# Maurits-Zuid
## growing value

July 2nd, 2021

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# Acknowledgements

Our introduction to Maurits-Zuid started with a four-day Heritage & Design workshop. It was part of a partnership between several Dutch universities to give students the chance to work creatively in a transdisciplinary way. There, on-site and online, we got acquainted with the different stories about the area and what functions Maurits-Zuid accommodated in the past. The workshop was centered around the question how the Municipality of Ede could develop Maurits-Zuid while taking its pre-existing cultural and natural values into account. It was also during this week of teamwork that we got to know our commissioners – Roel During and Jeroen Kruit from the Science shop Wageningen. Also, their mission with which we would proceed became clearer. Their enthusiasm, guidance and advice throughout the process pushed us to sharpen our thought process and motivated us to dive deeper into the question behind the question. Hereby we would like to thank Roel During and Jeroen Kruit.

We would also like to thank our coaches from the university Marlies Brinkhuijsen, Clemens Driessen, Barbara Tempels and Suzanne van Brussel for their constructive feedback and motivating comments during the process. They kept us on our toes and shed light on pitfalls we sometimes overlooked. Overall, the pin-up meetings were predominantly enjoyable and enlightening.

Lastly, we want to thank the experts we talked to who provided us with valuable and complementary knowledge about project and process management in general and applied to Maurits-Zuid. In total, the process took around 8 weeks, from submitting our preference for this project in the end of April 2021 until handing in an extensive report and hopefully inspiring design of a site we are fully acquainted with in the beginning of July 2021. As a group, we are very proud and fulfilled by this project and what is has brought us – and hopefully many others.

# Contents

# Introduction

Hereby we present you our Atelier product 'Green capital in Maurits-Zuid: growing value'. It has been written and designed to meet the requirements of the last course within the curriculum of the master program Landscape Architecture & Planning at Wageningen University. But most of all, it has been an effort to provide a discourse-altering proposition which is situated at the interface between idealism and reality. Our common interest in challenging the standardised, often detrimental way of project and process management in a green context is clearly expressed in our report, hence our preference for this project.

Maurits-Zuid for us, represents a site where it becomes possible to let green prevail. We started with addressing the need to safeguard the green framework within project development in order for it to create value. From this theoretical basis, we advanced towards having several clarifying conversations with professionals who are active within project and process management. During these dialogues, it became clear that along the way from project plan to reality, (too) much green structures are being lost. Accordingly, our mission was to identify those decision-making moments where the green framework is reduced. When unfolding these crucial points within the planning, design, implementation and management phase of a project, a call to adapt the current state of affairs of project planning emerged. In turn, we highlighted several interventions in time that could – and should – be implemented to enforce a systemic change.

After providing the analytical context, it all comes together in a visualization of how Maurits-Zuid will look like if you translate our idealism regarding the system change of project planning into reality. But where lies that pragmatic boundary of idealism? It has been a great challenge for us as soon-to-be planner and landscape architects to get a grasp of how the process from planning, through design, to management is done in real life. Therefore, we have chosen to work with certain simplifications and assumptions about this process. On the other hand, our – relatively naïve – view on reality likely worked in our advantage. We have not allowed ourselves to be held back or be influenced by, for example, financial structures.

With that said, we would like to invite you to read on and be guided by our report. For us, this document will become a common thread throughout our mission to keep challenging the status quo in the field once graduated.

# 01 Project description

The project story begins at the adjacent ENKA terrain, which is situated on the otherside of Ede-Wageningen railway station. There, a conflict arose between the residents who bought a house and the project developer who applied for a permit to cut two old, monumental oaks. As these people based the purchase of their future home upon these trees – as they liked the view – they were enraged. United in 'Platform Eiken op de Enka', these future inhabitants shared their worry with the Science shop Wageningen accompanied with the following question: 'How can we prevent that trees are cut down to make way for new houses from happening again elsewhere?'. Accordingly, in an effort to safeguard the green structures on the site on the other side of the railway, the Science shop Wageningen took on the project of Maurits-Zuid.

### What Maurits-Zuid has been

Maurits-Zuid was part of a larger military context, including three other sites (Maurits-Noord, Simon Stevin and Elias Beeckman) that were established as a result of the conscription in 1901. Ede offered the perfect location for the development of new military grounds, given that the site was easily accessible by train, and had a good connection to the already established practice terrains nearby (Gemeente Ede, 2010). However, over the years, the military terrains fell out of practice. As of January 1st, 2011, the Municipality of Ede gained ownership of the area (Gemeente Ede, 2010). Until now, the main barracks of Mauritz-Zuid have been repurposed, whereas most of the other former military buildings have only been demolished. That is, because the process of transforming these emptied pieces of land has been delayed due to the discovery of old – active – military material including bombs in those grounds. This has resulted in the entire area having to be sieved. Meaning, that the existing green structures have largely fallen victim to this extensive operation. Thus the rich history of Maurits-Zuid – its tabula scripta – is wiped out and transformed into a tabula rasa – a clean sheet – for the project development consortium. This adds the challenge of how to incite – and reinforce – the project developer and related stakeholders to restore a green structure so bold and rigid that the composition actually adds value – to the houses, people, flora and fauna. A solitary tree may be valuable, but the incremental value lies in this tree as an element in the overall ecosystem and its relationship to the overall green framework.

### What Maurits-Zuid will be – if we don't change the system

As mentioned before, Maurits-Zuid is currently a fallow piece of land on a unique location where Ede, Ede-Wageningen railway station and the Veluwe meet. But it will not lie empty for a long period of time. Partly due to its location, this valuable land is subject to an ambitious plan conceived by the World Food Centre Development (WFCD) consortium. This alliance – consisting of a project developer (BPD), a construction company (Van Wijnen) and a real estate company (GREEN) – intends to transform Maurits-Zuid into a multifunctional and vivid spot for food related businesses and organizations (see figure 1). The addition of housing and recreational facilities enhances the mixed-use concept that is imagined for this area.

Figure 1. Visualization of the World Food Centre, Maurits-Zuid
Source: https://indebuurt.nl/ede/nieuws/komt-het-world-food-center-nog-wel-in-ede-dit-is-er-aan-de-hand~67798/#&gid=1&pid=1

## Problem statement

The Science shop Wageningen posed the question of what should be changed in the method of project development of new building sites so that the green capital already present is included in the plan in the initial situation (Wetenschapswinkel, n.d.). But to be able to answer this question, you have to understand which values green capital embodies in itself and what this value means for the local residents, the environment and the project developer. That is, because greenery is often undervalued and therefore not prioritized. This is endorsed by Van Hattem (2021) who stated that: 'Green is often looked as if it only costs money. It takes up square meters on which you could otherwise build houses, so apparently it reduces land revenue. In addition, greenery brings with it more maintenance costs'. This misconception of the value that green embodies is problematic. Consequently, our main research question evolves around the notion of green capital, its revaluation and how it can become preeminent in project development. This leads to the following main research question:

'How can green capital become leading in the area development of Maurits-Zuid?'

This outdated way of perceiving green within project development doesn't occur at one specific moment in the process. We therefore divide the project process into four phases: planning, design, implementation and management. Accordingly, we formulated the following sub questions:

SQ1: 'What issues regarding green capital could appear during the planning phase of project development?'

SQ2: 'What issues regarding green capital could appear during the design phase of project development?'

SQ3: 'What issues regarding green capital could appear during the implementation phase of project development?''

SQ4: 'What issues regarding green capital could appear during the management phase of project development?'

It is important to state that we do not claim that when answering these sub question all issues are addressed. It is better seen as an impetus to unravel and illustrate the issues that appear within projects and to provide recommendations on how to break this chain of action.

# 02 Theoretical framework

This theoretical framework is two-fold. First, the notion of green capital will be operationalized. In the second paragraph, we dive into green infrastructure and the valuation thereof. The theoretical framework sets the parameters from where the reports reasons.

## 2.1 Green Capital

Green capital originates from natural capital, also called ecological capital, which is 'the stock of natural resources that have the capacity to provide services to people' (PBL, 2016, p.10). The Millennium Ecosystem Assessment (MEA) conducted in 2005 showed that on a global scale 60% of these ecosystem services are in decline (PBL, 2016). This continuous degradation will result in a menace to the sustainability of our living environment while undermining its resilience (European Commission, 2013). Awaited, the demand for ecosystem services will rise because of growing population numbers, resulting in an increased pressure on the ecological system. Therefore, besides utilizing the natural resources, it is crucial to preserve and develop it in addition to its functional value of supplying humanity with natural resources. Thus, in this report the concept of green capital will be operationalized according to the following rationale:

> 'The maximum exploitation of natural resources, while being preserved and developed'
> (PBL, 2016, p. 11).

Translated to practice, this could be illustrated by e.g. a tree (see figure 2); we use its services such as the provision of oxygen, shade and carbon storage, while in return we must provide the tree with the space to grow and develop to its maximum potential.

## 2.2 Green Infrastructure

Green infrastructure (GI) focusses on strategical planning in order to enhance nature and to facilitate natural processes. Accordingly, GI can be defined as 'a strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services in both rural and urban settings' (European Environment Agency, 2014, p.15). Hence, the application of the GI strategy will effectively safeguard the ecological values in an area, while simultaneously providing social benefits in the rapidly urbanizing environment (Ma, Li & Xu, 2021). GI aims for multifunctionality on a site where the greenery is more than just a space, but where it also contributes to environmental values (EEA, 2021).

In order to enable a successful application of the GI strategy, authorities on different levels must improve integration and coordination concerning the management of the landscape to eventually include GI and the corresponding biodiversity enhancement in the planning process (EC, 2013).

Given that GI is a network of places that enhances and maintains ecosystem services and biodiversity for the benefit of human life, it can be stated that it is a facilitator of natural capital: the provision of stock originating from ecosystem goods and services for human welfare (Chenoweth et al., 2018). By this definition, the facilitation of natural capital by GI creates green capital. Hence, by preserving and developing GI, an important step will be taken towards the conservation of green capital which benefits humans and animals.

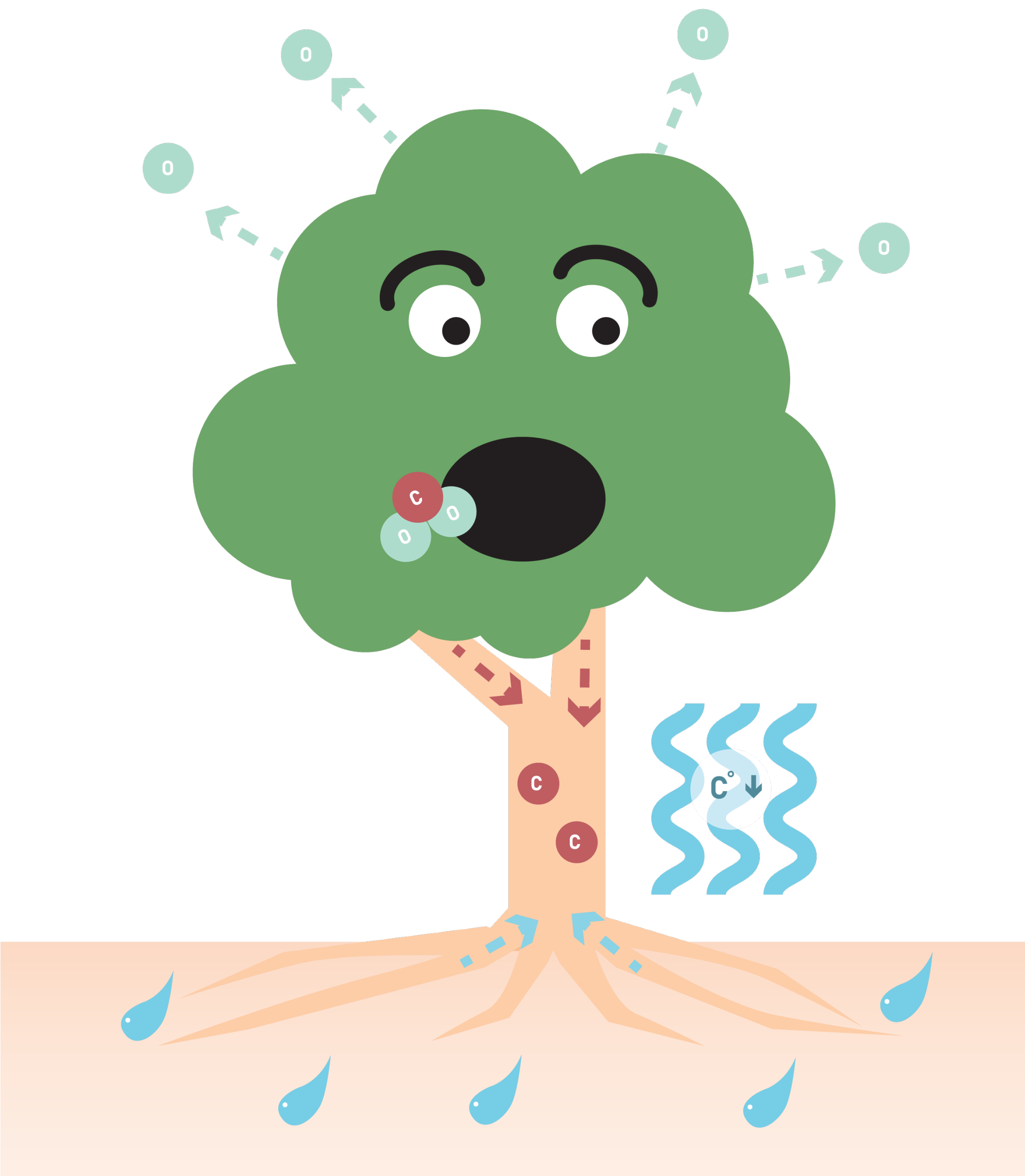



Figure 2. Green capital of a tree

## Valuation of GI

What predominantly happens now is that the main aim of conserving green capital is economic growth through ecological means. Thereby trying to monetize the ecological values GI embodies. Nevertheless, it is nearly impossible to monetarize (the benefits and disadvantages of) an entire ecosystem. This would undermine the social and biodiversity values which cannot be expressed in monetary terms. Currently, species become subject to market valuation since making a profit is the main motive of project development (Fenech, et al., 2003). Nevertheless, 'greenery increases the value of houses [...], between five and twenty per cent' (Van Hattem, 2021, p. 55).

The non-monetary values of GI are relevant for both humans and animals. For humans the value of GI can be found in physical and psychological benefits. Physical benefits concern the provocation and creation of temptation to go by foot or cycling instead of using motorized vehicles. The bodily movements will also affect physical health indirectly, since a decrease in motorized vehicles would result in an improvement of the air quality (Austin, 2014). Movement also has psychological benefits such as stress reduction, improvement of the cognitive capacity and the development of positive emotions (Domingos, Pêgo & Santos, 2021). Altogether, GI improves body and mind.

Moreover, the benefits of GI on human society go beyond direct engagements. GI also provides an ecosystem which benefits human society, given that its viability is maintained, see table 1. The ecosystem services do not function independently but are interrelated and embedded in the ecosystem (Austin, 2014).

The ecosystem health indicates the impact of GI on the ecosystem and the provision of ecosystem services through multiple components. Important indicators include air and water quality, soil structure, energy and material recycling, habitat and species diversity and ecosystem resilience. The latter one of the indicators is highly complex and often difficult to grasp in contrast to indicator species. The abundance and distribution of the species can be considered as representation of the whole ecosystem's health (figure 3) (Austin, 2014). Even though indicator species do not cover the complexity and entirety of the ecosystem, they provide a tangible indication and contribute to the local support among residents, almost as if they were a spokesperson for the ecosystem.

Lastly, we elaborate on the implementation of green infrastructure. The European Union requires the development of a GI strategy. This strategy can be considered as a manifestation that natural capital and the preservation thereof reaches beyond Maurits-Zuid and the Dutch border (EC, 2013). Concretely, the European Commission formulated the GI strategy as a medium to successfully execute their biodiversity strategy for 2030 which concerns the expansion of inter alia GI and Natura 2000 areas as key investments towards not only an economic recovery but also a movement towards 'healthy and resilient societies' (EC, n.d.; EC, 2020).

These EU wide policies are directly related to Maurits-Zuid, where the adjacent Veluwe has been assigned as a Natura 2000 area. By further investing and expanding the green capital that the site has to offer, an ecological impact could be made which is valuable on local, national and global scale.

| **Ecosystem services** |
| --- |
| Air & Water Purification |
| Waste Decomposition |
| Soil & Nutrient cycling |
| Climate & Radiation Regulating |
| Habitat Provision |
| Noise Pollution Control |
| Aesthetic & Cultural |
| Products |

Ecosystem services → Green infrastructure → Human Society

Table 1. Ecosystem services are provided through GI to human society (Austin, 2014).

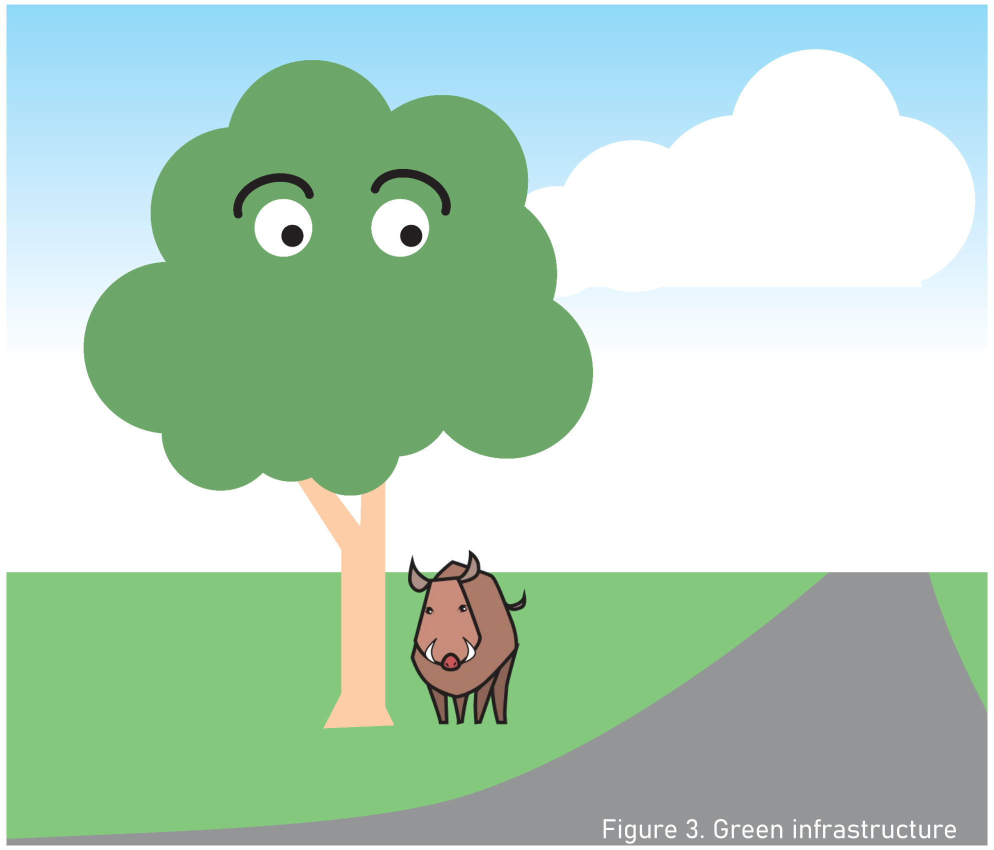
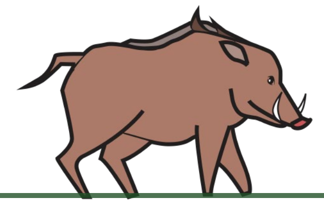


Figure 3. Green infrastructure

# 03 Analysis

Chapter 3 is devoted to the analysis and the preparation thereof. This part of our report starts off with a compact overview of the informative dialogues we had with experts in the field of planning, design and management. Thereafter, we dive into the transition from vision to reality. We divided the project progress into four phases: planning/governance, design, implementation and management. In each phase, we identified issues that could contribute to the diminishing of green throughout the project. We hereby state that this is a non-exhaustive inquiry. This effort should be seen as a starting point and invitation to look further into the pitfalls of project development regarding green capital. We end chapter 3 with several generic recommendations which we consider to be beneficial in relation to the proposed interventions on a lower scale.



### 3.1 Dialogues

We started off with conducting exploratory conversations that gave us insight into the planning, design and management phase of a project. This information confirmed and complemented the knowledge we already possess within the team. This approach reinforces our transdisciplinary way of working. Transdisciplinarity implies 'a process of collaboration between scientists and non-scientists on a specific real world problem' (Stock & Burton, 2011, p. 1098). Within our group, those with experience in the work field embody this interface between scientist/non-scientist. We spoke with several professionals with different expertise, below you can find an overview of whom we talked to:

- Joeri Faas — Technical advisor at TreeBuilders
- Claire Nouwen — Landscape Architect for the Municipality of Ede
- Martijn Barendse — Planner at Pouderoyen Tonnaer
- Wiard Ligterink — Project Leader Maurits-Zuid for the Municipality of Ede

As can be derived from the list above, we deliberately chose to interview three experts which are currently not active within the project of Maurits-Zuid in order to ensure objectivity. In addition, we consulted the project leader for Maurits-Zuid to verify our findings from the conversations with the tree expert, the landscape architect and the planner.

The overarching finding of every conversation we had, was that there should be more focus on green space in project development. Luckily, according to all experts this is a trend that started some time ago already. Municipalities have become more aware of the values green encompasses, but the greatest gain would be to enter the political arena with well-founded arguments that reinforce the message of how important green is for our living environment (Joeri Faas, personal communication, June 3rd, 2021). Martijn Barendse (personal communication, June 2nd, 2021), Joeri Faas (personal communication, June 3rd, 2021) and Claire Nouwen (personal communication, June 8th, 2021) added to this in order to strengthen this plea, that we must recognize the benefits that green embodies for us better as well. Meaning, we should go back to basic and recall, for example, that it is the trees that provide us with oxygen, reduce our stress levels and increase our productivity and overall health (Van Hattem, 2021).

All experts emphasized the pitfall of applying the concept of mixed-use in relation to green. Claire Nouwen (personal communication, June 8th, 2021) for example stated that 'the accumulation of functions gradually reduces the share of green space'. In the early stages of project development, the vision board is filled with green façades and vertical forests, whereas in reality little greenery from the initial plan can withstand the test of time. Underlined by Martijn Barendse (personal communication, June 2nd, 2021), she continued by stating that a concrete intervention to overcome this could be to define the green framework first and then fill in the building plots with the project developer.

According to us, this is where more in-depth work can be done. (The maintenance of) public space is often the responsibility of the municipality, the green space located between the building plots should also become part of the municipality's responsibility instead of the project developer. When doing so, more valuable connections can be made with the general public space and the green spaces between the built-up area. This is in line with what Wiard Ligterink (personal communication, June 4th, 2021) and Martijn Barendse (personal development, June 2nd, 2021) said about the fact that we need a strong government to safeguard our green structures.

Another relevant aspect, according to Joeri Faas (personal communication, June 3rd, 2021), is the fact that '[green] experts should be more involved in policy and plan making or the policy makers should develop and deepen [their knowledge about green] more'. Martijn Barendse (personal communication, June 2nd, 2021) urged on the need for transdisciplinary teams (e.g. planner, architect, traffic engineer and ecologist) as a way to deal with this is knowledge fragmentation. When looking at an issue (regarding green) from these four points of views, it becomes possible to come up with unique insights rather than if these disciplines were to approach it merely from their own perspective.

To conclude this overview of insights derived from the conversations held with the four experts, the function and necessity of visualization will be addressed. Visual communication is often underestimated, according to Claire Nouwen (personal communication, June 8th, 2021). She emphasized that a strong vision for green is only coherent and complete with visualizations that make clear where you are headed.

### 3.2 From Ideality to Reality

As mentioned in the previous paragraph, visualizations play an important role in conveying a message. Similar is the relevance of visual support in a vision document for the living environment. It starts already in the early stages of a project. Lofty masterplans, imposing high-rise buildings and an omnipresent green fabric entice you with the idea of living in a future-proof, sustainable and blooming environment. This also applied to the designs for Maurits-Zuid provided by the different workshop groups. All proposals incorporated themes such as community-based, organically shaped, inclusivity, openness, mixed-use, well-being, self-sustaining, green connections and nature-driven. On their own and combined, these designs represent an ideal image for this area. However, 'a recent study has shown that the built reality often differs from the imagined design visualization, which could mean that hyper-real imagery leads to project expectations that are impossible to meet' (see figure 4) (Raaphorst, 2019, p. 19 – 20). In case of Maurits-Zuid, our expectation – supported by the dialogues held with experts – is that its reality will be quite less green than imagined.

The line that separates idealism and realism is precarious. Lee and Pae (2017) highlighted the inherent paradox between these two representations. 'They argue that the most realistically looking images are produced to depict landscapes that are not yet actualized. 'Realism', in that sense, does not refer to the real word but rather to an established pictorial convention that traces back to the arts of the early 20th century [...] within the discipline of landscape design' (Lee & Pae, 2017, in Raaphorst, 2019, p. 19).

So, what happens in the transition from vision document to a place where people actually live?

Figure 4. Visualization versus reality
Source: http://www.wearetown.co.uk/render-and-reality/

### 3.3 Project phases

In order to pinpoint issues that could occur during project development, we identified four main phases as a simplification of reality; planning & governance, design, implementation and management. For each of these phases we aim to describe several main issues and what could be recommended in response to this issue. As mentioned before, this list serves as a starting point. Aligned with the previous paragraph, we will support our arguments with illustrations.

## 01 Planning & Governance

**Issue 1. The usage of abstract and ambiguous descriptions in policies that regard greenery.**

Taking a look at 'Article 6 Green' of the land-use plan for Maurits-Zuid, some peculiarities can be noted. Starting with a list that is formulated with possible intentions for the green space in this area:

> 'The spaces that are identified for green are intended for:
>
> a) green space, road verges and vegetation
> b) playground facilities
> c) water and water management facilities
> d) preservation of landscape elements
> e) sidewalk and bikeway
> f) access routes for adjacent facilities
> g) utilities
> h) fire safety and extinguishing facilities
> i) locally identified as 'specific type of green – parking' a parking lot
> j) locally identified as 'bridge' a bridge head and/or bridge to realize a bridge for cyclists and/ or a cyclist and pedestrian connection
> k) locally identified as 'parking garage' an underground parking garage
> l) the corresponding structures, not being a building'
>
> (Gemeente Ede, 2013)

Within this list, the majority of the intentions relate to the implementation of grey structures (i.e. infrastructure), implying that green is a mere buffer. Only points (a) and (d) can clearly be related to the development of green structures. Nevertheless, what these elements exactly are and what rules they need to comply with for construction is not mentioned nor made explicit. Especially considering that the land-use description continues by a chapter that outlines the construction rules (see annex A), thereby nullifying the potential of the green space. This example illustrates that the lack of clear description concerning green space development leaves too much room for interpretation, resulting in a space where the intention for greenery has not been lived up to. This argument is also backed by Joeri Faas (personal communication, June 3rd, 2021) who stressed the necessity to make policy "details" less subject to one's own interpretation that allows to fit the policy to their own purpose instead of the greater good.

**Issue 2. The requirements to construct a robust green infrastructure do not have the same status as the requirements for grey infrastructure.**
For the construction of grey infrastructure, the CROW manual is used for clear requirements and is generally seen as an authoritative handbook. When it comes to the construction of green infrastructure, such requirements also exist but are not seen as equally sacred. Consequently, the construction of green infrastructure is left open for one's own preferences. By giving the requirements for green infrastructure the same status as that of grey infrastructure, minimum measurements can be ensured for a robust structure and healthy ecosystem. To take it a step further, the already available guidelines for green (e.g. 'Tussen beplantingsplan en eindbeeld by P.J.H.M. Reuver) could be implemented in the CROW handbook. In this way, 'green' can tag along on the jurisprudence of 'grey' (see figure 5).

**Issue 3. The decision making process takes over 15 years.**
The problem with an excessively long decision-making process is that as time goes by, shifts happen within society and the overall state of mind (e.g. regarding sustainability and preference for housing or due to crises). The ideas that underlie the initial decisions corresponded with the societal and environmental topics of that time. Consequently, once the plans are executed, the perspectives have changed and the ideas behind the decisions have become misplaced in the new zeitgeist. Often, size and complexity lengthens the process of decision-making. A possible intervention could be to decrease and divide the plots in phases, so that the building process is shortened and split. Thereby, the risk of dwellings taking up green space in the rush and speed of construction is diminished as well.

**Issue 4. There are no predetermined consequences in case a plan changes along the way whereby green capital decreases.**
In case of miscalculations in the project planning or execution phase, a fine can be imposed which can easily be bought off by the project developer. In relation to Maurits-Zuid the 'nature protection law' is relevant, of which the breaking thereof is considered a so-called 'economic crime' (art. 7.1 lid b, Wet NB 2021). Thus, money can offer a gateway to the maximum exploitation of nature.

In order to preserve and develop green capital, feedback loops could be created. By rejecting plan proposals that do not comply with the minimum measurements of green structures, its quality or even its presence can be guaranteed. To establish this iterative process a continuity team could be established which can hold the respective party accountable. This will be elaborated upon in paragraph 3.4.


Figure 5. CROW x IPC, for strict requirements

**Issue 5. Smaller municipalities lack the capacity and specialism to judge professional advice regarding green.**
Within smaller municipalities certain disciplines might be underrepresented or absent because of a lack of capacity. Consequently, when a specialist proposes a plan, the municipality is unable to judge the validity and suitability of the plan. In the municipality Westerwolde several maple trees were planted near a riding school. Unknowingly that leaves and seeds could be deadly poisonous for the horses (Looden, 2020). The implementations of the deadly trees cannot only be blamed on the lack of specialism, but also the lack of contextual knowledge which will be elaborated upon next.

To prevent such debacles from happening again in the future, we propose that smaller municipalities must forward the specialist advice to a governmental consultancy (see figure 6). This governmental consultancy on national level possesses all knowledge available on themes within the realm of green. In this way, this governmental body can assess the specialistic advice provided by a consultancy company. The municipality must closely cooperate with them to translate the assessment by the national body to the local context as they are the experts of the genius loci.

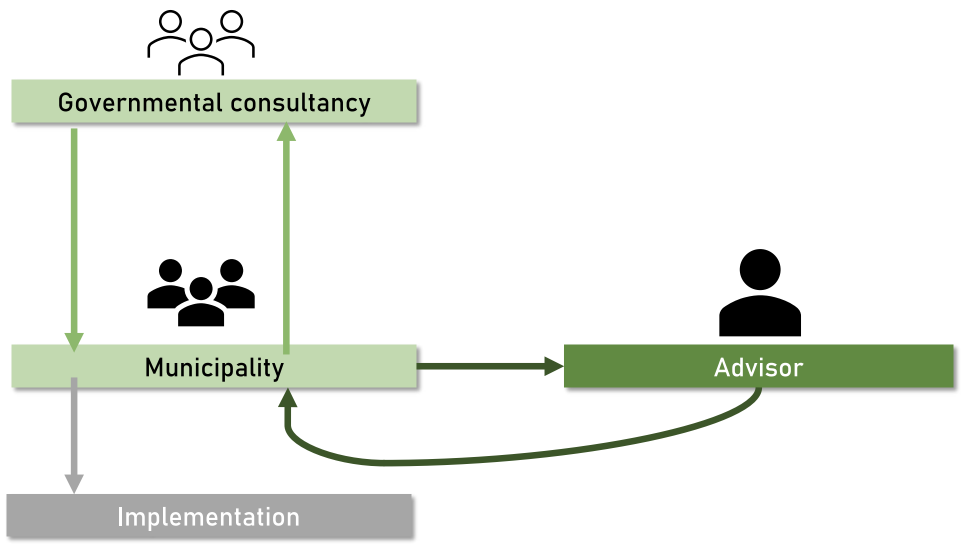


Figure 6. Forwarding of advice within a smaller municipality

**Issue 6. Decisionmakers and planners lack site and contextual knowledge.**
Continuing the example of the maple trees in the municipality of Westerwolde, the context in this case had not been accounted for. If the surrounding environment had been carefully examined and more critical look had been taken on the proposed tree species, the danger of maple trees to horses would have surfaced. The current state of affairs within project planning must make site visits mandatory to acquire contextual knowledge of the site to use as input in the decision-making process.

# 02 Design

**Issues.**
As the area of Maurits-Zuid is currently stripped bare, the municipality and project developer are left with a clean sheet to build upon – a tabula rasa instead of a tabula scripta. On the one hand, this offers a lot of freedom for the project developer. But on the other hand, it means that green structures have been sacrificed here. This part of the project phase will not only discuss issues that could occur and possible solutions, but also how the implementation thereof would look like spatially.

As previously stated in the planning phase of the project, the policy documents for Maurits-Zuid indicate that in zones intended for 'green', other elements are also granted space, such as access roads and building volumes up to 50 m3 (Gemeente Ede, 2013). Moreover, during our field visit (May, 18th, 2021) existing tree structures were monitored by a tree specialist while construction was already taking place. At Maurits-Zuid, we observed that the assessment and valuation of green elements comes when construction is already taking place. Although this indicates good will on the part of the municipality, we plead for a stronger commitment by structurally placing green monitoring at the front of the process.

In project development, the implementation of infrastructural elements e.g., buildings, roads, parking, sewerage, and cable systems, are often based on fixed dimensions. These dimensions are clearly formulated in policy documents and e.g. the CROW handbook. Nevertheless, the dimensions that CROW proposed are not binding, whereas in reality it is often perceived as fixed requirements in project development. We plead for a same system of seemingly authoritativeness for the green environment. Reuver (2001) formulated the 'Green structure preconditions' (see annex B) which are further exemplified within this report through specific measurements and their management implications per specific Green typology.

When these guidelines for green are not considered in time they often result in underdeveloped green and in high maintenance. Figure 7a indicates that when pavement is placed too close to shrubbery, clipping must occur. In turn this means that flowers sometimes cannot develop, and berries will not grow. Thereby, lowering the ecological value that might have been envisioned within the planning stage.

To ensure that trees have sufficient space to grow to their maximum potential, strict measurements for green space are required. In the design phase, we project measurements of green structures where trees can grow into mature specimens within the context Maurits-Zuid.

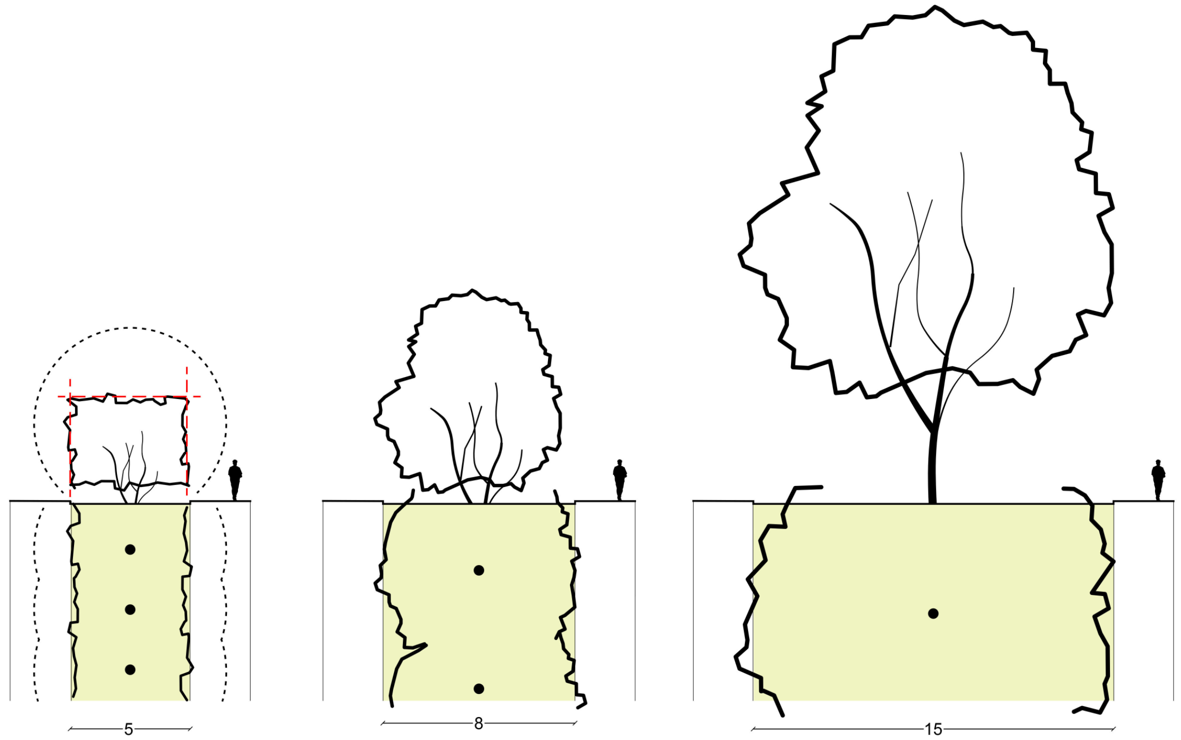



Figure 7. From left to right: a) A depiction of the friction between greenery (a shrub) and infrastructure (a pavement), the lack of space for greenery often results in management issues such as the need for clipping and/or root pressure on the pavement; b) wider margins for shrubs and c) wider margins for trees to grow, accustomed to their final shape and size.

**Analysis & Findings.**

Given that the development plans for Maurits-Zuid have already been approved by the municipality of Ede, our strategy is to use the proposed plan as a starting point, see figure 8 (De Zwarte Hond, 2020). Adopting this map as a starting point, has the advantage of being able to contribute realistic ideas to the ongoing process. In addition, idealism is added to strive for the ideal future we envision, where the potential of green capital and its valuation is continuously preserved and developed.

The existing urban development plan for Maurits-Zuid is based on an orthogonal structure of green axes that frame open, and yet undefined plots. These plots are to be 'filled in' with a modular grid. This modular grid is a response to the goal of mix-use development of working and living.

Figure 8. Existing plan of De Zwarte Hond
Source: https://dezwartehond.nl/en/projects/world-food-center-ede/

The orthogonal base structure, is a response to the existing green structure (see figure, 10). The municipality of Ede has provided open GIS-coordinates for trees that hold a monumental status, and ecologists have provided information on the current species of animals found in the area. Namely; badger, sand lizard, hazelworm, bat, see figure 11 (Koppel & Hoof, 2019; De Zwarte Hond, 2020).

In Maurits-Zuid, but also more generally in the Netherlands, a strict border between forest and adjacent plots exists. Grazing keeps the vegetation short so that the plot can function as a pasture, see figure 9. In Maurits-Zuid this forest edge is suboptimal for ecological developments.

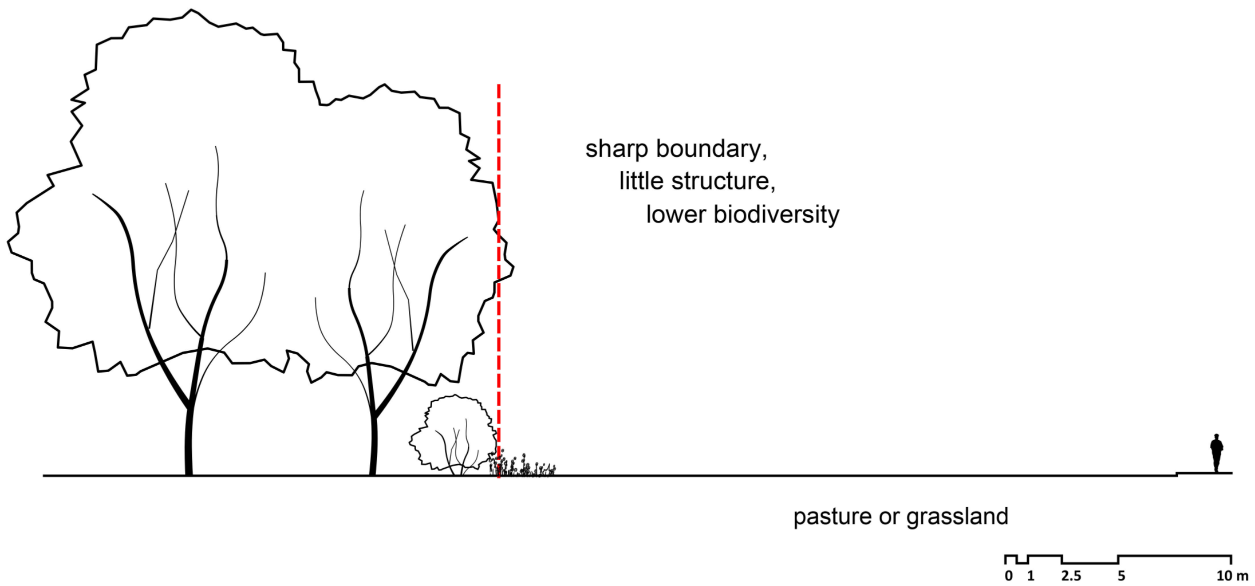



Figure 9. Strict boundary of greenery
(Adapted from Ecopedia, 2021 & Reuver, 2001.)


Figure 10. Map of existing trees based on GIS data (dark green) and aerial photos (light green) which are taken as starting point for the design.


Figure 11. Map of animal species and habitat position currently present in Maurits-Zuid

**Design approach.**

Ecotone
Our approach is that we reason from an ecological perspective, where we preserve and develop green capital to prevent that it will become subject to urban development. Hereby, we focus on habitat development with attention to the fauna as an end user. By creating a robust green framework, it can withstand the dominance of project development within the area (PMFIAS, 2021).
Nevertheless, an ecologically valuable forest edge consists of two layers: a mantle which is a shrub zone and a rim which contains rough grassy herbs. A forest edge that consists of natural layers has a width that varies between 1 to 1.5 times the tree height. Applying this rule on a tree height of 20 meters, creates a zone mantle and rim layer of 30 meters (see figure 12). Moreover, in practice the width of most forest edges usually varies between 20 and 40 meters (Ecopedia, 2021). These measurements are considered a baseline for the design exercise.

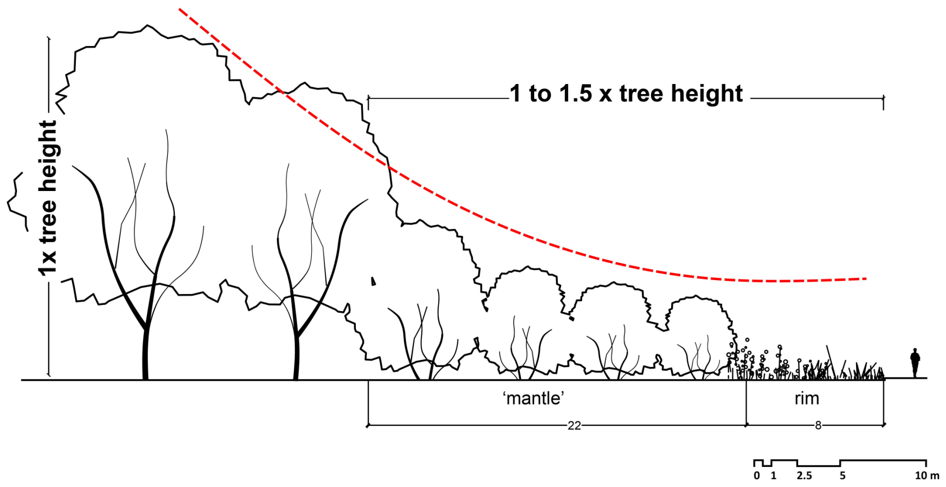



Figure 12. Design principle of an ecotone forest edge with three zones; core-'mantle'-rim.
(Adapted from Ecopedia, 2021 & Reuver, 2001.)

Animal aided design
Humans are often considered as the main end user of a plan, thereby overlooking the presence of animals and their role as end user. Ensuring space for greenery can be combined with creating a larger habitat for these animals, for which animal aided design can be employed as a strategy. Weisser & Hauck (forthcoming) present a species portrait to inform planners about the biology of the species and its interaction with humans. Species portraits were made for species currently present on the terrain of Maurits-Zuid and the adjacent woodland de Sysselt (Koppel & Hoof, 2019; Geldersch Landschap & Kasteelen, 2017). Table 2 depicts the species taken up in the design research (*). This list is not exhaustive, but illustrative of the approach of including species life cycles in the domain of planning. E.g., amphibians, insects and many other are not included and should be incorporated when further researching and designing for multi-habitat use.

| Mammals | Reptiles | Birds (over 100 nesting birds) |
|---|---|---|
| Red deer (Cervus elaphus)* | Viviparous lizard (Zootoca vivipara) | Nightjar (Caprimulgus europaeus) |
| Mouflon (Ovis orientalis)* | Sand lizard (Lacerta agilis) * | Black woodpecker (Dryocopus martius) |
| Wild boar (Sus Scrofa)* | Slow worm (Anguis fragilis) | Swift (Apus apus) * |
| Badger (Meles meles)* | Smooth snake (Coronella austriaca) | |
| Red fox (Vulpes vulpes) | Common European viper (Vipera berus) | |
| Pine marten (Martes martes) | Grass snake (Natrix natrix) | |
| Red squirrel (Sciurus vulgaris) | | |
| Common bat (Pipistrellus pipistrellus) | | |

Table 2. Illustrative list of species in Maurits-Zuid

Lastly, the currently present habitats are mostly located at the edges of Maurits-Zuid (see figure 11), which underlines that an ecotone is necessary to preserve the biodiversity in the area. Moreover, the edges of the Veluwe are becoming increasingly important. Multiple animals can no longer live in the core of the Veluwe due to the increase in nitrogen pollution, which inhibits the growth of certain flora (Koopman, 2020). Currently, the vegetation of the Veluwe is insufficient in mitigating the acidification as a consequences of increased nitrogen levels (Tijink, 2020). The ecotone can also provide a temporal buffer while we must search for a greater solution to solve the nitrogen crisis of the Veluwe, in the meantime it can house its fled residents.

## Design.

The ecotone allows for an integration of natural and built elements (see figure 13). On the one hand, it offers the animals of the Veluwe sufficient space to freely move instead of being pushed to the edge, while on the other hand it creates a robust green framework for urban development. In the design, the forest edge -consisting of a core, mantle and rim- is set up in measurements of respectively 50-20-20 meters. These generous sizes guarantee outgrowth of trees and are thus inclusive of the ecological value of the mantle and rim while simultaneously accommodating a habitat for larger animal species. Figure 14 shows what the integration of the ecotone of Maurits-Zuid could look like.


Figure 13. Map of ecotone versus plots


Figure 14. Map showcasing a design combining different layers of green human and faunal infrastructure.

In the existing plan undefined ('white') plots hold a significant amount of space which also includes green capital. These plots are in the hands of the project developer, and a pitfall of this system is that it is sometimes unclear for the municipality what happens on these plots while construction is taking place (Claire Nouwen, June 8th, 2021, personal communication). To avert this nuisance, and to be able to enforce ecotone guidelines, we plea that plots size assigned to the project developer should be reduced to building size and its direct vicinity, figure 15. This way, the municipality and project developer hold a shared responsibility for the development of public space.

In response to declining biodiversity in urbanized areas where private green often becomes surfaced, private green in the plan become garden reserves. The garden reserve is part of a movement to counteract the trend of paved gardens. Altogether, a garden reserve aims to create natural and animal friendly environments for a wide range of species. Garden reserves often offer a migration opportunity within larger cities, since they act as steppingstones. Moreover, the richness of bee species is equally supported by gardens as by rural environments (Lynch, 2018). To ensure the quality of the garden reserve, there are multiple criteria that must complied with to carry the label of garden reserve. These requirements focus on both aquatic and terrestrial biodiversity with a focus on the creation of refuges (Tuintelling, n.d.).

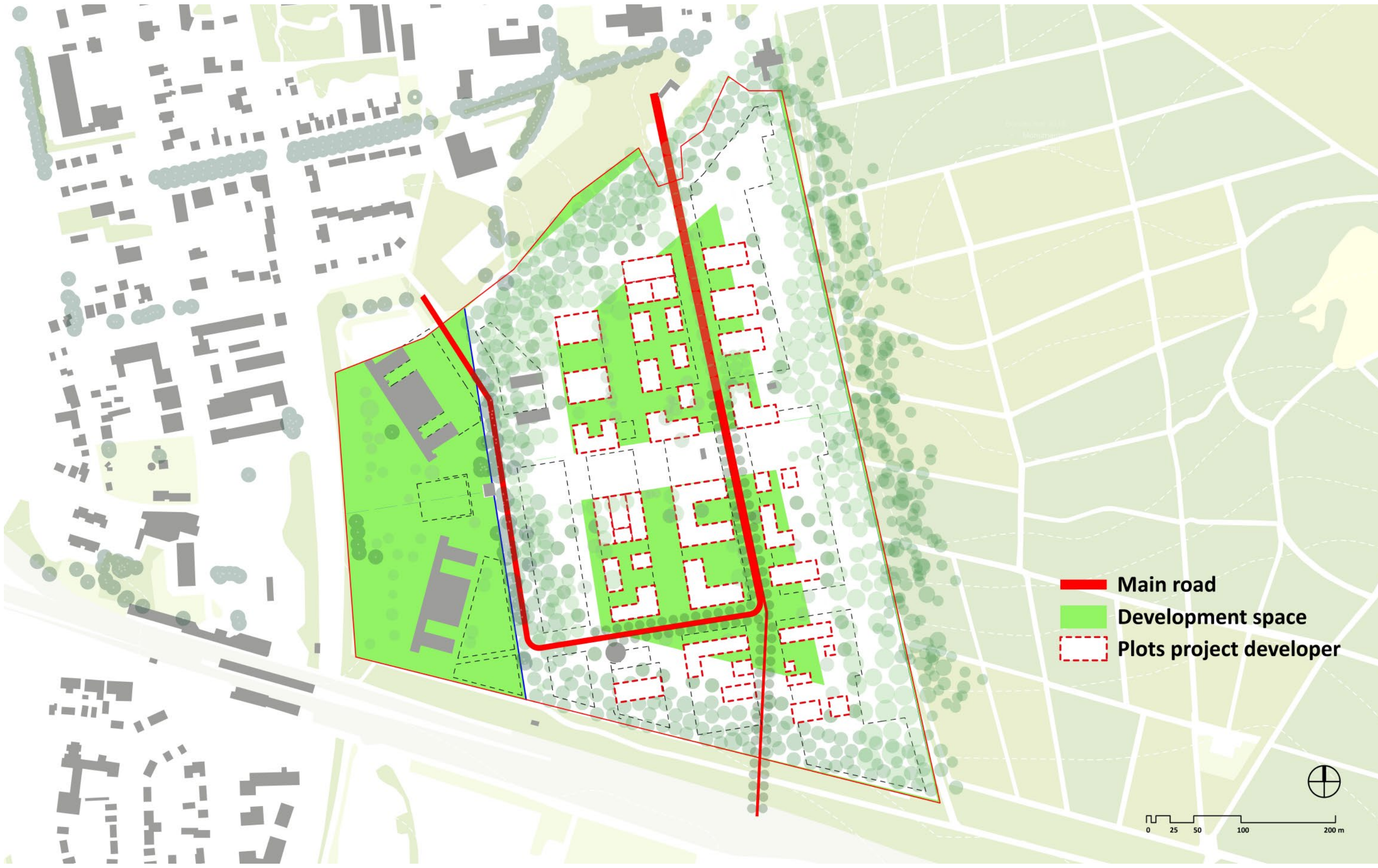



Figure 15. Map of public-private places

**Design conclusion.**

The sections and modal split schemes as shown in figure 16, visualize the spatial uptake of infrastructural elements that are commonly present in the development of public space. These reference measurements are based on general accepted guidelines for example, a two-way road of 6 meters, parking lot 5 meters, and bike lane of 2,5 meters.

The lower section displays interventions that hold a high potential to win space for green, this includes a shift towards a one-way street, reduction of parking space and utilization of private gardens.
Touching upon private domains raises the issue of ownership. While municipal ownership may ensure a strict implementation of ecological guidelines, having private space may be an important criterion a person holds towards their living environment. A way to meet both criteria could be to enforce ecological requirements for private owned gardens (see figure 17). This way, preconditions for the green capital can be integrated and combined with personal wishes. A final element the design touches upon are public spaces outside of the ecotone framework. Here, the generous sizes between the buildings (approximately 30 meters) could be used to create additional foraging spots for animals.

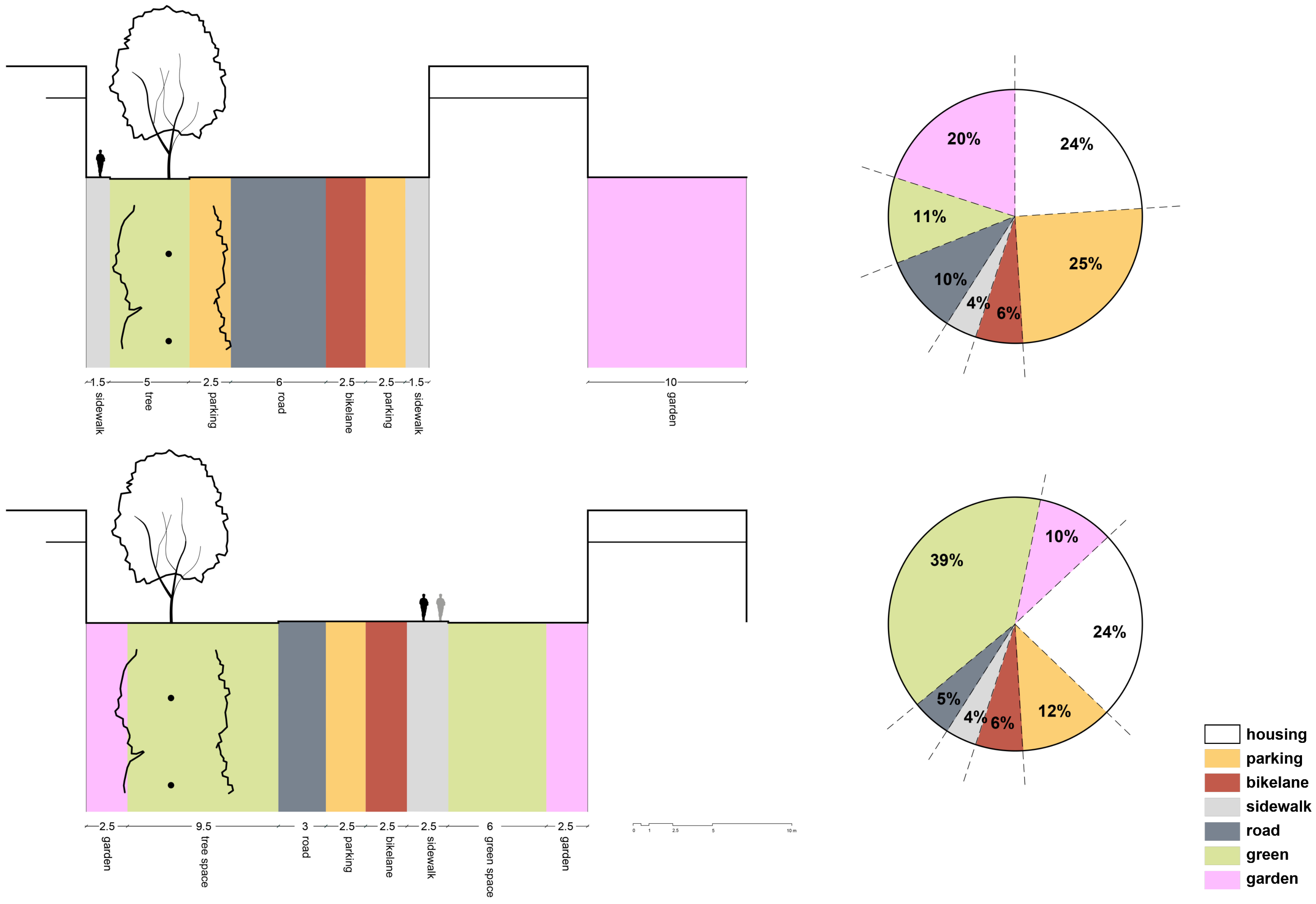



Figure 16. Sections and modal split schemes of public-private places

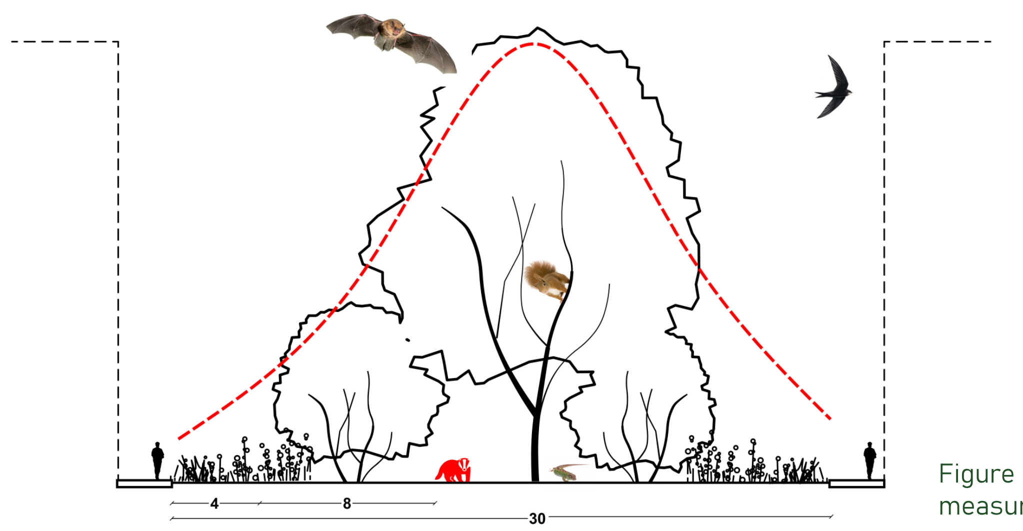



Figure 17. Concept of the garden reserve adapted to spatial measurements of Maurits-Zuid.

## 03 Implementation

**Issue 1. Faulty baseline information.**
By taking cadastral maps as the baseline information some faulty measurements could influence the proposed design and the final implementation thereof. Wrongly mapped property boundaries could for instance influence the size of green space around buildings (see figure 18) (Vlasblom et al., 2015). Or in the case of the Enka terrain where presumably the monumental oak trees lacked coordinates. Hence, the verification of baseline information should become a part of the planning phase, in combination with the acquisition of site and contextual knowledge.

**Issue 2. Incorrect estimations during the plan execution.**
In the translation from the drawing table to the work field the reality can turn out differently than expected. The construction of infrastructure and buildings could turn out to be spatially conflicting with green structures. For instance, in Huissen the dwellings were constructed too close to the green infrastructures whereby the trees were limited in their growth and would require more management to stay clear of the facades (see figure 19). Consequently, it was decided upon to remove some trees to limit the financial consequences, given that a change of the construction plan is valued higher than the preservation of the green infrastructure (Veldkamp, 2021).

**Issue 3. Potential conflict between human inhabitants and wildlife.**
The co-existence of humans and animals such as in Maurits-Zuid could result in conflicts. People might feel threatened by the presence of animals, even though they care greatly about nature. This could be considered a safety issue by the future inhabitants, while it should be regarded as an opportunity. Part of the issue is rooted in the marketing of the site, where the plots of Maurits-Zuid are sold as 'exclusive' and with expensive kitchens. However, living on Maurits-Zuid should be seen as an chance to live uniquely close to nature, where you do not only buy a house for yourself but also a living environment for the fauna. The marketing strategy of the site should correspond to this perspective, which will automatically target a group of residents who also consider nature as an opportunity and not as a threat, thereby becoming a self-fulfilling prophecy.

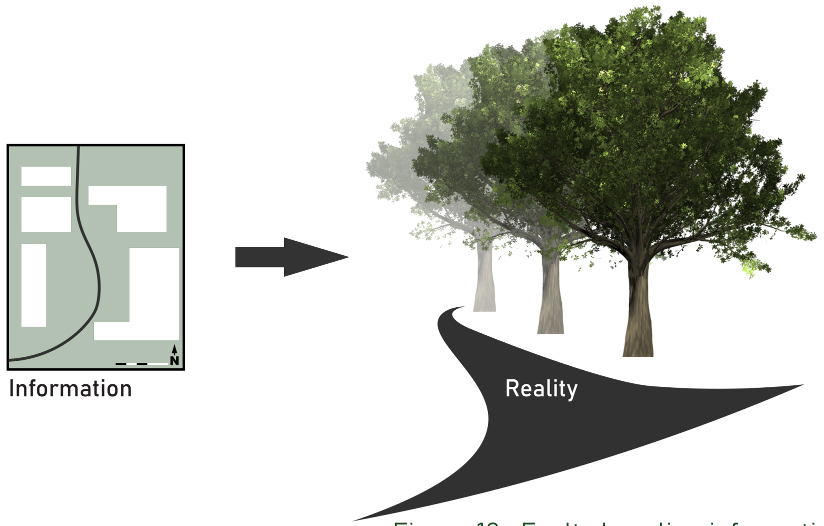


Figure 18. Faulty baseline information

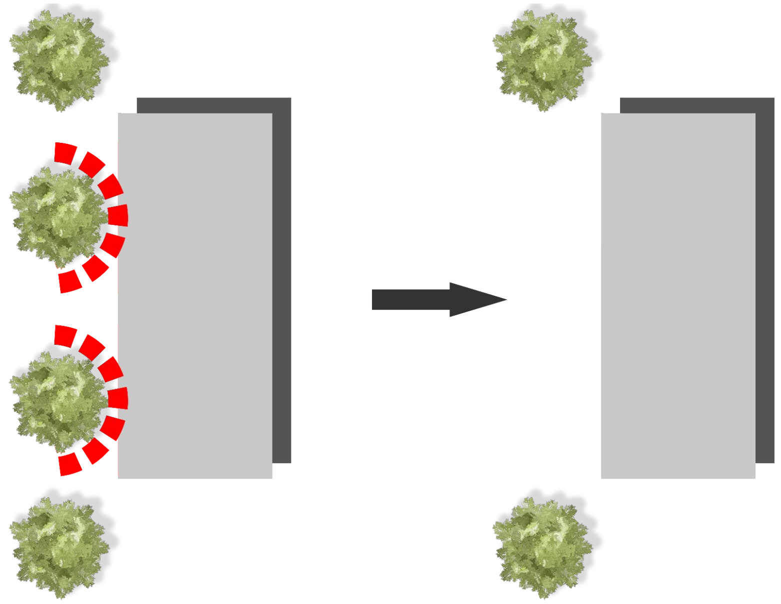


Figure 19. Incorrect estimations during project execution

04

# Management

**Issue 1. Unclear responsibilities.**

The lack of clearly assigned responsibilities can lead to conflicts and management that is long overdue. In Oosterwold (Almere), where residents themselves oversee the construction of their houses, infrastructure, waste management and so on, the lack of clear responsibilities led to conflicts of interest. Locally determined regulations are not complied with strict enough, and it is unclear whose interest outweighs that of others. Within the community there is need for structure and a division of responsibilities (Molen, 2019). By means of a so-called RASCI-matrix (Responsible, Accountable, Support, Consult and Inform) responsibilities can be divided with matching tasks and authority.

**Issue 2. Lack of continuity.**

In many projects co-management in the public space allows residents to directly influence their living environment according to their own interest and preferences. Nevertheless, the dynamics in residents affects the continuity of the management. For example, residents moving out of the area can cause a dropping out of responsibilities and tasks (Bulten et al., 2017). By creating a feedback loop towards the municipality in the form of an hourglass organization, a representative of the municipality can hold the residents accountable (see figure 20).

**Issue 3. Lack of knowledge.**

Those who perform the management could be insufficiently informed on how to properly manage green infrastructure regarding the preservation of green capital. The museum of natural history in Rotterdam lost its bewildered nature reserve due to inaccurate management. The whole reserve was mowed down entirely resulting in a loss of species (Olivier, 2020). Similarly, after implementation, residents might want to add more color to the green infrastructure through e.g. planting violets, which eventually does more harm than good (see figure 21). By educating and raising awareness among those who are involved in the after-care of the green infrastructure, such mishaps can be prevented. The continuity team, which will be elaborated upon in paragraph 3.4, could be a facilitator for this to ensure the final quality of the greenery.

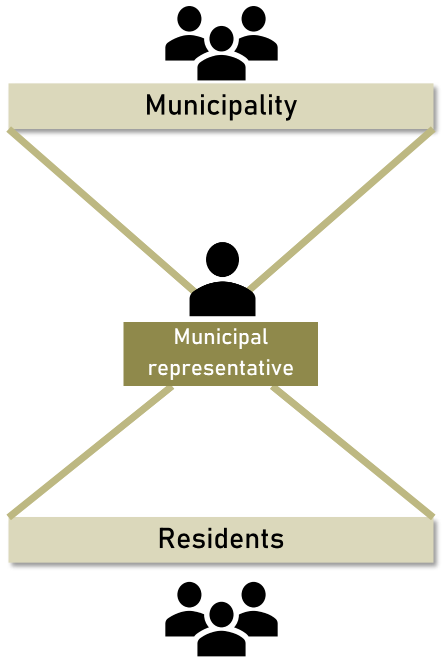



Figure 20. Hourglass organization

Figure 21. Lack of knowledge

## 3.4 Towards systemic change

The issues that arise in the planning, design, implementation and management phase cannot be solved with one solution. The entire system is faulty, where green capital often falls victim to the issues that stack upon each other during the development of a project. Transforming the status quo of project development asks for a systemic change where the value of green capital is guaranteed.

### 1) Environmental personhood

Assigning legal rights to a non-human entity such as nature will allow to re-establish the balance between economic exploitation and conservation of green capital (Bétaille, 2019). Currently, non-human entities are ineffectively and insufficiently protected from governmental jurisdictions on multiple levels (Toledo, 2020). In case harm has been done to the environment, the insinuation of the issue relies on plaintiffs. Only when plaintiffs act on behalf of the environment, a compensation becomes negotiable. However, the compensation will be specific for the personal harm of the plaintiff, it does not include the flora nor fauna that suffered.

By acknowledging nature as a legal person, it will receive rights and obligations and allow it to sue any other legal entity (see figure 22). Through environmental personhood nature can defend its right to ecosystem health among other things, ensuring that green capital will be preserved and developed. In order to give nature a seat at the table of stakeholders and decisionmakers, legal guardians and representatives must be assigned as an embodiment of nature to serve on behalf of nature (Toledo, 2020).

### 2) The burden of proof

Currently, when a site is about to endure some changes, discontent residents tend to raise objections to the proposed changes. If there are sufficient objections the project developer will be compelled to change the plans. In this case, the residents are responsible for the burden of proof. By turning it around, the project developer becomes responsible for the burden of proof. Accordingly, unnecessary and irresponsible interventions that harm green capital be prevented.

In short, this means that the project developer must clearly indicate and provide proof why it is necessary to undertake certain actions, especially concerning decisions that involve green capital. In case the project developer decides to make a change of plans, which e.g. requires the removal of green infrastructure, then this will undermine the strength and feasibility of his own plans. This will make it easier to hold the project developer accountable.

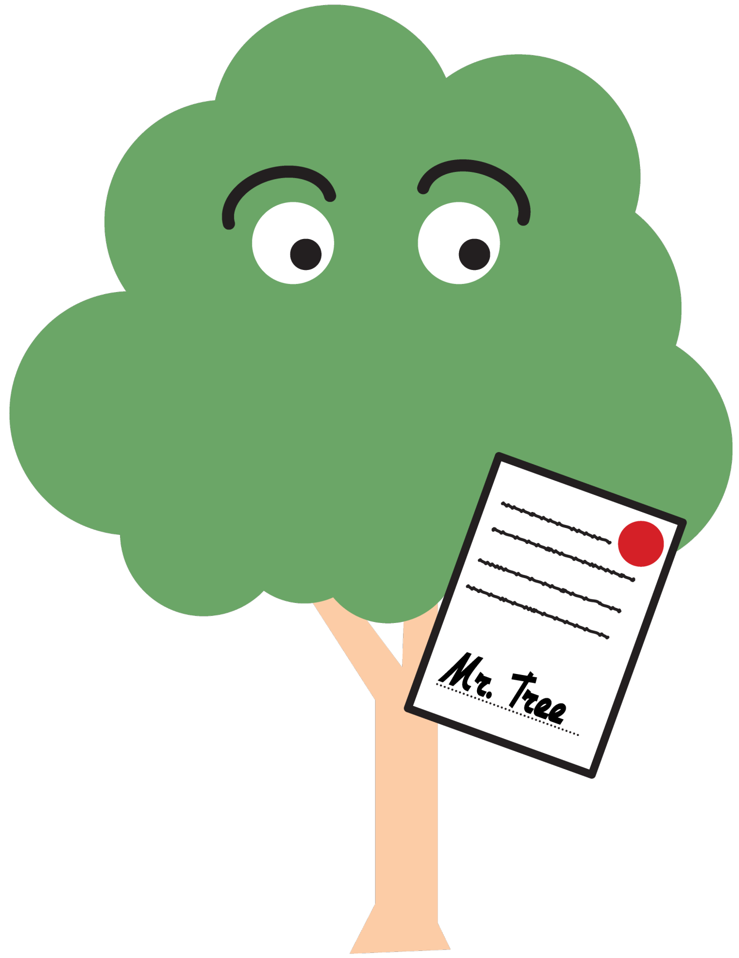



Figure 22. Environmental Personhood

### 3) Transdisciplinary teams

Current teams in project development tend to be composed of members of a similar discipline – urban planners mainly coordinate the zoning plan in the initial phase, landscape architects take care of the design and in the subsequent phase, the municipality's management department is actively organizing the day-to-day management. Consequently, the output that one team produces in a certain phase is predominantly aided by people with the same background and expertise. At the decision-making table, these specialists often tend to set high demands in the area and phase in which they possess expert knowledge.

However, when blending these disciplines together in a project team that transcends all project phases, these experts can take their knowledge and ideas to a higher level in an integrated way (see figure 23). Or in other words, together you come to results which you would not have achieved as individuals. Retracing who exactly made which addition is therefore neither feasible nor desirable, because unique ideas have manifested themselves. Also, when not one discipline bears all responsibility, but all disciplines are equally involved, the chance reduces that an area is being regarded as a tabula rasa at the decision-making table. Given that the transdisciplinary lens will provide a wide scope which includes all values within an area, thereby enabling a full comprehension of the tabula scripta. The current state of the area, the tabula scripta, must be considered as the basis from where the reasoning starts, instead of deciding on a plan to which the site must adapt.

By for example including a horticulturist more in the planning phase of the decision-making process, they can request and assess climate adaptive measures. Instead of trying to alleviate the negative consequences of inadequate decisions made earlier on in the process. After all, it is those in the implementation and maintenance phase who physically work in the green environment, not the municipal planners, designers or policy makers. Thus, by placing disciplines together from the start, their efforts could create incremental and future-proof values without any disregards.

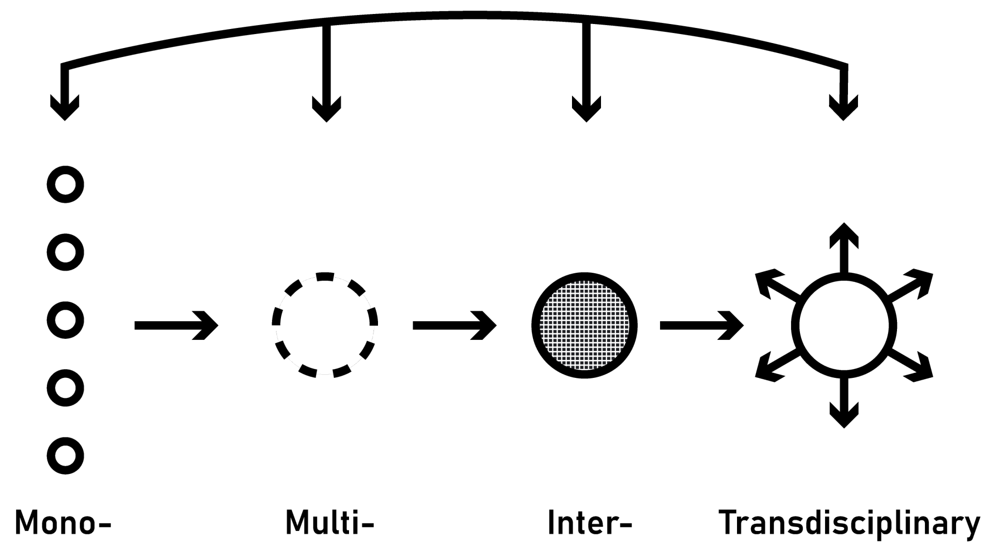


Figure 23. From mono- to transdisciplinary teams

### 4) Continuity team to guarantee project quality

Information derived from one phase of a project should be transferred correctly and completely to the next phase. The loss of information or the misinterpretation thereof could result in the loss of quality of the project. By establishing a continuity team that will keep track of the project during all phases, they can hold the respective stakeholders in that phase accountable. If the plan does not meet the requirements, the continuity team can reject the plan and ask for a revision until all conditions are met. Hence, creating feedback loops, which will prevent that the project developer might indemnify oneself instead of improving the plan. Thus, the continuity team will be able to hold any involved stakeholder responsible within the project, thereby creating feedback loops which will ensure the quality of the project and consequently preserve green capital.

### 3.5 Interventions in time

**intervention**
[ in-ter-ven-shuhn ]
noun

1. the act or fact of intervening.
2. interposition or interference of one state in the affairs of another.

(source: dictionary.com)

This year's Atelier, the theme 'Interventions in Time' was adopted. As a consequence of interventions in the past, the future can be steered and shaped. Or in other words, interventions done now are acts into the future. Interventions in time can be planned for short term, long term and everything in between. Sometimes, these interventions produce unforeseen consequences – both positive and negative. That is, because reality is not linear, but subject to not only the unpredictability of people and animals, but also the seemingly intangible systems such as the economy.

On the one hand, we see that the interventions in time done in the current state of affairs of project development predominantly result in the surrender of green now and in the future. On the other hand, we also posed new questions and interventions that will have a positive impact on the preservation of our green capital in the future (figure 24).

In our case, the interventions proposed in the project development phases align with the reappreciation of nature movement that gained momentum during the COVID-19 pandemic. People went into nature en masse to escape the city (Koek, 2020). Almost collectively, we again remembered the healing nature of walking and evaluated to what extent we actually want to cram ourselves into seemingly unhealthy urban spheres. Therefore, we consider our approach and report to be of significance in the light of current conditions.

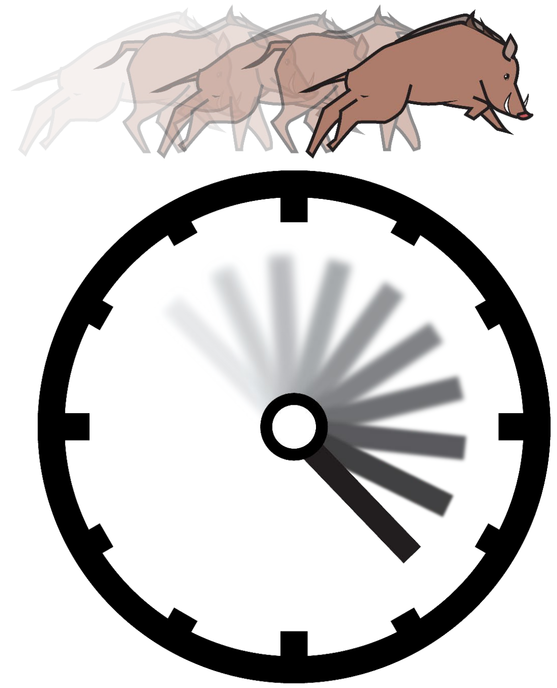


Figure 24. Interventions in time affect fauna

# 04 Conclusion

In order to answer the main research question:

‘How can green capital become leading in the area development of Maurits-Zuid?’

we reasoned from the perspective that not only humans, but above all animals are grateful end users of a design. Both depend on green capital to survive, which stresses the importance and relevance of this research question. Firstly, issues had to be identified in a tangible process, to see where and what conflicts occur, and where we can step in to create the future we strive for with leading green capital.

During the planning phase a great deal of the problem lies in the abstract use of language. This vague and implicit language is for example prevalent within zoning specifications of the green space, but rather specific within the built environment. Furthermore, multiple extra functions are possible to realize within the green zone, making it an area susceptible to be taken advantage of. The previous problem seeps into the design phase. Where this minimal appointed space for green has to be shared with all these other functions, less and less green space is left over. Within the design phase, this causes the measurements for green to be insufficient for them to properly develop, and can thereby hinder the prosperity of a design.

During the implementation phase, problems occur through differences between the actual outside space and the maps provided from the previous phases. This causes problems when implementing the design, since unforeseen aspects, such as undocumented trees can come up. Another aspect is incorrect estimation of tree development, thereby placing buildings too close to the canopy. During the management phase, issues occur regarding knowledge of the managing party. Inhabitants that co-manage an area might not have practical knowledge on how to upkeep an ecological environment. Also, inhabitants might be unknown of the importance of the natural area they are living in. Or, they may plant decorative or even invasive species. Responsibility within the maintenance phase needs to be clearly communicated. Since confusion and discrepancies can in turn have a negative impact on the green capital that we are trying to intentionally preserve through our proposed interventions.

To conclude and answer the main question, a chain of smaller interventions in time should aid the systemic change that can safeguard the preservation and development of green capital in Maurits-Zuid. However, systemic change cannot be enforced if not applied to a concrete project or area. Therefore, we used Maurits-Zuid to illustrate the identified issues, or another context when applicable. By combining research elements – consisting of a theoretical framework, dialogues and (landscape) analyses – with planning and design interventions, we could work towards a green capital research agenda.

# 05 Recommendations

To take this project beyond a report identifying issues, we propose five recommendations. This way, the result is made tangible and concrete for stakeholders, which in turn is in line with how it should go in project development according to us.

Firstly, the process of project development could be guided by the rules applied to an escape room. Escape rooms force collaboration between participants, and only by solving challenges together people can move on to the second room. In this chapter, this principle is metaphorically implemented but has potential to be worked out in real life. Within the process of development each phase represents a “room”.  Progress to the second phase is only possible when all stakeholders come to a mutual agreement. This minimizes setbacks to previous phases and supports the continuation of a project where all voices are heard. Moreover, there is no way to buy yourself out! Besides that, hints can be retrieved from the continuity team, which is represented by the organizing part of the escape room.

Secondly, Maurits-Zuid is more than just parcels to build houses on – it’s an experience to live in a unique environment. Currently billboards emphasize the plot size, house dimensions, and installed furniture. Instead, marketing techniques can be used that centralize this experimental element that transcends the physical and materialistic aspects of buying a house. For this to be successful it is highly recommended that the conditions, and possible dangers are communicated clearly to the future resident’s through illustrations and education. This in turn targets groups of people that aspire to live within an environment that enables a morning coffee while coming eye to eye with a wild boar.

Thirdly, to apply co-management of the public space it is advisable to apply or work together with existing initiatives in the area. Rather than creating a co-management group for every development project, it might get a quicker foothold by building upon previous experiences, and locally committed parties.

The fourth recommendation is to examine the identified issues in each project phase of development through further research. For example, further research on the topic of ‘green’ as a mere buffer space, and the implication/solutions of it. All the identified issues in the four project phases are an agenda for further research on its own.

Lastly, when executing the research from the Green Capital Agenda, its strongly recommended to work in a transdisciplinary team. Multiple issues transcend the realm of project planning and landscape architecture into politics, economics, or law.

# 06 Discussion & Reflection

In this report, we aimed to pinpoint a variety of issues that might occur during different phases of project development. The issues included represent a non-exhaustive list, which should not and cannot be considered as complete. The stated issues are a mere starting point of the identification of a far greater problem.

During the process of identifying these problems, each issue opened another door to a new range of questions that would require additional research to fully comprehend the addressed issue, as previously mentioned in the recommendations. Nevertheless, this allowed for a focus on the questions of where things could go wrong instead of trying to solve something that is way bigger than ourselves. This approach also allowed us to position our report and ourselves as an indicator of issues where we strive for change from a more idealistic perspective.

Given that we are students allowed us to be provocative and to poke our nose into (political) sensitive subjects. Moreover, it also gave us the freedom to think out-of-the box, to go beyond conventional solutions and to be bold and show how things could be done differently. This also touches upon the chapter of 'ideality to reality', which is applicable to our team as well. Where does our idealist visualization of the future end and where does reality start?

Furthermore, the fine line between ideality and reality is reoccurring in the report. The recommendations that are formulated could in a sense be considered extreme, or too idealistic. Ideally, nature would be an entity with legal rights and with a representative who goes to court as soon as the ecosystem health is endangered. Truth to be told, reality will most probably play out differently, where only in extreme cases of ecosystem health endangerment a representative might defend nature's rights. But by explicitly pinning it down as an option, we contribute to changing the status quo and our ideality can become our reality too.

Another point for discussion is the tension field between practical knowledge and experience versus theoretical and academic reasoning. Over the course of this project word of mouth information from practical experiences within project development has been included and considered as a truth which are difficult if not impossible to support with scientific sources, while we aim to formulate this report on a scientific basis. Part of the cause of this tension could be found in the transdisciplinarity of the team and the project. A balance must be found between the knowledge of a non-scientist and that of a scientist.

Lastly, the collaboration with the commissioners can be looked back on as smooth, efficient and a perfect balance between professional and amicable. We approached the communication with the commissioners as a briefing of our ideas and progress upon which could be reflected, which allowed us to transform the project to something that came from us as a response to the commissioners' question, instead of becoming a report that merely described the wishes of the commissioners. The continuous positive feedback and open-mindedness of the commissioners enabled us to take on this approach, while we tried to find our way through all our ideas to provide an answer to their question.

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# Annex A - Article 6 Green

English translation of Article 6 of the municipal development plans for Maurits-Zuid.

## Article 6 Green

### 6.1 Development description

The spaces that are identified for green are intended for:

a. green space, road verges and vegetation
b. playground facilities
c. water and water management facilities
d. preservation of landscape elements
e. sidewalk and bikeway
f. access routes for adjacent facilities
g. utilities
h. fire safety and extinguishing facilities
i. locally identified as 'specific type of green – parking' a parking lot
j. locally identified as 'bridge' a bridge head and/or bridge to realize a bridge for cyclists and/ or a cyclist and pedestrian connection
k. locally identified as 'parking garage' a underground parking garage
l. the corresponding structures, not being a building

### 6.2 Construction rules

6.2.1 Buildings

a. On or in the site solely buildings with a public function can be constructed, of which the volume does not exceed 50 m3.
b. By derogation of the provision mentioned under a. as locally identified 'parking garage' an underground parking garage with a maximum construction depth of 10 m and a built-up area of no more than 2.400 m2 is possible.
c. Locally identified as 'specific building designation – different building' height and construction accents may be applied to buildings, on the understanding that:
    1. The built-up area does not exceed 100 m2;
    2. The gutter height is no less than 9 m and no more than 12 m;
    3. The building height is no less than 9m and no more than 14 m.

6.2.2 Structures, not being a building

For the construction of structures, not being a building, the following provisions are applicable:

a. The construction height of property and site fencing must not exceed 2 m.
b. The construction height of a bridge head must not exceed 7 m.
c. The construction height of artistic expressions (artworks) must not exceed 10 m.
d. The construction height of playground facilities must not exceed 6 m.
e. The construction height of signaling and communication masts must not exceed 20 m.
f. The construction height of other structures, not being buildings, must not exceed 3 m.

### 6.3 Environmental permit for the construction of structures, not being a building, or activities

6.3.1 Environmental permit

It is prohibited on or in the site, without or in derogation of a written permit from the mayor or aldermen, to carry out or have performed the following constructions, not being a building, and activities:

a. Raising, excavating, moving, levelling, reclamation and/or deep plowing of soils;
b. Digging, filling or deepening, enlarging or reprofiling of watercourses, trenches and ditches;
c. The removal of nature and landscape elements; besides the regular management;
d. The construction and/ or resurfacing of paths and roads, parking spaces and/ or other surface paving.

6.3.2 exceptions

The in Article 6.3.1. mentions prohibition is not applicable to the construction and activities which:

a. Concern the regular management;
b. Are already in progress at the time this plan comes into effect.

6.3.3 Permissibility

The permit referred to in Article 6.3.1. can solely be granted, given that no disproportionate harm is done to the preservation, restoration nor the development of the landscape, cultural-historical and/ or natural values of the site.

### 6.4 Other requirements

The mayor and aldermen can impose further requirement to the site and the dimensions of the buildings and/ or the surfacing, for the benefit of:

a. The protection of green structures and elements;
b. The protection of ecological, landscape, cultural-historical and/ or natural values;
c. The possibility of usage and development of adjacent areas.

# Annex B - Green structure preconditions

The following preconditions must be considered when implementing green, to allow it to grow to its maximum potential (Reuver, 2001);

1. Provision of time, rest, and space. The more time, rest and especially the more space for development, the more nature values will be accommodated. Life span of urban-green is often limited because functions can change quickly, which affects the choice of tree species. It is pointless to plant vegetation that will be fully grown and fulfill their function after 30 years, while removed within 10 to 15 years.
2. Minimal management costs. The available financial means could determine whether it is desirable to plant management intensive or extensive species.
3. Safety considerations. This concerns both traffic and social safety. Combined with social skill, closed planting between bike path and road is undesirable, which affects the planting form.
4. Environmental considerations. This could for example mean to not plant hawthorns in a certain area because of the risk of fire blight.
5. Spatial boundaries. Boundaries in length, width, and height, both above and below ground level can be caused by different factors; high-voltage pylons and underground cables and pipes and so on.
6. Above- and underground infrastructure. In many cases the underground infrastructure such as sewerage and cables limit the rooting space. Similarly, above ground infrastructure such as transmission towers could limit the construction of a forest edge. Such obstacles are inevitable and must be considered.

# Annex C - Animal profiles

## Sand Lizard (zandhagedis)

Lacerta agilis

**Oviposition and hatching**

Suitable sites are +/- free of vegetation, loose substrate with good drainage, aerated and suitable for digging. Sand is often accepted for oviposition. Area of oviposition site 1-2m2, with at least 30cm depth, preferably 50-70cm, soil humidity ca. 5% exposition to South to Southwest

**Habitat**

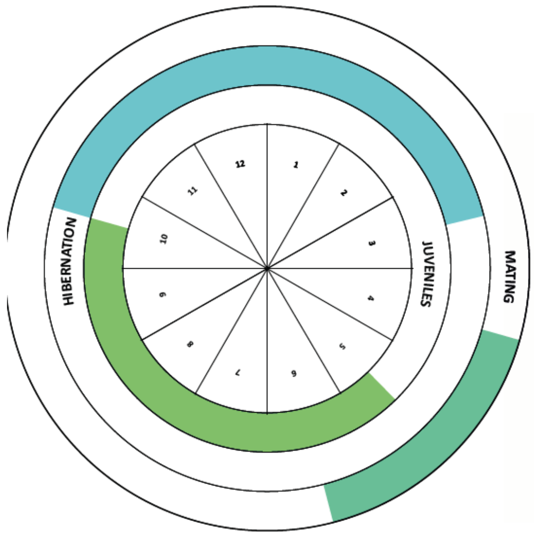
- Mosaic of different structures for thermoregulation: sun-exposed and shady places, aim for large gradient of temperature within small area.
- Open and closed areas, grasses, herbs, perennials, shrubs and bare-ground. Layer composition; e.g. herbs 30-50%, shrubs 20-30%
- Places for sunbathing, dead wood, stones, wooden poles, dry vegetation (leaf litter, dried-up plants after flowering).
- Thermic properties of materials rapid warming, heat storage, fast drying.
- Mosaic of different expositions favorable (East, West, South)
- Night roost: below ground cavities in soil or stone, spaces between deadwood, leaf litter or drystone walls.
- Places for fast withdrawals: vegetation (>75% cover) with shrubs, grasses, leafletted, also stones, deadwood etc. Flight distance max 70-100cm

**Food**

Foraging on open areas with jagged or short vegetation Almost exclusively insects and other anthropoids, e.g. beetles, grasshoppers, spiders, caterpillars. Generalist with broad spectrum of different prey items.

**Hibernation**

Wintering grounds: below ground cavities in soil, small mammal burrows, in loose soils also burrowing activities. Dry, well-drained, insulated, frost-free, often south-exposed slopes.






**Space requirements**

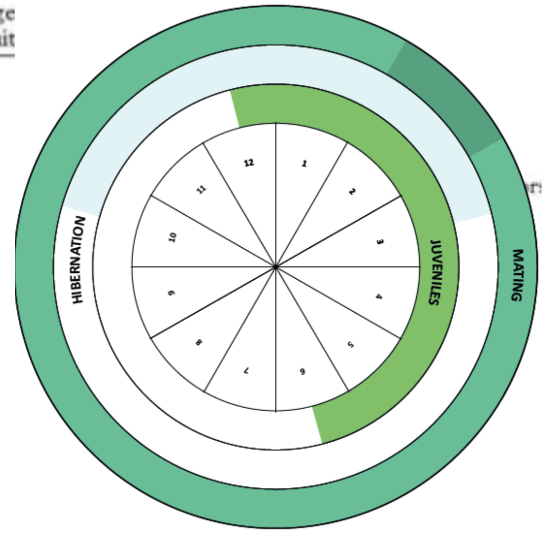
- Home range ca. 100m2
- Adjacent to habitat of existing populations.
- At least 10 ha in size (200-300 adults, or more than 100 females).
- Maximum of 4 kilometers from existing sites.
- Corridors (stepping stones) at least 1 hectare in size (20-30 adults, or >10 females). At most 2 kilometers from existing and new habitats.

## Badger (das)

Meles meles

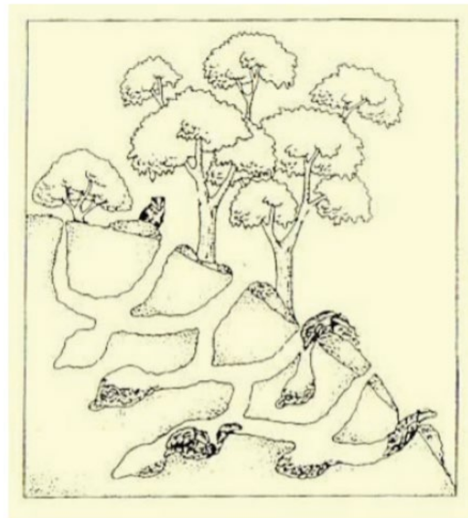

**Mating**

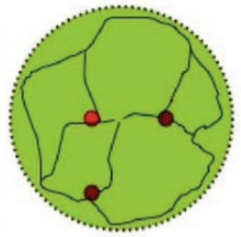
Occurs throughout the year, with a peak in February. The complete mating season runs from December up to June. During autumn juveniles go their own way, searching for new territory and a partner. Young females can mate during the winter once they are one year old.




**Habitat**

- Badgers reside in a system of underground burrows (setts) which are up to 4 feet deep and hundreds of years old.
- Soil with loose substrate that also quickly drains rainwater.
- Adequate cover around burrows
- Migration routes and little disturbance are required.
- Can house more or less the same number of badger families as the number that have to make way for the work.
- Do not contain any barriers such as steep (e.g., revetailed) banks or roads
- Offer sufficient peace and quiet.





**Food**

Foraging occurs up to about 1.5 to 12 kilometers from the burrow. In areas where food can be found all year round. In fertilized grasslands with grass shorter than 5 centimeters, to find easy lots of worms. (Corn) fields, orchards and shrubbery are suitable for feeding during a certain part of the year. Important for building up a fat layer to get through the winter. Found in small scale arable and pasture landscapes with sufficient woodlots, hedges, and treerows. These elements serve a double function as shelter and guidance.

- Have sufficient food available throughout the year.
- Offer sufficient (linear) plantings, orchards
- Earthworms (staple food).
- Forest fruits, fall fruits, nuts, acorns, grains (especially corn and wheat), mushrooms, young rodents, hedgehogs, snails, and insects (such as beetles and wasp and bumblebee brood) and the larvae of long-legged mosquitoes (leatherjackets) and beetles (grubs).

**Space requirements**

Territory ranges from 30-150 hectares in optimal, and 150- 600 hectares in marginal areas.

## Common small bat (gewone dwergvleermuis)

Pipistrellus pipistrellus

**Habitat**

In and around buildings. Especially near ‘green environments’ such as parks, deciduous forests, wooded banks and sheltered water features. A residence can be used for one or more functions. Depending on the function, the residence at that time is called a mating, maternity, winter, or summer residence. For different periods there are different requirements for residences. It is likely that common pipistrelle bats have a preference for buildings where different spaces can be used depending on the weather conditions.

- Maternity residences are transformed from summer residences from early May to mid-July.
- Mating residences are used from mid-August to early October. The male resides here throughout the year. In addition to buildings, this residence can be located in tree cavities or closets.
- Summer residents are all other residences (where there is no maternity, mating or hibernation).

**Groutes**

Around sunset, dwarf bats fly out and use sheltered routes to reach the foraging areas. They choose line-shaped structures as much as possible and fly preferably out of the wind and light (street lights, lights of buildings, etc.). They often forage along these structures, e.g. treerows, waterways with upright vegetation and greenery.

- shelter and height, density and structure (single, double, overhanging).
- extent of holes or interruptions
- light sources present and how the flight route lies in relation to the landscape element.

**Foeraging**

Forage in gardens, parks, estates, along avenues, rows of trees, wooded banks, planted dikes, forest edges, cemeteries, sheltered ponds and waterways. Generally forage within 5 kilometers of their residence. In the evening/night, several sites are reached by a fixed route.

- Fly at an average height of 2 - 5 meters, but sometimes up to more than 50 meters.
- Do not fly through the vegetation along the vegetation while hunting. Depending on vegetation height and shelter at some distance (1 - 8 meters).
- Open spaces the size of about 1 - 3 mature trees in dense vegetation such as forests.
- Strongly wind-sheltered places along linear tall vegetation or wind-sheltered places along water. The higher the trees or the wider the structure, the greater the insect supply. Only rows of trees with a porosity (permeability) smaller than 30% (in central Netherlands) and 10% (northern and western Netherlands) provide sufficient wind shelter to serve as foraging areas.

**Food**

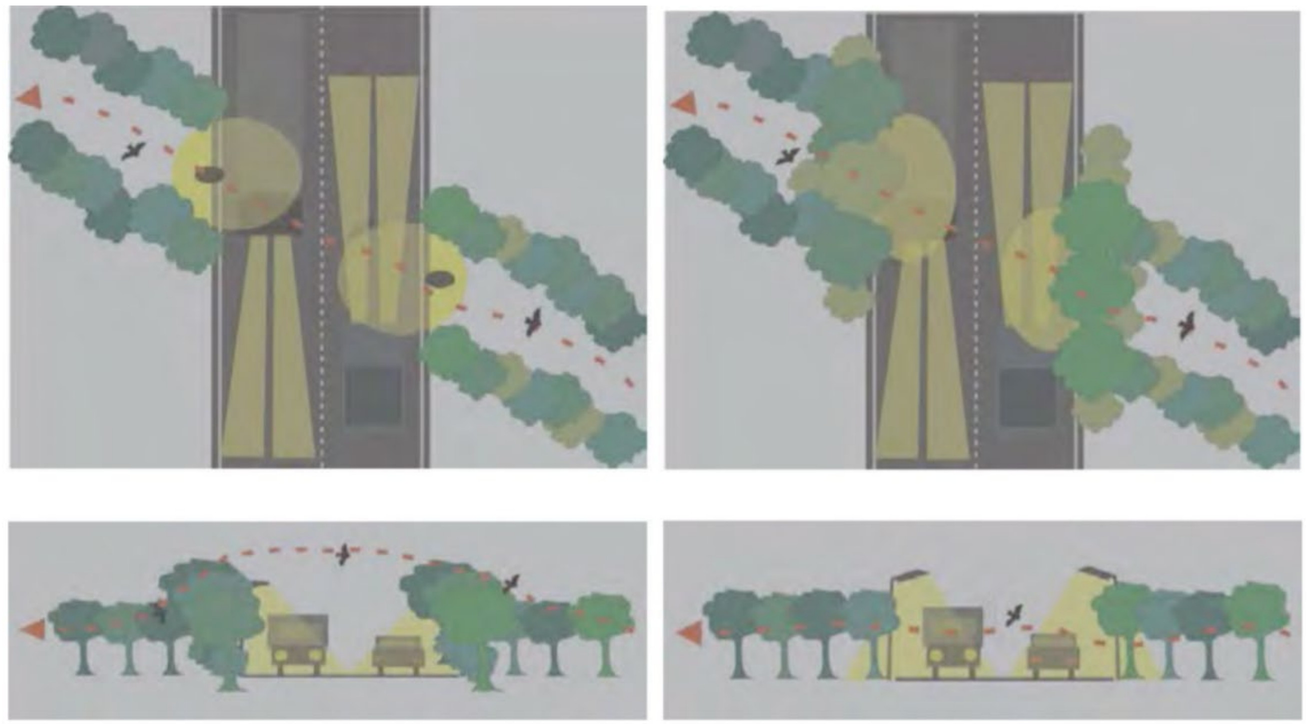
Mosquitoes, shot moths, but also moths, lacewings, moths and sometimes beetles. They catch these prey in flight. A building-dwelling group of often 50 animals catches more than 10 million mosquitoes in a year.

**Mating**

Slow reproducer, females typically have one young per litter. Typically 50-70% of females will give birth to a young in a given year. After about 6 weeks after birth, the young are independent.

**Space requirements**

- Microclimate: temperature, different temperatures within one object (gradients), rate of warming or cooling (buffer value) and humidity. It is essential that the accommodation is draught-free in connection with temperature regulation and the prevention of dehydration in winter. Winter quarters must also be largely frost-free.
- Location and characteristics of the entrance and exit openings: the approach route must be free of obstacles such as branches or trees. Also, the accommodation may not be accessible to cats and the like via a roof, for example. No obstacles, such as scaffolding, scaffolding cloth or high vegetation, in front of the entrance.
- Material: the inside should be rough (no smooth concrete or wood), not painted and not fraying over time.
- Space use and safety (against predators).
- Location in relation to other functions in the habitat.

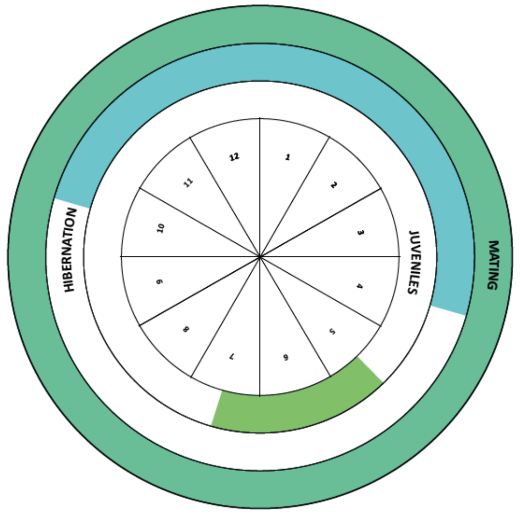



## Swift (gierzwaluw)
Apus Apus

**Habitat**
The swift is a distinct summer bird and is almost exclusively present in the Netherlands from April through October, with the highest presence in May through July. The winter is spent in tropical Africa. The first birds arrive in the second half of April.
The swift spends most of its life in the air. Only to breed do swifts temporarily leave the skies and come to the surface of the earth. Originally, swifts were rock dwellers and over the centuries they have traded the rocks for houses and other buildings. Prefer residential areas over 50 years old in urbane or sub-urban areas.

Nests in dark cavities in ventilation shafts, crevices in walls, under roof tiles and in church towers. However, due to urban renewal projects in the 1960s, many nesting opportunities are lost. A major cause lies in the fact that the Building Regulations indicated that there should be no openings through which animals such as mice and rats could gain access to the buildings. As a result, the swift is completely dependent on the supply of artificial nesting opportunities in those areas.

**Hatching**
The hatching season is from May through July. 2 to 3 white eggs are laid in early May to early July. Incubation time is 18 - 22 days and the young fledge on average after 40 - 42 days. By mid-July, all young are usually fledged. Incubating birds frequently return to their nests to alternate brooding or to feed the young. Breeding birds spend the night on the nest.
Young birds up to 14 days old therefore go into "hibernation" with one of the parents on the nest; with older youngsters, the parents go foraging for food on their own. As a rule, swifts look for their food in a radius of 8 kilometers around the nest site.




**Food**
In flight they catch and eat flying insects (air plankton), tens of thousands of insects per day. They catch these insects from the air in flight with their extremely large beak opening, where they can reach speeds of 120 kilometers per hour.

**Space requirements**
- Free flight path of at least 3 meters below the flight opening of the nest and at least 1 meter wide is needed, because they cannot take off directly from the nest and therefore first drop down.
- No obstructing elements in the flight path such as trees, flagpoles, scaffolding, etc. For nesting sites next to roads, it is important that the flight hole is high enough so that no traffic victims can fall.
- No specific migration routes
- No specific foraging area: they fly to areas where food is available.
- Migrates south in late summer and back to its breeding grounds in the north in spring.

## ‘Fauna damage prevention’

### Wild boar (wild zwijn)
Sus scrofa

**Benefits and potential conflicts**
The main crop damage caused by feral pigs is to potatoes, grassland, corn, and grain. The pigs root under turf for animal proteins, such as earthworms, leatherjackets, and grubs, whereby the grassland may be completely converted locally. Boars also root for sown grains, seed potatoes, and ensiled crops. In cereals, in addition to foraging, damage from trampling (lying down, rolling) can occur.

**Threats and conservation status**
There is a growing population of several thousand wild boar in the Netherlands. Wild boar are only allowed to occur in specially designated habitats. In the rest of the Netherlands they are not wanted and are shot. Nevertheless, in parts of Limburg, Noord-Brabant, Overijsel and Gelderland, outside the designated habitats, wild boar populations have been present for years.

Wild boar with piglets
Source: https://www.destentor.nl/regio/wat-moet-je-wel-en-niet-doen-als-je-een-wildzwijn-tegen-het-lijf-loopt~a2a2223b/

### Red deer (edelhert)
Cervus elaphus

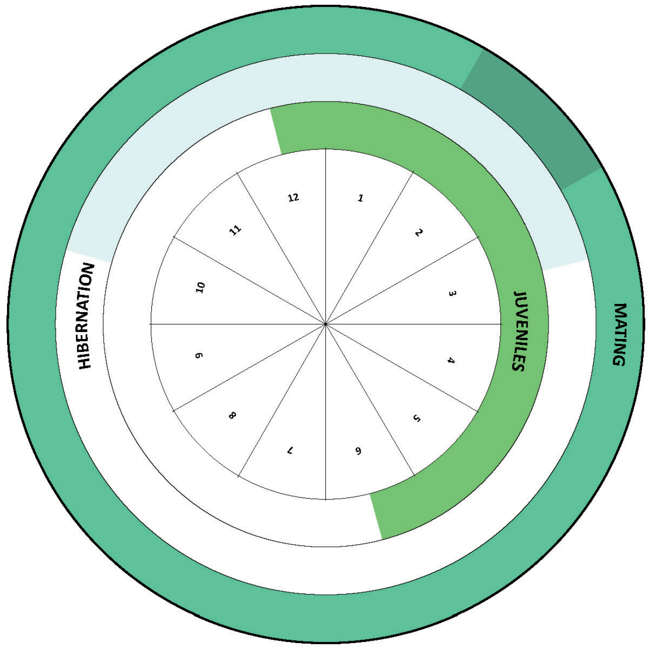
**Benefits and potential conflicts**
Roe deer eat herbs, grasses, leaves and buds. Roe deer can cause particular damage to fruit trees (buds and bark) and young forest stands. Red deer in forest and nature areas eat grasses, herbs and leaves.
In agricultural areas they eat numerous crops, including grasses, corn, potatoes and grains. The most important method of preventing damage is management, or the realization of the target stock. In addition, the installation of a grid remains one of the most effective measures. Experts see opportunities in diversionary feeding through the construction and maintenance of wildlife corridors within the core areas. This method will be further promoted in the coming years.

**Threats and conservation status**
Threats and conservation status of red deer, roe deer and fallow deer can be prevented or limited. The roe deer population in the Netherlands remains fairly stable. Since 2010 the red deer population has been increasing in the Veluwe. The fallow deer population has increased sharply in recent years in Zuid-Veluwe, Noord- and Zuid-Holland and Zeeland.

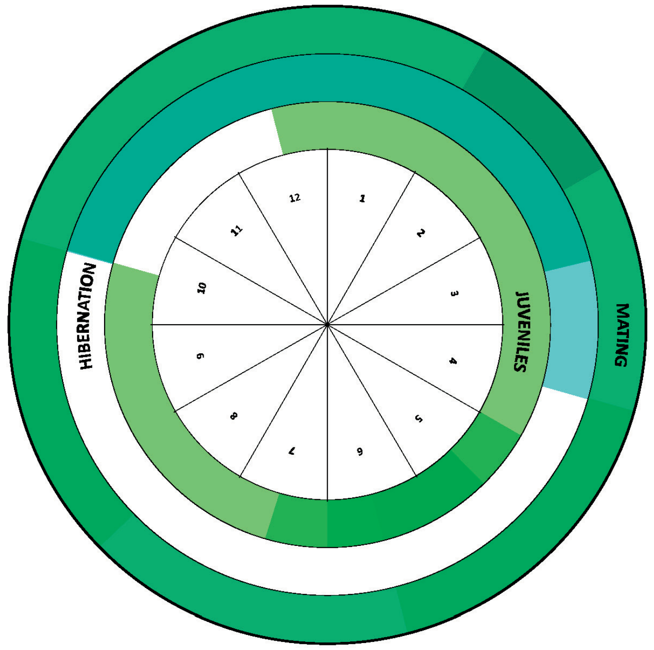
Red deer at the Veluwe
Source: https://www.natuurmonumenten.nl/dieren/edelhert

# Annex D - Animal lifecycles


Sand Lizard

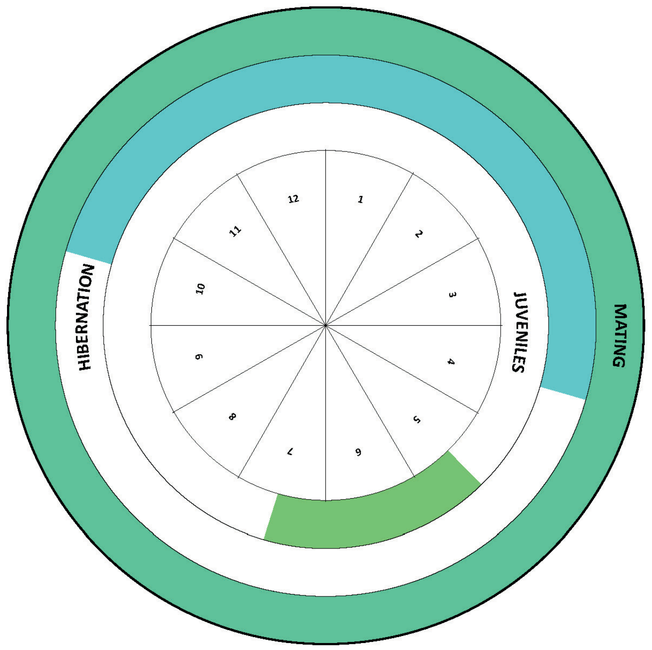



Badger





Common small bat




Swift

**Mating**
**Hibernation**
**Juveniles**

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