Evaluating soundscape intentions in landscape architecture:
A study of competition entries for a new cemetery in Järva, Stockholm

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This is an Accepted Manuscript of an article published by Taylor & Francis in Journal of Environmental Planning and Management on 24/10/2016.

Available online: http://www.tandfonline.com/doi/full/10.1080/09640568.2016.1215969

To cite this article: Gunnar Cerwén, Carola Wingren, and Mattias Qviström (2016): Evaluating soundscape intentions in landscape architecture: a study of competition entries for a new cemetery in Järva, Stockholm, Journal of Environmental Planning and Management, DOI: 10.1080/09640568.2016.1215969

To link to this article: http://dx.doi.org/10.1080/09640568.2016.1215969

ABSTRACT
While soundscape is increasingly acknowledged within landscape planning and design discourse, there is little research that clarifies how soundscapes are actually dealt with in landscape architecture practice – partly owing to methodological insufficiencies. This paper, therefore, describes a model for evaluating soundscape treatment in landscape design proposals, focusing on three key aspects. With the dual aim of testing the model, and learning more about how soundscape is approached in practice, the paper spotlights a major design competition for a new cemetery in Sweden. The model proved fruitful and easy to apply. It showed that only limited attention was paid to soundscape in the competition as a whole, and was a useful means of pinpointing proposals where soundscape was fully considered as a design feature; one competition entry that did so is described in the paper. Discussions cover design practice, trends in the competition and model application.

KEY WORDS
Landscape architecture, Soundscape planning, Cemetery design, Architectural competition, Noise management
1. Introduction

We see, smell, hear, touch, and taste landscapes through materials; they are sensual. Gravel crunches underfoot, grass swishes, a wooden bridge thumps hollow. (Whiston Spirn 1998, p. 97)

Landscapes affect our experiences and actions, and influence health and well-being (Jackson 2003; Whiston Spirn 1998). Sound is a crucial part of the landscape, as it is a key factor in how we relate to our environment. For instance, sound has been shown to affect appreciation (Anderson et al. 1983; Carles, Barrio, and de Lucio 1999; Gan et al. 2014) as well as behaviour (Cohen and Spacapan 1984; Laviala et al. 2016; Atkinson 2007). Exposure to loud and/or unwanted sounds (noise) can be related to negative effects on health, including cardiovascular disease, hearing disorders, sleeping disorders and stress (Basner et al. 2014; WHO 2000). By contrast, it has been shown that certain natural sounds (e.g. bird song) can have a positive effect on recuperation from stress (Annerstedt et al. 2013; Saadatmand et al. 2013).

Considering how soundscapes1 inform our everyday experiences, and constitute a factor in stress and other health-related issues  they need to be taken into account as an integral part of landscape planning and design – not least in projects where noise is an issue.2 However, landscape architecture practice has tended to focus primarily on the visual (Botteldooren et al. 2008; Hedfors and Howell 2011; Southworth 1969), with other sensory impressions being under-emphasized. While several researchers and practitioners notice this general tendency, there is limited research which details actual designs and their shortcomings in terms of their treatment of soundscape (Payne, Davies, and Adams 2009; Laviala et al. 2016). One of the aims of this paper is, therefore, to contribute to an increased understanding of how soundscape is dealt with in the landscape architecture profession.

For the purposes of our study we chose an open architectural design competition for a new cemetery in Stockholm, Sweden, which attracted over a hundred entries. This was a strategic choice, not only due to the prestige of the competition and the large number of entries, but also to the sound-related conflicts that arise at a cemetery where noisy infrastructure hems in the site on two sides; if the soundscape is not considered in such a critical case it is not likely to gain more attention in other cases (cf. Flyvbjerg 2006).

1 Research on soundscape offers a basis for an inclusive analysis of the sonic environment (Schafer 1994 [1977]; ISO 2014; Brown, Gjestland, and Dubois 2016). The soundscape approach takes as its starting point human experience in a context – which means that it includes positive as well as negative aspects.

2 While sometimes being considered as opposing strategies, soundscaping and noise management have also been described as complementary or integrated (Brown, Gjestland, and Dubois 2016; Adams et al. 2006; Brambilla and Maffei 2010; Brown 2010; Coelho 2016). We regard environmental noise management here, not as a separate entity, but as an important part of an inclusive soundscape strategy that focuses on contextual experience. Our approach to soundscaping can thus be summarized as all measures taken in order to affect the sonic environment in a way that is considered beneficial to the experience of the site.
Soundscape research is a relatively new field, which means that there is a need for methodological development, including the formulation of design related tools (Andringa et al. 2013; Raimbault and Dubois 2005; Payne, Davies, and Adams 2009). For this reason, drawing on previous research within the field, the second aim of the paper is to present a model for evaluating approaches to soundscape in landscape planning and design situations. The paper is divided into five parts, where this introduction constitutes the first. The second part is the case description, i.e. the architectural competition and the constraints of the site, including the sound environment. This is followed by a description of the model used as a basis for the study. The findings are then presented and discussed in the fourth part. This section covers general tendencies, as well as a more detailed study of one of the entries that was picked out as a result of applying the model. The final part evaluates the model and presents our conclusions in relation to the practice of landscape architecture.

2. Case description

2.1. The cemetery environment

The cemetery as a context for study is particularly interesting with regard to sound. In an extensive study carried out in Sweden in 2011, concerning experiences of and attitudes towards cemeteries (Davidsson-Bremborg and Dahlgren 2011), tranquillity [fridfullhet] was found to be the most important quality people sought at a cemetery, with more than 90% of the participants saying that they wished to find this quality in a good cemetery. The role of sound in tranquil environments has been emphasized in previous research. In Great Britain, for instance, it has been found that tranquillity depends mainly on two key features: “quiet and natural environments” (Pheasant et al. 2008). Similarly, in Sweden, sound has been described as a key component in environments that offer serenity [rofylldhet] (Grahn 2011).

The cemetery is, amongst other things, a place for grief, mourning and remembrance. While grieving is often referred to in temporal terms like recovering from a wound (Engel 1964) the process also has a physical, spatial facet (Maddrell and Sidaway 2010), and is intensified at certain locations (such as the cemetery). Among the many different ways in which people seek to cope with grief, the cemetery can be used as a platform for maintaining connections with a deceased loved one (Silverman and Nickman 1996), or for memorialising the deceased in other ways (Hallam and Hockey 2001). In other words, cemeteries have a part to play in both meaning-making and placemaking, which is something that can be considered in the design of new cemeteries (Wingren 2013).

Furthermore, “natural” qualities in cemeteries can potentially aid grieving through what have been called restorative environments (Kaplan and Kaplan 1989) or supportive environments (Pálsdóttir 2014; Grahn 2011). In other, related contexts there has been a consideration of the role of sensory experiences, including sound, in coping with recovery
from stress (Adevi and Lieberg 2012; Pálsdóttir et al. 2014). Sensory experiences are also emphasized in mindfulness — a mental state that is increasingly being incorporated into methods for dealing with various difficult situations, with good results (Keng, Smoski, and Robins 2011).

In a secularized country such as Sweden (according to the World Bank Group it is the most secularized country in the world) it has become increasingly common to use some cemeteries for other activities, such as taking the dog for a walk, jogging, or even sunbathing or having a picnic (Olsson 2012; Wingren et al. 2015). This is something that should be taken into account when considering soundscape aspects, since there may be activities which complement or undermine users’ need for tranquillity (or any other need). In this context, cemetery maintenance plays an important part as well.

To sum up, there are many different potential functions that can be incorporated in the contemporary cemetery, a development that could have benefits for sustainable city development as densification proceeds. However, combining different functions in the same area also calls for careful consideration in terms of how functions work together, in order to avoid conflict between different sonic activities (Brown and Muhar 2004; Southworth 1969; Hedfors 2003). Especially tranquillity may be a quality at risk of disturbance from other functions of the cemetery, from cemetery management, or from functions outside the cemetery — such as infrastructure.

2.2. The competition in Järva

In 2009, an open architectural competition was announced (SC 2009) for a new cemetery on the outskirts of Stockholm (see Figure 1). The 42-hectare site for the cemetery is situated in the south-west corner of the “Järva common” recreational area (see Figures 2 and 3). The site is surrounded by apartment housing areas from the 1960/70s, and by two major roads (the E18 and Akallavägen). The Järva recreational area includes allotment plots and some small-
scale farming with grazing land, and is also home to sports such as Disc golf. The area chosen for the future cemetery contains the characteristic silhouette of the 30-metre high Granholm mound, which is formed of construction waste. There is a stream to the north of the competition area, and in the southern part of the common, close to one of the major roads (E18), there is a patch of wet land (requiring extensive drainage before it can be used for burial). There are also historical remains to be found in the site.

The competition was arranged collaboratively by the Stockholm Cemeteries Committee, the City Planning Administration, and the Swedish Association of Architects. The jury consisted of three landscape architects, two architects and two representatives from the Stockholm Cemeteries Administration. The jury was also able to consult an expert group on various topics, such as traffic engineering and archaeology, but no acoustician was assigned to this group.

The competition brief (SC 2009) highlights the importance of cultural and natural amenities, as well as aspects such as connections to surroundings, accessibility and feasibility, tranquillity, and recreational qualities. It states that the cemetery design should “accommodate a diversity of burial practices and cultural manifestations while at the same time being an evocative, tranquil place for the visitor” (SC 2009, p. 5).
The brief recommends that the development should start from “the eastern and southern parts of/by [sic] the hill, at sufficient distance from the immediate surroundings of the bypass road to the west and with the best possible screening-off of noise emissions” (SC 2009, p. 16). Physical features such as entrances, footpath and cycle-track networks, boundaries, funeral purposes, buildings and ceremonial spots, ancillary buildings and a depot yard, and traffic and parking areas should be included in designs (SC 2009, pp. 17-19).

The assessment criteria to be applied by the competition jury were architectural quality, functionality, and feasibility (SC 2009, p. 19). The brief required that each entry should present a site plan (1:2000) of the fully-developed cemetery, a site plan (1:500) for the first phase, as well as perspective drawings and a short description. A maximum of four A1 sheets (copies in half size, A3) were allowed for submission.

2.3. Representation of soundscape in the competition

The site chosen for the new cemetery is problematic in terms of noise, as it is surrounded by major roads; there are 16,000 vehicles per average day to the west (Akallavägen) and 43,000 vehicles per average day to the south (E18) (STA 2011a, p. 388). The noise levels at the location at the time of the competition are illustrated in Figure 3.

As a result of infrastructural development it is estimated that by 2035 there will be a substantial increase in traffic volumes, with up to about 120,000 vehicles per day to the west (E4 bypass) and 50,000 vehicles per day to the south (E18) (STA 2011a, p. 389). An environmental impact assessment of the infrastructure expansion to the west (STA 2011a) estimates that, if no counter-measures are taken, a substantial part of the future cemetery area will receive levels of 60 dB (L\text{Aeq,24h}) \text{3} or more (cf. Figure 5). The part of the cemetery situated closest to the western development would be exposed to levels of up to 70 dB (L\text{Aeq,24h}). And even if noise-control measures are taken, the future situation will be substantially more problematic than the present. When the competition opened, it was still not clear exactly how the noise problems connected with the new developments were going to be addressed (SC 2009).

The problem of noise is recognized in the competition brief in several places; in the description of the site, in the formulation of the task, as well as under accounts. Positive aspects of sound are not mentioned explicitly, but the organizers acknowledge that the handling of noise is fundamental for the experience of the future cemetery, and encourage the submission of creative solutions:

Noise problems being a factor crucial to experience of the place, it will be an advantage if the scheme can present ideas and solutions for noise issues. The account can be general and sketch-like in character. (SC 2009, p. 19)

3 Equivalent (average) dB(A) level per 24h.
A range of documents were made available to competition entrants, concerning various aspects such as topography, soil conditions, or infrastructural developments. Noise maps were also provided which described different situations and scenarios. Owing to the complexity and uncertainty of the future infrastructural developments, as well as to the fact that two of the maps provided were incorrectly marked, it may have been difficult for entrants to understand from these documents the noise situation actually pertaining. This confusion is confirmed when one looks at some of the follow-up questions asked by competition entrants.

3. Evaluating soundscape design: introducing a model

Soundscape can be studied using different complementary perspectives, such as the users’ experience of the sonic environment (see e.g. Augoyard and Torgue 2005; Schulte-Fortkamp and Fiebig 2016; Axelsson, Nilsson, and Berglund 2010), the communication and understanding of soundscape (see e.g. Truax 2001; Aiello et al. 2016; Hedfors and Howell...
2011) or the relationships between sound and design (see e.g. Hellström et al. 2014; Zhang and Kang 2007; Cerwén 2016). The present paper deals with an evaluation of landscape design and its effect on soundscape, and touches on all these aspects.

Soundscapes are defined through human experience and are therefore dependent on context (cf. ISO 2014). While some fields of sonic studies focus on isolated acoustic events, understanding soundscapes is about looking at how different sound sources interact (with each other, and with the person/persons experiencing them), making it a complicated discipline to study.

3.1. The structure of our analysis
The large number of entries in the competition called for a quantitative research approach. The analysis needed to be straightforward enough to allow for the appraisal of a large number of proposals, yet at the same time rigorous to allow us to draw conclusions concerning the comprehensiveness and complexity with which the proposals dealt with the question of soundscape. In order to identify the most crucial aspects to include in such an analysis, we initially studied twelve randomly chosen design entries and compared them with previous research on approaches to soundscaping.

If we consider soundscape design as an orchestration of an already-existing situation, there are two basic outcomes which soundscaping can set out to achieve: the reduction of unwanted sounds; and/or the introduction of wanted sounds (Brown and Muhar 2004;
Brown 2012). This division corresponds well to a small-scale design situation. However, as the cemetery competition involved a large-scale design entailing structural decisions vis-à-vis the cemetery’s organization, there was a need for an additional aspect (covering both introduction and reduction): localization of functions (cf. Brown and Muhar 2004; Southworth 1969; Hedfors 2003). The resulting model, then, is based on three main categories that were considered central for soundscape orchestration in the given context (see Figure 4).

3.1.1. Category I: localization of functions
This category concerns the strategic localization of functions, and the influence this has on the sonic environment. It entails decisions on different scales, ranging, for example, from the location of a whole cemetery through to the zoning (in space or time) of functions within this cemetery (Brown and Muhar 2004). Category I could include a consideration of wanted, as well as unwanted, effects in the soundscapes concerned (although, in the present study, there were no proposals that described wanted effects relating to Category I).

The most typical application of Category I is the avoidance of unwanted sounds by ensuring sufficient distance. In the given context for our study, the main concern is the transport infrastructure. The site for the competition has some parts that are exposed to a lot of noise, and other parts that are quieter (since they are further away from roads and/or sheltered by the hilly topography of the landscape); this implies that there is potential for strategic localization of the cemetery functions.

3.1.2. Category II: reduction of unwanted sounds
The second category is concerned with looking at how interventions in the landscape such as noise screening, topographical changes, or application of acoustically appropriate materials can be used to reduce unwanted sounds in a given area. Category II is related to category I, but differs from it in that the localization of different functions is fixed. As with category I, the noise from road infrastructure is the main concern in the given context.

3.1.3. Category III: introduction of wanted sound
The third and final category concerns the intentional introduction of features that produce desired sound, such as water features, rustling vegetation, bells, gravelled walking paths, biotopes for birds, or sound art. The focus thus is on positive sonic qualities which are consciously stimulated or introduced, which in the given context mostly means natural or nature-like sounds. This category also covers the concept of masking (Moore 2012), i.e. the introduction of wanted sounds to reduce the impact of, or completely cover, unwanted sounds. Similar to Category II, Category III concerns interventions aimed at improving locations that have already been given a position in the landscape.
3.2. Design evaluation process
For our study we have interpreted and evaluated all the drawings and texts of the 111 design entries in the cemetery competition, using the criteria described above. Our approach is based on the interpretation of how sonic aspects are communicated in the proposals, or in other words, the intentions that can be explicitly understood from the drawings and texts submitted.

The majority of the proposals submitted consisted of the allowed maximum of four A1 sheets. The evaluation of each entry’s text and drawings took on average about half an hour, and gave an overall idea of the submitting party’s intentions, priorities and visions for the new cemetery, as well as an understanding of how they envisaged addressing sonic aspects. Two of the 111 submissions have been omitted from our study (No. 43 contained unintelligible text and No. 22 was a politically charged message rather than a design proposal), meaning that we have examined a total of 109 entries.

Together with a quantification of how each entry dealt with soundscape issues (according to the model described above), we also noted qualitative data considered as especially illuminating or relevant in relation to design practice. Everything was recorded continuously on an Excel sheet.

4. Applying the model: findings and discussion
The following presents our findings in relation to the three soundscape categories used as a basis for the study. Each category is first presented individually, after which there is an analysis of the interrelationships between the categories. One competition entry, which showed itself to be particularly interesting when we applied the model, is analysed with regard to its treatment of sound. Finally, there is a summary of the most relevant findings and a discussion of design trends in the competition.

4.1. Category I: localization of functions
It was found that 20% (n = 22) of all competition entries made reference to sound in ways that corresponded to Category I. (17.5% explicitly in text, and 2.5% indirectly, through illustrations). While the most common concern among the 22 proposals in Category I was the relationship between the cemetery and the road infrastructure, six proposals also considered the compatibility of functions within the cemetery, so that, for example, social areas were envisaged as being separated from secluded or quiet areas.
In order to gain an overview of the proposals, the locations of all 109 ceremonial buildings\(^4\) envisaged in the entries were plotted on a noise map depicting the expected noise situation after infrastructural changes. The resulting figure (Figure 5) indicates that the group of 22 proposals that made reference to sound when locating functions (Category I) generally placed the ceremonial building in quieter spots. An analysis with Fisher’s exact test (based on the numbers indicated in Figure 5, Location Count) reveals a statistically significant difference at \(p < 0.05\).

\(^4\) We chose to plot the ceremonial building as it constitutes a central feature in cemetery design, and as such, it is likely to have been given a strategic position in the designs.
4.2. Category II: reduction of unwanted sounds

The study shows that 59% (n = 64) of competition entries state that they have worked with reduction of unwanted sounds (50% make an explicit text reference and 9% have illustrations of mounds, screens or vegetation belts in clearly strategic positions in their plans). An additional 4.5% said that it was not necessary to introduce barriers, as the distance to the roads in their proposals was deemed sufficient. In total, then, 63.5% (n = 69) of proposals expressed awareness of the possibilities for working on questions we define as Category II.

The study reveals that measures for reduction typically occur along the major roads of the area, through the construction of screens, noise barriers and/or vegetation belts in different combinations. This positioning adjacent to the roads is also strategically effectual for reducing the impact of the infrastructural noise (i.e. as close to the source as possible) (Forssen, Kropp, and Kihlman 2015).

The most common measure for screening noise along the roads was the use of vegetation (a total of 41 instances, 38% of all proposals). In 17 of these cases, vegetation was used as the sole measure for screening, which is noteworthy considering the debated and sometimes limited effect of vegetation on reducing noise (Van Renterghem, Attenborough, and Jean 2015). In addition to vegetation, 26 references were made to noise screens, nine to buildings/constructions and 33 to topographical barriers or mounds (in different combinations). A few competition entries also referred to the (already proposed) covering of the E18 for screening effect, and to the use of silent asphalt. Besides silent asphalt, no other mention was made of the absorbing qualities of materials.

In some competition entries, it is implied that the noise issue would be solved (completely) through screening and that, as a consequence, development of the cemetery could proceed close to road infrastructure. Yet, as a recent traffic-noise investigation carried out on the cemetery area confirms (SCC 2015), the effect of screening is limited, and varies depending on context. Few of the design proposals mention these kinds of limitations of screening.

In addition to screening along the roads, entries included other features which were positioned within the cemetery itself. These structures were typically part of the visual design of the cemetery, such as the fencing in of a smaller space or the demarcation of the cemetery boundary. Twenty-one proposals made reference to walls or construction in this way as having a noise-reduction effect. The actual effect in terms of noise reduction could be questioned in several of these cases, owing to (a) the fact that they were generally of low height (to afford open sightlines, for greater safety and security), and (b) the distance from the source (generally speaking, the roads) and/or the listening position. Still they may have an influence on perceived noise disturbance, as visual input has been shown to affect such experience (Hong and Jeon 2014).
4.3. Category III: introduction of wanted sound

It was found that 23% (n = 25) of proposals made reference to sound in a manner that corresponded to category III. The features and/or aspects that were referred to are summarized in Table 1. The total count exceeds 25, as some proposals made reference to more than one sonic feature.

The table reveals that the most typical reference is to sounds of nature, such as the rustling of vegetation, the rippling of a water feature or the sound of birds and other animals (20 in total). The nature sounds may be a direct result of the design, such as in a water feature, or indirect, as when birds and other animals are attracted as a result of the new biotopes in the cemeteries proposed (cf. Dawson 1988). One explanation for the prevalence of nature sound references could be that, when considered as a group, nature sounds tend to be perceived as positive (Axelsson, Nilsson, and Berglund 2010). The table further reveals that relatively few mentions can be related to human activity (3 in total), which may be a result of the specific context that the cemetery presents where social interaction may not be considered suitable (cf. 2.1. The cemetery environment). The table also indicates examples where sound was used as a dominant design feature or a soundmark (Schafer 1994 [1977]) such as in the use of belfries, sound art and/or music (8 in total).

Table 1. Seven types of (textual) references to sonic experience relating to design were found in the competition entries. The table illustrates the respective count for each of these, as well as percentages in relation to all 109 proposals.

<table>
<thead>
<tr>
<th>Type of activity</th>
<th>Number of proposals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water and water features</td>
<td>11 (10%)</td>
</tr>
<tr>
<td>Vegetation (rustling)</td>
<td>5 (4.5%)</td>
</tr>
<tr>
<td>Sound of birds or other animals (attracted by biotopes in the cemetery)</td>
<td>4 (3.5%)</td>
</tr>
<tr>
<td>Sound of steps (e.g., on gravel path)</td>
<td>2 (2%)</td>
</tr>
<tr>
<td>Life and movement</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Sound art and/or music</td>
<td>5 (4.5%)</td>
</tr>
<tr>
<td>Bells and/or belfry</td>
<td>3 (2.5%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>31</strong></td>
</tr>
</tbody>
</table>

The table shows that the most common reference to experiential qualities of sound was made in relation to water features (11 in total). However, these 11 references constitute a rather small part of the total number of water features noted in the competition. (88 proposals incorporated water features). On a closer examination, it was found that even though there were some additional proposals that included water features with sonic potential, the vast majority did not – 57 of the 88 proposals (65%) were classified as silent as they only included ponds, water mirrors or lakes (rather than streams, fountains or falls). The rather large number of silent water features could be associated with an intention to achieve tranquil or “still” environments. However, the surrounding infrastructure works to negate this effect – it
would perhaps have been fruitful in some of these cases to investigate the potential of water features that produce sound, to be used as masking (Rådsten Ekman 2015; Brown and Rutherford 1994).

Our study found that 6.5% (n = 7) of all proposals made a reference to noise masking (or a corresponding description, such as “a shift of focus”). Water is the most common method used for masking (5 proposals). One entry mentions the use of vegetation, and another uses sound art.

4.4. Crossing of category boundaries?
We collated the figures detailing how many of the three categories were addressed in each proposal and in what combinations, to produce the following figure (Figure 6), which illustrates some of the trends found in the competition.

![Figure 6](image)

**Figure 6.** Displaying how many and which combinations of the Categories (I, II and III) are referred to in the 109 competition entries studied. Group A contained no reference to categories, Group B to one category, Group C to two categories, and group D contained reference to all three categories.

The figure illustrates the fact that around one quarter of the proposals did not make any reference to sound at all (Group A, nA = 28, 25.5%). This is noteworthy, especially considering that the location in question is severely affected by noise. The other three quarters of the proposals made a reference to working with sound, but quite a lot of these references amounted to no more than a very general mention. The largest group of entries were found to look at sound in just one of our three categories (Group B, nB = 51, 47%). Relatively few proposals (Group C&D, nC&D = 30, 27.5%) covered more than one category, with only five
proposals working with all three categories (Group D, nD = 5, 4.5%). It would be fair to summarize this by saying that sound was given relatively low priority amongst the competition entries. When sound was addressed, this was seldom done within more than one category, suggesting a somewhat simplified approach.

On examining the different groups, it was found that the entries in Group D included approaches to soundscape that had a firmer phenomenological base and a greater level of detail than characterized the competition in general. Therefore, before moving on to look at further details regarding the general trends in the competition, the following section highlights one of the entries from group D, with the aim of gaining increased understanding of how one can work with different aspects of the soundscape simultaneously, and what the potential benefits of such an approach may be. We have chosen to look at entry number 9, called Alice, because here, the soundscape intentions were clearly conveyed in a way that emphasized the on-site experiences. Two of the other proposals in group D (45 and 87) were also found to be particularly comprehensive, but number 9 lent itself best to illustrating some of the points we wanted to make.

4.5. Alice – a proposal with a specific focus on sound

The name of proposal No. 9, Alice, is a reference to the conceptual use of the hillock [Granholmstoppen] – which the proposal has renamed as Alice (see Figure 7 for an overview). The proposal aims to include many different kinds of functions in the overall design of the cemetery.

![Figure 7. An overview of the future cemetery as proposed by entry number 9, Alice. Credit: ÅWL Architects 2010.](image-url)
The compatibility between the functions (Category I) is addressed through the introduction of three different characteristics: activity [aktivitet], solemnness [högtidlighet] and peacefulness [stillhet]. These different needs, or types of use, are incorporated in order to steer the localization of functions so that they do not clash or compete with each other:

The area is divided into zones that are characterized by different moods. Different functions are located so that visitors with different intentions do not disturb each other. (ÅWL Architects 2010, p. 1)

It can also be noted (see Figure 8) how areas for peacefulness and solemnness are placed in a manner that allows distance to infrastructure, whereas areas intended for activity are placed nearer the fringes, i.e. closer to the roads (this division was, however, not maintained in the final, third phase of the proposed development).

![Figure 8. The localization of different kinds of functions in proposal 9, Alice (activity, solemnness and peacefulness) in the first stage of the proposed development. Credit: ÅWL Architects 2010. Adjusted, hatched and translated for the purposes of our paper.](image)

In addition to localization of functions, noise from the infrastructure has been considered in Alice in that it calls for reductive measurements (Category II). Here, the approach is mainly based on the introduction of noise barriers covered with grass, and includes a general description of the situation at the site with existing features:

The area is disturbed by noise. Part of the disturbance will be reduced when the E18 motorway is covered, with the barriers envisaged in our entry further improving noise reduction. Even with these measures, however, the area will always be disturbed by noise. (ÅWL Architects 2010, p. 2)
It is noteworthy that Alice, as one of very few proposals, raises the limitations inherent in screening for noise (Category II). This awareness is perhaps one reason why several complementary strategies were incorporated in Alice: noise screening is used in interaction with strategic locations for functions and the introduction of positive sounds for masking.

Alice includes several references to water features that produce sound (including a waterfall, an installation which has water running over a wall, and rippling flowing water) (Category III). The sound of water is described as having the effect of enhancing experiential qualities and/or reducing the impact of noise through masking (cf. Rådsten Ekman 2015; Brown and Rutherford 1994):

The proposed ponds with gurgling water sounds will also aid the reduction of the surrounding noise. (ÅWL Architects 2010, p. 2)

Furthermore, some of the water features are described in a way that suggests an interaction between the visitor and the water. The following example is from the description of the eastern chapel:

The loggia welcomes the visitor from a distance, invites the visitor from the road with the water rippling alongside it, and then onto the jetty where the water burbles beneath your feet. (ÅWL Architects 2010, p. 4)

Similarly, a water-based design feature that follows the roadway between the entrance and the chapel is described in a way that suggests active involvement in a sonic experience;

Murmuring water accompanies the visitor on their way from the water mirror by the chapel on to the pond by the entrance. (ÅWL Architects 2010, p. 3)

The sound of water is used here in a way that suggests a connection between the (cemetery) environment and the visitor; this can be seen as an example of the concept of supportive environments (Grahn 2011). The sound is also used to emphasize directionality.

Another related feature that is proposed in Alice is the use of contrast. The architects argue that noise can be used to achieve relative silence:

We want to use this [the noise] to create silent spaces. Using the topography, we create spaces, “rooms”, where the noise suddenly fades away so that a tangible sensation of silence occurs. The burial areas in the first phase are in shallow hollows, and the existing hills are preserved – partly for noise reduction. Also, the amphitheatre and the entrance sites are enclosed by noise-absorbing barriers. (ÅWL Architects 2010, p. 2)

While these ideas would need to be backed up by a detailed acoustic analysis before they could be practicable, there should be the potential for this kind of contrasting effect to be used more in design practice, as the human sensory apparatus responds to contrast.
In addition to the explicit sonic references in the Alice design proposal, it also naturally contains several functions and design elements that have sound-producing effects, although this is not referred to specifically when they are being described such as vegetation (including biotopes for birds and other animals), gravel paths, and an area for sheep grazing.

The coherent approach to sound that is employed in Alice seems to be centred on the on-site experience, including positive as well as negative aspects. The three categories (used as starting point and methodology in the current paper) are used interchangeably in such a way that the incorporation of one aspect reinforces the other.

4.6. General trends in the competition

The study showed that the design entries in general accorded no more than limited priority to questions of soundscape: one quarter of the proposals did not mention sound at all, despite the noise-afflicted location of the competition area, and references to sound in the remaining three quarters were generally somewhat cursory, for example marking a noise wall in the plan and/or describing it briefly in the text. There are few proposals in which sound is analysed, problematized or given thorough space in the presentations.

4.6.1. Extensive use of buzz phrases

It was found that words such as peaceful, tranquil or contemplative are frequently used in the first few paragraphs of the presentation of proposals, suggesting a recognition of the importance of working systematically with the acoustic environment. However, a study of the entries indicates that, as a rule, these “buzz phrases” or “empty words” are not followed up or acted on in the actual planning and design of the cemetery. The following example is from proposal number 4:

Once inside, the visitor can walk along “the path of contemplation” […], the gaze is drawn to a vertical focus – “the obelisk of silence”, located at the foot of Granholmstoppen’s meditative summit and “the spiral of life.” After passing “the path of the rhythm of life” with its colonnade, and “the wall of the unspoken words” […], the visitor approaches the “place of silence” and the chapel, which is built to end with a staircase and “the wall of silence. (NRJA F.L. Tadao&Luksevics Ltd. 2010, p. 2)

While there are several references to places of relative silence in this description, the proposal included no description as to how the silent areas were going to be created. While it seems that there has been some consideration of what the desire for tranquility entails – there is some distance from the roads to the “tranquil” places mentioned – there is no mention of such acoustics-oriented planning or design. And there are examples in several other entries where similar “silent” functions, such as places for contemplation or meditation, are placed in close proximity to roads. Proposal number 103, for example, includes a “place for reflection” (MD Landschapsarchitecten 2010, p. 1) at a position where there would be more than 60 dB (L_{Aeq,24h}) – while making no reference to sound (Group A).
4.6.2. A defensive approach

Our study found that most of the references made to sound related to noise, rather than experience of sound; 69% of the proposals that addressed sound did it through a focus on noise, while 31% included some reference to experience or a “positive” aspect of sound. This pattern tallies with a critique that has been raised previously in relation to how urban sound environments are managed, and which has been referred to as a defensive approach (Amphoux 1993; Hellström 2003). The present study confirms this pattern in the given situation, as well as clarifying how it manifested itself in different phases of the design. When the focus is on negative aspects, as in traditional noise management (Brown 2010), other experiential aspects and potentials of sound can be forgotten – thus illustrating the difference between environmental noise management and the soundscape approach.

The defensive approach can be said to have been encouraged in the competition brief, as sound was only referred to in terms of noise. The nature of the competition site, with major roads in proximity and a problematic sound environment in several parts of Järva common, could be an additional explanation, along with the established practice.

4.6.3. A tendency to rely on positive sounds

There was also an “opposite” tendency in the competition, in that the focus on positive aspects of sound sometimes overshadowed any concern with noise. This tendency was found in seven proposals. For example, in proposal 98 (Superteam 2010), a sound-art installation was used as a means of transforming the noise from the highway to make it a more positive sound. While a previous reference project has shown that this idea has potential, it does not seem to be realistic as a single solution for dealing with the noise in all parts of a new cemetery.

A similar focus on positive sounds can also be found in the jury’s brief. When the jury recommended that the first phase of the new cemetery should be located in the western part of the competition area, the recommendation was made with reference to practical and aesthetic reasons. The jury brushed aside the noise issues that exist in this part of the site by highlighting the positive sounds of the area, stating:

> Exposure to the major road is a complicating factor, but even here the birdsong from the broadleaf woodlands is audible and the cemetery can then be extended both northwards and southwards round the hill. (SC 2010, p. 8)

Positive experience of sound is thus being used as a rationale for allowing development in a noisy area. As a rationale it is questionable, as the audibility of birds does not necessarily mean the soundscape is a pleasant one. It has previously been suggested that it is pertinent to work with soundscape quality as long as the SPL levels are below 65-70 dB(A) (Zhang and Kang 2007), thus lending some support to the jury’s argumentation. However, in order to achieve tranquil qualities, considerably lower SPL levels than this are probably necessary.
(Pheasant et al. 2008; Cerwen et al. 2016; Nilsson and Berglund 2006) and this would be difficult to achieve in the western parts of the area. Further, the recommendation given by the jury differs from the one given in the original competition brief, in which noise constituted a basic issue to be considered in connection with localization. In the brief, it was judged appropriate that the development should begin by the hill in the eastern and southern parts of the cemetery area – with specific reference to the problem of noise from the bypass in the western part (cf. 2.2. The Competition in Järva and 2.3. Representation of Soundscape in the Competition).

This tendency, in the competition, to refer to positive sounds as a means which by and of itself can counter noise might be a consequence of the recent introduction and establishment in the professional discourse of a broad and inclusive soundscape approach. Such an approach includes consideration of positive aspects of sound, and this seems to have stirred interest amongst architects (which was also one of the original intentions). However, the present study indicates that there is a risk that the focus may shift from noise to a rather one-dimensional and unconstructive focus on individual, positive sounds.

4.6.4. Discrepancies in communication of soundscape considerations

In the study, there were surprisingly few proposals that referred to sound in what we term Category I, localization of functions. Only 20% of proposals expressed a consideration for sound that corresponded with this category, which can be compared with the 63.5% of proposals that made a Category II reference (both categories dealing with different approaches to noise control). The rather low amount in Category I is noteworthy, especially considering the fact that the competition to a large extent dealt with issues related to overall planning – which would rather lead one to expect the reverse to be the case.

The study indicates that there were some proposals that had considered sound as a basis for localization of cemetery functions, but did not mention it in their presentations. The low count in Category I may therefore, to some extent, also be related to how the architects presented their intentions (which would mean that it does not only, as indicated in Figure 5, reflect a lack of consideration).

There are different possible explanations for this incongruence: entries may have been created using a work process that is intuitive or subconscious in regards to sound; another possible explanation is that other (visual) aspects were prioritized in the limited space allowed for each presentation. Such a choice of priority could be related to how sound was presented in the competition brief, as well as, perhaps, a general tendency within the profession to prioritize visual aspects (cf. 1. Introduction).

It has been argued that there is a relationship between the tools used in the profession and the aspects spotlighted in the resulting designs (Corner 1992; Olwig 2004). The presentations of the entries in the Järva cemetery competition can be regarded as representative for the
kind of tools that are generally used within the profession, i.e. texts, drawings, perspectives and plans. According to Corner (1992) and Olwig (2004), the use of such tools may have an influence on which aspects are given priority – in other words, the visual is accorded priority.

Furthermore, if the proposals are judged based on visual rather than acoustic qualities, the consideration given to sonic aspects is likely to be limited in favour of aspects that increase the chances of winning. Avoiding focus on negative aspects such as noise could potentially be a successful strategy. The winning proposal, for example, did not mention noise; but instead included a short reference to the positive sound of leaves (Category III). It should be added here that the winning proposal, when further developed subsequent to the competition, was relocated (see SCC 2015) – one of the reasons being the problem with noise in the original location. This illustrates the role of our Category I, and the problem that can arise when acousticians are brought into the design process too late (Coelho 2016).

The jury’s report explaining their choice of winner and honorary mentions (nine proposals in total) included two references to sound; one being in Category II (Proposal 29, 2nd prize, Group B) and one being in Category III (Proposal 81, Honorary Mention, Group C). Neither of the five proposals that addressed all of our three categories (Group D, including proposal number 9, Alice), were mentioned in the jury report.

5. Concluding remarks

This study has focused on how soundscape was dealt with in a major design competition for a new cemetery in Sweden. Our analysis of the entries and the competition framework provides an increased understanding of how sound can be dealt with in different aspects of landscape design and planning.

Our study shows that many entries contained no more than a rather limited focus on sound, which in many cases might have resulted in an environment unfit for a new cemetery, with potential negative effects for functionality, experience and health. Our findings thus tally with the critique raised previously on this topic (Botteldooren et al. 2008; Hedfors and Howell 2011; Southworth 1969). The lack of communication about and consideration of sound in this early phase of a design is especially unconstructive, as it is likely to result in a need, in later phases, for measures to be taken which may well be comparatively expensive and/or less effective. This issue is particularly pertinent with regard to our Category I, and was underlined in the Järva competition by the fact that the winning proposal was moved to more quiet parts of the cemetery area subsequent to the competition.

Our study shows, further, that even though soundscapes were commonly referred to in a positive and selling manner in proposal descriptions, the means by which it was envisaged
that the prerequisites for these soundscapes would be created were less clearly
communicated. In some of these cases, it was evident that no real deliberation had been
given to soundscape. In other cases, the architects’ design proposals seemed to entail some
kind of accommodation of sound that were not explicitly referred to in the written
presentation (this applies particularly vis-à-vis Category I). At the same time as being a
methodological reflection, this incongruence is a finding in its own right as it suggests that
sound is either not a prioritized aspect in the presentation of proposals, or that it is difficult
to communicate (cf. Olwig 2004; Corner 1992).

In our view, there seems to be a need to incorporate more knowledge relating to sound into
landscape design and planning practice. The soundscape approach, in which positive aspects
of sound are included in the design process, would seem to be a good way to reach
architects, planners and other stakeholders, for whom noise issues and the science of
acoustics have failed to stir the imagination (Brown 2010; Schafer 1994 [1977]). However, as
the present study indicates, there is a risk that too much focus can be placed on the positive
aspects, with a resultant insufficiency of attention being given to the problems posed by
unwanted noise. The model introduced as part of this study emphasizes the interplay
between different kinds of approaches, and as such could be used as a bridge to understand
the inherent relationships.

The model, structured around three main categories – (1) localization of functions (2)
reduction of unwanted sounds and (3) introduction of wanted sounds – centres on the
identification of potential transformations of a pre-existing soundscape. The model was
fruitful to use in the given context and resulted in an overview of how soundscape was
treated in a large number of entries, and also enabled us to identify proposals which were
interesting with regard to their approach to soundscaping. This, together with the fact that
the model is straightforward, shows that there is scope for using it, both for understanding
and for evaluating approaches to soundscaping in landscape design.

Landscape architecture is a complex field in which many aspects must be considered. In the
architectural competition studied here, soundscape was not a prioritized aspect. While there
were some good examples in the study of how sound could be handled, there were also
some inconsistencies and points of confusion in the competition framework, which may have
deterred the architects from working with soundscape issues. One way to improve how
soundscape issues are dealt with in the future would be to give them higher priority in
competitions. For instance, competition briefs could be formulated to encourage creative and
comprehensive approaches to soundscaping. Our model and findings here could serve as
inspiration and a starting point.
Acknowledgements

We would like to thank Karin Söderling, Claes Larsson, Katarina O Cofaigh, Marianne Klint and Thomas Holmström for sharing their knowledge in questions relating to the competition, as well as supplying access to the empirical material. We would also like to thank Lennart Johansson at Stockholm City and Sara Revström at ÁWL architects for allowing the reproduction of images. Finally, inspiring discussions with Anna Petersson, Maria Liljas and Eva Reimers within the research project CAMINE has been of importance for our research.

Funding

This work was supported by Svenska Forskningsrådet Formas (The Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning) [grant number 259-2011-582].

References


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