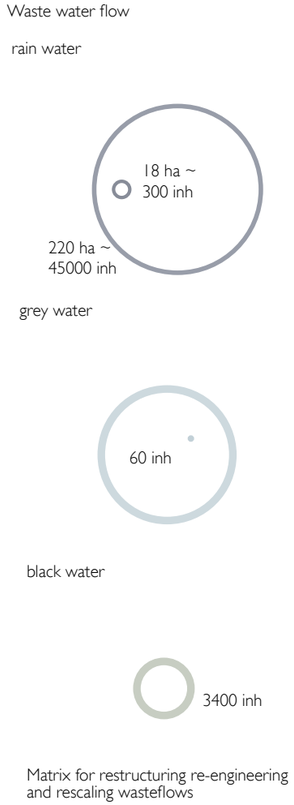
In short, waste infrastructures as sewage, etc. tend to spatially structure urban development, at least implicitly or indirectly, but often also explicitly and directly. Urban development goes hand in hand with infrastructure building and vice versa.

Hence, re-infrastructuring of waste management has a potential to restructure our urban environments.

As Hildebrand Frey indeed suggests in Designing the City: Towards a More Sustainable Urban Form, a transition to a more qualitative way of life is made possible by technological solutions and behavioural changes, but an effective change is possible only if they are led by a transformation of the physical characteristics of the city through urban design (Frey, 1999).

FROM TREE BRANCHES TO CELL STRUCTURE

New wastesheds



Matrix for restructuring re-engineering and rescaling wasteflows

The 20th century model of urban development has become obsolete and has proven unable to respond to the new demands of the city. Decentralization is at the order of the day. Unnecessary hierarchies and inefficient centralisations have to be broken up and patterns and systems recombined in order to (re) generate the future city.
Fundamental restructuring, rescaling and re-engineering of the current infrastructures will generate the necessary shift in waste management and practices. It entails change at all levels: from modifications of consumption attitudes, to inducing new everyday habits of sorting, to those concerning the professional specialized sector of waste disposal; thus, it means a change in cultural, political, professional, and technical terms.

Waste management is going to play a pivotal role in this transformation process, a process that is not so much about optimization but about a revolution.

New wastesheds in Deurne Zuid

Cellular multiscalar system in Deurne Zuid

Economy of scales as principle for new waste flows

1. Rethinking the concept of waste

A first element to consider in the restructuring waste flows, is the shift of perspective from waste as a residue without value into waste as a potential resource, that can be mined, preferably (close to or) at the place of production. In this way trash beholds opportunities for ecological valorisation and local (or more distant) economies.

2. Identify optimal scale

A second element to consider in the restructuring waste flows is to define the optimal scale for each flow, balancing economies of scale (hence efficiency) with ecological performance. Strategies involve further the unravelling of waste flows into more specialized sorting of materials, in order to be able to engineer the most appropriate procedure and life cycle for each of them.

3. Disconnect and redirect, creating wastesheds

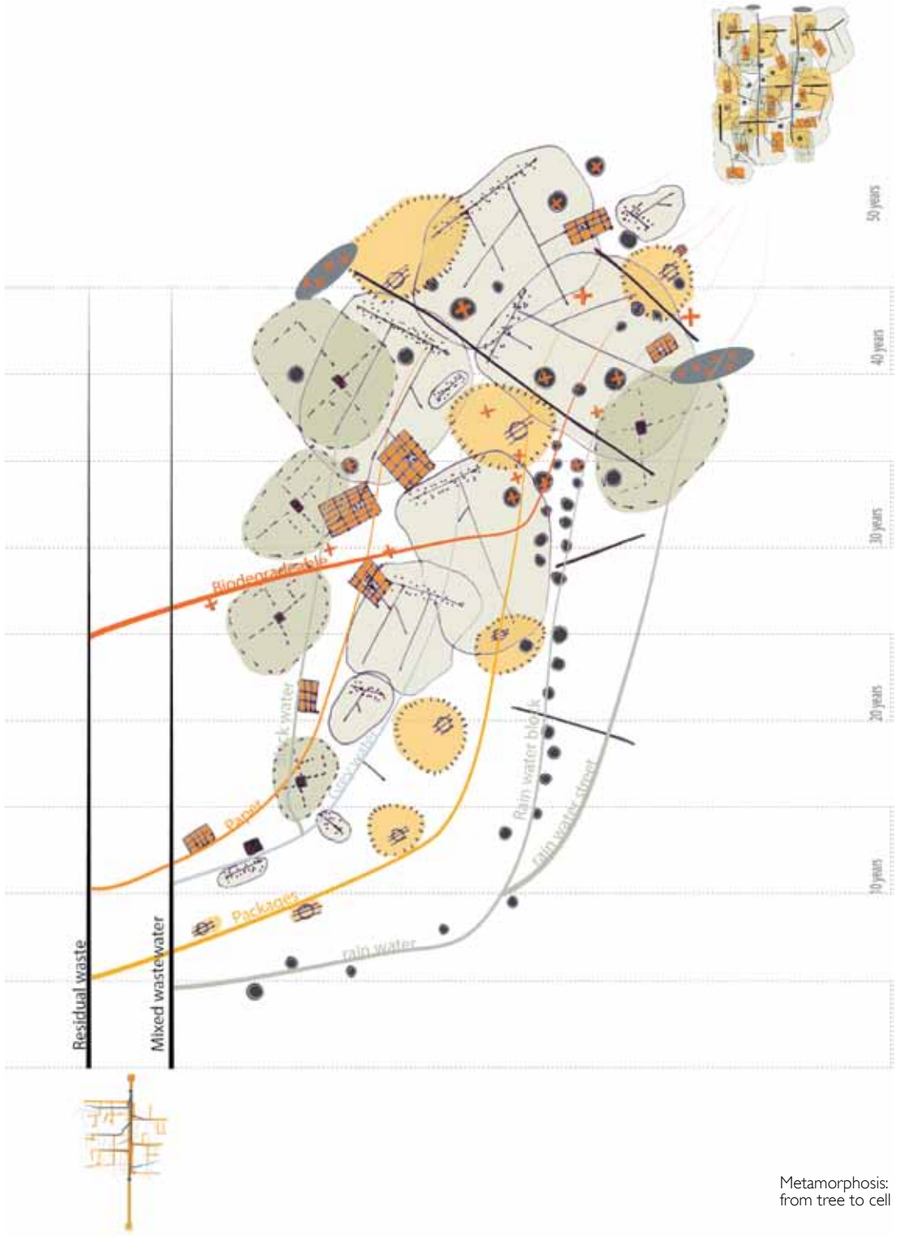
Thirdly, cells, or new wastesheds can be created by disconnecting and redirecting the new wasteflows according to the optimal scale. These wastesheds function as natural waste management areas (per product) that reconfigure the spatial structure of the territory.

4. Overlap to create synergies

As fourth, the overlapping of different layers of sheds generates complexity of structures and hence increases potentially their performance. These intersections and coincidences create synergies, resulting in new spatial typologies and configurations.

5. Initiate metamorphosis

As last, relationships between flows are stimulated as intertwined cycles, generate synergies, and catalyse the spatial transformation of the city into new patterns: a new form, a metamorphosis is initiated, generating different gazes, porosity, flexibility, and organic adaptability.



Metamorphosis:
from tree to cell

Following these points, we can shift the tree structure to a cellular system; wastesheds are constructed that define new spatial organisations in the city; from a prosthesis that comes from a reductionist centralised system back to an organic, almost self-adaptive system.
The transition in waste practice, as instigator of urban radical changes, can in this way be used as a lever for a new identity of the 20th century belt in Antwerp.

dI

DESIGN
INVESTIGATIONS

DIRTY ANTWERP

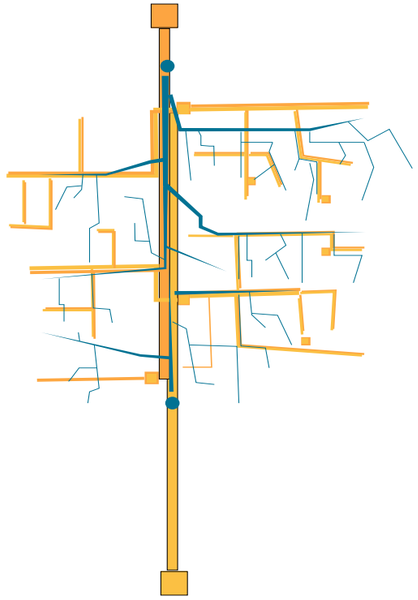
Landscape Urbanism Thesis Studio Spring 2015, Campine Region, Belgium

Authors: Caterina Rosso, Carmen Van Maercke

Promoter: Bruno De Meulder

Recycling Park in Antwerp

source: (stad antwerpen, 2014)



Current centralised system,
operating as a tree

Form the principles of economy of scale:

1. Rethinking the concept of waste

A first element to consider in the restructuring waste flows, is the shift of perspective from waste as a residue without value into waste as a potential resource, that can be mined,t preferably (close to or) at the place of production. In this way trash beholds opportunities for ecological valorisation and local (or more distant) economies.

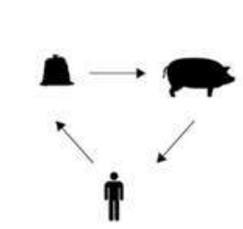
DIRTY ANTWERP

"Dirty Antwerp" dissects the city of Antwerp's layers of waste. Firstly, it examines the relationship between waste flows and the production of space throughout time. It tracks the evolution of waste flows over water and land, from city to periphery, from a small organic cycle to a linear industrial flow. After decades of increasing waste volumes caused by mass consumption, production of non-bio degradable plastics and chemical fertilizers, we are now in the transition from waste management to sustainable materials management. Under pressure of natural resource scarcity, geographies of waste and waste processing are under tremendous transformation.

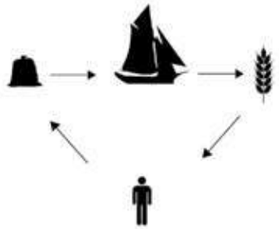
In order to investigate this transition, the second part of the booklet maps Antwerp's current waste geography: spaces for production and processing. This ranges from well hidden incinerators operating at the industrial scale in the city periphery to small scale bottom-up initiatives which activate social spaces. These community and individual initiatives revalue waste as a resource, set up small scale circular economies and activate social activities and spaces through community practices of repairing, reusing and recycling.

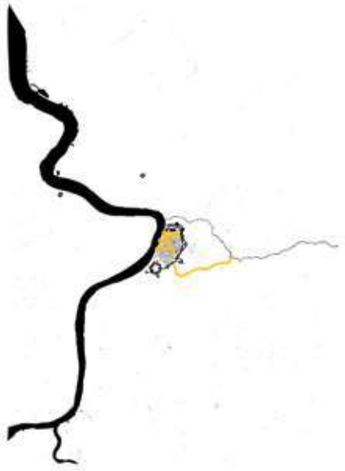
The knowledge gathered in this booklet serves as a basis for the strategies developed in "Re-engineering flows" and "Editing the 20th Century Belt" in which we build up strategies to reach more sustainable urban forms in Antwerp's 20th century belt.

WASTE THROUGH HISTORY

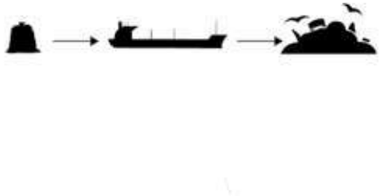


1401



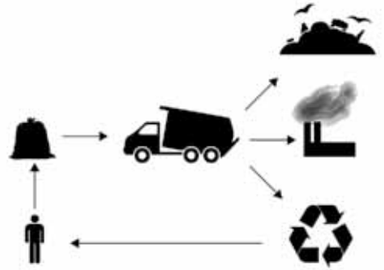


± 1750



± 1850-1950

± 1970



2015

Middle Ages
"cleaning by eating", use of animals

waste dumped in the *ruien*

specicifc places for waste in the city, like *hooikaar, mestkaai*

1401
Rattenborch first landfill

use of the canal *Herentalse vaart* for transporting manure to rural areas

1803
Napoleon commands the covering of the *ruien*

1862
public sanitation system

dumping manure and later household waste in Brecht
transport by train

1882
ruien officially part of sewage system

transport by boat over Kempisch Canal

1900
chemical fertilizers replace organical waste fertilizers

50's
municipality becomes responsible for waste processing and dumping

1953
construction of the first Belgian incinerator

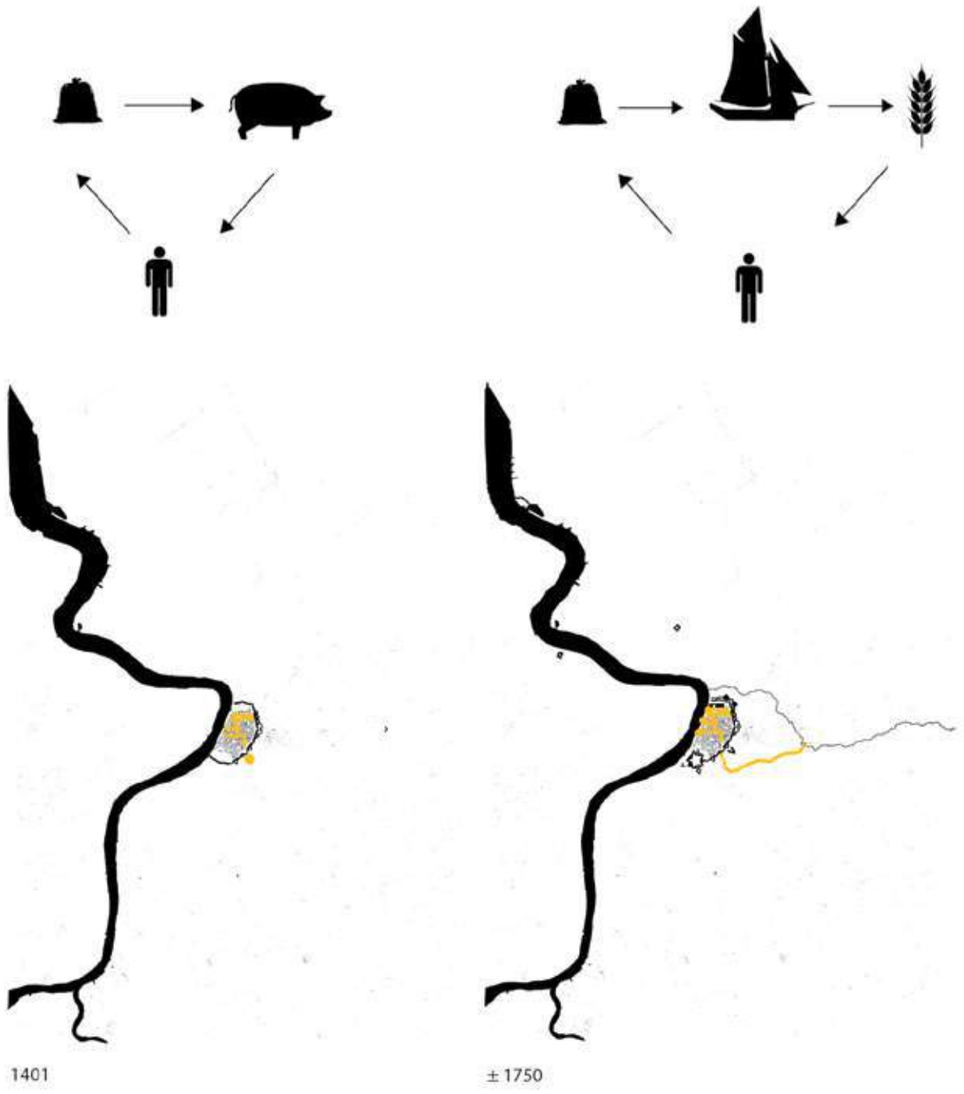
60's
rise of environmental concern

1980
foundation of OVAM

1984
opening of the first recycling park

90's
policy shift from waste processing to waste prevention

2000
projects for reintegration of brownfield sites in the landscape



Places for waste in the city of Antwerp 1750 (Poulussen, 1987)

Kermis, by Pieter Brueghel de Jonge (Brussels, 1564 of 1565 - Antwerp 1638), (Lampo, 2013)

WASTE THROUGH HISTORY

Cleaning by eating

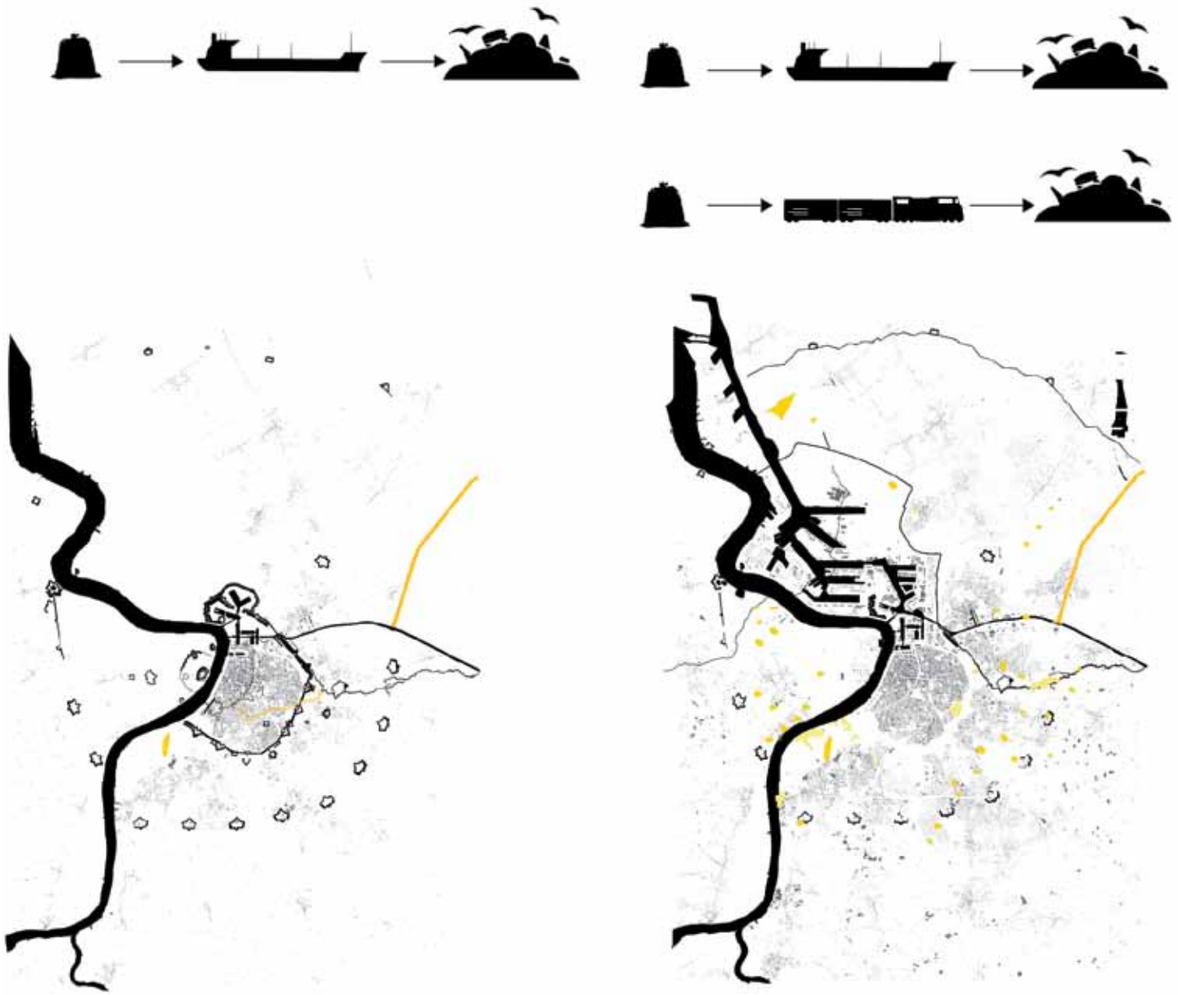
Until the 18th century waste can be described according to the principle of waste equals food, a circular economy (Braungart & MacDonough, 2007). When nomadic cultures turned into sedentary settlements, waste turned into a nutrient for agricultural purposes. Biological waste was returned to the soil, replacing nutrients, fertilising the ground for the following harvest. However when populations started growing, communities extracted more resources than naturally could be restored and the higher densities caused sanitation problems. (Braungart & MacDonough, 2007) Then the construction of infrastructure for sanitation started. This was also the case for the city of Antwerp.

Trading waste

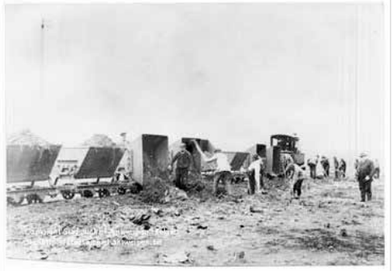
In the Late Middle Ages, the previous "soft waste infrastructure" of pigs and chickens was supported by a variety of newly developed waste professions, such as the "*slykmyder*" (person in charge for waste-collection), the "*gruiskar*" (construction waste) and the "*nachtwerker*" (septic tank cleaner). Due to its economic value, waste was traded to the farmers of the countryside or used as building material for dykes. As a result, specific trading places emerged in the city of Antwerp along the *ruien* and its quay, such as the *mestkaai* (manure quay).

Dumping in Antwerp

The *ruien*, half-circle shaped water ditches, were developed about 1100 as defence mechanism for the city and transportation infrastructure. Through time, as the city was growing, several extensions were made, and at the same time the *ruien* extended their function to air waste infrastructure: they were used for illegally discharging wastewater and in the Late Middle Ages, the inhabitants of Antwerp constructed their toilets, called "*Weerdribben*", directing water towards these water ditches (*De Antwerpse ruien,* 2013). The city tried, instead, to promote the use of the septic tank. Besides being the place for trading market and waste water, dumping was also in practice. In the beginning, this occurred mainly in the *ruien*, but it was forbidden in 1401(Lampo, 2013). As an alternative the first legal dumping site was created: Rattenborch. Coinciding with the place where the prostitutes worked, this first landfill was positioned outside the city walls, as all functions which were supposed to be out of sight (Lampo, 2013).



transportation of municipal waste over the Kempisch Canal (Felixarchief)



dumping of municipal waste by train in Brecht (Felixarchief)

dumping of municipal waste at kielse broek (Felixarchief)

From circular to linear

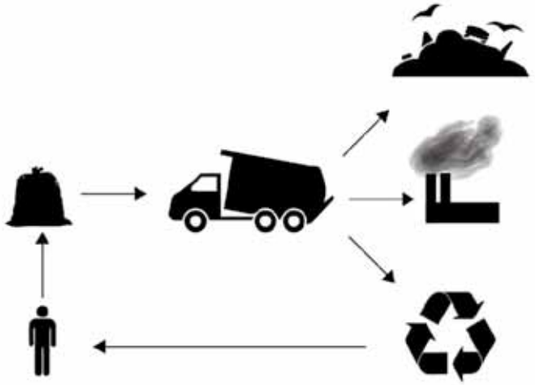
Over time the population of Antwerp grew substantially, with a related increase of disposal and an upscaling of the trading market. Nearby areas of the city, such as Hoboken became specialised in the waste economy and traded the manure of Antwerp to several regions such as the Waasland (agricultural region on the left bank side) (Lampo, 2013). Also the infertile Campine region was having a two way economy with the city of Antwerp. Manure was transported by boat to fertilise the headland, which in return produced food to feed the city of Antwerp. The new canal called the "Herentalse vaart", which connected the river Schijn (direction Campine) with the *ruien* inside the city centre, made this possible (Poulussen, 1987). The city kept expanding and the number and composition of waste increased and changed. The abundance overcharged the market, waste lost its economic value, and dumping became the solution: it is then that a linear process emerged.

Moving the waste away

By using the Herentalse vaart and later the Kempisch kanaal, waste was transported by boat to the Campine region, where a fraction was used as biological nutrient, yet the vast majority was dumped, like for example in the village of Brecht (Linnig, 1860). The collapse of the trading market and the disappearance of autonomous professions obliged the city of Antwerp to install *'openbare reinigingsdienst'* (public sanitation) in 1862, as a municipal waste management which was in charge of the sanitation of the city, as well as the maintenance of the *ruien* (Lampo, 2013). In the beginning of the 19th century, due to the extensive population growth, the *ruien* were found to be responsible for the cholera outbreak (*De Antwerpse ruien,* 2013).
As a consequence, Napoleon gave the order, in 1803, to cover the *ruien* for hygienic reasons (*De Antwerpse ruien,* 2013).

Sewage arriving

This process took place in a few phases and got completed by the end of the century. At this point, a strong tendency towards living in urban areas required the construction of large scale sewage systems and the installation, in the houses, of water flushed toilets. Therefore, the municipality allowed toilets to be directly connected to the *ruien*, which became officially part of the sewage system. As the amount of waste increased, and the *ruien* disappeared gradually, transporting and dumping by boat got replaced by the transportation of waste by train. This went hand in hand with the formation of new landfill sites, such as the Kielse broek or the Hooge Maey, along the railway (Geys 1960).



2015

Waste professions in crisis

Furthermore, by the introduction of chemical fertilisers at the beginning of the 20th century, the demand for organic waste decreased and became, in time, less attractive as a good for economic purposes (Loordbach, 2007). Economic growth generated new invaluable waste flows, resulting in the disappearance of independent professions and in the increase of governmental responsibility, which prioritised landfilling as the main waste treatment. Although in the 1920s and 1930s new technologies got developed, the landfilling practices continued. In the 1950s, due to the huge growth of disposal, municipalities were held responsible for waste management, which brought about numerous landfills along the administrative borders (as far as possible from the centre). With the raise of synthetic materials and the use of chemical and toxic substances in the 1960s, the waste management became more expensive and subsequently municipalities clustered in intercommunals in order to reduce the price (Begets, 2015).

Changing attitude

This was coupled with upcoming environmental movements which grew up in the 1970s, as reaction to a range of environmental disasters.

The first small initiatives appeared around recycling and reusing waste, which got supported by the government, and the ladder of Lansinck (waste hierarchy concept) got developed. In 1980, a governmental change was initiated by the foundation of OVAM, the public waste management enterprise regulating and preventing waste streams. Lansicnk's ladder gained status, was overall accepted and promoted the incineration process as a substitute to landfilling.

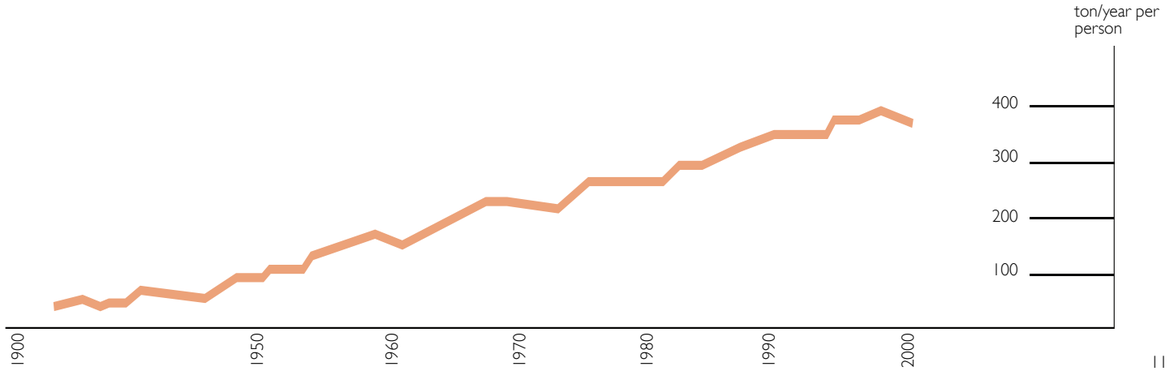
However, the overall negative attitude towards waste from the 1960s, 1970s, and 1980s –in which waste was considered as the result of an unsustainable government of society, a society disregarding possible side effects in the future– changed from the 1990s on (Loordbach, 2007).

The limited energies which were activated in the previous decades got enhanced and prevention got prioritized to processing (Loordbach, 2007). A shift from landfilling to incineration and reuse was set into motion, with highly specialised, professional waste management infrastructure as effect. After one hundred years of disposal, a new waste market opened up, treating waste as a valuable commercial good resource. In this, waste as a resource is subject to broad interpretations which includes historically polluted sites to be integrated in the landscape again, the construction of pipes in the ruien to redirect the sewage towards the cleanings station, as well as bringing the former landfills inside the circular economy by enhanced landfill mining.

Transition in waste menagement

In short the increase of waste cannot simply be clarified by the rise of the consumption society; also the waste composition has played an important role (Loordbach, 2007). Therefore systems structurally diverse were required over the years, and they have changed the waste management radically: from "waste equals food", to decentralised systems, to centralised landfilling and incineration processes, till an in-between position nowadays.

This current intermediate position can be described as a multilevel (public-private interactions) and multi-scale system, in which the main challenge for the future is to overcome the relying on markets, but rather to encourage efficiency and longstanding feasibility in waste management (Loordbach, 2007).



REGIONAL WASTE FLOWS

Besides countries such as Denmark, Germany, Austria and Sweden, Belgium is one of the European nations that is phasing out landfilling and investing more in recycling methods, although it still relies for a very substantial part on incineration. The European union still considers it however as advanced in relation to recycling and waste management. Notwithstanding this to a large extend self proclaimed assets and qualities, it can not be denied that the current waste management system is unwieldy and inefficient. Consequently it has to be scrutinized.

Green waste
Household waste
Pmd/paper waste
Bulky waste
Ground waste
Industrial not hazardous waste
Industrial hazardous

Prevention
"Zero waste" shop
Repair café

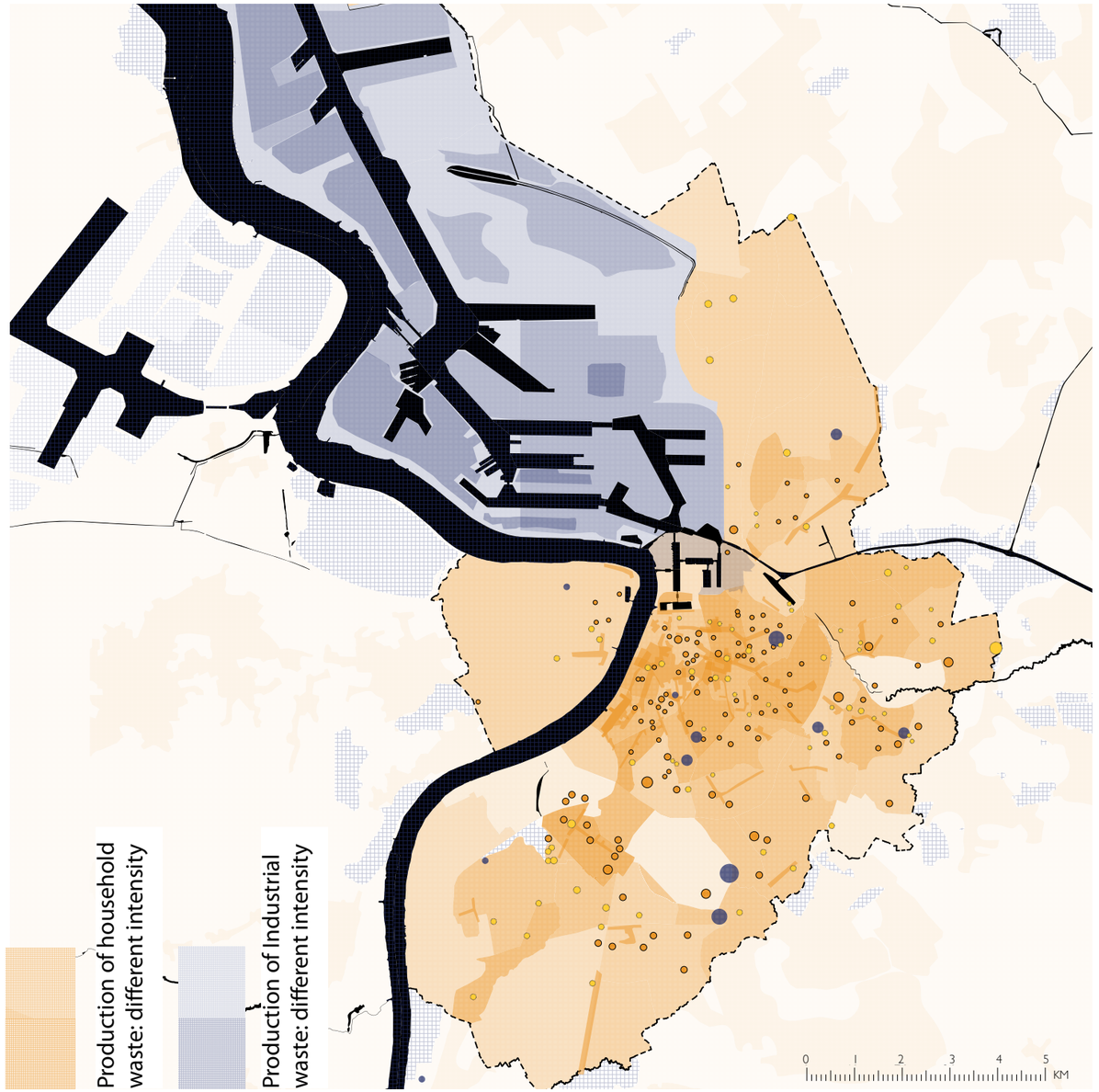
Reuse
Second hand shop

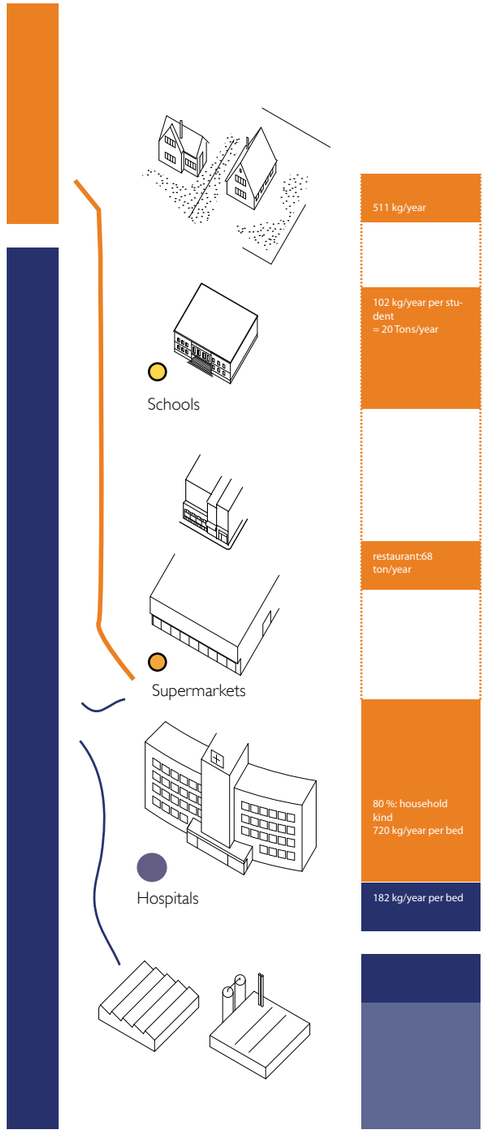
Collection and sorting
Collection household waste
Collection specific material _household and industrial waste
Collection barges' waste

Transformation
Compostering
Recycle point
Recycle point of hazardous waste

Energy production
REMO site
Incinerator of household waste
Incinerator of mixed not hazardous waste
Incinerator industrial not hazardous waste
Incinerator hazardous waste

Dumping
Landfill industrial not hazardous
Landfill industrial hazardous





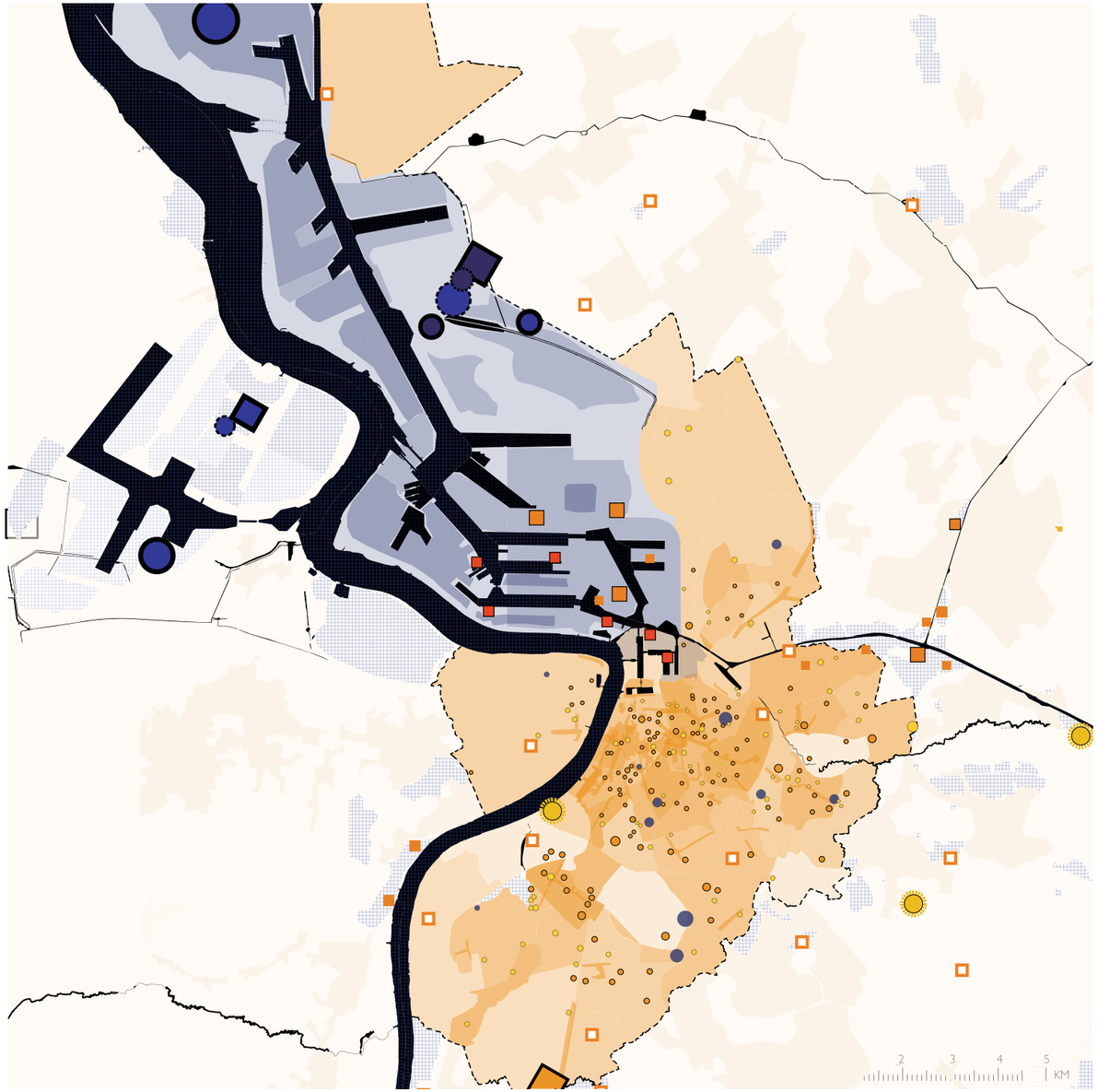
source: (D. Ruggiero, 2013)

THE SPACE FOR WASTE IN ANTWERP

The city as producer of waste

As base layer, the territory can be understood as a producer of waste of both household and industrial origin. The industrial waste in a city like Antwerp is very relevant both for the production of industrial waste in loco and for the collection of waste from ships and barges that reach the harbour. This flows is maintained separated from the flow of the municipal waste.

The city as generator of waste has not to be interpreted as a uniform surface: this landscape of waste generation can be rendered with different gradients of impact depending on the quantity of waste the different functions in the city produce and in which density they are organized. On top of the evident difference generated by variety in population density, some parts of the city are under the pressure of special buildings: supermarkets, shops, restaurants, schools, hospitals, sometimes organized with a strong agglomeration on some main lines (like the main radial roads linking the belt with the inner city).



PRODUCTION

Production of household waste: different intensity

Production of Industrial waste: different intensity

COLLECTION

Recycling park

Collection for specific material

Collector different materials

Collector hazardous waste_ ships

TRANSFORMATION/ RECYCLING

Compost

Building material

Transformation_ Scrap material

Transformation_ Industrial hazardous

INCINERATION

Household

Not hazardous

Hazardous

DUMPING

Landfill not hazardous+ ashes

Landfill hazardous

The city as processor of waste

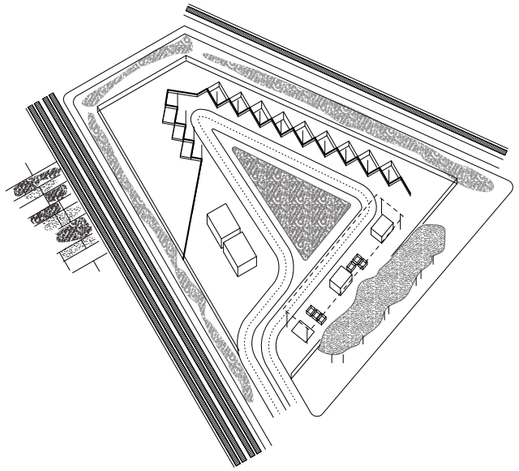
Nowadays the city has a relatively classical waste organisation, both in terms of collection and disposal.
The city is divided in three sectors (North, Middle, South); each sector has its own trajectory of collection and moving of the garbage.

Collection points

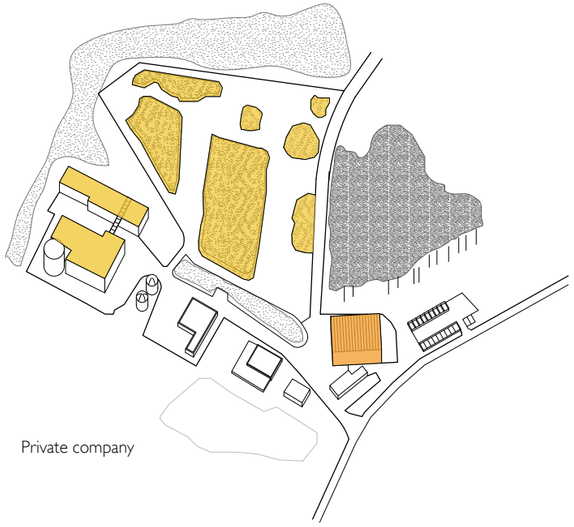
The collection happens mainly in three interconnected ways:
. house-to-house, for ordinary waste, by municipal trucks.
. in the recycling parks, where the citizens go by themselves for household exceptional materials.
. provided directly from private companies for all the municipal waste not of household origin (restaurants, private agencies, schools).
Here also the normal house-to-house flow ends up.

Transformation points

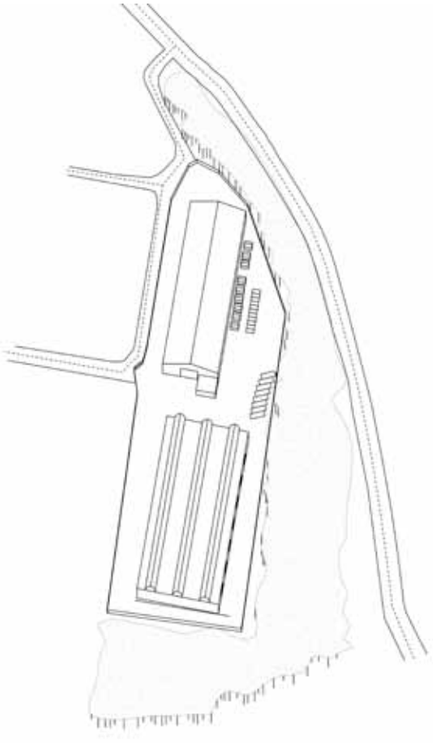
Except for some companies that provide a first processing of material, most of the recyclable material is not transformed within the city. What the city provides itself is the disposal of residual waste: the municipal one is entirely burnt in the incinerators at the outskirt of the city in the South, I.S.V.A.G.
As for the industrial one, it is processed and disposed by the incinerators in the harbor. What cannot be incinerated is dumped in the last two active landfills. Here also the companies that process the hazardous waste are located and they collect the hazardous material produced not only by the city, but from the whole sanitary system of Belgium.
These big processors occupy extended surfaces along big infrastructures, in isolated places but easily accessible.



Recyclingpark



Private company



Garbage truck hub

Recycling park _ Municipality of Antwerp

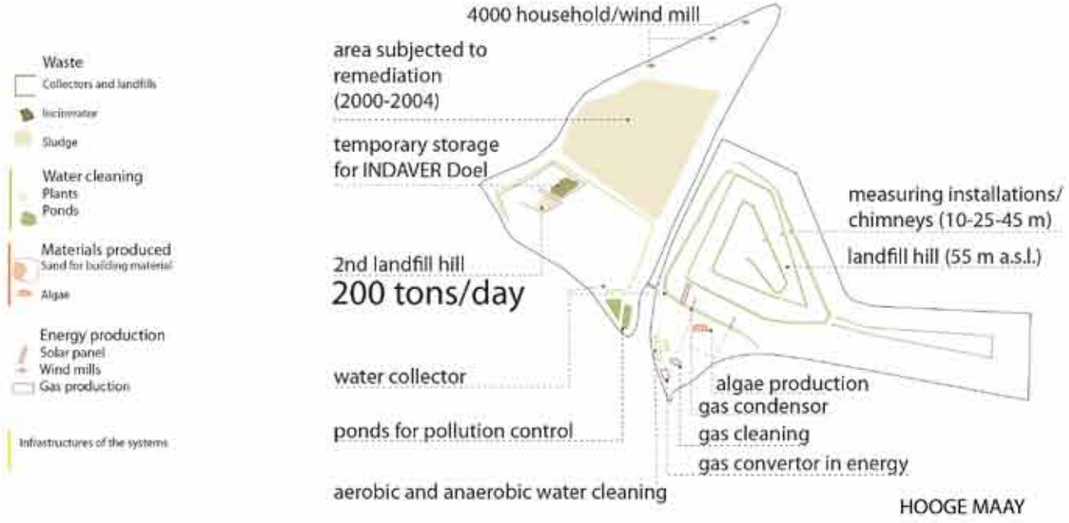
The recycling parks are run by the city in every district (except for the centre) and they provide a paid service for collection of special waste.
Nowadays they are nine and the municipality is looking for the possibility of opening new ones because they are overcharged: in the weekend and holidays the turnout is remarkable.
The new recycling parks are conceived as common squares surrounded by the containers. Some special practices, like the creation of a spot for exchanging books for free are always present.
They are normally located in marginal isolated spaces in the quarters (for example in spaces bordered by big infrastructures).

Trucks' station for house to house collection

The municipal waste collection is coordinated by three garbage truck stations, one for every zone of the city: North, Centre and South. The three hubs are part of eighteen technical clusters of the city, which, the municipality is planning to change: the plans consist of selling and clustering the technical facilities at one spot, which implies a further centralisation of functions.

Private companies

Intermediate point: collection and sorting of industrial and household not hazardous waste- SITA.
The big private companies (such as SITA, Van Ganzewinkel, Bruco) are specialised in different materials and provide the collection by using their own trucks and the sorting in loco.

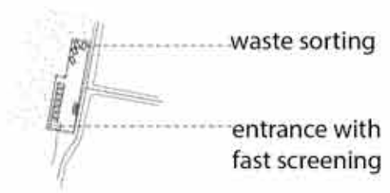


Transformation points

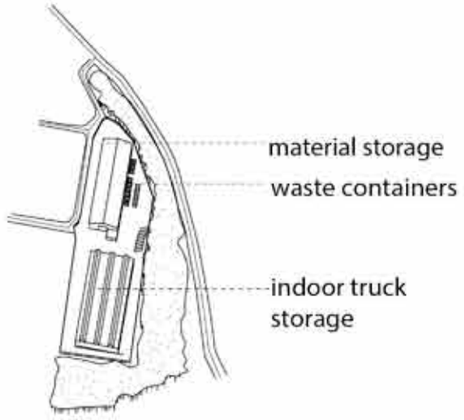
The Hooge-Maay site_ cluster of waste facilities

In this site in the northern part of the harbor, six different facilities related with waste transformation are located. They have grown organically one close to each other, occupying an isolated site, historically already used as a dump.
What is impressive is that they are totally autonomous, they do not take advantage from this proximity or exchange material, they provide separately for cleaning the water.

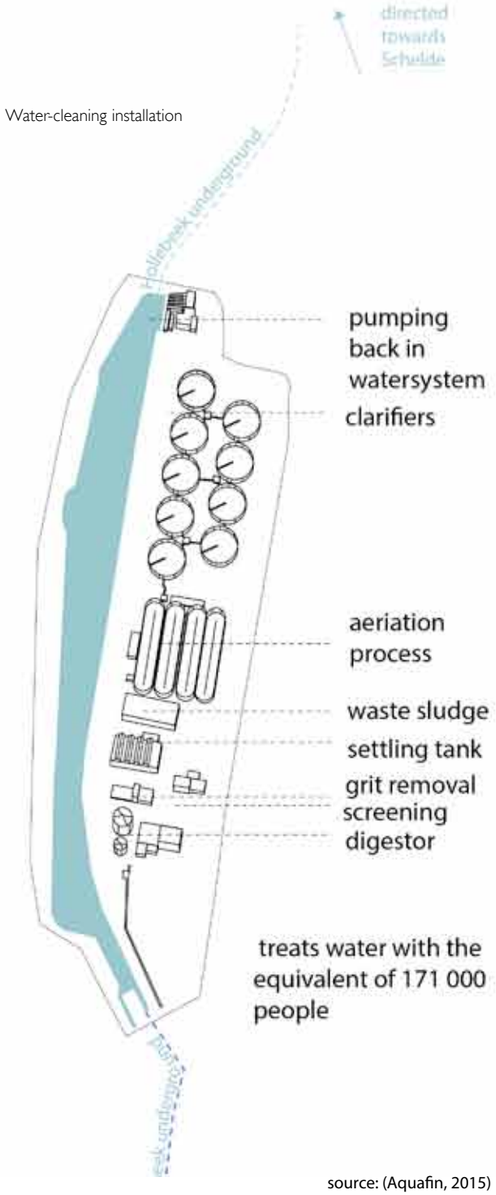
Recycling park



Garbage truck hub



Water-cleaning installation

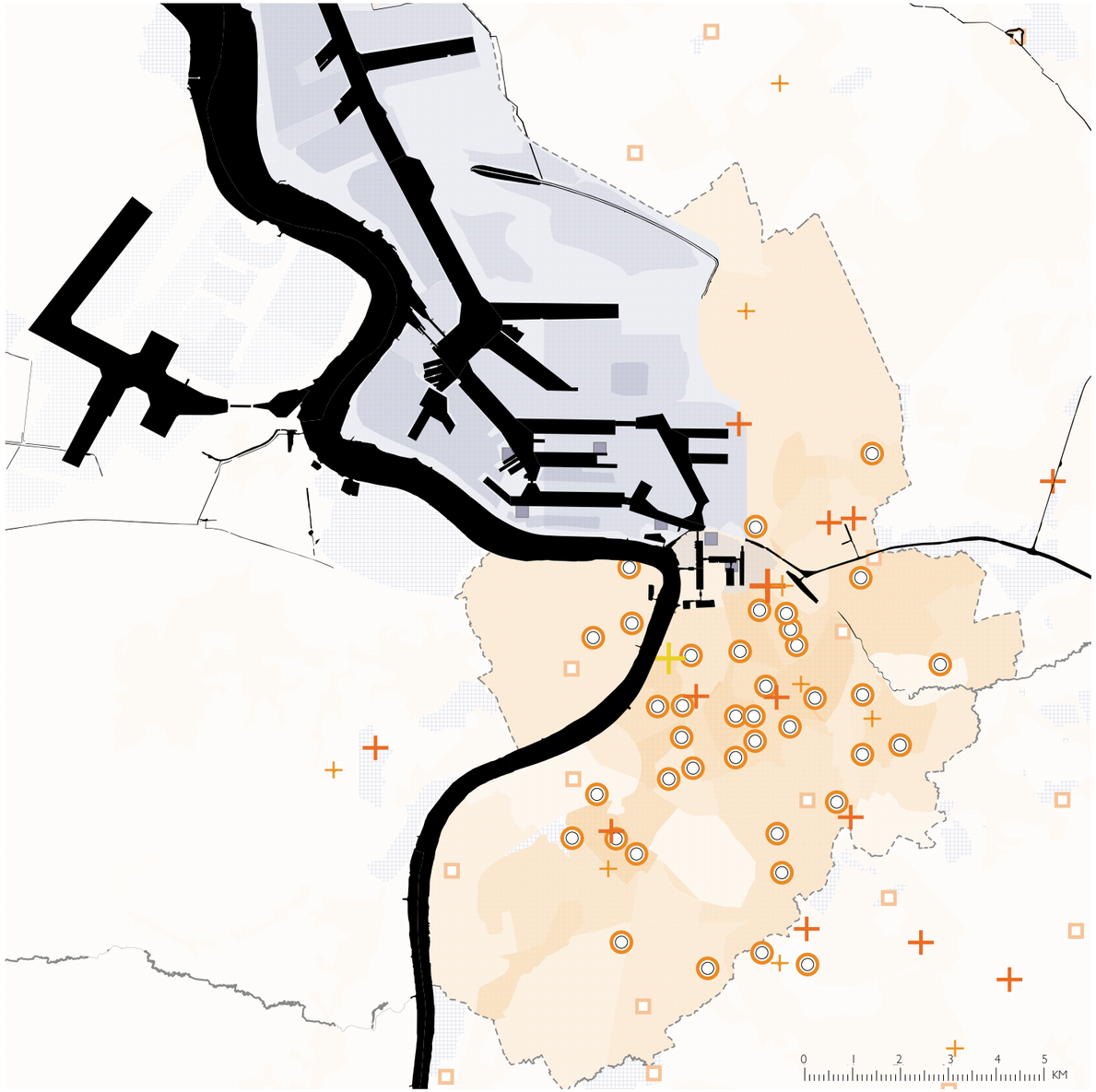


source: (Aquafin, 2015)

Transformation points

The wastewater cleaning station of Antwerp South

In terms of water treatment, the city of Antwerp is provided by two big waste water infrastructures with centralised facilities located in industrial sites. The site had already in the past a main role as waste infrastructure: during history this marshland situated just outside the city, served as an important landfill, in which up to the 1970s municipal waste was dumped. This evolved over time to the position of the municipal waste infrastructure, such as the hub for garbage-trucks and recycling park at the site nowadays. Together with the water-cleaning also this site can be considered as an organically grown cluster of waste-practices, one close to the other.



source: (Milieuzorg op school, 2015)
source: (repaircafe, 2015)
source: (Istas, 2015)
source: (kringwinkel, 2015)

Initiatives in the city

Different new waste practices such as the *Repaircafe*, the *MOS schools (groene school)*, the *geefkast*, and fleamarkets are popping up in the city as alternatives to the centralised waste infrastructure. These small "energies" are bringing waste practices back into society and urban tissue, and aim in this way to generate jobs and awareness. They can be considered small changes in the system which are less depending on big actors; however, in order to make a difference, they need a carrying network. Consequently they can be considered as an example of good existing practices; yet the aim should be the multiplication of this kind of cellular systems, directed and back up by a system.

The different new waste practices are operating according to different scales and actors. Some are initiatives from bottom up (such as the *geeflast*), others are organised from top down, directed from the state or municipality (*MOS School* and *brengbox*). Besides, some initiatives are taken by independent organisations (such as the *repaircafe*, *maakwinkel* and *zero waste shop*).

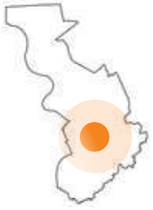
what scale where

Geefkast_ Den Dam

Exchange of stuff in the neighborhood

Robuust_ City Center

"Zero waste" shop



Repair Café_ City Center

Temporary spot for repairing

Flea market_Dageraadplaats

The different new waste practices are operating according to different scales and actors. Some are initiatives from bottom up (such as the geeflast) others are organised from top down, directed from the state or municipality (MOS School and brengbox). Besides this, some initiatives are taken by independent organisations (such as the repaircafe, maakwinkel and zero waste shop).

what scale where

Groene School_MOS school

Flanders

Quality label for schools investing in sustainability

Brengbox

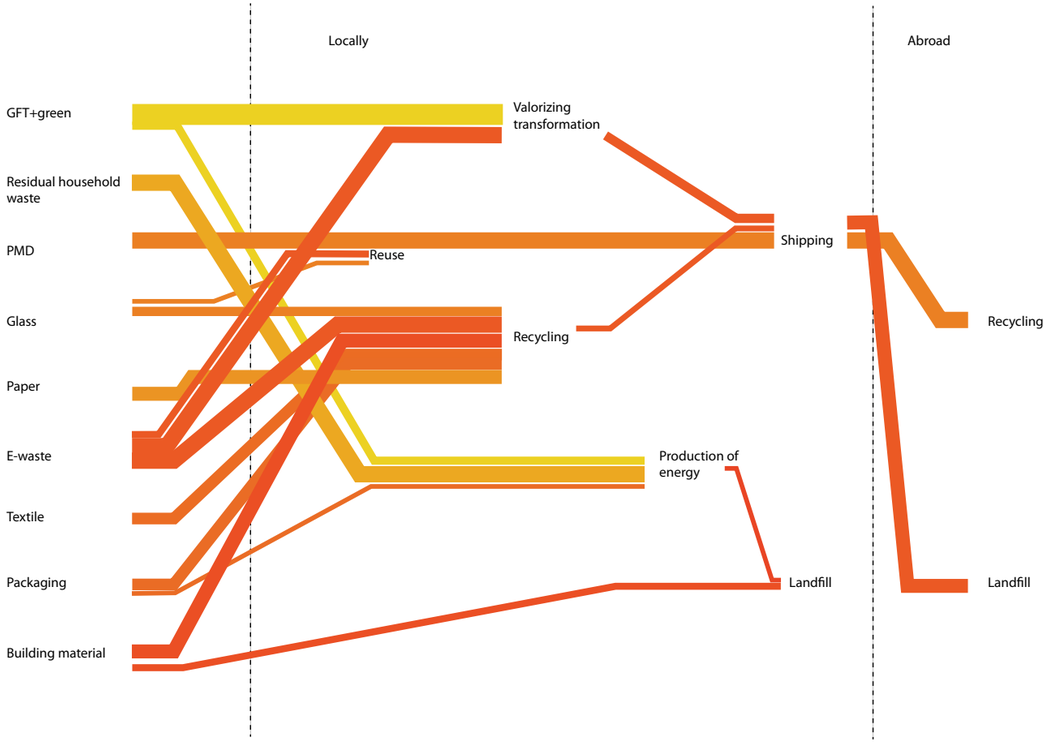
Antwerp

Pop-up bluk container

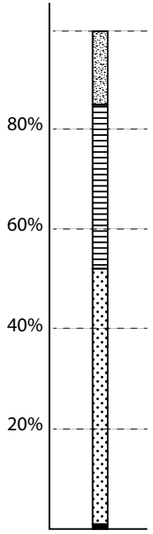
De Maakwinkel

Antwerp

Part of kringwinkel selling stuff which is or can be easily upcycled



(source: Smart Cities, 2015)



Compost

Recycling

Incineration

Dumping

Municipal waste

GFT+green

Residual household waste

PMD

Glass

Paper

E-waste

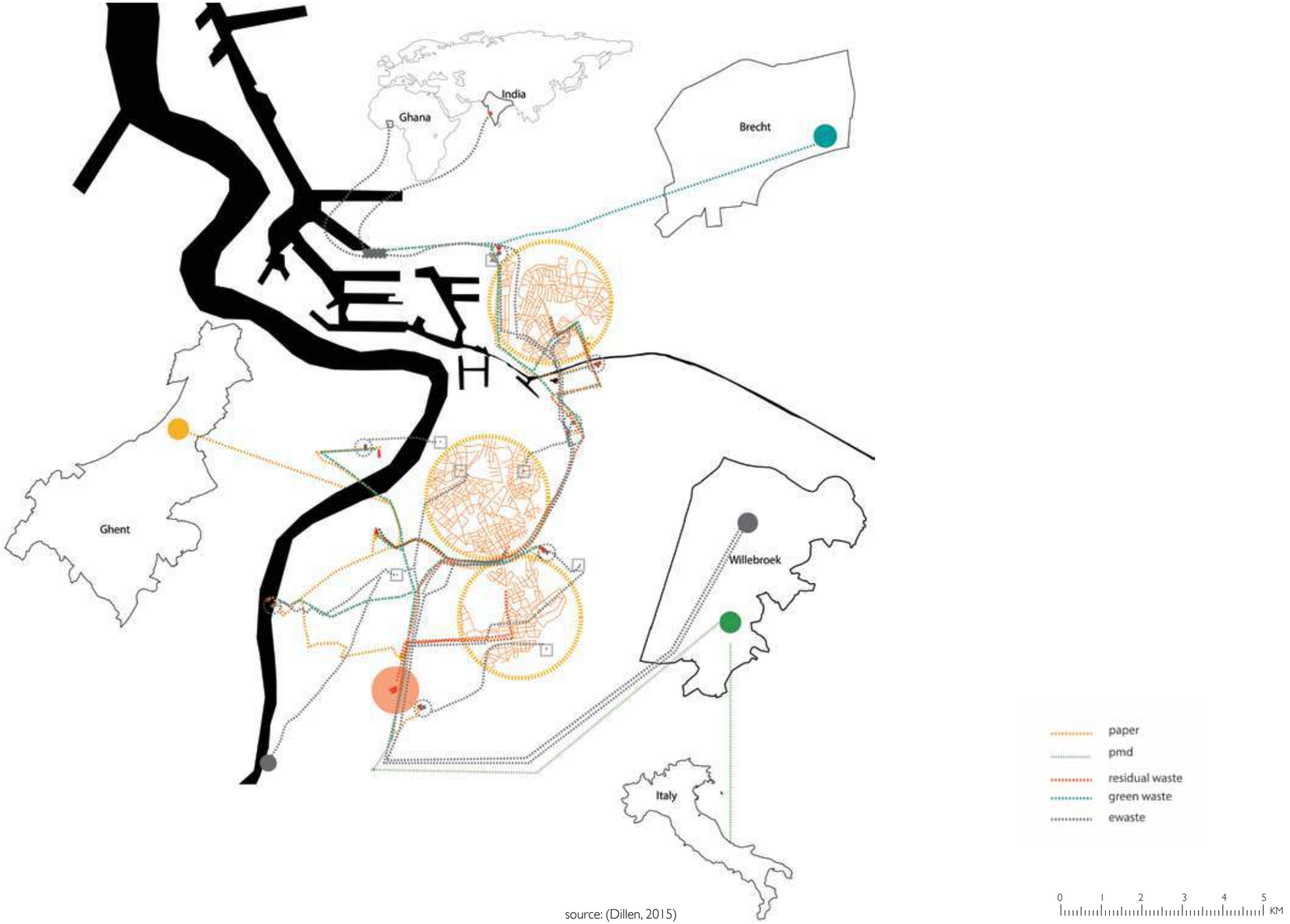
Textile

Packaging

Building material

The city as node in waste-flow

By following specific flows, it is possible to understand the functioning of the system and its weaknesses. Belgium belongs to the three European top countries in terms of waste management and recycling. In numbers: 36% of Belgian waste is recycled, 21% composted, 42% incinerated and only 1% ends up in the landfill. Regarding these numbers, Belgium has a good reputation, yet if looked closer, one can notice that waste sometimes has to travel long distances around the world to get recycled or processed. From this perspective it can be concluded that the system is operating in a rather inefficient manner, in which the long distance travels and related energy consumption can be considered as a huge dissipation. Antwerp, with its optimal position in the heart of Europe, functions as a node in this complex net of waste flows.

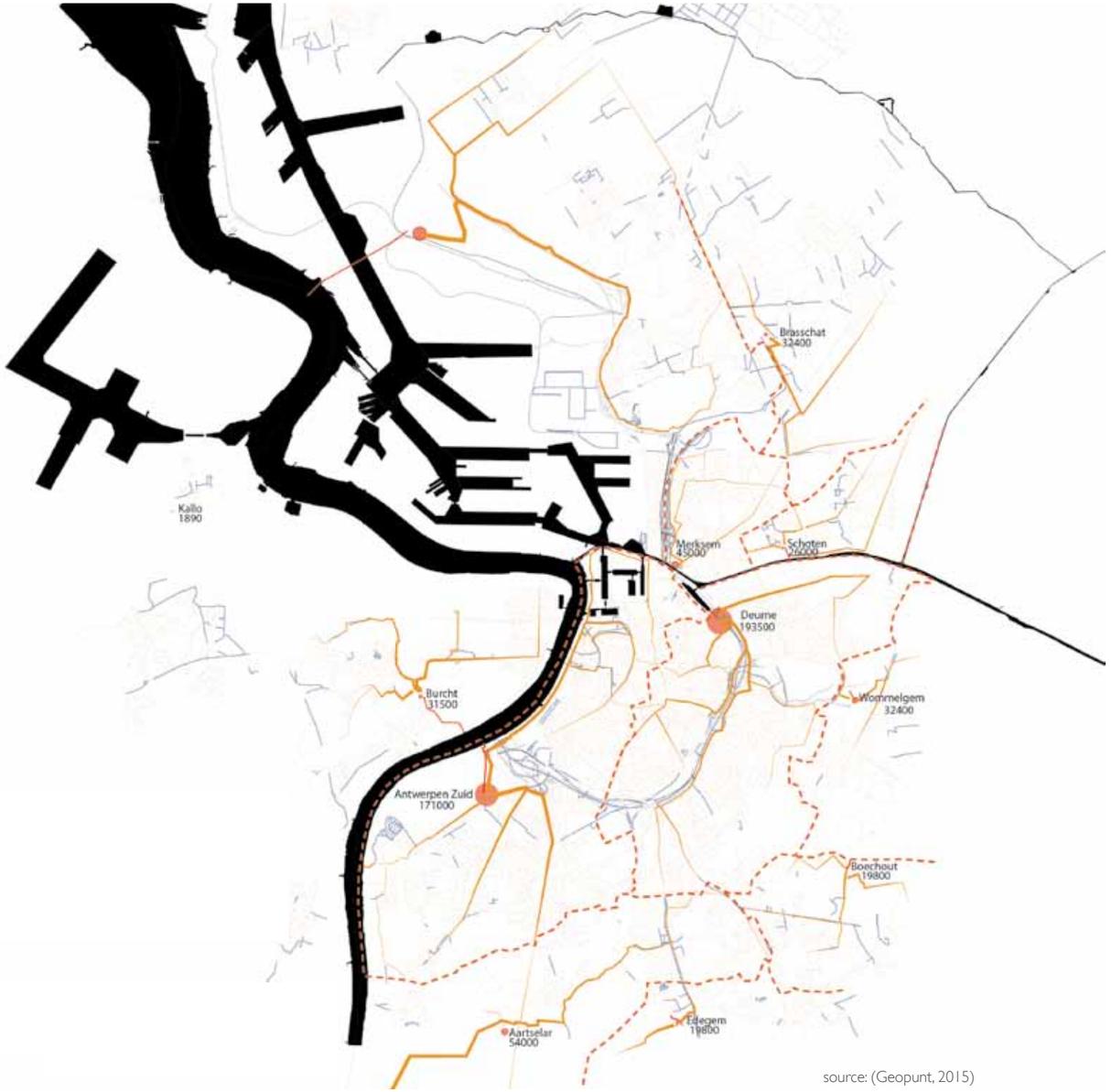


source: (Dillen, 2015)

Solid waste

The municipal waste collection of Antwerp is organised by the city itself and not outsourced to any private company, like in the surrounding municipalities. Therefore, the city of Antwerp owns three garbage truck hubs, from which trucks depart every morning, to collect waste and deliver it to specialised companies, which on their turn trade it to other more specialised companies. Some waste processing businesses are operating on a provincial level, such as the green waste digester in Brecht, others on regional or national level, such as the paper factory in Ghent or the plastic collector in Willebroek. These highly specialised and centralised enterprises, constitute a tree shaped system, which explains the long distance waste has to travel before getting processed.

Yet, in this, Antwerp –as the second largest sea harbour of Europe– is operating also on a larger scale as an essential node on the routes of dirt; beside the municipal waste, Antwerp is also functioning as a hub for both national and European waste flows. The European electronic waste for instance is passing through Antwerp on its way to get 'processed' –burned in unhealthy circumstances – in Ghana or India (Davidson, 2010).



source: (Geopunt, 2015)

Wastewater

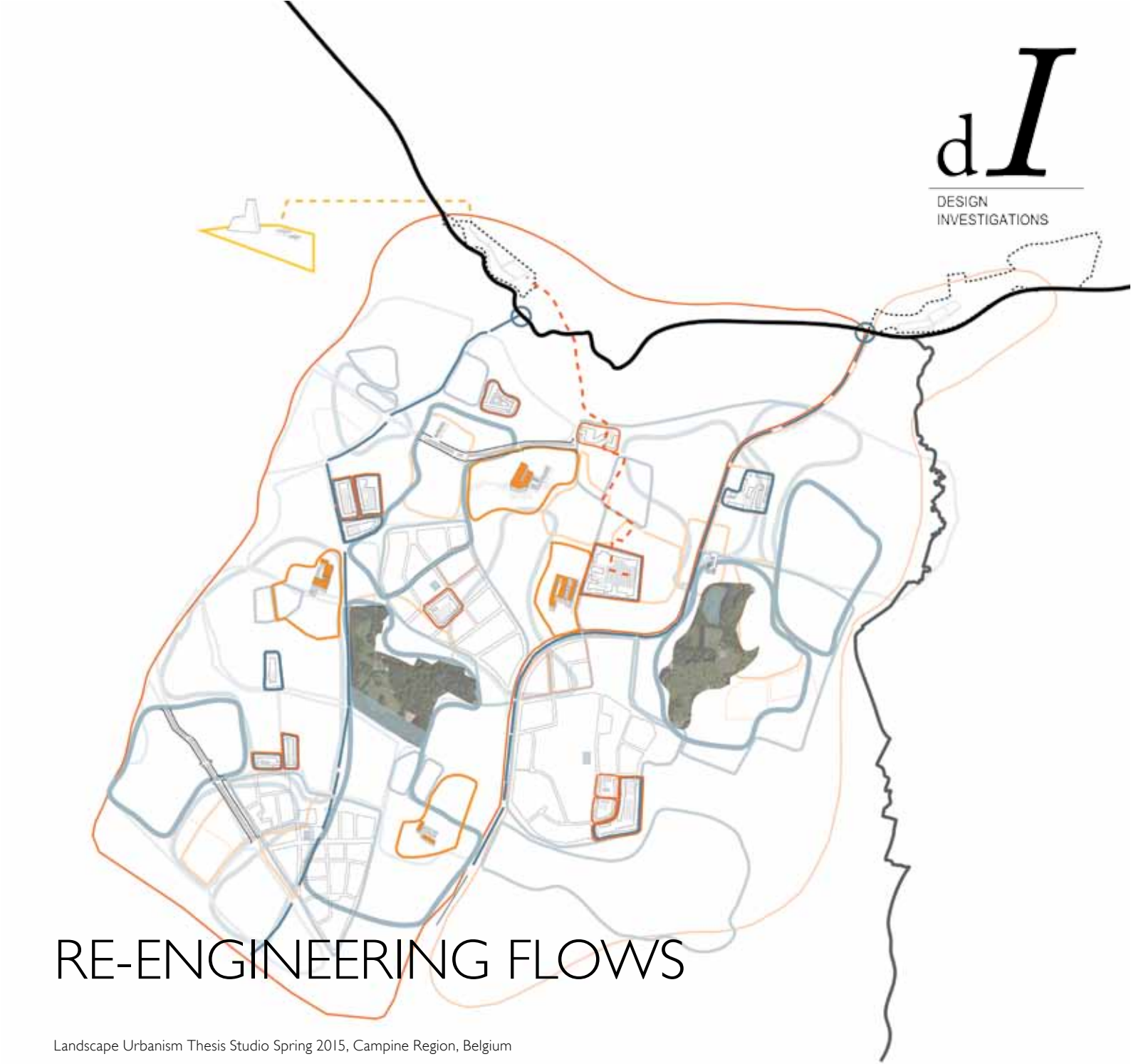
Antwerp wastewater is directed via the sewers to the two main water-cleaning stations in the city: Antwerpen Zuid and Deurne, which treat the wastewater of respectively 171000 and 193500 inhabitants (aquafin, 2015). This operation required the realisation of long and costly sewage pipes and on top of that it contributes to a disequilibrium in hydrologic systems: enormous quantities of water are extracted at a certain point and after consumption and cleaning replaced in completely other hydrological basins, which provokes in turn an impoverishment in ecological terms. In addition to this, the systems' infrastructure is built according to a clear hierarchy which can be considered as a manifest expression of the tree shaped system. This also demonstrates its vulnerability: once an element of the hierarchy fails to operate, it has consequences on a much larger scale.

european postgraduate masters in

urbanism

strategies and design for cities and territories

UPC Barcelona | TU Delft | KU Leuven | IUA Venezia



dI
DESIGN
INVESTIGATIONS

RE-ENGINEERING FLOWS

Landscape Urbanism Thesis Studio Spring 2015, Campine Region, Belgium

Authors: Caterina Rosso, Carmen Van Maercke

Promoter: Bruno De Meulder

dI
DESIGN
INVESTIGATIONS

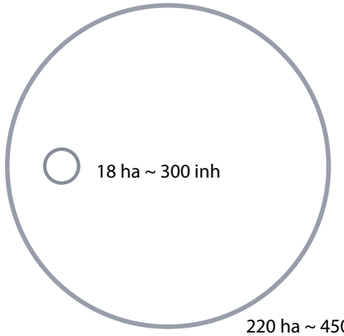
RE-ENGINEERING FLOWS

Landscape Urbanism Thesis Studio Spring 2015, Campine Region, Belgium

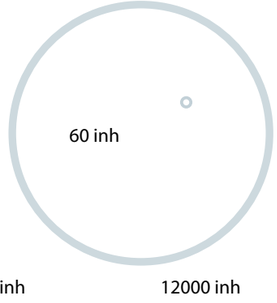
Authors: Caterina Rosso, Carmen Van Maercke
Promoter: Bruno De Meulder

Waste water flow

RAIN WATER



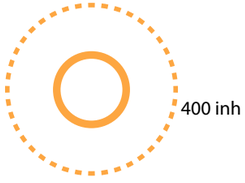
GREY WATER



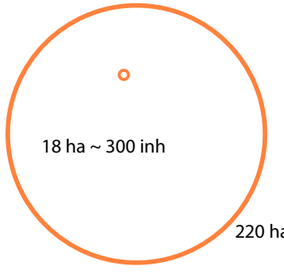
BLACK WATER

Solid waste flow

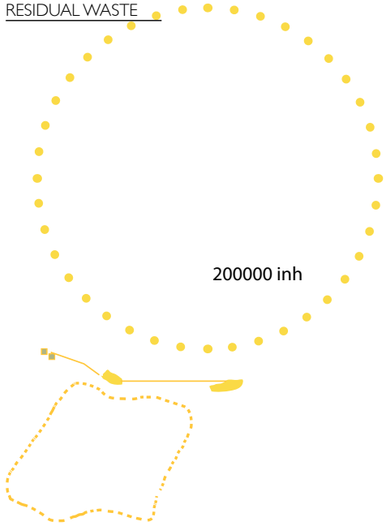
PAPER



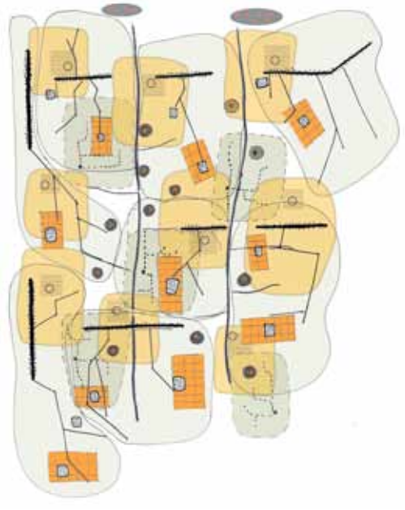
BIODEGRADABLE



RESIDUAL WASTE



Matrix: new waste sheds for restructuring re-engineering and rescaling wasteflows.



Envisioned wastesheds

Form the principles of economy of scale:

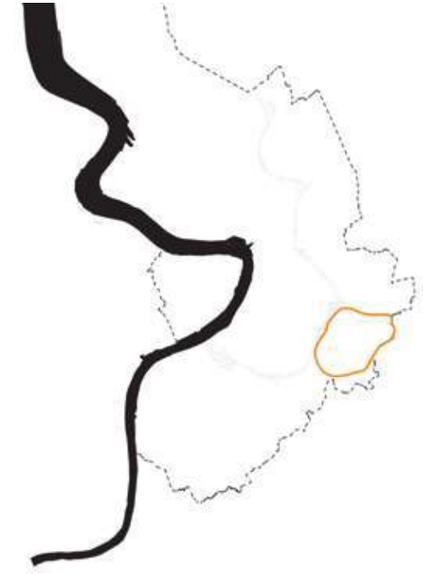
2. Identify optimal scale
A second element to consider in the restructuring waste flows is to define the optimal scale for each flow, balancing economies of scale (hence efficiency) with ecological performance. Strategies involve further the unravelling of waste flows into more specialized sorting of materials, in order to be able to engineer the most appropriate procedure and life cycle for each of them.

3. Disconnect and redirect, creating wastesheds
Thirdly, cells, or new wastesheds can be created by disconnecting and redirecting the new wasteflows according to the optimal scale. These wastesheds function as natural waste management areas (per product) that reconfigure the spatial structure of the territory.

RE-ENGINEERING FLOWS

"Re-engineering flows" explains the urban design strategies developed for restructuring, rescaling and re-engineering the current waste flows at the scale of a city fragment. A transition to a more sustainable way of life is made possible by technological solutions and behavioural changes, but an effective change is possible only if they are led by a transformation of the physical characteristics of the city through urban design (Frey, 1999). In what follows we set up a strategy to design a more sustainable urban form by re-directing waste flows. We make use of waste flows to produce and shape space and to (re)structure the urban tissue of Antwerp's 20th century belt.
By disconnecting and redirecting existing waste flows from the currently centralized waste management systems, new waste-sheds are envisioned according to the principle of economies of scale. This is tested for the waste flows of water, paper and residual waste.

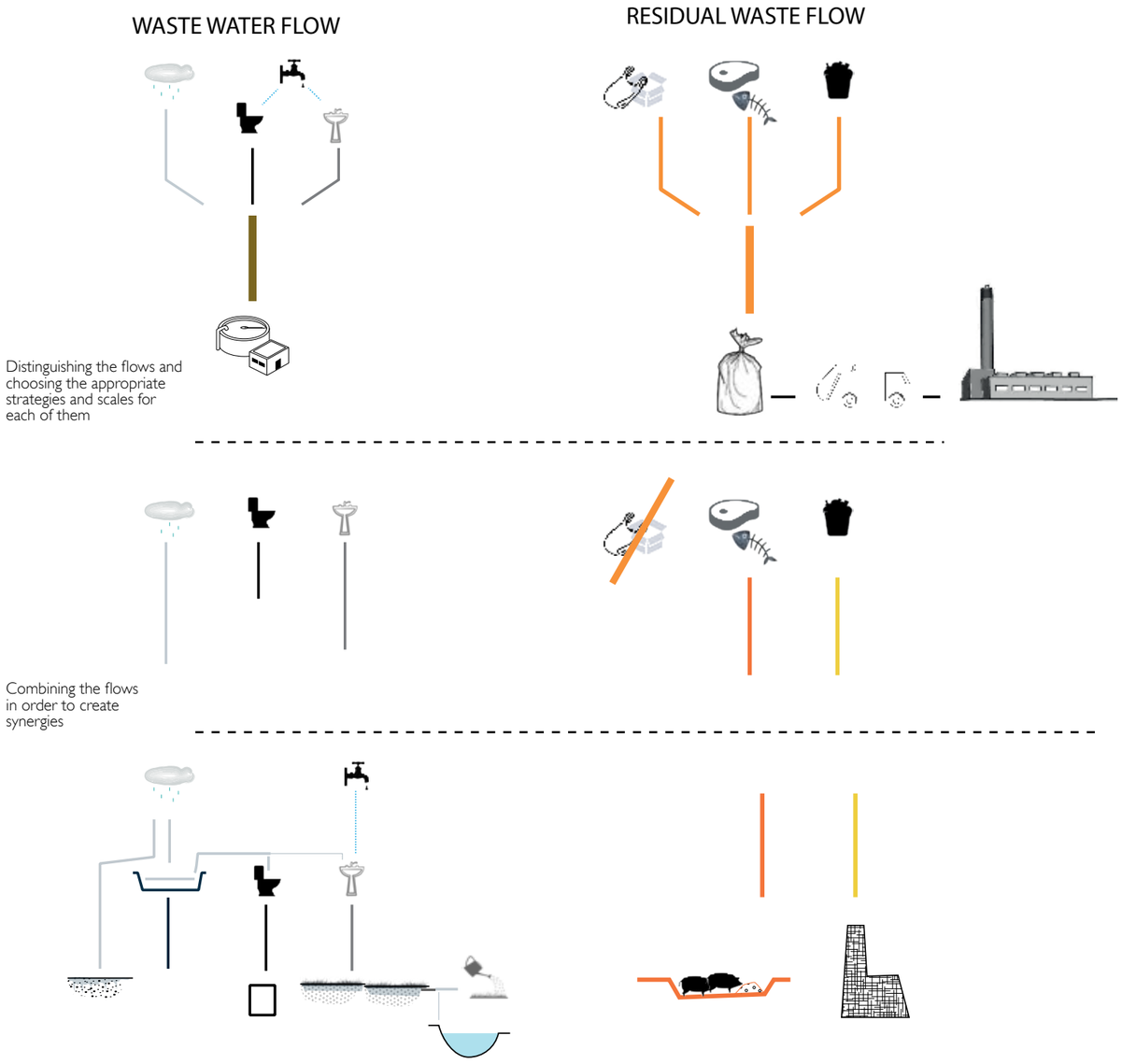
The 20th century belt characterised by a horizontal patchwork of single family houses, oversized roads and large monofunctional patches such as supermarkets or sport facilities.

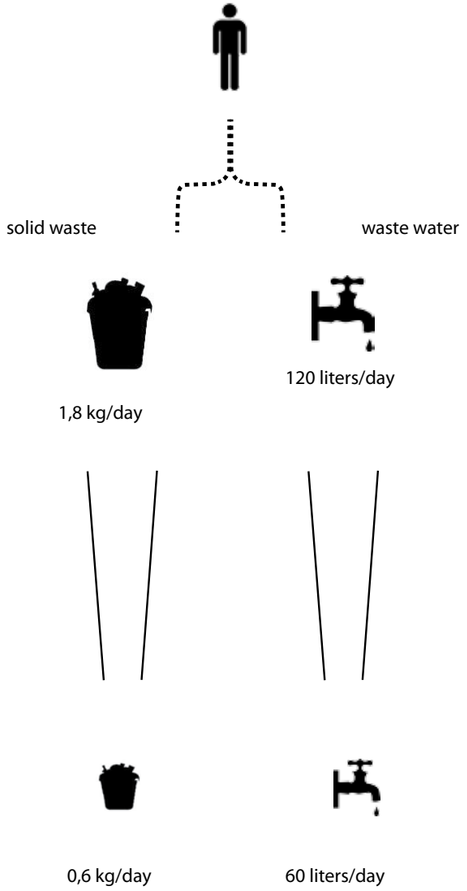


Location of Deurne Zuid

The test-site

In order to test this vision, a representative site of 3 by 3 km is chosen in the 20th century belt, known as Deurne Zuid. It is part of the district of Deurne, in the Eastern part of the belt.





source: (Dario Ruggiero, 2015)

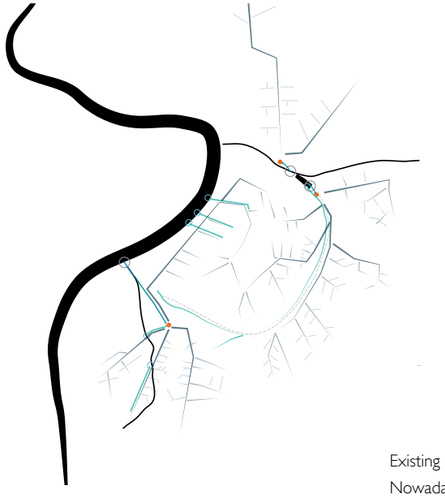
ECONOMY OF SCALES

By starting from the principle of economy of scales, that means recognizing the optimal scale for each flow that constitutes the system, a shift will be made from traditional engineering schemes and solutions, towards a social, economic and ecological infrastructure.

Using this concept, we have investigated how to restructure both the flows of waste water and solid waste (with particular attention to residual waste and paper). The rethinking of new flows concerns two aspects: a more specific distinction of the existing products and how to minimize the production of "waste", and the application of specific strategies appropriate to each material that permits a reduction of processual complexity, a link with other flows to re-establish a cyclic nature of this flow or a simpler less impacting way to deal with it.

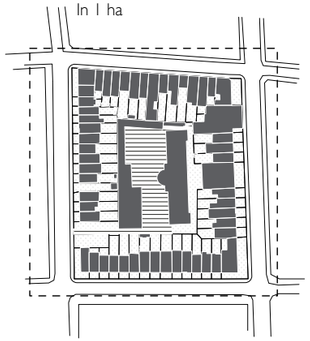
As for the water, a sustainable management of water-cycle is based on the valorization of less valuable waters and the re-use of high quality water exclusively where such characteristics are really needed. The main distinction between the categories of "black water" (the one water to flush the toilets), "grey water" (coming from other household functions) and "rain water" is the first step for reducing the big amount of waste water reaching the water cleaning systems nowadays and for the rethinking of more reasonable cleaning strategies.

In terms of residual solid waste, it is nowadays consisting of the sum of three kinds of elements more or less equally distributed: packages that envelope food and other goods, biodegradable material that is not compostable (like for example cooked food) and all the other kind of household waste that cannot be sorted. The abolition of disposable packages from actual way of consumption is already proposed by some shops and adopted by individual consumers, but it should be reorganized in a systemic way. Supermarkets can play a role in a new flow of material, by promoting reusable packages and installing cleaning and returning sites. This would entail the disappearing of 30% of the residual waste produced nowadays. Another 30%, coming from biodegradable material, can be split from the residual waste, in order to become part of a more valuable chain than the one of burning waste in big incinerators.



Water cleaning station
main "branch" sewer
second "branch" sewer
third "branch"
rain water separate
drainage system
overflows

In 1 ha

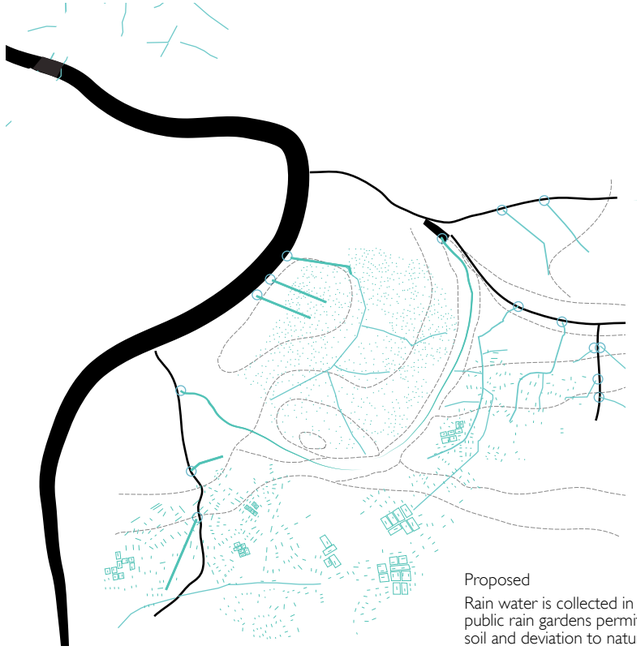


Density: 113 inh/ha

Water on
public surface: 3.4 m3
Open private: 5.38 m3/day
Roofs: .11.2 m3/day

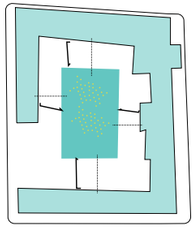
Existing

Nowadays the rain water is mainly drainaged into the sewage system.



separate drainage system
for rain water
public rain garden
entrance in streams
private rain garden

collection on roofs

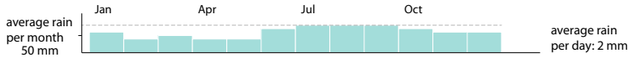


Hypothetic density: 210 inh/ha

Proposed

Rain water is collected in rain garden for private use; public rain gardens permit infiltration of water in the soil and deviation to natural streams.

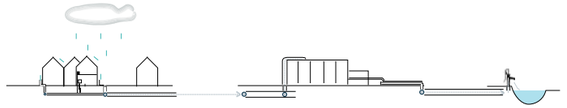
source: (Geopunt Vlaanderen, 2015)



RAIN WATER FLOW

Nowadays rainwater falling on the roads and roofs is mainly collected in pipes and led into the sewage system. This implies on the one hand that it is not saved or used for any specific function, and on the other that it can occasionally produce overflows (from the sewage into natural streams) and overcharges the water cleaning stations so as to increase its efficiency (Nicola Martinuzzi, et al., 2104).
Actually, rainwater represents a local and renewable source which requires simple and economic treatment (it generally simply needs an efficient filtration system). The collection of rainwater (of good quality once purified) for private use from roofs and gardens, would be sufficient for the household demand of water for the 30%, (for house cleaning, toilet flushes, laundry) and the collection of rainwater on public surface can provide the water for the cleaning of roads and other external usages.

2015



2045

Private use

Public use:
cleaning and cooling

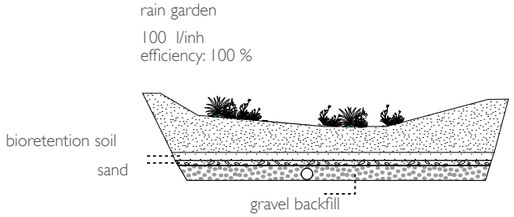
Inside natural
streams

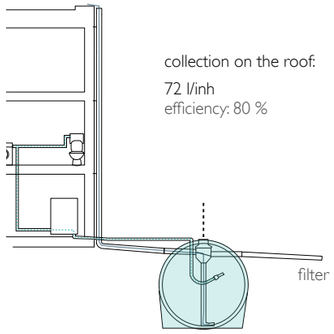
The rain may be collected and cleaned by means of underground filters (whose efficiency is of 70-80%, because the water is partially reused for cleaning the system) or by means of rain gardens (private or better collective, in order to diminish the consumption of surface, 100% efficiency).
This solution permits the recycling of the whole amount of rainwater and guarantees a high level of treatment. It consists of a waterproof basin filled with inert material. It is a very flexible system: it may consist of one basin or the sum of small basins, enriched by different kinds of plants.

As for the collection on the roads, a new system would take advantages of the natural morphology of the territory by deviating along main lines the water by following the topography and ending up in natural streams. Public rain gardens along the road imply a system of infiltration in the ground, whenever it is not necessary for special use: the slow percolation through gravel material, filters the water and recharges the aquifer as in the natural conditions of permeability.

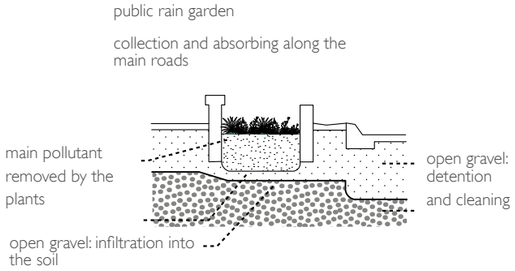
Strategies

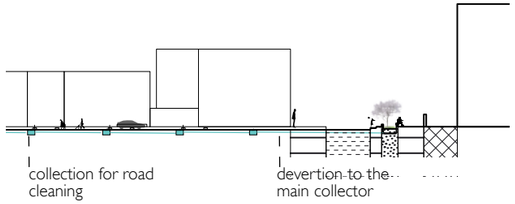
Private space





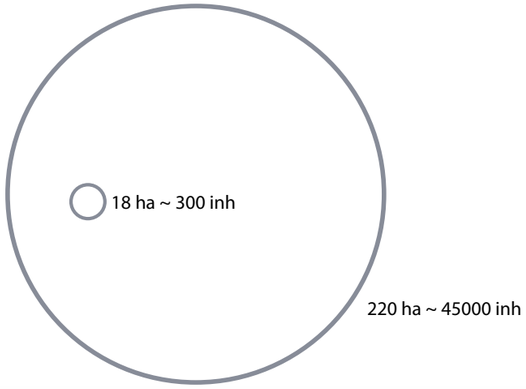
Public space





source: (Nicola Martinuzzi, et al., 2104)

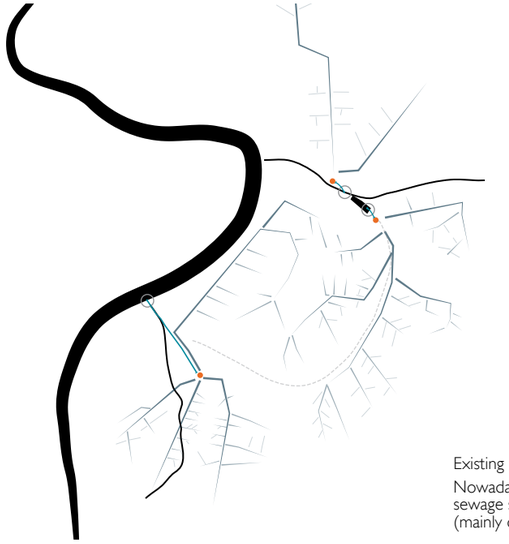
Optimal scales



Rain water flows in Deurne South

By using this strategy, the rain water system would be completely detached from the existing sewage system and its centralized logic. The rain garden-collectors along the main road will become the new backbones of the system (two in the case of Deurne are identified, representing the "pipes" of a new system constituted by lines and small cells, which represent the "shed" in which a rain-garden acts, normally of one block in the belt).

New wasteshed tested on Deurne Zuid

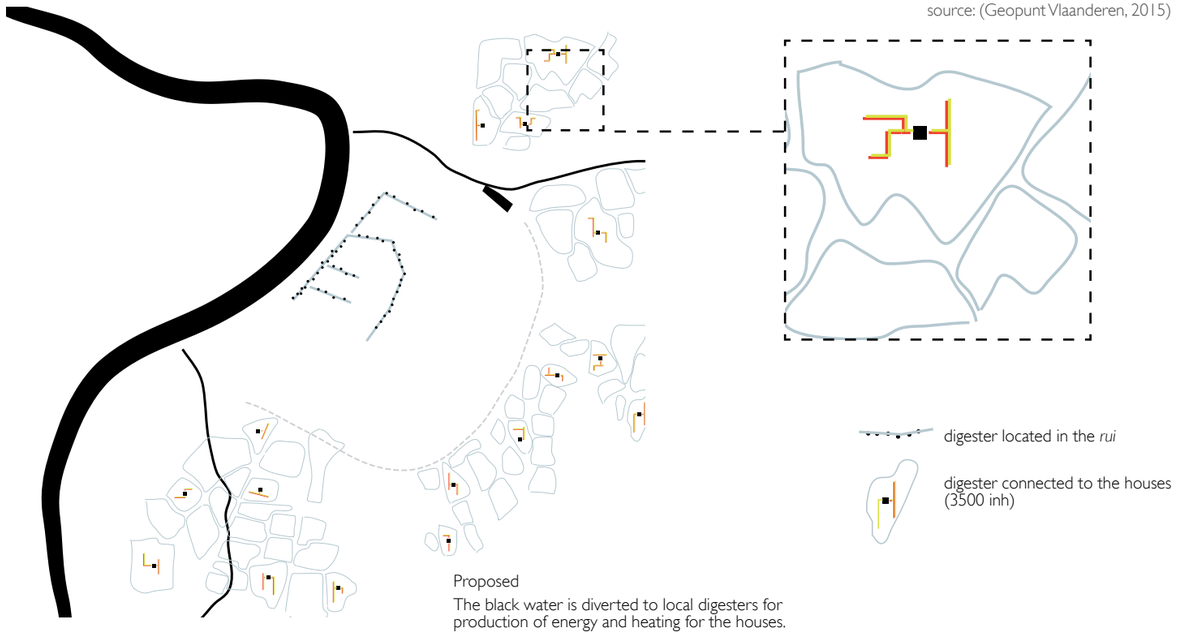


Water cleaning station
main "branch" sewer
second "branch" sewer
third "branch"
rain water separate
drainage system
overflows

Existing

Nowadays the black water is collected in tree-shaped sewage system and directed to water celaining plants (mainly one in Deurne Noord, one in Antwerp South)

source: (Geopunt Vlaanderen, 2015)



digester located in the *rui*

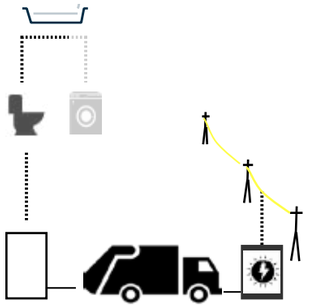
digester connected to the houses (3500 inh)

Proposed

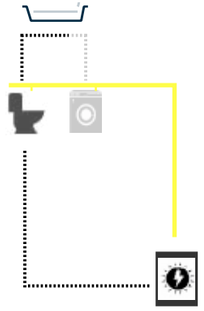
The black water is diverted to local digesters for production of energy and heating for the houses.

2015

2025



2045



BLACK WATER FLOW

Generally, in order to satisfy water-needs, drinkable water is drawn from the public aqueduct network: this of high quality water, is used indiscriminately for both drinkable and undrinkable scopes. Thus, a double wastefulness occurs: high quality water is used for poor aims and it is "wasted away" by means of the sewage system. Black water constitutes nowadays approximately the 30 % percent of waste water produced per person (corresponding to 30-40 liters per day). Separating the black water collection form the sewage system is the first step; also to this will allow the transformation of the infrastructural system of grey water.

Linked to the rainwater management, the reuse of rainwater to flush toilets reduces enormously the consumption of drinkable water. Furthermore by detaching the black water collection form the sewage system is the first step to transform the infrastructural system of grey water.

Secondly, the black water constitutes itself a valuable resource: many new developments have already envisioned or applied the adoption of district anaerobic digesters to convert black water and additional biomass (e.g. organic waste or grease) in energy for the neighbourhood itself (Kim Augustin et al., 2014).

The detachment from the system is made possible by the reactivation of the septic tanks.

During a first phase the black water can be already collected by traditional ways of transport and redirected to black water machines for the production of electricity. It is calculated that they can produce enough electricity for half of the households, part of the collections and 30 percent of the heating. (Kim Augustin et al., 2014)

The gradual replacement of buildings would permit the complete application of a strategy for black water flow and black water infrastructure: the introduction of vacuum toilets would keep the production of black water at one tenth of the present one; the households would be directly connected by pipes to the digester, a system that can be integrated in the built environment and requires only a small space (about 20 m^2).

This implies that the new system would follow a different rule and trajectory from the existing ones, since it is governed by a different system (a vacuum system, not depending on gravity).

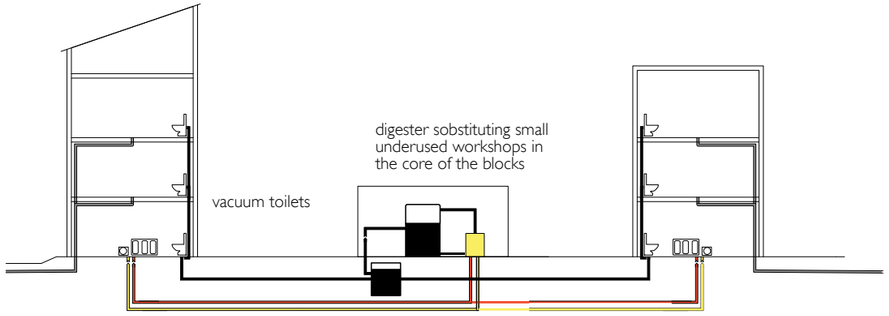
The central digester converts waste in energy and directly re-link it to the surrounding buildings.

A possible location of black water digesters in the city centre, where there is less abundance of surfaces, consist in reusing part of the wasteful infrastructure of Antwerp, the ruien. Here the abundance of space and the direct connection to the houses overhead, would facilitate the introduction of the system.

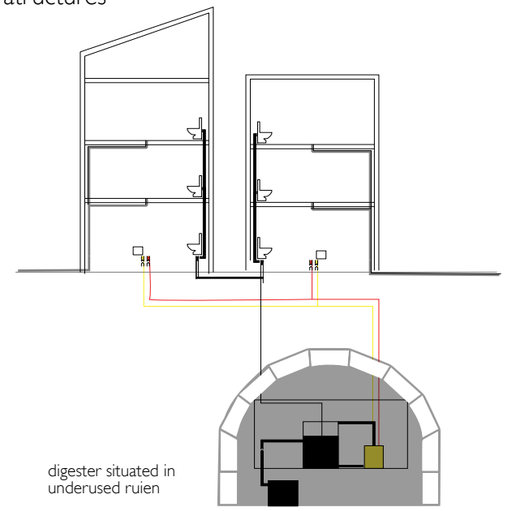
Strategies

Black water treatment: biogas production
1 machine/3500 inh
energy for 50% of the households
heating for 30% of the households

Re-used of abandoned spaces



Re-use of underused infratructures



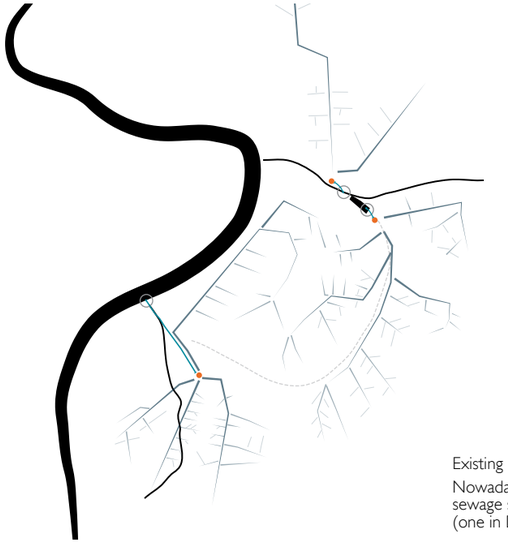
source: (Kim Augustin et al., 2014)

Black water in Deurne Zuid

This kind of system, working on a local level, can have different sheds. The optimal scale considered is for 3500 inhabitants, since it has been concretely already experimented in new development projects (settlement Jenfelder Au).

3500 inh

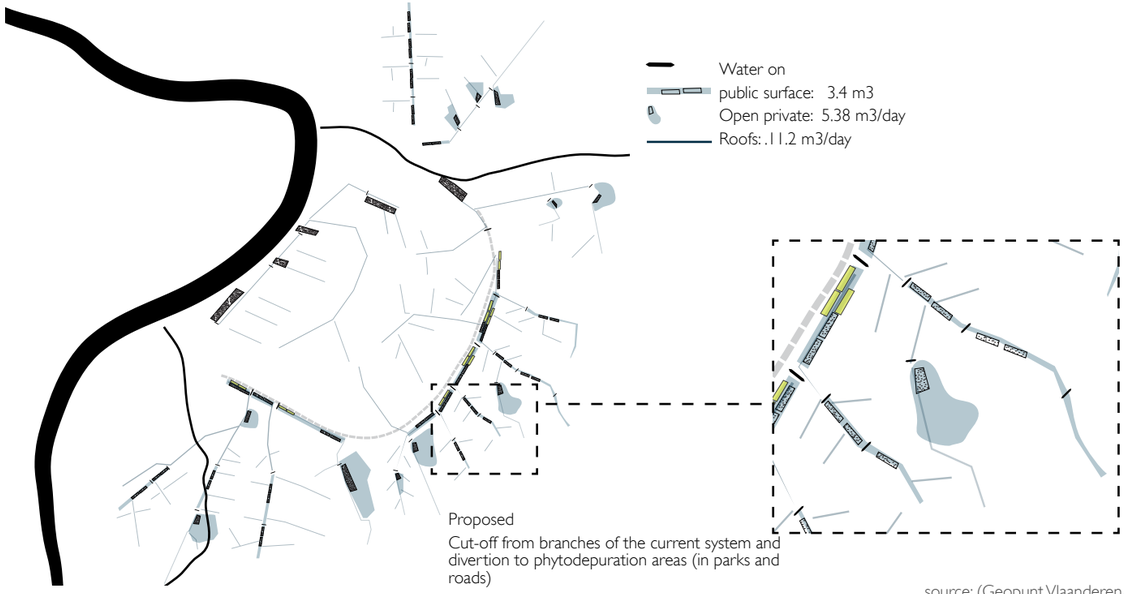
New wasteshed tested on Deurne Zuid



Water cleaning station
main "branch" sewer
second "branch" sewer
third "branch"
rain water separate
drainage system
overflows

Existing

Nowadays the black water is collected in tree-shaped sewage system and directed to water cleaining plants (one in Deurne Noord, one in Antwerp South)



Water on
public surface: 3.4 m3
Open private: 5.38 m3/day
Roofs: .11.2 m3/day

Proposed

Cut-off from branches of the current system and divertion to phytodepuration areas (in parks and roads)

source: (Geopunt Vlaanderen, 2015)

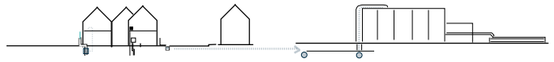
GREY WATER FLOW

The detachment of black water collection from the sewage system is at once the first step to permit the transformation of the infrastructural system of grey water.
Grey water gets sanitized much faster than black water.
Phyto-depuration answers appropriately to the request of efficiency, simplicity and low cost of maintenance, and adaptability to variations in water load.
Furthermore, it permits the treatment in situ, following a logic of decentralization of the depurative system. Thus, the "depurator" is not anymore something to confine far from residential areas.

The conversion of the water cleaning system entails a cut-off of branches of the centralized system. The strategy foresees the recognitions of strategic places where to act operate this separation: the existing infrastructure is "recycled" for the new system, but water would stop its actual itinerary at the places where the water gets cleaned, mainly in: big public parks, and along the main radial roads where nowadays the secondary pipes of the drainage system pass, and benefitting on big impermeable underused surfaces around them (parking lots of supermarkets, big companies, ...)

Times and processes of phyto-depuration depend mainly on the use assigned to the purified water: the re-use for irrigation (of parks, vegetable gardens, glass-houses) reduces the needed time and even takes advantage of nutrients contained inside it.
The sub-superficial flow system of phyto-depuration presents noticeable advantages: it limits the risk of bad smell, the generation of insects, and therefore can be used in residential areas. On top of that, it can be perfectly integrated in the public domain, since its surface is walkable.

2015



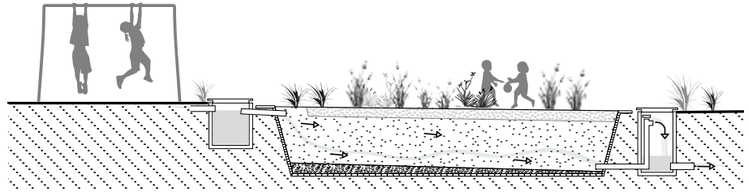
2045

source: (Nicola Martinuzzi, et al., 2104)

Strategies

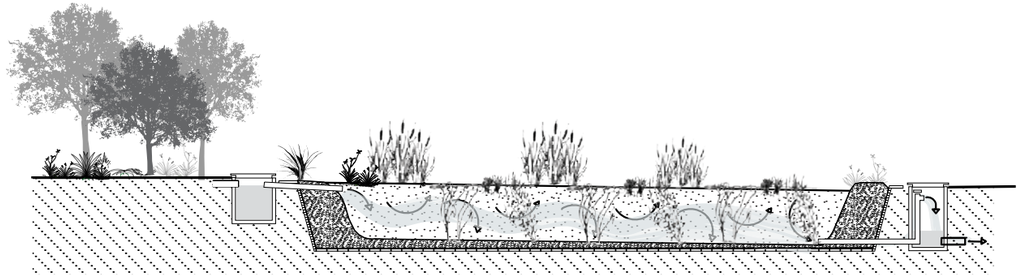
Average amount of space: 3 m2/person
Duration of the process: 9 days for the process

Subsuperficial phytodepuration



Roads, public spaces.

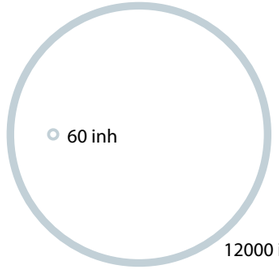
Superficial phytodepuration



Big open spaces,.

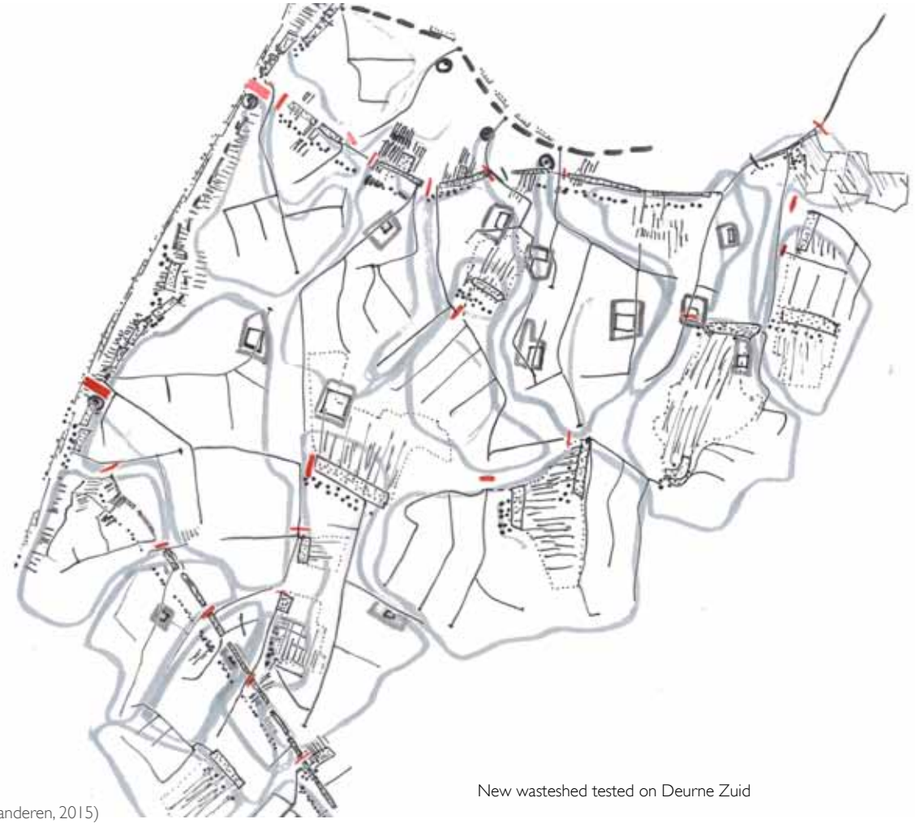
source: (Nicola Martinuzzi, et al., 2104)

Optimal scales



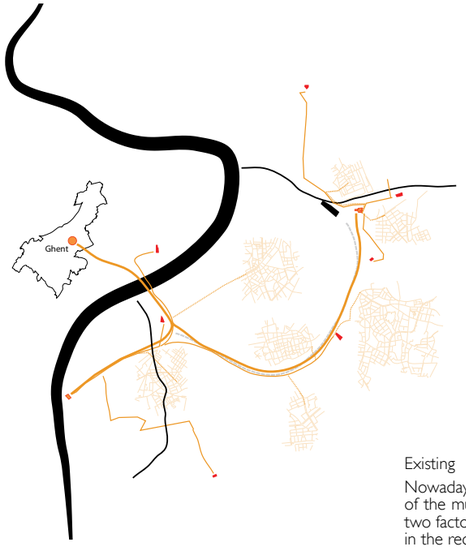
Grey water in Deurne Zuid

The cut-off from the central system and the constitution of autonomous branches of small dimension, that can vary from wastesheds of 60 to 12 000 inhabitants, takes account of the opportunities offered by the place. Other sub-cells can be created which can constitute a small cycle of grewater cleaning , related to one specific function, like for example paper recycling (see further).



New wasteshed tested on Deurne Zuid

source: (Geopunt Vlaanderen, 2015)

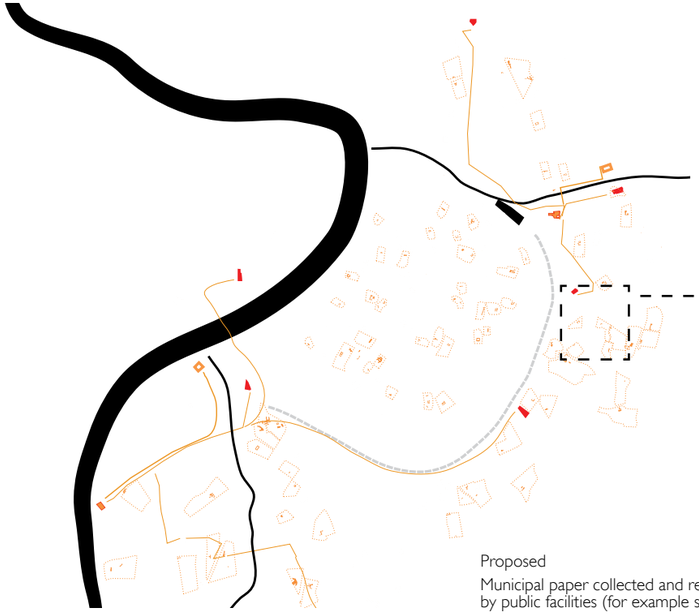


Existing

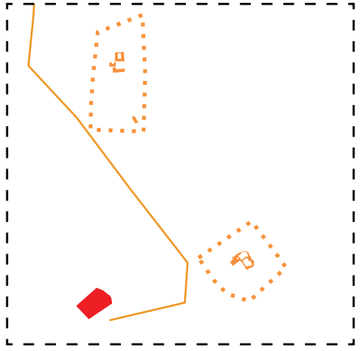
Nowadays the paper is collected by the tracks of the municipality and firstly transformed in two factories in Antwerp; then sent to Ghent in the recycling factory

Recycling factory
Recycling park
First sorting
Main transportation
Hypotetic way of tracks in the city
Movement from recycling park

source: (Dillen, 2015)

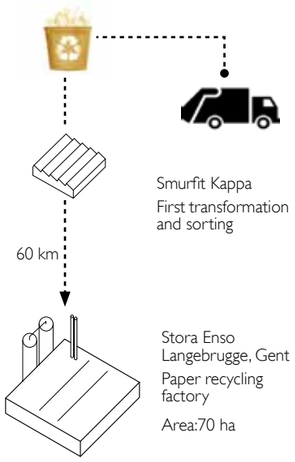


Public buildings and hypothesis of wasteshed



Proposed

Municipal paper collected and recycled by public facilities (for example schools).



Smurfit Kappa

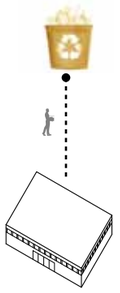
First transformation and sorting

60 km

Stora Enso Langebrugge, Gent

Paper recycling factory

Area:70 ha



Public building

Area: 40 m2

source: (Taramachine, 2015)

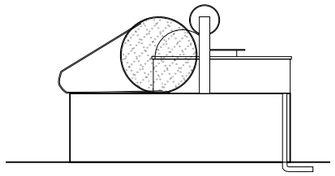
WASTE PAPER FLOW

Downscaling a flow

Nowadays paper recycling is in general an economical valuable activity, carried out by big companies. In the specific case of Antwerp, as described in "Dirty Antwerp" booklet, paper is collected from the three sectors and directed to two facilities for the first phase of sorting and transforming the material, but then entirely sent to a big installation in Ghent, as well as the paper of industrial origin. Big plants need huge surfaces and enormous amount of water.

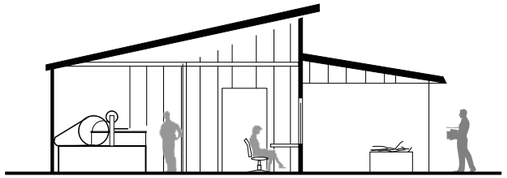
The adoption of new small machines with small capacity (75 kgs/day) would permit the downscaling of the whole system, with the maintenance of the material on site and the reuse of it immediately after the recycling. Furthermore the adoption of this function by small public institutions (for instance schools, libraries, administrative buildings) can combine the service for the surrounding with a new economical source.The machines need only the space of two rooms (often available in public buildings) and the availability of water, so that they should work in synergy with places for phytodepuration.

Strategies



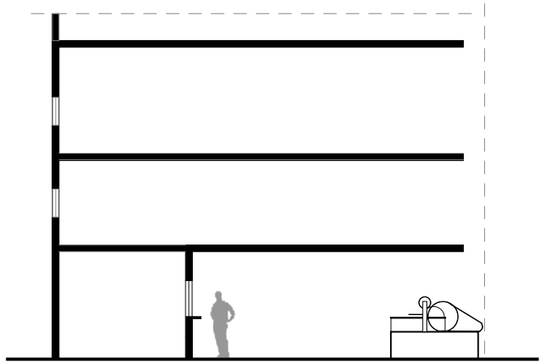
Paper machine:
TARA PaperMek - XV
Capacity: 75 kg/day
Water requirement: 2500 l/day
Area requirement: 2 rooms, 400 m2

New shed



Shed with paper collection, processing and seeling point.
Recognizable point in the neighbourhood

Re-use of underused spaces



Claim of underused places inside institutional buildings (schools, libraries, administrative buildings)

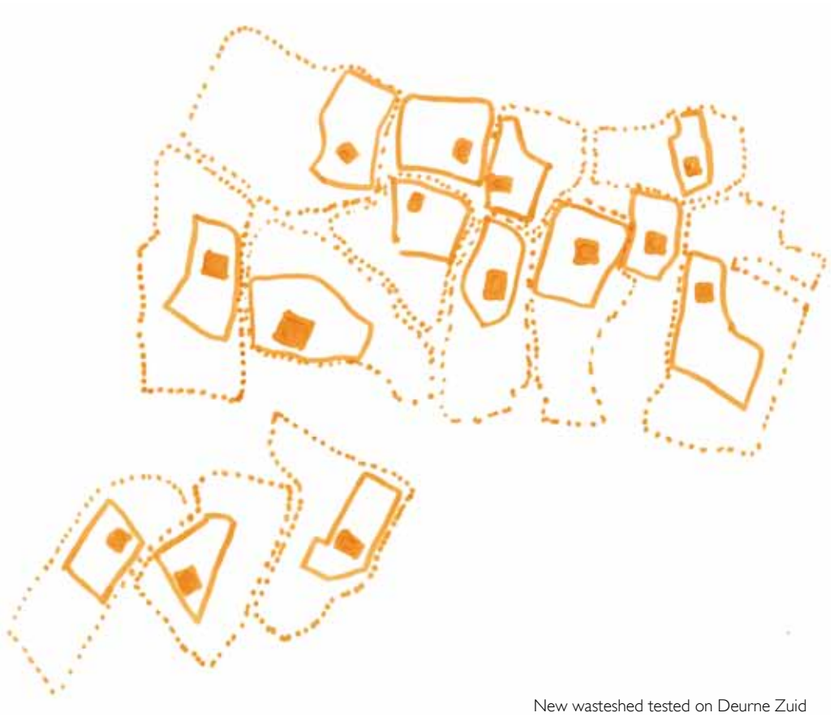
source: (Taramachine, 2015)

Optimal scales

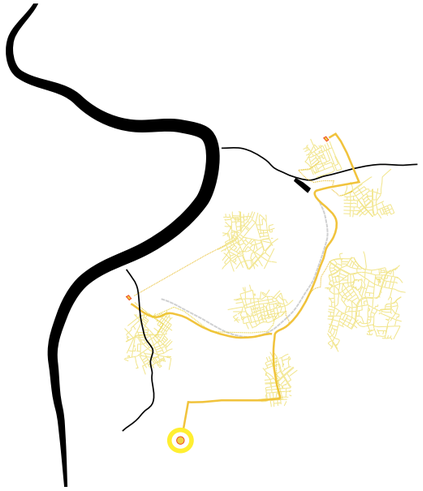
Waste paper flow in Deurne Zuid

In which concern the case of Deurne Zuid, the scheme takes into account the actual dispoinibility of schools, that would permit the collection of the main part of household paper. Every machine would cover the production of paper for the surrounding neighbourhood.

This exemplification shows the opportunities for an area in the belt to reach "self-sufficiency" in terms of recycling and redistributing of paper.



New wasteshed tested on Deurne Zuid



ISVAG incinerator

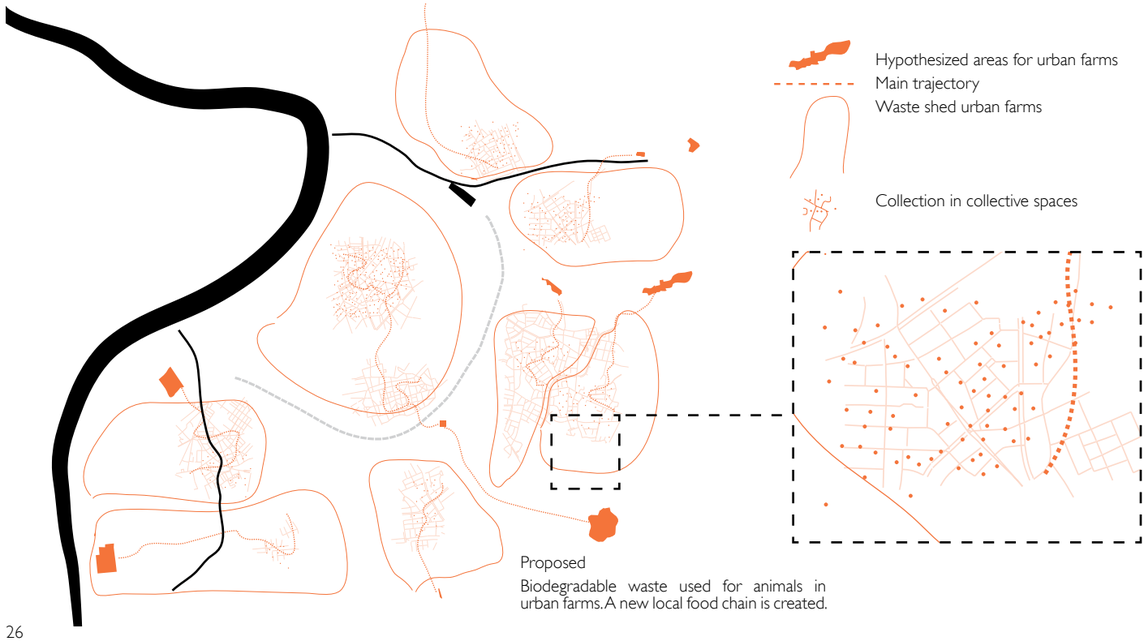
Collection point

Main transportation

Hypotetic way of tracks in the city

Existing

Nowadays biodegradable non compostable waste is burnt in ISVAG ncinerator as residual waste



Hypothesized areas for urban farms

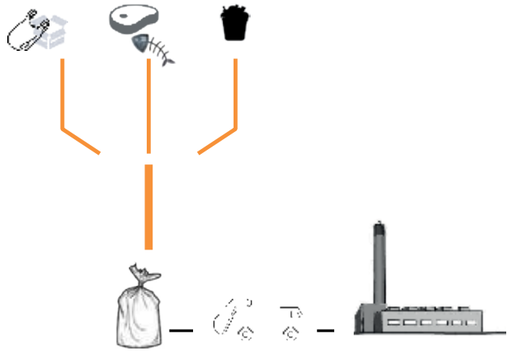
Main trajectory

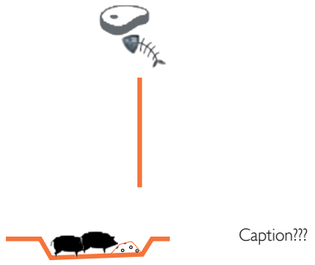
Waste shed urban farms

Collection in collective spaces

Proposed

Biodegradable waste used for animals in urban farms. A new local food chain is created.





Caption???

source: (Dillen, 2015)

BIODEGRADABLE WASTE

Recycling/ from waste to food

Nowadays the biodegradable non compostable waste (cooked food, cheese, etc.) ends in the residual waste and is burnt in the ISVAG incinerator.

To restore the ancient technique of making it the base for diet of farm animals, is a logic practice already ongoing at least in a demonstrative way in Belgium (for example the project of Ghent "hetspilvarken"). The pigs consume about 2-3 kg of food per day and need a relatively small space. Some considerations need to be taken into account about the placement of animals inside the city. However, the shape of the city permits to recognize interesting places already identified as underused green areas at the edge of the belt. On the one hand the small farm system of only some capital permits a better introduction into the urban environment and implies an educational value, on the other hand bigger farms take advantage of the proximity to the built areas, but at the same time can become part of a new chain of local food production and distribution.

Strategies

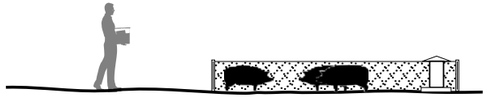
1 pig: 2,5-3 kg/ day of food

1 pig: re-use of biodegradable waste from about 20 ppl

1 pig: 3-9 m2

Embedded in the tissue

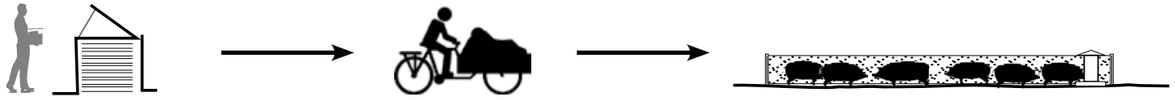
Small-scale scattered farms



educational added value

Direct depositing

Urban farm model



Collection point in the neighbourhood

social jobs creation

farm: 300-1000 pigs

source: (Hetspilvarken, 2015)

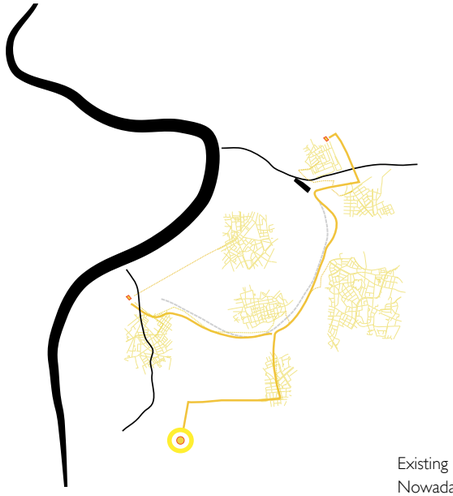
Optimal scales

220 ha ~ 45000 inh

Biodegradable waste flow in Deurne Zuid

The application of these principles for Deurne Zuid, consists of the creation of two farms for the whole district. They would be located close to the district; which this also permits the application of alternative solutions for collecting the material from the blocks and islands of apartment buildings, were collective points can be located.

New wasteshed tested on Deurne Zuid



Existing

Nowadays the residual waste is collected in the city and transported to the incinerator if ISVAG where it burns to produce energy.

ISVAG incinerator

Collection point

Main trajectory

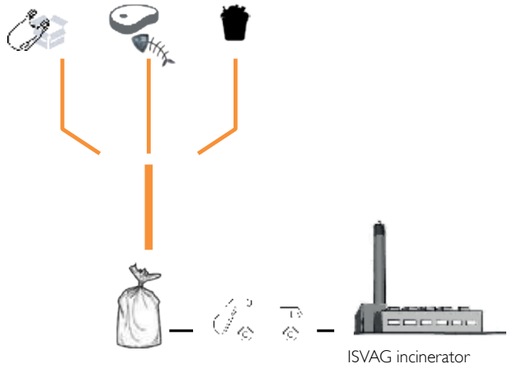
Hypotetic way of tracks in the city

Former landfill

Main trajectory

Proposed

Residual waste is minimized. It is transported to plasma gasifier for production of energy and building material, all together with the material from former landfilled.



ISVAG incinerator

Plasma-gasifier

source: (Dillen, 2015)

RESIDUAL WASTE

Recycling/ from waste to energy

According to calculations by The Journal of Cleaner Production, the European Union's garbage dumps contain an estimated 5 000 million tons of waste. Digging up, sorting and possibly recycling the waste could recover in the region of 5% of the industrial use of materials in the EU during the next 25 years, and the cleanup of garbage dumps could create up to 800 000 direct jobs. (Laevers et al., 2014)

The residual waste of the whole municipality of Antwerp and of the adjacent intercommunales is collected and led to the ISVAG installation. It is a traditional incinerator in the South of Antwerp, established in 1975, converting the waste in energy.

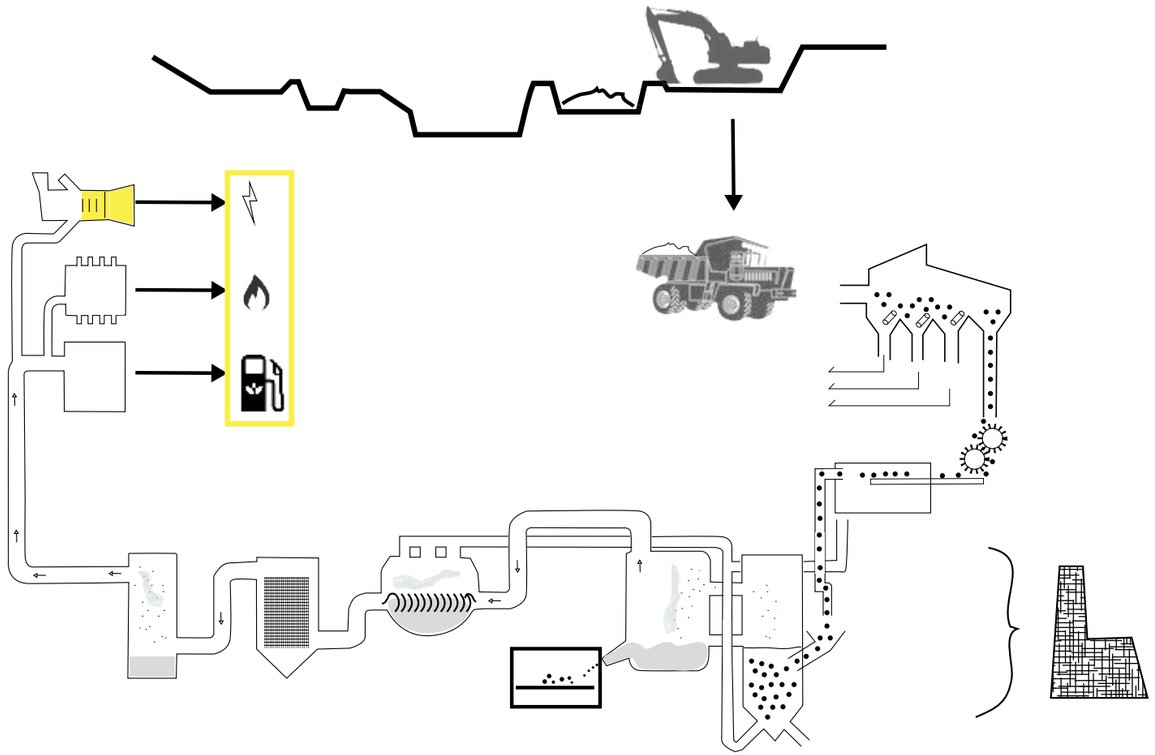
The innovative plasma-technique (already experimented in Campine region in Remo landfill) would make possible to exploit the cleaning of the existing landfills as an energetical source at the same time, and to transform in a more sustainable way the waste produced everyday: the captivating plasmatechnique is "a technology that involves the heating of solids like wood and plastic at ultra-high temperatures and converting it into gas, an energetic gas mixture that can be used to create hydrogen gas. The waste product of the process is melting slag, which can be turned into high-quality building materials and eventually used in the cement and home-building industries. (Laevers et al., 2014) The production of inert granulates, that can be applied as building material instead of gravel (e.g. used as gravel concrete), can have an off-site impact upon local gravel extraction.
(Devocht, 2010, p.285)

The plants for this operation could be part of the urban tissue, or even landmark in the city.

Strategies

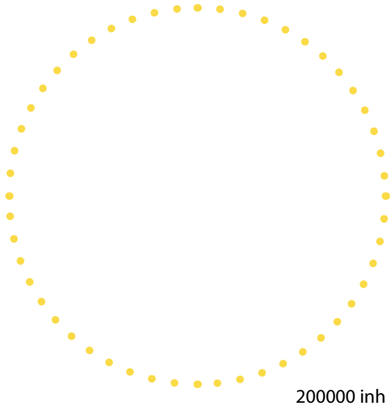
Enhanced landfill mining

Transformation in plasma gas



source: (Ballard, M., 2015)

Optimal scales



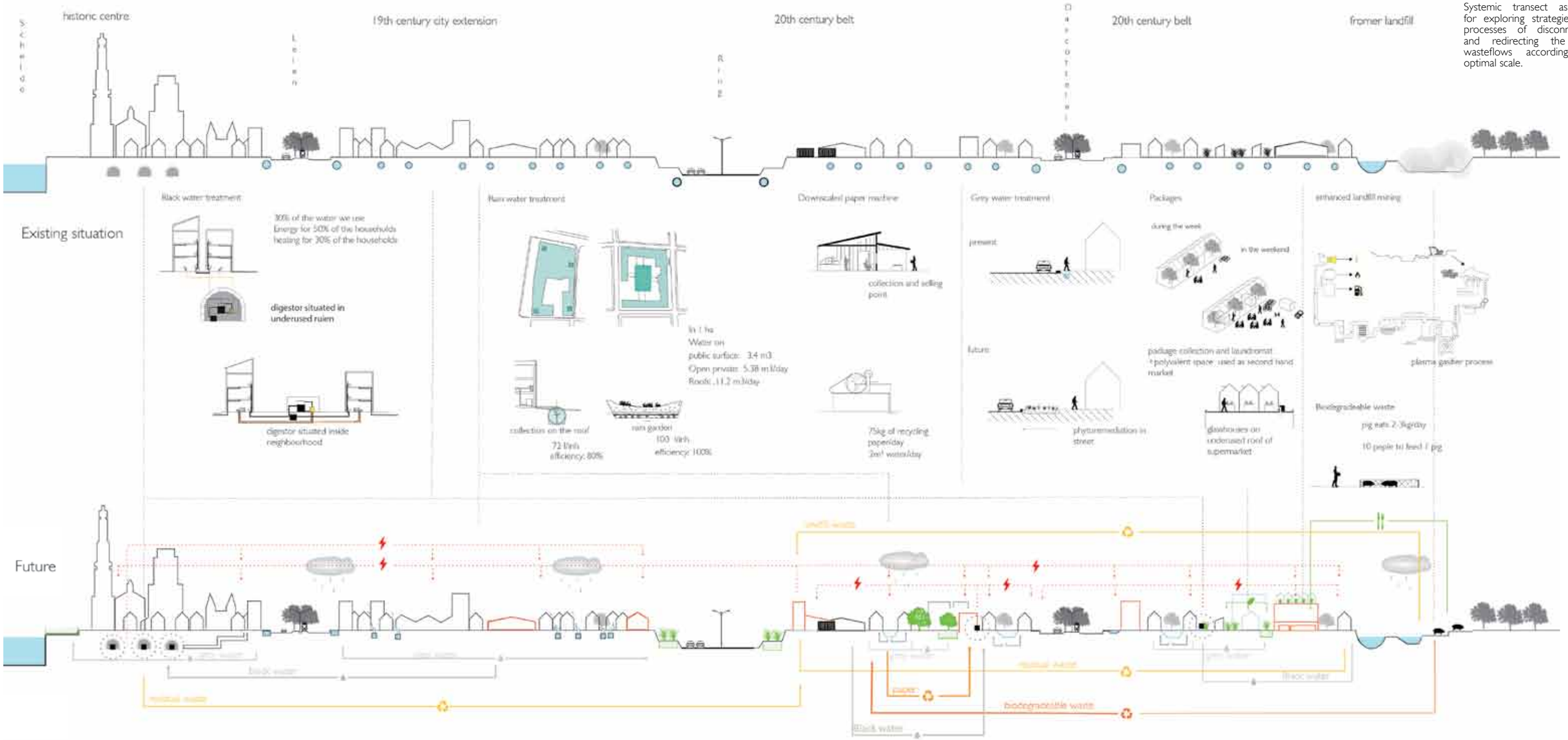
200000 inh

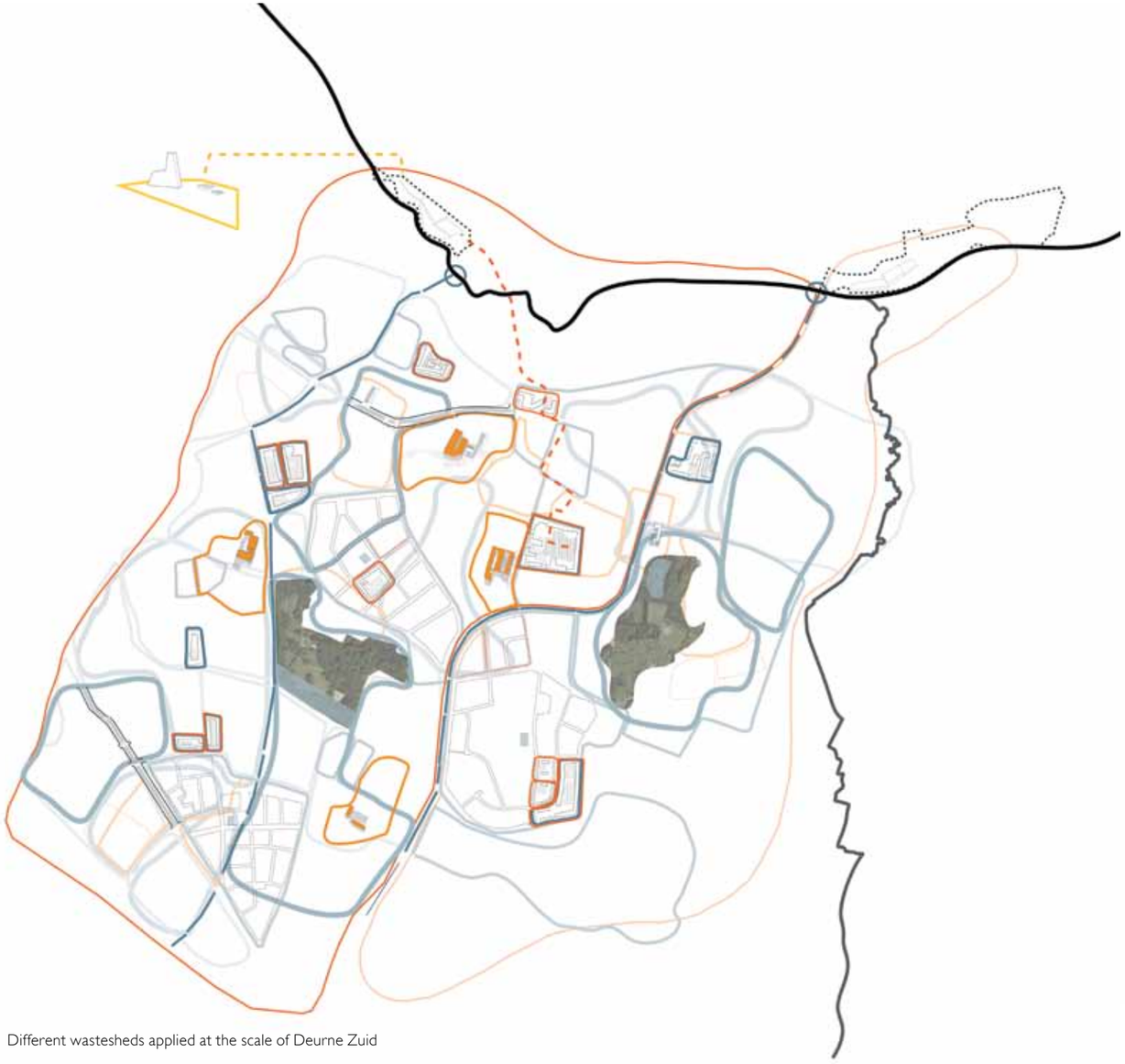
Residual waste flow in Deurne Zuid

The city of Antwerp in the hypothesys of population growth would need two plasma gasifiers to make them working optimally. They would both provide solution for waste produced by the population and for the gradual cleaning of the landfills scattered along the borders of the municipality.
The site of Deurne Zuid contains two of these landfills, (of 3,5 ha and 9,5 ha, respectively) occupying wide areas of the Rivirienhof, in proximity of the river Schijn.

New wasteshed tested on Deurne Zuid

Systemic transect as tool for exploring strategies and processes of disconnecting and redirecting the new wasteflows according the optimal scale.





Different wastesheds applied at the scale of Deurne Zuid

Cellular multiscalar system in Deurne Zuid

By means of the principles of economy of scale, we pleed for a shift of the current tree shaped waste infrastructure to a cellular multi-scalar system, which is shaped by the 'economy of scales' and finally results in new spatial configurations.

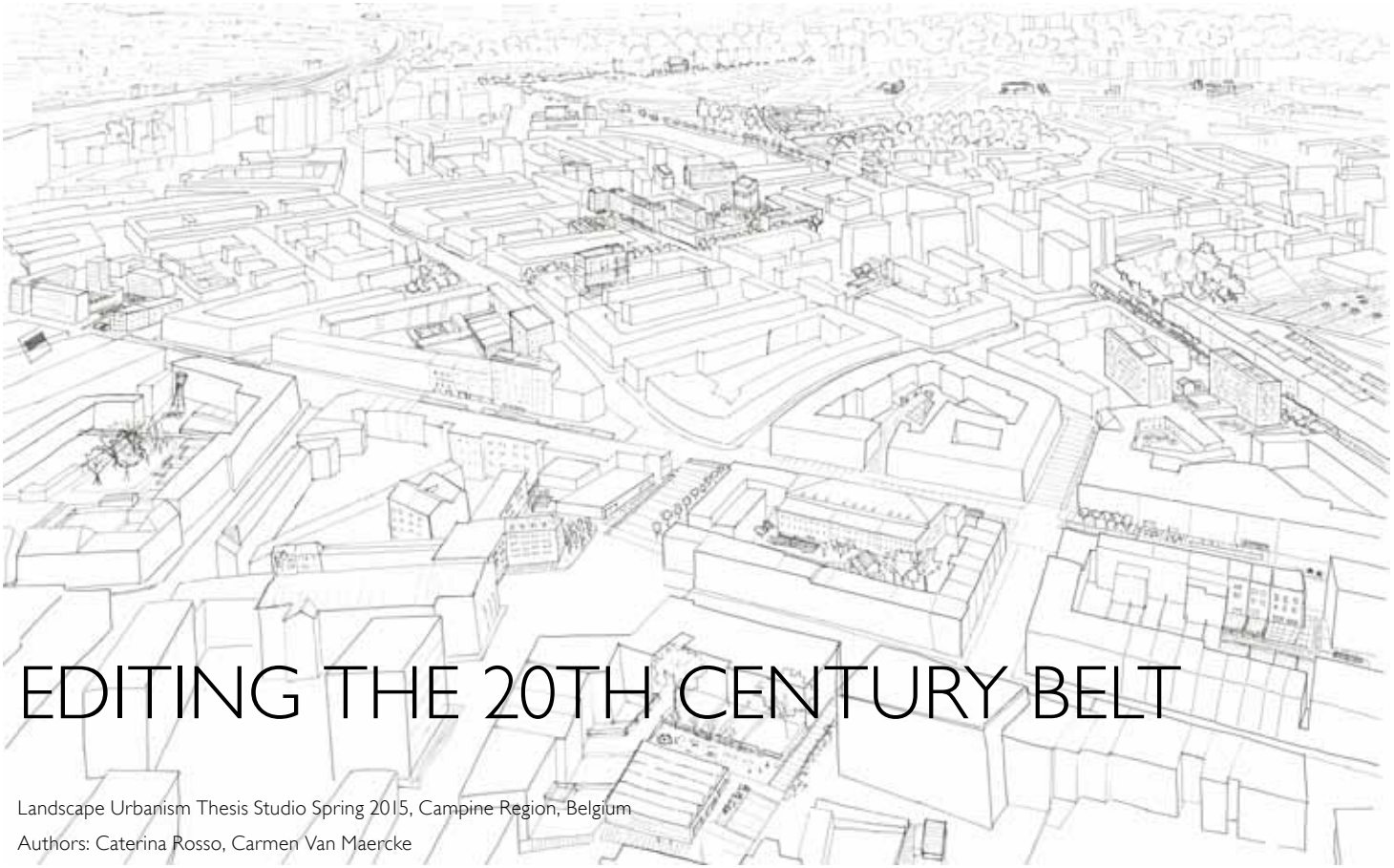
european postgraduate masters in

urbanism

strategies and design for cities and territories

UPC Barcelona | TU Delft | KU Leuven | IUA Venezia

dI
DESIGN
INVESTIGATIONS



EDITING THE 20TH CENTURY BELT

Landscape Urbanism Thesis Studio Spring 2015, Campine Region, Belgium

Authors: Caterina Rosso, Carmen Van Maercke

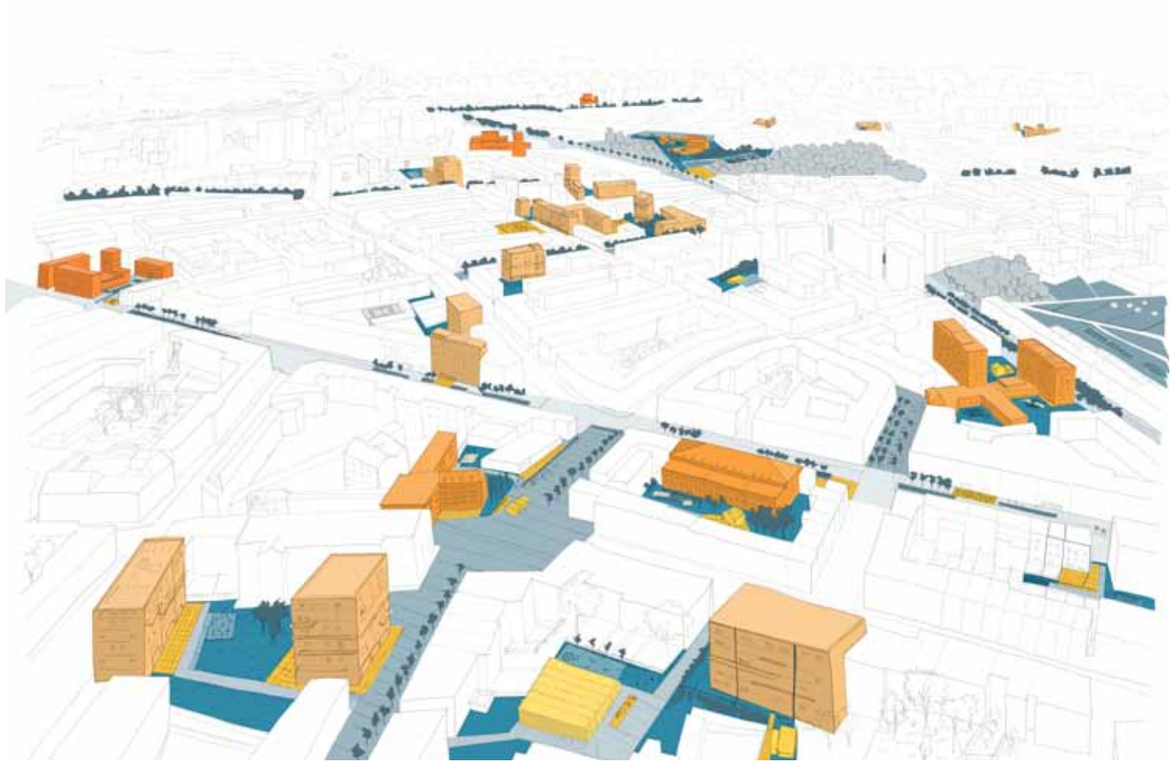
Promoter: Bruno De Meulder

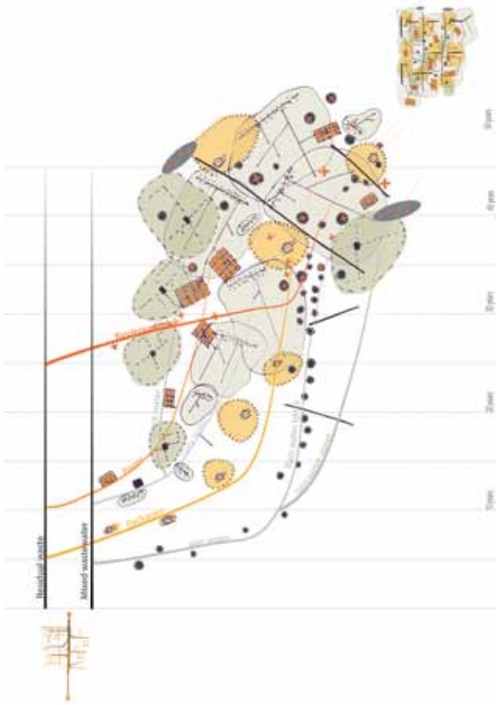
dI
DESIGN
INVESTIGATIONS

EDITING THE 20TH CENTURY BELT

Landscape Urbanism Thesis Studio Spring 2015, Campine Region, Belgium

Authors: Caterina Rosso, Carmen Van Maercke
Promoter: Bruno De Meulder





Form the principles of economy of scale:

4. Overlap to create synergies
As fourth, the overlapping of different layers of sheds generates complexity of structures and hence increases potentially their performance. These intersections and coincidences create synergies, resulting in new spatial typologies and configurations.

5. Initiate metamorphosis
As last, relationships between flows are stimulated as intertwined cycles, generate synergies, and catalyse the spatial transformation of the city into new patterns: a new form, a metamorphosis is initiated, generating different gazes, porosity, flexibility, and organic adaptability.

EDITING THE 20TH CENTURY BELT

"Editing the 20th century belt" investigates the "metamorphosis" of the belt through the potential reconversion of several representative spaces. The driving principle is the use of re-engineered waste flows to produce and shape space and to (re)structure the urban tissue. Antwerp's 20th century belt, a rather dull and monotonous area without too much many qualities and sophistication, but at the same time devoid of major complications, is an environment requiring a re-investment cycle. Most of its housing is out-dated. It might be the first product of Antwerp's planning on a massive scale. Nevertheless, exactly because of that, it became archetype of monotonous and lifeless neighbourhoods. In opposition to the historic centre of Antwerp, the 20th century belt had only one wave of development until now. There was no urban renewal campaign at all. It simply amalgamated what a first, fast rush of urbanisation delivered, mostly between the 1950s and 1960s.

The question is now how the re-infrastructuring of the 20th Century belt can also re-qualify the boredom of Antwerp's postwar dwelling environments. They are dying to be reconverted into attractive dwelling 21th century urban environments that guard a new dynamic balance between, amongst others, ecology and economy.
The following booklet investigates this "metamorphosis" through representative spaces of the belt and their potential reconversion.

source: (Luyten, Dries, 2014)

THE 20TH CENTURY BELT

The 20th century belt is mainly characterised by urban development accomplished in the 1950s and 1960s. Such a development engulfed the belt around Antwerp in one big wave. Resonating with time spirit, the belt mainly consists of single family houses, pockets with rather large apartment buildings that alternate with mono-functional service patches in which supermarkets, sporting facilities, schools, health facilities, megastores, etc. were dumped. Steenwegen and leien (large roads), which have been built clearly to make space to the autos that exactly in this period conquered the mobility market, organize the accessibility. Antwerp's 20th century belt is without any doubt extremely boring and lacks, despite the fact that it houses the majority of Antwerp's inhabitants. Besides its monotony, the 20th century belt has intrinsic qualities such as limited accessibility by public transport (but a great potential to be developed further, together with other new means of mobility). Its position on cycling distance from the centre marks it as a territory in which biking (and now also e-biking) is the rule. Unfortunately a significant biking path system does not exist yet. Given its current density, it has wider and more varied range services than neighbouring municipalities that suffer the boredom of the suburbia. Seen positively, and given its low density, there is a basis for growth and optimization. The belt offers, besides a basic infrastructure, plenty of opportunities for growth, densification and drastic reconversion of the existing tissue, that, as stated earlier, does not have a great value, if any. Re-qualification should allow not only to accommodate the predicted population, but also to absorb the needed services and jobs. Eventually, finally, after sixty years of boredom, it could also lead to the upgrading of its quality. By 2030 the city will welcome 100 000 new inhabitants, consequently, between 15 000 to 30 000 new houses will be required in the fifteen years to come. Also services and jobs will have to be provided in unpredictable amount and on unknown moments. (Dehaene, 2014)






UNDERLAYER, NETWORK, ACUPUNCTURE

Following from the issues and the characteristics of the 20th century belt, five critical elements are distinguished which can be considered typical for the belt and take already an important position in waste infrastructure, the production of waste as a social educational element in our society.
The elements are divided in three different categories. The divisions are related to the variety of spatial occupation and consequently the kind of required action needed. The three categories are respectively called: the under-layer, networks and acupuncture. For every category, different stakeholders are identified, which will play a main role in the transition process.

Each category consists of critical elements:

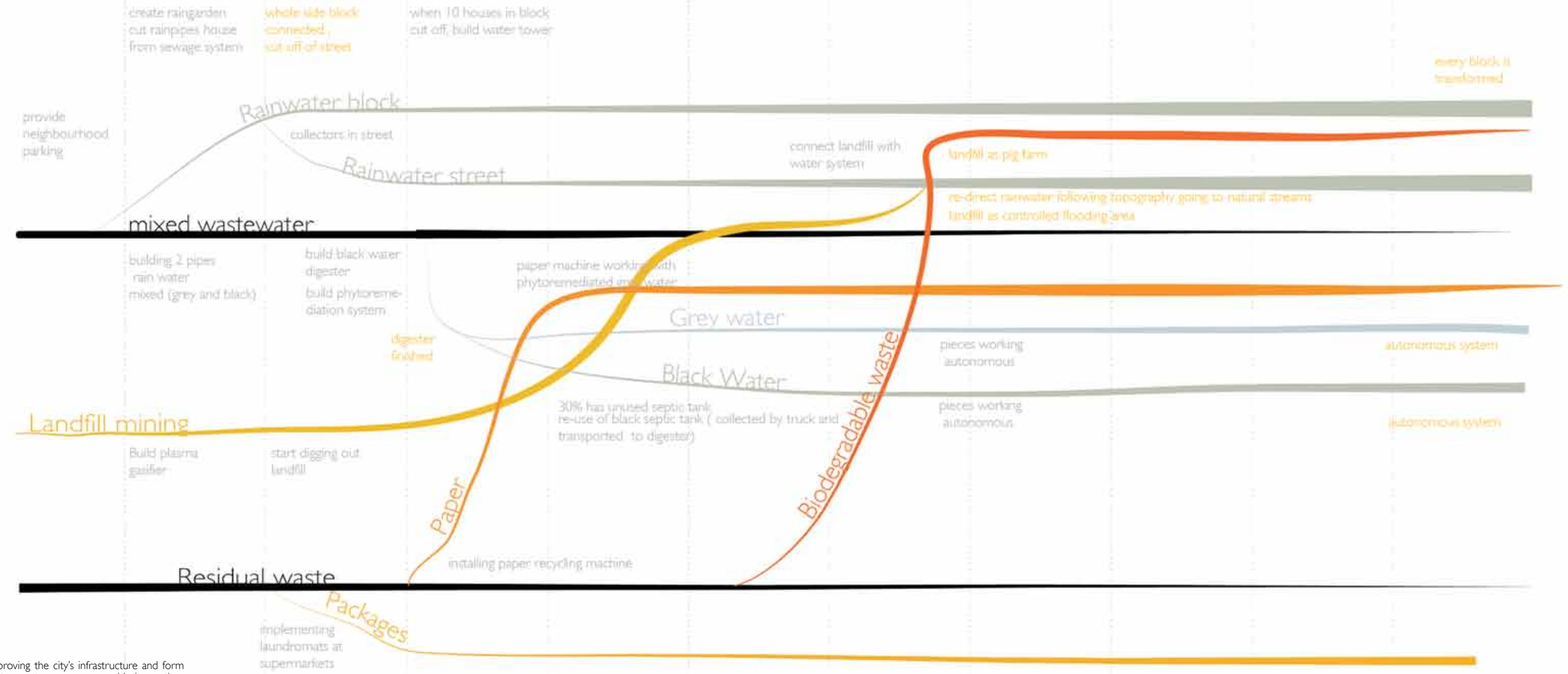
The category of the 'under-layer' deals with the horizontal patchwork of single family houses in the 20th century belt.

In 'networks', proposals are investigated regarding the main streets (steenwegen and leien) and the former landfill sites.

The last category, that of 'acupuncture', is focussed on two elements that can produce a relative large scale effect by means of small scale interventions, because of their intrinsic qualities. The elements are the supermarkets and schools.

For each element different propositions are made, starting from their specific characteristics and hidden qualities.

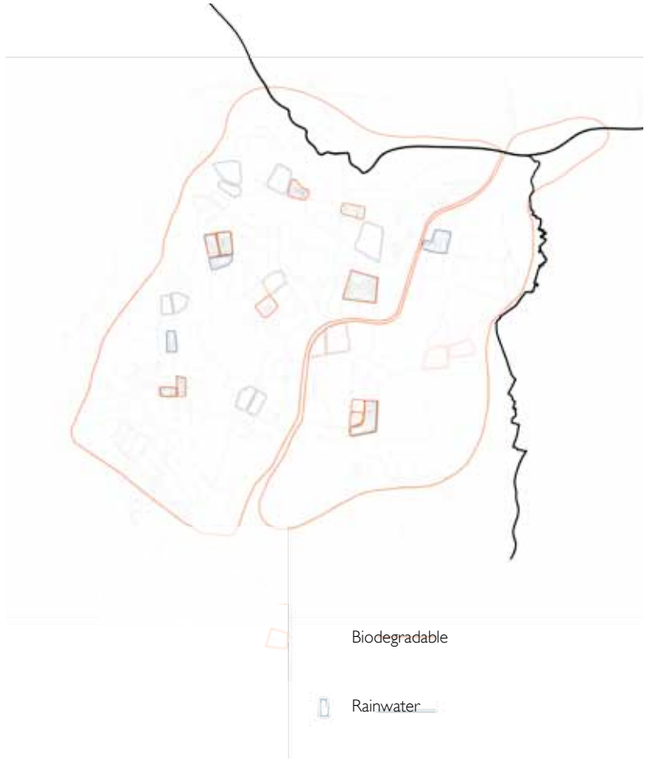
The general proposals are part of a processual structure, guided by the disconnecting and redirecting waste-flows and creation of waste-sheds. All these new waste sheds constitute the main base for a new structure in which synergies originate at the overlapping, coinciding or inclusion point of different waste-flows: the points where the interventions take place.



Process

The vision for improving the city's infrastructure and form entails a slow but non-stop process, considering a time span of 50 years, that takes into account the replacement of housing and the process of densification of the belt and permits to maintain control over the process.

By disconnecting and redirecting waste-flows new wastesheds are created, which restructure the 20th century belt. Every proposal is positioned at an intersection or interplay between different waste-flows through time.



Waste sheds related with the housing block applied on Deurne Zuid

UNDERLAYER: HOUSING BLOCK

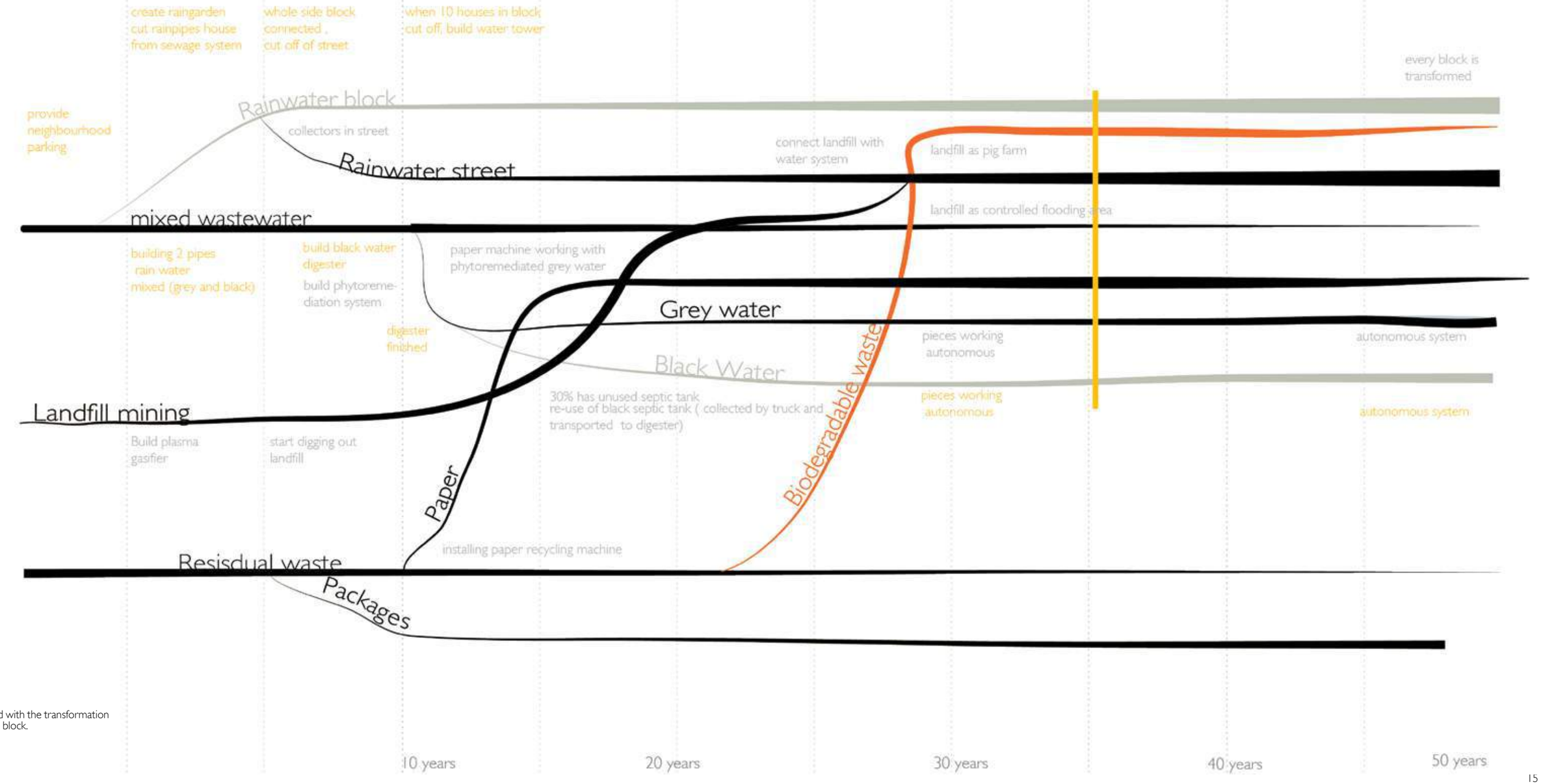
The 20th century belt is characterised by horizontal, low density spread, with a major attention to the cars and their parking spaces. Housing blocks are mainly containing single family houses and their inner spaces are 'filled' with garages. This consumptive way of living contributes to the unsustainable image of the 20th century belt.

Therefore a new identity for the 20th century belt should be built on new typologies and ways of living. The housing block in this sense plays an important role.

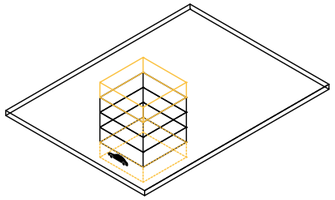
Seen from the perspective of waste as a resource, some waste-flows can be directly mined at the place of production, such as rain and black water. Others, such as biodegradable waste can be redirected from the current waste-flow and commonly collected for specialised purposes.

Due to this fact, the interventions of the housing block are related to one or more waste-flows and can be positioned at the crossing of these three different newly created waste-sheds.

As the typology of the housing block is dealing with private property, a gradual transition will be deployed setting up mechanisms that can instigate or support change.

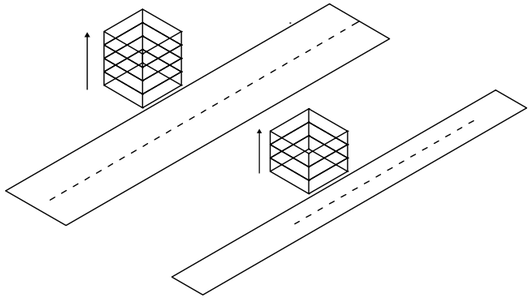


Process related with the transformation of the housing block.



1. Provision of neighbourhood parking

New developments of more than five flours, have to provide a neighbourhood parking space in the foundations.



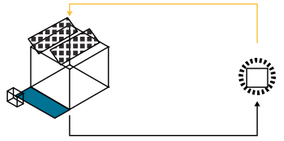
2. Increasing densities

The minimum and maximum heights of buildings depend on the road hierarchy and can give in this way more character to the road itself

E.g.

Hierarchy one: minimum 6 - maximum 8

Hierarchy two: minimum 4- maximum 6



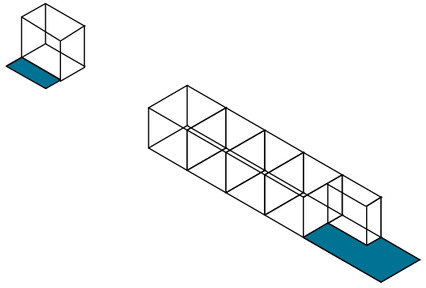
3. Sustainable New housing developments

-connected to black water digestor by means of vacuum pipes to provide half of the energy

-Other half of energy provide by solar panels

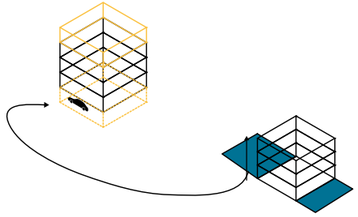
-Rainwater recuperation with Raingarden

-Biodegradable waste collection



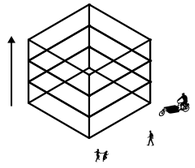
4. Provision of raingarden

New developments are obliged to leave 30% of the plot open to provide raingarden. Can be individually or collectively organized. E.g. Everybody his own raingarden or for example five houses together provide one raingarden which serves as collective space



5. Obtaining open space

Deviations from the existing building heights and depths are allowed for residents if they connect in exchange to the black water digester and offer their private parking spaces (in front of the house or the garage box) for the underground neighbourhood parking. The obtained spaces can then be used as collective space and raingarden.



6. Recycling of the underused

Use of the underused buildings in the core of the housing block by recycling, replacing them or by raising it in height. The ground flour should be given to public use such as public facilities such as a selling point for locally produced vegetables or as workshop.

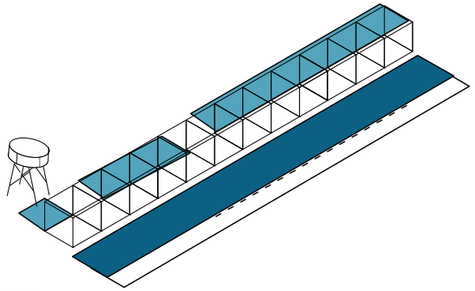
Rules

In order to establish new synergies between waste sheds and new activities at the site of the housing block, a set of rules is developed. These rules are not set up as restrictions, but rather as tools which can generate a more sustainable way of living.

The concept of rules is chosen as a way to influence the private property and housing-market, by giving some guidance, yet leaving space for their own aspirations. Nowadays they are mainly directed to the use of wasted resources, such as rain and black water.

According to the strategy of rainwater, a rain garden can be installed, which can capture the rain, clean it and set it available for domestic usage. The application can be organised individually or in a collective way, which has different spatial configurations as its outcome. Space can be obtained by removing garageboxes from inside the building block and by providing neighbourhood parkings in the foundation of high newly developed buildings.

Furthermore, the use of the blackwater, as energy provider, and common biodegradable waste collection are stimulated in new housing developments. Besides, a less wasteful way of living and consumption of space should be encouraged; this should be done by raising the building height and by promoting an optimal use of the sites, in which underused spaces can leave space for workshops or small selling points.



7. Watertower

When 10 houses connect to raingarden, a watertower is built and their rainwaterpipes are disconnected from the general sewage system in the street. Rain which is fallen on the road itself, is collected in subterain phytoremediation basins, which break up the street and make it becoming a part of a network of linear parks (see network: *steenwegen* and *leien*).

Re-defining the plint: worshops and exchange points in the nieghbourhood

Variations

The rules are not designed to be restrictive; on the contrary, they can engender a range of possibilities, decided by the interested parties. The raingarden, for example, can generate shared spaces, which can be configured according to the desires of the community: it can be deployed as a community garden, orchard, swimming pool, farm, playground, etc. The surrounding plint can be redefined giving space to workshops, ateliers, small shops, and so on.

Rain garden in building block as tool for aprropriation of the space by the inhabitants

property banking

Negotiated sale

Donations

Tax forecolsure

→ Landbank →

Urban bardens, green space, ...

Rehabilitation programs

Rentals

Land Assembly

Demolition or deconstruction

Resale

funding

Tax forecolsure

land sales revenue

foundation support

land assembly for creation of pedestrain trail near Traverse county lake, Michigan, US

creation on Urban gardens, Kent county, Michigan, US

deconstruction project, Kent county, Michigan, US

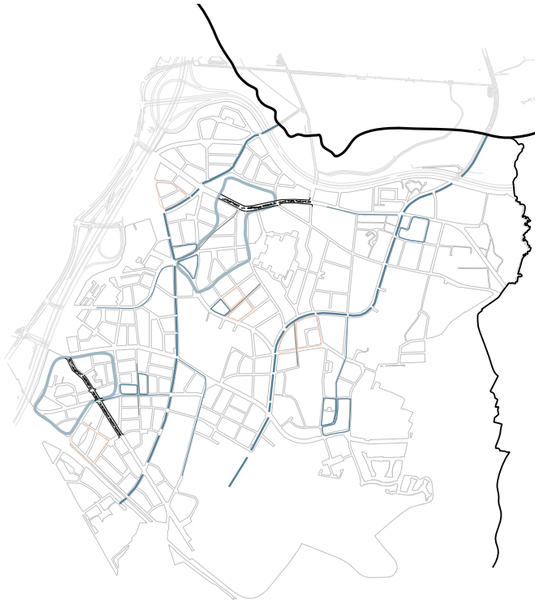
Mechanisms to support change

The feasibility is often a problem regarding projects touching private property. Different concepts trying to overcome this kind of difficulties already exist. Different tools, which are necessary to arrive at common actions, are examined. The land bank and land coalition are proposed as two possible mechanisms that can instigate and support changes in the existing housing blocks.

The land bank is an apparatus for aggregating parcels of land, preparing them for upcoming development and sale. It operates according to two engines: it functions as a cooperation and reforms tax foreclosure. The accessibility to properties is gained by negotiated sale, tax foreclosures and donations. In return the land bank creates a variety of programs, such as urban gardens, rehabilitation programs, demolition and deconstruction (careful demolition in order to re-use deconstructed building material).

On the other hand land coalition is, as a variation of the land bank, a judicial form of cooperation that can be facilitated by the government. It makes a vision for a larger project area, not considering the exact parcelisation and property division of the site. Thereafter a financial institution can calculate the increase in property value. Relying on this, property owners can decide to move to individual or common development. Exchange in property is also possible.

These are two exemplary mechanisms that can support the transition of the current wasteful living conditions in the 20th century belt towards a more responsible ways of dealing with resources and consequently more sustainable ways of living.



rain water shed

grey water-shed

phytodepuration in the roads

Waste sheds related with the road system applied on Deurne Zuid

NETWORKS: STEENWEG AND LEIEN

Linear parks

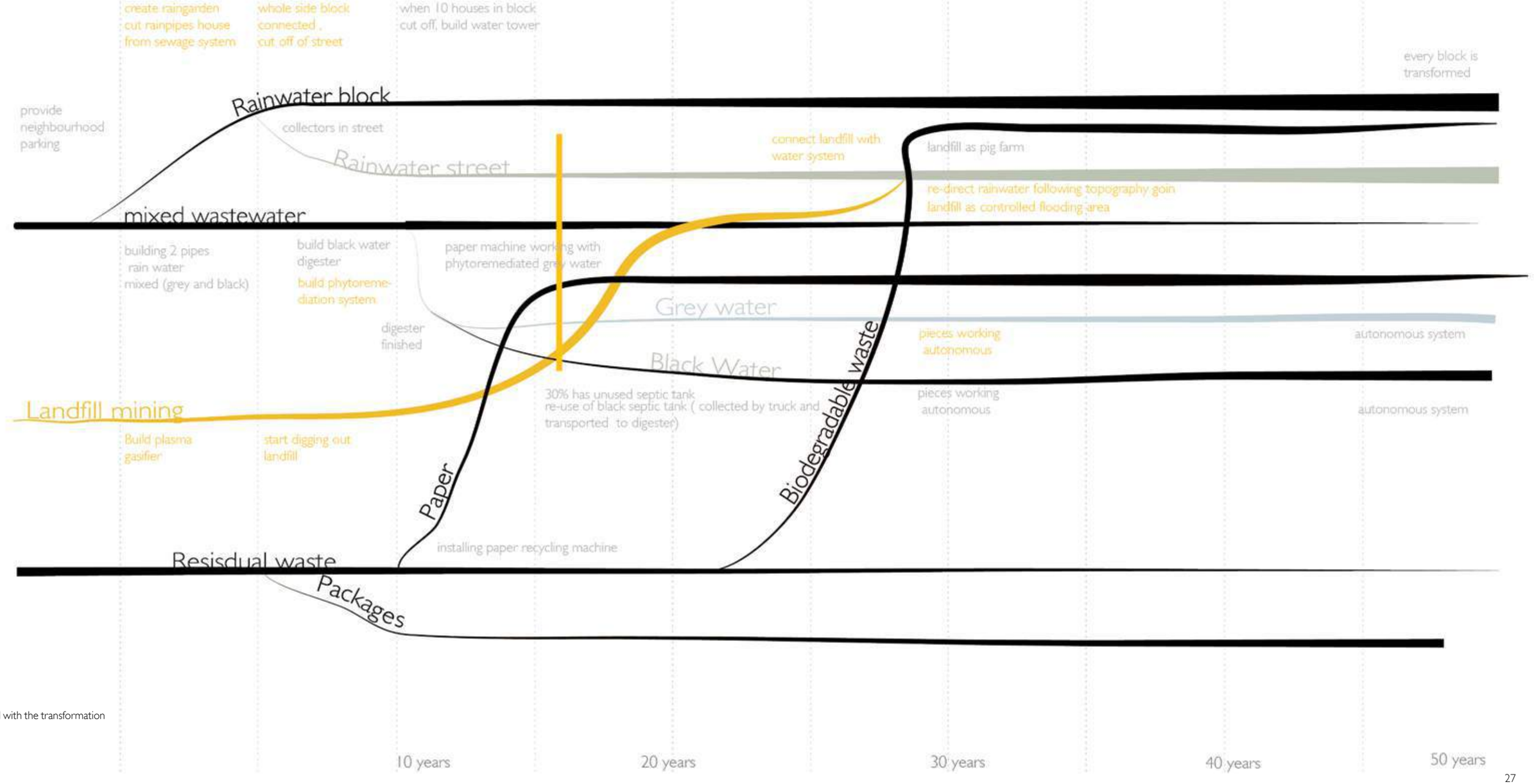
The roads of the belt ("steenwegen and leien") have been designed pure from functional perspective (for the car), but never from the perspective as public space. They are monofunctional, low quality spaces and contribute to the uninteresting image of the belt nowadays.

Therefore they should be rethought in order to change this image, but also in the way they function as infrastructure for current wasteflows.

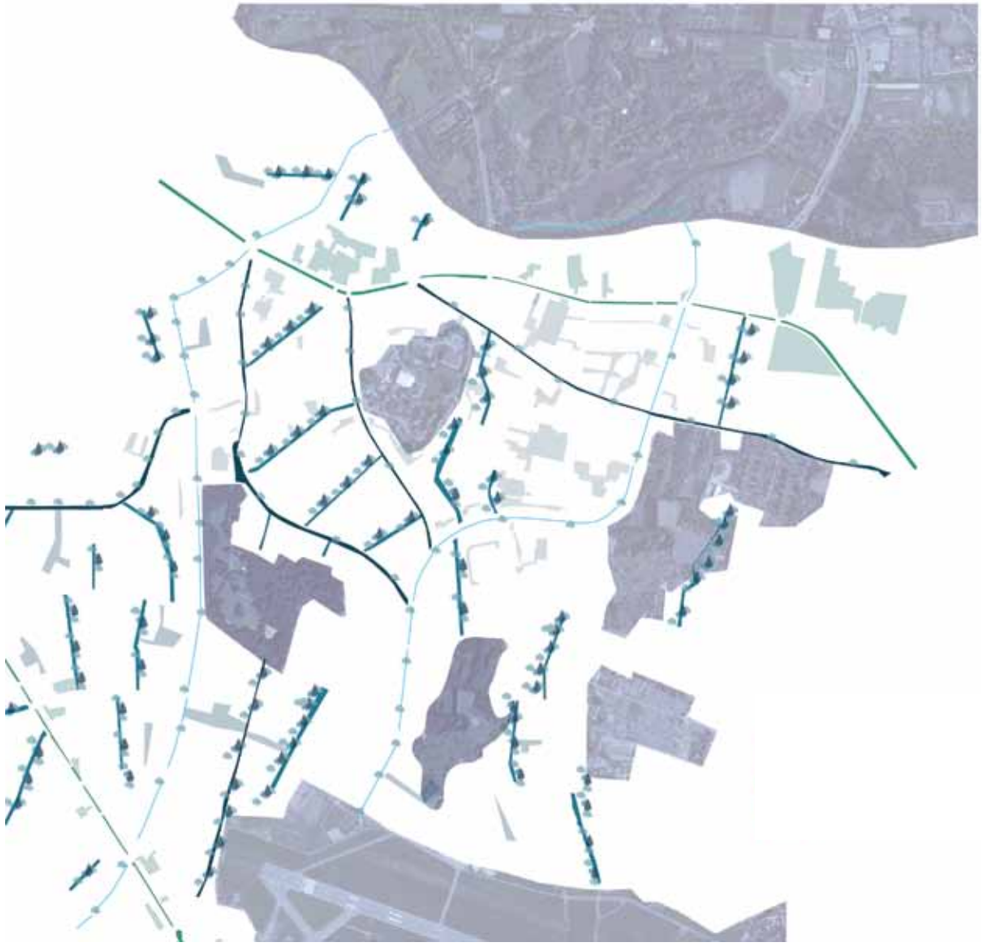
Currently roads and street serve as collectors of sewage water, which is directed towards large scale cleaning stations. In this process, different kinds of wastewater (rain, grey and black) water are mixed, cleaned and discharged in the river: possible valuable resources are lost.

By changing the way of collecting rain and greywater, disconnecting it from the general sewage system and redirecting it, a significant amount of water is gained, which can be used for several purposes at site.

Due to this, the interventions at the level of the street, are related to grey and rain water wasteflows and can be positioned at the crossing of these different newly created wastesheds.



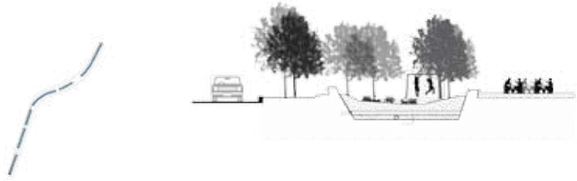
Process related with the transformation of the roads.



Possible transformation of the road system as result of disconnecting and redirecting the rainwater flow

Gradation in road structure:
Primary rain water structure:traffic reduced roads
Secondary rain water structure: slow traffic roads
Tertiary rain water structure: traffic free roads
Grey water phytoremediation

The phytodepuration in main roads: from cut-off of the waste infrastrcuture to new spaces in the road.



Public rain garden in the road..

The coalition of close building blocks and the creation of collective parkings instigate changes in road hierarchy and permit the transformation of roads in space for collectivity (temporary or permanent).

A tool-kit

Main roads carrying the second "branches" of the sewage system get disconnected and become part of a structure of decentralized waste-sheds for grey water:
the phyto-remediation is combined with tramlines and new spaces for public activities
Furthermore, since cleaned grey water serves as a good fertilizer, it can be used in green houses, orchards and vegetable gardens.
Regarding the rainwater flow, new infrastructure is constructed as collectors in the street, shaped as public rain gardens. These change the section of the street drastically and allow to play with different hierarchies.
The rain collected is used to clean streets or water plants. The excess of water is redirected to natural waterbodies. For smaller roads, the transformation goes hand in hand with the densification
process: the operation of densification and transformation of the building blocks, whenever it includes more than one block at a time, permits the definition of a new scheme for circulation, where some segments can be claimed for other scopes than for the car (see rule 7 housingblock).
Furthermore the streets can be converted into linear green spaces or 'linear parks' and constitute in this way a network for soft mobility, which can be linked with existing *speelweefsel* (play roads for kids)
The injection of practices related with waste (collective spaces for biodegradable waste and rain gardens in the blocks, re-use of abandoned workshops for activities of reuse, exchange of second hand goods, repairing spots) should be part of this soft network crossing the tissue.

Linear park, tertiary rain water structure: traffic free road

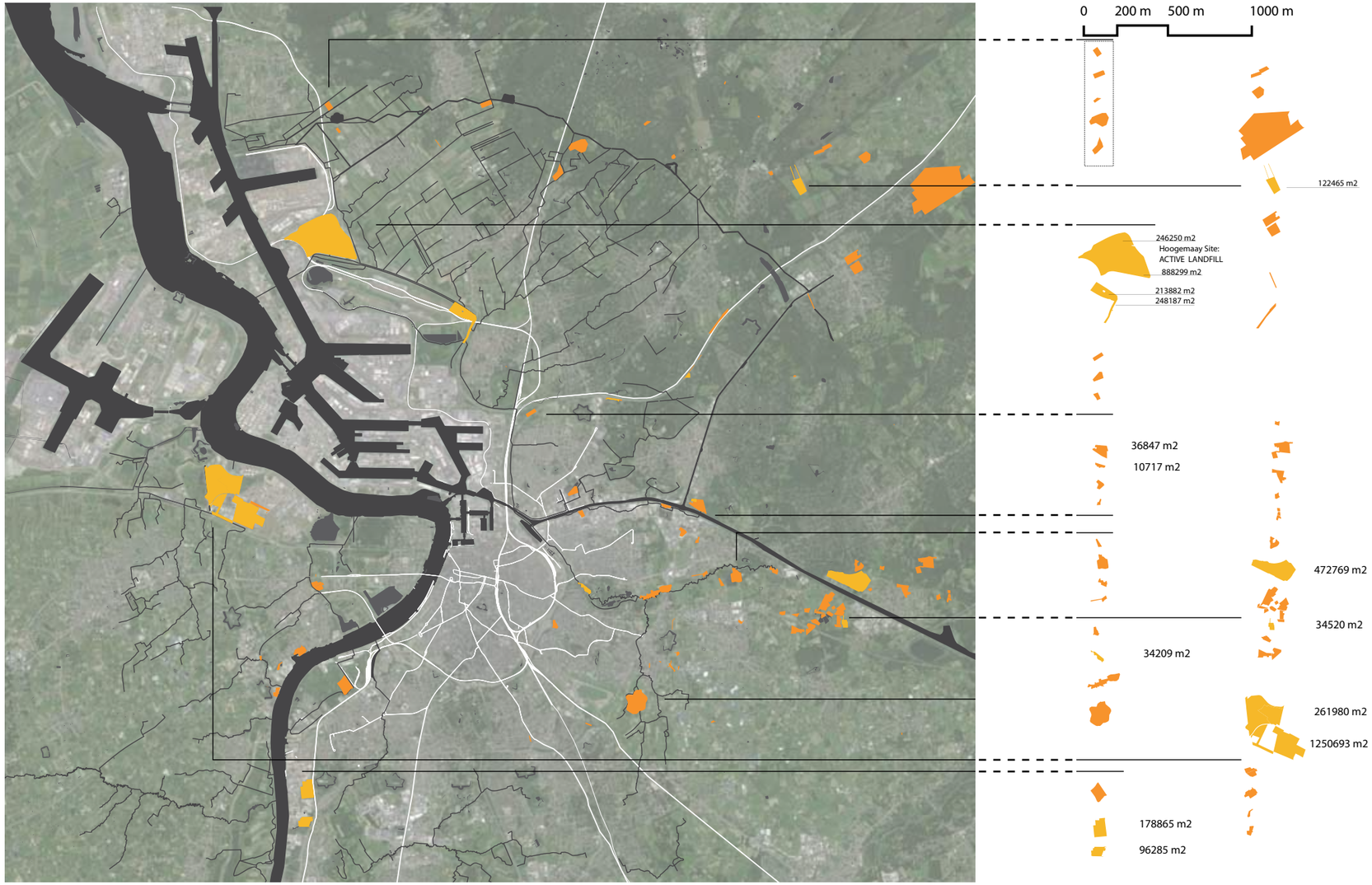
Linear park, phytoremediation of grey water embedded in tramway

NETWORKS: LANDFILLS

Ancient presents

Former landfill sites are mainly positioned or -better- hidden in large scale green structures, such as the park 'Rivierenhof'. Historically they have been developed there, since no other function could maintain due to high humidity and the presence of marshlands. As a result they are till today blind spots in the city.

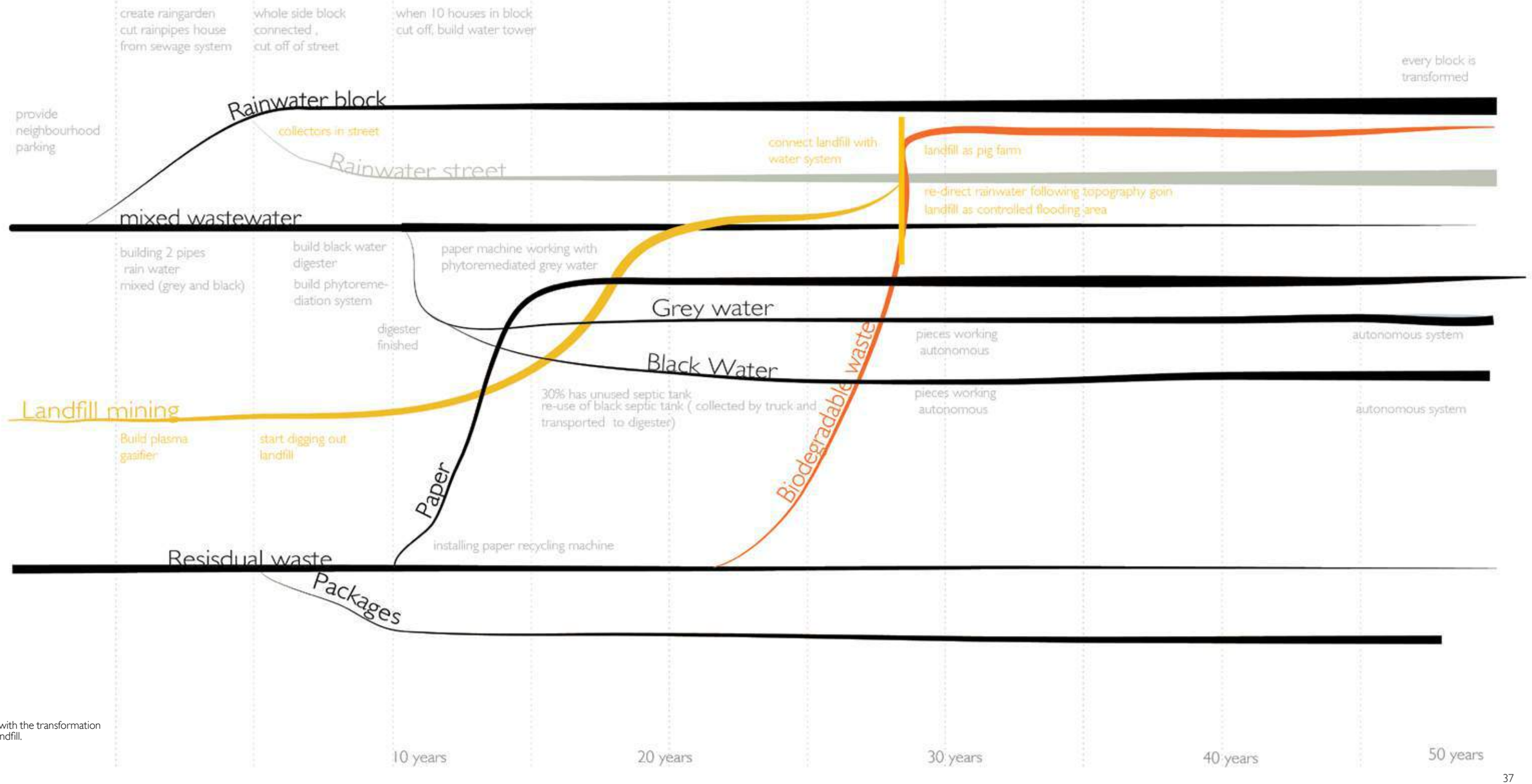
Yet nowadays, by use of new techniques, such as enhanced landfill mining, this polluting waste heritage gives an opportunity for resource mining and energy provision.Moreover,, they can - after being remediated- be reintegrated in the city and its parks.



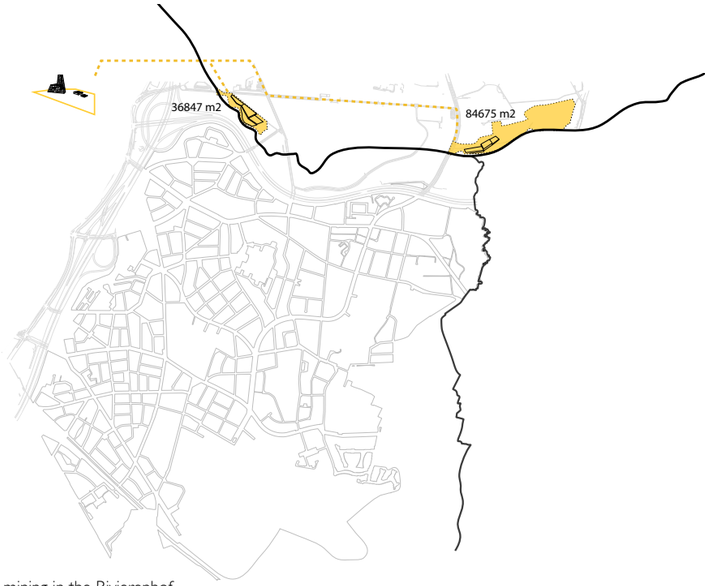
Former landfills of Antwerp

Source: (Begets, 2014)

The former landfills are mainly positioned in wet or flooding areas at the borders of the municipality, so as far as possible from the core of the city and inside the 20th century belt. They are the hidden residues of a dated waste management system.



Process related with the transformation of the former landfill.

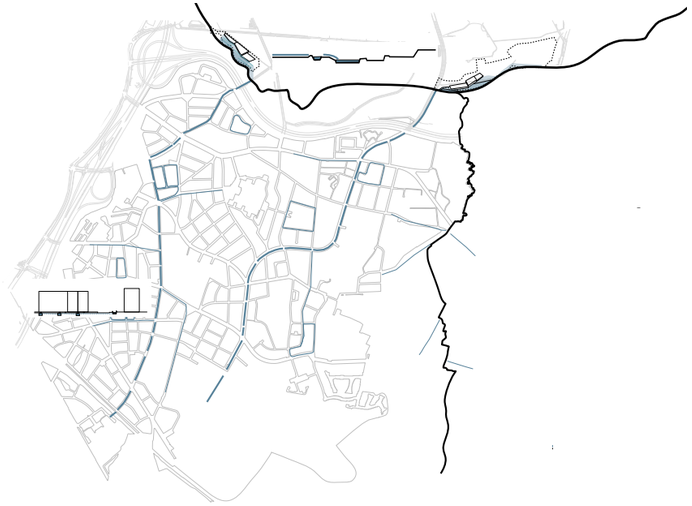


Residual waste

Plasma gasifier

Digging of former landfill

Landfill mining in the Rivierenhof



Rain water

Floodable areas

Rain-shed
for collection

Main rain-shed

Creation of controlled floodable areas along the Schijn

Map of flooding risks and ecological value in Antwerp

Map of topography of Antwerp

source: (Geopunt Vlaanderen, 2015)

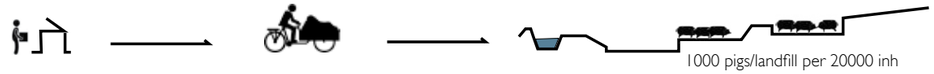
Enhanced landfill mining

Using the new technology of enhanced landfill mining, the waste can be digged out and transformed into plasmarock- a new building material- and energy by the plasma gasifier. By gradually removing the waste, new spaces are set free which can be taken into use again. Due to its proximity to natural rivers and its location in flooded areas, this artificial landscape is included in the big scale strategy of rain water: it can host controlled flooding areas, that coincide with the places where the main collectors of rain water would flow into the Schijn river.

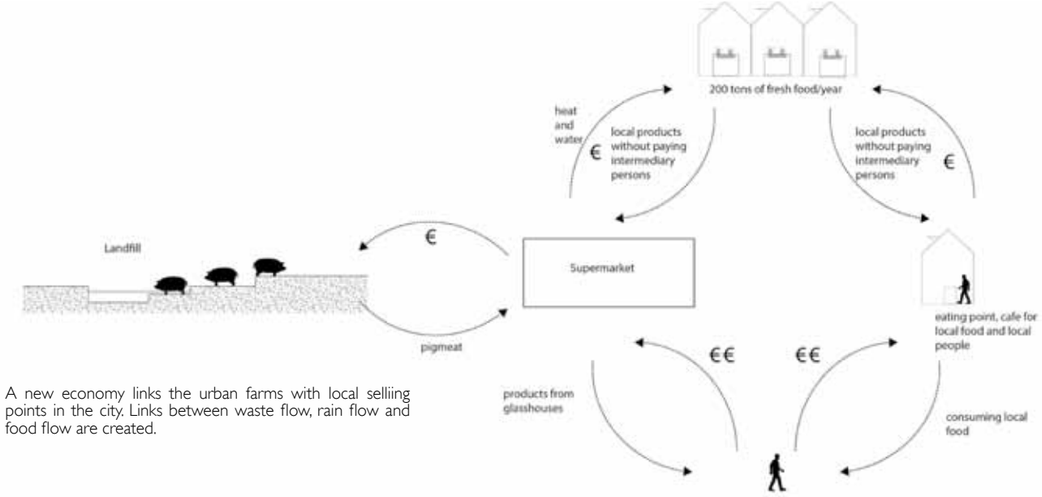
Biodegradable waste sheds and network and creation of urban farms coincinding with the former landfill sites by means of transformation of microtopography.

Urban farms

Moreover, the transformation of the topography can supports, by means of different levels the creation of the natural environment (naturally muddy land) for pigs and other animals. Thus, the constitutions of urban farms permits at once the transformation of biodegradable waste flow, conveyed here and used as nourishment for the animals, and the integration of an alternative local food-chain, in collaborations with new kind of supermarkets and selling points.



System of collecting of biodegradable waste for the farm provides new jobs and is made possible by bycicle



A new economy links the urban farms with local selliing points in the city. Links between waste flow, rain flow and food flow are created.

Landfill along the Schijn river

Waste sheds related with the supermarets applied on Deurne Zuid

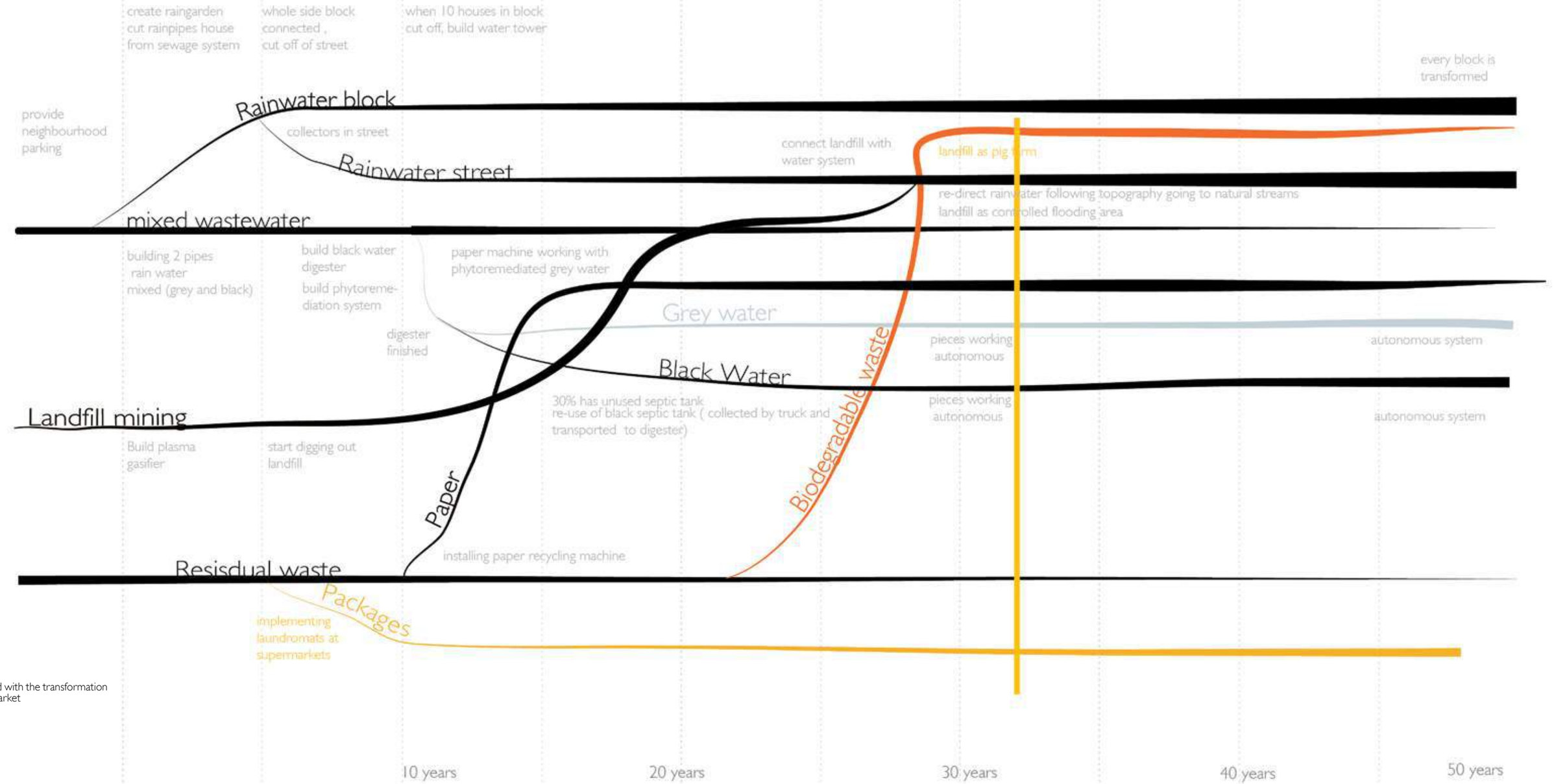
ACUPUNCTURE: SUPERMARKET

Place for production, consumption and exchange

The supermarkets can be considered an important player in the reduction of waste, since they have a prominent position in the complex chain of exchange of goods and are a significant producer of waste. They are extremely wasteful from the point of view of the consumption of space; they are mono-functional programs, occupying a huge space which is only used during several timeframes of the day/week. During the periods of inactivity they are conceived as lifeless UFO's inside the urban tissue.

A better, less wasteful typology of the supermarket –in the sense of how it deals with space and solid waste– is to be proposed. Its accessibility and position inside the urban tissue can be turned into positive aspects which can further support minor and major changes.

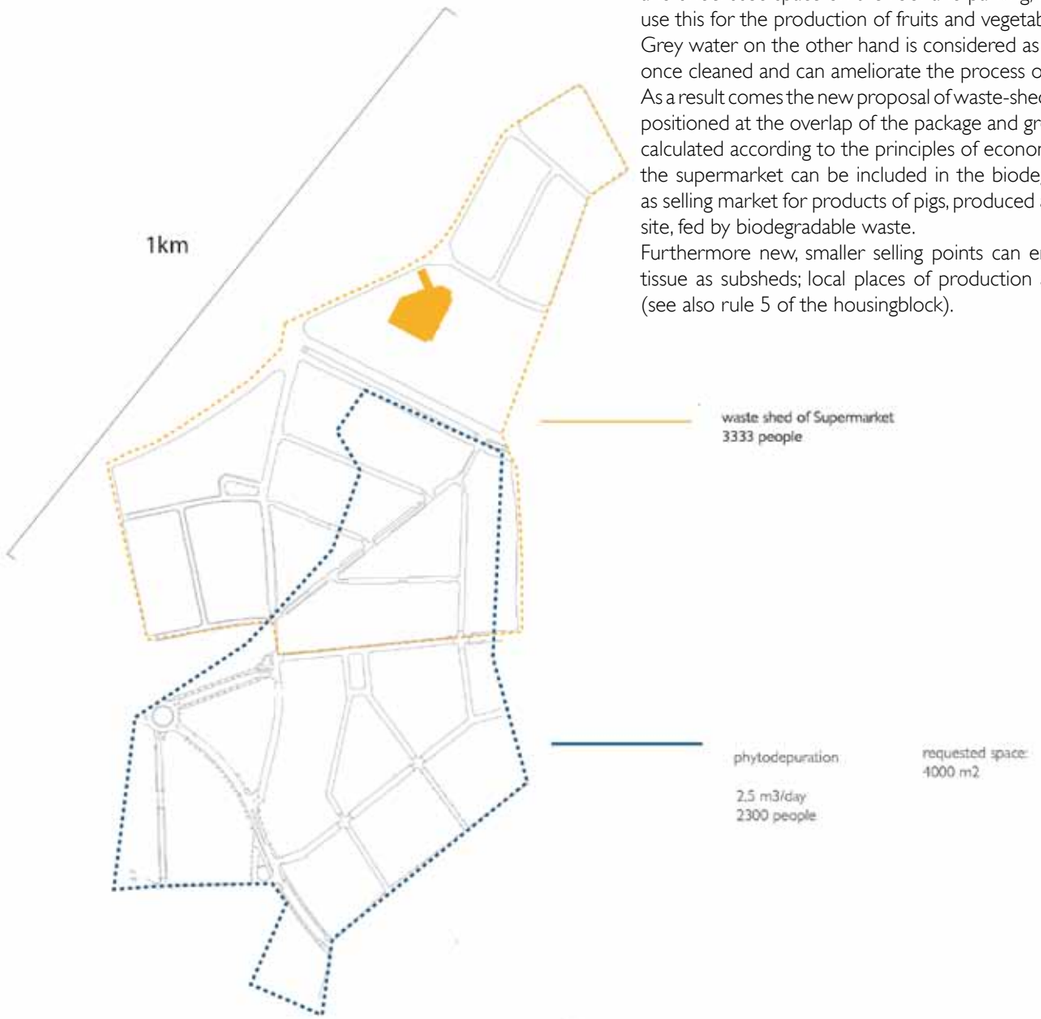
A new typology of the supermarket is proposed, as the overlapping of the biodegradable, package and grey water waste flow. In this process, different actors are involved over time. Yet, the balance can mainly be considered between entrepreneurs, neighbouring inhabitants and financial institutions. Land-coalitions can reshuffle the properties, which makes larger operations possible.



Process related with the transformation
of the supermarket

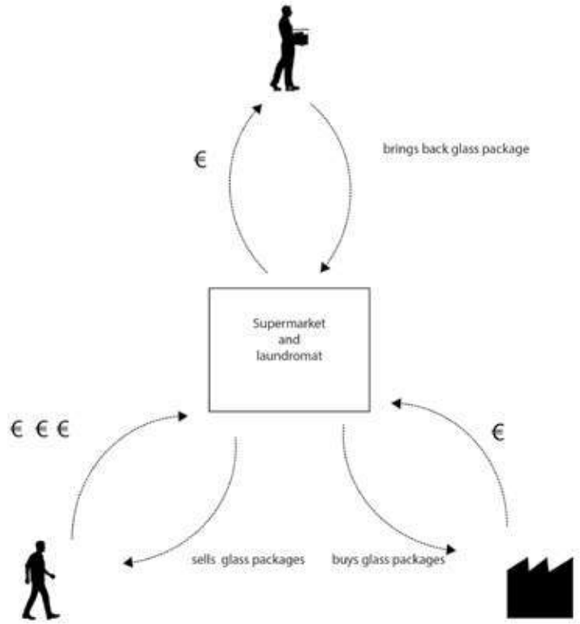
New waste shed

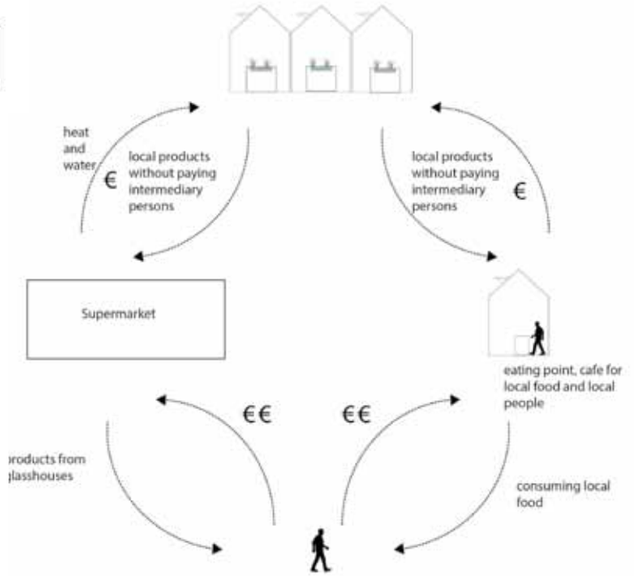
A strategy for the supermarket is further built on the existing idea of reintroducing packages, which can be returned, cleaned and reused. Furthermore it is the combination of heat by the cooling installations and underused space on the roof and parking, found as trigger to use this for the production of fruits and vegetables in glasshouses. Grey water on the other hand is considered as a good fertilizer once cleaned and can ameliorate the process of food production. As a result comes the new proposal of waste-shed of the supermarket positioned at the overlap of the package and grey water wasteshed, calculated according to the principles of economy of scales. Besides the supermarket can be included in the biodegradable wasteshed, as selling market for products of pigs, produced at the former landfill site, fed by biodegradable waste.
Furthermore new, smaller selling points can emerge in the urban tissue as subsheds; local places of production and trading of food (see also rule 5 of the housingblock).



New economic cylces

Adding to the new waste-sheds, new economic activities can be generated, such as the cleaning and selling of reusable packages or the farming of and trading in fruits and vegetables grown on the roof or domain of the supermarket, fed by cleaned grey water..
Accompanied to these new economic activities, new jobs can be created.





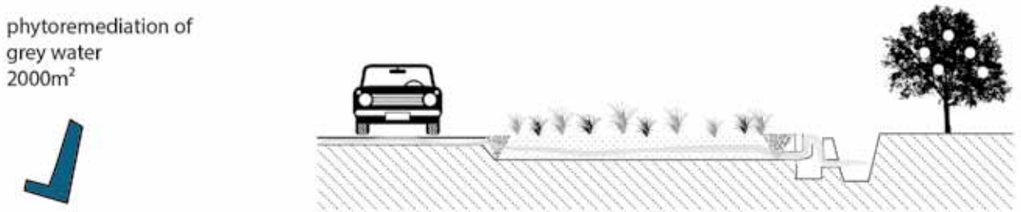
A tool-kit

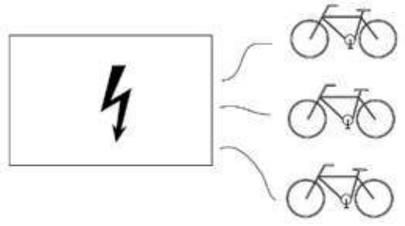
In order to establish synergies between waste-sheds and new activities at the site of the supermarket, a toolkit is developed. By applying these tools, a more sustainable way of trading and producing can be generated. Moreover they can be regarded as elements which can be used in a open way, without a fixed combination, or a fixed outcome; these strategies can operate individually or together.

The tools are respectively directed to the cleaning of grey water, the production of food by the heat of the supermarket and an open polyvalent space to install a laundromat or secondhand goods exchange platform. Additionally, for an optimal use of the site, the typology of supermarket as flat shoebox should be abandoned; on the contrary a densification on the site itself should be encouraged.

Cooling installations inside supermarkets produce a great amount of heat which is lost. By using this heat, combined with wasteful spaces such as the roofs or the parking lot, new ways of food-production can be instigated, which can have on their turn a direct effect on the trading-market and shorten the food-chain.

More space can also be gained by promoting the use of electric bicycle. In this way, the parking lots can be reduced, making space for other functions, such as green space or glasshouses.

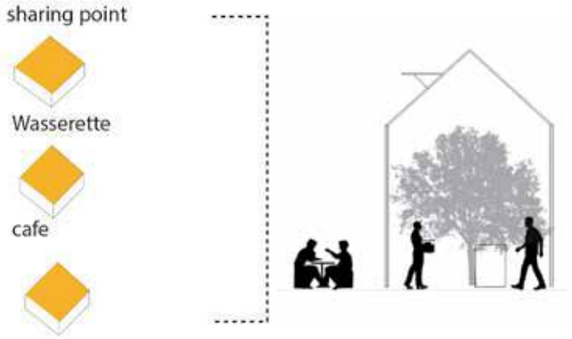




A tool-kit

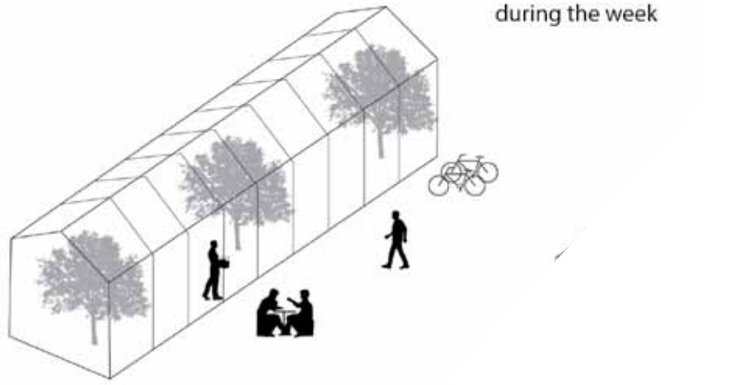
In support of the function of Laundromat (space to clean packages) for reusable packages, a space could be created inside the supermarket or could be organised on the terrain itself, combined with other functions such as a sharing point for goods (for example a place where people from the neighbourhood would share technical tools such as a drills or saws, as well as cars) and a cafe were locally produced food is sold.

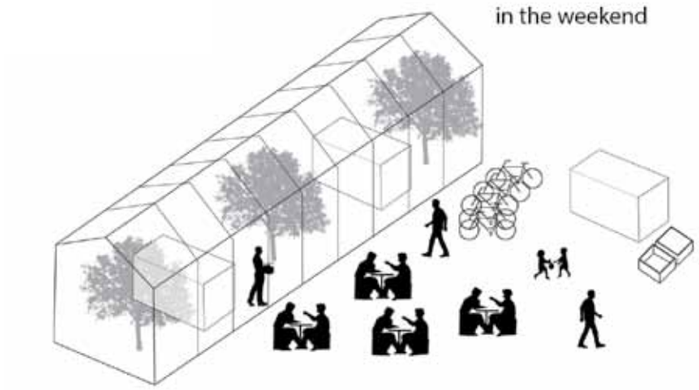
The whole can be understood as a polyvalent structure in which separate modules are implemented, depending on the desired function. In this way the space can grow and change in time and may be inserted as space for flea markets or pop up recycling parks. Some waste is depending on seasons, for instance green waste in spring or clothes before every sales. Therefore a pop up recycling park can appear as a support to temporary overcharged recycling parks.

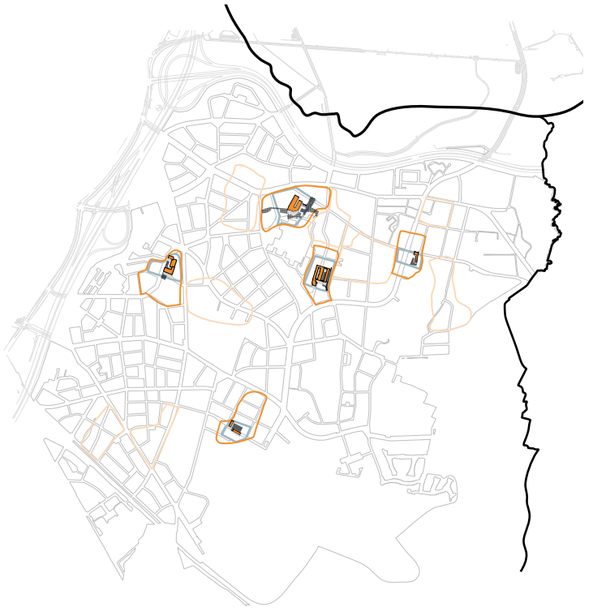


To ensure a constant activity at the place, the polyvalent structure is combined with the function of the glasshouse and production of food.

In time, activities which changes the atmosphere and function during the week/year can be added or removed.







paper

grey water shed related to paper recycling

Waste sheds related with the schools applied on Deurne Zuid

ACUPUNCTURE: THE SCHOOL

A member of the paper-shed

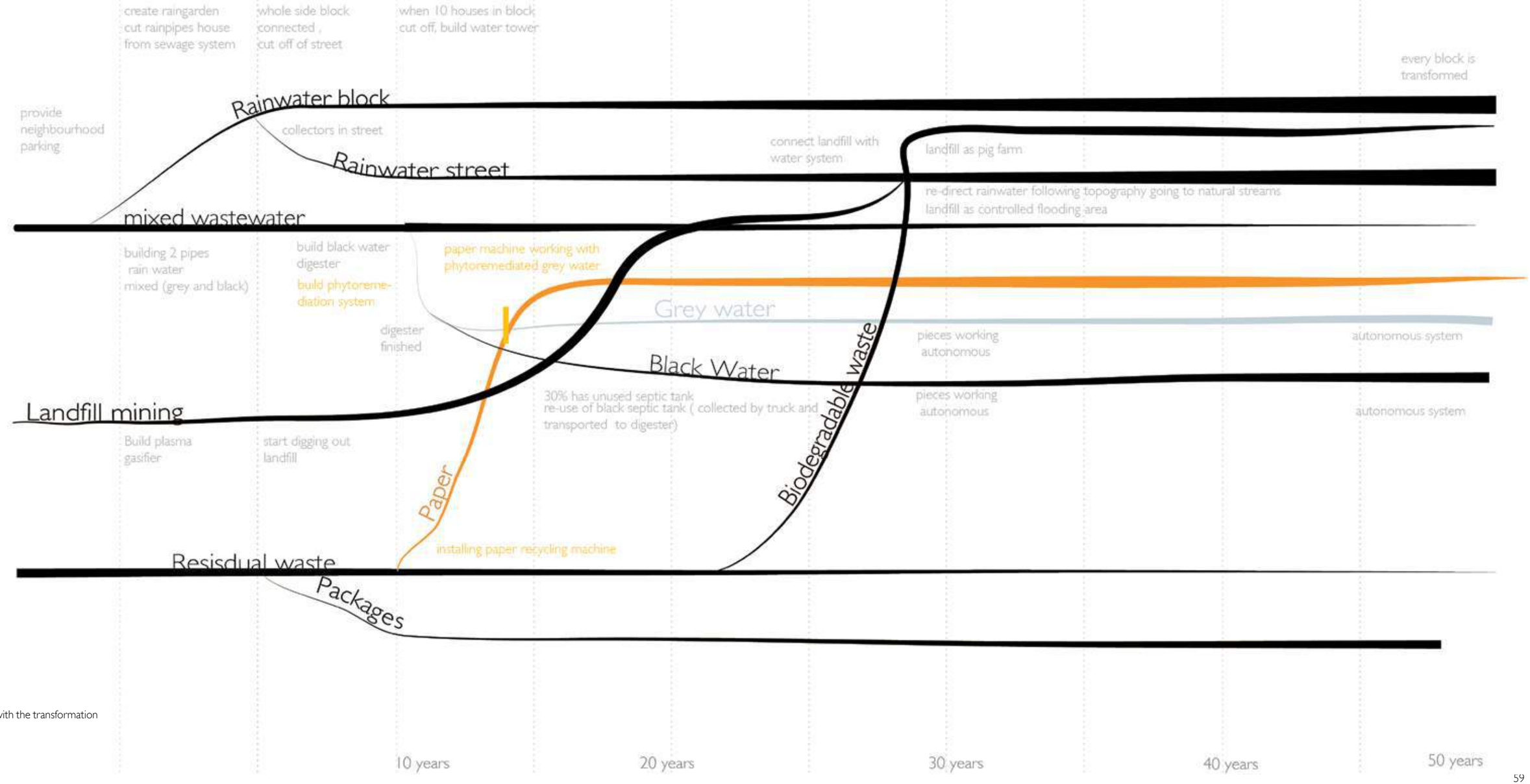
The school may be considered an important player for its educational role, but also because of its intrinsic qualities, such as good visibility, accessibility, position inside the urban tissue, and open air space.

For the school there is a strategy related to paper; the school itself is a big consumer of paper and the cycle of paper can be downscaled: this can generate a small new economy. Since paper recycling demands a lot of water, the grey water waste flow is included as important deliverer of required resources.

As a result the proposed waste-shed for the school is positioned at the overlap of the paper and grey water waste-shed, calculated according the principles of economy of scales (see Engineering flows booklet).

In Belgium, schools are organised according to different governmental structures, depending on the subsidies they receive (from state or other institutions). Yet, a general kind of funding can be obtained for projects dealing with environmental concern, ecology and waste, called the MOS school, delivered by the Flemish government. To achieve this funding the new school has to answer several issues.

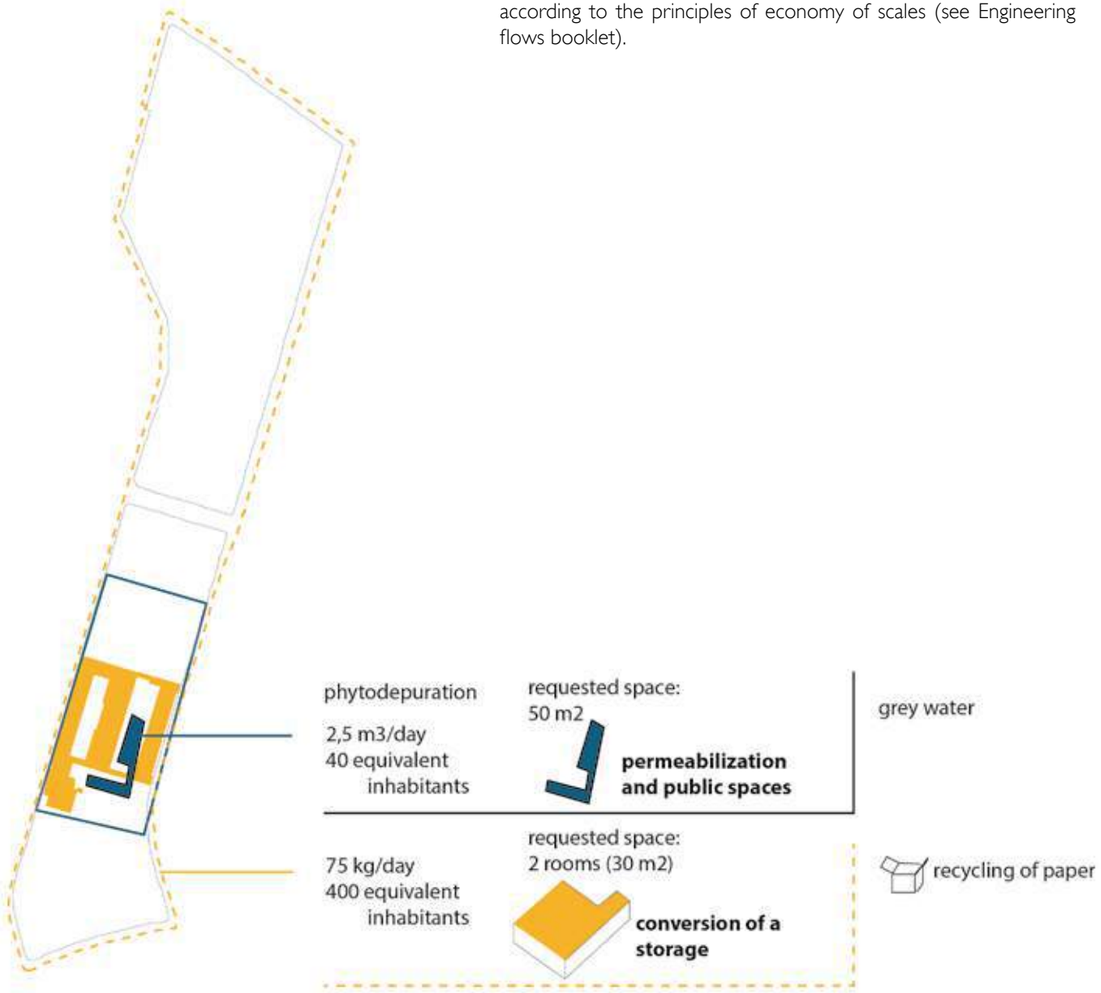
Nowadays, over sixty schools in Antwerp attained the status and combined funding of 'MOS school'. The 'MOS schools' cannot be considered the main possible funding instrument in order to realize interventions, but they can help to instigate projects. Once installed, small economies are generated out of the paper recycling, which turns it into an autonomous program.



Process related with the transformation of the school.

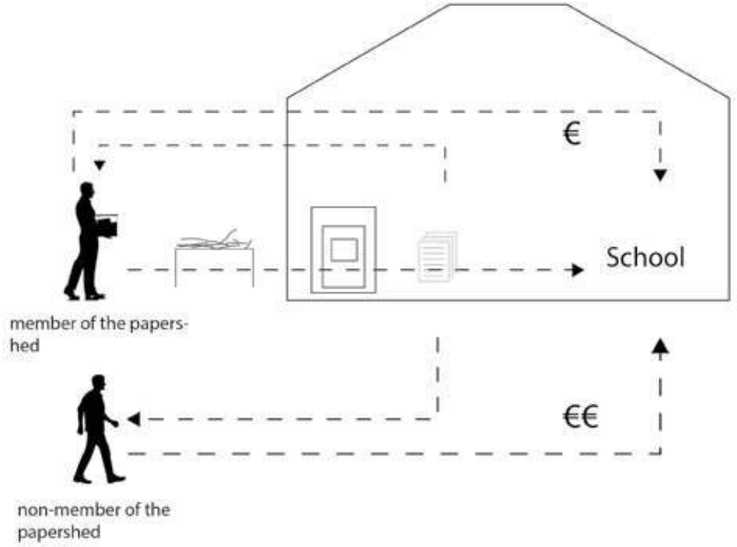
New waste shed, new waste infrastructure

The new proposed waste-shed of the school is positioned at the overlap of the paper and grey water waste-shed, calculated according to the principles of economy of scales (see Engineering flows booklet).



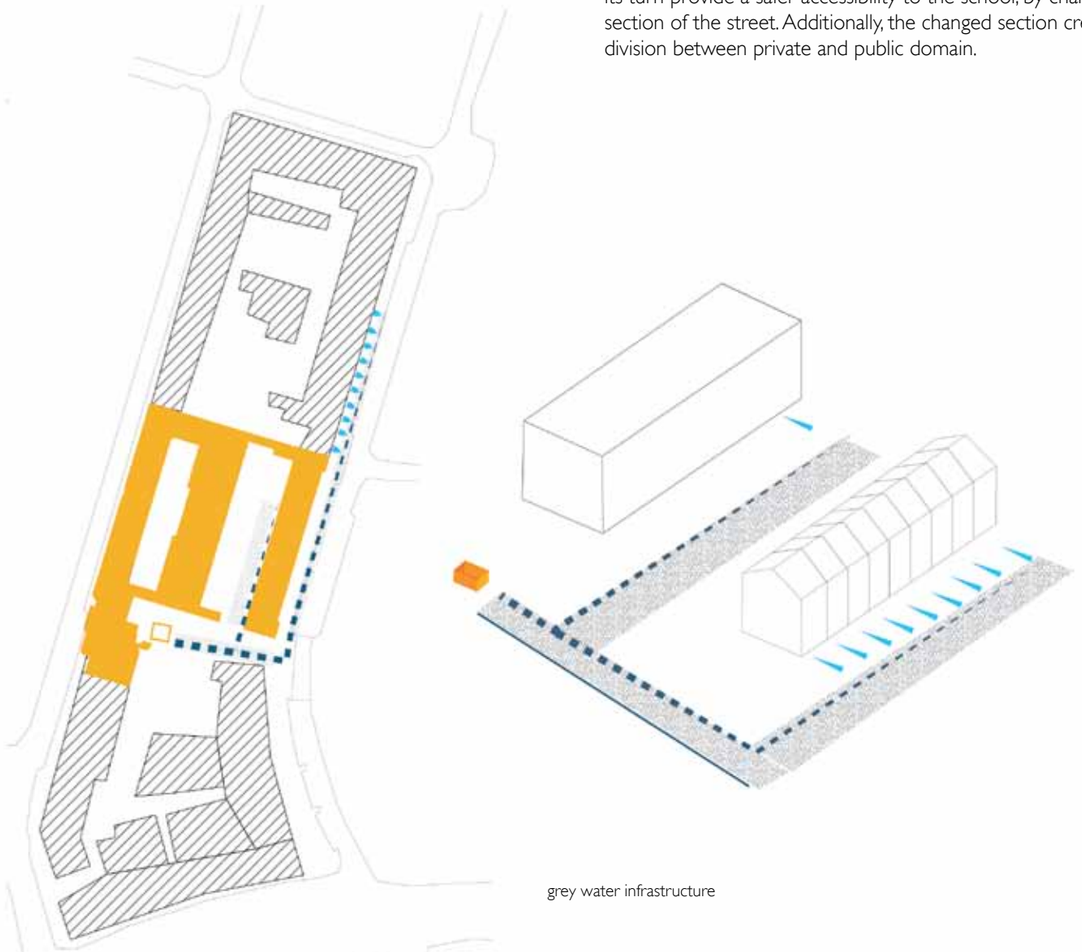
New local economy

By collecting, recycling and selling paper a new economy can be added to the school itself. In this way, the income of the school is, besides the existing capital, less depending on governmental subsidies.

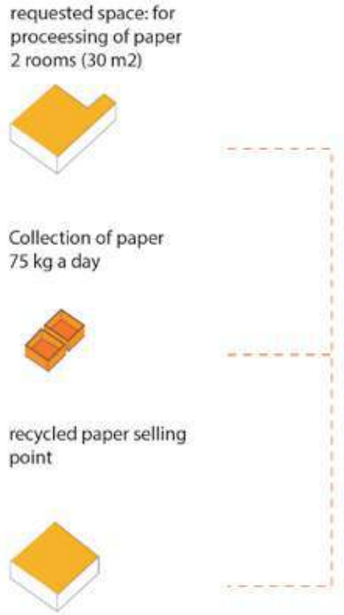


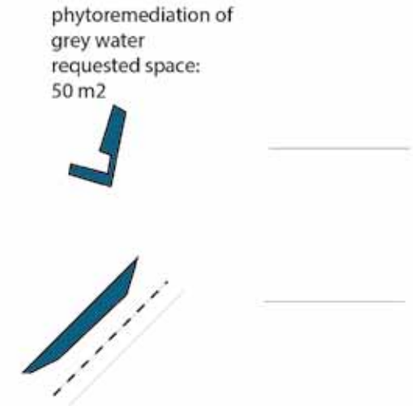
New waste infrastructure

Recycling paper demands a lot of water; by using the grey water from the neighbourhood another wasteflow is included inside the strategy. The grey water phytoremediation infrastructure can in its turn provide a safer accessibility to the school, by changing the section of the street. Additionally, the changed section creates a soft division between private and public domain.



grey water infrastructure

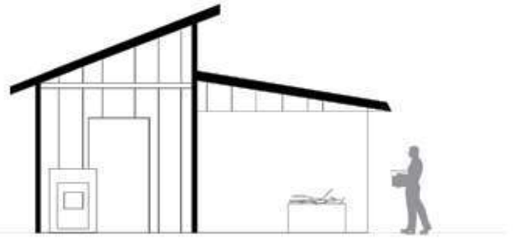




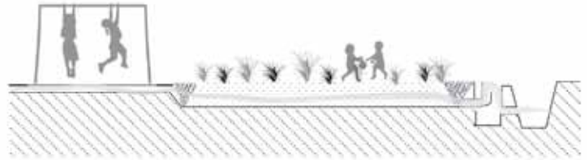
A tool-kit

In order to establish new synergies between waste-sheds and new activities at the site of the school a toolkit is developed. By applying these tools, a more sustainable way of trading and producing can be generated. Furthermore, they can be regarded as elements which can be used in a open way, without a fixed combination, nor a fixed outcome; strategies which are able to operate individually or together.

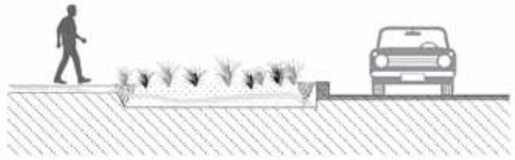
The tools are respectively directed to the cleaning of grey water, and the collection, recycling and selling of paper. For this, a new space has to be constructed or an underused room of the school itself should be used.



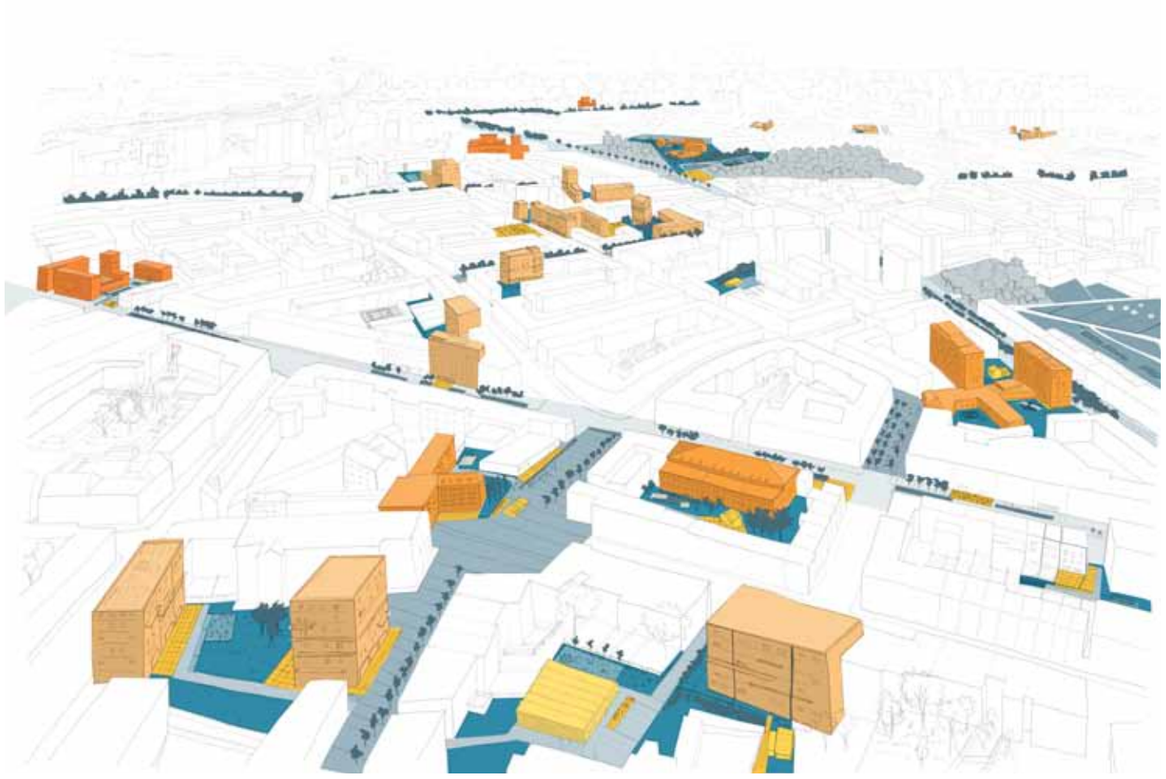
shed with paper collection, paper processing machine and paper selling point



inside playground, divider between public and private domain



chaninging section street, creator of public space



New spaces in the city evolve through the creation and overlapping of different waste-sheds.

- New public and colletive spaces.
- Re-use of under-used workshop
- School
- New residential building, new housing block
- Supermarket
- Steenweg
- Speelweefsel
- Vegetable garden
- Rain garden
- Phyto depuration

An image for the 21st century belt

The design investigations explored in this thesis demonstrates how changing the waste practices can instigate transition as starting point for imagining new urban configurations, typologies and densities.

Moreover, by rethinking the concept of waste, identifying optimal scales and disconnecting and redirecting flows, waste-sheds that define new spatial organisations in the city can be generated. By overlapping them, new synergies are engendered which affect the ways of inhabiting the belt and result in a new set of spaces.In short, a metamorphosis is initiated, which can shift the current reductionist centralised structure back to an organic, almost self-adaptive system.

This transition will not happen overnight but will be part of a process of disconnecting and redirecting flows, that can be organised, considering different stakeholders such as the city, Ovam, Aquafin, schools, supermarkets, families, …

In this manner, the shift of waste practices grows to be a tool to restructure Antwerp's 20th century belt and to define the new image of 21st century Antwerp.

european postgraduate masters in

urbanism

strategies and design for cities and territories

UPC Barcelona | TU Delft | KU Leuven | IUA Venezia