Graduation Plan

Master of Science in Architecture, Urbanism & Building Sciences

MSc Landscape Architecture 2024 - 2025

Lotte van Elst

Graduation Plan

Submit your Graduation Plan to the Board of Examiners (Examencommissie-BK@tudelft.nl), your mentors and delegate of the Board of Examiners one week before the P2 date at the latest.

I Personal information	
Full name	Lotte van Elst
Student number	5293294

II Studio / Lab information		
Name / Theme	FLOWSCAPES	
Main mentor	Steffen Nijhuis	Landscape Architecture
Second mentor	Kristel Aalbers	Urbanism
Argumentation of choice of the LA graduation lab	I am keen to learn more about and elevate my skills in working on urgencies in urban development through the system-based approach this studio adopts. Based on the introductory presentations, I concluded that this studio primarily focuses on (large-scale) problem-solving within landscape architecture. I have been curious to learn and become skilled in using landscape-based logic and design as the basis of this approach.	

III Graduation project	
Title of the project	**Rethinking Birrarung** Restoring riparian space for the Yarra River for ecological resilience and city-river connectivity
Context and aim of the project	
Location (region / area / site)	The Yarra River, Melbourne, Australia
Problem statement	The Yarra River system faces several challenges. Rapid urban development since colonization has compromised the rivers' riparian zones, resulting in the loss of riparian land within the urban context of Melbourne. Privatization and intensive land use in and around the riparian zone have contributed to the decreased accessibility of the river for citizens, as well as fragmenting ecological corridors, weakening both ecological integrity, human-river interaction, and social connections. Furthermore, the disruption of, and lack of space for, natural (seasonal) flow dynamics of the river threatens dynamic-dependent ecosystems critical to the river's health, and increases the risk on floods.

	To summarize, the challenges faced by the Yarra River system that will be addressed in this graduation project are: 1. Urban encroachment on the river system After colonization, rapid urban development followed on the floodplains of the Yarra River. With the large amount of space available, this changed to urban sprawl, as the city grew fast and wide. The result is encroachment of urban development on the riparian zone of the Yarra River, without acknowledging the importance of this system and the riparian space it requires to function properly. 2. Riparian zone fragmentation & inaccessibility Privatization and intensive land use of riparian land of the Yarra River system has resulted in a fragmented riparian zone. Although the river itself still functions as a natural corridor, the fragmentation of the riparian zone results in a disconnect in this part of the system. This is expressed by the loss of ecological connections along the river, essential for the well-being of the whole system. On an urban scale, it results in inaccessibility and thereby physical and social disconnect between the river, the city, and its citizens. 3. Change in (seasonal) dynamics of the river Urban development after colonization resulted in a change in the way of living with the Yarra River. Instead of using it lightly, like the Wurundjeri people (= Aboriginal tribe) did, now large amounts of water are extracted from the system, among others for drinking water, agriculture, and recreational purposes. This negatively influences the naturally occurring (seasonal) flow dynamics of the Yarra River. Combined with the overall loss of riparian zone (problem statement 2), dynamic flow dependent ecological systems are harmed and the risk on water-related casualties (ex. Floods) from storm surges rises.

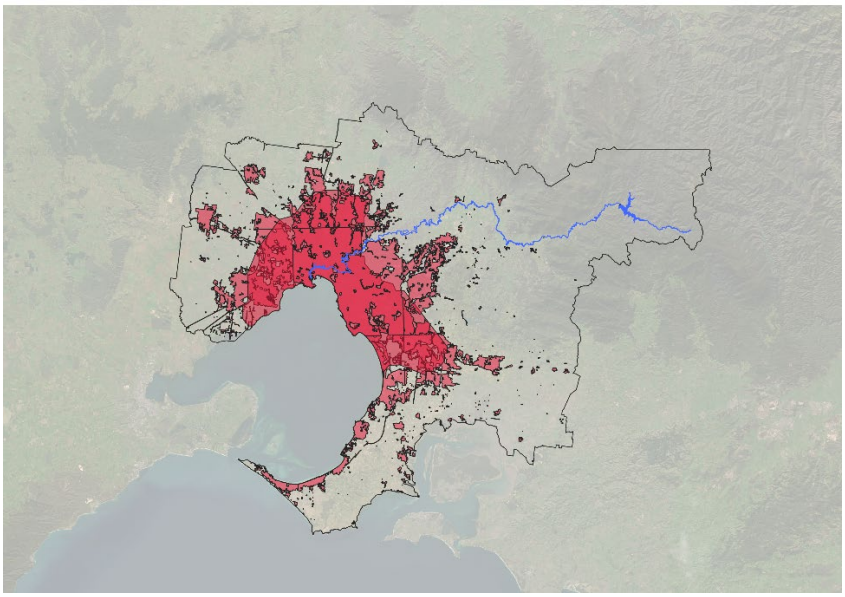
Research question(s)	*Main Research Question* How can riparian space for (seasonal) flow dynamics of Birrarung (the Yarra River) be restored to create a resilient ecological corridor while achieving urban integration of the river system, using a landscape-based design approach? *SQ1 - Understanding the city-river system* How can the connection between a densifying Melbourne and the Yarra River, the flow dynamics within the river system, and the role of riparian land use be understood, and what potentials and challenges can be defined? *SQ2 - Design Research / Principles* Which strategies and design principles are suitable for enhancing the integration of the Yarra River system within the urban network of Melbourne while simultaneously reintroducing seasonal dynamics? *SQ3 - Design Implementation* How can the defined strategies and design principles be translated into a spatial landscape architectural design intervention on both a regional and urban scale of the Yarra River? *SQ4 - Synthesis* Has the adopted approach been effective and did it provide a desirable outcome?
Design assignment	

By addressing the three issues mentioned in the problem statement, the Yarra River system has the potential to be a backbone for enhanced blue-green connectivity within the urban context of Melbourne and ecological connectivity along its riparian zone throughout Victoria. The Yarra River will be redefined as a socially connecting space in the urban context, where public access to and engagement with the river and riparian zone are integrated into a blue-green network.

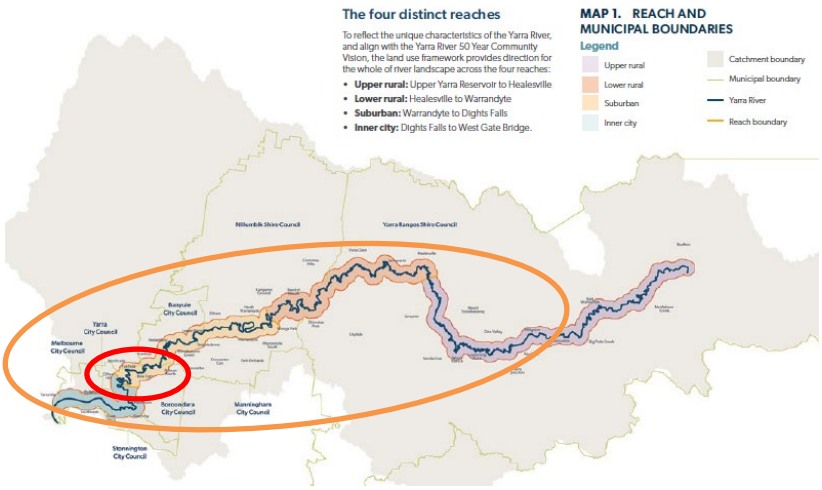
The anticipated approach is to restore space for, and reintroduce, flow dynamics of the Yarra River system within its riparian zone (such as seasonal flooding).

Restored riparian zones can function as multifunctional public spaces. Through this approach, the river system can be transformed into a dynamic and accessible landscape. On an urban scale, this will mean the development of the riparian zone into an urban parkland, enhancing city-river connectivity and ecological resilience throughout the river system. On a regional scale, reintroducing river dynamics will

mean the creation of ecologically resilient riparian zones and an ecological network along and throughout the river.



Map of outlines of Melbourne boundaries (black), built-up area (red) and Yarra River (blue).

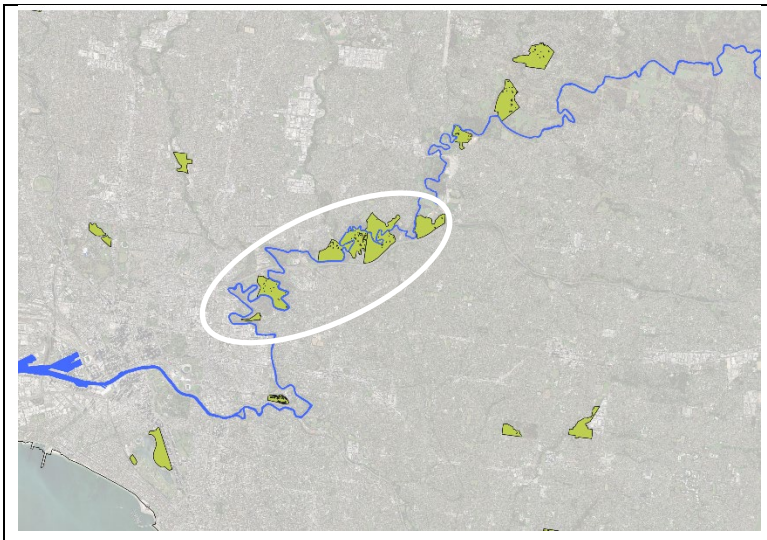


Yarra River with the Yarra Catchment. Subdivision of Yarra River in 4 zones

Regional design area: suburban and rural zone of Yarra River (riparian zone: river + 50-100m in lateral direction from either side of the river)

indication of the section of the River assigned for regional design

indication of urban (local) design area



Urban (local) design site: 2-6km stretch or Yarra River in the urban context (riparian zone: river + 100-500m in lateral direction from either side of the river). Around Yarra Bend Park and golf courses from Ivanhoe & Kew.

IV Graduation process

Method description

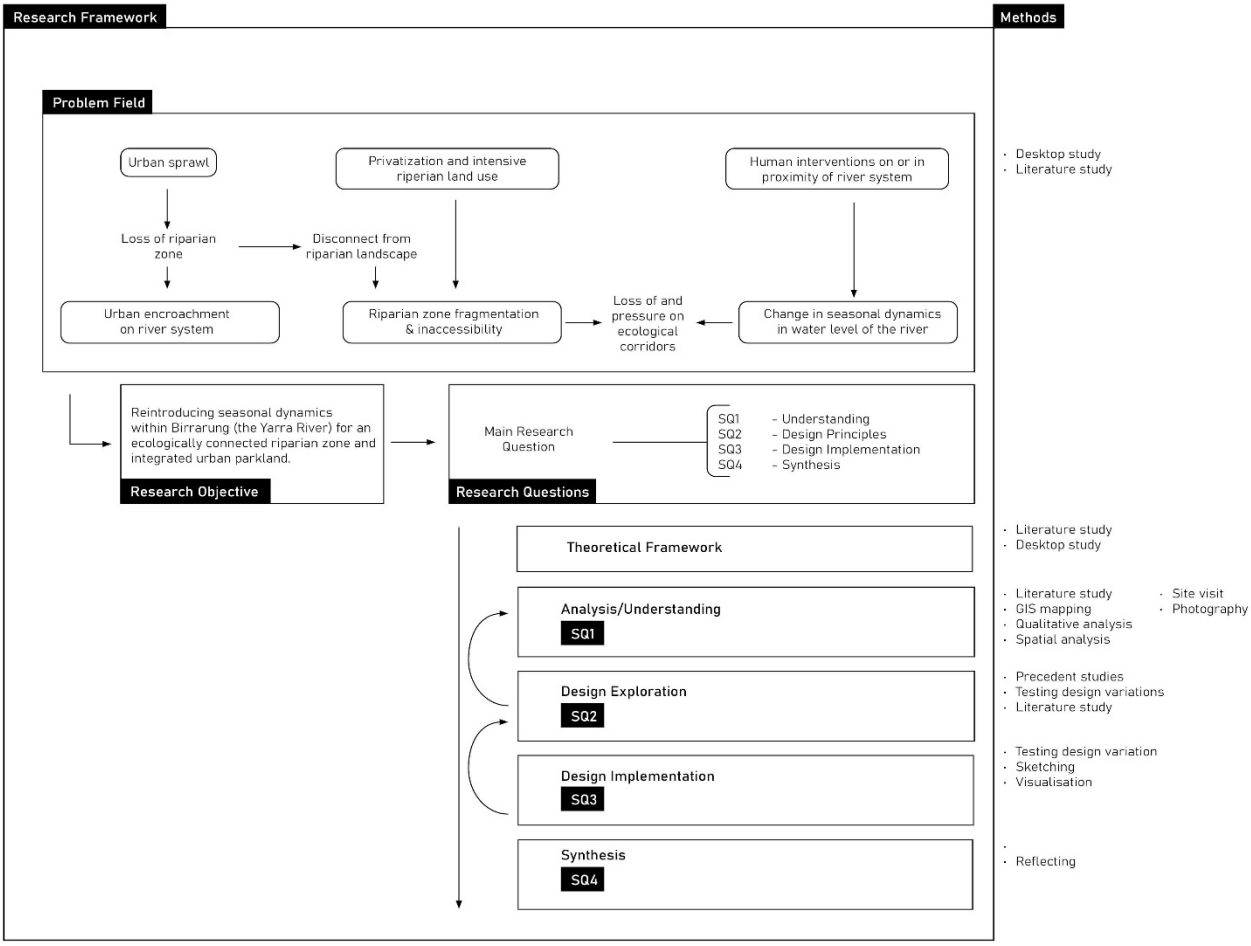
The structure of the research (research methodology) is described by the following framework. Relevant methods per phase are described on the right-hand side of the framework.

Complementary explanation of the framework:
The research itself is divided into 4 main sections

1. Analysis & Understanding
2. Design Exploration
3. Design Implementation
4. Synthesis

Within this research, an iterative design process will be followed. In this process, design principles will be formulated in the 'design exploration' phase and implemented on the design site in the 'design implementation' phase. Within this process, the design will be developed by working between different scales (multi-scale approach), in which transitions between large and small-scale design explorations are made to test and evaluate (the results of) design explorations on multiple scales.

The result from the design implementation process will be reviewed and adjusted until a desired outcome for the research site is achieved. Finally, the final design, as well as the research process, are reflected upon to determine the research method efficiency and effectiveness of the outcome.



Literature and more applied references

Understanding & design approach

Abshirini, E., & Koch, D. (2016). Rivers as integration devices in cities. *City, Territory and Architecture*, *3*(1). https://doi.org/10.1186/s40410-016-0030-4

Research Approach: Research through design

Nijhuis, S., & de Vries, J. (2019). Design as research in landscape architecture. *Landscape Journal*, *38*(1–2), 87–103. https://doi.org/10.3368/lj.38.1-2.87

Theory: Landscape infrastructure

Nijhuis, S., & Jauslin, D. (2015). Urban landscape infrastructures: Designing operative landscape structures for the built environment. *Research in Urbanism Series*, *3*, 13–34. https://doi.org/10.7480/rius.3.874

Understanding, theory & design approach: Natural Flow Regime

Poff, N. L., David Allan, J. D., Bain, M. B., Karr, J. R., Prestegaard, K. L., Richter, B. D., Sparks, R. E., & Stromberg, J. C. (2017). *The Natural Flow Regime: A Paradigm for River Conservation and Restoration*. https://www.researchgate.net/publication/247932778

Theory: River Culture

Wantzen, K. M., Ballouche, A., Longuet, I., Bao, I., Bocoum, H., Cissé, L., Chauhan, M., Girard, P., Gopal, B., Kane, A., Marchese, M. R., Nautiyal, P., Teixeira, P., & Zalewski, M. (2016). River Culture: An eco-social approach to mitigate the biological and cultural diversity crisis in riverscapes. *Ecohydrology and Hydrobiology*, *16*(1), 7–18. https://doi.org/10.1016/j.ecohyd.2015.12.003

V Reflection on the project proposal

1. What is the relation between your graduation topic, the lab topic, and your master track?

The graduation topic relates to the lab topic of Landscape Based Urbanism by adopting a landscape-based approach to address issues that are related to the urban context of Melbourne. Landscape-based urbanism is an approach in which the landscape forms the basis for designing future-proof urban environments. For this graduation project, a landscape structure (in this case the Yarra River) forms the basis for the improvement of urban public spaces and thereby livability of the city (in this case Melbourne). Additionally, the project explores the opportunity of connecting urban networks to natural/ecological networks and structures.

The master track 'Landscape Architecture' from the TU Delft focuses on creating spatial solutions inspired by nature, art, and technology. The starting point for this graduation project is a natural structure, the Yarra River. Exploring the challenges and opportunities this river faces provides a spatial design assignment for the development of an enhanced blue-green network on both a regional and urban scale. The project addresses multifaceted issues with robust landscape design, in other words, departing from the field of landscape architecture to address issues related to a variety of (scientific) fields. The project will provide a landscape architectural spatial design as a main outcome.

2. What is the relevance of your graduation work in the larger social, professional and scientific context?

Rivers have in many cases worldwide been the starting point for urban development and with rapid technological development, the direct dependencies of urban life on river systems (health) have become less apparent. However, with the increasing amount of environmental and climatological issues many cities now face (ex. Urban heat island effect, air pollution) the need for qualitative natural spaces in cities rises. Rivers have the potential to provide these spaces, but due to human intervention, their health and resilience are impacted. To keep living with and alongside river systems (in a safe way) for centuries to come, space has to be given back to these river systems to allow for seasonal dynamics to take place and improve ecological resilience. When looking at this graduation topic from a broader context, this project highlights the importance of a resilient and healthy river system for life in an urban context and thereby suggests approaches for enhanced city-river and thereby social connectivity.

From a professional perspective, the project adds to the understanding of the importance of river system health and resilience for urban life. The project explores existing and new ways of reintroducing the natural dynamics of river systems, thereby building on this field of knowledge and adding a valuable case-study on the role of landscape design for urban and river resilience. Within a scientific context, the project is an example of how a river system can be researched to obtain knowledge on the design potential these structures provide. Within the scientific field of landscape architecture, this research

shows how a research-through-design approach can be applied as a method to yield valuable findings on river system resilience and the improvement of city-river integration. Thereby, the design outcome can be used as knowledge for future research on river system networks and can be developed further for application on sites facing similar issues worldwide.