
Highway transformation as an opportunity for landscape restoration in the Netherlands

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Introduction

The traffic and waterways infrastructure of the Netherlands dates mostly from the middle part of the 20th century. At this time the primary focus was, as in many countries, on facilitating transport. As a consequence, many historical agricultural landscapes were subject to fragmentation, which also reduced their ecological value. During the last 20 years, more attention has been given to the mitigation of the negative effects caused by linear infrastructure. Regulation has helped stimulate this, although regulations for landscape development were, and still are, less strict than those affecting nature.

This overview covers 20 years of landscape planning in relation to infrastructure and shows the development in design, planning and cross-disciplinary interaction and how this affects landscape and nature alongside infrastructure.

Background

In the Netherlands, independent consultancy firms often play an important role in landscaping; ensuring infrastructural changes fit into their surroundings. The author is a landscape architect, who has worked at several firms during the last 20 years, and has experience of fitting infrastructure into a variety of landscapes. This involves working within a team, where landscape architects cooperate with architects, ecologists and infrastructure technicians. In the 1990s, authorities kept charge of the entire process. They ordered a design and consequently translated this into terms and rules for building contractors. Over the last 10 years, authorities have searched for other ways to guide contractors in achieving the desired product within the given guidelines: a well-fitting road, canal or railway. The aim was to spend less governmental time on engineering and to benefit from innovations and the cost-efficiency that building contractors could provide. New contracts with increased responsibilities became the new way for the authorities to ask for assistance. With Design & Construct (D&C) and Design, Build, Finance and Maintain (DBFM) contracts, building contractors are given responsibilities beyond the technical construction of infrastructure. This includes aspects as landscape and ecology, fields of knowledge that building contractors have no experience with. As a result, building contractors include independent consultancy firms

for nature and landscape in their tender teams. Therefore, the work of the landscape architect changed from making plans as a 'limiting condition' to 'co-engineering'. The goals of the landscape architects however, stay more or less the same: to improve the spatial quality and the natural conditions surrounding the infrastructural intervention.

Goals and objectives

The main goal of this paper is to show how practices for landscape and highway planning in the Netherlands have changed and to highlight opportunities for the future. It also shows how recent changes in the assignment and responsibilities (from governmental to co-creating with constructors) affects landscape design.

Methods

In order to design the green space in the surroundings of an infrastructural intervention, the following steps are essentially being taken:

- a) definition of characteristics of the landscape and natural context (historical composition, structure, development, influence of water, spatial and ecological qualities and problems);
- b) analysis of these findings, leading to threats and chances;
- c) conceptual design;
- d) consultation with specialists;
- e) design of the basic shape;
- f) design of the specific shape in tune with engineers.

There is always friction between the area the landscape architects would like to change and the building boundaries that have to be taken into account. Attention is also needed during the design and development process, to ensure that the intentions of the design are retained. Steps a. to e. are usually documented in a plan (maps and text) for the specific project. Step f. is mostly integrated into the technical design. All studies and designs to which this article refers generally follow these main steps.

Results

Integration of landscape and nature planning

In the early 1990s, landscape and greenway planning mainly focussed on a drivers' view: how to best show the landscape to the passer-by. Vegetation was located next to the road for decoration and safety reasons (such as to highlight bends in the road), and type and layout depended on the type of landscape. At

the same time, ecologists tried to restore the connection for affected species in a rather technical way, which fitted the technical approach of the road authorities.

At first, landscaping highways and ecological compensation were different topics with different specialists working on them. The synchronisation of these two subjects was a big step forward and was first achieved in the mid-1990s. New ecological connections between both sides of the highway, which had to be broadened, were realised alongside landscape structures such as waterways and dykes (de Wit and Visser, 1996).

The same structures for landscape and nature

Landscape structures, such as small rivers, avenues of trees or hedges, provide shelter for numerous species and clarify the overall structure of (mostly manmade) landscapes on both sides of the road. Restoration of these structures is nowadays often regarded as well-fitting for landscape perception as well as nature. These persisting structures show how the landscape was originally formed and the influence of natural processes, human land use and interventions. The 'soul of the place' can be visibly highlighted in the landscape. Also, elements aimed at enhancing value for nature, such as a badger tunnel, perform better when attached to the right landscape structures.

Greenway planning as a precondition

Some remote or highly industrialized places have no real 'soul' that can be used as a characteristic or to increase ecological value. In that case, landscape design can create new attractive and recognizable features with infrastructure as a driving force. For example a highway through the city of Badhoevedorp is outplaced to an area near the airport where urban developments are planned. Greenway planning created a head start to the development of the area, but has a very modest design. Future urban planning is welcome to fit in, and the possibility of development of natural connections is kept open (Visser, 2009).

Reconstruction of historical landscape

In rare cases, completely new roads are being constructed and the whole of the surrounding landscape can be taken into account. The historically open landscape south of Gouda is characterised by a linear structure, where a lot of ditches divide elongated plots. To fit the new road into this landscape, treelines, plots of reed and water storage basins are designed to be visually connected on both sides of the road. In this way, residents living close to the new road could maintain a partial view on the open landscape, while road

traffic was largely hidden from view. At the same time, historic landscape structures were accentuated and slightly enhanced (Visser, 2006).



Figure 1. The new N207 fitted into the historically open landscape of the Krimpenerwaard

Enhancement of water systems and natural connexions

When existing roads have to be broadened, opportunities exist for the reconnection of landscape features. For example, a former drainage channel near Eindhoven, has been changed into a ‘natural’ creek with wide banks on both sides. It is given enough space under wide fly-overs. This helps to restore natural connections in the entire water system of this creek. As a result, climate change adaptation in this part of the city and surrounding area has been enhanced (Luning and Visser, 2000).



Figure 2. A2 Randweg Eindhoven – Dommeldal, in 2005 (left) and in 2009 (right) when former road space is given to the creek and broad viaducts are constructed

When an existing highway passing within in a nature reserve needs to be

broadened, the opportunity to reconnect natural relations could be exploited; not only in crossing the road but also parallel to it. Verges can be specially adapted to encourage those species of interest or which are influenced by the specific highway. Near Ede, where a Natura 2000 area ('Veluwe') is crossed by a highway, wide verges with heather provide both great ambiance and visual connection with the adjacent nature reserve as well as new habitat for sand lizard (Visser et al., 2014).

Measures against pollution

Good landscaping can be beneficial in reducing the impact of (new) infrastructure on nitrogen deposition. In the previous example near Ede, the highway passes vulnerable habitats of a Natura 2000 area. The reconstruction of the highway provides the possibility to create a hill alongside the highway, planted with heather. This hill could block traffic sound and reduce the visual impact, improving quiet recreation in the nature reserve. For the motorists, it shows the presence of the nature reserve through the heather. At the same time the hill could reduce the spread of nitrogen emission by traffic and so reducing the negative impact of the highway on the vulnerable habitat behind the hill (Visser et al., 2014).

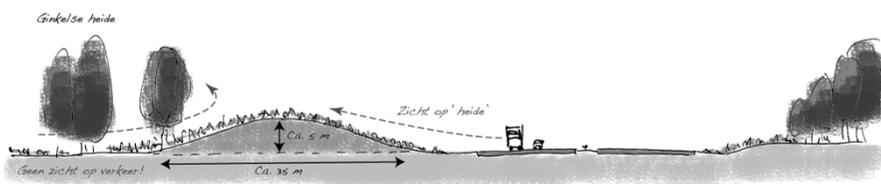


Figure 3. Sectional drawing: a heather hill where highway nitrogen could deposit

Stimulating chances

This practice of enhancement or reconstruction of landscapes and ecological connections is, understandably, only viable when changes are being made on the infrastructure itself. Only then, thanks to the law, a little money is set aside for the green goal. Regulation in the Netherlands requires that the instigator of an infrastructural enhancement pays significant attention to the landscape, although there are no rules on how to do this. Instigators find it important however, for otherwise a building permit could be denied. Nevertheless, there is no cost-prescription or given percentage as to what must be spent on the landscape. European regulations (Natura 2000) and Dutch law require compensation for (potential) ecological damage; otherwise building could be

stopped before permits are issued. Also, a water permit may be required and then also rules for water management must be taken into account. Therefore, infrastructural development in the Netherlands is always combined with activities that, as far as possible, undo the potential damage done to landscape, water system and ecology. Furthermore, with progressive landscape design, an infrastructural development can be used as a chance to enhance the quality of the surroundings and restore structures and systems that former technical approaches have destroyed. In the end, both a functional infrastructure and higher qualities of landscape, nature and water systems can be achieved.

Organising public support

Landscape design is accepted as an amplifier for public support. Landscape architects in the Netherlands often operate as a defender of spatial quality. In search of optimising spatial quality, landscape architects can objectify the characteristics in the surroundings of the planned development. When different aspects of the surrounding landscape are being depicted, they become topics to take into account and to discuss. Both public and technicians can understand the relevance of these aspects, especially when drawn (figure 4, left). The influence of possible transformations (figure 4, right), as a result of infrastructural change, can be discussed and found to be either acceptable or not (Visser and Kerpel, 2010).

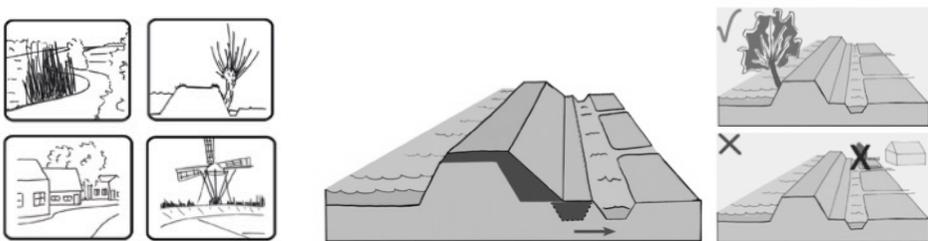


Figure 4. Reinforcement of the embankments of river 't Gein, near Amsterdam as an example where landscape analysis and design was used as an amplifier for public support and for making responsible choices.

Creation of a support base is sometimes asked for in the directive. Although a company can never guarantee support, planners often promote the designs to the parties involved. As, for example, at Nigtevecht, where 3D visualisations are being made to show the public which sight they can expect when a cycle bridge and nature connection are being developed. Landscaping the environment of the bridge and showing this in an understandable manner, takes away a lot of resistance.



Figure 5. Visual and aerial view made to help create support for a cycle bridge and nature connection near Nigtevecht, over the Amsterdam-Rijn Canal

More integration desirable

Landscape architects are needed to integrate different needs and wishes. Different authorities have their own problems and their own ways of solving them and often they want to use the same land. By bringing more needs together and by designing landscapes where solutions are integrated and spatial quality is increased, landscape architects contribute to multi-functioning developments. Nowadays commissioning parties expect plans to be integrated, particularly as authorities are keen to save money. They wait and see if anybody else gets into it and then try to influence. Sometimes commissioning parties already connect needs. Infrastructure can then be designed in full integration with, for example, natural (re-)connection, as is shown near Nigtevecht (Visser et al. 2015).

Discussion and conclusions

Thinking in chances, exploiting opportunities

Greenway planners play an important role in telling, or mainly showing in designs and sketches, the story of the landscaping and the exploited possibilities. With the public growing more assertive and well informed (internet!) this will become even more important.

Greenway planners can use the need for more and better infrastructure to restore landscape structures or develop bold natural connections. Landscape can be beautiful in itself, but is not only decoration. When more aspects are included, the landscape will be even more meaningful. Ordering parties and possible partners are willing to integrate more interests, but only when costs are being taken care of.

Furthermore, planners can develop new landscapes that contain solutions to modern social problems, such as climate change, the need for renewable energy, and measures against pollution. They must not stop looking for new combinations in order to design innovative new landscapes, which preferably

fit into the historical context of the place. New layers of history are being constructed in the landscape and greenway designers play their parts.

With the assignments for greenway planners changed, from commissioned by authorities to commissioned by building contractors, parties are being continually challenged to create distinguished designs. This can stimulate innovations, as long as the tender request facilitates this goal explicitly. Innovations often consist of new combinations or new ways to arrange things. The two mayor developments in greenway planning: change of ordering parties and extreme integration of topics can magnify each other.

Designers must, however, continuously stress to their commissioning parties the importance of fitting their developments in the surroundings with an eye for spatial quality.

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