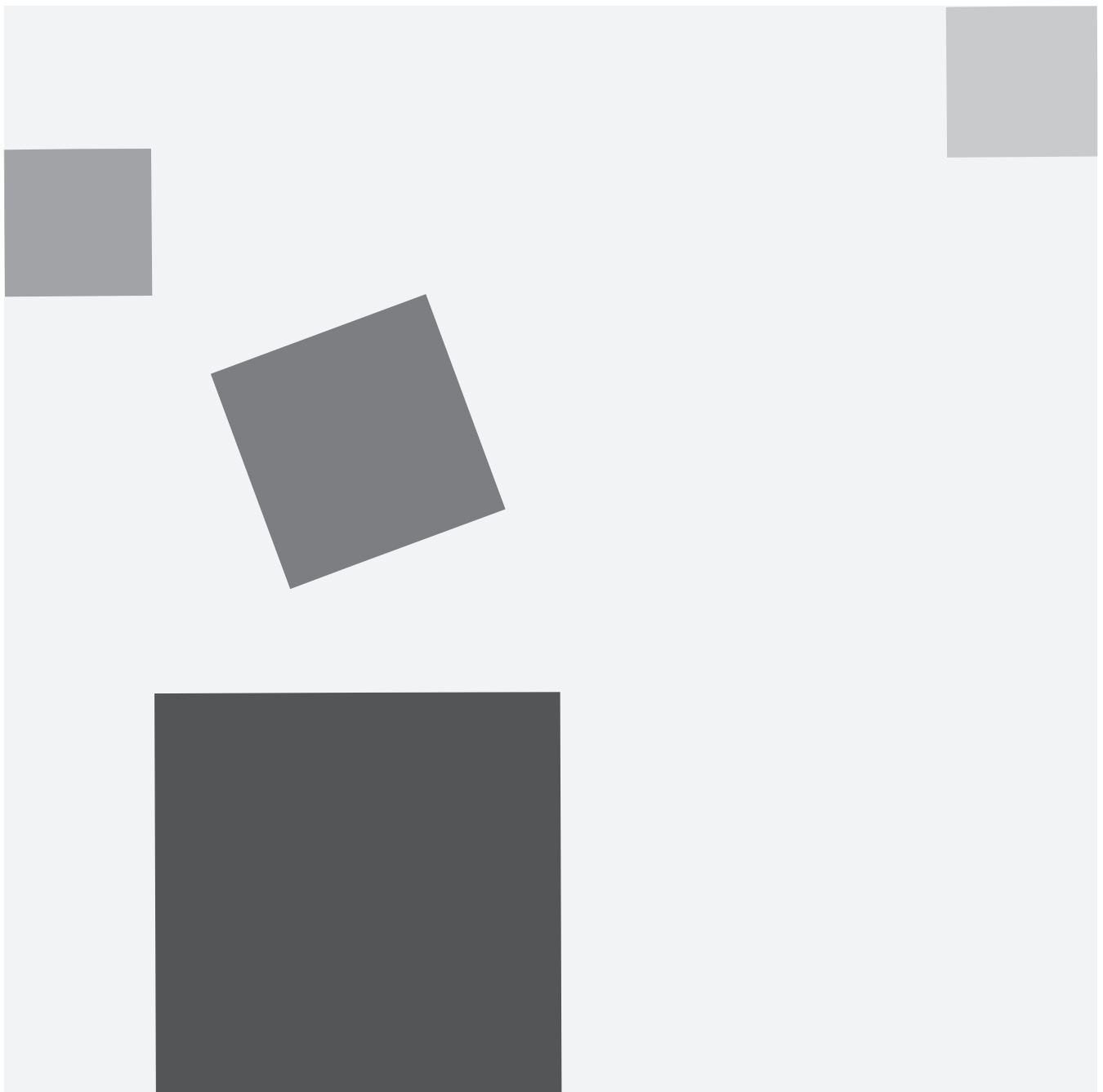TONGERSEWEG MEMORIAL PARK

UNLOCKING THE POTENTIALS OF
GREEN URBAN CEMETERIES

DIRCO KOK | WAGENINGEN UNIVERSITY

TONGERSEWEG MEMORIAL PARK
Unlocking the potentials of green urban cemeterires
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ABSTRACT

This thesis arises from the notion that there are yet to be unlocked potentials for urban cemeteries. Today, many urban cemeteries are monofunctional, secretive, and closed-off spaces. Initially established in the city's periphery, their regained position within the city forms one of the arguments to reconsider their relationship with the urban tissue.

With the concept of compact cities gaining in popularity, all green areas, including green cemeteries, might become more attractive as publicly accessible spaces. Combined with a general decline in burials, public use can mean the difference between succumbing to degradation or becoming a thriving part of the local community. Furthermore, urban cemeteries offer tremendous opportunities to improve their ecological performance, which is simply inevitable when planning and designing in the age of a climate and biodiversity crisis.

Therefore, this thesis looks for a better understanding of the current role of urban cemeteries and potential additional roles. It is profiled as a two-legged approach; grasping green urban cemeteries as a story on culture and nature, inherent to the landscape architectural discipline. It aims to redefine what a cemetery can become, thereby reinforcing its role in the urban green infrastructure.

Learning from three reference studies and transforming the findings into design guidelines formed the starting point for a research-based design for the Tongerseweg Cemetery, a monumental and actively used cemetery in Maastricht. A thorough analysis, theoretical research, and design guidelines formed the basis for the strategies and design interventions proposed for the cemetery. It offers an attractive perspective of the transformation into a biodiverse, climate-positive community space.

The work is published both in this academic report and as a catalog containing design approaches, strategies, and principles on various levels of abstractions. The catalog aims to serve as a reference work for the practice side of the landscape architectural discipline.

Keywords:
Cemeteries, Green infrastructure, Urban green space, Memory sites, Urban ecology

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1. INTRODUCTION

1.1. PROBLEM CONTEXT

My master thesis arises from the notion there are yet to be unlocked potentials for green urban cemeteries. World-wide, cities are in constant transformation in terms of demography, competing spatial claims and available public space. This also effects urban cemeteries, since the places for the dead are an integral part of any human settlement. World-wide, the concept of the compact city is gaining in popularity and urban areas experience densification, in The Netherlands stimulated amongst others by former state architect Frits van Dongen (Jim 2004; van Dongen 2015). This results in **intensification and competing claims** on the city's green open space system. In that context, the introduction of **new ways of using public green space** or **stacking functions** on top of existing ones becomes relevant. Haaland and van den Bosch (2015) then also argue for the importance of multifunctionality in green open spaces. This may have consequences on how urban cemeteries may shift from just being burial spaces to becoming performative in multiple ways. New ways of using public space may affect how urban cemeteries are utilized and valued as part of urban green infrastructure in the future (Skår, Nordh, and Swensen 2018; Nordh and Swensen 2018; Długozima and Kosiacka-Beck 2020).

Although the primary objective of cemeteries is to fulfil the need for burial space, green urban cemeteries encompass a **variety of qualities and functions related to cultural history, biodiversity and people's uses and preferences** (Nordh and Swensen 2018). Many green cemeteries in The Netherlands are quite large and in many ways park-like (Wille, Vijftigschild, and Nuvelstijn 2004). In municipal green plans (*groenstructuurplan*), they are often treated as private, mono-functional spaces, but we can see the emergence of new perspectives on urban cemeteries relating to their inherent qualities as green open space and habitat patch within the city. Cemeteries are part of the larger green structure in municipal green plans and thereby entail potentials on the one hand for green recreation and on the other hand for providing ecosystem services.

We can speak of a **multiplicity in green urban cemeteries: they can hold multiple identities and values in one space.** The concept of urban ecosystem services offers a strong lens to study existing and explore potential contributions they make to the city's open space system.

Therefore, this thesis reviews the role of the cemetery within the urban fabric and what they could become in the future. It looks for a better understanding of the role, functioning and successful design of urban cemeteries as green urban public space. It is profiled as a **story on both culture and nature**. Thereby I aim to **innovatively expand and redefine what a cemetery could become in the future**, reinforcing their role as green urban (public) space.

DEFINING THE GREEN URBAN CEMETERY

This thesis revolves around green urban cemeteries, by which is refered to cemeteries with **various degree of vegetation**. Furthermore, a cemetery is different from a churchyard in that there is no consecrated building, such as a church, on-site.

Examples of multiplicity in green urban cemeteries;
Fig. 1.1: Converted areas of traditional lawn cemetery into naturalistic prairie plantings at Green Wood Cemetery (Brooklyn, NY), source: Presson, 2020
Fig. 1.2: Assistens Cemetery (Copenhagen) is used for jogging, biking and relaxing on a sunny day; source: Foreningen By&Natur, n.d.

The claim that cemeteries might become more attractive as publicly accessible parks is supported by changing societal perception towards the dead (Deunk 2016). Stigmas around the dead are vanishing, thereby lowering the threshold to visit a cemetery. Slowly and cautiously, cemeteries increasingly **embrace more public use** and become being seen as part of the city's park system, a trend that started to circulate in the Netherlands only very recently, but can be observed in the rest of Europe or coastal American cities already longer (Gemeente Amsterdam 2020; Grabalov 2018; Swensen 2018).

This context is the initial argument to start investigating the potentials of multifunctionality at cemeteries. Thus, this thesis explores **the accomodation of park and ecological functions** in green urban cemeteries, **and to which extent these can be accomodated**.

1.2. RESEARCH FRAMEWORK

1.2.1. PROBLEM STATEMENT & KNOWLEDGE GAP

Research on cemeteries covers topics such as cultural historical discourse on cemeteries (Rugg 2000; Kolnberger 2018), people's use and preferences (Evensen, Nordh, and Skaar 2017; Swensen 2018; Marriott 2018; Grabalov 2018), ecological and habitat performance (Clayden et al. 2018; Kowarik et al. 2016; Swensen 2018; Yılmaz, Ku ak, and Akkemik 2018), biological processes in the disposal of human remains (Santarsiero et al. 2000) or memorialisation (Treib 2005). Thus, as also Woodthorpe (2011) points out, the multidisciplinary interests in cemeteries means that **literature is fragmented** and publications are spread between various discipline-specific journals.

Within landscape architecture, research on the design of green urban cemeteries is merely concerned at planning and design rationales from a historical perspective, e.g. see Clayden et al. (2018), Kolnberger (2018) or Rugg (2000). **Research on the design for contemporary cemeteries and future trajectories for historical burial sites is scarcely available**. Furthermore, research focusing on cemeteries as urban public green spaces is limited (Kjøller 2012).

Even though landscape architects and urban planners are succesfully working on the re-design of green urban cemeteries, there is limited research on these design approaches, let alone comprehensive volumes bundling together relevant knowledge for the planning and design
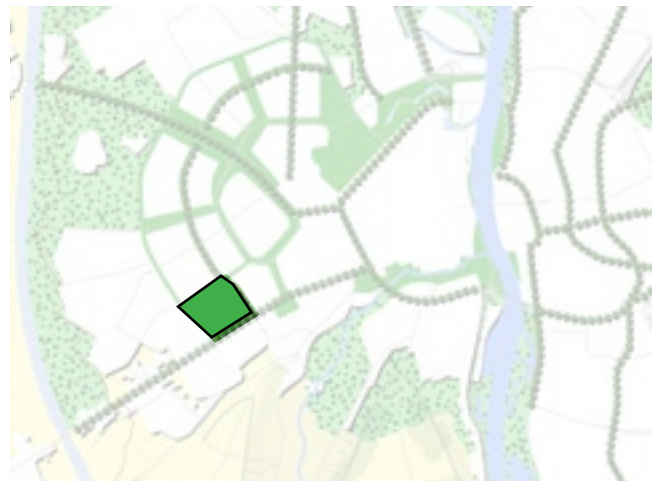
Fig. 1.3: Green urban cemeteries are often colored in on the map alongside the rest of the city's green infrastructure, but its specific role and potential often remains unaddressed. Pictured above, Tongerseweg Cemetery in Maastricht is part of the larger green structure in the municipal green plan (*groenstructuurplan*); source: Gemeente Maastricht, 2020

industry. Designers often search for precedents or best-practice examples. However, these are specific to their location and design brief and it can be complex to apply them to a new assignment which has its own specificities. Here, **the potential of generating design guidelines arises**, since they provide principles or strategies rather than one specific solution (Prominski 2017). **Existing cemetery designs and the rationales behind them are abstracted into generalized guidelines** (approaches, strategies and tools) for the practice side of the discipline to use in the design process.

To conclude, the problem thus is a fragmented field of knowledge on urban cemeteries and a academic knowledge gap on the planning and design of the contemporary green urban cemetery. This is even more persistent when narrowed down to the Dutch context.

1.2.3. CASE: TONGERSEWEG CEMETERY, MAASTRICHT

The case study site for this thesis is the Tongerseweg Cemetery, a tree-covered cemetery, in Maastricht, The Netherlands. This city-owned cemetery is one of the oldest urban cemeteries in the Netherlands and dates from the early 19th century times of hygenic reforms. The cemetery was established during the time of the French occupation and has since been gradually expanded to its current size of 12 hectares with more than 10.000 graves. Part of the cemetery has the status of a **protected monument**. In addition, the cemetery with more than a thousand trees
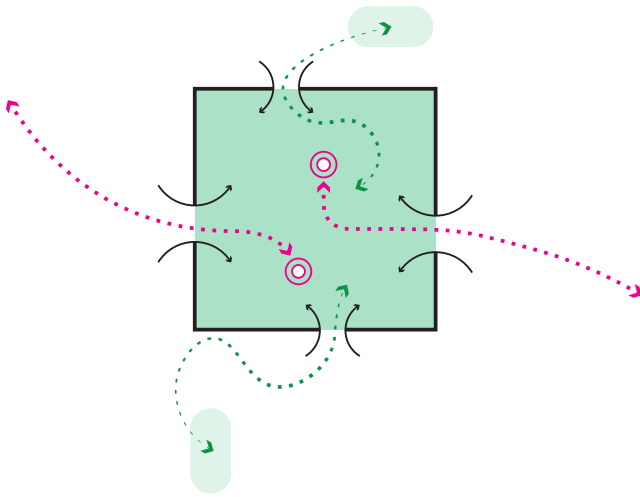
Fig. 1.4: The thesis objective visualized in a diagram: exploring urban green cemeteries' potential to embrace public use, engage with its surroundings and contribute to strengthening the existing, but fragmented, urban green infrastructure; source: author

also has a local ecological function. (Gemeente Maastricht 2017)

It's inner-city location and typical 19th century monumental character make it an examplary case to generalize the design result as input for other Dutch and Northern European cemeteries as well. Furthermore, the location raises a set of site specific issues that this thesis could properly respond to given its scope, adding additional relevance for selecting this case. E.g., there is **overdue maintenance** in the hardscape and the **burial product offering is outdated**.

Recently, the city administration has coined the idea to transform the cemetery into a **'multifunctional mourning and memorial park'** that could host cultural events. Thereby they are stretching the idea of what a cemetery could be, but ambitions are made in moderate terms.

Furthermore, the city of Maastricht expresses **ambitious ecological objectives** for their urban green infrastructure, Tongerseweg Cemetery included, in their Strategy on Spatial Planning and the Environment (Omgevingsvisie) for 2040 (Gemeente Maastricht 2020). Nordh and Evensen (2018) discuss the disparity between cemeteries often being colored in on the map along with other green spaces as part of the green infrastructure, but neglected and treated as private green spaces in the actual green infrastructure planning and design, which partly is the case in Maastricht as well, see figure 1.3.

Given these site specific conditions and moderate ambitions made, this thesis aims to push for and further stretch the idea of the Tongerseweg Cemetery as a **multifunctional cemetery park** embedded in the city of

Maastricht. Thereby, the site is exposed to contemporary ideas around burial and memorial and its potential to become more porous, engage with its surroundings and contribute to strengthening the existing, but fragmented, urban green infrastructure.

1.2.2.   THESIS STATEMENT

This thesis aims to contribute to the academic debate on the role of green cemeteries in the urban fabric. It does so by investigating to which extent and which interventions are needed to facilitate public joint usage and increase its ecological performance within the green infrastructure.

1.2.3.   OBJECTIVE

The objective of this thesis is to stretch the idea of, and thereby explore the potential of the Tongerseweg cemetery to transform into a multifunctional public park that engages with its surroundings by embracing wider public use and contribute to the existing, but fragmented, green infrastructure, thereby giving input for the transformation of similar green urban cemeteries, see figure 1.4.

1.2.4.   RELEVANCE

Thereby the **academic relevance** of this study is to contribute to the ongoing academic debate of the role of green cemeteries in the urban fabric, more specifically regarding their role as public park and green infrastructure. The research and design will be done at the intersection of contemporary burial culture, public park and green infrastructure, thereby interconnecting parts of the fragmented field of knowledge on cemeteries.

The academic relevance is also connected to its **landscape architectural relevance** that lies in investigating how, to which extent and by what design moves green urban cemeteries could increasingly engage with their surroundings by embracing wider public joint usage and contribute to the existing, but fragmented, urban green infrastructure. By generating and testing design guidelines based on insights from reference studies, the study contributes to both academia and the practical application of knowledge in design practice. As cemetery design is a common type of assignment for landscape architects, this is valuable new knowledge for the discipline.

The **societal relevance** of this study lies, as argued in the introduction, in the densifying city and how its

scarce green space could best be used. This thesis stretches the definition and concept of a cemetery. Thereby it offers new perspectives on how to use the green urban cemetery in a more multifunctional way.

Furthermore, this thesis embeds the design within a discourse of transitions in burial practices and rituals. Thereby one of the outcomes, the final design, could contribute a set of lay-out and design examples to consider in future cemetery commissions and design projects.

1.2.5. CONCEPTS

A set of core concepts regarding provides guidance and a lens to look at all the data gathered in this research. Furthermore, it helps in deliniating the research and structure some of the research chapters. The concepts are interlinked and figure 1.5 provides an overview how they relate to eachother to avoid misunderstandings.

GREEN INFRASTRUCTURE

Green infrastructure is one of the overarching concept within this thesis that is often mentioned alongside urban biodiversity and ecosystem services. Therefore, these key terms are specified to consequentially and comprehensively structure the research.

Green infrastructure is an emerging concept in planning and design that is often employed to holistically assess and improve the functioning of a cities open space system (Ahern 2007). It revolves around a network approach to green space systems. Essential features to green infrastructure approaches are, first, to adopt a **multi-scale and multi-object** approach and, secondly, to focus on their role of **interconnecting habitats** (Van der Ryn and Cowan 1996) and aim for **multi-functionality** of these habitats and connections (Sandstrom 2002).

URBAN BIODIVERSTIY

This brings us to urban biodiversity that is used as a generalized concept describing the diversity of ecosystems, populations and species and the genetic diversity within them. Urban biodiversity is used to describe the ecological quality of the green infrastructure or site. In urban settings, there is a **paradigm shift** towards a wider focus on all urban ecosystems, including native and non-native species (Grunewald et al. 2018). Through habitat destruction, fragmentation and the introduction of new (non-native) species, as well as indirectly changing the urban climate and day-and-night rhythms, human influences set urban biodiversity apart from biodiversity outside of urban areas

(Kowarik and Körner 2005).

All forms of urban biodiversity should be properly managed to secure its survival and let its human inhabitants benefit from its ecosystem services. Thus, it should be considered to what extent species of animals and plants can survive in these urban conditions, how to **foster and manage their habitats** and how to let people enjoy these natural amenities without destroying them.

ECOSYSTEM SERVICES

Here the concept of Ecosystem Services (ESS) is introduced as a theoretical lens to comprehend these functions and benefits. It most definitely is an anthropocentric concept stressing a range of provisional benefits of nature to human well-being (Haase et al. 2014). Thereby, I use a broad definition of the concept. For green urban cemeteries these may include **regulating services** (e.g. climate regulation and air quality), **supporting services** (e.g. providing habitat; maintain plant and animal diversity) and **cultural ecosystem services** related to recreation, wellbeing and health (Shanahan et al. 2015; Kowarik et al. 2016; Haase et al. 2014).

In literature, urban ecosystem services (UES) are sometimes set apart from ecosystem services (EES) stressing cities are dependent on ecosystems beyond the city city boundaries, but also benefit from internal urban ecosystems: the UES (Bolund and Hunhammar 1999). This research uses the term ecosystem services (ESS), since the objective is not to generate a full metabolic analysis of the city.

1.2.6. RESEARCH QUESTIONS

Urban biodiversity =
concept to discribe ecological quality

Green infrastructure system

Green urban cemetery

output → Regulating

output → Supporting

output → Cultural = public park functions

Ecosystem services:
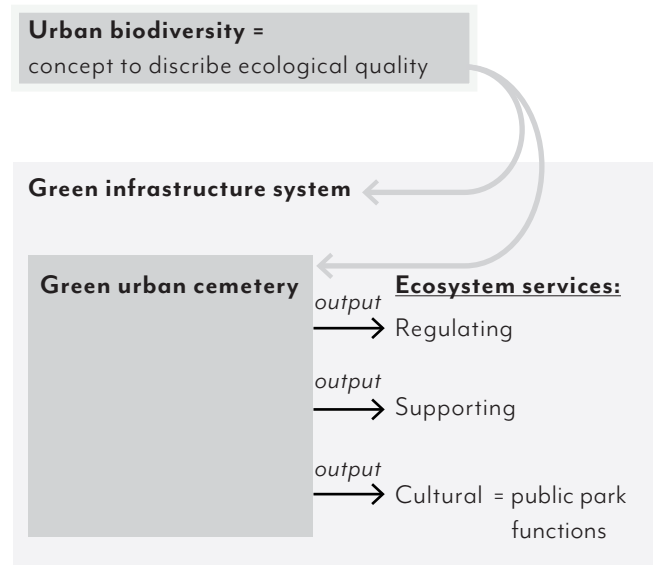
Fig. 1.5: overview of how the different concepts relate to eachother; source: author

The main research question (MRQ) for this thesis is:

What interventions are needed to accommodate public joint usage and increased ecological performance in green urban cemeteries, such as the Tongerseweg Cemetery?

To aswer the MRQ, three sub-research questions (SRQ) and one design question (DQ) have been formulated:

SRQ 1: What public park functions could a green urban cemetery serve?

SRQ 2: What role could a green urban cemetery play as green infrastructure within an open space system, using the concept of ecosystem services?

SRQ 3: What design guidelines can be generated from existing green urban cemeteries that serve park functions and that play a role as green infrastructure in city's the open space system?

DQ: How could the Tongerseweg Cemetery serve increased ecological and public park functions within its urban context?

2. METHODOLOGICAL FRAMEWORK

In this chapter, I will first touch upon the approach and type of knowledge claim this project adopts. Then, based on the sub-research questions and design question, three phases of inquiry are set up. A literature study phase on the respective topics of SRQ 1 & 2 and a reference study phase that culminates into a series of guidelines. These two phases plus the Maastricht site analysis will inform the case study phase. Here, the guidelines are tested and adjusted and a design for the Tongerseweg Cemetery is made. These three phases establish the knowledge base that will answer the main research question. See figure 2.1 for an overview of the research process.

2.1.   PRAGMATIC KNOWLEDGE CLAIM

This research project adopts a pragmatic approach and knowledge claim, as defined by Lenzholzer, Duchhart, and Koh (2013). The research is set up as a two-legged approach; positioning green urban cemeteries at the intersection of public joint usage and ecological performance. Thereby it is posited as a story on culture and nature, inherent to the landscape architectural discipline. This is reflected in the research questions that concern natural and cultural aspects, as well as design procedures. Therefore, a careful integration of different methods is required to integrate this knowledge. The outcomes are both guidelines and unique contextual new knowledge for the Tongerseweg Cemetery case.

2.2.   RESEARCH PHASES

2.2.1.   LITERATURE STUDY PHASE SRQ 1 & 2 (RESEARCH FOR DESIGN)

In SRQ 1 and SRQ 2 the theoretical framework is **set up to verify and build an argument**. First, on what could be adequate and applicable joint-usages for green urban cemeteries, and secondly, what roles a green urban cemetery could play as green infrastructure within an urban open space system. This is done by means of a literature study focussing on scientific literature and secondary reports that are relevant for the topic of green urban cemeteries regarding urban green infstrature, urban ecology and park functions. During the pre-proposal phase of this thesis, it was identified there is enough relevant literature 'out there' to answer SRQ 1 & 2. Snowballing was used to find additional papers to secure an extensive and complete overview of relevant literature 'out there'.

The concepts of Green Infrastructure, Urban biodiversity and Ecosystem Services presented earlier make up the analytical framework. They are concepts to guide and streamline this literature study. They are not the research focus in themselves but offer a conceptual lens at the starting point of this literature study.

The resulting knowledge is not place specific. The literature study generates four results. First, the output of sub-research question one builts a framework for assesing adequate and applicable 'public park roles' for green urban cemeteries. Secondly, the output of sub-research question two results in a set of key points on the role and potentials of a cemetery within an urban green infrastructure system.

Problem Statement & Knowledge Gap

↓

Main Research Question
(MRQ)
What interventions are needed to accommodate public joint-usage and increased ecological performance in green urban cemeteries, such as the Tongerseweg Cemetery?

↓ ↓ ↓

Research **for** Design

Sub-research question 1
(SRQ 1)

What public park functions could a green urban cemetery serve?

Method

Literature study

Output

Key points on adequate and appropriate park functions

Research **for** Design

Sub-research question 2
(SRQ 2)

What role could a green urban cemetery play as green infrastructure within an open space system, using the concept of ecosystem services?

Methods

Literature study
Secondary report study

Output

Key points on role of urban cemeteries in green infrastructure

Input from literature for guideline generation

Research **on** Design

Sub-research question 3
(SRQ 3)

What design guidelines can be generated from existing green urban cemeteries that serve park functions and that play a role as green infrastructure in city's the open space system?

Methods

Reference study through:
    Literature study
    Site analysis (field observation
                + desk research)
    Map study

Output

Abstraction into preliminary design guidelines

Research **based** Design

Design Question
(DQ)

How could the Tongerseweg Cemetery serve increased ecological and public park functions within its urban context?

Methods

Site analysis
Strategizing
Designing
Expert judgement

Output

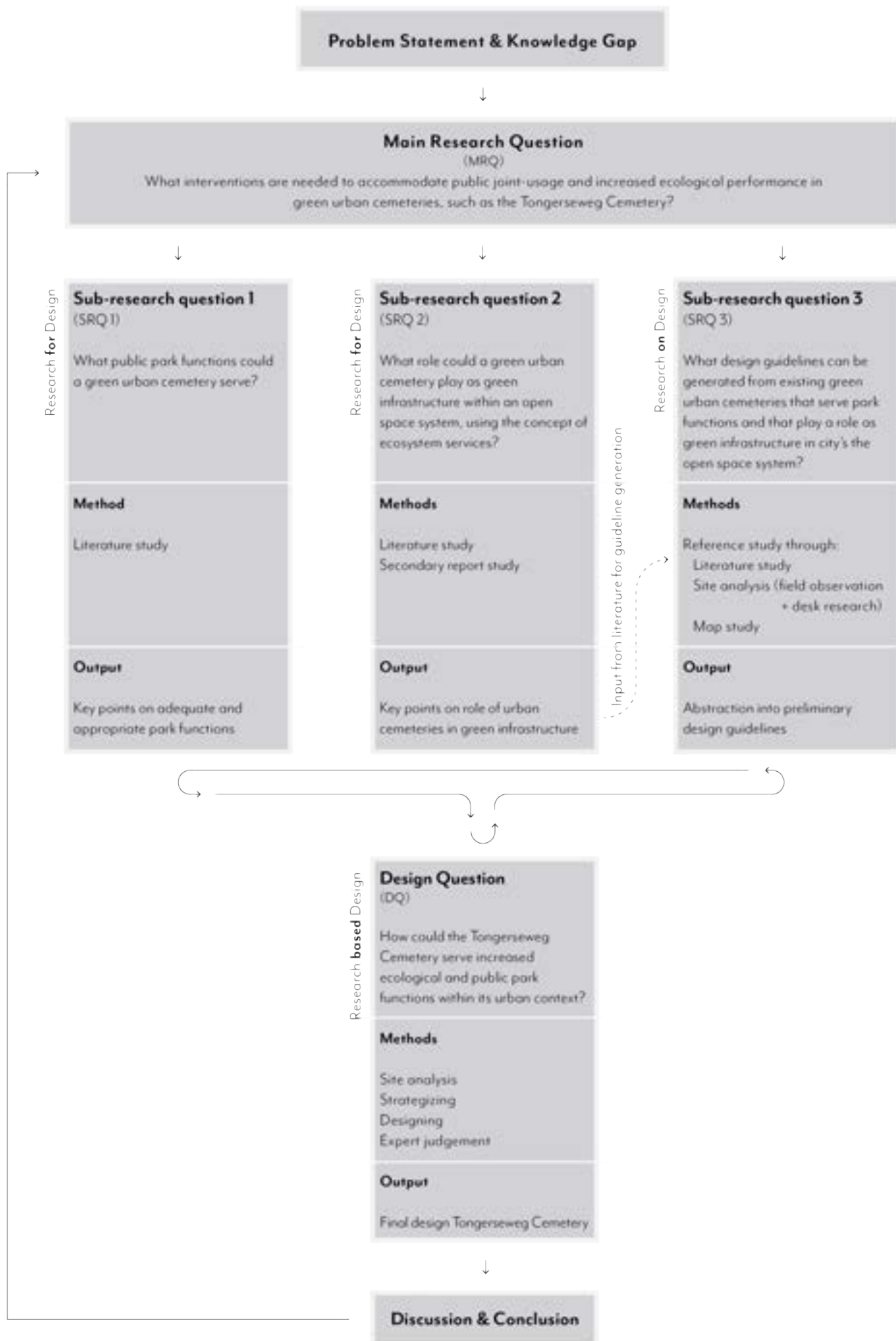Final design Tongerseweg Cemetery

↓

Discussion & Conclusion

Fig. 2.1: The research process visualized in a diagram; source: author

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Thirdly, the literature study produces a solid basis to act as theoretical lens when reviewing the case studies and assess and evaluate the observations in the cases. Fourthly, during the execution of the literature study, it has been decided to also generate design guidelines from information gathered on the contribution that green cemeteries can make to the urban green infrastructure.

2.2.2. REFERENCE STUDY PHASE
SRQ 3 (RESEARCH ON DESIGN)

A reference study on exemplary multifunctional green urban cemeteries is **aimed to generate a set of design guidelines** reflecting what lay-out and design principles makes them succesfully host additional roles for public joint usage and be integrated into the wider urban open space system. This research question thus answers what exactly it is in a cemetery design that makes them suitable for public joint usage and makes them contribute to the city's green infrastructure.

For the reference study of design approaches in existing green urban cemeteries an exploratory scan was carried out to find suitable 'best practice' cases.

The reference studies were selected on the following criteria:

- The cemetery offers a variety of burial options (coffin grave, urn internment, ash scattering, natural burial etc.)
- The cemetery is located in a city and surrounded by neighbourhoods.
- The cemetery is open to the public and the park management employs the site for joint usage as public park.
- The cemetery is a green cemetery, by which I refer to cemeteries with various degree of vegetation.

Three reference have been selected:

- Skogskyrkogården in Stockholm, Sweden
- Green Wood Cemetery in Brooklyn (NY), USA
- Melaten Cemetery in Cologne, Germany

The reference studies consist of multiple methods, to make a cross-over between data harvesting methods and increase the validity of the research outcome:

- **Literature study**; to explore the existing literature and secondary reports on design considerations, successes and complications of the respective cemetery.
- **Site analysis** (field observations and desk research); understand the urban characteristics, physical expressions, relationship with its adjacencies, historical context and lay-out and programming of the site. The field observations included both the cemetery and its adjacencies and were done by foot and bike. Desk research through historical/contemporary maps, geo-data sets, design plans and secondary reports.
- **Map study**; understand the adjacencies and connections within the urban context, historical growth and development, and topographical characteristics

For site analysis, it should be stated that due to the global COVID-19 pandemic, I was able to visit Green Wood Cemetery and Melaten Cemetery, but I have not been able to visit the Skogskyrkogården in Stockholm for field work. The full extent of the site is available in Google Street View, thus it was decided to substitute in person observation that way. Furthermore, given its renowned status, a lot has been published on this cemetery, which made it possible to work around obstacles imposed by COVID-19 restrictions.

The data (literature, observations, maps, photographs) was processed by a systemic analysis, focussing on the site's history, architectural composition, burial infrastructure, 'urban life' and its link to the wider urban green infrastructure and surroundings. Finally, all these results are evaluated and guidelines are derived from relevant data that lend itself to be abstracted into a guideline. In this process, the data from the literature study for SRQ 2, on green cemeteries and their contribution to the green infrastructure, was also included to abstract guidelines.

In appendix 1, the abstraction of information into design guidelines and their hierarchical organization is discussed in greater depth.

2.2.3. CASE STUDY PHASE
DQ (RESEARCH BASED DESIGN)

The output of the three sub-research questions are the input for the design phase of this thesis. The design phase is set up as 'research based design', implying that the design is based on the preceding sub-research questions. Through the design process the preliminary

design guidelines that were generated before, are **tested and adjusted accordingly, as well as invent new ones** (Brink et al. 2017). Thereby both location-specific and generalizable knowledge is produced.

To make a design for the Tongerseweg Cemetery and answer the design question, three other methods were used. It should be stated beforehand the site analysis does not per se generate new knowledge but is important to let the design fall 'in place':

- **Site analysis** (field observations and desk research): to comprehend site-specific knowledge required for making a design. Field observations were made by during several site visits, spread over various seasons. They included both the site and its adjacencies (surrounding neighbourhoods, relevant parts of the city's green infrastructure) and were done by foot and bike. Desk research is executed through the study of maps, geo-data sets, secondary reports. In combination with field observations, it frames the urban characteristics, relationship with its adjacencies, historical context and current lay-out and programming of the site. Expected trends for the Maastricht burial market and legal and physical burial constraints were analysed as well.
- **Strategizing, modelling and designing**: to explore and test out new possible directions for the Tongerseweg Cemetery, using the results of SRQ 1, 2 and 3 as input for the design
- **Expert judgement**: to assess the feasibility of the strategies, program and design proposals, experts were consulted for their opinion and extra input on the design drafts.

Three experts were included in the design process for expert judgements:

- Erik Kaptein, senior landscape architect at the Municipality of Maastricht, who is actively involved in the Tongerseweg Cemetery.
- Erik ter Heide, project leader on Public Space for the municipality of Boxtel, who is actively engaged in the management and design of their cemeteries for over the past two decades and has plenty of 'hands on' experience with cemetery design, transformation and management.
- Friso van der Zee, a plant and forest ecologist from Wageningen Environmental Research that is part of the 'Limburgs Heuvelland' forcus group at the OBN Knowledge Network for Nature Restoration and Management. He brings in knowledge on local ecology and forest management.

A **reciprocity between the design and research** questions was established once it turned out that more knowledge is required to successfully finish the design, thereby creating an iterative process. The 'research based design' results in the design synthesis: adjusted design guidelines and the final design.

2.2.4. EVALUATION

In the discussion and conclusion, the design guidelines will be evaluated on their applicability within the design in Maastricht and their applicability to other contexts. Furthermore, it will be evaluated how this thesis relates itself to the objective of setting out new future trajectories for green urban cemeteries more generally.

3. EXPLORATION ON PUBLIC PARK FUNCTIONS FOR GREEN URBAN CEMETERIES

As discussed before, cemeteries hold unique potentials for joint usage by the public besides their prime burial related activities. Thereby they can contribute to the urban landscape in new ways. This chapter discusses how green urban cemeteries could evolve from (solely) burial space to hybrid urban (memorial) parks.

The extensive literature study has shown that cemeteries are of a multi-faceted nature which is manifested in the complexity of roles imposed on these spaces. Every cemetery already contributes to the urban environment in its very own way. They are part of an already existing green infrastructure and serve the local communities. Given their primary role as a site for burial and relatives to visit their loved ones, there is a field of tension between the concept of a cemetery and public park. Thus, a nuanced positioning of the cemetery as public park and the park functions it could host is needed.

3.1. WHY CEMETERIES AS URBAN PARKS?

As discussed in the introduction, in the context of the compact city, the importance of green areas increases. This has its consequences on how green urban cemeteries may **shift from just burial spaces to becoming spaces for recreation alike**.

In this context of increased urban interest and development, Grabalov (2018) argues a better understanding of the current role of green urban cemeteries and potential for the accommodation of more functions in urban cemeteries appears highly relevant for urban planners.

Furthermore, **new attitudes towards the death** (Blanco & Vidal, 2014; Venbrux et al., 2009), increasingly diverse urban populations, and new ways of living in and using the city, could potentially lead to changes in use of the urban green open space network, such as green urban cemeteries (Franck & Stevens, 2006; Ivers, 2018; Östberg & Rae, 2018).

Like urban parks, cemeteries offer both natural and cultural qualities and have many similarities to well-established parks such as lawns, decorative planting and strolling paths. Those are sites with lots of potential that could be **opened-up and made accessible**, so a more **reciprocal relationship** with the rest of the city can grow.

Some cemeteries are well-established as a place for visitors, e.g. the UNESCO Skogskyrkogården in Stockholm, which welcomes an annual 400.000 visitors (Larsson, Schlyter, & Backlund, 2014). Also lesser known or smaller cemeteries, such as Gamlebyen cemetery in Oslo, Melaten Cemetery in Cologne or Green Wood Cemetery in Brooklyn (NY), welcome visitors and appear to be used for a variety of everyday activities, such as dog walking, socializing, cycling and hosting appropriate events (Cologne Trouist Board, 2020; Evensen, Nordh, & Skaar, 2017; Payson Coleman, 2019).

Many old cemeteries are still selling plots and burying the deceased but given **cremation and other arrangements are increasing in popularity**, their days as just a cemetery are numbered. Here, public use can mean the difference between succumbing to degradation or becoming a **thriving part of the local community**. In this context, cemeteries can have improved park functions.

3.2. RELATIONSHIP BETWEEN THE LIVING AND CEMETERY OVER TIME

The relationship between the cemetery and city over time, has always been in transition. Situated next to the church or in public mass graves (e.g. Holy Innocents' Cemetery), until the nineteenth century, graveyards were at the heart of the community around the church; there was 'familiarity and spatial intimacy between the living and the dead' (Johnson, 2008, p. 780). **Hygienic reforms** and space becoming scarce led to the relocation of the dead to the city's periphery. The new cemeteries were situated as sole island in between agricultural land, their only relation with the outside sometimes being their border following the existing allotment pattern. Surrounded by ditches, hedges or walls, they imposed a strong separation from their surroundings, thereby sequestering the dead from the living

Two examples of cemeteries that increasingly embrace more public use:
Fig. 3.1: Main entrance at Green Wood Cemtery (New York) used for an open-air opera event; source: Patch, 2018
Fig. 3.2: Non-active part of St. Marien and St. Nikolai II Cemetery (Berlin) transformed into a park and playground; source: McMillan, 2016

(Rugg, 2000). This took cemeteries out of the heart of the community into 'other' spaces **'clearly differentiated from the everyday spaces of the living'** (Young & Light, 2016, p. 64).

Simultaneously, the Garden Cemetery movement gained popularity, also in the Netherlands (e.g. Nieuwe Ooster in Amsterdam and Crooswijk Cemetery both by L.A. Springer). These were new cemeteries typically founded outside the city in a landscaped park-like setting, adopting the Romantic style in fashion in landscape design at that moment (Tarlow, 2000). Intentionally designed this way, their winding paths lend themselves for strolling and their manicured greenery became a main recreational space and tourist attraction in the industrialized city (Al-Akl et al., 2018). Before the widespread development of public parks, the garden cemetery was intended and actively used as a place for the public to enjoy outdoor recreation amidst art and sculpture previously available only for the wealthy.

Now **incorporated by expanding cities**, urban cemeteries are 'increasingly **conceived as places to be visited and incorporated into everyday practice**' (Young & Light, 2016, p. 65). See figure 3.3 for examples.

Initially built in the periphery, their regained location within the urban fabric was not initially part of their lay-out and design. This regained position within the city forms one of the arguments to reconsider their role in and, relationship with the city.

3.3. PARK OF CULTURAL SIGNIFICANCE AND IN NEED OF CHANGE

Cemeteries are **mirrors of our society**. They represent the relation between the collective and the individual, the social system of that time, the developments in the field of architecture, design and landscape architecture, the transformation of a "culture of mourning", as well as the varieties of different religions and spirituality cemeteries currently reveal. It is deeply rooted in a particular place, revealing local narratives and culture. In every part of the world this is different, making it not only a mirror of society but also a catalogue of culture and anthropology. Therefore they are important places that provide civic identity and local place attachment amongst others (McClymont, 2016).

Large urban cemeteries often contain rich layers of history and contain memorials of all sorts that receive annual ceremonial tributes. This renders the place a particular status. With politicians and notables buried in the larger urban cemeteries, these places add to people's general knowledge of a city's history. In addition, cemeteries that

still actively bury, means relatives actively use the cemetery and have a personal relationship with, and memories attached to, the place where their relatives and friends are buried. Therefore, cemeteries function 'as **spatial vessels of civic identity**, telling diverse histories of the city and

representing intangible notions of the character of a given place' (McClymont, 2016, p. 393).

The rituals surrounding death used to be defined by the religion of your community and rank in society. Now, society has become more equal but at the same time more diverse. Increasing **eco-consciousness and individualization** will also have their reflections on burial practices. Furthremore, the multicultural society we live in today has led to demands for burial sites tailored to specific societal groups. This signifies the **need for change** and opens the discussion on how cemeteries should adapt to and design for those societal changes, thereby completing the circle by adding a new contemporary layer to the cemetery.

3.4. CONTEMPORARY DISCOURSE ON URBAN PARKS: PARK ROLES

By conceiving green urban cemeteries as public parks, they need to be **positioned within the wider range of urban green spaces** present in the city. Since the industrial revolution, a manifold of parks has been developed in modern cities, ranging from city parks and commons to neighborhood green and allotment parks (Clark, 2006).

Public parks have long been recognized for the physical and aesthetical quality they give to urban neighborhoods. The traditional view that defines a good urban park is that they provide healthy environments and open space with ample recreational opportunities for urbanites (Walker, 2004; Zieleniec, 2010). Today public parks are demanded to accommodate a much wider range of objectives by local communities, politicians, and society more generally.

While the 'traditional' functions have not

1896   source: Kadaster, 2020
2021   source: Google Earth Pro, 2020
1891   source: Bien, 1891
2021   source: Google Earth Pro, 2020
1864   source: Kadaster, 2020
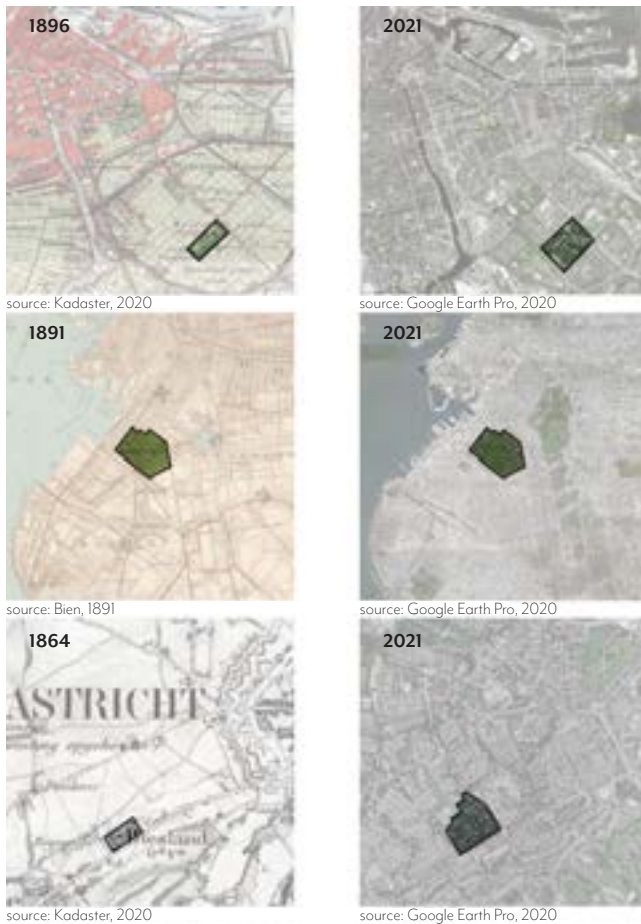2021   source: Google Earth Pro, 2020

Fig. 3.3: Three examples of cemeteries initially built in the periphery that have regained their location within the urban fabric. , top to bottom: De Nieuwe Ooster (Amsterdam), Green Wood Cemetery (Brooklyn, NY), Tongerseweg Cemetery (Maastricht); source: author
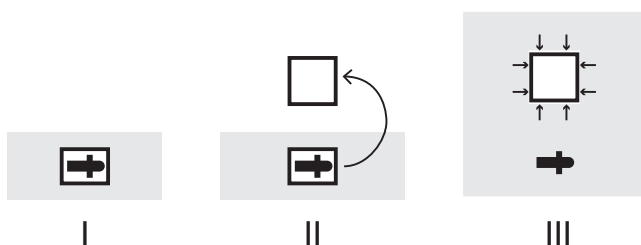
I   II   III

Fig. 3.4: Initially located around the church (I), 19th century hiegenic reforms initiated the development of cemeteries in the city's periphery (II). Nowadays cemeteries have regained their location within the urban fabric again (III); source: author

Fig 3.5: Cemeteries adapt to changes in burial culture and changing relationships with the dead. At De Nieuwe Ooster Cemtery this meant a big redesign happened from 2005 onwards; pictured above are the new urn graves in a mirroring pond; source: NRC, 2007

disappeared, the set of **functions projected onto parks has only increased and broadened** since then (Lindholst et al., 2016). Every objective in the city is projected onto the park, from climate resilience and local food systems to social inclusion and solving the biodiversity crisis. The city park has become a container that has to be so many things at once, that **no univocal profile remains**.

Following to this, three main directions of public parks in the 21st century have been identified in the literature study that have been found relevant for this study.

Firstly, urban parks become more **hybrid**; offering a layering of functions and becoming 'productive' in a variety of ways, beyond providing recreational space or hygiene (Berrizbeitia, 2018). Berrizbeitia (2018) also stresses the rise of more hybrid forms of landscape design where **boundaries diminish** between landscape and nature, private and public, wasted and conserved, fallow and productive, and the human and the non-human.

As a space primarily serving as burial infrastructure, the cemetery is an infrastructural landscape in itself burying the deceased and accommodating commemoration and memorialization by the living. Adding park roles (and ecological functionalities as the second leg of the thesis) turns this spaces per definition into a **hybrid landscape**, following Berrizbeitia (2018).

Secondly, there is the tendency of **'activation', programmability, and exploitation of urban parks** for citizens in search for spectacle and events every time of the day and year. This relates to the increasing hegemony of neo-liberal economic models imposed on the shape of the city (Ivers, 2018).

Thirdly, as a follow up of the points discussed above, public parks are demanded to accommodate a wider range of qualities by local communities, politicians and society more generally. Potential interesting objectives the green urban cemetery could host include **public health** (offering ways to engage in healthy activities), **outdoor education** (providing nature education and interpretation) **climate change mitigation** (regulating local climate), contributors to **social inclusion and cohesion** (offering diverse & appropriate programming and events), and contributing to **city attractiveness** and competitiveness (place-making) (Konijnendijk et al., 2013; Walker, 2004).

As a quiet and tranquil gem in the city, the green urban cemetery seems the **antipole** to this tendency to 'activate', program and exploit urban parks. This gives it a **distinct identity** in a series of other green spaces.

Therefore, green cemeteries hold unique niche potentials as quiet parks, where a layering of deliberately picked program overlaps with consideration and respect for the primary function of burial and memorial.

In this context where the city park has become a container that has to be so many things at once, **a clear profiling and positioning** of what functions it can and cannot host has to be made. Therefore, in the following paragraphs the existing function as a commemorative and active burial landscape are played off against park functions that have been found in literature, in reference cases and later in the design in Maastricht. That way, applicable and adequate park functions for urban cemeteries are defined since they simply cannot absorb all objectives given its prime function as burial infrastructure.

3.5. DEFINING APPLICABLE PARK ROLES FOR THE URBAN CEMETERY

Defining applicable park roles for the urban cemetery means **balancing potential park functions against the existing contribution cemeteries make to the city**. On the one hand, as a public space that should be open for all, the cemetery should welcome and meet the need of its various user-groups. On the other hand, since it is functionally different from a public park, it is important to carefully consider what types of activities a cemetery invites to, in order to maintain its role as a place for mourning and peace in the city (Evensen et al., 2017).

The research outcome, as found in literature or in an existing cemetery, are possible park roles that could be adequate and applicable for urban cemetery. These are presented in scheme 3.7 (opposite page).
The outcome is twofold:

The existing functions relating to burial and memorialisation are summarized. For an active cemetery these are the prerequisite conditions for defining adequate and applicable park functions that could coexist next to the existing contribution related to their prime function as active burial space.

The second set of adequate park functions have been found in literature, in reference cases and later in the design in Maastricht. In literature, these park functions are typically discussed as positive activities that complement the cemetery, make it more multi-functional and that positively contributes to the city and its residents (Anna & Ewa, 2020; Evensen et al., 2017; Grabalov, 2018; Swensen, 2018).

To help define adequate and applicable park

functions, the municipality of Copenhagen addresses **'five tensions'** (figure 3.6) when assesing long term development plans for their municipal cemeteries (Copenhagen Municipality, 2015):

- **Collective resource or private place:**
  The cemetery must be nice to visit for both the recreational users and for graveyard owners - although the two user groups have different behavioral patterns and needs.

- **Tribute to life or a place for grief:**
  The cemetery is a unique space because it is one of the few places in society where grief is legitimate and focussed on. The field of tension holds the dilemma that while the joy of life can ease the grief and make the cemetery experience less heavy, it is important that it never gets in the way of other people's mourning process.

- **Place for all or a place for certain activities:**
  In the cemetery everyone is welcome, but the deceased and their relatives must be respected. Therefore the recreation that takes place on cemeteries, be in alignment and calm.

- **Familiar place or a distant place:**
  For some cemeteries are familiar and safe, while for others feel distant and sometimes even scary. It is a field of tension that emphasizes that some citizens need help to get the cemetery demystified to enjoy the recreational opportunities.

- **Timeless place or a place in transformation:**
  This paradox is about developing cemeteries in harmony with societal change. Since we are dealing with a place with death at the center - there is also a special need for continuity and stability. Therefore, change must be introduced slow-paced and with great historical awareness.

These 'five tensions' are highly relevant when planning and designing future trajectories for green urban cemeteries and therefore added to this chapter. They summarize apparent contradictions, but they can also be perceived as a sliding scale. That way, it can help to decide on strategic goals and additional qualities that one wants to develop. When considering the direction in which to develop the qualities at a given cemetery, certain park functions may fall off or be added to the list.

3.6. CONCLUSION

This chapter explored potential park functions that could be accomodated at green urban cemeteries, and placed this in the context of increased urban interest and development. Their regained position within the city forms one of the arguments to reconsider their role in and, relationship with the city.

The set of (possible) adequate park functions presented in figure 3.7 is very generic and differs for every green urban cemetery and its individual context. As mentioned before, Grabalov (2018) argues for a better understanding of the potential for the accommodation of more functions in urban cemeteries for urban planners. Thereby, range and extent to which new funtions are accomodated is of course highly depending on the cemetery's context. The problems and questions at play in the surroundings determine in what way the cemetery could respond to its surroundings and what new functions could be adequate and applicable to add. The 'five tensions' presented in figure 3.6 can help to take position when planning and designing future trajectories for green urban cemeteries.

Collective Resourse	Private Place
Tribute to Life	Place for Grief
Place for All	Place for Certain Activities
Familiar Place	Distant Place
Timeless Place	Place in Transformation

Fig. 3.6: 'five tensions' that can help to take position when planning and designing future trajectories for green urban cemeteries; source: adapted from Copenhagen Municipality, 2015, p. 18-19

**Existing functions relating
to burial & memorialisation**

as found in literature

place of memorial
> *memorizing the deceased*
(Östberg & Rae, 2018)

sacred space
> *i.e. chapel, monument, also place reads as sacred*
(Östberg & Rae, 2018)

place of burial
> *burial infrastructure & logistics*
(Östberg & Rae, 2018)

intangible heritage
> *i.e. particular type of landscape athmosphere*
(Rugg, 2020)

tranquility
> *protected from activities deemed disrespectful*
(Rugg, 2020)

undistracted environment
> *focus for the pilgrimage of friends and family*
(Rugg, 2020)

place for contemplation & reflection
> *to forget & remember, attend people & past times*
(Treib, 2005)

**Possible additional
park functions**

as found in literature or in an existing cemetery

recreation

strolling
(Skår et al., 2018)

dog walking
(Skår et al., 2018)

jogging
(Grabalov, 2018)

cylcing
(Evensen et al., 2017)

crossing / throughfare
(Evensen et al., 2017)

playing
(Skår et al., 2018)

resting
(Skår et al., 2018)

picknicking
(Harnik & Merolli, 2010)

public programming
(Harnik & Merolli, 2010)

bird watching
(Harnik & Merolli, 2010)

community

socializing
(Skår et al., 2018)

event space
Green-Wood Cemetery, Brooklyn; Arnos Vale Cemetery, Bristol

act of commemorating toghether as local community
(Woodthorpe, 2011)

outdoor education

art classes
(Harnik & Merolli, 2010)

exploring cultural heritage
(Swensen, 2018)

learn about nature and natural processes
(Clayden et al., 2018; Kowarik et al., 2016)

place for art exhibit
(Melaten cemetery, Cologne)

guided tours
(Melaten cemetery, Cologne)

LEGEND
function
> *example*
found in literature (source) OR at cemetery

Fig. 3.7: Summarizing the existing contribution to the urban environment and (possible) adequate and applicable park functions for the urban cemetery (encompassed in literature study or known reference case); source: author

INTERMEZZO

THE 21ST-CENTURY LANDSCAPE OF BURIAL AND MEMORIALIZATION

More and more people are making more deliberate choices concerning death: about places, practices, and settings in which to say goodbye, about the form their memorial takes, and about the part landscape can play in the process. More people are now cremated than buried in the Netherlands, and the demand for urn interment and ash scattering is still increasing. Meanwhile, the LOB (National Organization for Cemeteries) senses an overcapacity of conventional coffin graves available amongst its members and increasing demand for urn burials. Alternative forms, such as green burials, are growing exponentially as well (BRANA, 2020; LVC, 2020; Valentijn & Verhoeven, 2018).

Thereby, as a product of secularization and individualization, traditional religious rituals increasingly have fallen out of favor, resulting in a 'quest for new burial rituals' (Wouters, 2002, p. 1). In combination with the rise in new burial methods, new rites of passage and sacrosanct acts have emerged. Cook & Walter (2005) make a different distinction and argue that the most significant contrast is not between religious and secular but between the traditional and contemporary funeral rituals. The latter is characterized by 'reduced authority of the celebrant, greater personalization and choice, euphemistic reference to death, less poetic language, and diminished ritual movement' (p. 365). According to E. Venbrux, Peelen, & Altena (2009, as cited in H. J. M. Venbrux, Heessels, & Bolt, 2008) the experimentation and innovation in death rites are fostered and facilitated by an increasingly consumer-oriented undertaking business leading to more personalized burial rituals.

Thus, since burial practices and rituals are in transition, it should be considered what demands and needs this imposes on the design of cemeteries. This requires a new design language that welcomes these new methods and rituals. It is very relevant since with their physical arrangements and design decisions, combined with personal and communal memories, these landscapes move us and shape how we remember and memorialize.

Changing burial culture manifested through increasingly diverse funeral processions:
Fig. 3.8: by motor bike; source: CM Walkers, 2021
Fig. 3.9: by bicyle; source: Ode uitvaartbegeleiding, 2021

Fig 3.10: Herinnering Verlicht is an event at the Nieuwe Ooster Cemetery (Amsterdam) that centers around memorializing together with the community; source: Hehenkamp, 2019
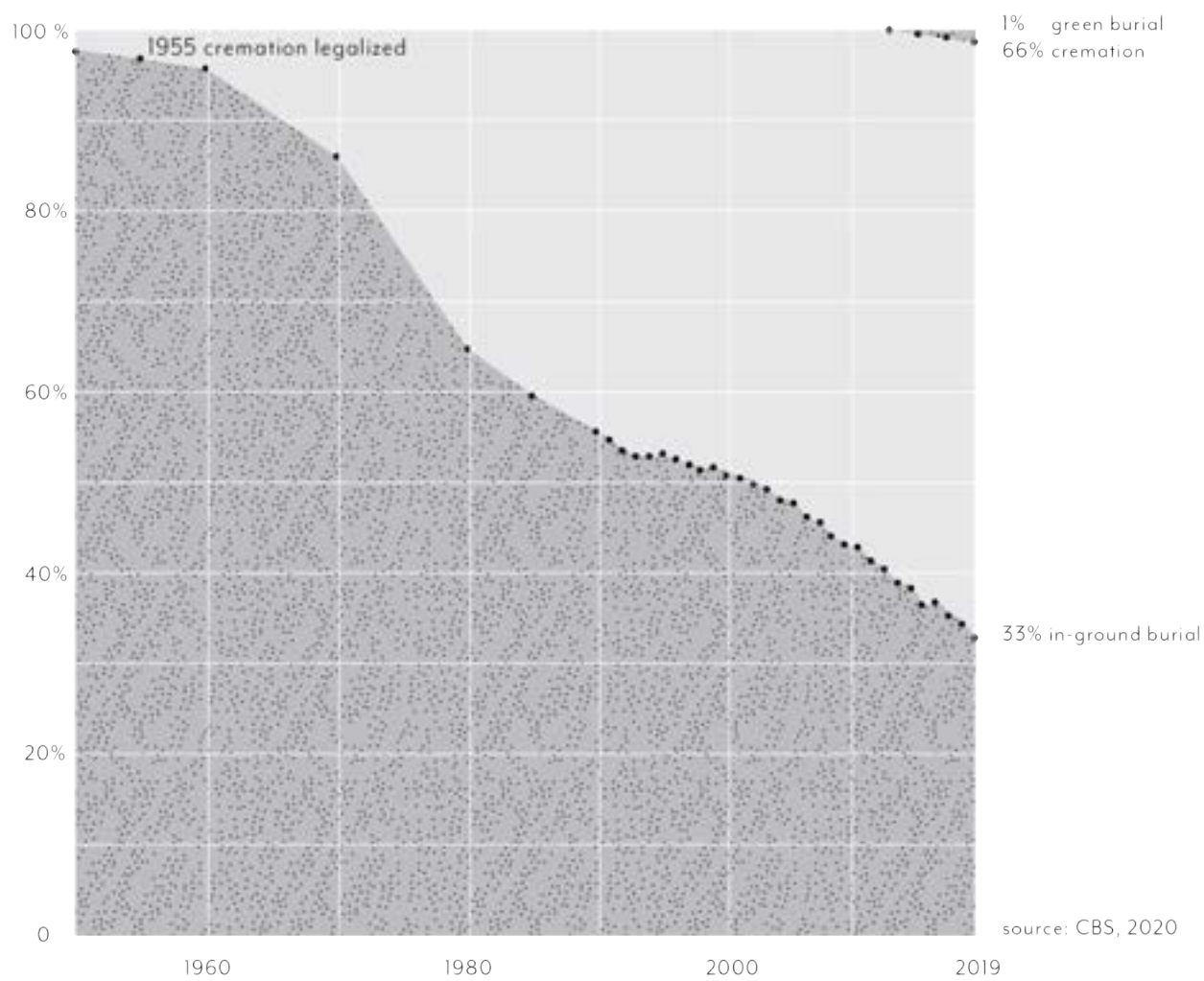
Fig. 3.11: Burial trends in the Netherlands since 1950; source: author

4. GREEN URBAN CEMETERIES' ROLE
IN THE GREEN INFRASTRUCTURE

Cemeteries are ubiquitous components of the urban green infrastructure that may stretch over large areas in cities (Kowarik et al., 2016). Nordh & Swensen (2018) argue cemeteries are the green urban spaces with both cultural and natural qualities and argue for integration into the green infrastructure planning system.

This chapter explores the potential of urban cemeteries as critical green infrastructure. It provides an overview of essential theories and debates on urban green infrastructure and problems and potentials for the integration of cemeteries into the urban green infrastructure. It is built up starting at the site scale, focusing on the existing qualities and potentials of green urban cemeteries. From there, it is assessed what the cemetery means in its bigger context of the city's open space system.

4.1. WHY CEMETERIES & GREEN INFRA?

Given their specific characteristics, almost all urban cemeteries have the potential to improve their ecological performance and integration in the larger urban green infrastructure. As discussed in the introduction, currently their specific role and potential often remains unaddressed. There is a set of urgent issues relating to the urban biodiversity crisis and changes in urban (micro) climate that green urban cemeteries could well respond to. Therefore this chapter challenges this status quo and aims to stretch the idea of green urban cemeteries and ways they could be better integrated and contribute to the urban green infrastructure. It does so by studying existing and potential contributions these places can make to the city's green infrastructure. The findings are divided in site scale and city scale and structured using the concept of ecosystem services. See figure 4.1 for an overview of the provided ecosystem services, expanded upon in the following paragraphs.

4.2. SITE SCALE

4.2.1. SUPPORTING ECOSYSTEM SERVICES: CEMETERY AS HABITAT

There is growing recognition of the urban landscape and its role in conserving and fostering biodiversity. Habitat is fragmented and the functioning of urban land-use types as habitats for species is of growing importance for biodiversity conservation (McKinney, 2002). As mentioned before, there is a paradigm shift towards a wider, more holistic, focus on all urban ecosystems, **including native and non-native species and their contributions to species**
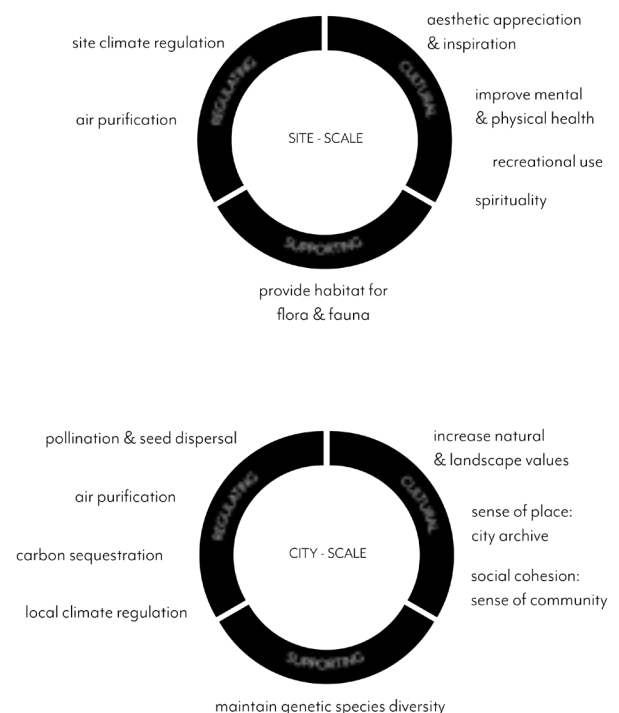

Fig. 4.1: Summary of provided ecosystem services by green urban cemeteries on the site scale and city-scale; source: author

conservation (Grunewald et al., 2018). This is relevant since many cemeteries contain non-native, decorative, plant species (Yilmaz et al., 2018).

Urban parks and green cemeteries, as one specific type of urban green space, constitute particularly important biodiversity hotspots in the cityscape (Nielsen, van den Bosch, Maruthaveeran, & Konijnendijk, 2014). Their large size and habitat diversity have been found to positively contribute to urban biodiversity (Prugh et al., 2008). Given most cemeteries occupy large chunks of land in the city underlines their role as habitat.

While parks and green cemeteries share common characteristics, differences exist in terms of lower recreational pressure, specific habitat features such as sepulchral architecture and sometimes less maintenance (Kowarik et al., 2016). These factors are known to positively influence species richness. Especially the lower visitor pressure makes green urban cemeteries **quiet and relatively undisturbed spaces** and thereby excellent habitats that support urban biodiversity (Kowarik et al., 2016; Politi Bertoncini et al., 2012).

The distinct quality as quiet and stable refuge makes it stand apart within the array of urban habitats.

For example, in their study on the Weißensee Jewish Cemetery in Berlin, Kowarik et al. (2016) found that old tree-covered cemeteries provide a great habitat for native species that are generally negatively affected by habitat loss and forest fragmentation in urban environments. **Birds** in Northern Europe are very sensitive to landscape composition and configuration, and many species can thrive well in cemeteries full of old trees (Ferenc et al., 2014). The same is true for **arthropods, such as insects and spiders**, (Magura et al., 2010) and **bats** (Gehrt & Chelsvig, 2003).

For perennial plants, Kowarik et al., (2016) results show that **parts of cemeteries containing forest-floor understory** served can be excellent habitat islands for woodland species. Prerequisite are standing grave markers to leave space on the ground to have space to grow a thick and lush understory. Another emerging insight on cemetery groundcover lies within urban grasslands, which will be stressed under the subchapter of 'maintenance'.

Furthermore, cemeteries are full of **sepulchral structures (e.g. gravestones, tombs)** that, when time passes and the elements settle in, start functioning as habitat analogues for **species whose habitats are natural rocks, such as lichens and bryophytes** (Lundholm & Richardson, 2010). Often, some of these species are (critically) endangered. Furthermore, all sorts of wall vegetation, such as endangered ferns, could find

Fig 4.2: At Mount Auburn Cemetery, Camebridge, USA, the Maple Avenue was designed to provide 200 new burial areas in crypts along a curving path through groves of native trees and shrubs to improve habitat diversity. Meanwhile, the thicket also functions as site edge, screening off an adjacent road; source: Reed Hilderbrand, 2021

Fig 4.3: Barn owl using the cemetery as habitat to forage; source: NaturesLens, 2014

Fig 4.4: Diverse forest-floor understory designed with seasonal changes at Nordre kirkegård, Herning, Denmark. A semi-open canopy brings in a lot of light on the graves and enables a rich understory to develop and thereby defines the whole atmosphere of the visitor. Prerequisite are standing grave markers to leave space on the ground to have space to grow a thick and lush understory; source: Herning Kirkegårde, 2021

habitat in the gaps of walls and tombstones.

Derived from ecological theory on habitat heterogeneity, the importance of temporal and spatial **habitat heterogeneity** is stressed for the biodiversity richness of old urban cemeteries (Nielsen, van den Bosch, Maruthaveeran, & van den Bosch, 2014). Given most historic green urban cemeteries have grown organically over time, there is a difference in age, maturity, and usage intensity and sometimes even parts of neglect. This already makes for habitat heterogeneity and from a urban biodiversity perspective should be conserved, or enhanced, by allowing natural development in some parts of the cemetery, while keeping other parts more open, with different degrees of canopy closure (Kowarik et al., 2016).

4.2.2.   REGULATING ECOSYSTEM SERVICES

Green urban cemeteries are often mature landscapes that frequently pre-date municipal parks. That gives them a major capacity to deliver regulatory ecosystem

Fig 4.5: Trees that have had the space and time to grow into mature trees. Pictured above, at Weissensee Cemetery (DE), a dense canopy and beautifully dappled light; source: P. Adenis, 2016
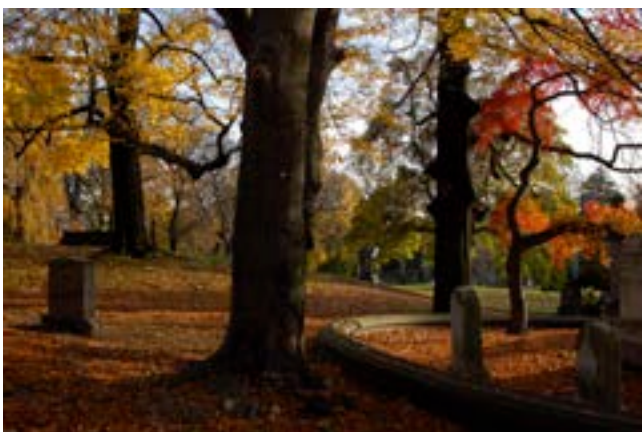

Fig 4.6: Variation and seasonal dynamics at Green Wood creates strong aesthetical experiences; source: Vige, 2009

services. Trees are the most prominent elements of most cemeteries' vegetation because of their size, shape, and seasonality. The large collection of trees in urban cemeteries, makes one could approach them as true arboreta.

At cemeteries, trees have the **space and time to grow into large mature trees**, giving them a big advantage to deliver regulatory ESs. This is a big advantage over most other urban trees in pavement, e.g. in street and plazas, that cope with little rooting space, poor soil and drainage, soil compaction from traffic, and disturbance from digging operations. Landscape architect Springer already knew this and in his cemetery designs actively separated trees in tree soil from areas active burial, characterized by poor sandy soil for drainage and aeration and that would be disturbed by grave digging (Wille et al., 2004). Therefore, when fully grown in all their grandeur, cemetery trees can maximally provide social, aesthetic, climatic and ecological benefits. Social, aesthetic, and climatic benefits will be discussed below, where ecological benefits have been discussed as part of the subchapter 'Cemetery as Habitat'.

Urban trees can play a major role in improving environmental conditions. The climatic benefits have been found to not only relate to areas of woodland, but smaller groups, lanes and solitary trees can equally improve environmental conditions in urban areas (Tyrväinen et al., 2005).

Firstly, cemeteries rich in tall mature trees both **provide shade and reduce the local temperature**. The latter fact is because the vegetation coverts solar energy into latent heat energy through evaporation of water (Van Hove et al., 2011). Canopy rich cemeteries thus have lower air temperatures than their surroundings, which can have significant impacts on human health. After intercepting solar radiation, reducing air temperature is the second most effective way to reduce heat load on people and temper the consequences of the urban heat island (Brown et al., 2015).

During heat waves, these cooler cemeteries may provide citizens with shade and relief from high air temperatures, thereby increasing thermal comfort. Thus, in case the cemetery is the only park around in a neighborhood, opening these spaces to be used as parks allows them to act as cool zones where one can make a stroll or sit down in the shadow. Thereby they help the city protecting its citizens, particularly the elderly and those with a medical condition, from excessive heat.

Cemeteries also provide climatic benefits on the larger urban scale, but these are discussed later this chapter.

Secondly, trees and vegetation **reduce air pollution** by removing pollutants. Trees capture air

pollutants most efficiently when they are planted close to the source of emissions (Tyrväinen et al., 2005). In most cemeteries, this means the edge can help reduce air pollution by removing pollutants from, for example, adjacent roads.

4.2.3. CULTURAL ECOSYSTEM SERVICES: CEMETERY AS MEMORIAL SITE AND COLLECTIVE RESOURCE

As discussed in chapter one, most cultural ecosystem services lie in their (potential) public park functions as discussed in chapter three. These are related to providing recreational opportunities, improving mental and physical health, and providing aesthetics and inspiration (Axelsson-Lindgren, 1995; Tyrväinen et al., 2005, p. 81; Tzoulas et al., 2007; Van den Berg et al., 2014).

What was missing, but is an essential cultural ecosystem service, is their capacity to **provide space for spirituality**.

4.2.4. POTENTIALS

In literature, differentiated management, developing urban grasslands and naturalistic meadows and new forms of burial have been identified as potentials that can enhance the habitat function of green urban cemeteries. Hereby, tension lies in how to increase their ecological value, while harmonizing other aims, including allowing ongoing uses (visits, burials), conserving cultural heritage.

URBAN GRASSLANDS
Clayden et al. (2018) argue that by **reducing the use of clipped lawn grass and introducing rougher meadows**, cemeteries can contribute to creating habitats and spaces that are more complex, especially for insects and their predators, but that demand less management and fewer pesticides.

The approach of Dutch local authorities to management traditionally has been underpinned by the drive to maintain a more formal and manicured aesthetic of the cemetery by means of neatly clipped lawns. Intensive maintenance, such as frequent mowing and fertilization, is required to maintain the clipped lawn and are a significant contributor of greenhouse gasses (Milesi et al., 2005). Furthermore the ubiquity of clipped lawns is a principal barrier to biodiversity provision, since they are poor refuges for plant and animal communities due to their intensive management (Aronson et al., 2017).

There is a growing realization that alternative management regimes can be both cost effective and more

There is a geographical limitation on the potential of green cemeteries as critical green infrastructure. In Europe, traditionally the Latin and Nordic burial tradition are the dominant ideas and each other's explicit opposites (Wille et al., 2004). Latin cemeteries in Southern-Europe are predominantly hardscape landscapes paved by individual tombstones and sparse greenery, see figure 4.6. In the Nordic burial tradition, the overall cemetery landscape reigns over the individual grave and the dead are buried in a green commemoration landscape, see figure 4.7.

Dutch cemeteries generally align with the Nordic tradition, being uniform green park-like landscapes, where the individual expression is subordinate to the larger cemetery landscape.

Thus, on-plan, many green urban cemeteries in the North-West of Europe can be seen as green islands in their neighborhood. Therefore, green urban cemeteries can be regarded as increasingly valuable entities for biodiversity conservation given their ubiquity within urban fabrics world-wide.

Variation in cemetery design in Latin versus Nordic burial tradition;
Fig 4.7: Our Lady of Almudena Cemetery, Madrid (ES); source: Diaz, 2021
Fig 4.8: Assistens Cemetery, Copenhagen (DK); source: Qiujieblog, 2016

Green Wood Cemetery (New York) shows us successful examples of developing perennial meadows and rough urban grasslands in a cemetery. This was pioneered in collaboration with Cornell horticulturalists and designer Larry Weaner. They introduced new seed mixes to improve the traditional mix, adjusted the frequency and height of mowing, and found effective ways to manage soil disruption (Charap et al., 2020).

Lessons have been learned in the process, especially relating to public acceptance. While the public voiced strong enthusiasm for the transformation, aesthetic concerns were voiced by stakeholders and lot owners that saw the longer grass as a symbol of neglect. They learned to gradually implement such changes and balance mowing frequency with growth rate. In reverse, the initiators also see it as opportunity and educational project to shape the public's view of acceptable lawn management, thereby quietly planning to raise awareness (Charap et al., 2020).

Fig 4.9: In the fall, the windswept gold-colored grasslands give the the cemetery a cinematic feel; source: T. Stoelker, 2021

Fig 4.10: Mausolea are nestled in among the wildflower meadow by Larry Weaner, an attractive solution that increases biodiversity and is an attractive maintenance solution for steep terrain; source: Art Presson, 2020

sustainable (Smetana & Crittenden, 2014). Chollet et al. (2018) show that a reduction of mowing frequency induces a dramatic increase in the plant community diversity and act as resource for animals such as pollinators and insect predators.

The decrease of in-ground burials, decommissioning of grave fields, and changing societal perception on natural aesthetics provide an opportunity to challenge the clipped lawn cemetery aesthetic by returning to a more complex and diverse vegetated landscape. In doing so, the cemetery could once again make a more substantive contribution to delivering a range regulatory ESs that help to mitigate the effects of urban heat islands, flooding, poor air quality and loss of biodiversity (Cameron et al., 2012; Clayden et al., 2018).

Developing urban grasslands within cemeteries gets the public engaged in the importance of pollinator habitat in the city and, on a symbolic level, will attract many forms of life to a place that memorializes the deceased.

DIFFERENTIATED MANAGEMENT

Kowarik et al. (2016) argues for the use of differentiated management that includes cemetery sections that are maintained regularly and others where little maintenance occurs, and nature is allowed to develop., see figure 4.11. Thereby a **heterogeneity of habitats** can evolve in the cemetery, thereby supporting urban biodiversity. However, this would also require a careful consideration **balancing culture and nature** (or ideas on wilderness, naturalistic aesthetics, and neatness).

Kowarik's et al. (2016) study on the beforementioned on the Weißensee Jewish Cemetery in Berlin highlights the habitat value of old urban cemeteries for native plants and animals, and shows that less frequently managed parts of the cemetery where a forest-floor understory is allowed to develop, can be excellent habitat islands for woodland species. Since many old urban cemeteries are also important heritage sites, conflicts arise between biodiversity conservation and monument preservation. Their study argues that cultural and biological values can co-exist in old cemeteries but requires reconciling biodiversity and heritage conservation for it to work.

So, how to give shape to this? Ecological quality tends to look messy, and this poses problems when imagining and constructing new landscapes that enhance ecological quality. Recent studies point out the acceptance of 'wild' elements in urban green spaces by residents is often higher than expected (Weber et al., 2014), especially when **minor cultural interventions** make it look cared for and indicate natural succession as a wanted process (Bergman, 2020;

Hofmann et al., 2012). Mowing a narrow strip along the edge, maintaining verges of allées or paths in wilder parts of the cemetery enhances the acceptance of related natural processes by visitors (Bergman, 2020; Kowarik et al., 2016). In other words, 'it requires designing orderly frames for messy ecosystems' (Nassauer, 1995). See for example the work of Gilles Clement, Michel Desivigne or Georges Descombes wherein some parts of the design are fixed, and some are able to evolve and become 'messy'. This also creates new possibilities for landscape design, as it forces landscape designers to desert conceptions of gardens and landscapes as merely governed by human maintenance and needs (Lokman & Herrington, 2016).

From the perspective of monument preservation, it is important that the colonization of built structures by plants and animals not be negatively perceived as the destruction of important artifacts (Kowarik et al., 2016). As mentioned before, sepulchral structures may pose great potential for all sorts of lichen and wall vegetation, see figure 4.11. Thus, allowing the overgrowth of built structures such as walls or graves in some parts of the cemetery may appropriate, while constantly being in dialogue with heritage experts to prevent deterioration of graves of high cultural importance and keeping out excessive threats such as tree establishment which roots could tear apart the monument.

NEW FORMS OF BURIAL

The shift from in-ground burial to cremation means decreasing pressure on space, since ash burial takes up less space than conventional coffin burials. Space saving burial options leaves more space available that could be designed in a more nature inclusive fashion. E.g. lush urn gardens,compacter burial clusters and memorial groves instead of conventional burial fields densely populated by individual headstones. See Fig. 4.12 and 4.13 for an example. Furthermore, natural burial also lends itself for more nature inclusive designs.

4.3. SCALING UP: CEMETERIES AS CRITICAL PART OF THE GREEN INFRASTRUCTURE

Tzoulas et al. (2007, p. 169) stress that green infrastructure are 'all natural, semi-natural and artificial networks of multifunctional ecological systems within, around and between urban areas, at all spatial scales'. When studying green urban cemeteries in relation to green infrastructure, this implies one should conceive the cemetery as **part of a wider green open space system**, implying a multi-scalar approach. Thus, in this subchapter we will zoom out, transcending the site scale.

Fig 4.11: Example of the colonization of built structures by plants of conservation concern: the ferns Cystopteris fragilis, Asplenium trichomanes at Weissensee Cemetery in Berlin, Germany; source: Kowarik et al., 2016

Fig 4.12: Less frequently managed parts of the cemetery where a forest-floor understory can develop, can be excellent habitat islands for woodland species, while at the same time still being appreciated by users; here a wedding at Arnos Vale cemetery in Bristol, UK.; source: Plotbox, 2019

Fig 4.13: Example of compact urn graves that leave plenty of room for landscaping: loosely placed urn interns in a birch grove at Berestein cemetery, Hilversum, The Netherlands; source: Holm, 2015

4.3.1. POSITIONALITY IN THE CITY & BETWEEN HUMAN & NON-HUMAN

Green infrastructure relates to the complete set of green spaces and the connectivity between them. Furthermore, key literature suggests green infrastructure should aim for multi-functionality, which implies they should perform well ecologically, meanwhile being enjoyable for human visitors as well (J Ahern, 2002; Jack Ahern, 2013; Ryder, 1995; Walmsley, 2006). Weilacher (2015) points out it is risky to use the predicate green in spite of the long-established understanding that nature in the city is not only green but also grey; a "color-neutral" understanding.

Key point as a take away is that this implies green infrastructure is to be aimed and designed for all its inhabitants; **humans** (e.g. for recreation) and **non-humans** (e.g. habitat provision), which is the position taken in this thesis.

4.3.2. SUPPORTING ECOSYSTEM SERVICES

Parks and alongside green cemeteries are one of the most important components of the urban green infrastructure (Bertram & Rehdanz, 2015; Bolund & Hunhammar, 1999; Chiesusra, 2004; Shanahan et al., 2015). The biggest supporting ecosystem service of cemeteries is in the **habitat they provide** and how they can act as **connector between other green spaces** at different scales. The provision of habitat has been discussed before, and here we focus on the integration of the cemetery in the city-wide green infrastructure.

Creating habitat and designing nature-inclusive is a broad issue in terms of scale and complexity. Here, most important is to see the interventions as holistic issues that make sense on both the site and relate to the wider territory. E.g. simply placing nesting boxes for bats only makes sense if the bat can forage, finds safety, and has routes to migrate outwards.

On an abstract level, the city's green infrastructure can be seen as a system of **points (small habitats), surfaces (large habitats) and lines (migration routes)** (Vink et al., 2017). Points are specific micro habitats where individuals or sub-populations live, such as an amphibian pool or decaying tree. A large habitat patch forms a surface on the ecological city map, like a city park or cemetery. The lines are the ecological connections between habitats and between the city and countryside.

When designing habitat and aiming for contributing to the city's green infrastructure, it is essential to first make an inventory of the existing situation and understand the way local species and (a)biotic factors relate to each other. Ecosystems are so complex that it is better to relate to existing conditions and built from there (Vink et al., 2017). That way the design is in conjunction with the overall system, fitting into the existing green infrastructure.

Thus, a cemetery with high ecological connectivity (the lines) is one in which organisms can move freely between suitable habitats (Bennett 2003, Crooks and Sanjayan 2006; Mitchell, Bennett, and Gonzalez 2013). This has all sorts of benefits, amongst others for pollination, seed dispersal, and maintaining genetic diversity. When working on connections, different species respond differently to the same physical environment, therefore requiring a variety of specific type connections (Rudnick et al. 2012; Bennett 2003). That being said, spatially disconnected green spaces can be functionally connected, e.g. while bats need trees or buildings to navigate, birds can fly out independently.

4.3.3. REGULATING ECOSYSTEM SERVICES

As stated before, green urban cemeteries with a significant canopy (which is often the case) have a major role in **regulating local climate and mediate environmental extremes** such as temperature peaks. The cooling effects of urban parks, and cemeteries, is referred to as 'Park Cool Island' (Wang et al., 2018). The cooler air from parks often moves out into adjacent neighborhoods, providing cooling winds that greatly reduce heat stress during hot days (Nowak & Heisler, 2010).

Park size and tree coverage matters in providing climatic benefits. The cooling of surrounding areas has been found to increase with park size (Nowak & Heisler, 2010). Large parks, and thus large green cemeteries, are cooler than the smaller ones - Chang et al. (2007) found that parks over three hectares are usually cooler than their surrounding urban area, while temperature difference was more variable for parks smaller than three hectares.

Furthermore, green urban cemeteries are able to purify air and sequester carbon, be it these are generic attributes that green spaces share and air purification has been shown to mostly have local impacts, as mentioned before in subchapter 4.2.2.

4.3.4. CULTURAL ECOSYSTEM SERVICES

As discussed in chapter one, most cultural ecosystem services lie in their (potential) public park functions as discussed in chapter three. To summarize, first, these are related to increasing the natural and landscape values of towns, thereby increasing the quality of resident's lives (Millward & Sabir, 2011). Secondly, cemeteries are places where people with shared experiences and feelings can encounter each other, thereby providing a sense of community. Thirdly, the cemetery functions as a city archive and thereby gives a sense of belonging, rootedness, and sense of place in a particular way that other parks do not cater for (McClymont, 2016).

4.4. CONCLUSION

Many green urban cemeteries are blind spots in city's green infrastructure planning, whereby their specific role and potential remain unaddressed. As stable, quiet and relatively undisturbed green space they provide a range of supporting, regulating and cultural eocsytem services, as presented in figure 4.1. This places us in a position to come up with a set of potentials as well.

The biggest potentials that were found are two-fold. First, potentials to improve on-site ecological performance through new management practices and the introduction and design of more sustainable burial options. Second, on the city-wide scale, potentials of connecting to the wider green infrastructure, aiming to unlock and integrate its ecological qualities of the cemetery into the larger green infrastructure.

Thereby, green urban cemeteries can be regarded as increasingly valuable entities in biodiversity conservation given their ubiquity within urban fabrics world-wide and are simply inevitable when planning and designing in the age of a climate and biodiversity crisis.

Thus, the tension lies in how to increase their green infrastructure value, while harmonizing different aims, including allowing ongoing uses (visits, burials), conserving cultural heritage and providing habitat. Concrete approaches, design strategies and tools on how to get this done are presented in chapter five and apendix 2.

5. REFERENCE STUDY: PUBLIC JOINT USAGE OF GREEN URBAN CEMETERIES IN PRACTICE

Skogskyrkogården
● Stockholm, Sweden

● **Melaten Cemetery**
Cologne, Germany

Green Wood Cemetery ●
New York, United States
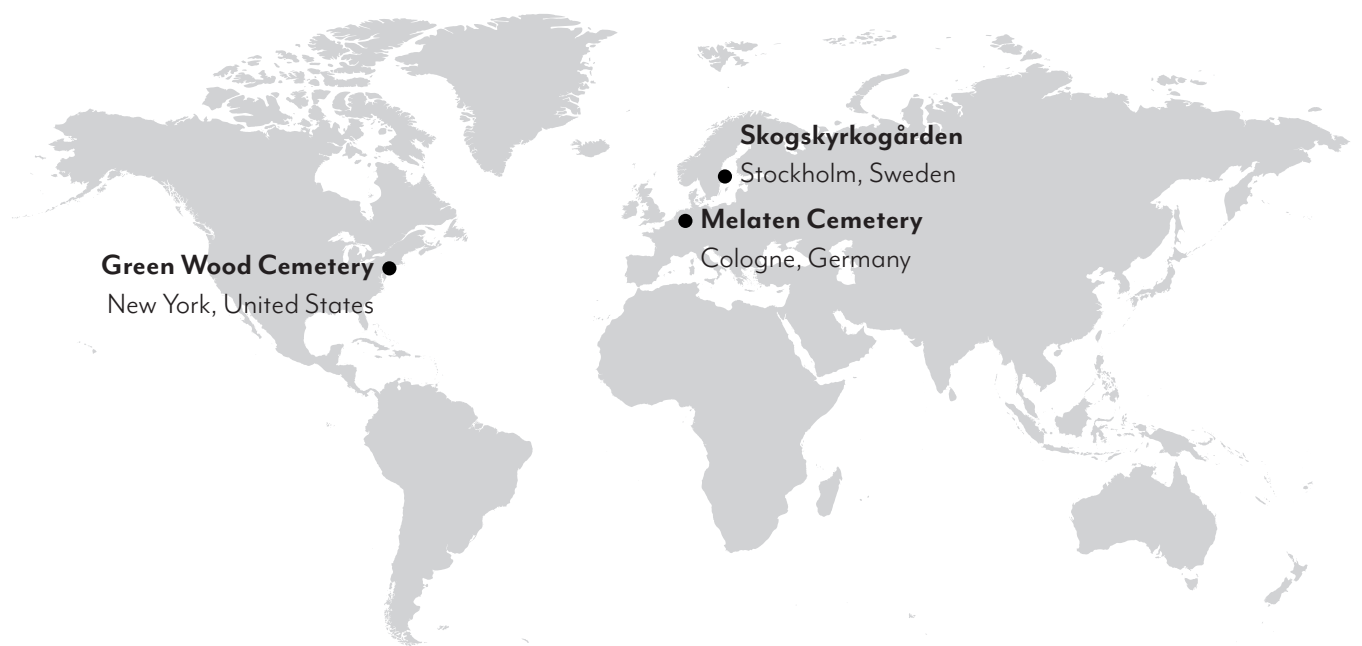
5.1.   INTRODUCTION

As mentioned before, even though landscape architects and urban planners are succesfully working on the (re)design of green urban cemeteries, there is limited research on these design approaches, let alone comprehensive volumes bundling together relevant knowledge for the planning and design industry. Designers often search for precedents or best-practice examples. However, these are specific to their location and design brief and it can be complex to apply them to a new assignment which has its own specificities. Here, the potential of generating design guidelines arises, since they provide principles or strategies rather than one specific solution (Prominski 2017).

Therefore, the reference study on exemplary multifunctional green urban cemeteries is aimed to generate a set of design guidelines reflecting what lay-out and design principles makes them succesfully host additional roles for public joint usage and be integrated into the wider urban open space system. It zooms in on what exactly it is in a cemetery design that makes them suitable for public joint usage and makes them contribute to the city's green infrastructure. Furthermore, it is studied how these parks function in their urban context.

This chapter summarizes the results of the reference study on three existing urban cemeteries:

- Skogskyrkogården in Stockholm, Sweden
- Green Wood Cemetery in Brooklyn (NY), USA
- Melaten Cemetery in Cologne, Germany

Short descriptions and conclusions of the reference study are presented in this chapter. The extensive reference study can be found in appendix 1.
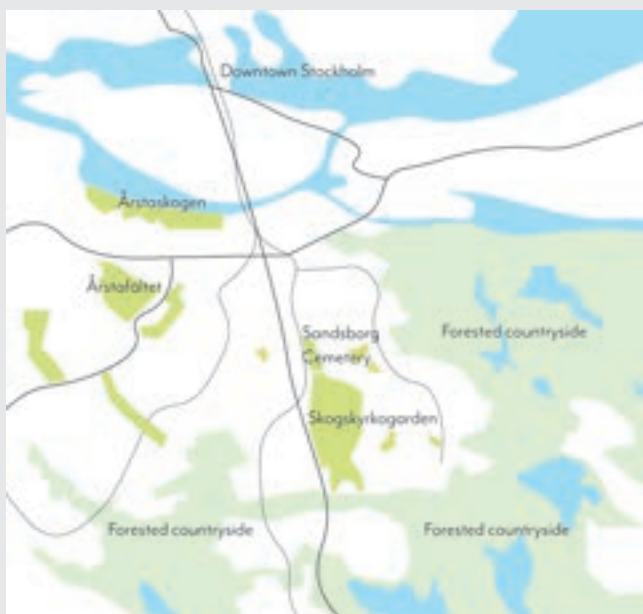
5.2.   ANALYTICAL FRAMEWORK

The results are summarized and evaluated through the analytical framework that consists of:

- **Architectural composition**: analysis of the lay-out, including the design of burial fields, and features that structure the site, including the edge condition.
- **The use of planting**: the way planting is used to structure and create certain athmospheres in the design. Furthermore, the design's ecological performance and relevance to the green infrastructure.
- **Circulation**: the way circulation is organised on-site and how it is integrated in the wider urban context
- **Urban life and multifunctional use**: the extent of public joint usage and the extent to which the cemetery is part of local urban life

5.3. SKOGSKYRKOGÅRDEN

Location	**Stockholm (SE)**
Owner	**City of Stockholm -**
	public ownership
Year	**1917**
Designers	**Gunnar Asplund and**
	Sigurd Lewerentz
Size	**102 hectares**
Graves	**385.645**
Types	**In-ground burial, urn field,**
	ash scattering
Hours	**main entrance 24/7**
	other entrances 11 AM - 4 PM

Users		
	👤	mourning relatives
	🚶	pedestrians / stollers
	🚲	cyclists
		playing kids
	🛷	sledgers
	🐕	dogwalkers
	🏃	joggers
		roller skaters
	🧍	visitors / tourists

59°16'11.3"N 18°06'15.5"E

Skogskyrkogården is an exceptional example of how architecture and landscape can be combined in a cemetery. Its design has greatly influenced the design of cemeteries around the world (Treib 2005). The German woodland cemetery movement (e.g. Ohlsdorf, Hamburg and Waldfriedhof, Munich) served as inspiration for the cemtery's design, as did Casper David Friedrich's paintings.

Between 1917 and 1920, this cemetery was built on a site covered with pine trees, where the existing forest was delicately tailored to its new function by blending plant and architectural components and altering and exaggerating existing topography. Thereby they skillfully manipulate views and scenery that provides in variation while moving around the cemetery.

The Skogskyrkogården is a strong example that shows there can be a multiplicity of landscapes within one site. This cemetery holds multiple identities and atmosphere in one space that is made possible by successional degrees of privateness. Transitions from the public areas to the more (semi) private areas create a continuity in the cemetery that is pleasant for visitors, mourners and local residents.

The park's entrance is structured along a modestly designed, ascending boulevard, with the sound of water from a nymphaeum. This brings about an interesting arrival without the usual clutter of gravestones directly 'in your face'. Instead, one arrives at a clean, serene scene, the purpose of which is contemplative and very powerful (Clayden & Woudstra, 2003).

The dense pine forest that was largerly retained in the design makes the site, surrounded by suburban neighbourhoods, relevant as an 'urban forest' habitat within Stockholm's green infrastructure. It consists of large full-grown trees and, in areas where no burial occurs, a rich understory, resulting in a biodiverse environment that provides a habitat for local flora and fauna.

Fig. 5.1: overview plan; source: author

200 meter

Fig. 5.2: Central clearing located after the main entrance, with the urn gardens on the left, meditation grove on the hill on the right; source: Landezine, 2010

Fig. 5.3: The open character of the woodland is maintained by a regime of gravemark expression; source: Landezine, 2010

5.4. GREEN WOOD CEMETERY

Location	**Brooklyn, New York (US)**
Owner	**Green Wood Historic Fund - charitable organization**
Year	**1938**
Designers	**Almerin Hotchkiss**
	David Bates Douglass
	Quennell Rothschild & Partners
Size	**193 ha**
Graves	**570.000**
Types	**In-ground Burial, individual, and communal Mausoleum**
Hours	**daily 7 am - 7 pm**

Users
- mourning relatives
- pedestrians / stollers
- outdoor hangouts / picnics
- playing kids
- sledgers
- birders
- dogwalkers
- event visitors
- tourists

40°39'25.9"N 73°59'35.2"W

Located in the middle of the dense and highly urban Brooklyn (New York), Green Wood Cemetery is a 193 hectares burial park of hills, valleys, glacials ponds, winding paths. Established in 1838 as a garden cemetery, it was 'Brooklyn's first public park, before Olmsted created Prospect Park' (White, Willensky, and Leadon 2000).

Parks are rare in Brooklyn, making the place stand out and be used as a true public park by locals. Despite its limited hours of operation, the cemetery plays an essential role for the surrounding communities. Since it's the only major green space in the area, many people come here to walk their dogs, meet with others, picknick, or escape the heat of the sun as the New York summers can be hot. The site's park-like design with winding walking paths and four seasons of beauty from century-and-a-half-old trees make it a peaceful oasis for mourners, visitors and the local communities alike.

Spread out over the site, there are features such as lawns, ponds and flower gardens that explicitly are not used for burial and have been appropriated by locals for informal activities. Furthermore, these areas allow the cemtery to host events such as an outdoor movie screening or the Nightfall light festival around Halloween that offer low-profile and interesting opportunities for locals for new ways to visit its grounds and generate additional income to support this monumental site.

The park is designed in 'gardenesque' style (Turner 1986) which makes it an attractive park for recreation, but the drawback here is the grave fields are very exposed and no retreat is really possible. Furthermore, there is also little variation between burial fields.

The site host and extremely diverse stand of trees and is recognised as an arboretum, which adds to its ecological significance of the site (e.g. diverse blooming period for insects). In recent years, the cemetery management ramped up the amount of projects that focussed on improving habitat. Thereby it has introduced perrenial prairie meadows and transformed clipped lawns into urban grasslands, in order to introduce more native planting and boost habitat diversity.

Fig. 5.4: overview plan; source: author

Fig. 5.5: Historic depiction of Green Wood Cemetery; source: Green Wood Historic Fund, 2021

Fig. 5.6: Every summer, the cemetery organises outdoor cinema nights; source: Maike Shultz, 2019

5.5. MELATEN CEMETERY

Location	**Cologne, Germany**
Owner	**City of Cologne**
	- publicly owned
Year	**1810**
Designers	**Ferdinand Franz Wallraf**
	(architect)
	Maximilian Friedrich Weyhe
	(Landscape architect)
Size	**43 hectares**
Graves	**55.500**
Types	**In-ground Burial, urn field,**
	ash scattering
Hours	**Summer 7 a.m. to 8 p.m.**
	Autumn 8 a.m. to 7 p.m.
	Winter 8 a.m. to 5 p.m.
Users	mourning relatives
	pedestrians / stollers
	cyclists
	joggers
	visitors / tourists

50°56'20.1"N 6°55'09.9"E

Melaten Cemetery was opened in 1810 during the Napoleantic era of hygenic reforms. Its lay-out can be considered as rational and efficient as other public works of hygenic reform. The Melaten Cemetery has a clear lay-out that is divided in a grid of burial fields or 'rooms' that are connected by rectangular paths.

While the cemetery was only sparsely planted at the beginning, in 1826 this changed with an extensive planting plan from the garden architect Maximilian Friedrich Weyhe. Now, all main axis are planted with large plane trees create airy cathedral-like avenues and the secondary paths with a mixed tree selection that offer year-round interest. This makes a pleasant landscape for a walk or a run for visitors, mourners and local residents alike.

Its easy navigable path system results in recognisable A to B avenues, which makes the cemetery naturally started to function as a slow traffic throughfare for local residents connecting adjacent neighbourhoods and missing links in the bike network. It attracts other user groups and significantly adds to the feeling of 'publicness' at this cemetery, as these main allees become like 'city streets'. In contrast, the burial fields are like garden rooms that provide privacy and seclusion. This brings various 'speeds' to the cemetery; the axis as spaces of movement and the burial fields as places to stop and memorialise.

This case offers the largest diversity of burial options in comparison to other cases; the grid is a strong patchwork that is able to implement diverse burial wishes. This overall layout is highly adaptable, as its structure (casco) has existed since its existance, but the programming of every burial field can change over time. Recently, several citizen initiaves resulted in the opening of three lush perennial urn gardens, and in the future it is likely changing burial demands will result in more burial fields to change. Since every burial fields is like its own world, there is an exciting juxtaposition of 'garden rooms' to explore.

Ecologically speaking, the diversity in burial rooms also is an interesting lay-out that adds to the biodiversity of the place, since it enables a diversity ranging from forested patches where wildshoots roam freely to lush perrenial meadows.
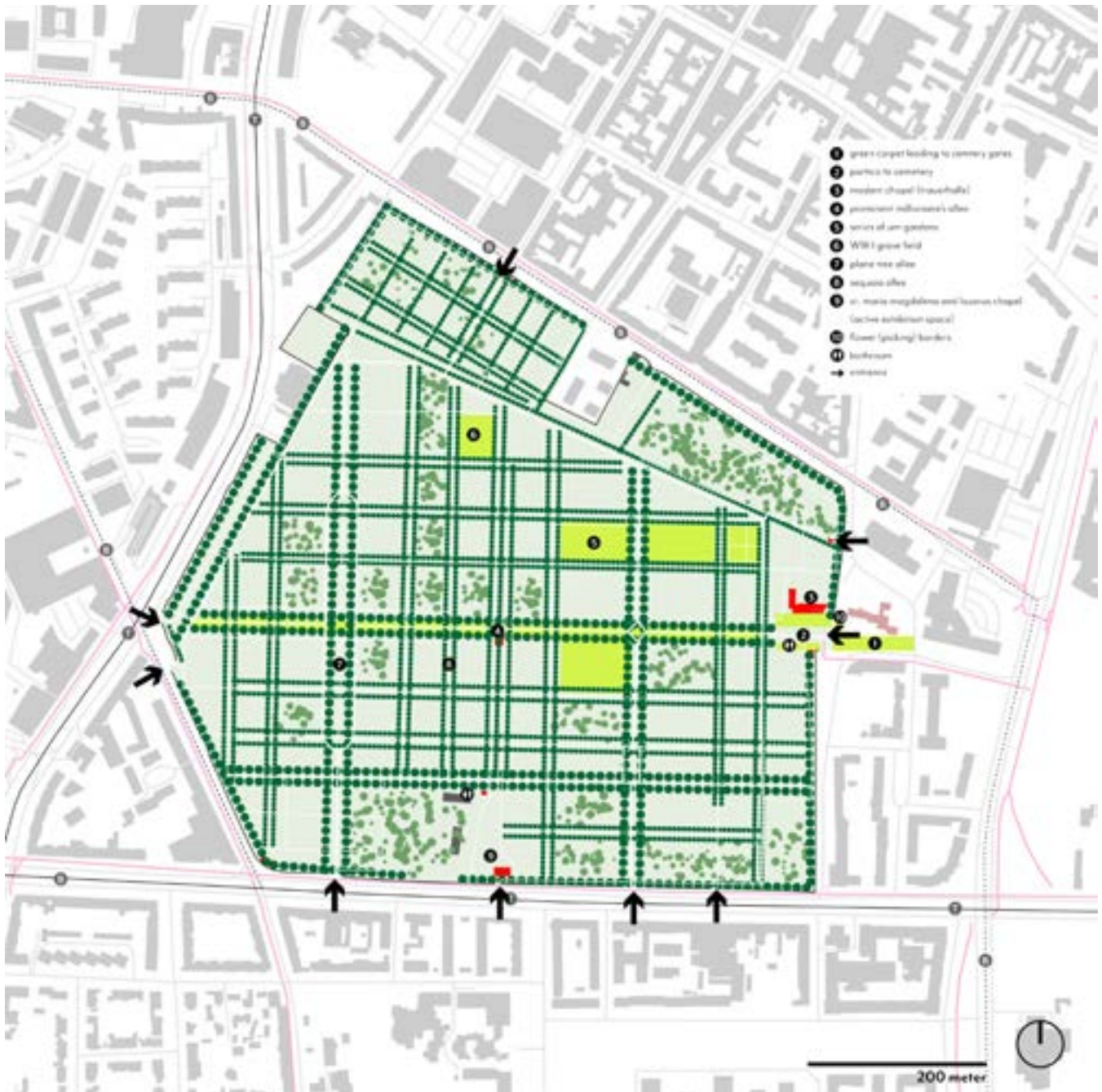
Fig. 5.7: overview plan; source: author

Fig. 5.8: Melaten Cemetery's primary axes are aligned by light and airy plane tree canopy. This planting choice creates a pleasant athmosphere, which takes away the hard and dark feeling of a cemetery; source: author

Fig. 5.9: Urban bike network connects well with the primary cemetery roads, therefore function as throughfare for slow traffic; source: author

5.6. REFERENCE STUDY OVERVIEW

The three reference studies show similarities and differences regarding their lay-out, connection to the city and the user groups they attract. The characteristic they share, and which can be concluded from this reference study, is that green urban cemeteries are indeed able to host park functions, allow for public joint usage and can positively contribute as green infrastructure to the city's open space system.

All three case studies offer generous green areas, space and tranquility, and are increasingly considered communal spaces that start functioning like public parks. This is most evident in Green Wood, since it's the only major green space in the area, many people come here to enjoy all sort of activities normally seen in 'normal' city parks. Contrastingly, Skogskyrkogården sees the least public joint usage of all three cases, given the availability of alternative green spaces in the green and spaciously laid out neighbourhoods. Thus, we can speak of a negative correlation between the availability of 'other' nearby green spaces and the occurence of public joint usage.

As seen in this reference study, cemeteries have the ability to truly become part of the urban fabric and urban life (= spatially and socially). Green Wood and Melaten Cemetery actively invite urban life through their gates. E.g. Melaten Cemetery does so by allowing slow-traffic connections between surrounding neighbourhoods, and Green Wood Cemetery is the best example as it offers a vast amount of year-round programming of events and community programs. In the lay-out and design of Green Wood Cemetery, there is also space kept free from burial and that leaves room for other program, following from the fact this garden cemetery back in the days was also explicitly aimed to be used for recreational activities such as picknicks and carriage rides. These two references break with the paradigm of the cemetery as introvert, closed-off spaces, and make it a rather porous and inviting space in the urban fabric. A sidenote here is that the Green Wood and Melaten Cemetery are closed at nighttime, but that can be the case for urban parks as well.

When it comes to flexibility of the design, the Melaten Cemetery showed the strongest framework to cope with change. It's gridded structure (casco) has existed since its existance, but the programming of every burial field can change over time. Since every burial fields here can be seen as a small world on its own, there is an exciting juxtaposition of differents worlds in one site.

Regarding ecological and habitat qualities, the case study of ecological significance and habitat provision is something best dealt with on the large scale. Therefore, it is striking only Skogskyrkogården is dealt with in the city's green infrastructural plans. It is discussed in park plans at the local level and assigned ecological, recreational and social qualities, as well as included in ecological plans that aim to secure the habitat of species threatened by extinction (Nordh and Evensen 2018). Green Wood, in a context of little government intervention in urban planning and design, is managed by a trust that sets its own goals regarding ecology and habitat provision. Melaten Cemetery, being adjacent to the inner green belt, is not included in the city's 'grüngürtel' plans. This is striking, given its potential and the city has such a historically strong green belt planning tradition. Given their inherent qualities, green urban cemeteries already provide ecological, cultural and recreational functions, but including them in green infrastructure planning could add missing links and offer better integration into the overall open space system. Given these facts, urban cemeteries are simply inevitable when planning and designing in the age of a climate and biodiversity crisis.

In conclusion, even though different cultures and traditions influence the role of green urban cemeteries in different countries, the three reference cases show that green urban cemeteries hold unique opportunities to contribute with a wide range of qualities to the urban landscape and urban life. All three cemeteries show a wide array of design choices that improve the social, cultural and ecological significance of these landscape, beyond their primary function as active burial space. As a general conclusion, their success in dealing with joint usage, or even being used as a city park, lies in the combination of programming and design. Succesful contribution to the wide urban green infrastructure, especially ecological performance, lies the their combination of maintenance and design.

5.7.   CONCLUSION

Based on the three reference studies and preceding literature study, an overlap in approaches, strategies and design principles started to emerge that effect public joint usage and ecological performance of a given cemetery. From this, a set of guidelines has been derived that is not place-specific. This allows designers to easily transfer them in their own work (Etteger Ma R. 2016, 89–92; Prominski 2017). For a catalog with extensive specifications, see appendix 1.

The guidelines are structured following the work of (Prominski, 2017). Following from the research scope of this thesis two overarching approaches structure the guidelines at the most abstracted level: facilitating public (joint) usage and the provision of ecosystem services. Both approaches are further specified in a set of design guidelines.

First, both approaches are broken down into a set of design strategies that express strategic corridors of possible directions. The design strategy is still abstract and general in nature and shows the variety of directions to achieve the overall aim stated in the approach.

Most design strategies comprise a sub-layer of specific design tools. They are the most concrete suggestion for design, but still 'drawn in an abstracted way to allow for a creative transfer to the specific design case of the user' (Prominski, 2017, p. 198).

Figure 5.10 shows the organization and level of abstraction for all design guidelines. See figure 5.11 and 5.12 for an overview of all harvested guidelines.
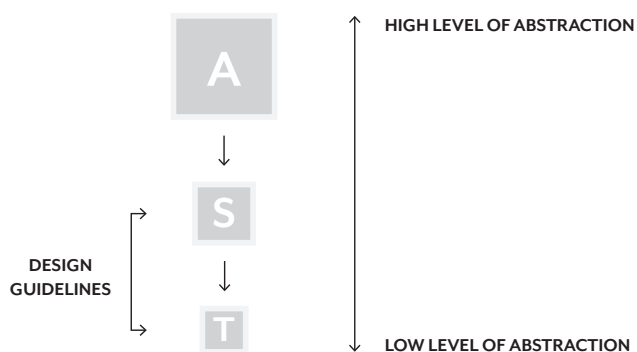

Fig. 5.10: Hierarchical organization of approach, design strategy and design tools in this research, following Prominski's (2017) theorizing on design guidelines; source: author

FACILITATING PUBLIC USE: DESIGN & ACTIVITY

STRATEGY

CREATE VARYING DEGREES OF PUBLIC AND PRIVATENESS	ENCOURAGE PUBLIC AND VOLUNTARY INVOLVEMENT	CONNECT THE CEMETERY TO ITS VICINITY
→ Skogskyrkogården → Melaten Cemetery	→ Green Wood Cemetery	→ Skogskyrkogården → Green Wood Cemetery → Melaten Cemetery

TOOL

SCALE
XS

individual grave

S

burial field

M

main structure

create thresholds that help transition
between public and privateness
→ Skogskyrkogården
→ Melaten Cemetery

create a park hierarchy
→ Skogskyrkogården
→ Melaten Cemetery

provide spaces that provide and
suggest seclusion and privacy
→ Skogskyrkogården
→ Melaten Cemetery

make a hierarchy of entrances;
formal main entrance and informal
back-entrances
→ Skogskyrkogården
→ Melaten Cemetery

make accessible for all modes of
slow-traffic and discourage the use
of cars
→ Skogskyrkogården
→ Melaten Cemetery

L

place in urban fabric

create clear A to B throughfares
that make meaningful connections
→ Skogskyrkogården
→ Melaten Cemetery

align paths and entrances to
existing urban grid
→ Skogskyrkogården
→ Green Wood Cemetery
→ Melaten Cemetery

XL

regional landscape

position the cemetery park in
its surroundings as throughfare,
destination or as both
→ Skogskyrkogården
→ Green Wood Cemetery
→ Melaten Cemetery

Fig. 5.11: Guidelines for facilitating public joint usage; source: author

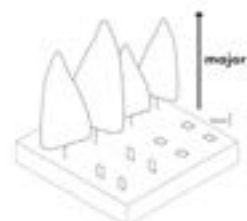| OFFER (FREQUENT) APPROPRIATE CULTURAL EVENTS	MAKE THE CEMETERY INTO A PLACE FOR LEARNING	MAKE THE CEMETERY VISIBLE WITHIN THE URBAN FABRIC	CREATE ATTRACTIVE SPATIAL QUALITIES THAT INVITES AND ALLOWS FOR PUBLIC JOINT USAGE
→ Green Wood Cemetery	→ Green Wood Cemetery	→ Green Wood Cemetery → Malaten Cemetery	→ Skogskyrkogården → Green Wood Cemetery → Malaten Cemetery

major

aim for subservient memorials and balance visual disturbance with a strong continuous green decor
→ Skogskyrkogården
→ Malaten Cemetery

include outdoor educational facilities
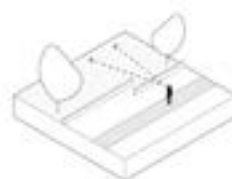→ Green Wood Cemetery

design spaces where no burial occurs and that leave room for other program
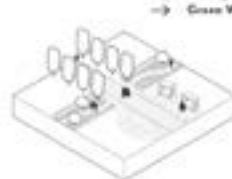→ Skogskyrkogården
→ Green Wood Cemetery

use contemporary, light planting with seasonal interests that provides for spatial experience
→ Green Wood Cemetery
→ Malaten Cemetery

make transparent and permeable edge condition
→ Green Wood Cemetery

take along the design of the cemetery's vicinity
→ Malaten Cemetery

CONTRIBUTING TO THE URBAN GREEN INFRASTRUCTURE: DESIGN AND MAINTENANCE

STRATEGY

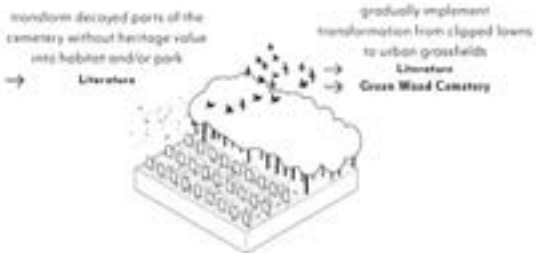| TRANSFORM THROUGH MAINTENANCE REGIME THAT AIMS FOR MORE ECOLOGICAL DIVERSITY	DESIGN IN CONNECTION WITH THE OVERARCHING LARGER SYSTEM	INTEGRATE ECO OBJECTIVES IN S BURIAL DESIGN
→ Literature → Green Wood Cemetery → Melaten Cemetery	→ Literature	→ Li → Skogh → Melate

TOOL

SCALE
XS

individual grave

dialogue between cultural heritage
vs. ecology sector
→ Literature

S

burial field

transform decayed parts of the
cemetery without heritage value
into habitat and/or park
→ Literature

gradually implement
transformation from clipped lawns
to urban grassfields
→ Literature
→ Green Wood Cemetery

plant trees in a way they have the
space and time to grow into large
mature trees
→ Literature

M

main structure

create heterogenity of habitats
→ Literature
→ Melaten Cemetery

introduce sustainable burial
practices
→ Literature

messy ecosyst
→ Li

L

place in urban fabric

create a variety of connections
specific to different target species
→ Literature

XL

regional landscape

design with points, surfaces and
lines in mind to create coherent
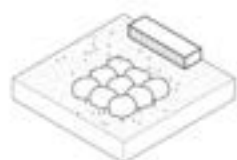ecosystem connectivity
→ Literature

relate interventions to wider
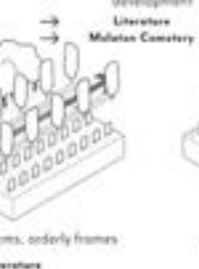territory and built from existing
(regional) conditions
→ Literature

Fig. 5.12: Guidelines to improve contribution to the urban green infrastructure; source: author

erature
rphogården
n Cemetery
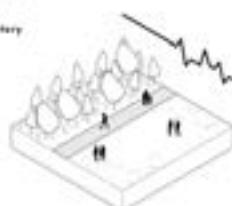

create clustered burial facilities,
leaving space open for landscape
development

→   **Literature**
→   **Malmön Cemetery**

ms, orderly frames
erature

retain quiet and undisturbed
places

⇒   **Literature**
⇒   **Skogskyrkogården**

6. CASE: THE TONGERSEWEG CEMETERY OF MAASTRICHT

Tongerseweg Cemetery ●
Maastricht, The Netherlands

The design part of this thesis explores the potentials of the Tongerseweg Cemetery in Maastricht as a contemporary multifunctional cemetery park. This chapter presents the results from the thorough multi-scalar site analysis.

First, subchapter 6.2 presents a macro-scale urban analysis that contextualizes Tongerseweg Cemetery within the broader Maastricht landscape. Furthermore, it discusses recent developments and issues that impact the cemetery's exploitation.

Then, subchapter 6.3 presents the results from a site scale analysis that served as the basis for the proposed strategies and design for the Tongerseweg Cemetery.

HISTORIC URBAN DEVELOPMENT

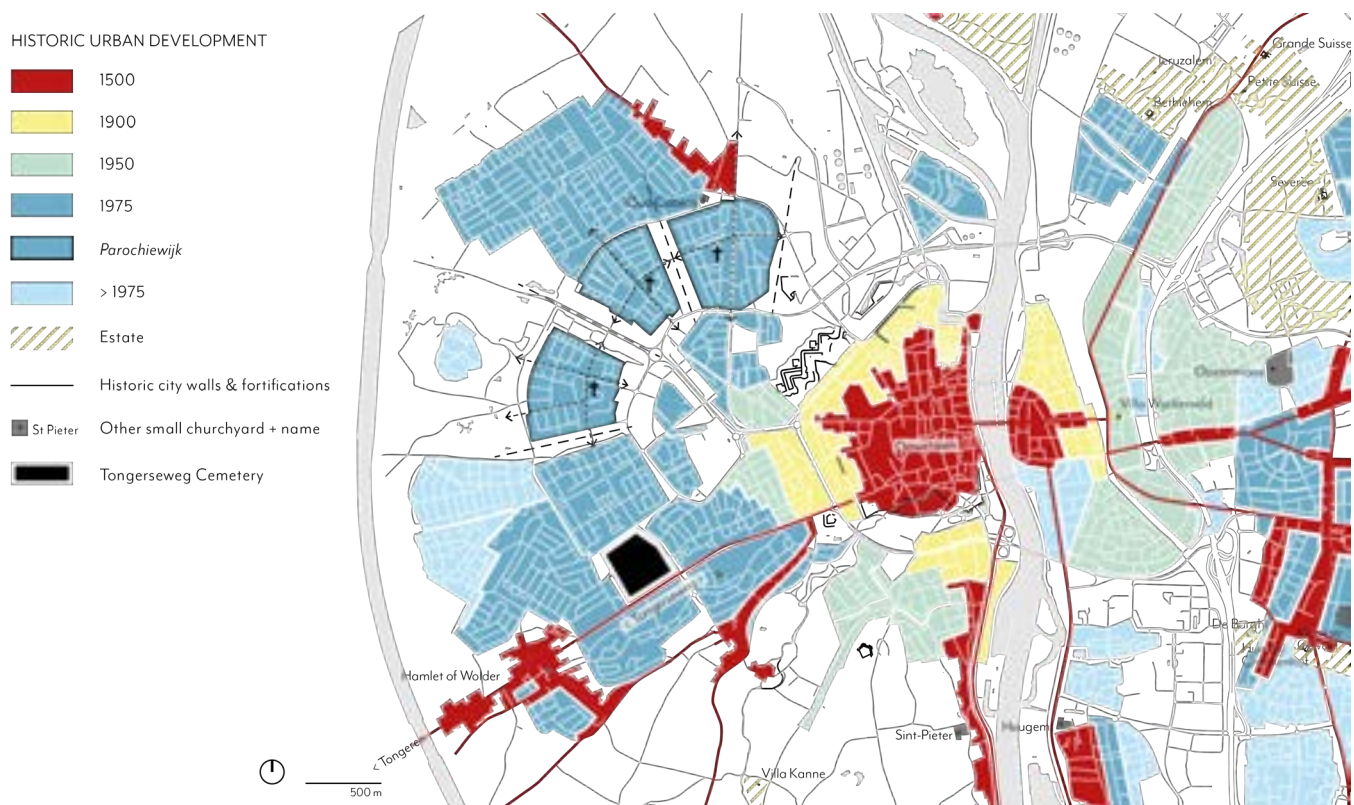|	
■ (red)	1500
■ (yellow)	1900
■ (light green)	1950
■ (medium blue)	1975
■ (blue)	*Parochiewijk*
■ (light blue)	> 1975
▨	Estate
—	Historic city walls & fortifications
▪ St Pieter	Other small churchyard + name
■ (black)	Tongerseweg Cemetery

Fig. 6.1: map of historical urban development; source: author

6.1. POSITIONING THE CEMETERY IN MAASTRICHT AND THE REGION

6.1.1. HISTORICAL CONTEXT: HOW THE CEMETERY AND CITY CAME INTO BEING

The Tongerseweg Cemetery is owned by the municipality of Maastricht and is one of the oldest public cemeteries in the Netherlands. First established in 1810, it has since been altered and extended into its current size of 12 hectares, with more than 10.000 graves being occupied. In the period of French dominance between 1795 and 1813, several studies were initiated on the future of Maastricht churchyards. These were attempts by the Napoleonic administrators for burial reforms, favoring medial theories and the involvement of technicians as the basis of new cemetery projects (Denton, 2003). This was part of a broader societal movement pushing for hygenic reforms at the time.

The unhygienic conditions at the old Maastricht graveyard between Bogaardenstraat and Capucijnenstraat in the city center were no longer deemed bearable. The terrain coped with stagnating water, causing rotting corpses and the chance of epidemiological outbreaks since houses surrounded it. This situation pressured the establishment of a modern general cemetery, a 'Cimetière Générale'. In 1809 1,2 hectares were bought along the Steenweg, a paved road connecting Maastricht and Tongeren. Thereby, well situated outside the city, the site meanwhile was well connected to the city.

The first design, a square of hundred by hundred meters, was demarcated with a moat and a wall. A sober yet convincing design designed by the Maastricht's city architect Jean François Soiron (Eijkelenberg & Reinders, 2016).

Since then, the cemetery has grown increasingly over time by a series of expansions. Also, the cemetery's initial peripheral location has not held up, as post-war residential neighborhoods have slowly incorporated the site into the city (see figure 6.1).

Socio-culturally, the end of burial within the city walls marked a whole new period in funerary history. In 1827, Royal Decree determined that every municipality had to have a public cemetery available to be able to bury all residents. From that time onwards, all religious denominations were buried together in the same cemetery, while previously, they remained separated from each other in separate churchyards and graveyards. Because of this compartmentalization along socio-political lines, the different groups were still buried in separate sections within the new cemetery. However, it marks the first step in the cemeteries becoming a more pluriform place.

MAASTRICHT GREEN INFRASTRUCTURE

River Bound wet nature

Higher-situated nature unit

Urban Green Infrastructure

Insect corridors
(under development by municipality)

By municipality designated
robust ecological connections

Primary tree structure
(bat migration + melliferous value)

Habitat for:

Midwife Toad

Swallow

Wide variety of native insects

Wall Lizard

European Hamster

Red Squirrel

Badger

Eagle-Owl

Wall Flora

Tongerseweg Cemetery

Fig. 6.2: map of Maastricht's green infrastructure; source: author

6.1.2.   MAASTRICHT'S GREEN INFRASTRUCTURE

Although Maastricht is a city with a long history dating back to the Romans, it never experienced an era of extreme urbanization and therefore cannot be called a 'metropolitan city' nor is it 'rural'. The city had an early industrial development, like the region in which it is located, and, historically, an economy largely based on agriculture, minerals, raw materials, and its processing. Therefore, Maastricht is best characterized as a large provincial town, where the urban green infrastructure is strongly interlinked with the surrounding countryside next to the city.

Fig. 6.3: The Jeker valley that is close to the cemetery. In the back the St. Pietersberg with the regionally characteristic oak-hornbeam forest on the slope and oak-beach forest on the plateau; source: IVN, 2021

Maastricht has a unique (micro)climate in the valley of the Meuse and Jeker. Situated in the hills of Limburg, its geology and morphology make it distinctly different from the rest of the Netherlands. Here, the Tongerseweg Cemetery is situated on the löss-covered plateau at +92 meter NAP, where the Jeker valley is +50 meter NAP and the Meuse valley +45 meter NAP. The variation in topography and hydrology results in a large variation of habitat conditions and offers significant opportunities for flora and fauna.

The city has several valuable natural gems; the old fortifications (e.g. Hoge Fronten park), green courtyards, and large city parks such as the 'Stadspark', see figure 6.2 and 6.9. Furthermore, the city boasts unique habitats like limestone walls, lowland hay meadows, and alkaline grasslands, making particular plants, including orchids, flourish. The unique (micro)climate and southern location make 'southern species' like the wall lizard, specific solitary bees, and midwife toad thrive here.

The surrounding countryside next to the city is largely left intact and is dotted with protected nature reserves. For the Tongerseweg, the Jekerdal surrounded by the Pietersberg and Cannerberg and the dry valley (droogdal) of the Klein and Lange Zouw are relevant when considering green infrastructural connectivity.
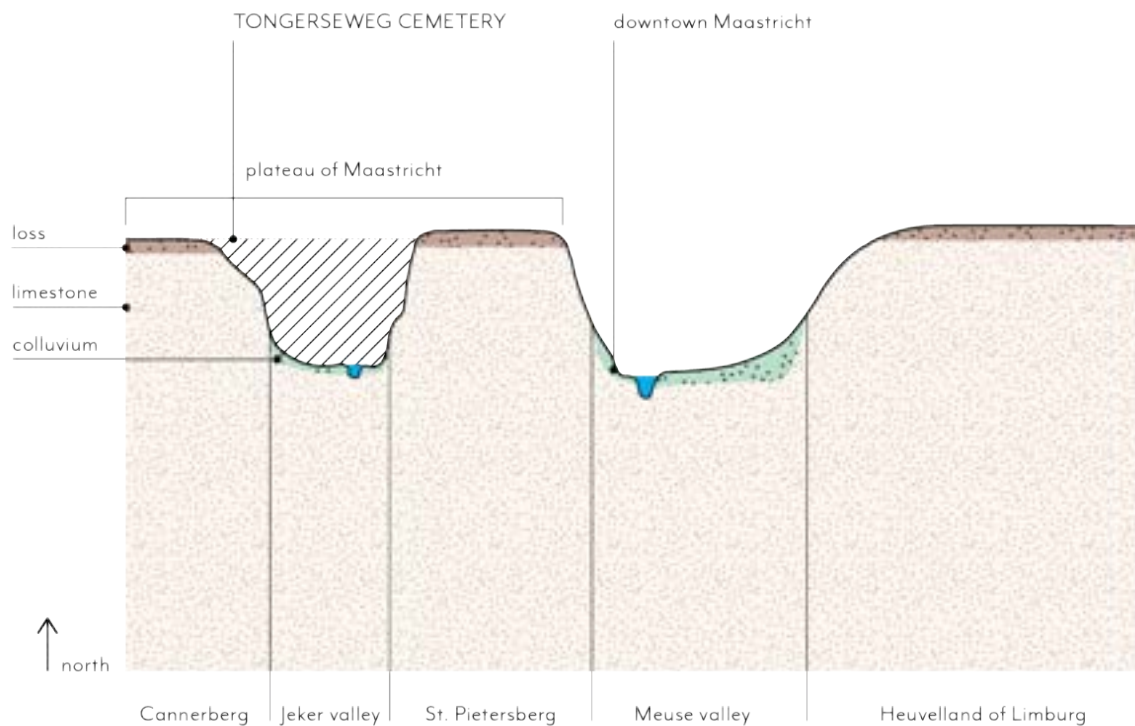
Fig. 6.4: geological positioning of the site in relation to the Jeker and Meuse valley; source: author

The Pietersberg and Cannerberg comprise thousands of marl pits that offer special shelter for many species of bats, and above ground, the quarries form a unique habitat for the eagle owl, two protected species that also call the Tongerseweg Cemetery their home. The importance of Maastricht's urban green infrastructure for biodiversity has increased in the past decades, primarily due to agricultural industrialization and eco-environmental degradation of the surrounding countryside.

REGIONAL GREEN INFRASTRUCTURE

The municipality of Maastricht has already drawn up a green infrastructure plan, the most recent dating from 2020 in their Strategy on Spatial Planning and the Environment (omgevingsvisie). It describes the framework of different types of green areas in the city. Herein, the city of Maastricht expresses ambitious ecological objectives for its urban green infrastructure, but the Tongerseweg Cemetery is described in its status quo, and no ambitions are articulated (Gemeente Maastricht, 2020, p. 65). Thus, there is a disparity between the cemetery being included and colored in on the green infrastructure map along with other green spaces but neglected and treated as private green space that is not taken along in green space planning and design.

This subchapter discusses points of attention when aiming to better integrate the Tongerseweg Cemetery in the broader green infrastructure. Besides, it includes both analysis outcomes and critical considerations towards the city's plans.

⟶ In the past two decades, the city mainly worked on large projects that focused on large additions or big revamps of the green infrastructure. With the area development of De Groene Loper, Rivierpark Maasvallei, the ENCI quarry, the Frontenpark and the Tapijnkazerne, Maastricht has gained fantastic green areas. Now, the attention should shift to maintaining and strengthening the current green areas in the city, of which the Tongerseweg is one of them. Note that none of these large-area developments were in the east of Maastricht, which could be an argument to initiate a project in the east through the Tongerseweg Cemetery.

⟶ The cemetery has a large patch size (14 ha) in relation to other large parks, e.g. the Stadspark (11 ha) or Hoge Frontenpark (17 ha). Large patches are better suited to create a habitat with a real impact. Therefore, this potential should be cherished and exploited in the design.

⟶ There are missing links (corridors, and stepping stones) to the cemetery that could increase connectivity to make organisms move more freely between the cemetery and other suitable habitats. the ecological value of the cemetery and its functioning in the larger network. Without

policy changes, the natural gems in the city will remain (partially) isolated, and the vital connections between the urban nature patches themselves and the surrounding countryside will remain largely incomplete. The cemetery's current main ecological qualities, described in subchapter 6.2.6, guide what to connect to and what type of connections this should be for the Tongerseweg Cemetery. To generalize, we can focus on two types of connections:

First, species bound to old trees that could benefit from connections to the Jekerdal and adjacent hillside forests of the Cannerberg and Pietersberg. To a lesser extent, this also applies for connections to other areas with serious canopy, such as the Stadspark or dry valley of the Kleine and Lange Zouw.

Secondly, insects bound to the cemetery's spring flora and lowland hay meadows could benefit from improved connectivity to other forage locations and nesting sites (Liquete et al., 2015).

In considering connectivity with the rest of the green infrastructure, not only the municipality's territory should be considered, but private gardens also form interconnected habitat networks (Goddard et al., 2010). Especially the Mariaberg, Biesland, and Campagne neighborhoods contain relatively large and green gardens.

→ The cemetery has outstanding ecological qualities amidst the post-war green by which it is surrounded. These stretches of green are woven through the neighborhoods and predominantly consist of intensively managed lawns and compact stand of trees without understory. This is most clearly manifested in the neighborhoods Daalhof and Belfort northeast of the cemetery. This type of landscape is already widespread around Maastricht and is known to harbor only a limited number of plant and animal species (Sehrt et al., 2020). It should be noted that the radial and concentric main green structure of the parish districts of Pottenberg, Malpertius, and Caberg north of the cemetery are ecologically more diverse, e.g., as expanded upon by van Geest & Verhees (2015). Therefore, the current cemetery is an outstanding ecological island amidst the post-war green, which should be cherished and built upon.

→ An earlier study by Alterra (Bezemer & Visschedijk, 2003) and Stadsnatuur Maastricht (Bode & Jansen, 2017) showed that Maastricht has a relatively small amount of 'green' surface area (Bezemer & Visschedijk, 2003) compared to similar sized Dutch cities (Bode & Jansen, 2017, p. 46). That stresses the importance of squeezing more out of the existing green infrastructure, in other words, improve the Tongerseweg cemetery through new design measures and management changes.

Fig. 6.5, 6.6 and 6.7: The green open spaces in the surrounding neighborhoods of Daalhof (top two images), Belfort (bottom image), Mariaberg, Biesland, and Campagne all have little to no program to offer and are not designed to stay or retreat in the green. Ecologically, they are not the most biodiverse neighborhoods either; source for all 3: Google Earth Pro, 2021

6.1.3.   SURVEY ON MAASTRICHT PUBLIC SPACE AND PARKS

Maastricht has a relatively young park tradition since it has been a dense city bound by its city walls until the late 19th century. The city then had just one park, 'de Boompjes', outside the city walls, that is now part of the 'Stadspark'. However, with the city's urban expansion beyond the city walls, parks and open green spaces have been part of the urban layout ever since (see Figures 6.2 and 6.9). Below is a description of the results from the park survey done, which sets us up to see missing gaps, and how the Tongerseweg could be positioned as a meaningful park addition.

The Maastricht park system consists on the one hand of city parks and other green open areas with their own atmospheres for different forms of recreation and user intensity. On the other hand, the park system consists of a network of connections, called 'slow-roads' for walking and cycling. This network allows residents to comfortably move around and reach other parts of the green recreational system. One of the city's objectives is a growing share of walking and cycling in the modal split, replacing urban car journeys by bike and foot (Gemeente Maastricht, 2020, p. 30). This is something to consider when designing the cemetery's circulation and embedding it in its context.

There is a large variation between the parks in terms of size, historical relevance, and program intensity, resulting in a wide range of park types. Encounters in and with the parks take place in various ways, and some locations are used more intensively than others. Therefore, the municipality has zoned the park system based on the type of green space and its user intensity, which is included in figure 6.9. This safeguards a good balance between user values and nature values between different green areas without losing the appeal of areas due to excessive user intensity and/or inappropriate activities. See figure 6.9 for an overview of the park scan and figure 6.10 for an overview of the current park offering compared on size, program and historical relevance.

This thesis conceives the cemetery as part of a connecting structure of parks and green corridors near the center of Maastricht. As seen in figure 6.9, there is a radial and concentric grid from the city center towards the northeast. The cemetery is embedded within this structure but is characterized as a closed-off and inward-focused space upon approach; see figure 6.38 and 6.39 for examples.

In Mariaberg, the province of Limburg, housing corporation Servatius and the municipality of Maastricht are working together on restructuring and renovating the neighborhood. The project is centered around a new urban axis: the 'Blauwe Loper'. It entails a renovation and new additions to the public space and creates improved accessibility for pedestrians and cyclists to the city center (see figure 6.9).

The plans are relevant for this design since the current Blauwe Loper axis stops at the Javastraat, where the cemetery starts. In the design, we can study a slow traffic route over the cemetery as an extension of the Blauwe Loper. This route will (as is the proposal) be in line with the Blauwe Loper, making it even longer.

In figure 6.10 we can see a good number of parks appointed for a high user intensity and host a lot of programming, such as the popular Stadspark and Griendpark that are programmed year-round and cater for hustle and bustle. Based on the 'gap' in the top left in figure 6.10, there is the potential to develop the Tongerseweg cemetery into a more quiet, slow-paced park with a high historical value. This perfectly combines with the vision to create an environment that offers a place for individual grieving as well as for collective action and encounters.

The green open spaces in the surrounding neighborhoods of Daalhof, Belfort, Mariaberg, Biesland, and Campagne all have little to no program to offer and are not designed to stay or retreat in the green. This partly lies in their design as open lawns with scattered (solitary) trees where one feels exposed, and no place for encounter is offered (see figures 6.5-6.7).

The cemetery has become a place of encounter for the entire Maastricht community, as so many inhabitants of the city have found their last place in this park. Program and activities related to increasing community encounters, collective action, memorialization, and modest and quiet programming could be accommodated in a new design for the cemetery.

City Park

High user intensity:
zoned as meeting and recreation zone

Medium user intensity:
zoned as meeting and recreation zone

Countryside (ommeland):
zoned as meeting and recreation

-------- Slow-road network for walking and cycling

-------- 'Blauw Loper' (explained on page XX)

Sports terrain

Event location

Tongerseweg Cemetery

Fig. 6.9: scan of the Maastricht green open space system; source: author

PARKS

1 Van de Vennepark	4,9	ha
2 Viegenpark	2,2	ha
3 Parc Montagne	4,5	ha
4 Frontenpark	14,4	ha
5 Griendpark	5,8	ha
6 Groene Loper	14,1	ha
7 Waldeckpark	4,1	ha
8 Stadspark	11,5	ha
9 Charles Eyck	1,0	ha
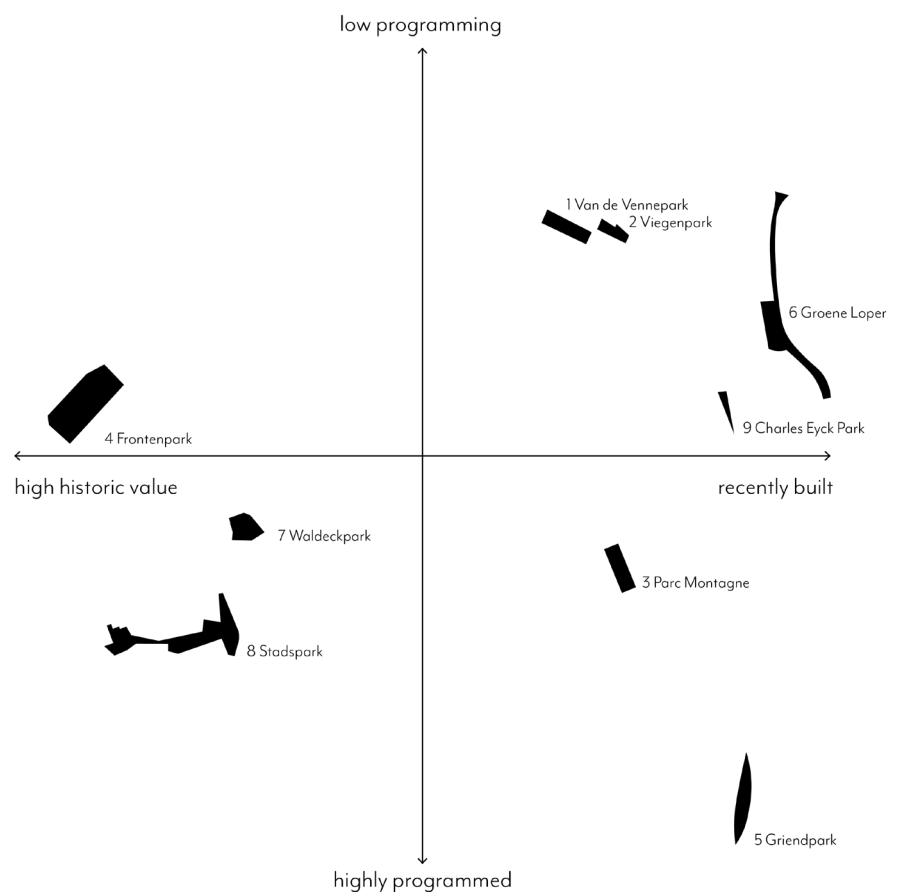
Fig. 6.10: survey of the existing Maastricht park system; source: author

6.1.4. RECENT DEVELOPMENTS IMPACTING THE TONGERSEWEG CEMETERY

As discussed in the intermezzo (pg. 22), the Dutch burial culture is changing. The Tongerseweg Cemetery is still selling plots and burying the deceased, but given that cremation and other arrangements increase in popularity, the cemetery cannot be sitting around doing nothing. Adapting to this new reality could mean the difference between succumbing to degradation or securing a sound exploitation and becoming a thriving part of the local community.

DIFFICULTING EXPLOITATION

In recent decades, and especially in recent years, there has been a decline in the number of funeral services, and the negative financial result of the cemetery budget is a recurring topic of discussion in the city council. The main cause is the decline in burials and secularization (Gemeente Maastricht, 2017). In addition, the historic core of the cemetery is protected as a national monument, which also pushes up the costs. Since the daily maintenance tasks put so much pressure on the operational costs, many large-scale maintenance tasks have been kept off in recent years. Further postponement of investment can lead to a severe loss of the unique spatial quality of the place.

BURIAL MARKET ANALYSIS

By order of the municipality, the future of the local burial market has been researched. The results are discussed below, which gives an overall picture of future trends to anticipate on.

The Tongerseweg Cemetery only offers limited and outdated burial products, while the wishes on the funeral market are becoming increasingly diverse. The current offering is:

- In-ground urn and coffin burial
- Ash scattering meadow
- Limited amount of columbarium niches below the chapel

The cemetery must prepare for an expansion of the range of burial products and services to meet citizens' wishes. A brief overview will be given:

→ At this moment, 75% of people in Maastricht choose for cremation, higher than the Dutch average, and that percentage continues to increase (Gemeente Maastricht, 2017). From summer 2021 onwards, resomation (alkaline hydrolysis) will be legalized in The Netherlands, which is estimated to result in a further drop in people choosing for in-ground burial (NOS Nieuws, 2020).

One would expect the increasing number of cremations to be accompanied by an increase in the number of ash burials and internments, but this has remained forthcoming. This is most likely linked to the limit offering and quality of ash burial, interment or scattering. Expanding the options for cremation ash and a collaboration with the local crematorium will have a positive influence on the cemeteries exploitation and burial numbers (Gemeente Maastricht, 2017).

→ Natural burial options would be an interesting opportunity for the cemetery. Natural burials are on the rise in the Netherlands and abroad. In general, a natural burial is significantly cheaper than a traditional burial. No expensive grave markers are involved, and the management is maintenance-extensive (Gemeente Maastricht, 2017). The competition is located far away (Eygelshof (Sittard) 23 km; Bergerbos (St. Odiliënberg) 50 km; Maasbree (Venlo) 80 km), which makes natural burial interesting for Maastricht.

Maastricht is also close to the Belgian border. Since natural burial is not allowed in Flanders, there is no real competition from Belgium, which offers the opportunity to tap into a new market. It is known, for example, that many Germans have their cremation performed in the Netherlands. Thus, offering services in the form of natural burial would be a logical step.

→ The average number of burials in Maastricht is 250 per year, of which 125 are buried at the Tongerseweg Cemetery.

→ The section for Islamic burials is starting to get full. The expectation is that the new generation of Muslims will increasingly choose to be buried in the Netherlands, and this is expected to grow considerably in the coming years. Therefore, the municipality aims to add 1.600 m2 which should be sufficient for the coming 30 years (Gemeente Maastricht, 2017).

→ Other minority groups that frequently use the cemetery are members of the Armenian population, as there is a large group living in the South of Limburg, and the Armenian Apostolic Cathedral is located in Maastricht. In 2017 it was agreed that burial fields EE and FF are dedicated to Armenian burials.

These trends are putting pressure on the exploitation of the cemetery, also because its surface area

appears to be far too large. The market research has shown that in the near future, a reduction of 7.000 of the 14.000 traditional in-ground burial plots and half of the current surface area will be sufficient (Gemeente Maastricht, 2017). The cemetery management has taken the first step by discontinuing burials in the northern part of the site (see figure 6.18). The expectation is that a further reduction of traditional plots and replacing them with other types of burial plots will continue to happen in the future.

In 2020 the first crematorium, La Grande Suisse by DELA and Monuta, has opened its doors in the Maastricht estate zone. The municipality has allowed the construction in 2017 and since then pro-actively sought collaboration between the crematorium and the Tongerseweg Cemetery since it can be an excellent opportunity for the cemetery's exploitation. The municipality now has concluded a 'gentlemen's agreement' that seeks to inform and stimulate relatives to choose for ash internment at the Tongerseweg Cemetery (E. Kaptein, personal communication, October 26, 2020).

The crux of the story is that legally every Dutch municipality is under the obligation to have a public cemetery. Thus, the cemetery should prepare itself for the future: doing nothing is no option.

CURRENT BUSINESS PLAN ON THE TABLE

Given the current problems in the exploitation of the cemetery, in 2017 the city council has decided to draw up a business plan that aims to realize a future-proof cemetery. The starting point of the business plan was the vision to transform the cemetery into a multifunctional mourning and memorial park. The essential points of the plan are (Gemeente Maastricht, 2017; Kaptein, 2020):

· Renovation of paths, transformation of the greenery and repairing overdue maintenance.
· Improving signage and signpostings.
· Adding additional ash internment options.
· Expanding the amount of Islamic and Armenian graves.

Thereby the municipality is stretching the idea of what a cemetery could be, but ambitions are made in moderate terms - potentially because of short-term political cycles and associated costs of big structural changes. The potentials, as discussed in chapters 3 and 4, and as seen in the reference study, are not taken advantage of. This leaves room for the design to push the idea of what could be possible at the Tongerseweg Cemetery and spark the conversation on the cemetery's future. See figure 6.12 for the plan.

Fig. 6.11: La Grande Suisse, the first crematorium of Maastricht that opened in 2020; source: La Grande Suisse, 2021

Fig. 6.12: current strategic plan drawn up by the municipality. 1 = monumental core, 2 = traditional burial + new Armenian burial field, 3 = decomissioning of burial fields, 4 = cemetery extention, ▲ = current + added entrance; source: Kaptein, 2020
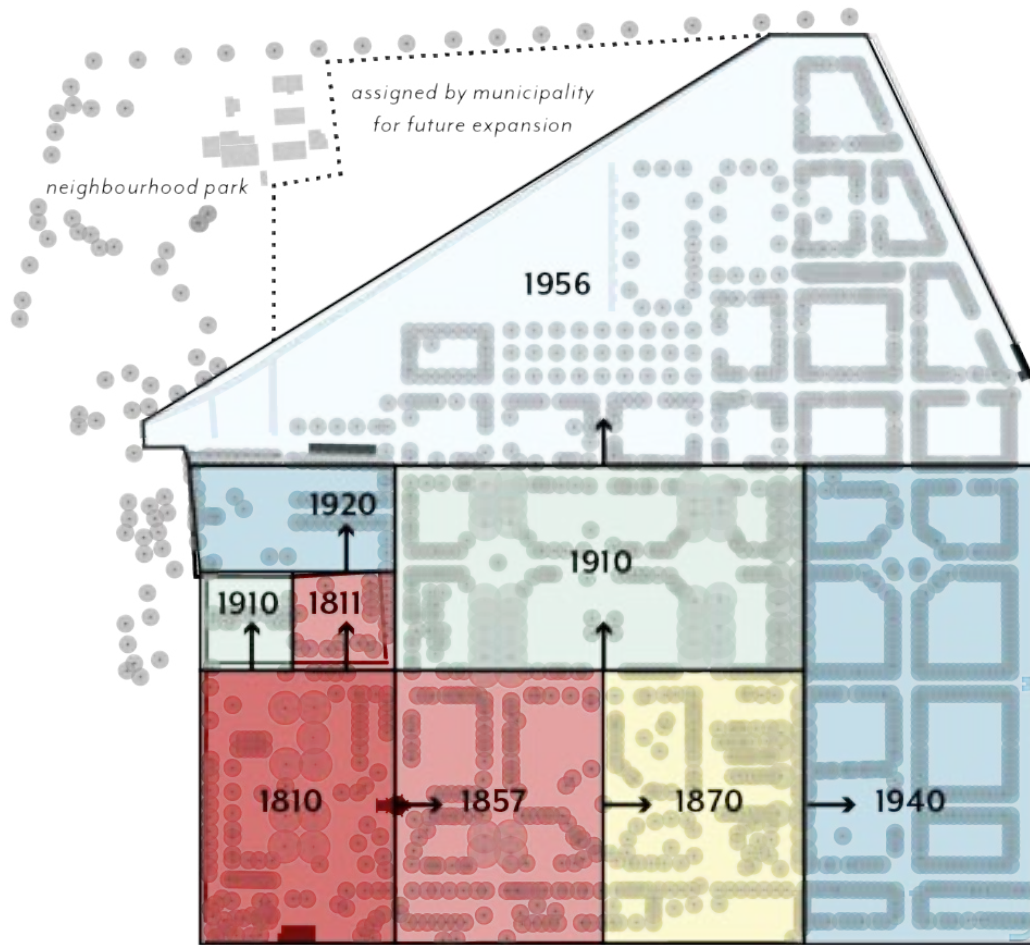
Fig. 6.13: historical growth of the cemetery and reserved space for future expansions; source: author

6.2.1. HISTORICAL DEVELOPMENT & CURRENT MONUMENTAL CONDITION

INITIAL ESTABLISHMENT AND DESIGN

The cemetery is characterized by an old, monumental core built in different phases from 1810 till 1910. City architect Jean François Soiron designed the oldest part as a squared hortus conclusus. A smaller version was first opened in 1810, and the entire design was realized by 1857. The site was demarcated with a moat and a wall of 2,70 meters high. In the heart of the wall along the Tongerseweg, a gatehouse was designed. This gate still is the iconic main entrance into the site and is used as an entrance for funerals.

As happened elsewhere in the context of mass industrialization and the emergence of a new bourgeoisie class, the principle was used whereby the most 'important' and wealthy inhabitants were buried in the most important places along the lanes. In contrast, the working class and peasantry were buried in, sometimes anonymous, mass graves on the burial fields. The rise of the new rich was reflected in richly detailed, often bombastic grave monuments along the axis, see figure 6.17. Thereby the cemetery is a prominent historic place in telling the history of the city.

The anonymous graves and the burial fields are either empty or filled in again with new plots. However, the nineteenth-century grave monuments of the wealthy have been preserved and are all virtually intact. They have a high historical value as an ensemble and set the atmosphere when walking around in the historic core.

Initially, the cemetery also had a segregated parcellation for people of different faiths and ways of life which was related to social compartmentalization, which, to a lesser extent, is still present in the designated areas for Islamic and Armenian burial.
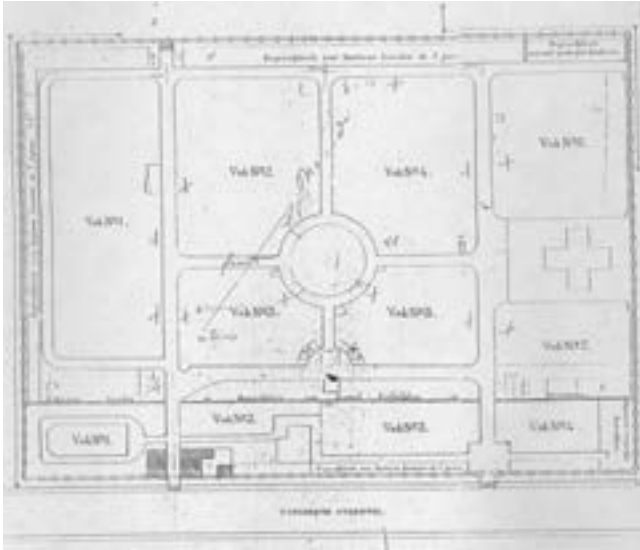
Fig. 6.14: Design for the extention of 1857, when Soiron's partially realized design from 1810 was finalized. Source: gemeentearchief Maastricht via Denessen & Bruijnesteijn, 2002

Fig. 6.15: The lane planted perpendicular to the main entrance gate. Source: gemeentearchief Maastricht via Denessen & Bruijnesteijn, 2002

Fig. 6.16: Classical tombs and grave monuments from the first half of the nineteenth century give an impression of the monumentality of some parts of the historical area, as drawn by Philippus van Gulpen around 1850; Source: gemeentearchief Maastricht via Denessen & Bruijnesteijn, 2002

Fig. 6.17: Photo taken around 1890 on the main axis towards Tongerseweg. Note the high density of monumental grave markers along the edges. The number of primary plots was limited: wealthy residents competed for the best location at the cemetery. source: gemeentearchief Maastricht via Denessen & Bruijnesteijn, 2002

Area of (high) monumental value

Indifferent monumental value

Out of use for burials since 2015

Out of use for burials since 2017

Monumental wall

① Monumental entrance archway

② Monumental chapel with burial crypts underneath
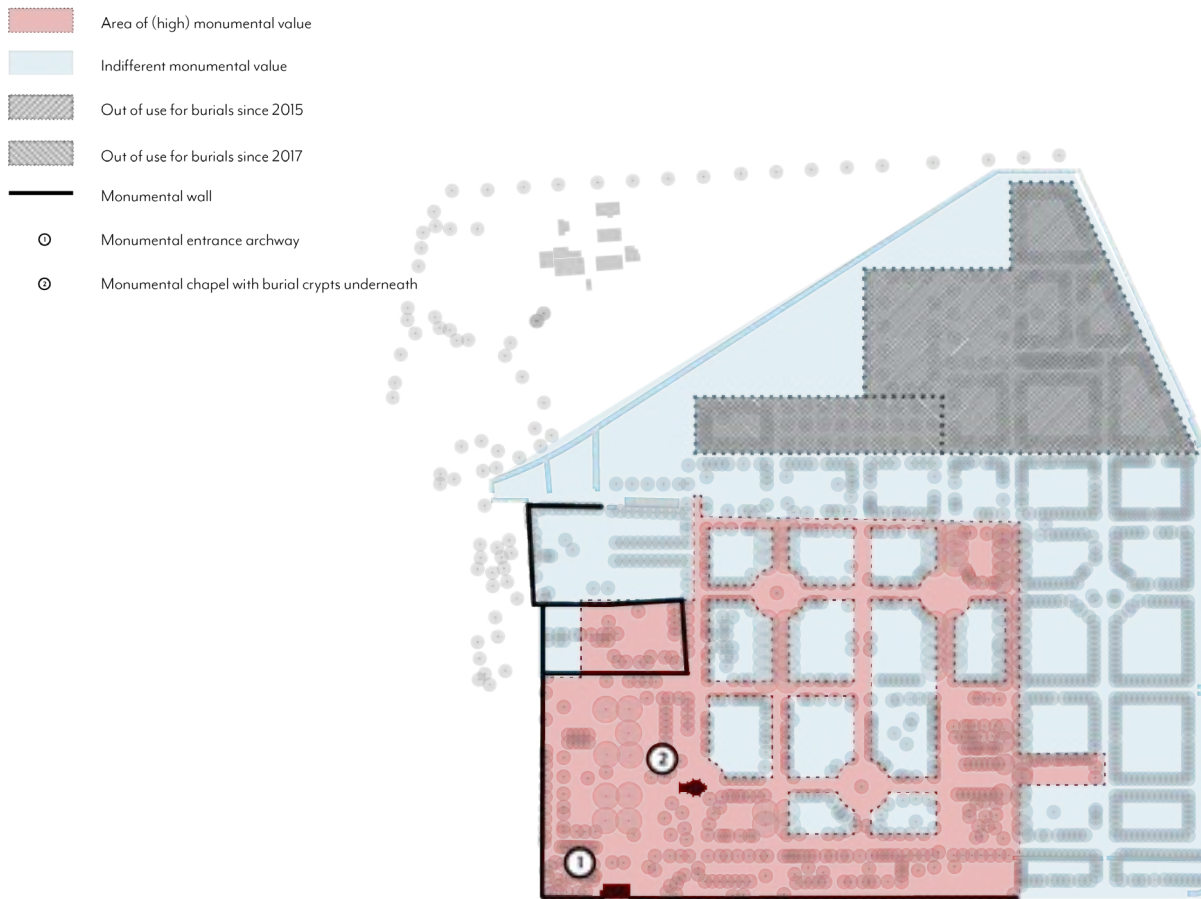
Fig. 6.18: current condition and monumental value, note the historical core in red and the large ring of monumentally indifferent space around it; source: author

GROWTH PROCESS AND CURRENT CODITION

A gradual growth process of the cemetery has happened since. Soiron's 1810 design had a clear layout based on a grid of burial fields or 'rooms' connected by rectangular planted lanes. This grid was the basis for later expansions and is since the structuring spatial principle of the entire cemetery; in basis comparable to what we have seen in the Melaten Cemetery reference study.

Even though the structuring principle of lanes and burial fields has been carried through in later additions and adjustments, they have compromised the initial design's clarity, quality, and diversity. The new additions, especially after 1910, seem to be a thoughtless continuation of Soiron's original grid structure that lacks final direction or an overarching idea. For example, Soiron's design was executed with various trees for each lane, where the later additions are planted with continuous rows of conifers that emphasize a dark and gloomy athomosphere (see subchapter 6.2.4). Also, there was a variation in the size and atmosphere of burial rooms, where expansions turned into repetition of monotonous burial rooms.

In the current condition, there is a monumental core that consists of the 19th and early 20th century parts. This area has a (high) monumental value, which is also endorsed by monument committees. Furthermore, there are large areas of burial fields and lanes that are monumentally indifferent. Therefore, the decommissioning of burial fields can take place in these parts.

Ad hoc extensions have been realized that lack a clear overall identity. They give the place an 'unfinished' feeling, especially on the side of the Planetenhof with the large empty space and undefined edge condition (Fig. 6.27). As a result, an area in strange condition appears, which offers insufficient attractiveness to merge into a meaningful part of the townscape.

The lanes of the recent additions are monotonously planted with cypresss, in contrast to the more diverse, more transparent, and seasonally dynamic lanes in the oldest parts. Besides, it brings about a dark and mournful aesthetic.

The field north of the cemetery is currently reserverd for future expansions in the zoning plan (see Fig. 6.18).
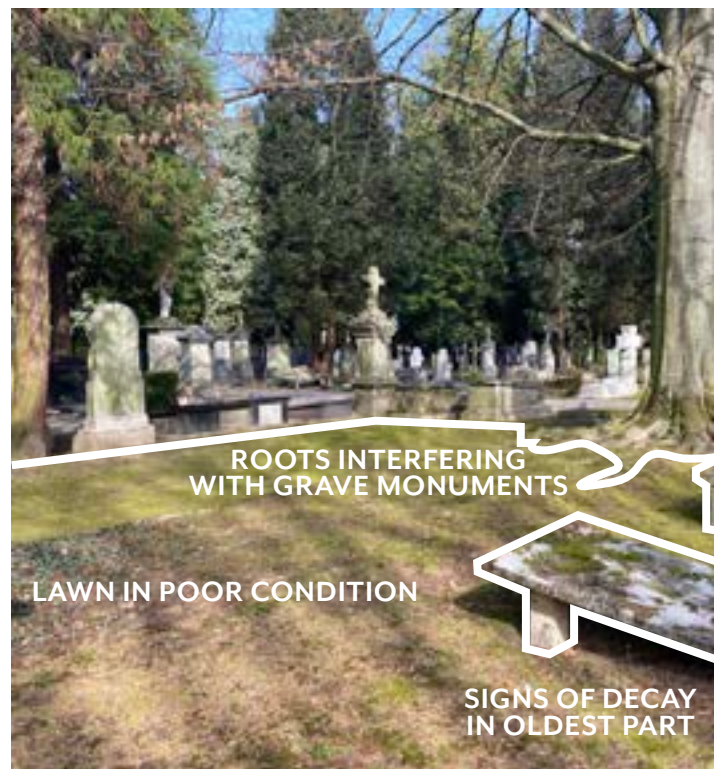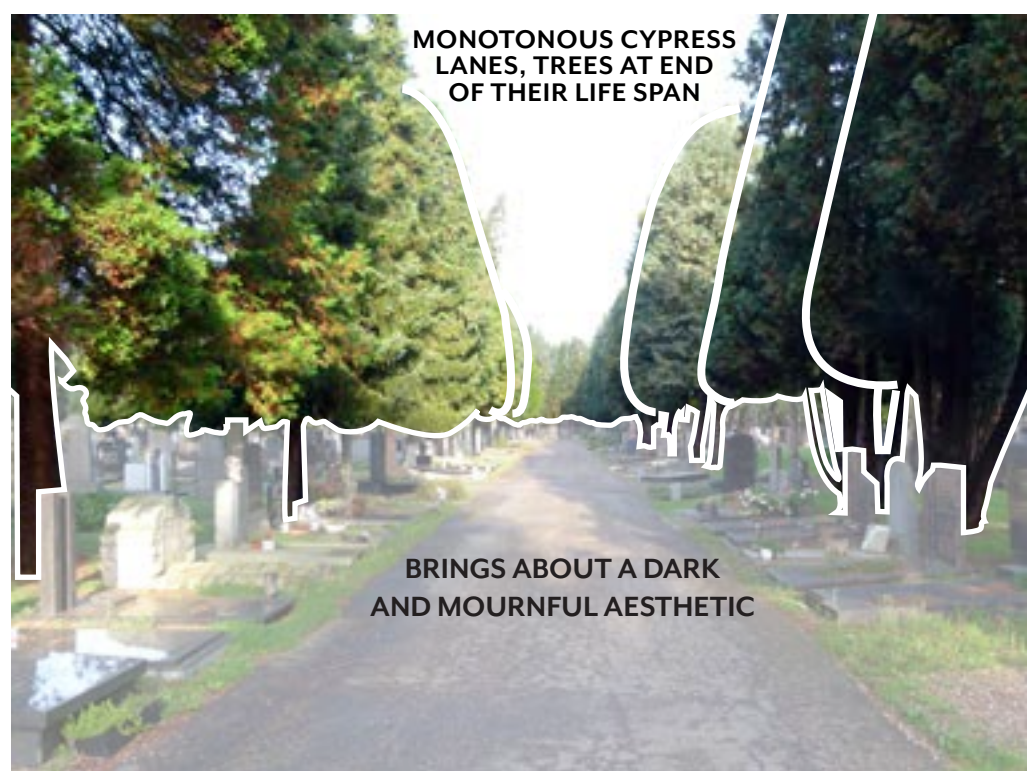
1

MONUMENTAL
MEMORIAL CHAPEL

2

MISSERABLE WASTE BINS AMIDST GRAVES

3

LACK OF WATER TAPS

RANDOMLY
PLACED
IBC CONTAINERS

4

MONUMENTAL ENTRANCE

VIEW INTO BEECH LANE

CEMETERY
MANAGEMENT OFFICE

5

ROOTS INTERFERING
WITH GRAVE MONUMENTS

LAWN IN POOR CONDITION

SIGNS OF DECAY
IN OLDEST PART

Fig. 6.19-6.29: site impressions + analysis; source: author

GATE

MONUMENTAL
BEECH LANE
(TREES IN
GOOD CONDITION)

RANDOM PLACED
CONTAINER BINS

7

MONOTONOUS CYPRESS
LANES, TREES AT END
OF THEIR LIFE SPAN

BRINGS ABOUT A DARK
AND MOURNFUL AESTHETIC

6

GRAVES

MAINTENANCE SHED AND VANS SPILL
OVER INTO THE ADJACENT GRAVE FIELD

8

10

LARGE OPEN FIELD   &   UNDEFINED
EDGE CONDITION

GIVE CEMETERY AN 'UNFINISHED LOOK'

9

11

ANOTHER EXAMPLE OF WASTE
COLLECTION & WATER TAP POINT

9

11

8

10

2

7

6

3

1

5

4

LACK OF COHERENCE
IN BURIAL FIELD PLANTING

CONSTANTLY CHANING
GRAVE DIRECTION

?

HARD TO NAVIGATE ONESELF AROUND

BURIAL INFRASTRCUTURE

	conventional in-ground burial
	in-ground urn burial
	specific burial zone
	war graves
❶ soil and maintenance depot
❷ Islamic burial plots
❸ Jewish burial plots
❹ catholic clergy burial zones
❺ Indonesian war monument + 16 WWII graves
❻ Armenian burial plots
❼ Commonwealth war graves
❽ ash scattering meadow
❾ columbarium niches below chapel
❿ burial site for Maastricht mayors

50 m

Fig. 6.30: burial infrastructure; source: author

6.2.2. CURRENT BURIAL PRODUCTS

The public cemetery has always aimed to offer a final resting place for all Maastricht residents of every faith and way of life. This is historically expressed in burial sections for Protestants and Catholics and nowadays in burial sections for Jews, Muslims, Armenians, and children and prematures at the so-called 'Angel field'. In addition, special sections are dedicated to war graves, the Catholic clergy, and the graves of Maastricht mayors.

Many burial fields lack spatial quality as a result of overdue maintenance or poor design and are in need for an upgrade, see figure 6.31 and 6.32 for examples. Some of the burial fields are too densely laid out, resulting in a cluttered and clogged aesthetic over time.

Chapter 6.5.2. gave an overview of the current burial products. See figure 6.30 for a spatial overview of the current burial products, decommissioned burial fields, and potential areas for transformation into new burial options.

The Cemetery works with grave rights of 20 year, after which extension is possible, on condition that the burial field has not been

Fig. 6.31: the ash scattering field; source: author
Fig. 6.32: many burial fields are underdesigned and some of them very crowded with gravemarkers; source: author

- bus stop
- road side car parking
- entrance
- closed off entrance gate
- maintenance entrance
- primary path
- secondary foot path
- bike lane network
- Blauwe Loper
  (see callout in text)

50 m
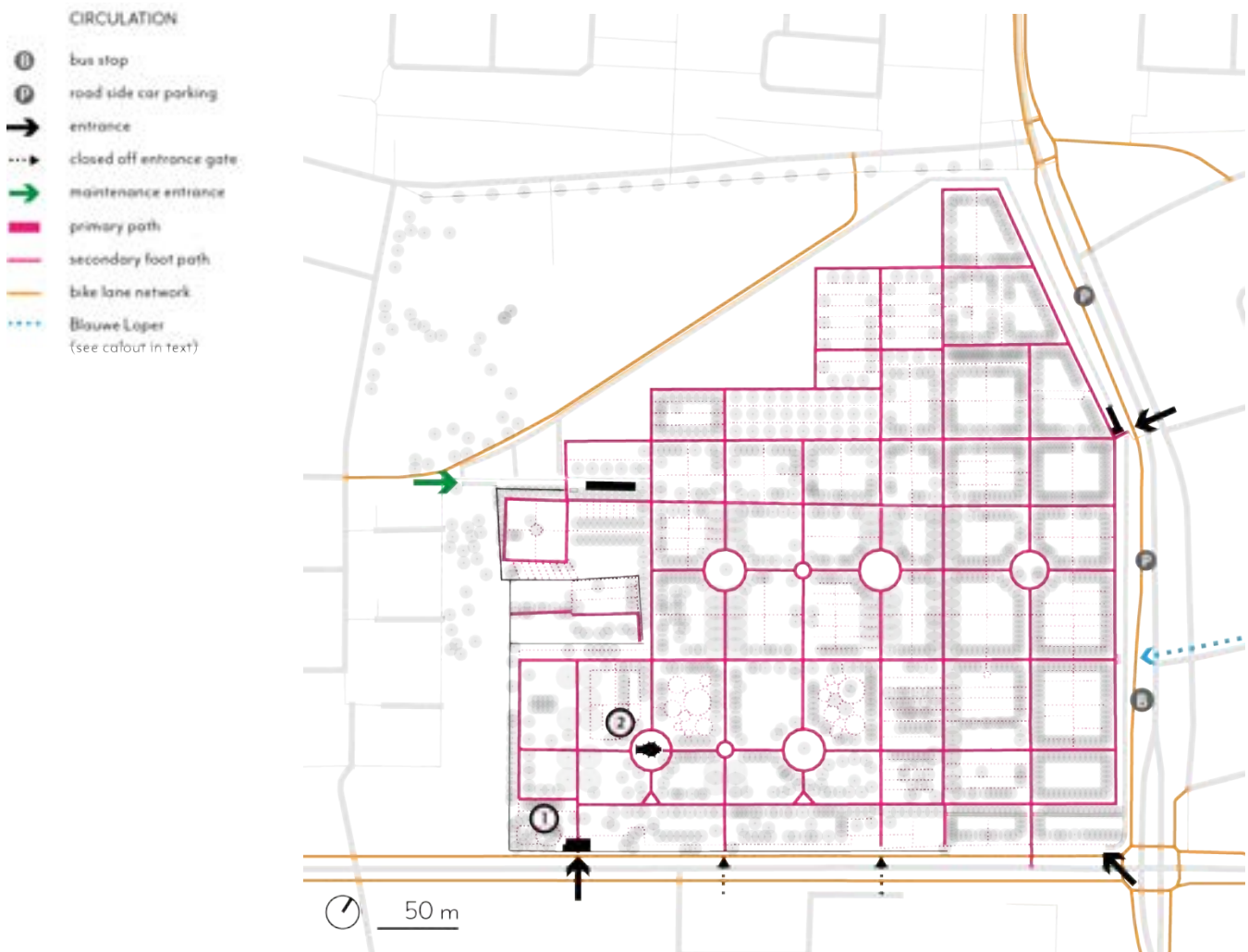
Fig. 6.33: circulation; source: author

6.2.3. CIRCULATION

Expressed in the tree lanes and path system, the site is characterized by its geometric system of axis and crossings. From a practical point of view, this helps visitors can quickly and effectively find their way. In addition, small secondary paths allow the visitor to move around the individual graves of the burial fields.

The cemetery has a limited number of three entrance points for its large perimeter of 1,4 kilometers. The northern side does not even have an entrance. On all sides, streets and bike lanes bump into the cemetery's edges, and the site has great potential to make new connections between the surrounding neighborhoods. New entrance points also hold the potential to create a more porous cemetery. Furthermore, existing entrances have been closed off. E.g. three monumental entrance gates in the wall along the Tongerseweg could potentially provide entrance to the cemetery, but two are closed, and only the one with the gatehouse is currently opened.

The entrance gate along the Tongerseweg serves a the main gate for funeral processions, something to be kept giving its atmosphere and historical significance.

No clear path hierarchy exists; all axis have the same path width and materialization. The cemetery is only allowed to be accesed by foot: bikes are parked in the racks at the entrance points. Given the site's large size and the age of some relatives visiting their loved ones, it should be studied whether and how biking could introduced.

Fig. 6.34: one of the closed off entrances in the wall along the Tongerseweg that could provide new entrance points into the cemetery to open up and increase its permeability; source: author
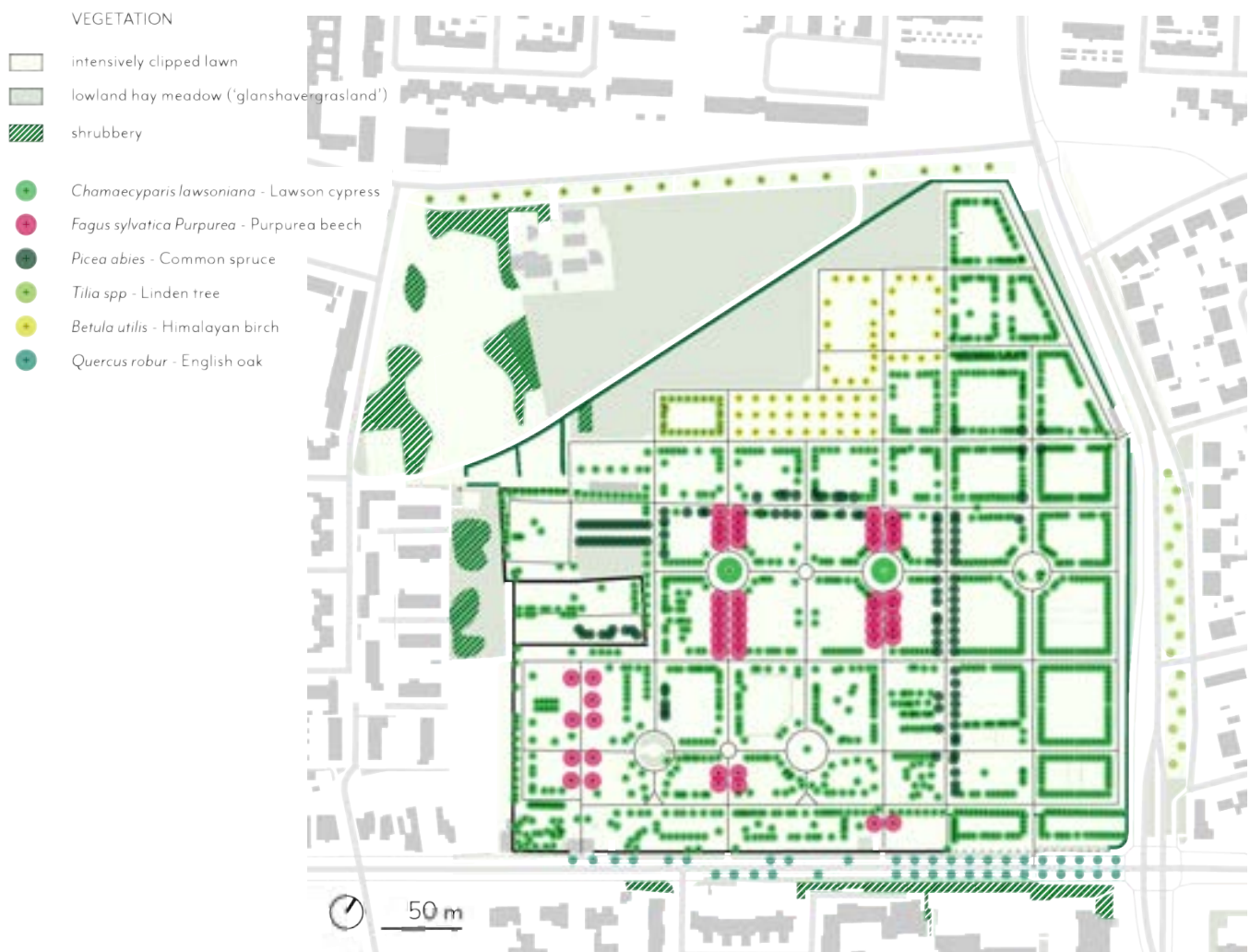
63

VEGETATION

☐ intensively clipped lawn

☐ lowland hay meadow ('glanshavergrasland')

▨ shrubbery

● *Chamaecyparis lawsoniana* - Lawson cypress

● *Fagus sylvatica Purpurea* - Purpurea beech

● *Picea abies* - Common spruce

● *Tilia spp* - Linden tree

● *Betula utilis* - Himalayan birch

● *Quercus robur* - English oak

50 m

Fig. 6.35: vegetation; source: author

6.2.4. VEGETATION

The cemetery is a small urban forest with over 1700 trees. In terms of dendrology, it is currently dominated by species that emphasize the character of the place of death with dark evergreen trees such as the cipresses (*Chamaecyparis lawsoniana*) and the spruces (*Picea abies*). It has little diversity and predominantly consists out of the 1600 cypresses. The palette of trees in the early designs had more variation, but during the extension of 1910, its designer, Rosseel, was not only concerned with the layout of the new section he designed, the existing sections were also redesigned by replacing most of the lanes with the dark evergreen cypresses (Denessen & Bruijnesteijn, 2002).

Furthermore, their dense way of planting prevents daylight from reaching the ground, dries out the soil, and their needles acidify the soil. This results in a bare and empty ground-level where nothings grow, see figure 6.36.

Currently, the Chamaecyparis lawsoniana and some Fagus sylvatica 'Purpurea' are getting at the end of their life span, and the replacement of these lanes should be considered (E. Kaptein, personal communication, October

26, 2020).

This offers the opportunity to rethink a more future-proof and diverse tree palette. The addition of more seasonality (cycles of life & dead), flowering moments, and bright and cheerful aesthetics should be considered.

Fig. 6.36: bare lawns and no understory able to grow under the cypresses and spruces; source: author

thick Thuja plicata hedge

brick wall - 2,7 meters high

fence

trees around edge

Fig. 6.37: circulation; source: author

6.2.5. BOUNDARY CONDITION

The Tongerseweg Cemetery currently is one of a kind that is very closed-off from its surroundings. It has intentionally been designed to be excluded and disconnected from its surroundings. Fences combined with thick evergreen hedges and a high brick wall in the historic part isolate the site from daily life. This makes the cemetery an otherwordly place and dead something invisible and extraordinary, while it is an intrinsic part of life (Kolnberger, 2018). Changing societal perception around the dead asks for a renegotiation of the cemetery landscape and its visibility in the city. Combining this objective with the objective to facilitate increased public use of green urban cemeteries makes a strong argument to open up and make cemeteries more visible within the urban tissue.

The little amount of three entrances for a perimeter of 1,4 kilometer increases the feeling of impermeability of the edge.

As discussed before, the undefined edge condition at the Planetenhof makes the cemetery turn its back to the city.

Fig. 6.38: the cemetery appears as a dark, closed off island in the streetscape, here the southeast corner upon approach from the Tongerseweg; source: Google Earth Pro, 2021

Fig. 6.39: the monumental wall with gate; source: Otter, 2010

Fig. 6.40: beech lane with lots of ecological meaning for species bound to old trees; source: author

Fig. 6.41: Sequoiadendron giganteum, one of the biggest trees in the Netherlands ; source: Monumentaltrees.com, 2021

6.2.6. EXISTING ECOLOGICAL QUALITIES

The cemetery is a green oasis that forms an ecological island in the city where both people and animals find peace. The cemetery has a park-like character, with many trees and meadows on the northern side. The site's main ecological qualities are (Frissen et al., 2009):

→   **Species bound to old trees**: the ecological qualities of the cemetery mainly lie in the presence of the large number as well as the age of some trees. Birds breed here, particularly species tied to mixed coniferous-deciduous forests such as the tawny owl, sparrowhawk, and jay. The old trees also provide nesting opportunities for squirrels and the little bat. All common bird, mammal, and bat species present are protected. In the flora and fauna scan from 2009, ecologists see room for improvement in including more deciduous native trees in the stock of trees (Frissen et al., 2009).

→   **Spring flora**: the spring flora that occurs under the trees and between the graves is an important ecological feature for the cemetery, especially in providing the first nectar in early spring when insects start foraging.

→   **Lowland hay meadows**: lastly, the lowland hay meadows (*'Glanshavergraslanden'*) are most interesting for their flora and insects. Butterflies such as the Icarus find host plants and nectar plants here. Essential in their management is to mow them maximum 1 or 2 times a year.

Fig. 6.42: Spring flora is present in a couple of spots in the monumental core of the site. Shown here a carpet of Scilla; source: author

As discussed in chapter 6.2.4. the monotonic stand of 1600+ cypress trees leaves room for a more diverse urban forest. Furthermore, most of the burial fields consist of clipped lawn or have no planting at all, also leaving room for improvements.

When aiming to design in connection with the larger ecological system, it is crucial to focus on interventions that relate to the wider territory, as we have seen in chapter four. Therefore, the characteristic nature types of the

Fig. 6.43: abundant spring flora on the forest floor of a oak-beech forest; source: Frank den Hond, 2021

Fig. 6.44: oak-hornbeam forest; source: G. Gerding, 2006

Fig. 6.45: oak-hornbeam forest with common hazels in its understory; source: Ecopedia, 2021

Fig. 6.46: lowland hay meadows; source: D. Frissen, 2017

Maastricht landscape are interesting to consider in the design phase of the thesis. That is to say, the **oak-beech forest** (Fago-Quercetum) and **oak-hornbeam forest** (Stellario-Carpinetum). Especially the oak-hornbeam forest is very characteristic of the hillsides of southern Limburg. Oak-Beech forest are rather common on the plateaus of southern Limburg. They both have a **rich understory** of common hazel (Corylus avellana) and abundant spring flora covering the entire forest floor in spring (e.g. snow drops, wild garlic, crocus, scilla).

6.3. DESIGN BRIEF

Based on the city and site scale analysis, key points have arisen that should be tackled in the design. Summarized the design should respond to:

Diversification of the burial product offering

Making space for contemporary burial practices

Catching up on overdue maintenance and seize it as an opportunity for a quality impulse
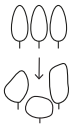
Replacing the large number of cypress trees at the end of their life span and diversify the stand of trees

Moving from a closed-off island towards a welcoming memorial park with a recognizable face towards the city
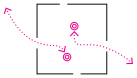
Increased public use and making space for appropriate cultural activities
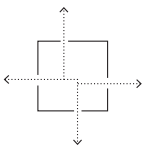
Improving accessibility by making new connections to the surrounding street grid and establishing new neighborhood and city-wide connections
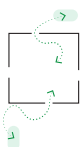
Linking the cemetery with the wider Maastricht green infrastructure and the Jeker valley

7.   SYNTHESIS: MAASTRICHT MEMORIAL PARK

7.1.   DESIGN AIMS

This chapter presents the strategies and design interventions for the Tongerseweg Cemetery, which are based on the preceding research chapters. It answers the design question:

How could the Tongerseweg cemtery serve a wider array of functions as public park and green infrastructure, besides burial?

The overal design objective for the Tongerseweg Cemetery is to **embrace increased public use** and **improve its contribution to the green infrastructure** of Maastricht. Thereby it aims to transform the site from a closed off island into a recognizable memorial park in the middle of an urbanized environment. Making an (optically) open area with a clear and inviting atmosphere that appeals to wander around and relax, but also to contemplate, encounter other relatives or memorialise on one's own.

Furthermore, the design is influenced by contemporary and future-oriented ways of thinking about death and memorialisation. This is not the primary concern of the research, but is an important objective given the current outdated offering of the cemetery.

The proposed strategies and design are placed in a time frame from now up to 25 years. As an active cemetery, burial plots are constantly sold and the management works with grave rights of twenty years. Therefore, leased burial plots influence when and where changing and redevelopping the landscape is possible. Expert judgement was part of the design process and Erik ter Heide, who manages the public cemetery of Boxtel, has shown me on-site that is possible to start a process of redevelopment in an active cemetery. In that case sticking to a long term strategic vision and plan is a necessity, to secure a coherent and consistent result.

BUILT UP OF THE CHAPTER

First, four strategies are presented that set out a direction and clear objectives for future developments. This is followed by a 'masterplan' that shows the long-term vision for the cemetery. The 'masterplan' is split out in different types of interventions. Lastly, five highlights are presented that concretize the interventions.

7.2.   CONNECTION TO GUIDELINES

Appendix 2 is a catalog with all guidelines that were developed during the reference study and the design phase. The application of specific guidelines in this design is referred to by means of the angle bracket symbol (>).

7.3.   STRATEGIES

7.3.1.   STRATEGY 1:
POSITION CEMETERY IN NOWADAYS

The cemetery adopts a **pluriform approach** and offers much **wider variety of burial options**. Therefore investments should be made in increasing the product range to improve operations. Existing products are upgraded and new products are added. The point of departure is that everybody is equal, thus there is no hierarchy between cheaper and more expensive burial plots. Furthermore, **contemporary funeral rituals** are embedded, such as an outdoor funeral ceremonies. Spatially, the monumental core (see 6.3.1.) is **renovated and upgraded** to offer the more traditional ways of burial, since its monumental status doesn't allow big changes. The areas of indifferent monumental value are **redevelopped** and adapted to offer newly introduced burial options.

REDEVELOP

RENOVATE + UPGRADE

Fig. 7.1: graphic depiction of the pluriform approach; source: author

7.3.2.   STRATEGY 2:
NATURE INCLUSIVE PLACE OF BURIAL

The cemetery becomes a more nature-inclusive place of burial, whereby the ecological value of the cemetery is significantly improved. This strategy is two-fold: providing **more sustainable burial options**, given that conventional practices come at a high environmental cost (Keijzer et al., 2014), and **improving the cemetery's ecological qualities in relation to the larger green infrastructure**.

More sustainable burial options are achieved through new sustainable burial options, e.g., natural burial, and through space-saving burial options that leave more room for landscape development, e.g. urn gardens.

Ecological improvements are mainly related to (1) the gradual transformation of the current cypress monoculture into a richer, more diverse evergreen-deciduous lanes and urban forest,   (2) the transformation into more diverse burial rooms and urban meadows, and (3) newly proposed connections to the rest of the green infrastructure.

Fig. 7.2: the 'Living Cocoon', developed by TU Delft, as a sustainable burial option; source: TU Delft, 2021
Fig. 7.3: example of compact urn graves that leave room for forest development at Berestein Cemetery, Hilversum; source: Holm, 2015

low programming

Tongerseweg Cemetery

1 Van de Vennepark
2 Viegenpark

6 Groene Loper

9 Charles Eyck Park

high historic value   recently built

4 Frontenpark

7 Waldeckpark

3 Parc Montagne
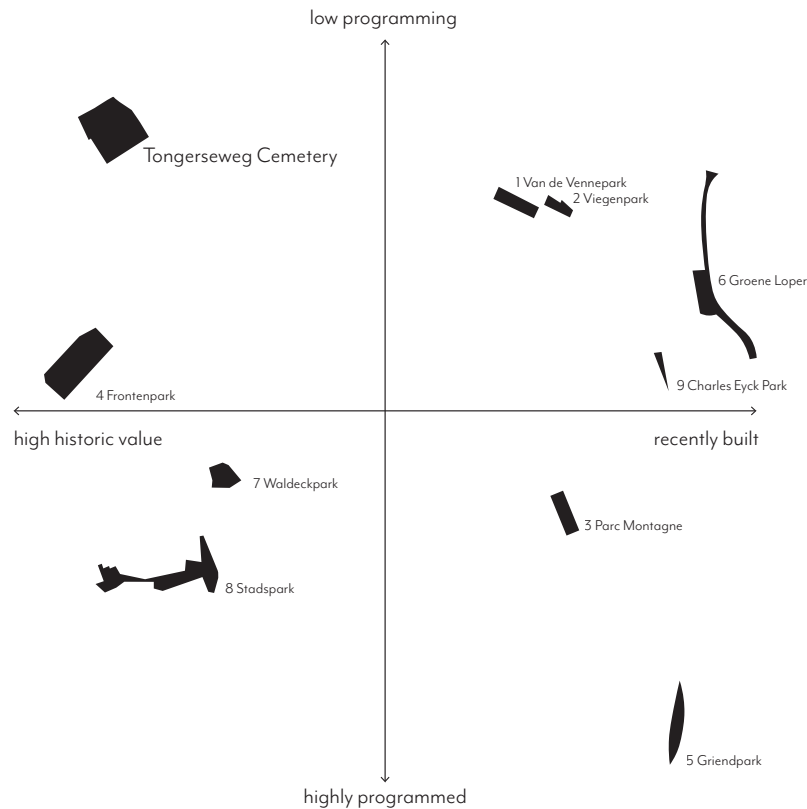
8 Stadspark

5 Griendpark

highly programmed

Fig. 7.4: the Tongerseweg Cemetery as a park positioned in relation to the other Maastricht parks; source: author

> TOOL POSITION THE CEMETERY PARK IN ITS SURROUNDINGS AS THROUGHFARE AND DESTINATION

7.3.3.   STRATEGY 3:
NEW MEANINGFUL PARK ON ALL SCALES

The cemetery shifts from a closed off-island to a recognizable (memorial) park. The cemetery adds new qualities as a public park to the daily lives of surrounding inhabitants, becomes a new addition to the existing park spectrum as a **multifunctional memorial park for the entire city**. By offering burial facilities unique to the region, the Tongerseweg can regionally profile itself and increase its relevance.

Tongerseweg Cemetery

Skogskyrkogården,
Stockholm (SE)

Melaten Cemetery,
Cologne (DE)

Green Wood Cemetery,
New York (US)

green suburban context   dense built-up context
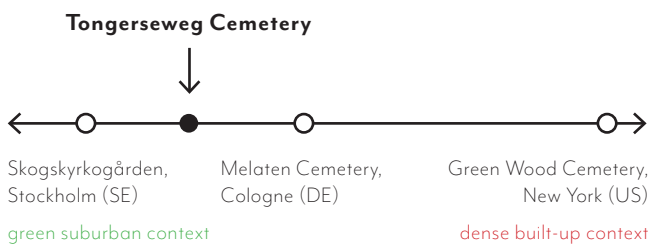
Fig. 7.5: as expanded upon in chapter three and in the reference study, the type of park functions depends on the cemetery's context and what other parks already have to offer. In relation to the reference study, the Tongerseweg is located between the Skogskyrkogården and Melaten Cemetery; source: author

REGIONAL SCALE

Regional profiling: Green burial, Armenian & Islamic burial facilities unique to the region (see chapter 6.1.4.)

MAASTRICHT SCALE

- Multifunctional memorial park for entire city
- Place for memory, mourning, reflection and healing, ceremony and collective action
- Appropriate cultural programming, e.g. classical chamber music
-

NEIGHBOURHOOD SCALE

- Place of encounter for surrounding neighborhoods
- Quiet and contemplative space
- Cool(ing) zone during summer heat
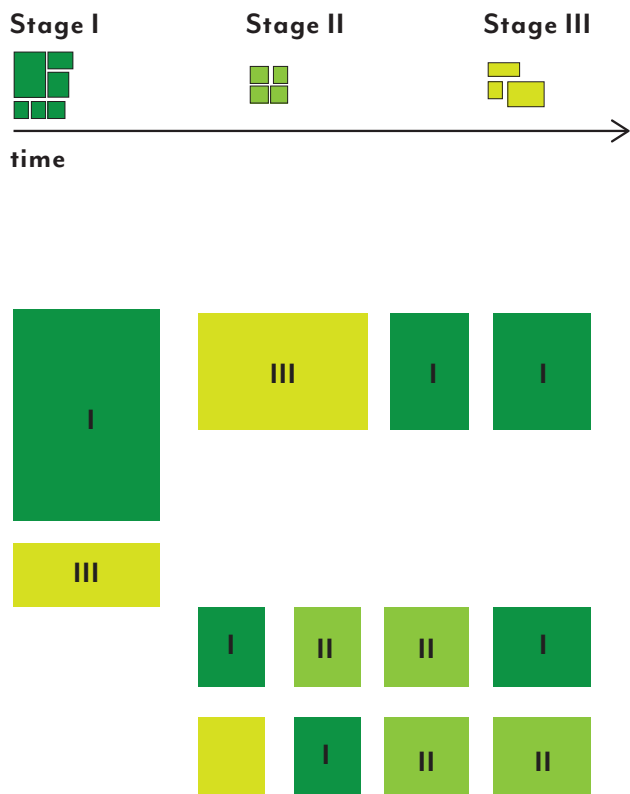- Improved connectivity between neighborhoods
- Extension of Blauwe Loper

time

Fig. 7.6: graphic depiction of the phased transformation of burial fields into a variety of 'garden rooms'; source: author

7.3.4. STRATEGY 4 : PHASING ITS REALIZATION

As an active cemetery where several burials take place every week, the masterplan's implementation is phased. It is a **process of (re)development rather than one single project**. Therefore, two typologies are introduced to phase the interventions gradually:

⟶ **Garden rooms**: the cemetery comprises plenty of burial fields that are developed separately from each other, when the time is right. The program and size of the burial fields differ. Thereby, every burial field becomes a world on its own, and an exciting juxtaposition of garden rooms and (forest) glades comes into existence. This perfectly matches the local landscape in the south of Limburg, with its various typologies of small enclosed spaces. The reference study on Melaten Cemetery is a good reference for this approach.

⟶ **Phased forest development**: The decommissioned burial fields and inactive parts are transformed into a natural burial and memorial forest. 1,5 hectares are immediately available for the development of a memorial forest. Other (to be) decommissioned fields are gradually transformed into a more wooded area. Here, the locally characteristic oak-hornbeam and oak-beech forests are used as archetypes.

Different typologies of of small enclosed spaces that are characteristic of the local landscape in the south of Limburg.

Top to bottom:
Fig. 7.7: Sint-Servaasbron, Jeker valley; source: author
Fig. 7.8: *'Carrehoeve'*; source: Klement, 2020
Fig. 7.9: Cloister gardens in the St. Servaas basilica; source: Marcelmulder68, 2014
Fig. 7.10: orchard landscape of the south of Limburg; source: Frans Voncken, 2019

source: Duncan Cargill, 2021

source: Jingbin Wu, 2019

source: Jonathan Buckley, 2021

source: Ecopedia, 2021

source: Les Snats, 2021

Fig. 7.11: graphic depiction of the phased transformation of burial fields into the memorial forest; source: author

PHASE I
NOW

Closed burial field -
no new burials occur.

PHASE II
0 - 20 YEARS

Step-by-step burial plots become vacant when grave lease rights end. Gradualy the plots are given out for natural burial.

PLANTING STRATEGY
Empty plots are planted with fast growing common hazels and large specimen oaks, beeches and hornbeam. Small woodland plants are planted as understory that will form significant and mature groups.
Inspired on 'the Nuttery' at Sissinghurst Gardens.

PHASE III
20 YEARS

All conventional graves have expired and the contours of the new memorial forest appear.

PLANTING STRATEGY
Natural burials and ash scatterings are marked by naturalising bulbs (stinsenmix) that expand over time, merging into a bold flower carpet in spring.

PHASE IV
> 20 YEARS

The memorial forest has become a mature urban forest in the middle of Maastricht. It is low maintenance compared to the conventional burial field that was here before.

PLANTING STRATEGY
Initially densely planted to quickly establish a full-grown aesthetic, selected thinning can now be done to stimulate succesive growth.

Fig. 7.12: masterplan - situation in > 25 years; source: author

primary path +
mown strip along meadow edge

bike lanes

mown lawn path

columbarium garden

managed perennial urn garden

rough meadow

historical burial room

woodland + stinsenflora

cherry burial orchard

pavilion

--- subtle & modest fence
for security after nightfall

→ entrance

strengthened tree lanes

⬚① highlight + number

1. existing neighborhood park integrated in developments (outside fenced area)
2. forest glade memorial pavilion
3. ceremonial / event pavilion
4. Islamic burial site
5. Jewish burial site
6. Catholic clergy burial site
7. Indonesian war monument
8. Armenian burial site
9. Improved war graves memorial site
10. Burial site for Maastricht mayors
11. Memorial chapel
12. Monumental entrance arch
13. New maintenance shed

7.4.   INTERVENTIONS

7.4.1.   MASTERPLAN

The masterplan was developed to steer the various interventions over time and secure their coherence, aiming to develop a multifunctional mourning and memorial park with room for appropriate public and cultural activities.

The cemetery regains its position in the urban fabric, with an optically more open and more inviting edge condition, where it previously had turned its back to the city. The cemetery's circulation is better integrated with the surrounding street grid, properly mingling private and public uses.

The cemetery itself is a rich and layered design with different atmospheres and a juxtaposition of open and closed, light and shaded, and public and private. It is all bound together by the grid structure that has steered the site's development since 1810, but more playfully and loosely, not as strict and monotonous as it always was. This development will also add a richer and more biodiverse patch to the city's green infrastructure than it is today.

Furthermore, regarding burial Maastricht will gain a memorial forest and natural cemetery (only the thirteenth so far in the Netherlands), and the burial offering will be better aligned with the nowadays and future burial market, securing a healthy and fruitful third century of the cemetery's life.

The plan combines a variety of elements and atmospheres that are broken down in the following paragraphs. In addition, five highlights have been worked out in more detail that elaborate on design details and the design's tactility on the small scale.

See figure 7.13 for the burial typologies embedded in the masterplan.

50 m

conventional in-ground burial

natural forest burial

urn garden (in-ground burial)

specific burial zone

war graves

upgraded ash scattering meadow as part of the urn garden

1.   forest glade memorial pavilion
2.   ash scattering in dedicated spots in the memorial forest
3.   outdoor ceremonial pavilion
4.   Islamic burial site
5.   Jewish burial site'
6.   columbarium garden
7.   Catholic clergy burial site
8.   Indonesian war monument
9.   Armenian burial site
10.   Improved war graves memorial site
11.   Burial site for Maastricht mayors
12.   Soil and maintenance shed

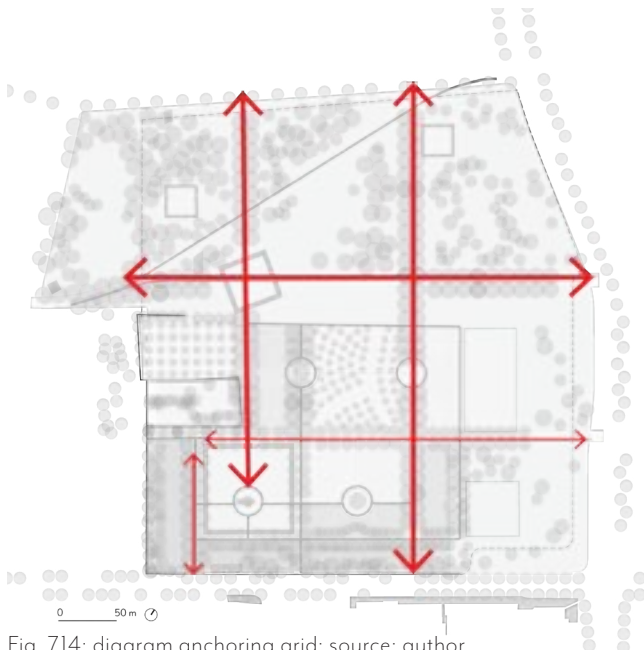Fig. 7.13: burial infrastructure embedded in masterplan; source: author

Fig. 7.14: diagram anchoring grid; source: author

7.4.2. ANCHORING HISTORICAL GRID

Fragments of the historical grid are accentuated and extended into the new parts. Thereby it holds the entire design together and secures continuity and an easily navigable site.

Fig. 7.15: diagram rooms and glades; source: author

7.4.3. ROOMS & GLADES

A series of fields, garden rooms, and forest glades bring special moments and surprises while moving throughout the site. Furthermore, it breaks up the large site into comprehensible and intimate areas and offers a place to turn inwards upon oneself.

> TOOL PROVIDE SPACES THAT SUGGEST SECLUSION AND PRIVACY

Fig. 7.16: diagram of phasing; source: author

7.4.5. PHASING

By studying the readily available space, which burial fields have been decommissioned and which could be in the future, a suggestion is given on how the plan could be executed in three phases: I. now, II. 0 – 10 years, and III. 10 – 25 years. See subchapter 7.3.4. for two main phasing tools.
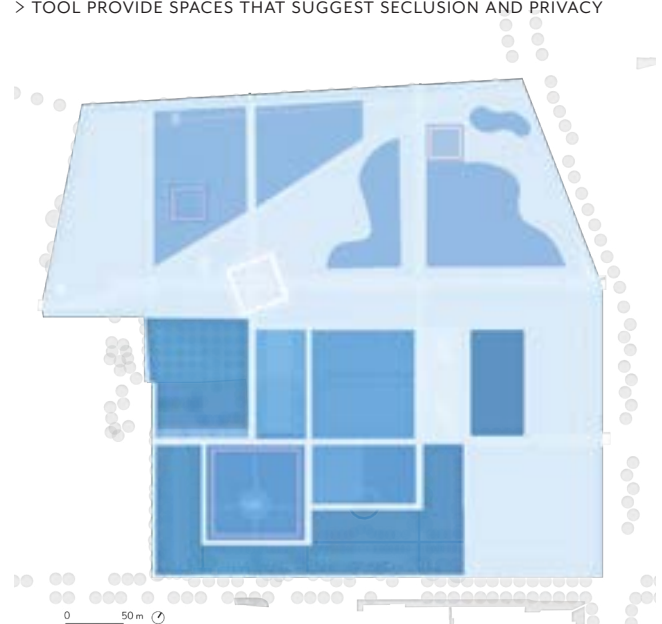
Fig. 7.17: diagram levels of privateness; source: author

7.4.6. PUBLIC-SEMI-PUBLIC-PRIVATE

The masterplan holds areas with varying degrees of public and privateness. A clear path hierarchy, thresholds (planting and low walls), and the provision of secluded spaces balance the cemetery's use by both the bereaved and public joint usage.

Fig. 7.18: diagram pavilions; source: author

7.4.4. PAVILIONS AS ANCHORING POINTS

A set of four pavilions is proposed that define an area and can be flexibly used for different programming. Furthermore, they offer anchor points while moving on-site and provide the area with an iconic identity. Designed as bold pergolas, their columns are inspired by Romanesque architecture that is so typical for Maastricht. They are built from beige rammed concrete, referring to local materiality.

> TOOL PROVIDE SPACES THAT SUGGEST SECLUSION AND PRIVACY

Climbing Plants

Roof

Columns
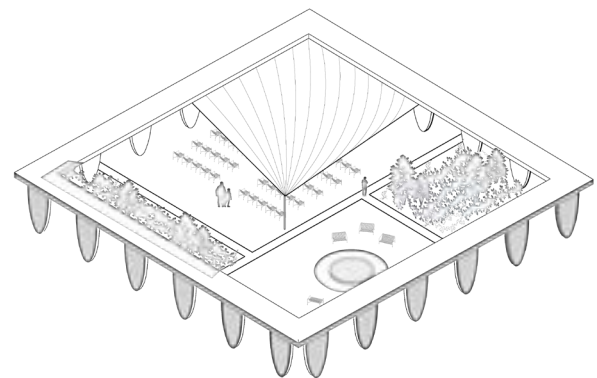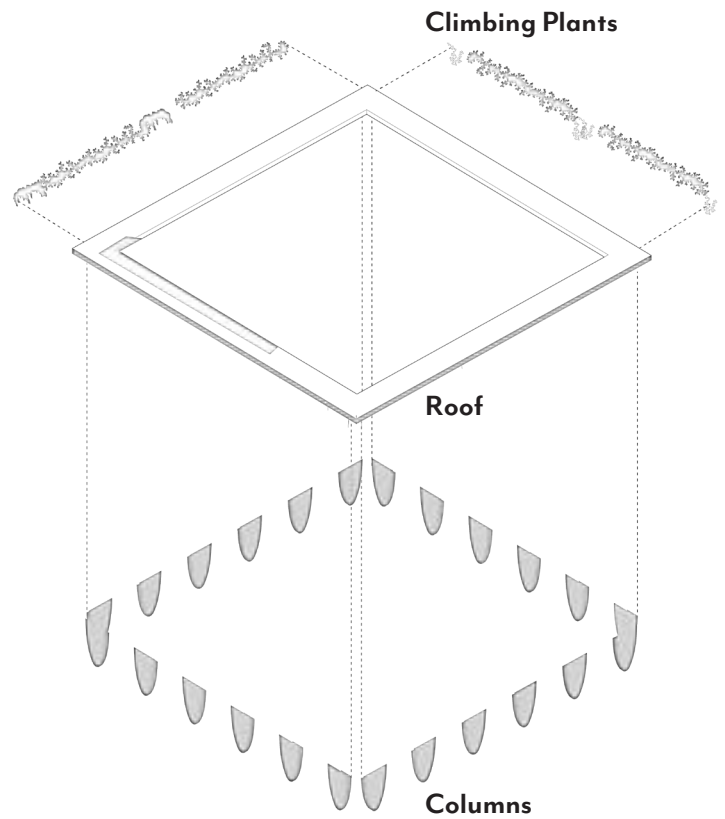
Ceremonial Pavilion
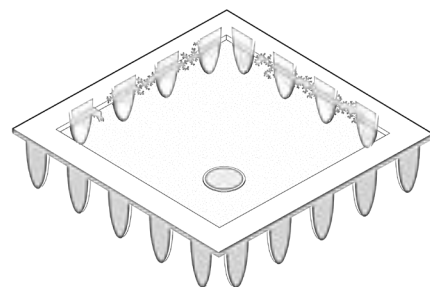
Forest Pavilion

Fig. 7.19: basic principle of the pergola structure that comes back in different forms around the site; source: author

VEGETATION

Ap	*Acer pseudoplatanus* 'antropurpureum' - Purple Sycamore Maple
Ar	*Acer rubrum* - Red Maple
Ah	*Aesculus hippocastanum* 'Baumannii' - Baumanii Horse Chestnut
Cl	*Chamaecyparis lawsoniana* - Lawson cypress
Fs	*Fagus sylvatica* 'Purpurea' - Purpurea beech
Mk	*Magnolia kobus* - Kobus magnolia
Pa	*Picea abies* - Common spruce
Py	*Prunus x yedoensis* - Yoshino cherry
Qp	*Quercus petraea* 'Ryan' - Ryan sessile Oak
Qr	*Quercus robur* - English oak
Sg	*Sequoiadendron giganteum* - Giant Sequoia
Ti	*Tilia spp* - Linden tree

Mixed deciduous forest:
30% *Carpinus betulus* - Hornbeam
30% *Quercus robur* - English oak
20% *Corylus avellana* - Common hazel
20% *Fagus sylvatica* - Common beech

0   50 m

Top: Fig. 7.20: proposed tree plan; source: author
Bottom: Fig. 7.21: tree selection; source: author

Roots				↔	↓	↓	↔	↓	↓	↓	↓	↓	↓	↔
Height (m)	25-30	15-25	20-25	15-25	25-40	5-7	25-30	7-15	25-35	8-10	25-30	25-30	>40	20-30

↓ = deep tap root system   ↔ = shallow root system at surface

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PROPOSED GROUNDCOVER

	lawn
	lowland hay meadow
	managed perennial garden
	native woodland understory + naturalising bulbs
	shadeloving groundcover planting
	mixed native hedge

0   50 m
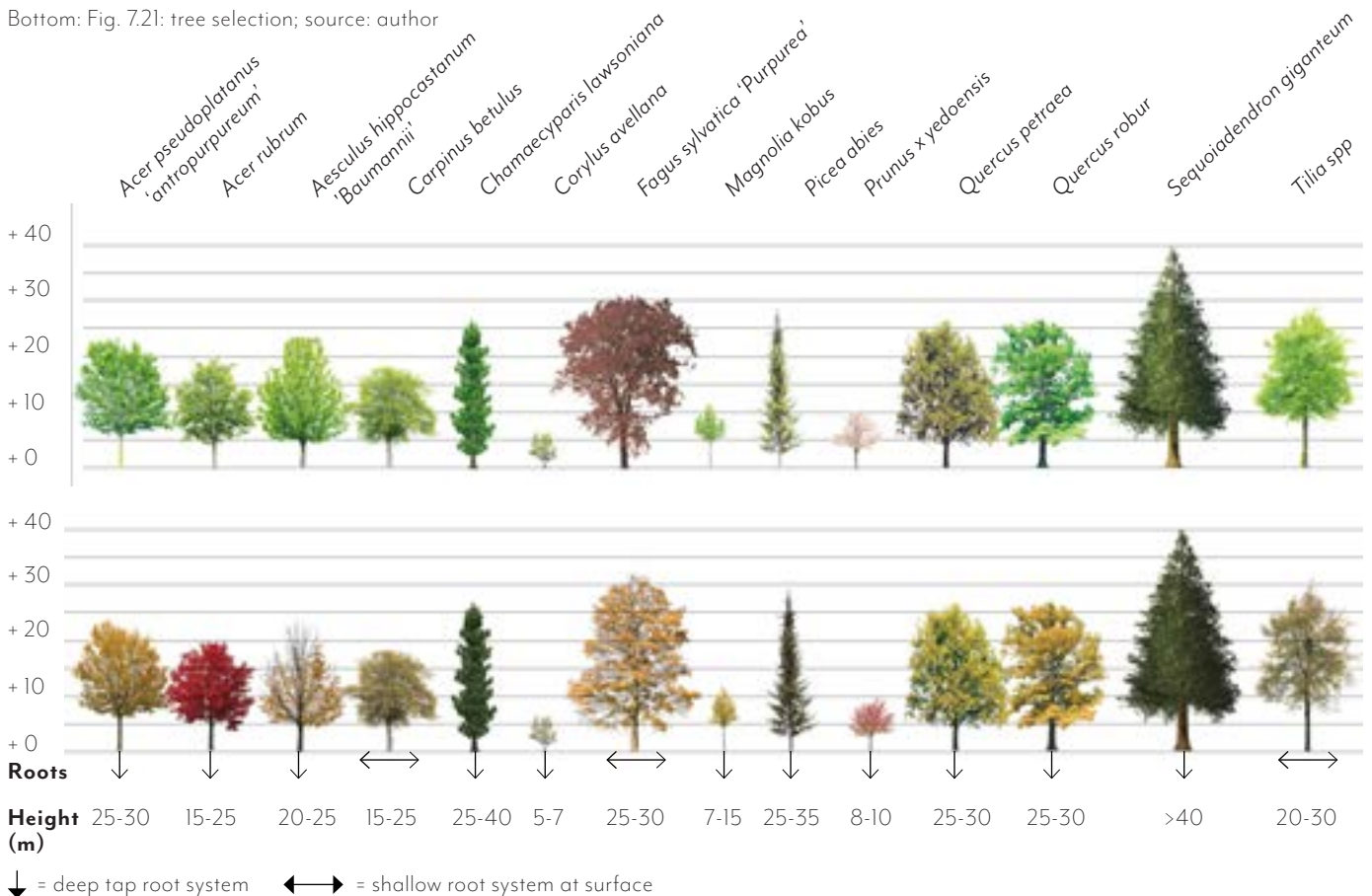
Fig. 7.22: proposed groundcover; source: author

7.4.7. PLANTING STRATEGY: AN URBAN ARBORETUM

A light and airy planting palette is used that brings about a more pleasant and relativizing atmosphere to the cemetery. By working with various forms, textures, colors, and seasonality, a park with year-round interest is created, also for those not visiting a grave. See scheme 7.20 for the variety of trees and the color spectacle of various reds and yellows in fall. The symbolic connotation, of course, relates to bringing the cycle of life into the site, starting in spring and traveling through periods of growth until death and decay.

The tree's root characteristics have been taken into account in the tree selection process and in their place on site, to avoid unwanted interference with burials and grave digging.

It is of importance to gradually replant the allees to prevent large clearings at once; which is also ecologically undesirable. The urgence is there: the oldest cypresses at the end of their life span could be replaced first, from then gradually rolling out the new vegetation scheme step by step.

> TOOL CREATE THRESHOLDS THAT HELP TRANSITION BETWEEN PUBLIC AND PRIVATENESS
> TOOL CREATE HETEROGENITY OF HABITATS

CIRCULATION

- 🅱 bus stop
- 🅿 road side car parking
- ↔ entrance
- ▬▬ primary path
- ⋯⋯ secondary foot path
- ── mown grass path
- ── bike lane network
- ▬▬ slow traffic routes crossing the cemetery
- ▪▪▪ ceremonial funeral route
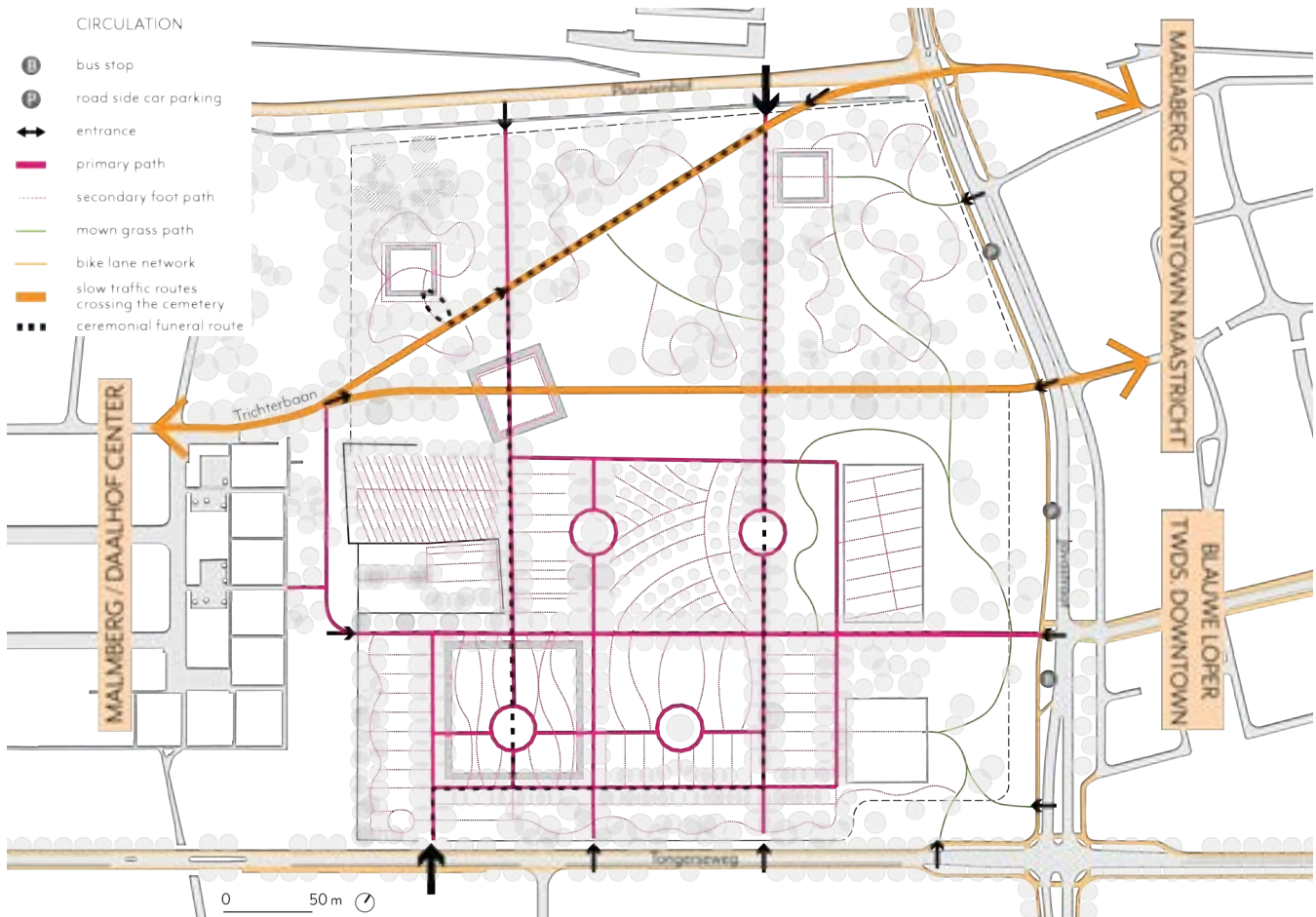
Fig. 7.23: proposed circulation; source: author

7.4.8.   CIRCULATION, PATH HIERARCHY & ENTRANCE HIERARCHY

The circulation scheme is closely linked to the integration of the cemetery and city. Public use of a cemetery increases when it becomes part of people's daily movement patterns, thus a generous amount of formal and informal entrances are made. They are aligned to the existing urban grid provides ample opportunities to enter the park.

The monumental entrance gate along the Tongerseweg and a new entrance close to the memorial pavilion are the formal main entrances that offer the grandeur for a funeral procession to enter. Eleven informal secondary entrances are more subtly designed and function as welcoming entrances for residents and relatives visiting the deceased alike.

Through this action, the cemetery goes from three entrances now to thirteen entrances in total, thereby generously increasing the site's porosity. In addition, new connections between the surrounding neighborhoods are made, and east-west thoroughfares from the suburbs towards downtown Maastricht are realized.

> TOOL CREATE A PATH HIERARCHY
> TOOL MAKE A HIERARCHY OF ENTRANCES
> TOOL MAKE ACCESIBLE FOR ALL MODES OF SLOW-TRAFFIC AND DISCOURAGE THE USE OF CARS
> TOOL CREATE CLEAR A TO B THROUGHFARES
> TOOL ALIGN PATHS AND ENTRANCES TO EXISTING URBAN GRID THAT MAKE MEANINGFUL CONNECTIONS

Fig. 7.24: proposed measures for better integration of the cemetery into the larger green infrastructure system; source: author

	City park & neighbourhood green
	Pollinator strips in municipal green
	Strengthening tree lanes (polinator value + bats & bird migration route)
	Green private gardens as stepping stones
	Tongerseweg Cemetery

Habitat for:

	Midwife toad
	Swallow
	Wide variety of native insects
	Wall lizard
	European hamster
	Red Squirrel
	Badger
	Tawny Owl
	Wall Flora

7.4.9.   EMBEDDING IN REGIONAL LANDSCAPE INFRA & ECOLOGY

A set of strategies and policy advises is provided in figure 7.24. They aim to better integrate the Tongerseweg cemetery in the wider Maastricht green infrastructure focussing on:

- Improving the connections to the concentric structure of neighborhood green and city and improve their ecological quality.
- Improving the connection towards the Jeker valley, the closest nature reserve to the cemetery.
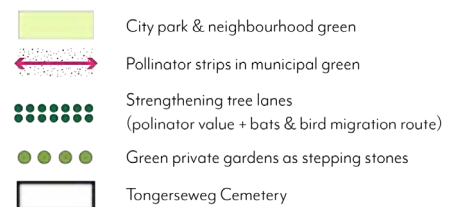
> TOOL CREATE A VARIETY OF CONNECTIONS SPECIFIC TO DIFFERENT TARGET SPECIES
> TOOL RELATE INTERVENTIONS TO WIDER TERRITORY AND BUILT FROM EXISTING (REGIONAL) CONDITIONS
> TOOL DESIGN WITH POINTS, SURFACES AND LINES IN MIND TO CREATE COHERENT ECOSYSTEM CONNECTIVITY

7.5.   HIGHLIGHTS

Fig. 7.25: transformed allee - spring rendering; source: author

7.5.1.   HIGHLIGHT 1: TRANSFORMING THE ALLEES

The transformed allees are planted with deciduous species that bring seasonality, dramatic fall colors, and magical dappled sunlight to the lanes. Besides, a more transparent canopy allows more daylight to reach the ground and allows the development of a rich understory. A dense carpet of flowering spring bulbs kicks off the arrival of spring. Furthermore, the pavement is improved and seized as an opportunity to introduce sustainable water collection that is later re-used to water grave plants. Water throughs, as seen in subchapter 7.5.6., are located at crossing points of the allees to fill a watering can.

> TOOL USE CONTEMPORARY, LIGHT PLANTING WITH SEASONAL INTERESTS THAT PROVIDES FOR SPATIAL EXPERIENCE
> TOOL PLANT TREES IN A WAY THEY HAVE THE SPACE AND TIME TO GROW INTO MATURE TREES

Fig. 7.26: transformed allee - summer rendering; source: author

BURIAL DENSITY OF 700 GRAVES/HECTARE
similar density as nature cemetery 'Witteveen' in Drenthe
that is part of the Dutch Nature Network (NNN)

Planted lane that extends the grid
into the new memorial forest

Messy ecosystems, orderly frames:
stately allee for funeral processions

Carpinus betulus

Querc

Ash scattering
regulated by
absorbtion capacity

Engraved field stone and/or GPS coordinate

Buried at depth of 100 cm to cre
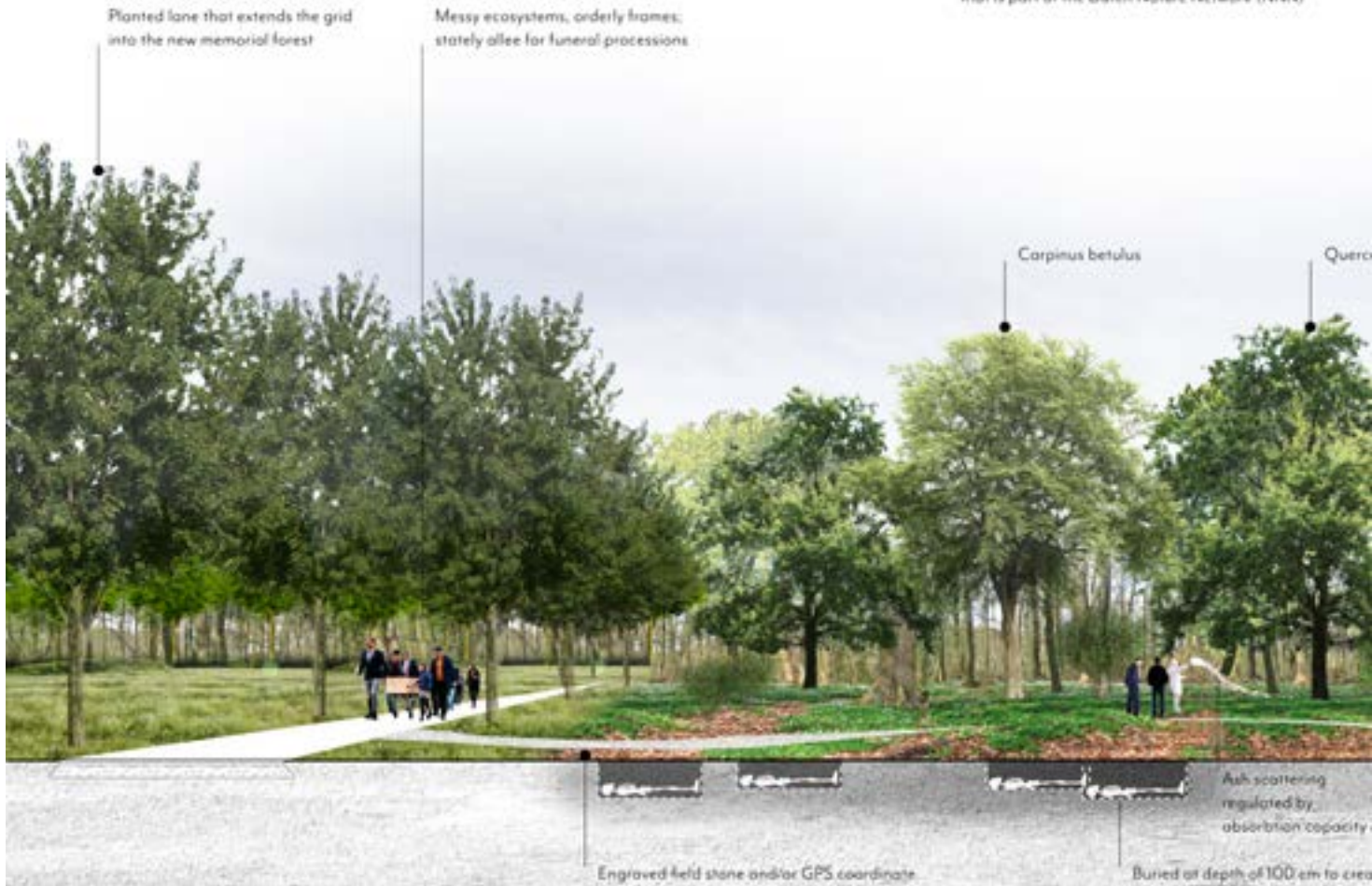
Fig. 7.27: section of the memorial forest looking south;
source: author

7.5.2.   HIGHLIGHT 2:
MEMORIAL FOREST

The memorial forest caters to the lack of green burial options in the region. More than 1,5 hectares is instantly available to realize a burial forest and will keep growing following the transformation of closed burial fields into a memorial forest, as presented in strategy 4. In addition, the memorial forest itself is relatively low-maintenance, which compensates for increased maintenance obligations required for other parts of the design.

The proposed oak-beech-hornbeam forest is an eclectic mix of the local oak-beech and oak-hornbeam forest typologies in discussion with forest ecologist Friso van der Zee.

Given that a green burial or ash scattering has minimal grave markings, a forest glade with a pavilion is proposed that offers a physical place for memorialization and a place for inscribing the name of a deceased relative.

> TOOL PROVIDE SPACES THAT SUGGEST SECLUSION AND PRIVACY
> TOOL INTRODUCE SUSTAINABLE BURIAL PRACTICES
> TOOL MESSY ECOSYSTEMS, ORDERLY FRAMES
> TOOL RETAIN QUIET AND UNDISTURBED PLACES

(NL)

Pergola enhanced by engraved detail memorialising the name, nicknames, GPS coordinate and other information

Memorial & flower pond

Pergola from beige rammed concrete referring to local materiality and Roman architecture

us robur

Fagus Sylvatica

Lonicera periclymenum

Corylus avellana

bedaria holostea

of soil

he odor barrier
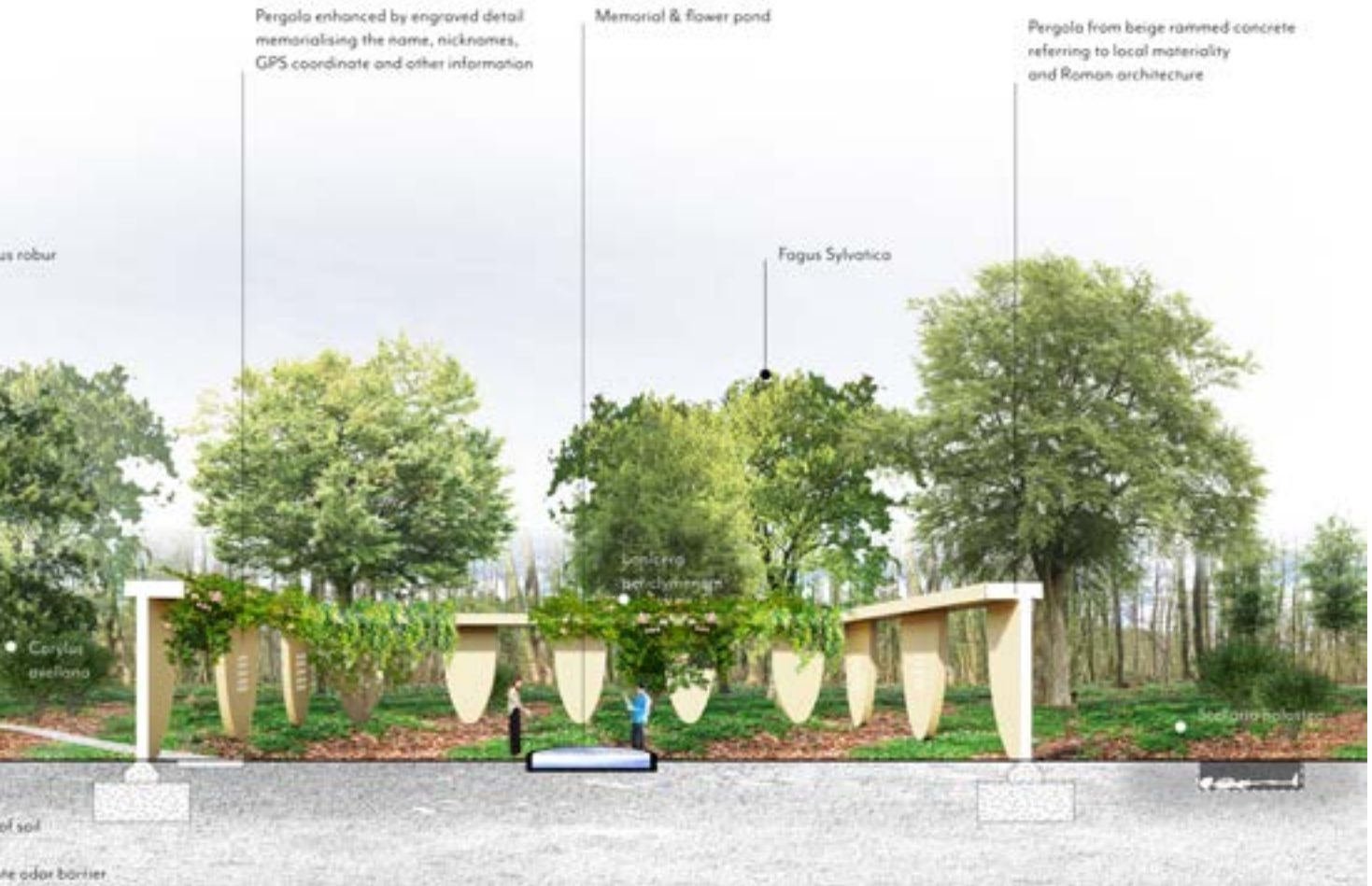
7.5.3.   HIGHLIGHT 3:
BURIAL ORCHARD

Referring to the local fruit orchard in the hills of southern Limburg, a burial orchard is introduced that accomodate 'conventional' casket and urn burial. The paths and rows are designed slightly curving to prevent the feeling of an endless burial field. The burial orchard is planted with specimen Prunus × yedoensis, which are also planted in the famous cherry groves along Tidal Basin (Washington DC,US) and in the 'Amsterdamse Bos' (Amsterdam, Netherlands). They flower exuberantly.

> TOOL CREATE THRESHOLDS THAT HELP TRANSITION BETWEEN PUBLIC AND PRIVATENESS
> TOOL AIM FOR SUBSERVIENT MEMORIALS AND BALANCE VISUAL DISTURBANCE WITH A STRONG CONTINUOUS GREEN DECOR
> TOOL CREATE COMPACT BURIAL FACILITIES, LEAVING SPACE OPEN FOR LANDSCAPE DEVELOPMENT

Fig. 7.28: burial orchard looking north; source: author

Yoshino Cherry
Prunus x yedoensis

hedge as a threshold that helps transition from the public footpath to the more private burial orchard

Pastoral oak gate

urn grave near tree to minimize soil disturbance

2.2x1.4 casket grave

Snake's head fritillary
Fritillaria meleagris

Flexible four season heavy duty t
pergola structure used for attach

Shadbush
Amelanchier Lamarc

Purple moor grass
Molinia caerulea M

White foxglove
Digitalis purpurea 'Alb

Iris
Iris 'Benton Nigel'

Autumn moor grass
Sesleria autumnalis

7.5.4.   HIGHLIGHT 4: CEREMONIAL PAVILION

A ceremonial pavilion arises in an already available area and thus can be added to the cemetery relatively quickly. It defines a multifunctional area that can be used for funeral rituals, memorial events such as All Saints Day, and side-programming that centers around art and appropriate performances (e.g., classical music/exposition). Furthermore, it is a focal meeting point where one can encounter other people dealing with the same emotions.

Pergola from beige rammed concrete
referring to local materiality
and Roman architecture

Informal seating for
meeting & encounters

Reflection pond for laying down flowers
- such as Minneslund in Skogskyrkogården

arp -
ment

kii

oarhexe

Fig. 7.29: ceremonial pavilion looking west; source: author

> TOOL DESIGN SPACES WHERE NO BURIAL OCCURS AND THAT LEAVE
ROOM FOR OTHER PROGRAM
> STRATEGY OFFER (FREQUENT) APPROPRIATE CULTURAL EVENTS

Demarcated and set apart
by newly introduced wall

Beige rammed concrete
referring to local materiality

New central memorial location
providing enough space bundling
all memorial activities

Quercus robur

Wall Brown
Lasiommata megera

New routing and
information signage

Bench from rammed concrete

7.5.5.   HIGHLIGHT 5:
OPENING UP & CLUSTERING
MILITARY MEMORIAL SITE

Large parts of the cemetery's edge condition are transformed into an optically open area that appeals to enter, such as here around the corner of the Javastraat and Tongerseweg. Given the low ecological value of the eastern edges, the transformation into these open lowland hay meadows also brings a significant ecological improvement. In this corner, a military burial site has always been hidden between the trees. Through this design move, it is placed in the spotlight of society again and is given credit where credit is due. In addition, this new memorial location provides enough space to bundle all war-related memorial events. Up till now, the site always was short of space during these events.

Eagle-owl
Bubo bubo

SLOW-TRAFFIC THROUGHFARE

Recreational joint-usage of main avenues

Extention of the 'Blauwer Loper'
connecting downtown and Daalhof

Red poppy
Papaver somniferum

Mown lawn path

Fig. 7.30: looking towards the military memorial site; source: author

> STRATEGY MAKE THE CEMETERY VISIBLE WITHIN THE URBAN FABRIC
> TOOL MAKE TRANSPARANT AND PERMEABLE EDGE CONDITION
> TOOL GRADUALLY TRANSFORM CLIPPED LAWNS TO URBAN MEADOWS

870

1500

1400

700

1500

1500

700

1500

100

1500

250
100

3000

250
100

350
100

Meuse river

Tongerseweg Cemetery

N

Loss

downtown
Maastricht

Maastricht formation

Gulpen formation

Vaals formation

Carboniferous
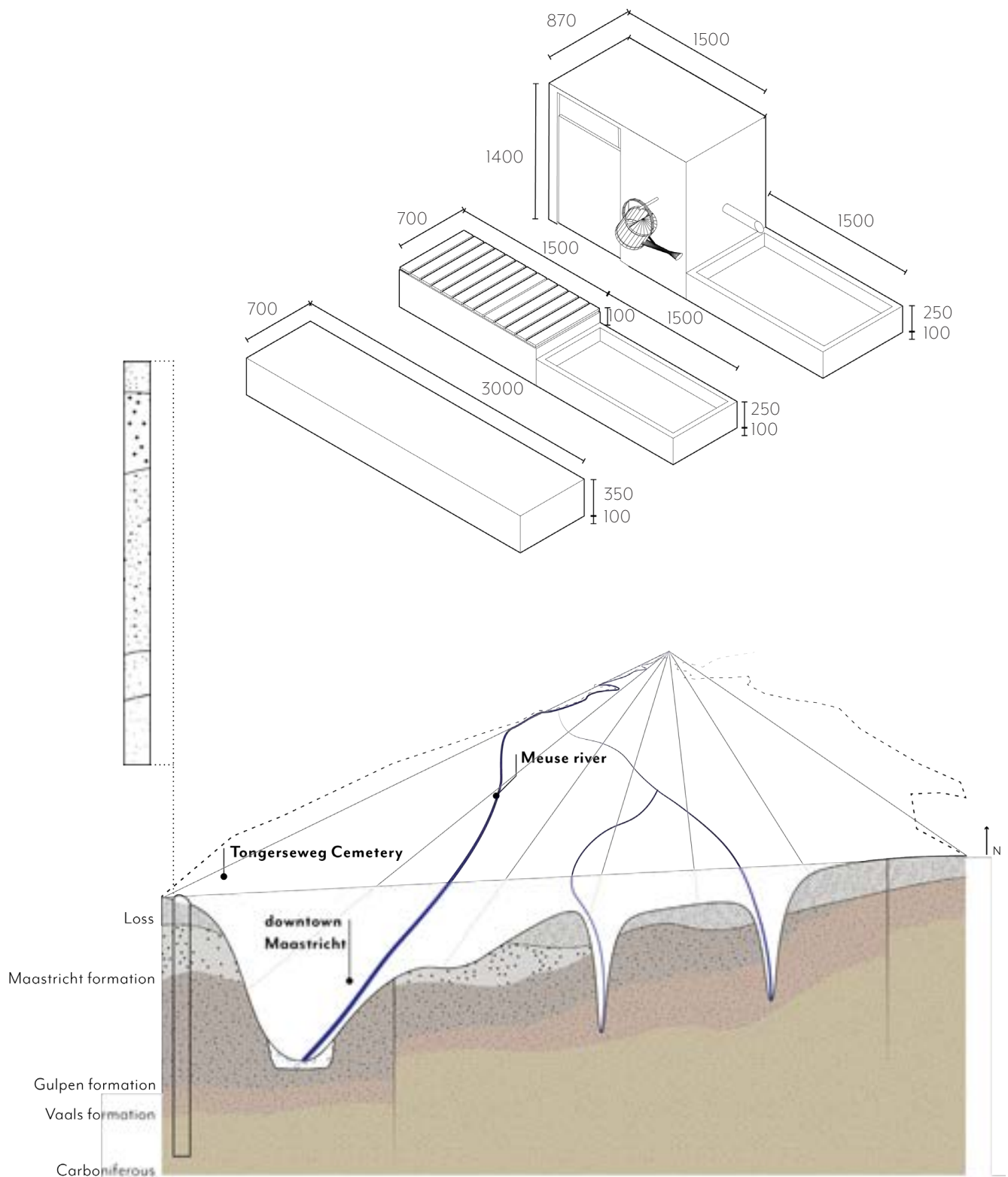
Fig. 7.31: The use of rammed concrete in furniture and the pavilions is a reference to the local geology, reflected by the subtle color and texture differences seen in rammed concrete. Units in millimeters; source: author
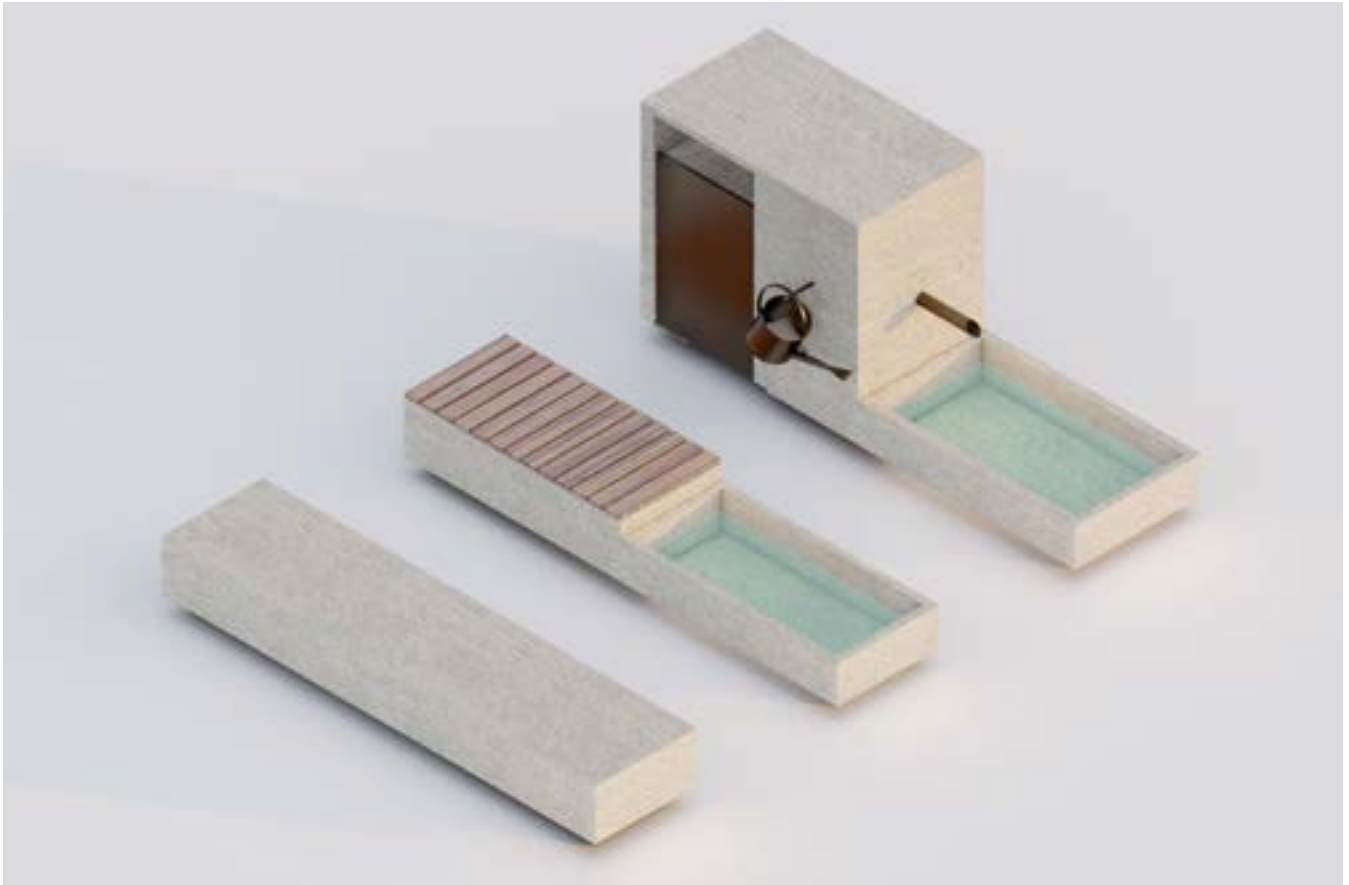
Fig. 7.32: render of proposed series of benches, water throughs and waste collection made with rammed concrete; source: author

Fig. 7.33: use of rammed concrete at the Bruder Klaus Kapelle by Peter Zumthor in Wachendorf, Germany; source: Willem-Jan Beeren, 2011

Fig. 7.34: use of rammed concrete at Kolumba Museum courtyard in Cologne by Vogt landscape architects; source: Danish Architecture Center, 2021

8. DISCUSSION & REFLECTION

This discussion interprets the thesis' results, which methods were used, and of what use these were, including shortcomings.

GENERATION OF DESIGN GUIDELINES

The generation of an extensive set of guidelines is one of the two major outcomes of this thesis but has to be critically reviewed.

The research provides an extensive foundation for reflective practitioners that work on the (re-)design of green urban cemeteries. The catalog with design guidelines saves them the time of looking for relevant literature and best-practice examples and allows them to design more effectively.

Furthermore, the organizing system of different scales and levels of abstraction is its power. This was one of the most complex parts of the reference study. However, after a long iterative process, the introduction of the current ordering system has dramatically increased the usability of the tools in other design cases. Furthermore, the different levels of abstraction lead to an increase of the research's applicability since it makes the guidelines as specific as they need to be and at the same time have the necessary openness for the application in specific design cases (Prominski, 2017).

The reference study in itself is a normative way of doing research, as the interpretation of references and making correlations between the references is partially influenced by the person that executes the research (Swaffield & Deming, 2011). Neglect of theory would be misleading (Prominski, 2016) and therefore, the final set of guidelines is, more than planned before, supported by a mix of theories. It draws from the humanities and social and environmental sciences. This is specified under every guideline. Thereby sub-research questions 1 and 2 have had more influence on the reference study than planned before; the outcomes of sub-research question 2 even directly led to design tools.

During the first steps of formulating guidelines on green infrastructure and ecological performance, my ecological knowledge seemed insufficient to see patterns and similarities in the references as quickly as I did regarding the integration of public park functions. Therefore, the theory on green infrastructure and ecology from sub-

research question 2 was brought in to formulate additional guidelines that I did not find in the reference study. In addition, this use of contemporary ecological theory allowed the development of more progressive ecological guidelines since not all contemporary ways of dealing with green burial and ecological management were present in the selected references.

TESTING OF THE GUIDELINES

During the design process, it became clear the preliminary design guidelines needed to be formulated more clearly and precisely, which is a standard procedure during guideline testing (Prominski, 2017). No new guidelines were invented during the design phase. More time than planned was spent on the reference studies and generation of design guidelines; Three iterative rounds of guideline generation and ordering followed after each other. This set us up with an already detailed and well-structured toolbox before kicking off the design phase. The most significant adjustments that were made during the design are as following:

- *Tool: position the cemetery park in its surroundings as thoroughfare, destination or both*
  A returning question during the design was what way to integrate the cemetery with the surrounding neighborhood and how it related to other green public spaces. The case studies position themselves as either a thoroughfare, a destination, or as both. Once this was clarified for the Tongerseweg Cemetery, the design process made big steps forward.
- *Tool: dialogue between cultural heritage vs. ecology sector*
  The field of tension between freezing monumental heritage or transforming it influenced this tool, since the design task at the Tongerseweg was closely related to the question of transforming a nationally protected monument. It shows us that cultural and biological values can co-exist in old cemeteries but requires reconciling biodiversity and heritage conservation for it to work.

- *Tool: retain quiet and undisturbed places + Strategy: create varying degrees of public and privateness*

Before improvements were made in the structuring of design guidelines, many public park & ecological design tools were mixed together. The design in Maastricht made clear some tools work both ways. E.g., creating more intimate places with a higher feeling of 'privateness' almost automatically means a quiet and undisturbed spot is created. This also occurs between the tool: aim for subservient memorials and balance visual disturbance with a strong continuous green décor and the tool: create clustered burial facilities, leaving space open for landscape development. They come close in what they try to effect, but their aim and objective differ. Therefore these were separated and properly illustrated to offer a clear and accurate set of guidelines for both public park functions and ecological objectives.

INTERFERING WITH CONFLICTING GUIDELINES

The wide array of guidelines automatically implies conflicting guidelines. Ambitions can be high, but every cemetery has a limited amount of space, and not everything is possible to be included.

In the case of Maastricht, the biggest conflicts encountered were:

- Freezing heritage vs. dynamic heritage management
- Existing cemetery functions vs. loading new park functions
- Ecology: considering nature development against other uses

On top of that, there is also friction between the three of them.

This implies that many design decisions have to be made to find the right balance when guidelines conflict with each other. Here, ecological objectives were always prioritized over the objectives to increase public joint usage. The idea behind this is that park programs can be designed 'nature-inclusively' where ecological objectives can still be integrated, even be it for different target species.

Holding on to the earlier defined ecological core qualities of the site (chapter 6.2.6.) helped to make the design decisions as it was deemed okay to replace one ecological core quality with another ecological core quality. For example, the eastern edge condition changed from a closed-off area that was densely planted with a monoculture of cypress trees into an open meadow, see design highlight 5 (7.5.5.). This establishes an optically open edge condition that looks more inviting and makes the cemetery turns its face to the city. Here, a switch from one ecological quality, a stand of old trees, towards a lowland hay meadow is deemed a proper and desirable outcome.

GREEN URBAN CEMETERIES IN THE WIDER DEBATE

In the beginning of this report, we have positioned green urban cemeteries in the context of the compact city. Urban land is getting scarcer with intensification and competing spatial claims as a result. At the same time, the global COVID-19 pandemic has shown us the need for improved open outdoor spaces. It has been striking to see how two of the reference cases, Skogskyrkogården and Green Wood Cemetery, have been in the news with their increased use as a public park when other parks started to overcrowd with people looking for their bit of outdoor space (Cotto, 2020; SVT, 2021). People vote with their feet, and this pandemic could have kicked of a new era in how green urban cemeteries are designed to be used.

Too many old urban cemeteries in the Netherlands are dull sites, with burial products that are slowly but steadily becoming obsolete and big ecological underperformance, e.g., see the dead ground level in the analysis on the Tongerseweg.

This research has shown the tremendous potential these places hold when they diversify their activities and are planned and designed for a wider user group. On the city scale, they are often a nonentity in green infrastructure planning, while cemeteries present the opportunity to be transformed into biodiverse, climate-positive community spaces. The catalog with guidelines provides an extensive toolbox for how to change that status quo and break the trend.

9. CONCLUSION

This thesis started by positioning green urban cemeteries at the intersection of green infrastructure and joint usage as a public park. In the context of intensification and competing spatial claims, green urban cemeteries are seen as closed-off islands in the urban fabric, which can make way larger contributions to the city's green open space system than they do today.

Sub-research question 1 explored public park functions for green urban cemeteries. It stressed the importance of studying potential park functions for green urban cemeteries in the context of the multifunctional use of green spaces. Furthermore, initially located in the periphery, they have regained their position within the city again, that asks for a renegotiation with their surroundings.

It appeared that the range and extent to which new public park functions can be accommodated is highly dependent on the cemetery's context. The amount of green space already available and local problems and questions at play determine how the cemetery can respond to its surroundings and what new functions could be adequate and applicable to add.

Sub-research question 2 explored the role green urban cemeteries play, or potentially could play, in the green infrastructure. Nowadays, many green urban cemeteries are blind spots in city's green infrastructure planning, whereby their specific role and potential remain unaddressed. However, as stable, quiet, and relatively undisturbed green spaces, they are an outstanding habitat feature compared to other, more dynamic urban landscapes. Through new management practices and the introduction and design of more sustainable burial options, on-site ecological performance could be improved. Furthermore, by better linking the cemetery with the wider green infrastructure, the site's ecological qualities are unlocked and integrated into the larger green infrastructure. Thereby, green urban cemeteries can be regarded as increasingly valuable entities in biodiversity conservation given their ubiquity within urban fabrics worldwide and are simply inevitable when planning and designing in the age of a climate and biodiversity crisis.

In the meantime, the practice side of the landscape architectural discipline hasn't been sitting around doing nothing. There are exemplary projects of green urban

cemeteries at the intersection of green infrastructure and joint usage as a public park. Three reference cases were selected and thoroughly studied. The reference studies and output of SRQ 2 supplied the process of generating design guidelines on facilitating joint public usage and increasing the ecological performance of a green urban cemetery. As mentioned before, the catalog with guidelines provides an extensive toolbox that helps to transform active cemeteries into more biodiverse, climate-positive community spaces.

To test out the toolbox full of guidelines, the Tongerseweg Cemetery in Maastricht was selected as a testbed. It's inner-city location, and typical 19th-century monumental character make it an exemplary case to generalize the design result as input for other Dutch and Northern European cemeteries as well. The inferior spatial quality and downward spiraling exploitation make it a relevant study object.

The proposed design aims to transform the site from a closed-off island into a recognizable memorial park in the middle of an urbanized environment. Making an (optically) open area with a clear and inviting atmosphere that appeals to wander around and relax, but also to contemplate, encounter other relatives or memorialize on one's own. Through the design, the site's habitat qualities are significantly transformed and improved. Thereby, the cemetery is also proposed to be better integrated into the wider Maastricht green infrastructure and the Jeker valley, so its habitat and ecological qualities are unlocked and become available for the larger green infrastructure.

Furthermore, the design is influenced by contemporary and future-oriented ways of thinking about death and memorialization. This is not the primary concern of the research but is an important objective given the current outdated offering of the cemetery.

Altogether the big majority of the generated design guidelines have informed the design of the Tongerseweg, which signifies that the toolbox comes close to providing a complete overview of the interventions needed to accommodate public joint-usage and increased ecological performance in green urban cemeteries, thereby answering the main research question of this thesis.

Thus the biggest outcome of this thesis is what the research and design question resulted in together.

The generic outcome is a catalog that contains all design guidelines: it has a high generalisability. This work is published both in this academic report and as a catalog containing design approaches, strategies, and principles on various levels of abstractions. Thereby, the catalog serves as a reference work for the practice side of the landscape architectural discipline. Thereby, I aim to bring the harvested knowledge 'out there' to be used in future planning and design exercises on green urban cemeteries.

The second outcome is the design for the Tongerseweg Cemetery, a location-specific outcome. The design has been positively received by Erik Kaptein, landscape architect and representative of the municipality of Maastricht, and the hope is that it will become a valuable guide in steering the cemetery's future.

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GUIDELINES CATALOG

UNLOCKING THE POTENTIALS OF
GREEN URBAN CEMETERIES

APENDIX 1
REFERENCE STUDIES + GUIDELINES

DIRCO KOK | WAGENINGEN UNIVERSITY

SKOGSKYRKOGARDEN

Location	**Stockholm (SE)**
Owner	**City of Stockholm - public ownership**
Year	**1917**
Designers	**Gunnar Asplund and Sigurd Lewerentz**
Size	**102 hectares**
Graves	**385.645**
Types	**In-ground burial, urn field, ash scattering**
Hours	**main entrance 24/7 other entrances 11 AM - 4 PM**

Users

- mourning relatives
- pedestrians / stollers
- cyclists
- playing kids
- sledgers
- dogwalkers
- joggers
- roller skaters
- visitors / tourists

59°16'11.3"N 18°06'15.5"E

HISTORY

In the autumn of 1914, an international architectural competition was announced to design a cemetery on the site of a former quarry. Swedish architects Gunnar Asplund and Sigurd Lewerentz won the competition, and their proposal was praised for its its considerate and outstanding character. The proposal stood out as it maintained the area's inherently beautiful features, especially the forest. No wonder, since it was inspired by the, back then, fashionable German forest cemeteries of e.g. Munich and the neoclassical paintings of Caspar David Friedrich (Världsarvet Skogskyrkogården, 2021). The architects designed the entire complex as a gesamtkunstwerk, from landscape to the smallest lamp. The forest cemetery was completed in 1940 and the finished result can be described as a harmonious unity of nature and architecture.

ARCHITECTURAL COMPOSITION

The design is built up from a couple of key moments that create supprising moments while moving through the site. Here, I discuss two of these moments as an example.

First, when ascending through the main entrance, the path splits into two; one entering the pastoral meadowforest clearing complete with a reflecting pond and a tree-lined meditation hill, and the other up to a large cross and the chapels of the Holy Cross, Faith, and Hope. This brings about a very interesting arrival that breaks with the traditional avenue and sightlines seen in many cemeteries. This also makes there is no clutter of gravestones when entering the cemetery; and one arrives at a clean, serene scene, the purpose of which is contemplative and very powerful (Clayden & Woudstra, 2003). The paths then rejoin and become a avenue through a dense grove of tall pine trees, the so-called Way of Seven Wells, leading to the Resurrection Chapel.

Secondly, deep within the forest a massive, gray-plastered wall and a pompous arch signifies an enclosed forest garden that is populated by large pines. Deep within this enclosure the woodland chapel is built. Thus built up of three types of enclosure - wall, dense pine canopy and the chapel itself - it creates a succesional degrees of permeability and privateness, which is able to create a very tranquil and private landscape within the larger landscape.

Fig. 10.1: overview plan; source: author

USE OF PLANTING

The site contained a piece of untouched forest, which was cleared and thinned to realize the design; like carving out a piece of wood. Most of the clearings are geometric and sharp. Walking through the landscape, the repetition of pines and subtle gravemarkers bring transcendance and a sense of mindfulness.

The grave fields themselve are covered with a clipped lawn, giving a clean aesthetic of high stems, a bright green lawn carpet and dotted gravemarkers placed in there. This image is very powerful and calming; it speaks stillness.

The designers added a birch grove south of the central void, defined by lush weeping branches that filter the sun light. It is intended as a transition between the open central void and the dense, darker forest landscape.

CIRCULATION

The designers encircled the site with a dry-stone wall, thereby demarcating and setting apart the cemetery from its surroundings, also an archetypical reference to the classical Swedish walled cemetery. Therefore, the site is only accesible through specific entrance points, that connect to main roads and the city's metro network. There is even a busroute running through the cemetery, that as a

side effect also gives an increased sense of 'publicness' and 'commonplace'.

The entrances are linked to the surrounding street grid. They are of varying appearance and importance. All the entrances are designed very subtle compared to the other cases. The main entrance is wider and a nymphaeum adds some tranquility and serenity while entering. Where the main entrance is designed for funeral processions to enter, these side entrances allow for quick visits.

The large primary paths allow for cars to move freely over the side, but also support joint-usage by cyclists, roller-skaters and sledging in winter.

BURIAL INFRASTRUCTURE & PRESENCE OF DEATH IN DESIGN

With five chapels of varying sizes, three for cremation, the cemetery can accomodate up to five funerals simultaneously. Every morning, the funeral servecies for that day are posted at the entrance.

The outdoor spaces around the chapels and crematorium and their courtyards serve the needs of funeral rituals by accomodating waiting individuals and groups various degrees of formality and informatility, by means of shelter, seating and chaning seasonal plant borders.

The urn gardens north of the main chapel are enclosed by low walls and pergolas, distinguishing them from the void. They contain a series of taller urn walls arranged in parallel groups of three or four. The spaces between these walls are narrow and intimate.

The grave markers in the forest cemetery are subtle and clean, dotted between the pines. Thereby they blend in very well with the forest landscape. The designers seem to have been concerned with the overal landscape lay-out and let the individual graves blend into the forest.

URBAN LIFE & MULTIFUNCTIONAL USE

To some extent, Skogskyrkogarden sees multifunctional use of its site. This is three-fold:

First, the site is a recognized UNESCO heritage site, which brings in visitors that come for tours and sightseeing. Infrastructure such as routing, park plans and a visitors center cater this group.

Secondly, local residents use this site for low-key recreation like a stroll, walking the dog or roller-skating on the wide boulevards. Interestingly, last winter a discussion started in the national media as to how far public joint-usage can go, as big groups of families with their sledges have been out to slide down the hills of the cemetery (SVT, 2021), which was deemed inappropriate.

Thridly, all events organised on site focus on memorialisation of the dead, such as All Saint's Day which is a big communal getogether. Thereby the cemetery takes a place in the local community, but this is associated with its primary function: a place of burial.

Of all three cases, Skogskyrkogarden sees the least public joint-usage. Its lay-out and design, e.g. its successional degrees of privateness, the non-prominence of graves and the tranquil forest, would make it hypothetically suitable for multifunctinal use. However, the availability of alternative green spaces in the green and spaciously laid out neighbourhoods around the site, make this cemetery is predominantly used by people visiting the deceased. Thus, we can conclude a negative correlation between the availability of 'other' nearby green spaces and the occurence of public joint-usage.

central void

holy cross in the middle
of central void

topographical manipulation

entrance axis

sight line

dry stone wall (edge condition)

Fig. 10.2: burial infrastructure; source: author

pine forest

birch grove

lawn dotted with pines

lawn

pond

weeping elm grove

Fig. 10.3: planting design; source: author

metro

bus

car parking

entrance

primary path (accesible by car)

secondary foot path

slow traffic routes

bike lane network

bus route

Fig. 10.4: circulation; source: author

ash scattering forest
on hill

flower stand in
remembrance garden

urn garden

holy cross chapel

crematorium

woodland chapel

resurrection chapel

soil depot

jewish cemetery

flower shop

in-ground burial plots

Fig. 10.5: burial infrastructure; source: author

5

GREEN WOOD CEMETERY

Location	**Brooklyn, New York (US)**
Owner	**Green Wood Historic Fund**
	- charitable organization
Year	**1938**
Designers	**Almerin Hotchkiss**
	David Bates Douglass
	Quennell Rothschild & Partners
Size	**193 ha**
Graves	**570.000**
Types	**In-ground Burial, individual,**
	and communal Mausoleum
Hours	**daily 7 am - 7 pm**

Users   🏃 mourning relatives
         🚶 pedestrians / stollers
         🧺 outdoor hangouts / picnics
         👫 playing kids
         🛷 sledgers
         🦅 birders
         🐕 dogwalkers
         👪 event visitors
         🧍 tourists

40°39'25.9"N 73°59'35.2"W

HISTORY

Green Wood Cemetery was founded on the outskirts of Brooklyn, back then, far enough to be separated from the city but close enough for visitors. The cemetery was the brainchild of Henry Evelyn Pierrepont, a Brooklyn social leader, and inspired by Mount Auburn Cemetery in Cambridge, Massachusetts; one of the first garden cemetery designed as a landscaped park-like setting. It was a popular tourist attraction in the 1850s, and was the burial place for most of the most famous New Yorkers who died during the second half of the 19th century.

Opened in 1838, the Green Wood Cemetery soon became popular for excursions. Green Wood became the fashionable place to be buried. In 1860, Green Wood drew 500,000 visitors a year. Crowds flocked to Green Wood for family outings, carriage rides and sculpture viewing . Green Wood's popularity also helped inspire the need for and creation of public parks, including New York Central Park and Prospect Park in Brooklyn.

ARCHITECTURAL COMPOSITION

The designers left the glacial landscape of knolls and ponds intact. It's plan included retention and beautification of the natural features. They added a winding networks of roads and paths follow the natural contours of the land, that was influenced by the dominant landscape style in fashion at that time.

It results in a suprising landscape of succesive vistas and scenery. Expensive burial plots for the notables are located on prominent corners or viewpoints within this composition, a common practice in the class society during the erection of the cemetery.

USE OF PLANTING

The Green-Wood Cemetery was founded in 1838 as one of America's first rural cemeteries. It's plan included retention and beautification of natural features like ponds and knolls with added roads and paths that followed the natural contours of the land, as well as the planting of hundreds of native and exotic trees and plants. Thereby it comprises arboretum-like qualities featuring a diverse and dynamic collection of trees and shrubbery. The tree collection continues to grow and each new planting is selected for its climate adaptiveness, resilience, wildlife value and aesthetic seasonal beauty. Trees are rare in this

Fig. 10.6: overview plan; source: author

Boorklyn neighbourhood, which also contributes to the public use of the cemetery as public park.

All burial spaces are subject to restrictions concerning grave markers, plantings, and memorial tributes. This results in a serene and wholesome landscaped park aesthetic, preventing the a cluttered and clogged aesthetic over time.

As discussed in chapter four, since 2017 transformative efforts have been set in motion to replace clipped lawns with perennial meadows and wilder urban grasslands (Charap et al., 2020), aimed to increase the site's biodiversity, much needed in the densely built-up Brooklyn.

CIRCULATION

The entrance points of the cemetery are well alligned with the urban grid of surrounding districts, be it a scarce number; four entrances for a 193 hectares park. The gothic archway is a focal point drawing visitors in from 5th Avenue. The other three entrances are more subdued to their surroundings. All entrances are open, free from dark vegetation, offer facilities (e.g. water tap & bathroom) and have a welcoming appearance for visitors. The winding path network and hilly topography make it unsuitable to use the site as a throughfare connecting surrounding neighbourhoods.

7

As a true Northern American cemetery, a widespread network of primary paths is accesible by car. This pushes non-motorists to the roadsides in order to stay safe. The secondary paths for pedestrians therefore make up the primary way to explore the site by foot.

BURIAL INFRASTRUCTURE & PRESENCE OF DEATH IN DESIGN

With a limited number of burial plots available, there are no frequent burials at Greenwood anymore. In the northwestern corner, behind the entrance, the chapels, crematorium and funeral parlour are concentrated.

The cemetery offers traditional in-ground burial and above-ground placement in one of the community mausoleums for both caskets and urns. As a hybrid cemetery, it offers both traditional and "green" practices, which can be harmoniously employed besides eachother. Land is also available for the construction of a family mausoleum or sarcophagus.

All burial spaces are subject to restrictions concerning grave markers, plantings, and memorial tributes. This results in a serene and wholesome landscaped park aesthetic, preventing the a cluttered and clogged aesthetic over time.

URBAN LIFE & MULTIFUNCTIONAL USE

Parks are rare in Boorklyn, making the place stand out and be embraced as a true public park by locals. Despite its limited hours of operation, the cemetery plays an essential role for the surrounding communities. Since it's the only major green space in the area, many people come here to walk their dogs, meet with others, bring their family and kids for a picknick, or escape the heat of the sun as the New York summers can be hot. During my site observations, it was a warm Sunday afternoon and there seemd to be as much people coming to visit the cemetery as a park, as there were people visiting the bereaved. The site's park-like design with winding walking paths and four seasons of beauty from century-and-a-half-old trees make it a peaceful oasis for mourners, visitors and the local communities alike.

Spread out over the site, there are features such as lawns, ponds and flower gardens that explicitely are not used for burial and have been appropriated by locals for informal activities. Furthermore, these areas allow the cemtery to host events such as an outdoor movie screening or the Nightfall light festival around Halloween that offer low-profile and interesting opportunities for locals for new

ways to visit its grounds and generate additional income to support this monumental site.

Thus, we can conclude the cemetery is truely part of the local communities and actively invites urban life through its gates. The reasons are its park-like (gardenesque) design style and areas that leave room for other activies that make it a pleasant environment to be in. Furthermore, its extensive voluntary programs and year-round programming of events create strong links with local communities and get's groups of people in touch with the cemetery that would not visit it otherwise.
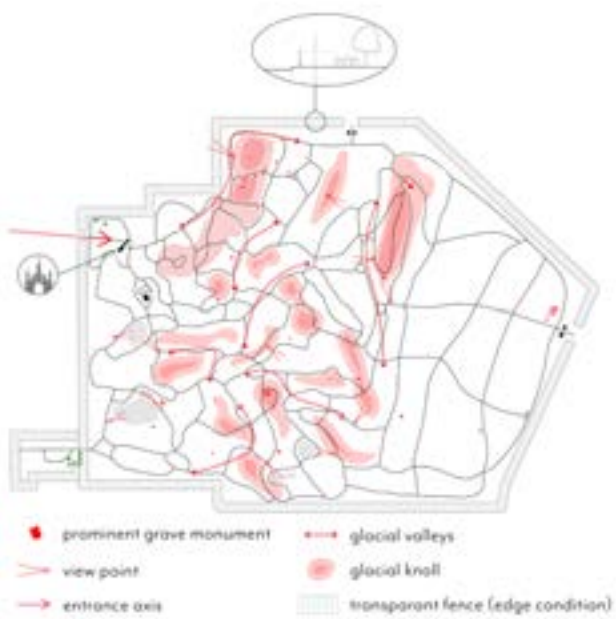
Fig. 10.7: burial infrastructure; source: author
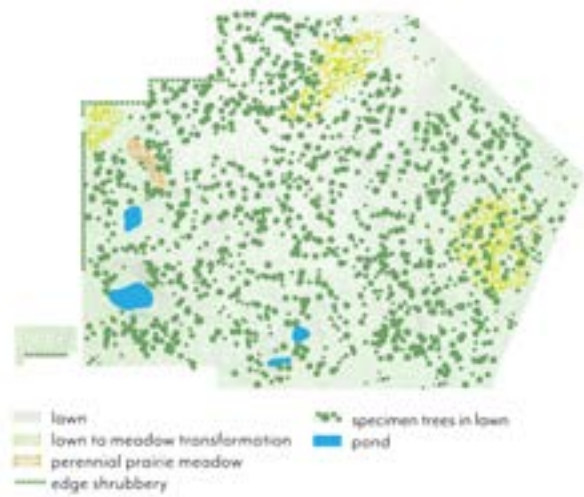
Fig. 10.8: planting design; source: author

Fig. 10.9: circulation; source: author
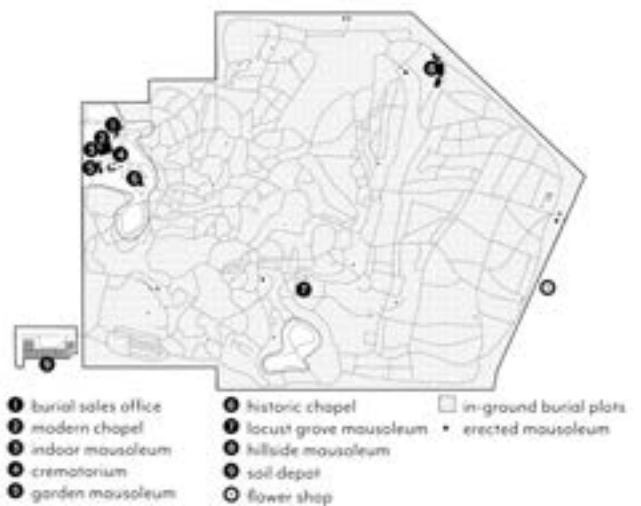
Fig. 10.10: burial infrastructure; source: author

MELATEN CEMETERY

Location	**Cologne, Germany**
Owner	**City of Cologne**
	- publicly owned
Year	**1810**
Designers	**Ferdinand Franz Wallraf**
	(architect)
	Maximilian Friedrich Weyhe
	(Landscape architect)
Size	**43 hectares**
Graves	**55.500**
Types	**In-ground Burial, urn field,**
	ash scattering
Hours	**Summer 7 a.m. to 8 p.m.**
	Autumn 8 a.m. to 7 p.m.
	Winter 8 a.m. to 5 p.m.
Users	mourning relatives
	pedestrians / stollers
	cyclists
	joggers
	visitors / tourists

50°56'20.1"N 6°55'09.9"E

HISTORY

Melaten Cemetery originates with the arrival of the French in 1794, with which the cemetery system in Cologne began to change. Burials within the city walls were forbidden, so the Melatenhof was chosen as the new cemetery site.

The cemetery is a landmark but also a landscape of power that tells the story of 19th century Cologne. The major east-west axis, called 'Millionallee', was reserved for tombs of wealthy families and notables. The tombs there are not only important from an art-historical point of view, but also tell the narrative of this industrial city that was in full development in the nineteenth century and about the people who played a role in it.

ARCHITECTURAL COMPOSITION

Expressed in the tree lanes and path system, the site is characterized by its geometric system of axis and crossings.

The modern chapel and adjacent square, shelters and borders creates a welcoming ensemble. Entering from this side, it functions as portico to cemetery; a transition zone.

In a recent redevelopment by the municipality, the axis into the cemetery at the Woensamstrasse was enhanced by expanding the east-west axis outside the cemetery with a pedestrian lane, benches, trees and adding perrenial borders. This creates a nice green strip through the neighbourhood leading to the cemetery gates.

USE OF PLANTING

In the 1826 planting plan landscape architect Maximilian Friedrich Weyhe set out a clear grid. The main paths and the east-west axis, on which the most expensive graves are located, were planted with high, light avenues of plane trees. The side paths are planted with linden, thujas, sequoias and cherry trees. It results in light and airy avenues with seasonal change.

Grave fields appear within this grid as burial chambers, sometimes demarcated by a clean-cut hedge. The relatively small grave fields (30-50 x 50-100 meter) allow for personal freedom to arragne individual graves withhout the whole looking cluttered or disordered. Like in Chris Zalm's 1975 plan of Almere-Haven cemetery, it can be considered that 'limited chaos' in this situation of rooms with a limited number of graves might be equated with
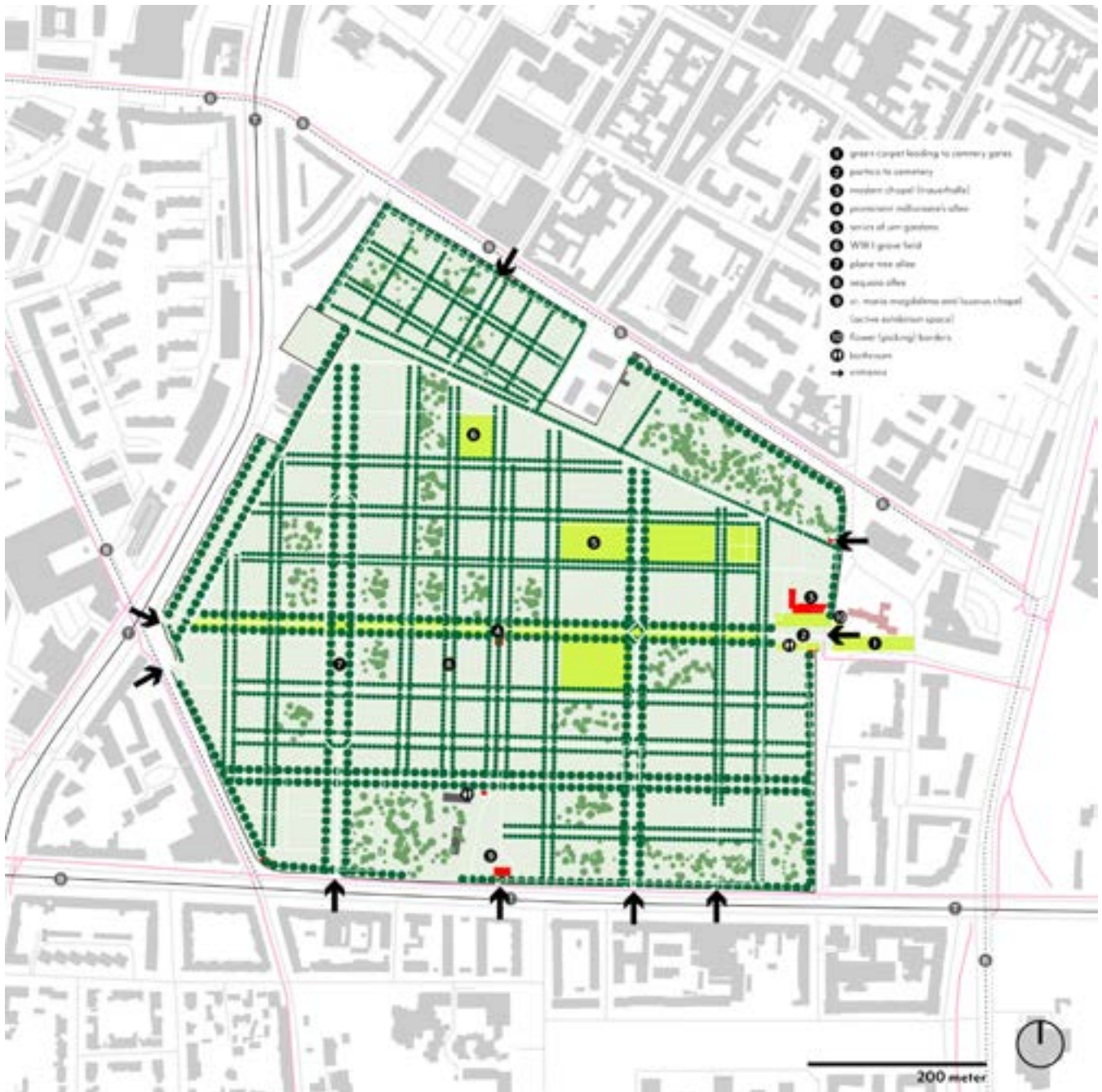
Fig. 10.11: overview plan; source: author

'variety' (Clayden & Woudstra, 2003).

Later, in the course of the expansions, graves and smaller lanes were joined by thujas, maples, birches, weeping elms that have resulted in certain parts of the cemetery to get cluttered and lose its clear geometry.

CIRCULATION

Melaten cemetery is well alligned with the surrounding urban grid. Entrances face urban streets and corridors, thereby facilitating a visual connection that invites one inside. The local pedestrian and bike lane network connects well with the primary pathways and makes the

cemetery function as throughfare for slow traffic between adjacent neighbourhoods. This joint-usage is succesful and does not clash with burial related activities because of its clear path order (where to and where not to bike), and the sthraight axis facilitating clear A to B movements, and the seperation between burial fields and pathways.

BURIAL INFRASTRUCTURE & PRESENCE OF DEATH IN DESIGN

Melaten cemetery is predominantly a place of gravefields and burying the deceased. Funeral rites and procession are relatively invisible compared to the other

two case studies. The ensemble at the main entrance forms a center of gravity for relatives. It offers a meditative shelter space, chapel, wide array of flower stalls and forms a place to meet relatives and famiy members for a visit together.

This case offers the largest diveristy of burial options in comparison to other cases; the grid is a strong patchwork that is able to implement diverse burial wishes. This overall layout is highly adaptable, as it's structure (casco) has existed since its existance, but the programming of every burial field can change over time. Recently, several citizen initiaves resulted in the opening of three lush perennial urn gardens, and in the future it is likely changing burial demands will result in more burial fields to change.

URBAN LIFE & MULTIFUNCTIONAL USE

The multifunctional use of this cemetery is mostly limited to its function as a slow traffic throughfare for local residents connecting neighbourhoods and missing links in the bike network. It attracts other user groups and significantly adds to the feeling of 'publicness' at this cemetery, as these main allees become like 'city streets'. In contrast, the burial fields are like garden rooms that provide privacy and seclusion. This brings various 'speeds' to the cemetery; the axis as spaces of movement and the burial fields as places to stop and memorialise.

In terms of other program, the Saint Maria Magdalena and Lazarus Chapel (#9 on the general plan) is an active exhibition space, but its location at the southern edge of the cemetery prevents it from establishing a meaning connection with the rest of the cemetery.

Fig. 10.13: burial infrastructure; source: author

Fig. 10.14: planting design; source: author

Fig. 10.15: circulation; source: author

Fig. 10.16: burial infrastructure; source: author

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COMPARATIVE ANALYSIS OF 3 CEMETERIES

S-scale
typical burial field abstraction

source: author

M-scale
main structure
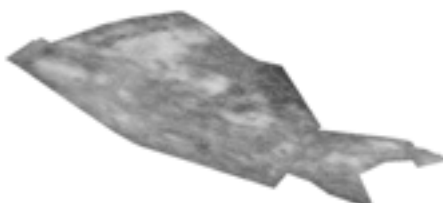
SKOGSKYRKOGARDEN

- Sober gravefields subservient to the larger landscape
- Egalitarian society: no big variation between burial fields and individual monuments.

1. intact pine forest
2. informal walking route to individual grave
3. subtle grave marker subservant to larger landscape

PLANTING

- Intact pine forest providing the feeling of security and comfort.
- Well balanced publicness and privateness through planting.

BURIAL FIELDS

- Last resting place in a woodland relating to deep deep connection of Swedes and the landscape.
- Pleasant for public joint-usage as graves are not the single dominant expression of the place.
- Enclosed groves and walled areas providing places that offer more seclusion and intimacy.

PATH SYSTEM

- Path hierarchy create larger park boulevards used as local throughfares.
- Clear hierarchy of paths and entrances.
- Smaller secondary paths and forest floor make visitors keep off the burial fields.

REGRADED QUARRY TOPOGRAPHY AS STURCTURING PRINCIPLE

14

S-scale
typical burial field abstraction

M-scale
main structure
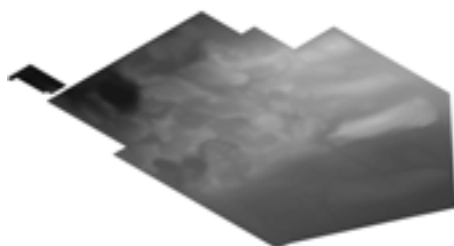
GREEN WOOD CEMETERY

- Landscape is relatively the same throughout the site and no clear differentiation between burial fields and different zones.

1. winding paths following the landscape contours
2. fields of scattered grave markers reflecting the individual
3. prominent grave monuments at path crossings and around lakes

PLANTING

- Diverse urban arboretum featuring a diverse and dynamic collection of trees.
- Trees are rare in Boorklyn, making the place stand out an be used as a true public park by locals.
- Very exposed grave fields - no retreat possible.

BURIAL FIELDS

- Continuing lanscape of prominent grave monuments along paths and ponds, cheaper burial plots behind
- No variation between burial fields
- Explicit spaces where no burial occurs leave room for other program; appropriated by locals for informal activities

PATH SYSTEM

- No path hierarchy
- Winding paths with ever changing scenery makes for nice routes for a stroll through the park

UNDULATING GLACIAL TOPOGRAPHY
AS STURCTURING PRINCIPLE

S-scale
typical burial field abstraction

- Largest diveristy of burial fields in comparison to other cases

1. war grave field
2. conventional burial field / chamber
3. prominent graves along axis
4. urn garden
5. non-active burial field with wildshoots

M-scale
main structure

PLANTING

- Axis with large plane trees create airy cathedral-like avenues that make for a pleasant walk or run
- Expressed through the planting and path system the site is conceived through the geometric system of axis and crossings.
- Garden rooms that provide privacy and seclusion

BURIAL FIELDS

- Patchwork of grave fields serving diverse burial wishes
- Every burial fields its own world: exciting juxtaposition of gardens / inner-worlds to explore

PATH SYSTEM

- Clear hierarchy of paths and entrances
- Path grid makes for recognisable A to B througfares, making meaningful connections for slow-traffic
- Various 'speeds' in the cemetery; the axis as spaces of movement and the burial fields as places to stop and memorialise.

STRONG GRID AS STUCTURING UNDERLYING PRINCIPLE

ORGANISATION OF DESIGN GUIDELINES

The guidelines are structured following the work of (Prominski, 2017). Following from the research scope of this thesis two overarching approaches structure the guidelines at the most abstracted level: facilitating public (joint) usage and the provision of ecosystem services. Both approaches are further specified in a set of design guidelines. Prominski (2017) uses the term design guidelines as the overarching term for design strategies and design tools. Strategies have a higher level of abstraction than tools, but both are neither totally specific nor completely universal and represent structured knowledge bundles at an intermediate level.

First, both approaches are broken down into a set of design strategies, that express strategic corridors of possible directions. The design strategy is still abstract and general in nature and shows the variety of directions to achieve the overall aim stated in the approach.

Most design strategies comprise a sub-layer of specific design tools. They are the most concrete suggestion for design, but still 'drawn in an abstracted way to allow for a creative transfer to the specific design case of the user' (Prominski, 2017, p. 198).

Figure 10.17 shows the organization and level of abstraction for all design guidelines.
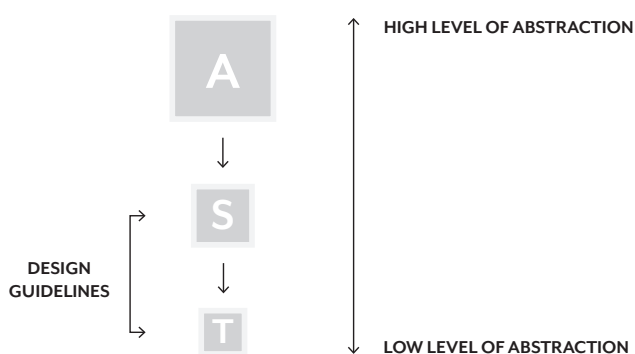
Fig. 10.17: Hierarchical organization of approach, design strategy and design tools in this research, following Prominski's (2017) theorizing on design guidelines; source: author

GUIDELINES

APPROACH FACILITATING PUBLIC USE

STRATEGY CREATE VARYING DEGREES OF PUBLIC AND PRIVATENESS

TOOL create thresholds that help transition between public and privateness

TOOL provide spaces that suggest seclusion and privacy

TOOL create a path hierarchy

STRATEGY ENCOURAGE PUBLIC AND VOLUNTARY STEWARDSHIP

STRATEGY EMBED THE CEMETERY IN ITS SURROUNDINGS

TOOL make a hierarchy of entrances

TOOL make accesible for all modes of slow-traffic and discourage the use of cars

TOOL create clear a to b throughfares that make meaningful connections

TOOL align paths and entrances to existing urban grid

TOOL position the cemetery park in its surroundings as throughfare, destination or as both

STRATEGY OFFER (FREQUENT) APPROPRIATE CULTURAL EVENTS

STRATEGY MAKE THE CEMETERY INTO A PLACE FOR LEARNING

TOOL include outdoor educational facilities strategy make the cemetery visible within the urban fabric

TOOL make transparant and permeable edge condition

TOOL make transparant and permeable edge condition

STRATEGY CREATE ATTRACTIVE SPATIAL QUALITIES THAT INVITES AND ALLOWS FOR PUBLIC JOINT-USAGE

TOOL aim for subservient memorials and balance visual disturbance with a strong continuous green decor

TOOL design spaces where no burial occurs and that leave room for other program

TOOL use contemporary, light planting with seasonal interests that provides for spatial experience

APPROACH CONTRIBUTING TO THE URBAN GREEN INFRASTRUCTURE

STRATEGY TRANSFORM THROUGH MAINTENANCE REGIME THAT AIMS FOR MORE ECOLOGICAL DIVERSITY

TOOL dialogue between cultural heritage vs. Ecology sector

TOOL transform inactive parts of the cemetery into habitat and/or park

TOOL gradually transform clipped lawns to urban meadow

TOOL create heterogenity of habitats

STRATEGY INTEGRATE ECOLOGICAL OBJECTIVES IN SITE LAY-OUT AND BURIAL DESIGN

TOOL create compact burial facilities, leaving space open for landscape development

TOOL plant trees in a way they have the space and time to grow into mature trees

TOOL introduce sustainable burial practices

TOOL messy ecosystems, orderly frames

TOOL retain quiet and undisturbed places

STRATEGY DESIGN IN CONNECTION WITH THE OVERARCHING LARGER SYSTEM

TOOL create a variety of connections specific to different target species

TOOL relate interventions to wider territory and built from existing (regional) conditions

TOOL design with points, surfaces and lines in mind to create coherent ecosystem connectivity

APPROACH **FACILITATING PUBLIC USE**

Green urban cemeteries offer generous green areas. Like urban parks, they comprise natural, recreational, and cultural qualities and have many similarities to well-established parks such as lawns, decorative planting and strolling paths. Therefore, they are increasingly considered communal spaces that is being used by mourners, visitors and the local community alike (Swensen 2018).

The reference study shows us that cemeteries have the ability to truly become part of the urban fabric and urban life (= spatially and socially) actively invite urban life through their gates. In the design and programming of urban cemeteries one will have to take the needs of all its user-groups into consideration in order to keep and develop the particular quality that the cemetery as an urban public green space offers to its visitors and the local community. The design strategies and tools explicate how to do this in a proper way.

STRATEGY **CREATE VARYING DEGREES OF PUBLIC AND PRIVATENESS**

→   **Skogskyrkogarden**
→   **Melaten Cemetery**

Cemeteries' unique character could be disappearing if cemeteries are made more accessible and promote public joint-usage. The challenge is to utilize cemeteries' potential for restoration, contemplation, and relaxation without compromising its main purpose to serve mourners (Evensen et al., 2017; Rugg, 2000). The public joint-usage does not need to be in opposition to a quiet and respectful atmosphere if the visitors know where they should go or sit down.

Creating varying degrees of public and semi-pubic is especially important in cemetery design, where landscape is both shared and (semi-) private. That requires prompt transitions steering different user groups from one situation to another. More than warning signs, positive signs for walks, enough benches, clear footpaths, thresholds between public and semi-public areas are all part of welcoming citizens to visit cemeteries without disturbing those visiting a grave (Skår et al., 2018).

The design tools following from this strategy all three presents ways to deal with separating degrees of publicness and making transitional spaces between these. They aim to separate flows of traffic and distinguish public and semi-public spaces. This is especially important for public (joint) usage to co-exist with people coming for a funeral ritual or visiting a grave. The grieving process has phases of anger and depression that ask for intimacy and privacy for the bereaved when visiting their relatives at the cemetery (Kübler-Ross et al., 2006).

TOOL **CREATE THRESHOLDS THAT HELP TRANSITION BETWEEN PUBLIC AND PRIVATENESS** Ⓢ

→ **Skogskyrkogarden**
→ **Melaten Cemetery**
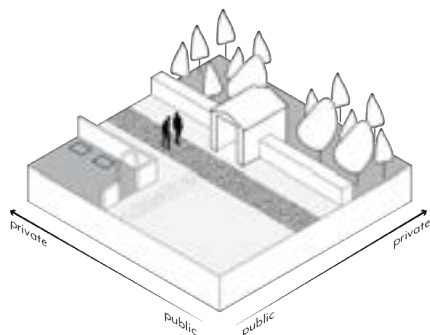
Following Cathrine Dee (2001), thresholds are small transitional space between larger spaces or paths. Threshold can be physical, psychological and emotional barriers (Ebru, 2018). They 'give spatial configuration to people's need to adjust from one situation or experience to another' (Dee, 2001, p. 171). Thresholds can be constructed from: landform, vegetation, built matter and water.

SKOGSKYRKOGARDEN

Fig. 10.18: Pergola marks the actual and symbolic transition into the urn garden. A low wall demarcates the garden, but makes it possible to connect with the central void; source: Landezine, 2010.

SKOGSKYRKOGARDEN

Fig. 10.20: An entrance arch marks the transition between a primary road and the woodland chapel. A dense pine grove fills this hortus conclusus before one reaches the chapel, creating an 'in between place' as Dee (2001) would say;
source: Landezine, 2010

TOOL **PROVIDE SPACES THAT SUGGEST SECLUSION AND PRIVACY** Ⓜ

→ **Skogskyrkogarden**
→ **Melaten Cemetery**
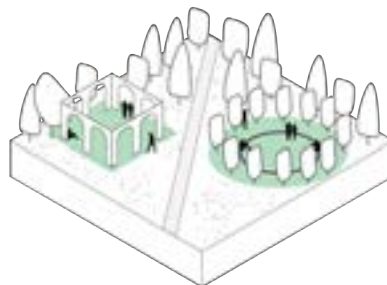
Enclosure by vegetation, landform and structures enables the definition and separation of spaces and their indirect experience, use and character (Dee,2001). Well designed enclosure suggests and provides seclusion and privacy, acting as shelter to express and contemplate about deeply personal emotions of loss and grief. It accommodates solitude, assisting the turn inward. Proper application of this principle can be beneficial in managing increased public use of cemeteries. The grieving process has phases of anger and depression that ask for intimacy and privacy for the bereaved when visiting their relatives at the cemetery (Kübler-Ross et al., 2006). Differentiated spaces, among which spaces of enclosure can provide for this.

SKOGSKYRKOGARDEN

Fig. 10.19: Inward-focussed meditation grove on top of knoll provides privacy and secluded small-scaled spaces for grieve and memorial; source: Marlies Brinkhuijsen, 2015

SKOGSKYRKOGARDEN

fig 10.21: Large concrete pergolas create sheltered space. Benches provide a place to gaze over the entrance square; source: author

→   **Skogskyrkogarden**
→   **Melaten Cemetery**
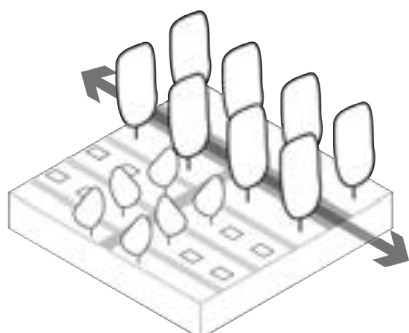
To steer different types of visitors in the right direction and separate flows of traffic a path hierarchy should be established. This is done by varying path width and materiality relative to each other. A functional aspect to take into account are grave digging machines that require certain dimensions to reach a burial site.

SKOGSKYRKOGARDEN

SKOGSKYRKOGARDEN

Fig. 1022: primary path accesible by all means of transport; source: Landezine
Fig. 1023: specific path towards the cross, detailed with distinct materiality; source: Fig.

→ **Green-Wood Cemetery**

Organizing community activities and public events are not at the core of a cemetery management. However, they highly contribute to getting people attached to the local cemetery and offer a way to get acquainted with the site and come back more often. The case study showed that involvement of volunteers and friends' groups can be crucial when an urban cemetery wants to do more than just burying the deceased.

Partnering with the local community is always beneficial as it contributes to social cohesion and place-attachment (Percy-Smith, 2000). Green spaces stewarded by the local community are the most valued and successful. Their involvement has a positive impact on (perception of) safety, livability of the environment and they are most capable to play into local wishes and demands (Kazmierczak et al., 2010).

The case of Green-Wood cemetery showed wide public involvement in management, conservation and enabling on-site events. Continued cuts in local authority funding have led cemetery boards to set up and actively encourage volunteer involvement in maintenance and restauration, in a process of creating a more financially sustainable model of stewardship (Jolly, n.d.). Green-Wood cemetery showed a professional recruitment program for volunteers offering interesting training opportunities and group working days, e.g. on-site training on monument restauration, tree planting and clean-up days. Furthermore, the majority of events and tours are organized and hosted by a community of active citizens, e.g. the school tours, heritage tours and flora & fauna tours.

The Green-Wood cemetery board takes public stewardship serious and fully engages these volunteers in all facets of cemetery management. Thereby it has fostered a sustainable model of stewardship and enabled a strong local community of volunteers around itself.

GREEN-WOOD CEMETERY

GREEN-WOOD CEMETERY

Green-Wood cemetery offers a wide array of opportunities to get involved;
Fig. 10.24: birding activities are offered on a regular basis and supported by a group of enthusiastic volunteers; source: City Birder, 2018
Fig. 10.25: volunteers busy planting new trees during a planting day; source: Green Wood Historic Fund, 2021

TOOL   **MAKE A HIERARCHY OF ENTRANCES** Ⓜ

→   **Skogskyrkogarden**
→   **Green-Wood Cemetery**
→   **Melaten Cemetery**

→   **Skogskyrkogarden**
→   **Melaten Cemetery**

Successful urban parks of today have in common to be well linked to their surroundings. They are urban locations with spatial openness and multifaceted relationships to their urban surroundings (Josselin de Jong, 2010; Tisma & Jókövi, 2007). Thus, it is no coincidence that the principles derived from the case studies, overlap with the discourse on how to embed urban parks with its surroundings. Urban cemeteries have distinct qualities to offer the urbanites, thus properly connecting to the surroundings may unlock these qualities for whole new user groups.

Public use of a cemetery increases when it becomes part of people's daily movement patterns, thus making a generous amount of both formal and informal entrances that are aligned to the existing urban grid provide ample opportunities to enter the park and facilitate visual connectivity that invites citizen to enter. Not only does it enhance the physi¬cal accessibility, it also strengthens visual connections between the cemetery and streetscape, and the psycho¬logical accesses that these connections imply. By doing so, the cemetery starts to become part of the urban fabric and flows of people spill into the cemetery.

Making clear A to B throughfares increases accessibility and make the site part of daily urban movement patterns. At Melaten cemetery, the local pedestrian and bike lane network connects well with the cemetery's paths, thereby making the cemetery function as throughfare for slow traffic between neighbourhoods. This joint-usage is succesful and does not clash with burial related activities because of its clear path order where to and where not to bike) and the straight axis facilitating clear A to B move¬ments.

When a clear path hierarchy and materiali¬ty is in place, these habits can be 'nudged'; it becomes clear what activities should be performed where. Furthermore, all cases are connected by bus and metro, where the Stockholm Woodland cemetery even has on-site bus stops. Besides, the bus adds a true sense of 'publicness' to the place, like the cemetery is part an ur¬ban neighbourhood.
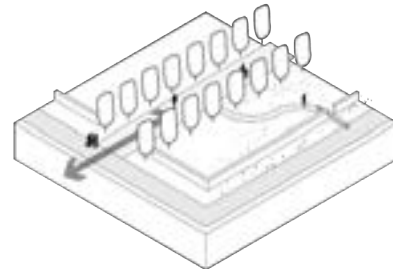
Create a formal main entrance and number of informal back-entrances with subtle expression. Where the main entrance offers the grandeur for a funeral procession to enter, the side entrances should take away the heavy feeling associ¬ated with visiting a cemetery. Thereby these smaller side entrances function as a welcoming entrance for residents. These smaller subtle side entrances work especially well when many are available.
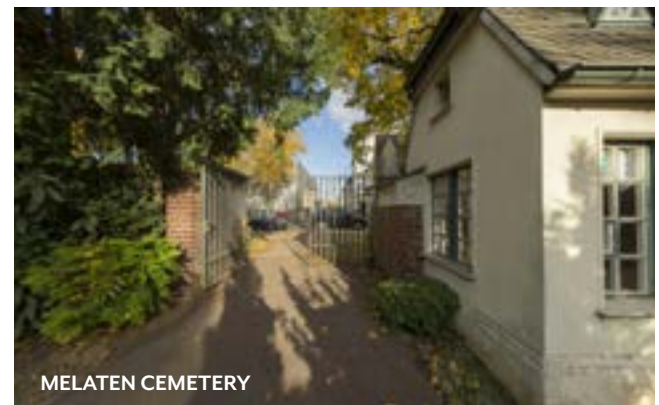

MELATEN CEMETERY

Fig. 10.26: Back-entrance towards adjacent neighbourhood at Weinsbergstraße; an informal passage to enter the site for visiting a bereaved or one's daily stroll; source: author
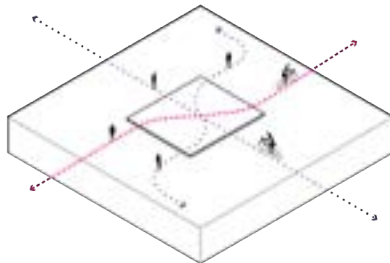

GREEN-WOOD CEMETERY

Fig. 10.27: Gothic entrance arch along 5th Avenue. Its looks associate formality and grandeur and is used for funeral processions entering the site; source: author

TOOL **MAKE ACCESIBLE FOR ALL MODES OF SLOW-TRAFFIC AND DISCOURAGE THE USE OF CARS** (M)

TOOL **CREATE CLEAR A TO B THROUGHFARES THAT MAKE MEANINGFUL CONNECTIONS** (L)

→ **Skogskyrkogarden**
→ **Melaten Cemetery**
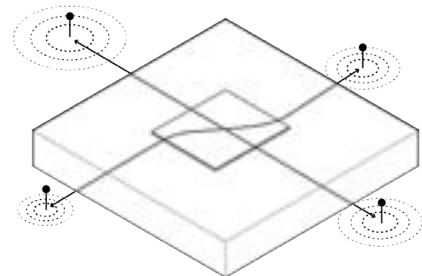
→ **Skogskyrkogarden**
→ **Melaten Cemetery**

Make the site accessible by all modes of active transport; foot, bike, roller skates, etc. and logically connect with nearby public transport. Discourage the use of car to balance out undesirable nuisance.

Making clear A to B throughfares increases accessibility and make the site part of daily urban movement patterns. Facilitating paths for crossing avoids disturbance of the grave-visitors from people rushing through. At Melaten cemetery, the local pedestrian and bike lane network connects well with the cemetery's paths, thereby making the cemetery function as throughfare for slow traffic between neighbourhoods.
Mapping where people preferably cross can be used to define main crossing routes that can be further designed as thoroughfares (Evensen et al., 2017).

SKOGSKYRKOGARDEN

Fig. 10.28: Public use increases by making the site accesible by several modes of transport; source: Marlies Brinkhuijsen, 2015

MELATEN CEMETERY

Fig. 1030: The cemetery's main east-west axis is well linked to the bike lane net.It therefore functions as throughfare for slow traffic between the Braunsfeld business district, downtown Cologne and the 'Innerer Grüngürtel' (inner green belt); source: author

MELATEN CEMETERY

Fig. 10.29: Urban bike network connects well with the primary cemetery roads, therefore function as throughfare for slow traffic; source: author

TOOL **ALIGN PATHS AND ENTRANCES TO EXISTING URBAN GRID** **L**

→   **Skogskyrkogarden**
→   **Green-Wood Cemetery**
→   **Melaten Cemetery**

Aligning paths to the existing urban grid facilitates visual connectivity which invites citizen to enter. Besides, it reinforces the visual ties between the cemetery and streetscape and strengthens the psychological access that these links suggest.

TOOL **POSITION THE CEMETERY PARK IN ITS SURROUNDINGS AS THROUGHFARE, DESTINATION OR AS BOTH** **XL**

→   **Skogskyrkogarden**
→   **Green-Wood Cemetery**
→   **Melaten Cemetery**
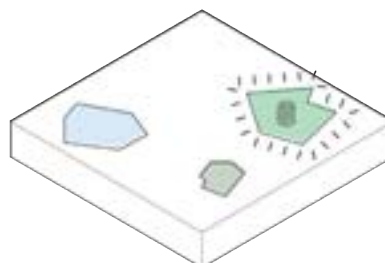
The green urban cemetery is one of the many entities comprising a green open space network. Make clear how the cemetery relates to it's surroundings and other green public spaces. The case studies position themselves as either a thoroughfare, a destination or as both. Green-Wood Cemetery is located in an densely urbanized tissue lacking green space, thus the green cemetery functions as a destination for activities seen in 'regular' public parks elsewhere. On the other hand of the spectrum, Melaten Cemetery does not offer much to facilitate public stays and functions rather as a throughfare.
When facilitating more public use in a cemetery, aim to complement and make clear which spatial and programmatic qualities it offers to make it stand out from other green public spaces.

→ **Skogskyrkogarden**
→ **Green-Wood Cemetery**

Offering appropriate cultural events offers three benefits for facilitating more public use;

First, inviting the public for events is a great way to get people to become more familiar with the site for return visits. Green-Wood Cemetery organizes events such as an outdoor movie screening or the Nightfall light festival around Halloween that offer low-profile and interesting opportunities for locals for new ways to visit its grounds.

Secondly, continued cuts in local authority funding are widely impacting cemeteries world-wide. Organizing side-activities can be the extra source of income helping to make ends meet.

Thirdly, large communal events can offer a new dimension to the mourning process and bring the community together. At Skogskyrkogarden All Saint's Day is the day where families visit the grave of their loved ones and spend time together as a family. The site turns into a sea of lit candles and communal memorial services and gatherings are organized throughout the terrain.

Still, the cemetery's main function is to serve bereaved people with a quiet place to mourn and commemorate. Thus, when designing areas to host cultural events, consult the strategy 'Create varying degrees of public and privateness'. Secondly, which events at a cemetery is deemed appropriate or not culturally differs from country to country.

SKOGSKYRKOGARDEN

GREEN-WOOD CEMETERY

GREEN-WOOD CEMETERY

fig 1031: In Stockholm All Saint's Day is a big communal getogether; source: 123RF, 2021
Fig. 1032 & 1033: Given the scarcity of green space in Brooklyn, Green-Wood Cemetery programs year round events. A couple of areas on-site are not actively used for burial anymore and are used for hosting larger events such as the annual music and theatre festival at Niblo's Garden (top) and summer outdoor cinema (bottom); source: Green Wood Historic Fund, 2021 & source: Maike Shultz, 2019

→ **Green-Wood Cemetery**

→ **Green-Wood Cemetery**

As indicated by many authors in literature, old green urban cemeteries have great potential to become a place for outdoor education, one of the contemporary demands put onto urban parks (Lindholst et al., 2016; Nordh & Swensen, 2018; Tyrväinen et al., 2005). Old green urban cemeteries often consist of both historic heritage (memorials, sculptures, architecture) and natural heritage (some cemeteries comprising arboretum-like qualities). Both offer great potential to be exploited for outdoor education.

Green-Wood Cemetery shows extensive local school partnership whereby their grounds are used for environmental education purposes. They include (COVID-19-proof) virtual programs, on-site guided programs, and resource kits and cover wide variety of topics on art, history, and nature. Outdoor education can provide opportunities to learn about nature and natural processes in an urban environment and facilitates cognitive coupling to seasons and ecological dynamics in technological and urbanized landscapes (Tyrväinen et al., 2005).
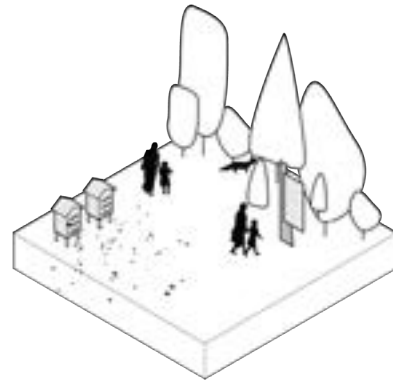
Create educational opportunities to learn about art, history, and natural processes in an urban environment.

GREEN-WOOD CEMETERY

Fig. 1034: The 'Alive at Green-Wood' comprises both an educational program and hiking trail about the environmental diversity that makes this cemetery one of New York City's great natural resources;
source: author

→ **Green-Wood Cemetery**
→ **Melaten Cemetery**

→ **Green-Wood Cemetery**

In Dutch, and Western societies in general, death has become something relatively invisible.

Physically, cemeteries intentionally have been designed to be excluded and discon¬nected from their surroundings. Fences, thick hedges, and walls isolated them from daily life. This has made the cemetery an oth¬erworldly place. Their invisibility makes dead some¬thing extraordinary, while it's an intrinsic part of life (Kolnberger, 2018).

This separation of the living and dead is a very cultural decision and expression. The Dutch word for 'tuin' comes from 'omtuinen' meaning to fence-off or to enclose. This is exactly what many cemeteries intend: fenced-off gardens closed-off from the outer world. Inside a hygienic and idealized landscape for burying the deceased. As Aben and de Wit (1998) argue, the enclosed, walled garden, whose origins lie in the medieval 'hortus conclusus', ensures the exclusion of both city and wilderness.

Changing societal perception around the dead asks for a renegotiation of the cemetery landscape and its visibility in the city. Connnecting burial landscapes with their surrounding increases the visibility of death in daily life. Noticing such place can put things into perspective. Combining this objective with the objective to facilitate increased public use of green urban cemeteries makes a strong argument to open-up and make cemeteries more visible within the urban tissue.
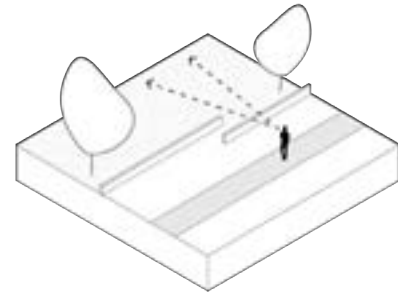
When aiming for increased public joint-usage, the cemetery's perimeter should have a certain degree of transparency and (visual) permeability. That way it reveals to the public what the site has to offer and allows for more social control and an increased feeling of safety.

GREEN-WOOD CEMETERY

GREEN-WOOD CEMETERY

Fig. 10.35: Green Wood Cemetery is encircled by a low fence for security purposes. There is no perimeiter vergetation, resulting in a transparent edge condition, which contributes to the feeling of 'publicness'. Besides, it offers social control, and prevents vandalism and theft; source: Google Earth Pro, 2021
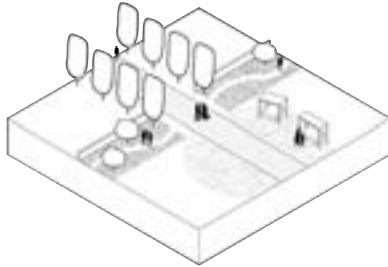Fig. 10.36: Once inside, the transparent edge condition allows for magnificient views over the city's skyline; source: author

→   **Melaten Cemetery**

To combat the status quo of cemeteries as closed-off islands in the city, also consider the cemetery's vicinity. Other design tools talk for example about continuous slow-traffic connections running through the cemetery, then also design these in a way logically blending into the surroundings. In Melaten Cemetery, the flower stalls, main entrance and service building form a transitional space where cemetery and neighborhood well blend together.

MELATEN CEMETERY

fig 10.37: The cemetery's main east-west axis continues in a pedestrian promenade leading into the adjacent neighbourhood. An ensemble of flower stalls and perennial borders centred around a square increase the visibility of the cemetery within the neighbourhood; source: author

→   **Skogskyrkogarden**
→   **Green-Wood Cemetery**
→   **Melaten Cemetery**

Cemeteries are more than a place for somber reflection; rather they are a hidden gem within the city. An open space resource that 'can and should be used for something other than burial' (Harnik & Merolli, 2010). In literature, the additional functions a cemetery can vary widely, from throughfare or tranquil restorative space to actively programmed city park (Evensen et al., 2017; Harnik & Merolli, 2010; Nordh et al., 2017). However, these public usages will only start to work when the cemetery looks inviting to all, also to those coming for purposes other than visiting a grave. The case study found that the spatial qualities do influence to what extent a cemetery is used by the urban dweller other than visiting a grave.

All three cemeteries in the case study are generously designed, resembling park-like qualities. They have site designs with walkable friendly paths, seating and offer an interesting planting palette. These qualities invite to recreational use beyond visiting graves, such as dog walking, socializing, resting on benches, strolling or even physical exercise. Thus, the spatial qualities of a cemetery's design determine its success of facilitating public join-usage.

For public joint-usage to work well, the cemetery design should not only radiate drama and tragedy. Historically, the use of dark evergreen planting and weeping trees (as if it were a waterfall of tears) are ever-repeating design expressions found at cemeteries. In his 1779 book 'Theorie der Gartenkunst' Christian Cay Lorenz Hirschfeld describes cemeteries as gardens of melancholy where by means of planting an atmosphere is created to channel feelings of anger and grieve and convert the visitor into a state of melancholy (Hirschfeld, 1779).

In contemporary design literature this dark and dramatic design moves have been abandoned and more and more attention is on light memorial parks that reflect light, calm and relaxed atmosphere (Treib, 2005; Wille et al., 2004, 2013). When aiming for public joint-usage, it also works well to create atmosphere that are more light-hardness, relativity and positivity. This can be done by subservient memorials, leaving room for other program and paying attention to planting plan, which is explicated in the following three design tools.

TOOL **AIM FOR SUBSERVIENT MEMORIALS AND BALANCE VISUAL DISTURBANCE WITH A STRONG CONTINUOUS GREEN DECOR** (XS)

→   **Skogskyrkogarden**
→   **Melaten Cemetery**
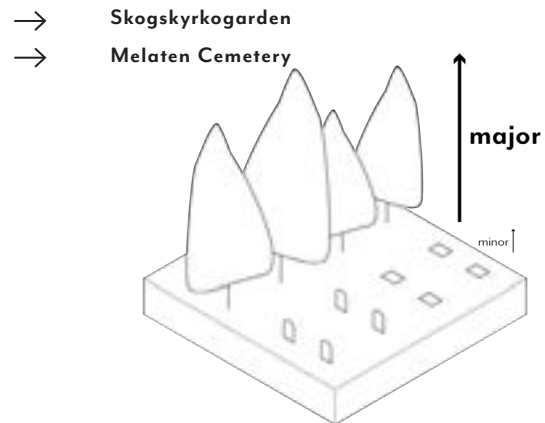
Subtle grave markers avoid the unsatisfactory appearance of a landscape full of variegated hardstone. It takes away the prominent and 'in your face'-feeling of a cemetery, generating a more approachable landscape. At Skogskyrkogarden this design tool is successfully exploited, since the open character of the woodland is maintained by a regime of grave marker expression. At Greenwood cemetery, all burial spaces are subject to restrictions concerning planting and memorial tributes. Here it has resulted in a serene and wholesome landscaped park aesthetic, preventing the a cluttered and clogged aesthetic over time. This results in an inviting, park-like environment.

SKOGSKYRKOGARDEN

Fig. 10.38: In Stockholm, the open character of the woodland is maintained by a regime of gravemark expression. This results in a serene park aesthetic, preventing the a cluttered and clogged aesthetic over time; source: Landezine 2010
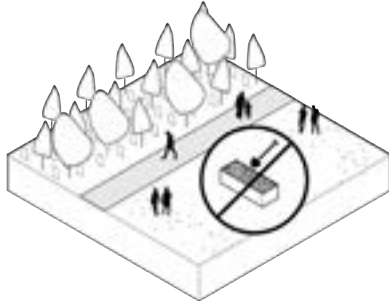
TOOL **DESIGN SPACES WHERE NO BURIAL OCCURS AND THAT LEAVE ROOM FOR OTHER PROGRAM** Ⓜ
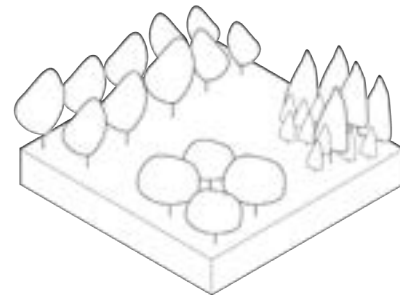
→   **Skogskyrkogarden**
→   **Green-Wood Cemetery**

Open areas where no burial occurs creates two factors that contribute to facilitating public use of the cemetery. First, it simply creates space that can host additional programming other than burying the deceased.
Secondly, it generates a more welcoming appearance for certain activities to take place. It takes away the prominent and 'in your face'-feeling of a cemetery, generating a more approachable landscape. E.g. at Skogskyrkogarden the central void is used for sledging families in winter, and at Green-Wood Cemetery the lawns are full of picnicking Brooklynites on a sunny weekend.

TOOL **USE CONTEMPORARY, LIGHT PLANTING WITH SEASONAL INTERESTS THAT PROVIDES FOR SPATIAL EXPERIENCE** Ⓜ

→   **Green-Wood Cemetery**
→   **Melaten Cemetery**

Using a light and airy planting palette (instead of dramatic dark evergreens and weeping trees) brings about a more pleasant and relativizing atmosphere to the cemetery. By working with a variety of form, texture, color and seasonality, year-round interest is created also for those not visiting a grave (Axelsson-Lindgren, 1995). See chapter 4.2.3. for more information.

GREEN-WOOD CEMETERY

Fig. 10.39: At Green-Wood Cemetery, both the non-burial areas and areas with a low burial density result in abundant public joint-usage on sunny days. E.g. one can spot picnicking families or people reading a book along one of the ponds; source: Krista Turner, 2014

MELATEN CEMETERY

Fig. 10.40: Melaten Cemetery's primary axes are aligned by light and airy plane tree canopy. This planting choice creates a pleasant athmosphere, which takes away the hard and dark feeling of a cemetery; source: author

APPROACH CONTRIBUTING TO THE URBAN GREEN INFRASTRUCTURE

Given their specific characteristics, almost all urban cemeteries have the potential to improve their ecological performance and integration in the larger urban green infrastructure. Thereby they can provide specific ecosystem services. Here, cemeteries can also profit from the fact that burials are decreasing, and at a certain point (in decades) drastically less space for burials is required, and cemeteries can have improved ecological functions.

This approach is two-legged; First, the cemetery as ecological island in the urban tissue; discussing on-site measures to improve habitat conditions. Secondly, discussing the cemetery and its integration into the wider urban green structures. This large-scale scope is important when working on urban nature as working on a specific site only becomes meaningful when considering its position in the larger ecological system of parks, corridors, and adjacent countryside.

Today, in many cases, urban cemeteries are characterized as monofunctional spaces, serving to bury the deceased. Also in city's green infrastructure they are blind spots (Nordh and Evensen 2018). However, their inherent qualities of tranquility and low levels of disturbance make these spaces often already are true oases for many animals in relation to other green urban spaces. Cemeteries, an important component of urban green structure, also serve as a 'repository of biotic diversity' (Barrett & Barrett, 2001). Because of being preserved areas, especially old cemeteries may be habitat islands for uncommon native species and play an important role in conserving urban habitats and rare species (Kowarik et al., 2016). Measures to improve on-site ecological performance predominantly lies in new management practices and the introduction and design of more sustainable burial options.

On the large, city-wide scale, measures relate to connecting the green urban cemetery to the wider green infrastructure, aiming to unlock and integrate the ecological qualities of the cemetery for the green infrastructure. A plethora of research has found that even small and medium scale parks are able to improve urban green connectivity and multifunctionality for its flora and fauna (Gómez-Baggethun et al., 2013; Ioja et al., 2014; Lynch, 2018), and Yılmaz et al. (2018) stress the importance that cemeteries, even the small ones, have for wildlife in the city. Given these facts, urban cemeteries are simply inevitable when planning and designing in the age of a climate and biodiversity crisis.

STRATEGY TRANSFORM THROUGH MAINTENANCE REGIME THAT AIMS FOR MORE ECOLOGICAL DIVERSITY

In many cultures, the maintenance approach of cemeteries traditionally has been underpinned by the drive to maintain a formal aesthetic of the cemetery. This often results in a monotonous landscape with little diversity. Typical are the clipped lawns and graves with headstones aligned in neat rows, which Rugg (2000) describes as the 'lawn cemetery'. Intensive maintenance, such as frequent mowing and artificial fertilization, is required to maintain this aesthetic and are a significant contributor of greenhouse gasses (Milesi et al., 2005).Thus, when working on an existing cemetery, transformation into a more complex and biodiverse landscape is an interesting option.

In literature, transforming cemeteries through a new maintenance regime has been identified as potentials that can enhance the habitat function of urban cemeteries (Clayden et al., 2018; Kowarik et al., 2016). E.g. by through differentiated management, developing naturalistic meadows or creating a diverse understory. Here the tension lies in how to increase their ecological value, while harmonizing different aims, including allowing ongoing uses (visits, burials), conserving cultural heritage, and providing habitat. It is thus the interactions of design, management and natural processes that drive important habitat features of cemeteries.

→ **Literature**

→ **Literature**
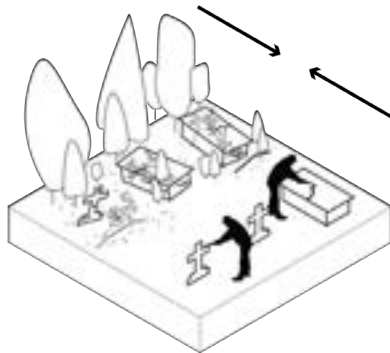
Cemeteries are full of sepulchral structures (e.g. gravestones, tombs) that, when time passes and the elements settle in, start functioning as habitat analogues for species whose habitats are natural rocks, such as lichens and all sorts of wall vegetation, such as ferns (Lundholm & Richardson, 2010). Often, these species are (critically) endangered.

However, for the sake of monument preservation and preventing an unkempt look, it is important that the colonization of built structures by plants and animals not be negatively perceived as the destruction of important artifacts (Kowarik et al., 2016). Cultural and biological values can co-exist in old cemeteries but requires reconciling biodiversity and heritage conservation for it to work. Thus, constantly being in dialogue with heritage experts and park management to prevent deterioration of graves of high cultural importance and keeping out excessive threats such as tree establishment which roots could tear apart the monument.
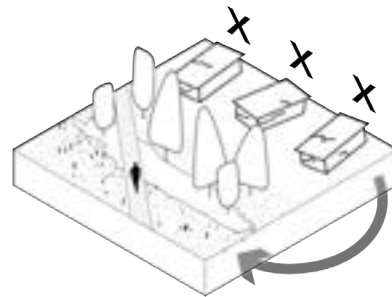
Given most historic green urban cemeteries have grown organically over time, there is found a difference in age, maturity, and usage intensity and sometimes even parts of neglect. The inactive parts/ areas waiting to be used for future burial can have improved ecological value by transforming them into habitat (Kowarik et al. 2016; Relais Landscape Architects n.d.). This could contribute to increased habitat heterogeneity, discussed in the tool 'Create heterogeneity of habitats'.
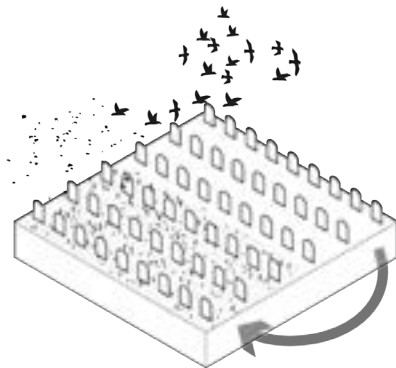
→   **Literature**
→   **Green Wood Cemetery**

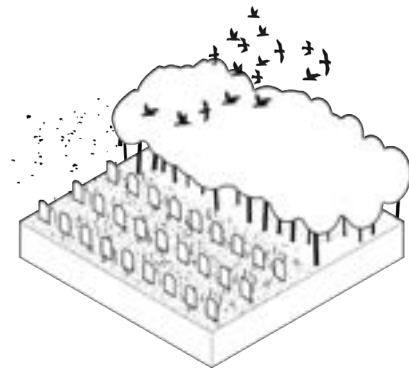→   **Literature**
→   **Melaten Cemetery**

The omnipresent design of cemeteries in Europe and North America is a grid pattern of grave markers in intensively managed lawns. Referred to as 'lawn cemeteries' by Rugg (2000) they form a principal barrier to biodiversity provision and climate resiliency (Aronson et al., 2017). By reducing the use of turf grass and introducing meadows and more trees local authorities can contribute to creating habitats that are more complex (especially for insects and their predators) but demand less management and fewer pesticides.
Green-Wood Cemetery (New York) shows us successful examples of developing perennial meadows and rough urban grasslands. Lessons have been learned in the process, especially relating to public acceptance. While the public voiced strong enthusiasm for the transformation, aesthetic concerns were voiced by stakeholders and lot owners that saw the longer grass as a symbol of neglect. They learned to gradually implement such changes and balance mowing frequency with growth rate (Charap et al., 2020). To me, developing urban grasslands within cemeteries gets the public engaged in the importance of pollinator habitat in the city and symbolically will attract many forms of life to a place that memorializes the deceased. In essence, meadows are living systems with plants drifting across site that establishing a self-sustaining, open-ended ecology.

Derived from ecological theory on habitat heterogeneity, the importance of temporal and spatial habitat heterogeneity is stressed for the biodiversity richness of urban cemeteries (Nielsen et al., 2014). When designing and deciding on a maintenance strategy, aim for (1) a diversity of habitats (e.g. low vs. high canopy closure) and (2) differentiated management (different degrees of maintenance; e.g. manicured vs. allow nature to develop). Take active and in-active parts of the cemetery in account when designing and planning for habitat heterogenity.
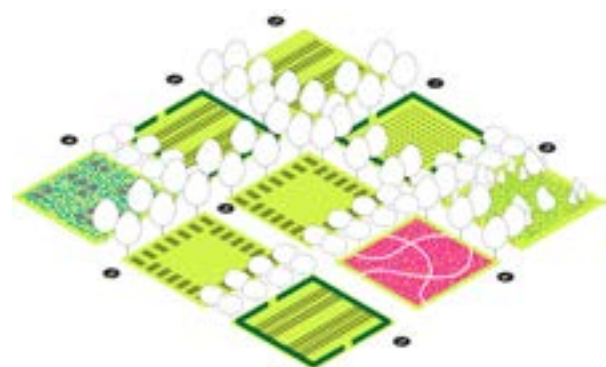

GREEN WOOD CEMETERY

fig 10.40: At Green Wood Cemetery, more biodiverse seed mixes were introduced to transform former clipped lawns into urban grasslands. Management-wise, the frequency and height of mowing was adapted too; source: Charap, 2020

MELATEN CEMETERY

Fig. 10.41: The diverse patchwork of burial fields increases the spatial habitat heterogeneity of Melaten Cemetery, creating a juxtaposition of different habitats for its flora and fauna; source: author

STRATEGY INTEGRATE ECOLOGICAL OBJECTIVES IN SITE LAY-OUT AND BURIAL DESIGN

Cemeteries are quiet places with little disturbance, except for grave digging and low amounts of visitors, not much happens here. Given these characteristics, this strategy presents four tools that show potentials and interventions that improve and develop even more ecological quality into these resting places.

TOOL **CREATE COMPACT BURIAL FACILITIES, LEAVING SPACE OPEN FOR LANDSCAPE DEVELOPMENT** ⓜ

→   **Literature**
→   **Melaten Cemetery**
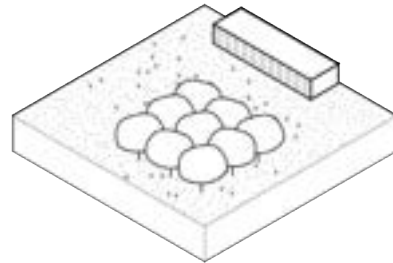
The shift from in-ground burial to increased cremation means decreasing pressure on space in cemeteries, since these burials takes up less space than conventional coffin burial. This leaves more space for compact or clustered burial facilities and landscape development, e.g. lush urn gardens or combining a compact columbarium with adjacent memorial groves.


MELATEN CEMETERY

Fig. 10.42: Responding to the trend of increased cremation, several citizen initiaves have resulted in the opening of urn gardens at Melaten Cemetery. Since these burials takes up less space than conventional coffin burial, lots of attention was put to design them as lush perennial gardens; source: author

TOOL **PLANT TREES IN A WAY THEY HAVE THE SPACE AND TIME TO GROW INTO MATURE TREES** (M)

→ **Literature**
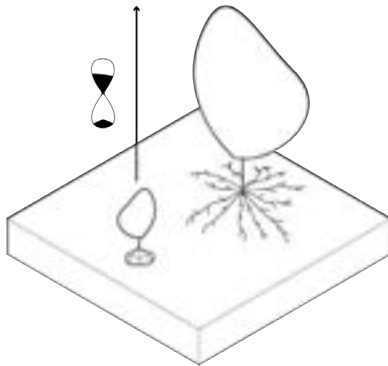
At cemeteries, trees have the space and time to grow into large mature trees, and thereby optimally deliver regulatory and supporting ESs. This is a big advantage over most other urban trees that have to cope with little rooting space, poor soil and drainage, soil compaction from traffic. When planting trees in areas of dense, conventional burial, actively separate trees in tree soil from areas active burial, characterized by poor sandy soil for drainage and aeration and that would be disturbed by grave digging (Wille et al., 2004).

TOOL **INTRODUCE SUSTAINABLE BURIAL PRACTICES** (M)

→ **Literature**
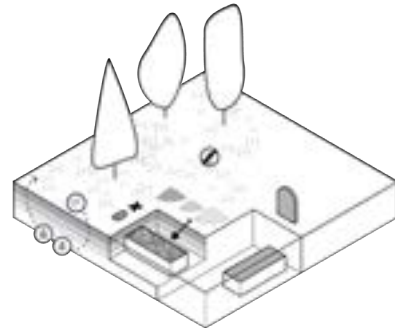
Introducing emerging burial practices such as natural burial and organic reduction can have a big impact on the delivery of Ecosystem Services at cemeteries.
In their research, Clayden et al. (2018) reveal how natural burial can transform the traditional cemetery, with its focus on an intensively managed lawn aesthetic, towards a more habitat rich and spatially complex landscape with its own distinctive identity. These practices possess totally different grave marker expression and grave field lay-outs compared to conventional burial which leaves a lot of space for landscape development. Given natural burial plots give little room for individual grave marker expression, a shared location for memorial/name inscription could be an interesting option.
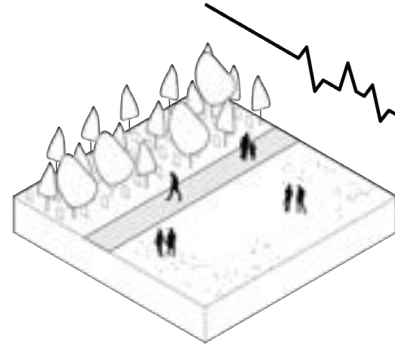
TOOL **MESSY ECOSYSTEMS, ORDERLY FRAMES** Ⓛ
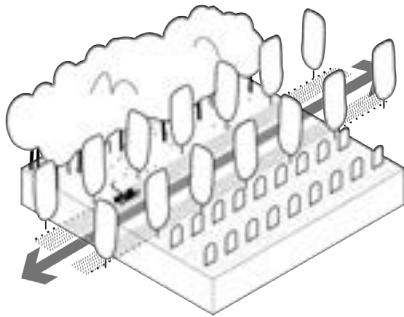
Designing orderly frames for messy ecosystems; design minor cultural interventions make it look cared, e.g. mowing a narrow strip along the edge, maintaining verges of allées or paths.

TOOL **RETAIN QUIET AND UNDISTURBED PLACES** Ⓛ

When transforming the cemetery for joint usage as public park, retain space for quiet and undisturbed places. This is one of the key environmental qualities that make cemeteries stand out from other city parks that are more intensively programmed.

SKOGSKYRKOGARDEN

Fig. 10.43: In areas where no burial occurs, a rich understory is maintained under the canopy. Visitors are not able to enter these patches, resulting in biodiverse patches that provides an excellent habitat for local flora and fauna; source: Google Earth Pro, 2021

The biggest supporting ecosystem service of cemeteries is in the habitat they provide and how they can act as connector between other green spaces at different scales. The provision of habitat has been discussed before, and here we focus on the integration of the cemetery in the city-wide green infrastructure.

Creating habitat and designing nature-inclusive is a broad issue in terms of scale and complexity. This strategy is two-fold.

Firstly, to focus on interventions that relate to the wider territory. E.g. simply placing nesting boxes for bats only makes sense if the bat can forage, finds safety, and has routes to migrate outwards. Thus, when studying green urban cemeteries, one should conceive the cemetery as part of a wider green open space system, implying a multi-scalar approach.

Secondly, a cemetery with high ecological connectivity is one in which organisms can move freely between suitable habitats (Crooks and Sanjayan 2006; Mitchell, Bennett, Rudnick et al. 2012). Therefore, it is fruitful to create a variety of connections specific to different target species.

→ **Literature**
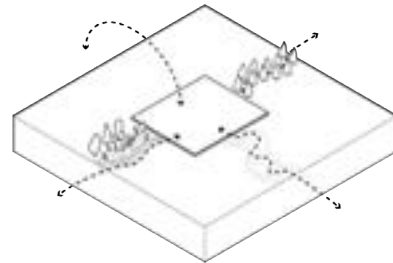
Establishing ecological connections to the cemetery has all sorts of benefits, amongst others for pollination, seed dispersal, and maintaining genetic diversity. When working on ecological connections, different species respond differently to the same physical environment, therefore requiring a variety of specific type connections (Bennett 2013). Having said that, spatially disconnected green spaces can be functionally connected, e.g. while bats need trees or buildings to navigate, birds can fly out independently.
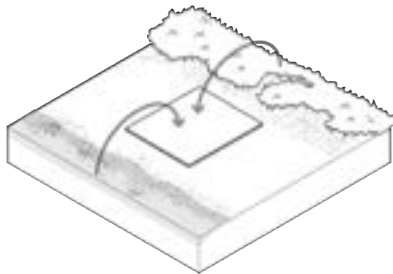
RELATE INTERVENTIONS TO WIDER TERRITORY AND BUILT FROM EXISTING (REGIONAL) CONDITIONS   XL

DESIGN WITH POINTS, SURFACES AND LINES IN MIND TO CREATE COHERENT ECOSYSTEM CONNECTIVITY   XL

→   **Literature**

→   **Literature**

When designing habitat and aiming for contributing to the city's green infrastructure, it is essential to first make an inventory of the existing situation and understand the way local species and (a) biotic factors relate to each other. Ecosystems are so complex that it is better to relate to existing conditions and built from there (Vink et al., 2017). That way the design is in conjunction with the overall system, fitting into the existing green infrastructure.
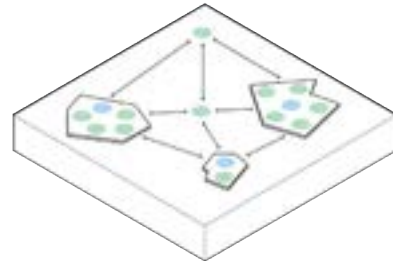
On an abstract level, the city's green infrastructure can be seen as a system of points, surfaces and lines (Vink et al., 2017). Points are specific micro habitats where individuals or sub-populations live, such as an amphibian pool or decaying tree. A collection of these points from a surface on the ecological city map, like cemeteries or park. The lines are the ecological connections between surfaces and between the city and countryside. When planning on corridors and steppingstones, do not forget gardens and adjacent habitats form interconnected networks that help establish ecological connectivity (Goddard et al., 2010).

GUIDELINES OVERVIEW
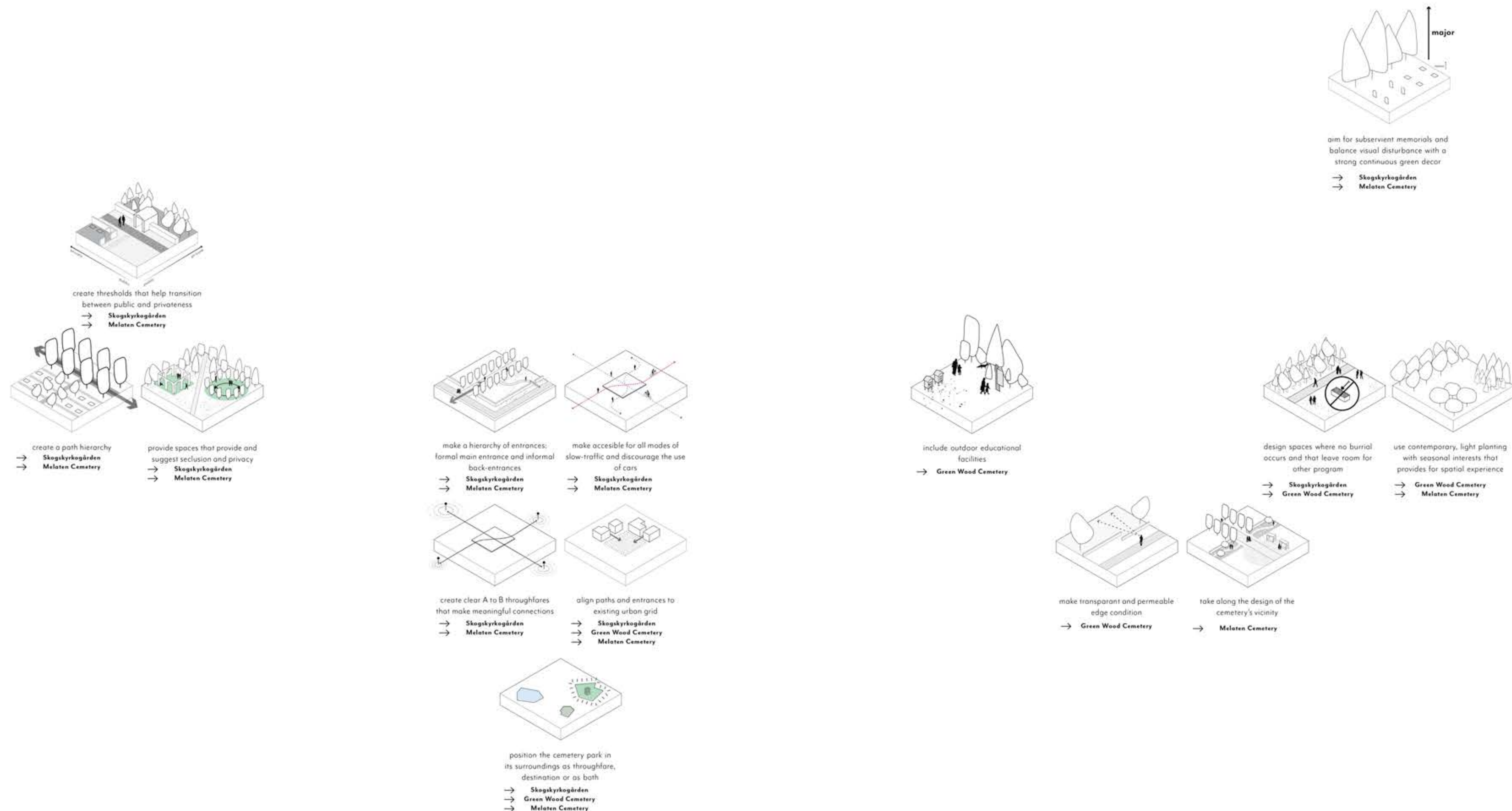
POCKET FOR LARGE GUIDELINES OVERVIEW POSTERS

FACILITATING PUBLIC USE: DESIGN & ACTIVITY

STRATEGY

CREATE VARYING DEGREES OF PUBLIC AND PRIVATENESS	ENCOURAGE PUBLIC AND VOLUNTARY INVOLVEMENT	CONNECT THE CEMETERY TO ITS VICINITY	OFFER (FREQUENT) APPROPRIATE CULTURAL EVENTS	MAKE THE CEMETERY INTO A PLACE FOR LEARNING	MAKE THE CEMETERY VISIBLE WITHIN THE URBAN FABRIC	CREATE ATTRACTIVE SPATIAL QUALITIES THAT INVITES AND ALLOWS FOR PUBLIC JOINT-USAGE
→ Skogskyrkogården → Melaten Cemetery	→ Green Wood Cemetery	→ Skogskyrkogården → Green Wood Cemetery → Melaten Cemetery	→ Green Wood Cemetery	→ Green Wood Cemetery	→ Green Wood Cemetery → Melaten Cemetery	→ Skogskyrkogården → Green Wood Cemetery → Melaten Cemetery

TOOL

SCALE
XS
individual grave

major

aim for subservient memorials and balance visual disturbance with a strong continuous green decor
→ Skogskyrkogården
→ Melaten Cemetery

S
burial field

create thresholds that help transition between public and privateness
→ **Skogskyrkogården**
→ **Melaten Cemetery**

M
main structure

create a path hierarchy
→ **Skogskyrkogården**
→ **Melaten Cemetery**

provide spaces that provide and suggest seclusion and privacy
→ Skogskyrkogården
→ Melaten Cemetery

make a hierarchy of entrances; formal main entrance and informal back-entrances
→ Skogskyrkogården
→ Melaten Cemetery

make accesible for all modes of slow-traffic and discourage the use of cars
→ Skogskyrkogården
→ Melaten Cemetery

include outdoor educational facilities
→ **Green Wood Cemetery**

design spaces where no burrial occurs and that leave room for other program
→ Skogskyrkogården
→ Green Wood Cemetery

use contemporary, light planting with seasonal interests that provides for spatial experience
→ Green Wood Cemetery
→ Melaten Cemetery

create clear A to B throughfares that make meaningful connections
→ **Skogskyrkogården**
→ **Melaten Cemetery**

align paths and entrances to existing urban grid
→ Skogskyrkogården
→ Green Wood Cemetery
→ Melaten Cemetery

make transparent and permeable edge condition
→ Green Wood Cemetery

take along the design of the cemetery's vicinity
→ Melaten Cemetery

L
place in urban fabric

XL
regional landscape

position the cemetery park in its surroundings as throughfare, destination or as both
→ **Skogskyrkogården**
→ **Green Wood Cemetery**
→ **Melaten Cemetery**

CONTRIBUTING TO THE URBAN GREEN INFRASTRUCTURE: DESIGN AND MAINTENANCE

STRATEGY

| TRANSFORM THROUGH MAINTENANCE REGIME THAT AIMS FOR MORE ECOLOGICAL DIVERSITY | DESIGN IN CONNECTION WITH THE OVERARCHING LARGER SYSTEM | INTEGRATE ECOLOGICAL OBJECTIVES IN SITE LAY-OUT AND BURIAL DESIGN |

→ Literature
→ Green Wood Cemetery
→ Melaten Cemetery

→ Literature

→ Literature
→ Skogskyrkogården
→ Melaten Cemetery

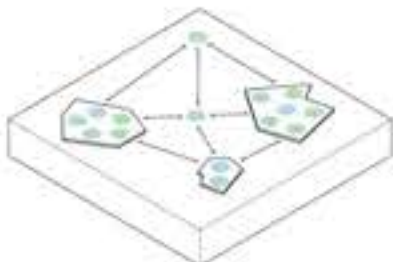TOOL

SCALE
XS

individual grave

S

burial field

dialogue between cultural heritage vs. ecology sector
→ Literature

transform decayed parts of the cemetery without heritage value into habitat and/or park
→ Literature

gradually implement transformation from clipped lawns to urban grassfields
→ Literature
→ Green Wood Cemetery

plant trees in a way they have the space and time to grow into large mature trees
→ Literature

create clustered burial facilities, leaving space open for landscape development
→ Literature
→ Melaten Cemetery

M

main structure

create heterogenity of habitats
→ Literature
→ Melaten Cemetery

introduce sustainable burial practices
→ Literature

messy ecosystems, orderly frames
→ Literature

retain quiet and undisturbed places
→ Literature
→ Skogskyrkogården

L

place in urban fabric

create a variety of connections specific to different target species
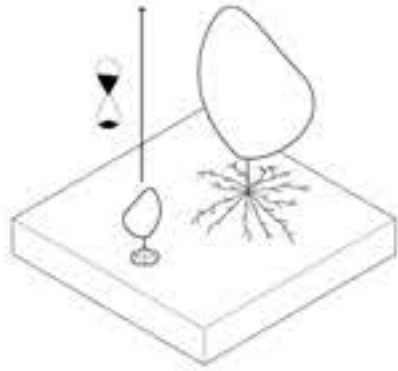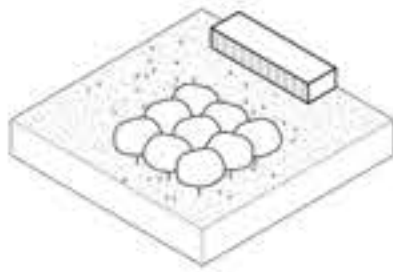→ Literature

XL

regional landscape

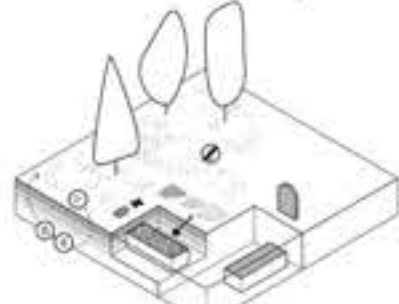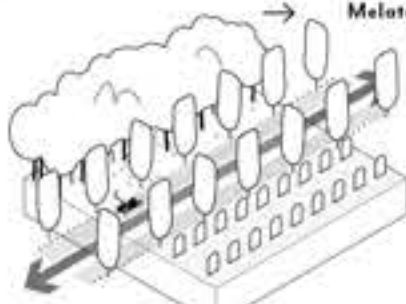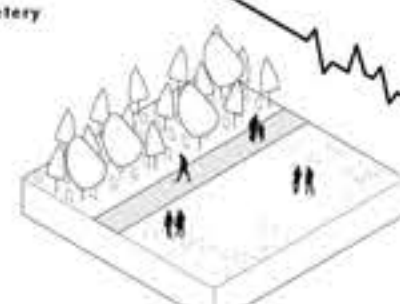design with points, surfaces and lines in mind to create coherent ecosystem connectivity
→ Literature

relate interventions to wider territory and built from existing (regional) conditions
→ Literature

AUGUST 2021