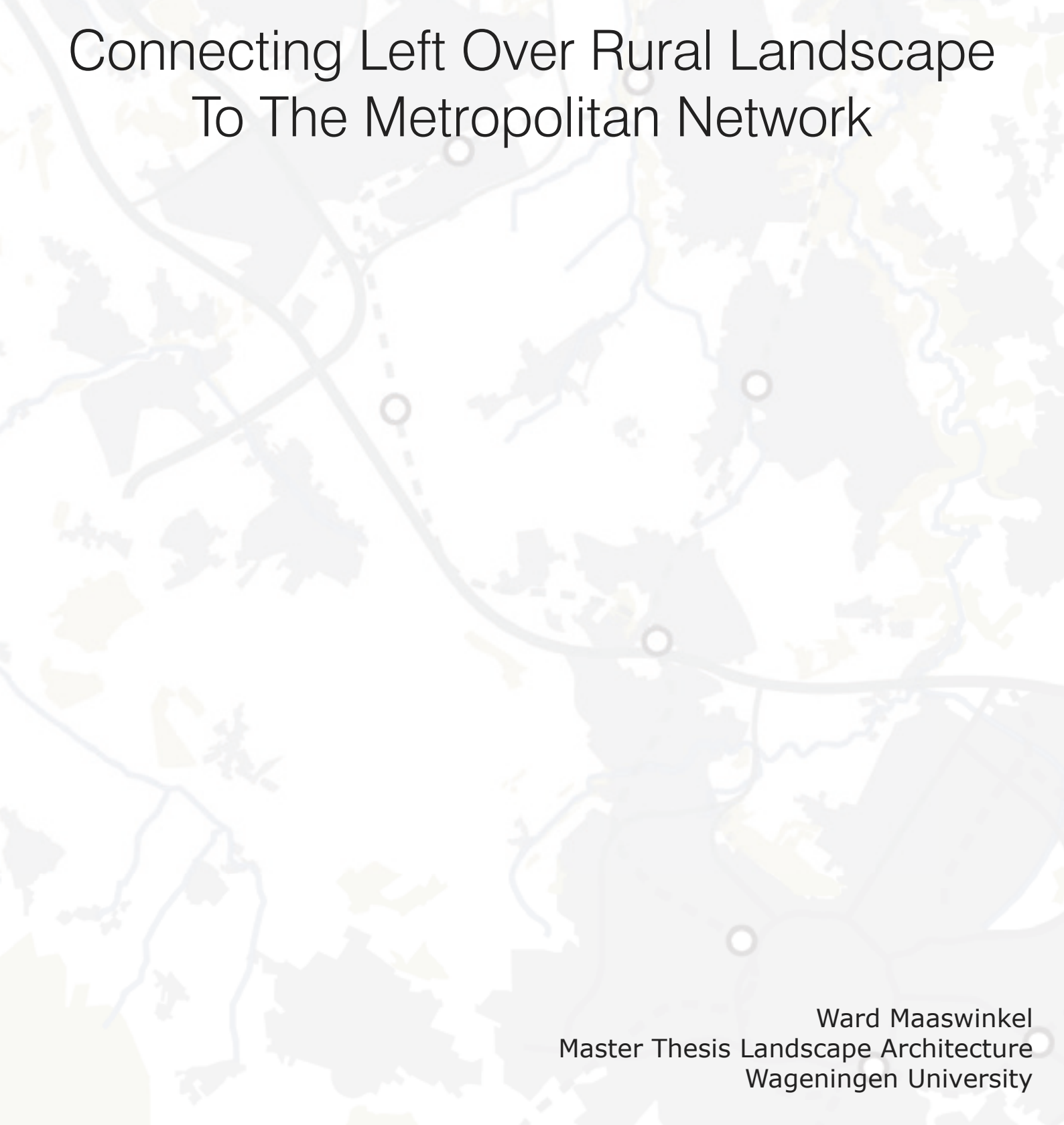# Connecting Left Over Rural Landscape To The Metropolitan Network

Ward Maaswinkel
Master Thesis Landscape Architecture
Wageningen University

Colofon

Summary

The city and the rural landscape cannot be seen as two separate entities anymore. Urbanization has generated an urban network that covers the entire green space and separates it into larger and smaller parts. The originally continuous green space is becoming more and more fragmented and captured within the urban fabric.

The speed and size of these spatial developments together with the one-sided emphasis on functionality and utility have led to a loss of natural and cultural historical qualities of the landscape. Because of the decreasing importance of the natural condition and the historic occupation pattern as an ordering mechanism in the landscape, urban sprawl is occurring and landscape qualities are being affected.

The previous policy strategies were based on this dichotomy between city and rural landscape, but a new tendency between city and the rural landscape has come to existence. The urban network and the rural landscape have become intertwined, instead of being two different entities they can be seen as two kinds of networks that are interwoven with each other. Together they form a new urban/green fabric.

A suitable approach to this new tendacy, which offers guidelines for this relationship between urban and green networks (as an ordering mechanism) and provides these rural landscapes with a new meaning in its relationship towards the city and in which its qualities (cultural historical, ecological, agricultural and recreational) can be preserved or strengthened, has been lacking until now.

During this master thesis a 'landscape approach' using a greenway and framework concept, is investigated and explored in order to determine if this approach could be a possible solution to the problems the 'left over rural landscapes within the urban network' are facing currently. A research by design method is applied in which the 'left over rural landscape' between Parkstad and Aachen is used as case study.

The design process results in a 'recreational hybrid landscape' based on the 'framework concept', in which a synergy between the low dynamic processes of nature and the high dynamic processes of urban development is created.The design aims to connect the project area to its metropolitan context in a functional, infrastructural, spatial and symbolic way.

In this case, the landscape approach based on the framework concept seems to be a suitable approach in order to solve the problems the 'left over rural landscapes within the urban network' are currently facing. To determine if this approach could be used as overall approach to left over rural landscapes within the urban network, it first has to be tested on different landscape types.

However, the main principle of the framework concept based on the low and high dynamic processes within the landscape in all cases remains relevant. Nature's low dynamic processes which mostly are strongly related to the hydrological processes of the landscape, should be emphasized and play an important role during the process of analyzing and designing the rural left over landscapes within the urban network, no matter what landscape type.

Keywords: urban-rural relationship, urbanized landscape, hybrid landscape, recreational landscape, metropolitan, greenways, framework concept, sustainable energy production, local food production, accessibility, coherence, Parkstad, Aachen

Preface

This master thesis is the second and final part of a research on 'left over rural landscapes within the urban network', and is made by Jac Duyf and Ward Maaswinkel. The first part of this research, called 'Dutch Metropolitan Parks?', was made during our minor thesis in 2011.

The initial plan was to do the entire master thesis together, but halfway the process it was decided to split up and make separate designs. During this individual design process I eventually also had to make a lot of changes in the common parts of this master thesis, in order to make a clear and coherent story. This finally resulted in separate reports by Jac and me, which both start with the same problem, approach and analysis, but end with different visions, designs and conclusions.

The relationship between the rural and the urban landscape is a broad topic which consists of many aspects (spatial, functional, societal, experiential, etc.) and can be examined at various scale levels. Therefor the research has been an iterative process. We had to go through the process several times in order to get a clear focus for this research.

The urban pressure on the remaining cultural landscapes, which connect us with the past, and are of high ecological value, is increasing. At the same time the large cities, which together form metropolitan areas, are becoming larger and unhealthier to live in. Therefor I hope this research will contribute to finding a suitable approach to the left over rural areas within the urban network, and to creating sustainable healthy cities and landscapes for people to live in.

Despite the fact that it took much longer than expected, I have gained a lot of knowledge on the functioning of the landscape, the relationship between society and the landscape. I now understand the forces which are responsible for the landscape as we experience it, and how they can be used and influenced in order to improve the quality of the landscape.

I would like to thank my supervisors Dr. Ir. Ingrid Duchhart and Ir. Jhon van veelen for their support and feedback during the process, and of course my thesis partner and good friend Jac Duyf.

Ward Maaswinkel
December 2012

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Introduction Thesis

LEFT OVER RURAL AREAS WITHIN THE URBAN NETWORK

From a natural to cultured landscape
The natural landscape which used to be the result of only abiotic and biotic processes turned into a cultural landscape after humans introduced agriculture. The influence of man on the appearance of the landscape grew as the technical ingenuity along with the population grew. The development of occupation patterns showed a strong coherence with underlying abiotic layers and a strong continuity in time. (fig. 1) (Kerkstra, et al., 2007)

The industrial revolution and the rise of urban areas
The human ability to influence nature grew spectacularly during the industrial revolution. More than ever it became possible to alter the physical conditions of the land to suit the needs and dynamics of society. Since then, urbanization, industrialization and intensification of agriculture have had a radical influence on the landscape. Large urban areas were developed during the industrialization and many small villages have expanded immensely. Because of this rapid urban expansion the distinction between city and rural land became less distinctive. (fig. 2) (Kerkstra, et al., 2007)

The inversion of city and land
The classic image of the city as a bounded artificial element, surrounded by green space for agriculture and nature, is no longer valid anymore. Cities and villages have greatly expanded and have grown together into a "metropolis" (a big city) or a "metropolitan area" (a network of cities or urban areas). Urbanization has generated an urban network that covers the entire green space and separates it into larger and smaller parts. The originally continuous green space is becoming more and more fragmented and captured within the urban fabric. Tummers en Tummers-Zuurmond (Tummers & Tummers-Zuurmond, 1997) have described this process as the inversion of city and (rural) land. The rural land becomes part of the city, caught in the urban network. (fig. 3) (Kerkstra, et al., 2007)

Urban sprawl and the degradation of landscape qualities
The speed and size of these spatial developments together with the one-sided emphasis on functionality and utility have led to a loss of natural and cultural historical qualities of the landscape. Because of the decreasing importance of the natural condition and the historic occupation pattern as an ordering mechanism in the landscape, urban sprawl is occurring and landscape qualities are being affected. This results in a lack of structure and coherence and an increase of interfering, inappropriate elements. Due to this lack of a consistently applied ordering mechanism, the positioning and designing of new developments becomes increasingly dependent on pragmatic interests, in which continuity and coherence between the parts and the whole is missing. The result is disorder without character. (Kerkstra, et al., 2007) (Antrop, 2004) Figure 4 shows where in The Netherlands the effects of the urban sprawl is most noticable. Some examples of urban pressure & sprawl can be seen at page 15.

Fig. 1 Urbanization of the Netherlands 1960 (ABC Architectuurcentrum , 2011)

Fig. 2 Urbanization of the Netherlands 2006 (ABC Architectuurcentrum , 2011)

A new landscape: food production, nature, culture and recreation

The future of our rural landscape will have, as well spatially as functionally, a close relation with city developments. The needs of the urban environment increasingly take claim of the rural land, like opportunities for recreation, room for nature conservation and preservation of the cultural historic heritage, while the size of the working population in the rural land is decreasing. Agriculture will keep on existing, but there's also a new development phase: the post-rural cultured landscape (post-agrarische cultuurlandschap). A landscape that not only feeds the city dwellers but also offers an opportunity to escape the busy city life. (Kerkstra, et al., 2007) (Antrop, 2004)

Problems and opportuntities: the future of the rural landscape

In the future the rural landscape will be closely related to the city. Due to the rising oil prices we are heading to a future where sustainability becomes an important issue, local food production will become an important topic for these areas. (Davids & Olde, 2011) Furthermore climate changes raise environmental topics, nature is an aspect we have to take into account, not to forget in making sustainable agriculture possible. (Davids & Olde, 2011) And last, we see people moving from the countryside to the city, the urban regions are expanding with great speed while the smaller villages have to deal with the problems of shrinkage. As stated before, this has led to a loss of natural and cultural historical qualities (Kerkstra, et al., 2007), but also in an increasing shortage of green areas for leisure and recreation. (VROM, 2008a)

The aspects of food production, nature, culture and recreation will become important topics for these areas. Landscape and cultural historical qualities have to be preserved in order to meet these demands of the future landscape and to prevent loss of quality because of urban sprawl. (Kerkstra, et al., 2007)

OVERALL ASSIGNMENT

The future of left over rural landscapes

In the past several policy strategies have been used to preserve the open rural landscape with its cultural historical qualities and strengthen its recreational qualities as a counterweight to the urban pressure from surrounding cities, like the Rijksbufferzones (fig. 5), the 'Groene Sterren' (Green Stars) and the 'Randstadgroenstructuur' (Randstad green strucuture). (VROM, 2008b; Croonen, et al., 1995) The problem is that maintaining the rural landscape and cultural historical qualities is very expensive and it becomes impossible in times of an economic crisis. Another issue is that, despite the growing demand from cities for recreational opportunities, these rural landscapes have little to offer and don't have a lot of meaning to the surrounding citizens (VROM, 2008a)

"When public and policy attention for landscapes grew in the 1970s and 1980s, design assignments broadened and landscape designers were able to integrate all kinds of landscape elements in their designs. From the late 1980s, the assignments included new nature and water management, and recently
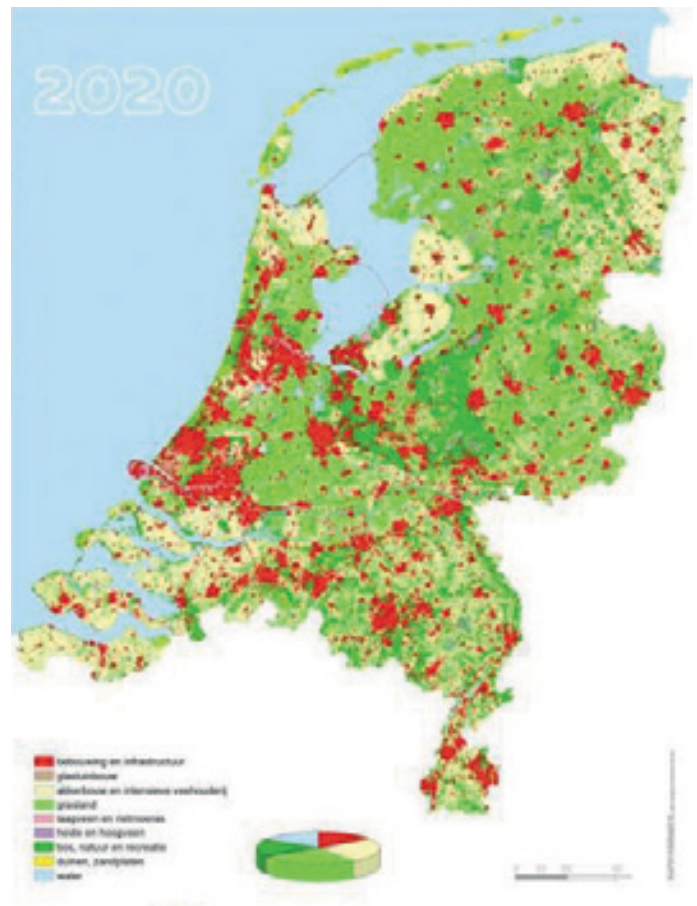
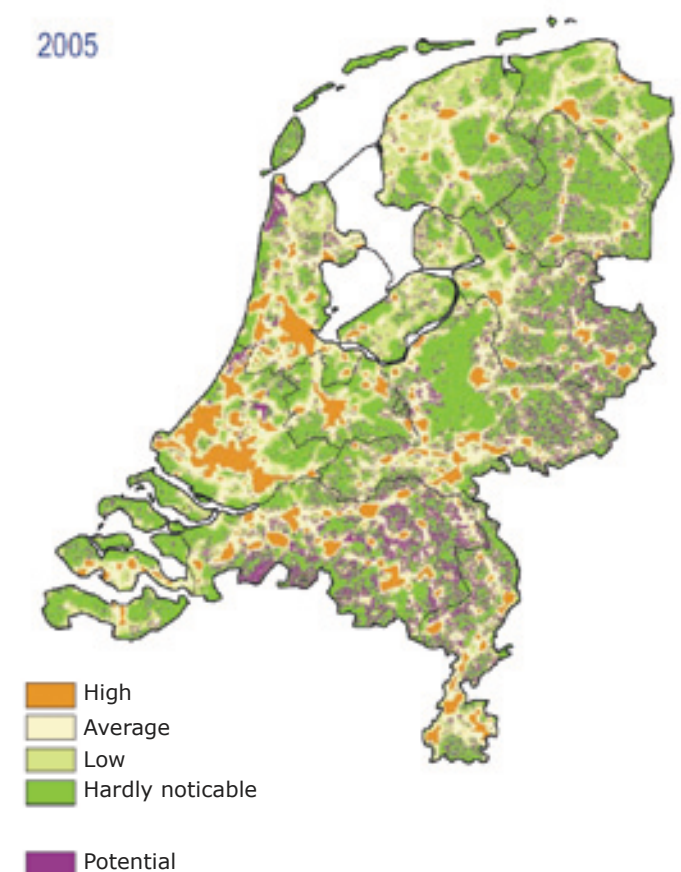*Fig. 3 Urbanization of the Netherlands 2020 (ABC Architectuurcentrum , 2011)*

Fig. 4 Degradation of (visual) landscape quality as a result of urban sprawl (Milieu- en Natuurplanbureau, 2006)

cultural heritage has become a hot item in planning and design.

Although the diversity and supply of leisure opportunities did increase, one may question how diverse the leisure supply really was and whether it met consumer demands. After all, real freedom of choice requires both a diversity of supply and a supply that meets demands. It reminds one of the famous quote by businessman Henry Ford that could order their car in 'any colour – as long as it's black'. In practice, leisure was supply-oriented too, and in rural landscapes it was restricted to extensive forms of recreation. As soon as the number of visitors increased, separate areas were planned and designed. Public authorities concentrated on general, basic supply, and dynamic demands were left to market parties. Public authorities, planners and designers shared this attitude.

Within the limits of extensive forms of recreation, planners and designers concentrated on specific types of leisure once again. The themes that occurred most often and that turned out to be unremitting in both policy and design were for people to take a break from daily life and to enjoy landscape and nature. Amusement and entertainment were associated with mass recreation and did not combine well with extensive forms of recreation. Only recently, when 'fun' became trendy, amusement and entertainment have returned in landscape design" (Brinkhuijsen, 2008)

Because of this lack of recreational opportunities the government (het Rijk) is looking for a new approach for these rural landscapes in which cultural historical qualities are preserved while providing room for new developments and possibilities that make these rural landscapes sustainable again. (VROM, 2008a)
The government is looking for a new approach for these rural landscapes that will provide a solution to the following main points:

Fig. 5 Locations of the 10 'Rijksbufferzones' (VROM, 2008b)

- **There is a need for a new economic foundation for these rural landscapes, in which recreation plays a vital role, in order to make these landscape sustainable again.**
  Conventional agriculture became insufficient to maintain the rural landscape. The rural landscape has to become sustainable again: this means economic viable, natural processes (ecology) need to be taken care of together with the cultural historical qualities which can be found in these landscapes. The rural landscape also has to meet the future demand for recreational opportunities from surrounding cities. A recreational program is needed on a local and regional scale. This will make recreation an important economic foundation for the future rural landscape.

- **The rural landscape should become more meaningful to the surrounding urban areas.**
  The landscape should become more meaningful for people living in surrounding cities. It should become part of the city in a functional way; it has to become part of the (daily) life of citizens.

- **The rural landscape has to get a strong(er) identity**
  It should evoke a strong image in people's minds, like a strong brand does. It should be spatially recognizable and be distinctive towards its context.

Fig. 6, 7, 8, 9, 10, 11 Examples of the increasing urban pressure & urban sprawl on the rural landscape in the Netherlands (VROM, 2008b)

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A park approach

As a solution for these issues the government introduced the concept of 'Metropolitan Parks' for these rural landscapes in 2008. The idea was to solve the problems by using a 'park approach' and as example the named Central Park (New York), Fontainebleau (Paris) and Hyde Park (London) (Fig. 12). (VROM, 2008a)

"'Dutch Metropolitan Parks' is a new concept introduced in 2008 in the policy document 'Structuurvisie Randstad 2040' to offer a solution to the problems that 'Rijksbufferzones' and other comparable areas face. These problems are that they offer little recreational opportunities, are of little value to people, are too expensive to maintain and are slowly being 'swallowed' by urbanization." (VROM, 2008a)

"High quality green areas which will improve the quality of peoples' lives. These 'Metropolitan parks' will offer a sustainable resistance against urban sprawl. Water, nature, landscape and recreation form the main aspects in this concept." (VROM, 2008a)

During our research in the minor thesis (Duyf & Maaswinkel, 2011) we've investigated this new phenomenon called "Metropolitan Parks" by comparing 5 case studies in the Netherlands which were selected by the NVTL as possible "Metropolitan Park" designs (fig. 13). Our goal was to provide a better definition of the concept of "Metropolitan Park." We compared the 5 case studies and asked ourselves in what extend they could be called a "park" or "metropolitan"? Are they really "Metropolitan Parks"?

Traditional characteristics of parks are the fact that they are (1) bounded recognizable places, (2) that they are a representation of the relation between society and nature and (3) that their primary function is recreation.

Most case studies, however, appeared to be rural landscapes where agriculture and not recreation was still the main function. Furthermore a clear boundary did not exist (1). They often merged into the surrounding rural landscape.

The stereotypical image that people often associate with a park is often a natural image, an image that is explicitly present in the a style of "Landscape garden" (Central Park and Vondelpark) and in parks like the "Amsterdamse Bos", "Parc du Sausset" and "Landschaftspark Duisburg-Nord". The rural landscape in the Netherlands is primarily an agricultural landscape. The 5 case studies in general tried to create a park with this agricultural image. This looks like a 'Contradictio in terminis'; the agricultural landscape does is not an image of nature (2) consequently it cannot evoke the same experience as from a stereotypical (traditional) park. What seems to emerge is a hybrid form between landscape and park (a landscape with park elements) or a recreational landscape (a rural landscape with recreation facilities).

Fig. 12 Searching areas for 'Dutch metropolitan parks as described in 'Structuurvisie Randstad 2040' (VROM, 2008a)

Naturally these 5 case studies contained recreational facilities or a recreational program, however it was not clear to what extend they had something to offer on a metropolitan level. A recreational program often did not exceed the level of a regular city park (3), it did not include the regional level (like "Landschaftspark Duisburg-Nord"), although this should be an essential quality of a "Metropolitan Park".

As a result the recreational program of these case studies was also not sufficient enough to function as a new economic foundation. Metropolitan facilities that could improve the importance of these large landscapes at a regional scale were often missing. Therefor the meaning to the surrounding urban region of these rural left over landscapes did also not change much. Not only because metropolitan recreational facilities were missing, but also because these "parks" did not became part of the (daily) life of citizens; they did not succeed in linking or intertwining city and landscape as well functionally as spatially. Furthermore, most of the case studies did not manage to create a strong identity for a specific area at a regional scale, because the areas were not bounded, still had a strong rural image and were missing special (recreational) facilities.

According to these aspects the 5 case studies should instead be classified as on one hand a hybrid form between park and landscape (Park21) or recreational landscapes (Amstelscheg, Park Lingezegen, Buytenland) or on the other hand a traditional urban park (Leidsche Rijn Park).

According to our research in which we are dealing with left over rural landscapes that generally have a agricultural character and function, it is not possible to literally apply the concept of a (traditional) "park" on a regional level. Maybe, theoretically, by converting these agricultural areas into more natural ones, but transforming enormous

areas like these on a regional level would practically be impossible, unsustainable, and most undesirable in times of an economic crisis.

Design criteria: the qualities of a park as guidelines for design

To strengthen these left over rural landscapes (providing them with more meaning, a stronger identity and a recreational program) the government introduced the concept of "park" because parks (like Central Park, Vondelpark, Amsterdamse Bos) do contain these qualities. But if it's not possible to literally create a park on a regional scale to offer a solution to the stated problems, could it be possible to apply the qualities that make a "park" such a strong place on these left over rural landscapes?

This is an aspect that we've also taken into consideration during our minor thesis. We've looked at how we could translate the assignment (the problems that were introduced by the government) into practical and measurable criteria by linking them to the concept of "park". So we looked at which park qualities could contribute to or provide a solution for the stated problems. Eventually we we're able to elaborate and test

6 design criteria in the scope of our research:

1. Unity & recognizable areas
2. Spatial organization
3. Accessibility
4. Users & functions
5. Complexity
6. Mystery

From a literature study we found that these criteria, among others, played an important role in creating a park that met the requirements from the assignment. During the research we tested our 5 case studies according to these 6 design criteria. We were able to provide a full analysis of the first 3 design criteria.

In the scope of our research we did not succeed in clarifying the other 3 criteria (Users & function, complexity and mystery) and making them fully verifiable, because of the limited time that was available for this research and because especially Complexity and Mystery were very abstract definitions that were difficult to test and measure. In the end we have given some attention to the visual aspects of the design criteria Complexity and

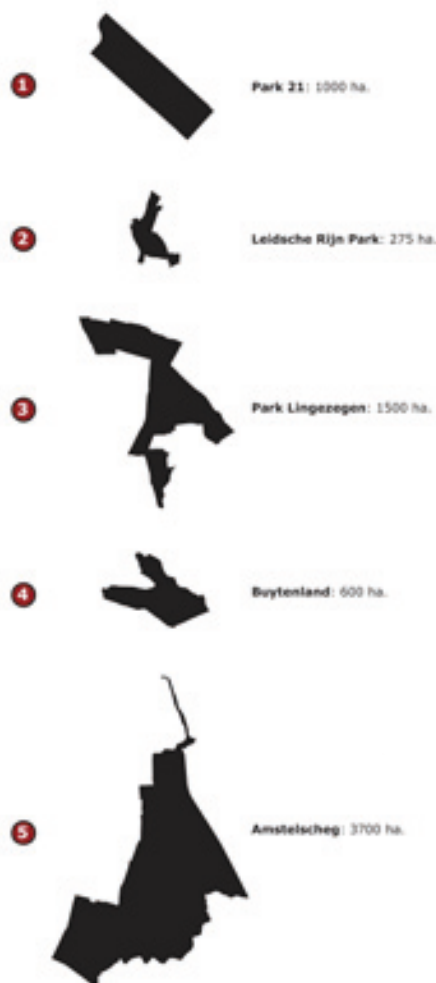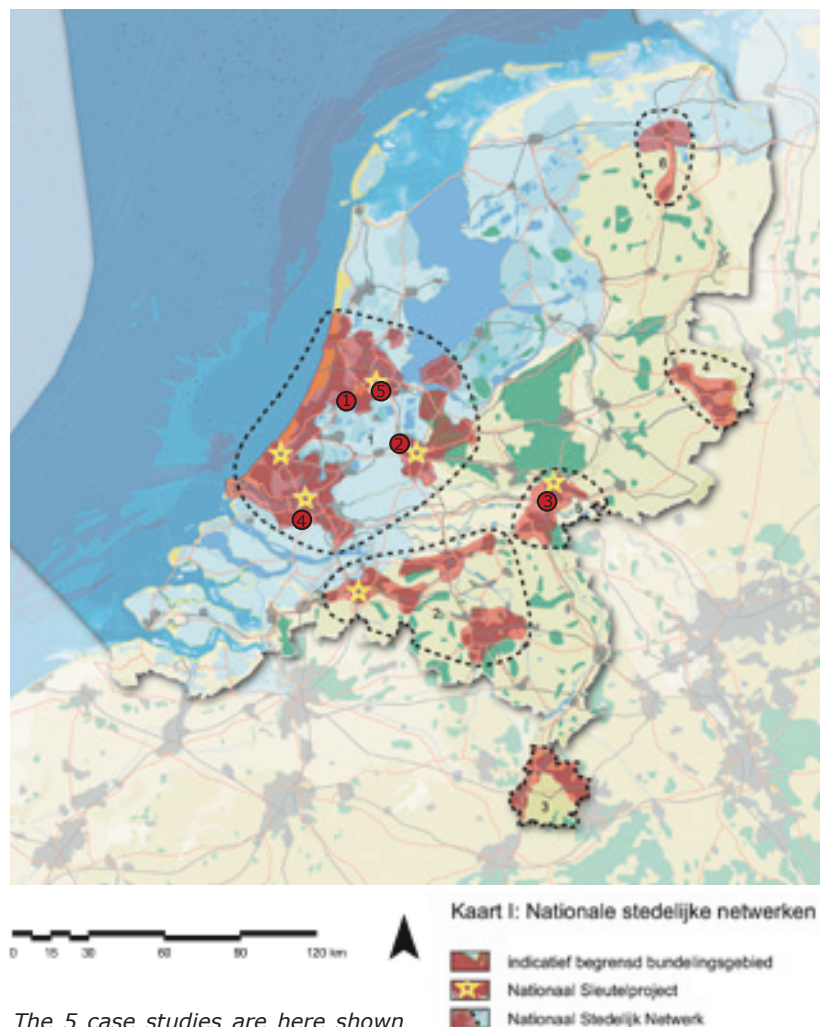*Fig. 13 The 5 Metropolitan Parks that have been analysed in the previous research of the minor thesis, showed in relation to each other. Although all 5 case studies were labeled as possible examples of "Metropolitan Parks" they differ a lot in scale and context.*

The 5 case studies are here shown in their context. The map (VROM, 2006) shows the important urban regions in the Netherlands.

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Mystery, but it should be noted that their full definition goes beyond only their spatial aspects.

Conclusions: not suitable for the regional scale
This list of design criteria we've mentioned is not yet complete, with great certainty we can say that there are more "design criteria" that could play a vital role in providing a solution to the stated problems. Parks have other qualities that go beyond the spatial and functional qualities we've mentioned in our list of design criteria. We think that furthermore "natural processes," "sustainability" and "community participation" could be important aspects. But these are just another few of probably many aspects that we have not yet been able to explore during our research.

But, the 6 design criteria that we have been able to mention during our minor thesis have provided us with useful information about our 5 case studies. In fact every case study appeared to have some strong and weak points. The only case study that virtually 'scored' well on every single one of the 6 design criteria was Leidsche Rijn Park, but it was also this particular case that we concluded not to be a "Metropolitan Park". This park did not have many metropolitan facilities and therefor it could be questioned whether it would have a meaning or function on an (inter)regional level. At the same time the park was a lot smaller than the other examples and therefor it was rather an example of a large traditional park than it could be classified or even compared to the left over rural landscapes.

As an addition to the general conclusions of the minor thesis we could ask ourselves whether these "design criteria" are applicable for the left over rural landscapes of an (inter)regional scale? Are they perhaps based, too much, on the "traditional" park concept? In some extend these design criteria still play a role in our case studies, but they have proven not to be sufficient enough on this particular scale. Apparently a park approach isn't offering us the right answers and solutions. What design criteria do offer us guidelines for future designs? How can we find these particular design criteria that are obviously different on a regional scale? For this, we have to again get back to the starting point and ask ourselves: if a park approach is not offering us a solution to the stated problems, what is the right approach? What has changed in contemporary urban rural relations which makes a park approach an outdated concept?

KNOWLEDGE GAP
A new tendency between city and rural landscape
The city and the rural landscape cannot be seen as two separate entities anymore. The previous policy strategies were based on this dichotomy between city and rural landscape, but a new tendency between city and the rural landscape has come to existence. The urban network and the rural landscape have become intertwined, instead of being two different entities they can be seen as two kinds of networks that are interwoven with each other. Together they form a new urban/green fabric. (Vroom & Ettema, 2010) Within this urban/green fabric the 'green' part of this fabric is under constant urban pressure.
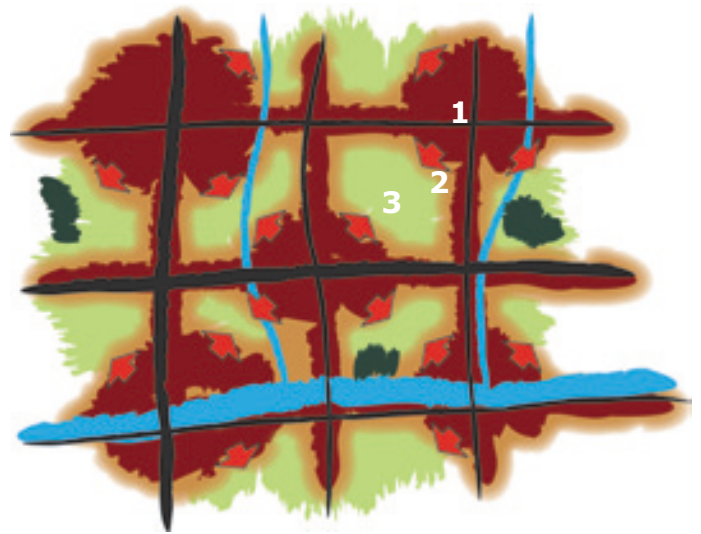
Fig. 14 Abstract representation of the new 'urban/green fabric', 1: the urban centre, 2: the (sub)urban fringe, 3: the rural countryside of the urban network. The red arrows represent the urban pressure on the left over rural landscapes

Fig. 15 The new urban/green fabric could be compared to a weaving pattern existing of 'urban' and 'green' threads

Antrop describes four domains on the polarized axis between city and countryside which can be distinguished as a basis for the development of the future of urban and rural landscapes (Antrop, 2004). These are:

1. the urban center
2. the (sub)urban fringe
3. the rural countryside of the urban network
4. the 'deep', remote rural countryside.

In each of these domains driving forces of accessibility, urbanization and globalizing forces are active in different ways. Conflicts and opportunities change accordingly. Different strategies should be developed for each of them. Landscape research and planning should not be restricted to the un-built rural areas alone and landscape ecological principles should be applied as well in city

planning.

Of the four domains he describes, the third: 'the rural countryside of the urban network' seems to correspond with the 'left over rural landscapes within the urban network'. The first three domains are represented in figure 14 which is an abstract representation of the urban/green fabric. The fourth domain 'the deep, remote rural countryside' is not shown in this figure because it cannot exist inside the urban/green fabric.

Finding a suitable approach
The left over rural areas within the urban network seem to be facing the overall problems as described before, because the new urban/green fabric is not being fully acknowledged and recognized yet by the government and policy makers, and therefore a suitable approach to this new tendancy has been lacking until now.

This has raised new questions about what approach is best suitable to offer guidelines for this relationship between urban and green networks (as an ordering mechanism) and to provide these rural landscapes with a new meaning in its relationship towards the city and in which its qualities (cultural historical, ecological, agricultural and recreational) can be preserved or strengthened. The concept of "Rijksbufferzones" is out-dated and the park approach is not sufficient enough at this regional scale. The problem is that policymakers still haven't found the right approach yet.

STARTING PROPOSITION
The metropolitan urban-green fabric
In this research we are dealing with rural left over landscapes that are subject to urban pressure. These landscapes have become separated due to urban expansion. The urban network and rural landscape have become intertwined and can be seen as two kinds of networks, interwoven with each other. We're not talking about a city anymore, but about an urban network. And in this research (and in the research from the minor thesis) we're focusing on the areas where the urban influence is the highest, the so called "metropolitan areas". But how can we define this concept of a "metropolitan area"?

In the minor thesis we already talked about "metropolitan" in the context of this new concept called "metropolitan park," which were situated in "metropolitan regions" or "metropolitan areas." So what is a "metropolitan area"? Apparently there's not a clear definition of what a "metropolitan area" really is, although there are various definitions that provide some clarification of this concept. The online Encyclopædia Britannica provides us with the following description:

> *"Metropolitan area, also called Metropolis, a major city together with its suburbs and nearby cities, towns, and environs over which the major city exercises a commanding economic and social influence. Literally construed, metropolis from the Greek means "mother city," and by implication there are progeny or dependents scattered about the core area. Sometimes there may be two or more major cities, as in the Tokyo-Yokohama*

> *Metropolitan Area (Japan) or an agglomeration of metropolitan boroughs as in Greater London (England)."* (Britannica Encyclopædia Online, 2012)

So, as we stated in our minor thesis, we can say that a "metropolitan area" is an area with a network of cities that are clustered together and can have an urban center or multiple urban centers and has a regional or international importance. "metropolitan" in the case of a "metropolitan park" means that it is spanning this whole network of cities. This was one of the characteristics of a "metropolitan park" that was often not present in our case studies.

Also Julia Czerniak, who describes modern large parks in her book "Large Parks" talks about this "higher level". Although she is talking about "large parks" she addresses some issues that could still be valid to our left over rural landscapes subject to urban pressure. A new connection needs to be established between city and rural land, providing these left over rural landscapes with more meaning and a strong identity. Subsequently the "metropolitan" aspect becomes very important. Julia Czerniak notes that a "large park" or in our case these left over rural landscapes in a "metropolitan" context should take the traditional program of a park to a higher level, stating:

> *"Large invokes thinking beyond the given... Large also implies a considerable amount of energy, vision, commitment, and innovation..."* (Czerniak, et al., 2007)

Another interesting definition of the "metropolitan area" is found in the "Metropolitan world atlas" (Susteren, 2005) that takes the concept of "metropolitan" to an even higher level:

> *The term "metropolitan area" does seem to express a clearly urban concept for everyone: the superlative of the city. However, it leaves a few questions unanswered, such as: What does a metropolitan area look like? How big is a metropolitan area? What kind of spatial configuration does it have? And what are its physical characteristics? Some sources in the literature define a metropolitan area as a city with more than a million inhabitants. However, given the thousands of cities which now satisfy this criterion, this definition is unworkable. Apparently the term "metropolitan area" implies a certain rare quality.*

> *A metropolitan area can be considered as an urban region or conurbation with a global range of influence. In other words, a metropolitan area is a city with a global impact, an area where global relationships dominate over local ones. A metropolitan area is sensitive to world developments and also contributes to them.*

> *When the world (the globe) and a metropolitan area are closely interrelated, global*

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connections are needed to help metropolitan areas influence the world and each other. We have therefore chosen to define the term in the following way: Metropolitan areas are regions where global relationships dominate over local ones and which are characterised spatially by a high concentration of global connections and a high concentration of people.

A historical review of the populations of metropolitan areas over the centuries reveals that metropolitan areas have flourished and declined at various points in history and have thereby come to typify different eras and civilisations. It is nonetheless remarkable to find that "the metropolitan area" seems to be a temporary spatial concept, and on the broad scale of time and space it is for this very reason that it seems to typify the various historical periods.

This definition may be questioned, the book limits the number of "metropolitan areas" around the world to a 101. But interesting is that it mentions a global influence, and also the "metropolitan area" as a temporary spatial concept not a static unit. A "metropolitan area" can therefore be subject to great urban expansion but also shrinkage. In linking the rural landscape with the urban environment we can therefore ask ourselves if it's possible to introduce the landscape as an ordering mechanism, not only as a guideline for future city developments but also for shrinking cities?

In our research we will not restrict our definition of a "metropolitan area" to cases with only a global impact, although a global connection might still be existing. A "metropolitan area" in our case is referring to:

"A region in which a major city or multiple major cities together with its suburbs and nearby cities, towns and environment are closely related to each other (economically, politically and socially) and cannot be seen as different entities enclosed by rural land but are part of a spatially closely connected urban fabric with an impact on an (inter)regional, (inter)national or even global scale." (see fig. 14)

Figure 13 shows examples of this definition of "metropolitan areas" in the Benelux. In this definition of a "metropolitan area" we link the concept of "metropolitan" to a "higher level", be it (inter)regional, (inter)national or even global. To provide our left over rural landscapes with a "metropolitan" meaning would be to introduce a higher level of importance. Although the "metropolitan area" does not necessarily need to be of global importance, although global issues could still be used to connect the urban environment with the rural landscape in these "metropolitan areas".

Global issues
Contemporary landscapes should deal with contemporary issues. In modern society we face not only local, but also global problems. Health issues, aging demographic trends, climate change, ecological decline, energy production, sustainable living, food production and cultural diversity are a few important issues that play an important role. (Kerkstra, et al., 2007)

The origin of many of these issues is the increasing technical ingenuity. Since the industrial revolution our ability to influence the land to suit the needs and dynamics of society increased rapidly. The global population has been growing at great speed, and now it seems we're to facing the limits of our growth. This "population explosion" has an increasing effect on the global economy but more importantly it's affecting our global environment. And still our population keeps on growing.
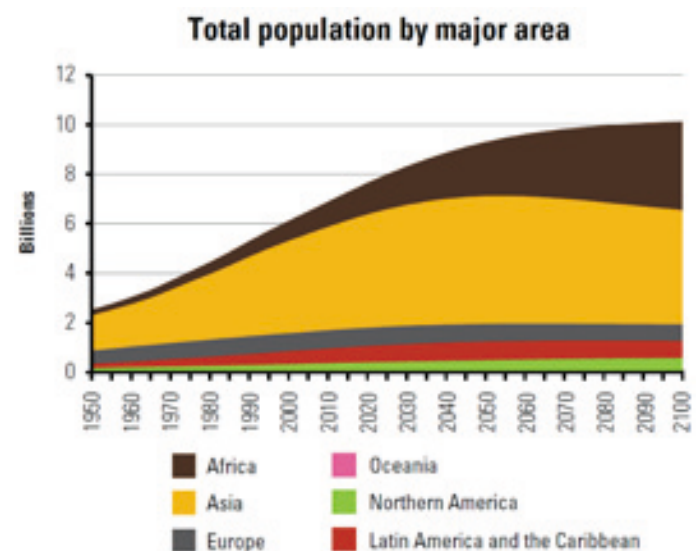
Fig. 16 The total population by major area showing an increase in population over the next 50 years. (United Nations Department of Economic and Social Affairs \ Population Division, 2011a)

"The global population Over most of human history, the world population grew very slowly if at all. Growth rates began increasing slowly during the 17th or 18th centuries as mortality started to decline. With accelerating gains in longevity, the growth rate of the world population increased, especially during the 20th century, when it reached a peak at 2 per cent per year in 1965-1970 (figure 2). Since then, the speed of population growth has been decelerating, largely as a result of falling fertility in the developing world. By 2005-2010, the population growth rate at the world level had reached 1.16 per cent per year and is projected to decline to 0.44 per cent per year by 2045-2050 and 0.06 by 2095-2100." (United Nations Department of Economic and Social Affairs \ Population Division, 2011b)

Another issue in our growing society is the aging problem. In the more developed regions the percentage of older people increases, posing even more pressure on the economic system and various health issues.

"Population ageing results mainly from declining fertility. ... Globally, the number of persons aged 60 or over is expected to more than triple by 2100. ... Increasing longevity also contributes to population ageing. Globally, life expectancy at birth is projected to rise from 68 years in 2005-2010 to 76 years in 2045-2050 and to 81 years in 2095-2100." (United Nations Department of Economic and Social Affairs \ Population Division, 2011a)
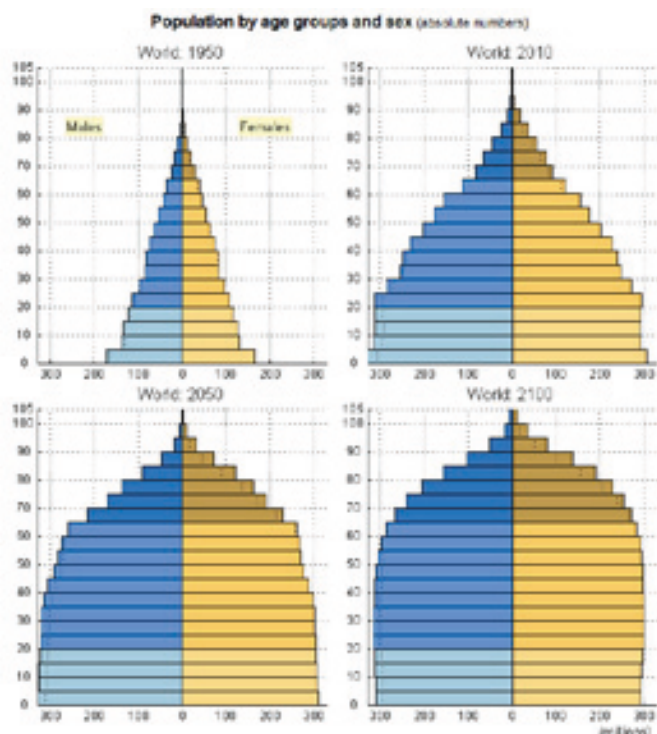

Fig. 17 When looking at the absolute population pyramids of the world, the demographic change from a less developed to a more developed society becomes clear. Many more developed regions show a similar pyramide as the world has in 2100 (United Nations Department of Economic and Social Affairs \ Population Division, 2011a)

These changes in demographic trends pose various economic problems, but more problematic are the environmental problems. A degrading healthy environment, climate change, depletion of energy sources and issues concerning our food production system and future freshwater supplies are all examples of issues that now become increasingly important.

To raise awareness of these global issues that our contemporary society is facing it is important that the global and the local scale should not be separated. Ecology is an important and broad aspect in all these issues which is closely related to health, sustainable energy and climate change. A "park approach" is not sufficient enough in addressing ecological problems, because traditional parks normally are bounded 'isles', and cut off from larger scaled processes. Ecological processes cannot not be confined, they are systems on multiple scale levels. They are everywhere you go and they can link everything together.

Furthermore, ecological systems are often linked to cultural developments and the location of food production. And it raises another important topic, that

of sustainability, which plays a very important role in the future of these left over rural landscapes. Sustainability is not limited to merely "surviving" in an ecological context; it also includes economic health and cultural vitality. These "metropolitan landscapes" ask for the same design requirements as Julia Czerniak denotes in her book Large Parks (Czerniak, et al., 2007) 'Large parks must be designed for both ecological and programmatic complexity, for both biological and socio-cultural diversity and accordingly, for all facets of sustainability.'

A landscape approach as a possible solution
We are asking ourselves if it could be possible to increase the exchange between landscape or park and city, make a clear link, as well visual as functional. And how to connect both city and rural landscape, integrate them with each other, without losing the identity of both and without treating them as two totally different entities. In order to understand the processes and systems in these areas a landscape approach seems to be more legit. We also ask ourselves if it would be possible to use a landscape approach, which uses concepts of systems and networks as a possible solution for the problems which were mentioned in the overall assignment.

The abstract representation of the new urban/green network shows the current relation between the urban and the green networks of the landscape (fig 14).

Figure 18 on page 20 illustrates what we want to accomplish with the landscape approach and what is meant by connecting the city and the rural landscape with each other.

Introduction Thesis

The green network in this vision is enhanced, in such a way that it can withstand the urban pressure, so a balance is created within this urban/green fabric. The green network runs through the cities and crosses infrastructural barriers, connecting nature areas. Since the green network runs through the city, citizens will also be more connected with the green or natural network.

Landscape ecologist Nina-Marie Wister writes in her essay 'Sustainable Large Parks: Ecology Design or Designer Ecology' in the book Large Parks, that:

> *'From an operational ecological perspective, smaller parks cannot reasonably be self-sustaining, nor resilient ecosystems, unless they are functionally connected through robust landscape linkages to other similar areas.'* (Czerniak, et al., 2007)

Landscape ecologist Richard Forman suggest that the optimum shape for a patch (a park or left over rural landscape in this case), in terms of its ecological function, is:

"generally 'spaceship shaped,' with a rounded core for protection of resources, plus some curvilinear boundaries and a few fingers for species dispersal." (fig. 19)(Dramstad, 2004)

Even though they speak about parks, these ideas correspond with our vision for the urban/green fabric, in which isolated nature areas and rural landscapes (the rounded core as Forman describes) are functionally connected through robust landscape linkages.

In creating these linkages and core areas the greenway (Searns, 1995) and the framework concept (Ahern, 2002) could play an important role in finding a suitable approach for the new metropolitan urban-green fabric. The landscape approach together with the greenway and framework concept will be explained, investigated, applied, and eventually evaluated during this thesis.
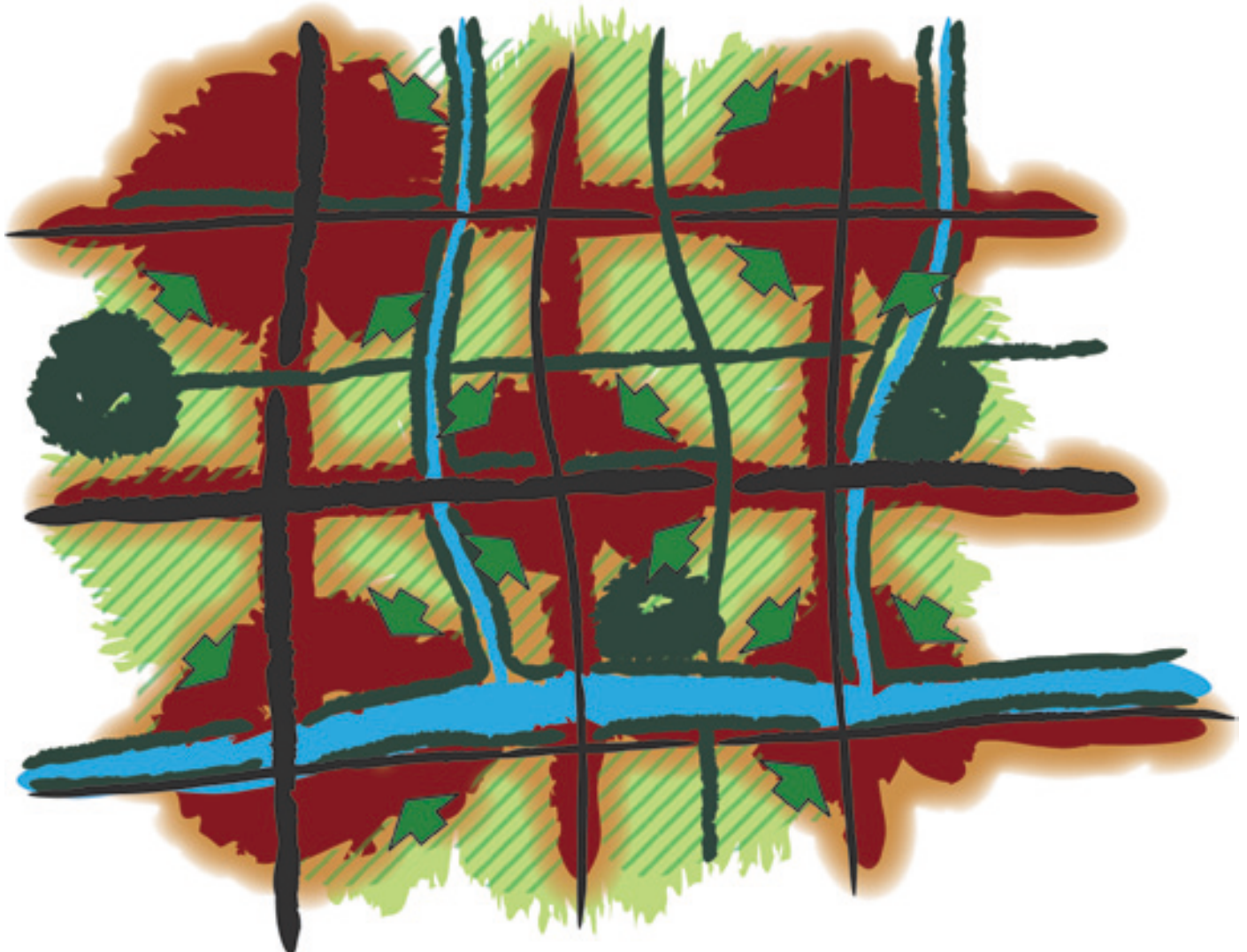
Fig. 18 Vision for the urban/green fabric with an enhanced green network, in which the entire green network, existing of nature areas and left over rural landsacpes can withstand the urban pressure and a balance is created

dispersal funnel
to distant area

some interaction with
adjacent area

core area

"drift fence" effect catches
dispersing species

Fig. 19 The ideal patch shape according to Forman (Dramstad, 2004).The green network exist of several 'core' areas, which are connected by robust landscape linkages

2. Research Method

Research Method

THEORETICAL STARTING POINTS

The landscape approach is based on several theories and models which try to grasp and explain the 'landscape'.

We will start with the model of Kerkstra and Vrijlandt, also known as the 'triplex-landscape' model (fig. 20). Here the landscape is approached as a set of topographical or structural relation between geomorphology, surface and ground water, soil types and related vegetation types and land uses. They stated that even though the reality is complex, landscape morphology, soil and vegetation types as well as water flows are major land-use guiding principles. (Duchhart, 2007)

The landscape is the tangible result of a dynamic systems which develop their selves through space and time. The landscape as we experience it, the landscape qualities and the underlying landscape processes are a coherent whole. (Kerkstra, et al., 2007)
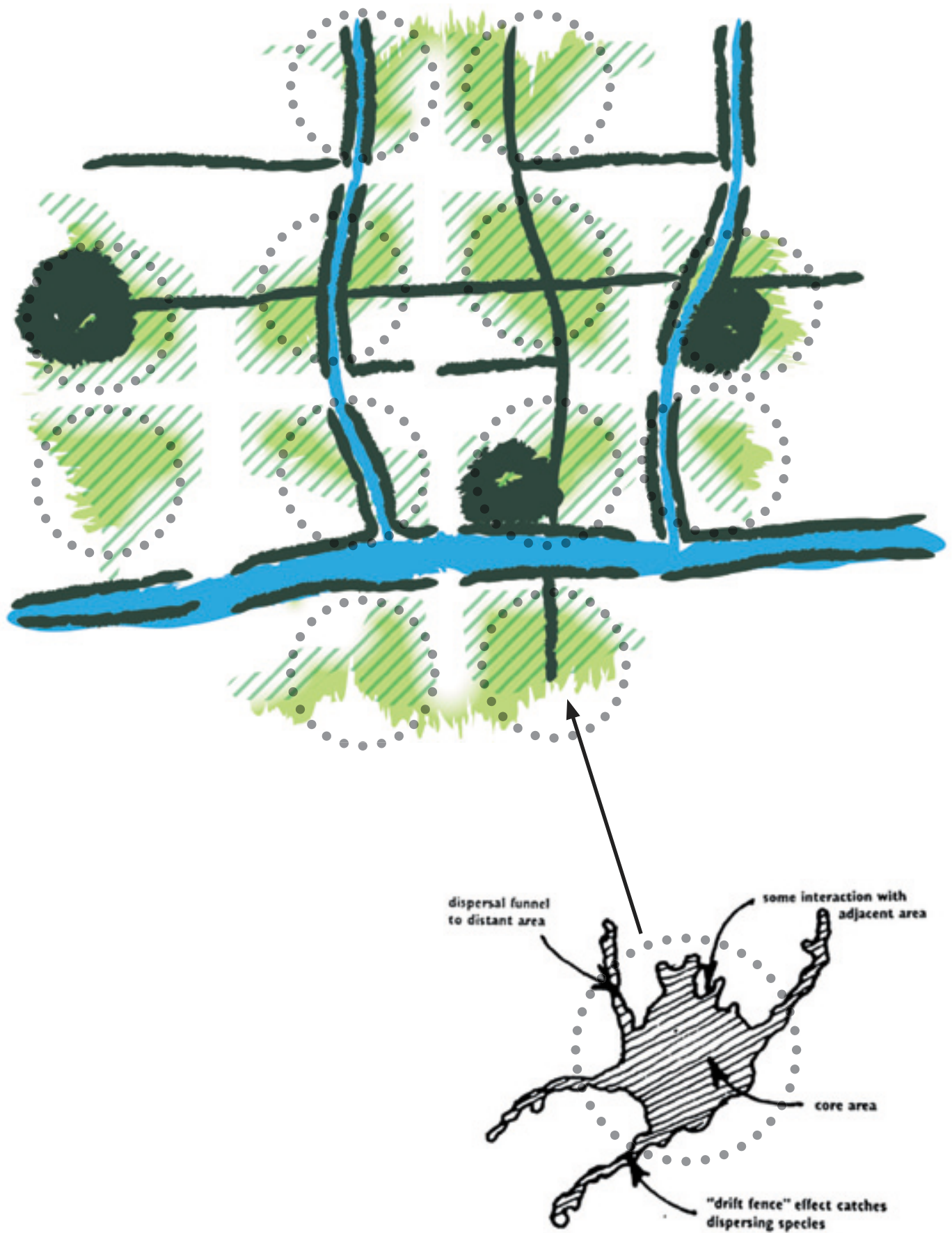
Nowadays much of the anthropogenic processes do not follow the landscape's logics anymore and formed a new layer which is hardly related to the underlying landscape. In more recent publications of the same authors the anthropological component receives more emphasis. They explain the anthropological layer consists of an infrastructural network which is connected to the urban developments. The infrastructural network consists of highways, local roads, railroads and canals. This infrastructural network is public property and is part of the public space in the rural landscape. The combination of this new urban network together with the old cultural landscape forms the metropolitan landscape we are working with right now. (Kerkstra, et al., 2003; VROM, 2004)

Kerkstra and Vrijlandt are mainly concerned with defining the landscape in visible and tangible terms. However, physical dynamics are not the only ones that guide land use. For a full understanding of landscapes, sociocultural, economic and political forces are as important as physical forces.

Kleefmann's sociophysical-organization model is based on the reciprocal relationships between man and nature and should be seen as an abstract notion of the functioning and coordinating of human activities required for living a meaningful life . These reciprocal relations also played an important role among the theoretical landscape-architectural concept described above. However architects tend to approach these relations much more from an ecological and spatial perspective, while Kleefmann explicitly includes a social point of view. (Duchhart, 2007)

The sociophysical-organization model has two basic components: the natural and the societal. Both components are inextricably connected through intertwining processes to fit the natural base to the societal needs. The result of these interactions is called the sociophysical-organization.

The natural component consists of two subsystems:
- An abiotic subsystem representing the non-living natural surroundings (e.g. soil, water, and air)
- A biotic subsystem concerning living organisms, including the biotic dimensions of human beings

The societal component consists of three subsystems:
- An economic subsystem representing the organization of production and labor
- A cultural subsystem representing the shared patterns of norms and values
- A political subsystem representing the intermediary between the two foregoing subsystems

Kleefmann looked at the model from a perspective of spatial organization. In this context spatial organization is viewed on the one hand as a social-spatial organization comprising the spatial positions of social activities and on the other as a physical spatial organization that consists of physical entities. (Duchhart, 2007)

By intertwining the theoretical notions of both models (Kerkstra's triplex-landscape model and Kleefmann's sociophysical-organization model) as described above, Ir Duchhart created a new model which increases the understanding of driving forces underlying the visual landscapes.

> *'The triplex-landscape model is strong in analyzing the tangible physical environment and natural organization principles, while Kleefmann's sociophysical-organization model helps to bring to light less tangible (process oriented) issues, such as cultural taboos, and the way principles of social organization interact with nature.'* (Duchhart, 2007)

This last described model which combines the models of Kerkstra and Kleefmann we see as very useful for our thesis and explains the 'landscape approach'. We believe this way of analyzing the landscape will provide us with the necessary knowledge of the type of landscapes we are working with, to be able to redesign these landscapes, not only is a physical way but also in a process-related and socio-cultural way. We need to understand which processes are responsible for the continuing urbanization of the former rural landscapes in order to guide these developments into a direction which is both good for nature as society. We believe that, when the needs and desires of both the natural component and the societal component are being met, as result, sustainable places of high aesthetic quality will come into existence.

CONTEMPORARY LANDSCAPE

'Triplex - landscape'

Network landscape

+

Modern
occupation pattern

Historical
occupation pattern

Biotic pattern

Abiotic pattern

Network layer

Cultural layer

Driving forces of
the landscape

Landscape period 1
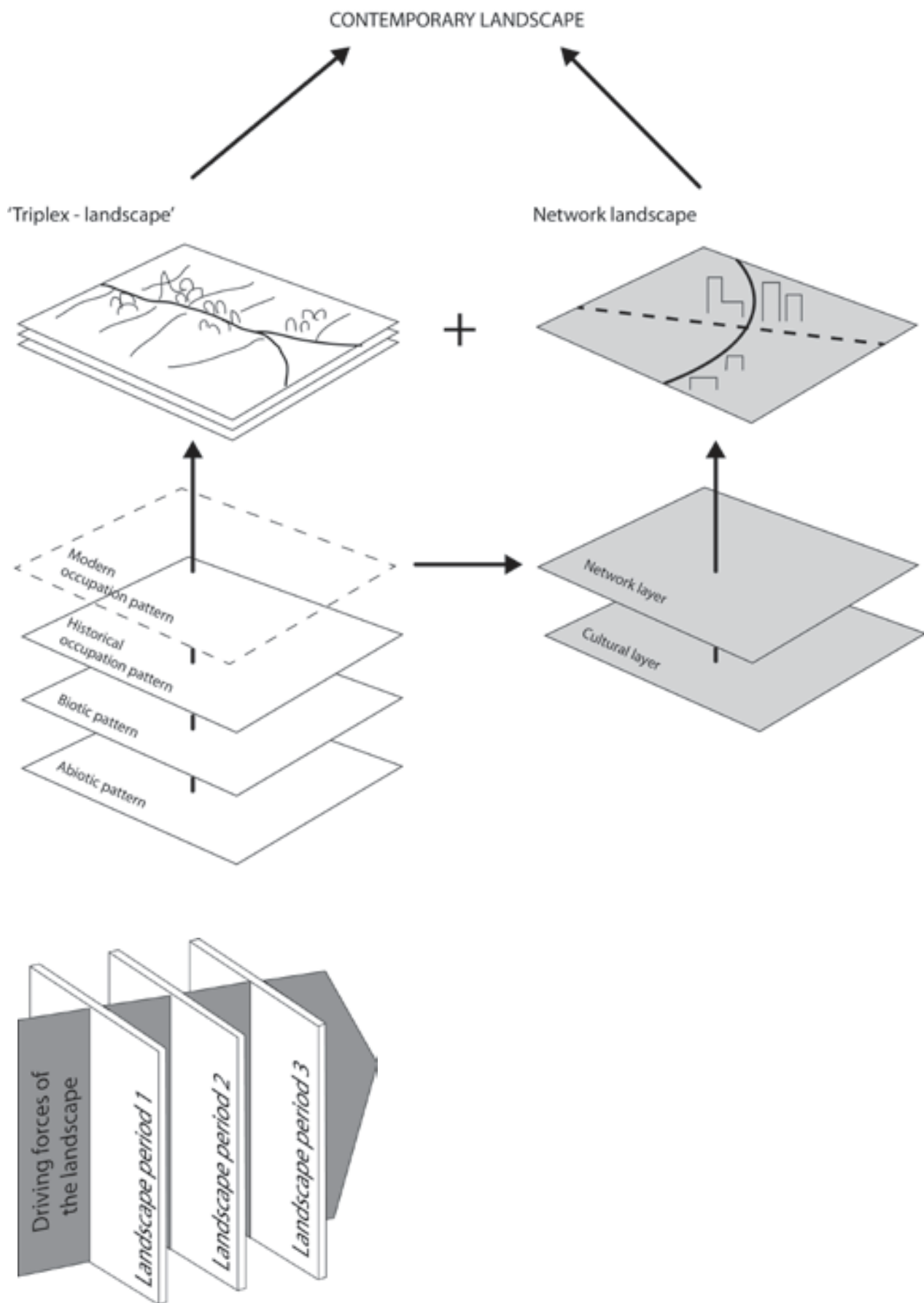
Landscape period 2

Landscape period 3

Fig. 20 'Triplex-landscape' model combined with 'network landscape' model (Kerkstra, et al., 2003; VROM, 2004)

Research Method

Research question 1

During this thesis we want to investigate if a landscape approach could provide a possible solution for the problems which are mentioned in the overall assignment; creating an economic foundation in which recreation plays a vital role and providing these landscapes with more meaning and a stronger identity. A park approach proved to be too rigorous and not applicable on the regional scale.

A landscape approach could be used to trace processes and systems which play an important role in making these rural left over landscapes sustainable on an ecological, economic and socio-cultural level. These processes and systems could function as a possible backbone or foundation for future developments. New foundations should exist in as well the rural landscape as the urban fabric, so they connect both, city and landscape, and provide the rural left over landscape with more meaning towards the city.

Such a sustainable foundation should offer guidelines for future developments and urban expansion or shrinkage in the urban and green fabric, linking them together while preserving or strengthen its (cultural historical, ecological, agricultural and recreational) qualities. Furthermore the landscape approach is applicable on many different scale levels, which makes it possible to address as well local as global issues.

Question1:

Which processes and systems can be found in the urban/ green fabric by using a landscape approach, that could function as a sustainable (ecological, economic and social-cultural) foundation for the future development of left over rural landscapes within the urban network, in which recreation plays a vital role?

- *In what way(s) could these processes and systems be used as a sustainable foundation for the future development of left over landscape within the urban network?*

- *In what way(s) could recreation become the main economic foundation for the left over rural landscapes within the urban network?*

Research question 2

The Dutch government introduced the concept of 'metropolitan parks' as a way to make these left over rural landscapes stronger and to offer a solution to the previous mentioned assignment; creating an economic foundation in which recreation plays a vital role and providing these landscapes with more meaning and a stronger identity. Our conclusion was that the park approach is not sufficient enough at this regional scale level in solving these issues.

During our minor thesis we tried to find out if it would be possible to use the qualities which make a traditional 'park' a strong place, in the left over rural landscapes. From this question a list with 'design criteria' finally emerged:

1. **Unity & recognizable areas**
2. **Spatial organization**
3. **Accessibility**
4. **Users & functions**
5. **Complexity**
6. **Mystery**

We have concluded that these 6 criteria are still mainly related to the traditional 'park' concept, which results in some of them being not very significant to the left over rural landscapes which we are working with now. Probably there are other or more criteria to be found for this type of landscape which are important. We still concluded that these 6 criteria were present in the 5 case studies, even though these criteria might not be the most important for these kind of landscapes. This is why we still want to find out if these criteria can be applicable in these left over rural landscapes, as an addition to the landscape approach.

During the design process of our major thesis we want to investigate when and in which way the 'design criteria' we found during our minor thesis, can be used. By doing this we will experience for how far these 'design criteria' are useable and workable, and if we need to adjust them. Besides this we will also try to find other new criteria which are more related to these large scaled rural landscapes.

Question2:

- *In what way are the design criteria from the minor thesis useable during the design process for a left-over rural landscape with a landscape approach?*

- *What other important design criteria do we encounter during the design process?*
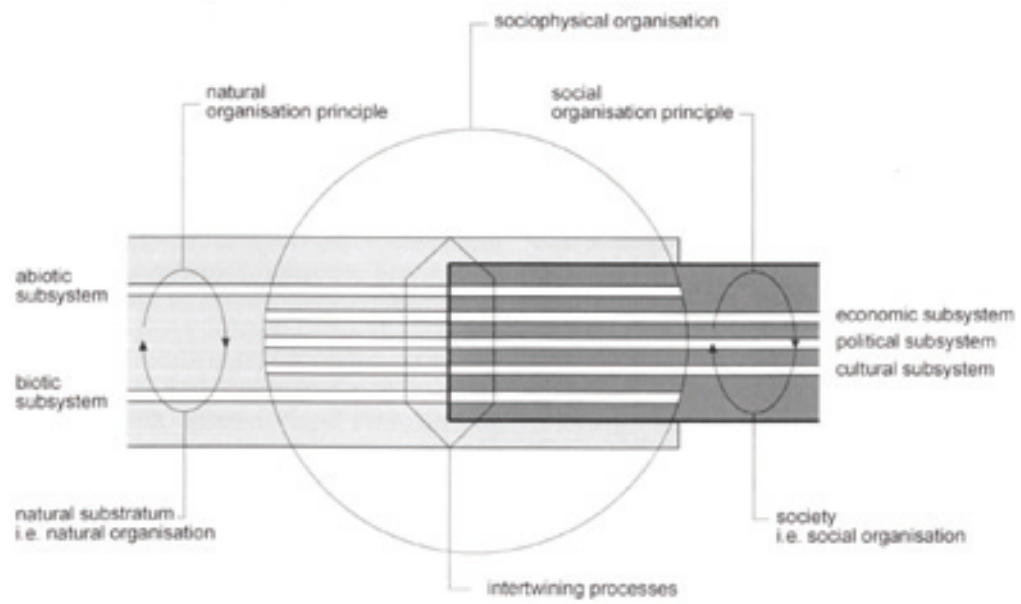
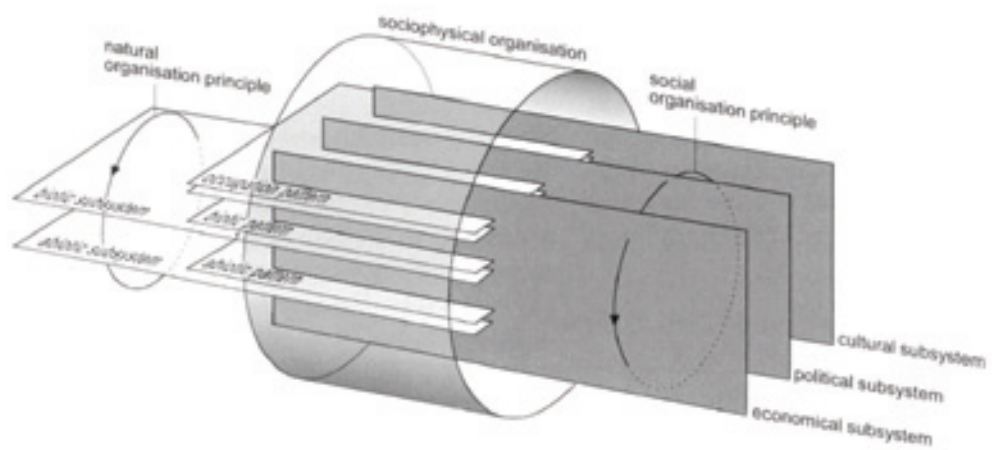*Fig. 21 Sociophysical-organisation model (Kleefman, 1992)*

Fig. 22 Intertwining the triplex model and the socio-physical model (Duchhart 2007)

Research Method

TYPES OF DATA & KNOWLEDGE CLAIM

This study can be described as an explorative, pragmatic and interpretative research based on qualitative data. The design process itself will be the main data input to answer the two research questions. Besides the design process, literature studies are also used as data input, together with the gained knowledge of the minor thesis.

Using a problem as a central issue corresponds to the pragmatism approach saying:

> *'instead of methods being important, the problem is most important, and researchers use all approaches and to understand the problem'* (Creswell, 2003)

METHODOLOGY 'RESEARCH BY DESIGN'

In order to answer research question 1 we will first do a small literature research on the greenway concept. The findings of this literature research will be applied during the design process of a case study, which will be used as main . In the end we will reflect on the usefulness and usability of these concepts in finding a suitable approach for left over rural areas within the urban network.

Research question 2 will also be answered by applying the theory derived from the minor thesis, during the analysis of the project area. During this process the usefulness and usability of these criteria will become clear.

Besides the overall assignment of our thesis topic, we will also need to do research on the project area itself in order to determine the project area's assignment. After this it will become clear what exactly needs to be analyzed besides the networks as described in research question 1.

During the design process small literature and design studies on certain topics will be used if necessary, in order to make argumentated design choices.

Figure 23 shows the overall work process and methodology during this thesis.

DESIGN PROCESS

Broad landscape analysis

To be able to analyze the full spectrum of the landscape, we will use the model described before created by Duchhart. This means that we will analyze the tangible physical environment and the natural organization principles that are present in our project area, as well as the less tangible (process oriented) driving forces underlying the visual landscape.

In order to accomplish this we will divide the analysis in three parts (fig. 24). In the end these different parts together should give us an adequate representation of the landscape.

First, we will do a 'classic' landscape analysis according to the 'triplex model'. This analysis will provide us with information about the structural relation between geomorphology, surface and ground water, soil types and related vegetation types and land uses.

Second, the contemporary urban network will be analyzed, which consists of an infrastructural network, connected to the urban developments. The occupation patterns of today's society are less related to the underlying abiotic layers of the landscape. They are mainly guided by the infrastructural network and urban development.

These developments are guided by the underlying economic, political and cultural driving forces of today's society, and these will be analyzed during the third and last part. Because the last two part are closely related and intertwined they will be analyzed simultaneously.

'Triplex-landscape' analysis

The entire landscape between Parkstad and Aachen will be analyzed. This landscape is part of the National Landscape of South Limburg. This landscape has some very distinctive qualities: the height differences, the green character, the contrasts in open/closed and small and large scaled.
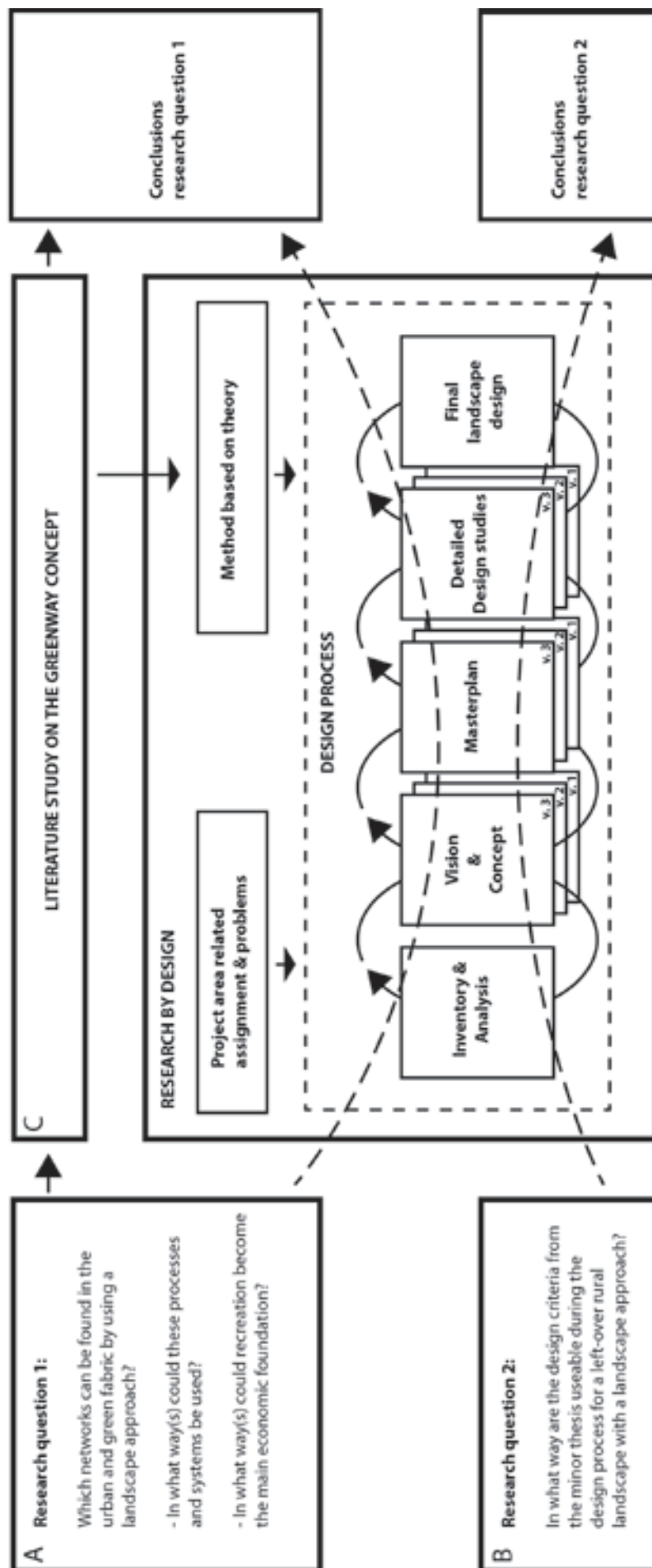
In policy documents this landscape called "het Heuvelland" often seems to stop at the border between the Netherlands and Germany, but if we look at the actual situation we can see that this characteristic landscape of the South of Limburg stretches until Aachen. Beyond Aachen another landscape consisting of hills and mountains starts, which is not part of our project area.

The characteristics of this landscape as described above, are all strongly related to each other as products of the interaction between abiotic, biotic and anthropogenic processes, which together form the landscape. The landscape which is characterized by the main qualities as described before, is the tangible result of a dynamic systems which develop their selves through space and time. The landscape as we experience it, the landscape qualities and the underlying landscape processes are a coherent whole (fig. 20).

The abiotic circumstances (the terrain's height differences, the soil and water system) can be seen as the landscape's foundation. On top of this foundation the human occupation developed. The abiotic circumstances and the intensity of human occupation determine to what extend it is possible for ecology to develop (plant and animal world).

This hierarchical relationship explains how and in what order we will analyze the landscape on the following main qualities:

- The abiotic and biotic basis
- The occupation through time and cultural historical aspects of the landscape
- The experience of the landscape

LITERATURE STUDY ON THE GREENWAY CONCEPT

C

Conclusions research question 1

Conclusions research question 2

RESEARCH BY DESIGN

Method based on theory

Project area related assignment & problems

DESIGN PROCESS

Inventory & Analysis

Vision & Concept — v.1, v.2, v.3

Masterplan — v.1, v.2, v.3

Detailed Design studies — v.1, v.2, v.3

Final landscape design

A Research question 1:

Which networks can be found in the urban and green fabric by using a landscape approach?

- In what way(s) could these processes and systems be used?
- In what way(s) could recreation become the main economic foundation?

B Research question 2:

In what way are the design criteria from the minor thesis useable during the design process for a left-over rural landscape with a landscape approach?

Core literature:
Part A - (Antrop, 2004; Czerniak, et al., 2007; Kerkstra, et al., 2007; VROM, 2008a)
Part B - (De Jong, 2010; Kaplan, et al., 1998; Lynch, 1960; Spirn, 2000)
Part C - (Ahern, 2002; Searns, 1995)

Fig. 23 The methodological framwework in which the process and approach of the project is visualized

Research Method

Urban network analysis
The urban network is part of the anthropogenic processes which used to be based on the abiotic and biotic underlying layers. Nowadays much of the anthropogenic processes do not follow the landscape's logics anymore and formed a new layer which is hardly related to the underlying landscape. The combination of this new urban network together with the old cultural landscape forms the metropolitan landscape we are working with right now (fig. 20).

So, another important part of our analysis is the urban network. Since we're working in and with a metropolitan area it is important to know which developments are currently happening in this urban network which mainly consist of Aachen and Parkstad. We also need to know what (f)actors are responsible for these developments and where they are located. The urban network will be analyzed on the following aspects:

- Regional infrastructure
- Economic actors
- Policy

Driving forces analysis (societal system)
In this last part we will also pay attention to the less tangible economic, cultural and political processes, which are behind the visual patterns we can find in the landscape. We will describe these processes and we will try to make them less implicit.

Conclusions broad landscape analysis
At the end of the analysis, we will look at our findings and summarize the most important networks and/or systems in our project area. The economic, cultural and political processes will be summarized in a scheme to give a clear overview. Research question 1 will be answered at the end of this part.

'Which networks can be found in the urban and green fabric by using a landscape approach, that could function as a sustainable (ecological, economic and social-cultural) foundation for future developments in which recreation plays a vital role?'

Project area analysis (according to the design criteria of the minor thesis)
After the broad landscape analysis, the confined project area will be analyzed according to the design criteria of the minor thesis. Besides analyzing the project area, also the design criteria will be evaluated on their usability and completeness. Research question 2 will be answered at the end of this part.

'In what way are the design criteria from the minor thesis useable during the design process for a left-over rural landscape with a landscape approach?'

Vision/concept
The conclusions from the broad landscape analysis, the project area analysis and the literature studies, together will lead to an argumentated vision and concept for the project area.

Landscape design
During the master plan phase we will further develop our vision and concept into a concrete design. The concept will be integrated with the current landscape. This chapter will be mainly about the functioning and systems of the design. Even though, this master plan will still be quite abstract.

Landscape design elaborations
During the last part of the design process the visual experience and the spatial characteristics of the landscape design will be made clear. Several parts of the landscape design will be worked out on a smaller, concrete scale level.
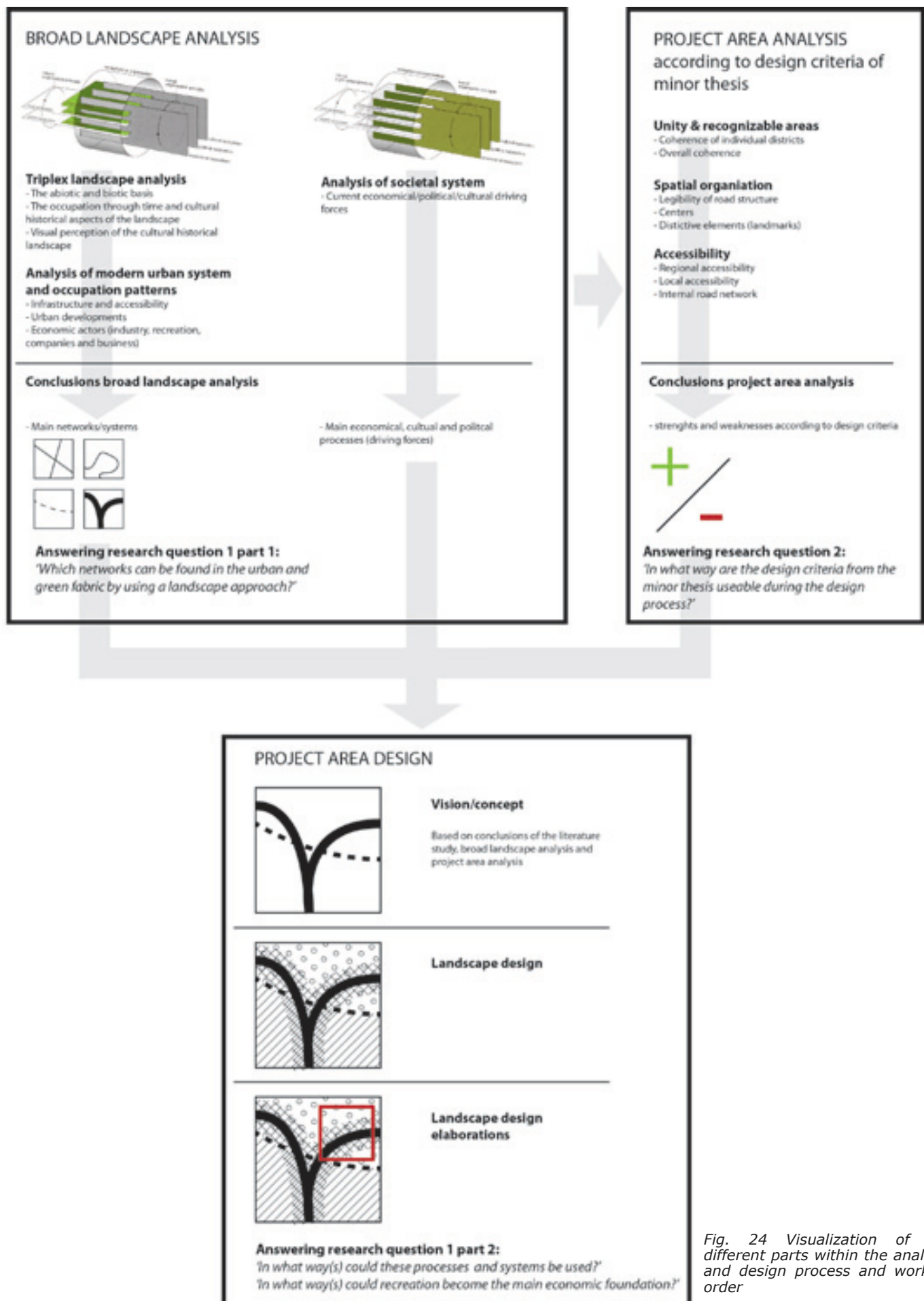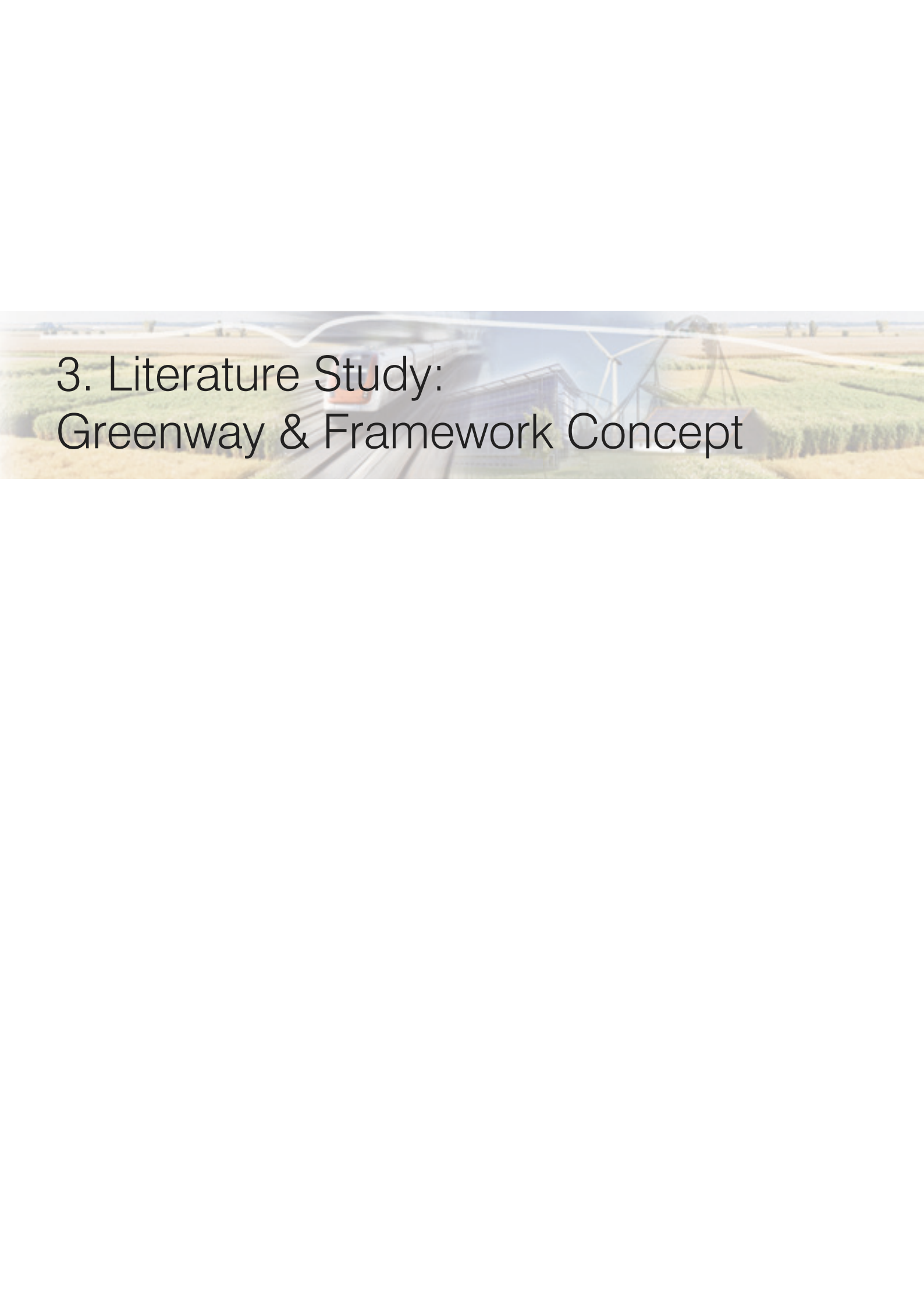
ANALYSIS & DESIGN PROCESS

BROAD LANDSCAPE ANALYSIS

Triplex landscape analysis
- The abiotic and biotic basis
- The occupation through time and cultural historical aspects of the landscape
- Visual perception of the cultural historical landscape

Analysis of modern urban system and occupation patterns
- Infrastructure and accessibility
- Urban developments
- Economic actors (industry, recreation, companies and business)

Analysis of societal system
- Current economical/political/cultural driving forces

Conclusions broad landscape analysis

- Main networks/systems

- Main economical, cultural and politcal processes (driving forces)

Answering research question 1 part 1:
'Which networks can be found in the urban and green fabric by using a landscape approach?'

PROJECT AREA ANALYSIS according to design criteria of minor thesis

Unity & recognizable areas
- Coherence of individual districts
- Overall coherence

Spatial organisation
- Legibility of road structure
- Centers
- Distictive elements (landmarks)

Accessibility
- Regional accessibility
- Local accessibility
- Internal road network

Conclusions project area analysis

- strenghts and weaknesses according to design criteria

Answering research question 2:
'In what way are the design criteria from the minor thesis useable during the design process?'

PROJECT AREA DESIGN

Vision/concept

Based on conclusions of the literature study, broad landscape analysis and project area analysis

Landscape design

Landscape design elaborations

Answering research question 1 part 2:
'In what way(s) could these processes and systems be used?'
'In what way(s) could recreation become the main economic foundation?'

Fig. 24 Visualization of the different parts within the analysis and design process and working order

31

3. Literature Study:
Greenway & Framework Concept

Greenway & Framework Concept

Ecological benefits of greenways

In the late 1980s, a number of writers began to build on the idea of pursuing more environmentally sensitive urban development like McHarg (1969, "Design with Nature") and Forman and Godron (1986, "Landscape Ecology").

"These writers and scientists saw urbanization, agriculture and other human activities chopping up wild places and leaving isolated 'islands' of habitat. This process was identified as a serious threat to the health and diversity of species." (Searns, 1995)

"Authors, including Harris (1984), Noss (1987), Binford and Buchenau (1993) and Labaree (1992), suggested that corridors, including strips of wilderness, greenways, linear parks, and even hedgerows may have a role to play in linking isolated islands of habitat. Noss (1987) was one of the leaders in arguing the need for special corridors in the human-dominated landscape (Adams and Dove, 1989). In addition to providing connectivity and a conduit for seeds, animals, water, sediment and nutrients, corridors offer the virtues of trapping contaminants, filtering, and being places of habitat themselves as a source of animals and seeds (Labaree, 1992). Smith, Hellmund and other contributing writers consolidated much of this thought in "Ecology of Greenways," (1993)." (Searns, 1995)

This thinking helps provide a new perspective on greenways and their potential to serve both humans and nature. But it should be noted that, along with greenways that link places, 'interior habitat' is still needed. This means greenways should connect larger green areas. A greenway that doesn't connect anything becomes obsolete. Also it is important that the pursuit of greenways not divert attention and resources from saving this kind of habitat as well.

Cultural and recreational benefits of greenways

These writers mainly support greenways because of their potential to strengthen and heal the ecological qualities of the landscape. But besides these ecological benefits, we are mainly interested in the cultural and recreational potentials of greenways.

Robert M. Seams in his paper 'The evolution of greenways as an adaptive urban landscape form', states that:

'a greenway is more than just an ecological system. To find a comprehensive definition of the word greenway it's probably the best to look at the two root words, 'green' and 'way.' "The word 'green' suggests areas that are left vegetated and in most cases appear or at least strive – to be natural. The word 'way' implies

movement, getting from here to there, from point to point." (Searns, 1995)

"This is the important distinguishing feature of greenways – they are routes of movement – for people, animals, seeds and often water. But a greenway is also a 'place' offering solace and opportunities for exploration and play and with a sense of nature preserved, restored or interpreted." (Searns, 1995)

More than just parks or amenities, greenways represent an adaption – a response to the physical and psychological pressures of urbanization. They also offer an important way to preserve history and educate the public about nature and foster a broad based sense of stewardship for the land.

Historic preservation using greenways to highlight area culture and heritage may turn out promising. "Rivers, streams, canals, rail lines and roads often played key roles in the settlement and development of cities, regions, states and nations." (Searns, 1995) *Preserving political and social history can be a way to link together past, present and future as well as geographic points along corridors.'*

"Urban greenways can also take the land stewardship message across ethnic, cultural and class lines. Because they are more accessible than remote parks and wildernesses, greenways can convey their message – through first-hand experience – to a broader cross-section of the population. This notion of access and diversity should be a principle element of all greenway plans." (Searns, 1995)

Greenways are connecting natural processes and movements with culture, people and functions, the daily life with the annual cycle, our long history with dreams for the future. They could connect the city with the environment, not only visual, but also connect them in a level of thinking and feeling, a link we are often missing in our contemporary society.

Jack Ahern supports these arguments in his paper 'Greenways as a planning strategy' by saying that:

'Greenways may connect cultural resources into a type of network or system that may have greater value and higher use than the sum of the constituent parts - as a kind of landscape synergy. Cultural landscape resources are increasingly recognized for their interpretive and recreational values. Linking

these resources makes them accessible to a larger region of users, and, through multiple use, may realize compatible uses within a single greenway.'
(Ahern, 2002)

He also explains how greenways can increase the landscape's legibility:

'Greenways have the potential to provide a visible structure and legibility to the landscape. When a greenway produces a strong pattern and form in the landscape, certain natural features and processes may become more visible and legible. (Ahern, 2002)

Lynch (1972) has described other advantages of linking open spaces into a system: The open space system not only makes the [city] visible, but also the larger natural universe. It can give the observer a sense of the more permanent system of which he and the city are only parts. ..... To convey a sense of the web of life, of the intricate interdependent system of living things, will be even more important. (p. 124).' (Ahern, 2002)

A linear network of greenways as planning strategy
Ahern explains that a network of greenways can be used as a planning strategy to achieve sustainable landscapes, in which the problems of fragmentation, land degradation, urban expansion and uncontrolled land use change can be solved.

'The strategic objective is to establish a durable network capable of supporting basic ecological functions, protecting key natural and cultural resources and permitting other uses which do not impair landscape sustainability. As a planning strategy, it substitutes the difficulty/futility of planning the entire landscape, with a strategic effort to build a linear network as a kind of sustainable framework (Sijmons 1990, Kerkstra and Vrijlandt 1990, Buuren van 1991).' (Ahern, 2002)

FRAMEWORK CONCEPT
A spatial and conceptual framework for landscape stability and change
In order to translate this strategy to a spatial and conceptual framework for landscape stability and change, the framework or 'casco' concept is used (fig. 25).

'Change and uncertainty are fundamental in natural and cultural systems. The landscape is no different - change is also fundamental - and uncertainty is a "given". This is the paradox of time in landscape planning. Nature needs time and certainty in some places - yet cultural and economic forces demand flexibility in others. The framework concept in the Netherlands is a spatial strategy for addressing this paradox in the realms of planning and design. It guarantees nature a long term stability, and allows more flexibility for land use change in the other areas. (Ahern, 2002)

Some land uses support ecological processes which operate slowly and require stability in

A

B

········ drainage divides

⌣ groundwater flows

▨ low dynamic framework
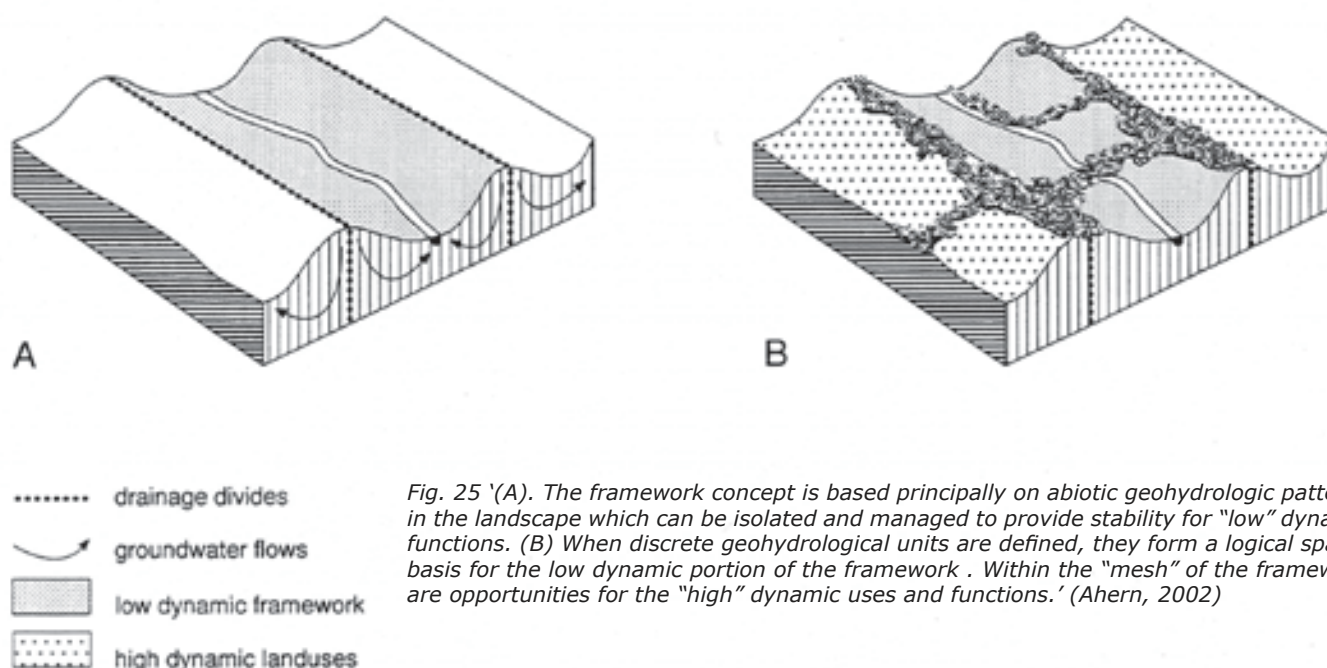
⬚ high dynamic landuses

Fig. 25 '(A). The framework concept is based principally on abiotic geohydrologic patterns in the landscape which can be isolated and managed to provide stability for "low" dynamic functions. (B) When discrete geohydrological units are defined, they form a logical spatial basis for the low dynamic portion of the framework . Within the "mesh" of the framework are opportunities for the "high" dynamic uses and functions.' (Ahern, 2002)

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time and space. These are the "slow turning" wheels of the landscape such as nature conservation, watershed management and river floodplain dynamics. Other land uses and processes are influenced more by cultural and economic forces and depend on an ability to change in response to market and technological factors. Changes in land use for increased industrial production, for new housing, or soil and drainage alterations to support different agricultural systems are representative of the landscape's "fast turning wheels" (Sijmonds 1990). The framework concept recognizes the fundamental and particular needs of both. (Ahern, 2002)

Many of the environmentally-sensitive and hazard-susceptible landscapes have been found to occur along linear corridors which also have a high percentage of cultural and visual landscape resources (Lewis 1964). Because of these unique properties of linear networks, they represent a useful strategy to promote spatial integration, to link pattern and process, and to facilitate flows in the landscape. Networks that connect landscapes create a synergy of desirable landscape

functions and processes. Spatially-integrated linear networks offer physical advantages for the movement or flows of certain materials.' (Ahern, 2002)

The framework concept was originally created by Kerstra and Vrijlandt and formed the philosophical basis for the earlier mentioned practical application of 'Plan Ooievaar' (1987).

They observed that modern, high-dynamic agriculture increasingly dominates low-dynamic land uses and - in their opinion - this nullifies ecological and visual diversity, and historicity. To reduce these negative effects, Kerkstra and Vrijlandt evolved a philosophical approach that was based on a division into high-dynamic and low-dynamic land use types. This philosophy took shape in a landscape 'framework' concept. This framework created long term opportunities for low-dynamic land uses, such as nature conservation, forestry, recreation and water management as well as for relatively fast-changing high-dynamic land uses, such as, that required by modern agriculture. (Duchhart, 2007)

Originally this framework was developed to compose the (rural) landscape in such a way that all land use types
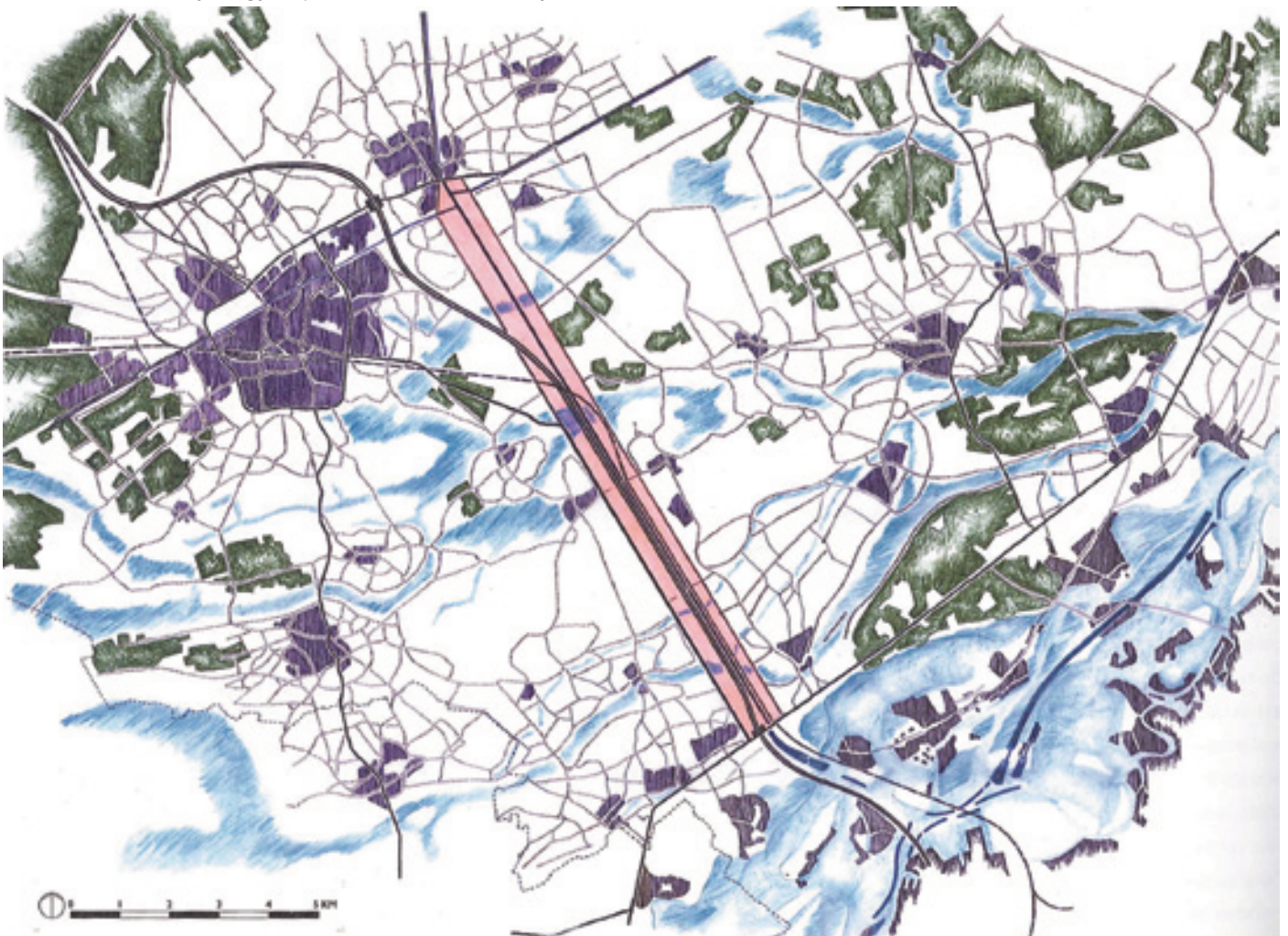

Fig. 26 The natural layer of the concept (Kerkstra, et al., 2003)

could function optimally without interfering with each other. Especially ecological function would benefit from this approach.

However, we mainly want to use the framework concept to create a strong recreational, ecological and cultural network, which could function as a backbone for the entire landscape it is part of.

We believe this spatial and conceptual framework as described above could be part of the solution for the problems the rural left over areas within the urban network are facing right now.

CASE STUDY
'De verborgen tuin van Midden-Limburg'
A project in which a similar approach has been used to strengthen the landscape is '3 over 30, De verborgen tuin van Midden-Limburg'. (Kerkstra, et al., 2003)
In this project a strategy is presented which should makes the qualities of the cultural landscape of Midden Limburg, which became invisible in time, visible and experienceable again.

Their concept exists of two layers: the anthropogenic and the natural layer. These two layers should offer policy makers handles to steer the landscape in certain directions. The anthropogenic layer (fig. 27) consists of a network of infrastructure which are connected to the related urban developments.
The natural layer (fig. 26) is formed by the ecological and hydrological networks of the stream valleys, infiltration areas and nature areas. The networks from these layers together form the public space of the rural landscape.

In their design they try to reduce the impact of the regional infrastructure on the natural, soil-based landscape, by combining all the main infrastructural connection (highways and railroads) into one large infra-bundle. The idea behind this is that the presence of large regional infrastructure (highways and railroads) stimulates urban development. By removing the regional infrastructure from certain areas, the urban development of these areas can be slowed down or stopped. This would give room again for the natural processes of the landscape to take place.

On a smaller scale they strengthen the local road pattern, which is strongly related to the natural, soil-based landscape. This will improve the landscape's quality.

By rising the water levels in and around the stream valleys, and by accentuating the stream valleys with vegetation, they will become better recognizable and

Fig. 27 The anthropogenic layer of the concept (Kerkstra, et al., 2003)

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experienceable. The network of stream valleys will function as main structure of the landscape and offers a sustainable framework, that allows a flexible use of the surrounding landscape.

The network of stream valleys can be seen as a continuous landscape park (fig. 28). Water-management, nature and landscape historical related goals will be realised within this 'park'. Close to urban areas the landscape park will offer room for urban functions like residential areas and recreation. The landscape park will function as public space and is public property. It can be used in several ways. In ancient times the uncultivated areas used to belong to the entire community, in 2030 the stream valleys will be the new 'commons' they propose.

We find this project very inspiring. Especially the network of stream valleys that together form a large landscape 'park', which could function as the new 'commons' of the future is an interesting idea.

Also the idea of giving this landscape park urban functions (like recreational function and housing development) at the intersections between this network and the anthropogenic network, seems like a good strategy to provide cities with the currently needed recreational opportunities. As long as the natural character of the landscape park stays (spatially) recognizable at these places despite the urban functions. How these urban functions will be integrated within the landscape park

depends on the situation. They say these should be designed separately.

A few examples on a more concrete scale of possible solutions are given (fig. 29 & 30). The location 'Beekdal bij Weert' shows how recreational facilities can be integrated. At the edges of new (wet) nature areas, recreational facilities and housing development areas can be developed at places which have to be further specified. The introduce a new estate at a large water retention lake with as main functions recreation and living. Within the landscape park there is also room for sporting facilities. The green of the landscape park penetrates deep into the urban fabric and functions as an attractive connection between Weert and the landscape park.
The introductions of new estates in the landscape park that offers room for urban functions could be a good solution in linking the rural or natural landscape with the urban context and network.

Our main critique however on this approach is that on a larger scale it still treats the city and the rural landscape as two separate entities. The networks of regional infrastructure and of the stream valleys appear to exist separately to each other. It seems as if they try to reduce and restrain the impact of the urban network as much as possible and repair and resurrect the cultural historic landscape
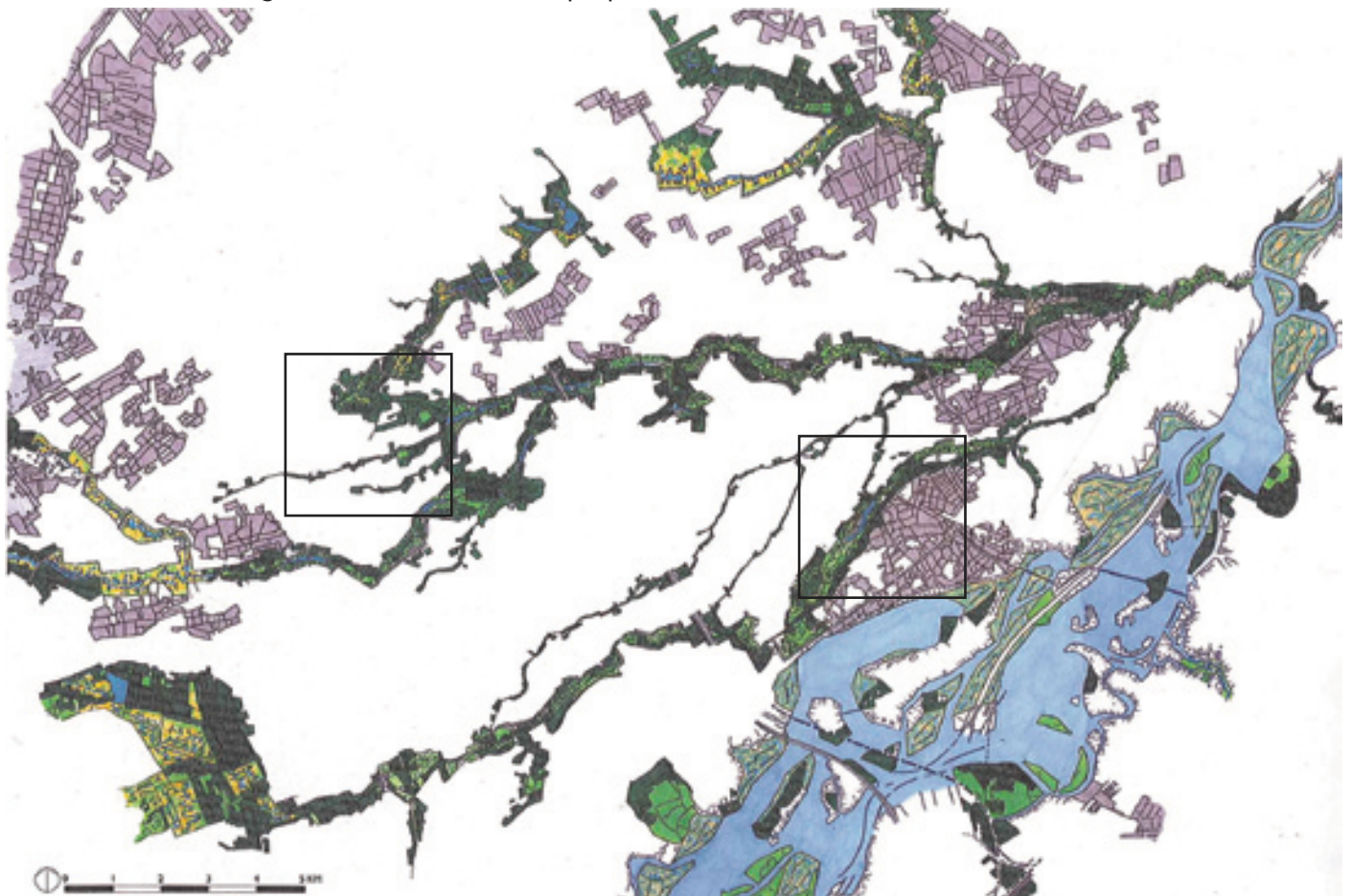

Fig. 28 A continuous 'landscape park' (Kerkstra, et al., 2003)

CONCLUSIONS

During the design process the framework concept existing of a liniar network of greenways (Ahern, 2002) as described before will be used, in order to partly answer research question 1:

- *Which processes and systems can be found in the urban/green fabric by using a landscape approach, that could function as a sustainable (ecological, economic and social-cultural) foundation for the future development of left over rural landscapes within the urban network, in which recreation plays a vital role?*

- *In what way(s) could these processes and systems be used as a sustainable foundation for the future development of left over rural landscape within the urban network?*

The case study 'De verborgen tuin van Midden-Limburg' described above, will be used as inspiration, during the design process. We will pay extra attention on interweaving the natural and the anthropogenic systems, instead of treating them as two different entities.
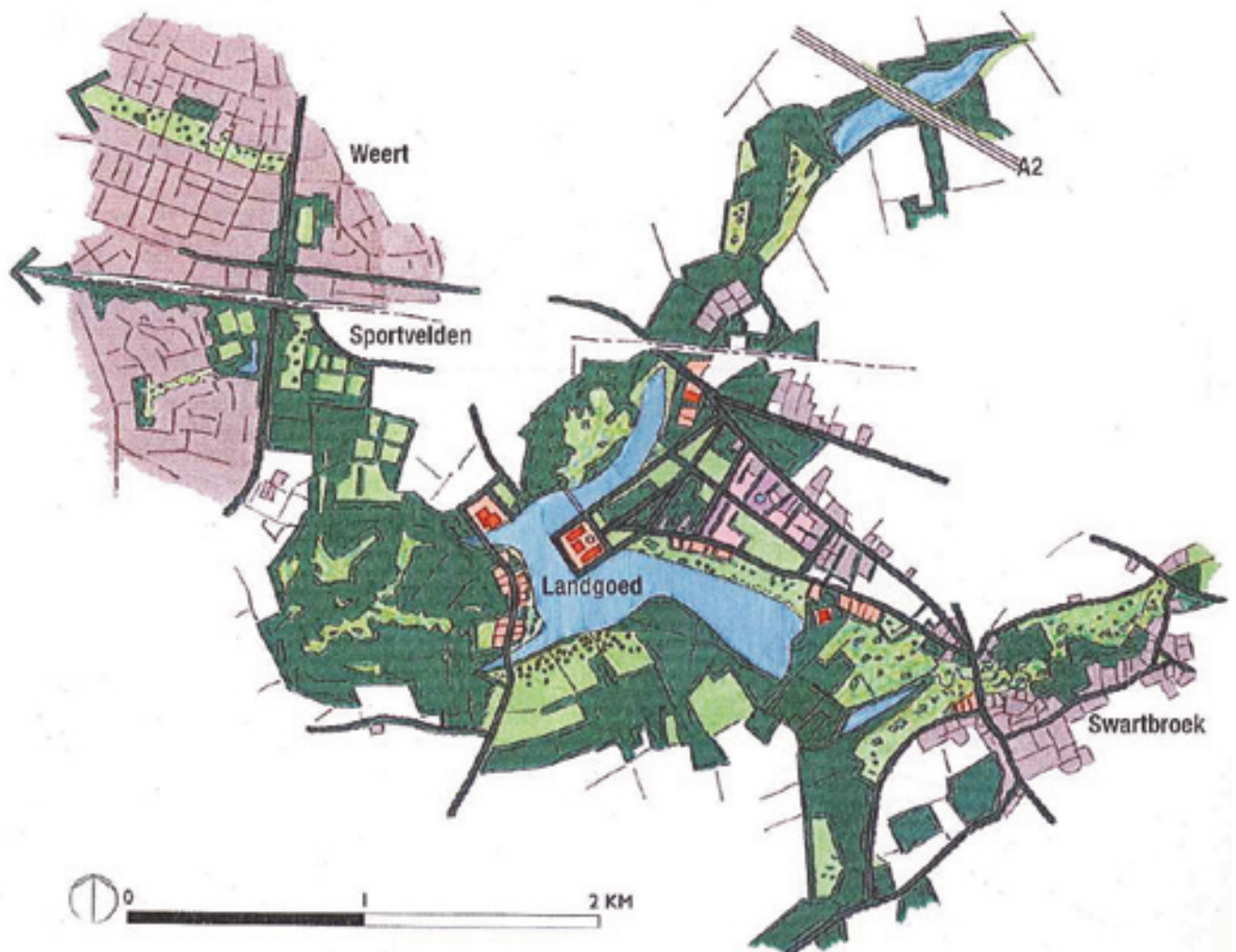
Fig. 29 'Beekdal bij Weert', new estate as recreational center (Kerkstra, et al., 2003)

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Fig. 30 Elaboration of a stream valley near Baexem (Kerkstra, et al., 2003)

4. Project Area Description

Project Area Description

WHY THIS PROJECT AREA

Comparable to the case studies

To be able to find an answer to our research question during this research, we need a project area. This project area has to be comparable to our case studies from the previous research in the minor thesis. These case studies were left over rural landscapes that once where "rijksbufferzones," areas which were meant to stay rural in order to prevent large cities from growing together. Their size and context however differ a lot, from 275 ha. to 3700 ha. (fig. 13). Most of them were positioned in the Randstad, where urban development is putting a lot of pressure on the rural landscape.

Personal interest

In the search of a project area we looked to the important metropolitan regions of the Netherlands (fig. 31 and 32) to establish in which region we should be looking for an interesting area that is exposed to an increasing urban pressure. Both maps show the most important urban regions on a interregional (international) level.

But our personal interest is also an important aspect in the search for a project area. Our case studies from our previous research in the minor thesis were situated in the Randstad and near Arnhem and Nijmegen. For our major thesis we were looking for a project area that focusses on a different landscape then we already have seen before in the case studies from our research and coincidentally, in other projects that we've been working on during our study.

So eventually we we're looking for a project area in the south of Limburg and because this area has a lot of international potentials. We narrowed our search down to the area of Parkstad and Aachen. This area is consisting of a large metropolitan region or network of clustered villages and cities that have been grown together and where the assignment that is pointed out by us is obviously really forthcoming. The rural left over landscape is confined by an urban network and furthermore exactly on the borderline of the Netherlands and Germany. This international importance makes the project area even more interesting in our search for a new concept of the "Metropolitan Park."

DESCRIPTION OF THE PROJECT AREA

International importance

On the previous pages it became clear that we are talking about a metropolitan region in the south of Limburg. Another issue that emerged was its regional or international importance, as is shown on the previous figures. The urban region of Parkstad and Aachen is right in between two large important metropolitan regions; on one side you have Brussel and Antwerpen (Vlaamse Ruit) and on the other Dortmund, Düsseldorf and Köln (das Rührgebiet). Our project area is also part of a large border-crossing collaboration network, the ELAt. Also the influence of the Randstad is of great importance.

The ELAt

On a larger scale this area is part of the ELAT (Eindhoven, Leuven, Aachen triangle), a region of border-crossing collaboration agreements since 2004 (fig 33). This has been done with the aim of effectively supporting the already developed trans regional collaboration of knowledge institutions and high-tech companies in this region, partly because of its central location and available knowledge competences and its development into the largest knowledge region in Europe.

"This region has a high concentration of outstanding knowledge centers, i.e. universities, higher technical education institutes and research centers. Leuven's university has a leading position among the 25 most renowned European academic research centers and is determined to expand and reinforce this position while Eindhoven University of Technology (TU/e) has a long tradition in research and development and RWTH Aachen is one of Europe's the most renowned engineering universities. In the research field, the IMEC (Interuniversity Microelectronics Centre) institute in Leuven is Europe's largest independent research center in the field of microelectronics and is becoming increasingly active in nano-electronics and bio-silicon. TNO has centers in Eindhoven and Helmond and there are three Fraunhofer institutes in Aachen along with a research center in Jülich. In addition, there are at least another twenty universities, business schools and polytechnics.

There is a well-developed entrepreneurial culture that provides the ELAt region with many outstanding role models as shown by the numerous spin-offs from universities and engineering institutes: in Leuven more than 90, in Aachen more than 300 and Eindhoven several outstanding spin-offs, all created in the last twenty years.

The ELAT region has the necessary physical structures such as incubators, research parks and industrial parks. These include the I&I and biotech incubator in Leuven, the Haasrode research Park, the Arenberg Research Park, the DSM Chemelot research park in Geleen (Sittard), the High Tech Campus in Eindhoven (HTCE) and the incubators on the HTCE and the TU/e campus, the TZA and MTZ incubators, research and business parks in Aachen and the Avantis cross-border business park." (ELAt, 2006)
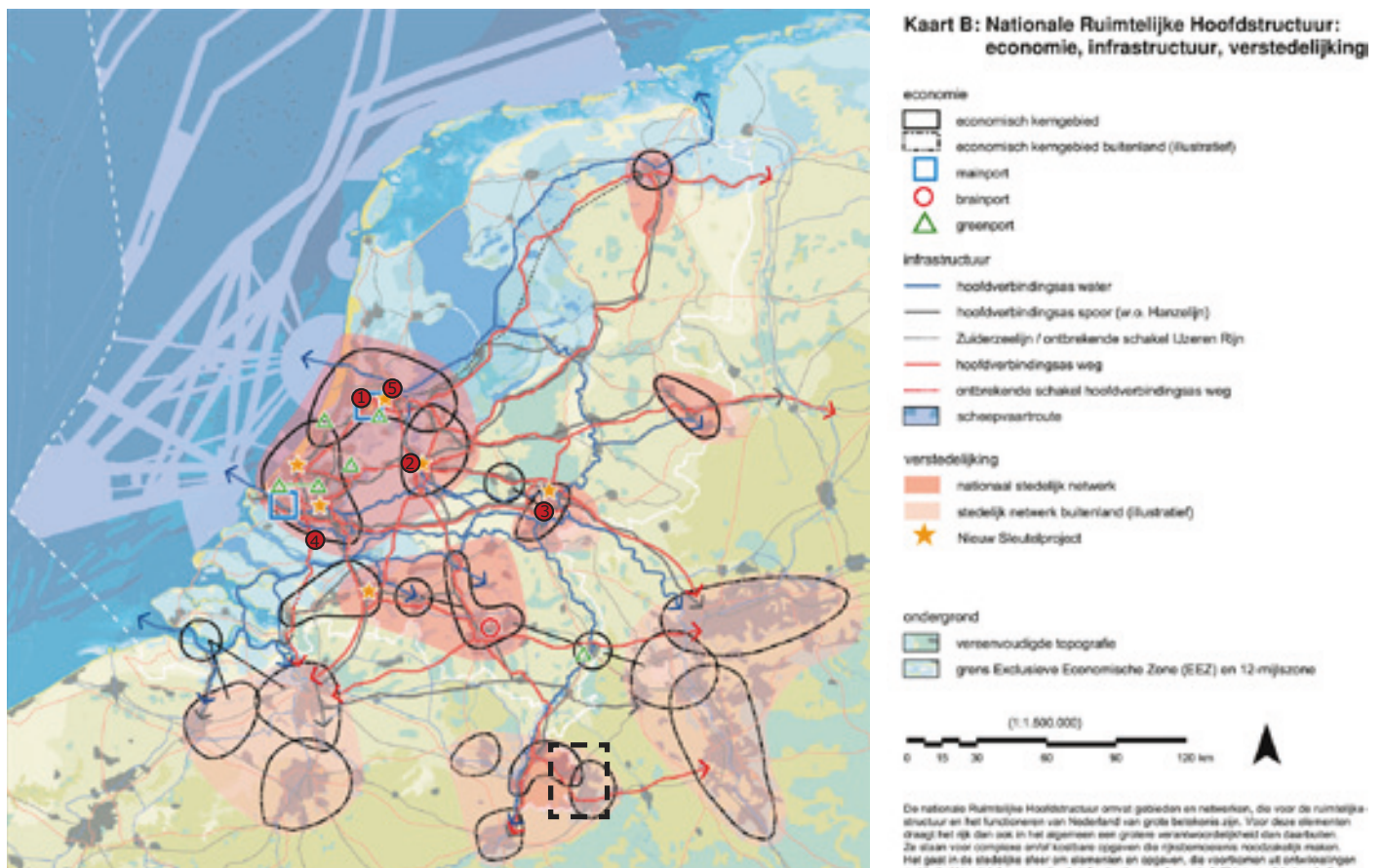
Fig. 31 The national main structure of the Netherlands (economy, infrastructure and urban development). Metropolitan regions that are of interregional importance are shown. In these areas the urban pressure on the rural landscape is the highest. (VROM, 2006)
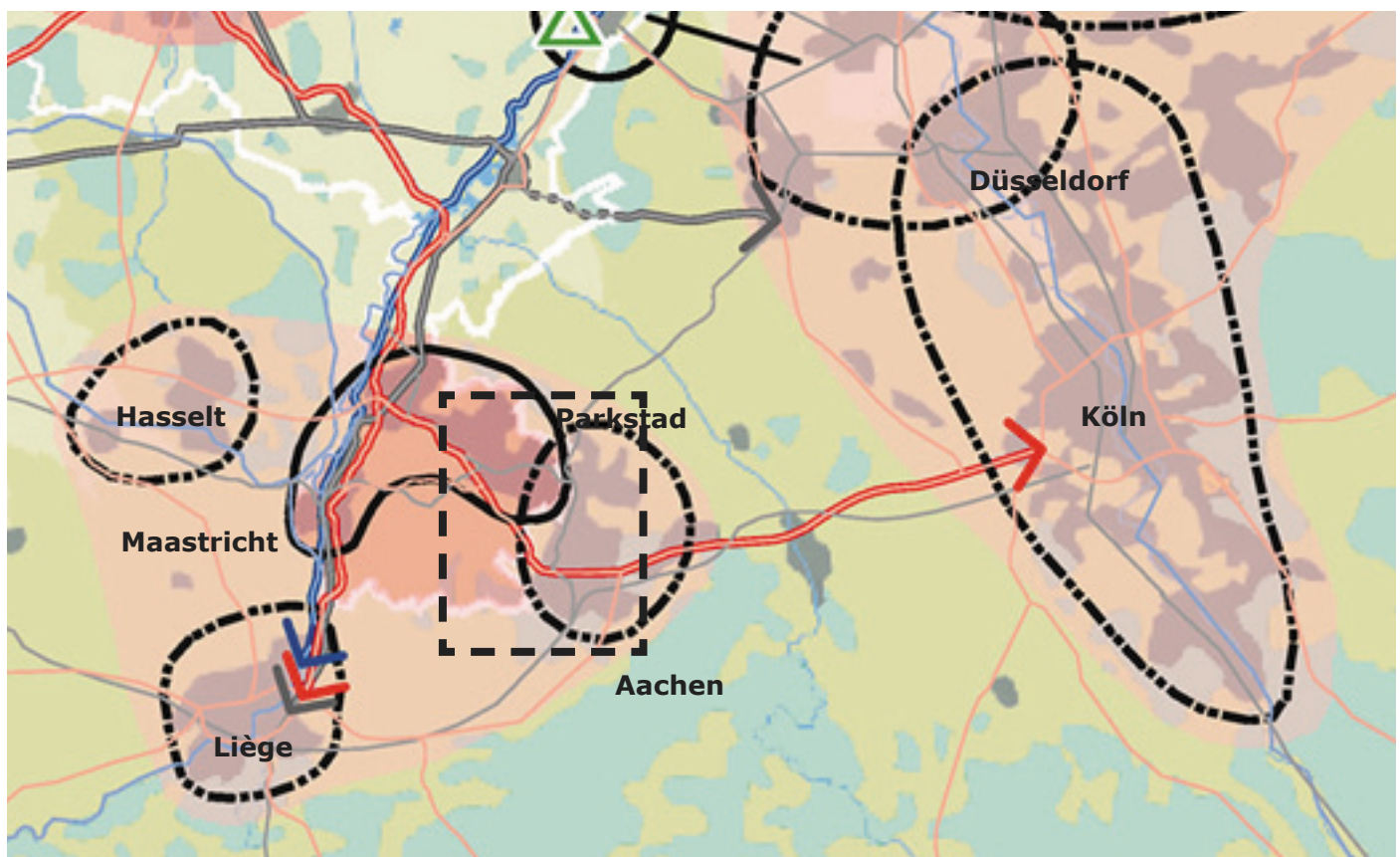

Fig. 32 The urban region of the south of Limburg. The focus area is indicated with the dashed rectangle, it includes Parstad and Aachen and its rural left over landscape in between these large metropolitan areas right on the border. Aachen furthermore is on an important route to "Das Ruhrgebiet." (VROM, 2006)

Project Area Description

The MHAL area

The peri-urban territory called the MHAL region is part of an even larger network of various peri-urban territories all across Europe called "PURPLE."

"PURPLE was set up in 2004 and brings together regions from across the EU including: Catalunya, Dublin, Flanders, Frankfurt Rhein-Main, Île de France, Mazovia, MHAL (Province of Limburg), Nord Pas de Calais, Regio Randstad, Rhône-Alpes, South East England, South Moravia Stockholm, West Midlands and Zealand (Denmark).

PURPLE members represent peri-urban territories, where urban and rural features co-exist. They are working together to maximise the advantages resulting from their location in proximity to large cities while minimising adverse impacts on the character, landscape and environment that make them distinct and special. Peri-urban regions in Europe are facing over-pressure. The balance between sustainable open space, sustainable agriculture and urban spatial and economic dynamics needs to be re-established. There are opportunities as well as challenges for those living and working in peri-urban regions, which should be reflected in tailor-made policies and strategies. (PURPLE, 2012a)

"General objectives of PURPLE:

- *Promote successful socio-economic transition in peri-urban rural areas and their agricultural sector.*
- *Influence European regional and rural policy making.*
- *Develop a distinctive role as the primary interlocutor with Brussels-based institutions, and with politicians and stakeholders across the EU on issues of special relevance to Europe's peri-urban regions.*
- *Act as a platform for peri-urban regions to share knowledge and good practice, allowing connections and productive cross-*
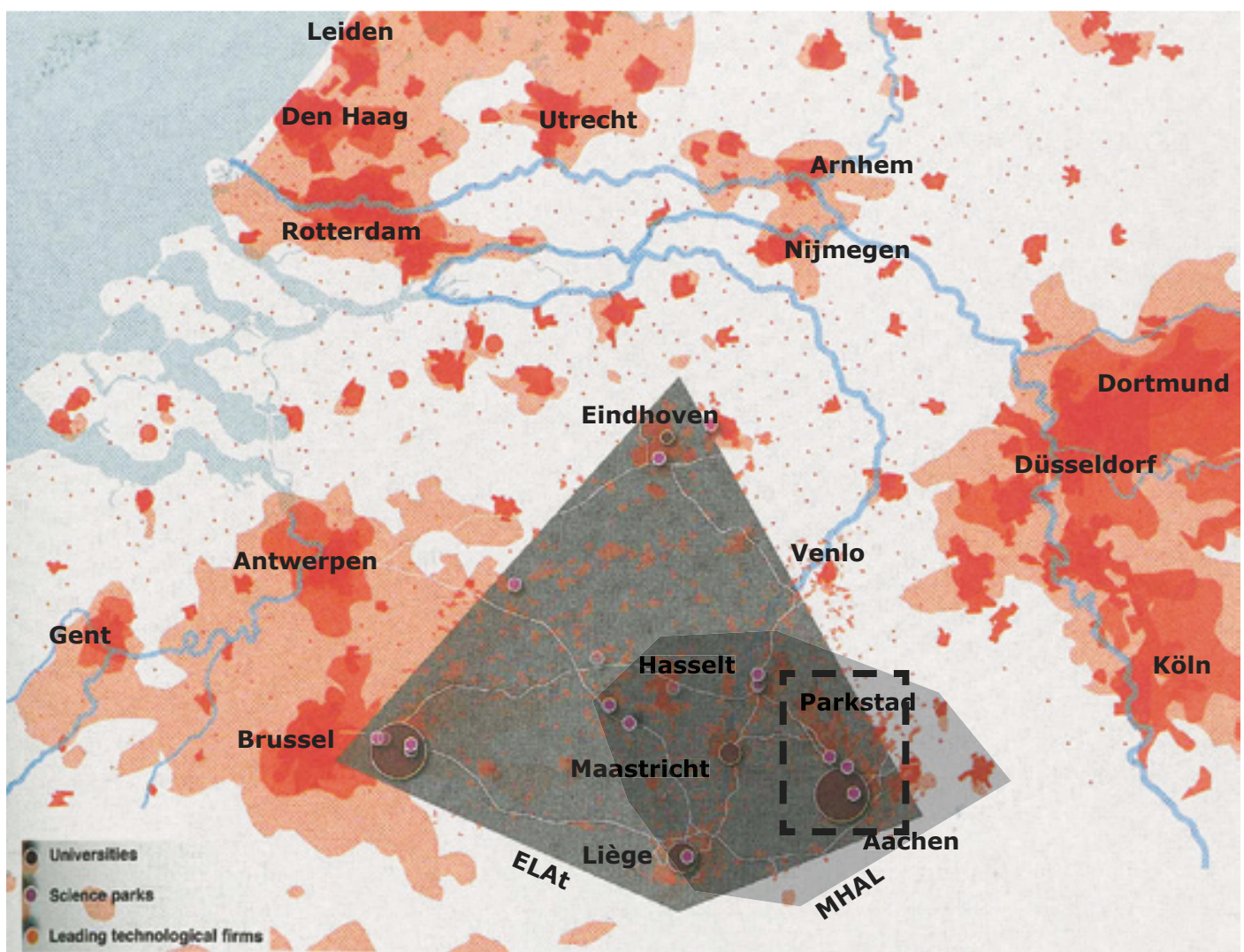
Fig. 33 Metropolitan regions in the Benelux, notice "de Randstad", "das Rühr" and "de Vlaamse Ruit." In between these large metropolitan regions is the smaller metropolitan region of Parkstad and Aachen, both part of the ELAt network and the MHAL area. (Boelens, 2009)

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fertilisation between existing projects, as well as promoting new trans-European initiatives in the field." (PURPLE, 2012b)

The south of Limburg is part of the "Euregio Maas-Rijn" (EMR), which was founded in 1976. Along with the south of Limburg also the region of Aachen (Kreisfreie Stadt Aachen, Kreis Aachen, Kreis Düren, Kreis Euskirchen and Kreis Heinsberg), the Belgian province Limburg, the province of Luik and the German speaking part of Belgium are part of the EMR. (Provincie Limburg, 2006a)
The EMR exists of rural and urban areas with a total of 4 million people. The urban areas are densely populated, are intensively occupied and provide a lot of employment in the service sector. The economy particularly exists out of agriculture, forestry and middle- and small businesses. (Provincie Limburg, 2006a)

IN 1991 the EMR obtained a official juridical status in terms of a foundation under the Dutch law. The members of this foundation are the Dutch and Belgian province Limburg, the province of Luik, the region of Aachen and the German community in Belgium. The goal is to

eliminate border obstacles and differences between seperate national systems. A second goal is to position the EMR as a coherent economic area in Europe and as a connecting link on the axis of Nordrhein-Westfalen - Benelux. (Provincie Limburg, 2006a)

"The MHAL-region is situated in the heart of the Euregio Maas-Rijn, at the foothills of the Ardennes-Eifel mountains. It cuts across the borders of The Netherlands, Belgium, and Germany, and encompasses the major cities of Maastricht, Hasselt/Genk, Heerlen, Aachen and Liège. It has a total population of nearly 2 million inhabitants, out of which 1,2 million live in these cities. The countryside is also fairly densely populated, with a number of average sized towns and larger villages." (PURPLE, 2012d)

"The MHAL-region has a polycentric (circular) structure, where all cities have their own characteristics. The region profiles itself as a 'Trinational Knowledge Centre" with a
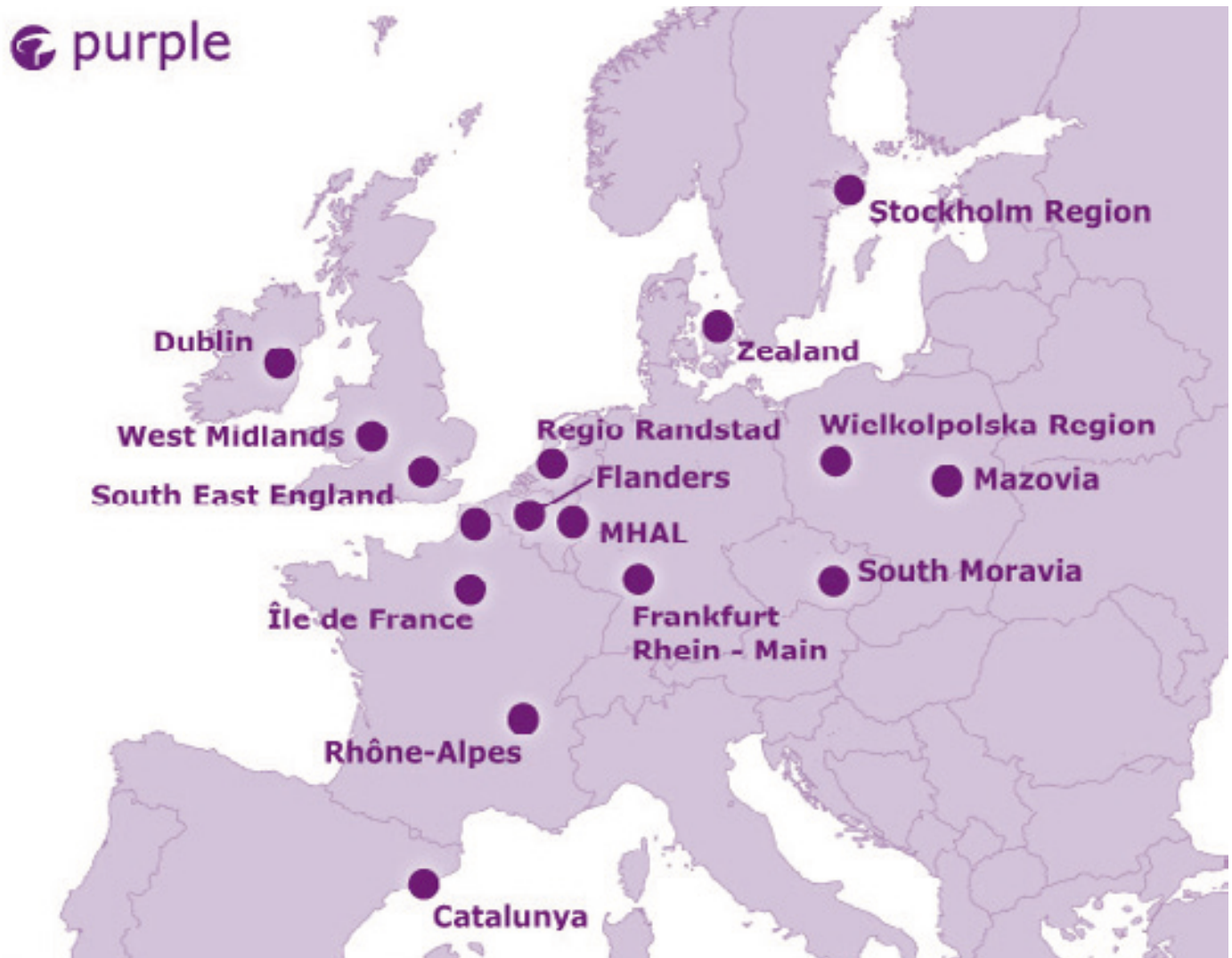

Fig. 34 The MHAL area is on a larger scale part of a collaboration of several metropolitan regions through Europe under the name PURPLE. (PURPLE, 2012c)

Project Area Description

The general policy statements for the urban network MHAL are (Provincie Limburg, 2006a):
- Expanding the (euregional) knowledge cluster
- Strengthening the cultural unity of the area
- Enhancing the complementarity and cooperation between the cities of Liège, Aachen, Maastricht, Parkstad Limburg, Hasselt-Genk and Sittard-Geleen
- Strengthening basic qualities of green elements
- Realizating cross-border traffic systems (MHAL-proeftuin)

In addition, there are a number of strategic policy statements for the MHAL area, that could create a new impuls in realizing the urban network of MHAL. These are (Provincie Limburg, 2006a):
- Developing and sustaining the corridor Echt-Roermond-Liège
- **Development and increasing the green status ("vergroenen") of the economic cluster Parkstad-Aachen**
- Developing the Tri-Country Park (Drielandenpark)

An important role and task for cities is to strengthen cooperation between the cities on economic, social and cultural fields and in the field of the environment. (Provincie Limburg, 2006a)

The common backyard for these cities is formed by the Tri-Country Park, the rural open space in the center of the city ring (fig. 36). This open space, although often reduced, is an important agricultural, natural and tourist asset and the forms the basis for the regional identity. (PURPLE, 2012d)

An important aspect for the Tri-Country Park (Drielandenpark) is sustainability. In the perspective of development coherence will be found in the approach of (Provincie Limburg, 2006b):

- Natural watersystems, paying attention to erosion, high water levels and drinking water
- The ecological mainstructure with its connections to surrounding areas
- Suburbanization problems
- Developing and sustaining cultural historic values in the landscape
- Biological agriculture and sustaining grassland farming
- Toerist and recreative structures and facilities
- Environmental problems
- Forest projects with recreational facilities in the urban fringe

Partners in the MHAL-region are public authorities who have collaborated since the 1980s in the Euregio Meuse-Rhine. Each partner has its own planning structure and documents, subject to national and regional rules and legislation. The Development Perspective of the MHAL region (1993) and the Three Countries Park (formulated in 2003) are based upon common interests in the preservation of the economic, natural and cultural assets of the region. Partners will try to defend and apply these interests in their own policy environment and develop joint cross-border projects to implement these policy guidelines. (PURPLE, 2012d)

Agricultural enterprises in the region aim to diversify their income from mainly agricultural production to tourist services (camping at the farm site, horseback riding), sales and processing of regional products (fruits, wine, cheese, ice cream, special meat breeds), health care and social welfare functions (psychotherapy, day care for children and elderly people). Traditional agricultural farm buildings are often reused for new enterprises and recreational functions. (PURPLE, 2012d)

Fig. 35 The Euregio Maas-Rijn, the MHAL region is the center of the EMR (Wiki, 2008)

Agricultural projects in the MHAL-region focus on innovative combinations of cropping and landscape management. Examples are: restoration and preservation of typical landscape elements (farm buildings, monuments, fruit tree orchards), the rehabilitation of nature parks and ecological zones, and the exchange of information on landscape and environment between various interest groups in the city and the countryside. Nature and landscape maintenance can be carried out both by public or non-governmental organizations and by individual farmers

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or farmers' groups against fixed government subsidies. (PURPLE, 2012d)

The cluster Parkstad
The urban region Parkstad Limburg covers an area of 8 municipalities in the South East of Limburg, with a total of 255.000 inhabitants. These municipalities are Heerlen, Kerkrade, Landgraaf, Brunssum, Nuth, Voerendaal, Simpelveld en Onderbanken. Positioned between "het Limburgs Heuvelland" and the foothills of the Eifel lies a characterizing landscape in which the urban areas and the rural landscape have become intertwined. The rural landscape grabs into the urban network through green islands and corridors. Slope forests, river valleys and plateaus are interspersed with agricultural fields in a undulating landscape enriched with majestic natural parks. Another important quality of the region is the variety of large-scale (recreational) attractions and many educational and healthcare institutions. The tourism sector is the fastest growing sector in the Netherlands. With the largest indoor ski resort in the world, the largest residential boulevard and the most modern zoo in Europe, the oldest and largest monastery and the largest Roman ruins in the Netherlands. (Parkstad Limburg, 2008)

Aachen
The city region Aachen is an innovative association of municipalities and consists of the cities Aachen, Alsdorf, Baesweiler, Eschweiler, Herzogenrath, Monschau, Stolberg and Würselen as well as the municipalities Simmerath and Roetgen. It is the legal successor of the district of Aachen and on the 21st of October 2009 it took on its tasks, human resources, assumed its debts and assets and took on the regionally important tasks of the city of Aachen. The city of Aachen, although it belongs to the city region Aachen, has the legal status of an autonomous municipality authority with a Lord Mayor and regional representations. (StädteRegion Aachen, 2011)

It's a city of water, springs, wells and water from above located in a beautiful landscape close to the three-country point, with Belgium, with which the Eifel is shared, and the Netherlands, which here shows its most delightful countryside. Characterizing is also it's international flair, with fast connections to Maastricht, Brussels, Paris, London or the North Sea and tourist atractions like the throne of Charlemagne in the 1200 year old cathedral and the town hall from the 14th century. A rich history and a promising future where it's regional or international status is highly acknowledged. (Borrenkott, 2011)

About 568,000 people are living in the city region Aachen on approximately 700 km². With 258,000 residents the municipality of Aachen is the by far biggest. The city
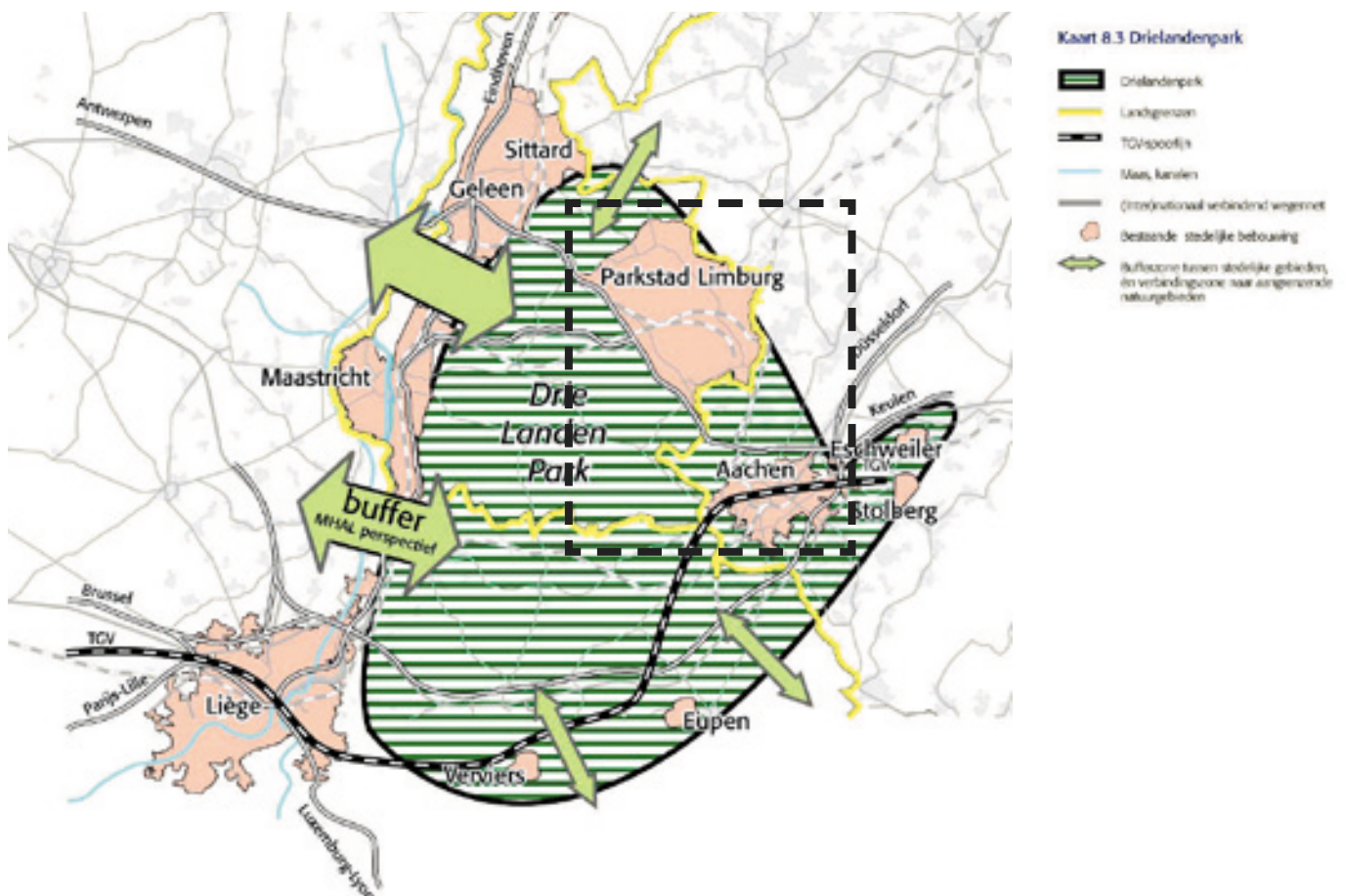

Fig. 36 The Tri-Country Park, the focus area is indicated with the dashed rectangle (Provincie Limburg, 2006b)

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Project Area Description

region Aachen joins the forces of the municipalities and stands for progress and economic growth. At the same time it is a politacal instrument to improve the quality of life for its inhabitants. It has dedicated itself to an efficient and citizen-friendly task performance. (StädteRegion Aachen, 2011)

RWTH Aachen Campus is the name of the project which is not less than one of the largest research landscapes in Europe that is set to come into existence on a surface of around 500.000 square meters. With this campus project Aachen will in fact become a city of science, which justifiably stands out from the meanwhile inflationary self-proclaimed German municipalities calling themselves science city. (Borrenkott, 2011)

On an area as large as two city quarters connected with each other, at least 200 technology companies are expected to settle within the next ten years and at least 5500 new jobs are intended to be created in research and development as well as in a similar magnitude in service-providing fields. The basic concept is an in this entirety

and scope completely new interlocking of university and industry for a mutual increase in relevance. The RWTH contributes its wealth of interdisciplinary competence in engineering and natural sciences, the companies their investments and orders.

This profound cooperation will take place in so-called clusters, which are intended to be built on at least 18 future-oriented research fields of sustained energy technology to medical technology, integrative production technology and photonics to innovative plastics and mobile communication. The criteria bar for the approval of a cluster has deliberately been set very high.

The first six clusters have meanwhile been approved and will be built on the Campus Melaten until 2011. From 2012 clusters, but also apartments and event locations will come into existence on the Campus West, the former grounds of the Aachen west railway station "Westbahnhof".

There a hotel, shopping and service facilities have already
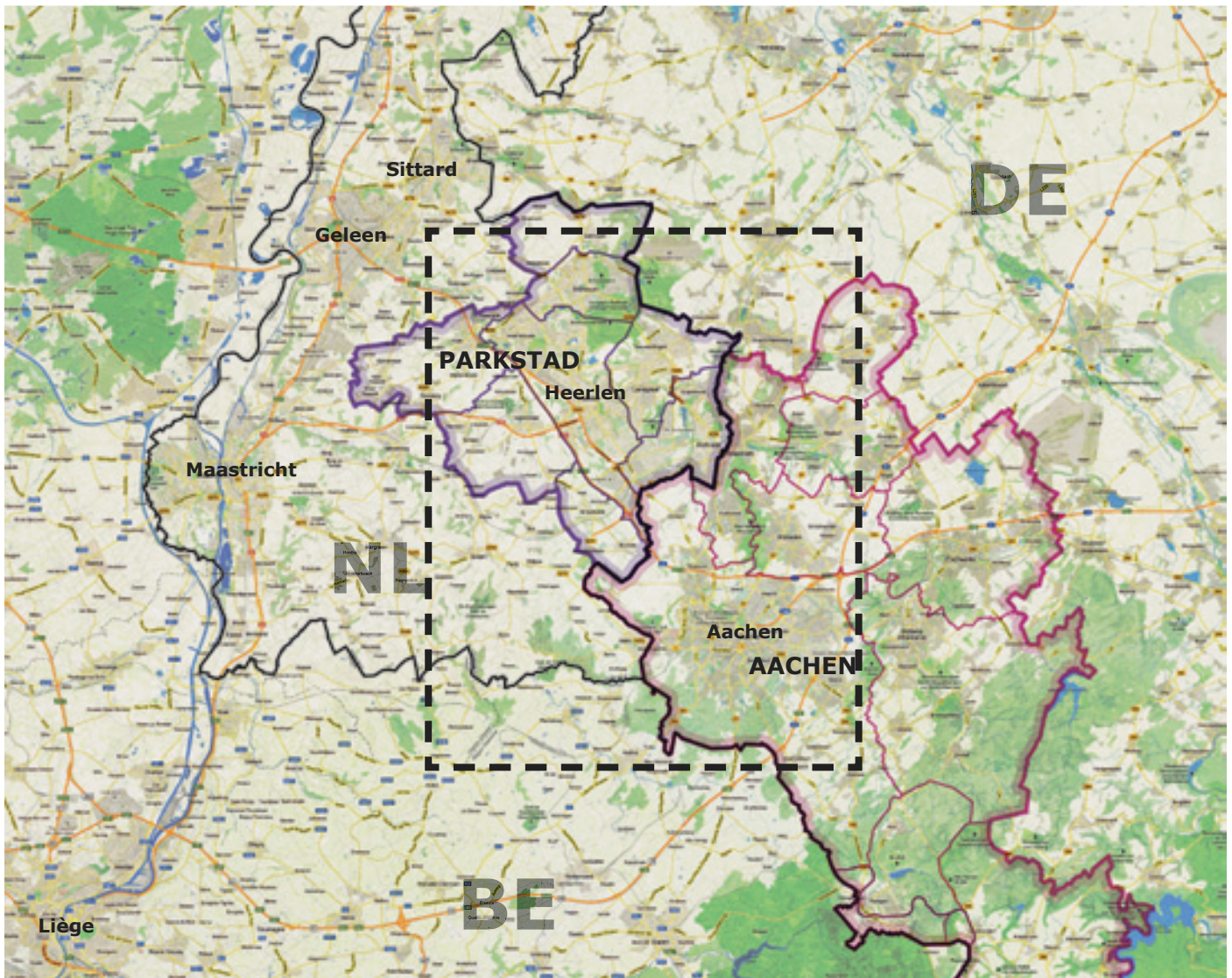
Fig.37 The cluster of Parkstad and the muncicipalities of Aachen (Google Maps, 2012)

been planned. According to the plan the whole project will be finished by 2016, and then also be animated with the cultural offer, which makes the science city Aachen interesting for "the worldwide best researchers", who are expected to be attracted to come here in the long term. The interest of the companies has, due to the financial crisis, in no way decreased. Siemens, Bosch, Microsoft, Deutsche Bahn, TNT, all no small fish, have already given their firm commitment.

AMBITIONS

The urban area Parkstad Limburg in combination with the region Aachen-North has a population of 750.000 inhabitants. The area is consisting of a more or less interconnected urban area that shares a long common history and a similar development (at least before the

Fig. 38 Close-up from where Parkstad and Aachen meet; the borderline of the Netherlands and Germany (Google Maps, 2012)

Project Area Description

20th century). On both sides of the border, both urban areas have expanded very quickly in the glory days of the mining industry, which was followed bij a rapid restructuring after the closing of the mines. In Aachen this has resulted in a succesful transformation from coal to knowledge, with the "Rheinisch Westfälische Technische Hochschule" (RWTH) as a catalyst. Parkstad has also reached some impressive results (the operation "from black to green"), but it also has some problems in succesfully recovering. These problems can be assigned to the unilateral structure of the population, the housing stock and the workforce. Together with Aachen-North they are now working on new developments that cross the national borders ("een grenzeloze doorstart") raising the following ambitions (Provincie Limburg, 2006c):

- Strengthening the relation between the ICT-sector and existing companies
- Responding to the future of the senior-economy by developing quality products and services
- Using and improving toerist and recreational opportunities in the area, also in relation to "het Heuvelland" and the "Eifel"
- Strengthening the park city structure to improve the living environent and creating an attractive region

To realize these ambitions it is important to improve and use the cross-border infrastructure. Also the the regulations on the labor market have to be harmonized, collaborations in eduction have to be improved and the administrative power within the entire region must be strengthened. (Provincie Limburg, 2006c)

Technology and education
From this economic point of view we can see that Aachen contains a stronger position compared to Parkstad. Aachen can be seen as a growing knowledge city and is directly linked to the ELAT network. By linking Parkstad via Aachen to the ELAT network, both Parkstad and Aachen could strengthen their economic position and benefit from each other.

Aachen has a lot of strong educational qualities, it has transformed itself into a strong knowledge center or in other words a city of science and will be strengthening this position even more in the near future. Furthermore, it will use these qualities in the fields of engineering and natural sciences like sustained energy production technology to medical technology, integrative production technology and photonics to innovative plastics and mobile communication in their local economy by linking unviversity and industry together.

Energy and health
The Avantis solar energy company is located exactly between Parkstad and Aachen on the border between the Netherlands and Germany. The main topics of Avantis are energy and health. This business area (fig. 40) could act as an important key factor to this process of linking Parkstad to Aachen. The Avantis area is being used as an experimental garden for new developments and this aspect could be further strengthened in the future.

The economy is changing very rapid from a one sided economy focussed on industrial production to a more dynamic, innovative and enterprising knowledge economy. A development that perfectly matches the vision of Limburg. The focus is on themes like healthcare, chematerials and energy, agroculture and food, and Leisure. They give direction to the economic positioning and profiling Limburg but also Aachen and connects them to national and european ambitions.

Tourism, recreation and leisure
Parkstad has a weaker position and is currently suffering from an increasingly aging population and shrinkage. To prevent the city from running empty in the nearby future, Parkstad is trying to position itself as an attractive living and working environment. By doing this they try to maintain the current younger population that is living in the city.
Recreation and tourism is an important issue in this case and a theme Parkstad is well known for. Strengthening these qualities in combination with its green (leisure) environment could provide possiblities here. Attracting visitors from surrounding cities could boost their economy. Furthermore, by efficiently using the shrinkage inside the cities to restore and increase green areas inside Parkstad a more attractive living and working area could be reached in the future. (Parkstad Limburg & Provincie Limburg, 2009)

Infrastructure
Parkstad and Aachen are connected trhough an intricate road network and a direct highway connection. Also by rail the two urban areas are connected, but these connections could and are planned to be improved. The current railroad connection will be updated to an IC connection which will improve its international connectiveness. Also another connection is being implemented, a new railroad connection through the inbetween landscape which will stimulate the development of and strenghten the position of the Avantis business park. This has become an important aspact in the process of linking the two urban areas together.

Sustainability
Another important theme is sustainability as we mentioned in our introduction. Parkstad and Aachen already know a lot of sustainability related projects. Sustainable neighbourhood and energy production are examples.

Fig. 39 The project area viewed from Kerkrade

Fig. 40 The Avantis cross-border business park (NRW.URBAN, 2006)

Project Area Description

In the introduction we described a new tendency between city and rural landscape; they cannot be seen as two separate entities anymore, they have become intertwined and together they form a new urban/green fabric.

When we zoom out on our project area (Parkstad-Aachen) we can see that is part of a larger metropolitan area, which can be best described by looking at the tri-country park concept (Sittard, Geleen, Maastricht, Liege, Parkstad and Aachen). It shows an urban network and a let-over rural area lying between the cities of this urban network. The left-over rural area also runs through the urban network at certain places (fig. 36).

Even though the tri-country park map shows this metropolitan area, it does not show the urban pressure and influence on the rural area. It also does not show how the green network runs though the cities.

Figure 41 again shows this metropolitan area of which our project area is part of, but now with the mutual influence between urban and green networks, as described in the introduction on pag 16 as an urban/green fabric. The red glow around the cities symbolizes the urban pressure and influence on the rural area. Besides the buffer zones between the cities (yellow arrows) this map also shows the stream valleys running through the cities.

The map shows that in our entire project area the urban pressure and influence is high. It also shows that the left-over rural area between Parkstad and Aachen (see smaller square on map) is partly enclosed by urban fabric and regional infrastructure (highway & railroad), making it a vague rural isle within the urban fabric of Parkstad and Aachen.

On the other hand it is also connected to and part of the cultural landscape the 'Heuvellandschap' lying left of our project area, but the highway and railroad act as a barrier between them, decreasing accessibility and visual coherence.

The project area in essence can be characterized as cultural rural landscape, but because of the high urban pressure and influence, the project area can also be characterized as urban. This results in a 'schizophrenic' landscape; an unclear identity, which makes it weak, vulnerable to urban sprawl and uncared-for.

It has to become clear what the role and position of our project area is (and should be) towards the surrounding cities (Parkstad & Aachen) and the entire metropolitan area it is part of.

After this is made clear, it will also become easier to determine what the function and identity of the project area itself should be.

Important questions are: how to connect these rural left over areas to the metropolitan network? How can they become significant to surrounding cities and citizens? In what ways can these rural left over areas serve the city besides conventional agriculture?

To get an answer to these questions, first the larger context of the project area will be analysed, and after that the project area itself.

After this analysis we will understand the project area and the current role and position towards its context. The possibilities in connecting these rural left over areas to the metropolitan network, will become clear.

Project area
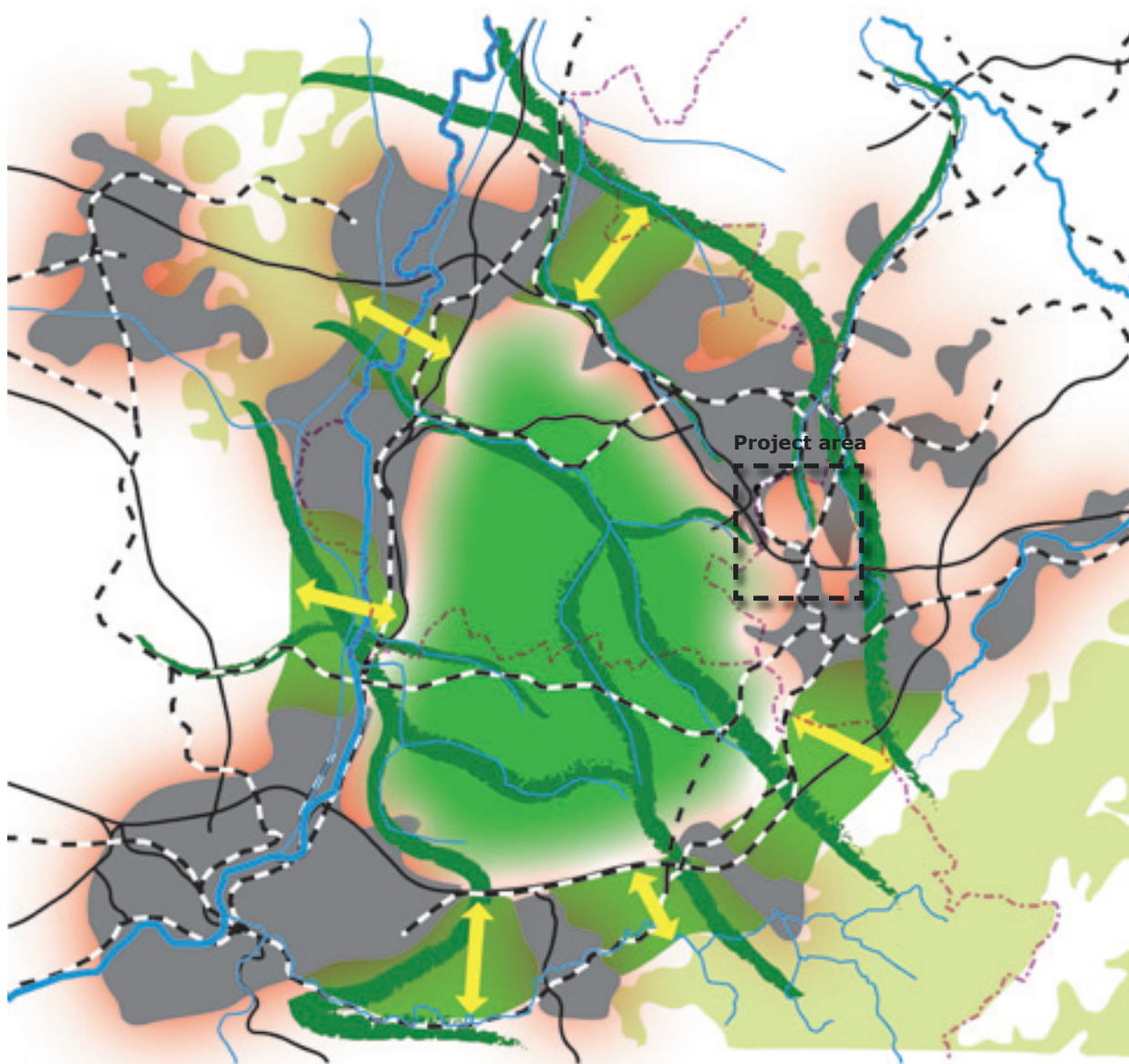
Urban network with urban pressure (red glow)

Cultural historic rural landscape (Zuid Limburgs Heuvellandschap)

Existing large nature areas

Buffer areas between cities

Ecological corridors along streams, connecting the surrounding nature areas

Fig. 41 Adapted Tri-country map now showing the mutual influence between urban and green networks, the project area is indicated with the dashed square

55

5. Broad Landscape Analysis

'Triplex - Landscape'
Urban Network
Driving Forces

5.1 'Triplex Landscape' Analysis

The Abiotic & Biotic Basis
Cultural landscape & Landscape Experience

'Triplex Landscape' Analysis

THE ABIOTIC AND BIOTIC BASIS

Geological formation

The collision of Europe and Africa and at the same time the divergence of America and Eurasia resulted in tension in the earth crust of the Netherlands. The earth crust was pushed together in a north-east south-west direction and in the opposite direction it was being pulled. This pressure and pull was responsible for the elevation of South Limburg and the Ardennes which are located more south. This process has been occurring since six million years ago, and it is still going on, unnoticeable. (Verwijmeren, 2012)

The elevation area of South Limburg is abruptly bounded by three fractions of the earth's crust, the so called 'Feldbiss fault zone' (fig 42, 43). This zone is approximately 10 kilometer wide and runs in a north-east south-west direction in the area of Sittard and Born.

During the 'late-Tertiair' South Limburg was part of a peneplain. Peneplains are former mountain areas which have been eroded for such a long time that they became almost flat. Within this peneplain the predecessor of the Maas, also known as the primeval-Maas or Waubach-Maas, created a wide but shallow valley. Because of erosion only a few remains of the primeval-Maas can be found. These are the remaining terrace hills existing of sand and gravel, which we can find above Simpelveld and Nieuwehagen (fig. 44). (Verwijmeren, 2012)

Influenced by the elevation of the 'Ardennenmassief', which South Limburg is part of, the Maas incised into this peneplain, during the 'Pleistoceen'. As a result of this slow indentation series of lower situated terrace levels
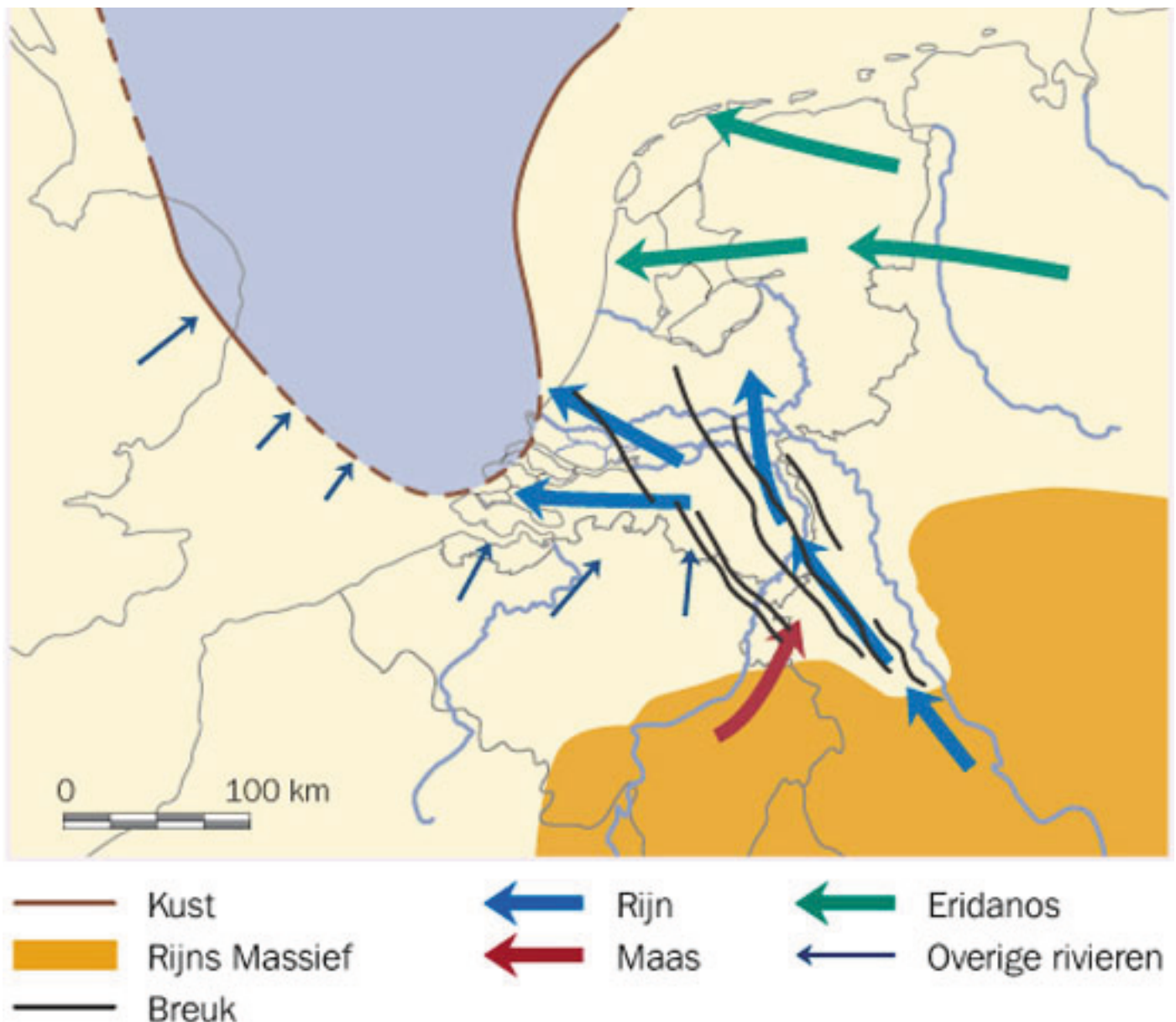
Fig. 42 Main geological formation processes approx. 1.9 million years ago (TNO-NITG, 2012)

were created, on which the Maas deposited its sand and gravel.

During the early-'Pleistoceen' the river initially flowed in a north-east direction (the East-Maas). Later the river followed a more western direction (the West-Maas) (fig. 43). (Kerkstra, et al., 2007)
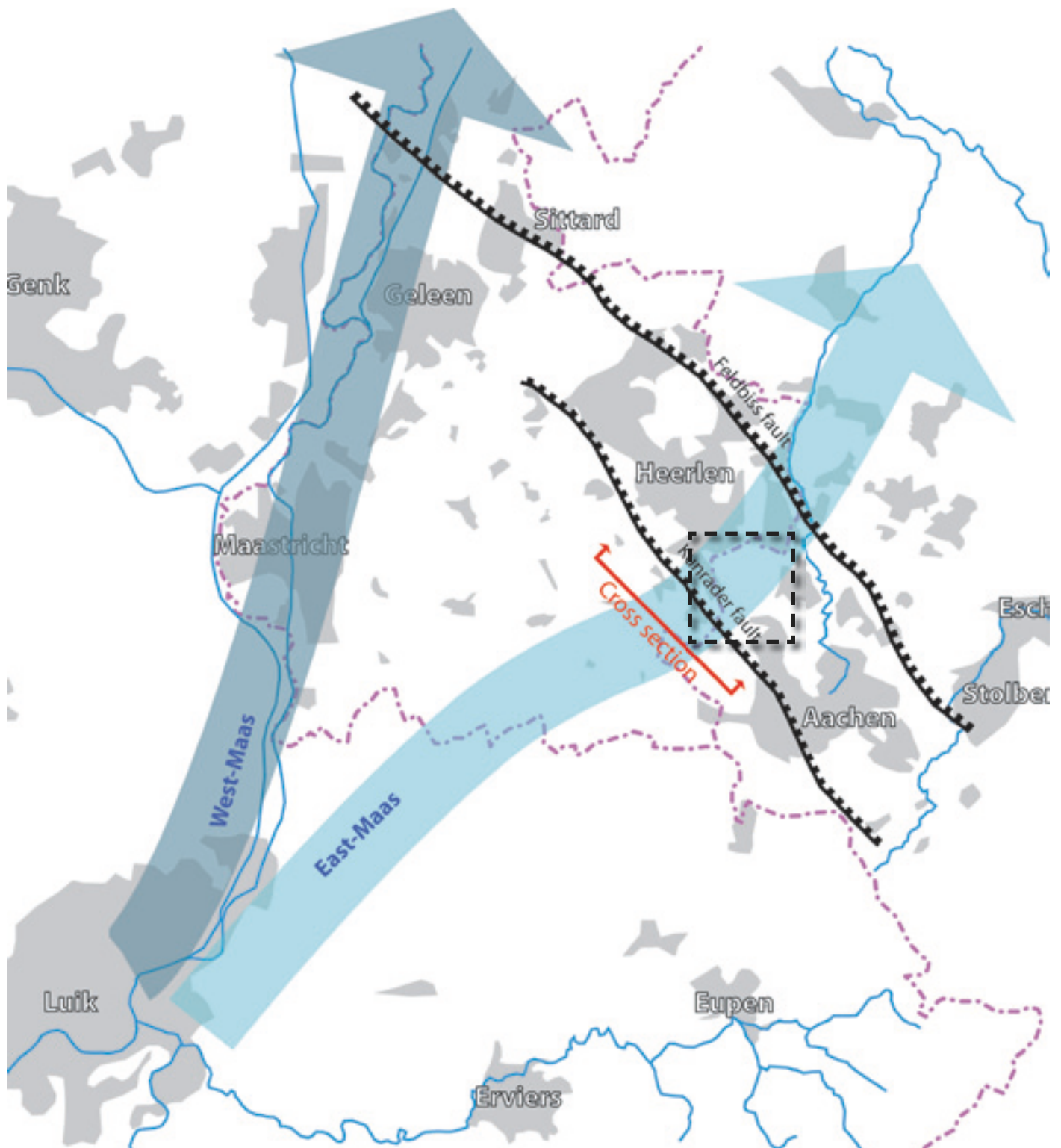
Fig. 43 Locations of the primeval Maas and fault zones (Kerkstra, et al., 2007)

'Triplex Landscape' Analysis

The Maas terraces have been covered with a layer of loess during the middle and late 'Pleistoceen'. The thickness of this layer varied from 10 meter in the West to one or several meters in the South-East. At some places the loess layer is missing or very thin (fig. 44).

The variety in height which is a characteristic feature of our project area, is the result of further indentation of the terrace landscapes covered in loess, by the river Maas and its branches. A pattern emerged, existing of higher plateaus (peneplain and terrace remains), lower valleys and slopes in between.

The higher areas in the South East are the oldest, the lower situated depositions of the Maas the youngest. The age difference can be seen by looking at the amount of erosion of the higher areas. The watershed of the East Maas is strongly eroded. This area mainly consist of long steep slopes. The higher situated parts have been reduced to relatively narrow ridges. (Kerkstra, et al., 2007)
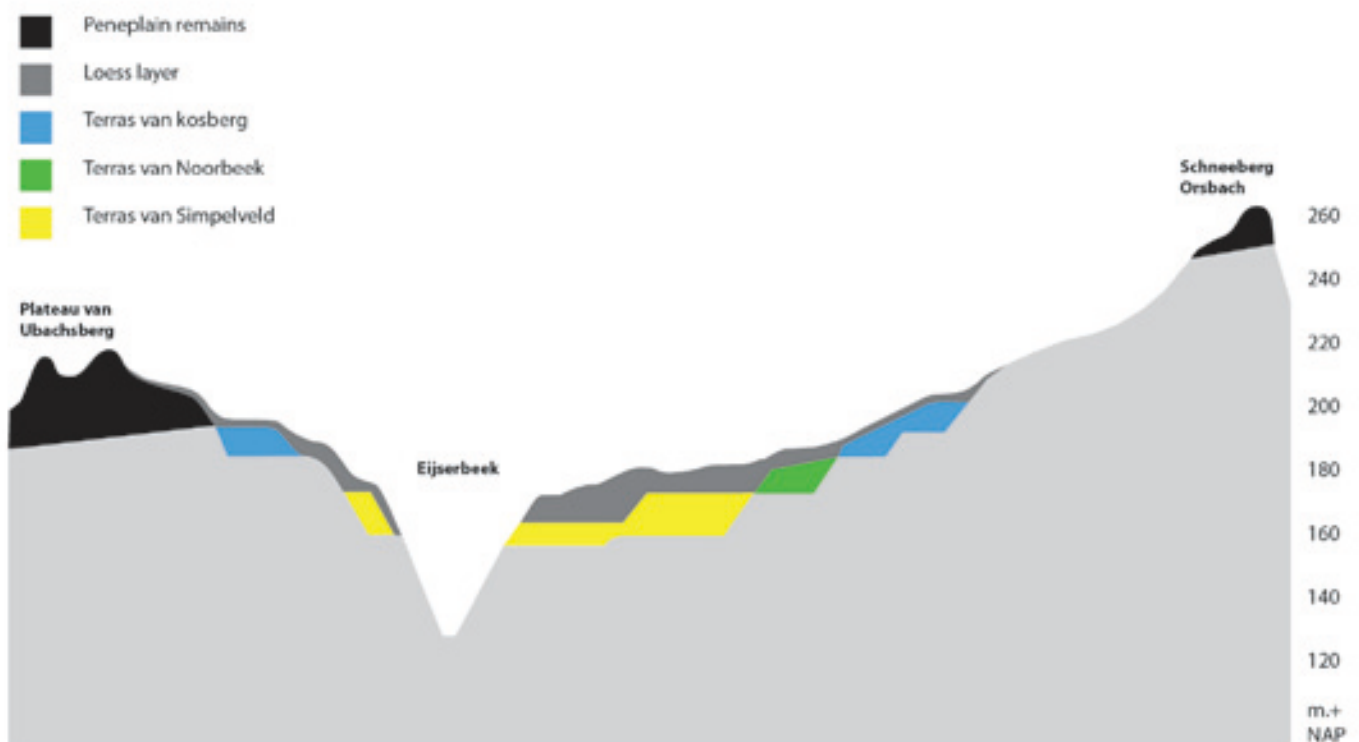
Fig. 44 Cross section showing the geological formations within the project area (Kerkstra, et al., 2007)
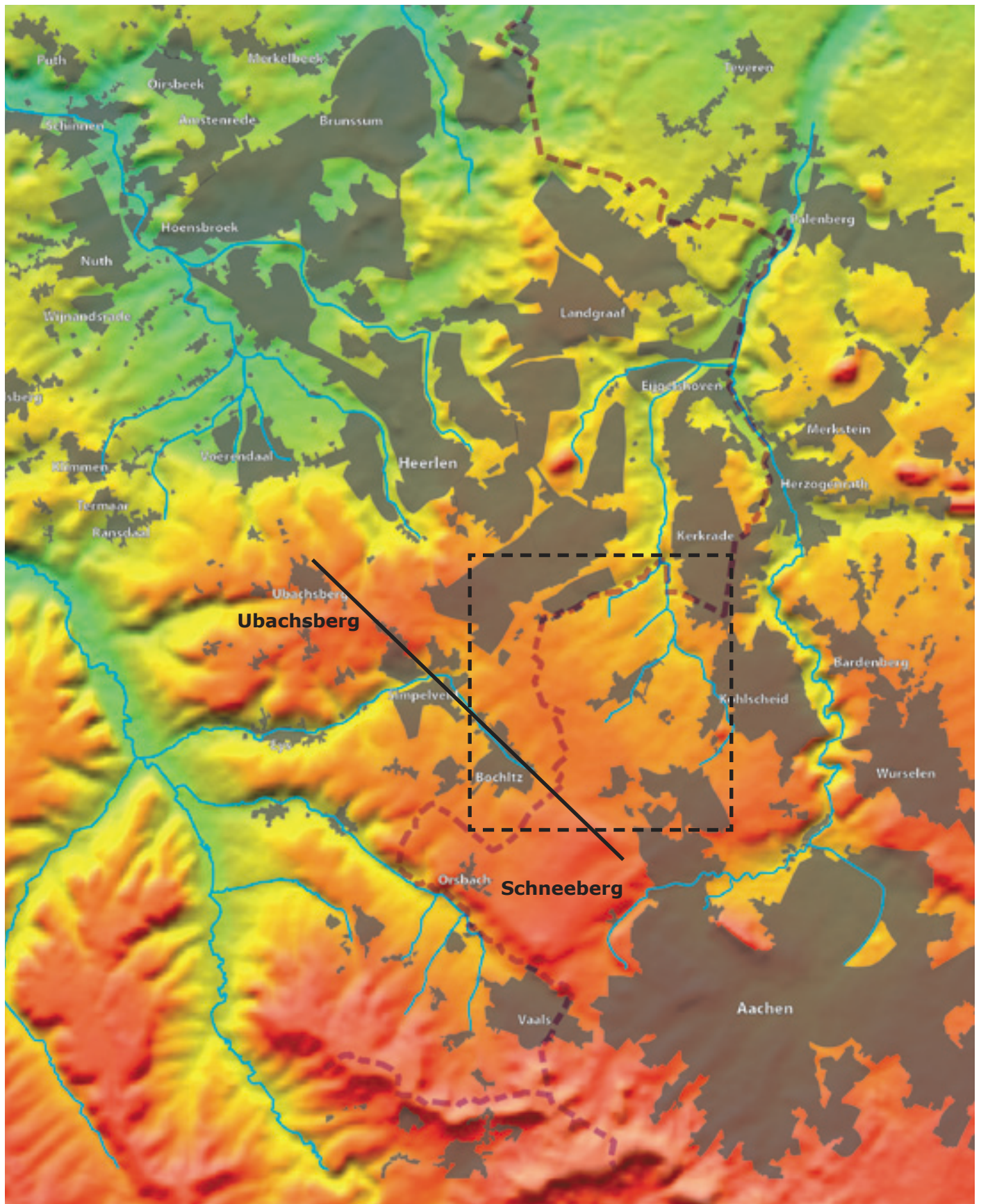
Fig. 45 Height map with main urban areas and streams

'Triplex Landscape' Analysis

Geomorphology

Plateaus

These are relatively flat or sloping, higher areas surrounded by steep slopes. Based on the relief, we make a distinction for the plateaus between the highest flat areas, which are not strongly affected by erosion and the gentle loess slopes, which form the transition to steeper parts of the terrain or the beginning of a dry valley. The shape and size of the plateaus depends on for how far it has been eroded.

Valleys

The valleys are the lower situated contrasting shape to the higher situated parts of the project area. They form a hierarchical system, which branches itself from downstream to upstream. Besides the Maas as main river, there are several other smaller watersheds which are of importance to our project area: the Geul, the Geleensbeek, the Worm and the Rode Beek. The valleys form the natural drainage system of our project area. Most of the valleys do not permanently contain water, only at certain moments. They are called the 'dry valleys'. Besides the dry valleys there are the valleys which are permanently wet.

Slopes

The slopes define the higher areas like the plateaus and the lower valleys. Gentle slopes can be located at the base of steeper slopes in valleys, as boundary of the lower situated, young loess terraces and loess slopes, and at the plateaus as main basin or as transition to the steeper plateau edge.

Steeper slopes we can find as boundary of the plateaus or at the edge of a valley.

In the slopes of carved-in valleys at some places springs can be found. Rain water is not only drained via the surface but it also infiltrates the loess, sand, gravel and limestone soils, until deeper impermeable clay layers. At the places where these impermeable layers come to the surface at steep slopes, this water reappears as springs. Springs can appear both at the base or at the top of slopes.

The combination of height differences and being covered with a layer of loess, makes the slopes very sensitive to erosion. As a result of agricultural use and erosion, 'graften' and 'hollow roads' were created in time. (Kerkstra, et al., 2007)
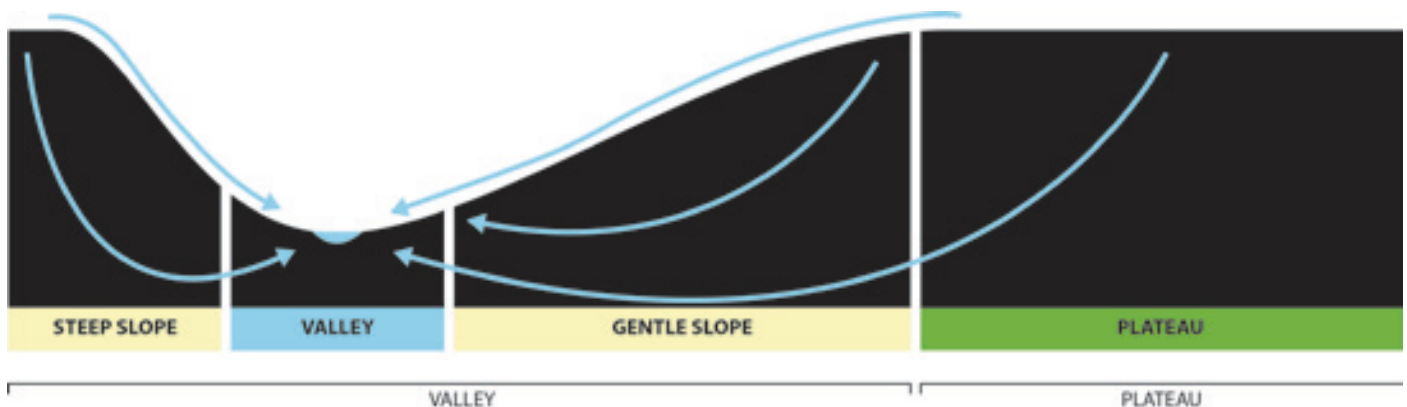

Fig. 46 Cross section showing the landscape types and the basic hydrological principles of the project area

Fig. 47 Geomorphological map of the project area

'Triplex Landscape' Analysis

Areas of ecological importance & ecological network
If we look at the context of the project area we can see it is situated between two large nature areas: the high wet forests with raised bogs (Hohes Venn - Eiffel Naturpark, Ardennes) and the dry forest areas of the 'Hoge Kempen' in Belgium (fig. 48).
In between these two large nature areas we can find:

- Rich and varied deciduous forest areas. Forest areas are mainly located at the plateaus, steep slopes and the wettest places, often in the valleys
- Semi-natural grasslands of high floristic qualities, including rare calcareous grassland located at steep slopes
- Quarries and natural caves occur diffusedly in the area and function as a biotope for rare species like bats, reptiles, birds of prey and amphibians

- Special spring and seepage environments
- The streams and the stream valleys are of great ecological importance and together with the adjecent slopes form the basis for the ecological structure
- The farmlands located at the plateaus function as important habitats for the endangered Hamster and nesting areas for field birds
- Landscape elements like hedges, orchards, 'graften' and hollow roads carry important ecological qualities of this small scaled cultural landscape

The main problems are:
- Disappearance of landscape elements because of intensivation of agriculture and the lack of landscape maintenance
- Nature areas are small, fragmented en vulnerable and lead to genetic isolation of small populations
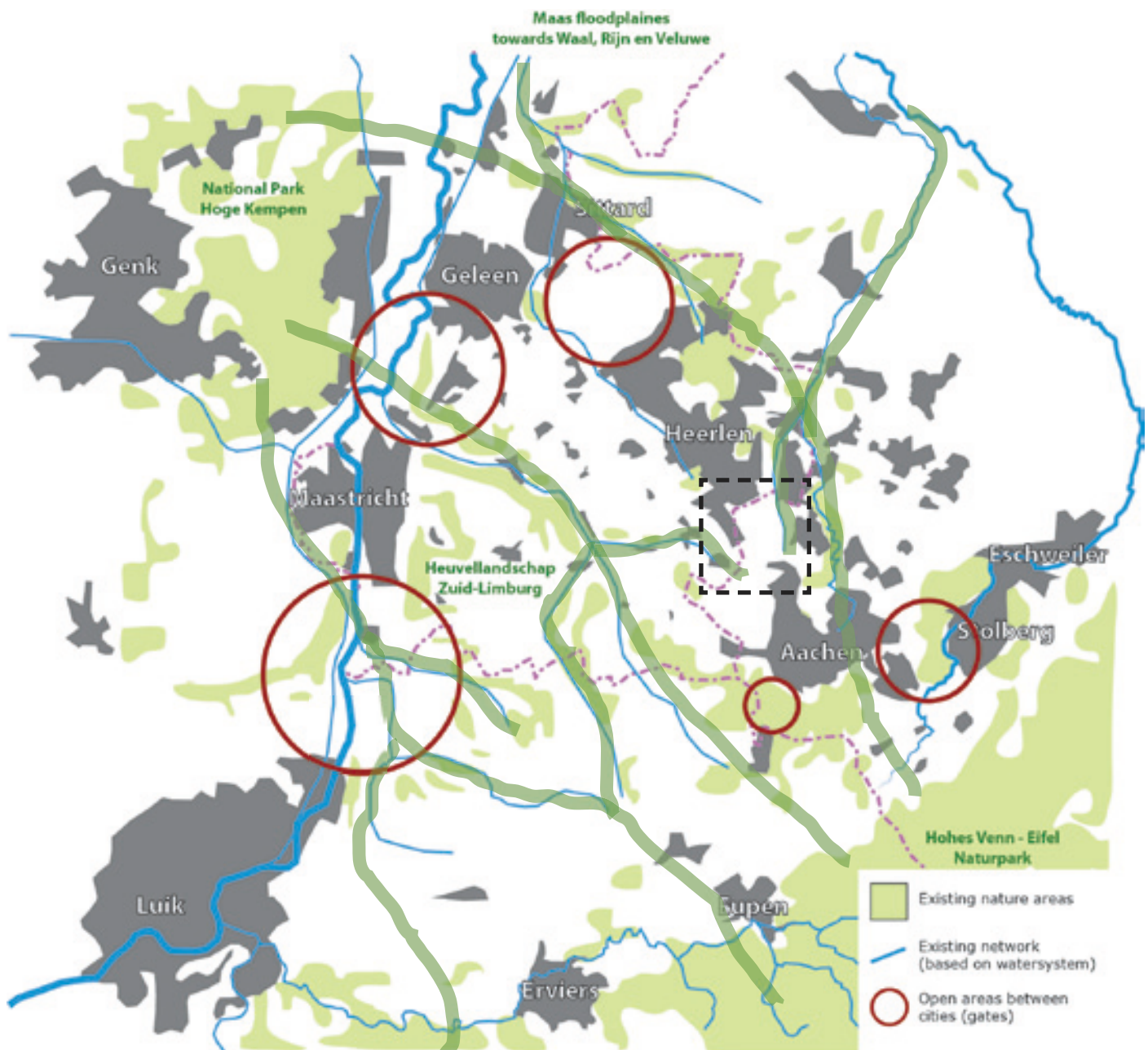
Fig. 48 Areas of ecological importance and ecological networks of the entire surrounding metropolitan area (Euregio Maas-Rijn, 2004)

- The open 'gates' between the cities are becoming smaller and smaller because of further expansion of the surrounding cities. These places are the only opportunity for nature in general to migrate, they need to be preserved. This is also the case on a smaller scale in our project area
- Increasing number of barriers because of the expanding infrastructure consisting of railroads, highways and canals

(Euregio Maas-Rijn, 2004)

The project area is mainly via the Worm and the Geul connected to the surrounding ecological network, but is not located within of one of the larger corridors between the two main nature areas of this region (Hohes Venn - Eiffel Naturpark and the Ardennes). Therefor the project area can play an important role in strengthening the overall ecological quality of the entire region, but does not does not play a vital role in connecting the large surrounding nature areas (fig. 49).
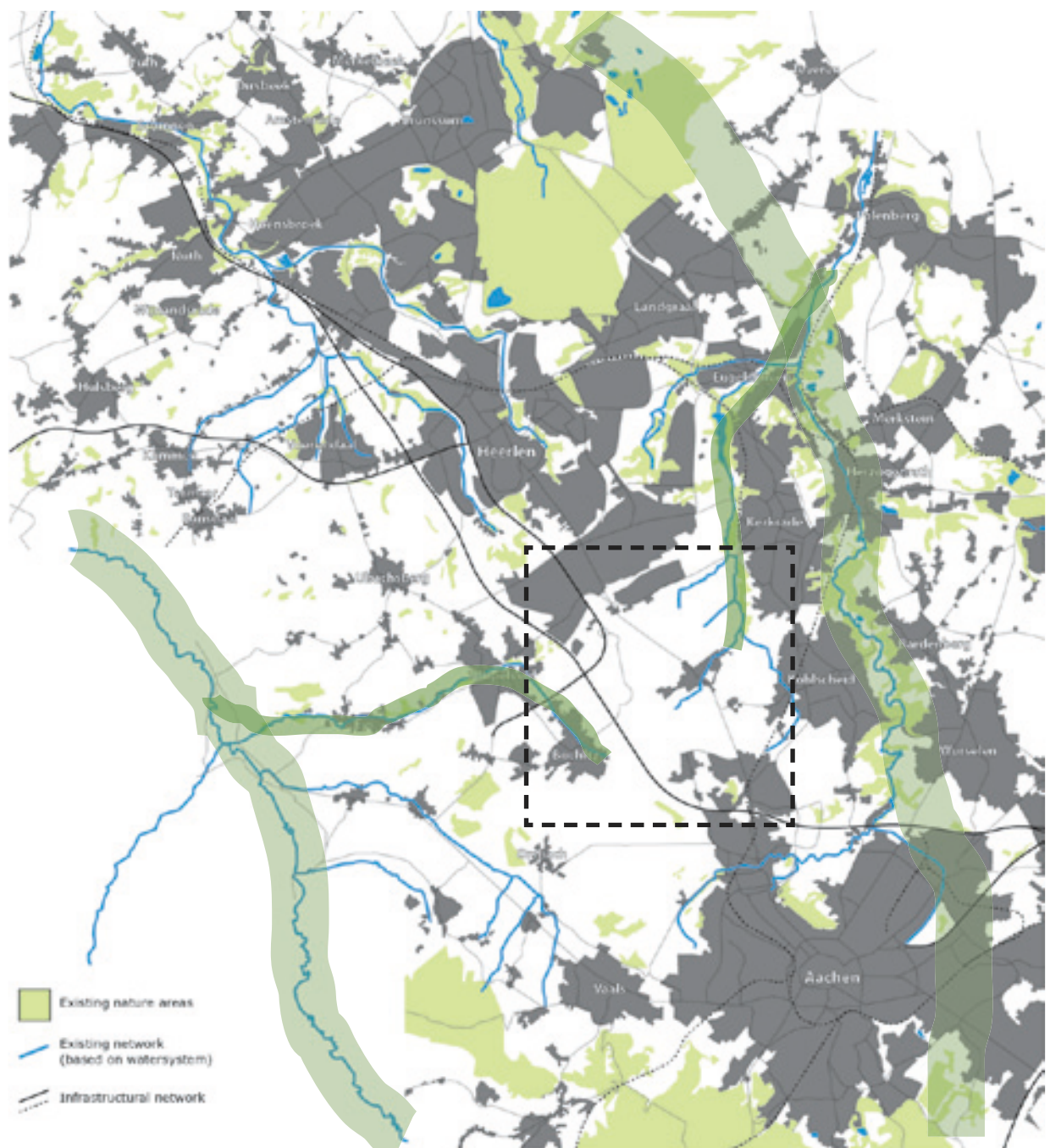
Fig. 49 Areas of ecological importance and ecological networks within the project area (Euregio Maas-Rijn, 2004)

'Triplex Landscape' Analysis

CULTURAL LANDSCAPE

In the following sections will be described (for the most influential periods) in what ways mankind occupied the landscape and how this shaped the cultural landscape as we know it today. See appendix 1 and 2 for an elaborate description of the occupation of the project area during all periods, and the visual experience of the cultural landscape.

Cultural landscape of the stream valleys

Historic qualities

The first farmers settled around 5400 B.C. on the gentle slopes and the higher valleys (avoiding the river valleys), where it was most easy to cultivate the land for agriculture. They were attributed to "de lineaire bandkeramiek cultuur" (the linear pottery culture). In the beginning of the Roman Age (12 B.C.) most of the gentle slopes and valleys were cultivated for agricultural purposes. Except from some ruins, not much has been left (visibly) from the Roman Age. The biggest influence of the Roman Age is its legacy of Christianity and classical philosophy.

Especially the valleys have been interesting throughout

history, but Christianity has left its biggest marks in this part of the landscape throughout the Middle Ages. The church had a lot of influence in this period of time and Christianity was flourishing. They could inn a part of the harvest so agriculture became very attractive because with a rising grain production also the income of the church was increased. With each church more harvest could be inned. This Medieval power structure is still clearly recognizable in the current landscape through numerous castles, monumental farms and churches that form the centers of old villages. The spatial distribution of these indicates that settlements were primarily situated in the water bearing valleys. Here accounted to the lowest part of the valley, but mostly they were positioned on the edge of the valley and the gentle slope.

We can still recognize the early medieval occupation pattern of roads parallel to the longitudinal direction of the valleys and in narrower valleys often villages in a ribbon structure. A special aspect of these valleys are their numerous castles that find their origin in the early medieval period. Only the castles that had a defensive character are currently still visible in the landscape, others have disappeared. These castles are called
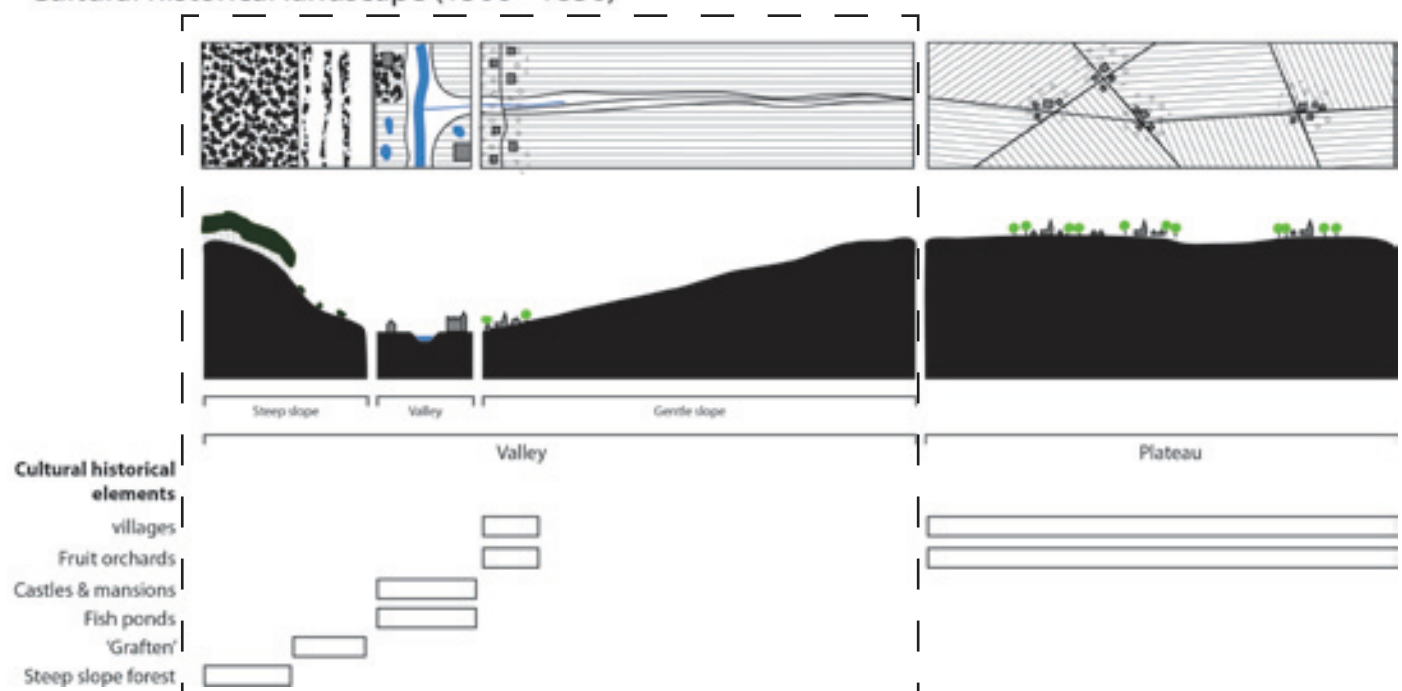

Fig. 50 Simplified representation of the cultural historic stream valley landscape (Kerkstra, et al., 2007)

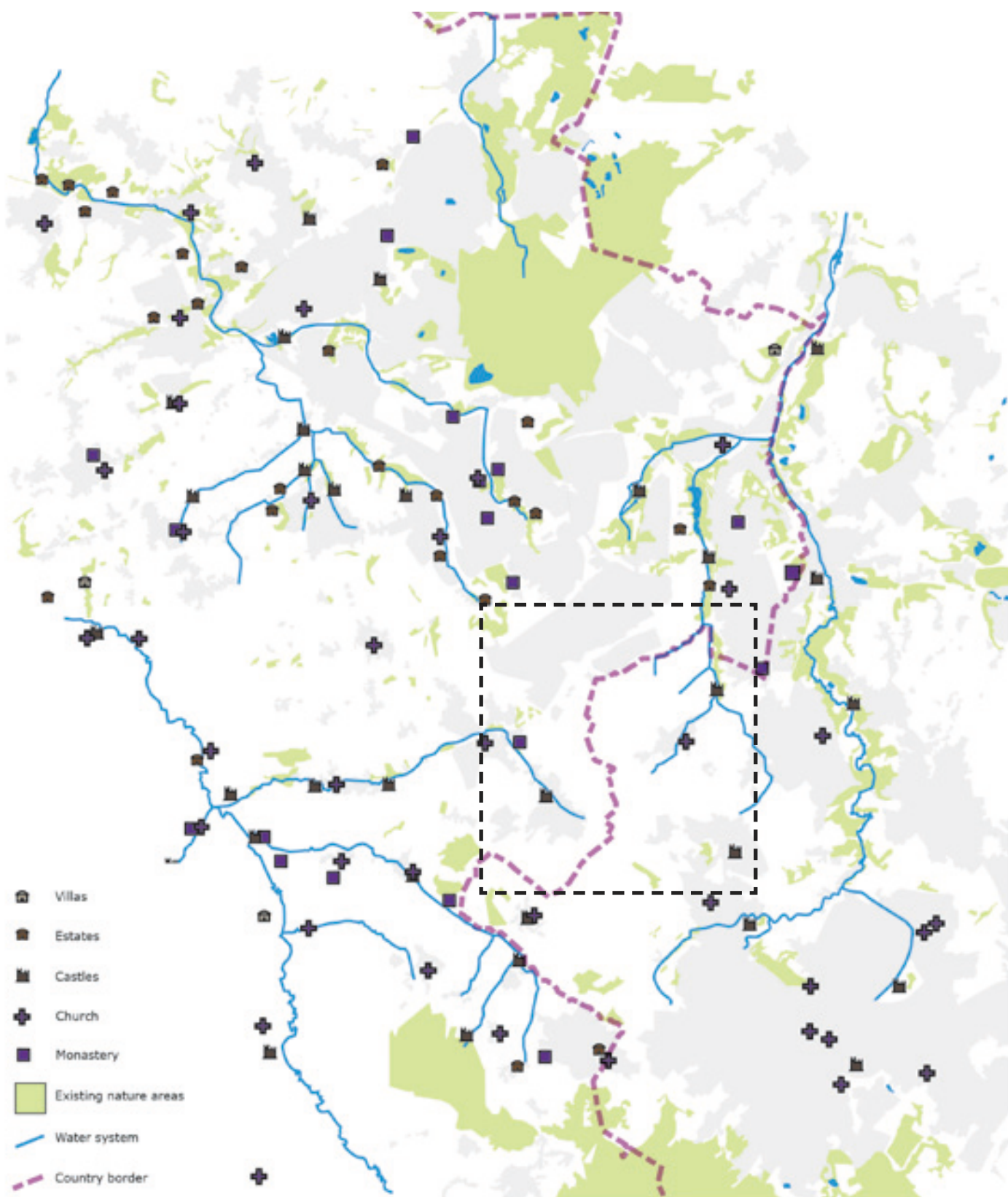Fig. 51 Cultural historic elements related to the stream valley system (Kerkstra, et al., 2007)

Legend:
- Villas
- Estates
- Castles
- Church
- Monastery
- Existing nature areas
- Water system
- Country border

'Triplex Landscape' Analysis

"mottekastelen," and were built upon a small hill with steep slopes and often surrounded by a dry or wet canal (gracht) and had a tower in the center where one could retreat.

These early castles were later substituted (13th century) by a new type of castles with heavy keeps (donjons), defensive walls and water canals. These were easier to defend and more pleasant to live in. Their positioning in the valleys made it easy to create water canals and provided a good view across the valley to guard their watermills. And as stated before, fruit production later added an important characteristic to the picturesque image of the valleys.

The growing prosperity also lead to the origin of estates, that were, just like castles, situated in the valleys. Around existing castles and estates park like gardens were created, first in a classicism style later (until halfway the 18th century) in a landscape garden style. Another typical elements from between 1500-1850 were the fishponds, as fish became a important source for protein. In small V-shaped valleys they were positioned as series one after the other. From halfway the 19th century almost all these fishponds have disappeared.

The Industrialization had a huge impact on a lot of aesthetic qualities of the landscape. The valleys however have often remained, although the overall characteristics of the entire valley may have been lost. However, a lot of cultural historic elements in the lowest parts of these valleys have remained, or at least in some extend. Ruins, restored castles, beautiful estates, churches and monasteries are still present and since recreation and tourism has become important during the industrialization age, they have been an important attraction contributing to the character for which Limburg is known for.

Landscape qualities of the valleys

The valleys play the most important role in the aesthetic qualities this landscape has to offer. They contain the picturesque qualities that are characteristic for this landscape. Cultural historic elements like ruins, restored castles, beautiful estates, churches and monasteries are still present, and in combination with old farms (carréhoeves) and historic villages they have a lot to offer.

In addition to these historic qualities are the ecological qualities the valleys conceal. The variations in height and difference in streams from springs to ponds and from fast to slow streaming brooks provide a unique and special fundament for interesting flora and fauna. Spatially these valleys provide an intimate character that is contrasting to that of the vast open plateaus.

Besides brooks and rivers the valleys also contain ponds. In the near of castles and villas large ponds are also cultural historic remnants. In some places these ponds have even been expand for recreational purpose, some

ecological and others just add up to picturesque qualities of the lower valley

Landscape qualities of gentle slopes and dry valleys

This part of the landscape is often in use as agriculture and grasslands. The gentle slopes are generally open, small clumps of forest mark this landscape. Steeper parts are often vegetated with forest, this is most common in the dry valleys where water has carved into the landscape and the problems of erosion are most prominent. Deep small brooks cut through these valleys guided by incidental vegetation and trees. Also the hollow roads (holle wegen) are characteristic for this part of the landscape, as a result of erosion they lay deeper than the surrounding landscape and because they are guided by trees they are very intimate and provide an interesting contrast with the wide open plateaus. Villages at the start of these small brooks often have historic qualities, because of their unfavorable economic position they often have remained small sized and untouched by urban expansion of the industrialization. Still modernization can have a negative influence on the aesthetic qualities of these areas. Recreation facilities and modern farms for example can influence the picturesque qualities of these places, also the disappearance of green belts around villages can amplify this affect.

Landscape qualities of steep slopes

The steeper slopes in combination with the valleys have the most interesting qualities of the area. They are often vegetated with large tracts of forest because erosion is most occurring in this part. Also hollow roads (holle wegen) emphasize this process. But most characteristic here are, if they're still present, the "graften." Horizontal strips of vegetation prevent further erosion but keep the slopes useable for agriculture or grasslands, creating half smaller spaces confined by green mass. Furthermore the ecological value of the vegetation is the highest on the steep slopes and in the valleys.

These slopes often conceal remnants of mining in the past and they can reveal the geological past of this landscape. But most striking is probably their great vistas across the lower valleys which provides some important aesthetic characteristics this landscape is known for.
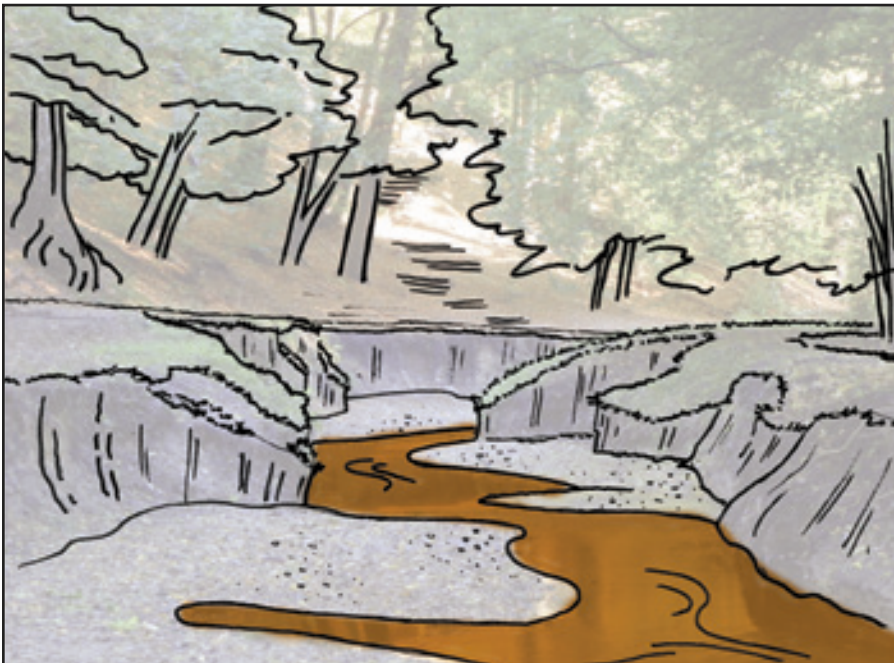
Fig. 52 "Graften' on the steep slopes

Fig. 53 Meandering streams in the valleys

Fig. 54 Dry valleys in gentle slopes

'Triplex Landscape' Analysis

Cultural landscape of the plateaus

Historic qualities

At the plateaus some ruins from settlements can be found from the prehistoric period, but their hard to find. Also from the roman age when the plateaus were cultivated for agriculture and a lot of villa's were build, almost none have remained. And after the roman age, the plateaus were again covered with forest.

It's until the middle ages that this landscape has slowly evolved with its qualities we can now experience. In the late Middle Ages (1000 - 1500 A.C.) the plateaus were cultured again for agricultural purposes. New settlements came into existence upon these plateaus in a web-like road pattern. Their names often ending with -rade or -rode, which refers to their origin as forest cultivation. Farms were situated linear in relation to each other as ribbon development.

Block by block the landscape became cultivated, the allotment structure was enhanced with wooded banks and hedgerows which eventually disappeared because there was a high demand for grain. Open fields came to existence, which define the image of the plateaus as we know it now.

Since the 16th century the architectural character of the villages changed due to an ongoing densification of buildings and a change from traditional timber construction to stone construction. At first in the most prosperous areas, but later also elsewhere. The Middle Age ribbon villages developed to street villages with closed facades, and the typical "Limburgese carré-hoeve" has found its origin in this period of time. The development of stone construction also had an impact on a sudden grow of the limestone mining, but also flint stone and sandstone mining. The use of natural stones in construction also made the geological makeup of this area visible in the buildings itself.

The rise of fruit production from the beginning of the 18th century had a big impact on the landscape. Around settlements meadows were created with fruit trees to increase efficiency, separated by hawthorn hedges. These dense fruit trees belts around villages characterized the their appearance until halfway the 20th century. Remains of these can still be seen in the landscape.
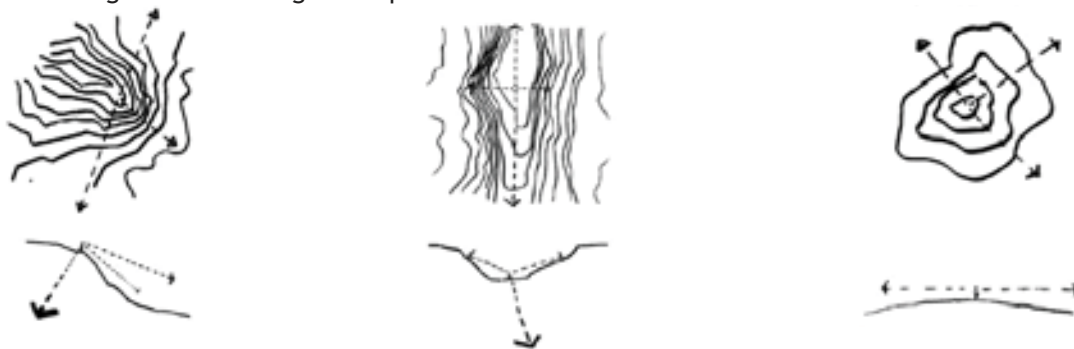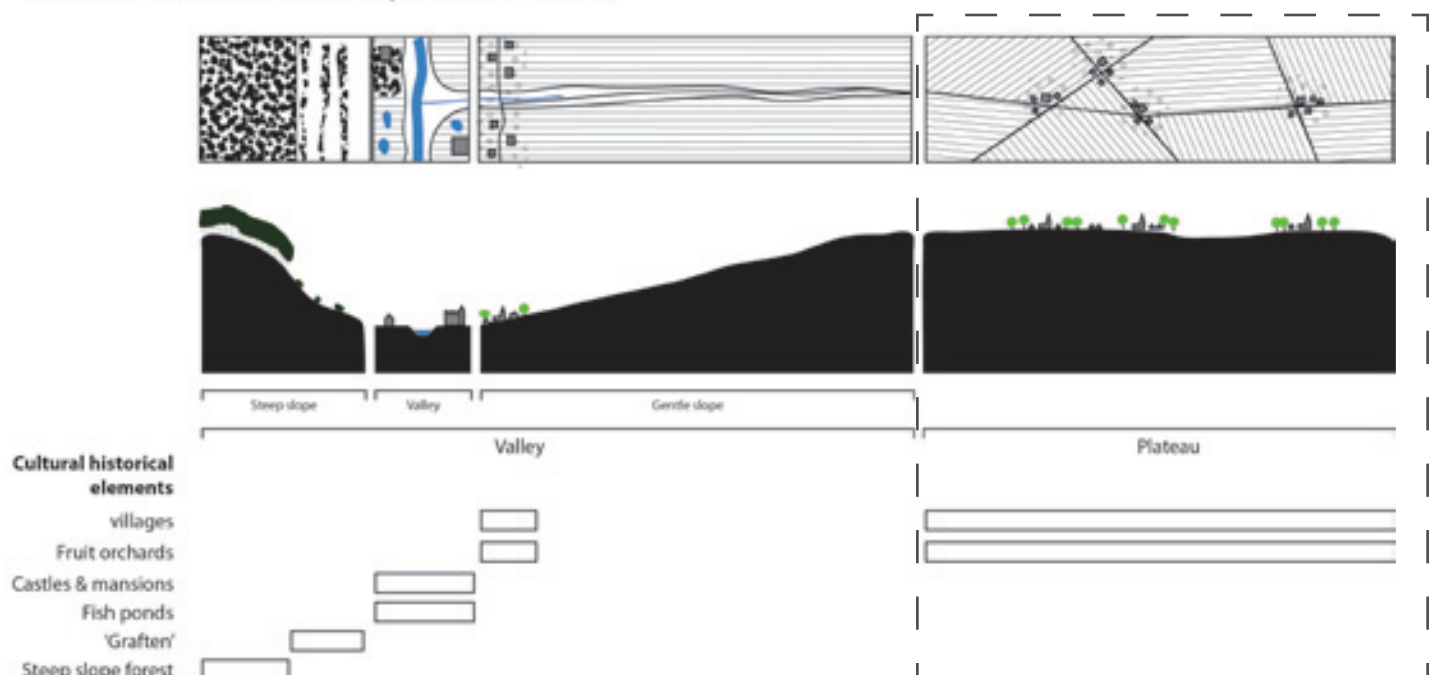

Fig. 55 Simplified representation of the cultural historic landscape of the plateaus (Kerkstra, et al., 2007)
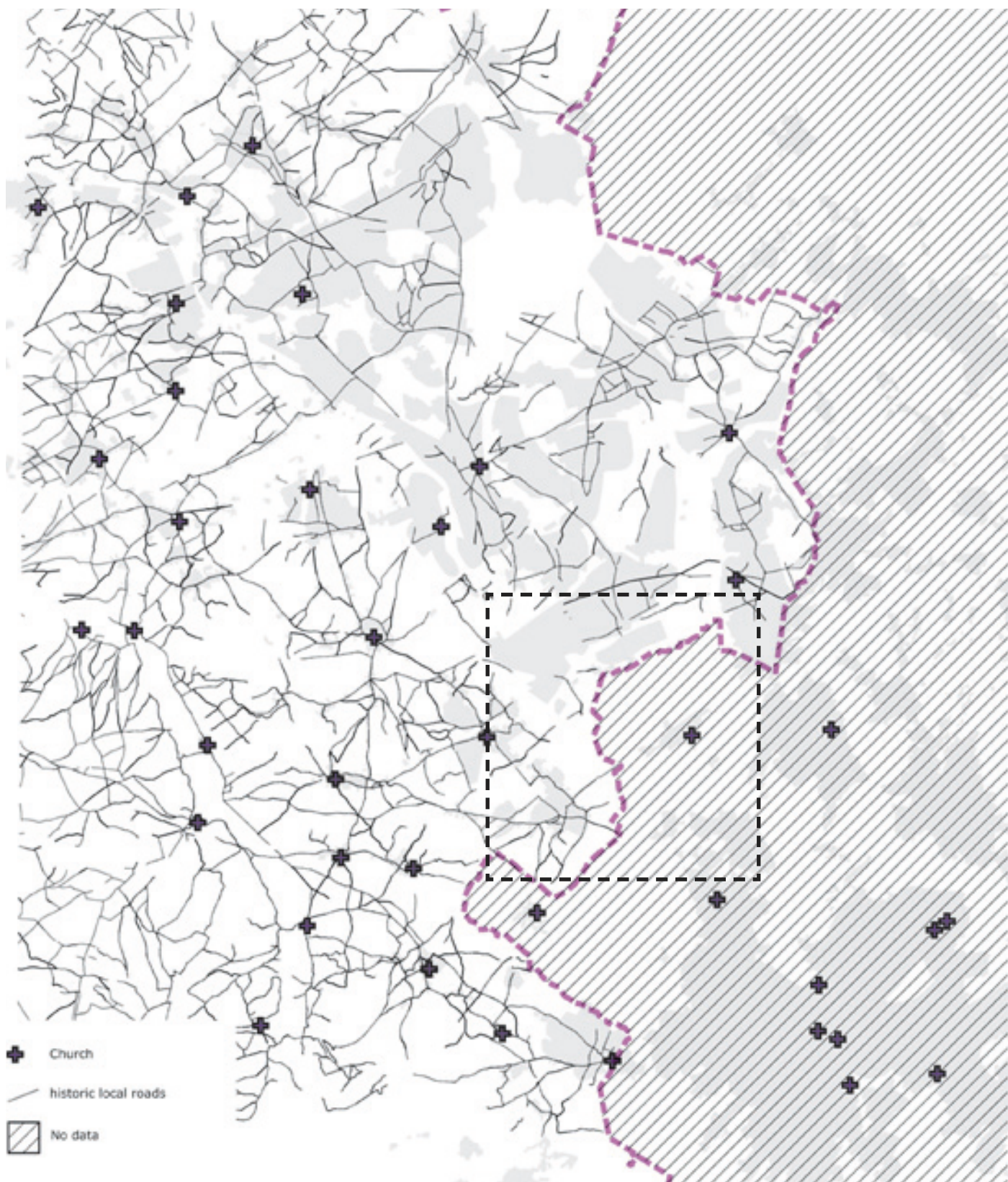
Fig. 56 Local road network connecting the villages (Kerkstra, et al., 2007)

'Triplex Landscape' Analysis

The industrial revolution had a major impact on these cultural historical landscape qualities and from around 1850 urban development made particularly use of the open plateaus. Also the small scales allotment structure changed into a more productive large scale structure.

Landscape qualities
These plateaus are now vast open landscapes still mainly used for agriculture. Due to the relief there exist many differences in openness. The plateaus can provide panoramic views that overlook the lower valleys, especially the edges of the plateaus at the top of (steep) slopes play an important role. Rising elements like trees at the top of slopes, urban sprawl or small villages can block these views.

On an ecological level these plateaus are not as interesting as the slopes and valleys, due to intensive farming and the absence of a rich variety of plants. Cultural historic elements, especially from the Middle Ages like chapels, churches and catholic crosses at crossings often guided by a few trees are important and striking orientation points.

The intensification of agriculture on the plateaus has now lead to erosion problems. But more visible is the disappearing and absence of green elements surrounding (historic) villages, and the new housing developments or new business areas. These changes can have a big impact on these vast open landscapes. Even the smallest interventions are visible in a very large range. They affect the aesthetic qualities of this landscape. Modernity is demands its toll on the scenic landscape Limburg is known for.

It can be discussed if some interventions are really undesirable awful or maybe a new future for these areas. Like these windmills that now often mark these open plains.

Fig. 58 Villages as green isles in open space

Fig. 59 Hollow roads within plateaus

Fig. 57 Religious signs on cross roads

'Triplex Landscape' Analysis

Mining history

In the beginning of this period large infrastructural projects changed the landscape drastically. New canals and changing dirt roads into paved roads are examples. Also railroads between Aachen and Maastricht in 1853 were developed. After this first (international) railroad many other railroad connections followed.

Because of the industrialization in the 19th century the demand for coal increased which resulted in large scale mining in our area. The mining industry was located in and around the Feldbiss fault zone because the coal layers here lay closer to the surface, and thus are easier accessible.

The development of the mining industry also made the villages and cities grow rapidly. To offer all these people working in the mining industry a home, new 'mine-worker colonies' were created besides existing villages and cities. (Bijlsma, 2011)

After WO II the mining industry disappeared because of competing other countries and the discovery of natural gas as energy source. Unlike other countries The Netherlands erased most of its mining history in the landscape. The only remains are traces of the mine railroad network, a few mine shafts and mine waste hills. In our project area there lie two 'untouched' mine railroads between Simpelveld and Kerkrade and between Simpelveld and Richterich.

Before WO II the train and tram were the main transportation units. After the war the car became more important. This led to the further development of the road network and eventually to the development of high ways. (Kerkstra, et al., 2007)
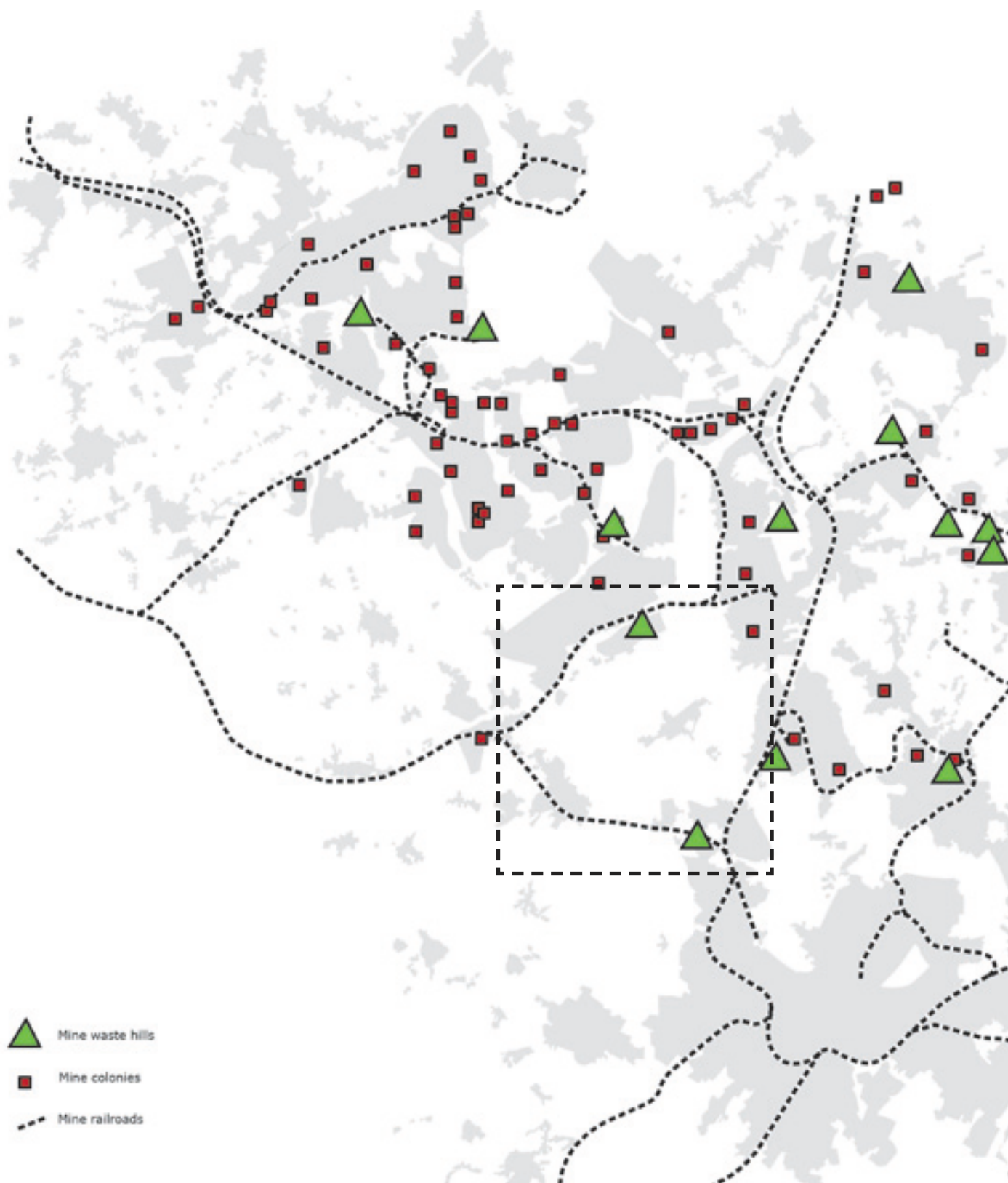
Fig. 60 Network of the old mine railroads

'Triplex Landscape' Analysis

The appreciation of the landscape
This landscape has various qualities, but we can ask ourselves what landscape types or what specific area get appreciated the most? What types of landscape are interesting enough to be preserved, maintained or strengthened? And which areas are less cared for, should be changed or could offer opportunities for the future?

The map on the right shows the appreciation of the landscape in our region (TAB, 2003). We've extrapolated the data to include the region of Aachen based upon the criteria on which the map is based and on our own field experience.

The map is based on certain "core qualities", as the workgroup of TAB explains (TAB, 2003):

"Quality is a broad concept. So what is valuable, and what is not? The "Structuurschema Groene Ruimte II" offers some starting points. The core qualities of the rural landscape are mentioned here:
- *Every landscape has its own identity*
- *Repose, space, quietness, darkness*
- *Accessibility*
- *Past and renewal*
- *Recognizability and vital water*
- *Spatial diversity*
- *Green character*
- *Intelligently combining of functions*

These core qualities have been translated to a number of universal indicators:

• Rarity (analogies: rate of threat / vulnerability). Something that is still existing but is being threatened to disappear. It has a unique status and obtains extra value, especially when it's irreplaceable.
• Recognizable (analogies: completeness, integrity, diversity, naturalness). That what is recognizable can be indicated, obtains an identity and consequently a legitimacy. Clear boundaries increases the recognizability of places.
• Coherence (analogies: sustainability, information value). Logical connections with the fundament (abiotic level) and with the environment increase sustainability. So its valuable to preserve this relation with the abiotic layer. Furthermore an extra dimension is linked to this quality; the depth (information value) which is added by this fundament. Consistency with similar or corresponding elements in the environment will be adding extra value.
These indicators have been translated into criteria for four areas of attention, these have been used to determine the value of the landscape: ecology, cultural history, visual-

spatial and functional." (TAB, 2003)

According to these indicators we can see that especially the valleys are appreciated the most alongside with areas that contain a lot of cultural historic elements and areas that contain a lot natural features. Areas where the influence of the city is noticeable and where the urban influence has an impact on the natural, cultural or historic qualities are being less appreciated. The least appreciated areas are often areas where new city developments are taking place or where the urban pressure is high, for example in the area surrounding the new Avantis business area.

The plateaus are often being less appreciated than the valleys and if we look at the criteria we can trace it back to the cause. The problem lies at the fact that the plateaus do not have a lot of spatial diversity, a green character, the presence of water and a combination of functions. This makes the plateaus vulnerable for future developments, because their few qualities aren't enough to protect their current characteristics and identity and it does not provide enough guidelines for new developments. Another issue is that these developments have an impact on the entire landscape, because the plateaus are the most visible and open.

The valleys with their streams guided by cultural historic elements, combined with recreational facilities, a green character and a lot of spatial diversity, have a lot more to offer. Therefore they are appreciated much more, providing these valleys with a solid ground to function as a sustainable network to be protected and cared for.
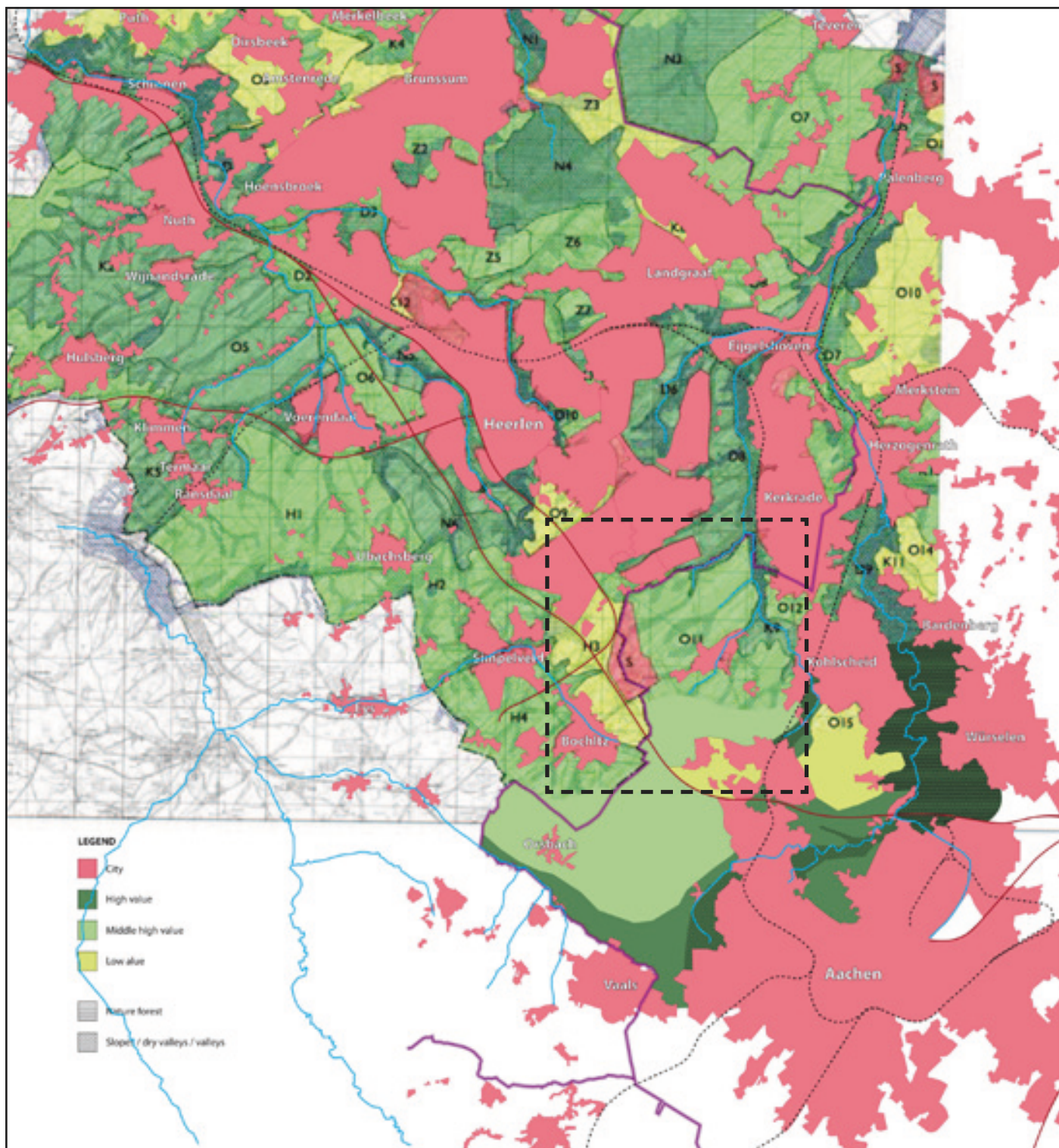
Fig. 61 A map showing the appreciation of the landscape (TAB, 2003)

5.2 Network Landscape Analysis

Development of network landscape
Infrastructural network
Economic actors

Urban Network Analysis

DEVELOPMENT OF NETWORK LANDSCAPE

When we compare the development of the urban areas Parkstad and Aachen we can see strong differences between them.

Development of Parkstad

The urban area known today as Parkstad initially was a network of small villages with the city Heerlen as center, which was built during the Roman Empire.

As a result of the mining industry, this network of villages expanded rapidly and already some villages merged into larger urban areas. New highways and railroad connections continued the urban expansion with new business and industrial areas in and around the existing urban network, resulting into the current situation.

Because the entire urban area of Parkstad initially existed of different villages, the area never really developed a strong center. Heerlen could be seen as the center of Parkstad but at the moment this is not how Parkstad is functioning. It still exists of and functions as a collections of several small centers.

The shrinkage that is currently occurring in Parkstad is being used strategically to recover the stream valleys running through Parkstad, which have been suffering from urban sprawl.

Development of Aachen

Aachen was built during the Roman Empire. It lies strategically between mountain ridges and hills around several hot wells and became a wealthy city.

In time it continued developing as a city with a strong center. Slowly it began to grab into the surrounding landscape like fingers across important infrastructural lines. Expansions occurred on flat areas and slopes have always been avoided as much as possible, even today. Because of this principle Aachen will mainly expand in north direction, towards our project area and Parkstad.

Also the planned new railroad connection between Parkstad and Aachen will influence and stimulate urban development of Parkstad and Aachen into our project area.
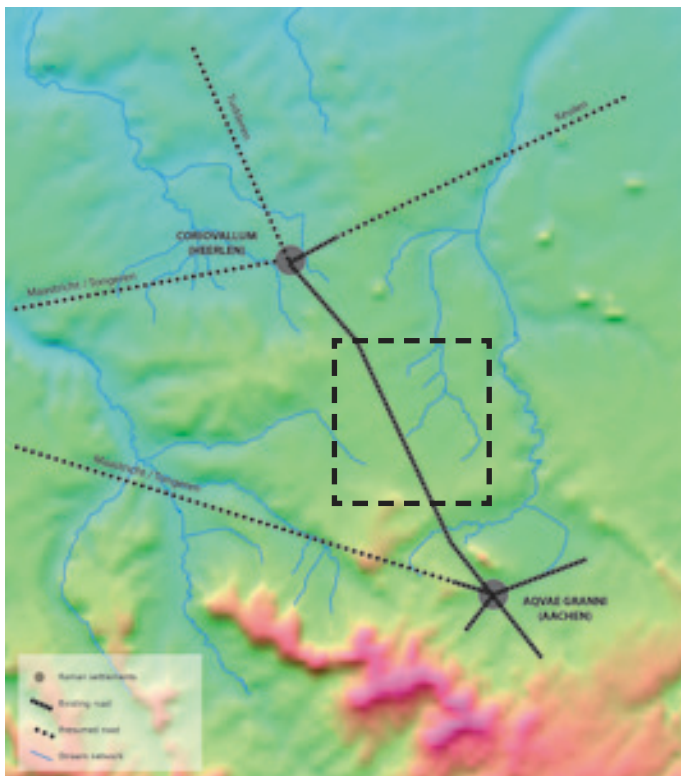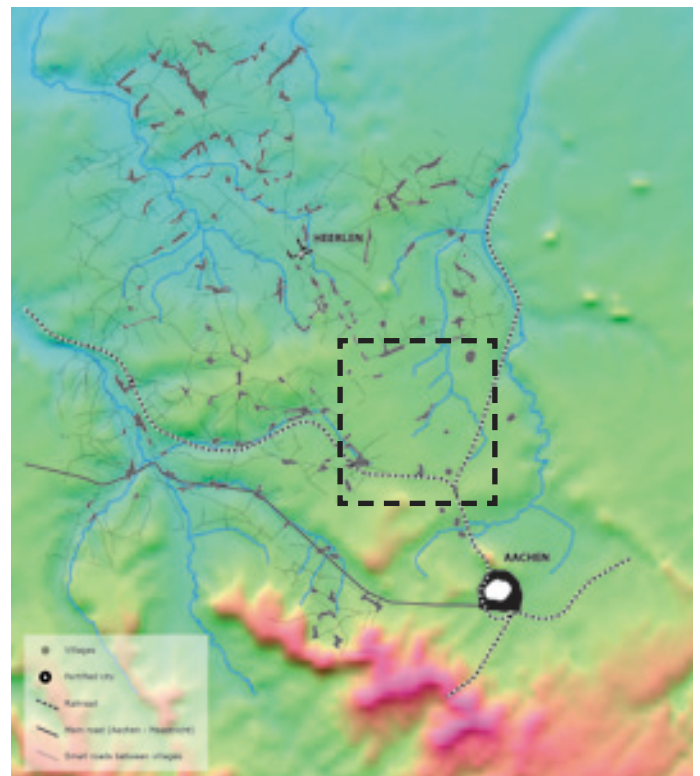

Fig. 63 Urban network during the Roman Empire

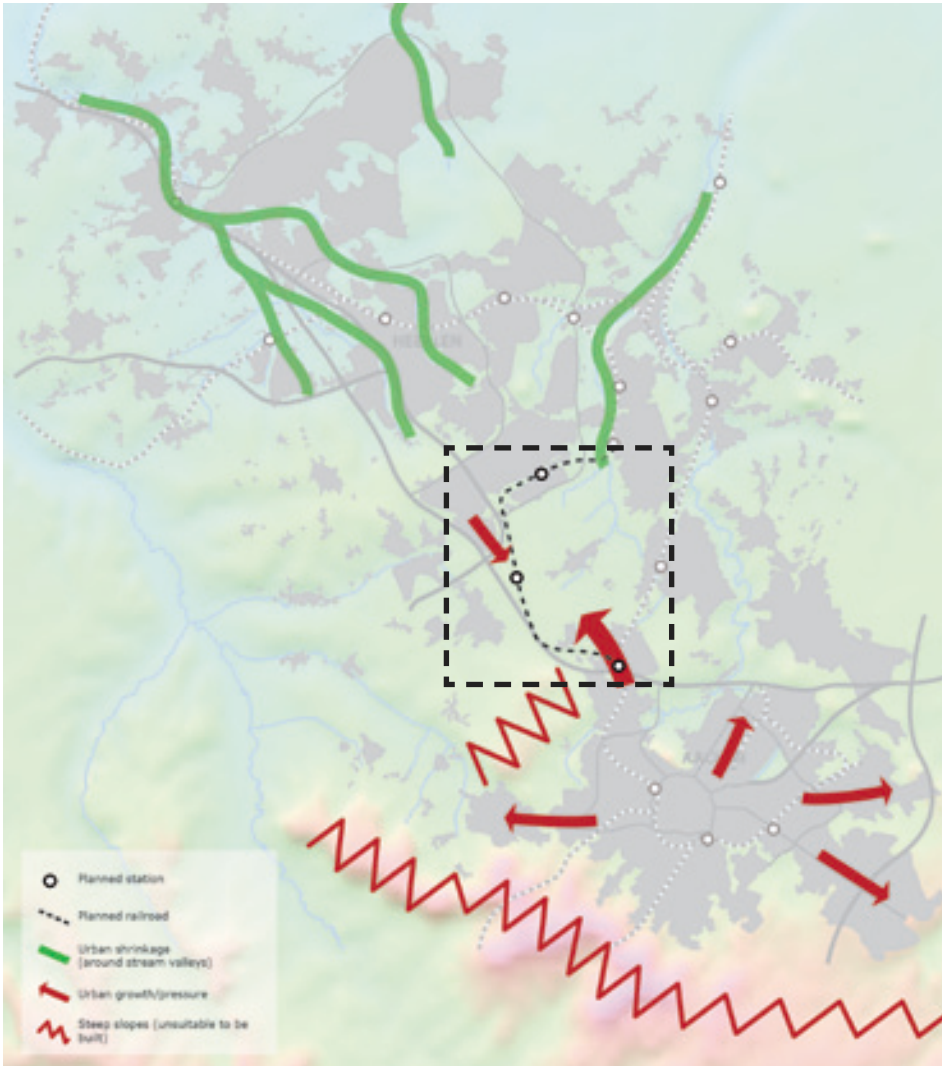*Fig. 64 Urban network during the Middle Ages*

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Fig. 62 Decreasing urban pressure in Parkstad (green) and urban growth in the direction around Aachen (red arrows)
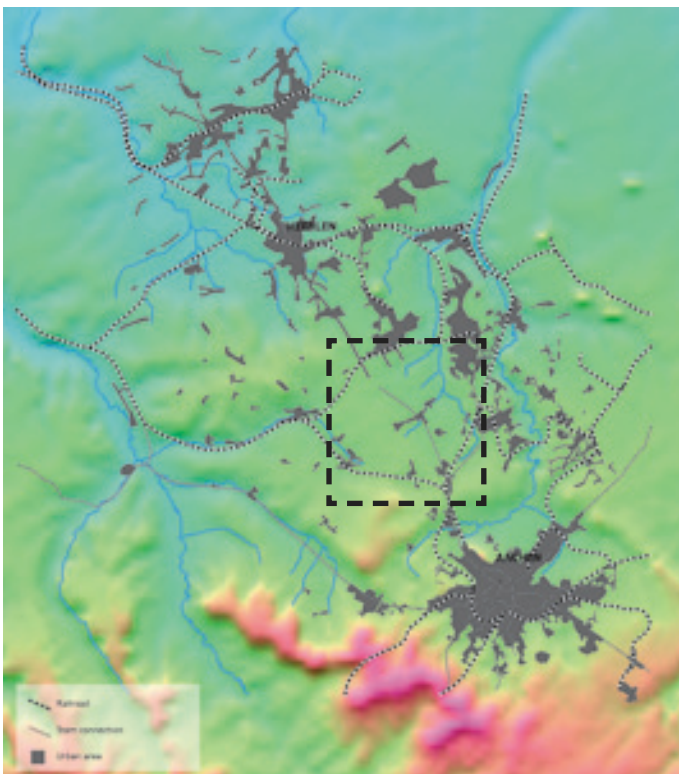

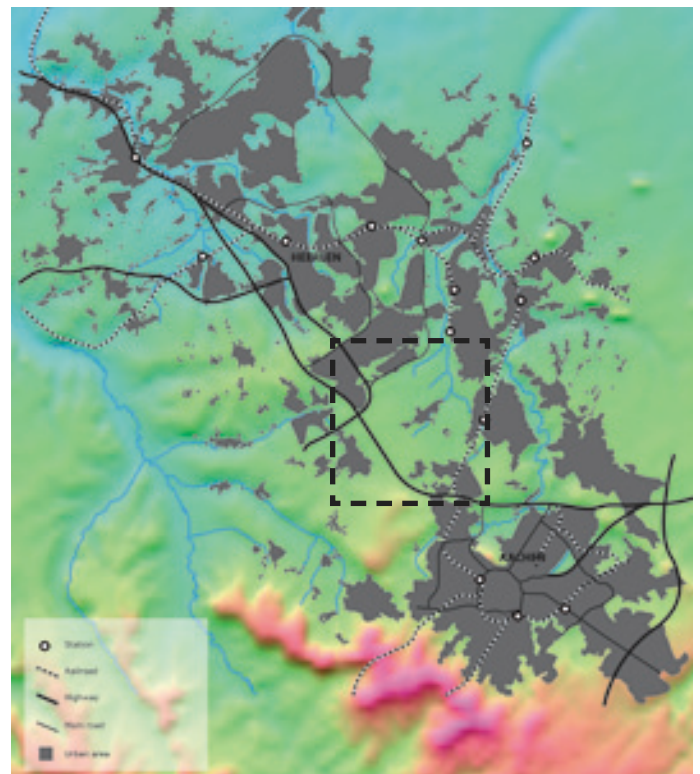*Fig. 65 Urban network during the ealry modern era*

Fig. 66 Contemporary urban network of Parkstad and Aachen
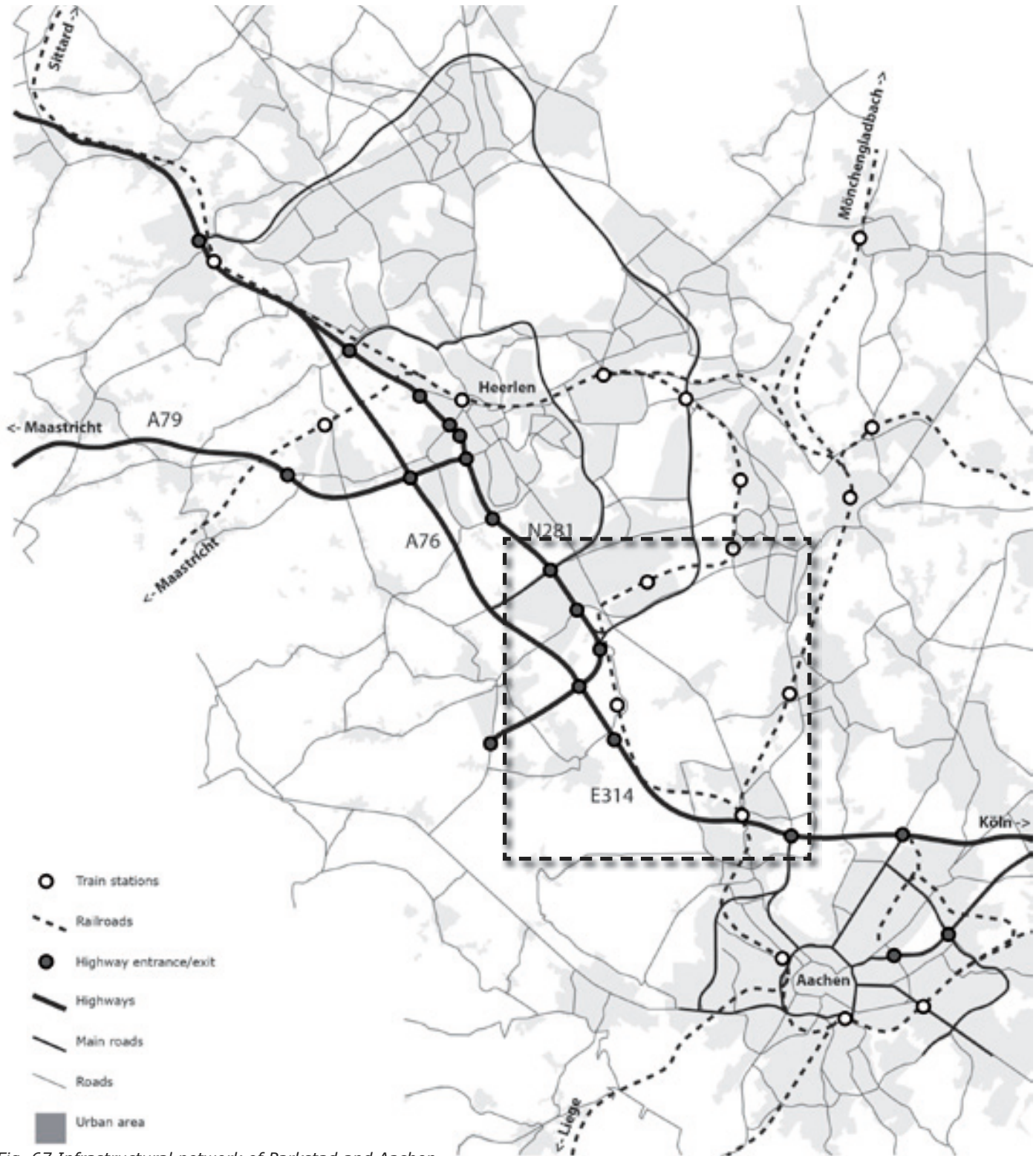
Urban Network Analysis

Fig. 67 Infrastructural network of Parkstad and Aachen

INFRASTRUCTURAL NETWORK

On a larger scale our project area makes part of the ELAt and MHAL region (see project area description). It is connected by railroad and highway connections between Heerlen - Maastricht and Heerlen - Sittard. Aachen has railroad and highway connections with Liege and Köln.

Parkstad and Aachen are connected by the highways A76 and E314. A direct railroad connection between Heerlen and Aachen will be realized in the near future: the 'Avantis-lijn'. Besides a quick connection it will also provide better access by public transport for the Avantis area and other less accessible urban areas that are further from the city centers. This is also an issue in the city of Aachen, where they state in their policy that enhancing the accessibility and mobility of various parts of the city Aachen is a main focus point. Also Aachen wants to enhance its regional and international accessibility by railway.
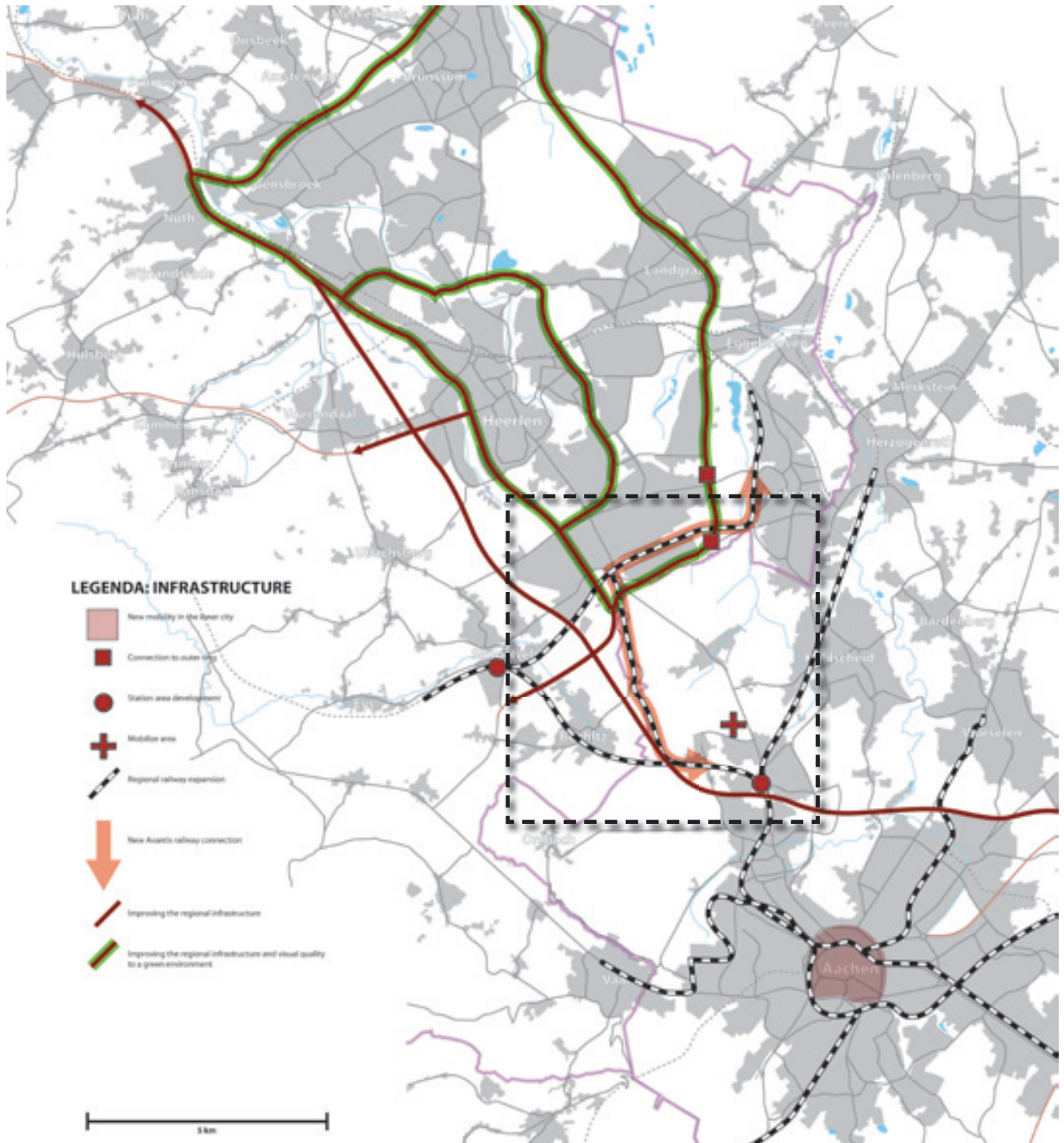
Fig. 68 New infrastructural developments of Parkstad and Aachen (Stadsregio Parkstad Limburg, 2010; Aachen, 2012)

The "Parkstadring" (ring road) is an ambitious plan to which is already halfway realized, to establish a good regional and international accessibility. Along this ring road several clusters will be developed that combine health, education, retail, bussiness areas, new energy, a green environment, tourism & recreation, sports and culture. These clusters will function together as one strong marketing product, the ring road will provide easy access and will act as a catalyst, stimulating the developments.

Urban Network Analysis
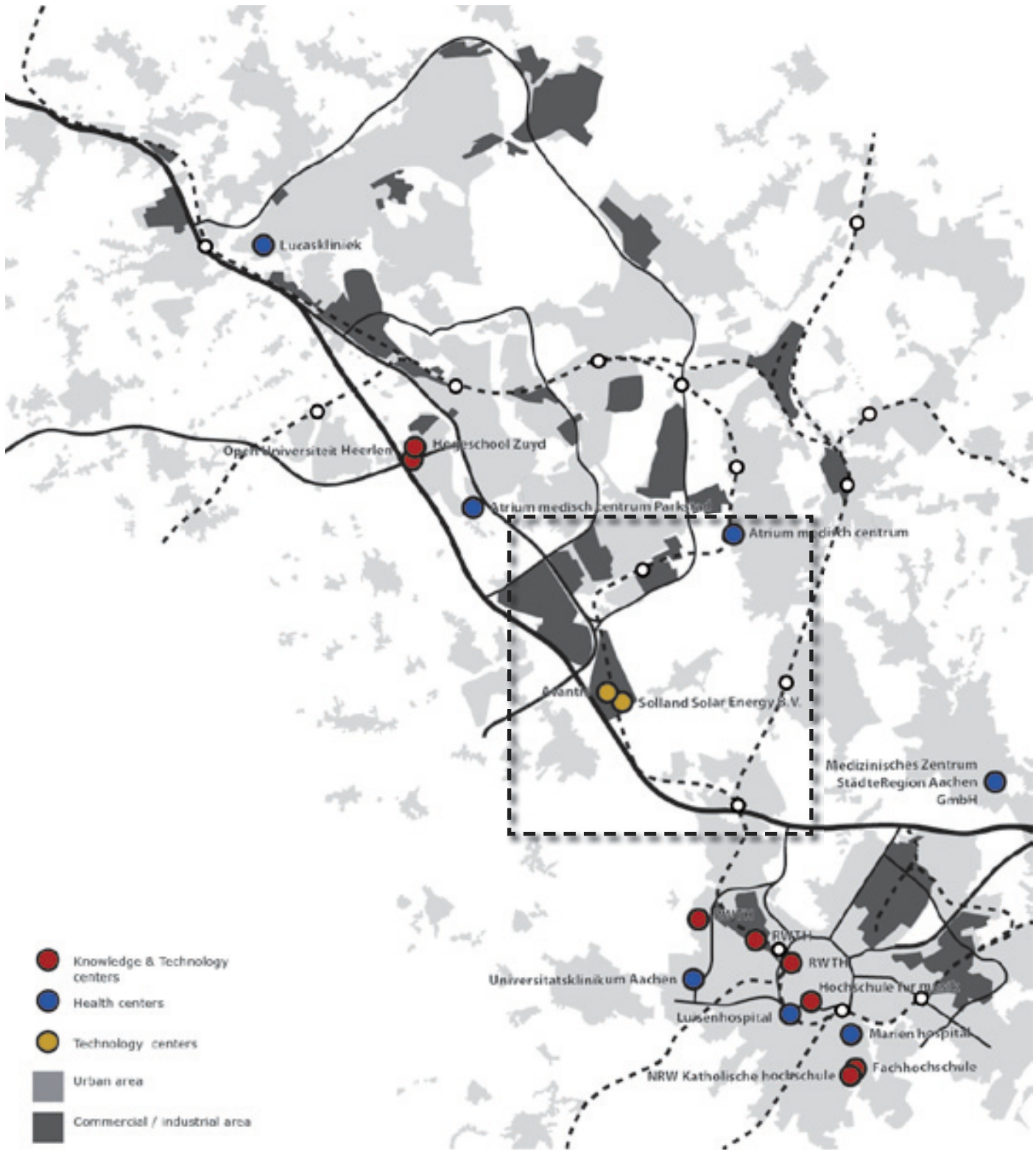
Fig. 69 Main economic actors within the urban network of Parkstad and Aachen

ECONOMIC ACTORS & POLICY

In Parkstad the population is aging and young people are leaving to the Randstad. The average age of the population of parkstad is becoming higher and higher and shrinkage is occurring. Another possible negative effect of this can be that this will weaken the economic position of Parkstad because the economic market is also shrinking. In this situation there is no reason for companies to stay in Parkstad and eventually there will be less and less facilities. This will make Parkstad even less attractive for young people to live and this way Parkstad could become trapped in a downward spiral which is hard to stop.

To prevent this from happening Parkstad at the moment is trying to attract more people and create more jobs by investing in the recreational sector. Parkstad already is known because of its recreational facilities and it will use this identity in solving these problems. Plans are being made for an enormous theme park 'Nature Wonder World' in a large nature area called the 'Brunssummerheide'.

Fig. 70 Recreational facilities within the urban network between Parkstad and Aachen

Parkstad also focuses on new energy, health, the cluster financial-administrative services and the development of the center of Parkstad. The current economic axis of the region is the N281. Along this road the healthcare center "Zorgvallei" will be expanded and an educational boulevard "Xperience Parkstad" will be realized. Moreover, the industrial areas and business & science parks "Trilandis," the cross border "Avantis," the Parkstad Stadium and "De Poort van Parkstad" are situated along this axis. This easily accessible corridor is one of the major concentrations of employment in the region with approximately 10,000 employees and the largest job site in Limburg.

Contrary to Parkstad, Aachen has a quite young population and the city is growing. The RWTH is a very important economic actor in Aachen and attracts a constant flow of new people to the city, coming for study and work. The RWTH is a very highly acclaimed university on a national (and international) level and has a strong emphasis on
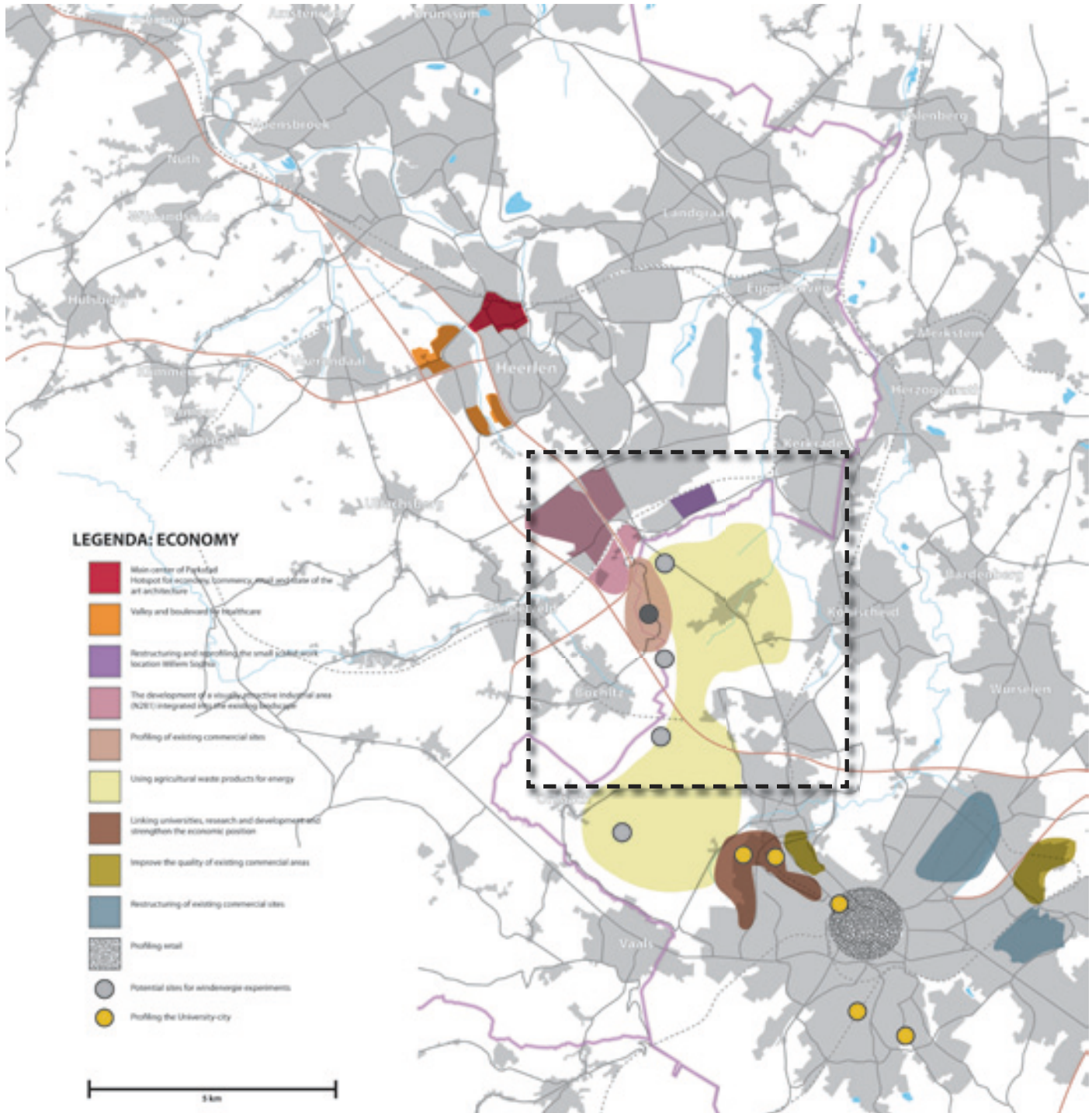
Urban Network Analysis

Fig. 71 Planned economical developments of Parkstad and Aachen according to policy documents
(Stadsregio Parkstad Limburg, 2010; Aachen, 2012)

technological research. *"The university clinics attached to the RWTH, the Klinikum Aachen, is the biggest single-building hospital in Europe. Over time, a host of software and computer industries have developed around the university."* (RWTH Aachen University, 2009)

The goal is to establish a close relationship between the university, colleges, businesses and research departments by redeveloping the RWTH area.

In between Aachen and Heerlen we can find Avantis Science and Business Park which is the first cross-border

German-Dutch business park. It is an innovative project and its purpose is to give new technologies the space they need to develop and to make a connection between research, development and international management possible. Energy and sustainability are important themes here.
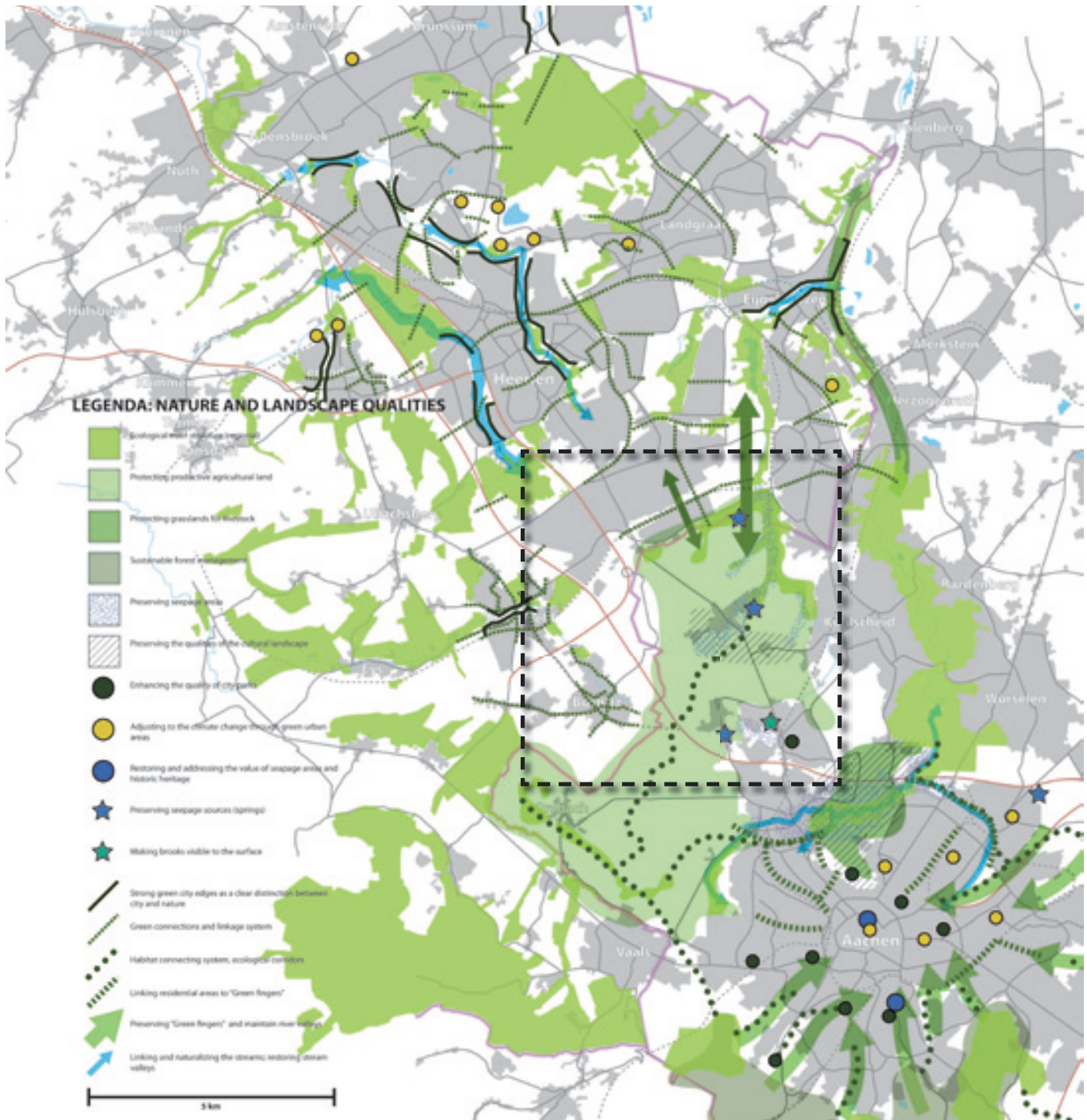
Fig. 72 Nature development/conservation in and around Parkstad and Aachen according to policy documents (Stadsregio Parkstad Limburg, 2010; Aachen, 2012)

The map above shows the policies of Parkstad and Aachen combined in one map. In the region of Parkstad the shrinkage of the population makes room (literally) for green space. This problem becomes an opportunity for the urban areas to transform its edges and improve the urban-rural relations and provides possibilities for "green fingers" and to strengthen the ecological main structure. On a regional scale nature and landscape, including heritage, and stream and river valleys form the basis for sustainable enhancement and vitality. The green elements in the rural area grow into coherent, robust structures with water as a leading element.

Also Aachen values its stream and river valleys and secures its "green fingers" that reach into the city and provide the people with attractive recreational areas into nature. The connecting of various biotopes by adding and strengthen the ecological corridors is an important aspect just as the securing of seepage areas.

5.3 Driving Forces Analysis

Driving Forces Analysis

DRIVING FORCES

This chapter addresses the most important driving forces. These are important issues or topics in contemporary society that are being expressed in culture, economy or policies. These are the most important developments that offer a direction to new developments and in our contemporary society these issues are not only local, but expanding to the global scale. We live in a time where also global issues have become increasingly important. Through the different scales similar issues could have different effects.

Global

In our current society the global scale has become increasingly important. Issues like global warming and the economic crisis for example have become important issues concerning everyone in their daily life, effecting even the local scale.

Our world has a growing population, especially the less developed regions contribute to the global growth. In developed regions other issues emerge, like the problems accompanied with cultural diversity due to global immigration to regions which ensure a better living environment, but also the problems associated with an aging society.

Health problems emerge, one aspect could be linked to the aging society, but also the increasing effect of the modern society on the environment is addressing issues regarding health problems caused by pollution and changing life styles.

The economic crisis is a global problem that is affecting some local regions more than the other. Consequently it poses constraints on new developments due to limited investments, putting emphasis on efficiency and sustainability.

The depletion of energy resources addresses the need for new sustainable energy. Also the issues raised by global warming underscore the importance of a healthier energy use and consumption.

The global environmental issues are probably the most mentioned when speaking of global impacts. Several aspects are being addressed here, the first and most striking on populations around the world is probably water.

From issues concerning drought in not only dessert regions but also in well drained urban and rural areas to issues concerning floods caused by an increase of melting water or storms due to changing weather conditions and many other. The adaptability of our society to changing weather conditions is being tested. In addition our need for clean drinking water is a slowly emerging issue.

It has been acknowledged that our natural environment is extremely important which has made the preservation, restoration and strengthening of our natural environment an important topic. Sustainability has become recurring theme, especially in systems that regard our basic needs, like food production.

From issues concerning drought in not only dessert regions but also in well drained urban and rural areas to issues concerning floods caused by an increase of melting water or storms due to changing weather conditions and many other. The adaptability of our society to changing weather conditions is being tested. In addition our need for clean drinking water is a slowly emerging issue.

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Europe (international)

This level of scale is addressing the international issues or driving forces that are addressed in various cross border collaborations like the Euregio Maas-Rijn, MHAL, the ElAt network and the Tri-Country Park powered by European legislations.

This international scale has a lot of similarities with the global scale, but is further focusing a lot on economic and environmental collaborations, concerning systems that go beyond national borders.
Europe and especially western Europe is a well-developed region consisted of many different nationalities. These two factors are therefor underscoring the issues of cultural diversity. The different national cultural identities should be ensured while individual cultural differences have to be acknowledged.

Also the aging population is posing various problems, especially during an economic crisis. It has an increasing impact on the health care system. This raises various health care issues and it is therefore that also international medical collaborations are being developed and sought.

On an international scale also international connections become important, whereas the infrastructure is an important economic driving force. Accessibility is a highly important factor for a thriving economy. An important way of transport that addresses this international scale and is greatly dependent on collaboration and investments from governments is the international railway.

It is also on this large scale that invisible networks are highly important. Economic collaborations like knowledge networks regarding science, technology and engineering have become important. The region in between "de Randstad," "de Vlaamse Ruit" and "das Rühr" has profiled itself as a strong economic region.

Europe has set targets for renewable energy sources and subsidizes investments in in sustainable energy as part of its drive to cut emissions of carbon dioxide. Along with sustainable energy, Europe is investing in its knowledge economy, as it will be of major important for future developments.

GLOBAL & INTERREGIONAL PROBLEMS
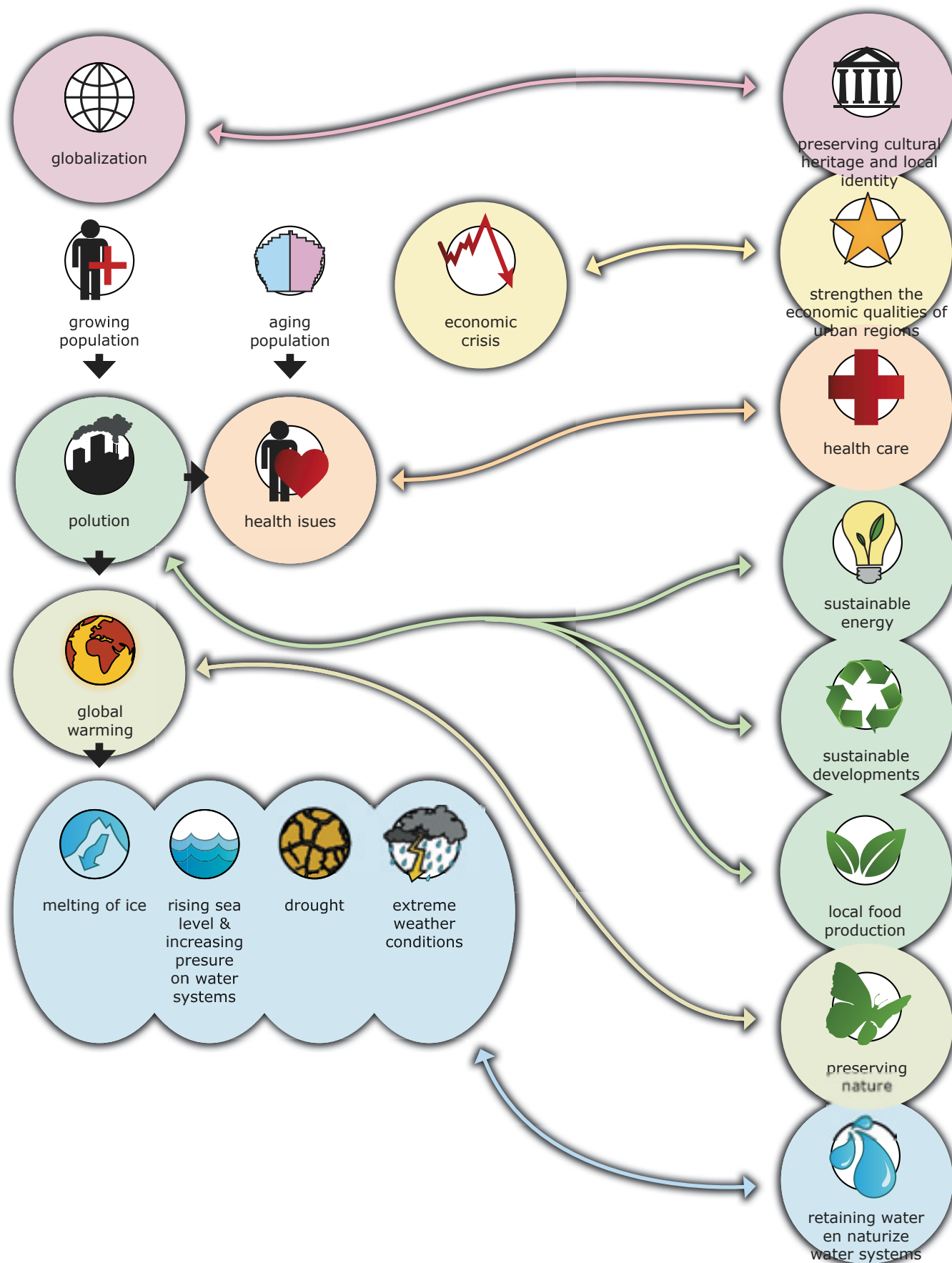
(INTER)REGIONAL & LOCAL SOLUTIONS

globalization

growing population

aging population

economic crisis

polution

health isues

global warming

melting of ice

rising sea level & increasing presure on water systems

drought

extreme weather conditions

preserving cultural heritage and local identity

strengthen the economic qualities of urban regions

health care

sustainable energy

sustainable developments

local food production

preserving nature

retaining water en naturize water systems

Fig. 73 Scheme representing the relation between the main global and (inter)regional driving forces

Driving Forces Analysis

PARKSTAD
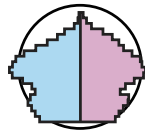
| shrinking population | aging demography | strengthen the economic qualities of urban regions | technology & engineering | tourism | recreation & leisure |

sustainable developments   sustainable energy

AACHEN
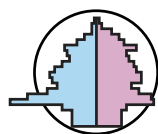
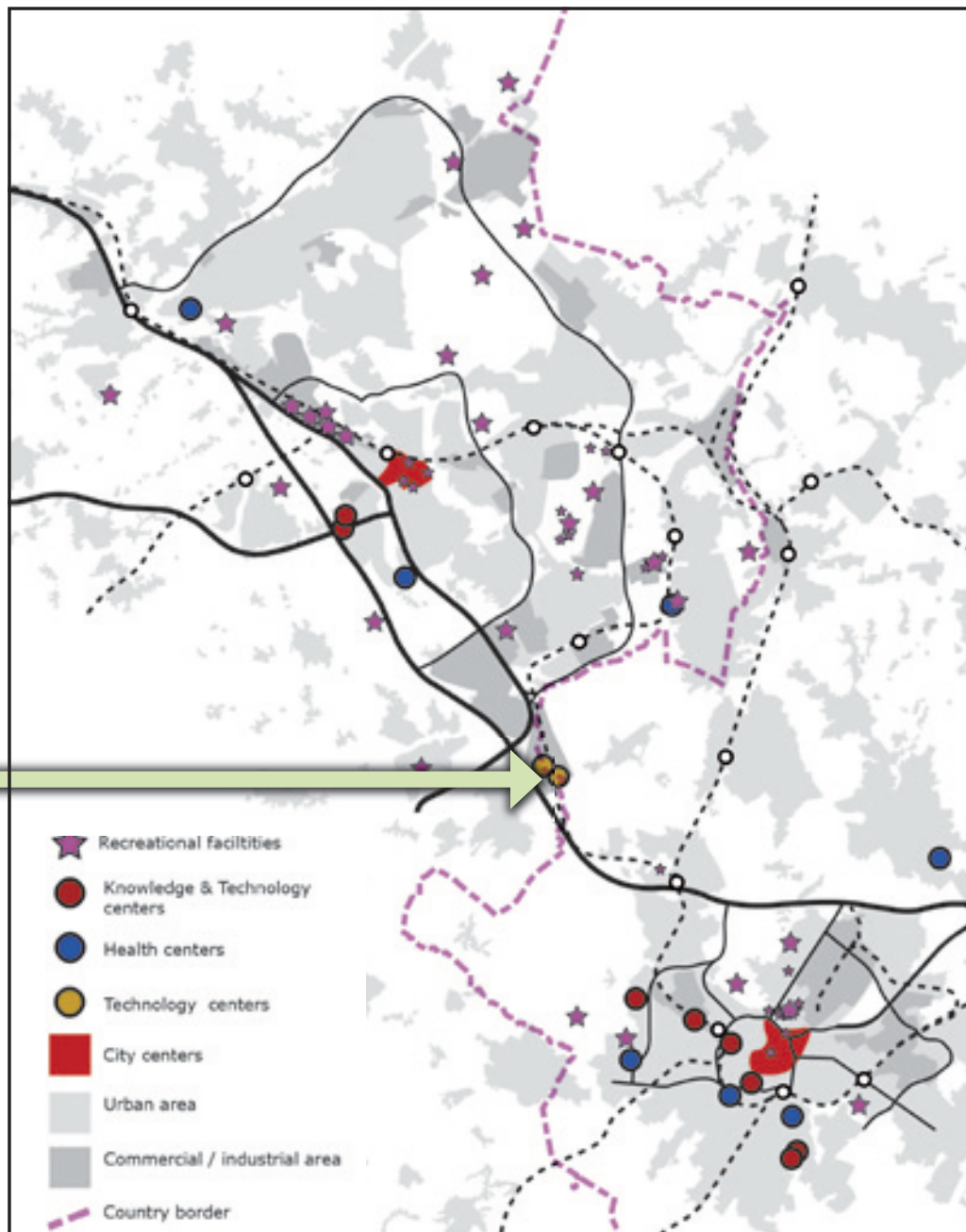| growing population | aging demography with a large young generation | strengthen the economic qualities of urban regions | technology & engineering | knowledge centers | health care |

Fig. 74 Scheme representing the relation between the driving fprces of Parkstad and Aachen and how they, linked to the regional infrastructural network and where they are located within this network

IMPORTANT FACILITIES IN PARKSTAD & AACHEN

Recreational facitlities

Knowledge & Technology centers

Health centers

Technology centers

City centers

Urban area

Commercial / industrial area

Country border

Driving Forces Analysis

Water issues like drought, erosion and the flooding of downstream rivers have become important topics which requires a changing perspective on cross border water management. Not only climate related issues but also water pollution due to large industries strike attention.

The various nationalities in Europe result in a great cultural diversity. Although the cultural identities are being strengthened, the overlapping cultural history should be preserved, because border regions are often historically interesting areas. The rural landscape conceals many cultural historic remnants, contains many recreational qualities, will become increasingly important in our future demand for sustainable food production and bears a lot of ecological aspects that should be preserved, strengthened and further developed.

Parkstad Limburg
Parkstad Limburg is a recreation city facing problems of a shrinking population and an aging demography. Younger people are leaving the area, while the aging problem is posing various economic and health issues. The problem could be that Parkstad would end up in a downward spiral of migrating people and degrading economy.

To address this problem Parkstad is focusing on developing its recreation and tourism sector. Recreation already is a well-known strength of Parkstad and it already has a lot of recreational facilities. Opportunities that combine recreation and landscape could be further exploited.

The economic crisis is putting further constraints on future developments. The population is shrinking and the job market is declining, both emphasize each other. Solutions have to be found to develop a new balance and stop further decline.

New developments are sought in cross border collaborations where the infrastructure plays a vital role. A connection to an international railway which connects Parkstad and Aachen to a larger network could boost new developments.

To a great extend these new developments are focused on the topics of technology and engineering. Sustainable energy is a highly important aspect in this topic which is closely related to certain specializations that the region is known for. Also extending and connecting existing knowledge with the knowledge center Aachen would further improve possibilities and opportunities for the future and strengthen the economic qualities of this region.

In the policy documents water is posed as a leading element in spatial developments. Water has always played a vital role in the development of this region and still has some interesting qualities. Water attracts recreation and places that contain streams (the valleys) are highly favored. The streams are guided by remnants of its cultural history and have a high ecological value.

But there are also problems, the issues of erosion and drought due to intensive drainage are very present. The intensification of agriculture is effecting the ecological qualities of the area. Global issues however underscore the importance of well-functioning ecosystems and drives the attention again to these areas. Preserving, strengthening and developing ecological networks benefits recreational and environmental aspects of the landscape. Sustainable local food production has already proven to be a helpful tool in these regions.

Aachen
Aachen is a science city with a growing population, in contrast to Parkstad. Its demographic construction exists for a large part of younger people; students due to its highly favored and international respected educational facilities. Aachen has positioned itself as a knowledge and science city and will do so even more in the future.

The knowledge and science identity is primarily focusing on technology and engineering, which again has a close relation to for example the field of health care and sustainable energy. Also the IT business is an important branch in the economy of Aachen.

Aachen and Parkstad have made plans to create a railway connection that connects both, to each other and to the larger international network. such a future railway connection could not only boost new developments but also provide spatial direction and improve future collaborations.

Not only Parkstad but also Aachen notes water as a leading elements in future planning. Aachen has always known a long history in which water has played an essential role, because of its springs it always had a unique quality.

And through history water has seemed to influence and direct developments. Many of the city's cultural heritage can be linked to the courses of the water. Preservation of this cultural heritage is essential.

Not only cultural, but also ecological aspects are acclaimed to the water. Aachen has similar problems and strategies as which we can find in Parkstad, valuing the ecological and recreational meaning of green complemented with its positive effects on the health and living environment of its population.

5.4 Conclusions Of
Broad Landscape Analysis

'Triplex - Landscape'
Urban Network
Driving Forces

Conclusions Broad Landscape Analysis

CONCLUSIONS 'TRIPLEX-LANDSCAPE'
Stream valley network
The project area is mainly via the Worm and the Geul connected to the surrounding ecological network, but is not located within of one of the larger corridors between the two main nature areas of this region (Hohes Venn - Eiffel Naturpark and the Ardennes). Therefor the project area can play an important role in strengthening the overall ecological quality of the entire region, but does not does not play a vital role in connecting the large surrounding nature areas.

The stream valley system (fig. 51) has been and still is the most important and characteristic aspect of this region. From a geomorphological point of view the hydrological processes shaped the landscape as it is now, but also from a cultural historical point of view the stream valleys have always been of great importance.

During the Middle Ages and the Early Modern Era (500 - 1850) the first villages in this landscape developed across the stream valleys together with castles, monasteries, mansions and carre farms. These developments formed the basis for the landscape as it is today, and they were all related to the stream valleys.

The stream valleys still are of high ecological, cultural and recreational value. Also regarding climate change related problems, like water storage, the stream valley system can play a very important role.

Local road network on plateaus
Another important network is the network which exists of old villages with churches in in the center and the web of local roads which connected all these villages (fig. 56)

In the early Middle Ages the villages and roads were still closely related to the stream valley. Later, between 1000 - 1300, the higher located plateaus became cultivated. A web-shaped road pattern came into existence which connected the new villages on the plateaus. The church played an important role in these developments.

Today a lot of this road pattern is still present, but most roads have been upgraded and repaved. Old chapels and road crosses can be found scattered throughout the landscape.

Today this religious network is still present in the landscape, but more as a reminder of former times.
It is not one of the driving forces of modern society.

Mine railroad network
The third important network is rooted in the mining history of this area (fig. 60). It consisted of mines, old railroads between these mines, mine waste hills and mine colonies. Most of the mining history has been erased. The mines are closed and most mine waste hills in the Netherlands and in our project area have been removed. Most former mining railroads became part of today's railroad network.

In our project area there lie two 'untouched' mine railroads between Simpelveld and Kerkrade and between Simpelveld and Richterich.

CONCLUSIONS URBAN NETWORK
The last important network in our project area, is the entire urban network, consisting of area of urban activity and infrastructure (fig. 74). This network is not connected to the natural fundament of the landscape.

The urban network is still expending, the urban pressure on the project area is mainly coming from the side of Aachen. The infrastructural developments within the project area will also stimulate urban developments.

At the side of Parkstad the urban network is shrinking and the build-up stream valleys are being restored.

The scheme on pag represents all the invisible driving forces which together are for a large part responsible for the developments in the project area. These driving forces work on a global, international (Europe) and/or local scale, and can be divides into several categories.

The driving forces that directly play an important role in our project area and will be used during the design process are the following (in order of importance):

USABLE DRIVING FORCES FOR VISION AND CONCEPT

Tourism, recreation & leisure
Parkstad is currently investing in this sector, as an economic strategy, in order to create more jobs and attract more visitors. New recreational facilities will require space in the current landscape.

Knowledge & Technology
The RWTH university of Aachen is a very important actor in the new economic developments within and around the project area and has a lot of influence on the development of Aachen and the surrounding landscape.

Growing population
The city Aachen is slowly growing which creates an urban pressure on the surrounding rural landscape.

Sustainable energy
Both Aachen and Parkstad have invested in new sustainable developments and want to present themselves as sustainable cities. Numerous projects on sustainable energy within and outside the Parkstad and Aachen are example of this trend.

Sustainable Development & preservation of nature
This driving force is strongly connected to making the area climate proof, which means the area has to increase its water buffering capacity. Nature areas currently are being developed and restored within and around the project area, mainly in the stream valley areas.

Health care
The Universitats klinikum, related to the RWTH, together with the Atrium Medical Center of Parkstad make health care an important actor within the project area. Because of the aging population of Parkstad, the pressure on health care will rise in the near future.

Preserving cultural history
The cultural history is a distinctive quality of the project area and preservation is an important goal of both Aachen and Parkstad.

Conclusions Broad Landscape Analysis

USABLE NETWORKS & DRIVING FORCES

With these conclusions we have answered the first part of research question 1:

Which networks can be found in the urban and green fabric by using a landscape approach, that could function as a sustainable (ecological, economic and social-cultural) foundation for future developments in which recreation plays a vital role?

The analysis has proven that the network of stream valleys in our project area is most important and rooted in this landscape.

The religious network and the network of the mining history in our project area are both remnants from former times and are not part of today's driving forces anymore. Because of this we believe they will not be strong enough to function as a foundation for our vision/concept.

The entire urban network (which exist of tangible spatial patterns and structures and of less tangible economic, cultural and political processes) will also not function as foundation for our vision/concept, because it is impossible to come up with a sustainable solution for these landscapes when we use the anthropogenic layer as a foundation for our vision/concept, because much of the problems landscapes are facing today are rooted within this layer.

This does not mean we will not use these three networks. They are part of the landscape so they have to be integrated in our approach for the future landscape. They will be additions, which will strengthen the main network or foundation.

During the design process we will further investigate In what ways recreation could play an important role in future developments for the rural left over areas within the urban network.

6. Project Area Analysis
According to the design criteria of the minor thesis

Project Area Analysis

The analysis of the context of the project area has proven that the network of stream valleys is most important and rooted in this landscape. During the literature study on greenways we explored in what way this stream valley network could function as a strong foundation for our vision and concept. We came to the conclusion that we will use a framework concept existing of a linear network of greenways.

In order to find out in how the framework concept can establish itself in the project area, the project area first has to be analyzed. For this analysis the design criteria from the minor thesis will be used. Besides analyzing the project area, also the design criteria will be evaluated on their usability and completeness.

After this the vision and concept can be based on the conclusions of this analysis together with the conclusions of the broad landscape analysis and the framework concept.

DESCRIPTION OF DESIGN CRITERA MINOR THESIS

During our minor thesis we tried to find out if it would be possible to use the qualities which make a traditional 'park' a strong place, in the left over rural landscapes. From this question the following 6 'design criteria', among others, finally emerged:

1. **Unity & recognizable areas**
2. **Spatial organization**
3. **Accessibility**
4. **Users & functions**
5. **Complexity**
6. **Mystery**

We were able to provide a full analysis of the first 3 design criteria. In the scope of our research we did not succeed in clarifying the other 3 criteria (Users & function, complexity and mystery) and making them fully verifiable, because of the limited time that was available for this research and because especially Complexity and Mystery were very abstract definitions that were difficult to test and measure. In the end we have given some attention to the visual aspects of the design criteria Complexity and Mystery, but it should be noted that their full definition goes beyond only their spatial aspects.

We have concluded that these 6 criteria are still mainly related to the traditional 'park' concept, which results in some of them being not very significant to the left over rural landscapes which we are working with now. Probably there are other or more criteria to be found for this type of landscape which are important. We still concluded that these 6 criteria were present in the 5 case studies, even though these criteria might not be the most important for these kind of landscapes. This is why we still want to find out if these criteria can be applicable in these left over rural landscapes, as an addition to the landscape approach.

Because of time limitations, the focus of this research on the usability and completeness of the design criteria, will be limited to the following 3 design criteria:

1. **Unity & recognizable areas**
2. **Spatial organization**
3. **Accessibility**

These 3 design criteria are the most concrete ones and will provide information about spatial and functional aspects of the project area which until now have not been discussed yet.

The other criteria 'Users & functions', 'Complexity' and 'Mystery' first need to be further investigated and clarified, before we can test and evaluate them. Unfortunately this would be beyond the scope of this thesis. Therefore these 3 criteria will not be addressed during this analysis.

The 3 design criteria that will be used, will be described and explained in the following sections.

Unity & recognizable areas

In their book "With people in mind" Kaplan, Kaplan and Ryan (Kaplan, et al., 1998) describe the factors of 'understanding and exploration' for designing "everyday nature in ways that are beneficial to and appreciated by humans."

> *"Understanding refers to the desire people have to make sense of their world, to comprehend what goes on around them. Understanding provides a sense of security. When people cannot understand a situation, they can become distressed."* (Kaplan, et al., 1998)

'Understanding' is divided into two factors: 'coherence and legibility.' Whereas 'coherence' is related to our aspect of 'unity & recognizable areas,' 'legibility' is closely related to our aspect of 'spatial organization.'

> *"A coherent setting is orderly; it is organized into clear areas. People can readily discern the presence of a few distinct regions or areas and those make it easier to make sense of, or understand, a place."* (Kaplan, et al., 1998)

It becomes easier for people to make sense of a place if one can easily distinguish a few distinct areas. A distinct area is coherent and will provoke a strong image.

If there is a clear relation or coherence between these few distinct areas also an overall image or identity will be established, in a physical sense.

Coherence in composition and order will encourage the understanding of a place. A few distinct areas make it easy for people to make sense of, or understand, their environment. It is also a part of orientation and legibility, a coherent image can provide people with meaningful information of where one is situated, or where one would like to go.

In the aspect of 'unity & recognizable areas' we will focus on the organization of the districts (or sub areas) in a design, we will show whether districts are coherent by looking at repeating elements, lines (patterns and

structure) and surfaces (recognizable land use). In other words this aspect focuses on the construction of various aspects in a district and whether they contribute to the constitution of distinct regions or areas. Furthermore it addresses the coherence of the whole, so how these various districts are connected together to give you the idea that they are part of a bigger whole.

Spatial organization
The other factor 'legibility' as being described by Kaplan, Kaplan and Ryan as the second factor of 'understanding' is related to our aspect of 'spatial organization.'

> *"The important issue in considering legibility is distinctiveness. To increase legibility, a scene has to have some memorable components that help with orientation. In a legible place, one can imagine finding one's way, not only to a destination but back again as well. A single landmark or an area that is distinctive makes way-finding much more straightforward."*
> (Kaplan, et al., 1998)

The factors that contribute to Kaplan, Kaplan and Ryan's concept of 'understanding' are closely related to the concept of 'imageability' that has been addressed by Kevin Lynch (Lynch, 1960), he distinguished 5 aspects contributing to the 'imageability of a place,' namely "landmarks, paths, nodes, edges and districts." Both address the close relation to way-finding or orientation and stress the importance of this aspect.

> *"In the process of way-finding, the strategic link is the environmental image, the generalized mental picture of the exterior physical world that is held by an individual. This image is the product both of immediate sensation and of the memory of past experience, and it is used to interpret information and to guide action. The need to recognize and patter our surroundings is so crucial, and has such long roots in the past, that this image has wide practical and emotional importance to the individual."* (Lynch, 1960)

Ann Whiston Spirn defines:

> *"a kind of hierarchy which orders landscape by subordinating some features to others."*
> *(Spirn, 2000)*

Granting importance of certain elements and areas above others can make an area more imageable. More simply put; when an area has a center (or several centers) it becomes easier to grasp the whole picture by comparing other regions to its center, like people do with urban areas (cities).

The 'spatial organization' addresses the organization of these districts and its structures and elements. A scene has to have some memorable components that help with orientation. A kind of hierarchy contributes to orientation; it addresses the attention points in a design and their interdependence; their relation to one another. For example, it is not easy to orientate yourself in an undifferentiated area, you need recognizable differentiation (not like chaos), hence a hierarchy or spatial organization.

Hierarchy or rhythm is key to orientation, differentiation in order is substantial for situating oneself in a large areas that tend to look the same all over the place. When one can orientate oneself easily, the risk of getting lost is not an issue anymore and people can dwell more comfortable. Exploration and dwelling is encouraged if the tension of getting lost is reduced.

Accessibility
The manner in which easy access is provided to a certain area is of great importance to the success of a park or the use of an area. People are an important measurement for the success of a park or recreational area and they are more likely to use them when these areas are easy to get to. This is especially true in the case of daily use, like short strolls or quick passages. For large parks also the regional accessibility has to be mentioned; it should be accessible by car and public transport. The accessibility of an area can be categorized into three groups, the regional, external and internal accessibility.

The regional accessibility is about access on the larger scale as with public transport or highway access which is especially important for large (metropolitan) parks due to the enormous scale and their regional and international importance.

Good external accessibility is a necessity for successful parks. Many entrances and a good connection with its direct context are of great importance and can determine whether a park will be used a lot or be abandoned. Even a good park offering a lot of opportunities for its users may be left aside by people when there's a critical lack of entrances. Especially large parks should be connected extremely well to get people to access the vast landscape that lies in front of them. Easy access is essential.

Subsequently the internal accessibility is just as important. A distinct main infrastructure is sufficient when it provides a good direct connection through the park; from point A to point B, connecting its centers to the context. But they should also provide the users with enough opportunities for exploration.

Main roads can provide certainty by orientation. Nodes provide the opportunity to deviate from these main roads and explore the various districts available in the park. These nodes are the points where a choice is presented and interaction is created. Circular paths or intricate networks encourage people to further dwell and explore. The opportunity for exploration is an important aspect here. The districts that are easy to get to and that give you the possibility to choose your own way in its smaller inner network are best suitable for exploration and dwelling. Therefore the presence of these intricate networks is also utterly important. (De Jong, 2010)

Project Area Analysis

From design criteria to analysis tools

During the minor thesis the design criteria have been used to evaluate designs on their quality, only by looking at the drawings and descriptions (appendix 3 gives an example of how this has been done for Park Lingezegen). However, these criteria can also be used to analyze an existing situation, so the strengths and weaknesses of a certain area, according to the design criteria, can be determined. These analysis exist mainly of map studies.

Main functions & composition of project area

In order to analyze the project area according to this criteria, it is necessary to first make a simplified abstract representation, which grasps the essence of a certain area. The essence can be found in the different aspects which already have been analyzed during the broad landscape analysis: the height differences (fig 75), the stream valley system with cultural historic elements and objects (fig 76), the historic road network (fig 76), and the contemporary urban network existing of areas of urban activity and an infrastructural network on an (inter)regional scale (fig 77). These are shown again here, but now only for the project area on a more detailed scale level.

Figure 78 shows how all these aspects of the project area are summarized into one abstract map which shows the essence of the current situation (fig. 78)

This map shows the main functions and composition of the project area. It filters out the main districts (or sub areas), the main infrastructural network and the main points within the project area, which can be distinctive objects or landmarks. The maps that will show the results of the analysis according to the design criteria, will use this map as starting point.

The project area can be divided in 5 main districts. The first district consists of the stream valley that runs through the project area. The second districts consists of an area of arable land on the gentle slopes between the stream valley and the higher plateau. The third district consist of the arable land on the plateau. The fourth district consists of the avantis business area. The fifth district consists of the highway and railroad, which together take up a lot of space in this landscape.

Within the project area there is one main road going from Parkstad to Aachen, and it passes the village Horbach in the middle of the project area. Besides this main connection there is a network of smaller local roads and paths within the project area.

The main objects or landmarks within the project area consists of the characteristic farms within the stream valley, the office buildings at the Avantis business area and the wind turbines of which a couple is located at the north of the project area and the rest at the east side, below Bocholtz.

The pictures in figure 79 give an impression of the 5 main districts which together form the project area.
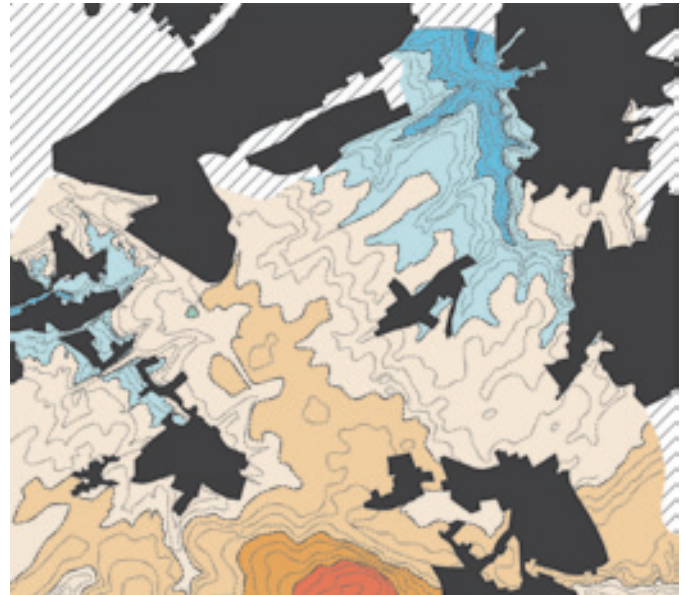

Fig. 75 Heigth map of the project area (heighest: 240m, lowest: 120m)

Fig. 76 Stream valley system with cultural historic elements and objects and historic road network
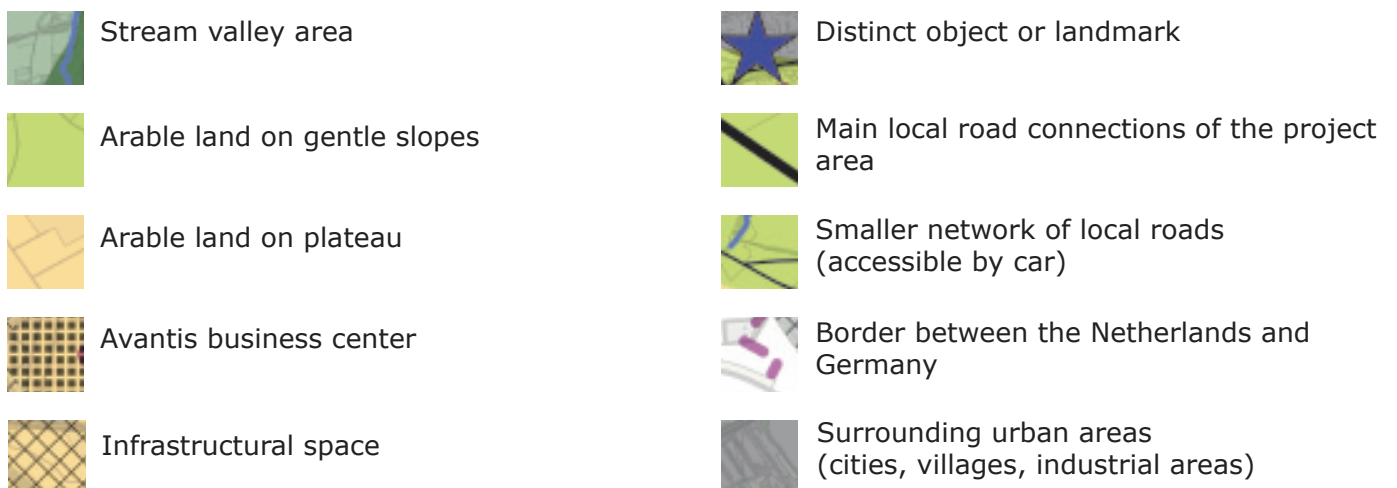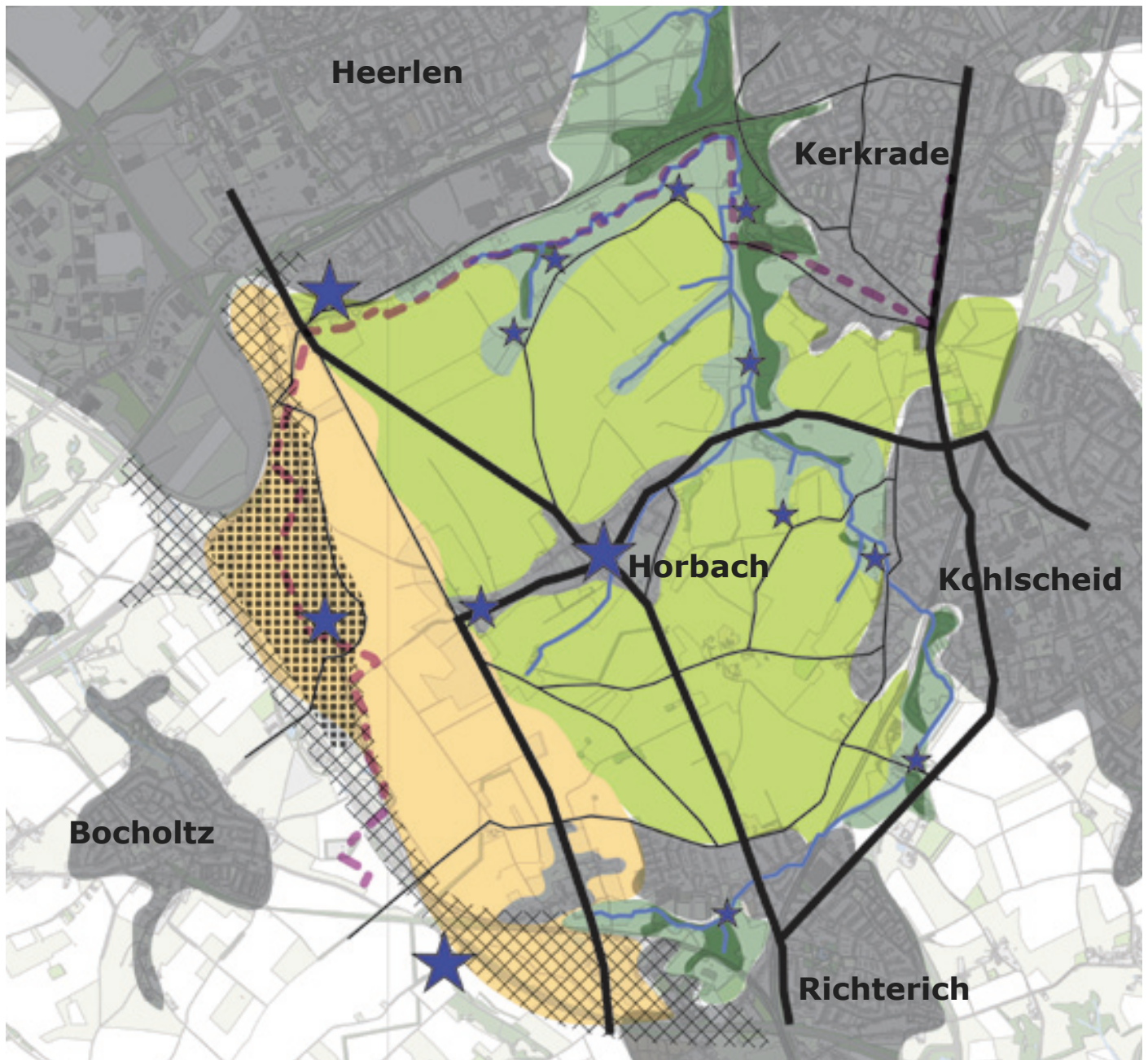

Fig. 77 Urban network

Legend:

- Stream valley area
- Arable land on gentle slopes
- Arable land on plateau
- Avantis business center
- Infrastructural space
- Distinct object or landmark
- Main local road connections of the project area
- Smaller network of local roads (accessible by car)
- Border between the Netherlands and Germany
- Surrounding urban areas (cities, villages, industrial areas)

Fig. 78 Simplified map showing the main functions and composition of the project area

Project Area Analysis

Arable lands on plateau

Avantis bunisess center

Infrastructural space

Arable land on gentle slopes

1. **Stream valley areas**
2. **Arable land on gentle slopes**
3. **Arable land on plateau**
4. **Avantis business center**
5. **Infrastructural space**
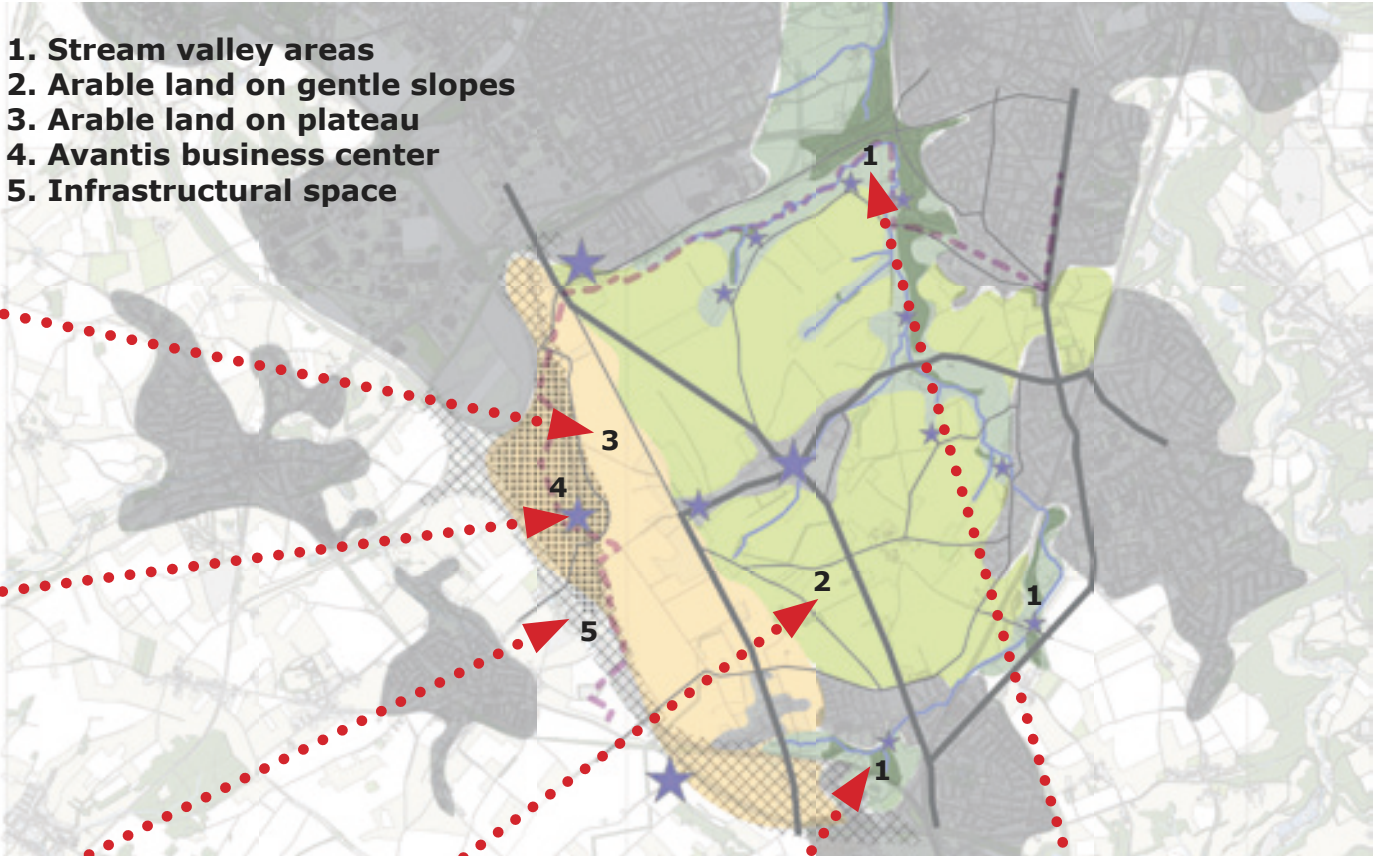
Stream valley area of Richterich

Stream valley area near Kerkrade

Fig. 79 Simplified map showing the main functions and composition of the project area, pictures (Google Maps, 2012) showing the 5 main districts within the project area

111

Project Area Analysis

(fig. 80)

Coherence of individual districts
1. Stream valley area
The stream valley area that runs through the project area lacks visual coherence, because some parts of it contain forest but other parts only exist of grass lands. The parts that don't contain forest are less recognizable. Often the stream is degraded to a narrow ditch where it passes a city or village, which makes it unrecognizable in these places.
The stream valley is most recognizable in the northern part of the project area, next to Kerkrade. In the hearth of Richterich a spring forest is located and is bounded by the surrounding village, which gives this part of the stream valley a park like character.

2. Arable land on gentle slopes
This area mainly consists of conventional agriculture on gentle slopes. Within this area lies the village Horbach. The overall network of small roads together with the parceling structure of the agricultural land gives this area a coherent appearance.

3. Arable land on plateau
The land use on his part of the plateau is the comparable to the area with arable land on gentle slopes. Because the plateau are higher this place offers a wide view over the entire project area and beyond. Also the road network and parcelling structure is more straight and less dense. This part of the plateau also has a coherent appearance.

4. Avantis business area
The Avantis business area has a very distinctive design which literally has a key-shaped structure and road network. The planned train station at this place form the center of the design. The area was planned to become a densely built up office area, but until now only a few offices has been built. However, the area still appears as a coherent area, because of the distinctive road structure. The design of this business area is very autonomous and is not related to the initial cultural landscape at all. The area shows some visual coherence, but has no process related coherence with the initial landscape.

5. Infrastructural space
The highway and the future railroad take up a lot of space inside the project area, and together create an autonomous area, instead of being merely objects within the landscape. Just like the Avantis business area the area has no process related coherence with the initial cultural landscape.

Overall coherence
The project area does not show overall coherence, because the new modern urban developments on the plateau are not related to the initial landscape. Therefore they are also not related to the other districts within the project area, since these are all strongly related to the initial cultural landscape.

(fig. 81)

Road structure
The road structure of the project area is mainly north-south directed. The east-west connections are missing or unclear, because of the highway, which act as a barrier.

Centers
Within the project area the village Horbach can be perceived as the main center; it is located in the middle of the project area where the two main roads cross. It is also the main center of human activity within the project area. Besides Horbach, the Avantis business center also can be perceived as a center.

Some parts of the stream valley area that contain forest, can be perceived as centers, but they are less prominent compared to the other centers. The stream valley forest next to Kerkrade and the park like stream valley situation within Richterich could more or less be seen as the current centers of human activity of the entire stream valley area.

Distinctive elements (landmarks)
The most prominent landmarks are the large wind turbines located at the edge of the project area. They can be seen from any location within the project area.

The office buildings at the Avantis business area also are quite high and prominent objects, which are visible from most locations within the project area.

The characteristic carre farms can be seen throughout the stream valley area and also play an important role in the imageability of the project area.
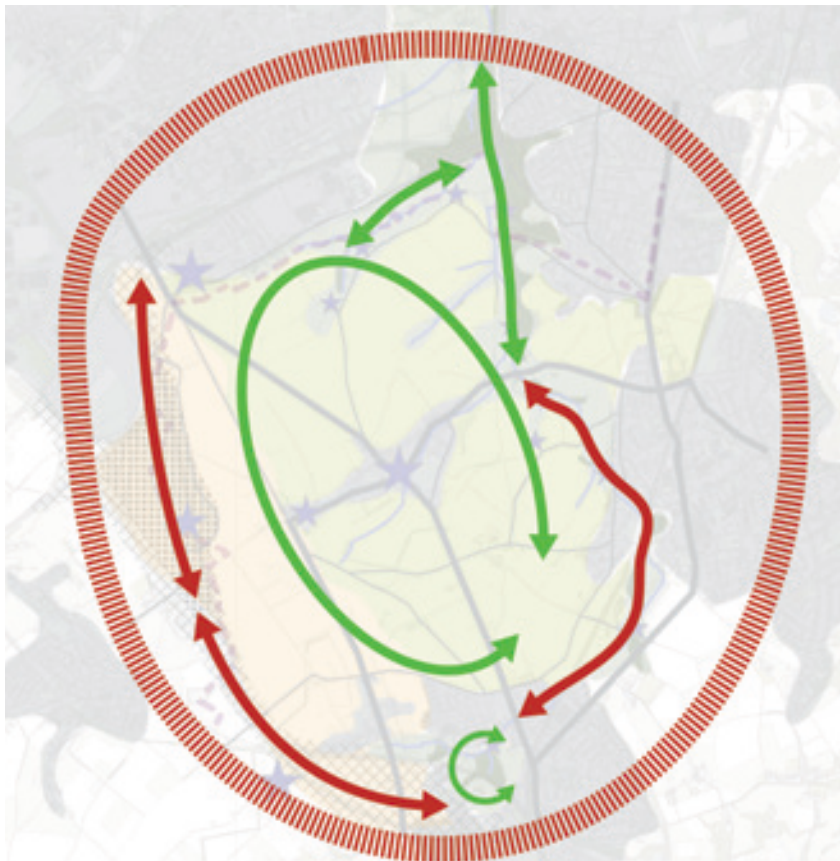
Fig. 80 Unity and recognizable areas

	Lack of overall coherence
	Recognizable coherent areas
	Incoherent areas
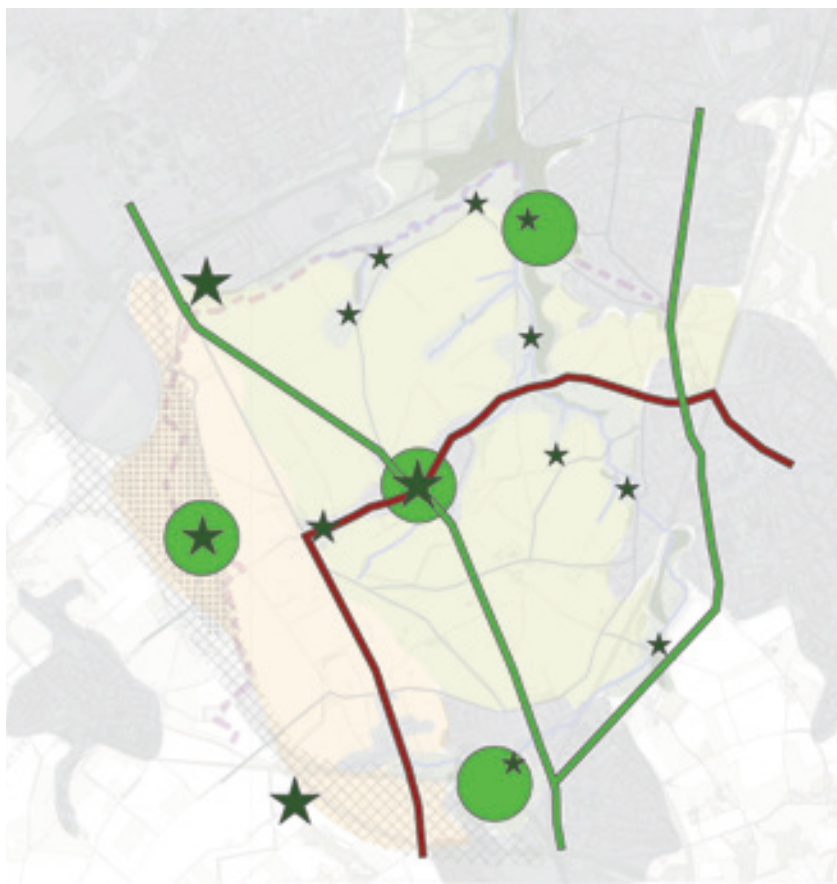
Fig. 81 Spatial organization

	Legible road structure
	Illegible road structure
	Concentration areas of human activity
	Distinct objects & land marks

Project Area Analysis

(fig. 82)

Connection between regional and local infrastructure
(fig. 83)
The first part of this analysis on accessibility is about the level of connectedness between the regional and local infrastructure; how easy is it for people to enter the project area by using the regional infrastructural network. When people arrive by train, what distance to they have to walk or bike before they are within the project area? And if people come by car using the highway, at which places can they leave the highway and enter the local infrastructural network?

The connection between the new Avantis train station and the local network is poor, considering this is a very important entrance point to the project area.
The connection between the new train station, and the highway at the side of Heerlen and the local infrastructural network is also poor. The height difference, caused by the stream valley, is probably the reason why the local road network is underdeveloped at this place. The border between the Netherlands and Germany, which runs through this place, could also be a reason why this area is poorly connected.
Besides these two factors also a new main road is planned exactly across the border, which will probably make this area even less connected.

Local accessibility (fig. 84)
The level of connectedness between the local road network within the project area and the context is highest at Kerkrade and Richterich. This means that people can easily walk or bike into the project area from their neighborhood. There are enough entrance points at these places.
The level of connectedness is especially low in the northern part of the project area, which has a underdeveloped road network. Also across the highway and new railroad, connection or entrance points are lacking.

Internal road & path network (fig. 85)
As already explained above the internal road network in the northern part of the project area is underdeveloped. Most other parts of the project area have a strong local road network. A lot of these roads and paths are unpaved, so unsuitable for cars, but visitors can use it for walking and bicycling.
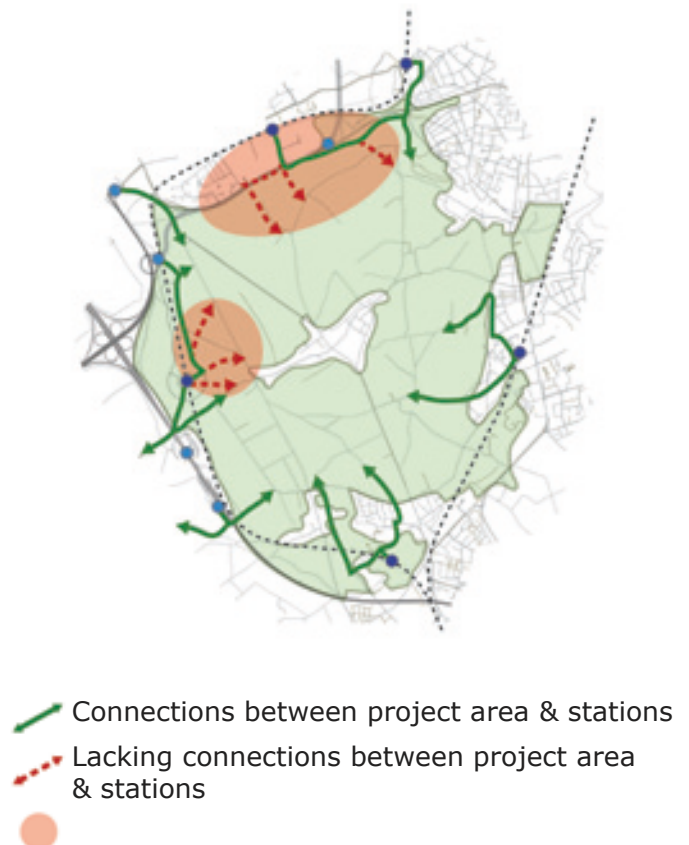

Connections between project area & stations

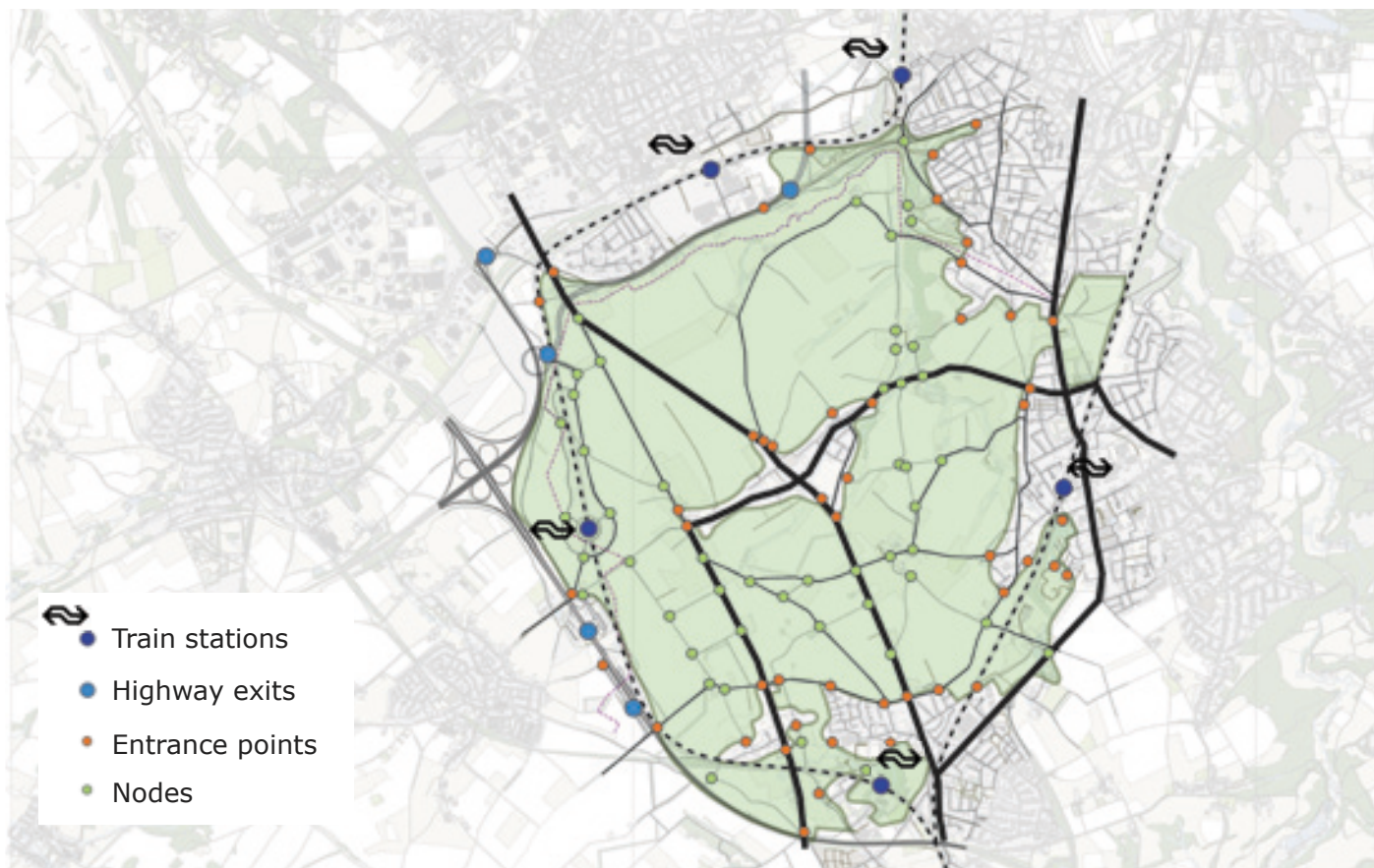Lacking connections between project area & stations

Fig. 83 Regional accessibility of the project area

Fig. 82 Accessibility of the project area

Train stations
Highway exits
Entrance points
Nodes

Areas with low local accessibility

Entrance points between project area & surrounding urban fabric

Opportunity for exploration

Lacking opportunity for exploration

Areas with a strong intricate network

Areas with no intricate network

Fig. 84 Local accessibility of the project area

Fig. 85 Internal network

Project Area Analysis

CONCLUSIONS OF ANALYSIS

Unity & recognizable areas

The project area does not show overall coherence, because the new modern urban developments on the plateau are not related to the initial landscape. Therefore they are also not related to the other districts within the project area, since these are all strongly related to the initial cultural landscape.

Spatial organization

The road structure of the project area is mainly north-south directed. The east-west connections are missing or unclear, because of the highway, which act as a barrier. This aspect leaves room for improvement. The other aspects of the project area have a clear spatial organization: several clear centers and several distinctive objects.

Accessibility

The level of connectedness between the regional and local infrastructure is quite high because the area is surrounded by five train stations, and several highway entrances and exits. Even though some of these train stations and highway connections are poorly connected to the local infrastructure.

The northern part of the project area has an underdeveloped local road network and therefore also is poorly connected to the surrounding urban fabric, which is especially a missed opportunity at the area near the neighborhoods of south of Heerlen. There is also a lack of connections across the highway and new railroad, which isolates the project area from the Heuvellandschap. This is also a missed opportunity because the project area could benefit from the Heuvellandschap from an recreational point of view, if they would be better connected.

CONCLUSIONS ON DESIGN CRITERIA

This section will address research question 2:

'In what way are the design criteria from the minor thesis useable during the design process for a left-over rural landscape with a landscape approach?'
-   What other important design criteria do we encounter during the design process?

Usability of the tested criteria

The criteria proved to be very useful analysis tools at this scale level and help understanding the strengths and weaknesses of the project area. Besides understanding, the strengths and weaknesses can also be localized with these criteria. This knowledge can be used during the design process and makes it easier to determine which aspects within the project area are most important to improve; it provides a clear focus during the following design process.

Difficulties in applying the criteria

Because the criteria originally were developed to evaluate large park designs, sometimes applying the criteria to the project area was difficult. Some of the original aspects of the criteria needed to be changed.

The main difficulty in applying these criteria is that landscapes like our project area, unlike parks, are not clearly bounded. The project area is between the urban areas of Parkstad and Aachen, but at the left side of the project area it becomes hard to say where the left over rural landscape begins and where it ends.

The left side of the project area is not clearly bounded by city and dissolves into the surrounding landscape, because here both the project area and the surrounding landscape exists for a large part of agricultural land. At this side the border of the project area becomes a transitional zone without clear edges. Within these 'zones' it is hard to determine the entrance points, which need to be pointed out in order to determine the accessibility of the project area.

Alterations of criteria

Parks are often designed to have one recognizable center, which also functions as a concentration point of human activity. This is why 'centers' became an important aspect of the initial design criteria 'Spatial organization'. However in this case, we are analyzing a rural left over landscape, without clear borders, which is not designed to have one or more recognizable centers. Nevertheless, it still contains several concentration points of human activity, which also have been indicated as 'centers' in the criteria 'Spatial organization'. It should be noted that these centers are somewhat different from the centers of the initial park related criteria.

An extra part has been added to the criteria 'Accessibility', by making a separate map for the level of connectedness between the regional and local infrastructure, called regional accessibility. The map 'external accessibility' has been renamed to 'local accessibility' and the map 'internal accessibility' has been renamed to 'Internal road network', since the name 'internal accessibility' made no sense.

The second part of this research question, which addresses which criteria have been missing and should be added will be discussed in the final conclusions and discussion part of this thesis.

7. Vision & Concept

Vision & Concept

The project area has been described as 'schizophrenic' being rural and urban at the same time. On the one hand it can be seen as part of the Heuvellandschap, a cultural historical landscape, which qualities mainly are located in or around the characteristic stream valleys. On the other hand the project area is strongly influenced by the surrounding cities and the invisible economic driving forces. This urban influence is mainly expressed around the highway and the new railroad connection between Heerlen and Aachen.

The urban influence is conflicting with the rural, cultural historical landscape, because there is no coherence between the old cultural landscape and the new urban developments. The qualities of the cultural landscape are slowly being decreased and the new urban developments are making the landscape more and more estranging.

Coherent hybrid landscape

Nowadays the sharp distinction between city and rural area is not sufficient anymore in understanding the environment. A new type of landscape came into existence the last decades, which can't be entirely grasped by calling it rural or urban, since it is both. The project area is a perfect example of this new kind of landscape which can be defined as: 'hybrid landscape'.

The framework concept, as described by Ahern, using a linear network of greenways, will be used as a planning strategy in order to let the new hybrid landscape function. This strategy will enable a synergy between nature's low dynamic processes and societal high dynamic processes within the project area, so both sides will benefit.

In the vision for this project area the 'schizophrenic' character will be embraced and turned into a distinctive quality. The difference with the existing situation is that in this vision the old cultural landscape and the modern urban landscape will be experienced and function as a coherent whole, they will become (inter)connected.

Recreation as economic foundation

The main function and economic foundation of these hybrid landscapes will be recreation. They lie close to or within the urban network and close to the citizens. Therefore they will be a solution to the recreational shortage most metropolitan areas are dealing with nowadays. Agriculture will remain an important aspect in the project area, but in a new extensive recreational form. Besides agriculture other important functions like nature conservation & development, sustainable urban development, sustainable energy production and health care will also play an important role in this multifunctional hybrid landscape.

One of the main goals of the project area will be to attract as many visitors as possible. These visitors will pay for certain recreational features inside the project area. This money will be used to maintain this new recreational hybrid landscape. In order to make it durable, it has to become less financially dependent upon the government. It has to become as self suffient as possible, because regarding the economic situation nowadays, financial support is not likely.

High dynamic processes

Heuvel landschap (Cultural landscape)

Sustainable urban development

Plateau
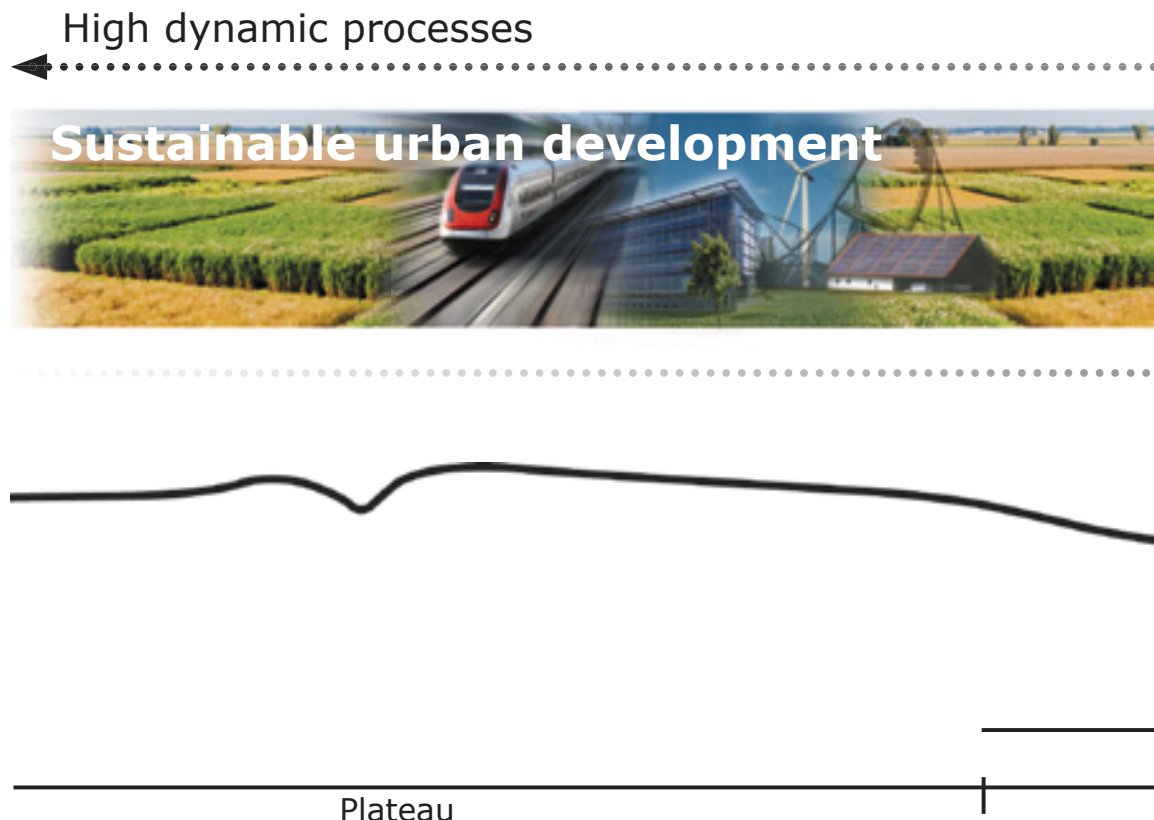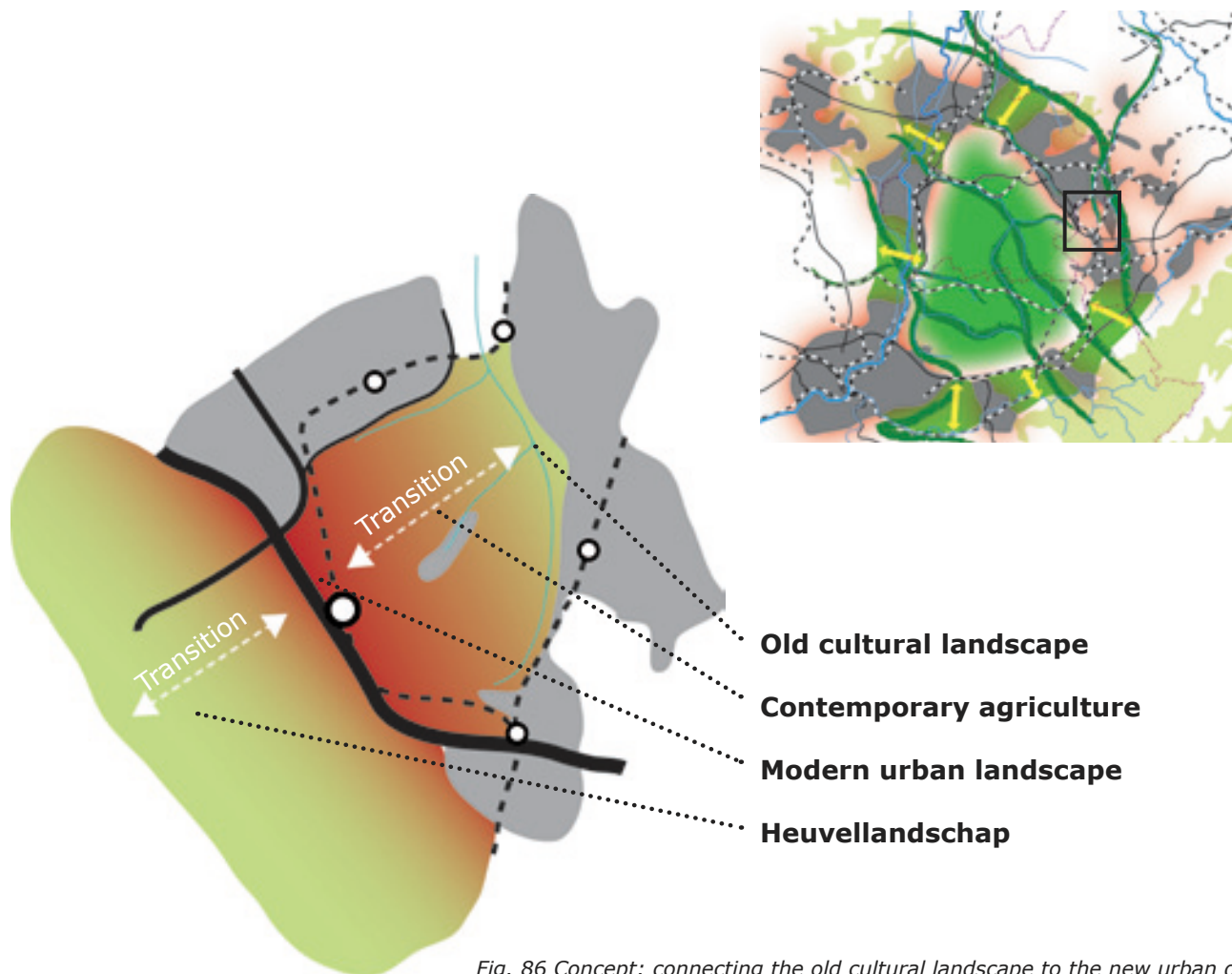
Fig. 86 Concept: connecting the old cultural landscape to the new urban developments

Old cultural landscape

Contemporary agriculture

Modern urban landscape

Heuvellandschap

Enhancing cultural & natural landscape

Kerkrade (City)

Low dynamic processes
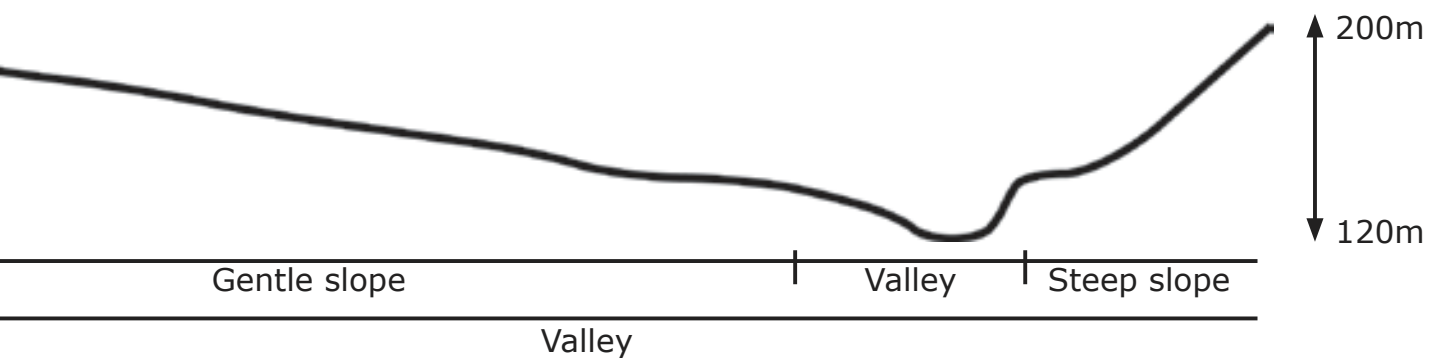
200m

120m

Gentle slope

Valley

Steep slope

Valley

Fig. 87 Cross section of project area showing the main principles of the concept

Vision & Concept

The potential users can be citizens from the surrounding cities, but also from more distant cities and even other countries. This means the recreational program has to be interesting and attractive enough for users from distant places to make the effort of travelling worthwhile.

Confining the project area
In this case the project area is limited to the left over rural area between Parkstad and Aachen. in order to focus on the area with the highest urban pressure and influence. Here the pressure and influence is highest as a result of the surrounding cities and the regional infrastructural network.
This area is also most interesting because it is an international area between the Netherlands and Germany, which offers interesting possibilities for international collaboration.

As explained before, the edges between rural and city are not sharp, but can be better described as smooth transitions. This is also the case in our project area. At the sides of Heerlen, Kerkrade, Kohlscheid and Richterich the project area is bounded by these cities. Only at the side of Bocholtz this edge is less sharp despite the highway and railroad. Here the project area slowly blends in with the 'Heuvellandschap'. The eventual design has to take these smooth transitions into account.

The project area as showed on the map also contains a segment of a larger stream valley system, which covers the entire metropolitan area our project area is part of. The vision and design for this segment can eventually also be applied on the stream valleys outside our project area.

For now the focus will be the area indicated with the square as shown on the map in order to make it workable and comprehensible.

CONCEPT
Connecting past with future
As explained before there is a lack of overall coherence between the different sub-areas in the project area. The urban influence which can be seen around the highway and new railroad on top of the plateau, conflicts with the remaining rural cultural landscape within the project area. The plateau is slowly turning into a modern urban landscape, contrasting with the cultural rural landscape.

This conflict between old and new can be turned into a quality by connecting them. by doing this, the project area will show a smooth transition from past (the stream valley) to now (conventional agriculture) to future (the plateau with new sustainable urban developments) to past again (Heuvellandschap) (fig. 86, 87, 88, 89 & 90).

As visitors will walk through this landscape they can experience and understand the development of the landscape through time. This way not only functional coherence but also symbolic coherence between past and future is created.

Sub areas and functions
The composition for this recreational hybrid landscape is based on the principle of the framework concept as described in the literature study on pag. 37:

> *It guarantees nature a long term stability, and allows more flexibility for land use change in the other areas.*
>
> *Some land uses support ecological processes which operate slowly and require stability in time and space. These are the "slow turning" wheels of the landscape such as nature conservation, watershed management and river floodplain dynamics.*
>
> *Other land uses and processes are influenced more by cultural and economic forces and depend on an ability to change in response to market and technological factors. Changes in land use for increased industrial production, for new housing, or soil and drainage alterations to support different agricultural systems are representative of the landscape's "fast turning wheels" (Sijmonds 1990).*
>
> *The framework concept recognizes the fundamental and particular needs of both.*
> (Ahern, 2002)

With the framework concept in mind three sub areas are created; the greenway area for the low dynamic functions, the plateau for the high dynamic functions, and the area in between which functions as a transition between the low and high dynamic landscapes (fig. 86, 87 & 88).

At the right next to Kerkrade, Kohlscheid and Richterich lies the stream valley, which will be turned into a greenway. Inside this greenway will be room for nature development & rain water storage, and cultural history combined with small scale recreation.

This greenway will safeguard the hydrological and ecological processes of this landscape. These processes have shaped the landscape as we know it today. These processes are part of the entire ecosystem and therefore essential to us, since we are also part of this ecosystem.

The main topic of the plateau will be sustainable energy production and urban development. Most of the plateau will be covered with energy crops. New urban clusters will be created at junctions of the local road network, according to the initial principles of the plateau villages (these will be described in the landscape design). Within these new urban clusters also new energy farms will be created that will maintain the fields with energy crops. By following these principles the new urban developments

1. Greenway: Nature development, cultural history & recreation (Low dynamic functions)

2. Local food production

3. Sustainable urban development & energy production (High dynamic functions)

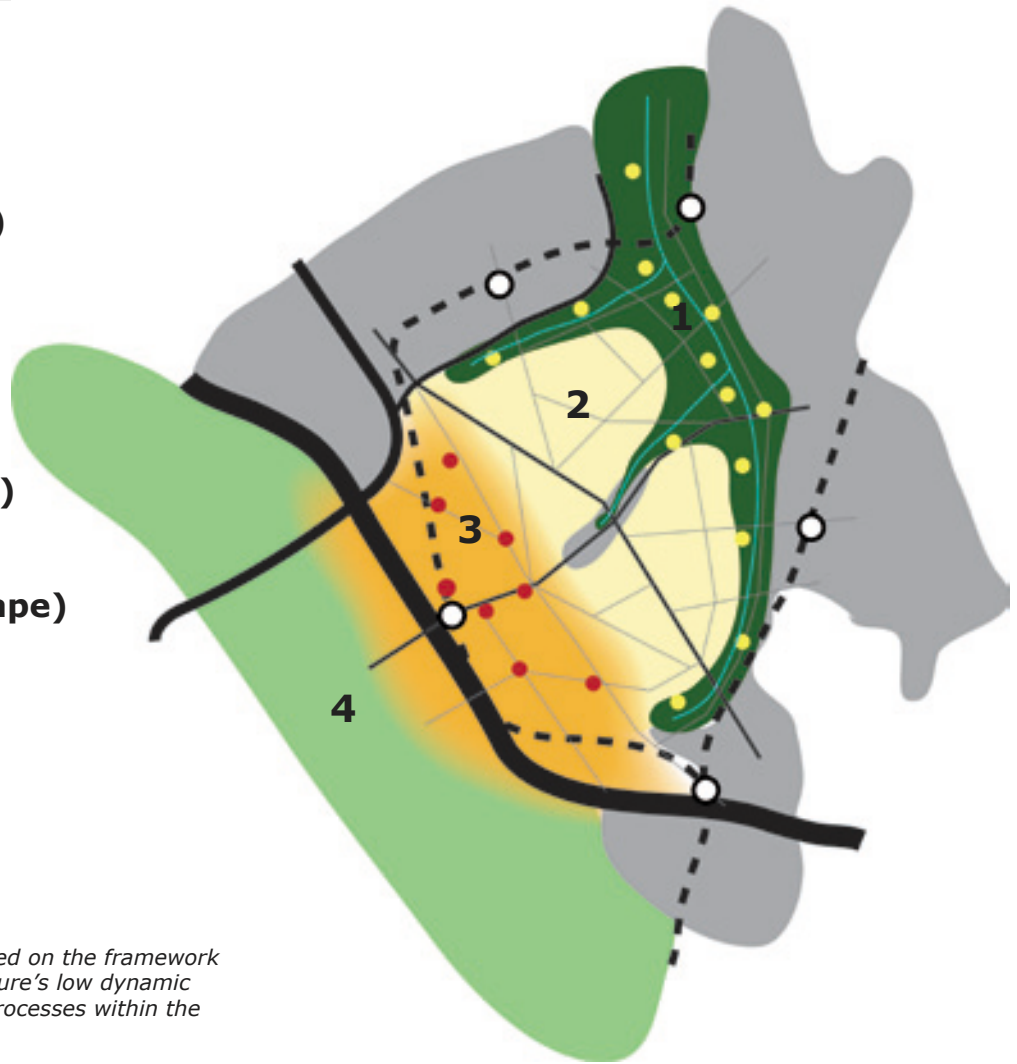**4. Heuvellandschap (cultural historic landscape)**

Fig. 88 Basic composition of concept based on the framework concept, creating a synergy between nature's low dynamic processes and the high dynamic urban processes within the project area
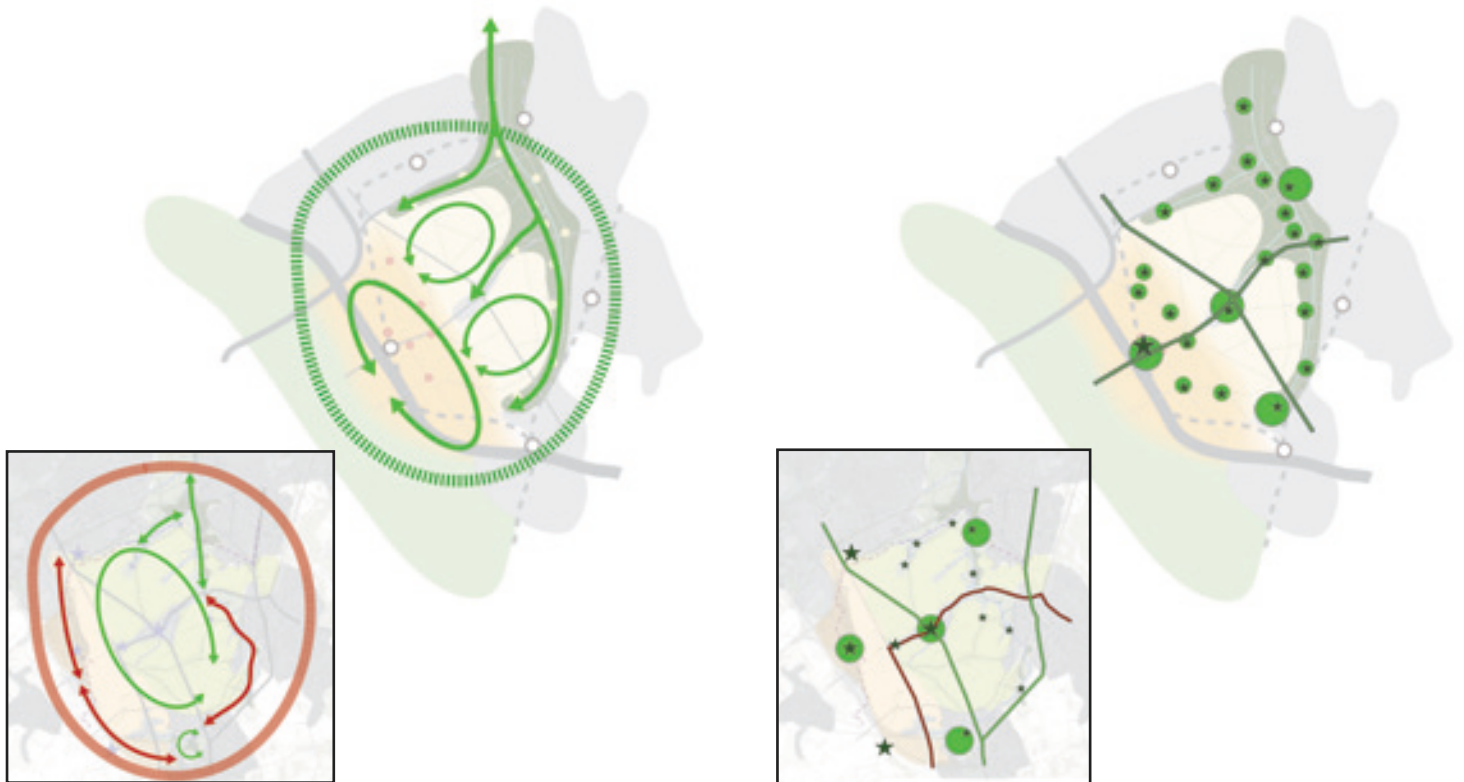

Fig. 89 Coherence: existing and new situation

Fig. 90 Spatial organization: existing and new situation

Vision & Concept

will become linked to the existing cultural landscape, and more coherence is created.

The new urban clusters will also be related to the RWTH university of Aachen and the Avantis solar energy research center. The new urban clusters will offer space for these important economic actors in our project area to grow. The urban clusters will contain the latest technology and developments at the field of sustainable energy production.

One main cluster will be created at the current Avantis business area. This cluster will also have an important informative and recreational function towards the public. At this location a large recreational facility has to be developed which will attract visitors from more distant places. This facility has to be linked to the sustainable energy theme.

Between the greenway and the plateau an area with local food production will be created, which will function as a transition between the old cultural landscape of the greenway and the modern urban landscape of the plateau. This area is strongly related to the greenway, because in the greenway the farms are located that will maintain this agricultural land.

Connected with economic driving forces
The project area will be connected to the metropolitan network by integrating it with the main economic driving forces of the project area. Figure 85 shows the economic driving forces of Parkstad which will be expressed in the project area, exist of the small and large recreational facilities. In the case of Aachen, they exist of knowledge and healthcare, related to the RWTH university and clinic. For Parkstad and Aachen sustainability (as in energy production, nature development & preservation) is an important topic, which will also be expressed in the project area.

USABLE DRIVING FORCES FOR VISION AND CONCEPT

Tourism, recreation & leisure

Knowledge & technology

Growing population -> Urban growth

Sustainable energy

Sustainable development & preservation of nature

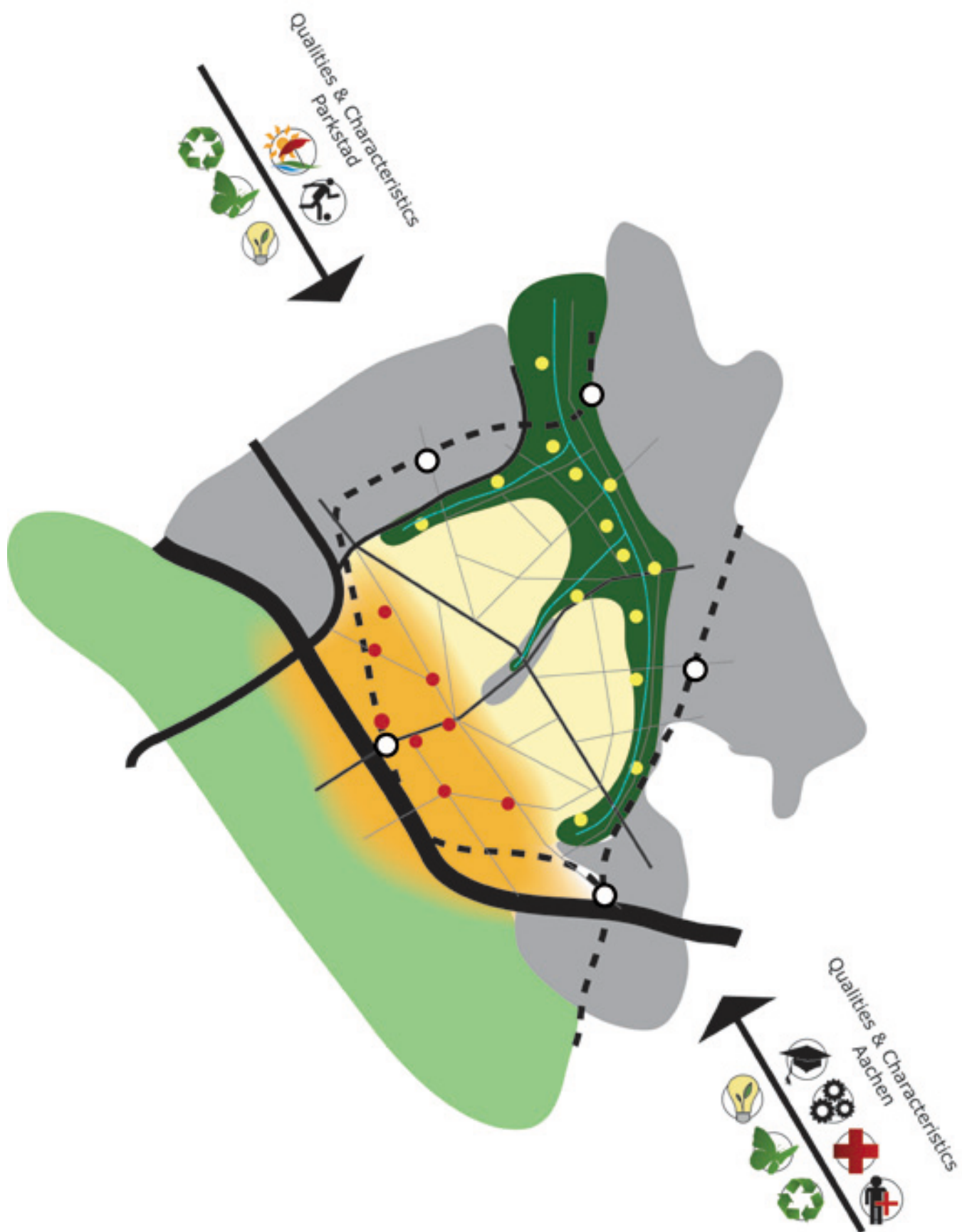Health care

Preserving cultural history

Fig. 91 The new hybrid landscape is connected to the important economic driving forces of the urban network

Vision & Concept

Connecting local with regional infrastructure
In order to make this new recreational hybrid landscape function, it is of great importance to connect the local infrastructural network (existing of main roads, bicycle paths and footpaths) to the regional infrastructural network of (existing of highways and railroads between the large cities) (fig. 92).

The Avantis train station on the plateau is located inside the project area, the other 4 train stations are at the border of the project area or very close to it. These train stations will function as important connection points. From these stations visitors can walk or rent a bike and enter the recreational hybrid landscape.

Visitors entering the project area from the highway can park their car at transferia points next to the highway. From these trasferia points they can also rent a bike or walk. The project area will be accessible by car, but it will be mainly designed for visitors afoot and by bicycle.

Improving local accessibility
Another important target group for the new recreational hybrid landscape will be the locals, living close to the project area in surrounding cities. They will use especially the greenway area frequently and for shorter periods. For example a short walk, or to visit the local farm shop.

The project area will only become part of the daily life of the local people when it is easy accessible. The road network of the surrounding neighborhoods should not stop at the border of these neighborhoods stop but should be continued into the project area. By doing this the greenway and the rest of the project area will become optimally connected with its direct context (fig. 93).

Improving internal infrastructural network
Inside the new recreational hybrid landscape it is also important for visitors to be able to move from one place to another. The current network inside the project area, existing of roads and foot and bicycle paths will be used and upgraded where needed. New connections inside the existing network will be based on the historic situation as much as possible.

Especially in the north of the project area, around the border between the Netherlands and Germany the internal road network is poor, since there are very few places where this border can be crossed. The height difference as result of the stream valleys and the old mining railroad in this area are barriers to the internal infrastructural network of the project area. In order to overcome these barriers, tunnels and bridges will be needed.

Existing situation

Level of connectedness between the regional and local infrastructure

External accessibility

Internal road network

126

Fig. 92 Improving the connection between the local road network and the regional infrastructural access points
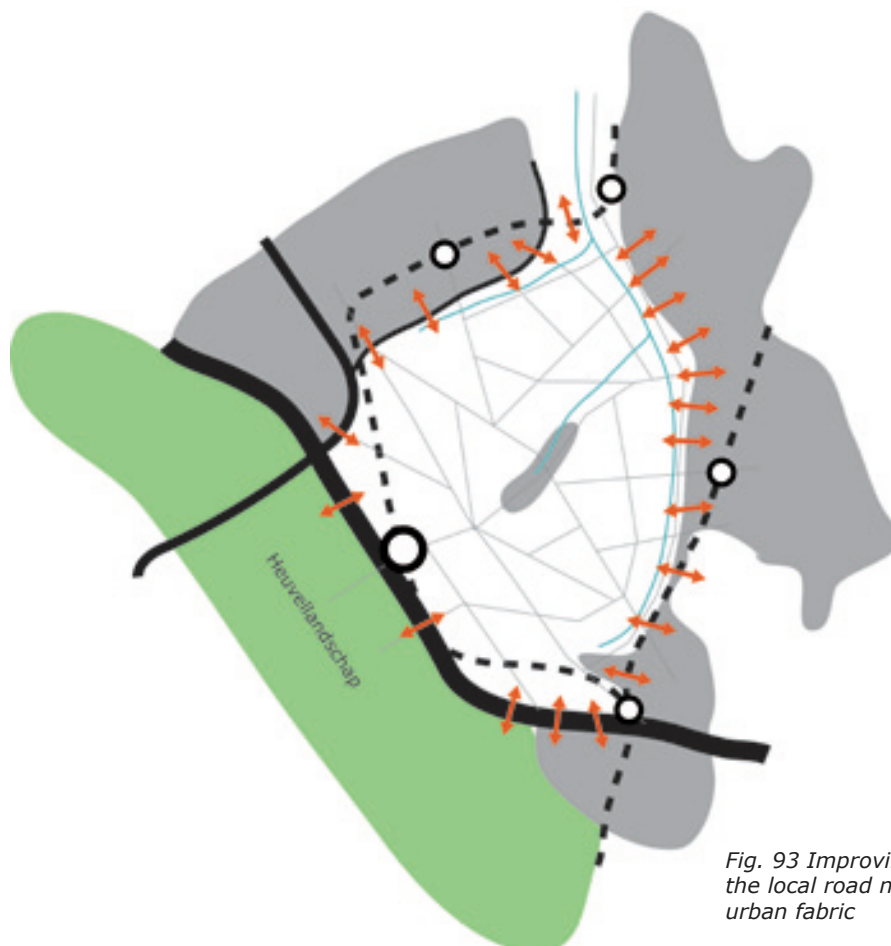

Fig. 93 Improving the connection between the local road network and the surrounding urban fabric

8. Landscape Design
'Recreational Hybrid Landscape'

Recreational Hybrid Landscape

STREAM VALLEYS

Greenways: Stream with gentle slopes, swamps, grassland, forest, farms as recreational centers and a network of foot & bicycle paths.

Tunnels for pedestrians & bicyclers to improve the accessibility of the greenway & project area, and to connect with the entire stream valley system.

Bridges for pedestrians & bicyclers to improve accessibility the project area.

Agraric land used for local food production for the surrounding cities and villages.

PLATEAU

New sustainable urban clusters on plateau according to principles of the original plateau villages, with as main theme 'sustainable energy production'.

New large wind turbine with public accessible observation cabin

Roads with extra wide verges and lanes, going through fields of energy crops.

INFRASTRUCTURAL NETWORK

Train stations & railroad

Highway

Local road network accessible by car

Local footh & bicycle network

Surrounding urban fabric

Surrounding stream valleys

Existing wind turbines

Border between the Netherlands & Germany

Height lines
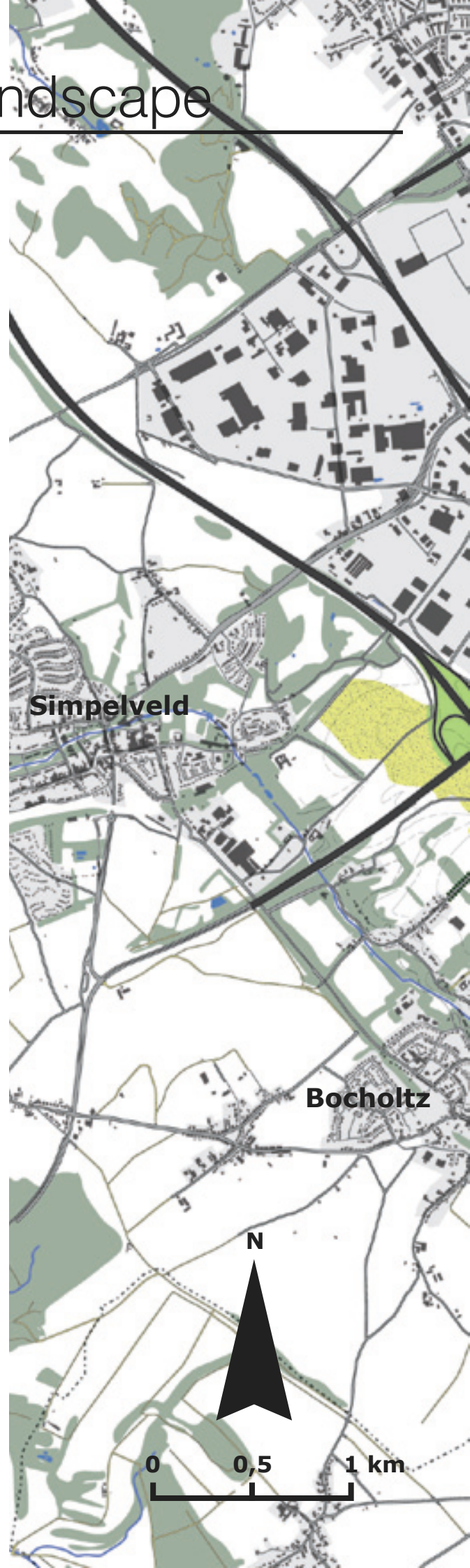
Fig. 94 Landscape design of 'Hybrid landscape' concept
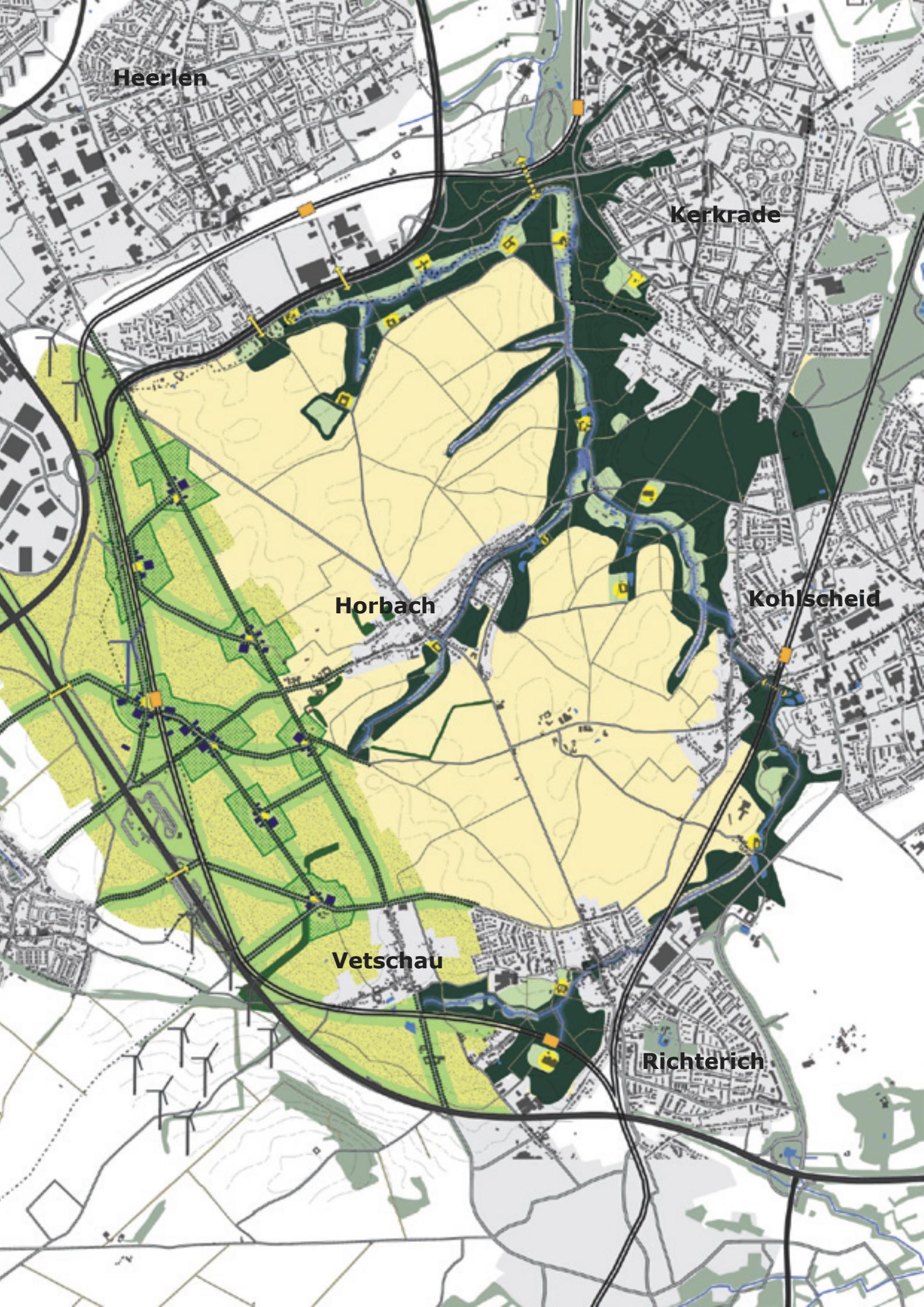
Heerlen

Kerkrade

Horbach

Kohlscheid

Vetschau

Richterich

Recreational Hybrid Landscape

GREENWAYS IN STREAM VALLEYS

Composition & appearance of greenway

The stream valleys will form the basis for the greenway inside this new recreational hybrid landscape. The greenway can be best described as an exaggerated version of the normal stream valley landscape type, which exist of a stream, swamps, wet grasslands and forest. There are basically two types of forest in the stream valley landscape type: wet forest that lies directly next to the stream, and forest on the steep slopes at the edge of the stream valley.

To give the greenway a robust and recognizable appearance in the landscape the forests on the slopes will become larger and more dense. This will result in one large linear shaped forest around the pattern of streams, which will be of high recreational and ecological value, as explained in the vision at page 122.

At places where the greenway can be wide enough, an open area of wet grasslands and swamp can develop around the stream, besides the forest on the slopes (see cross section A-A' page 134). At places where the greenway will be narrow (for example at places where it passes villages), the greenway will only exist of wet forest around the stream, in order to maintain the visual coherence with the rest of the greenway. (see cross section B-B' page 134)

At the village Richterich the greenways becomes entirely bounded by urban area which makes it a park like situation (see cross section C-C' page 134). This area already contains some recreational and sporting facilities and a large spring forest. Also a new train station is planned inside this 'park', which makes it a very interesting area with a lot of potential.

Development of greenway in time

In order for the greenway to reach its final form, first the accessibility of the greenway will be increased by improving the network of foot & cycling paths. Also the farms will be transformed into recreational centers. After this, the new greenway forest can be developed around the new recreational centers, and finally form one large linear forest across the stream.

The future recreational centers in the existing farms will be partly responsible for the development and maintenance of the new greenway forest. The entire landscape will benefit from these developments as well as the new recreational centers. New forest will improve the ecological and recreational quality of the landscape. It attracts more visitors and therefore increases the income of the recreational centers. part of this money can again be invested in the greenway (fig. 97).

Facilities in greenway

The recreational facilities in the greenway will consist of the cultural historical farms, which will function as recreational centers, and an intricate network of foot and bicycle paths. This network will connect the greenway with its direct context and it connects the farms with each other. (fig 95, 96)

The farms will be multi-functional and contain community gardens where people from surrounding cities and villages can grow their own food. The farms can also function as local food shops, restaurants, hotels and information points. Besides recreation, these farms can also get an health care related function, as a place for revalidation, or elderly care for example.

The forests of the greenway could also become the new 'commons', as described in the case study 'De verborgen tuin van Midden-Limburg' (Kerkstra, et al., 2003). The greenway will function as public space and becomes public property. Citizens of nearby cities and villages together with the new recreational centers inside the greenway can (voluntarily) be partly responsible for the maintenance of the greenway. This could also increase the level of connectedness between citizens and the landscape.

This greenway concept can also be applied to the other stream valleys outside the project area. Together an enormous international recreational network based on the stream valley pattern, can be created.
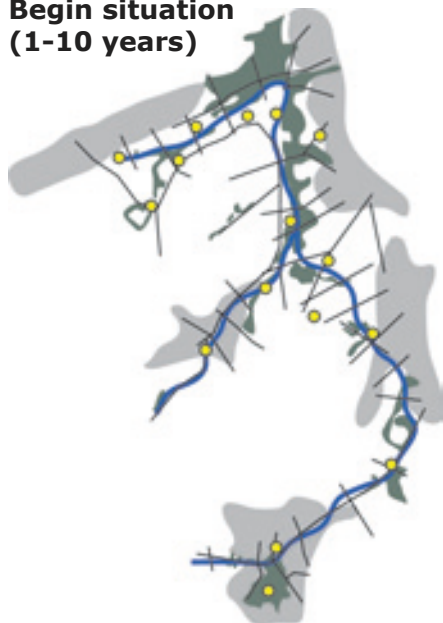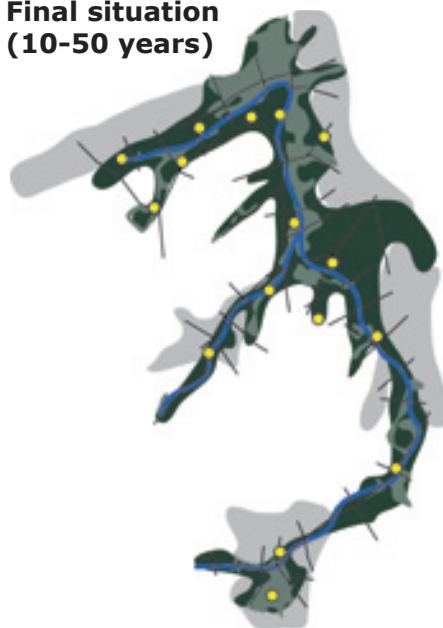

Fig. 95 Foot and bicycle paths in the greenway

Fig. 96 Existing farms as new recreational centers of the greenway

Greenway principle

**Begin situation
(1-10 years)**

**Final situation
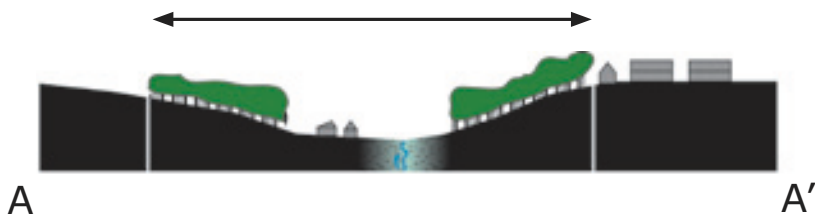(10-50 years)**

|	
	Stream
	Existing stream valley forest in greenway
	New stream valley forest in greenway
	Recreational centers (existing farms)
	Network of foot & cycling paths
	surrounding urban fabric

Fig. 97 Development and main principle of the greenway

Recreational Hybrid Landscape
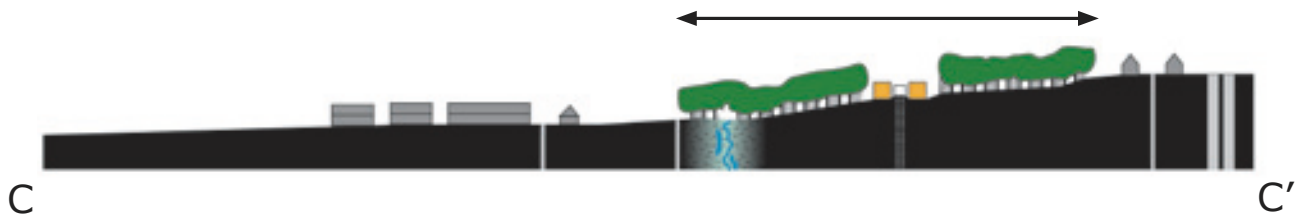
Broad greenway principle (linear forest with open center)

A   A′

Narrow greenway principle (linear forest through urban area)

B   B′
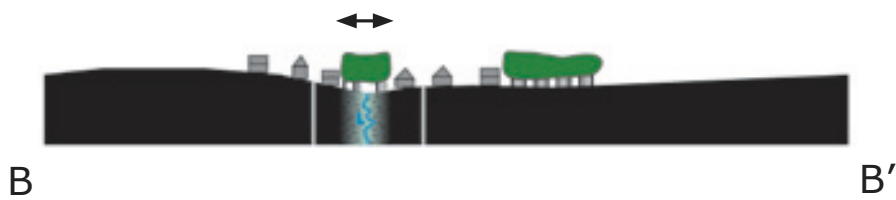
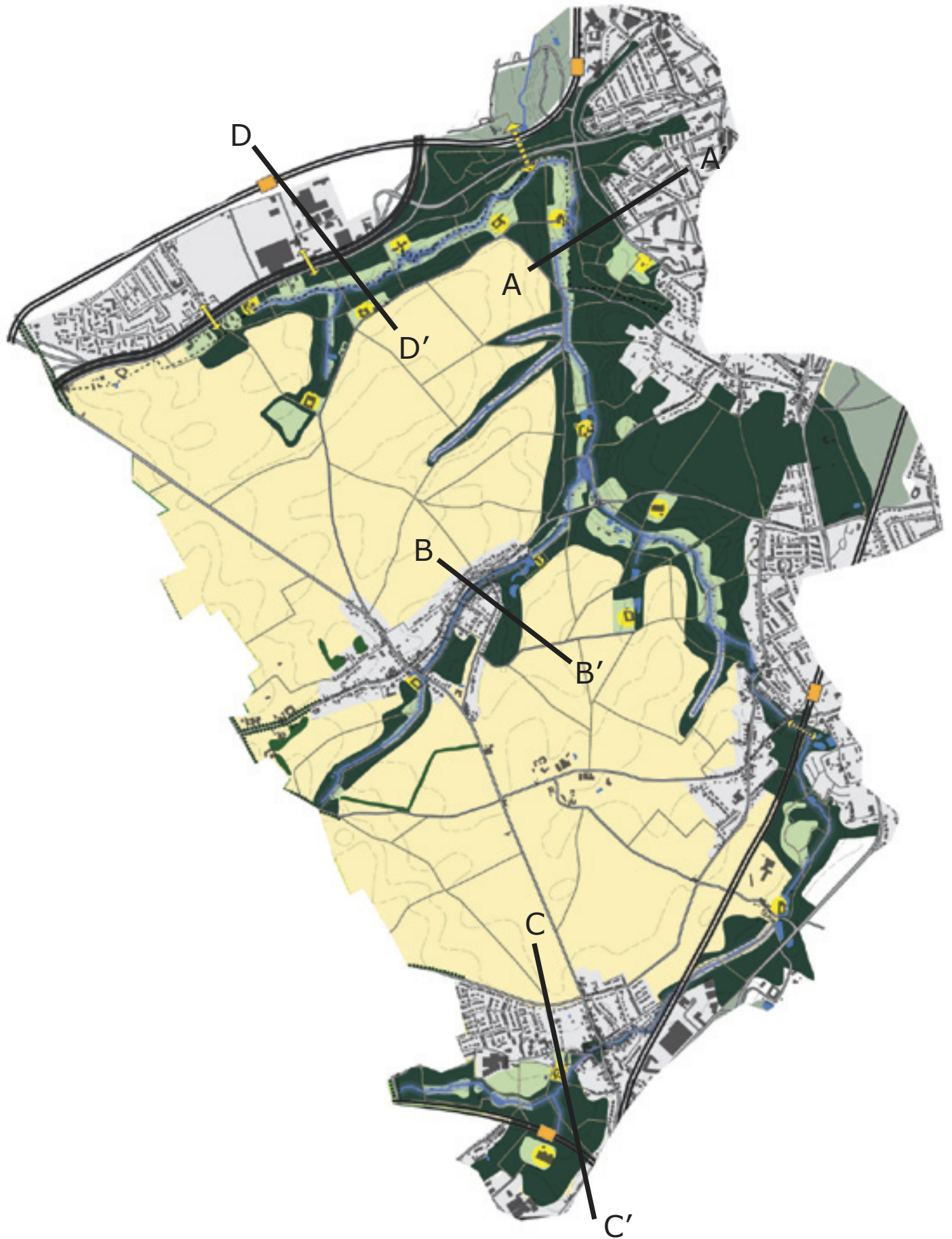Greenway within Richterich (park like situation)

C   C′

Position of greenway towards new ringway

D   D′

Fig. 98 Cross sections showing the basic structures of the greenway

Recreational Hybrid Landscape

Making the streams sustainable
In a natural situation a stream runs through a varied landscape existing of forest, shrubs, grasslands and swamp. The streams meander and have a gradual transition to the surrounding landscape. The watershed has a buffer capacity and is able to absorb by temporarily flooding of the stream valley.
The initial diverse stream valleys offered a lot of different sorts of plants and animals a living environment.

Nowadays the transition between stream and adjacent land is abrupt. The watershed area is almost completely drained which increases the risk on flooding during periods of extreme rainfall. Only a few plants and animals can be found in and around the streams. The stream valleys are dehydrated and acidified. Sediment and nutritions end up in the streams, instead of being buffered by adjacent land.

An important part of the new greenway is to restore the stream valleys into their original state and functioning as much as possible.
The transition between stream and adjacent land will become gradual again. The initial dynamics of the meandering stream that can take place again.

This improves the water storage capacity of the project area, makes it more climate proof and improves the water quality. Different mammals, birds, insects and other animals can find food, shelter, water, places for breeding and can use the greenway for migration (fig 102). (Verdonschot, 2010; Grontmij Nederland bv, 2006)

Fig. 99 Reference image of a stream with gentle slopes

Fig. 100 Stream surrounded by greenway forest

Fig. 101 Stream guided by wet forest

CURRENT SITUATION

Steep slopes

Strongly eroded stream

Dehydrated soil

Dehydrated soil

+/- 100m

NEW (INITIAL) SITUATION

Higher buffer capacity

Gentle slopes (More biodiversity)

Slope 1:25

Slope 1:2

Slope 1:25

+/- 100m

– – Extreme water level (T=10)

– – Normative water level (T=1)
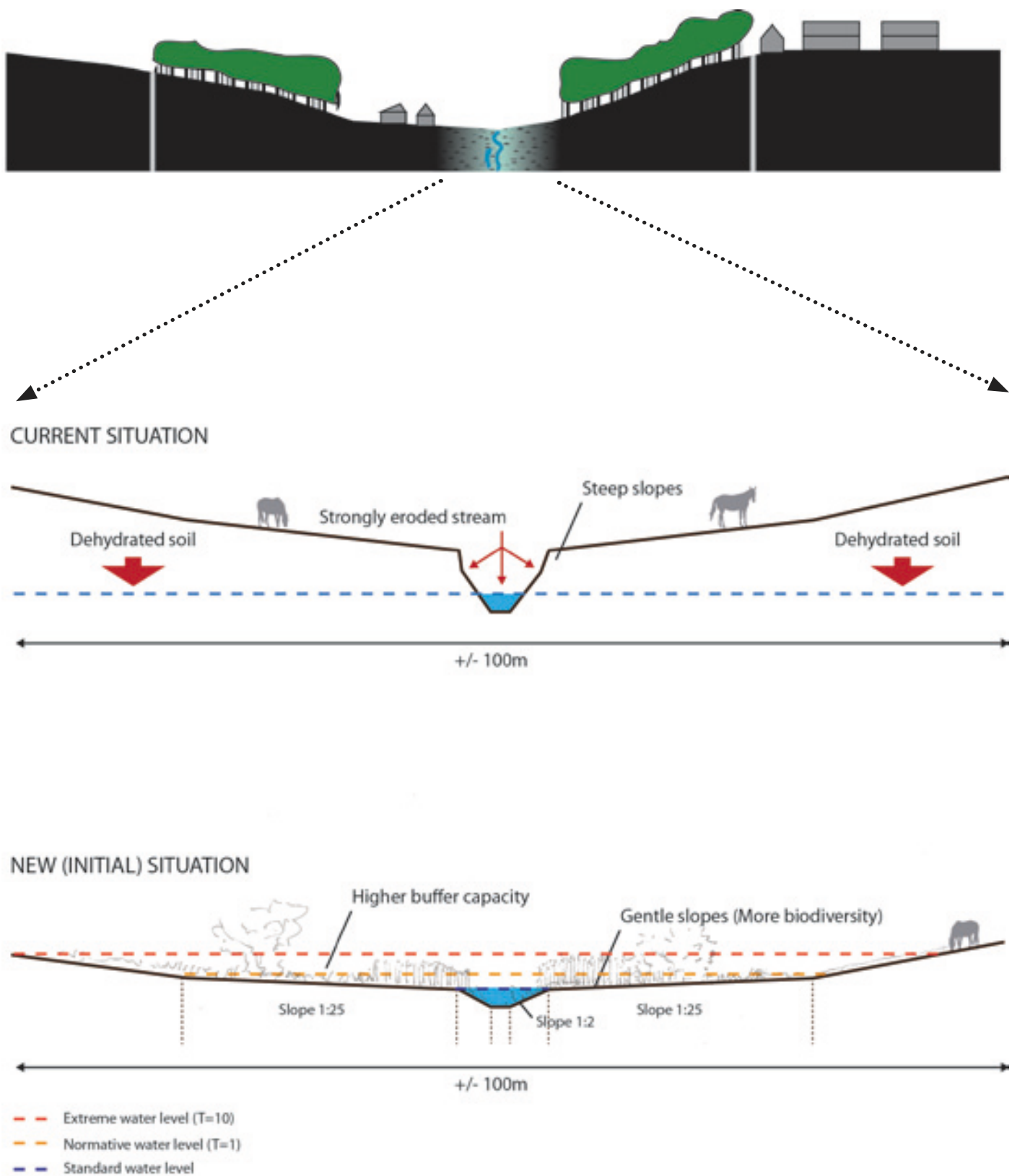
– – Standard water level

Fig. 102 Cross sections of the streams showing the current situation and the main principle of the new situation (Verdonschot, 2010; Grontmij Nederland bv, 2006)

Recreational Hybrid Landscape

SUSTAINABLE URBAN DEVELOPMENT ON PLATEAUS

Upgrading the road network

The current situation of this plateau has been changed in order to achieve a better coherence with the surrounding landscape.

The strange and detached (infrastructural) shape of the Avantis business area (literally key shaped), has been partly removed and adjusted, so it would appear as a part of the entire road network of the plateau again. The initial plan for the Avantis business area will be adjusted according to this new design.

Some historical roads have been restored again (fig. 76). These were removed during the building process of the highway and the Avantis business area. Also some new roads have been added to this network in order to make the plateau better accessible.

The road network of the plateau will be connected to the regional infrastructure as described in the vision at page 126.

Energy crops instead of agriculture

The initial plateaus in general were characterized as large scale agricultural production lands with an open character, from which you could look over the entire landscape. However, the plateaus in time have also been the most dynamic landscapes compared to the stream valleys and often changed in land use and appearance. Therefore the agricultural character and openness will be sacrificed in order to make new developments possible in this area. This way the urban pressure and influence can establish itself here instead of in the stream valleys.

Almost the entire plateau will eventually be covered with energy crops which can reach a height of more than 3 meters. The road network will cross these fields of energy crops and will be accentuated with lanes. Across these roads a green open stroke of approximately 30 meters at both sides will be created. This will prevent this landscape from becoming oppressive and will provide the landscape legibility. The plateau will keep the identity of a large scale production landscape (fig. 103, 105, 110).
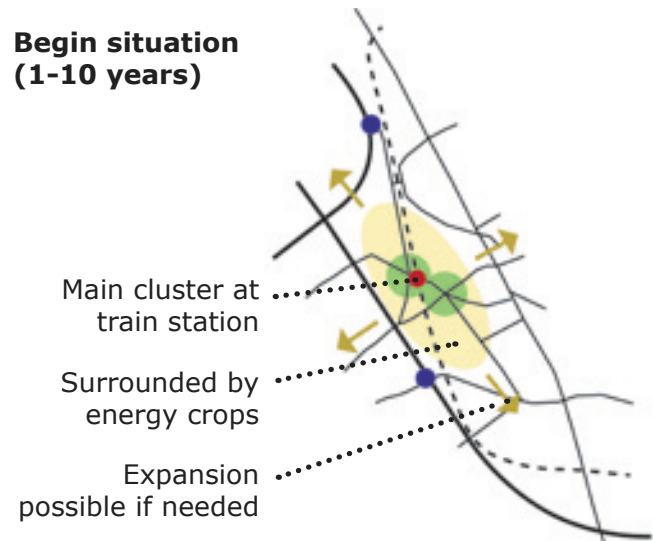
New urban clusters

New urban clusters will be created on top of the plateau at junctions of the local road network. These will be based on the structure and principle of the initial plateau villages (fig. 104).

These developed along junctions of roads as linear shaped villages, with a church and market place at the center of the road junction. These villages often also had a small rain water basin, for the cattle, in the center of the village. Clay was used to prevent the water from infiltrating in the dry sandy soil. Fruit orchards were planted around the villages as an extra source of income. The villages appeared as green isles on the open plateaus. These principles will be used for the concept of the new

Principle of new developments on plateau
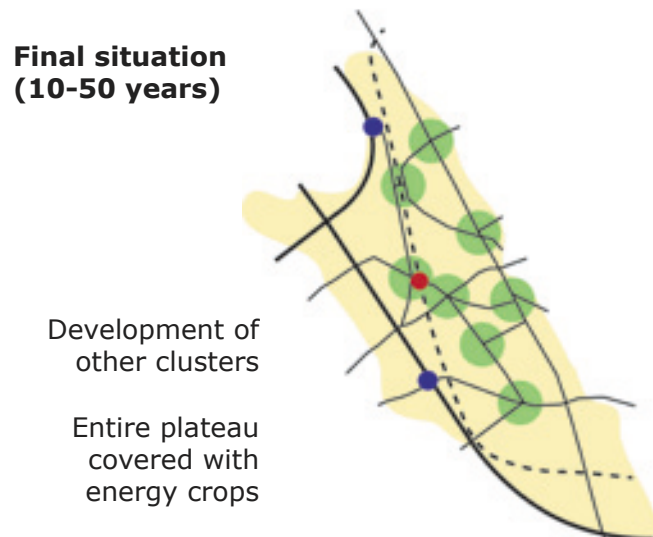
Begin situation (1-10 years)

Main cluster at train station

Surrounded by energy crops

Expansion possible if needed

Final situation (10-50 years)

Development of other clusters

Entire plateau covered with energy crops

Fig. 103 Development and main principles of the new energy landscape on the plateau

Principle of new urban clusters

Roads with lanes

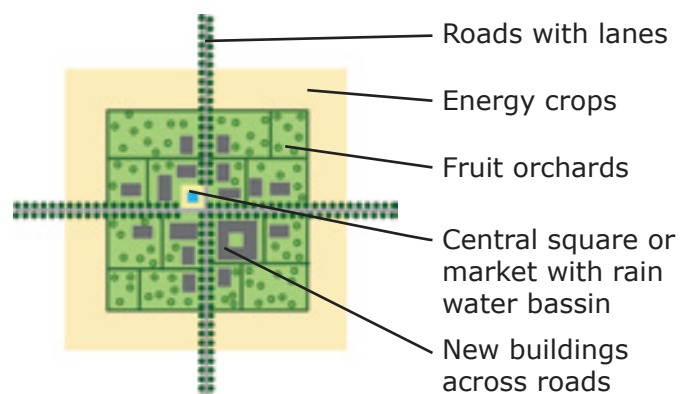Energy crops

Fruit orchards

Central square or market with rain water bassin

New buildings across roads

Fig. 104 Main principles of the new urban clusters

138

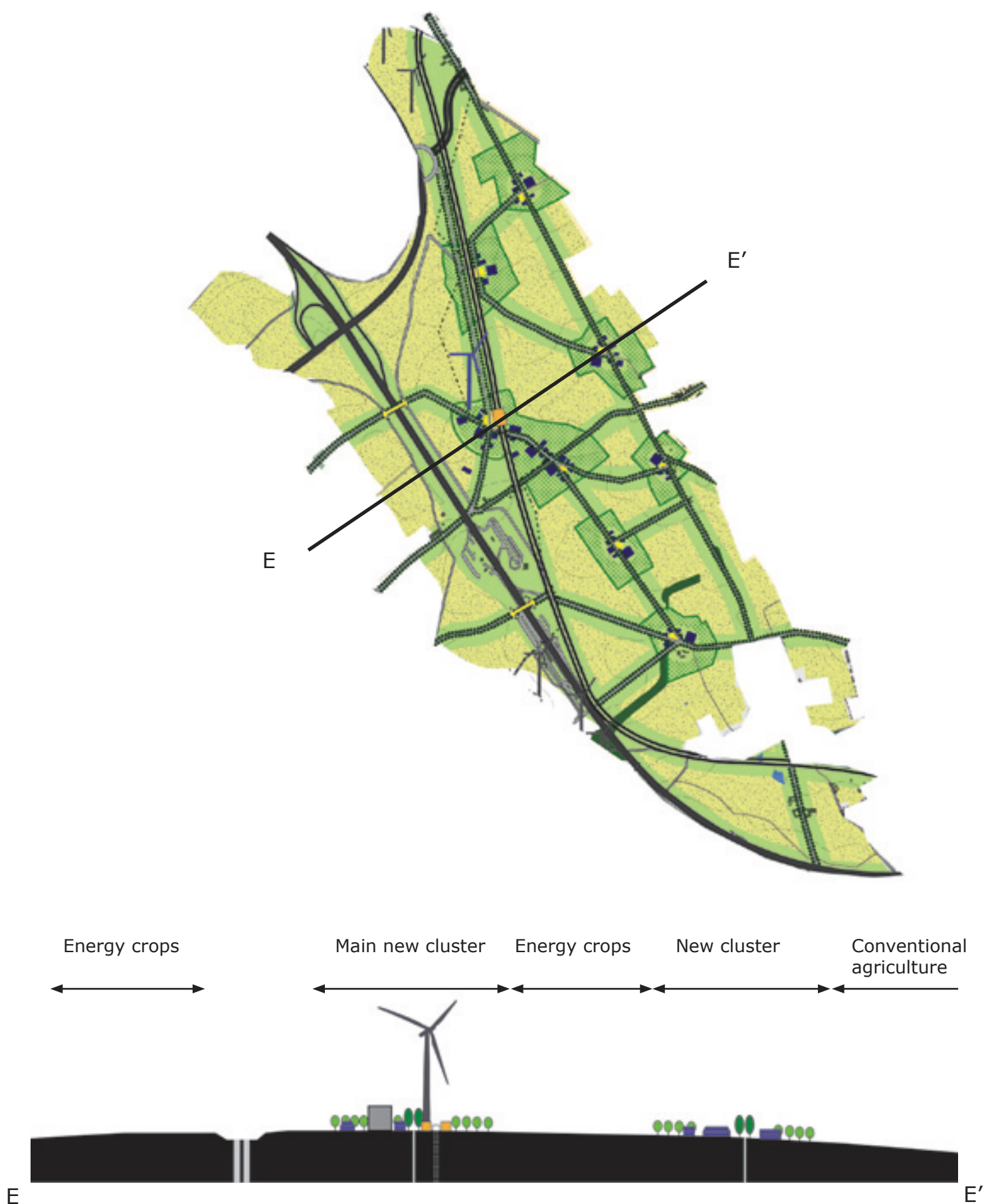| Energy crops | | Main new cluster | Energy crops | New cluster | Conventional agriculture |

Fig. 105 Cross section of the future situation of the plateau showing the basic structure of this new energy landscape

Recreational Hybrid Landscape

urban clusters. The main difference will be the buildings which will have a modern, high tech appearance, using technologies from the RWTH university and solar energy technology from Avantis. The only restriction is that they have to make a reference to the initial farms of this area. The new urban clusters will exist of offices, research centers related to the RWTH university. New farms inside the clusters will maintain the energy crop fields and fruit orchards (fig. 108, 109).

The water basin in the center, will be replaced with a rain water catchment area, in which the rainwater of all buildings in a cluster will be stored. These catchment areas will also contribute to reducing the overall dehydration problem of the project area.

The cluster at the former Avantis business area, will become the main clusters, which will also have an important recreational and informative function towards the visitors of the project area. This will also be the first cluster to be created. In time this network can grow and more clusters can be built when needed (fig. 95).

Large recreational facility
In or around this main cluster a large recreational facility will be created, which will be related to sustainable energy production and techniques. It also has to be integrated with the surrounding landscape. This large recreational facility has to attract people from more distant places, it has to become the main attraction or icon of the entire recreational hybrid landscape.

This facility will be located at the plateau, because the connection to the regional infrastructure here is strongest. The urban pressure and activity will be very high so it is not an option to place it in or around the stream valley area, since it is to vulnerable.

There are different possibilities in what this large recreational facility could be. It could be for example a sustainable theme park, which will be entirely self-sufficient regarding to energy and food. The concept of the 'Eden Project' in Cornwall (England) could also be applied in this project area, on a smaller scale (fig. 111).

Another possibility is that the entire plateau and network of new urban clusters will become one giant open air art gallery, with sustainability as the main theme. Visitors could wander through this energy landscape and explore interesting and exiting sculptures, of which some are openly exposed in the urban clusters and others will be hided within the energy crop fields. The Kröller-Müller sculpture garden, located in the Veluwe (the Netherlands) and Insel Hombroich (Germany) could be used as example and inspirational source in this case, in creating such a place with sustainability as main theme.

A more modest possibility would be a large wind turbine, which will also function as an observation tower with a panoramic view cabin, located under the rotor (fig 112).

For now, this modest option of a wind turbine accessible to the public will be used in the design. It would be very interesting to investigate the other possibilities within a separate design study.

The project area already contains wind turbines in this area. By placing one new large wind turbine in between these other existing wind turbines, another visual and symbolic connection with the surrounding landscape is created, which will also improve the overall coherence of the project area.

Combined heat-power plant & bio fermentation plant
In the main cluster will also a combined heath power plant in combination with a bio fermentation plant will be placed. Here energy and heath for the surrounding urban areas will be created out of biomass (fig. 106, 107).

The input for these sustainable power plants will come from the entire recreational hybrid landscape and from the surrounding cities. The plateau will provide energy crops, biomass from the fruit orchards and left over crops from areas with conventional agriculture. The greenway will provide biomass from mainly the stream valley forests.
Waste from surrounding cities can also be used as input for the combined heath power plant and the bio fermentation plant (fig. 113, 114). (Stremke, 2010)

Fig. 106 Combined heat-power plant (Flickr, 2010)

Fig. 107 Bio fermentation plants (SAMCON, 2012)

Fig. 108 Example modern sustainable buildings, related to the initial architecture (Stremke, 2010)

Fig. 109 Rain water basin of Monnikenhuizen, Arnhem (Geitenkampnet, 2012)

Fig. 110 Fields with energy crops (Stauffer, 2011)

Fig. 111 Eden Project: once into the attraction, there is a meandering path with views of the two biomes, planted landscapes, including vegetable gardens, and sculptures

Fig. 112 Wind turbine with observation cabin (Grousemountain, 2012)

141
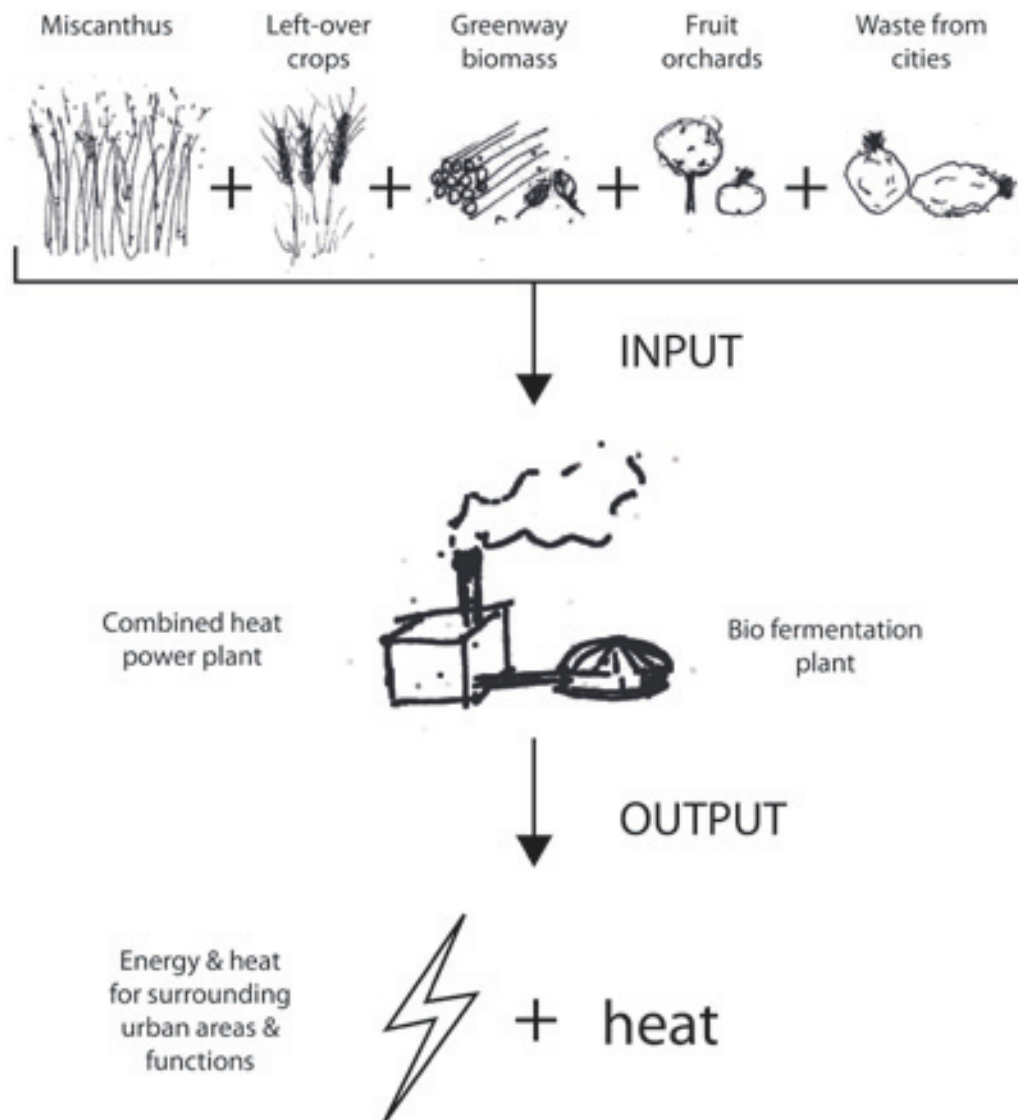
Recreational Hybrid Landscape

Fig. 113 Principle of the energy landscape (Stremke, 2010)

Fig. 114 Locations of the different biomass inputs within and around the project area (Stremke, 2010)

9. Landscape Design Elaborations

Greenway In Stream Valleys
Sustainable Urban Developments On Plateaus

Landscape Design Elaborations

In this chapter we will elaborate on the two most important parts of the landscape design; the greenway based on the stream valley area and the plateau with sustainable urban developments. The two areas which will be elaborated are indicated on the map at the right.

These two elaborations will be a concrete translation of the landscape design, which still was quite abstract. The spatial characteristics and visual experience of the new greenway in the stream valley area and the new urban developments on the plateau will be made clear. This will be done with detailed maps, cross sections and visualisations from a human perspective.

Fig. 115 Locations of the elaborations of the landscape design
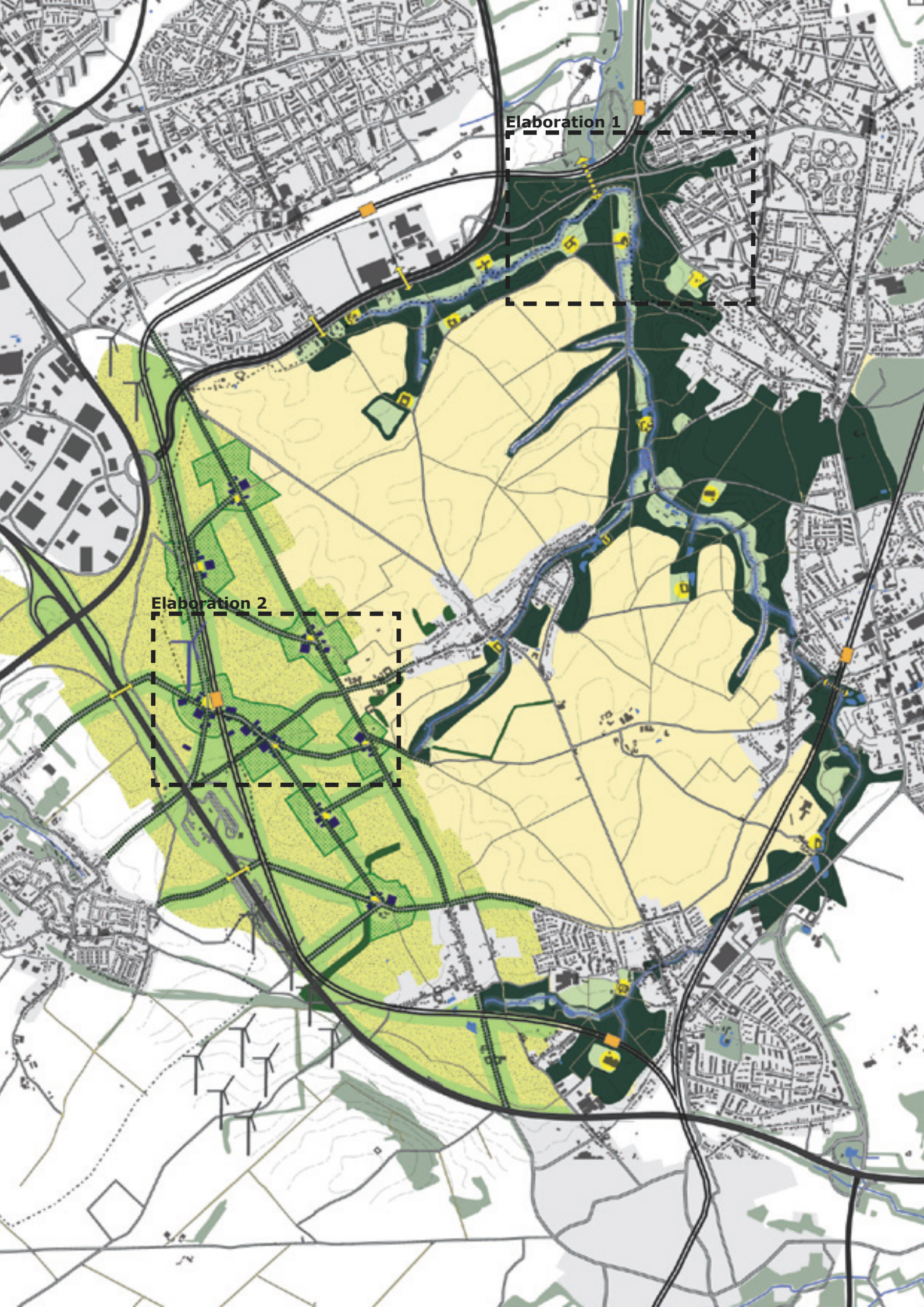
Elaboration 1

Elaboration 2

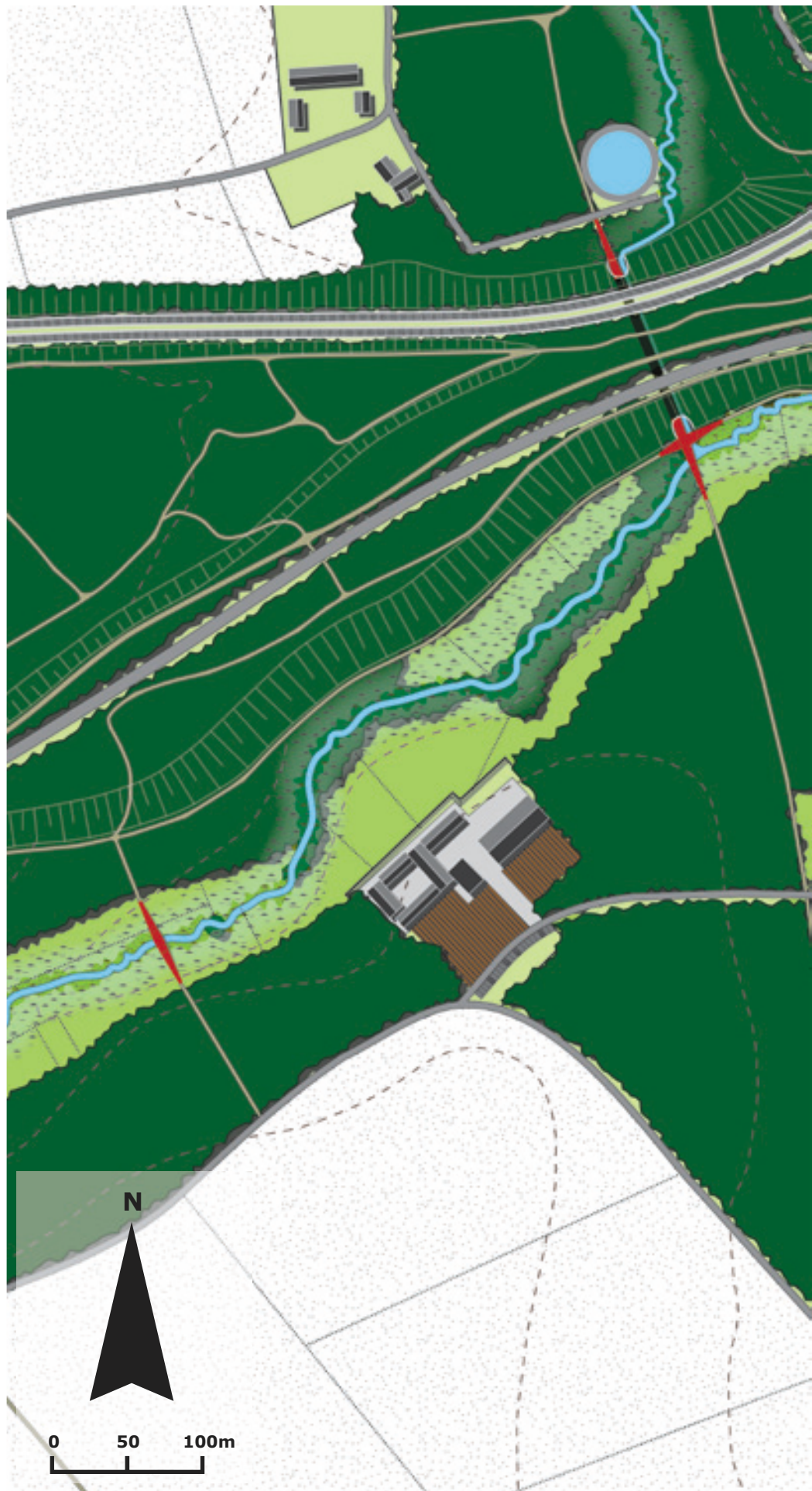# 9.1 Greenway In Stream Valleys
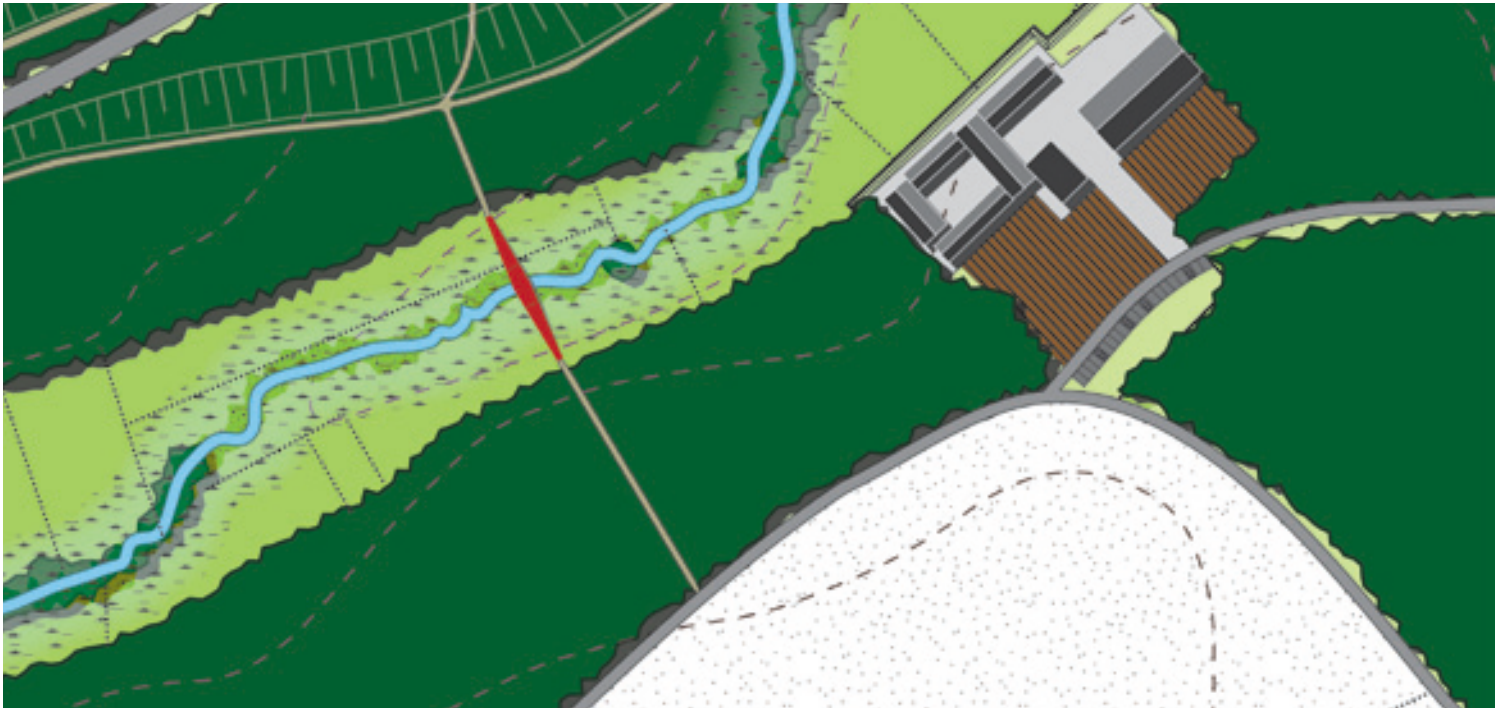
Greenway In Stream Valleys

Stream with reed & swamp at both sides

Wet grassland (inundation areas)

Wet forest along stream

Dry forest on slopes

New recreational areas (existing farms)

Community gardens

Parking strips

Arable land (local food production)

Railroad

Main roads

Foot & bicycle paths

Wooden bridges/ platforms

Tunnel

Existing sporting facilities

Existing cemetery

Surrounding urban fabric

Taluds

Heigth lines

N

0   50   100m

Fig. 116 Elaboration of the greenway near Kerkrade

Greenway In Stream Valleys

Dry Oak-Birch forest

Wet grassland (Inundation area)
- 'Dotterbloem' grassland
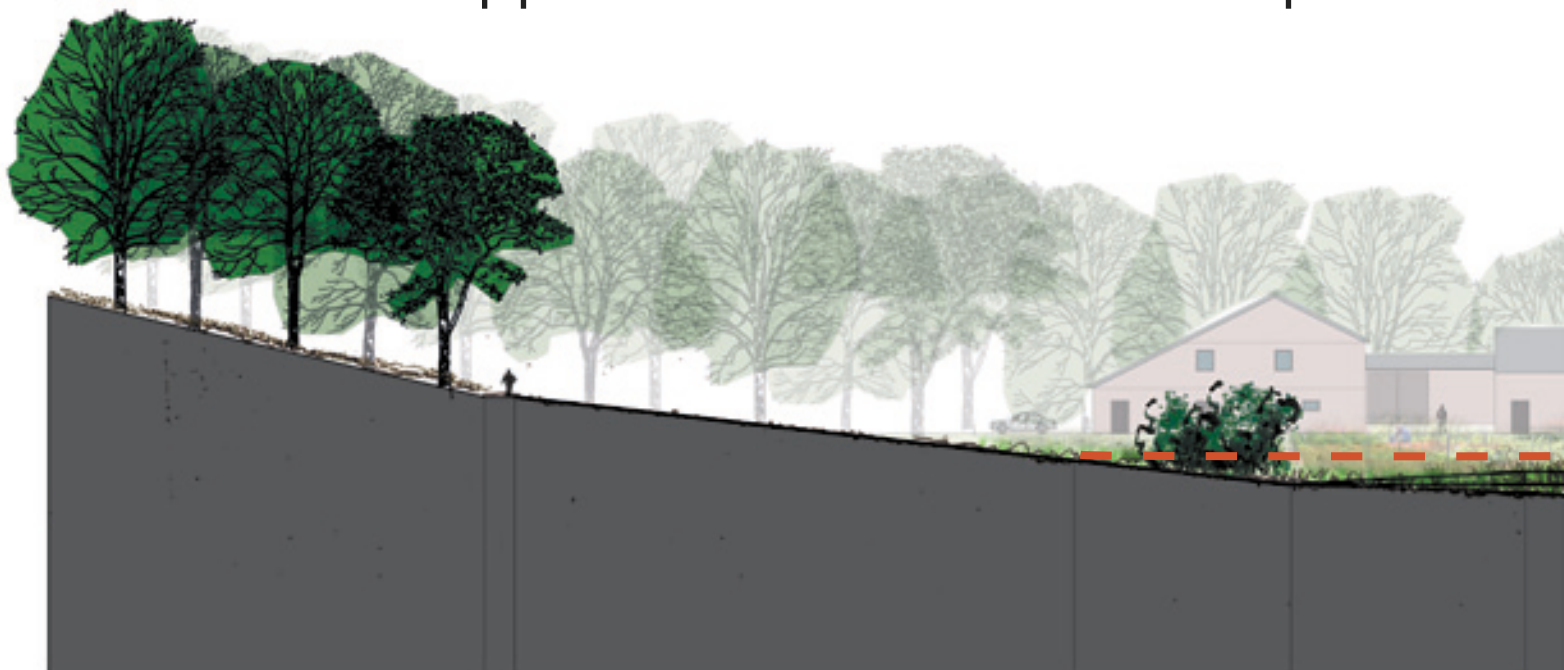- 'Blauwgrasland'

Foot & bicycle path

Fig. 117 Detailed cross section of the greenway near Kerkrade, showing the stream with bridge in the foreground and a recreational center in the background. The red dashed line indicates the maximum water level of the stream, the lowest part of the greenway can be inundated during times of heavy rainfall
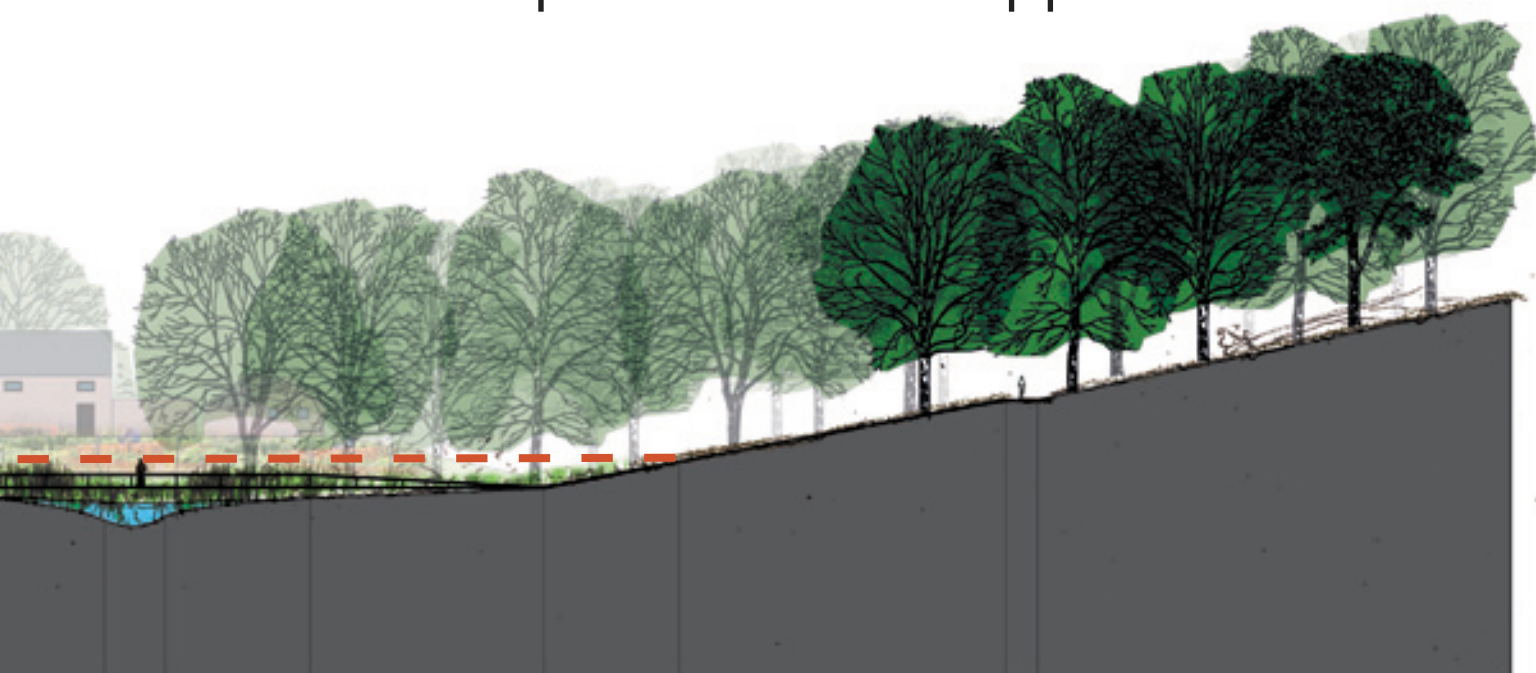
152

Stream / Swamp

Wet grassland (Inundation area)
- 'Dotterbloem' grassland
- 'Blauwgrasland'

Dry Oak-Birch forest

bridge

Foot & bicycle path

Greenway In Stream Valleys

Fig. 118 Visualization of broad greenway, showing the recreational centers at the right (existing farms), recreational paths, bridges and the surrounding greenway forest

Greenway In Stream Valleys

Grassland
(Inundation area)

Wet forest
- 'Elzenbroekbos'
- 'Elzen-essenbos'
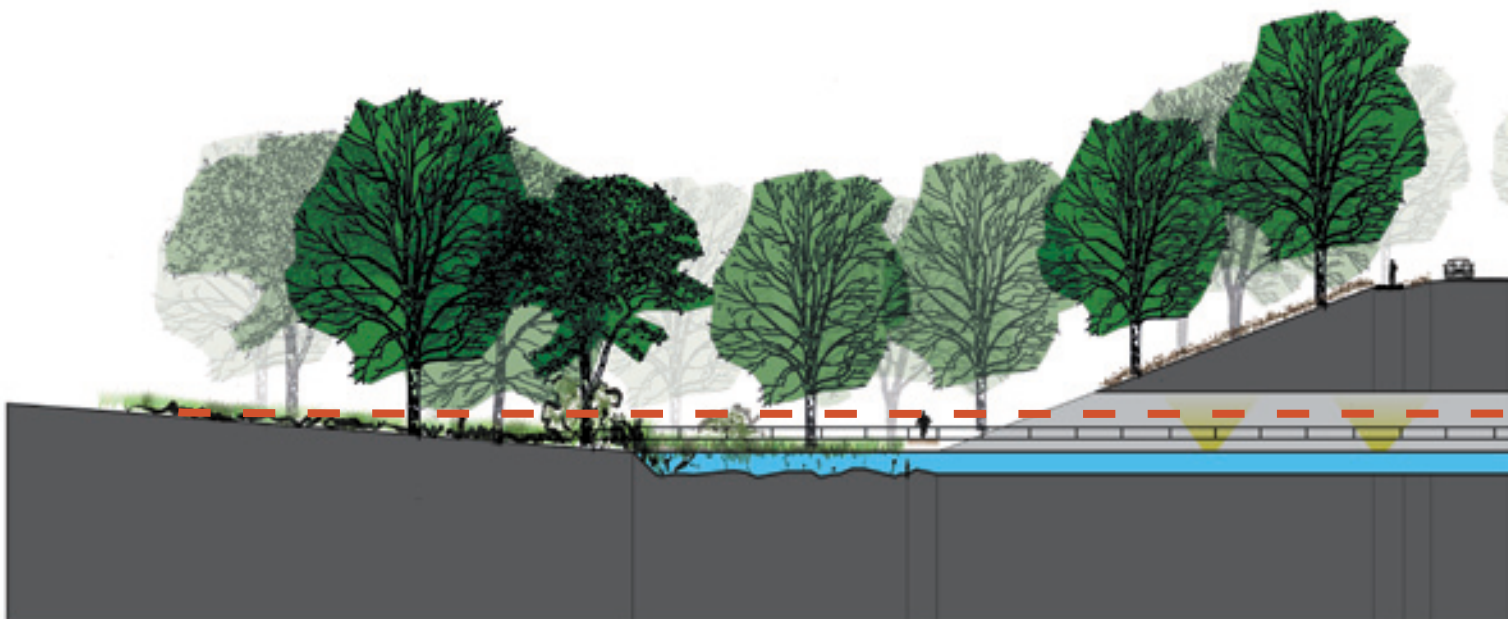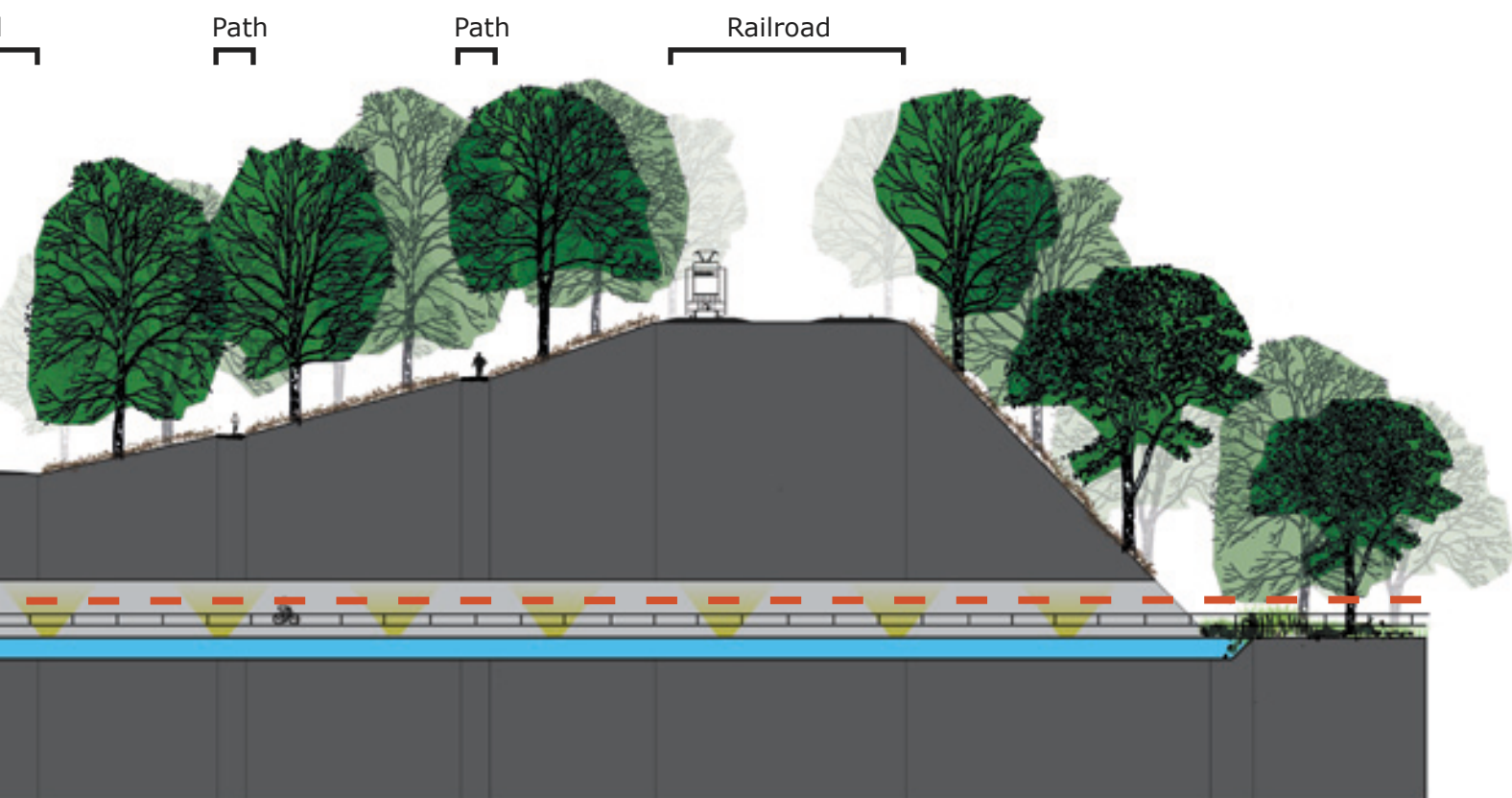
Stream / Swamp

Path

Path Road

Fig. 119 Detailed cross section of the former mine waste hill, showing the new tunnel which will connect the greenway part of the project area with the surrounding greenway network. The red dashed line indicates the maximum water level of the stream, the lowest part of the greenway including the tunnel can be inundated during times of extreme rainfall

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Dry Oak-Birch forest

Wet forest
- 'Elzenbroekbos'
- 'Elzen-essenbos'

Tunnel for pedestrians & bicyclers

Path

Path

Railroad

157

Greenway In Stream Valleys

Fig. 120 Visualization of tunnel through former mine waste hill, the wooden platforms are keeping the stream valleys accessible at swampy places

9.2 Sustainable Urban Developments On Plateaus
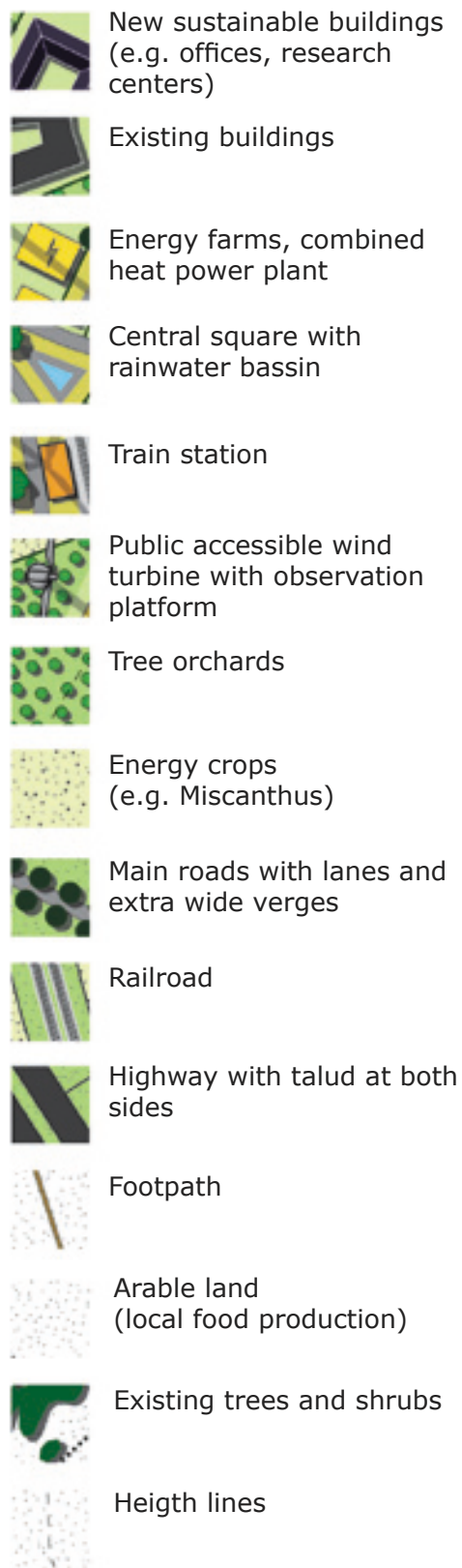
Sustainable Urban Developments

New sustainable buildings (e.g. offices, research centers)

Existing buildings

Energy farms, combined heat power plant

Central square with rainwater bassin

Train station

Public accessible wind turbine with observation platform

Tree orchards

Energy crops (e.g. Miscanthus)

Main roads with lanes and extra wide verges

Railroad

Highway with talud at both sides

Footpath

Arable land (local food production)

Existing trees and shrubs

Heigth lines

Fig. 121 Elaboration of the new sustainable urban developments on the plateau

N

0   50   100m

On Plateaus

Sustainable Urban Developments
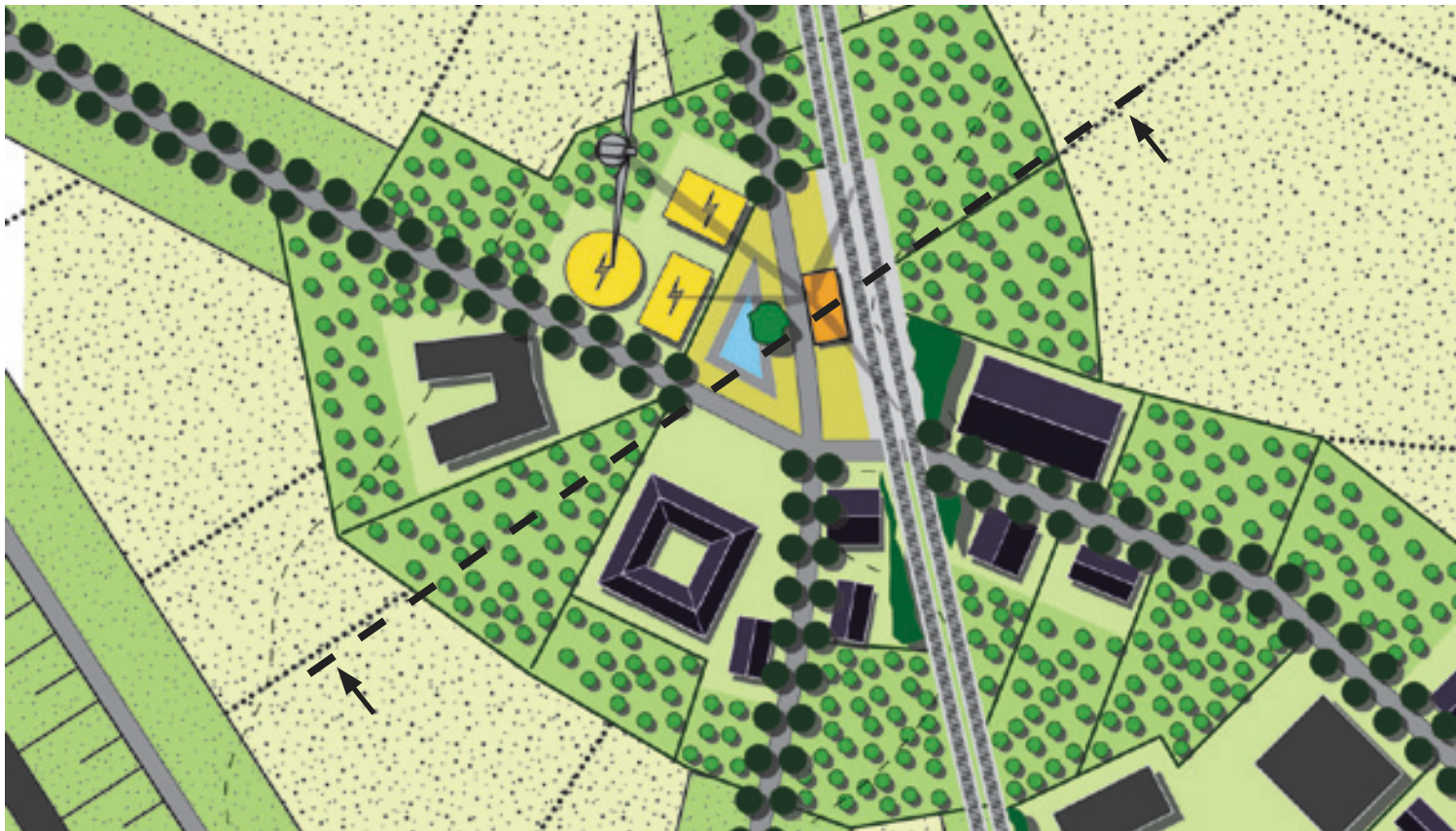
Energy crops
(e.g. Miscanthus)

Fruit orchard

(Existing) building within orchard

Road with lane

Fig. 122 Detailed cross section of the new main urban cluster, with the new public accessible wind turbine in the background

On Plateaus

**Central square &
Rainwater bassin**

New train station

Fruit orchard

Energy crops
(e.g. Miscanthus)
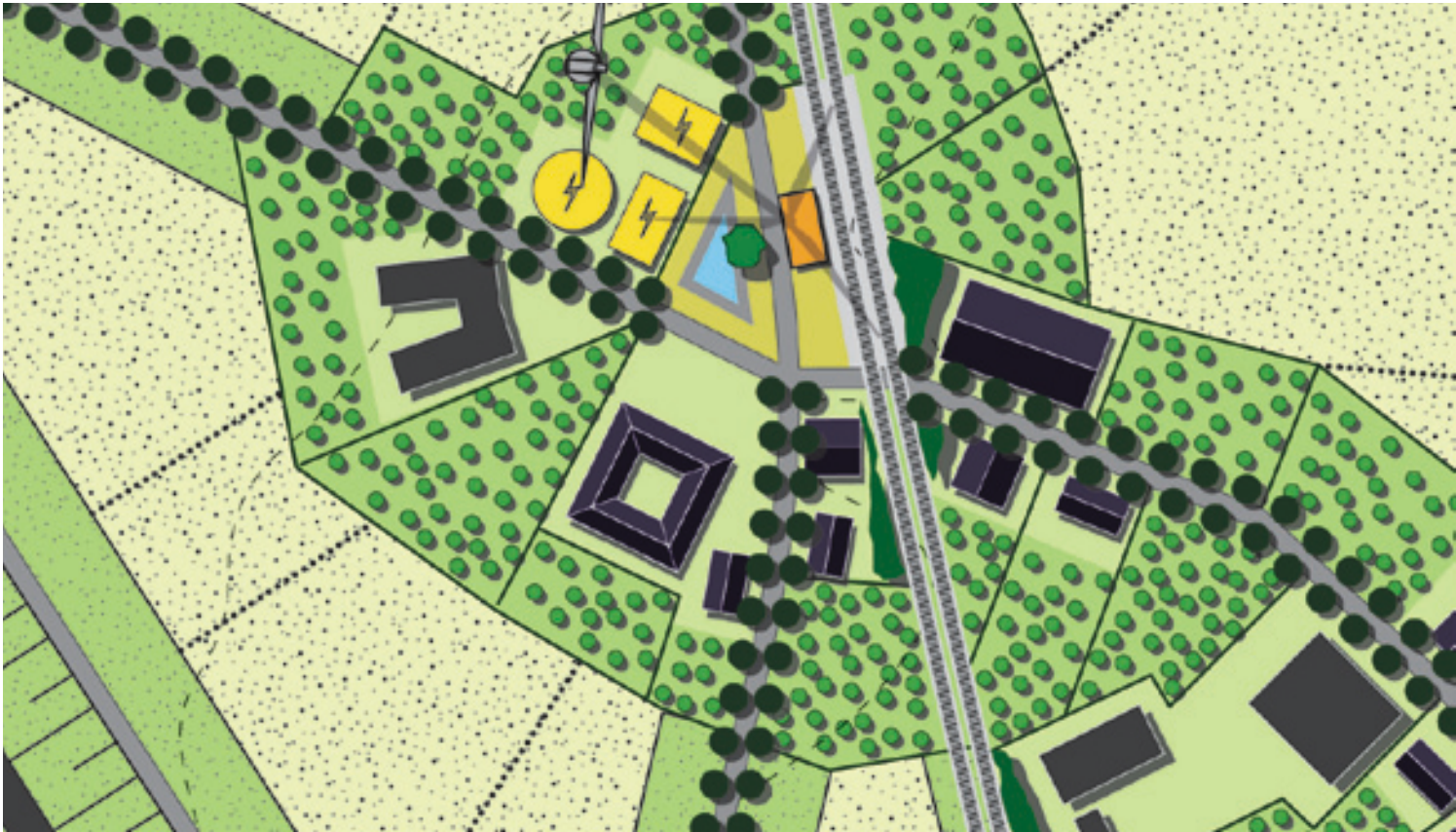
Sustainable Urban Developments

Fig. 123 Detailed cross section of the a lane through the energy crop fields with tree orchards, which surround the new urban clusters, in the background

On Plateaus

Sustainable Urban Developments

Energy crops
(e.g. Miscanthus)

Wide verge (dry grassland)

Road with
(Fraxinus ex

Fig. 124 Detailed cross section of the a lane through the energy crop fields with tree orchards, which surround the new urban clusters, in the background

On Plateaus

lane
(xcelsior)

Wide verge (dry grassland)

Energy crops
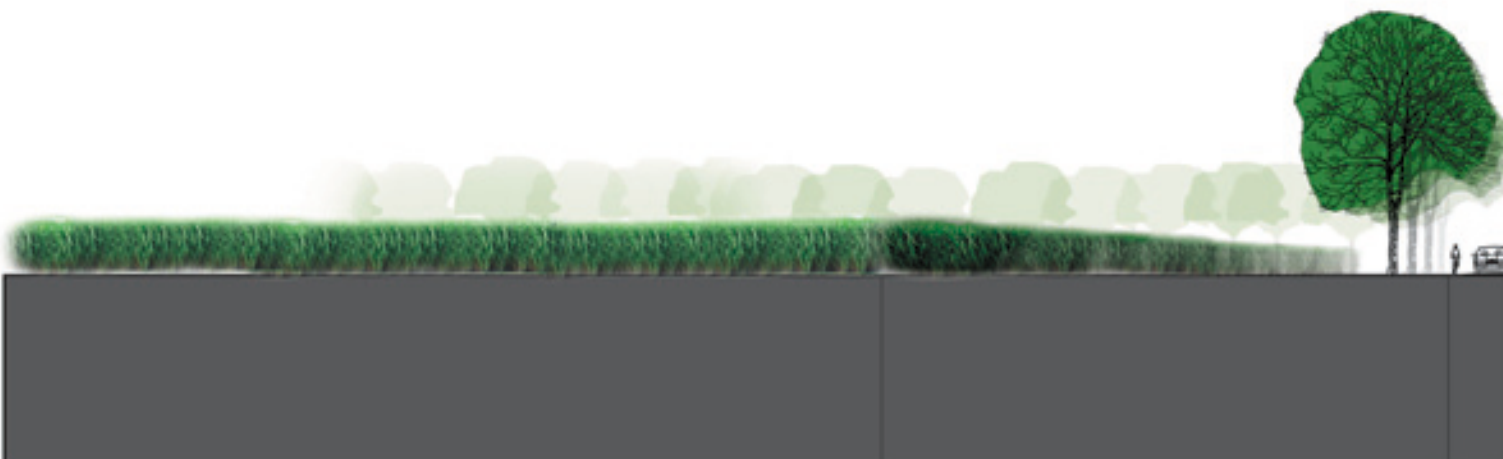(e.g. Miscanthus)

Sustainable Urban Developments

Fig. 125 Detailed cross section of the a lane through the energy crop fields with tree orchards, which surround the new urban clusters, in the background
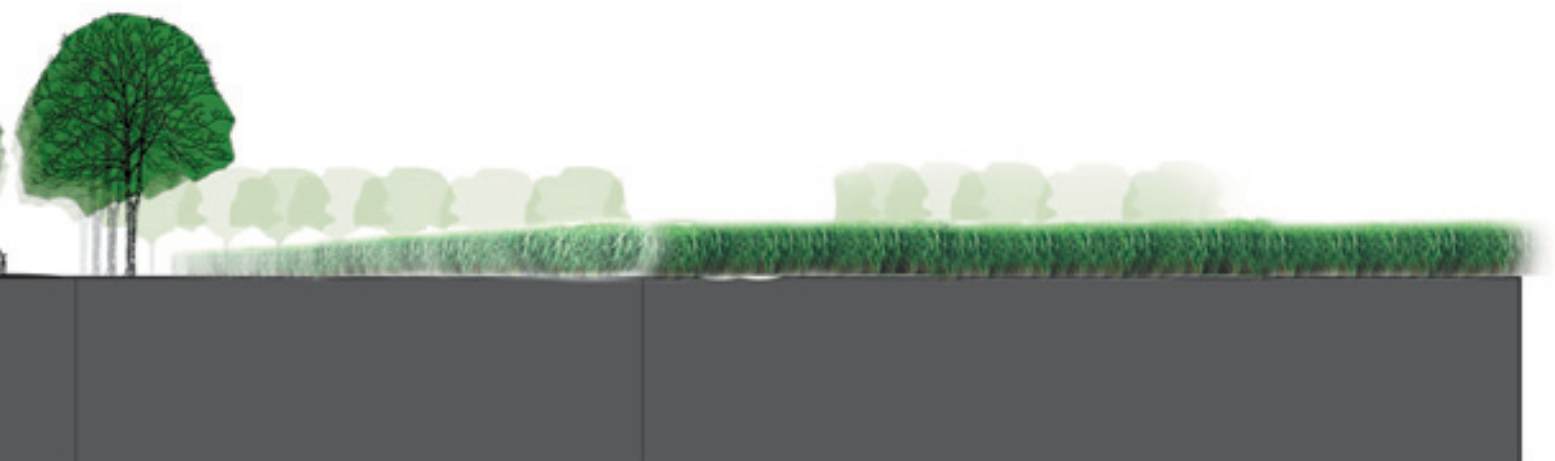
On Plateaus

10. Final Conclusions & Discussion

Final Conclusions & Discussion

This final chapters summarizes the conclusions of the research questions that have been addressed separately during this report, in order to provide a clear overview of all the findings of this research.

Besides summarizing, this chapter will also include a discussion part, in which the conclusions of the research questions will be discussed within the larger context. Also the methodology and the definition of 'left over rural landscapes within the urban network' will be discussed.

RESEARCH QUESTION 1: CONCLUSIONS

> *Which networks can be found in the urban and green fabric by using a landscape approach, that could function as a sustainable (ecological, economic and social-cultural) foundation for future developments in which recreation plays a vital role?*

The analysis has proven that the network of stream valleys in our project area is most important and rooted in this landscape. The religious network and the network of the mining history in our project area are both remnants from former times and are not part of today's driving forces anymore. Because of this we believe they will not be strong enough to function as a foundation for our vision/concept.

The entire urban network (which exist of tangible spatial patterns and structures and of less tangible economic, cultural and political processes) will also not function as foundation for our vision/concept, because it is impossible to come up with a sustainable solution for these landscapes when we use the anthropogenic layer as a foundation for our vision/concept, because much of the problems landscapes are facing today are rooted within this layer.

This does not mean we will not use these three networks. They are part of the landscape so they have to be integrated in our approach for the future landscape. They will be additions, which will strengthen the main network or foundation.

> *In what way(s) could these processes and systems be used as a sustainable foundation for the future development of left over rural landscape within the urban network?*

In the project area's vision the framework concept, as described by Ahern, is used as a overall spatial framework in which both nature's slow processes and the high dynamic processes related to urban development could take place and benefit from each other. The new design is called a hybrid landscape, because it supports both low and high dynamic processes, and expresses both sides of this landscape and still functions and appears as an unity.

The stream valleys together form a greenway network and will safeguard nature's low dynamic processes and will offer possibilities for small scale recreation. The

plateaus will be used to guide the urban development in a sustainable way, which will improve the overall landscape quality of the plateaus and urban sprawl will be prevented. The plateaus will also offer possibilities for large scale recreation in this design, in order to attract visitors from more distant places.

In order to make the project area part of the entire metropolitan green/urban fabric, it was very important to connect the landscape to the main economic driving forces of Parkstad and Aachen: tourism, recreation & leisure, knowledge & technology of the RWTH university of Aachen, the growing population of Aachen, sustainable energy developments, development and preservation of nature, health care, preserving cultural history and sustainable food production. The driving forces related to nature's slow dynamic processes will take place along the greenways and the driving forces based on the high dynamic urban processes will take place on the plateaus.

The framework based on high and low dynamic processes was also used to improve the level of infrastructural connectedness with the context of the project area. The highway and railroad within the project area connected the new sustainable urban developments of the plateau to the regional infrastructural network, improving its accessibility on a regional and international level. On a local level the local road networks of the surrounding residential areas are connected to the foot and bicycle paths network of the greenway.

The specific problems of the project area, like the lacking coherence between the old cultural landscape and the new urban developments and the low accessibility at some points, this way will be solved by implementing the overall framework based on low dynamic processes in the greenway and high dynamic processes on the plateau.

This approach is about (inter)connecting the project area with itself and with its metropolitan context in a functional, spatial and symbolic way. It acknowledges and uses the new tendency of the landscape in which rural and urban areas are becoming more and more intertwined, resulting into a metropolitan green/urban fabric.

> *In what way(s) could recreation become the main economic foundation for the left over rural landscapes within the urban network?*

During the design process another important goal was to make the project area as independent and self-sufficient as possible, by making recreation the main economic foundation. This means this landscape will generate its own income via recreational functions and maintain itself.

The greenway uses the existing farms which are located along the streams, as development points. The existing farms will be transformed in recreational centers which offer various small scale recreational opportunities for citizens (e.g. community gardens, information centers, local farm shops, restaurants, hotels, fun forest, etc.). These recreational centers will develop and maintain the

greenway forest. Some of the new recreational centers will keep their agricultural function besides the new recreational functions. They will keep maintaining the agricultural lands which are located next to the greenway, which will be used for local food production. This way of developing the greenway increases the flexibility of the landscape and makes it easier to cope with circumstances of economic growth or shrinkage.
Large scale recreation (e.g. amusement parks) cannot be placed in or around the greenway, since these kind of urban developments would conflict with the low dynamic natural processes of the greenway network.

Large recreational facilities in this design could be developed on the plateau. During the design process several options have been discussed. These large recreational facilities are very important for the project area because they attract many visitors and therefore can work as a catalyst for the development of the entire project area. It was beyond the scope of this thesis to entirely design such a recreational facility within the project area, even though some guidelines have been mentioned.

It is important to integrate these large recreational facilities with the surrounding landscape as much as possible, in a functional, spatial and symbolic way. In this case this means that large recreational facilities will have to be implemented within the overall structure of the future plateaus (they have to be treated like new urban clusters) and the main topic of this large recreational facility has to be sustainable energy and self-sufficiency. It has to be prevented that these facilities become self-contained entities without any connection to its surroundings. In this case it these facilities will only worsen the urban sprawl.

Regarding to the recreational functioning of the new hybrid landscape, again the level of connectedness to the regional infrastructural network and the local infrastructural network, needs to be stressed.

Even though the recreational centers of the green way will only offer small scale recreation, the entire greenway existing of numerous recreational centers, accessible forest, rough wet nature and an intricate network of foot and bicycle paths, will be able to attract not only local visitors but also people from more distant places. The greenway is surrounded by several train stations and it is important to have direct connections (foot and/or bicycle paths) from these train stations to the greenways so the greenway will also be easy accessible for visitors from more distant places.

The large recreational facilities which could be developed on the plateau, need to be as close to the new Avantis train station as possible, in order to make it accessible on a region scale level and part of the entire metropolitan network.

By making the accessibility of the recreational facilities as high as possible, more people will visit and use this recreational hybrid landscape and more income will be generated by the recreational facilities. This increases the change for recreational to become the main economic foundation of this hybrid landscape.

RESEARCH QUESTION 1: DISCUSSION
Reflecting on the 'landscape approach'
In the introduction of this thesis we propose the 'landscape approach' as a possible solution to the problems of 'left over rural landscapes within the urban network', instead of the previous 'Rijksbufferzone' and 'Metropolitan park' approaches which appeared to be unsustainable.

The recreational hybrid landscape, introduced in the vision as a result of the landscape approach, can be seen as the improved 'healthy' version of the left over rural landscape within the urban network and fills up the 'gap' of the former misleading dichotomic representation of urban and rural.

Even though the landscape approach, as described in this thesis, appears to be a suitable approach for this specific project area, it remains questionable if this approach could also be applied in places with left over rural landscapes within the urban network, containing different landscape types.

The landscape of the south of Limburg with its system of stream valleys is very suitable for the greenway and framework concept as described by Ahern. The stream valleys already run through both rural landscape and city and connects them. It is also already is a recognizable spatial element within the landscape and can be transformed into a connecting structure quite easily. In landscapes without these advantages the greenway and framework could be a lot harder to apply successfully. The usability of this landscape approach, using the greenway and framework concept, has to be further investigated in situation with different landscape types.

However, the main principle of the framework concept based on the low and high dynamic processes within the landscape in all cases remains relevant. Nature's low dynamic processes which mostly are strongly related to the hydrological processes of the landscape, should be emphasized and play an important role during the process of analyzing and designing the rural left over landscapes within the urban network, no matter what landscape type.

Changing identity
It should also be noted that, even though we want to preserve the remaining landscape qualities of the cultural rural landscape as much as possible, change is inevitable. In order to find a suitable approach to make the project area sustainable again, some sacrifices regarding the existing cultural rural landscape had to be made.

The urban processes can't be stopped and will express themselves within the surrounding rural landscapes. These processes can be guided with the framework concept, so they can take place without harming the cultural rural landscape. In order to make this possible,

Final Conclusions & Discussion

in this case the open character of the plateaus had to be partly sacrificed.

This indeed conflicts with the original identity or 'genius loci' of this landscape, but we believe the identity of a landscape should be able to change and develop together with the changing society, in order to be sustainable.

If nothing is done, eventually the unguided urban processes could entirely destroy the remaining cultural rural landscape, resulting in a new alienating and unrooted 'identity'. This is also described by Antrop (Antrop, 2004):

> *'Landscapes consist of places and places have a strong existential meaning. Landscapes contain the memory of the history of the land (Muir 2000). Lowenthal (1997) recognizes the following new meanings for rural landscapes:*
>
> - *Landscape as ecological paradigm*
> - *Landscape as the rightful realm of all*
> - *Landscape as collective identity*
> - *Landscape as art*
> - *Landscape as heritage.*
>
> *These all refer to the countryside as something stable, endurable and not superficial. Rural landscapes can be seen as 'lieux de mémoire', the roots of collective memory (Lowenthal 1997)...New landscape elements and structures, looking all alike, emerge and show no link with the specificity of the place. Gradually, the history and memory of the place are erased and the genius loci is lost (Antrop 2000b). When the break with the past is achieved, seldom a new distinct identity is realized. New landscapes are often experienced as alienated (Vos and Klijn 2000; Kolen and Lemaire 1999).'*

Probability of recreation as main economic foundation of the landscape
Recreation could become an important new economic foundation of the rural landscape, but only recreation will probably not be enough to generate a stable and sufficient income for this landscape.

Large recreational facilities like amusement parks will probably attract most visitors and generate the highest income, but at the same would take up a lot of space within the landscape and have a large visual impact. A balance needs to be found between preserving the cultural rural landscapes and introducing new developments which are needed to make the preservation possible, a compromise seems inevitable.

All the recreational facilities in the design for the project area would be developed by external investors. This way the project area would be most independent of the government. It remains questionable if the project area would find enough willing investors in times of economic crisis, like today. Even if investors would be found, it remains questionable if these investors will be willing to adjust their plans to the overall restrictions and guidelines of the design. Investors that also understand the importance of taking care of the landscape would be needed.

Besides food production and recreation these future landscapes could also play an important role in sustainable energy production. The landscape design for the project area transformed the agricultural fields on the plateau into energy crop fields. The energy crops together with other biomass input from within and around the project area are used as sustainable fuel for bio fermentation plants and combined heat-power plants. The produced energy and heat can be used for the surrounding urban areas, but can also be sold, as an alternative source of income.

The inital idea was to mainly use recreation as source of income, but during the design process sustainable energy production became the main alternative economic foundation of this landscape, besides recreation and sustainable food production, in order to increase the probability of the design. It remains questionable if the new functions in this vision will be enough to provide these left over rural areas an economic foundation which is solid enough to replace the current weakening agricultural economic foundation. Therefor it would be interesting to investigate the financial probability of this vision or similar visions in another study.

Defining rural left over landscapes within the urban network & confining the project area
During the introduction the origin of the left over rural landscapes within the urban network has been explained.

The term 'left over' indicates that the overall quality of these areas is degraded and degrading, and that these rural areas under high urban pressure are different from 'healthy' or 'strong' rural areas that are not under pressure.

If a rural area can be called 'left over rural landscape within the urban network' seems to depends on the level of urban pressure and influence. The level of urban pressure depends on the invisible economic driving forces, the presence of urban fabric (e.g. residential areas, business areas and industrial areas) and the amount of infrastructure (highways and railroads which stimulate urban growth).

These left over rural areas can be bounded by physical urban fabric, but also by invisible urban pressure. This makes it hard to tell where exactly the urban presence starts to influence the rural landscape, because it is unclear how far the urban pressure reaches. This reach can't be translated into spatial, measurable terms, so the transition from rural landscape under urban pressure to rural landscape without urban pressure remains intangible.

This resulted in a project area without clear borders, which was difficult to deal with during the analysis and design process of the project area. It gives a constant uncertainty of what should be included and what not.

In order to create a tangible and workable project area,

during the analysis and design process, the project area was confined to the area between Parkstad and Aachen. Even though this concept was now limited to this particular area it should be noted that the borders of the design area in reality are not as sharp as shown in the landscape design. The concept of this design could be continued to the context of the project area, as long as urban pressure and influence is present.

RESEARCH QUESTION 2: CONCLUSIONS

In what way are the design criteria from the minor thesis usable during the design process for a left-over rural landscape with a landscape approach?

The criteria proved to be very useful analysis tools at this scale level and help understanding the strengths and weaknesses of the project area. Besides understanding, the strengths and weaknesses can also be localized with these criteria. This knowledge can be used during the design process and makes it easier to determine which aspects within the project area are most important to improve; it provides a clear focus during the following design process.

Because the criteria originally were developed to evaluate large park designs, sometimes applying the criteria to the project area was difficult. Some of the original aspects of the criteria needed to be changed.

The main difficulty in applying these criteria is that landscapes like our project area, unlike parks, are not clearly bounded. The project area is between the urban areas of Parkstad and Aachen, but at the left side of the project area it becomes hard to say where the left over rural landscape begins and where it ends.

The left side of the project area is not clearly bounded by city and dissolves into the surrounding landscape, because here both the project area and the surrounding landscape exists for a large part of agricultural land. At this side the border of the project area becomes a transitional zone without clear edges. Within these 'zones' it is hard to determine the entrance points, which need to be pointed out in order to determine the accessibility of the project area.

Parks are often designed to have one recognizable center, which also functions as a concentration point of human activity. This is why 'centers' became an important aspect of the initial design criteria 'Spatial organization'. However in this case, we are analyzing a rural left over landscape, without clear borders, which is not designed to have one or more recognizable centers. Nevertheless, it still contains several concentration points of human activity, which also have been indicated as 'centers' in the criteria 'Spatial organization'. It should be noted that these centers are somewhat different from the centers of the initial park related criteria.

An extra part has been added to the criteria 'Accessibility', by making a separate map for the level of connectedness between the regional and local infrastructure, called regional accessibility. The map 'external accessibility' has been renamed to 'local accessibility' and the map

'internal accessibility' has been renamed to 'Internal road network', since the name 'internal accessibility' made no sense.

RESEARCH QUESTION 2: DISCUSSION
Missing process related criteria
The initial park concept was mainly about form and functionality towards society. Therefore most of the park related design criteria we have investigated during the minor thesis were form and function related. Even though the 3 criteria as described in the previous sections turned out to be very useful analytical tools on various scale levels, they remain quite general, and only provide information about the appearance and functioning of the landscape. During the minor thesis we already tried to look for criteria which address contemporary landscape, these where process related. Unfortunately we didn't have time to further investigate and clarify these criteria.

However during the literature study on the greenway and framework concept during this thesis we found a lot of theoretical support which also stresses the importance of using the natural processes of the landscape as a starting point for landscape planning and the findings of our broad landscape analysis seems to correspond with these notions:

Some land uses support ecological processes which operate slowly and require stability in time and space. These are the "slow turning" wheels of the landscape such as nature conservation, watershed management and river floodplain dynamics. Other land uses and processes are influenced more by cultural and economic forces and depend on an ability to change in response to market and technological factors. Changes in land use for increased industrial production, for new housing, or soil and drainage alterations to support different agricultural systems are representative of the landscape's "fast turning wheels" (Sijmonds 1990). The framework concept recognizes the fundamental and particular needs of both.
(Ahern, 2002)

Many of the environmentally-sensitive and hazard-susceptible landscapes have been found to occur along linear corridors which also have a high percentage of cultural and visual landscape resources (Lewis 1964). Because of these unique properties of linear networks, they represent a useful strategy to promote spatial integration, to link pattern and process, and to facilitate flows in the landscape. Networks that connect landscapes create a synergy of desirable landscape functions and processes. Spatially-integrated linear networks offer physical advantages for the movement or flows of certain materials.'
(Ahern, 2002)

Final Conclusions & Discussion

We believe in order to make and keep landscapes sustainable and resilient, it is necessary to acknowledge the natural processes of the landscape. These processes shaped the landscape as it is today and often are hydrological processes, which can't be tamed.

By giving them space to occur and develop, besides the societal processes (urban functions and infrastructure), the landscape will become or stay sustainable. If the natural processes are ignored these landscapes will become unsustainable and will face the problems of fragmentation, land degradation, urban sprawl and uncontrolled land use change.

These problems also relate to the left over rural areas within the urban network, like our project area. So if we are looking for criteria related to contemporary landscape under high urban pressure 'natural processes', should be one of them.

'Natural processes'
The criteria 'Natural processes' would determine the presence of natural processes within a certain area, and the quality of these processes. Is the landscape being used in such a way that the natural and societal processes can occur without conflicting with each other? Does the current situation provides enough space for the dynamics of natural processes, especially the hydrologic processes? Are the natural processes recognizable

It would also include important contemporary issues like improving and safeguarding ecological systems and making the entire landscape (urban and rural) climate proof.

This criteria could be used as an analytical tool in order to understand the functioning of the landscape and can locate the strengths and weaknesses regarding to the natural processes within a certain project area. It could also be used as a design or planning strategy. In this case a 'linear network of greenways as planning strategy' as described by Ahern would be a good example of how this could be done.

'Users & functions'
Besides natural processes, the relationship between citizens and the surrounding landscape also needs to be further investigated. What is the significance of the left over rural landscapes towards the surrounding citizens? In what way are they used by surrounding citizens? What facilities can be found within the project area? Which facilities are needed? Are the surrounding citizens attached to these landscapes? How can they become more attached to and engaged with these landscapes? These questions, among other user related aspects, belong to the criteria 'Users & functions'.

There has been written a lot about this topic and terms like 'Engagement' and 'Place attachment' often are mentioned. At the beginning of this thesis it was the intention to further investigate these topics, but during the thesis it appeared to be too broad to be included within this thesis.

DISCUSSION ON METHODOLOGY
When we started this master thesis, the plan was to continue the research we started during the minor thesis. During the minor thesis we investigated the new concept of 'Dutch metropolitan parks' on how they could be defined. Besides exploring this new concept by doing a case study comparison of 5 possible metropolitan parks in the Netherlands, we also tried to develop design criteria in order to evaluate these 5 case studies on their strengths and weaknesses.

During this research on Dutch metropolitan parks, we came to the conclusion that the main reason for the introduction of these metropolitan parks by the Dutch government, were the left over rural landscapes within the urban network.

We wanted to focus on these left over rural landscapes during this master thesis, but we also wanted to further develop and use the design criteria of the minor thesis. The initial plan was to use the theoretical framework of the minor thesis, during the master thesis. Unfortunately the main problem of and critique on our minor thesis was a lacking theoretical framework, so we had to first (re) develop a solid theoretical foundation for our master thesis.

Because of the 'baggage' of the minor thesis, it gave difficulty to (re)define the scope of this master thesis research, and to develop a solid theoretical foundation.

Eventually the research on the design criteria became an addition to the main research on the 'left over rural landscapes within the urban network' and finding a suitable approach in order to solve the problems of these areas.

During the minor thesis we've investigated several types of parks and the greenway park concept we found most interesting. It seemed like a useful strategy in solving the problems of the left over rural landscapes within the urban network, so during the master thesis we've also investigated and finally used this concept.

The master thesis research eventually contained several topics which are all strongly related to each other, but all needed to be investigated and clarified separately. The broadness might have resulted in a lack of depth in the theoretical part of this master thesis.

Especially the development of the design criteria from the minor thesis turned out to need a lot more time and work as expected, so we had to reset our goals during the master thesis. Instead of redefining and completing the list of design criteria, we had to narrow this part of the research down to testing and evaluating the criteria

which already had been developed and explained during
the minor thesis.

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Appendix I
Occupation Of The Landscape Through Time

Occupation Of The Landscape Through Time

Prehistory

Remains of prehistoric settlements from the end of the last ice age have been found in this area. In the tundra climate the landscape was quite open. Hunters and gatherers lived at the edge of plateaus, so they had a good overview of the lower landscape from their camps.

Later the climate became less cold and the landscape changed. This resulted in a landscape which mainly existed of forest. At this time agriculture slowly developed together with flint stone mining. Farmers would cultivate small patches of forest into cropland. These agricultural settlements were located at small streams and springs between the high plateaus and the lower valleys.

With time agriculture developed and the human influence on the landscape became stronger because of developing technology.

A Stone Age flint stone quarry on the Lousberg (approx. 3000-2500 BC) and other Stone Age findings bear witness to the fact that the Aachen region also was inhabited quite a long time ago. (Kerkstra, et al., 2007)

LEGEND DRIVING FORCES

|					
●	Settlement	▦	Wasteland	✱	Watermills
	Villages	▲	Flint editing	✕	Windmills
	Urban area	△	Industry: pottery	▣	Carre farm (Carréhoeve)
	New urban area	▽	Industry: roof tiles	⌂	Castle
▪▪▪▪	Wegtracé Roman era	◆	Industry: stone	⌂	Mansion
●●●	Supposed wegtracé	★	Industry: iron	▲	Mine mountain
—	Roads	⌂	Villa	■	Mine colonies
▬	Highway	⬟	Temple	∫	Siegfriedline
▪▪▪	Railroad	■	Monastery	⋰	Bunkers
▪▪▪▪▪	Tram line	✚	Church		
◉	Stations				

Prehistory
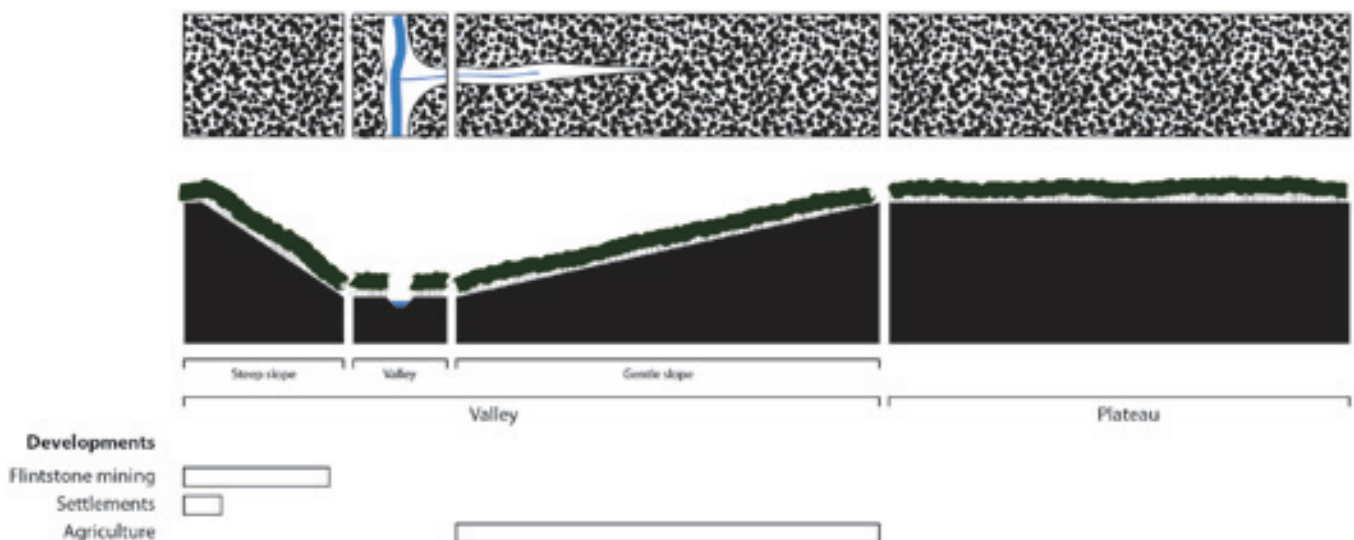
Fig. 126 Prehistorical occupation of the project area (Kerkstra, et al., 2007)
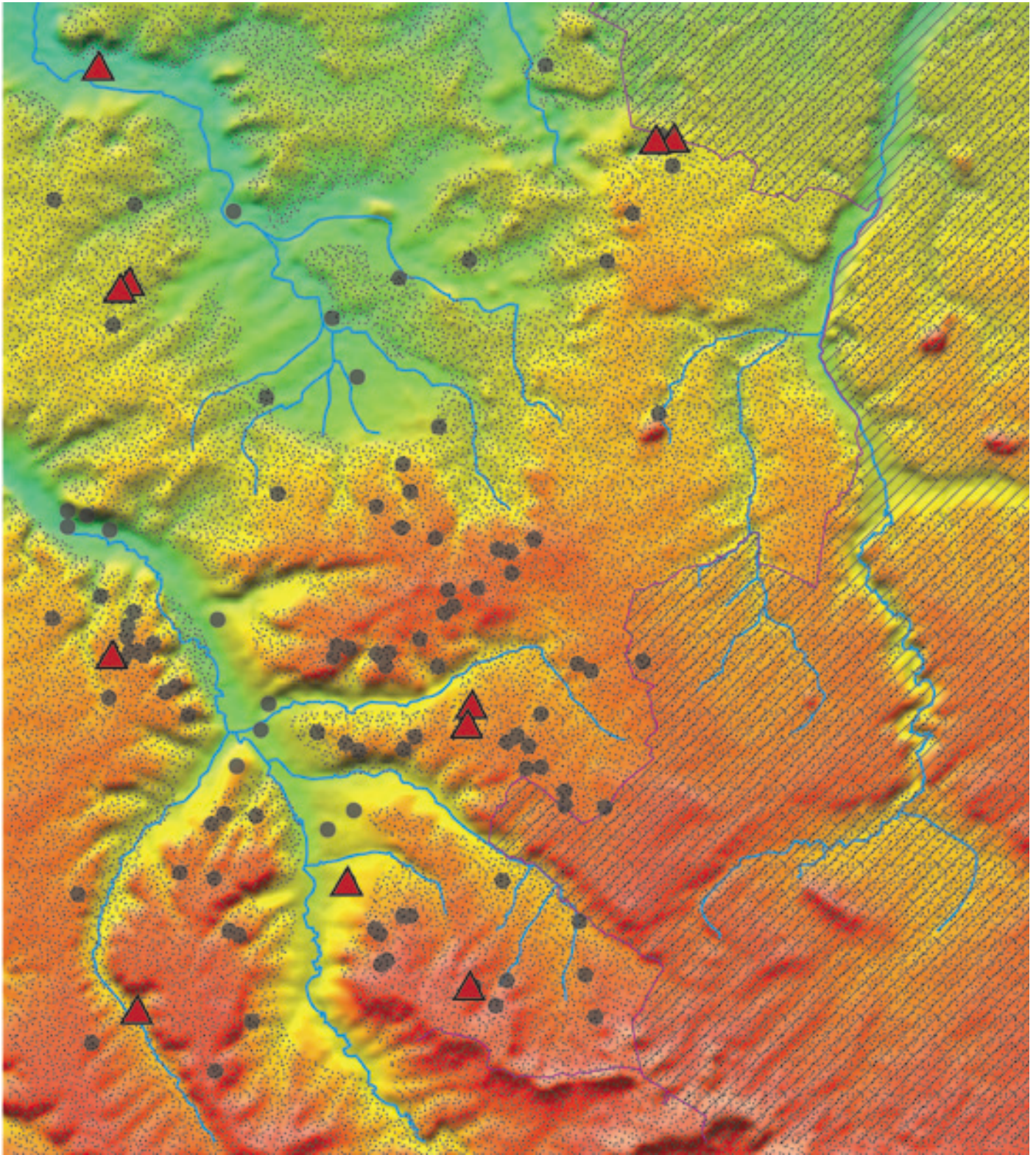
188

Fig. 127 Driving forces during the prehistory (Kerkstra, et al., 2007)

Occupation Of The Landscape Through Time

Roman history

During this time the plateaus still mainly existed of forest. Most valleys and gentle slopes were cultivated. Both Heerlen and Aachen already existed during the Roman empire. The connecting roads (limes) between the Roman settlements like Heerlen and Aachen run straight through our project area.

Across the limes villas were built, which were large farms. Large parts of the plateaus became cultivated. The Romans also introduced new building techniques, like using limestone, clay bricks and roof tiles for houses. Aachen means water, derived from the Roman name of "Aquae granni", which in turn stems from the Celtic god of healing, named Grannus.

There is substantial evidence, that both of the thermal baths belonging to "Aquae granni" became a bathing and health cure resort frequently used by Roman legionnaires. These thermal baths are natural hot springs, which have been discovered and used since the Celts. (Kerkstra, et al., 2007)

LEGEND DRIVING FORCES

●	Settlement	Wasteland	Watermills
	Villages	Flint editing	Windmills
	Urban area	Industry: pottery	Carré farm (Carréhoeve)
	New urban area	Industry: roof tiles	Castle
	Wegtracé Roman era	Industry: stone	Mansion
	Supposed wegtracé	Industry: iron	Mine mountain
	Roads	Villa	Mine colonies
	Highway	Temple	Siegfriedline
	Railroad	Monastery	Bunkers
	Tram line	Church	
	Stations		

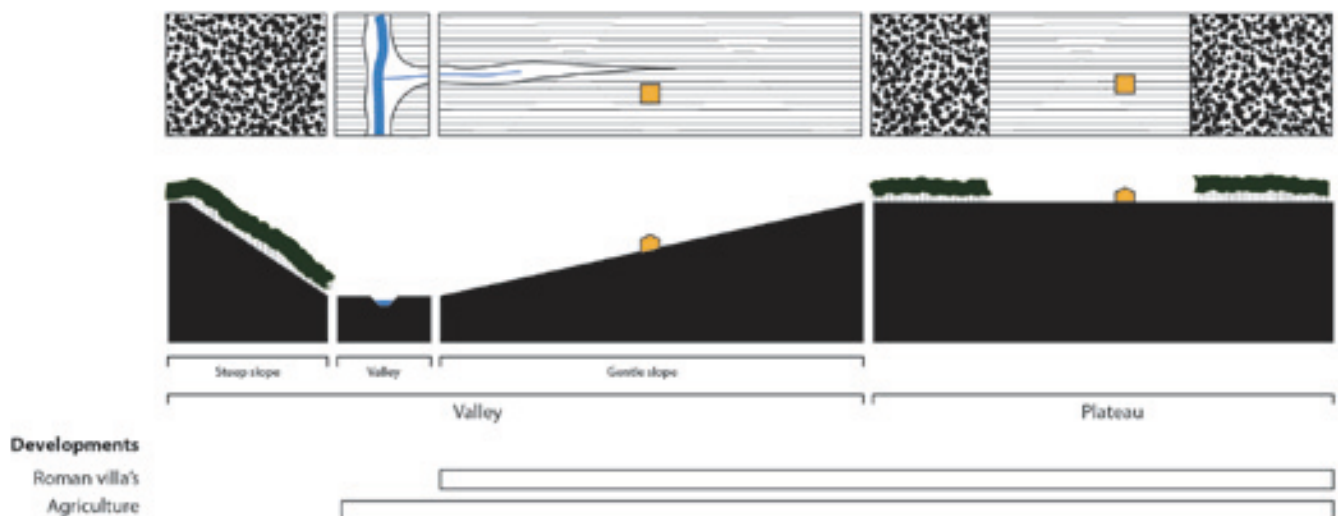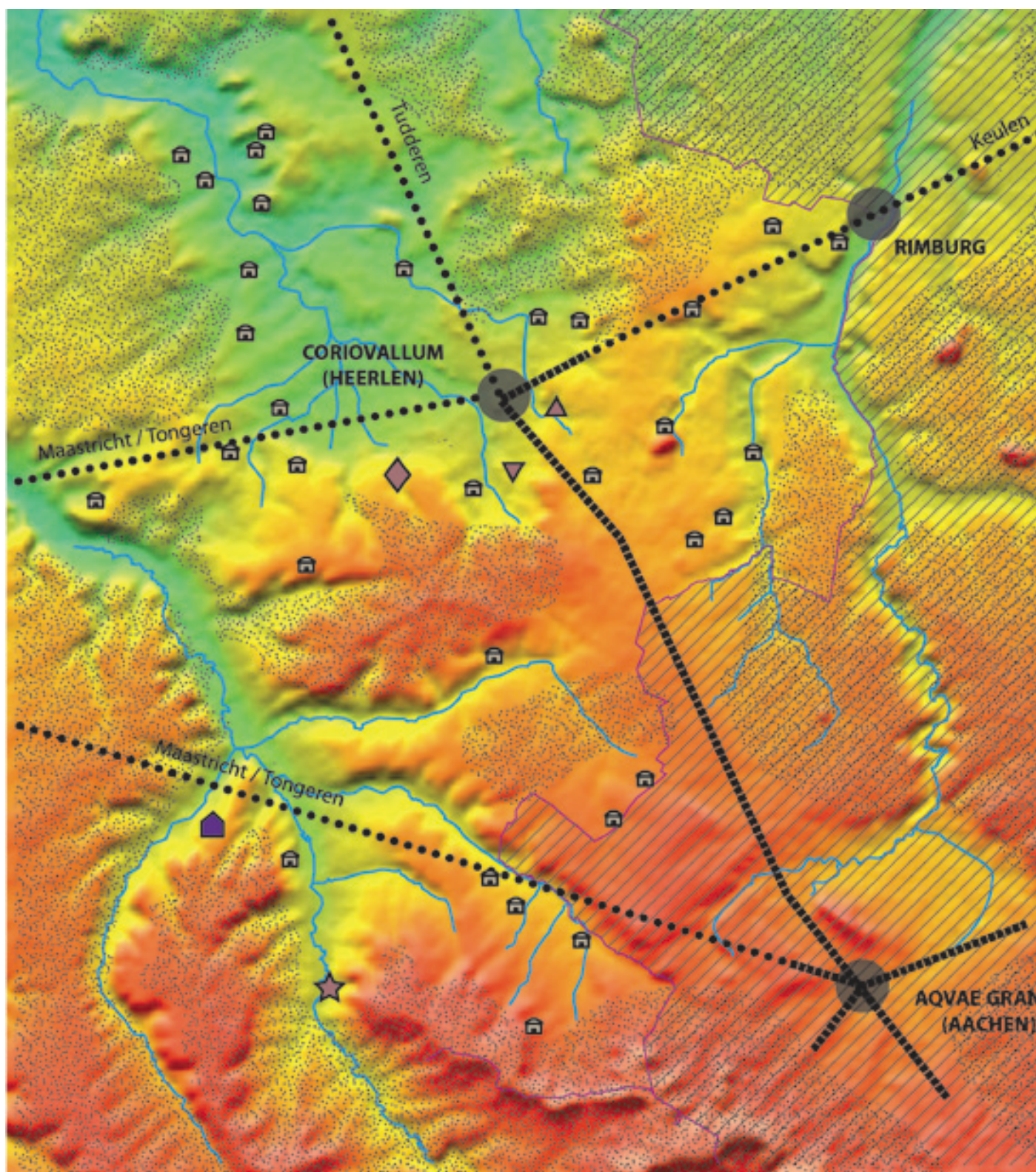*Fig. 128 Roman occupation of the project area (Kerkstra, et al., 2007)*

Fig. 129 Driving forces during the roman history (Kerkstra, et al., 2007)
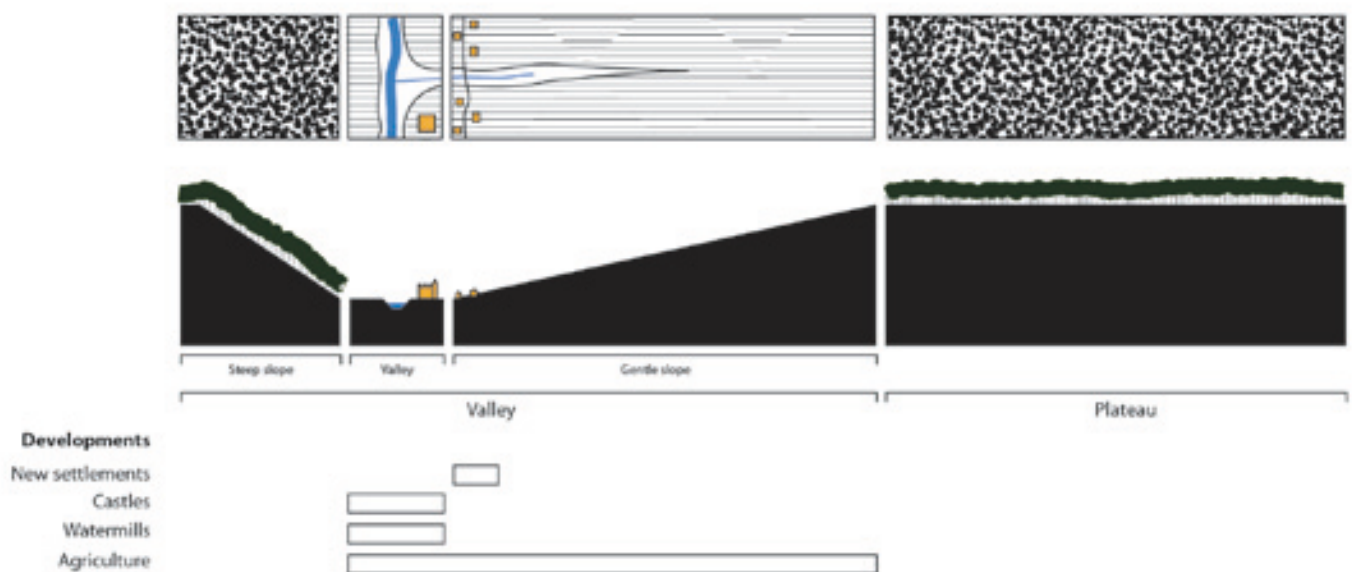
Occupation Of The Landscape Through Time

Middle Ages 500 - 1500

The development of the landscape of our project area as we know it right now starts in the early Middle Ages. Small farmers had to work on the land which was property of the nobile. The nobile were dependant on the King. The church also had a lot of power in these days. This system is still recognizable by the many castles and churches in the landscape. People mainly lived across the lower valleys which provided them with water. The plateaus still existed of forest, but were used by the villages in the valleys.

In the second period of the Middle Ages a lot of plateaus were being cultivated again and used for agriculture. New villages developed on the plateaus and formed nodes connected by a web shaped pattern of roads. The plateaus turned into 'open fields'. (Kerkstra, et al., 2007)
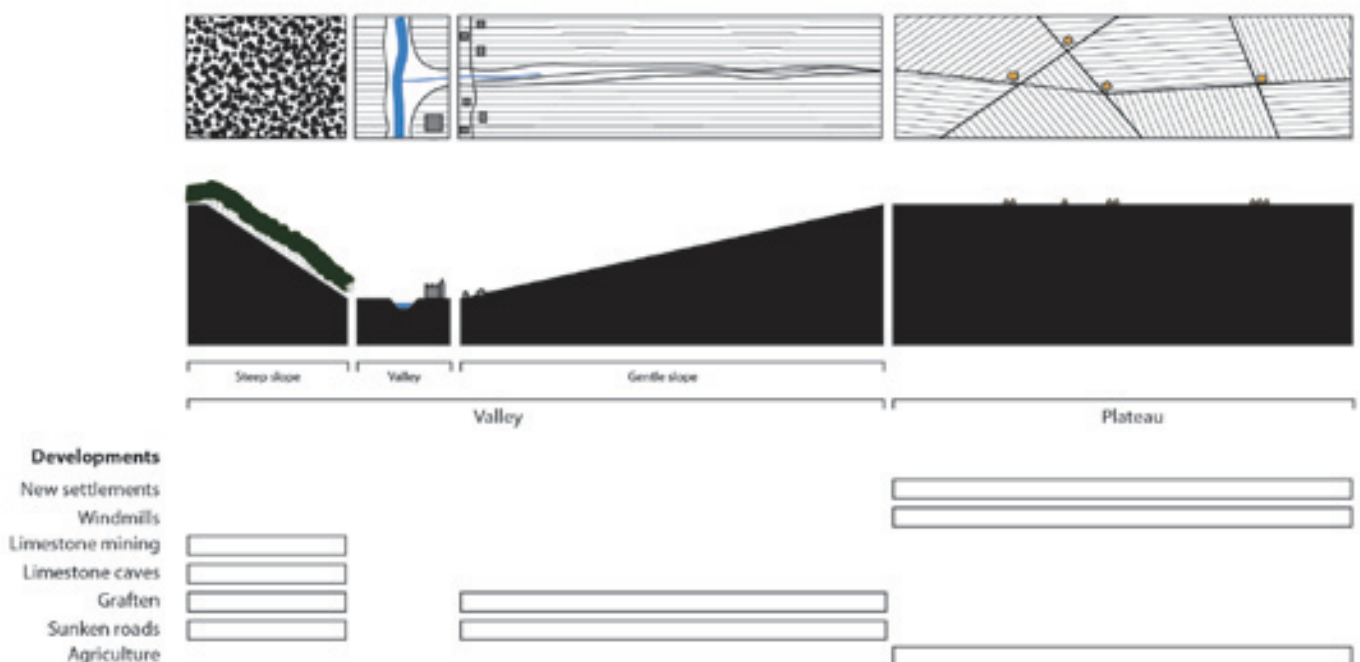
Fig. 130 Occupation of the project area during the Middle Ages (Kerkstra, et al., 2007)
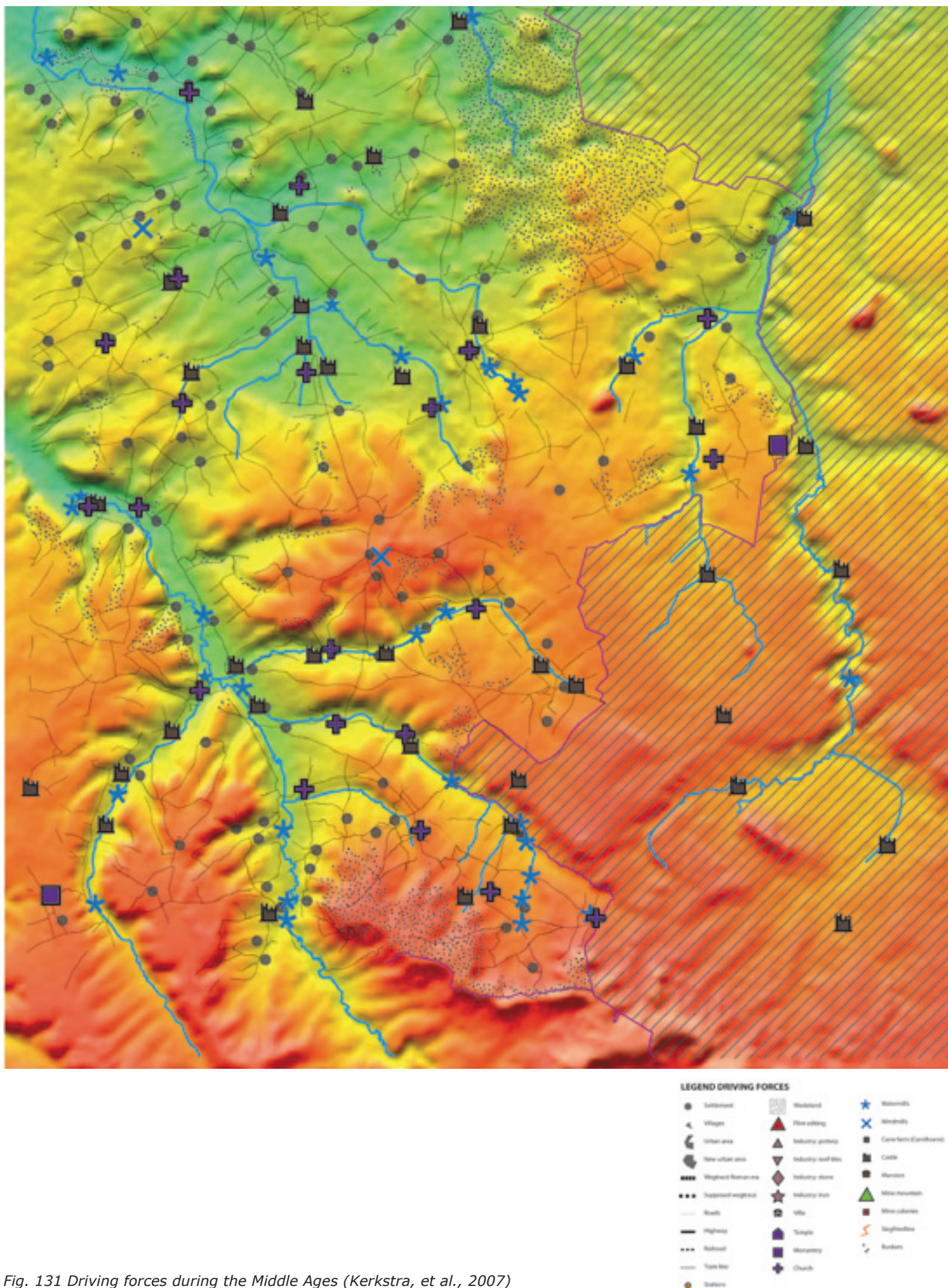
Fig. 131 Driving forces during the Middle Ages (Kerkstra, et al., 2007)

Occupation Of The Landscape Through Time

Early Modern Era 1500 - 1850
At the end of the Middle Ages the largest part of the area was cultivated. Next to small farmer settlements and villages also small cities started to develop. From the 16th century the villages grew and become more dense and closed.

From the beginning of the 18th century orchards around the villages were planted. By doing this they tried to increase their income. They would sell the fruit to surrounding large cities like Aachen and Liège. This development also changed the landscape because each village and small farm settlement was surrounded by a 'wall' of fruit trees. Today at some places you can still find remains of these orchards.

As a result of the increasing wealth in the cities people started to create mansions with surrounding park areas, which were situated in the stream valleys.

Another development were the fish ponds. These were located in the valleys next to the castles and mansions and where also an important source for food. Through time these ponds became less important and nowadays most of them have disappeared. (Kerkstra, et al., 2007)

LEGEND DRIVING FORCES

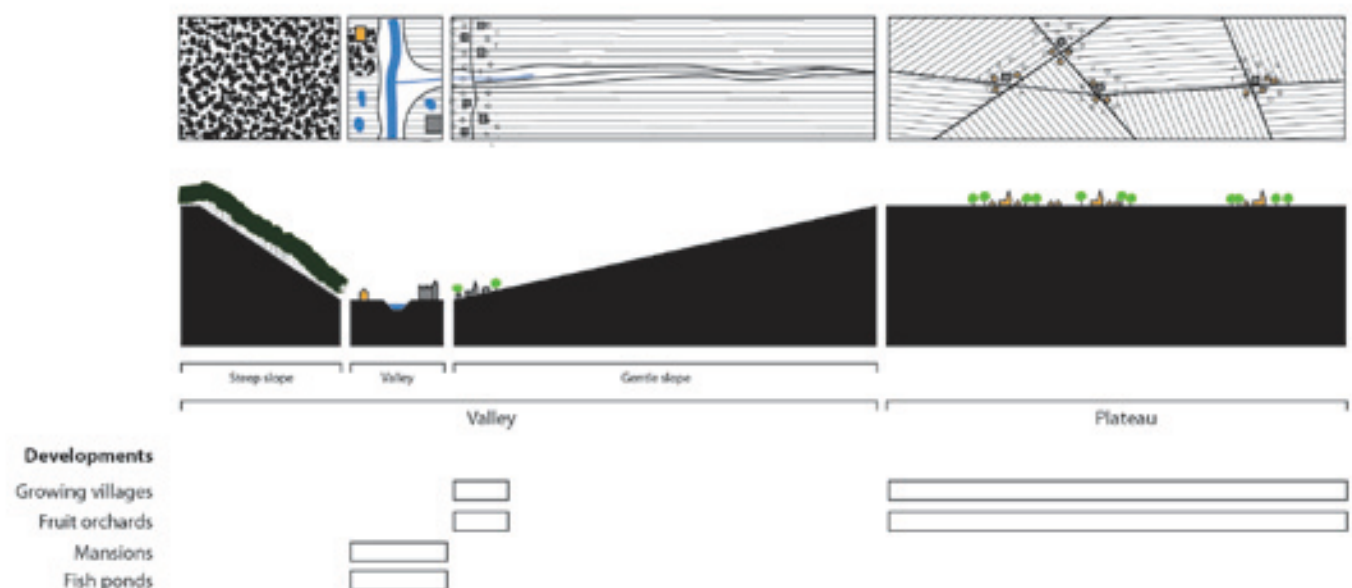|		
● Settlement	Wasteland	✳ Watermills
◀ Villages	▲ Flint editing	✖ Windmills
◀ Urban area	▲ Industry: pottery	▣ Carre farm (Carréhoeve)
◀ New urban area	▼ Industry: roof tiles	🏰 Castle
▪▪▪▪ Wegtracé Roman era	◆ Industry: stone	🏛 Mansion
●●● Supposed wegtracé	★ Industry: iron	▲ Mine mountain
— Roads	🏠 Villa	▪ Mine colonies
▬ Highway	🏠 Temple	∫ Siegfriedline
▪▪▪ Railroad	▪ Monastery	Bunkers
⋯⋯ Tram line	✚ Church	
◉ Stations		

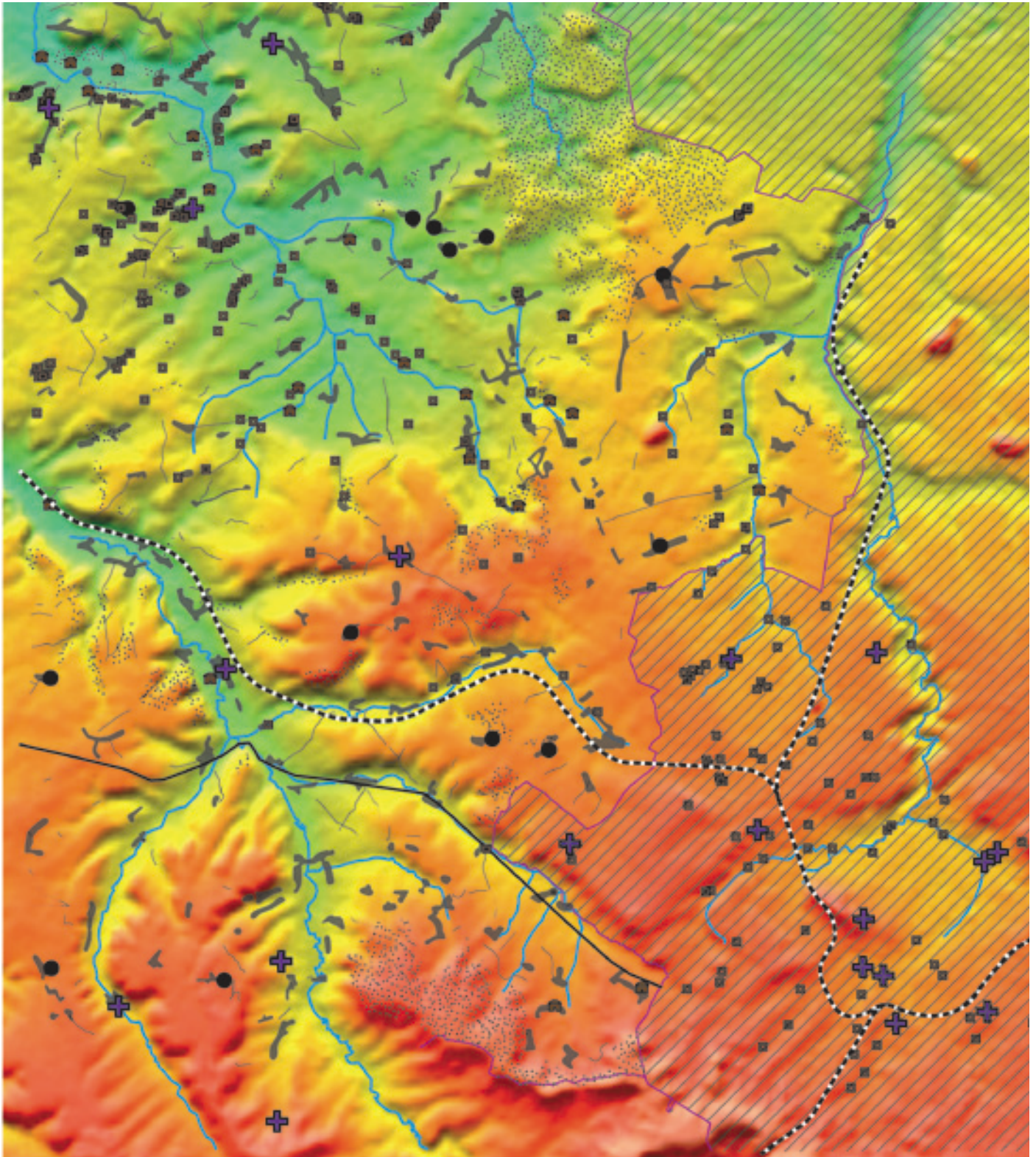*Fig. 132 Development of the project area during the early modern era (Kerkstra, et al., 2007)*

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Fig. 133 Driving forces during the early modern era (Kerkstra, et al., 2007)

Occupation Of The Landscape Through Time

Late Modern Era 1850 - 1965

In the beginning of this period large infrastructural projects changed the landscape drastically. New canals and changing dirt roads into paved roads are examples. Also railroads between Aachen and Maastricht in 1853 were developed. After this first (international) railroad many other railroad connections followed.

Because of the industrialization in the 19th century the demand for coal increased which resulted in large scale mining in our area. The mining industry was located in and around the Feldbiss fault zone because the coal layers here lay closer to the surface, and thus are easier accessible.

The development of the mining industry also made the villages and cities grow rapidly. To offer all these people working in the mining industry a home, new 'mine-worker colonies' were created besides existing villages and cities. (Bijlsma, 2011)

After WO II the mining industry disappeared because of competing other countries and the discovery of natural gas as energy source. Unlike other countries The Netherlands erased most of its mining history in the landscape. The only remains are traces of the mine railroad network, a few mine shafts and mine waste hills.

Aachen is situated at the most western tip of Germany. Therefore the city was heavily involved in the events of WO II. Approximately 65% of all houses and flats had been destroyed. At the end of the war, Aachen had only 11.139 inhabitants left. The Siegried Line is a remaining element of this war and still partly present in the area. The Siegfried Line was a defence system stretching more than 630 km with more than 18.000 bunkers, tunnels and tank traps. It went from Kleve on the border with the Netherlands, along the western border of the old German Empire as far as the town of Weil am Rhein on the border to Switzerland. Especially the tank traps, also called 'Dragon's teeth', are still visible in the area.

Before WO II the train and tram were the main transportation units. After the war the car became more important. This led to the further development of the road network and eventually to the development of high ways. (Kerkstra, et al., 2007)
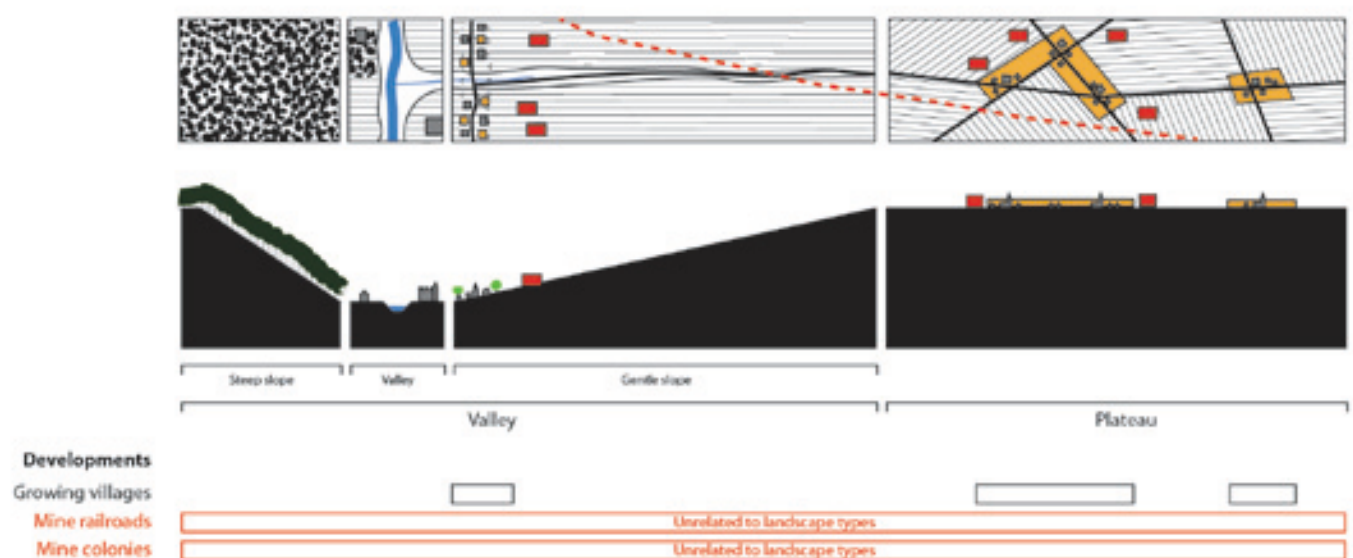

Fig. 134 Development of the project area during the late modern era (Kerkstra, et al., 2007)
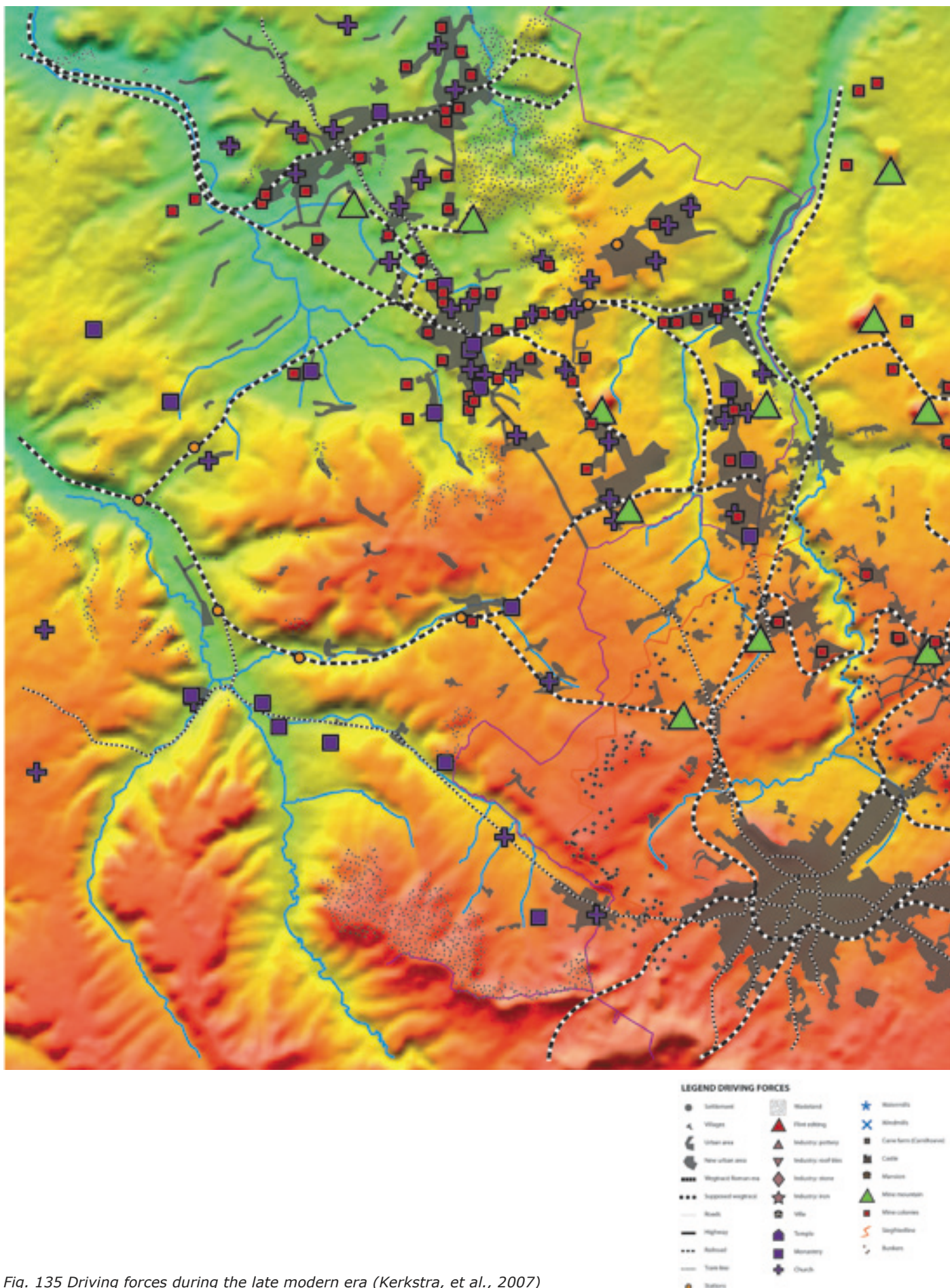
Fig. 135 Driving forces during the late modern era (Kerkstra, et al., 2007)

Occupation Of The Landscape Through Time

Contemporary History 1965 - 2000
From the beginning of the 20th century the urbanization of the landscape has been enormous. Especially at places where the mining industry has played an important role large urban areas have developed. A lot of smaller villages and cities have merged together at these places forming a network city.

Modernization and up scaling also played an important role in agriculture. Farms had to become more and more efficient to be able to compete with other countries. This also had a large impact on the landscape, which became less small scaled. Besides the modernization and up scaling, farmers often tried to find other sources of income next to farming, like making campsites or offering recreational opportunities to citizens on their land.

The development of highways has resulted in industrial and commercial areas next to the highways. A lot of new developments in the landscape are linked to the 'city network' and not to the landscape features. Because of this the initial landscape characteristics are slowly disappearing and becoming less recognizable. (Kerkstra, et al., 2007)

LEGEND DRIVING FORCES

|		
● Settlement	Wasteland	✳ Watermills
Villages	▲ Flint editing	✕ Windmills
Urban area	▲ Industry: pottery	Carré farm (Carréhoeve)
New urban area	▽ Industry: roof tiles	Castle
Wegtracé Roman era	◆ Industry: stone	Mansion
••• Supposed wegtracé	★ Industry: iron	▲ Mine mountain
— Roads	Villa	Mine colonies
▬ Highway	Temple	∫ Siegfriedline
••• Railroad	Monastery	Bunkers
...... Tram line	✚ Church	
● Stations		

Contemporary history 1965 - 2000
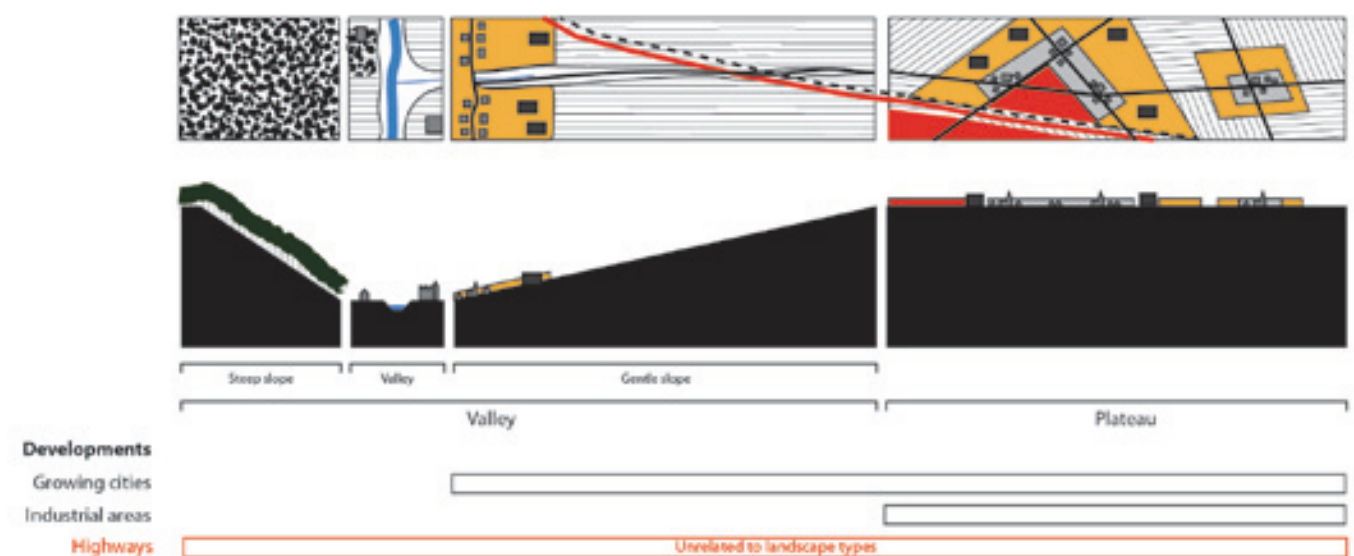
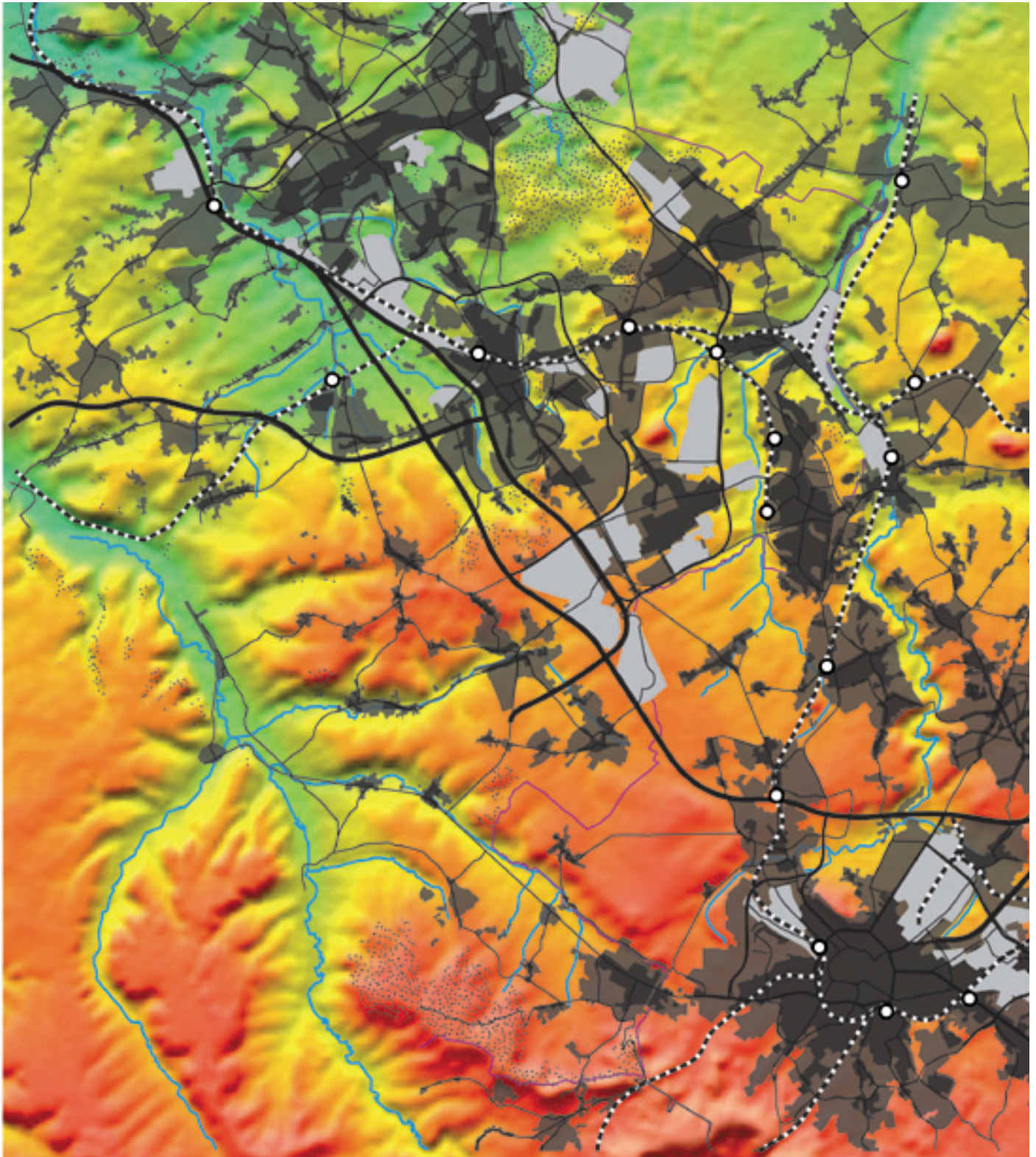*Fig. 136 Development of the project area during contemporary history (Kerkstra, et al., 2007)*

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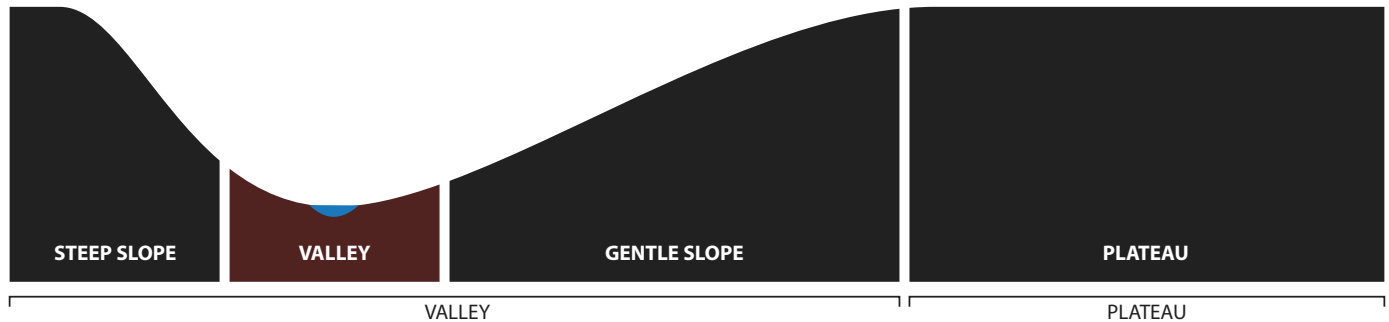*Fig. 137 Driving forces during contemporary history (Kerkstra, et al., 2007)*

Appendix II
Landscape Experience

Landscape Experience

| STEEP SLOPE | VALLEY | GENTLE SLOPE | PLATEAU |

| VALLEY | PLATEAU |

VALLEY

Historic qualities

The first farmers settled around 5400 B.C. on the gentle slopes and the higher valleys (avoiding the river valleys), where it was most easy to cultivate the land for agriculture. They were attributed to "de lineaire bandkeramiek cultuur" (the linear pottery culture). In the beginning of the Roman Age (12 B.C.) most of the gentle slopes and valleys were cultivated for agricultural purposes. Except from some ruïnes, not much has been left (visibly) from the Roman Age. The biggest influence of the Roman Age is its legacy of Christianity and classical phylosophy.

Especially the valleys have been interesting throughout history, but Christianity has left its biggest marks in this part of the landscape throughout the Middle Ages. The church had a lot of influence in this period of time and Christianity was flourishing. They could inn a part of the harvest so agriculture became very attractive because with a rising grain production also the income of the church was increased. With each church more harvest could be inned. This Medieval power structure is still clearly recognizable in the current landscape through numberous castles, monumental farms and churches that form the centers of old villages. The spatial distribution of these indicates that settlements were primarly situated in the water bearing valleys. Here acounted to the lowest part of the valley, but mostly they were positioned on the edge of the valley and the gentle slope.

Fig. 138 Some castles can still be seen today and function as important recreation facilities

We can still recognize the early medieval occupationpattern of roads parallel to the longitudinal direction of the valleys and in narrower valleys often villages in a ribbon structure. A special aspect of these valleys are their numberous castles that find their origin in the early medieval period. Only the castles that had a defensive character are currently still visible in the landscape, others have dissapeared. These castles are called "mottekastelen," and were build upon a small hill with steep slopes and often surrounded by a dry or wet canal (gracht) and had a tower in the center where one could retreat.

These early castles were later substituted (13th century) by a new type of castles with heavy keeps (donjons), defensive walls and water canals. These were easier to defend and more pleasant to live in. Their positioning in the valleys made it easy to create water canals and provided a good view across the valley to guard their watermills. And as stated before, fruitproduction later added an important characteristic to the picturesque image of the valleys.

The growing prosperity also lead to the origin of estates, that were, just like castles, situated in the valleys. Around existing castles and estates park like gardens were created, first in a classicism style later (until halfway the 18th century) in a landscapegarden style. Another typical elements from between 1500-1850 were the fishponds, as fish became a important source for protein. In small V-shaped valleys they were positioned as series one after the other. From halfway the 19th century almost all these fishponds have dissapeared.

The Industrialization had a huge impact on a lot of aesthetic qualities of the landscape. The valleys however have often remained, allthough the overall characteristics of the entire valley may have been lost. However, a lot of cultural historic elements in the lowest parts of these valleys have remained, or at least in some extend. Ruïnes, restored castles, beautifull estates, churches and monestaries are still present and since recreation and tourism has become important during the industrialization age, they have been an important attraction contributing to the character for which Limburg is known for.

Fig. 139 A view on a valley, the brooks are clearly being guided by a lot of vegetation (forest). In these valleys one can find for example ruïnes of old castles from the Middle Ages

Landscape Experience

STEEP SLOPE	VALLEY	GENTLE SLOPE	PLATEAU

VALLEY	PLATEAU

Landscape qualities of the valleys

The valleys play the most important role in the aesthetic qualities this landscape has to offer. They contain the picturesque qualities that are characteristic for this landscape. Cultural historic elements like ruïnes, restored castles, beautifull estates, churches and monestaries are still present, and in combination with old farms (carréhoeves) and historic villages they have a lot to offer.

In addition to these historic qualities are the ecological qualities the valleys conceal. The variations in height and difference in streams from springs to ponds and from fast to slow streaming brooks provide a unique and special fundament for interesting flora and fauna. Spatially these valleys provide an intimate character that is contrasting to that of the vast open plateaus.

Besides brooks and rivers the valleys also contain ponds. In the near of castles and villas large ponds are also cultural historic remnants. In some places these ponds have even been expand for recreational purpose, some ecological and others just add up to picturesque qualities of the lower valley.
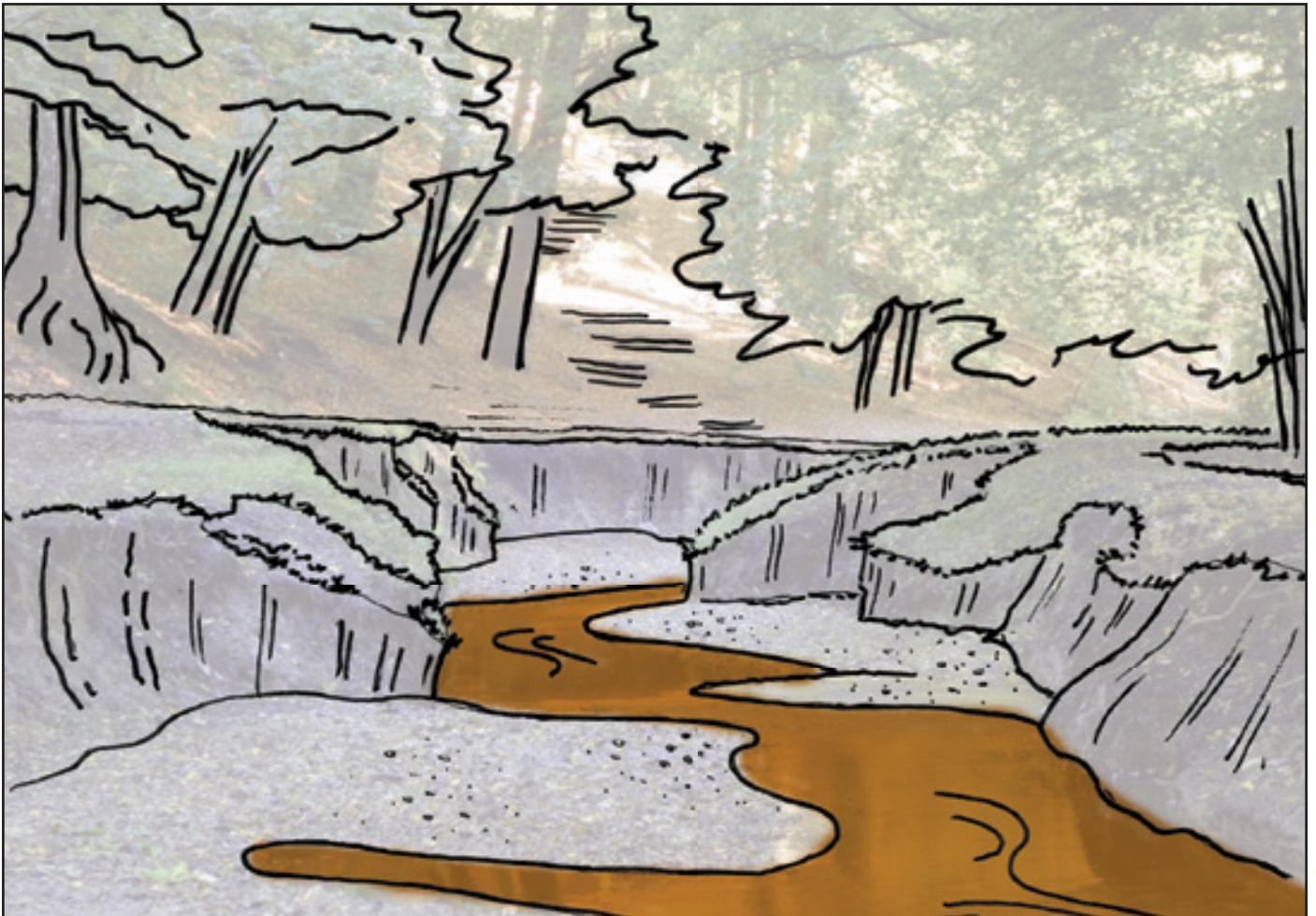

Fig. 140 Brooks can cut deep through the land when the stream runs faster during rainfall.
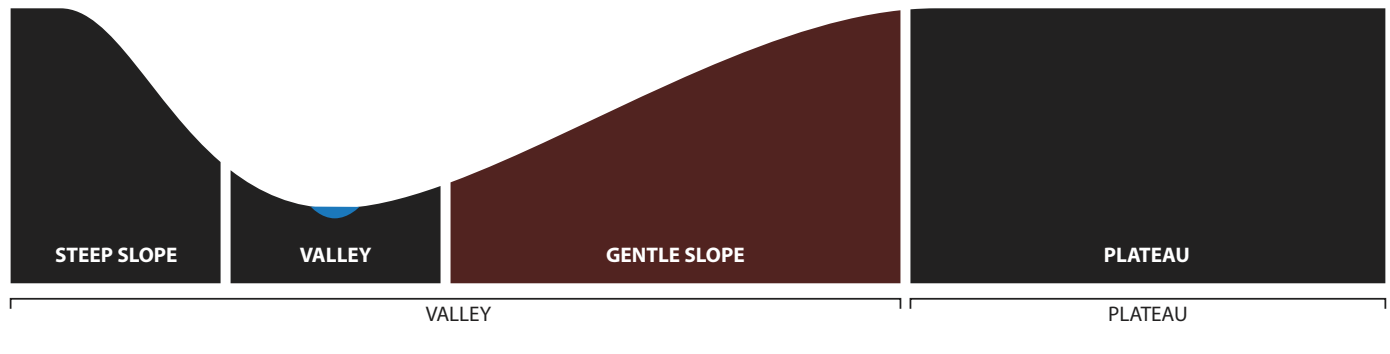
Fig. 141 These ponds are expanded for recreational purposes, they used to be fishing ponds near a castle (Gravenrode) in a valley between Heerlen and Landgraaf.

Fig. 142 The ponds in the valley can be aesthetically very appealing.

Landscape Experience

| STEEP SLOPE | VALLEY | GENTLE SLOPE | PLATEAU |

| VALLEY | PLATEAU |

THE SLOPES

Hirtoric qualities

Where hunters and gatherers lived primarly on the edge of plateaus where they had a perfect view upon the then open fields in the valley (when there was a tundra climate), the first farmers settled around 5400 B.C. on the gentle slopes and the higher valleys, where it was most easy to cultivate the land for agriculture. These first Dutch farmers are attributed to "de lineaire bandkeramiek cultuur" (the linear pottery culture). Flintstone mining became a flourishing economy until the metallurgy made an end to the Stone Age. This increased the ability to influence the natural environment. Flintstone mining was particularly done in parts where flintstone came close to the surface, which was often in the steep slopes.

In the beginning of the Roman Age (12 B.C.) most of the gentle slopes and valleys were cultivated for agricultural purposes. As said before, there are almost no remainings left from the Roman Period, except some main settlements from that period like Heerlen and Maastricht, also Aachen is mentioned in the Roman Period when its hot springs have been channeled into baths. The biggest influence of the Roman Age is its legacy of Christianity and classical phylosophy.

The Middle Ages had the biggest impact on this landscape and its from this period of time that the most cultural historic elements have remained. The first settlements were situated in the lower valleys, where everything they needed was in close range; fresh drinking water, wet meadows and fertile arable land. Later also the dry valleys in gentle slopes were occupied. Especially the gentle slopes were commonly used for agriculture.

Since a 1000 years after Christ, in the late Middle Ages, the plateaus were cultivated. This change of once vegetated landscapes to open plateaus consequently lead to problems of erosion. This was especially problematic on the slopes. We can now still see attempts to reduce the erosion on steep slopes by the "graften" that have remained from this period. Also "holle wegen" (sunken roads) are caused by this erosion problem, but are now characteristic for this region.

The dry valleys, mostly a division from the valley reaching out to the plateaus on the gentle slopes, were functioning as natural connections between the water bearing valleys and the plateaus. Settlements can be found at the start of these dry valleys, it was here that they could retain water in ponds to serve as drinkingwater for their cattle.

At the end of the Middle Ages the entire landscape was cultivated, except for the steepest hills and highest plateaus. The change in the 16th century from traditional timber contruction to stone construction resulted in a change of architectural character and densification of the villages. The Middle Age ribbon villages developed to streetvillages with closed facades, and the typical "Limburgese carré-hoeve" as we spoke of before, found its origin.

Stone construction also had an impact on a sudden grow of the limestone mining, but also flintstone and sandstone mining. The materials were used in the buildings. The materials were primarly found in the (steep) slopes where especially limestone was found on the surface and later through underground mining.

Fruit production rised from the beginning of the 18th century. Dense fruit tree belts with hawthorn hedges around villages characterized the their appearance until halfway the 20th century. Remains of these can still be seen in the landscape and often characterize the picturesque image in valleys.

The industrialization and the mining history an imense expansion of the urban environment. Small villages close to main roads and railways expanded quickly in the period 1850-2000. Many of them clustered together and gentle slopes and plateaus were filled up with urban development. With the increasing impact of the city also recreation and toerism became an important economy. Slopes and plateaus provided suitable places for campings, sport complexes and hotels.

Landschape qualities of gentle slopes and dry valleys

This part of the landscape is often in use as agriculture and grasslands. The gentle slopes are generally open, small clumbs of forest kan mark this landscape. Steeper parts are often vegetated with forest, this is most commen in the dry valleys where water has carved into the landscape and the problems of erosion are most prominent. Deep small brooks cut through these valleys guided by incidentle vegatation and trees. Also the hollow roads (holle wegen) are characteristic for this part of the

Fig. 143 A view on a dry valley, left the water bearing valley, right a gentle slope on which a dry valley reaches out to the plateau.
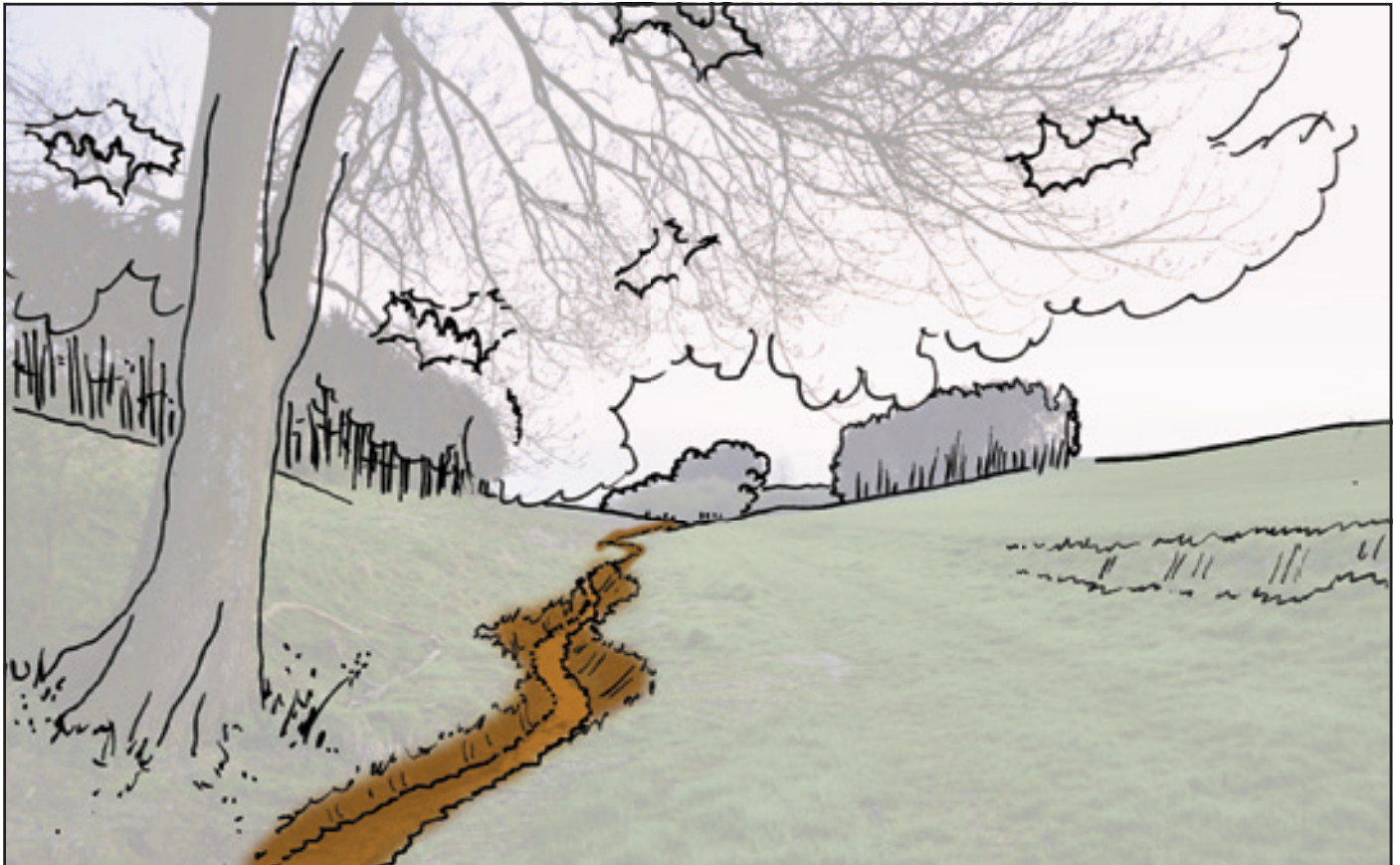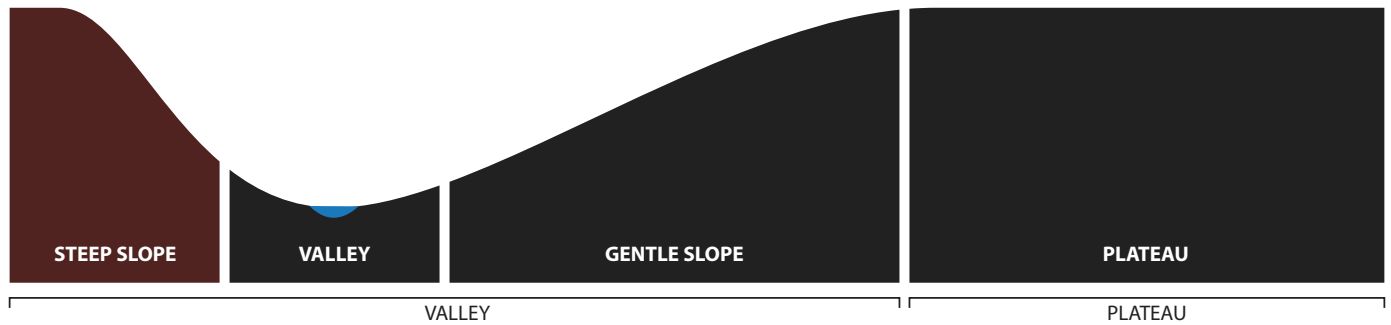

Fig. 144 This is the image of many dry valleys, a small stream of water slowly emerges from the plateau and ends in the valley.

landscape, as a result of erosion they lay deeper then the surrounding landscape and because they are guided by trees they are very intimate and provide an interesting contrast with the wide open plateaus. Villages at the start of these small brooks often have historic qualities, because of their unfavorable economic position they often have remained small sized and untouched by urban expansion of the industrialization. Still modernization can have a negative influence on the aesthetic qualities of these areas. Recreation facilities and modern farms for example can infuence the picturesque qualities of these places, also the disapearance of green belts around villages can amplify this affect.

Landscape Experience

STEEP SLOPE	VALLEY	GENTLE SLOPE	PLATEAU

VALLEY · PLATEAU

Landschape qualities of steep slopes

The steeper slopes in combination with the valleys have the most interesting qualities of the area. They are often vegetated with large tracts of forest because erosion is most occuring in this part. Also hollow roads (holle wegen) emphasize this process. But most characteristic here are, if they're still present, the "graften." Horizontal strips of vegetation prevent further erosion but keep the slopes useable for agriculture or grasslands, creating half smaller spaces confined by green mass. Furthermore the ecological value of the vegetation is the highest on the steep slopes and in the valleys.

These slopes often conceal remnants of mining in the past and they can reveal the geological past of this landscape. But most striking is probably their great vistas across the lower valleys which provides some important aesthetic characteristics this landscape is known for.

Fig. 145 Hollow roads (hollw wegen) have sunken in the surrounding landscape by erosion. Trees and vegetation guiding these roads provide them with an intimate character that is contrasting with the vast open plateaus

Fig. 146 Steep slopes sometimes contain remnants of "graften" that were used to counter erosion. Hollow roads further mark this type of land and connect valley and plateau through an intimate tunnel covered in vegetation.

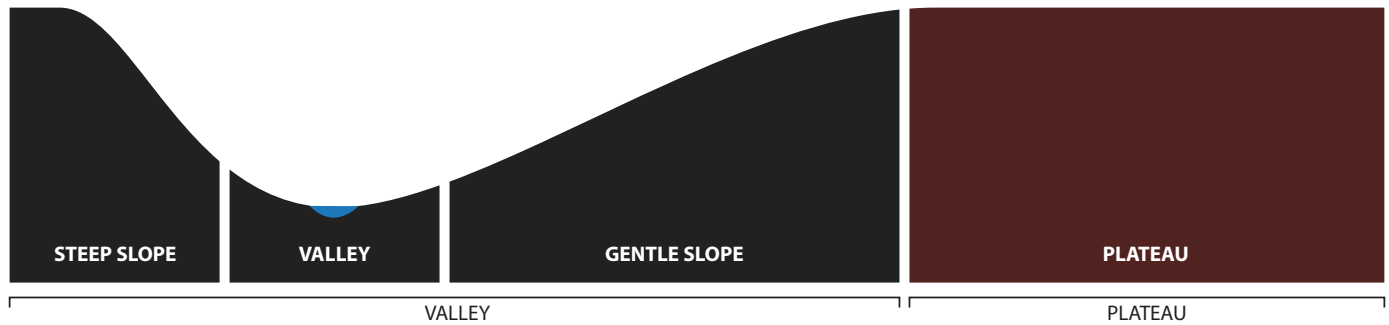*Fig. 147 Graften are characteristic for steep hills*

Fig. 148 Hollow roads (holle wegen)

Fig. 149 When looking uphill it becomes obvious how hollow roads (holle wegen), "graften" and vegetation or forest on the steeper parts confine various spaces and create an intimate character that bounds the valley.

Landscape Experience

| STEEP SLOPE | VALLEY | GENTLE SLOPE | PLATEAU |

VALLEY

PLATEAU

PLATEAUS

Historic qualities

At the plateaus some ruines from settlements can be found from the prehistoric period, but their hard to find. Also from the roman age when the plateaus were cultivated for agriculture and a lot of villa's were build, almost none have remained. And after the roman age, the plateaus were again covered with forest.

It's until the middle ages that this landscape has slowly evolved with its qualties we can now experience. In the late Middle Ages (1000 - 1500 A.C.) the plateaus were cultured again for agricultural purposes. New settlements came into existence upon these plateaus in a web-like road pattern. Their names often ending with -rade or -rode, which refers to their origin as forest cultivation. Farms were situated lineair in relation to each other as ribbon development.

Block by block the landscape became cultivated, the allotment structure was enhanced with wooded banks and hedgerows which eventually dissapeared because there was a high demand for grain. Open fields came to existence, which define the image of the plateaus as we know it now.

Since the 16th century the architectural character of the villages changed due to an ongoing densification of buildings and a change from traditional timber contruction to stone construction. At first in the most prosperous areas, but later also elsewhere. The Middle Age ribbon

Fig. 150 Typical "Limburgese carré-hoeve"

villages developed to streetvillages with closed facades, and the typical "Limburgese carré-hoeve" has found its origin in this period of time. The development of stone construction also had an impact on a sudden grow of the limestone mining, but also flintstone and sandstone mining. The use of natural stones in contstruction also made the geological makeup of this area vissible in the buildings itself.

The rise of fruit production from the beginning of the 18th century had a big impact on the landscape. Around settlements meadows were created with fruit trees to increase efficiency, seperated by hawthorn hedges. These dense fruit trees belts around villages characterized their appearance until halfway the 20th century. Remains of these can still be seen in the landscape.

The industrial revolution had a major impact on these cultural historical landscape qualities and from around 1850 urban development made particularly use of the open plateaus. Also the small scales allotment structure changed into a more productive large scale structure.

Landschape qualities

These plateaus are now vast open landscapes still mainly used for agriculture. Due to the relief there exist many differences in openness. The plateaus can provide panoramic views that overlook the lower valleys, especially the edges of the plateaus at the top of (steep) slopes play an important role.   Rising elements like trees at the top of slopes, urban sprawl or small villages can block these views.

On an ecological level these plateaus are not as interesting as the slopes and valleys, due to intensive farming and the absence of a rich variety of plants. Cultural historic elements, especially from the Middle Ages like chappels, churches and catholic crosses at crossings often guided by a few trees are important and striking orientation points.

The intensification of agriculture on the plateaus has now lead to erosion problems. But more visible is the dissapearing and absence of green elements surrounding (historic) villages, and the new housing developments or new business areas. These changes can have a big impact on these vast open landscapes. Even the smallest interventions are visible in a very large range. They affect the aesthetic qualities of this landscape. Modernity is demands its toll on the scenic landscape Limburg is

Fig. 151 A birdview of an open plateau

Fig. 152 A view from the plateau on a historic village, still surrounded by green. They appear as green isles in an open landscapes.

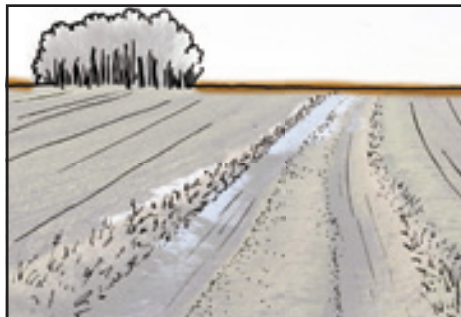Fig. 153   Catholic crosses at crossings, guided by a few trees as orientation point

Fig. 154 The highest tops on open plateaus

Fig. 155 The openess is also ideal for windmills that now mark this landscape

known for. It can be discussed if some interventions are really undesirable awful or maybe a new future for these areas. Like these windmills that now often mark these open plains.

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Landscape Experience

SPATIAL QUALITIES

This landscape also has some interesting spatial qualities that are important to mention and contribute to the aesthetic qualities of this specific landscape. Due to the small scale difference in relief and the characteristics of the various landscape types that enhance these spatial features there exist some interesting differences between open landscapes with wide views and intimate spaces.

One of the most important qualities of the plateaus are their openess. Because their elevated position in the landscape they provide wide views over the entire landscape. The highest points are the most interesting for it is there that the best overviews of the area are possible. The openess of the plateaus is an important factor contributing to this quality, without this openess that is often threatened by urban developments, these wide range views would not be possible. Especially the openess on the highest tops of the plateaus should therefor be preserved for its unique spatial qualities. It should also be mentioned that the mining history also had an interesting influence on the region. The mine waste hills that haven't been removed also provide interesting viewpoints and these remarkable landmarks still mark the horizon.

Not only the plateaus but also the slopes provide wide range views over valleys and landscape, especially the steep slopes are the most interesting. The steep slopes show the interesting height differences on a small scale and overlook the deep valleys. Not only do they provide wide views, they also contain elements like sunken roads and "graften" which offer an interesting contrast to the wide open plateaus. These small scale intimate places in combination with views over the valleys offer an interesting experience of the undulating landscape this region is known for.

The valleys are a sharp contrast to the open plateaus. They are intimate and filled with various elements, be it urban, agricultural, recreational, historic or natural, together they offer an interesting part of the landscape in which much can be explored. Its natural features has always seem to attract people, and also its spatial features make these valleys a nice environment to be in. There exist some views, through the valleys, but its boundaries clearly exist of the (steep) slopes that provide these places with an intimate character.

Fig. 156 Plateaus (Kerkstra, et al., 2007)

Fig. 157 An example of the wide views plateaus can offer

Fig. 158 Slopes (Kerkstra, et al., 2007)

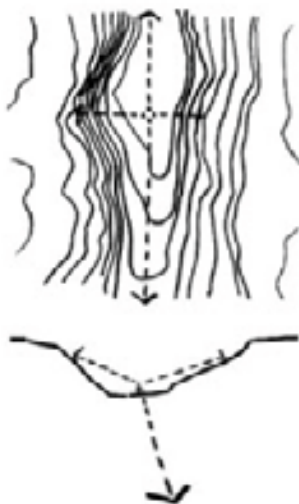*Fig. 159 The top of a steep slope provides overviews of surrounding areas and valleys*

Fig. 160 Valleys (Kerkstra, et al., 2007)

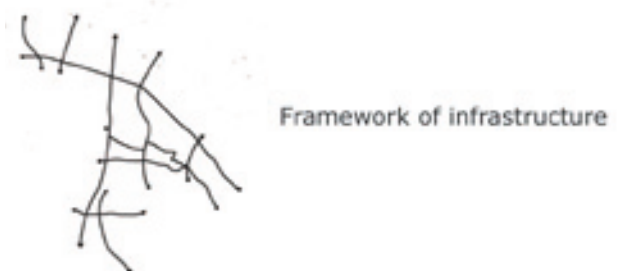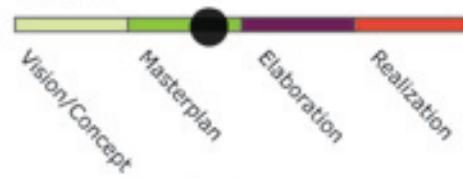*Fig. 161 A walk down the valley shows its intimate character*

Appendix III
Case Study Example Minor Thesis: Park Lingezegen

INTRODUCTION

GENERAL INFORMATION

Designer:	SAB Arnhem and DHV Deventer
Size:	1500 hectares
Rijksbufferzone:	Yes
Start:	2005
Phase:	

Vision/Concept — Masterplan — Elaboration — Realization

Existing situation

Districts

Framework of infrastructure

Recreational elements

INTRODUCTION

Figure 3.8. Context map Park Lingezegen

Figure 3.9. Design Park Lingezegen
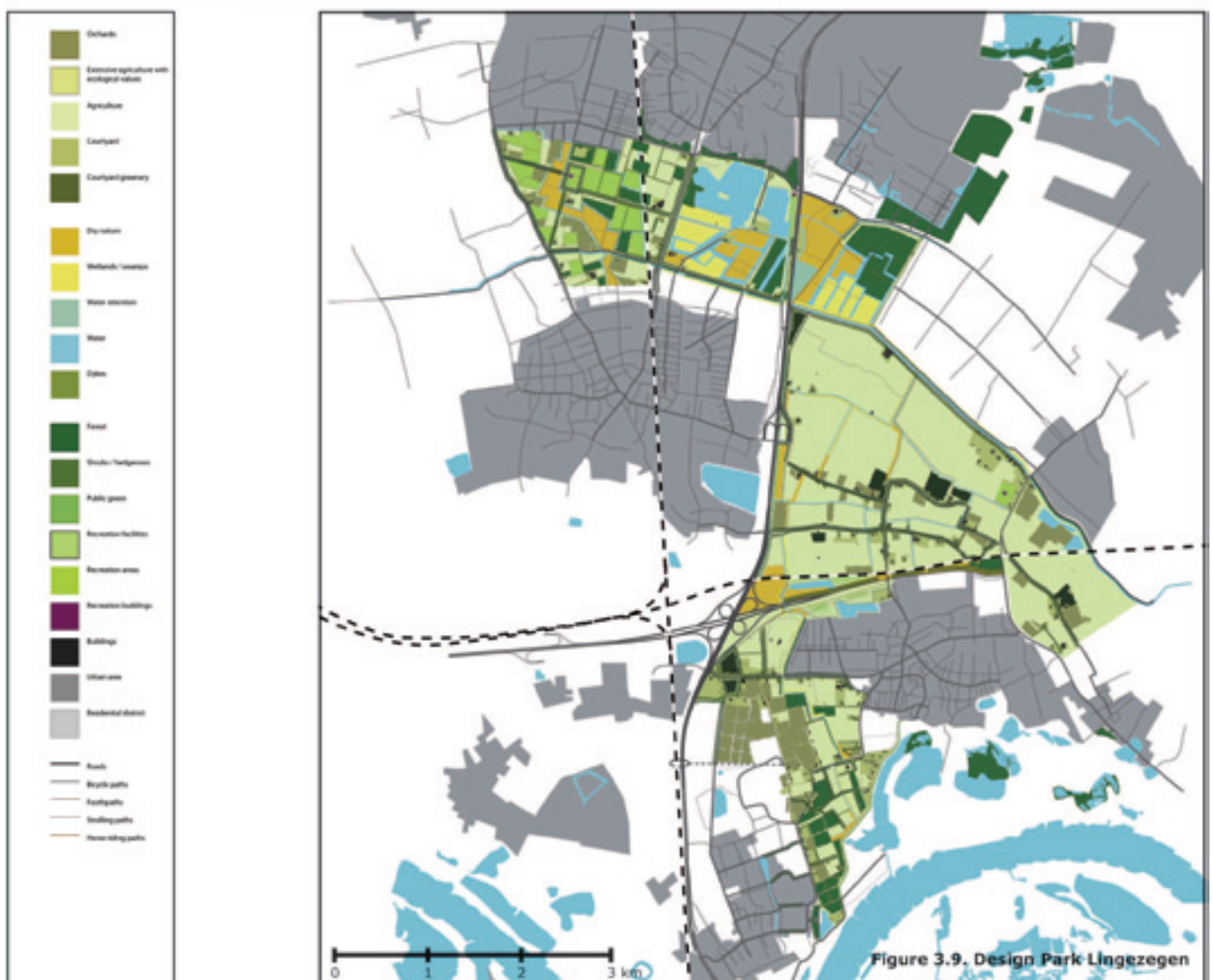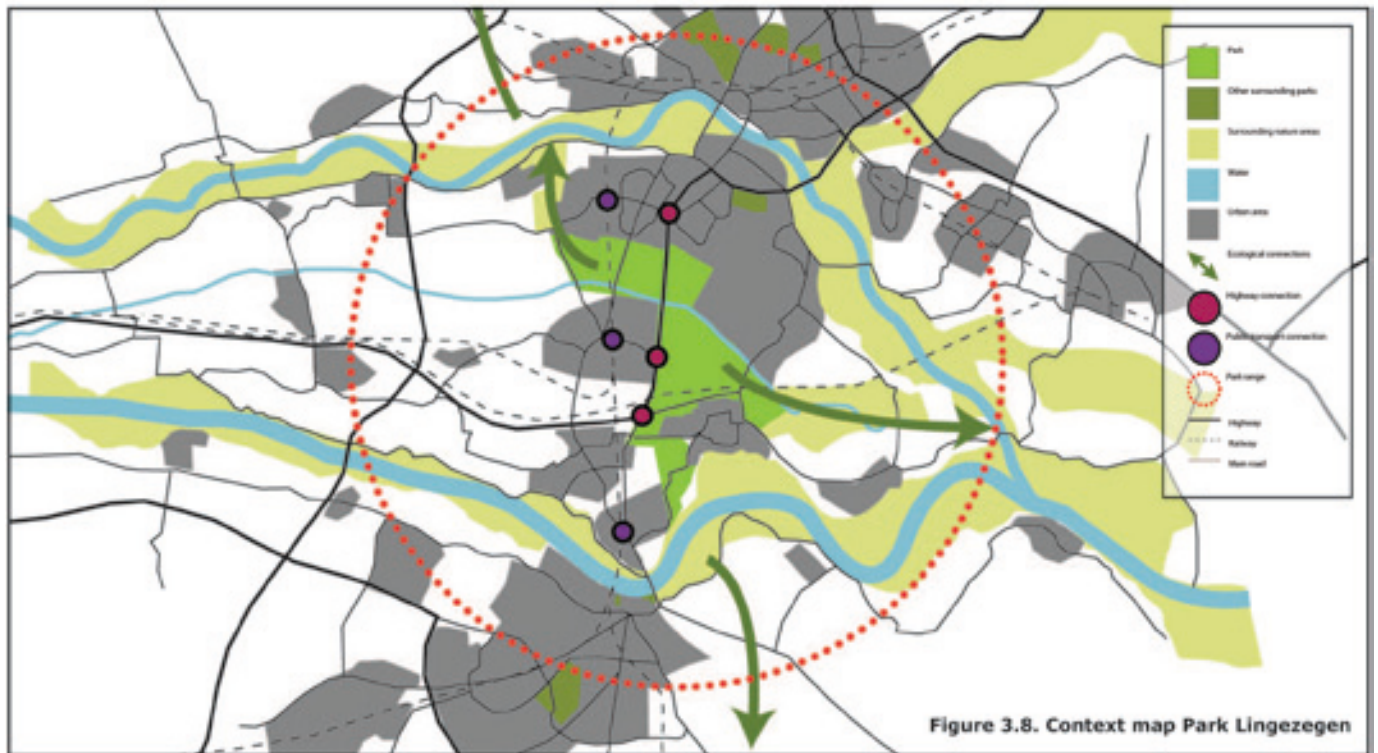
Fig. 162 Case study 'Park Lingezegen' of the minor thesis (Duyf & Maaswinkel, 2011)
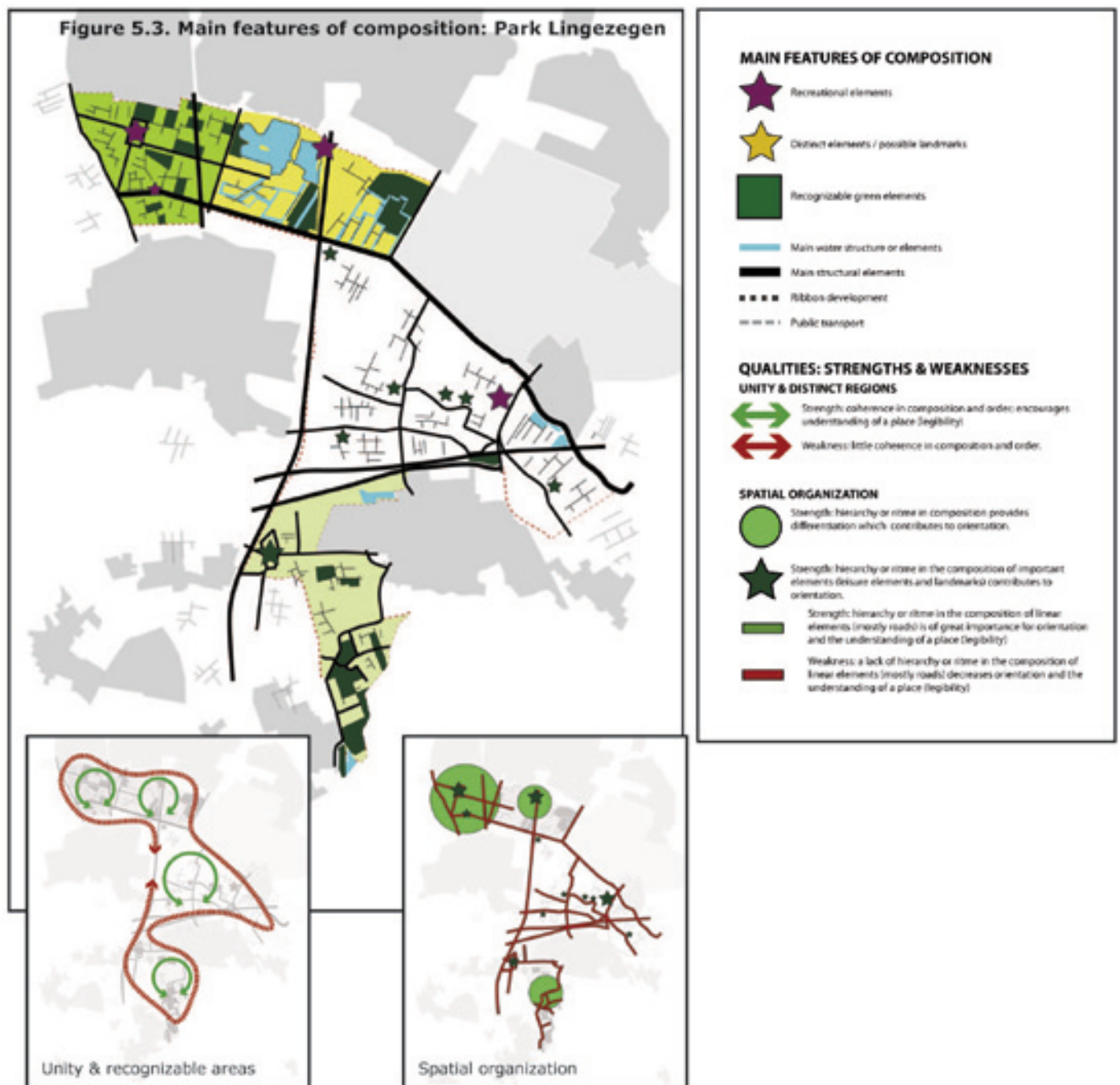
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Fig. 163 Case study 'Park Lingezegen' of the minor thesis, analysis of 'Unity & recognizable areas' and 'Spatial organization' (Duyf & Maaswinkel, 2011)
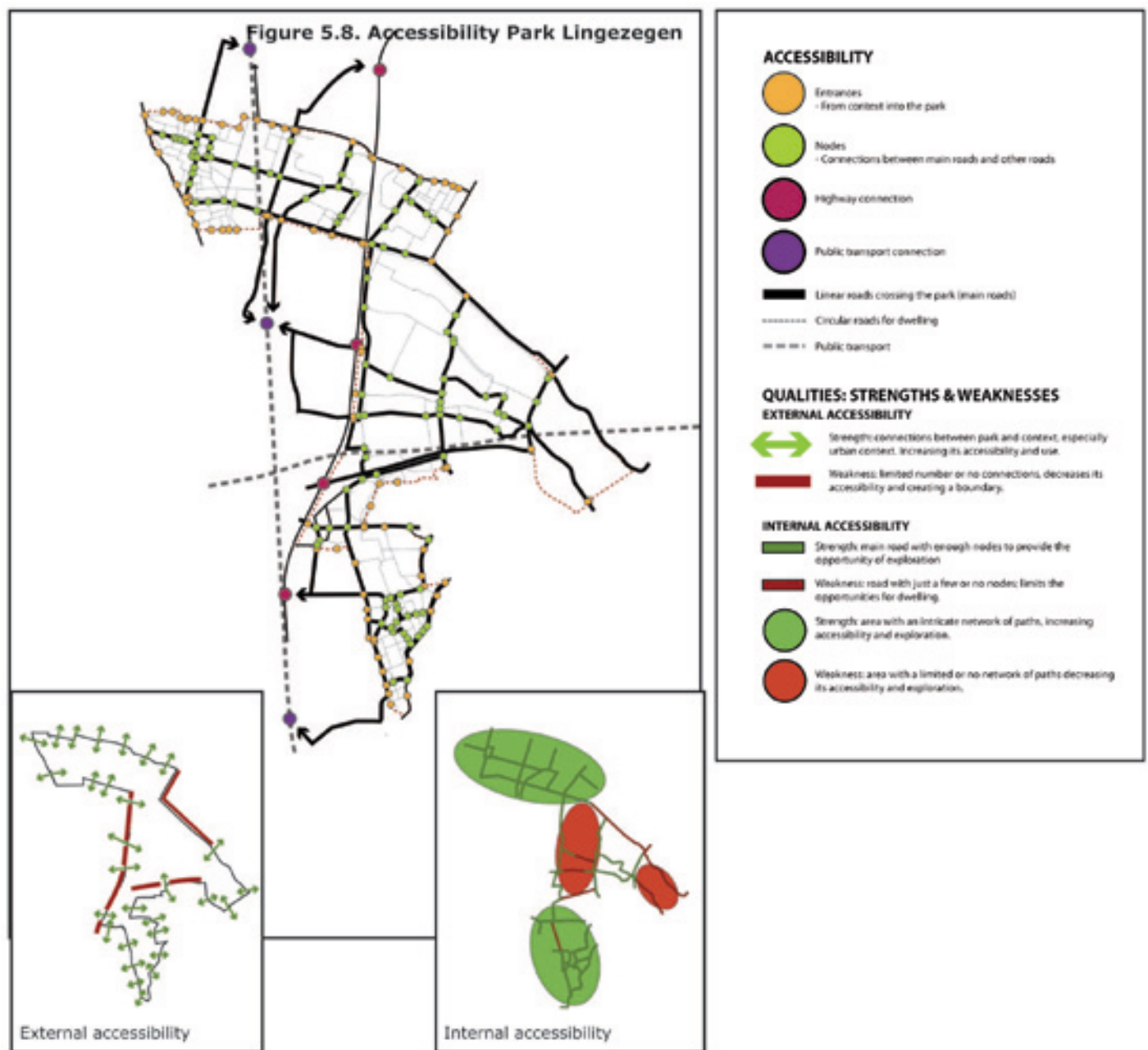
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Fig. 164 Case study 'Park Lingezegen' of the minor thesis, analysis of 'Accessibility' (Duyf & Maaswinkel, 2011)