

# Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences



## Graduation Plan: All tracks

Submit your Graduation Plan to the Board of Examiners ([Examencommissie-BK@tudelft.nl](mailto:Examencommissie-BK@tudelft.nl)), Mentors and Delegate of the Board of Examiners one week before P2 at the latest.

The graduation plan consists of at least the following data/segments:

Studio		
Name / Theme	Architectural engineering	
Main mentor	Mo Smit	Circular neighborhood
Second mentor	Jos de Krieger	Metabolism and waste reuse
Argumentation of choice of the studio	I always believe that architectural and urban principles have implications on decision-making in the system level when facing the city's resources and energy issues, like water, materials etc. The aE studio gives me the opportunity to use the "flow" as a framework to rethink how those synergies can be better interwoven in a spatial context, which is also in line with my personal interests about circularity.	

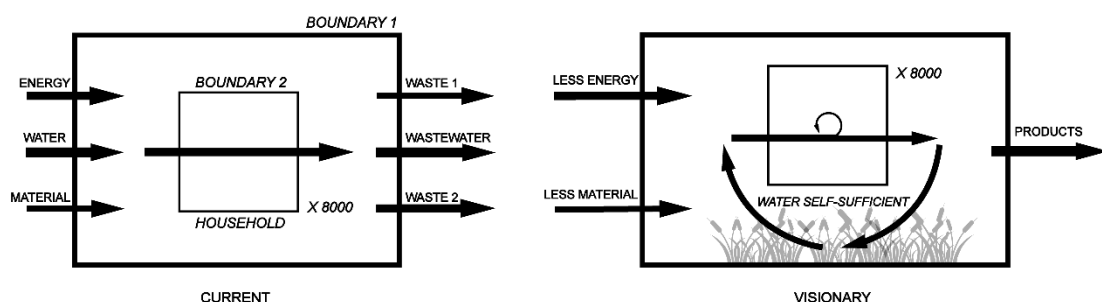
Graduation project	
Title of the graduation project	The innovative reed factory for a circular Strandeiland
Goal	
Location:	Strandeiland, Amsterdam
The posed problem,	The water scarcity problem is one of the most serious risks facing the world because only 0.5% of surface water on the Earth is suitable for human consumption. As the world population keeps increasing and is estimated to reach 8.1 billion in 2025, people's daily activities require large amount of fresh water and produces polluted wastewater, which brings heavier burden to the earth. Just like conventional neighborhoods in Netherlands that adopt linear economy, discharging all mixed effluent through sewer to the wastewater treatment plant is the main solution for most wastewater management in the world. There is no way to recycle the water resource and the treating process consumes a lot of energy. Nutrients and heat embodied in wastewater is also lost. All too often, water mistakenly is considered a cheap resource - and wastewater is seen as disposable. This must change. Now is the time to explore circular water management solutions and prevent these valuable resources from being lost.
research questions and	Main question: - How to build a circular sanitation system with reedbed filters in Strandeiland? Sub questions:

	<ul style="list-style-type: none"> <li>- What's the water-use and wastewater composition per household?</li> <li>- How to recycle wastewater both in building level and neighborhood level?</li> <li>- How to form the water cycle with reedbed filters?</li> </ul>
design assignment in which these results.	<p>The design assignment is to achieve a circular neighborhood with more green and strong local identity. The main shining points that Strandeiland present in the future will be the shared water recreation spaces alongside the beach and its willingness to recover the natural versatility, biodiversity and resilience, given the very attractive qualities of the island. The visionary circular neighborhood, equipped with 5.5 hectares reed natural reserve, 6km greenway and rooftop garden, can facilitate a variety of functions: water storage and treatment, urban lungs, biomass production, nature development, food production, recovery of raw materials and recreation and an attractive and safe route for cyclists and pedestrians. In the building level, by applying reed material as building elements, it adds special flavor to the identity of the island, forms a coherent aesthesis and the material itself has good building performances. As a biodegradable material, it's also sustainable and environmentally friendly. The reed factory is also a part of the water cycle and provides city residents with opportunities to participate in the design, construction and maintenance, which may be possible to save on costs of installation and management.</p>

## Process

### Method description

For a complex research with more than one system involved, it is important to define the system boundary first. Considering that Strandeiland is an island neighborhood, the first system boundary of the coastline is clear. In order to demonstrate the detailed water-use with daily activities and how they flow, the second system boundary, per household, is also introduced (see figure 2). The general scheme is to compare the conventional sanitation system and the visionary sanitation system within these two system boundaries. When zooming out, it shows a comprehensive overview of the total watercycle in the neighborhood, showing the input and output and recycling process. When zooming in, detailed waterflow and consumption per household is illustrated.



The main method used to collect data is by online resources, literature and field research. Only existing pioneer cases in Netherlands are taken into consideration for references. In this paper, the data related to helophyte filters and blackwater recovery are separately collected from Eva-lanxmeer and Waterschoon, both of which prove to perform well in system level. Additional assumption and conversion factors are also permitted in calculation.

### **Literature and general practical preference**

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## Reflection

1. What is the relation between your graduation (project) topic, the studio topic (if applicable), your master track (A,U,BT,LA,MBE), and your master programme (MSc AUBS)?

My graduation project aims to achieve a water circular neighbourhood by making urban and architectural interventions in the system level. In the neighbourhood level, I would suggest a reedbed-based watercycle system, which involves multiple strategies in the whole neighbourhood, including greenway, rooftop garden, biogas plant and expanded reed zone. In the architecture level, a reed factory demonstrates the local identity of a reed island and reuse waste reed materials. The studio topic is to research how circular design strategies can contribute to both the architectural and ecological value of buildings and neighbourhoods as a whole. I think my graduation project gives a possible answer to the studio topic in a specific context. In the end, I focus on the architecture design of a reed factory, so it's closely related to my track and master programme.

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

The project explores water flows within the neighborhood and possible ways to recycle wastewater to form a circular neighborhood. By calculating the water demand for each step within defined boundaries, it proves the whole system can function with only extra rainwater supplied, which is competitive. It aims to improve the social awareness that wastewater is valuable resources and should not be seen as disposable. Hopefully, the methods of research and part of the watercycle system that I develop for this project could also be applicable to other general neighborhoods in Netherlands.