

## Visual Gaps in the Landscape

Urszula Forczek-Brataniec

Institute of Landscape Architecture, Faculty of Architecture, Cracow University of Technology, ul.  
Warszawska 24, Kraków, Poland

E-mail: urszulafb@interia.pl

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### Abstract

The surrounding landscape is not identical to the space that we see. The space we see is just a fragment of the scene conditioned by place, topography, the body and awareness of the spectator. In landscape design, the seen space is the main design subject, but visual gaps, the areas that remain invisible, are also important. Their size, range, and type are valuable research and design areas in landscaping, and the measure of the landscape's condition and an element of its creation. The selected case studies illustrate how the conscious creation of invisible areas can be a condition for the proper creation of the seen space. The invisible space is connected to the concept of 'visual absorption capability' (VAC). However, absorbency is understood as the ability to absorb forms introduced by human beings without a depreciation of the landscape values, the visual gap includes the negative, out-of-control situations. The visual gaps in this concept are identical to visually omitted spaces; the areas that could be seen but which remain invisible due to disadvantageous conditions.

This analysis of visual gaps deals with the visual exposition from roads. The results of research prepared for an existing road and a proposed road were used. The first case involves the planning scale problem of an area with large open spaces that have high environmental value. The second case represents the urban scale of the outskirts of a small town near a UNESCO world heritage site. In both cases, the methodology developed by the Cracow Landscape Architecture School was used. The methodology is based on the geometrical analysis of the terrain that allows the borders of the view range and invisible areas to be precisely defined. Monitoring of the invisible areas in case of the proposed road allowed for successive stages of the design to emerge in order to decide which parts of the town will be visible and to avoid undesired visual gaps. In case of the existing road, an analysis was made to upgrade the visual values by restoring the most beautiful panoramas and insights in the natural and cultural landscape, and by correcting the visual gaps. The results of the analysis proved the utility of the invisible areas research in the context of both:

the visual absorption capability and the danger of visual gaps enclosing valuable elements that can build road space composition.

## Keywords

Visual gap, visible space, road space, scenic road, visual design

## 1. Introduction

*It could be good if the journey had some architecture and if it were possible to add a few stones to it, and even if the traveller does not seem to be the one who builds the landscape – that is a task for a stay-at-home man – but rather the one who dismantles it and destroys it, like the story of Baron von R. of Hoffman who travels around the world and collects landscapes. When he wanted to enjoy a beautiful view or create a new one he ordered trees to be cut, leaves to be torn off, the terrain to be flatten, all the forests to be felled and all the farms demolished, only because they hid a view.*

Then the baron leaves to never come back again to the same place. This is how the literary journey through Europe in Claudio Magris's book *Danube* starts out. Chaotic development, a common process of natural succession, and infrastructure development often cause beautiful towns' panoramas, views on the large open landscapes to vanish from the field of view. More and more often we have situations where we would like – like Baron von R. – to cut trees and demolish buildings to see a beloved scene, a far-off landscape that is hidden from the view.

The surrounding landscape is not identical to the space that we see. The space we see is just a fragment of the scene conditioned by place topography, body and the awareness of the spectator. Seen space comes into unseen space with a visibility border in between. This can be attributed to the different connotations that depend on which perception we take into account. A geometric border is the result of topography, while the limitations of sensual perception are the result of our body's construction; and the limitations of awareness are the same as the difference between 'to watch' and 'to see'. The subject of reflection will be the physical aspects of the visual perception connected to a place – the landscape understood as a spatial form that is governed by the rules of geometry. In this way, the visibility border is very precise: it marks the visible and invisible spaces. It is attributed to a defined place of observation. It can be a 'view point' or many points – a trace – the road. Every day we wander for kilometres when we commute, travel to school, are on a trip. It is good if these routes have some kind of 'architecture' and landscapes that could 'be collected'. But often, the most interesting views get drowned in the shadows and never exist in the space seen by travellers. Because the observation made from the road is the most common way of recognizing landscapes, the road is the subject of consideration.

### The idea of a 'visual gap'

An invisible area is the place that is out of range, unknown, a blank spot in the landscape. It can swallow a valuable object and deprive it of the possibility to exist in the landscape. It can also

contain a negative object that is beneficial to the landscape. An invisible area is connected to the concept of 'Visual Absorption Capability' (VAC). However, absorbency is understood as an ability to absorb the forms introduced by human beings without depreciating the values of the landscape (Smardon, 1986); the visual gap includes negative, out-of-control situations.

When they become an uncontrolled process, the landscape starts to lose its values and the ability to absorb increases and exceeds the acceptable limits causing the self-absorption of views. When the absorbency exceeds the positive meaning and becomes dangerous, it becomes a specific form of spatial 'cannibalism'. The visual gaps in this concept are equivalent to visually omitted spaces, i.e. areas that could be seen but which are invisible due to disadvantageous conditions.



Figure 1. Examples of visual gaps (buildings, greenery, acoustic screens).

Chaotic development, a common process of natural succession, and infrastructure development are common occurrences observed on the outskirts of towns and near the roads. As a consequence, invisible area becomes an unnoticed danger. The increase of invisible areas causes a reduction in the relationship between the spectator and the landscape (Appleyard et al., 1964). Hiding places that have aesthetic values, which are a journey destination important for culture and history, causes loosening of the contact with the terrain that we cross and strips out the identity of another element of our lives that is expressed in the form of an individual setting of the road space.

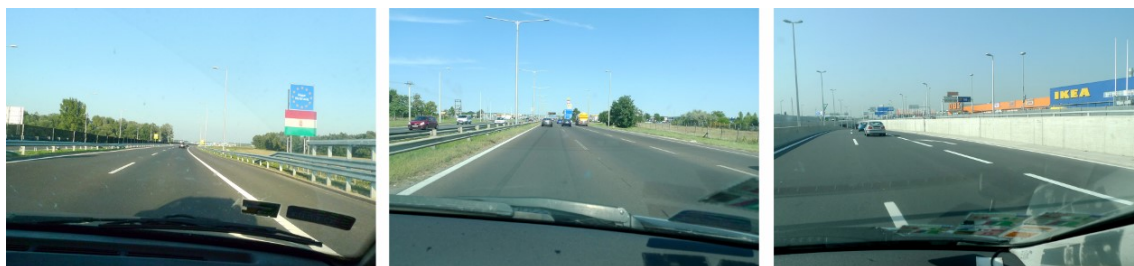


Figure 2. Contemporary road space – only the road signs with towns' names identify the country we are in.

There is a Polish proverb: 'What is out of the eyes is out of the heart' (Eng. 'Out of sight out of mind', Germ. *Aus den Augen, aus dem Sinn*). The terrain, an object that stops being visible, passes into oblivion and is erased from our consciousness and eliminated from our journey's architecture. On the other hand, an area that never was in our field of view will never come into being, even if we pass it a few times a day. We lose a lot when some beautiful views drown in the invisible areas and an everyday piece of beauty is removed from our collection of beautiful landscapes.

There is another Polish proverb: 'What the eye does not see, the heart does not regret', which is also mirrored in the landscape. The areas that are out of sight, away from the journey routes are more neglected and less looked after. Also, they receive less money from the town budgets.

Today, monitoring of invisible areas is becoming a more important element of design. This should apply both to newly designed roads and existing ones. In new designs, it supports the design of the road space and in case of the existing ones, it is the basis for preserving existing views and revealing lost views again.

Based on the selected examples, two analyses of invisible areas are presented. The first case is the presentation of the design process for a new road fragment that considers issues related to the value of views and the successive guiding of the range of visual gaps to achieve the optimal spatial effect. The second one considers an existing road, where an uncontrolled process of invisible area enlargement has occurred that endangers the perception of the place's visual identity.

## ***2. Presentation of two case studies***

### **Methods**

The analysis of visual gaps and landscape absorbency is based on the methodology developed and improved by the Cracow Landscape Architecture School. The initial analogue research of visibility issues (Flagorowska, 1981) has been conducted in a digital environment (Ozimek and Ozimek, 2007), and thereafter continued and verified by several landscape studies and analyses made especially for master planning (Böhm, 2008), by studies of the selected locations and objects (Myczkowski, 2001) and of the roads and dynamical perception (Forczek-Brataniec, 2008).

The methodology based on geometrical analysis of the terrain allows for the precise definition of the borders of the view range and invisible areas. The size of these areas is determined by the terrain relief and all the elements that appear on the surface such as trees and buildings. Two types of exposition were distinguished, and they depend on different elements that determine the visibility border. The primary visibility range, which is based on the terrain relief is called the 'potential exposition', and when supplemented by overlaying elements, it is called the 'real exposition'.

The visibility border is established by a three-dimensional terrain model prepared on geodetic base (DEM) analysis. The analysis uses a digital light-ray model that interacts with the 3-D terrain model (Ozimek and Ozimek, 2007). Depending on the scale and detailing of the study model, information is obtained about the visual potential of the given location and the reality that results from land management and land use. In case of analysis of the views from the road, this method can be used both for the proposed and the existing road. The separation of invisible areas allows

to identify areas, which are located outside of the sight range. Thereafter, it is possible to define the possibilities for visual gaps correction and move a given area into the visible area.

In the analysis of the proposed road, there are a few variables that can determine the range of invisible areas. The basic and primary factor is the line of the road. The line delimitates the outline of the space that will be opened by the new route and inevitably separates the invisible areas which will be out of sight. The line of the road on the plan is the deciding factor but other factors introduce other conditions, and the sum of all factors creates the final form of the visible space. The grade line (vertical alignment) of the road supplements the outlined route. Lifting or lowering it completes the range of invisible areas. The surrounding elements have a similar influence. Cultural elements such as screens as well as natural elements such as trees play a part in enlarging the invisible areas. The geometrical analysis allows the actual range of invisible areas to be defined during each design stage, and thereby to react in time during the design preparation stage.

### Case study 1

In the analysis of the existing road, some factors must be treated as 'constant'. These are usually the track and the gradient, but the additional elements on the road – trees and structures – are the variables in this configuration. The road space is examined in two stages. The first one is visibility based on the terrain relief. In this way, the information about the potential visibility range is collected. The second stage takes covering such as trees into account and allows the real visibility exposition to be defined.

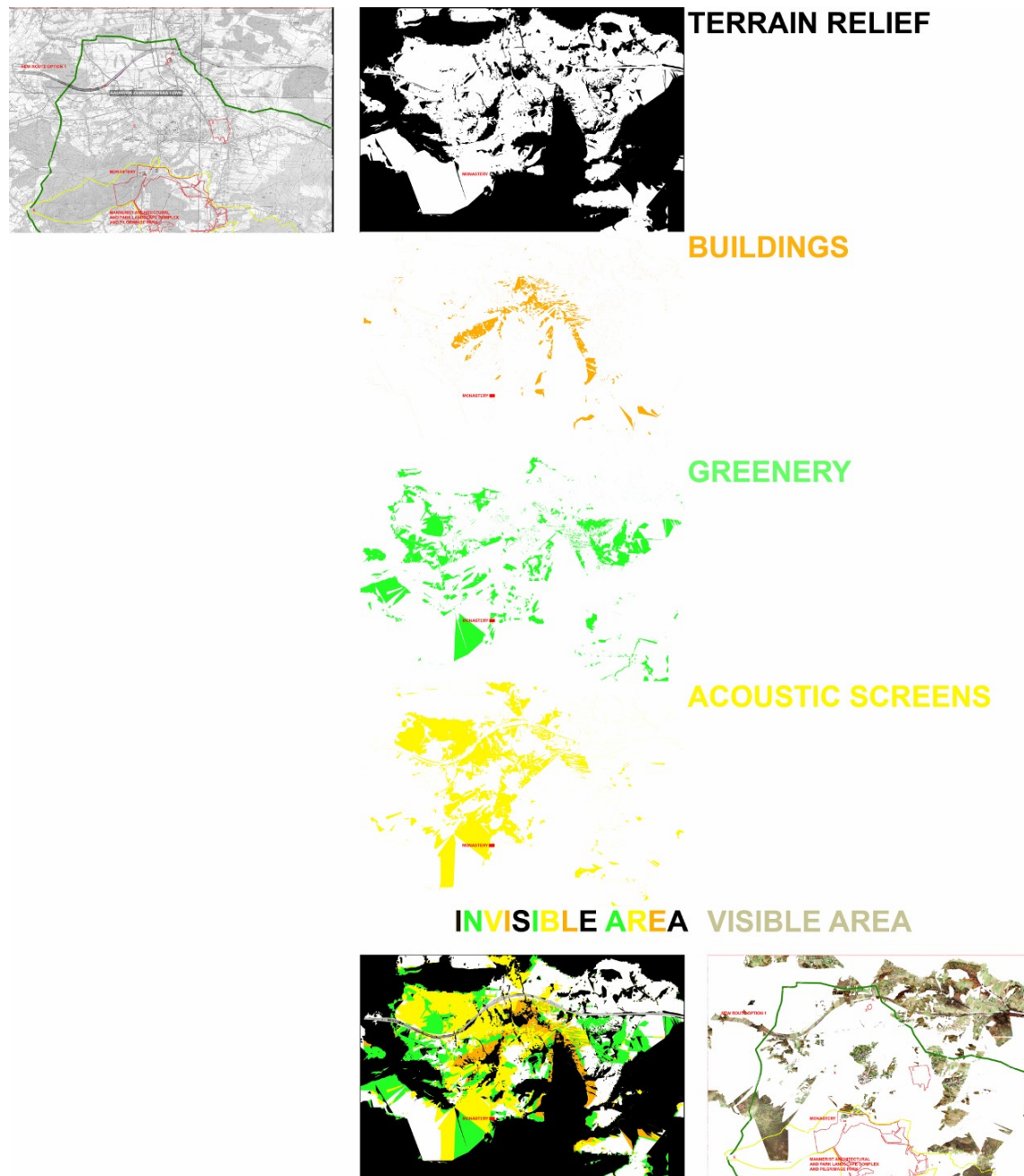


Figure 3. Study of the track of the road in Kalwaria Zebrzydowska for option 1. Illustration of the increase of invisible areas at the sequential stages of design detailing.

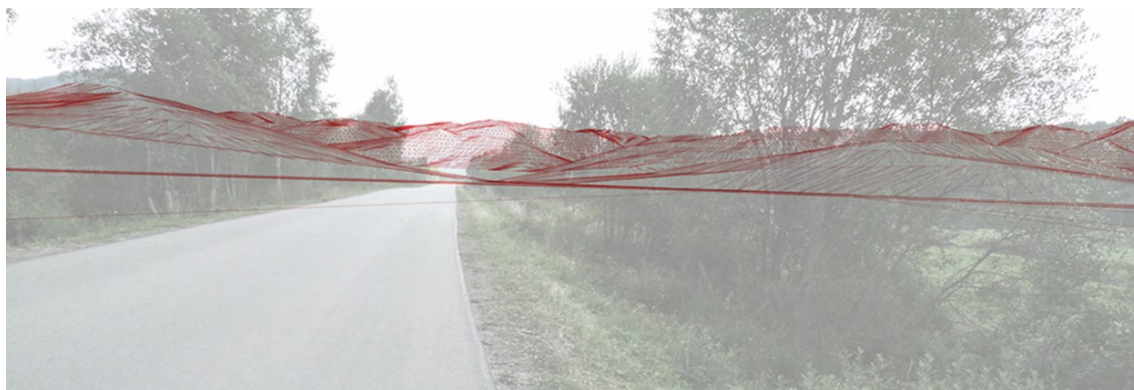


Figure 4. Study of preservation plan for the Bieszczady National Park. Illustration of the areas that became visibility gaps as the result of natural succession.

As a result, data is collected related to the existing relationship between the range of invisible areas and the invisible areas as the result of topography. A confrontation between them provides many options:

- Allows the absolute invisible areas that objectively will never be seen to be defined;
- Allows the conditional invisible area – visual gaps that can be visible when some actions are undertaken to be shown.

Additionally, when compared to the archival materials, the corrections of the visibility gaps could restore lost views and, in the future, influence the visibility of new developments. The presented method of landscape analysis has one more advantage – it clearly delivers the relationship between the form of development and the landscape result. Thanks to contemporary technologies of visualizations, the results can be shown before they are realized. This form of presentation is clear to everyone and allows dialogues to be conducted in various contexts, which is very important in the case of large-scale developments.



Figure 5. Influence of insignificant road gradient correction on the invisible area size.

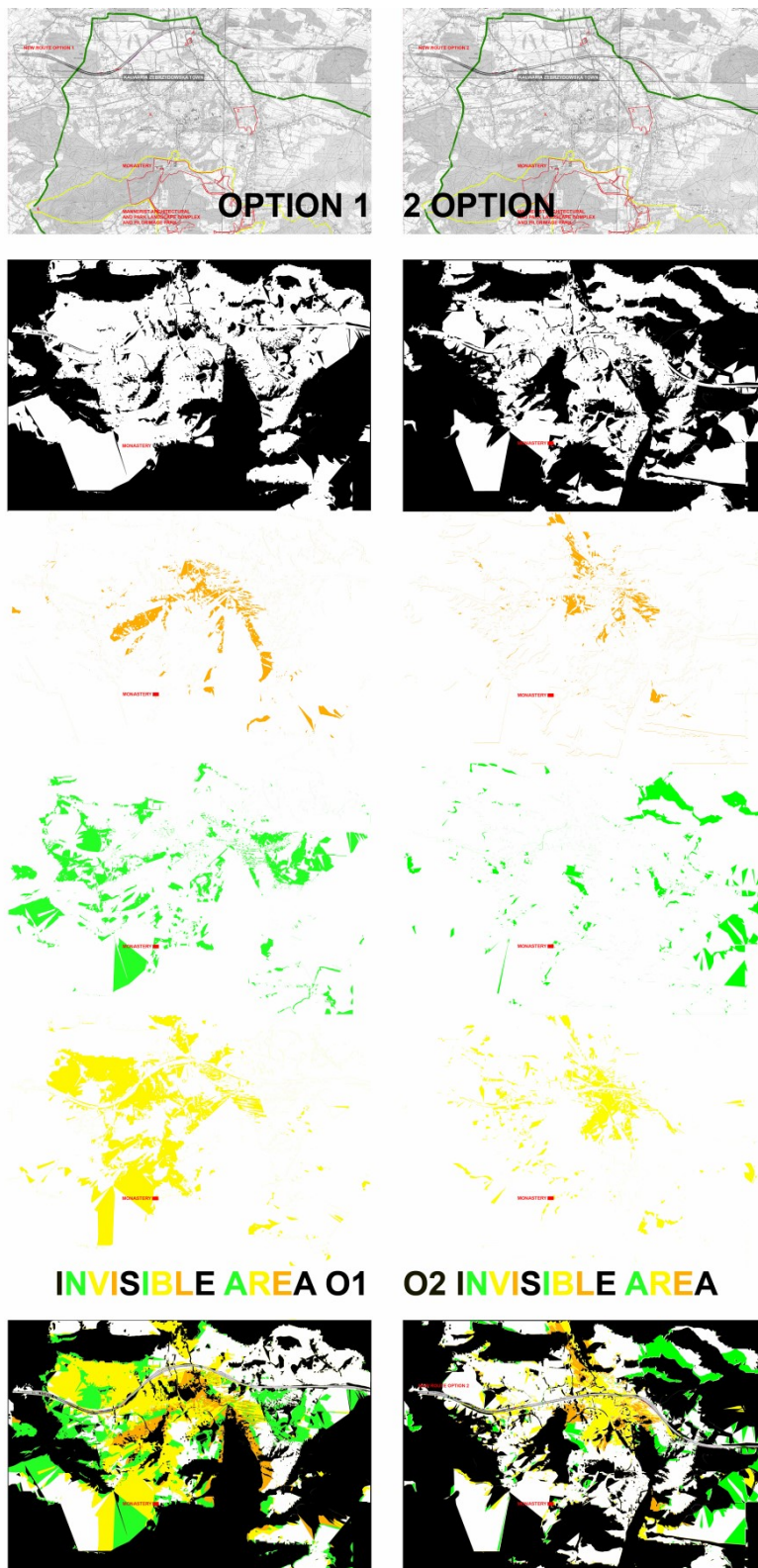


Figure 6. Comparison of the invisible areas in the two options of the designed road tracks in the area of Kalwaria Zebrzydowska. The illustrations sequentially show the orientation map, invisible areas created by terrain relief, buildings, greenery and acoustic screens.

Table 1. Comparison of invisible areas for the analysed options of the designed tracks of the road

| Options | AREA OF THE INVISIBLE AREAS CALCULATED FOR THE INDIVIDUAL LANDSCAPE ELEMENTS THAT DETERMINE THE SHAPE OF THE VISIBLE SPACE |              |                            |              |                                       |              |                                                          |              |
|---------|----------------------------------------------------------------------------------------------------------------------------|--------------|----------------------------|--------------|---------------------------------------|--------------|----------------------------------------------------------|--------------|
|         | Terrain relief                                                                                                             |              | Terrain relief + buildings |              | Terrain relief + buildings + greenery |              | Terrain relief + buildings + greenery + acoustic screens |              |
|         | Invisible area                                                                                                             | Visible area | Invisible area             | Visible area | Invisible area                        | Visible area | Invisible area                                           | Visible area |
| O1      | <b>52.80%</b>                                                                                                              | 47.20%       | <b>55.89%</b>              | 44.11%       | <b>65.36%</b>                         | 34.64%       | <b>77.94%</b>                                            | 22.06%       |
| O2      | <b>58.52%</b>                                                                                                              | 41.48%       | <b>60.35%</b>              | 39.65%       | <b>59.09%</b>                         | 40.91%       | <b>63.86%</b>                                            | 36.14%       |

As a result of the examination of real spatial situations, the invisible space analysis allowed for measurable design effects. The results were based on two representative landscape studies.

The first is the landscape study of the new road that runs on the outskirts of a town that is part of the UNESCO zone of Kalwaria Zebrzydowska: The Mannerist Architectural and Park Landscape Complex and Pilgrimage Park (The Landscape Conservation Study, 2010).

In case of the proposed road, the invisible areas were monitored from the drafting of the first option of the track through the gradient forming, greenery composition and infrastructure layout, and ending with the decisions related to the location of the travellers' service stations. Depending on the design decisions, the visibility gaps had different shapes that covered or revealed various parts of the town.

Thanks to systematic cooperation between the road designers and environment preservation team, interesting results were achieved. The main target was to achieve the ability to guide the visual gaps in the area of the Kalwaria hill to ensure a safe view of the UNESCO object/site. A lot of attention was paid to the issues related to acoustic screens locations and the masking greenery in order to minimize the influence on the view of the UNESCO object from the road. The primary benefit of the cooperation was that the right choice was made for the option that has the minimum influence on the landscape and achieves the best landscape values. The comparison of options was presented in a graphical way; it allowed a comparison to be made of the ranges of invisible areas and the areas that are lost or invisible to be evaluated. Another result of the analysis was a chart comparing the numbers of areas covered by visibility shadows. For the monastery exposition, the second option is clearly better.

## OPTION 1 2 OPTION

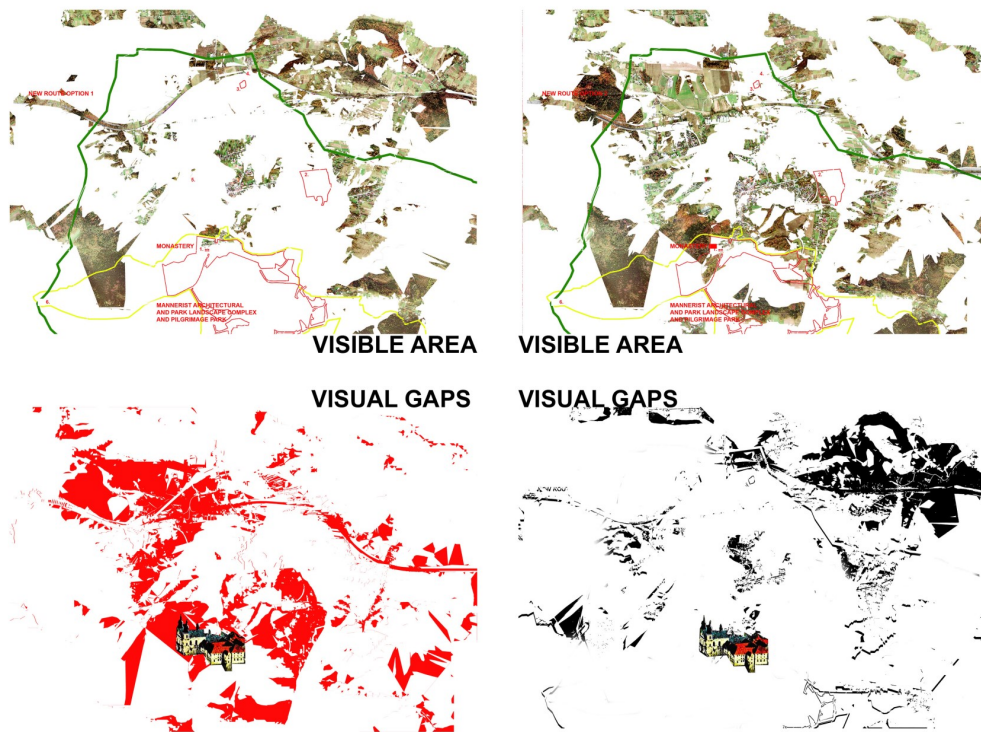


Figure 7. Comparison of visual gaps – lost visibility fields for both road options.

### Case study 2

The second example involves the existing road analysis. The elaboration is a part of a study on landscape value preservation and its results are implemented in the preservation plan for the Bieszczadzki National Park. The road, which runs across the national park, is a 'greenway' that links the main towns in the Bieszczady Mountains. Because the route passes through a nature preservation area, a secondary succession developed on the adjacent grounds. As a result, the view value of the scenic road decreased significantly. The process of overgrowth resulted in the enlargement of visibility gaps throughout large areas. At the moment, when the most valuable views started to be endangered, the decision was made to intervene. Because the road's environs are covered by some of the most stringent preservation requirements, special caution was required to take any action. The expected actions had to be adequate in the natural context and in the relation to the remains of the most valuable cultural settlements. The precise model and very detailed outdoor studies resulted in a very satisfying outcome. Finally, in the cooperation with the authors of other studies related to the project, the optimum range of conservation actions was specified to upgrade the spatial condition of the Bieszczady roads. As a compromise, a form of visual correction was chosen that resulted in the best proportions. The 'surgical' cuts of precisely selected visibility screens allowed the best panoramas to be extracted from the visual gaps.

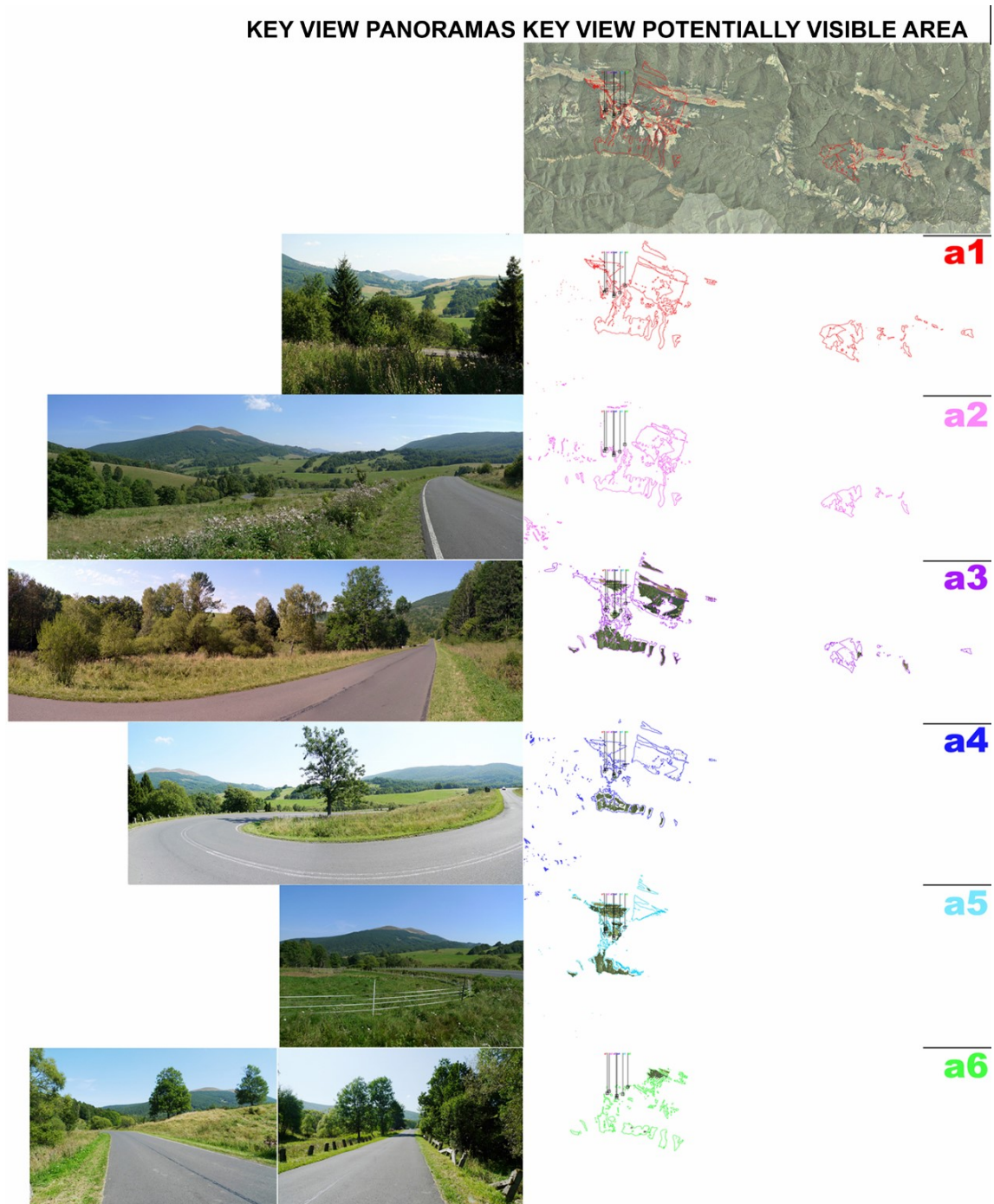
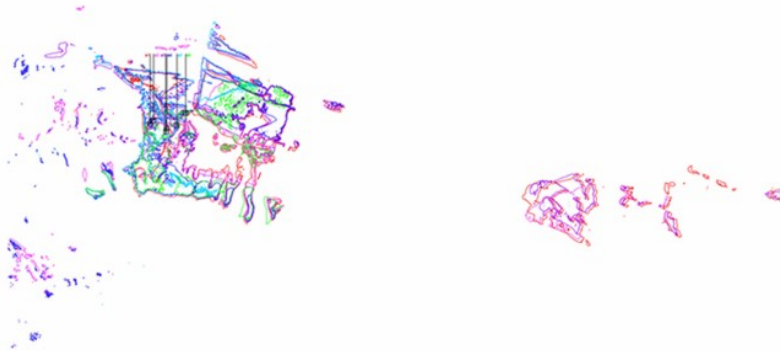


Figure 8. Bieszczady road section A. Comparison of the existing and proposed visual gaps with illustrations of the endangered landscapes.

## VISIBLE AREAS



## POTENTIALLY VISIBLE AREAS



## VISUAL GAPS AREA

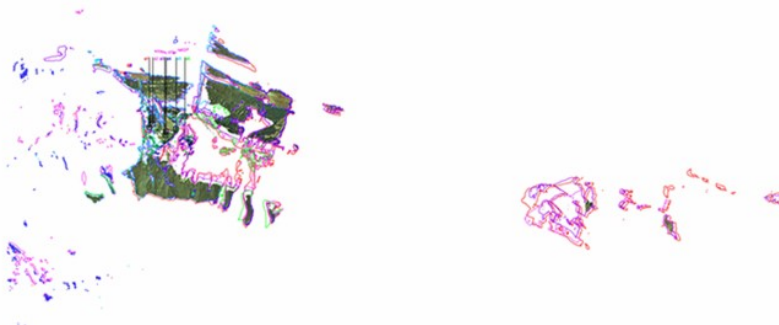


Figure 9. Visual gaps, the difference between the visible area and the area that could become visible. Possibilities for the extraction of the panoramas from the invisible space.

### 3. Discussion

These visibility range studies demonstrate the importance of the issue. They illustrate how easily visibility gaps can absorb the landscape; how easily they can be overlooked and make precious views that were always visible invisible. Also, they helped to change the way of thinking about the space. When treating the road as a narrative space that has its rhythm and order (Appleyard et al., 1964, Potteiger, 1998), the meaning of invisible areas acquires a very special significance. It decides the shape of space and presence of elements that construct its dramaturgy. The examples presented here describe the actions on the outskirts of a town in the urban scale and in the open landscape in the master planning scale. The problem of visual gaps is present in both, in natural and cultural landscapes. The leading element in the form of a dominant has the same importance whether it is a church tower or a mountain peak. It has the same importance in the town space as in the national park. Therefore, the observations and results of the research can be applied to every road space for the display of architecture and landscapes that could be collected. Taking the visibility aspect into consideration in the design process is currently not obligatory. Both cases involve preserved areas, and this was the only reason that a landscape architect was invited to participate in the project. Meanwhile, new roads are being built and designed by others in Poland. A road investment requires a land strip that is few dozen metres wide and stretched in the space over kilometres or even hundreds of kilometres running over complicated spatial conditions. The action occurs in the landscape and very strongly interacts with it (Bogdanowski 1976, Budziło 1990). According to the regulations, the presence of landscape architect is not required. However, if the road traverses an existing preservation area, a comprehensive study of the influence on the landscape can be done and the landscape architect participates in the design decisions. In other cases, the valuation of influence on the shape and quality of landscape can be ignored. The lack of pressure regarding the quality of created space is not beneficial for the landscape or the road users. This research was conducted over many years to show the purpose and even necessity of considering the architectural and landscape aspects of development (Clay & Smidt, 2002; Janeczko, 2008).

### 4. Conclusions

Journey architecture and the road space architecture require special attention as do the existing roads and the proposed roads. It decides the legibility and substance that are enclosed therein. The conscious view from the road composition that uses the assets of surrounding landscape allows optimal space to be created that reflects the sustainability idea. If these research results find a place in master planning applications, then we can talk about local regulations dealing with real landscape planning that preserves spatial effects. The title inspired by the conference: the idea of a visibility gap accurately expresses the tendencies of contemporary landscape. Town spaces and open spaces are absorbed by visual gaps that arise because lack of planning and design that considers the visibility context. The seen space is an expression of identity, a cultural value and source of priceless data for our awareness. Shaping this space is a task for landscape architects. Therefore, 'mind the visual gap' and let us compose road space that will inspire us to collect beautiful landscapes.

## Acknowledgements

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### ***Biography***

Urszula Forczek – Brataniec is a Doctor of Science in Architecture and Urban Design with specialty in landscape architecture. She is a lecturer at the Landscape Architecture Institute in the Faculty of Architecture at the Cracow University of Technology, Poland. Also, she is a member of the Scientific Council of Pieniny National Park and a member of the Landscape Architecture Association (SAK). For many years she has worked on the theory and practice of visibility studies and analysis in architecture up to planning scales. She cooperates with eM4. Brataniec. Architectural Practice.