ALVAT

SURFACE AND SUBSURFACE CONNECTED BY GREEN-BLUE NETWORKS

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COLOPHON

ALVAT Site
Surface and subsurface connected by green-blue networks

Elective AR0021
Aqua Terra Urban Design

Master 2 Q4-2013/2014 (9 ects)

This booklet shows the result of a short internship at VITO (Vlaams Instituut voor Technologisch Onderzoek) in Belgium. It is part of the Belgium case in the BALNCE4P research project.

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CONTENT

INTRODUCTION

The ALVAT site is situated in Belgium. More specifically it is located in between Brussels and Antwerp along the Schelde, close to Dendermonde and Sint Amands. It is part of the Municipality of Buggenhout.

Until 1995, ALVAT owned the site. This company used to clean and re-use old barrels. But in 1995 ALVAT went bankrupt.

Since then, this location is abandoned and is classified as an underused brownfield. This is because of the polluted ground due to the former industrial activities.

Although this site is abandoned and contaminated, the areas around the site are still in use. In the North and South of the site housing areas define the edges of the former ALVAT factory. On the East side agricultural activities take place. As said before, the big river the Schelde flows along the west side of the site.

Also elements of the history of this place are still present. For example the old railway track which is located on the East side of the site. Today this track serves as a touristic attraction with a small train passing by sometimes.

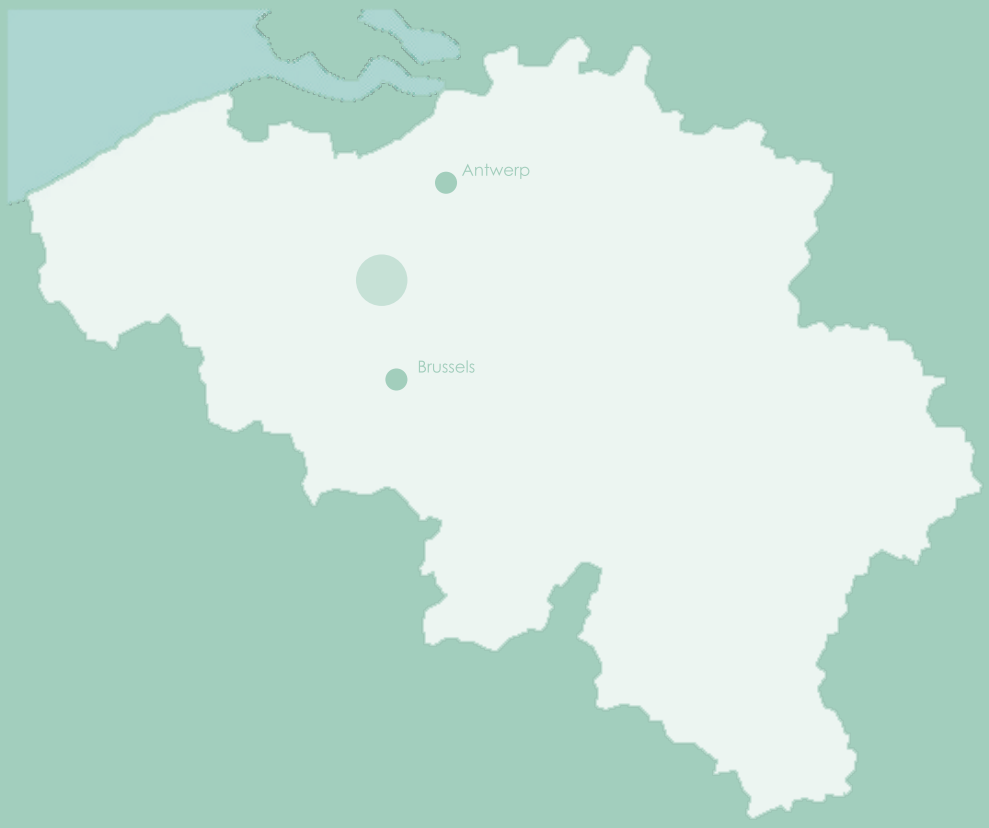


Figure 1
photographs of the site: the old railway track, entrance of the site, former 'tankenpark' and road along the Schelde on the west side

PROBLEM STATEMENT

As stated before, the site is abandoned because of the high-polluted subsoil. This results in the fact that the subsoil should be cleaned before any development on the site can take place. Because of the (expected) high concentrations of contamination it will be a huge investment. This is the main problem of the ALVAT site.

> Contamination

Figure 2 shows the different types of contamination, which are found on the site (Ecorem, 2002). Since then, no other investigations on the concentrations/types of contamination have been done. Therefore this project deals with results of 2002, although they might be different in the current situation.

Different types of contamination are present on ALVAT. The main findings are high concentrations of metals, BTEX, Mineral oil, PAK and VOCL's. But also the flow of groundwater is highly polluted. The blue arrows, going to the Schelde, show this.

> Stakeholders

Another problem that prevented redevelopment of the site in the past twenty years are the different interests of stakeholders. The following figure shows the interest and position of the different stakeholders (Touchant, 2014, p. 10).

Stakeholder	Interest	Position
Company	none: curator	owner
Municipality of Buggenhout	residential area	mix of housing and recreation
Province of East-Flanders	industrial area W&Z: right of first refusal	redevelopment of the industrial site into a water-bound business park
W&Z		
City of Dendermonde		
POM East-Flanders		
Enterprise Flanders	brownfield convenant	
Santerra	interested in acquisition	requested the brownfield convenant in the past
OVAM	not interested in acquisition	act if parties not fulfill their obligations
PMV	cleaning and selling the site	investment analysis

Table 1

Because of these different interests, it is difficult to define one outcome of this research. Therefore several scenarios are designed.

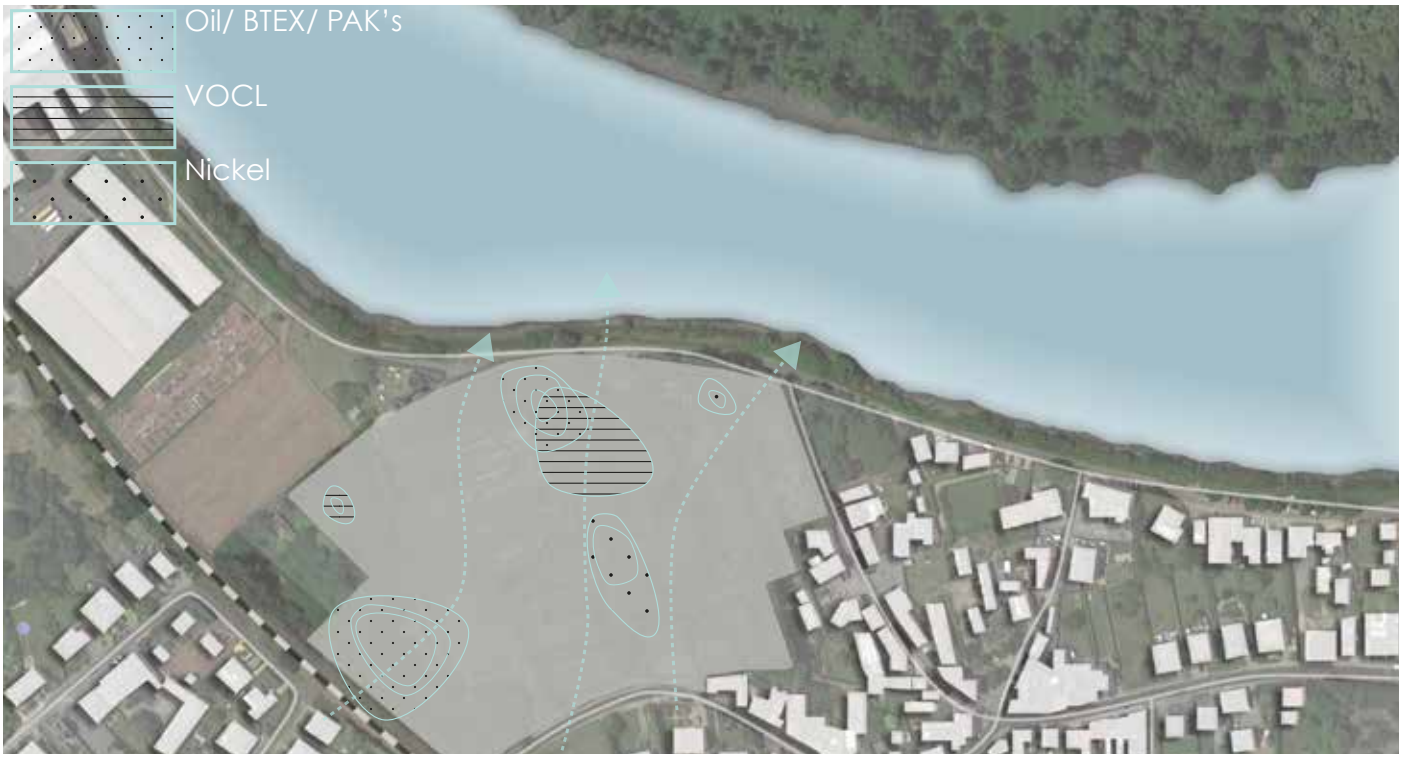


Figure 2
Different concentrations of contamination with polluted flows of groundwater

RESEARCH QUESTION AND METHODOLOGY

The main problems of the ALVAT site are both the contamination and the different interests of stakeholders. Therefore the site is still an underused space, although the location has a lot of potential. But what exactly is this potential? And how can this potential be turned into an opportunity?

The main starting point is to develop the site by combining the surface and subsurface. In addition, the condition of the subsurface is prior to the surface. Hence, the research question of this project is:

How to develop an urban plan for the ALVAT case in the near future by combining the technical measurements for the contaminated subsurface with spatial qualities of an urban plan?

Although it is not common that both technical engineers and urban designers work together from the beginning of the whole process, this project is trying to do so. This means that both engineers, who are investigating the subsurface from a technical perspective, and (urban) designers, who develop the surface from the perspective of people, are combined. To achieve this goal in reality the methodology used in this case is based on this dialogue between technique and spatial design: system exploration environment and subsurface (Hooimeijer, 2013).

During my internship at VITO I discussed a lot with them on the different topics, which are used in the SEES. Figure 3 shows the outcome of this dialogue.

The horizontal columns are about the technical layers, namely: archaeology, cables and pipes, explosives, carrying capacity, energy, water and the (morphological) quality of the soil. The vertical layers are about the spatial layers dealing with people, metabolism, buildings, public space and infrastructure. After looking closer at all these different topics, interesting relations between subjects occurred. In some cases subjects have a negative or positive influence on each other. In the case of the water-related topics, these could also result in an opportunity. Therefore this project focuses mostly on these water-related opportunities. How can these be turned into an actual strategy for the site from the perspective of both the surface and subsurface?

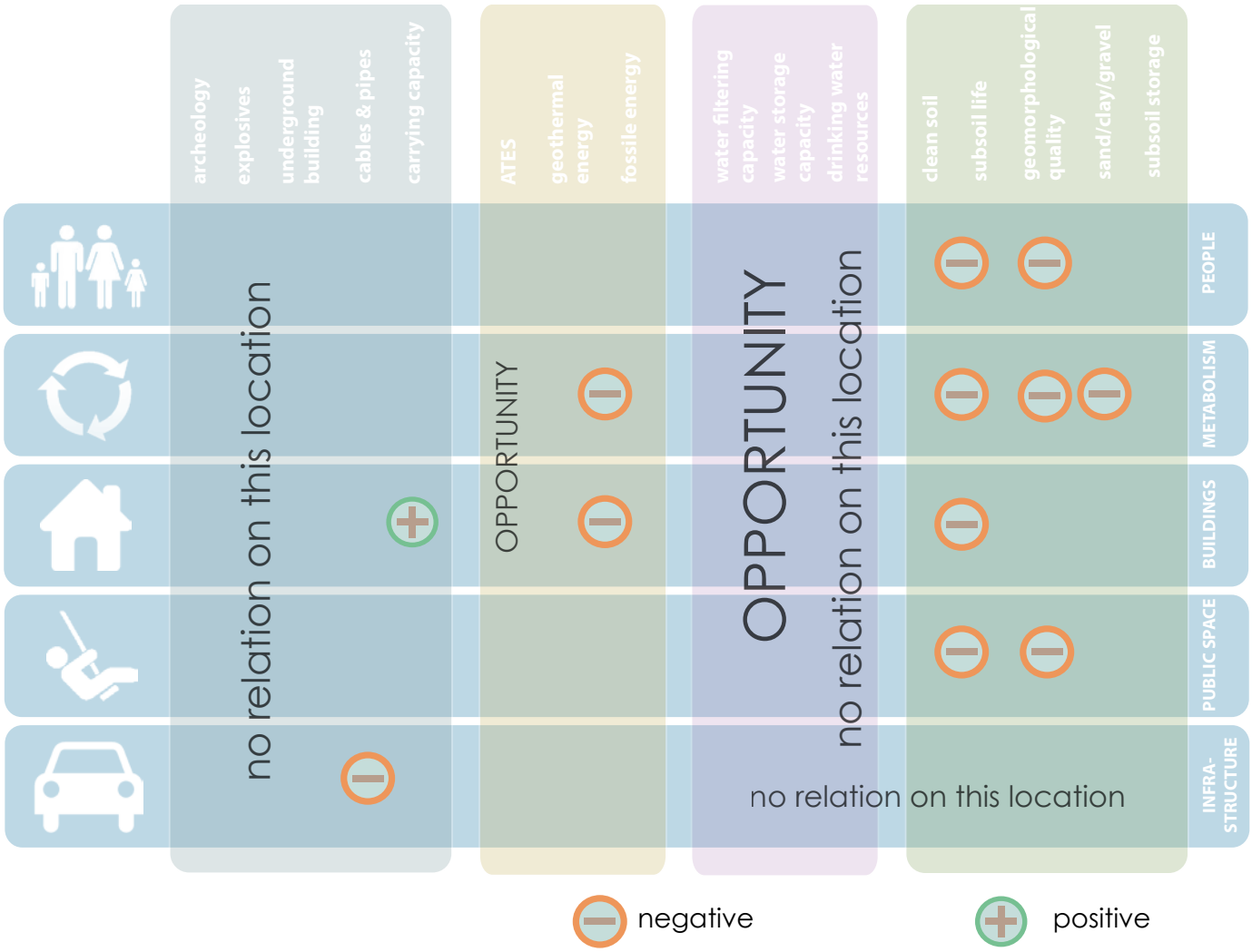


Figure 3
Result System Exploration Environment and Subsurface

THEORETICAL FRAMEWORK AND CASESTUDIES

The aim of this project is partially to develop the ALVAT site in a sustainable way. To investigate this aim a definition of sustainable development should be given first. The definition used in this research is the one given by Holling:

> *'Sustainability is the capacity to create, test and maintain adaptive capability. Development is the process of creating, testing, and maintaining opportunity. The phrase that combines the two, sustainable development, thus refers to the goal of fostering adaptive capabilities and creating opportunities..'*
> (Holling, 2001)

Both flexibility and creating opportunities are addressed in this definition. They are also the main aims of this research. As van Beek-Vlaanderen Oldenzeel states in her book 'Levende stad, stad om in te leven' it is relevant in cities nowadays to create green and liveable surroundings to work, live and recreate. It is not only good for the environment, also people will get involved with their living environment more. As a result they will move less often, which could be classified as a more sustainable effect (Beek-Vlaanderen Oldenzeel, 2012).

A recent example of this theory is the living area of EVA Lanxmeer. This area is designed in collaboration with the future inhabitants, municipality and a project developer. To make the area sustainable from the spatial and technical perspective, several elements were created in Lanxmeer. For example a large part is used for helophytes, WKO's are used for energy and several wadi's are installed to deal with a surplus of rainwater (Potz, 2012).

Another example addressing the contaminated ground is the project of 'de Ceuvel' in Amsterdam. In this case old housing boats were transported to the contaminated site. They were place on top of the contaminated ground and connected among each other by bridges. In this case people could live on the contaminated site while it is cleaned by nature over time (De Ceuvel, 2013).

Both projects are shown in the figure on the right page.

Figure 4
Case studies: EVA, Lanxmeer and de Ceuvel, Amsterdam

AIMS AND STRATEGY

The aim of this project is given by of the Balce4P project: balancing decisions for urban brownfield regeneration- people, planet, profit and processes (Norrman, 2012). Therefore the aim of the Balance4P research serves as the research question of this specific case at the same time. But how to achieve this goal?

As said before, the difficulties of this case are the out dated information and the different interest of stakeholders. Therefore the strategy is based on these uncertainties. Although not a lot is sure yet in the ALVAT case, some contaminated spots in the subsurface will still be there. How much and where exactly is hard to tell, therefore the strategy is based on flexibility both from the technical and spatial conditions of the surface and subsurface. As figure 5 shows both layers should work together in any case. But how can the spatial translation in relation to the technical conditions be flexible? And more important what function should this spatial translation have?

To answer this question some generic urban analysis is done. These are shown in the appendix of this booklet. The main conclusions of the analysis are:
- The site is surrounded by housing areas and by a little bit of agriculture
- Industrial area is situated along the Schelde, not far from the site
- Daily facilities like grocery stores are reachable within 7 min by car
- The other side of the Schelde is part of both Natura 2000 and the Sigmaplan. Therefore new ecological floodplains will be created in the near future
- A bicycle path goes around the site. Nowadays it has to make a strange angle because of the contaminated site

Combining these conclusions of the spatial analysis with the technical conditions lead to starting points as shown in figure 5 on the next page. These are defined by the technical measurement and the spatial measurements.

Technical measurements (p.18):
- Re-use fluvial and grey water within the area
- Connect (sub)surface by a green blue network

Spatial measurements (p.19):
- Contemporary buildings till soil is cleaned
- Phasing to develop a dynamic urban plan

But how could this concept in combination with these starting points be translated into a design, which harmonises the spatial and technical conditions? This will be explained on the next pages. As said in before, it is difficult to design a specific urban plan for this area in this stage, because of the different interests of stakeholders. Therefore scenarios are made,

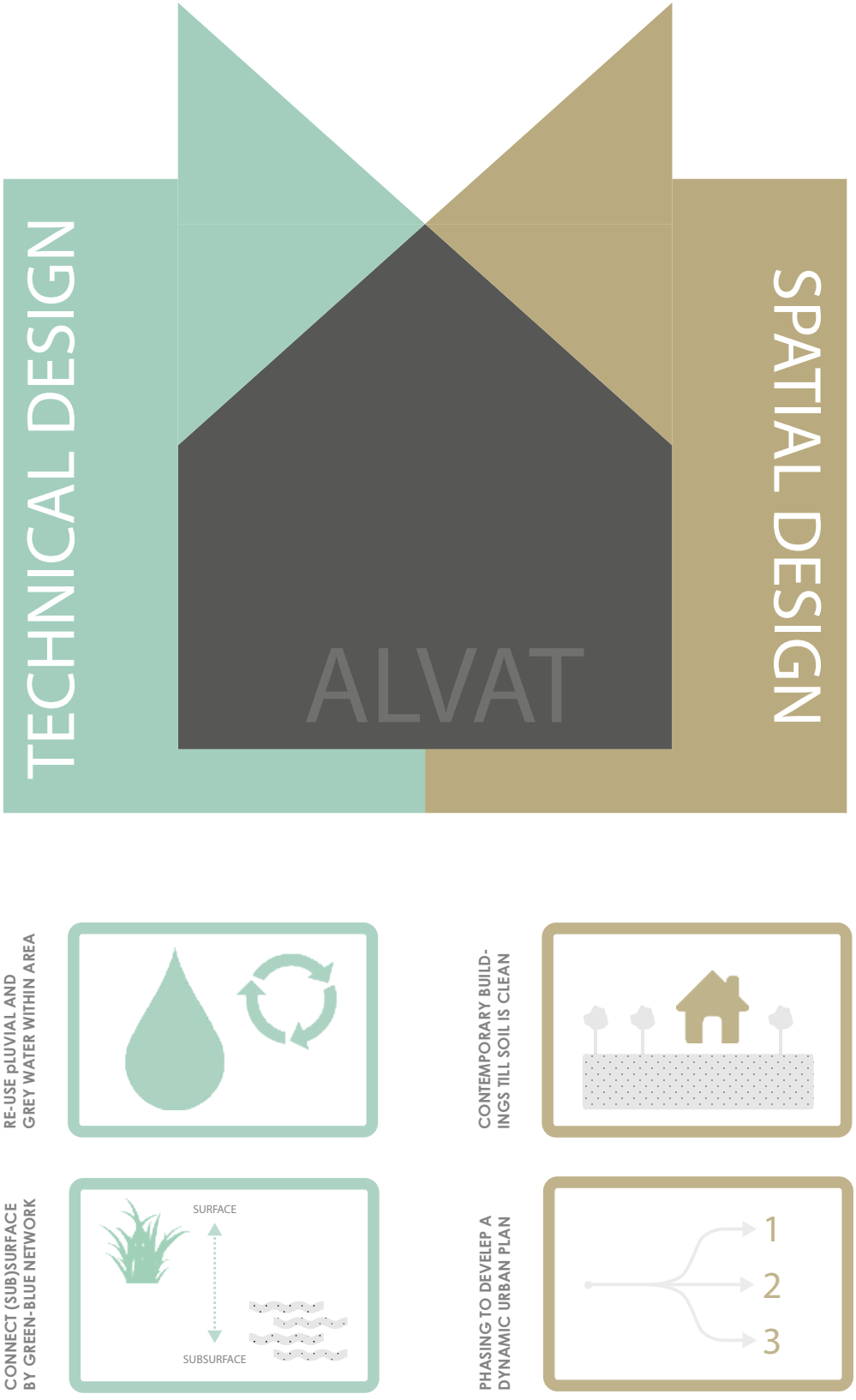


Figure 5
Concept and starting points

Technical measurements

The main ideas are re-using fluvial and grey water within the area and connect (sub)surface by a green blue network. This means that what happens in the subsurface will be reflected in the surface. Mostly the contamination will be treated by flushing the groundwater. Because the main remediation technique is based on water, the measurements in both the surface and subsurface will be (visually) connected by a green-blue network. In addition, the new development can become even more sustainable by re-using their grey and fluvial water.

Figure 10
Remediation techniques: flushing of groundwater and phytoremediation

Figure 6
Contamination

Figure 7
Underground parking garages

Figure 8
Main roads

Figure 9
Pumps and treatment installation

Spatial measurements

The main elements in the spatial design following the technical measurements in the subsurface are:

> Underground parking garages:
this is an often used example of 'integrated remediation'. However, this needs to be considered with care. The benefits of such a combination are dependent on site-specific conditions: building and maintenance costs can be much higher than the costs for an excavation. When there is no (imposed) need for underground parking, the builder will not choose for this.

> Main road connections & pumps:
located on between the parking garages to lead the groundwater flows in the direction of the treatment station in one of the garages.

> Ecological park:
this part is never investigated so there is no information about the contamination. Therefore an ecological park is located here using phytoremediation as a gentle remediation technique.

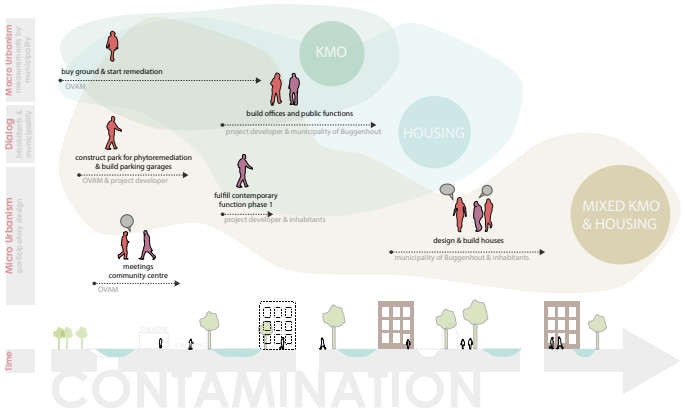


Figure 11
Spatial measurements

DESIGN

In the last decades sustainability in (building) projects has become a major issues. This is stated in the definition of PPP: People, planet, profit. But recently these three p's became a point of discussion. Is it really about only these three topics? Therefore a fourth P has been invented: project. As a result sustainability is about the following (Duijvestein, 2009):

People = the social quality
Planet = the environmental quality
Profit = the economical quality
Project = the spatial quality

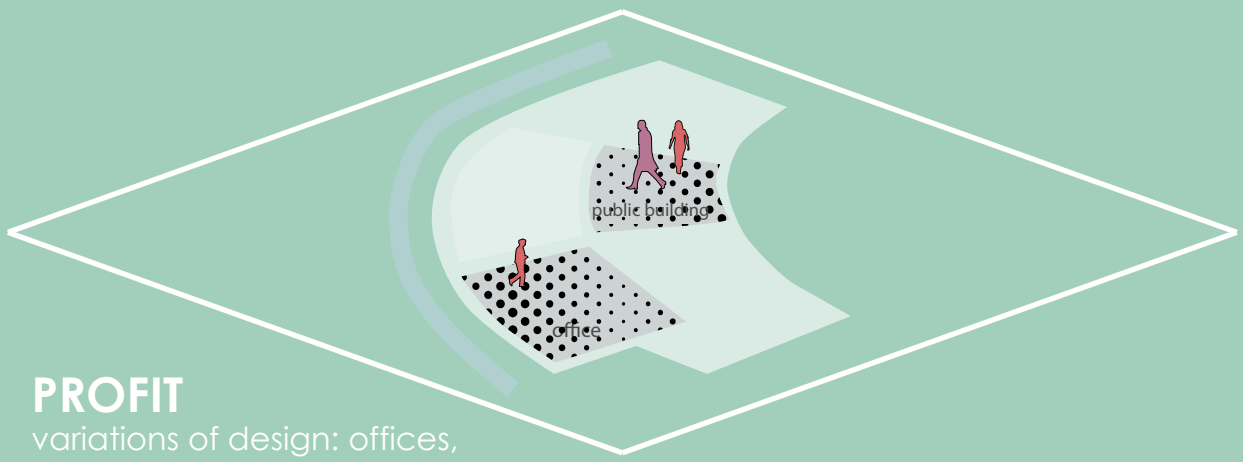
Therefore the design of this project will be explained according to these four layers.

As said before the concept is about a flexible harmony between both the technical underlayer as the spatial layer. Because the site has to be cleaned in any case, the technical measurements will not differ between the scenarios. These are explained by the lower two layers, planet and profit, in the figure on the right page.

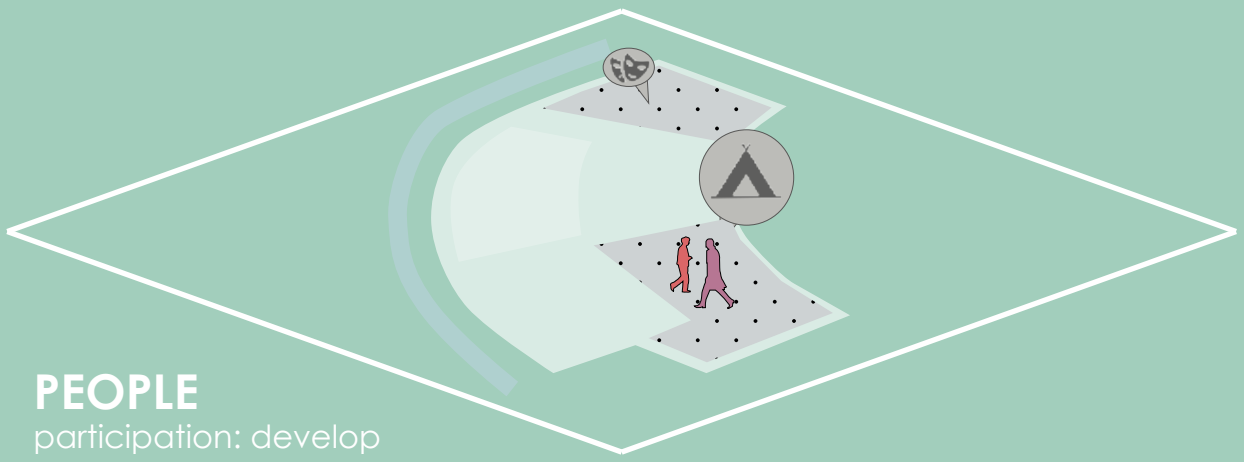
The planet layer is addressing the environmental quality as much as possible. This means it is represented in the contamination techniques to clean the site: flushing the groundwater and making underground parking spaces. This is done to direct the flow of groundwater towards a certain point where a technical installation can treat the contamination. Also the project layer is the same underlayer in every scenario. This layer contains the project-specific elements, namely water-related elements. As shown in the figure helophytes will be used to clean and re-use fluvial water within the area. Also phytoremediation is used to clean the contamination, which is unknown nowadays.

Both the layers of people and profit are flexible layers and are depending on the type of scenario that will be used. The layer of people is about involving people in the whole (design) process. As stated in the chapter 'theoretical framework' it is proven that involving people in an early stage they will appreciate their living environment more and therefore dwell longer in the area. This is also a part of sustainability (Potz, 2012).
Profit is about the economical aspects of the design. Because the contamination techniques will cost a lot, money has to be earned by developing the site. Therefore different scenarios contain public buildings and private buildings.

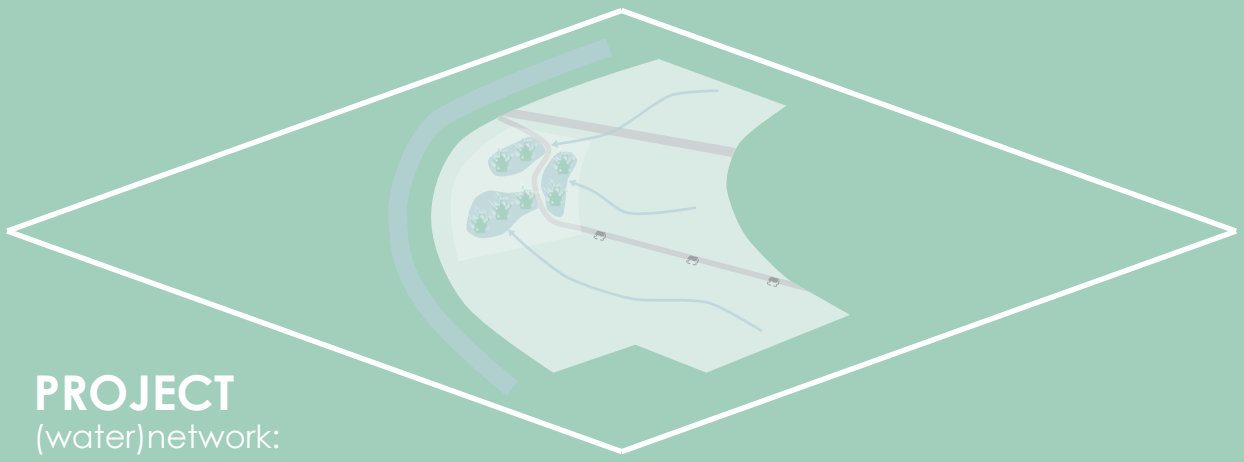
On the next pages the different scenarios are shown. These are explained by a timeframe: first the technical measurements will take place (planet). Then the project layer is implemented with the first steps of the profit and people layer. This is done to earn money and involve future users of the site in an early stage of the process. In the last phase the profit and people layer are executed.



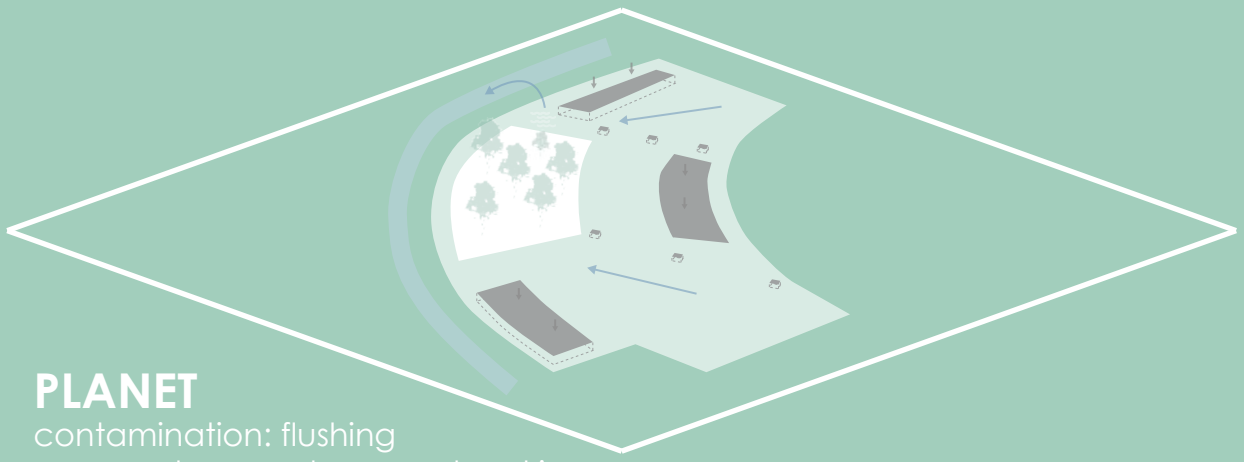
PROFIT
variations of design: offices,
public buildings & housing



PEOPLE
participation: develop
temporary functions



PROJECT
(water)network:
helophytes &phytoremediation



PLANET
contamination: flushing
grounwater & underground parking

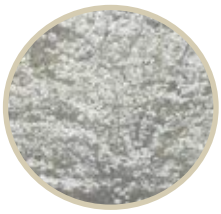
Figure 12
Rough plan water-related industry

Figure 13
Possible outcome water-related industry

Figure 14
Rough plan housing

Figure 15
Possible outcome housing

gleditsia
Honey locust



corbus florida
Dogwood

trifolium repens
White clover

eichornia crassipes
Water hyacint

phalaris arundinacea
Reed canery grass

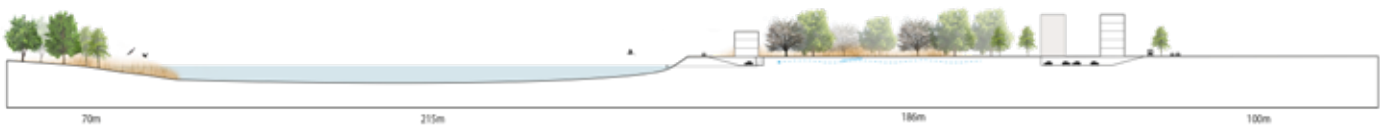


Figure 16
Section big scale: Schelde and park area combined with underground parking

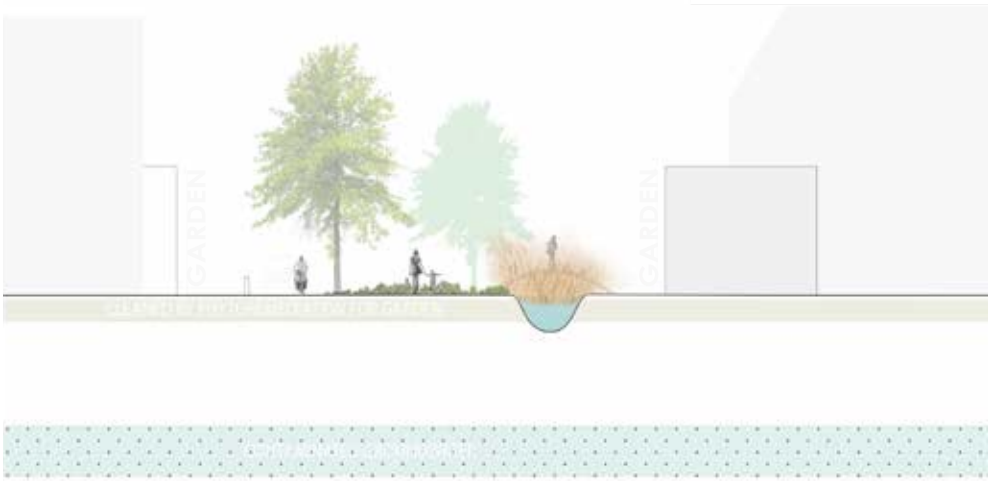


Figure 17
Section small scale: private neighbourhood with helophytes and urban farming

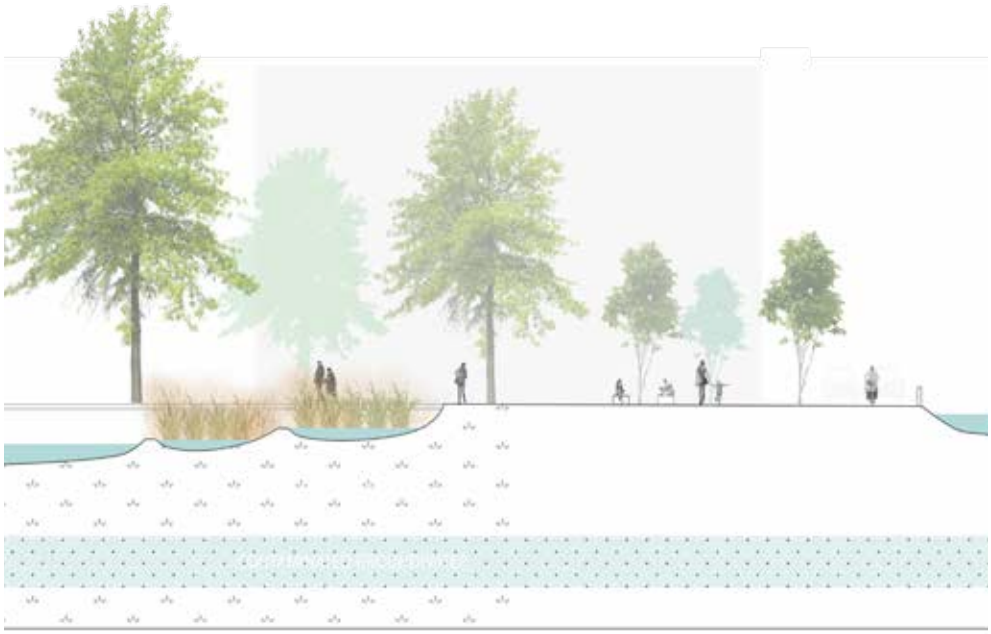


Figure 18
Section small scale: public road along the Schelde: park with helophytes and walking boards

MIXED-USE According to the theoretical research and urban analysis, a mixed-use scenario could be optimal for the ALVAT site.

The maps on the right page show the scenario in detail. As also with the previous scenarios first the planet and project layers are implemented. To make a bit of profit in an early stage of the process, public buildings could be built along the main road of the ALVAT site. These buildings could be used for offices or small shops for daily grocery shopping. On the other side of the site more offices can be build. These are close to the industrial area of Baasrode and could function as main offices for the industry overthere. In the rest of the area housing could be built in the future. But because it is difficult to built it all at once, future inhabitants could use the empty ground already for temporary functions. Not only to use the abondoned site, also to create a positive interest of the future inhabitants in the site.

The sections on this page show how this could all look in detail.
Figure 16 shows how the park with phytoremediation is located along the Schelde. To treat the chemicals as found during previous investigations, the main types of plants are shown in this figure (Sunshine, 2012)
Figure 17 shows a more specific view of the helophytes in between the houses. Also urban farming is shown, that could be used as a participatory project in the area.
Figure 18 shows the phytoremediated park in detail. Helophytes combined with the specific species of plants create a natural environment to recreate and relax along the Schelde.

Figure 19
Possible outcome mixed-use

STAKEHOLDERS AND PHASING

To achieve one of these scenarios several stakeholders in those different phases are important. As mentioned before the municipality of Buggenhout, W&Z, but also parties like the organization of OVAM and Santerra are interested in developing this site. Therefore only the stakeholders and their actions will be explained in generic terms, without assigning a specific party.

In order to achieve a sustainable design the involvement of users of this site in the future is considerably. As shown in figure 20 a distinction between micro urbanism and macro urbanism is made. Within micro urbanism the people are the main actors. These could be future inhabitants, but also companies who will occupy offices. This is depending on the scenario, which will be implemented. Macro urbanism is explained by the involvement of public parties e.g. the municipality. Both micro and macro should be seen as even important stakeholders. By a dialogue communication between both users and planners could take place. By communication with each other and taking decisions together both the municipality and the future users can create an emotional value.

But how are the stakeholders, actions and the design process related to each other?

Again the phasing as used in the different scenarios is also used in this dynamic strategy. It is important that someone will by the ground and start the remediation technique. At the same time meetings with future users could start. The next step is similar to the second phase: construct the park and the underground parking spaces. From the view of micro urbanism it could be useful to start creating temporary functions on the former ALVAT site. After a while first offices and public functions could be build.
In the last phase things like helophytes and urban farming are important spatial aspects to build. At the same time a project developer could start building houses. In the end a sustainable mixed-use area could occur on the former ALVAT site.

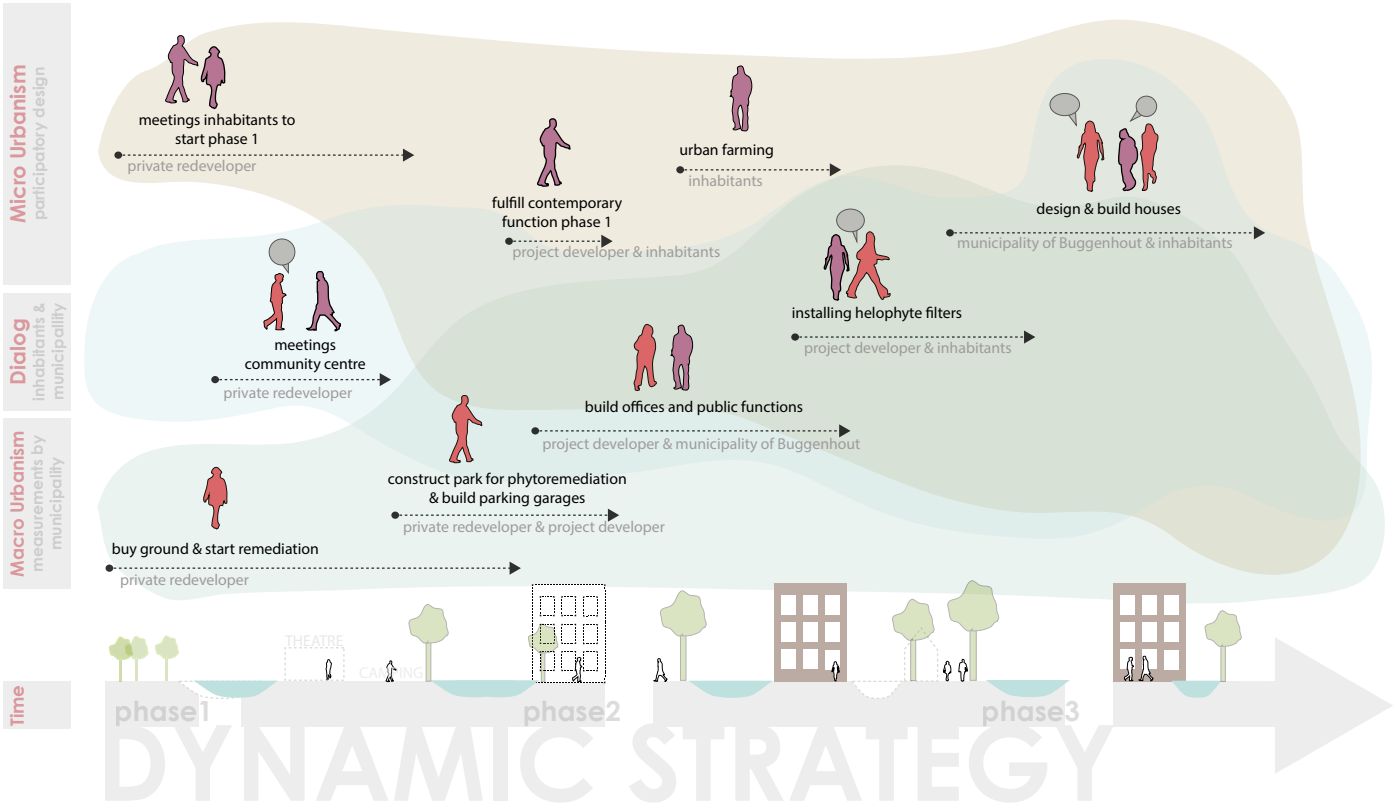


Figure 20
Dynamic strategy based on the mixed-use scenario

CONCLUSION

To conclude this project an answer should be formulated on the research question:

How to develop an urban plan for the ALVAT case in the near future by combining the technical measurements for the contaminated subsurface with spatial qualities of an urban plan?

After reviewing literature, case studies from practice and the urban analysis several aspects are important to mention.
First of all it is advised to start investigating the current situation of the contamination in the ground. It could be that the concentrations of contamination are lower than expected. The site is already empty for twenty years. When all stakeholders know the current conditions action could be taken with (maybe) less money involved. Second it is important that all stakeholders communicate open to each other and try to get closer to each other. They have different interest in the case, but in the end something should be done with the former ALVAT site. Not only from an environmental perspective, also from a social perspective. The site is abandoned and underused nowadays. This doesn't positive influence on the area. A discussion among the stakeholders could start by using the different scenarios. Because the scenarios differ a lot from each other, different parties could argue about a rough direction first. When they agree on this direction (e.g. mixed-use, water related industry or housing) they can start discussions on a smaller level. But, when they are starting discussions at this particular level it is useful to involve future users of the area in the (design) process. As the example of EVA Lanxmeer shows, involving people in an early stage could result into surprisingly (sustainable) building areas. Also it is easier to think all together about a way to treat the subsurface and design the surface at the same time. It could lead to surprising results in the future, which are not thought of in the Balance4P project yet.

In the end the different scenarios show the possibilities to develop an urban plan for the ALVAT case in the near future by combining the technical measurements for the contaminated subsurface with spatial qualities of an urban plan. The technical layer is flexible enough to deal with the different concentrations of contamination. At the same time it creates opportunities for the spatial layer. It could be used as a part for industrial offices, housing or a mix between housing and public buildings.

DISCUSSION

Although this answer seems simple, the reality will be different. To redevelop a contaminated and underused brownfield, all stakeholders should communicate. Maybe that is the first step in the field of redevelopment in brownfields: how can stakeholders with different interests start communicating in order to redevelop contaminated sites from the perspective of the subsoil? This could be an interesting topic to research when the Balance4P project is finished.

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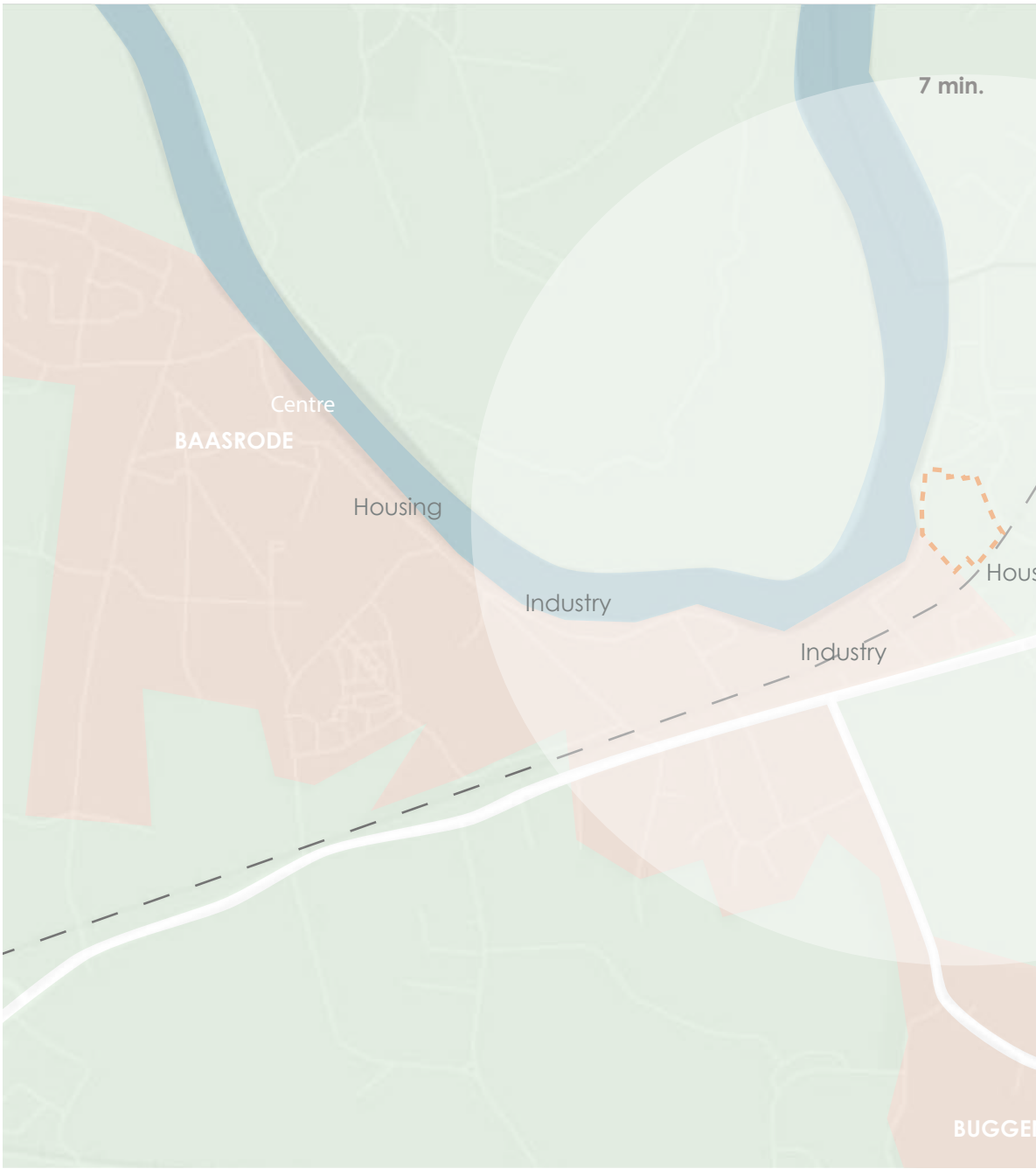
APPENDIX

Facilities



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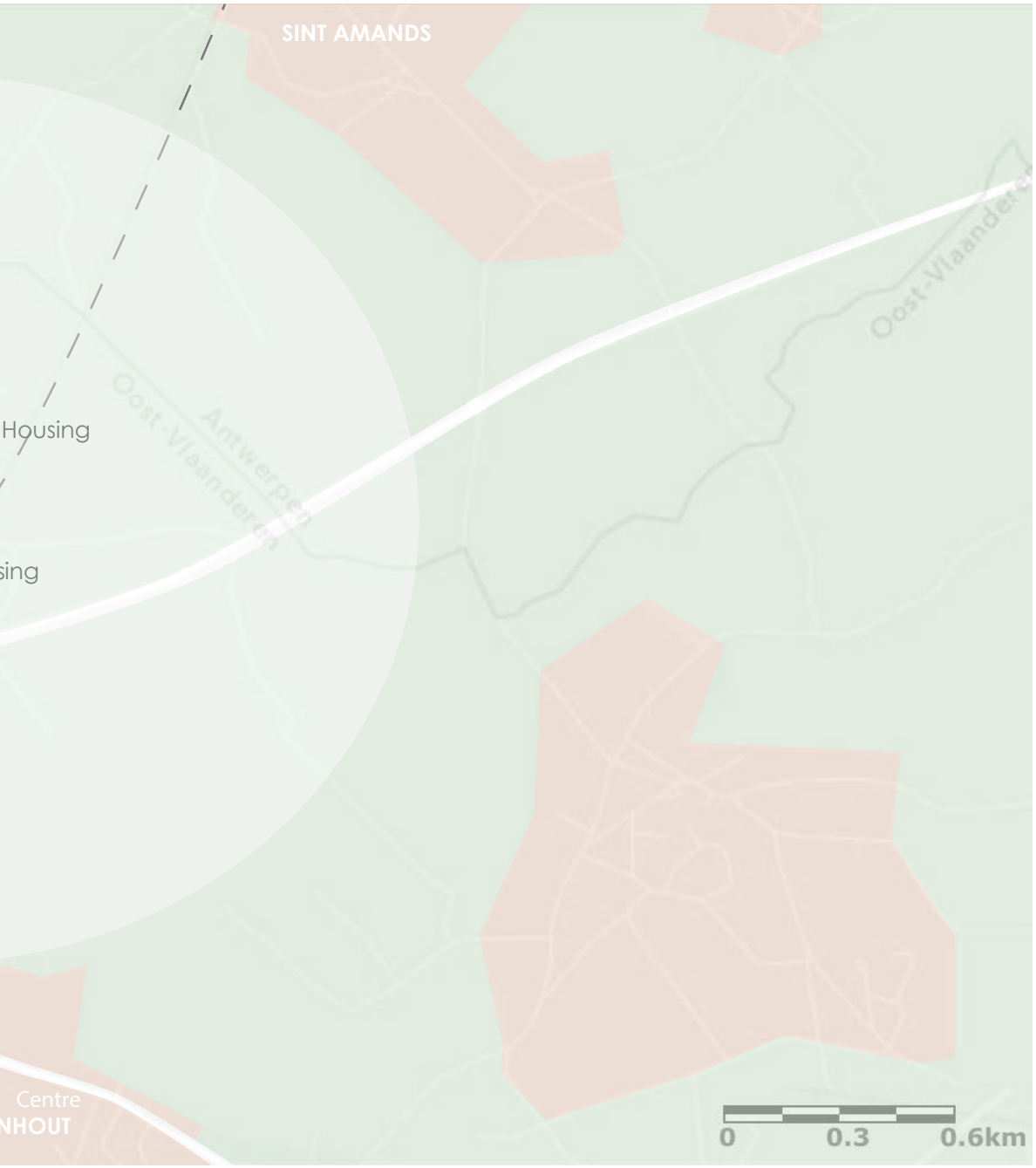
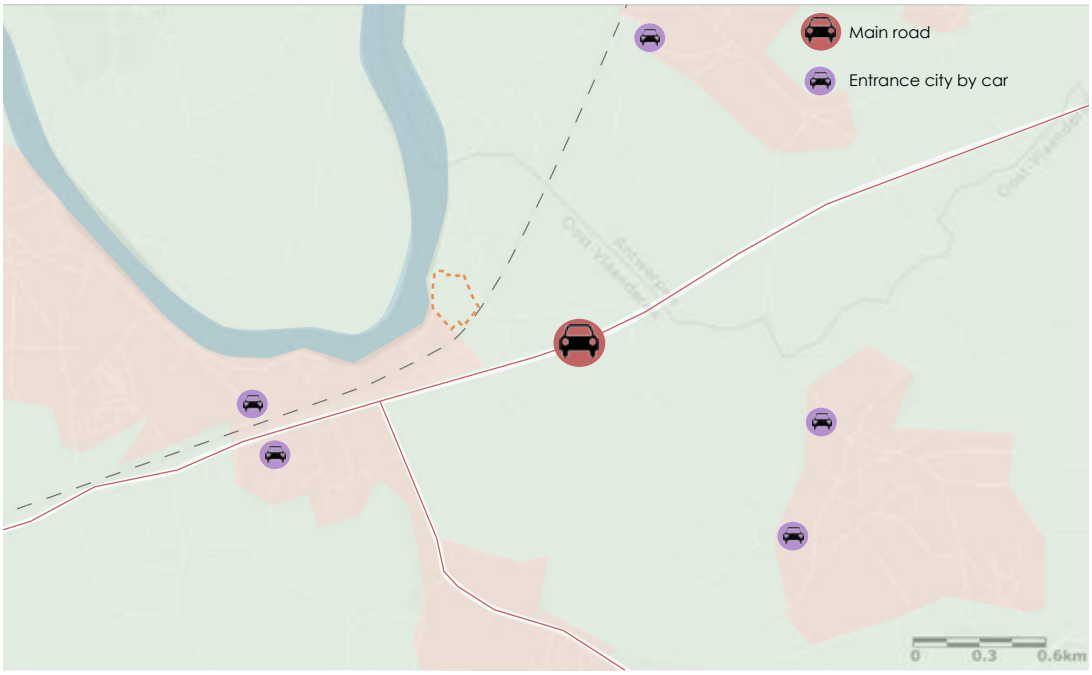
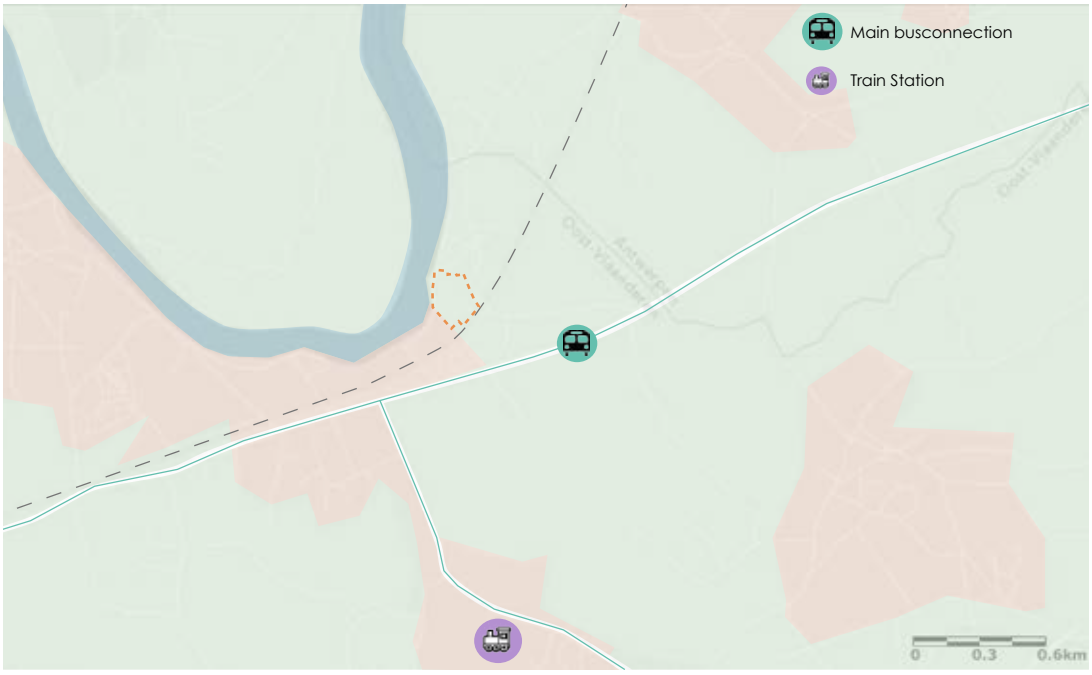

SINT AMANDS
Housing
sing
Centre
NHOUT
Oost-Vlaanderen
Antwerpen
0
0.3
0.6km

Grey network

Car traffic



Public transport



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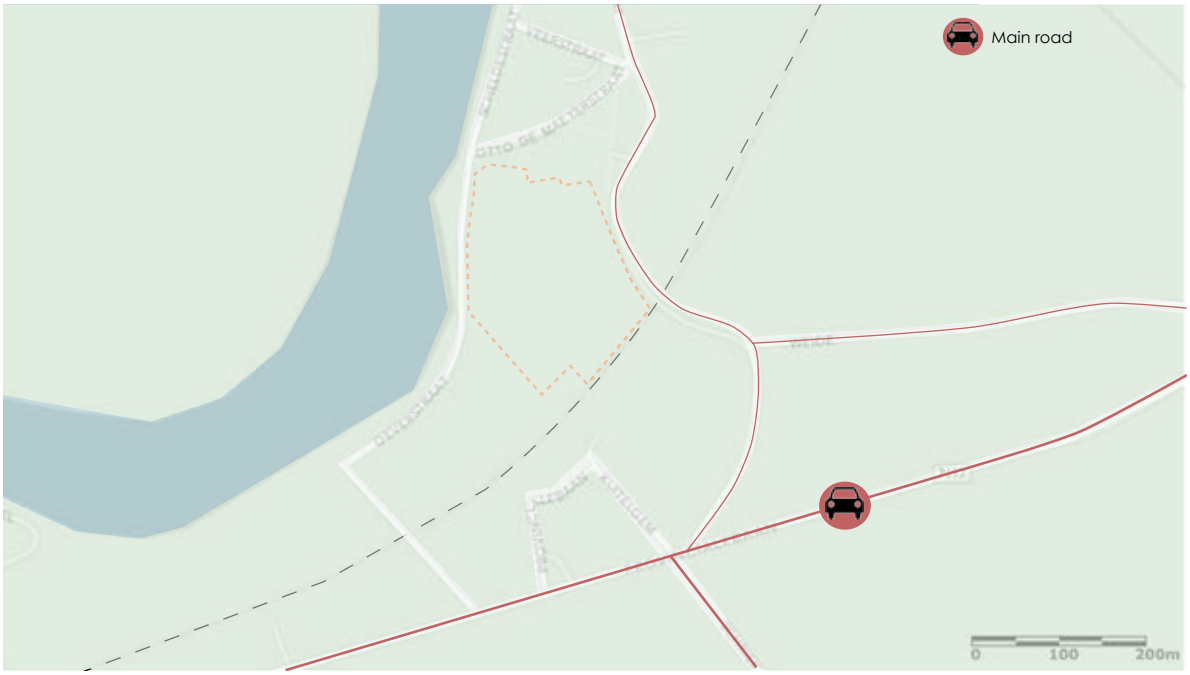
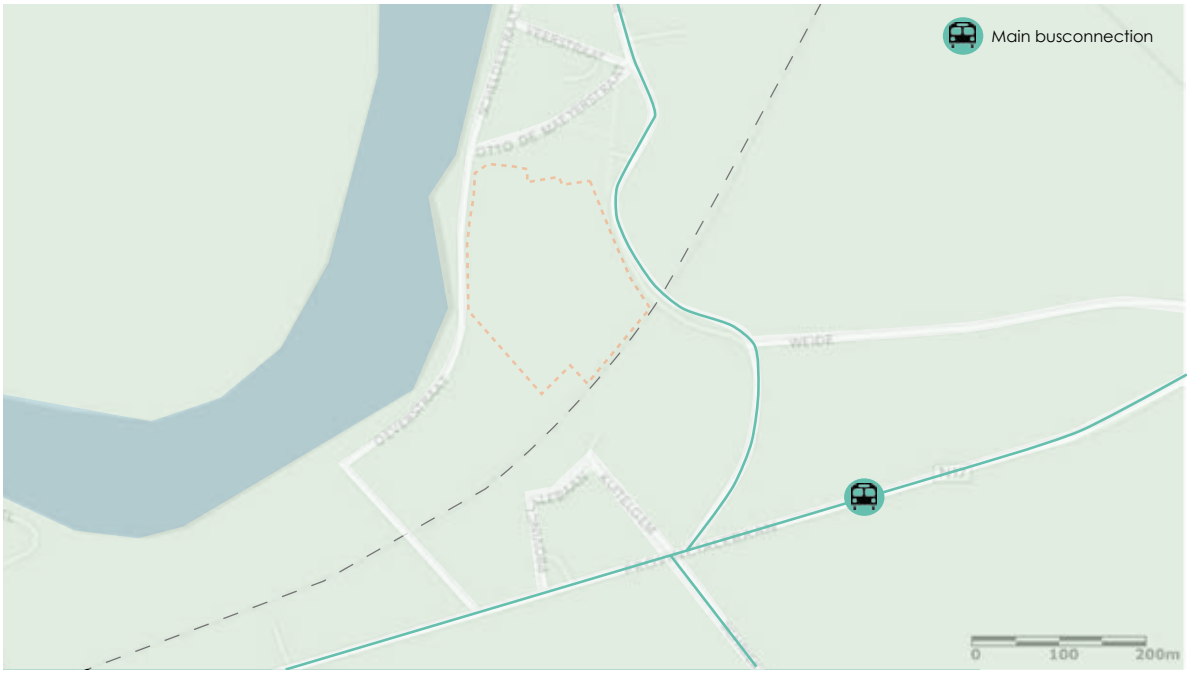
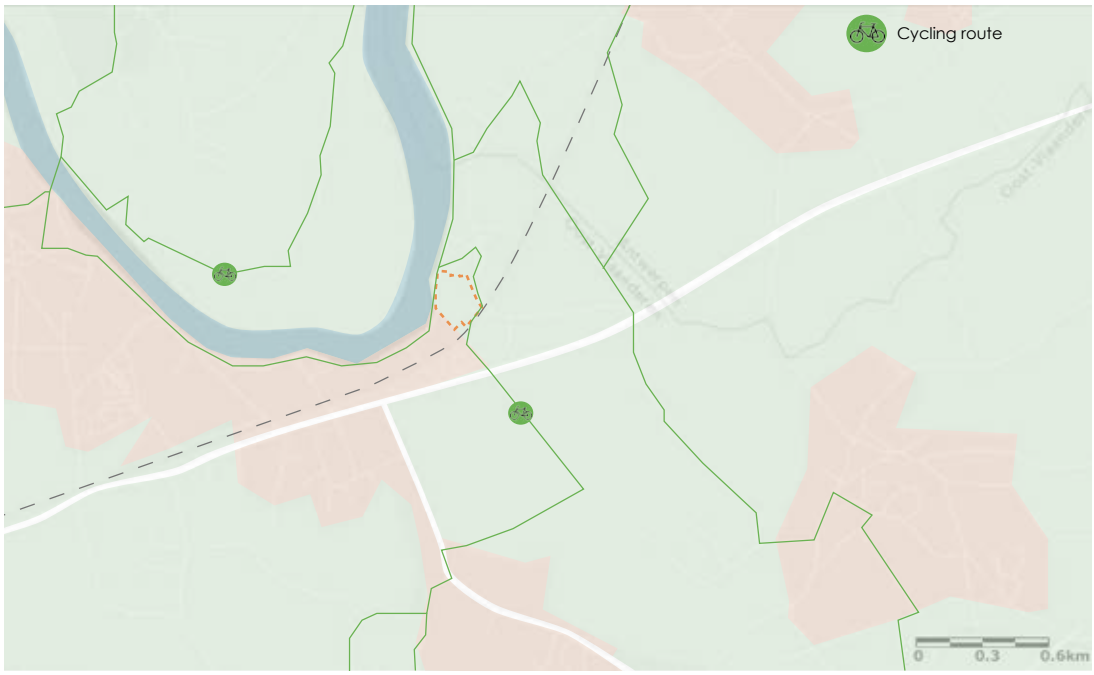

Main road
0
100
200m

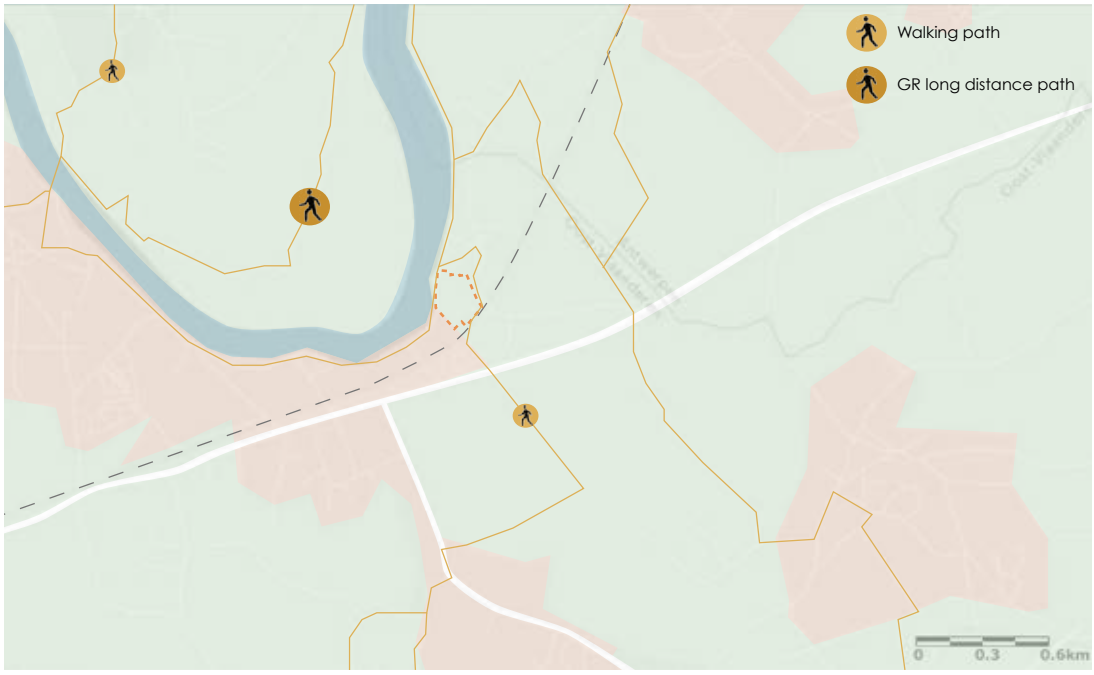

Main busconnection
0
100
200m

Grey network | slow traffic

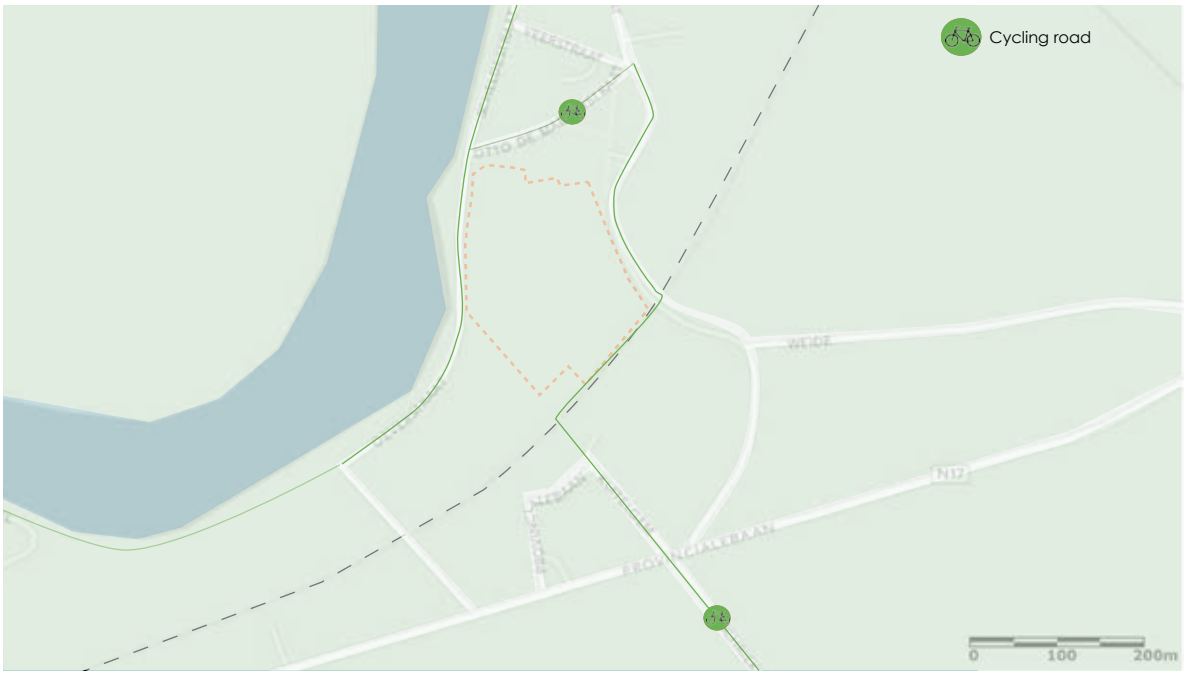
Cycling network

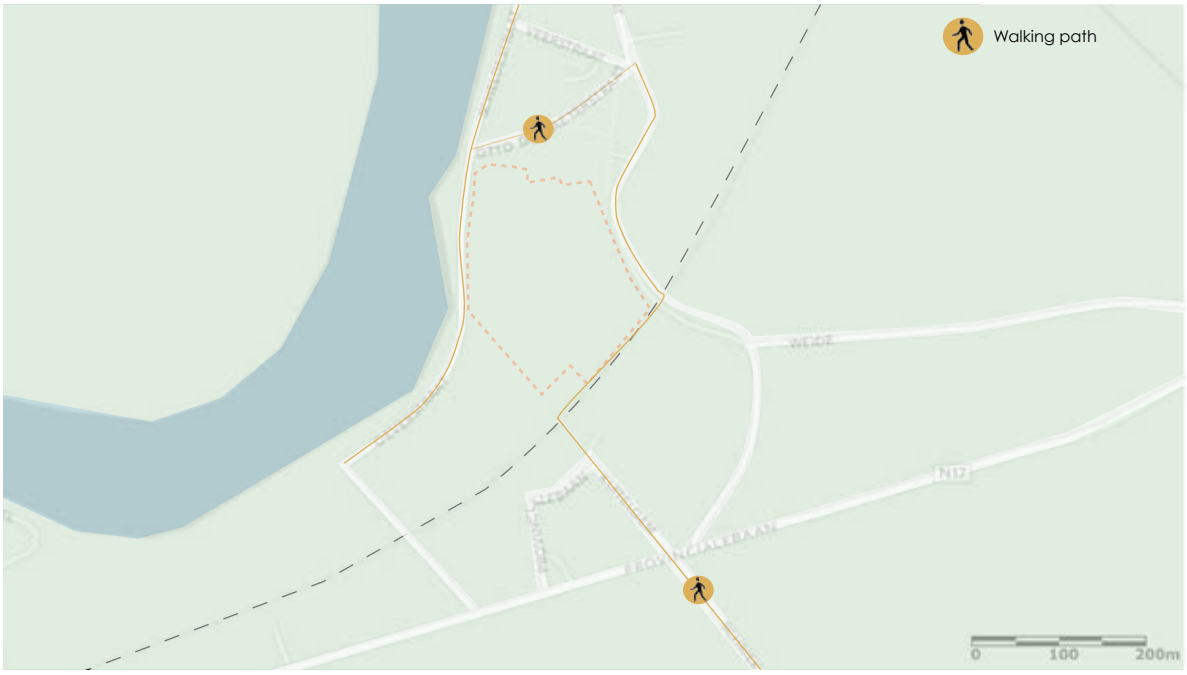


Public footpath



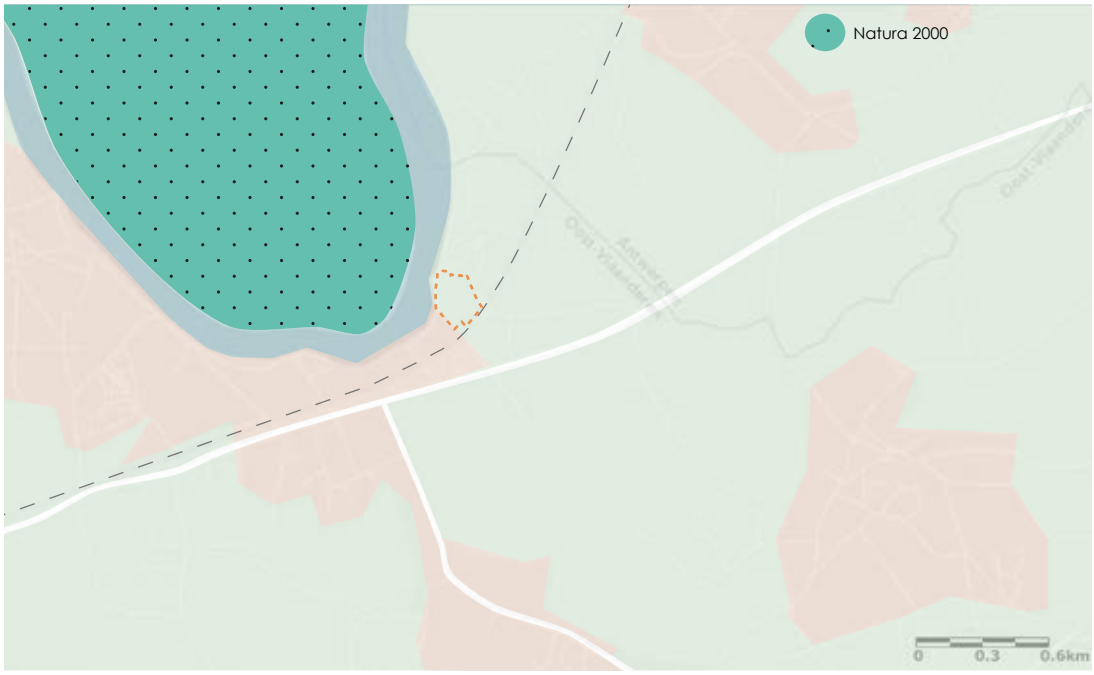
Source: http://www.fietsnet.be & http://www.wandelroutes.org


Cycling road
WEIDE
N17
0
100
200m

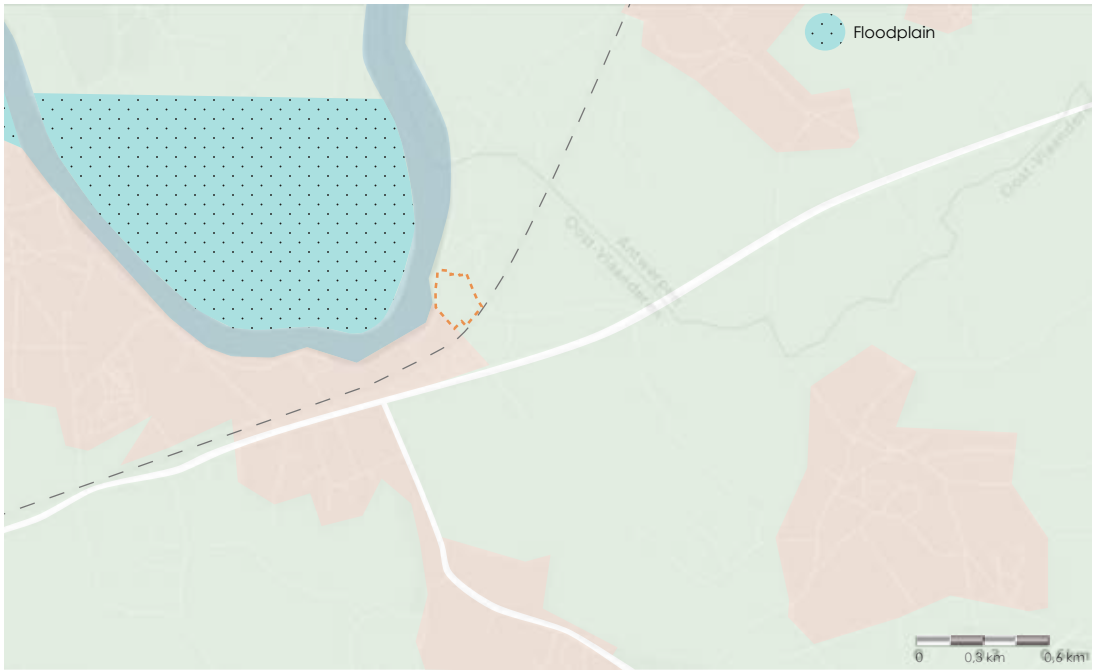

Walking path
WEIDE
N17
0
100
200m

Green and blue network

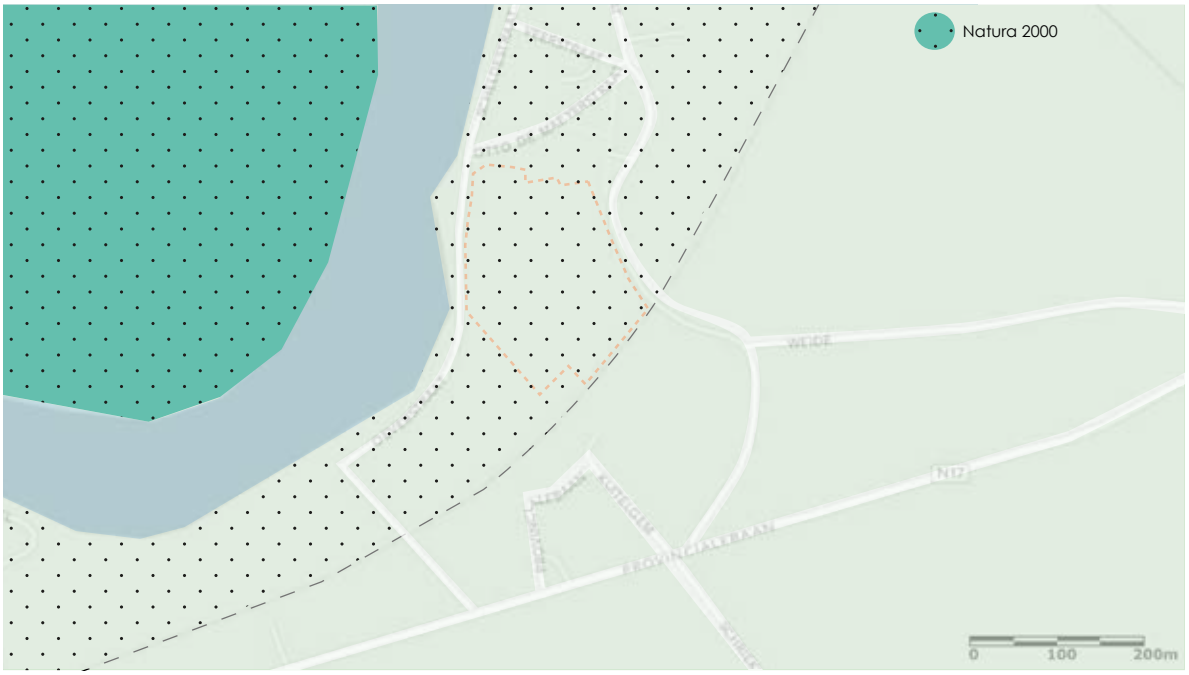
Green network



Blue network



Source: http://geo-vlaanderen.agiv.be/geo-vlaanderen/natura2000/
http://www.sigmaplan.be/nl/projectgebieden/vlassenbroek-en-wal-zwijn


Natura 2000
WEIDE
N17
0
100
200m


Floodplain
WEIDE
N17
0
100
200m