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Sustainability arises instinctively – Professional landscape architects rethink the suburban street

La durabilité s'impose d'instinct – les architectes-paysagistes professionnels repensent la rue de banlieue

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RÉSUMÉ

Un grand nombre de problèmes écologiques auxquels nous sommes confrontés aujourd'hui sont étroitement liés à la croissance continue de l'état-providence. L'utilisation de réseaux d'assainissement urbain durable (SUDS : *Sustainable Urban Drainage Systems*) pour gérer l'eau due aux orages dans les zones suburbaines est souvent considérée comme un ajout problématique au plan du site, un élément qui occupe un espace précieux. Les urbanistes qui mettent en place les SUDS se concentrent souvent strictement sur les aspects techniques, mais la présente étude montre que les architectes-paysagistes sont à même de travailler de façon libre et innovante avec les SUDS. Ils ont la capacité de les utiliser comme un outil conférant du caractère et une identité à une communauté locale et améliorant la qualité globale du quartier concerné. En optimisant le tracé et en ayant recours à l'innovation pour améliorer tous les éléments en synergie, l'étude montre aussi qu'il est possible d'incorporer des éléments des SUDS dans un plan de site typique sans confisquer d'espace supplémentaire.
Cette étude a été réalisée comme atelier de projet avec la participation de quatre équipes d'architectes-paysagistes professionnels travaillant sur le même projet. Les quatre équipes ont toutes pris part à un séminaire initial et tenu un rôle actif dans la discussion de thèmes liés à la croissance des banlieues et aux problèmes écologiques. A l'issue de cet atelier, chaque équipe a soumis une proposition de projet qui a fait l'objet d'une étude approfondie des auteurs du présent article. Les équipes engagées se sont toutes vu confier la même tâche à accomplir : réorganiser la rue de banlieue. L'atelier portait le nom de : « la Rue de Banlieue de Demain» (*The Future Suburban Street*)

ABSTRACT

Many of the environmental problems we face to today are closely linked to the continuous growth of the welfare state. Using sustainable urban drainage system (SUDS) to manage storm water in suburban areas is often seen as a problematic additional feature in the site plan, something that takes up valuable space. Urban planners working with SUDS often concentrate purely on the technical aspects, but this study shows that landscape architects are able to work freely and innovative with SUDS. They have the ability to utilise them as a tool to give character and identity to a local community, improving the overall quality of the neighbourhood. By optimising the layout and working innovatively to improve all the elements in synergy, this study also shows that it is possible to incorporate SUDS-elements into a typical site plan, without taking up additional space. The study has been carried out as a design workshop with four participating teams of professional landscape architects, working on the same design task. All four teams participated in a start-up seminar and took active part in discussions on themes related to suburban growth and environmental issues. At the end of the workshop, each team delivered a design proposal that has been subject to closer study by the authors of this paper. The participating teams were all given the same design task: to reshape the suburban street. The workshop was named 'The Future Suburban Street'.

KEYWORDS

Design, Research, Suburbs, Workshop

1 INTRODUCTION

Many of the environmental problems we face to today are closely linked to the continuous growth of the welfare state. The expansion of the welfare state in Denmark during the last century and the increased affluence have created the basis for the development of the suburb, as we know it today. The expansion was comprehensive; today 50% of the Danish population lives in suburban areas, making it the most popular way of living in Denmark (Tietgen, 2010). The growth of single-family detached houses took place primarily in the years 1945-75. Early in this period, planning was often random, governed only by surveyor developments. In the 1960s, planners began to take an interest in detached housing. Construction was promoted by high inflation rates and tax-deduction.

The trend continues today, with new residential areas consisting of detached houses still being developed. The layout of these residential areas does not differ greatly from the areas build throughout the last 25 years. The structure commonly consists of a road, seven meters wide with a curb and sometimes a sidewalk; pedestrian and bicycle paths that cross the area in their own system. The curbs are commonly granite or concrete, the roads are asphalt, and the paved pedestrian and bicycle paths are made of concrete blocks or asphalt.

Today we face social, environmental and climatic challenges in the suburb. How can we redirect the modus operandi? and who will take responsibility? Some of the challenges we experience are particular to the suburbs. These include the handling of increased quantities of storm water and storm water runoff, due to the increased area of impermeable paving.

This paper describes a design workshop with four teams of professional landscape architects. The four teams designed a suburban street in a project case after a two day start-up seminar with lectures and discussions on various subjects. The seminar covered themes including construction principles and materials, historical analyses on the development of the suburb, and neighbourhood activities. Participating municipalities shared their experiences of developing new suburban areas. The objective of the design workshop was to explore the challenges of designing and changing the suburban street. The suburban street case study was chosen in advance. By providing all teams with the same frame, case study, lectures and discussions, we were able to reveal how the teams prioritised multiple demands and wishes, including issues of sustainability such as the use of sustainable urban design systems (SUDS). The working title for the workshop was ‘The Future Suburban Street’.

2 METHODS

2.1 Considerations on method

Earlier work has shown that “the design process constitutes a strong and unique problem solving tool” (Backhaus et al, 2012), that can be useful when examining planning problems. It also demonstrates that the design process is seldom strictly linear, but rather can be characterised as a “wicked problem” (Rittle and Webber, 1973), in that both comprehension of the problem and solutions are only fully understood during the process of solving them, resulting in a number of ‘reflective learning loops’ i.e. an iterative process.

A design workshop such as this combines and confronts the substantial amount of knowledge available prior to a design process, and forces the designers to select and prioritise among the wide range of possibilities. The design thereby acts as a condensate, and assists when societies aspire to create an overview of a complex problem. Each design result will be one of many possibilities within the given context (Steenbergen, 2008) and therefore it is meaningful to investigate how multiple design teams will give form to a single design task.

Using the design workshop method can be seen as a design experiment, and the design process itself as an appropriate research method (Steenbergen, 2008).

2.2 Workshop program

The workshop consisted of a two-day start-up seminar with lectures and discussions and concluded with an introduction to the design task. There was a mid-term seminar where the teams presented sketches and shared thoughts about the design task, and a final oral and visual presentation at the end of the workshop. The workshop was carried through in a period of three weeks in fall 2011.

2.3 Design task

2.3.1 Case

The case area is 5 hectare and the plot ratio is 30 with two-storied houses as a maximum. The area was at the time when the workshop was carried through not developed or built. The case is chosen to be a typical parcellation made in the suburbs of Copenhagen the recent years. The area is a part of a bigger parcellation 5 kilometers outside Roskilde with a focus on storm water management and sustainability issues. The design teams where given the task to rethink the suburban street within the area showed in figure 1.

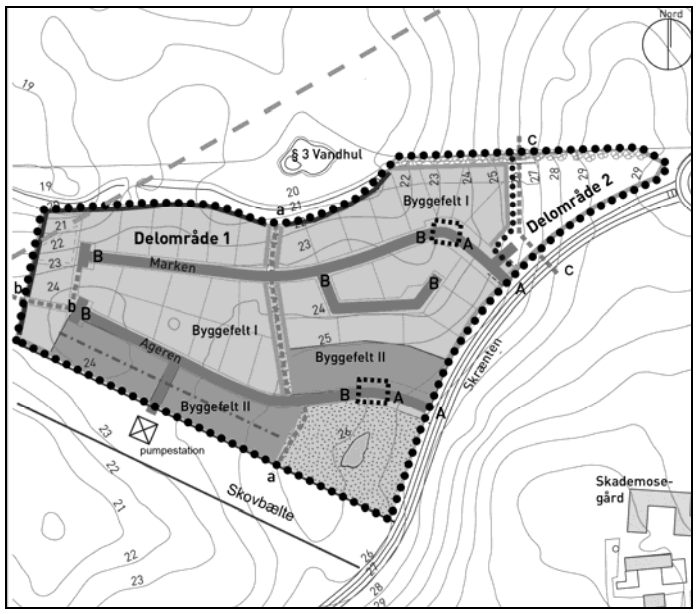

Figure 1: Siteplan from Localplan 574 “Marken og Ageren”, Roskilde, before the intervention of the four design teams working in parallel on the same design task. (Roskilde Kommune, 2011)

2.3.2 Key design questions

During the planning and execution of the workshop, the following themes were in focus:

- Optimising all types of area by rethinking standards and make use of overlapping functions.
- Incorporation of SUDS, with the aim of handling all storm water within the area.
- Sustainability-motivated choice of materials and construction design.
- Unfolding the suburban street’s potential as a place for social interaction and activity.
- Increasing biodiversity

As the Danish Concrete Association (Dansk Beton) was contributing to the funding of the workshop, it was a perfect opportunity to explore the possibilities of modern concrete materials within the frame of the workshop.

2.4 Invited teams

Six teams were invited to participate in the workshop. Four of these teams were interested and able to invest the needed resources at that specific time. The four teams were found within the personal network of the organisers. None of the teams, or the organisers knew all of the participating teams at the outset of the workshop. The teams all consisted of smaller professional landscape architecture offices, or departments of bigger architecture offices, with 3-8 employees.

All but one of the offices are located in the Copenhagen Region. The offices that took part were ‘1:1 Landskab’, ‘RUM by og landskab’, ’MASU PLANNING’ and ’BOGL Bang & Linnet Landskab’. For the seminar and presentations, two employees typically represented each team.

2.5 Workshop documentation

Each of the participating architectural offices produced two A2 posters and gave an oral presentation, explaining their design proposal to the other participating teams and invited guests. The presentations were recorded on video. The authors of this paper took notes to ensure that important points were kept in mind for further study of the design proposals.

3 RESULTS

3.1 Description of the proposals

Table 1: Workshop results presented according to the five themes identified during the planning of the workshop. (Citations from the posters have been translated from Danish to English by the authors of this paper).

	Team A **(1:1 Landscape)**	**Team B** **(RUM by og landskab)**	**Team C** **(MASU PLANNING)**	**Team D** **(BOGL)**
Optimising types of area	A narrow lane confining cars, parking takes place primarily on the private lot. The road area is kept to a minimum, with the sole purpose of distributing traffic. Space for swales is taken from the front gardens. Street trees are made to fit in the streetscape aesthetically, but are planted in the (small) front garden.	*"90% of the suburban streets today consist of asphalt with concrete paved sidewalks. They are often monotonous and unimaginative, designed for cars only, and do not promote play and stay, despite being empty for long periods during the day."* (poster) The street is designed as large paved polygonal areas, organised after the principles of 'shared space'. The additional space for this is taken from the private lots.	The road is visibly narrowed by using a combination of a broad gutter element and curb. Stormwater is managed in the rear gardens where plots meet each other. The retention beds take the role (and space) of a traditional hedge.	Two proposals illustrate the same idea with two different designs. The road is narrowed to 3 meters at the minimum, but when necessary wider to ensure parking on private plots, taking into account the turning radii. The reduction of pavement makes space for infiltration trenches (wadi's) with a traditional width of a residential street. Variation in species of trees and other vegetation along the roadside is designed as a feature to reduce traffic speed.
Incorporation of SUDS	Swales separate road from private lot. On the outer side of the sidewalk a permeable custom-made concrete paver allows stormwater to infiltrate into the soil.	SUDS elements, such as bio-retention areas and infiltration trenches are fit into the 'shared space', interacting with meeting places and playgrounds etc.	Water is transported along the street in concrete gutter elements to hollows/swales along the roadside. Rain gardens on private lots, in connection with the house facade or terrace. Detention beds where the plots meet in the back garden.	Bio-retention beds along roadside only.
Choice of materials and construction design	Small concrete pavers on the sidewalk and bigger on the street, separated by a 300mm wide curb. Permeable concrete pavers as part of sidewalk.	Paved with concrete in a pattern of continuous joins in a specific direction throughout the neighbourhood.	Asphalted road with a custom-made concrete gutter element with the purpose of safely transporting storm water to be handled where the terrain allows.	Concrete pavers with a custom-made border element, leading storm water runoff to nearby bio-retention beds. At the same time the element creates a visual and tactile effect in the area.
The street's potential as a place for social interaction	*"We believe that that the street is mostly a practical matter, with an aesthetic value"* (poster)	*"The suburban street … involves attractive meeting- and common areas, where some of the functions that traditionally take place in the front garden are moved to the street, making the street an attractive meeting place".* (poster)	-	The houses are moved forward to just 2-3 meters from the street, creating a condensed streetscape to promote interactions across the neighbourhood. "There will be communities created with room for all….In the front garden there is room for wooden decks going from the façade and out to and sometimes over the swales" (poster)
More biodiversity	Many different street trees are planted with a set distance to the street, but with varying distance between them. The swales are varied by using a wider variety of vegetation.	-	Illustrations show a great variety in plant form and species in connection with different SUDS elements	The swales along the street are seen as the main feature to promote biodiversity in the area.

3.1.1 Team A (1:1 Landscape)

The design proposal can be summarised as follows: The residential road is mostly of a practical nature, but includes an aesthetic value. The residential road must therefore be simple in its layout and easily comprehended.

Figure 2: Team A characterises the residential area as a place where people want privacy, and the residential road as a place for short stays and chance meetings in connection with daily activities.(Illustration: 1:1 Landskab)

A narrow lane confined cars, and parking takes place primarily on the private lot. There are sidewalks where pedestrians are safe from traffic. The linear shape expresses a strong functional composition. The clear spatial language in the proposal, results in a layout with a small front garden separated from the road by a swale. Alongside the road, there is space for trees, located here instead of on the private lot. In order to accommodate the planting of trees, the team proposes a paving allowing water to infiltrate in a structural soil.

3.1.2 Team B (RUM by og landskab)

The essence of team B's design proposal is moving activities from the front garden to the residential road.

Figure 3: With a reference to Denmark's well-developed hierarchy of roads, the team chooses to break down the formal road structure and form the road as a "shared space". (Illustration: RUM by og landskab)

The houses are pulled out to the front of the lots, next to the residential road. Part of the front yard is merged with the road. The goal of the proposal is for the residential road to distribute traffic and create space for activities and the local management of rainwater.

Figure 4: Layout plan, diagram showing the polygonal street structure, team B. (Illustration RUM by og landskab)

The residential road consists of polygonal areas that reduce the speed of cars circulating in the housing area. These polygonal forms offset the pavements and create small multifunctional pockets where storm water can be managed and activities, usually carried out in the front garden, can take place. The amount of paved area is actually the same as in a traditional road layout due to the green pockets within the paved area. The edge of the paved area becomes an important architectural element that the team wants to articulate, shaped with a custom-made element. This element will be able to handle the differences in terrain and provide the necessary stability for the paving, which is laid with a pattern of continuous joins in a specific direction. The pavement's system of joins provides uniformity to the site and gives the neighbourhood an identity. Likewise, the paving reduces the impression of the road being just an ordinary road.

3.1.3 Office C (MASU PLANNING)

Handling of rainwater and the reduction of resource consumption is an opportunity to look at a residential road in a new way.

The two sustainable approaches reduce the impermeable area, and use a distinct concrete element to diminish the amount of paved area and to separate the road from the dwellings. Narrowing the road reduces traffic speed to a minimum, and introduces a wide curb where cars can meet and pass easily. The contrast between the bright edge / curb and the dark lane, enhances the impression of a narrow road.

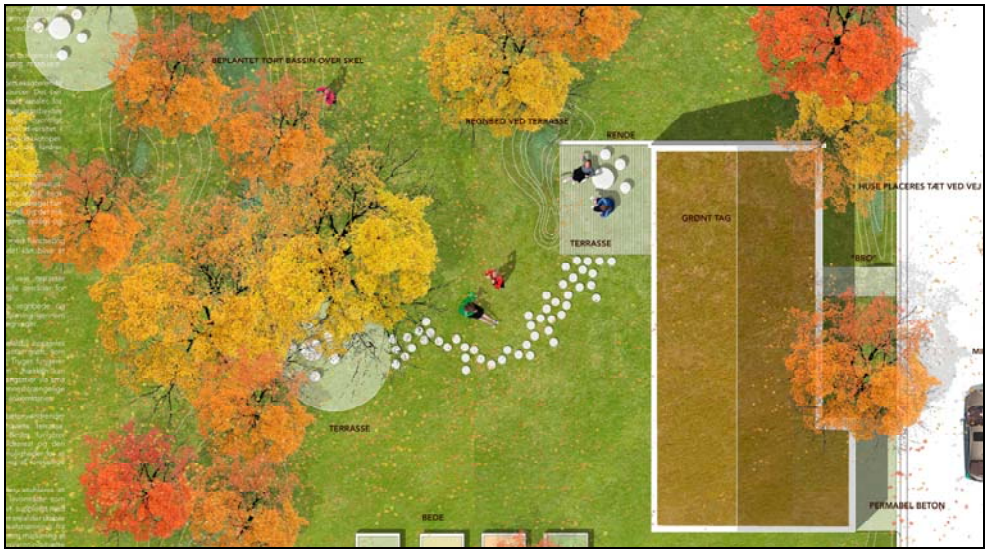

Figure 5: The storm water is primarily handled within the private lot. Part of site plan, team C.(Illustration: MASU PLANNING)

All stormwater from the paved surfaces is collected in gutters, made of concrete elements when necessary, and transported to hollows and channels. The gutters divide the dwellings from the road and lead the water to be managed in the terrain within the private lots.

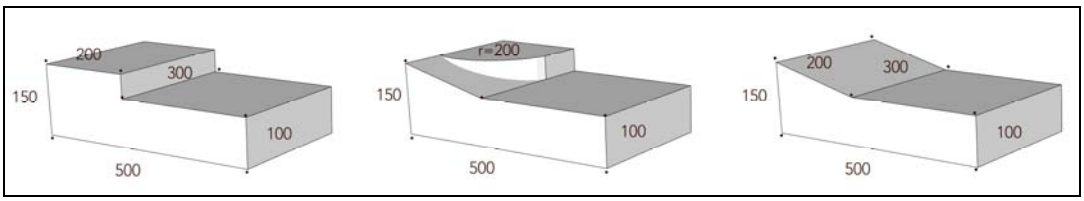

Figure 6: By using a combination of border elements, the rainwater from the road can easily be transported to where it can be managed in open terrain. Element design, team C.(Illustration: MASU PLANNING)

The broad edge also marks the road ends, where the terrain slopes down into a swale. In the driveway, where the car is parked, a special concrete element is used that has holes allowing water to penetrate to a permeable sub material.

3.1.4 Office D (BOGL Bang & Linnet Landskab)

How would a residential road of the future look, if one uses a 10m^2 area covered in different ways? Team D developed two design proposals. Both proposals handle rainwater visibly on the road, but dissolve the traditional road as we know it into a sinuous course, reducing the paved area to a minimum.

Figure 7: Team D first proposal using wadi's and private driveways to make the road and gradient sinuous. Part of site plan. (Illustration: BOGL)

The winding road is continuous and weaves from side to side. This winding form makes space for ‘wadi’s’ (infiltrations-trenches), as driveways for neighbouring residences are paired up where the two lots meet.

The paving pattern is uniform throughout the residential neighbourhood, with a single joint diagonal or angled relative to the direction of travel. Along the edges, the paving is finished with a whole (uncut) stone. This results in a "frayed" edge that supports the overall natural character of the area, also reflected in the design of wadi’s (illustration 10). Special border elements ensure that pedestrians have a guideline in the "shared space" design without traditional sidewalks. Edge elements are proposed in the same dimensions, while some of the paving elements have a square form that protrudes above the surface.

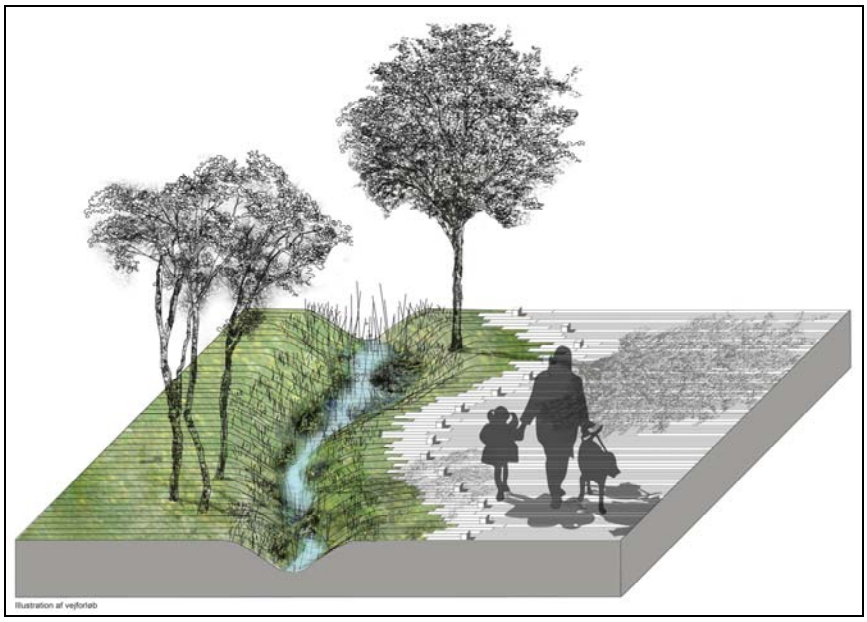

Figure 8: Perspective illustration of the wadi's in combination with the frayed edge. (Illustration: BOGL)

The second design proposal from team D has a uniform, broad lane of 5 meters. Within the paved area there are street trees, which reduce speed in the residential area. The pedestrians move along the edges. The straight edge leaves more space for stormwater handling, and the swale is a more distinct element separating the private dwelling from the public street.

4 DISCUSSION

4.1 Optimizing the plan layout

The main motive for team A, C and D was to reduce the paved area on the street, with team D being the most ambitious. A lecture from the start-up seminar, held by the participating traffic engineer, pointed out that most of the regulations in Denmark concerning traffic solutions were in fact 'only' guidelines and examples of 'best practice' gathered to visualise well known solutions optimised for cars. The width of the street was mainly determined by the turning radii when cars have to park on the private lot. By working with this theme, team D shows that while still retaining parking on the private lot, it is possible to reduce the overall paved area and make space for storm water management within a typical street layout width.

The discussions during the start-up seminar showed that road construction is a well-known technology, with guidelines and standards governing traditional road design for municipalities planning new residential areas. The primary purpose of the street design was the distribution of traffic.

Study of the design proposals and analyses of the lectures and discussions from the seminar; indicate that new aesthetics and design solutions are created when traditions and regulations are taken into discussion. This sheds light on the background of the regulations and standards, and what is just tradition shaped by common practice.

4.2 Storm water management

All the design teams took up sustainable urban drainage systems (SUDS) as a key feature to work with, and a theme that impacts the design. The consequence in all the proposals, was that SUDS elements takes up space in the residential area, but when combined with other challenges, e.g. reducing traffic speed, creating liveable streets, promoting biodiversity etc. SUDS elements can be incorporated in possible synergies.

All the teams worked with SUDS as an element that can create an attractive milieu and promote a liveable neighbourhood. The results from the workshop indicate that the potential use for SUDS is greater that 'just' a storm water management.

4.3 Materials and construction design

As a theme of the workshop was the potential use of concrete products, the proposals all focus on the use of concrete pavers, gutters, curbs and a variety of custom-made elements. These construction principles and functions can easily be applied to other materials. All the teams advocate the need for new elements in order to manage storm water in a dense suburban setting. They also placed focus on the border between the paved area and SUDS-elements, since the water here is of particular challenge to paved areas in general, but in particular in Denmark which is subject to many frost-throw cycles throughout the winter.

Choice of materials and construction design are actively used to promote a certain identity, most radically shown in team D's proposal (figure 8). Some of these paving elements are as yet unavailable, as all the teams designed new paving elements to fit their purposes and designs.

4.4 The active neighbourhood

One of the lectures at the seminar discussed the suburban street as a resource for creating liveable neighbourhoods. There is potential here, but despite society's many changes since the general layout of residential areas was formed 40 years ago, these areas are still designed in much the same style as previously (Kvorning, 2012). More residents drive, and the population is more active, working far from home, leaving the neighbourhood empty of people and activities for most of the day. The lecturer pointed out that the management of storm water, e.g. the maintenance of SUDS elements, could be resourced by means of engaging residents in local meaningful activities. Team B took this subject into account when shaping a multifunctional paved surface to promote activities vis-á-vis SUDS-elements.

The relationship between private dwellings and the street has been taken into consideration by all four teams, prioritising private ownership by defining the residential street as mostly practical (team A) or prioritising the street by reducing front gardens (team D), or by transforming the street into a multifunctional surface (team B).

These diverse approaches show that there are varieties of ways in which the suburban street can contribute to a liveable neighbourhood.

4.5 Biodiversity

Except for team B, all the teams mentioned biodiversity as a natural part of designing SUDS. The storm water that is designed to be retained within the residential area, can contribute positively to the diversity of flora and fauna. When studying all five design proposals, one perceives that the implementation of SUDS in new and existing residential areas can have the potential to increase biodiversity.

The American parkway kept recurring as a reference during the start-up seminar and the discussions. The design teams A, C and D referred back to this when presenting their design proposals. The American parkways are broad, countersunk lanes with full-crowned street trees, and houses set back from the road with an open front yard. The American parkway is considered an example of a simple, beautiful road, which gives structure to the residential area. Team A's design proposal is a parkway in a Danish context, and has the most characteristic design within this theme. Team D worked actively to create a crowned covering of a variety of street trees to promote biodiversity. They thereby developed the concept and created new synergies.

5 CONCLUSION

Sustainability arose instinctively when the four teams designed the new suburban street. All of the designs were based on the important current themes of sustainability and climate adaptation. The future suburban street is compact and contemporary. This is promising for future changes, as tedious, outdated practices currently prevail. We discovered that technological and social knowledge is easily incorporated, and that road standards can be contested. The challenges in changing the suburban streets are more likely to be encountered in environmental plans and housing programs than in the design phase.

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