

Symphony for the dike

Orchestrating a soundscape ecology design for a city park on the Delflandsedijk in Maassluis

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P4 – Master track Landscape Architecture





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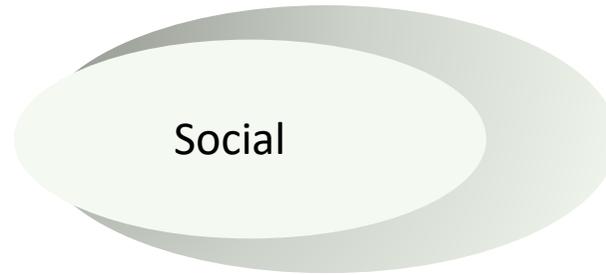
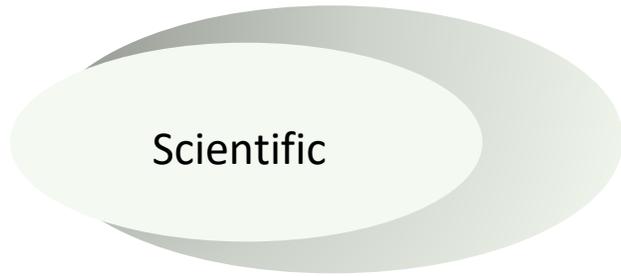
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Fascination



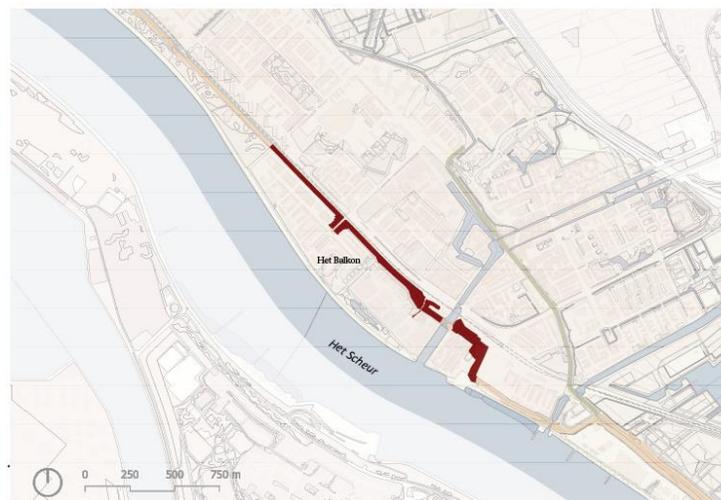
Scope & relevance



Province of Zuid Holland



Maassluis



Study area

Douane house, Maassluis.



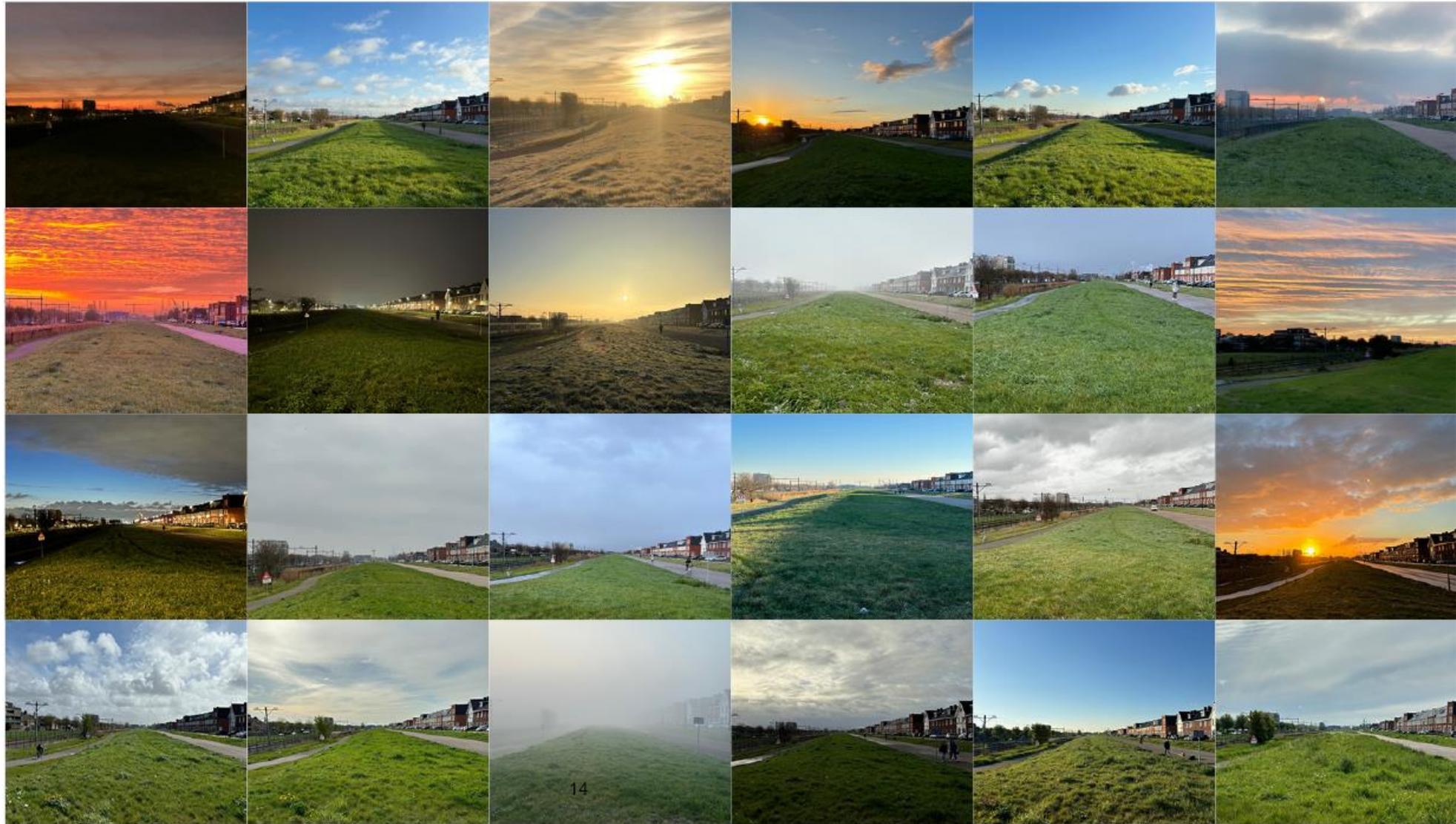
Source: By the author, 2023.

Location

“Every day by the dike”

For 9 months, pictures were taken from the same place at Delflandsedijk, at different moments of the day. From the end of Summer till the beginning of Spring.

Problem statement

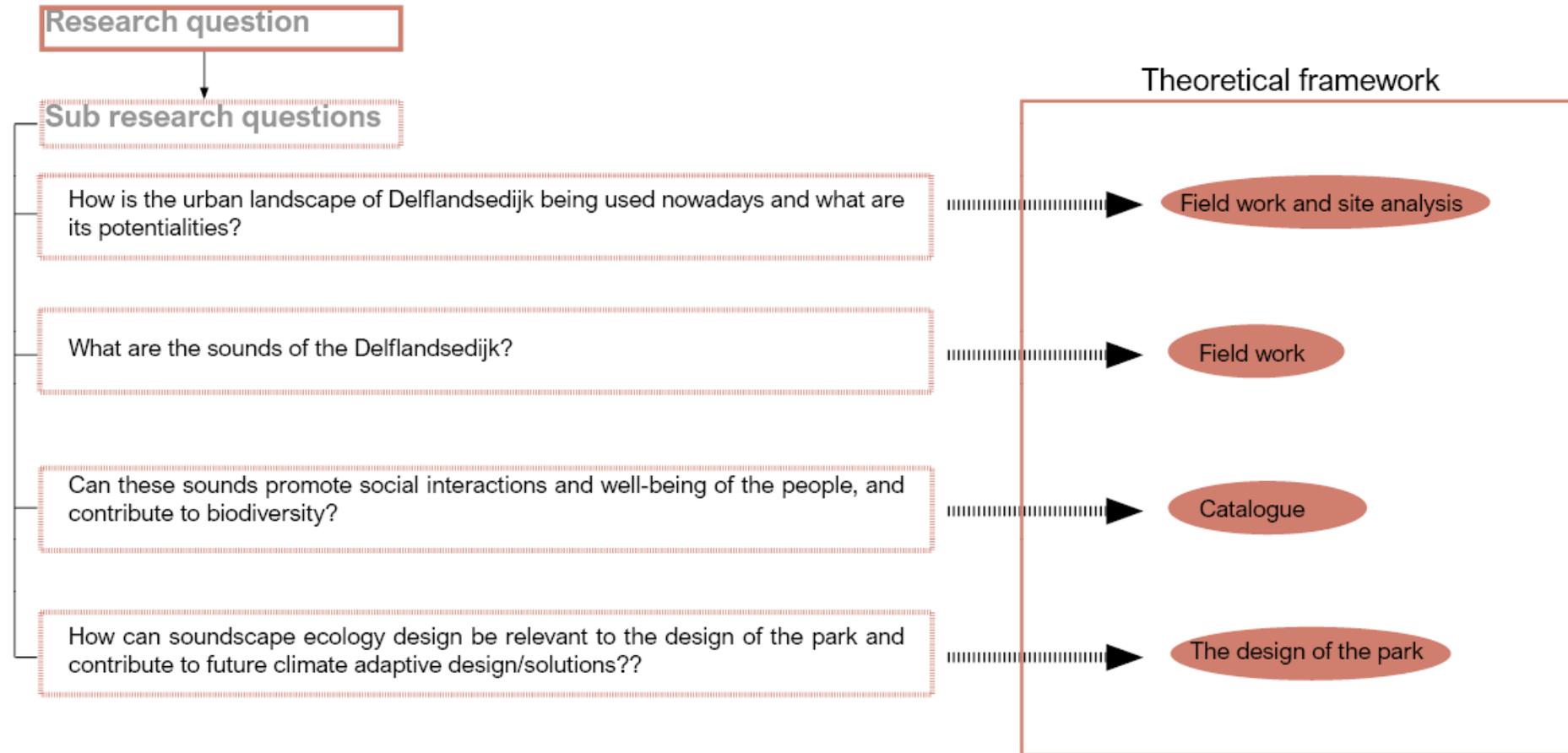


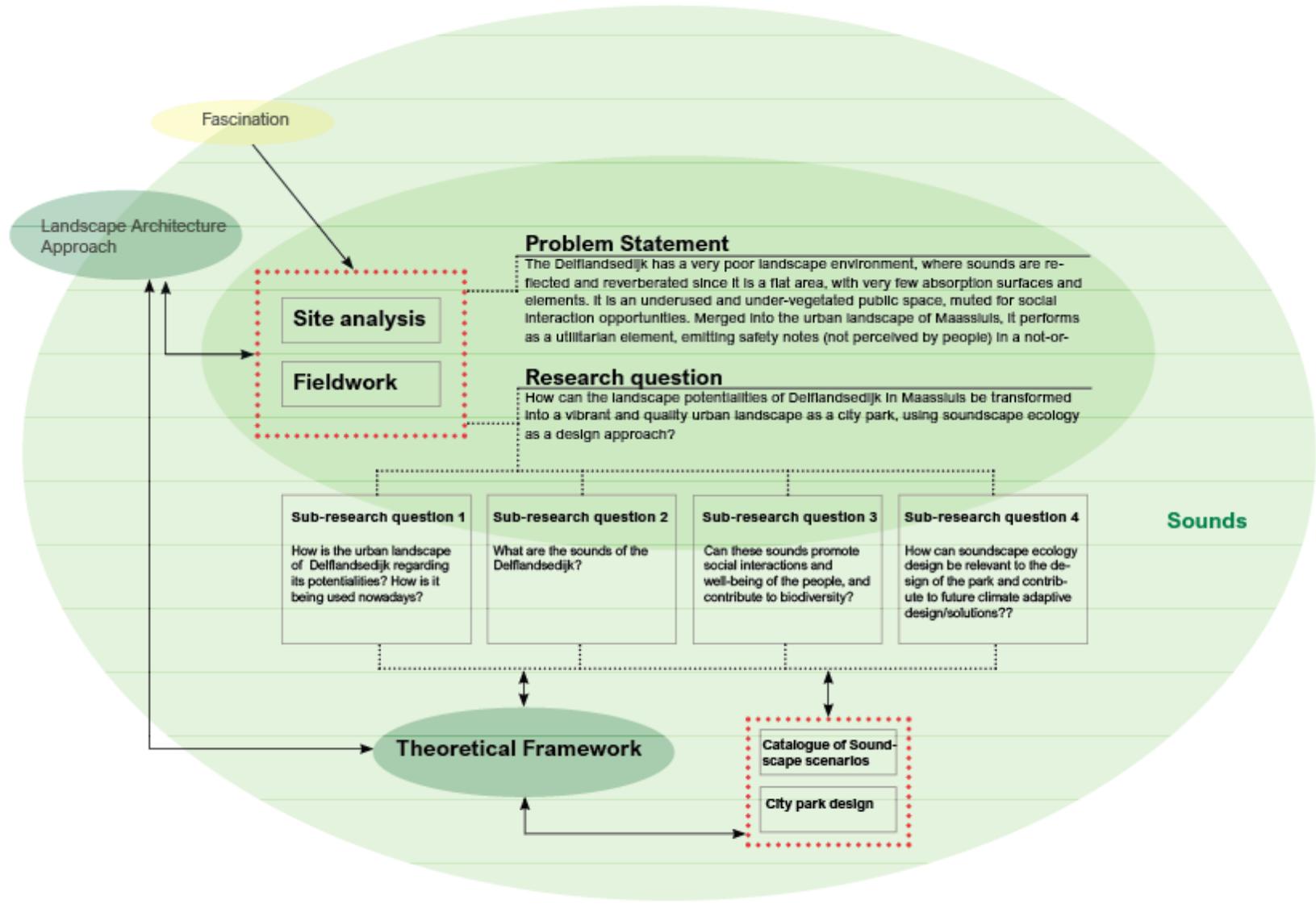
“Enjoy the silence...”



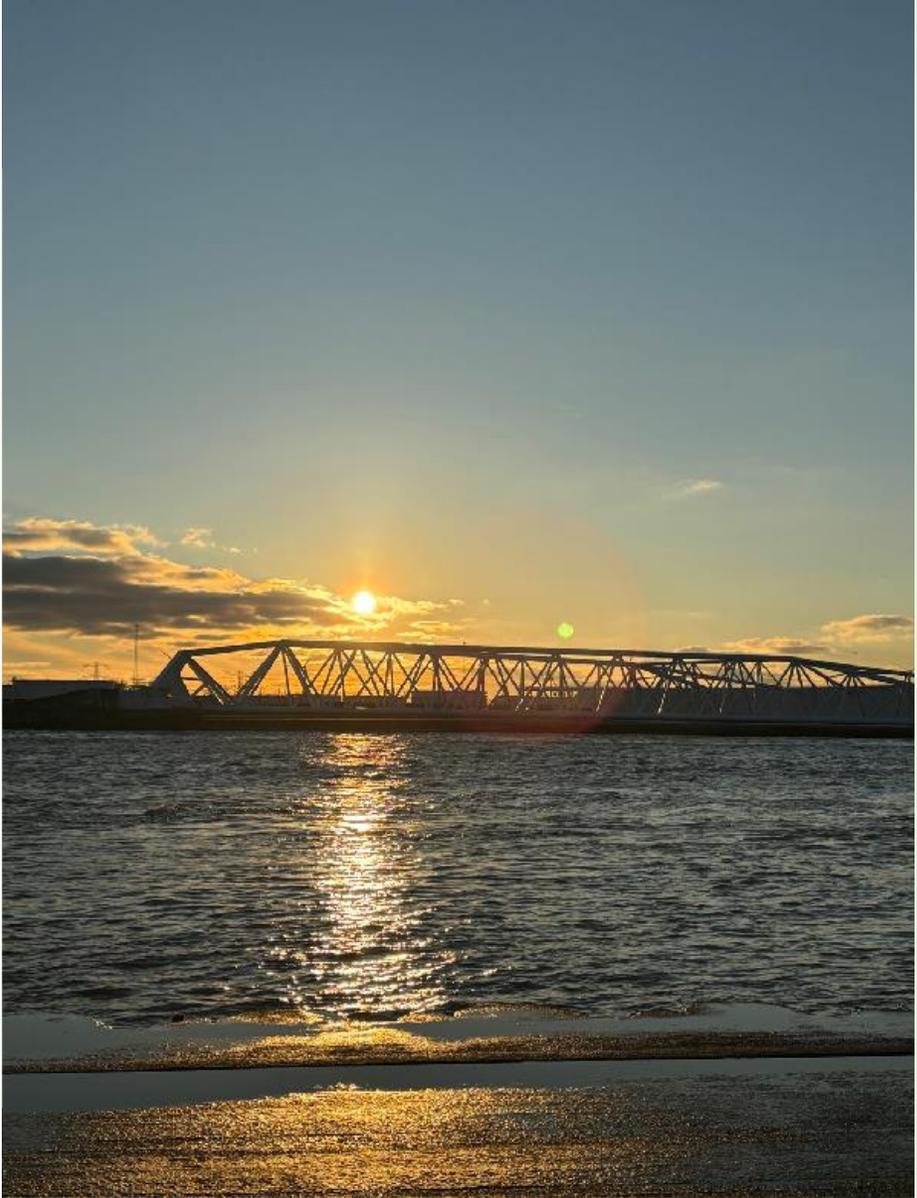
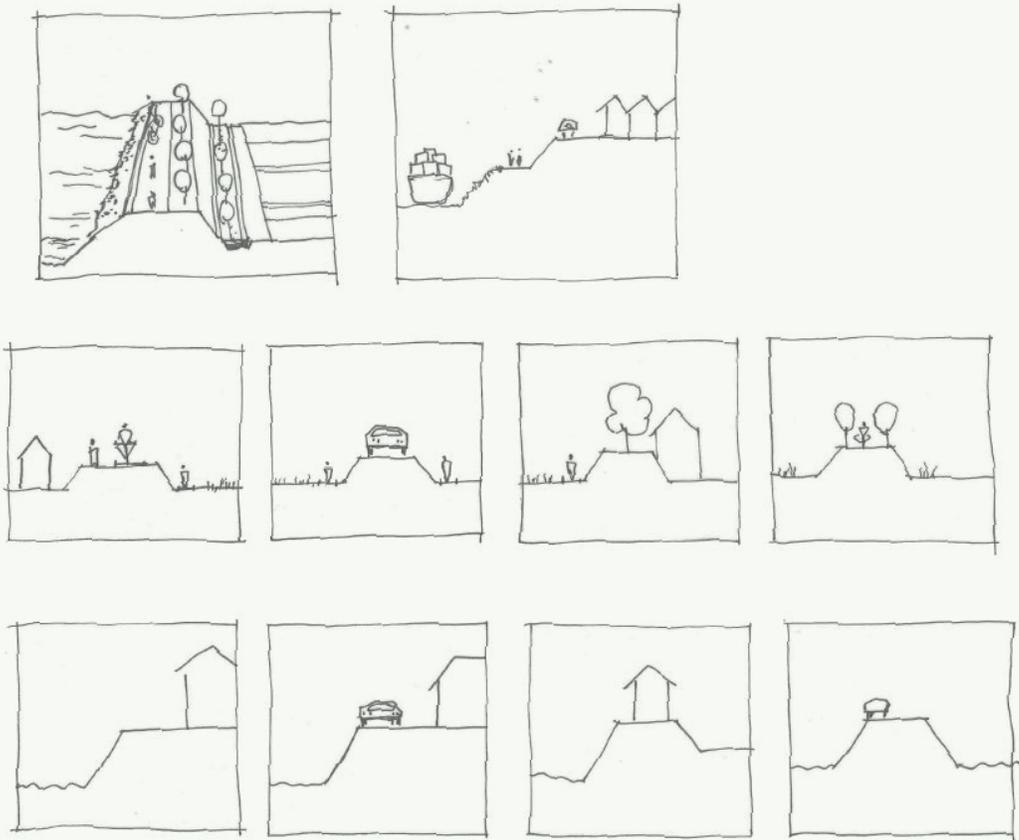
How can the landscape potentialities of **Delflandsedijk** in Maassluis be transformed into a vibrant and quality **urban landscape** as a **city park**, using **soundscape ecology** as a design approach?

Research question

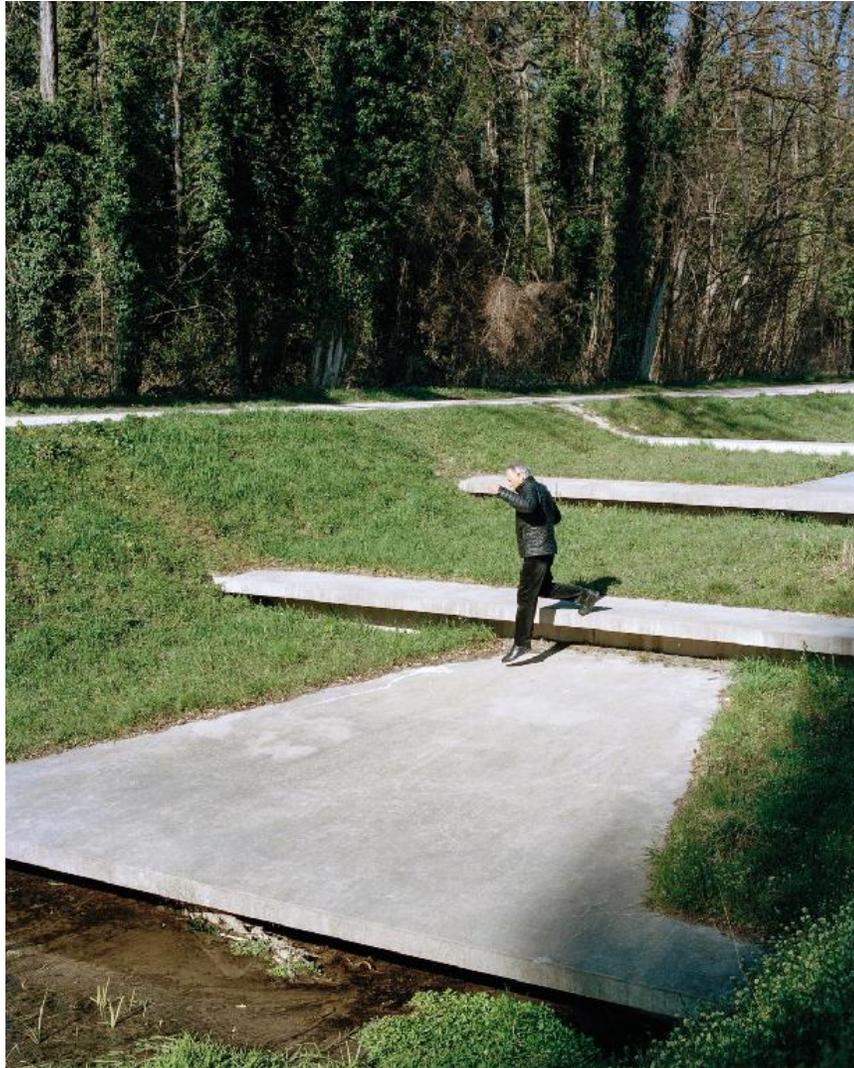




“Dikes are the landscape of the future.” (Felixx Architects)



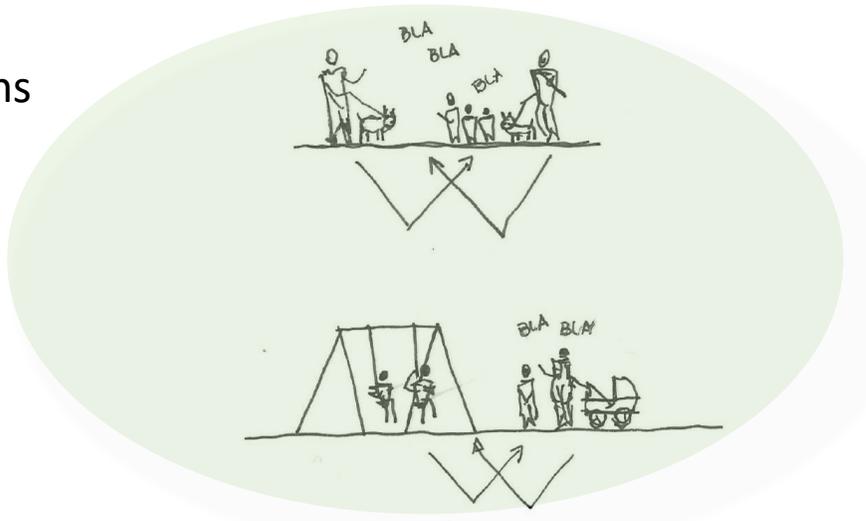
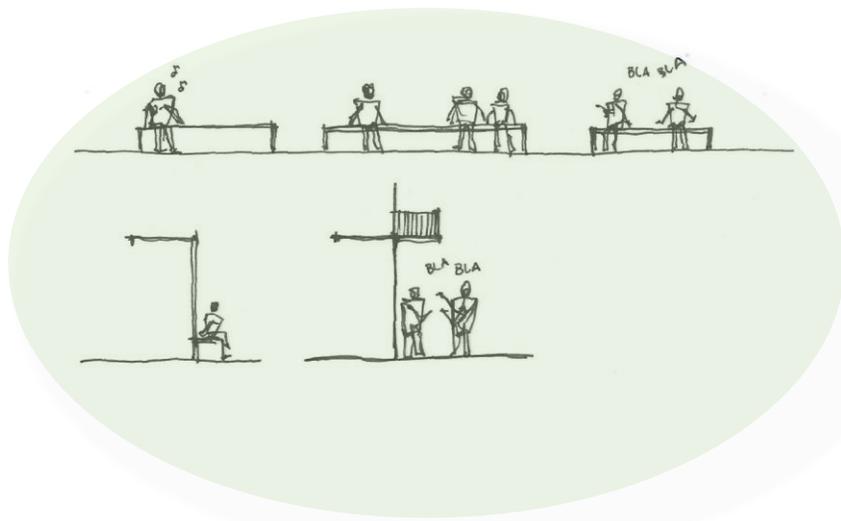
Understanding dikes



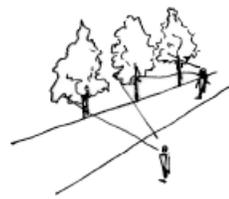
*“We need to make people see again things that we are used to, in a different way. People have to experience and have special moments with nature: touching water, smelling leaves, **listening to the sounds.**” (Georges Desmonds, “Green cities lectures”, TUDelft, October, 2023)*

Phenomenological approach of Landscape Architecture

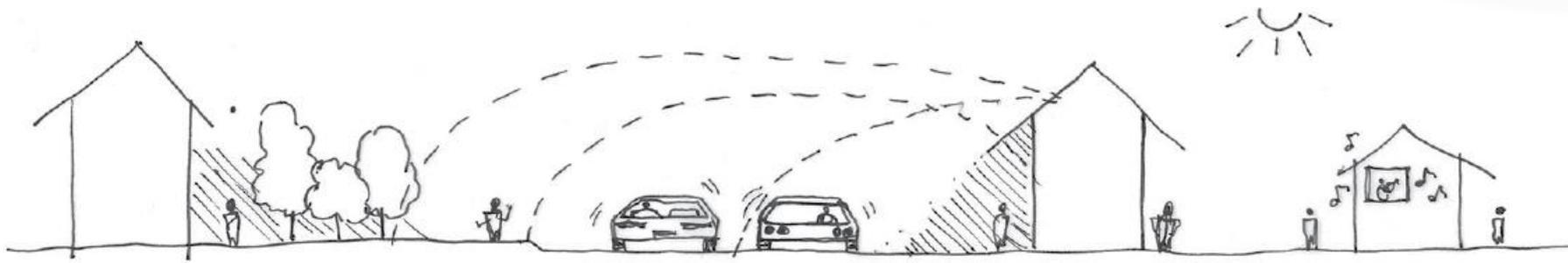
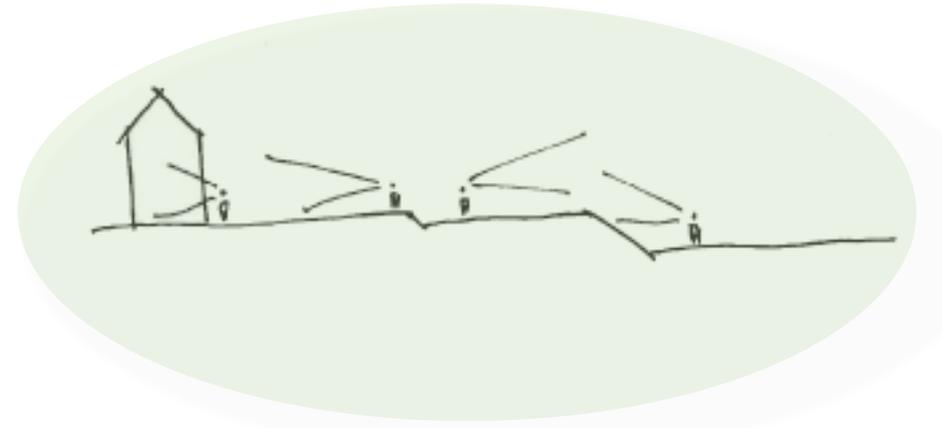
William Whyte: social interactions



Understanding public spaces, public places

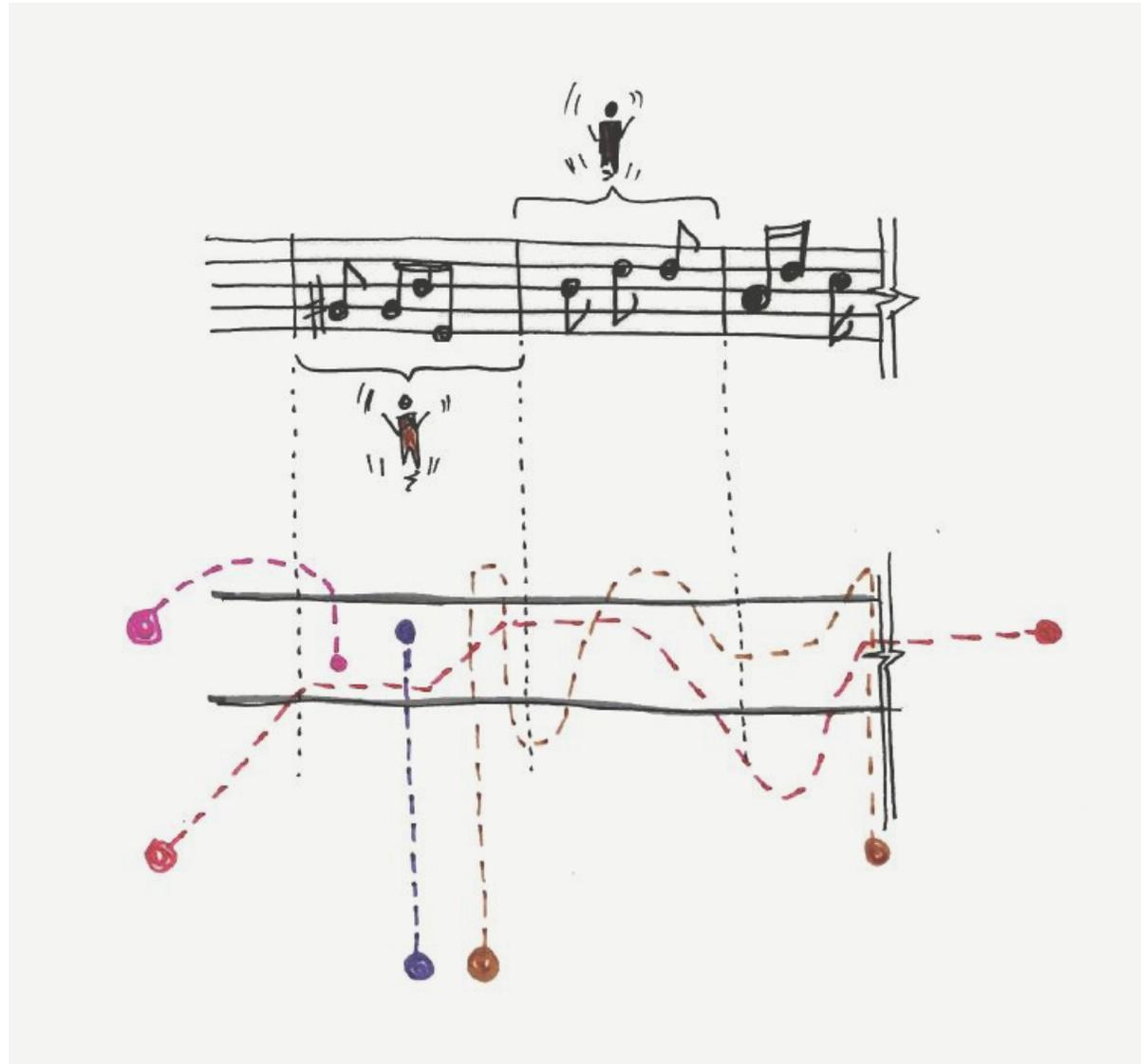


How do people move around? What do people see?
(Harteveld, M.)

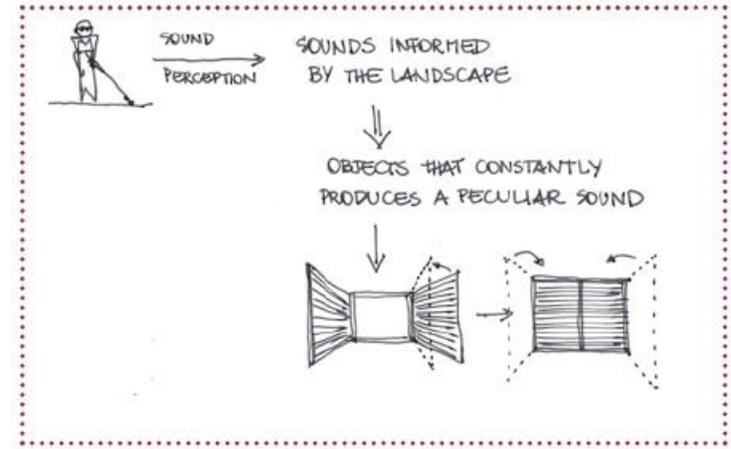
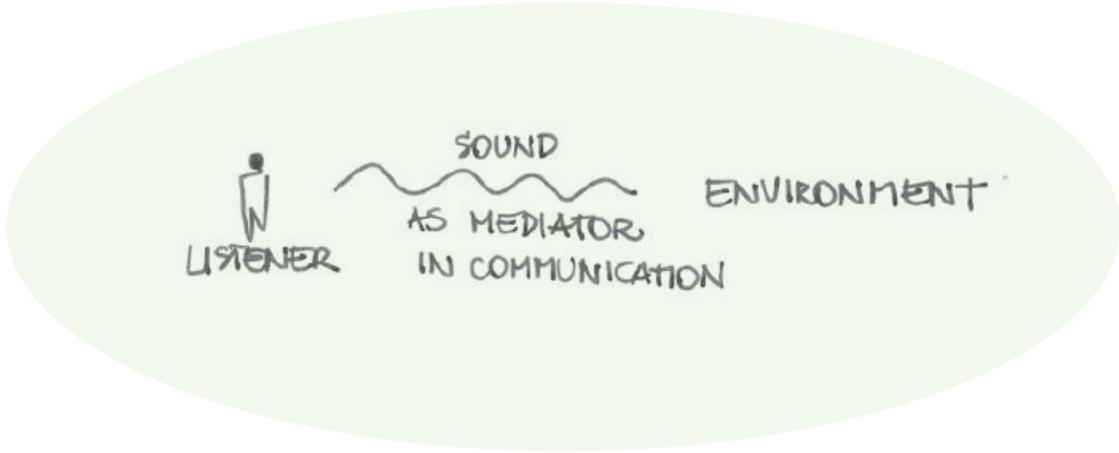


People connect to places according to their needs and preferences. Preferences are time-mood-needs conditioned.

After the pandemic, people returned to their routines and the public places could be enjoyable again. However, new senses, sounds, and experiences brought a conscious of their meaning. Everything that was not part of our daily life was attractive and wanted.



Understanding public spaces, public places



R. Murray Schafer

European Sound Diary

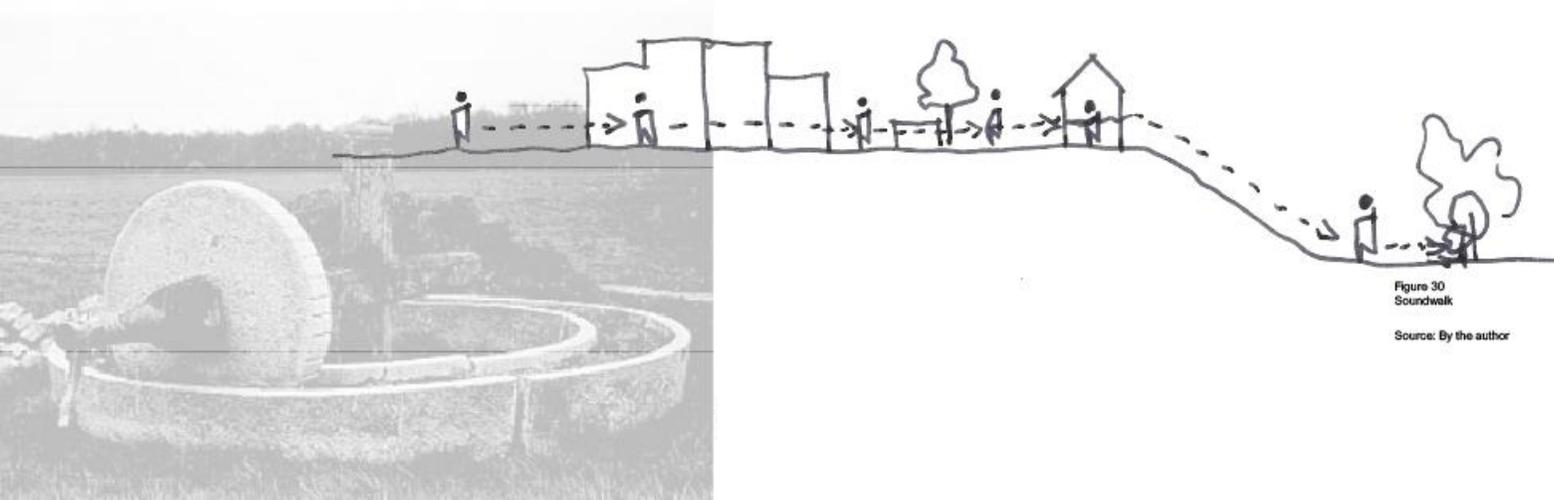
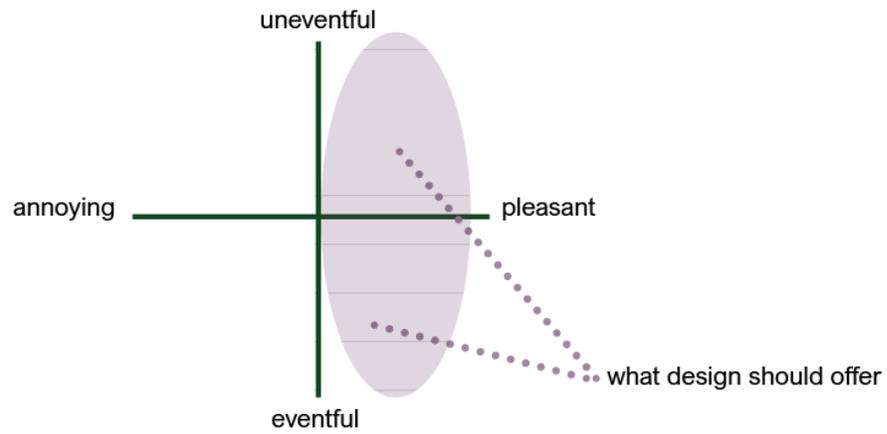
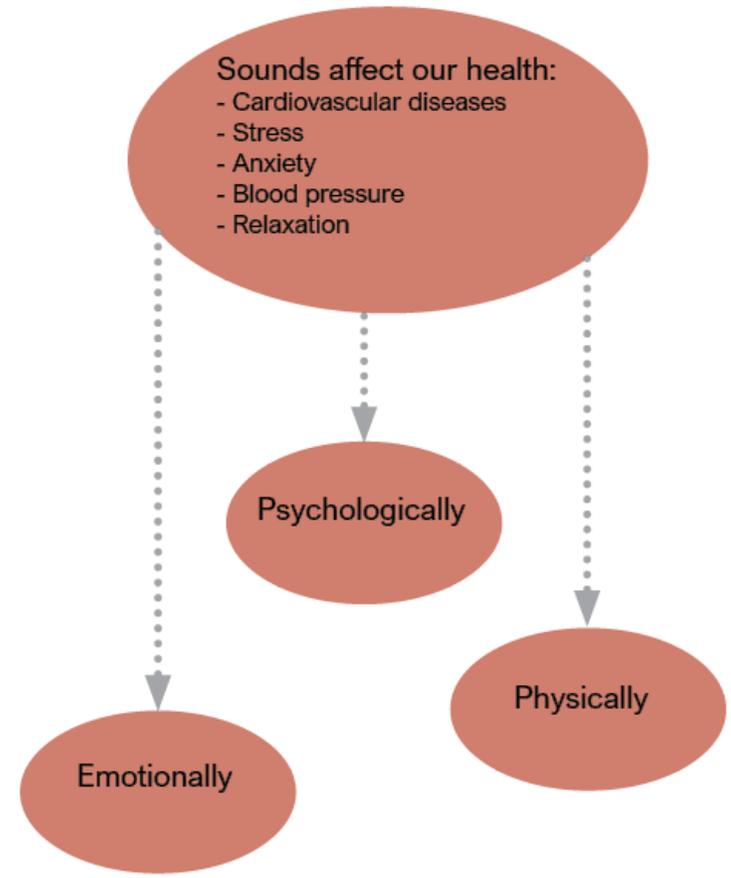
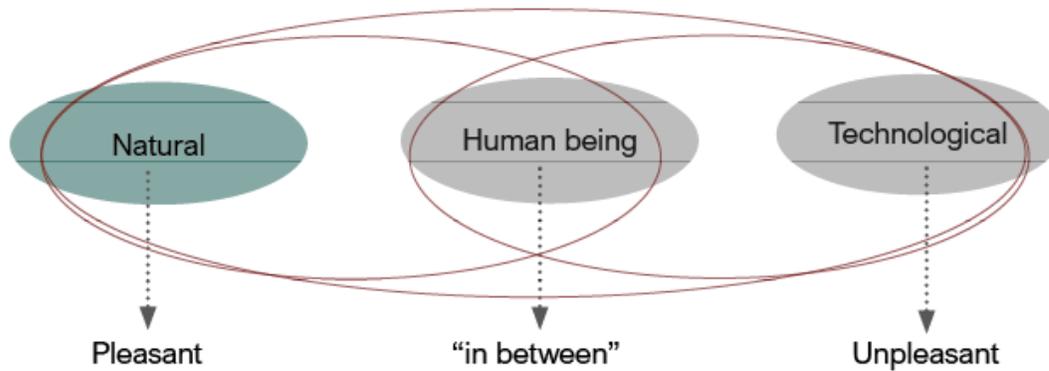


Figure 30
Soundwalk
Source: By the author

Soundscape



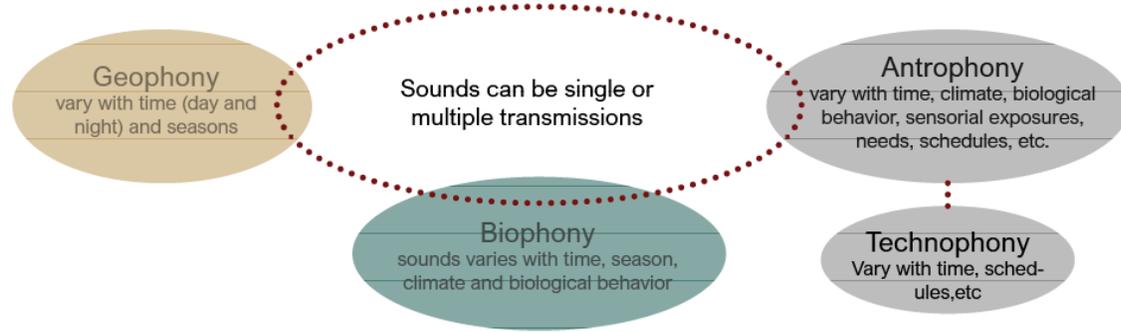
Axelsson's model for sound perception in the landscape



When we are calm and relaxed, we can connect easily to each other. On the opposite way, in an acute situation, we have an aggressive reflection.

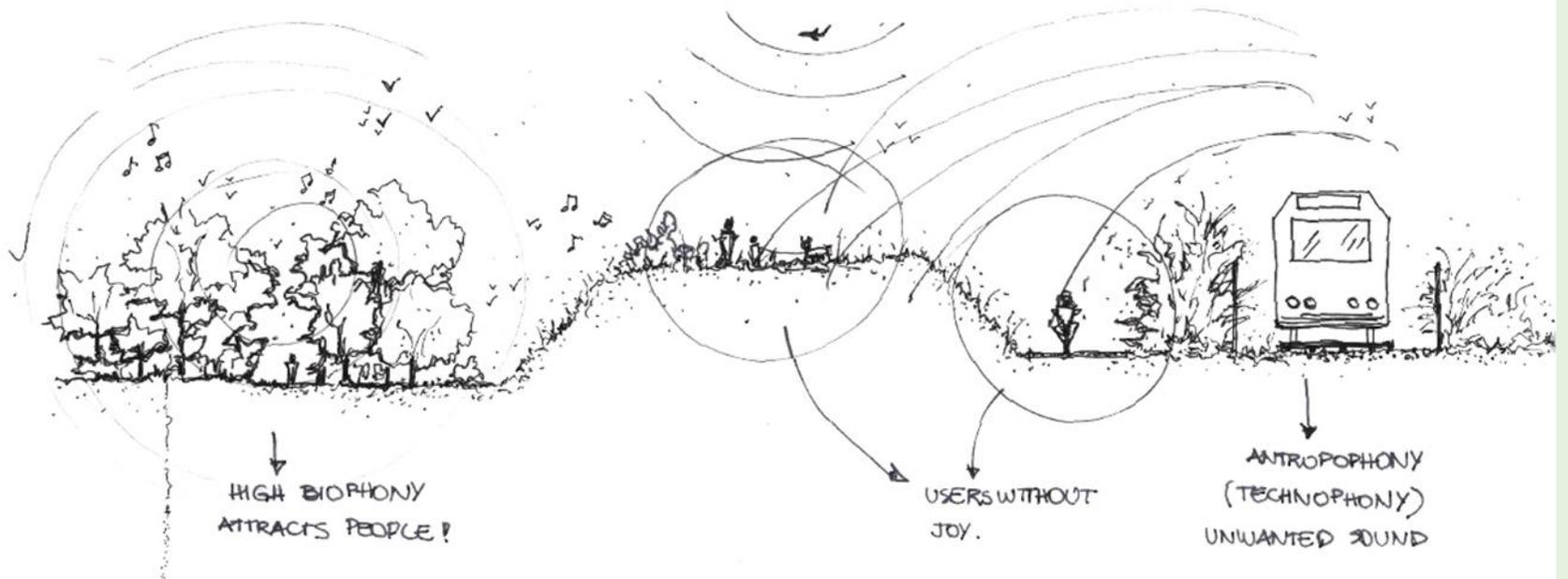
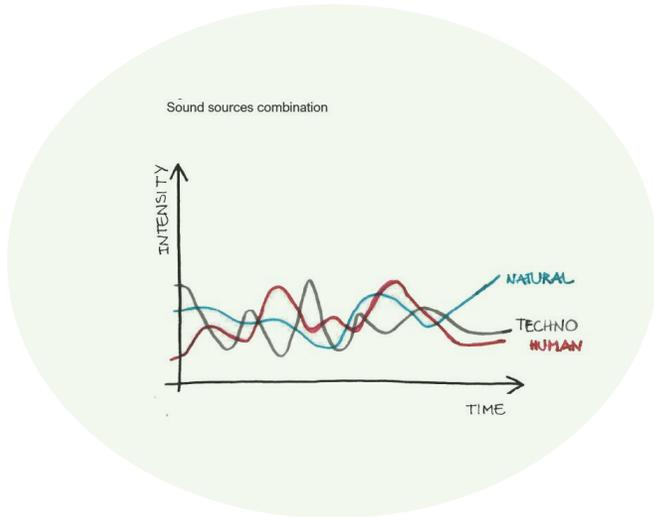
Soundscape

Variation in sounds



Sound can no longer be a side element in urban planning and landscape. It has a considerable impact on both human life and other living beings, especially when it is mismanaged, becoming noise.

Acoustic holds an essential importance, whether indoors or outdoors.

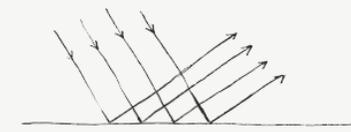


Park Buitenschot, Schipol. Designing with topography was the solution for aircraft sounds absorption.



Source: <https://www.hnsland.nl/projecten/landartpark-buitenschot/>

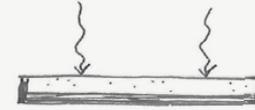
The propagation of sounds varies across landscape elements due to their unique diffusing and absorption characteristics.



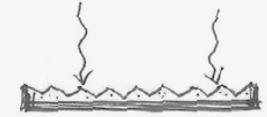
Diffusing in flat surface



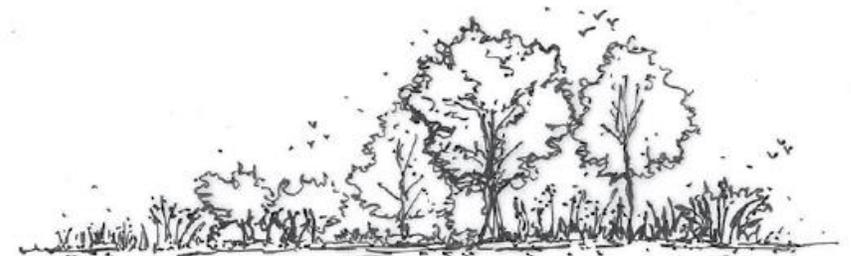
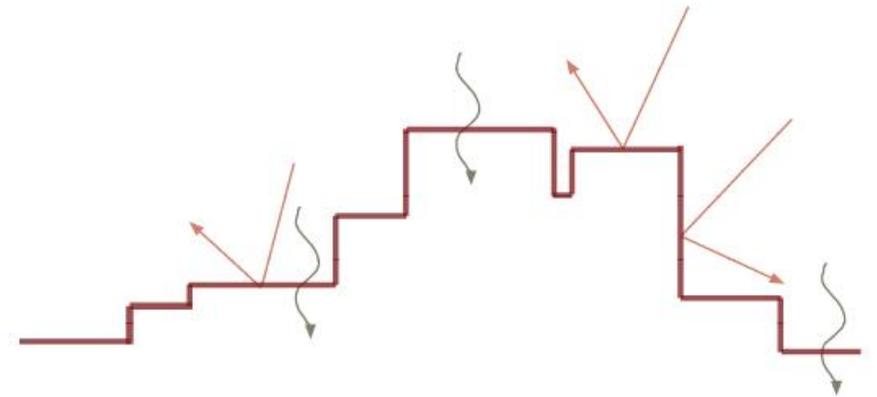
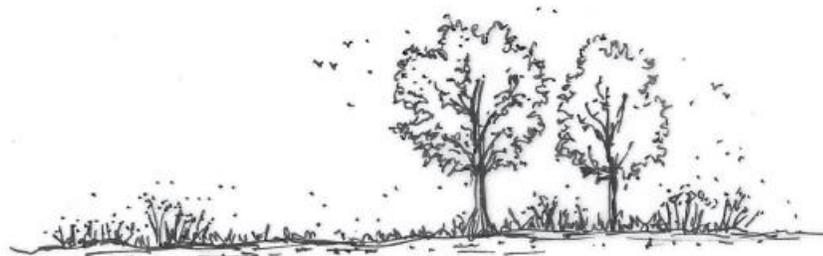
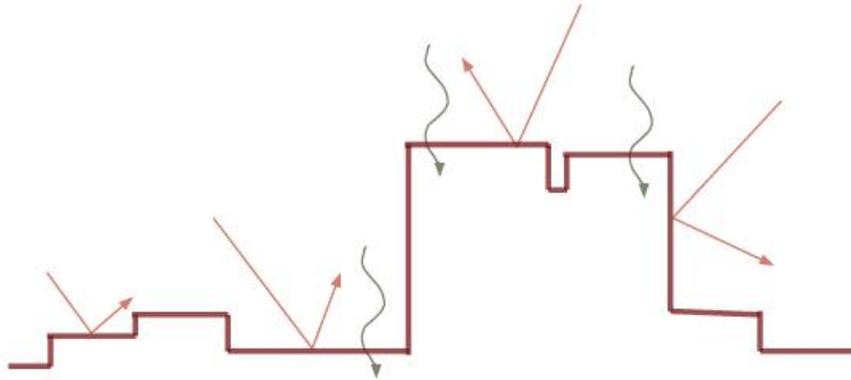
Diffusing in rugged surface



Absorption in flat surface



Absorption in rugged surface





Spring



Summer



Fall



Winter

Soundscape ecology



Urban acoustic environment - Valkenberg Park, Breda, NL.



Source: The author, 2024.

Rural acoustic environment - Hoek van Holland, NL.



Source: The author, 2022.

Wilderness acoustic environment - Foz do Iguazu, Brazil.



Source: The author, 2017.

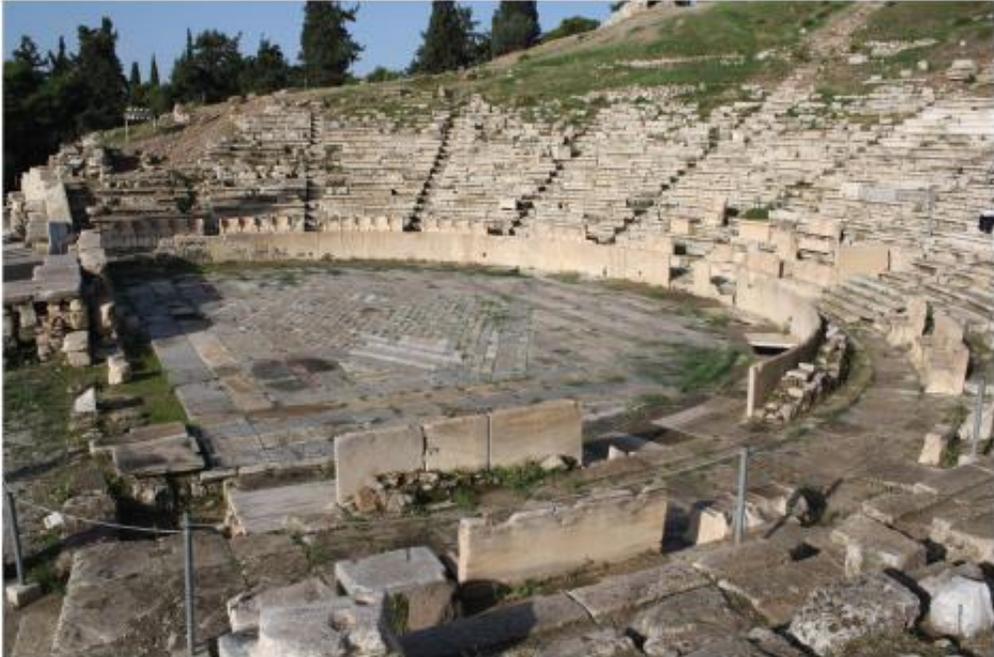
Underwater acoustic environment - Seal among algae.



Source: Kyle McBurnie. Kyle McBurnie
<https://pin.it/8eifl0Zy9>

Soundscape ecology

Theatre of Dyonisos Eleuthereus, Athens.



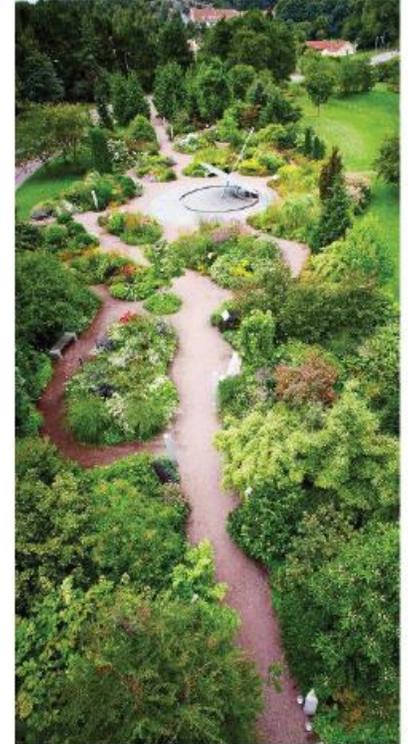
<https://www.worldhistory.org/uploads/images/3763.jpg?v=1713261243>

Paley Park, New York.



Source: https://upload.wikimedia.org/wikipedia/commons/4/41/Paley_Park_jeh.jpg

Vardens Park, Gothenburg, Sweden.
Speakers with sensors are placed along the walkways and reproduces sounds of the sea.



Source: <https://poseidon.goteborg.se/om-oss/vara-grona-gardar/vardens-park/>

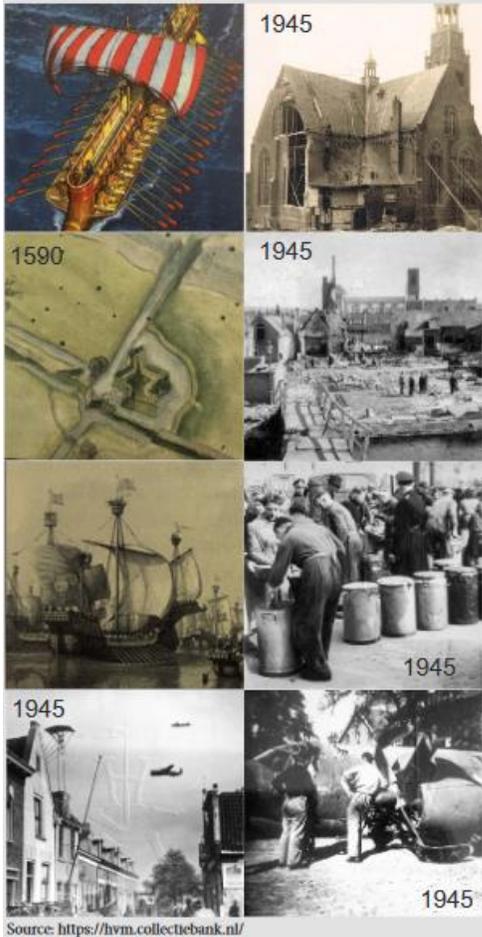
Soundscape



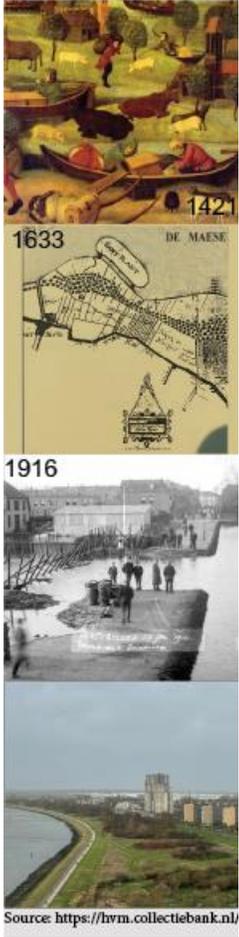
Site analysis

Sounds of history

WAR



LANDSCAPE DYNAMICS



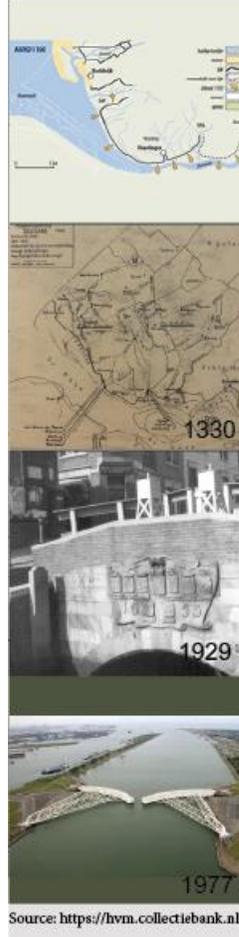
TRAGEDY



RELIGION



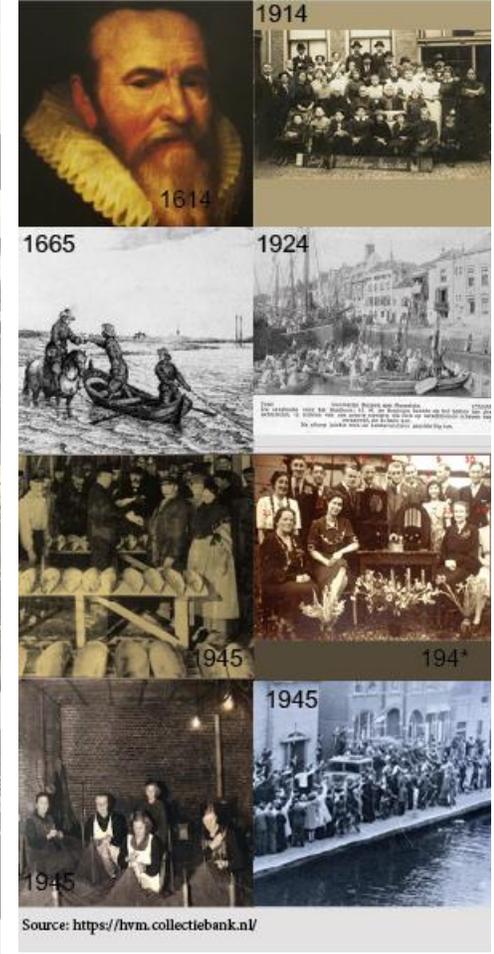
SAFETY



PROSPERITY



PEOPLE



Unwanted

Wanted



1633



1815



1850



1908



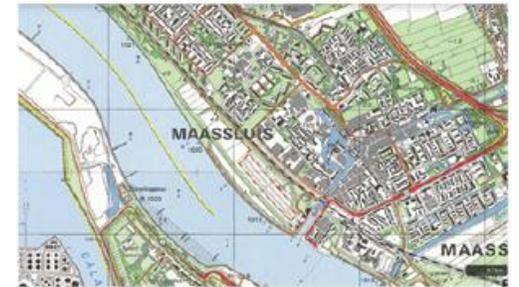
1939



1953



1986



1993



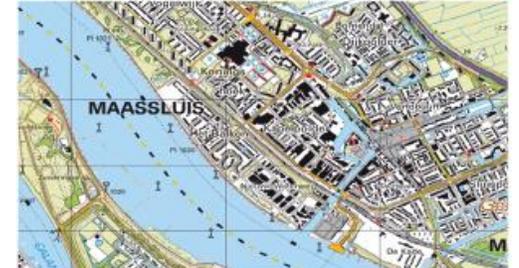
1995



1997



1998

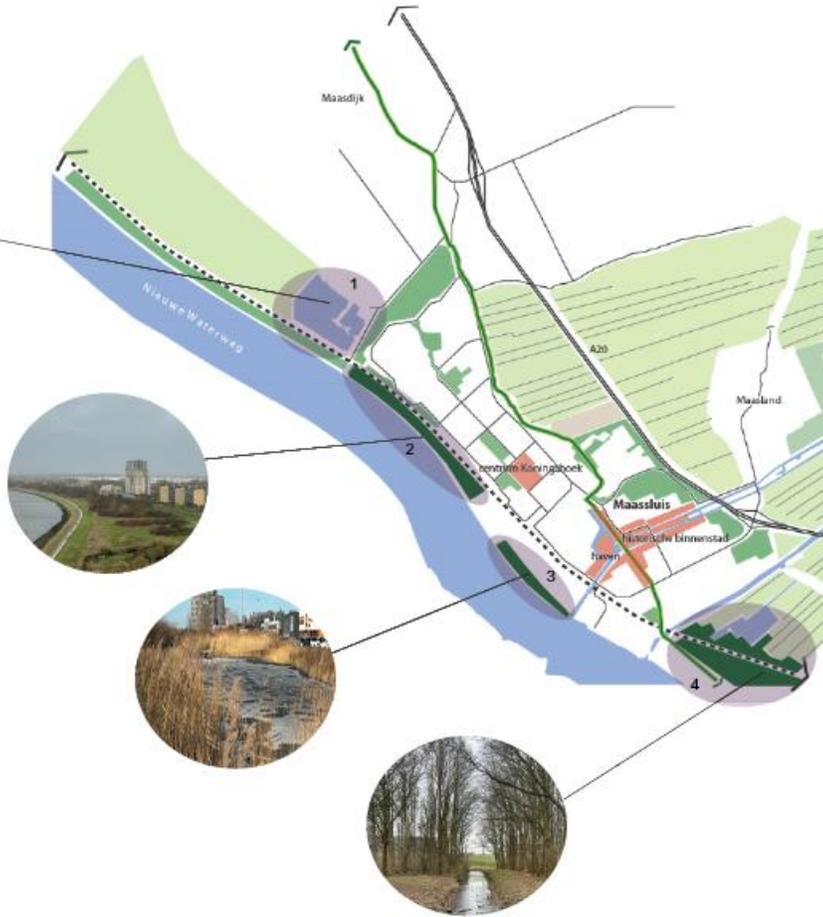


2022

Deltaworks/ Maaslandkering

Landscape dynamics

Green/blue structures



Legend

- 1. Oranjeplas
- 2. Sterrenbos
- 3. Green/blue area by Het Scheur
- 4. Wielerbaan



Landscape potentialities



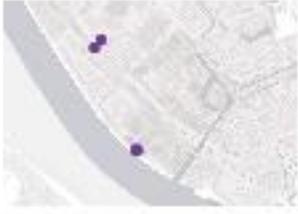
The landscape qualities differ throughout the area. The analysis are happening during Fall and Winter seasons, therefore, there are many interesting spots with layers of water, which is a very important element to be



Few species of trees are very common, with a grass revetment or small



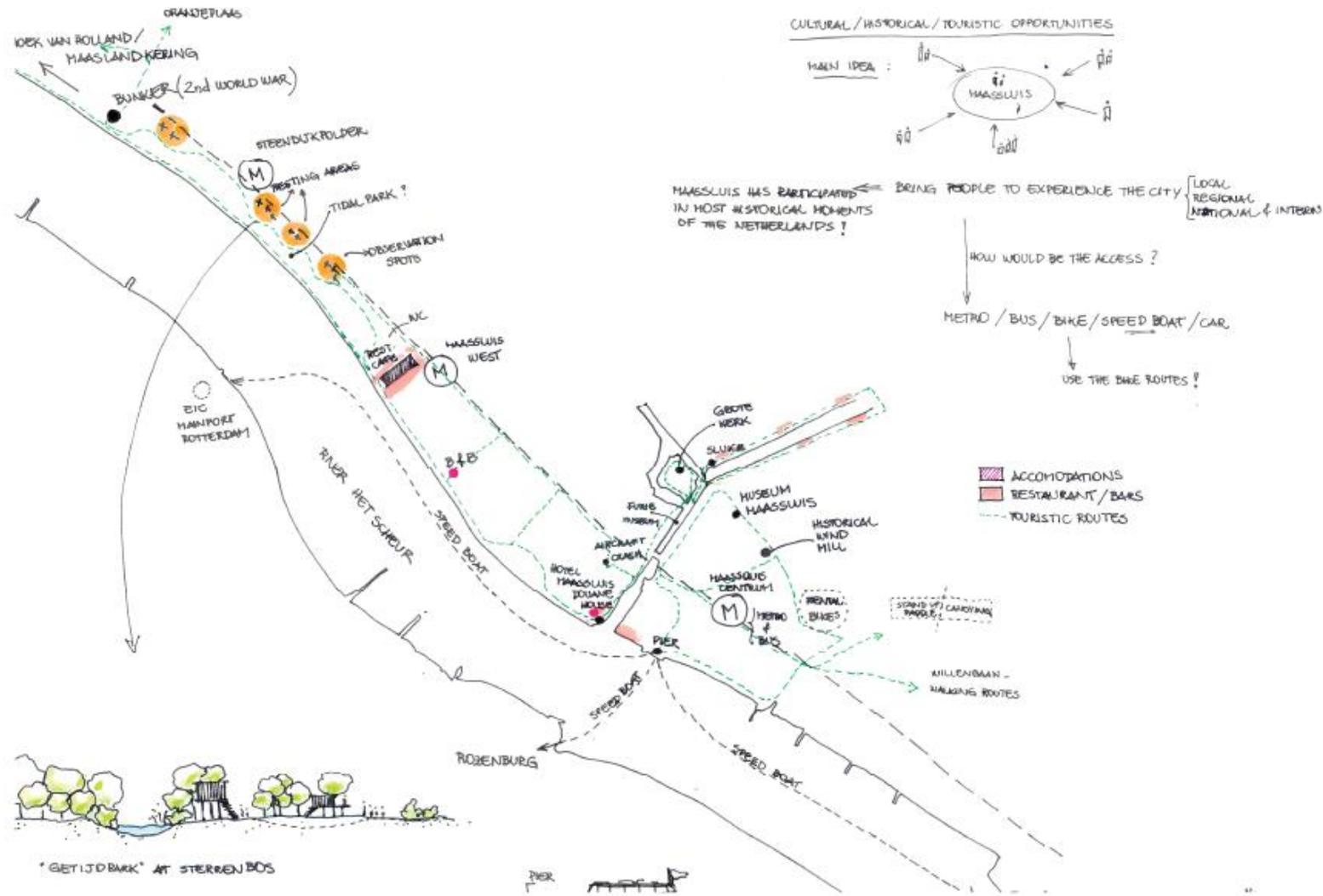
Vast areas with grass revetment on the polder contrast with dune vegetation on the riverfront, where stones gently receive some small species



Another observation is a concentration of birds in a specific place, not exactly on the dijk, but near it. It can be connected with the project of the park, creating a corridor for bird flocks. The presence of natural green-blue patch near the dike is also an important element to be connected to the park, with the same corridor concept described before. Besides, this particular patch can have more space for



Landscape potentialities



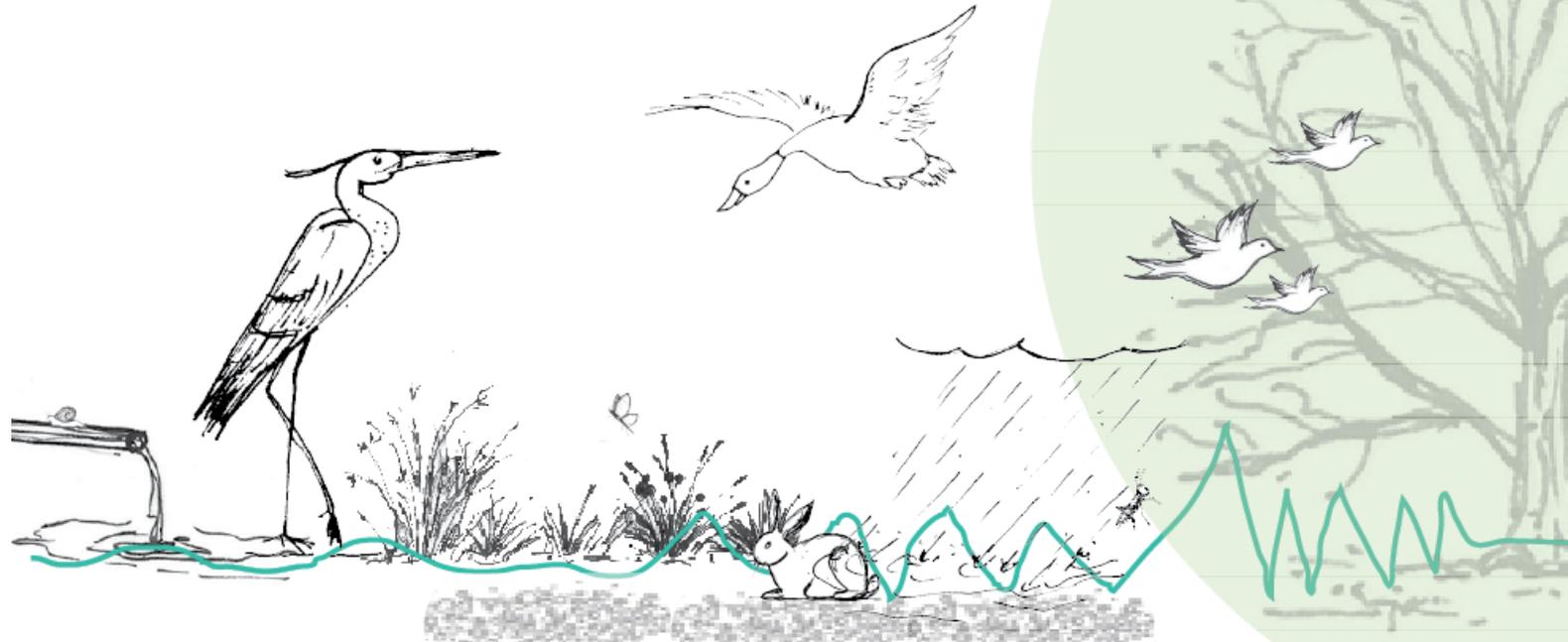
Opportunities

“How do organisms perceive spatial configuration in landscapes through soundscapes: heterogeneous structure across the landscape.” (Pijanowsky, 2012)

How can soundscape ecology design be relevant to the design of the park and contribute to future climate adaptive design/solutions??

Can these sounds promote social interactions and well-being of the people, and contribute to biodiversity?

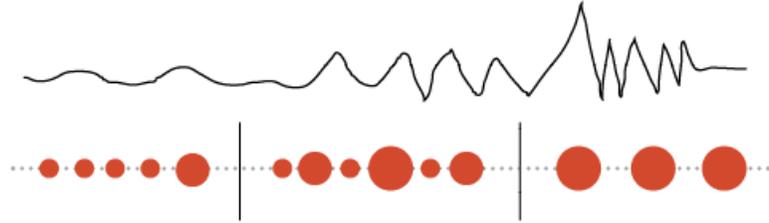
CATALOGUE FOR SOUNDSCAPE DESIGN



Paths	Walls	Vegetation: trees (high); shrubs (middle-low); foliage; moss and grass (ground coverage)				Water	Topography
Gravel	Bricks	spreading	dense	sparse	spreading	layer	flat
wood	Concrete	colunar	mid-dense	dense	sparse	canal	soft undulations
Stones	Metal (solid)	open	sparse	grouped	spreading	single jet	high undulations
Grass	Metal (permeable)	irregular	isolated	sparse	compact	drop	rugged
Sand	Green wall	pyramidal		mid dense	grass	cascade	
Shells		weeping		dense		multiple jet	
Concrete/asfalt	Glass	sparse				among stones	
Recycled rubber	wood	winter tree				hollow	
Bricks	Gabion						
Metal							

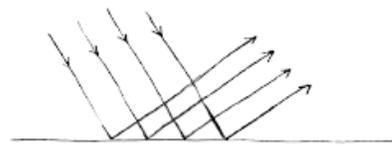
Catalogue for soundscape design

The compositions will inform sounds as in music. For each composition, a tempo is associated: *Presto*, *Allegro* and *Adagio*.



<i>Adagio</i> (slow)	<i>Allegro</i> (lively, quickly)	<i>Presto</i> (very rapid)
<ul style="list-style-type: none"> - Calm and soft sounds - Tranquil, serene - Sounds are controlled - High absorption - Low diffusing 	<ul style="list-style-type: none"> - Moderate sounds - not too fast - some sounds are controlled - moderate absorption - moderate diffusing 	<ul style="list-style-type: none"> - various sounds together - fast, dynamic - loud - low absorption - high diffusing
<p>Elements:</p> <p>Paths: sand, asphalt, concrete, recycled rubber</p> <p>Walls: gabions and hedges higher than an average person, pergolas</p> <p>Vegetation: more dense, forming enclosed spaces, mounds, tiny forests, moss coverage of the ground</p> <p>Water: single dropper, static layer or with slow movement.</p>	<p>Elements:</p> <p>Paths: stones in pieces, wood in pieces</p> <p>Walls: hedges in different heights, concrete (with rough texture), pergolas</p> <p>Vegetation: less dense gradient for shrubs and trees, mixed species.</p> <p>Water: single jet or combination of few.</p>	<p>Elements:</p> <p>Paths: gravel, shells</p> <p>Walls: none, permeable, low</p> <p>Vegetation: sparse, low shrubs, gradient of trees (caducifolias)</p> <p>Water: jets, curtains (cascade), fast flow</p>

The propagation of sounds varies across landscape elements due to their unique diffusing and absorption characteristics.



Diffusing in flat surface



Diffusing in rugged surface



Absorption in flat surface

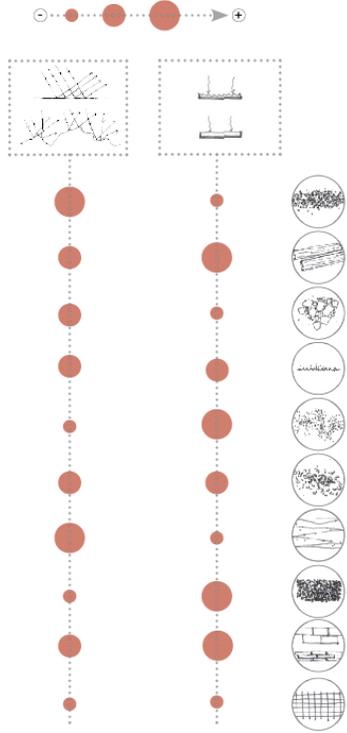


Absorption in rugged surface

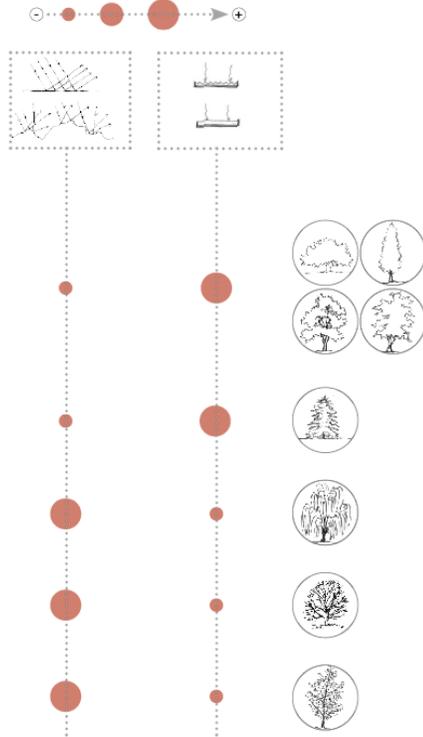
To begin, each element is assessed and graded based on these acoustic qualities, using perception instead of numeric values. This grading is the foundation for composing the Soundscape designs presented later on.



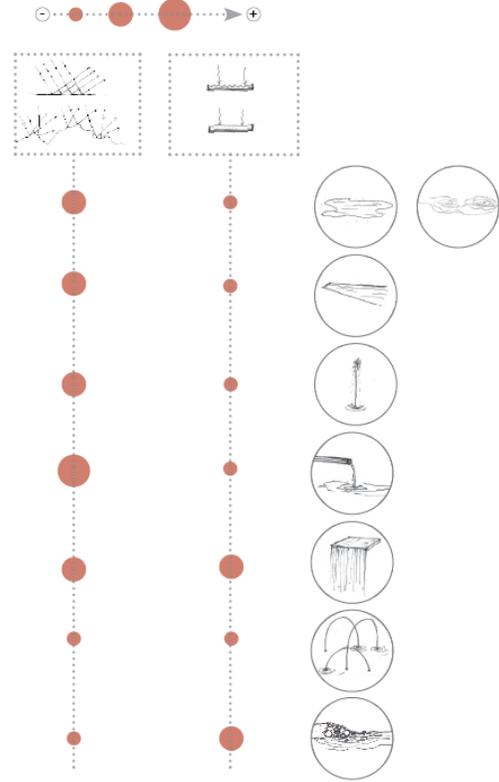
Paths



High elements- trees

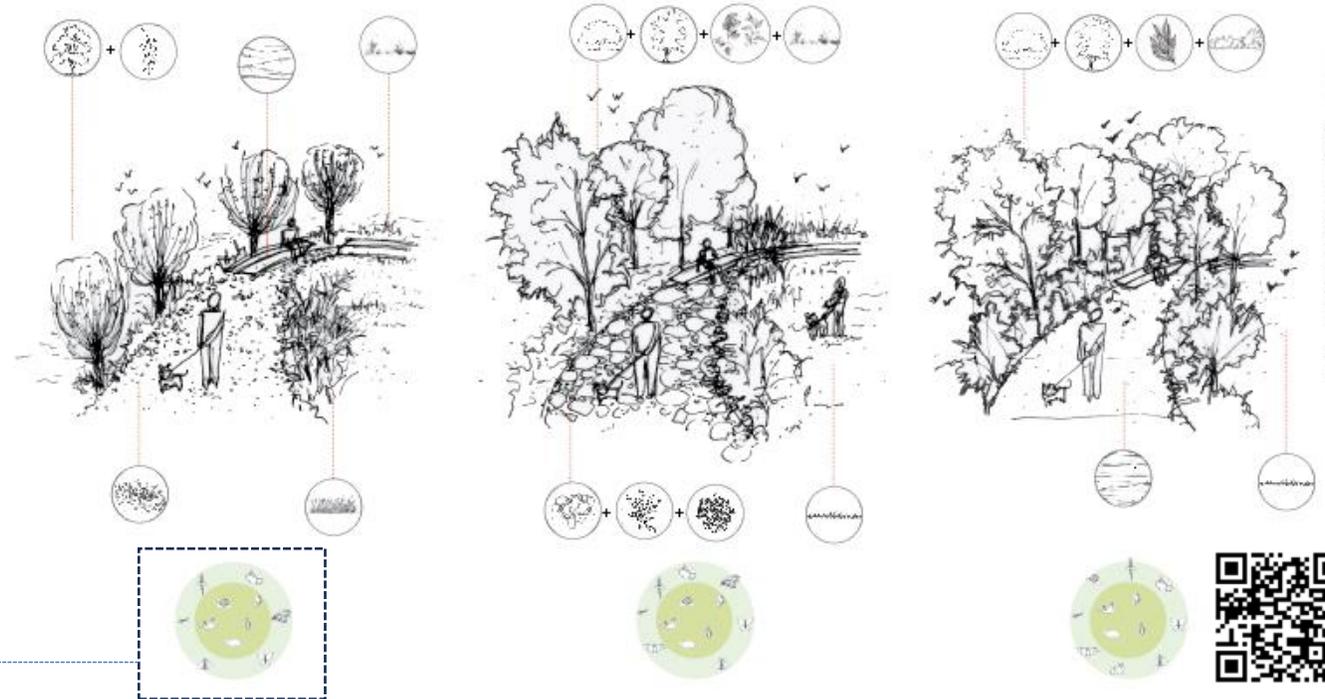


Water



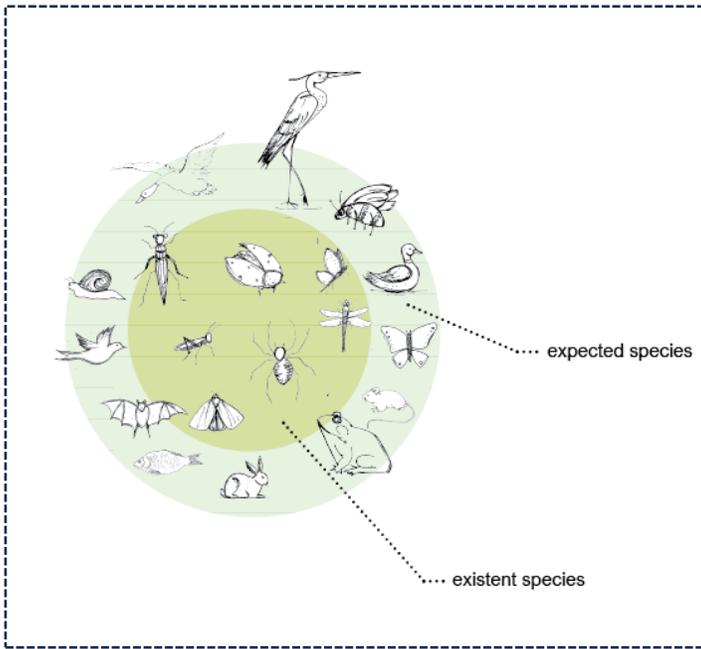
Sound propagation through elements

Design compositions



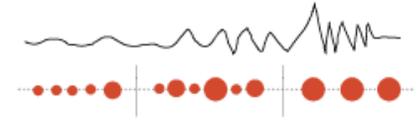
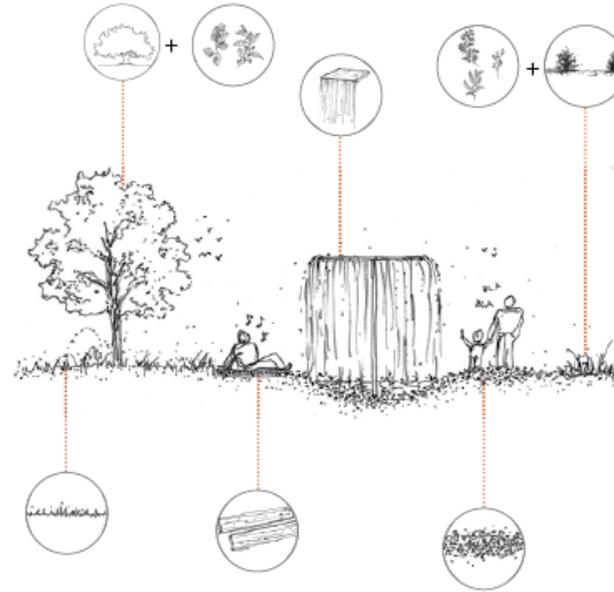
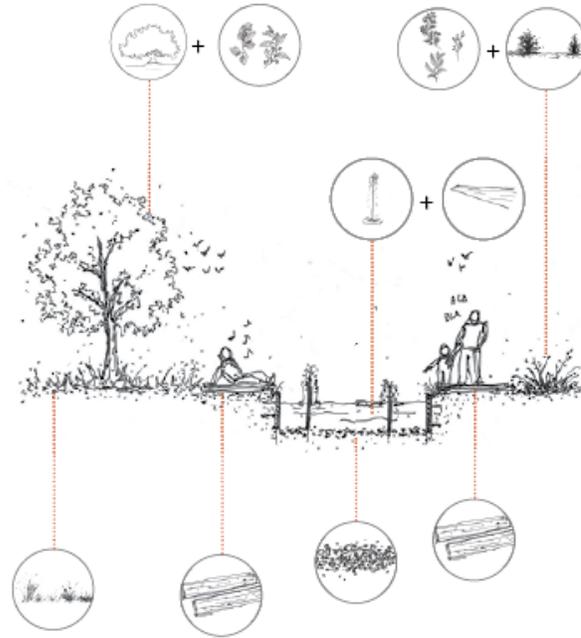
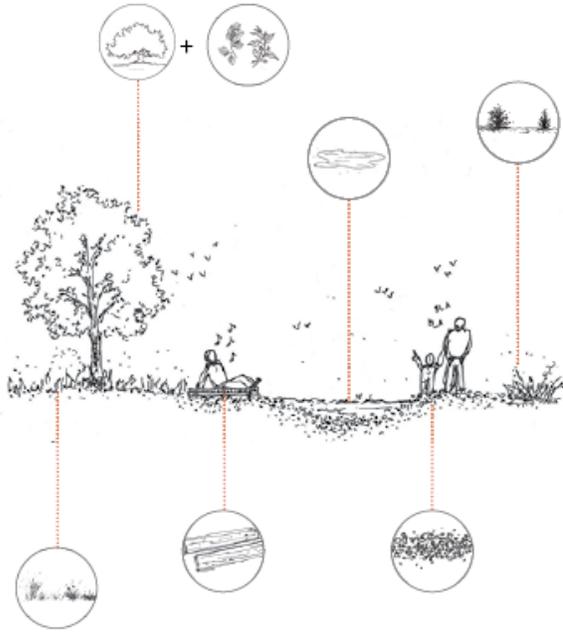
Pathways within parks can provide a variety of soundscape experiences. Shells produce a pleasant sonotope while walking over. Stones have a low absorption but also offer a tranquil soundscape. When the pathway is surrounded by dense vegetation, concrete or asphalt do diffuse the sounds. However, due to the variety of species and the enclosure, the sound sources are mixed and the sonic environment becomes exclusive to the local sounds, which are intensively perceived.

Fauna follows the complexity of ecosystems.



Catalogue for soundscape design

Design compositions



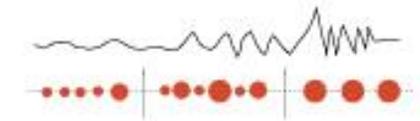
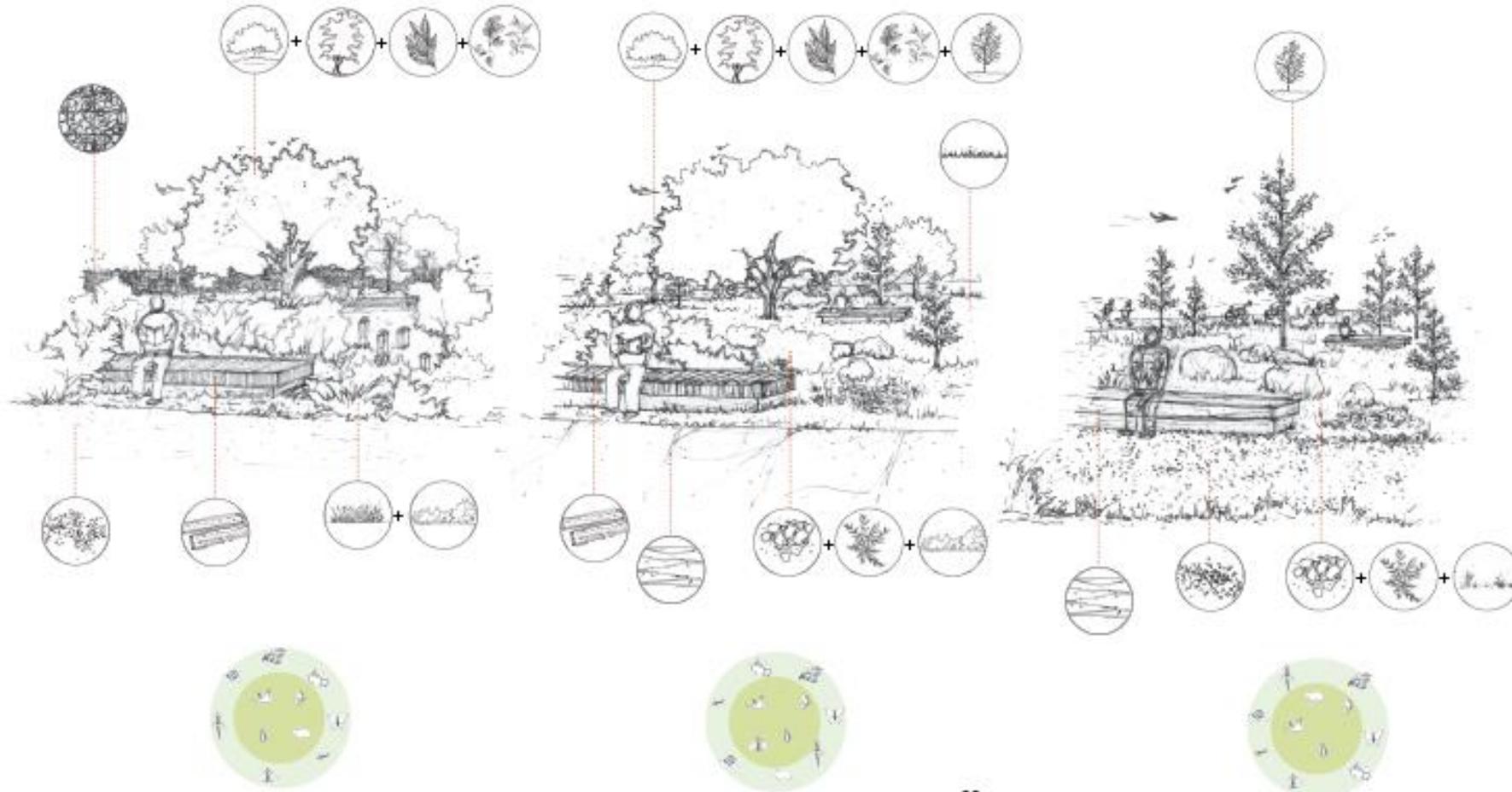
These compositions represent a common landscape featuring a single tree and a water element. As water flows freely in an open, stone-bordered ditch, a diverse range of living organisms find an ideal ecosystem to thrive. Various species of vegetation naturally grow along these borders due to the deposition of organic matter resulting from water level fluctuations. Water jets bring joy to people and create a pleasant sonic environment for relaxation. However, water curtains produce a different type of sound: harsher and more vibrant. They can mask other sonotopes in the surroundings but remain enjoyable.

All three soundscapes are attractive to fauna.



Catalogue for soundscape design

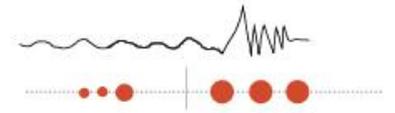
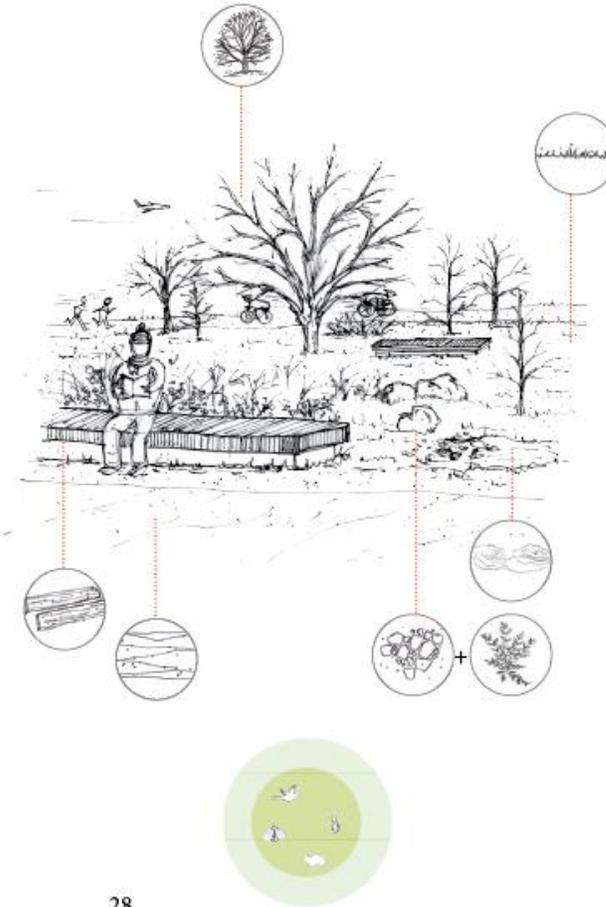
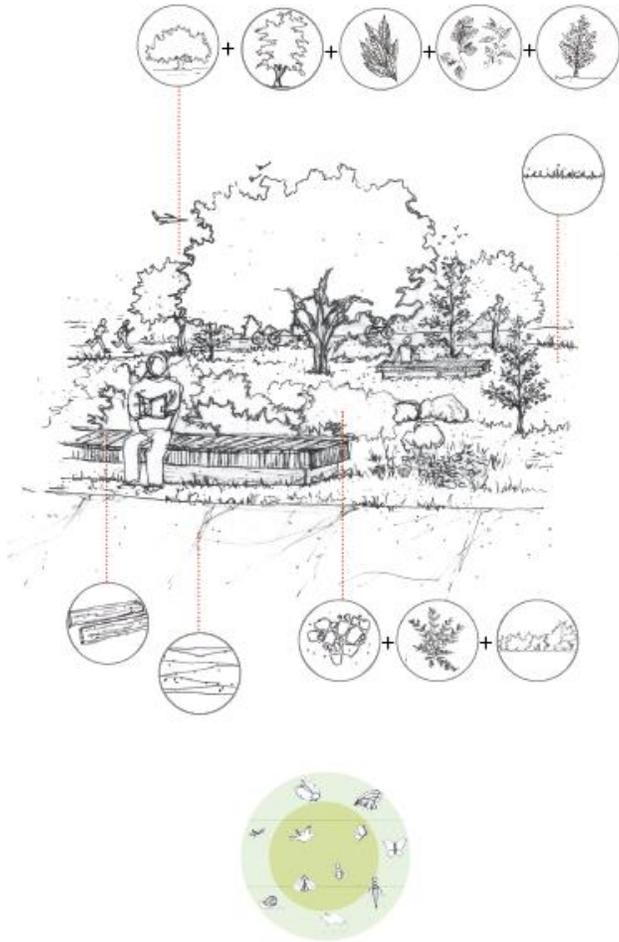
Design compositions



Few elements are used to change the soundscape of these compositions. Gabion walls are excellent for sound absorption and perform an aesthetic role as well. Trees have different leaves, sizes and shapes. A round canopy of dense foliage absorbs sounds effectively. Species with sparse leaves are efficient diffusers. Combined with dense or sparse shrubs, the compositions create sonic environments with varied sound levels.

Elements such as loose stones are suitable for moss growth, which brings more fauna to the area.

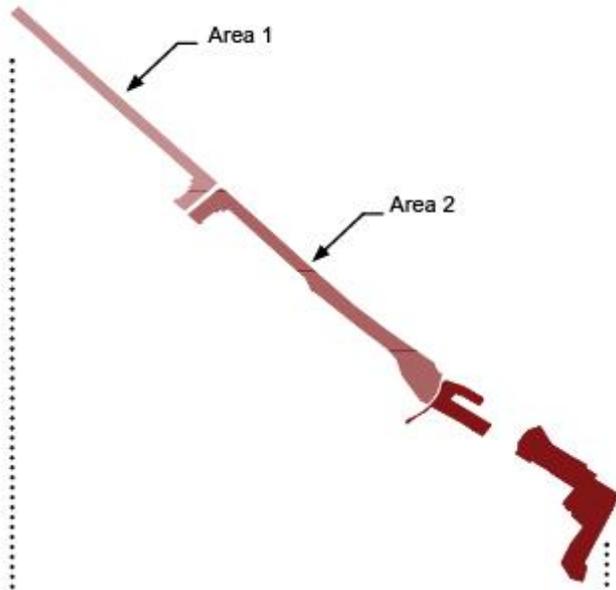
Design compositions and seasonality



The contrast between Summer and Winter is reflected on the soundscape. People continue to do their activities while the landscape changes, affecting its sonic environment. With the loss of leaves on trees and some shrubs, absorption decreases, and sounds propagate differently. Diffusion increases, transforming a once calm and relaxing environment into a place with a higher volume of sonotopes.

As mentioned earlier, fauna is less present on winter.

“Every environment can be treated as a concert hall”
(Cerwen, 2017, p.19).



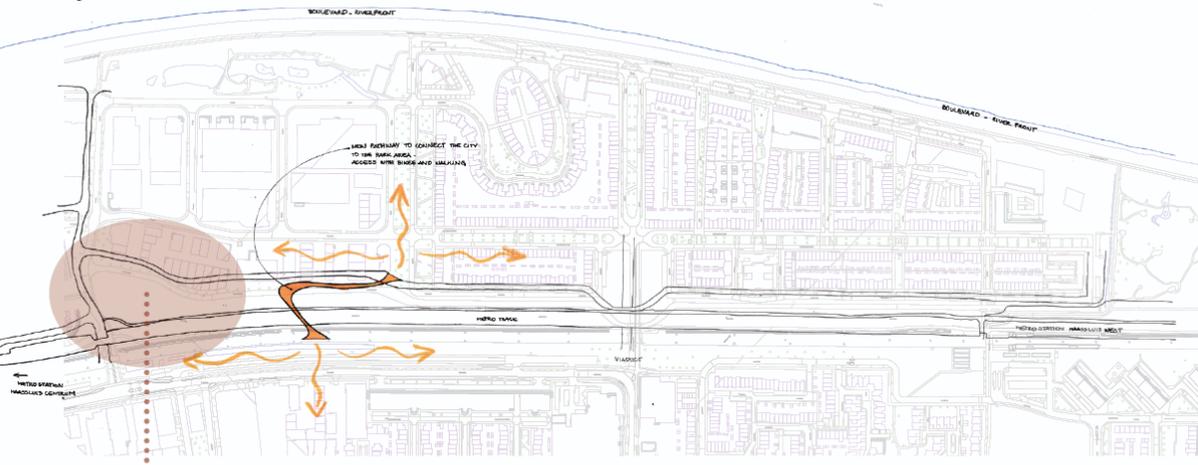
Metro station
Maassluis West

Maassluis

Metro station
Maassluis Centrum

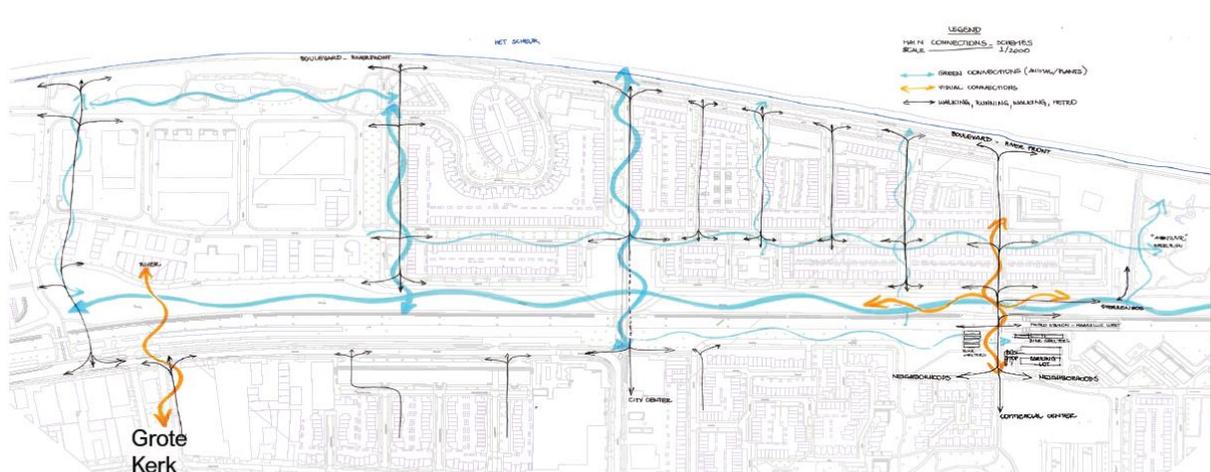
Symphony for the dike

Pathway location at Area 2.



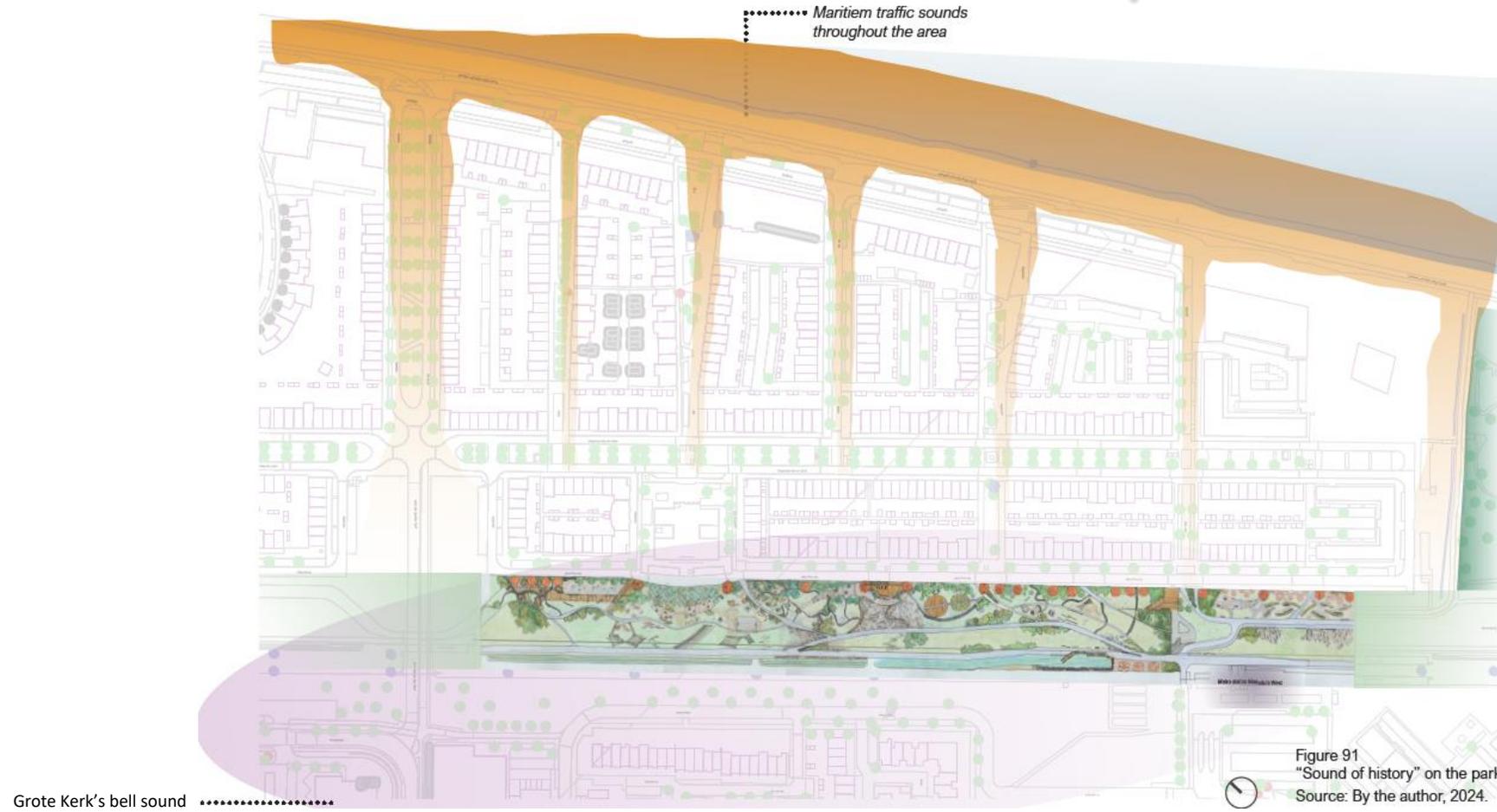
Potential location for local school facilities

Connections within the city



Source: By the author, 2024.

Symphony for the dike



Symphony for the dike

Soft and organic lines



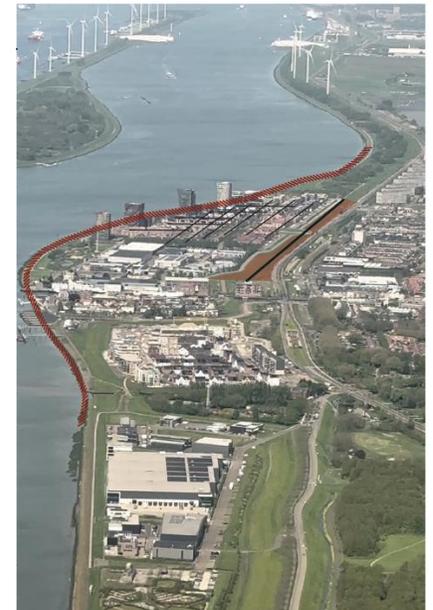
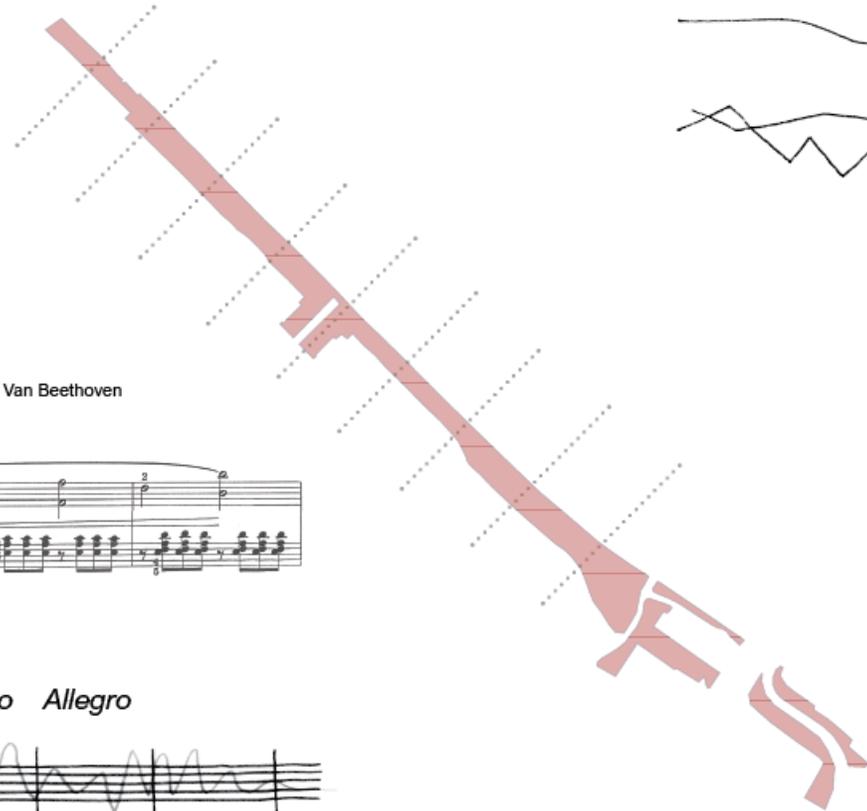
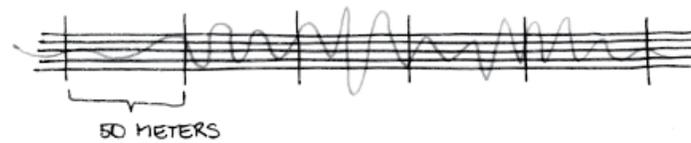
Harsh lines

Figure 83
Music notation of Sonata Op. 14, no.1, L. Van Beethoven



Source: Lima, Souza.

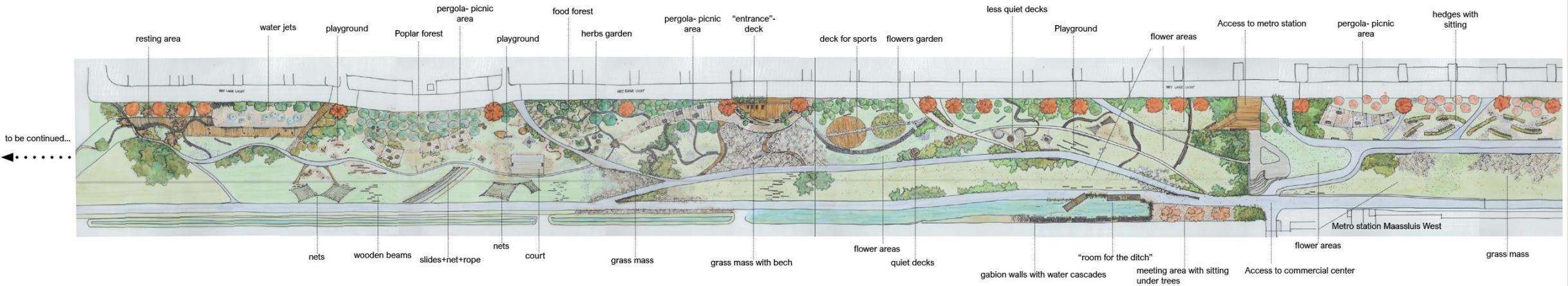
Adagio Allegro Presto Allegro



Symphony for the dike - concept

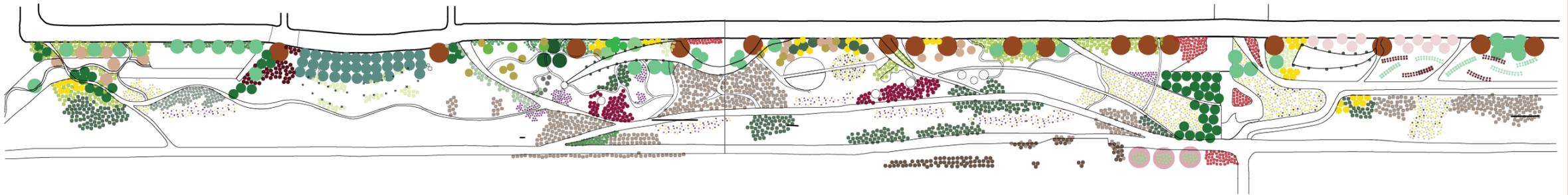


Symphony for the dike



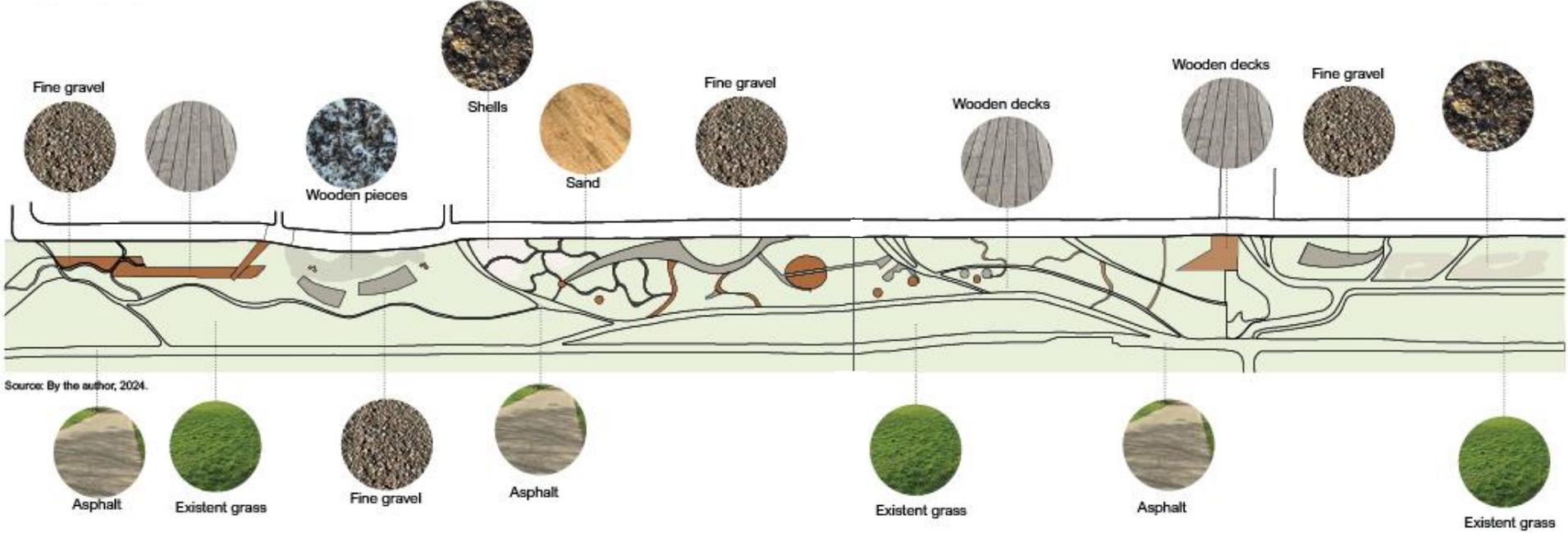
Like an orchestra, every element (“instrument”) in the urban context is important and complementary, but they must be tuned and encompassed.

- | | | | |
|---------------------------------------|---------------------------------|--|------------------------------------|
| ● <i>Ficus canca</i> | ✿ <i>Rhododendron poticum</i> | ☞ <i>Phragmites australis</i> | ••• <i>Crocus</i> |
| ● <i>Forsythia</i> | ✿ <i>Lonicera ligustrina</i> | ☞ <i>Taxus canadensis</i> | ••• <i>Papaver rhoeas</i> |
| ● <i>Malus domestica</i> | ✿ <i>Calamagrotis epigejos</i> | ☞ <i>Berberis thunbergii</i> DC. | ••• <i>Achillea millefolium</i> |
| ● herbs | ✿ <i>Skimmia japonica</i> | ☞ <i>Hedera hibernica</i> | ••• <i>Galium verum</i> |
| ● <i>Prunus persica</i> | ✿ <i>Viburnum davidi</i> Franch | ☞ <i>Euonymus fortunei variegatus</i> | ••• <i>Plantago argentea</i> Chaix |
| ● <i>Pyrus communis</i> | ✿ <i>Viburnum lantanoides</i> | ☞ <i>Weigela florida</i> (Bunge) A.DC. | ••• <i>Echinacea purpurea</i> |
| ● <i>Ginkgo biloba</i> | ✿ <i>Viburnum lantana</i> L. | ☞ <i>Sarcococca confusa</i> | |
| ● <i>Hippophae rhamnoides</i> | | ☞ <i>Spiraea thunbergii</i> | |
| ● <i>Prunus serrulata</i> | | ☞ <i>Allium ursinum</i> | |
| ● <i>Prunus yedoensis</i> | | | |
| ● <i>Populus nigra</i> | | | |
| ● <i>Acer palmatum</i> | | | |
| ● <i>Malus toringo var. sargentii</i> | | | |
| ● <i>Betula pubescens</i> | | | |



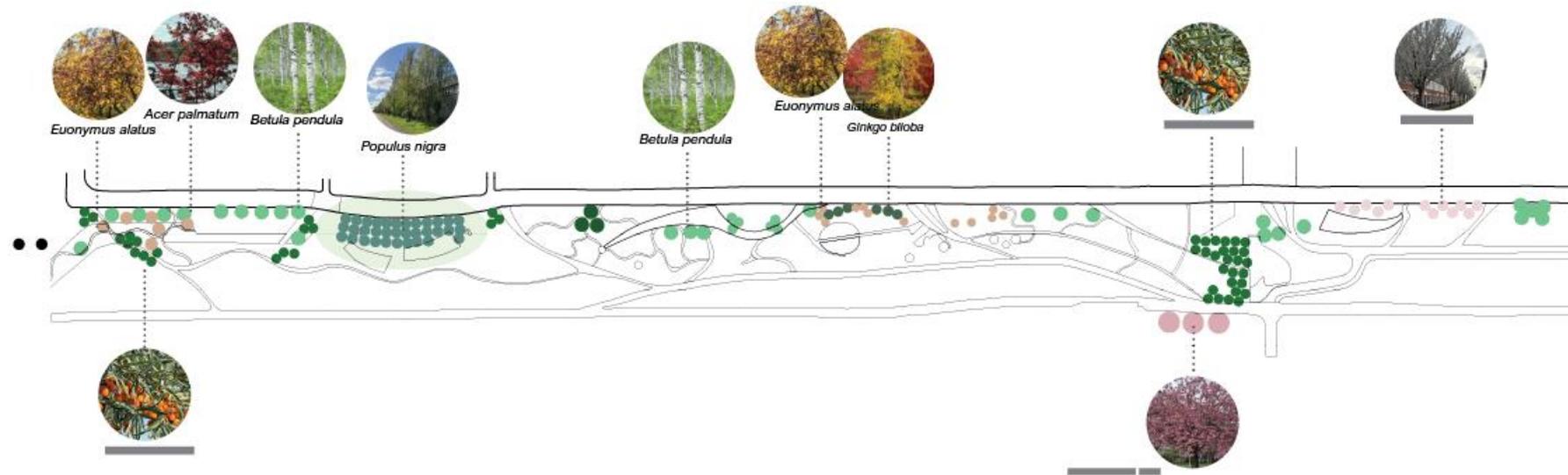
Planting scheme, fauna, materials

Ground floor materials



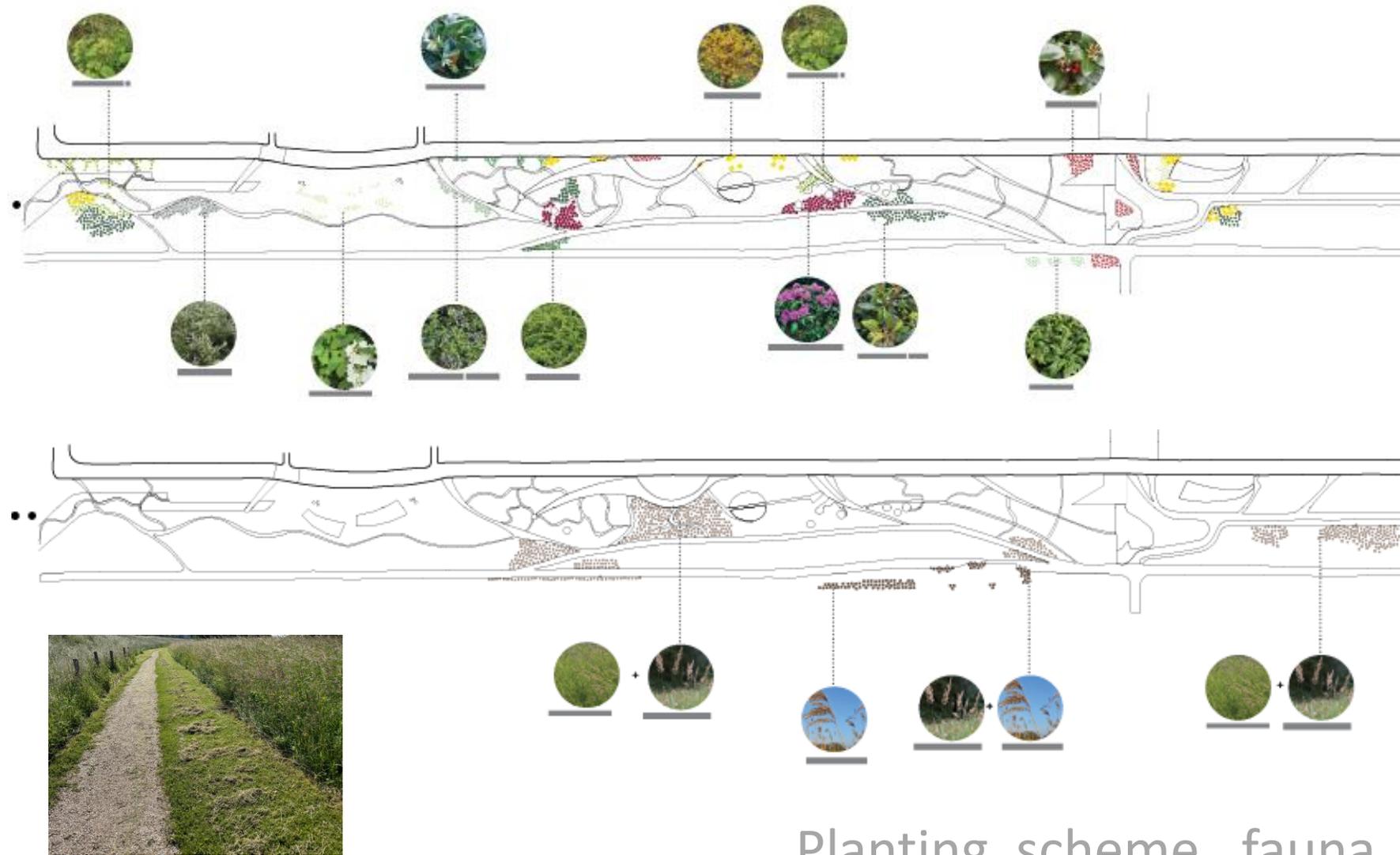
Planting scheme, fauna, materials

Trees



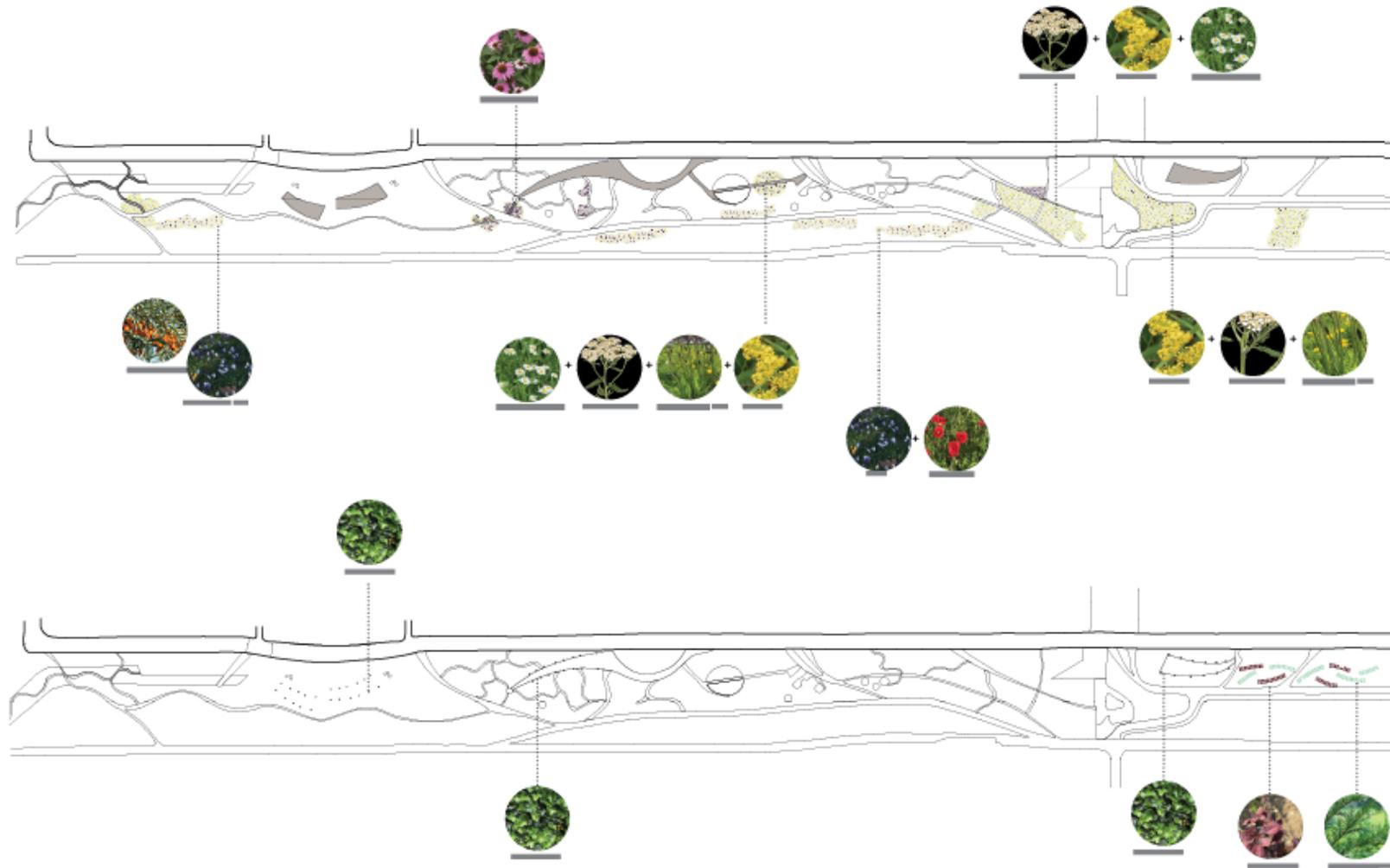
Planting scheme, fauna, materials

Shrubs and grasses



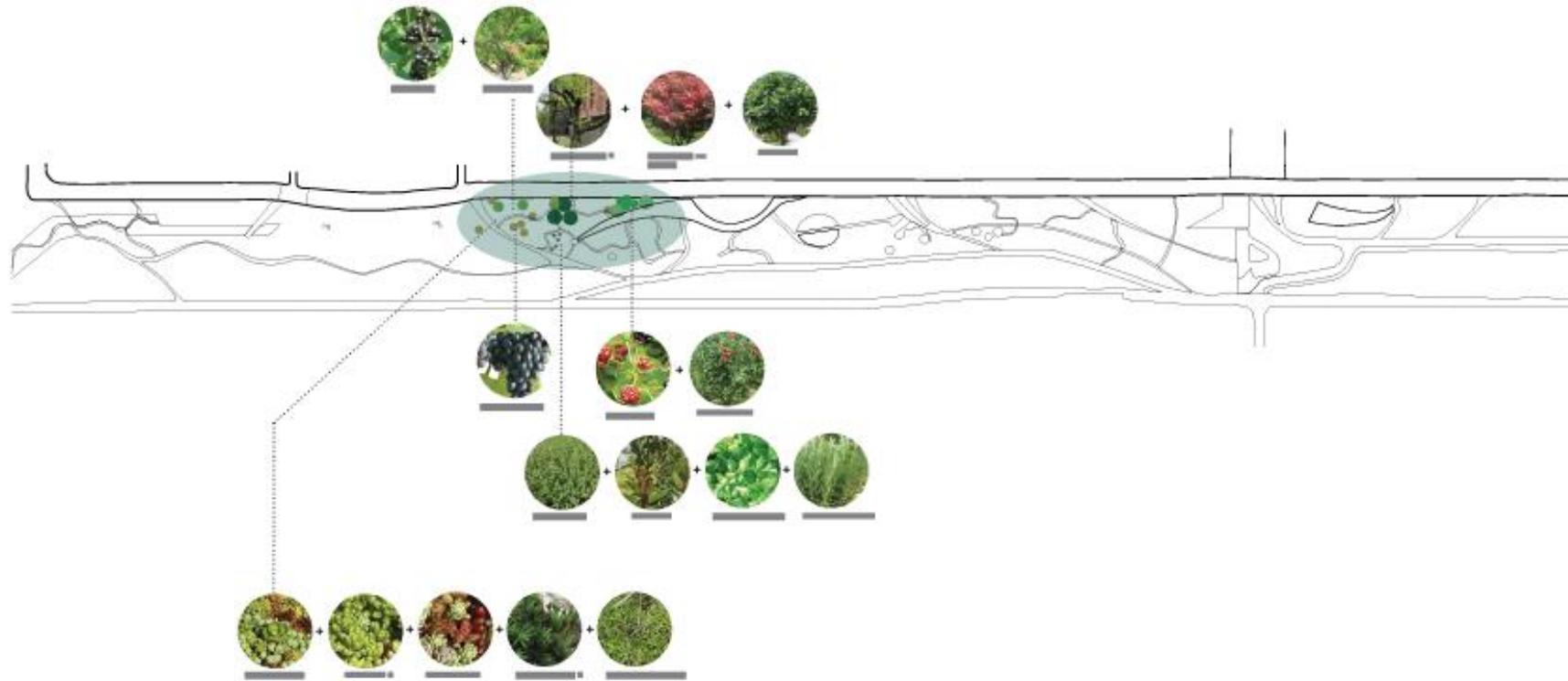
Planting scheme, fauna, materials

Flowers and hedges



Planting scheme, fauna, materials

Food forest



Planting scheme, fauna, materials

Fauna

-  City Park project
-  Existent green structures



Abramis brama



Pararge aegeria



Rana temporaria



Coccinellidae



Dasypoda hirtipes



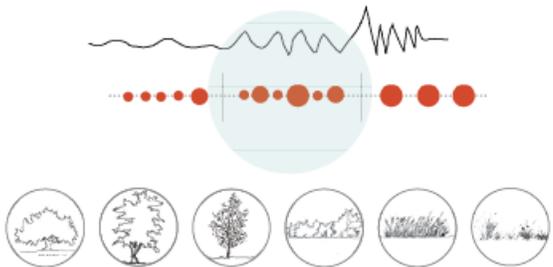
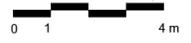
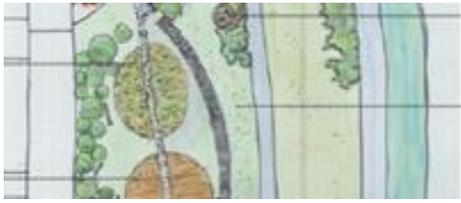
Anas platyrhynchos

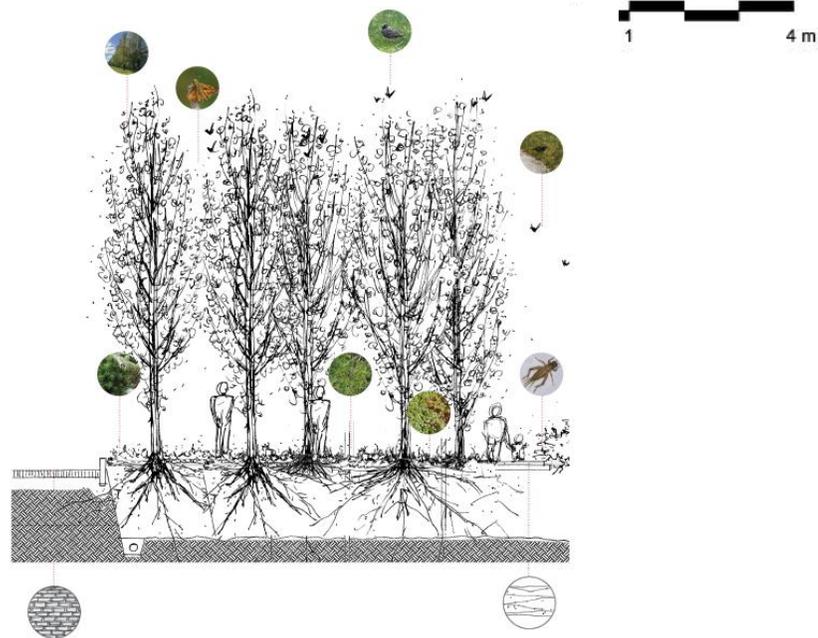
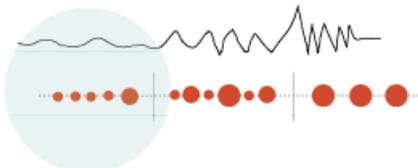
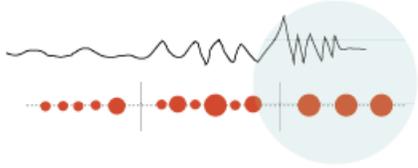


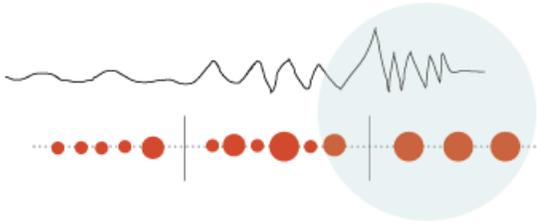
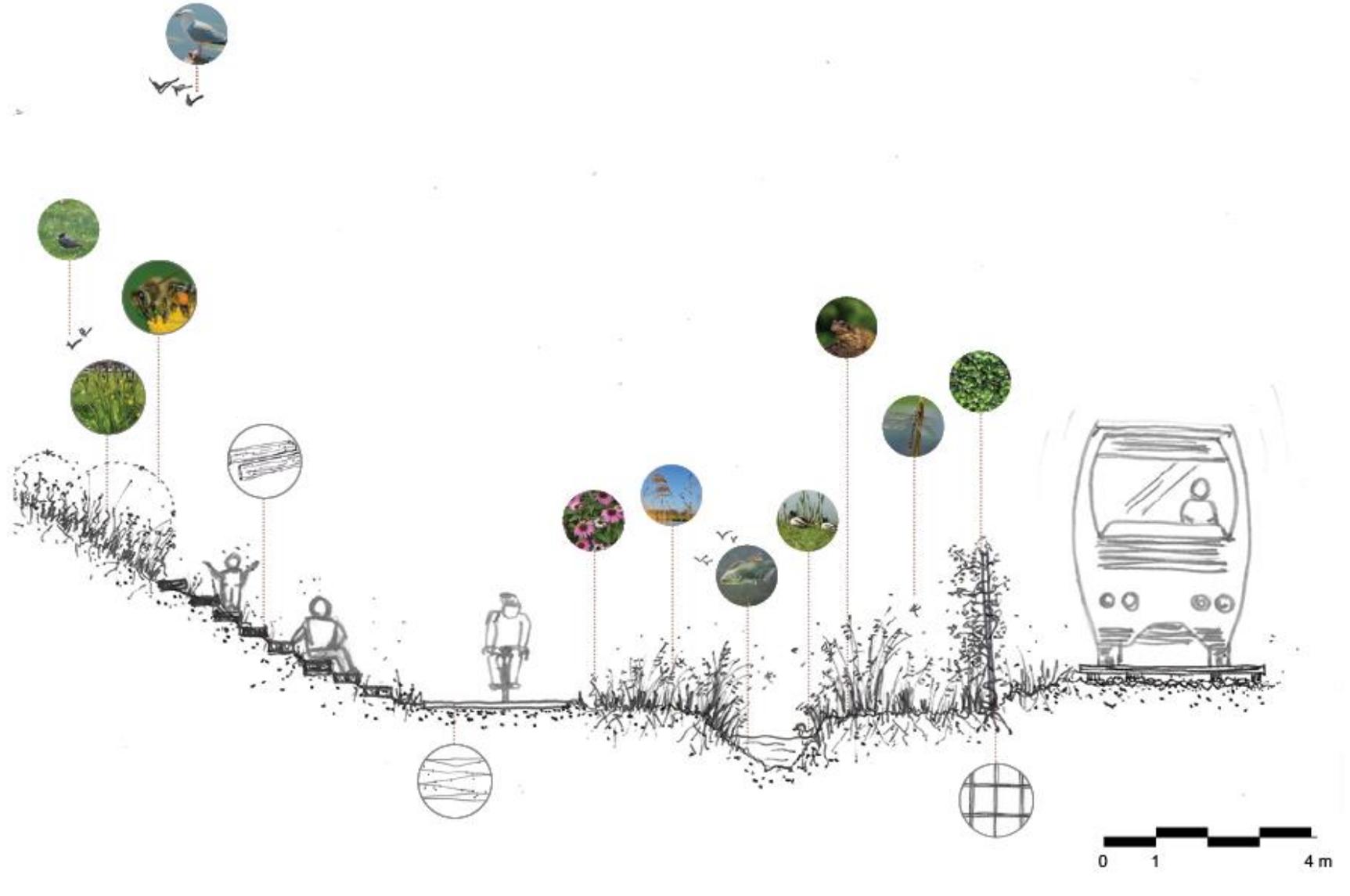
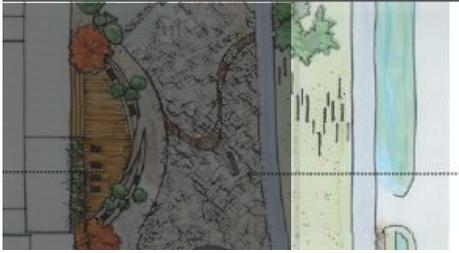
Sturnus vulgaris

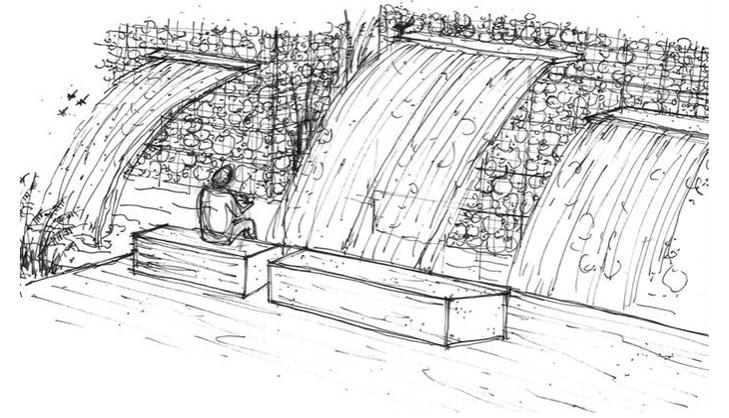
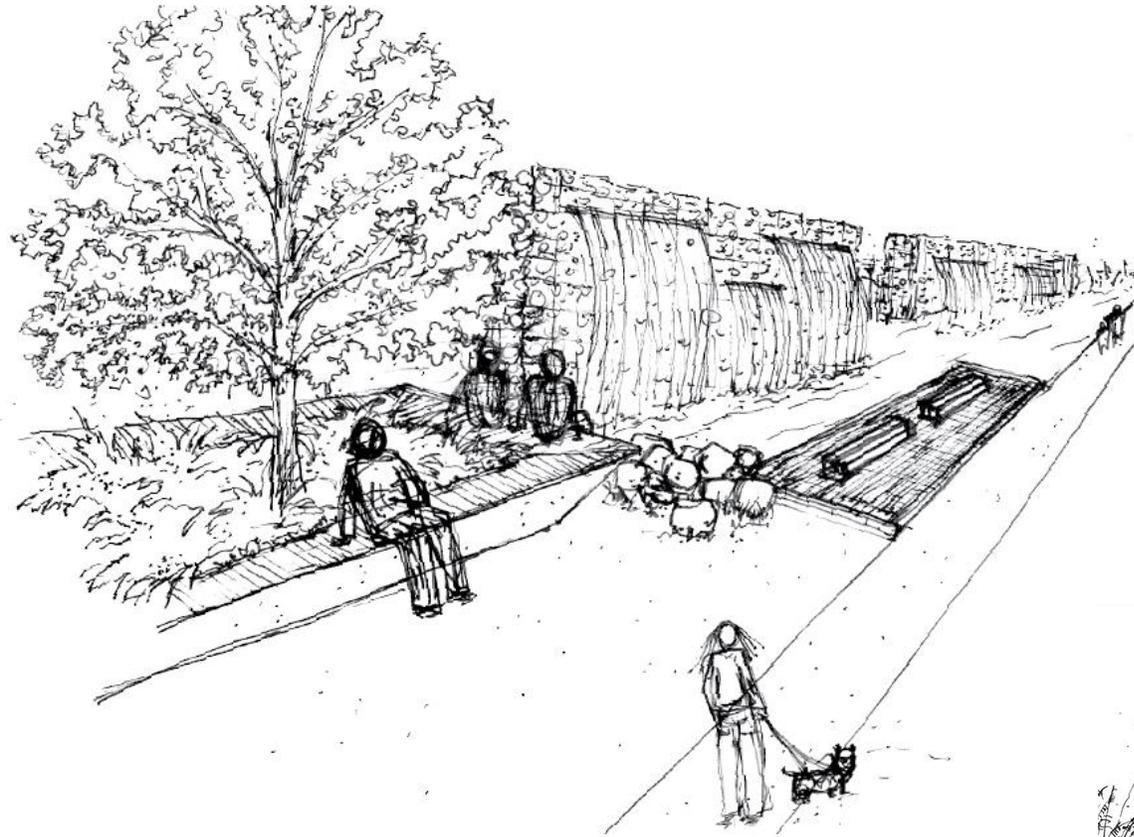
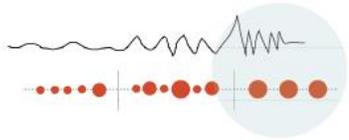


Planting scheme, fauna, materials

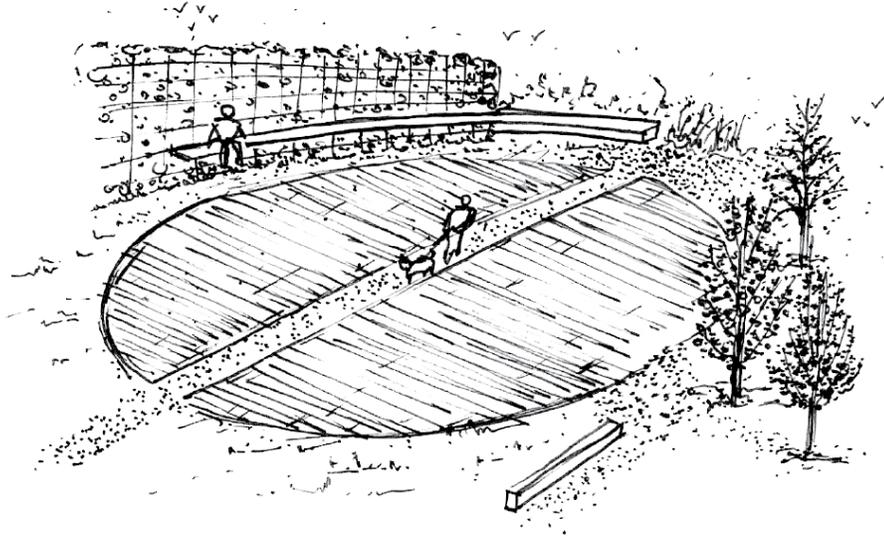
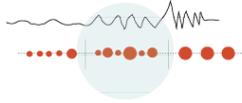




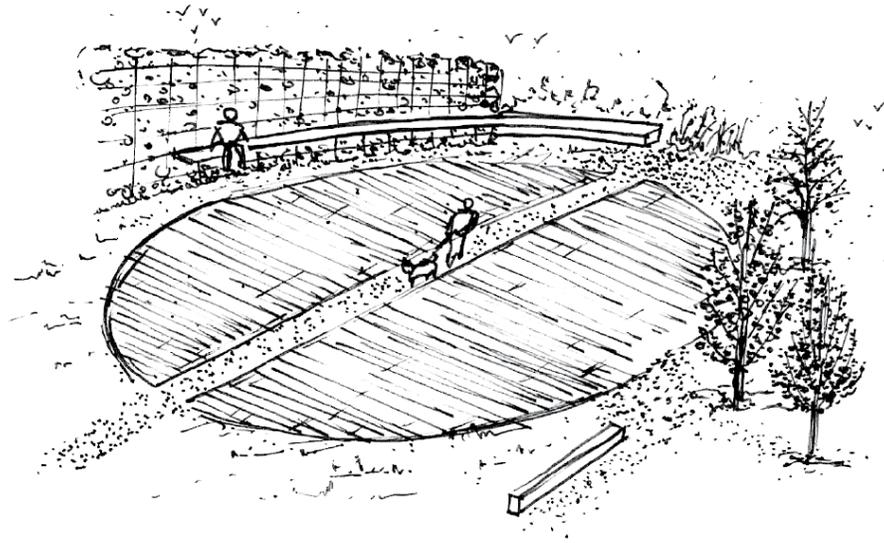
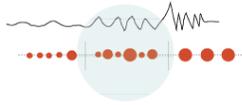




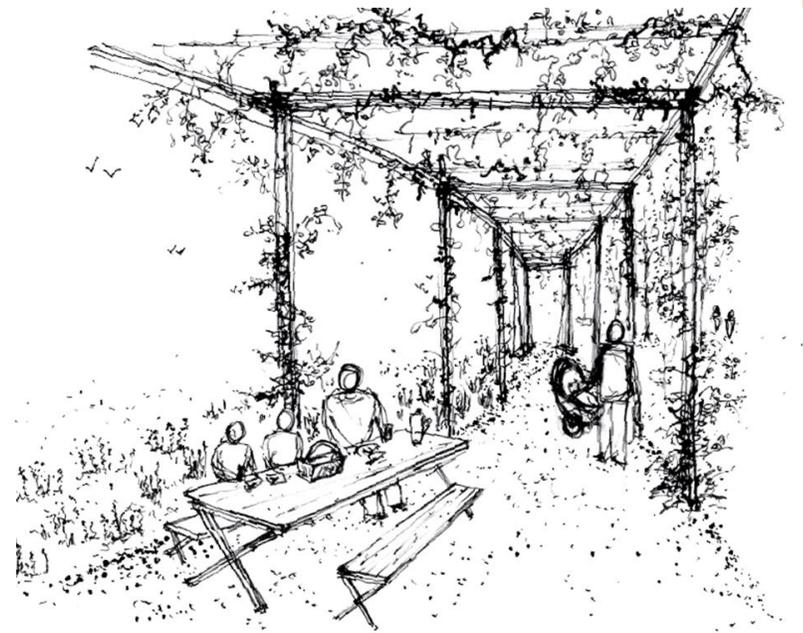
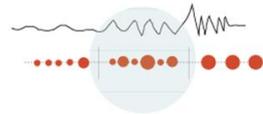
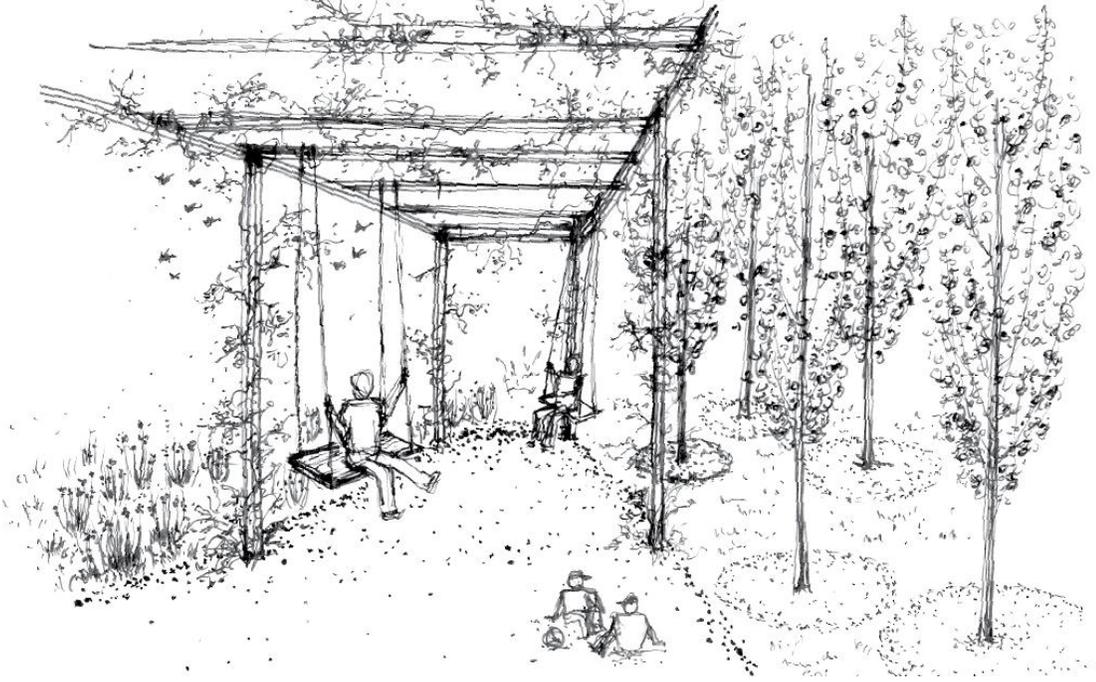
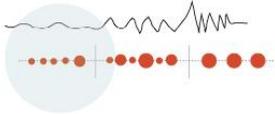
Impression



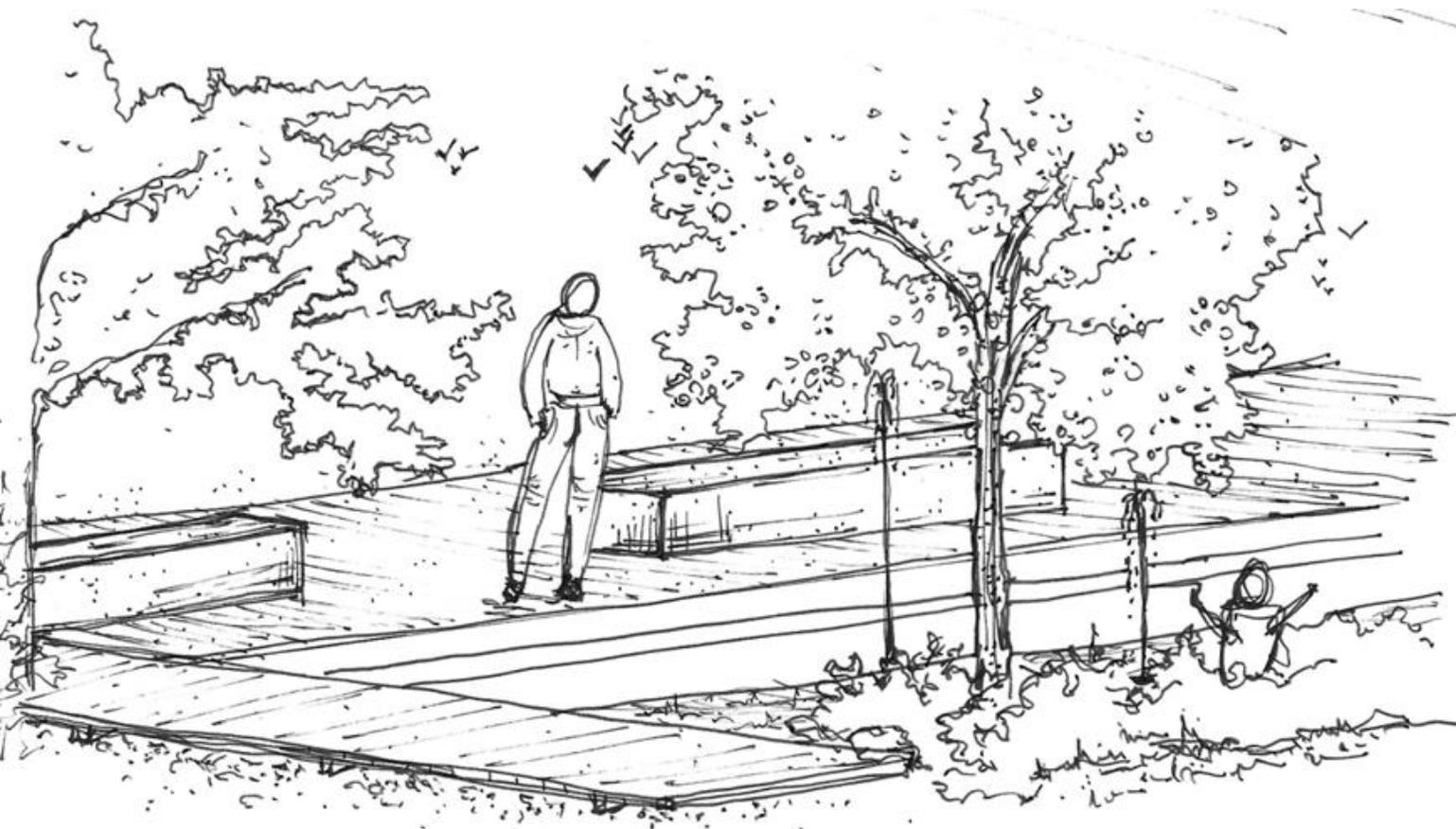
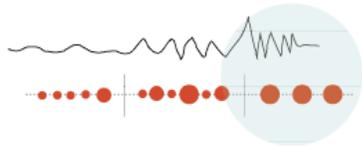
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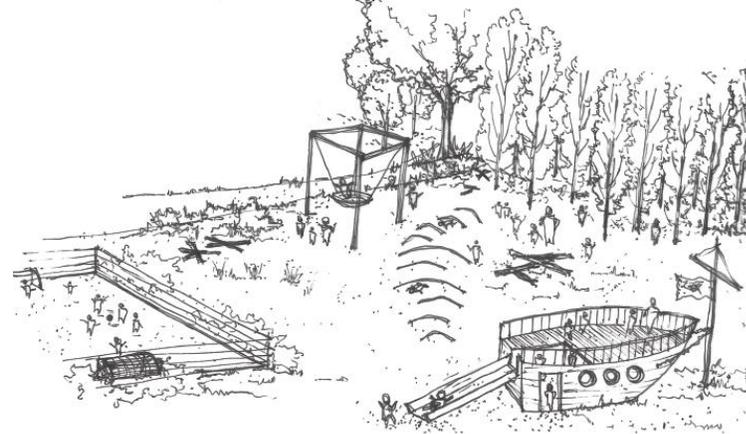
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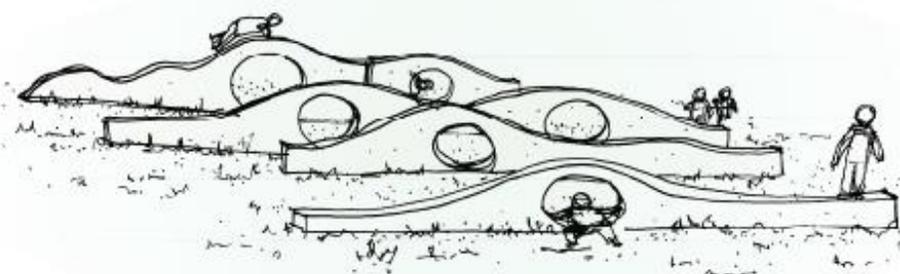
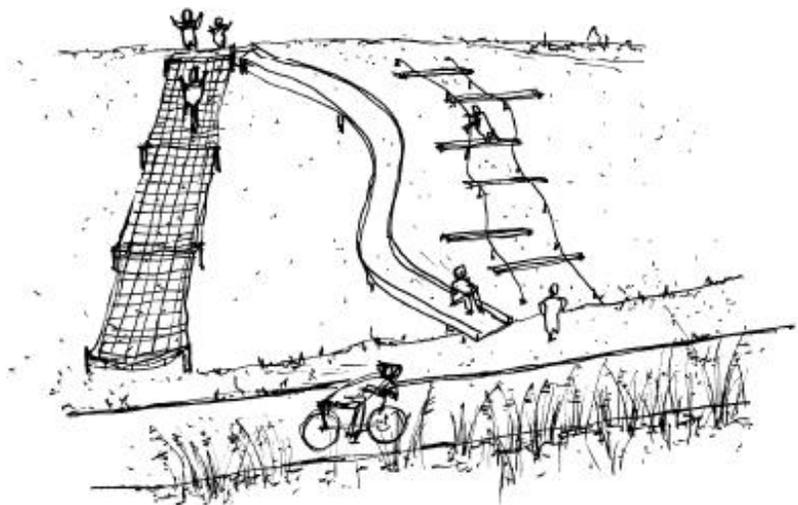
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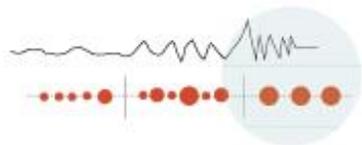
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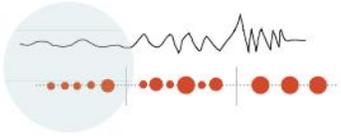
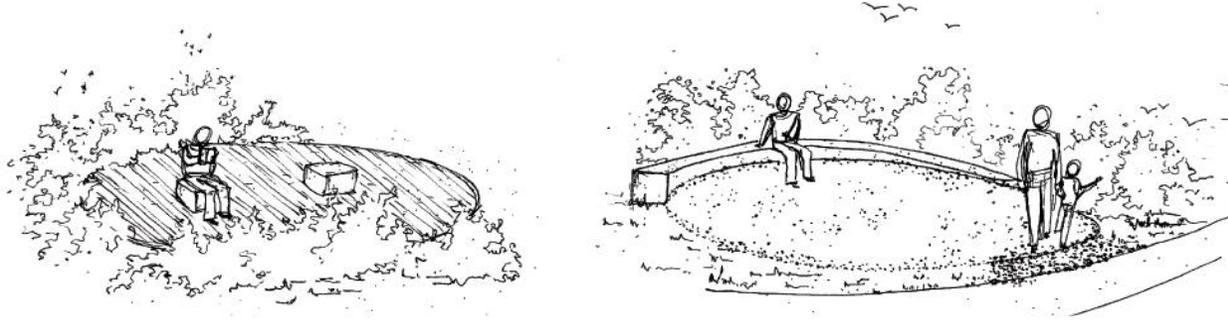
Soundscape: *Presto*



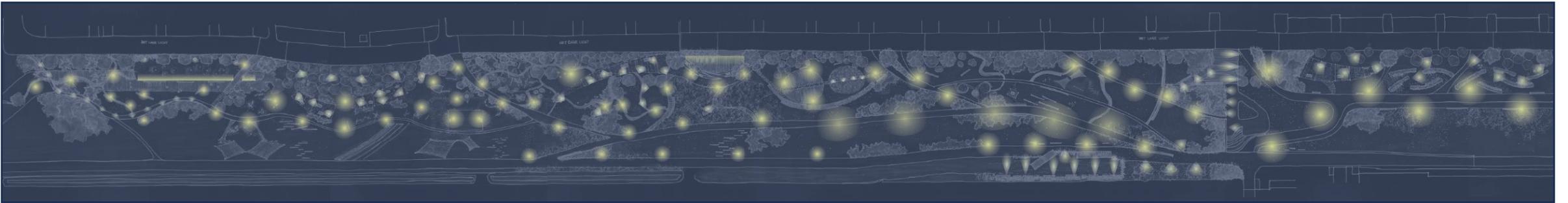
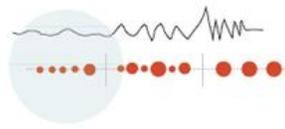
Playing structure designed by Studio Ossidiana and adapted for the park.



Impression



Impression



Lighting scheme

- The sounds of the Delflandsedijk did not offer a pleasant experience for the users and residents.
- sounds can be managed or chosen to offer pleasant places to everyone
- correct use of sounds can transform an unpleasant public space into a restorative environment (health)
- balanced sonic environment = balanced habitat for all living organisms
- “Catalogue for Soundscape Design”

The City Park on the Delflandsedijk

- the underused dike will be transformed, with additional layers of uses, pathways, flora and fauna, creating a truly public place.
- New sonic experiences
- it will also offer opportunities for recreation, sports, tourism and most importantly, social interactions
- It will integrate areas within the urban fabric and connect the fragmented green structures (resilience and biodiversity)

Sounds can contribute in many ways to making this world better. When well-orchestrated, they play a beautiful symphony, pleasant for all living organisms.



Research findings - Conclusions

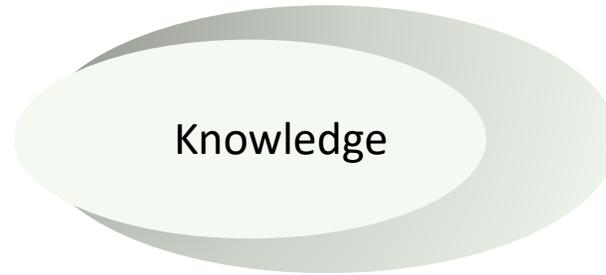
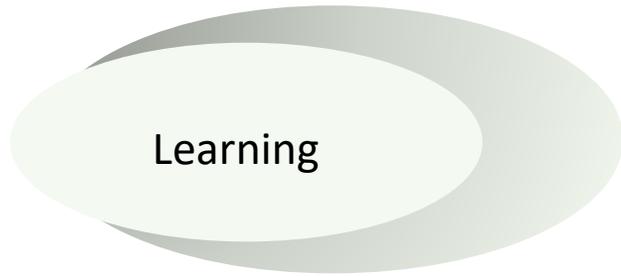
- Soundscape: a key element for urban planners and landscape architects;
- Scientific contribution with the “Catalogue for soundscape design”
- Research limitations: seasonality and complexity of a city park project
- Future directions and contribution to climate adaptive solutions: Soundscape design offers a fertile field for further research in landscape architecture and urban planning, providing innovative solutions to contemporary environmental challenges



- Tropical plants in Winter
- Natural water borders.



Research findings - Discussions



Reflection

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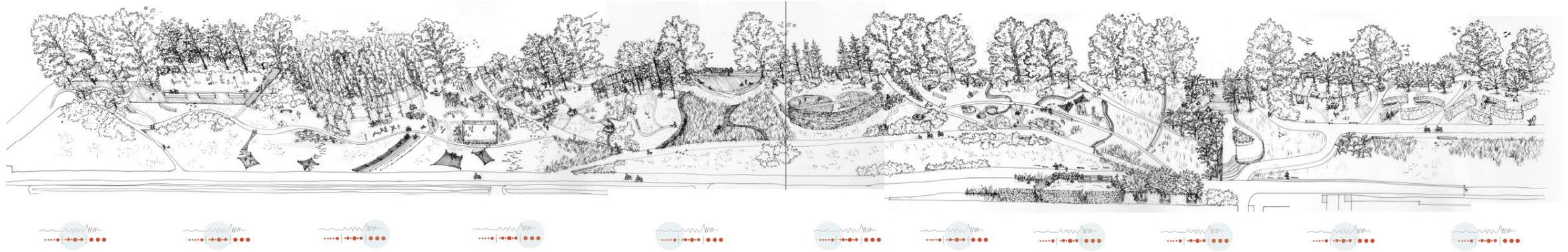
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References

Listen to the “Symphony for the Delflandsedijk”



(scan the QR- Codes next to you)

Thank you!
Dank je wel!
Obrigada!