

Architecture Drawn from the Toilet

Challenging Mindsets by Critical Design

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Dissertation presented in
partial fulfilment of the requirements
for the degree of Doctor of Architecture

June 2026

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ISBN 978-91-8103-449-3
DOI 10.63959/chalmers.dt/5906

Doktorsavhandlingar vid Chalmers tekniska högskola
Ny serie: 5906

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Graphic design by Louise Degraeve.



Arenberg Doctoral School
Faculty of Architecture



Doctorate in Double Degree with
Chalmers University of Technology (SE)
Department of Architecture and Civil Engineering

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“Solving climate change is not your responsibility because that is outside of your control. What you ‘are’ responsible for is the thing ‘inside’ your control. Indeed, the only thing that has ever been inside your control – your mindset.”

Clover Hogan 2021

I. Acknowledgements

This doctoral dissertation came to light with the support of a number of people and associations. In terms of research funding, I would like to acknowledge the Research Foundation Flanders (FWO) for granting me a fellowship in fundamental research (11P7N24N), which provided the financial support necessary to complete this research project. I am equally grateful to the Faculty of Architecture at KU Leuven and the Department of Architecture and Civil Engineering at Chalmers University of Technology for their guidance and support over the past four and a half years. As the host institution in this Double Degree Doctorate, I would like to extend a special thank you to Chalmers University of Technology for warmly welcoming me during my research stays and visits to Sweden throughout these years. I am also deeply thankful to the research group *Material Narratives* at KU Leuven and the division of *Architectural Theory and Methods* at Chalmers, as well as to the many academics I had the pleasure of meeting in Belgium, Sweden, and at the various conferences I attended. The many opportunities to exchange ideas and discuss the research along the way have been invaluable.

I would also like to express my gratitude to the members of the Examination Committee: Prof. Dr. Laurens Luyten (chair) for hosting the public PhD defence, and Prof. Dr. Hélène Frichot and Carl Bourgeois for their willingness to participate in the final evaluation of my PhD research. Together with Prof. Dr. Rachel Armstrong and Prof. Dr. Monica Billger as assessors, I want to thank you for critically engaging with the work and guiding me through the final stages of the PhD. This process has been an insightful experience that will continue to inspire me in my further career. My sincere thanks also go to my supervisors and co-supervisor: Prof. Dr. Fredrik Nilsson, for warmly welcoming me to Chalmers University, and Prof. Dr. Nel Janssens and Prof. Dr. Johan Liekens, for their amazing support in the development of this project, reaching back to my master's thesis initiated during the COVID pandemic in 2020. In this context, I would also like to acknowledge Dr. Alice De Smet for her encouragement and belief in me during my Master's studies in Architecture. My academic trajectory and

development as a researcher would not have been possible without the confidence you placed in me as a PhD candidate. I am also grateful to my colleague Ema Soukupová, who joined our *Architecture & Wicked Matters* research cell in 2024 and helped transform it into a growing academic collective.

A special word of thanks goes to the Blikfabriek for the inspiring collaboration and the countless conversations over the years. This research would not have been possible without their openness in welcoming the research to their site and their trust in me as both researcher and designer. I would also like to acknowledge Natuurpunt Hoboken, the students of the *Sanitopia* studio, and all other participants who took part in the many conversations surrounding the designs. I am furthermore grateful to Louise Degraeve for the fantastic graphic design of this book and for offering me a new view of my own work from a different perspective. My thanks also go to the staff of the Foto Studio at LUCA School of Arts for their assistance in photographing the design material, and to Bodhi Duyck for helping me realise my vision for the exhibition accompanying the public PhD defence.

I also wish to acknowledge the vibrant PhD communities at both universities, of which I have been a part. At Chalmers, I am especially grateful to Janneke, Anita, Bri, and the many other colleagues whom I had the pleasure of meeting and spending so many months with. At KU Leuven, I would like to extend my appreciation to all the colleagues at the SNS and Pacheco campuses. A special thank you goes to my colleagues in Brussels: Breg, Benoît, and Laura, whose everlasting enthusiasm made the challenging final phase of the research much lighter to carry. At the campus in Ghent, my workplace for the last few years, I am particularly grateful to Eva and Weronika for sharing offices and friendship during the early years of the research. I also want to warmly thank Marie, in whom I placed blind trust as a buddy; Floris, Floriane, and Jorik, for all the laughter they bring to campus; and Willemien, Tristan, Lena, Njômeza, and all the other colleagues who made office days and after-work drinks so enjoyable. The final effort of completing this thesis felt far less heavy because of your support.

On a personal level, I am deeply grateful to all the friends and family who continued to encourage me over the last few years. I have learned many things throughout the PhD, but what I will cherish most is the incredible community of people surrounding me. In particular, I want to thank my wonderful parents and brother for their unconditional support and for constantly reminding me to see the bigger picture. To my kind family-in-law, and Els in particular, thank you for welcoming me to write in both Ostend and France, in search of concentration and moments of rest. To my dearest friends Emma, Eva, Marthe, and Marie, thank you for being such steady companions as I navigated the first years of the PhD and the FWO application process. You have also kept me well-fed with your delicious cooking in the days leading up to the thesis submission, which motivated me during the final stretch. To Hanne, Elina and Ilaria, thank you for all the warm messages, encouragement, and wishes of good luck. To Emma, Flo, and Camille, thank you for your cards – even the late-arriving ones – which always managed to bring both encouragement and laughter. To Melanie, thank you for the chocolates and to Erinn for the amazing brownies and for counting down the days until the final submission. I have felt your presence even during moments of writing in isolation.

Finally, the biggest thank you goes to my partner Leon for all the meals, walks, conversations, proof-reading, words of motivation, and evenings you spent reading to me, and for always trying to make me feel better. You have provided me with the much-needed headspace to finish the PhD, and I could not have done it without you as my second brain.

II. Popularised Abstract

Climate change, biodiversity loss, and the depletion of natural resources are increasingly challenging the way we live. In this context, the doctoral research interrogates the effectiveness of existing sustainability approaches in architecture, which rely heavily on fragmented technological solutions. While such interventions can be valuable, they frequently focus on adapting our environments without questioning the lifestyles and habits that contribute to environmental problems in the first place. This research starts from the conviction that a more sustainable future requires a cultural change in how we think about and relate to the world around us. In searching for effective points of intervention, mindsets are identified as key leverage points for cultural change. This raises an important question: what can architect-designers do, within the boundaries of their discipline and agency, to contribute to a shift in mindsets? This research is grounded in the belief that architecture significantly shapes how people relate to the world around them. The spaces we inhabit shape our routines, habits, and behaviours. By reshaping these spaces and their environmental impacts, architecture may help people develop new ways of living and thinking.

To explore this idea, the research focuses on an unexpected but highly relevant topic: the toilet. Using a toilet is one of the most routine activities in everyday life. The flushing toilet and the underground sewer systems that support it have become so familiar that they are almost invisible. Yet these systems are increasingly facing environmental challenges. While the Flemish sewer system was once valued as an innovation for human health, criticism is now growing over its environmental impact. Ageing sewers, some of which date back to the 19th century, are finding it increasingly difficult to cope with the growing effects of climate change, heavy rainfall, and population growth. As a result, sewer overflows occur more frequently, and wastewater ends up in rivers and streams. The system is under severe pressure and, in some places, threatens to reach its limits. This research not only demonstrates that this hidden infrastructure is no longer sustainable, but also that it perpetuates a collective ‘flush-and-forget’ attitude: once wastewater disappears into the toilet, we no longer have to think about it. Rather than seeing this

as only a technical problem, the dissertation examines it as a cultural and spatial issue, and addresses the central question:

“How can architectural design trigger a shift in mindsets regarding how we deal with human bodily waste by shaping alternative toilet habits?”

In this context, the dissertation approaches the toilet as both an everyday object and an architectural case to challenge mindsets by means of research-by-design and critical design. To answer this question, the research investigates how redesigning toilets might influence everyday behaviour and attitudes concerning human bodily waste. Instead of immediately evacuating bodily waste away through sewers, alternative approaches could involve keeping waste on-site, treating it above ground, or organising collective forms of care and management. Such alternatives require and shape new habits, responsibilities, and ways of thinking.

The research unfolds through three consecutive design explorations centred around the same urban and semi-public case study: the Blikfabriek in Antwerp (BE). In each exploration, new toilet designs are developed that question existing habits surrounding toilet use and invite participants to look at them differently. This first takes place through *Critical Cartography* to map the issues addressed in the research. Secondly, *Design Scenarios*, or toilet designs, are developed for the case study site. And finally, these designs are introduced as *Conversation Pieces* in dialogue with participants and their way of thinking. Based on these three design explorations, broader design strategies are developed through which architecture can trigger a shift in mindsets. Such a shift can be small, like a subtle change in perspective or point of view, yet still sufficient to set us in an entirely new direction.

Gepopulariseerd Abstract

Klimaatverandering, biodiversiteitsverlies en de uitputting van natuurlijke hulpbronnen stellen onze manier van leven steeds meer op de proef. Duurzame ideeën binnen architectuur rekenen sterk op losstaande technologische oplossingen. Dit soort ingrepen kunnen waardevol zijn, maar zijn er vaak op gericht om onze omgeving te veranderen zonder de levensstijlen en gewoonten die aan de basis liggen van milieuproblemen in vraag te stellen. Dit onderzoek veronderstelt dat er een culturele verandering nodig is om tot een duurzamere manier van wonen en leven te komen. In de zoektocht naar effectieve manieren om zo'n cultuurverandering teweeg te brengen, beschouw ik denkpatronen, of 'mindsets', als een hefboom. Dit roept een belangrijke vraag op: wat kunnen architect-ontwerpers, binnen de grenzen van hun invloed, doen om mindsets te veranderen? In dit onderzoek vertrek ik vanuit de overtuiging dat architectuur een grote impact heeft op de manier waarop mensen zich tot hun omgeving verhouden. Architecturaal ontwerp wordt gekenmerkt door dagelijkse routines en gewoonten. Deze routines en gewoonten vormen op hun beurt specifieke leefomgevingen met een eigen identiteit, bewustzijn, waarden en mindsets. Omdat architecten ruimtelijke omgevingen vormgeven, beïnvloeden zij ook de gewoonten die daarin zijn ingebed.

Om dit te onderzoeken, focus ik op een onverwacht maar bijzonder relevant onderwerp: het toilet. Het toiletgebruik is een van de meest alledaagse gewoonten in ons dagelijks leven. Het spoeltoilet en het daarbij behorende ondergrondse rioleringssysteem zijn zo vanzelfsprekend geworden dat ze bijna onzichtbaar zijn. Toch botsen deze systemen steeds vaker op hun ecologische grenzen. Waar het Vlaamse rioolstelsel vroeger werd gezien als een grote vooruitgang voor de volksgezondheid, groeit vandaag de kritiek vanwege de impact ervan op het milieu. Verouderde riolen, waarvan sommigen dateren uit de negentiende eeuw, kunnen de toenemende druk van klimaatverandering, hevige regenval en bevolkingsgroei steeds moeilijker dragen. Riooloverstorten komen steeds vaker voor, waardoor afvalwater in onze rivieren en beken belandt. Het systeem staat onder zware druk en dreigt op sommige plaatsen zijn grenzen te bereiken. Dit doctoraatsonderzoek toont dat

deze verborgen infrastructuur niet langer duurzaam is en een collectieve 'flush and forget'-mentaliteit in stand houdt: zodra we onze uitwerpselen doorspoe-len, hoeven we er niet meer aan te denken.

In dit onderzoek bekijk ik dit niet enkel als een technisch probleem, maar ook en vooral als een cultureel en ruimtelijk vraagstuk. De centrale onderzoeksvraag luidt daarom:

“Hoe kan architecturaal ontwerp mindsets over hoe wij met menselijke uitwerpselen omgaan veranderen door alternatieve toiletgewoonten vorm te geven?”

Ik beschouw het toilet als een alledaags object, maar ook als een architecturale casus om aan de hand van ontwerpmatig onderzoek en kritisch ontwerp bestaande mindsets uit te dagen. Ik onderzoek daarbij hoe een herontwerp van het toilet onze dagelijkse gewoonten kan sturen. In plaats van onze uitwerpselen meteen af te voeren via de riolering, zouden we het bijvoorbeeld ook ter plaatse kunnen houden, het bovengronds behandelen of collectieve vormen van zorg en beheer ervan organiseren. Dergelijke alternatieven vereisen én vormen nieuwe gewoonten, verantwoordelijkheden en manieren van denken.

Het onderzoek verloopt via drie opeenvolgende onderzoekscycli, of *Ontwerpverkenningen*, rond dezelfde stedelijke en semipublieke casestudy: de Blikfabriek in Antwerpen (BE). Bij elke verkenning worden nieuwe toiletontwerpen uitgewerkt die bestaande gewoontes rond toiletgebruik in vraag stellen en deelnemers uitnodigen om er anders naar te kijken. Dit gebeurt eerst door de problematiek van het onderzoek in kaart te brengen aan de hand van een zogenaamde *Kritische Cartografie*. Vervolgens worden toiletontwerpen of *Ontwerpscenario's* uitgewerkt. En ten slotte worden deze ontwerpen voorgesteld als gespreksvoorwerpen of *Conversatiestukken* waarover de deelnemers in dialoog gaan. Op basis van deze drie ontwerpverkenningen worden bredere ontwerpstrategieën ontwikkeld waarmee architectuur kan bijdragen aan een mindsetverandering. Zo'n verandering kan klein zijn, zoals een subtiele verschuiving in perspectief, maar toch voldoende om ons op een volledig nieuw pad te brengen.

III. Summary

In recent years, growing awareness of the planetary crisis has highlighted how climate change, resource depletion, and biodiversity loss threaten life on Earth as we know it. Within this context, this doctoral research interrogates the effectiveness of existing sustainability approaches in architecture. The current tendency in architecture, in the context of climate change, is to rely heavily on fragmented technological solutions. This is often expressed through the adoption of green design and green aesthetics without sufficient consideration of their actual environmental impact. In Flanders, the context of this research, governmental strategies such as 'climate-robust' design interventions aim to mitigate the effects of climate change on the built environment. Yet, like many technological fixes, these interventions primarily seek to preserve existing patterns of living by adapting environments to withstand environmental change. Drawing on feminist science and technology studies (STS), new materialism, posthumanism, and traditional ecological knowledge (TEK), I argue that environmental degradation cannot be addressed through technological innovation alone. Such approaches often reproduce the very belief systems that contributed to the crisis in the first place. Instead, structural change requires a fundamental transformation in how we relate to and inhabit the world.

From this perspective, I argue that architecture should engage more actively with the cultural dimensions of sustainability. In searching for effective points of intervention, mindsets are identified as key leverage points for cultural change. This raises an important question: what can architect-designers do, within the boundaries of their discipline and agency, to contribute to a shift in mindsets? The research is grounded in the belief that architecture significantly shapes how people relate to the world around them. Architectural design is always embedded within specific contexts and is characterised by daily routines and habits. These routines and habits, in turn, reproduce particular habitats or daily living environments defined by a specific identity, consciousness, values, and mindsets. Because architects shape spatial environments, they also influence the habits that are embedded within them. As such, the

research rests on the conviction that architectural design can trigger a shift in mindsets by shaping new habits. In the search to support cultural change by architectural design, habits are therefore considered key entry points as they constitute a spatial issue closely intertwined with cultural norms and values.

To investigate the agency of architecture in shifting mindsets, I focus on one specific unsustainable habit: toileting. The toilet is a particularly relevant case because it shapes a daily practice that has become deeply ingrained in our architecture and lifestyles, making it difficult to change. Over time, we have become accustomed to the limited responsibility that the flushing toilet system places on users, and our everyday routines, standards of hygiene, and notions of civility are built around this expectation. The toilet, moreover, is typically the smallest architectural space and is often overlooked, including in architectural design research. Yet its presence is far more prominent underground, where it relies on an extensive network of pipes and sewers designed to quickly and efficiently transport human bodily waste away from our living environments. In Flanders, one of the most densely built-up regions in Western Europe, this infrastructural system is almost absent above ground but is saturated underground with networks to support the densely built world above.

Whereas the Flemish sewer system was once valued as an innovation for human health, it is increasingly criticised as a source of pollution and environmental damage caused by sewer overflows. Flemish sewers are now ageing, with some even dating back to their construction in the 19th century. As a result of the climate crisis and unexpected population growth, this system is under severe pressure and threatens to collapse. The dissertation demonstrates that this infrastructure is no longer sustainable and, more importantly, that it perpetuates our collective ignorance and lack of responsibility regarding this issue. In this context, I examine the contemporary 'flush-and-forget' attitude, which is spatially supported by the current wastewater infrastructure. The toilet herein becomes an architectural element and spatial entrance to challenge and loosen ingrained aspects that currently obstruct

change. In doing so, I seek to materially support the societal changes that are noticeable but struggle to come into being by investigating the following research question:

“How can architectural design trigger a shift in mindsets regarding how we deal with human bodily waste by shaping alternative toilet habits?”

The research expects that architectural design can evoke such a cultural shift by altering the design of toilets and shaping more sustainable toilet habits that support accountability for bodily waste. By retaining human bodily waste, for instance, on-site, treating it above ground, and setting up collectives that think and design with care for this matter, I compose and present more sustainable scenarios of dealing with and designing for it. In aiming to trigger a shift in mindsets and ultimately contribute to cultural transformation, I therefore argue that the first step is to challenge, loosen, and reshape established habits through architectural design, before it can support and realise broader societal changes.

Methodologically, the research unfolds through three consecutive *Design Explorations*, or research cycles, centred on the same urban and semi-public case study: the Blikfabriek in Antwerp, Belgium. In each exploration, new toilet designs are developed and raised for discussion in the case study to question and challenge existing toilet habits. This first takes place through *Critical Cartography*, which maps the issues addressed in the research. Subsequently, *Design Scenarios*, or toilet designs, are developed for the case study. And finally, these designs are introduced as *Conversation Pieces* in dialogue with participants. From the analysis of these three research cycles, broader design strategies are developed that can stimulate a shift in mindsets through architectural design. Such a shift can be as small as a slight change in perspective or point of view, yet still capable of setting us on an entirely new path.

The research findings developed during this research process contribute both methodologically and theoretically. First, I develop three methodological principles that are transferable to a broader research context as a toolkit. The principles include an architectural string figure or *Critical Cartography* underlying the research, toilet designs or *Design Scenarios*, and the presentation of architectural designs as *Conversation Pieces* in the case study. These

three methodological principles have been employed throughout the research to generate insights into the research question under study through architectural design. Together, these principles concern the methodological contribution of the research to the field of Research-by-Design.

Second, from creating *Design Scenarios*, raising them for discussion in the case study as *Conversation Pieces*, and analysing the design discussions, I develop six intermediate design strategies for shifting mindsets through architectural design. These strategies concern: The Design Strategy of Rendering Present, the Confrontational Design Strategy, the Public Design Strategy, the Responsive Design Strategy, the Design Strategy of Critical Distance, and the Design Strategy of Ecological-Spatial Value. Building on these findings, the six intermediate strategies are synthesised into three advanced design strategies. The advanced design strategies comprise the Informational Design Strategy, the Rewarding Design Strategy, and the Connecting Design Strategy. By moving beyond the situated case of the toilet, these advanced strategies become transferable to the field of critical design in architecture and even to architectural education and practice more generally.

Finally, three overarching themes or ‘key threads of reflection’ emerged as particularly significant in relation to the main ambition and are considered relevant for further investigation. The first concerns the relationship between technology, architectural design, and culture. The second addresses the creation and adoption of ecological-spatial values through architectural design, and the last examines the role of architecture in effecting change by elaborating on the process of moving from speculation towards normalisation. Together, these themes reinforce the dissertation’s central argument: that architecture can contribute to sustainability, not only technologically, but also by transforming habits and mindsets, ultimately leading to a cultural change in our patterns of living.

Samenvatting

De laatste jaren groeit het bewustzijn dat klimaatverandering, de uitputting van grondstoffen en het verlies aan biodiversiteit de levensstijlen zoals wij ze kennen bedreigen. Duurzame ideeën binnen architectuur rekenen sterk op losstaande technologische oplossingen. Dit zie je bijvoorbeeld bij het zogenaamde ‘green design’, waarbij onvoldoende aandacht gaat naar de eigenlijke ecologische impact van zulke ontwerpen. Ook in Vlaanderen, de context van dit onderzoek, grijpen overheden naar dit soort oplossingen, zoals de ‘klimaatrobuuste’ ontwerpen, die de gevolgen van klimaatverandering voor de bebouwde omgeving moeten beperken. Het probleem is dat dit soort ingrepen, net als vele technologische oplossingen, er in de eerste plaats op zijn gericht om onze omgeving aan te passen aan onze gewoontes en ideeën, terwijl die eigenlijk mee de oorzaak vormen van de klimaatcrisis. Onderzoeksvelden als ‘feminist science and technology studies (STS)’, ‘new materialism’, ‘posthumanism’ en ‘traditional ecological knowledge (TEK)’, tonen aan dat milieuvervuiling en ecologische achteruitgang niet enkel via technologische innovatie kunnen worden aangepakt. Om structurele verandering teweeg te brengen, moeten wij op een fundamenteel andere manier met onze omgeving omgaan.

Vanuit deze invalshoek stel ik dat architectuur zich actiever moet bezighouden met de culturele kant van duurzaamheid. In de zoektocht naar effectieve manieren om een cultuurverandering teweeg te brengen, beschouw ik denkpatronen, of ‘mindsets’, als een belangrijke hefboom. Dit roept de vraag op wat architect-ontwerpers, binnen de grenzen van hun vak en invloed, kunnen doen om mindsets te veranderen. In dit onderzoek vertrek ik vanuit de overtuiging dat architectuur een grote impact heeft op de manier waarop mensen zich tot hun omgeving verhouden. Architecturaal ontwerp is steeds ingebed in een specifieke context en wordt bepaald door dagelijkse routines en gewoonten. Deze routines en gewoonten vormen op hun beurt specifieke habitats of leefomgevingen met een eigen identiteit, bewustzijn, waarden en mindsets. Omdat architecten onze ruimtelijke omgevingen vormgeven, beïnvloeden zij ook de gewoonten die daarin zijn ingebed. Architecturaal ontwerp kan dus mindsets veranderen door nieuwe

gewoonten vorm te geven. In dit onderzoek beschouw ik gewoonten daarom als een belangrijk uitgangspunt in de zoektocht naar manieren waarop architectuur cultuurverandering kan stimuleren. Gewoonten vormen daarin een ruimtelijk vraagstuk dat nauw verweven is met culturele normen en waarden.

Om de invloed van architectuur op de mindsets van mensen te onderzoeken, focus ik op één specifieke niet-duurzame gewoonte: ons toiletgebruik. Het toilet vormt een bijzonder relevante casus omdat het staat voor een dagelijkse gewoonte die diep verankerd is in onze architectuur en levensstijl, waardoor verandering moeilijk is. We zijn doorheen de tijd enorm gewend geraakt aan het grote gebruikersgemak van het doorspoeltoilet: we dragen geen enkele verantwoordelijkheid meer voor wat er met onze uitwerpselen gebeurt. Dit wordt ook wel de ‘flush and forget’-attitude genoemd. Onze dagelijkse routines, hygiënenormen en opvattingen over sanitair vloeien voort uit deze houding. Daarnaast is het toilet doorgaans het kleinste kamertje in de architectuur en krijgt het weinig aandacht, ook in architectuuronderzoek. Ondergronds is het evenwel heel prominent aanwezig in de vorm van een uitgebreid netwerk van leidingen en rioleringen dat ontworpen is om menselijke uitwerpselen snel en efficiënt uit onze leefomgeving af te voeren. In Vlaanderen, een van de dichtst bebouwde regio’s van West-Europa, valt bovengronds van deze rioolinfrastructuur vrijwel niets te merken, terwijl het ondergronds volledig verzadigd is om de dichtbebouwde wereld erboven te ondersteunen.

Waar het Vlaamse rioolstelsel vroeger werd gewaardeerd als een innovatie voor de volksgezondheid, wordt het vandaag steeds vaker bekritiseerd als een bron van vervuiling en milieuschade, met name door riooloverstorten. De Vlaamse riolen zijn vandaag verouderd, waarbij sommige zelfs nog dateren uit de negentiende eeuw. Als gevolg van de klimaatcrisis en een onverwachte bevolkingsgroei staat dit systeem onder zware druk en dreigt het te bezwijken. In dit proefschrift toon ik aan dat deze infrastructuur niet langer duurzaam is en bovendien onze collectieve onwetendheid en de hedendaagse ‘flush and forget’-houding in stand houdt. Ik gebruik het toilet als een architecturaal element en een ruimtelijke ingang om vastgeroeste gewoonten, die duurzame

verandering in de weg staan, uit te dagen en los te weken. Op die manier probeer ik maatschappelijke veranderingen die maar moeilijk tot stand komen materieel te ondersteunen en onderzoek ik de vraag:

“Hoe kan architecturaal ontwerp mindsets over hoe wij met menselijke uitwerpselen omgaan veranderen door alternatieve toiletgewoonten vorm te geven?”

Het onderzoek verwacht dat architecturaal ontwerp een culturele verschuiving kan teweegbrengen door toiletontwerpen te veranderen. Zo kunnen duurzamere toiletgewoonten worden vormgegeven die mensen weer verantwoordelijk stellen voor hun eigen uitwerpselen. Met dit onderzoek stel ik zo’n duurzamere scenario’s voor die tonen hoe we op andere manieren met onze uitwerpselen kunnen omgaan en hoe we ervoor kunnen ontwerpen, bijvoorbeeld door deze materie ter plaatse te houden, het bovengronds te behandelen en collectieven op te zetten die er met zorg over nadenken en voor ontwerpen. Het doel is om onze mindsets bij te sturen en zo bij te dragen aan culturele verandering. Ik bear-gumenteer hierin dat we vastgeroeste gewoonten eerst via architecturaal ontwerp moeten uitdagen, losmaken en hervormen, voordat we bredere maatschappelijke veranderingen kunnen ondersteunen en bereiken.

De methodologie van het onderzoek ver-loopst via drie opeenvolgende onderzoekscycli, of *Ontwerpverkenningen*, rond dezelfde stedelijke en semipublieke casestudy: de Blikfabriek in Antwerpen, België. Binnen elke onderzoekscyclus werden nieuwe toiletontwerpen ontwikkeld voor de casestudy die de bestaande toiletgewoonten in vraag stellen en uitdagen. Dit gebeurde eerst via *Kritische Cartografie*, waarin de centrale thema’s van het onderzoek in kaart werden gebracht. Vervolgens werden toiletontwerpen, of *Ontwerpscenario’s*, ontwikkeld voor de casestudy. En ten slotte werden deze ontwerpen voorgesteld als gespreksvoorwerpen, of *Conversatiestukken*, waarover de participanten binnen de casestudy in dialoog gingen. Op basis van de analyse van deze drie onderzoekscycli werden bredere ontwerpstrategieën ontwikkeld die via architecturaal ontwerp een mindsetverandering kunnen stimuleren. Een dergelijke verandering kan zo klein zijn als een subtiele verschuiving van perspectief, maar toch voldoende om ons op een volledig nieuw pad te brengen.

De onderzoeksbevindingen die tijdens dit onderzoekproces werden ontwikkeld, leveren zowel methodologische als theoretische bijdragen. Ten

eerste ontwikkelde ik drie methodologische principes die als toolkit in een bredere onderzoekscontext kunnen worden gebruikt. Deze principes omvatten een architecturale *Kritische Cartografie* die een onder-legger vormt voor het onderzoek, toiletontwerpen of *Ontwerpscenario’s*, en de presentatie van de ontwerpen als *Conversatiestukken* binnen de casestudy. Deze drie methodologische principes werden gedurende het hele onderzoek ingezet om via architecturaal ontwerp inzichten te vergaren over de algemene onderzoeksvraag. Samen vormen zij een methodologische bijdrage aan het onderzoeksveld van ontwerpmatig onderzoek, of ‘Research-by-Design’.

Ten tweede ontwikkelde ik, aan de hand van het ontwerpen van *Ontwerpscenario’s* en het analyseren van de gesprekken rond de *Conversatiestukken*, zes tussentijdse ontwerpstrategieën om via architecturaal ontwerp mindsets te veranderen. Deze ontwerpstrategieën hebben elk een eigen focus: de Ontwerpstrategie van het Zichtbaar Maken, de Confronterende Ontwerpstrategie, de Publieke Ontwerpstrategie, de Responsieve Ontwerpstrategie, de Ontwerpstrategie van Kritische Afstand en de Ontwerpstrategie van Ecologisch-ruimtelijke Waarde. De bevindingen van deze zes tussentijdse strategieën worden samengebracht en verfijnd tot drie gevorderde ontwerpstrategieën met elk opnieuw een eigen focus: de Informatieve Ontwerpstrategie, de Belonende Ontwerpstrategie en de Connecterende Ontwerpstrategie. Deze uitgewerkte strategieën beperken zich niet tot het toilet als casus in dit onderzoek, maar kunnen breder toegepast worden binnen het veld van kritisch ontwerp in architectuur, binnen architectuuronderwijs en binnen de bredere architectuurpraktijk.

Tot slot kwamen drie overkoepelende thema’s of reflectielijnen naar voren. Deze zijn bijzonder relevant voor zowel de centrale ambitie van het proefschrift als voor verder onderzoek. Het eerste thema gaat over de relatie tussen technologie, architecturaal ontwerp en cultuur. Het tweede bespreekt hoe ecologisch-ruimtelijke waarden worden gevormd en opgepikt via architecturaal ontwerp. Het derde onderzoekt welke rol architectuur kan spelen binnen een cultuurverandering door in te gaan op de overgang van speculatie naar normalisatie via ontwerp. Samen versterken deze thema’s het centrale onderzoeksargument: dat architectuur kan bijdragen aan duurzaamheid, niet alleen via technologie, maar ook door gewoonten en mindsets bij te sturen, wat uiteindelijk leidt tot een culturele verandering in onze manieren van wonen en leven.

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1. Introduction

This chapter introduces the doctoral research, *Architecture Drawn from the Toilet: Challenging Mindsets by Critical Design* by Manon Persoone. First, I will position the research within personal interests and the research context that constitute the harbour of this project. In the following section, I will situate the research within the context of the global climate emergency, in which I interrogate so-called sustainability approaches in architecture. I will then outline the research focus and methodological approach before concluding with an overview of the research and a reader's guide that clarifies the structure and flow of this doctoral research and thesis.

1.1 Personal Background

From the very beginning of my master's studies in architecture, I had a desire to conduct research. Challenges, such as how to restore our connection to nature in our daily living patterns or what role architectural design can play in fostering ecological awareness and involvement, have triggered me ever since I became an architect-in-training. Drawing on these interests and my conviction to pursue them in a Research-by-Design manner, I chose multiple design courses organised by members of the research cell Architecture & Wicked Matters at the Department of Architecture, KU Leuven. As such, I completed my master's dissertation with Prof. Nel Janssens, Prof. Rachel Armstrong, and Prof. Rolf Hughes titled *On Thigmophilic Spaces: The Outhouse in Suburban Paradise* (Persoone 2021). The objective of the thesis was to rethink the architectural element of the toilet by erasing it as a common archetype and working towards more ecological alternatives for sanitation. The dissertation resulted in a theoretical thesis and a critical toilet design. The design transformed the archetypal toilet into a composting stove, created for a private setting, that performed care for both the human body and bodily waste as living matter (Fig. 1). After graduating, I received the Dean's Choice award for my master's thesis project, which selects and highlights excellent graduation projects and remarkable design interventions at the Faculty of Architecture, KU Leuven.

With this master's thesis project, I was invited to take part in a research line titled *26 Toilets to Re-Figure Habitation*, initiated by the research cell Architecture & Wicked Matters. More broadly, the research cell engages with posthumanist and new-materialist frameworks, acknowledging the agencies of more-than-human actors as so-called 'wicked matters' in architectural design. Established in 2020 by Nel Janssens, Johan Liekens, and Alice De Smet, the research line conceives a spatial alphabet that explores how concepts of waste, dirt, bodies, and earth can re-figure architecture from a posthuman perspective in times of ecological crisis (Janssens et al. 2025). As more designers and researchers join, the alphabet is expanding to encompass a series of Research-by-Design studies focusing on the toilet as an architectural element that is often overlooked and understudied in architectural design research. Within this spatial alphabet, my master's thesis became the letter 'T' for Thigmophilia, exploring the concept as a counterpart to claustrophobia and repositioning the toilet as a valuable 'thigmophilic' space capable of performing care.

We presented the research line at the CA2RE+ Conference on Reflection with a paper titled *J for Jewel* (De Smet et al. 2021). The paper was selected for publication in the book *CA2RE+: Evaluation of Design-driven Research*, as part of the chapter *Architecting Twenty-six Toilets to Re-figure Inhabitation: J for Jewel, S for Soil Times, T for Thigmophilia* (De Smet et al. 2022). In this chapter, we introduced the first three out of twenty-six artefacts that problematise our ways of inhabiting the environment by focusing on the toilet as an understudied element of architecture. The toilet is herein recognised as the ultimate spatial setting of exchange between body and world, the body being the most bare and basal site and scale for exploring the making of and caring for environments. This doctoral research is also part of this research line and covers the letter 'F' for Factory of Regenerative Habits. In search of more sustainable living patterns, 'F' delves into the wicked matter of human bodily waste and shapes toilet-artefacts for

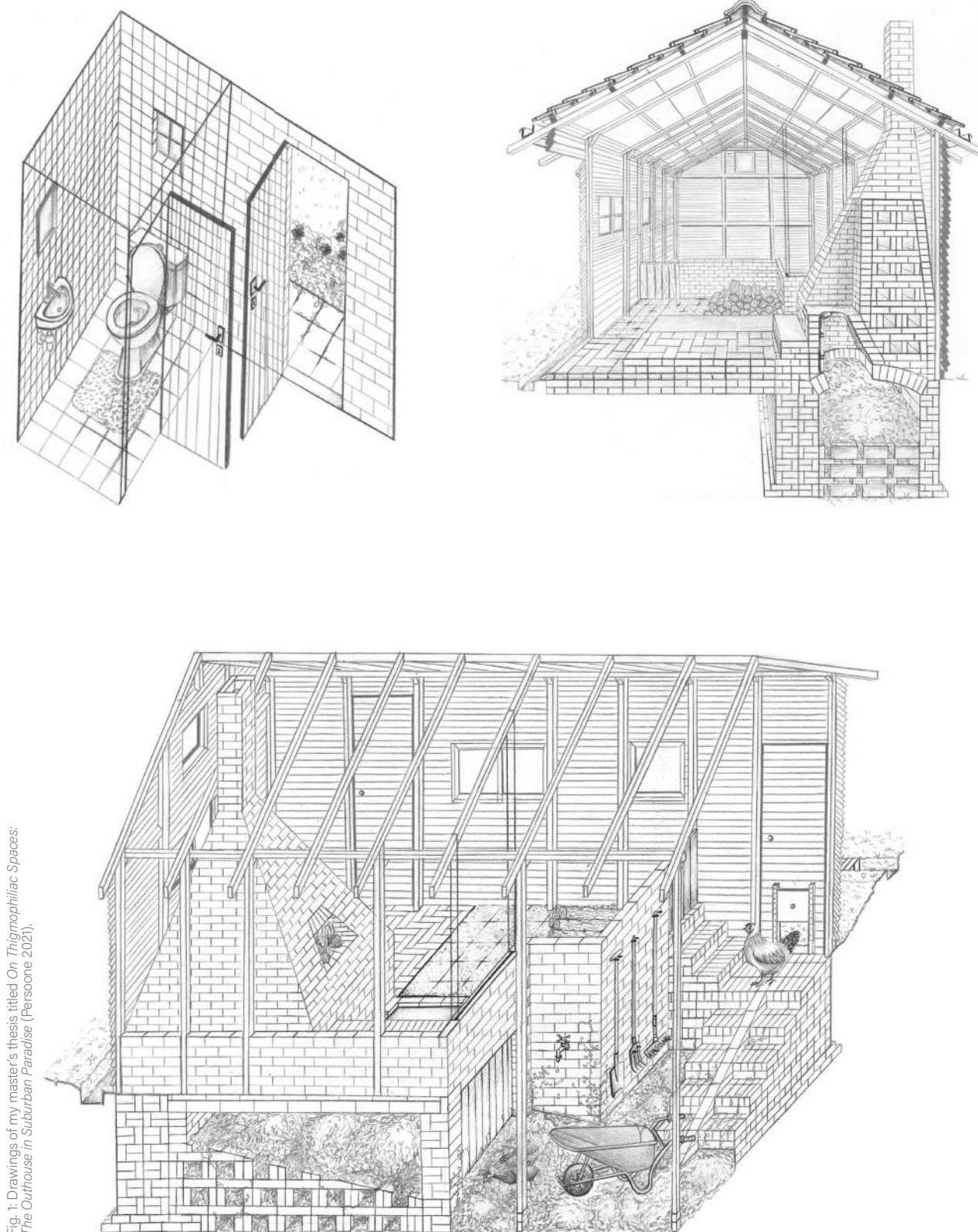


Fig. 1: Drawings of my master's thesis titled *On Thigmophilic Spaces: The Outhouse in Suburban Paradise* (Persoone 2021).

a real-world and semi-public setting, speculating on how the daily habits they shape might be transformed (Janssens et al. 2025). While my master's thesis and the letter 'T' in the spatial alphabet focused on private toilets, this doctoral research and the letter 'F' focus on semi-public toilets situated within an urban case study.

As such, I started a PhD directly after finishing my studies, joining the Architecture & Wicked Matters research cell under the supervision of Prof. Nel Janssens and Prof. Johan Liekens. The research cell is part of the larger research group Material Narratives, associated with the Research Section Architecture & Design of the KU Leuven Department of Architecture. In addition to my doctoral research, I was the co-lecturer of the Master's Design Studio *Sanitopia* at the Faculty of Architecture of KU Leuven for three years while completing my PhD (2022–2025). The studio explored the potential of human-generated waste to regenerate living environments of both humans and non-humans, aiming to develop inspiring spatial and architectural types and programmes for a former industrial site.

In terms of the institutional framework, the doctoral project is embedded within a Doctoral Double Degree between the Department of Architecture at KU Leuven in Belgium (home institution) and the Department of Architecture and Civil Engineering at Chalmers University of Technology in Sweden (host institution). Regarding the research context in Sweden, this PhD is conducted within the research group Architectural Theory and Methods, under the supervision of Prof. Fredrik Nilsson. During the course of the research, I spent alternate periods at both universities, with six months at the host university. A first research stay took place from January to June 2023, and a second one in February 2025.

In terms of funding, the research was funded by the Faculty of Architecture, KU Leuven, until I obtained a PhD fellowship in fundamental research from the Research Foundation – Flanders (FWO) in November 2023 (11P7N24N).

1.2 Situating the Research: Sustainability Approaches in Architecture

“When people think of design, most believe it is about problem-solving. ... Faced with huge challenges such as overpopulation, water shortages, and climate change, designers feel an overpowering urge to work together to fix them, as though they can be broken down, quantified, and solved. Design's

inherent optimism leaves no alternative, but it is becoming clear that many of the challenges we face today are unfixable and that the only way to overcome them is by changing our values, beliefs, attitudes, and behaviour.” (Dunne and Raby 2013: 2)

In recent years, growing awareness of the planetary crisis has highlighted the fact that climate change, resource depletion, and biodiversity loss threaten life on Earth as we know it (McGregor 2018). Situated within this context, the doctoral research interrogates the effectiveness of existing sustainability approaches in architecture. The field of architecture is positioned between the arts and sciences, incorporating a strong cultural dimension. However, in the context of the global climate crisis and the related debate on sustainability, architecture is mainly considered from a technological standpoint in search of tech-solutions. This tendency, in my understanding, is prevalent in urbanised Western Europe, where a great belief in technology is prominent. What is commonly presented as contemporary solutions to the climate crisis, including in architecture, are fragmented ‘technofixes’ (Haraway 2016). These technological updates to existing infrastructures allow us to continue our practices and habits, even when these habits form part of lifestyles that are demonstrably harmful to the environment. This tendency to rely on fragmented tech-solutions is exemplified in architecture by the increasing adoption of green design and green aesthetics without considering their concrete – and arguably insufficient – impact on environmental damage. In Flanders, the northern region of Belgium and the context under study in this research, strategies are emerging at the governmental level to mitigate the impact of climate change on the built environment, such as ‘climate-robust’ design interventions (Flemish Government 2024). Like fragmented technofixes, climate-robust design interventions largely stem from the anthropocentric desire to adapt the environment to reduce the effects of the climate crisis on our daily routines. The main purpose of these interventions is therefore to enable us to maintain our current way of life.

This technological approach to addressing the climate emergency is closely linked to the field of techno-solutionism. This field has been criticised

by scholars in feminist science and technology studies (STS) for its techno-utopian beliefs that technology will save humanity from its environmental and social crises (Haraway 2016). Conversely, scholars in feminist STS (Haraway 2016; Puig de la Bellacasa 2017), new materialism (Bennet 2010), and posthumanism (Braidotti and Bignall 2019) argue that we must drastically change our relationship with the environment now rather than waiting for the future. Additionally, in the field of traditional ecological knowledge (TEK), scholars have argued that the problem with so-called solutions to environmental degradation through innovative technology is that their framing of sustainability problems invokes the very belief systems that caused them in the first place (Martinez 2018). Unlike traditional Western science, TEK is an integrated approach to science, spirituality, and ethics, providing guidance on our moral obligations and necessary changes in relation to the natural environment, of which humans are an integral part. The influence of feminist STS, new materialism, posthumanism, and TEK on the research will be discussed in greater depth in Chapter 3: *Toilets Exploring Mindsets on Human Bodily Waste*.

1.3 Research Focus: Shifting towards Cultural Levels of Sustainability

Drawing on the research fields outlined above, I critique the merely anthropocentric and technological approaches to sustainability in architecture, which rely on technofixes and climate-robust design interventions. I argue that this response to the global climate emergency risks being insufficient, as it ultimately seeks to maintain ‘business as usual’. This way, they allow for harmful practices to persist without requiring significant structural or cultural change. The direction I take is closely aligned with the position of our research cell, Architecture & Wicked Matters. Within this research cell, we interrogate ingrained habits of radically removing ‘wicked matters’—such as human bodily waste—from daily living environments, despite their substantial contribution to growing environmental distress. In this context, we explore the ‘imaginability’ of interiorising more-than-human, vibrant matter present not only in toilets, but also in kitchens and bathrooms (Janssens, Liekens, Persoone and Soukupová 2025).

From within this research context, I argue that architecture should actively consider and engage with

the cultural level. I focus on the role and agency of architectural design in supporting a shift in how we inhabit the world. In the search for effective points of intervention for cultural change, I have, with other authors, identified mindsets as key leverage points (Meadows 1999; Ichioka and Pawlyn 2021). As argued by urbanist Sarah Ichioka and architect Michael Pawlyn, “long-term changes [in rising to our planetary emergency] lie primarily in cultural, rather than in technological transformation”, which they highlight, “must occur at the level of the mindsets—the shared ideas that determine to a large extent how a society works” (2021: 2). The identification of mindsets as leverage points is triggering to investigate what the role or meaning of architectural design, as a material practice, can be in this context. More specifically, it raises the question of what architect-designers can do within the boundaries of their field and agency to trigger a shift in mindsets. Such a shift may ultimately contribute to long-term cultural change in our current patterns of habitation.

The research is based on the belief that architecture can significantly impact the way we relate to the world. Architectural design is always embedded within a specific context characterised by a certain ‘praxis’. ‘Praxis’ here refers to the socially and historically situated routines and habits through which people provision their livelihoods. These habits and routines, in turn, reproduce particular habitats or daily living environments defined by a specific identity, consciousness, values, and mindsets. Significant changes in societal and environmental values and mindsets can arguably only be achieved through a change in ‘praxis’ (Matthews 2019). Since architects shape spatial environments, they also influence the ‘praxis’ embedded in these environments. As such, the research rests on the conviction that architectural design can trigger a shift in mindsets by shaping new routines and habits. In the search to support cultural change by architectural design, habits are considered key entry points as they constitute a spatial issue closely intertwined with cultural norms and values. The research, therefore, suggests that a dynamic relationship exists between architecture and habits, and more broadly, between design and culture.

Since cultures are grounded in long-standing traditions passed down through generations, changing these systems is a significant challenge that cannot be achieved overnight. Such a shift may be as small as a slight change in perspective or angle, yet capable

of setting us on a completely new trajectory. As will be explained in Chapter 2: *Methodology and Research Design*, these slight changes have also been observed during the research process in a long-term collaboration with an intrinsic, real-world, semi-public case study.

The Case of the Toilet

To investigate the agency of architecture in shifting mindsets, the research centres on one unsustainable habit as a case: the habit of toileting. This is a relevant case within the above research focus, as toileting is a daily practice that has become deeply ingrained in our architecture and lifestyles, making it difficult to change. We have become accustomed to the limited responsibility that the flushing toilet system places on users, and our everyday routines, standards of hygiene, and notions of civility are built around this expectation (Penner 2012). Public toilets, under study in this research, are particularly regulated and political spaces, which makes it even more difficult to propose changes to their design. Because these spaces engage with values of accessibility and questions of who or what is included or excluded by their design, public toilets are subject to strict regulations. The toilet, more generally, is typically the smallest architectural space and is often overlooked, including in architectural design research (Fig. 3). Yet its presence is far more prominent underground, where it relies on an extensive network of pipes and sewers designed to quickly and efficiently transport human bodily waste away from our living environments. In Flanders, one of the most densely built-up regions in Western Europe, this infrastructural system is almost absent above ground but is saturated underground with networks to support the densely built world above.

What makes the toilet a key entry point in this investigation is that it concerns a habit that is no longer proving sustainable today. During the period of this research, between 2021 and 2026, news articles appeared almost monthly, reporting on the pollution of natural waterstreams due to sewer overflows in Flanders (Verelst 2020; Demeulemeester 2025; Symons and Loosveld 2025). Today, in 2026, the Flemish sewer infrastructure is outdated, with some systems dating back to their construction in the 19th century. As a result of the climate emergency and unforeseen population growth, this system for evacuating and treating wastewater is nearing infrastructural collapse (Verlinden and Vanoppen 2021). At the outset

Fig. 2: Image of excessive pavement in Ghent, Belgium, where soil species can only sporadically break through cracks.



Fig. 3: The toilet is traditionally the smallest and most private room in the home.



of this research, I visited water researcher Marjolein Vanoppen, who explained that this underground system is particularly difficult and expensive to update because it relies on an extensive network of sewers and pipes hidden beneath streets and pavements.

I build on the observation across this research that centralised wastewater treatment systems are becoming increasingly outdated and unsustainable, and I argue that they perpetuate our collective obliviousness to the issue (Persoone 2023). This relates to the underlying logic of the flushing toilet system, to ‘flush and forget’, and to the way it is designed to render not only the user but also the impact of use invisible (Penner 2012). Through the case of the toilet, I therefore address the broader lack of accountability surrounding the treatment of human bodily waste, which is materially supported by the current infrastructure. This will be discussed in greater detail in Chapter 3: *Toilets: Exploring Mindsets on Human Bodily Waste*.

In response to sewer infrastructure nearing its limits, the fields of technology and engineering are seeking alternatives to the current wastewater treatment system. Vacuum toilets, for instance, are being prototyped that use six times less water and recover nutrients from the collected waste sludge (Jae-weon 2021). Such alternatives, however, are not yet appearing in real-world contexts for two main reasons. On the one hand, implementing new sustainable technologies is expensive and difficult to adapt to existing water-based infrastructure, as it introduces a completely new waste circuit (Ysebaert 2023). Especially in urban areas, where sewer infrastructure is widespread, retrofitting presents a significant challenge. On the other hand, dealing with waste and toilets remains a sensitive subject in Western Europe, as people tend to avoid engaging with, or even talking, about it. Throughout history, toileting has increasingly been privatised and evolved into the spatial translation of a prevailing taboo. Its exploration in real-world and public settings is therefore often overlooked. In line with the orientation of this research, this is not merely a technical issue, but a cultural one to be addressed. Furthermore, more sustainable sanitation systems exist already, such as constructed treatment wetlands or composting techniques, but are for similar reasons not widely perceived as successful.

Taken together, both reasons are issues that can be addressed through architectural design. While alternative systems already exist, their implementation

does not align with the mindset of the general public, which obstructs change to the familiar toilet system. The case of the toilet can therefore be understood as a situated application of the research focus outlined above: it represents an unsustainable daily habit for which technological alternatives are emerging but have not yet been widely adopted. Moreover, the flushing toilet system as a whole can be understood as a spatial manifestation of the tendency to conceal or avoid rejected matter – such as bodily waste – out of sight and out of mind, resulting in a significant impact on the built environment.

During the time of this research, general awareness of sewage pollution appears to be growing in Flemish news media. Newspaper articles highlighting problems caused by sewers here frequently adopt a human standpoint to raise awareness among the general public. The ban on open-water swimming in summer, for instance, is often the primary way for people in Flanders to encounter issues of water quality and pollution (Fig. 4). While these articles are mostly written from an anthropocentric perspective, describing how people are prohibited in their daily habits from doing certain activities, this perspective is noticeably shifting. Where the infrastructural wastewater system used to be evaluated primarily for its functionality to human users, it is now increasingly problematised in Flemish news articles for being destructive to the environment (Verelst 2020). In this shift, the focus moves from sewage systems as an innovation for human health to sewerage as a major source of pollution and environmental damage (Symons and Loosveld 2025). Although awareness of sewage pollution is increasing, and points to the need to explore alternative ways and habits of dealing with our bodily waste, this societal change is still struggling to become a reality.

Main Research Question (RQ)

In this context, the effects of daily habits are of particular interest to this research. Over time, spatial routines can become deeply ingrained in our lives, becoming so common that they remain unquestioned and unchallenged. In the case of the flushing toilet, in particular, the comfort it provides is so embedded in our lifestyles that it has become normalised, and its design remains largely unchanged. I therefore use the toilet as an architectural element and spatial entrance to challenge and loosen ingrained aspects

Fig. 4: The Houtdokken in Ghent, Belgium, was designed for swimming and is now a popular spot for sunbathing. Unfortunately, due to water pollution, humans are prohibited from swimming, and only ducks are allowed to enjoy the water.



that are currently obstructing change. In doing so, I seek to materially support the societal changes that are noticeable but struggle to come into being by investigating the following research question:

RQ: “How can architectural design trigger a shift in mindsets regarding how we deal with human bodily waste by shaping alternative toilet habits?”

With this research project, I expect that architectural design can evoke such a cultural shift by altering the design of toilets to shape more sustainable toilet habits that support accountability for bodily waste. By retaining human bodily waste, for instance, on-site, treating it above ground, and setting up collectives that think and design with care for this matter, the project composes and presents more sustainable scenarios of dealing with and designing for it. Alterations to the design of toilets can consist of, but are not limited to, toilet designs with different spatial settings; different spatial-temporal features; climate-induced or climate-dependent configurations; and entirely different positions within our architectures, both organisationally and functionally, as well as socio-culturally, with regard to the use, experience, and management of

toilet spaces. Accordingly, the research is guided by the following three research objectives (O1–O3):

- O1: To investigate new customs of cohabitation, or living together, with bodily waste by keeping it a local and internal matter on-site instead of externalising it through underground and hidden infrastructures that ultimately lead to long-distance water treatment facilities.
- O2: To shape alternative spatial practices and typologies to deal with human bodily waste as a valuable resource, leading to architectural practices that inherently incorporate and literally make room for storing, recovering, cultivating, or even gardening living matter.
- O3: To establish collectives that explore new forms of community collaboration in collectively dealing with human bodily waste on-site, but also new collectives that actively include and respond to non-human species.

In the process of triggering a shift in mindset and ultimately aiming for cultural transformation, I argue that the first step is to challenge, loosen,



Fig. 5: Image of large-scale sewer construction in Ghent, Belgium, with the pavement being removed from the soil and sewage pipes awaiting implementation, while trees are protected from the construction works.

and change established habits through architectural design, before it can support and realise the changes awaiting realisation.

1.4 Methodological Approach

As I will explain in greater depth in Chapter 2: *Methodology and Research Design*, architecture is a multidisciplinary field that employs a variety of research methods and tactics. This doctoral research in architecture adopts a mixed-methodology, with Research-by-Design as its primary method and driving force to address the main research question (RQ). Within our research cell of Architecture & Wicked Matters, Research-by-Design engages with the inter-relationship of thinking, feeling, and acting, as well as multiple levels of literacy and polyglotism (De Smet et al. 2022). In our work, this involves studying (interior-) architecture as a practice of making sense by bringing potential worlds into being. In this context, we take a speculative-projective approach, designing projects that address general issues by making them tangible and embodied, as exemplified in the research line *26 Toilets to Re-Figure Habitation* (Ibid.). Drawing on the approach of the research cell, I examine the agency of architectural design in triggering a shift in mindsets regarding human bodily waste, by shaping new toilet habits for a real-world case study situated in an urban and semi-public setting.

The research is grounded in the real-world setting of the Blikfabriek [English: Can Factory] in Antwerp (BE), which serves as a semi-public case study and micro-culture within urbanised Western Europe. Within this case study, the research investigates architectural design in confrontation with local habits, mindsets, and values. The Blikfabriek is a former factory site that has been repurposed into a collaborative workspace for a diverse range of civic actors, cultural organisations, and a collective of creators. The site is semi-public in that it hosts both visitors and a collective of permanent residents who work there on a daily basis. The Blikfabriek presents a unique, intrinsic case study for this research, as its community is experimenting with public composting toilets and the off-grid management of bodily waste in an urban environment. This unconventional and drastic decision – spatially as well as psychologically – presents a relevant real-world challenge for the research. Although I studied one site as a testing ground, it also functions as a typological site, representative of comparable contexts: former

industrial areas that have been temporarily repurposed into semi-public community centres and laboratories for urban and ecological experimentation. Moreover, I developed multiple smaller case studies or situations on this site, such as the wetland of the Blikvelden, which will be addressed in Chapter 4: *Toilets of Care as a Recovery Activity*. Throughout the research, the focus remains on this site to test different scenarios through architectural design and to establish a trusted relationship with the Blikfabriek organisation and the on-site stakeholders. This was necessary both for the real-world responses and imaginations of the designs and for sustaining long-term conversations over several years. This way, I was able to observe the development of a shift in mindset within this urban and semi-public context.

Another method as part of the research design concerns the literature review. Together with the fieldwork which I carried out at the case study, the insights emerging from the literature review are crucial for the composition of toilet designs for the Blikfabriek site. Given that the subject of the toilet spans multiple areas, I reviewed literature, sources, and designs from the fields of architecture, science and technology studies (STS), repair studies, environmental humanities, social sciences, and anthropology. The literature review is not the output itself but is directed at refining the research questions and informing the design decisions, as is common in Research-by-Design. The in-depth analyses include not only textual documents, but also artefacts, buildings, and settings, among others. As will be explained in Chapter 2: *Methodology and Research Design*, I investigate toilet artefacts to build my own competence and design approach as a design researcher. Although toilets have largely been understudied in architectural design research (Koolhaas et al. 2018), a review of recent toilet designs suggests a broader turn towards the toilet within architectural discourse. Perhaps ageing infrastructure, combined with growing environmental awareness, has contributed to renewed interest in toilets as architectural elements.

Within the methodological framework, I primarily follow a Research-by-Design approach to develop toilet designs to be experienced within the real-world and semi-public context of the Blikfabriek case study. The Research-by-Design activities consist of creating a variety of toilet designs that challenge everyday routines on-site, thereby exposing aspects of daily habits that are typically normalised or left

unquestioned. In the search for intentionally challenging design fields, the field of critical design soon emerged. As defined in the field of product design by design researchers Anthony Dunne and Fiona Raby (2013), critical design is an attitude or position that uses speculative design proposals to challenge narrow assumptions, preconceptions, and givens about the role design plays in everyday life. As they describe, this design attitude deliberately introduces the uncanny or slightly disturbing into everyday living environments to provoke reflection on accustomed habits and ways of living. Drawing on this definition by Dunne and Raby, and adopting it into the field of architecture, critical design offers a particularly productive lens – both theoretically and in the composition of artefacts – to challenge, loosen, and transform established habits through architectural design. With this research, I not only provide reflections on the main research question (RQ) under study, but I also constitute a methodological contribution to the field of Research-by-Design in architecture.

1.5 Research Overview

As a substantial part of the methodological approach of this research, the Research-by-Design process comprises three *Design Explorations*, or research cycles, discussed in Chapters 3–5, which form the main body and structure of the research through an iterative process over time.

Design Explorations I, II, and III

Each *Design Exploration* or research cycle has a distinct focus and investigates a specific part of the Blikfabriek case study. *Design Exploration I*, discussed in Chapter 3, aims to test the contemporary norms surrounding the toilet at the case study site and challenges the status quo by questioning why certain toilet designs are (not) acceptable. *Design Exploration II*, discussed in Chapter 4, investigates how toilets can participate in wetland conservation by collecting and treating waste in a constructed wetland on-site. And *Design Exploration III*, discussed in Chapter 5, proposes a renovation of the public composting toilets at the Blikfabriek site, assembling three design strategies to shift mindsets regarding human bodily waste. The three *Design Explorations* unfold sequentially, with each new cycle of the research process refining the research questions and advancing the research insights.

An important Research-by-Design tool that emerged from the research process and was developed over the *Design Explorations* is the *Critical Cartography*. The *Critical Cartography* is a continuous design tool, deployed to assemble crucial insights from literature review, fieldwork in the case study, and reflections from the *Design Explorations*, which are positioned on the map. It is drawn up as an architectural mapping – or architectural string figure – connecting all relevant aspects to display the ‘system’ of wastewater treatment in Flanders. Like a string figure, the purpose of the *Critical Cartography* is to tie things together, pass patterns back and forth, and reveal a system that would normally remain hidden in our everyday environments. Herein, it plays a crucial role in embedding and contextualising the speculative, and sometimes even provocative toilet designs within a recognisable environment and problematic.

Another crucial tool in the Research-by-Design, embedded in the subsequent *Design Explorations*, is the use of *Design Scenarios*, which concern the various toilet designs that I created over three *Design Explorations*. The term ‘scenario’ originated in the field of speculative design and shifts the focus from the technical to the cultural aspects of toilet design. The *Design Scenarios* are the core of this Research-by-Design and embody the ‘designerly’ exploration of the research question of how architectural design can trigger a shift in mindsets by shaping new toilet habits. In composing the *Design Scenarios*, I adopt a specifically sensitive and mindful approach, in which the toilet designs function as invitations or careful provocations to debate, discussion, and thought. This approach is particularly important because the research investigates the real-life context of the Blikfabriek as a case study, which faces real-world issues and concerns. The intention of the *Design Scenarios* created for this semi-public context is primarily to communicate ideas, stimulate conversation, and inspire new behaviours.

The toilet designs are specifically introduced during discussion moments as *Conversation Pieces* to challenge toilet habits in the context of the case study. The term *Conversation Piece* refers to the way in which artefacts are introduced into a real-life context to challenge prevailing assumptions and perceptions about architectural design, here focusing on the design of toilets. Instead of presenting ideas about how to cope with waste and the design of (semi-) public toilets linguistically, the models display a variety of

scenarios that challenge current assumptions about what a toilet is or can be. The goal of the designs is not to define how things should be, but to facilitate alternative worlds and visions. Consequently, the *Conversation Pieces* are used as a means to pose questions, trigger debate, and open minds for new ideas to grow.

Research Flow and Sub-research Questions (1–6)

Throughout the research process, the main research question (RQ) is refined iteratively. The process unfolds from the literature review and fieldwork at the case study, leading to the development of *Design Scenarios* or toilet designs, to their introduction as *Conversation Pieces* during discussion moments. This process concludes with a subsequent transcript and design analysis, indicating the end of one research cycle and the beginning of a new *Design Exploration*. Throughout the research, multiple sub-research questions (1–6) have emerged abductively, which are further advanced and explored through architectural design in the following chapters.

From reviewing literature and artefacts and carrying out fieldwork at the site of the Blikfabriek, specific observations arose throughout the research process, prompting the following sub-research questions as part of *Design Exploration I*, discussed in Chapter 3: *Toilets Exploring Mindsets on Human Bodily Waste*.

1. Following the observation that the spatial or visual absence of wastewater infrastructure in daily living environments results in a lack of awareness and accountability regarding waste treatment, what influence would explicitly rendering this infrastructure present through the design of toilets have on users' mindsets?
2. How can architectural design reposition the toilet as a space that holds users accountable for what they leave behind, in the face of the current system's 'flush-and-forget' attitude and obliviousness to human bodily waste?
3. What is the influence of the collective and public context on changing individual toilet habits in relation to the Blikfabriek as an urban and semi-public case study?

In response to these questions, I composed an initial series of speculative *Design Scenarios* which, after analysing the design discussions, result in the

delineation of the first intermediate design strategies. From this analysis, combined with refined literature review and fieldwork, the following sub-research questions emerged as part of *Design Exploration II*, discussed in Chapter 4: *Toilets of Care as a Recovery Activity*.

4. In contrast to the current user-centred approach to toilet design, how can architectural design expand relationality towards non-human species and adopt a more responsive attitude towards the needs of its surrounding environment?
5. In relation to implementing a new system – tied to new habits – for dealing with human bodily waste, how far should the speculative design proposal deviate from the existing situation to stimulate imagination and consideration?
6. In terms of the role of the architect-designer, should architects respond to prevailing cultural desires, or can they also distribute ideas, values, or beliefs and shape new ecological-spatial values by design?

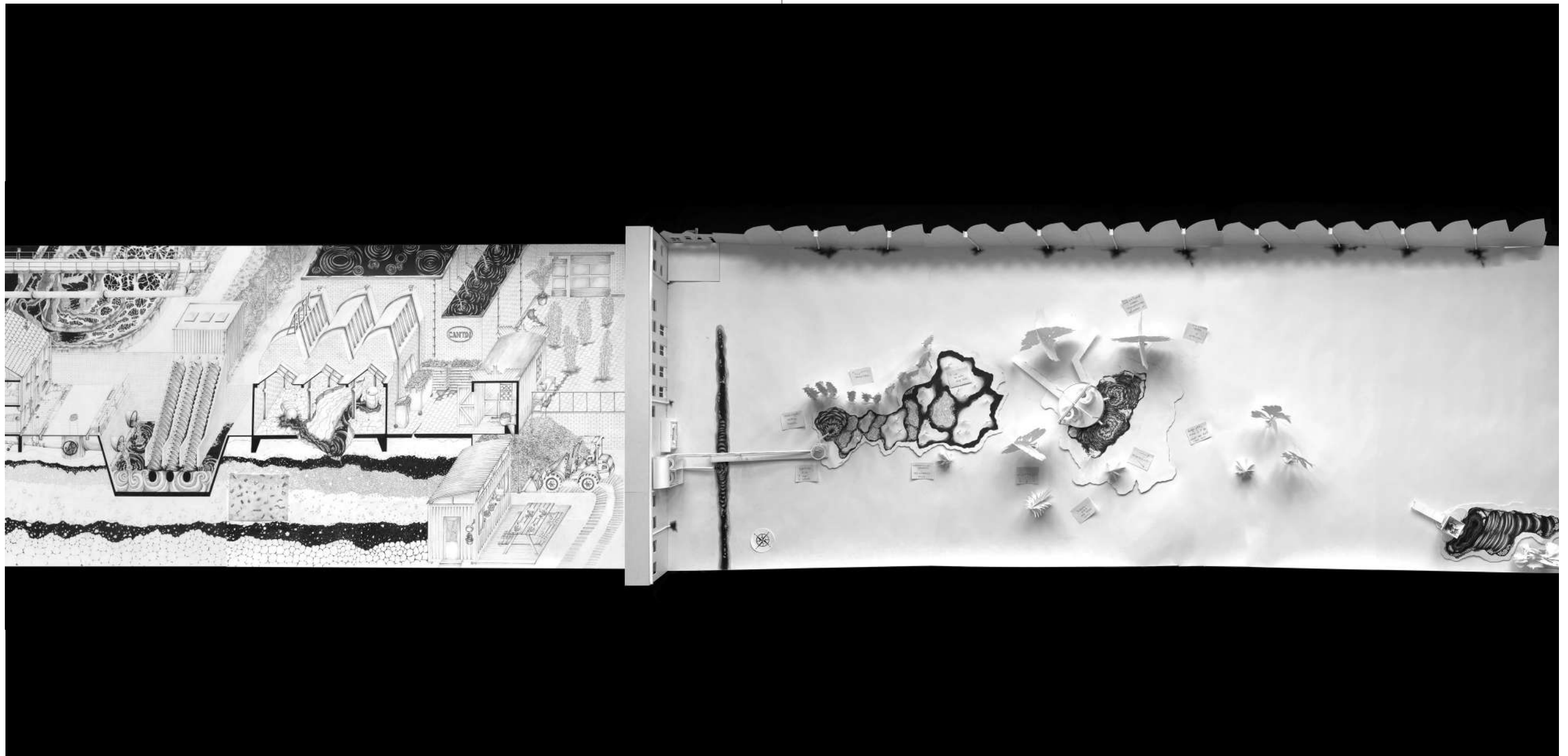
In response to the questions, I composed a more refined series of speculative *Design Scenarios* which, after analysing the design discussions, resulted in the delineation of advanced intermediate design strategies. From this analysis, combined with fieldwork and literature review, *Design Exploration III* emerged. In this final research cycle, I analyse the reflections from *Design Explorations I* and *II*, which led to three advanced design strategies to shift mindsets through architectural design. To develop and advance these design strategies, I articulated them spatially in three final *Design Scenarios*. These designs are put to discussion as a real-world, implementable design for the public composting toilets at the Blikfabriek site, discussed in Chapter 5: *Toilets That Challenge on a Real-life Scale*.

The doctoral thesis concludes with Chapter 6: *Reflections on Contributions*, which outlines the three methodological principles that constitute this research's methodological contribution to the field of Research-by-Design. It discusses the design strategies that emerged in response to sub-research questions (1–6) and concludes by reflecting on three key threads, or lines of reflection, that proved crucial to the research.

Reader's Guide

The doctoral thesis is organised around three research cycles, or *Design Explorations*, which form the main body of the research and are discussed in Chapters 3–5. Each of these chapters begins with an introduction through the *Critical Cartography*. The image on the next page provides an overview of which parts of the *Critical Cartography* are covered in each chapter (Fig. 6). By means of numbers in the text, I created a navigation through cut-outs of the drawing to ground the research in a situated context and real-world problem setting. In this way, the *Critical Cartography* is a continuous research activity that underlays *Design Explorations I*, *II*, and *III* (Fig. 7).

After setting the context through *Critical Cartography*, each chapter describes the part of the Blikfabriek under study in that chapter. This is followed by an explanation of the real-life issues explored through architectural design. From there, the chapters turn to the situated research questions before moving to the presentation and discussion of the *Design Scenarios*. In the discussion of the toilet designs, I deploy different voices and ways of writing, relating to the multilingualism of design and the polyglot ways of reading, making, working, and writing. More specifically, each *Design Scenario*, or toilet design, is presented through images of the design alongside an experiential description written in the second person, where 'you' refers to you, the reader, to invite you into the envisioned toilet experience. These images are accompanied by direct transcriptions of the reactions that emerged during the design discussions around the conversation table, presented on the pink papers in the thesis. The conversational excerpts are then placed alongside a reasoned analysis and discussion of each *Design Scenario* in greater depth. And finally, each chapter concludes with a summary of the intermediate reflections and key insights it entailed.



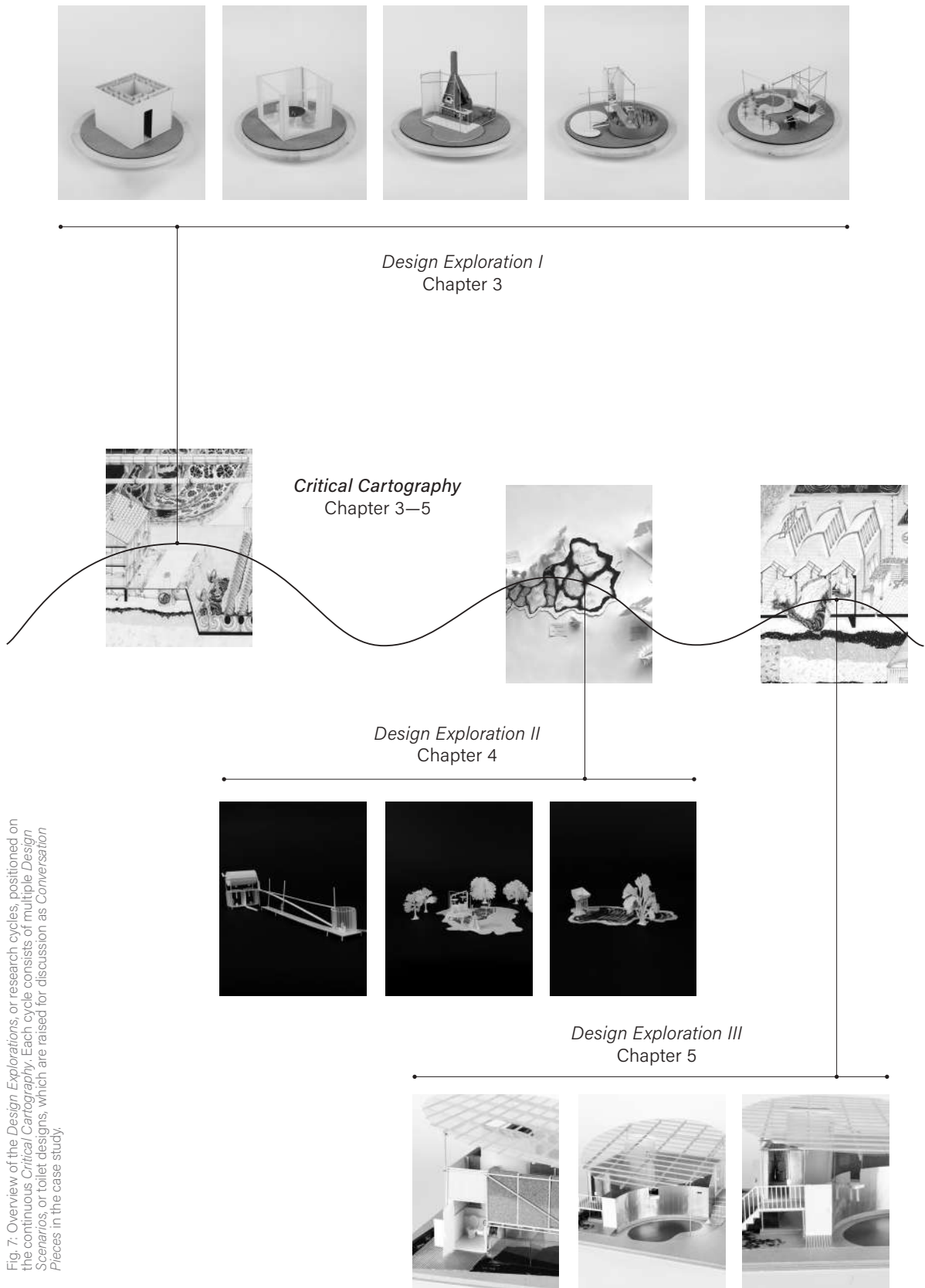
Design Exploration I
Chapter 3

Design Exploration III
Chapter 5

Design Exploration II
Chapter 4

Fig. 6: Overview of the *Critical Cartography* in its totality, indicating which parts will be discussed in which Chapter of the thesis.

Fig. 7: Overview of the *Design Explorations*, or research cycles, positioned on the continuous *Critical Cartography*. Each cycle consists of multiple *Design Scenarios*, or toilet designs, which are raised for discussion as *Conversation Pieces* in the case study.



2. Methodology and Research Design

Whereas Chapter 1: *Introduction* set the research focus and provided an overview of the methodological and research framework of the doctoral thesis, this chapter discusses the methodology and research design in greater depth. First, I will outline the theoretical framework and the rationale behind the chosen mixed-methods approach, followed by the structuring of the Research-by-Design through successive research cycles. Each subsection begins with a general framing of the theories and methods employed and, in the final paragraphs, moves towards specifying how I have applied these theories and methods in the research project. The chapter concludes with a reflection on the role of the architect-researcher in this context, as well as on the agency of architectural design in normalising change.

2.1 Qualitative Research

For this research, I employed a qualitative strategy, relying on non-numeric data and evidence. These include oral and written sources, experiential materials such as fieldnotes and transcripts of conversations, and – most crucially for this research – artefactual data in the form of architectural designs. In qualitative research, the researcher is positioned in an interactive relationship with the subject of inquiry, in which the research question often evolves through an iterative process (Creswell 1994). During this process, the researcher examines detailed information to identify patterns and to gain a deeper understanding of the key factors influencing a given phenomenon. In the case of this research, the main question under study was likewise refined throughout the process, advancing to:

RQ: “How can architectural design trigger a shift in mindsets regarding how we deal with human bodily waste by shaping alternative toilet habits?”

Researchers generally rely on three classical modes of reasoning: deduction, induction, and abduction (Peirce 1998). In the context of this research, and in relation to the main question outlined above, abductive reasoning became particularly important. Unlike deduction, which proves facts, or induction, which generalises a theory from collected data, abduction generates a new, albeit tentative, hypothesis. In design research, in particular, abduction is used to form a tentative hypothesis to explain complex, observed, or surprising phenomena. It acts as the logic of ‘what might be’, bridging the gap between an observed design problem and a possible artefact or designerly solution (Ibid.). This approach is essential for generating new ideas through design, as it begins with a desired end state and works backwards, searching for plausible means to support it, such as artefacts or creative interventions. The use of abduction herein helps to navigate the messy and uncertain terrain of design, providing a cognitive backbone for moving from problems to possibilities through architectural design (Ibid.). An abductive research proposal thus adopts an explanatory hypothesis that is tested throughout the research to yield a plausible conclusion, rather than a definitive verification. Accordingly, this research advances an abductive research proposal throughout the process: that architectural design can trigger a shift in mindset by shaping new habits, since patterns of habitation are shaped by habits, which in turn influence mindsets.

As this investigation into architectural design adopts a cultural perspective, it was of the utmost importance that the research was grounded in a real-life setting, in confrontation with local habits, mindsets, and values. In *The Handbook of Qualitative Research* (1994), researchers in sociology and methodology Norman Denzin and Yvonna Lincoln describe how qualitative researchers study phenomena in their natural settings, attempting to interpret them in terms of the meanings people attribute to them. Researchers in architectural design and methods,

Linda Groat and David Wang (2013), explain that in architecture in particular, objects of inquiry or designs must be investigated from their typical everyday environments or natural settings. Architectural research is often grounded in existing contexts and cultures and is tied to customary sets of habits that characterise ways of living. Groat and Wang argue that, in these natural settings, researchers ground their work in the empirical realities revealed through observations and interviews, while also acknowledging their own crucial role in interpreting and making sense of the data. Denzin and Lincoln (1998) refer to this characteristic of qualitative research as ‘bricolage’, which is defined as a pieced-together, close-knit set of practices that provide solutions to problems in concrete situations. The concept of bricolage suggests that qualitative researchers employ various methods specific to the context under study that are also relevant to the research question (Groat and Wang 2013). For architecture, eminently a multidisciplinary field, the diverse research tactics depend on the assembled methodology.

To review, I adopt a qualitative research strategy and examine architectural designs embedded in the real-world setting of the Blikfabriek in Antwerp (BE), serving as a case study and micro-culture within urbanised Western Europe. In this context, I focus on one unsustainable habit as a case: the habit of toileting. By creating toilet designs and introducing them into the case study, I explore local mindsets and toilet habits present on-site. I therefore developed a variety of research tactics linked to different methods, including literature review, fieldwork at the case study, design discussions with participants, *Critical Cartography* as a continuous design tool, and the development of architectural designs or *Design Scenarios* deployed as *Conversation Pieces*, among others.

2.2 Theoretical Position

Constructivist Grounded Theory

“One does not begin with a theory, then prove it. Rather, one begins with an area of study, and what is relevant to that area is allowed to emerge.” (Strauss and Corbin 1990: 3)

The term Grounded Theory has been particularly associated with the work of researchers in sociology, Barney Glaser and Anselm Strauss (1999). They define the approach as developing findings or an explanatory theory directly from the analytical process, ‘grounded in the data’. Because these grounded theories are drawn from data, they are likely to offer insight, enhance understanding, and provide a meaningful guide to action for the context under study (Strauss and Corbin 1990). In other words, Grounded Theory assumes that the object of study cannot be fully explained at the outset. Instead, an iterative process through which findings and theory emerge involves repeated observation, ongoing data collection from the natural setting and the progressive organisation of that data into a tentative explanatory framework (Groat and Wang 2013).

Drawing on Groat and Wang’s continuum of research paradigms (2013), I position this research as adopting a constructivist paradigm and a subjectivist epistemology. This means that knowledge emerges from a co-creation of understanding between the researcher and the respondents regarding the situation or context being studied. They explain that the constructivist approach in design-based research seeks to provide in-depth insights and interpretations of a given setting from the perspective of individuals

	Objective <----->		-----> Subjective		
	Positivism/Postpositivism		Intersubjective	Constructivism	
Epistemology	Knower distinct from object of inquiry	Knowing through distance from object	Knowledge framed by understanding sociocultural engagement	Knowledge co-constructed with participants	Knowledge perpetually provisional
Ontology	Assumes objective reality	External reality revealed probabilistically	Diverse realities situated in sociocultural context	Multiple constructed realities	Infinite realities

Fig. 8: Continuum of research paradigms by Linda Groat and David Wang (2013, adapted from Mugerauer (1995), Guba and Lincoln (1998), Teddlie and Tashakkori (2009), and Mertens (2010)).

experiencing that environment. While this often takes the form of in-depth analyses of textual documents or interview materials in the social sciences or humanities, in architectural design research, artefacts, buildings and spatial settings are often the subject of interpretation and reinterpretation (Mugerauer 1995).

Social Constructionism

As sociologist Dimitri Mortelmans (2013) writes, the constructivist paradigm comprises a range of movements that share the fundamental assumption that reality is ‘socially constructed’. It emphasises that everyone has their own understanding of reality, resulting in multiple realities shaped by social processes rather than reflecting a single objective truth. From the perspective of Social Constructionism, he explains, reality consists of different mental constructs that develop through social and experiential interaction. Both the form and content of reality depend on the individuals and groups that collectively share and reproduce these constructs. From an epistemological standpoint, constructivism assumes a close connection between the researcher and the research subject, as knowledge is ‘constructed’ throughout the research process rather than discovered. Methodologically, Mortelmans states this implies continuous interaction between the researcher and the research object, in which social constructs are interpreted and systematically compared with other perspectives. This is particularly relevant when it comes to habits or cultural narratives that have been passed down through generations, becoming ingrained over time.

The concept of social constructs and the belief that reality is socially constructed is important when discussing culturally ‘rejected’ or taboo matters, such as human bodily waste and toilets. The theoretical framework of Social Constructionism suggests that many parts of social reality – such as concepts, beliefs, norms, and values – are created through ongoing interaction between people, rather than simply discovered by observing the physical world (Berger and Luckmann 1966). In this view, much of what individuals consider reality is shaped by social agreements, conventions, and shared understandings. Unlike things that are biologically or naturally determined, these social constructs are formed, maintained, and shaped by the social contexts in which they exist. They strongly influence how individuals

think and behave, often being internalised based on cultural narratives and expectations, whether or not they are supported by empirical evidence. In this two-way process of constructing reality, individuals interpret and assimilate information through their social relations, while also contributing to the shaping of existing societal narratives (Ibid.). The collective shaping of narratives is crucial to this research, intending to challenge and disrupt daily habits to shake up convictions in everyday environments.

Toilets, in particular, have developed into a cultural taboo over time. Barbara Penner (2009), a researcher in architectural humanities, notes that the shared narratives and convictions surrounding this space have become so deeply ingrained that challenging them creates friction. This is particularly evident in public toilets, the focus of this research, where toilet visits take place in spaces shared with others. Although visiting the toilet is culturally considered an individual act, I argue that a change in habits is not. To trigger a shift in mindsets, the shared narratives within a given culture play an important role. When shaping new habits and spatial practices for a public context, aspects such as shame, social control, and the influence of others cannot be underestimated. With this research, I therefore argue that even the slightest cultural change begins with a collective shift in routines and habits, prompted by design. For this reason, I investigate people in collective interaction and discussion with architectural designs that disrupt and challenge their familiar toilet habits in everyday environments.

Waste, Rubbish, and Dirty Theory

“Would it not be wonderful if the despised object, idea, person, or group, the rubbish heaps of society, were to turn out to be its transformers, containing within their collective corpus the seeds of future regeneration? If what goes down can also come up in the world, all of a sudden, like falling up a social cliff.” (Wildavsky 1980: 736)

In addition to this quotation from the political scientist Aaron Wildavsky, the anthropologist Mary Douglas famously defines dirt as ‘any matter out of place’ in her book *Purity and Danger* (1966), raising the question: How does dirt, normally condemned as destructive, become creative? In this context, dirt is specifically judged as ‘out of place’ based on cultural

norms and shared values. According to Douglas's theory, waste in a given social system is defined as that which we want to discard: the inappropriate, the rejected, and the excluded.

In investigating the toilet, its design has rarely changed throughout history, and the subject remains largely understudied (Koolhaas et al. 2018). Over time, this architectural space has grown into the spatial translation of a cultural taboo (Gershenson and Penner 2009). In addition, sociologist and former PhD student of Mary Douglas, Michael Thompson, writes in his *Rubbish Theory* (2017) about the toilet and its wastewater infrastructure as the prime example of technological lock-in. He explains that nearly 200 years after the introduction of the flushing toilet, urbanised Western contexts have become heavily dependent on sewage and wastewater treatment systems. He adds that the practice of incorporating human waste into the water cycle to remove it from cities is now increasingly recognised as having caused significant problems. Within this framework, I aim to investigate whether the design of public toilets, perceived as dirty or culturally rejected spaces, can transform toilet habits, potentially leading to long-term cultural change in how we deal with human bodily waste.

“Dirt is certainly a question of habits and habitat. Rules dividing the clean and the unclean are based a posteriori on habits that are established through material trial and error.” (Douglas cited in Frichot 2019: 88–89)

From a similar intention to Douglas – to move past our disgust and work with dirt – Hélène Frichot (2019), a researcher in architecture and philosophy, defines Dirty Theory as essential for coping with our dusty, dirty, and defiled world. She notes that Dirty Theory crosses disciplinary boundaries and appears in ethnography, geography, and philosophy, as well as architecture and design. In the framework of her theory, she defines dirt as that which crosses boundaries, challenges decorum, and contravenes norms. As Frichot defines it, Dirty Theory is concerned with “discovering new ways of getting along with each other that challenge fixed categories, that track a diagonal and even a zig-zag course across taxonomic charts to invent new kinds of territories” (2019: 6). In this context, she connects her Dirty Theory with the work of scholars in new materialism and feminist

science and technology studies (STS) such as Jane Bennett, Maria Puig de la Bellacasa, and Donna Haraway. Similarly, in the context of this research, I draw inspiration from the fields of new materialism, feminist STS, and posthumanism to encourage other ways of relating to and dealing with human bodily waste that could set us on a path to a whole new sanitary future. These fields provide a lens through which I approach the research and help me to reframe the research questions and design decisions throughout the process.

2.3 Mixed-methodology

“Despite the assorted pitfalls and challenges, it is nevertheless our contention that combined strategies research represents an enormous opportunity for architectural research. By definition, architecture is a multidisciplinary professional field.” (Groat and Wang 2013: 448)

As Groat and Wang (2013) argue, architecture is eminently a multidisciplinary field and therefore uses different research tactics. Researchers in architecture, Isabelle Doucet and Nel Janssens (2011), assert that integrating knowledge from various disciplines and sources is essential for finding sustainable solutions for the future. Since this research critiques the technological sustainability trend in architecture, the integration of diverse research approaches is important. This research is based in the field of architecture and primarily follows a Research-by-Design approach as its main method and driver. The research employs methods and research strategies coming from the field of social sciences and humanities to introduce and discuss architectural designs in a real-life context. As Groat and Wang (2013) have suggested, the conventional paradigms of academic research must be expanded to encompass ‘designerly ways of knowing and thinking’, as described by Nigel Cross (2006, 2025), a scholar in architectural design research. The advantage of combining research approaches is that the strengths of each method can complement each other, while the weaknesses of each method can be substantially offset. This way, Groat and Wang (2013) state that a mixed-methodology can be highly effective if disparate strategies are well integrated, as this allows the complementary strengths of the combined strategies to be realised to their fullest potential.

Hélène Frichot also argues in her book *Dirty Theory* for an integration of multiple methods, stating that “dirty theory threatens to contaminate the researcher, making her methods not very respectable; on the other hand, this very contamination of thoughts and practices is inevitable and can be beneficial” (2019: 42). Particularly when a subject spans multiple areas, Groat and Wang (2013) ask whether combining the methods typically used in each field might offer a more effective and multidimensional way of investigating a phenomenon or setting. They argue that, despite the greater challenges involved, architectural research that combines strategies represents an important and necessary frontier in the field. This is especially relevant for research subjects, such as the toilet, which resist simple categorisation.

Case Study Research

“A case study is an empirical inquiry that investigates ‘a phenomenon or setting’ within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident.” (Yin, adapted by Groat and Wang 2013: 418)

This investigation into the agency of architectural design to trigger a shift in mindsets regarding human bodily waste is grounded in a real-world case study. A case study involves an in-depth examination of a case in relation to the complex dynamics with which it intersects and from which it is inseparable (Yin 2003). This research approach typically relies on multiple sources of evidence and often combines several data collection strategies (Groat and Wang 2013). Some advocates of the case study warn researchers that an excessive focus on generalising to theory can obscure the intrinsic value and uniqueness that each case offers on its own terms (Stake 1995). In this regard, educational researcher Robert Stake (1995) distinguishes between instrumental and intrinsic case studies. An intrinsic case study is undertaken when the researcher seeks a better understanding of the particular case, rather than using it primarily to understand a broader phenomenon. The core of such a case study lies in the researcher's effort to gain a detailed and nuanced understanding of the case itself using diverse data collection techniques. As Stake further explains, intrinsic case study research focuses on a specific case because it presents unique circumstances, with the case itself constituting the primary

object and goal of the study, rather than serving as a basis for broader generalisation.

Following the definition of an intrinsic case study, this research is grounded in the real-world context of the Blikfabriek in Antwerp (BE). It begins with an in-depth exploration of a practical context, as is typical for architectural design research (Groat and Wang, 2013). The decision to focus on an intrinsic case study is partly motivated by the need to reveal the intricate dynamics of this specific setting, rather than to restrict the theoretical scope of the research by examining multiple settings in less depth. Although I studied one case study as a testing ground, it also functions as a typological site, representative of comparable contexts: former industrial areas that have been temporarily repurposed into semi-public community centres and laboratories for urban and ecological experimentation. Within this site, I developed multiple smaller case studies or situations, such as the Blikvelden wetland, which will be addressed in Chapter 4: *Toilets of Care as a Recovery Activity*. Throughout the research, the focus remained on this site in order to test different scenarios through architectural design, as well as to establish a trusted relationship with the Blikfabriek organisation and the on-site stakeholders. This was necessary, as they are crucial both for their responses to the designs and for sustaining long-term conversations, spread over several years, through which a shift in mindset within this context could be observed.

The case under study in this research is the former factory site of the Blikfabriek [English: Can Factory] located on the border of the city of Antwerp (BE). For up to fifteen years, the site has been repurposed into a collaborative workspace for a diverse range of civic actors, cultural organisations, and a collective of creators. Today, it is regulated and subsidised by the city of Antwerp, although it was originally initiated and organised by a local collective of creators (Fig. 10–11). The factory site comprises 30,000 square metres of warehouses that have been transformed into a breeding ground for ecological experiments and a local hub for neighbourhood initiatives. As a result of the many activities taking place on site, the Blikfabriek hosts over 1,000 visitors each week, including the collective of permanent residents and creators. I have selected this site as an intrinsic case study because the team is experimenting with public composting toilets and the off-grid management of bodily waste in an urban, semi-public setting.



Fig. 9: Main entrance to the former industrial site of the Blikfabriek in Antwerp, Belgium, which is being studied as a case within this doctoral research. © Lies Augustus



In reality, however, only the flushing toilets are used intensively by both visitors and residents who permanently work on site. Since the introduction of public composting toilets in this area is an unconventional and drastic decision, bringing with it different kinds of issues and concerns, the site presents a relevant real-world challenge for this research.

The case study research includes fieldwork at the Blikfabriek site to gather information about how it operates and the mindsets present there, as well as discussion moments where toilet designs, or *Design Scenarios*, are introduced and discussed as *Conversation Pieces*. The latter will be explained in more detail later in the chapter. Additionally, the fieldwork included volunteering activities in which I took part, organised by Natuurpunt, an independent volunteering association which protects and restores vulnerable and endangered nature in Flanders. The insights gained through observation and participation were documented in field notes, subsequently transcribed into textual form, and later employed in the composition of the *Design Scenarios*.

Literature Review

As with much Research-by-Design, a literature review is traditionally used to study previous research and designs, and to reduce a large body of sources to a collection of references that directly inform the subject and questions under study. The process involves reading, analysing, evaluating and summarising literature in order to strengthen the research framework. The purpose of the review is to develop a greater awareness of the literature by reviewing previous research and formulating more insightful questions on the subject and the specific case study (Yin 2018). In this way, it is also related to abductive research, advancing sub-research questions throughout the process. Consequently, the literature review is not the output itself but rather a means of refining the research questions and informing the design decisions, as is common in Research-by-Design. When the questions under study are refined, the methods for answering them have been developed, and the results have been reported and interpreted, the final output is a literature survey that helps to answer the main research question (Groat and Wang 2013). Given that the subject of the toilet spans multiple areas, I reviewed literature and sources from the fields of architecture, science

and technology studies (STS), repair studies, environmental humanities, social sciences, and anthropology. The in-depth analyses in this architectural design research, therefore, include not only textual documents, but also architectural artefacts, buildings, and settings (Mugerauer 1995).

As a design researcher, I examined numerous artefacts to develop my own expertise and design approach. One example is *SlaveCity* (2008), a mega-installation by Atelier Van Lieshout, which presents a sinister utopian world composed of monumental sculptures, combining art and architecture to address societal changes in a playful yet confrontational way. The work of Atelier Van Lieshout was inspirational to the research, as their designs are intentionally provocative and sometimes shocking, intended to stimulate ideas through design. Similarly, the artwork of Alex Schweder is known for its provocative approach. His *Bi-Bardon* from 2001, for instance, combines the imagery of an anomalous body with that of a white, symmetrical plumbing fixture, creating a Siamese urinal that crosses into the uncanny (Schweder 2026). Social designer Fides Lapidaire (2019) takes a different approach to promote alternative toilet habits by raising awareness of the value of human bodily waste as a fertilising resource. In her 2019 project *Broodje Poep* [English: *Poop Sandwich*], she designed a food truck with a semi-public composting toilet, encouraging people to try it out in exchange for a free sandwich. The book *Elements of Architecture* (Koolhaas et al. 2018) also contains a chapter dedicated to toilets. This proved valuable to the research as it showcases a variety of unconventional toilet designs since their introduction in the 18th century. The chapter comprises, among others, research on low-tech composting systems, the emergence of high-tech public toilets in urban areas, closed-loop toilets for use in space that leave no by-products, and experiments on design criteria for toilets as part of *The Bathroom* (1976) by design researcher Alexander Kira.

As stated in the chapter *Toilet* (Koolhaas et al. 2018), the architectural element is often overlooked and understudied, including within architectural design research. During the course of this research, however, a subtle shift became noticeable. Looking at the Venice Architecture Biennale, several pavilions recently engaged explicitly with the subject of toilets and sanitation, particularly under the theme *How Will We Live Together?* (2021) and *The Laboratory of the Future* (2023). The Venice Biennale functions as

a platform for national pavilions to participate in global conversations and sets the agenda for architectural debate more broadly. *The Restroom Pavilion* (2021), for instance, intervened in the public restrooms of the Giardini, reframing toilets as political ‘battlegrounds’ where gender, religion, race, ability, hygiene, health, environmental concerns, and the economy are culturally defined and materially articulated (Biennale di Venezia 2023). That same year, the British pavilion included a hidden installation called *To-i-let* (2021), which focused on the disappearance and privatisation of public toilets in the UK (British Council 2021).

More recently, the German pavilion attracted attention with its installation *Open Maintenance* (2023), which introduced a waterless ‘chute toilet’ and an all-gender, contactless urinal (Arch+ 2023). These experimental, zero-water sanitary infrastructures sought both to challenge taboos surrounding bodily waste and to promote circular alternatives to conventional sanitation systems. Most relevant to this research, however, is the Finnish Pavilion’s exhibition *Huussi* (2023), which imagined a future history of sanitation (Renell and The Dry Collective 2023). By questioning the thus-far largely indisputable position of current water-based sanitation systems, the exhibition aimed to encourage architects to explore alternative solutions better suited to the world we inhabit today. The curators argued that such alternatives are systematically overlooked due to the dominance of existing, functional yet unsustainable infrastructures, combined with the persistent taboo surrounding bodily waste. Taken together, these recent projects suggest a broader ‘turn towards the toilet’ within architectural discourse. Perhaps ageing infrastructures, combined with a growing environmental awareness, have contributed to a renewed interest in the toilet subject.

Within our research cell, Architecture & Wicked Matters, the toilet has also been brought into focus, resulting in a research line titled *26 Toilets to Re-Figure Habitation*, which was set up in 2020 by Nel Janssens, Johan Lickens and Alice De Smet. This doctoral project is part of this research line and spatial alphabet, which explores how concepts of waste, dirt, bodies and earth can refigure architecture from a posthuman perspective in times of ecological crisis (Janssens et al. 2025). This exploration resulted in several Research-by-Design studies centred on the toilet space. As the first letters out of twenty-six

artefacts, the projects of *J for Jewel* by Alice De Smet and *S for Soil Times* by Johan Lickens have also been influential in developing my own expertise and design approach. *J for Jewel* takes the bare and basal body as a point of departure, approaching it as a site and scale for world-making (De Smet et al. 2022), while *S for Soil Times* concerns a reforestation and composting tower (Janssens et al. 2025). The latter draws on the concept to make ‘oddkin’ (Haraway 2016) through architectural design, and on the idea of becoming soil together (Puig de la Bellacasa 2017).

Next to the toilet artefacts as part of the research line, another compelling artefact under study is architect J. Yolande Daniels’ *FEMME pissoire* from 1992, created to serve a specifically ideological purpose (Penner 2009). The female urinal has a mirror placed directly at eye level, ensuring that female users are confronted with images of themselves as they urinate standing up (Fig. 12). This deliberate design decision actively challenges fixed ideas about what constitutes ‘proper’ feminine behaviour, fostering an awareness of the conventions that govern toilet protocol and how these have been adopted in society. Rather than attempting to convince users of the benefits of the female urinal, Daniels’ work seeks to demonstrate how the prevalent design of women’s toilets responds less to the experiences or needs of women than to the dominant ideological idea of femininity as modest, discreet, and hidden (Penner 2009).

“While not a grand gesture that will single-handedly bring the binary gender system crashing down, urinals for women point to the fact that small subversions can be built into design: small shifts in existing boundaries that can be embraced – or contested – in their turn. For Daniels, the true emancipatory potential of *FEMME pissoire* and the women’s urinal lies in the possibility that, through use, it might one day become banal, perhaps even unnecessary.” (Penner 2009: 149).

In reviewing design work, KU Leuven has a commission responsible for peer-reviewing Artistic and Design-Led Research Output (ADRO). The ADRO commission invites candidates for a peer review of their artistic work that introduces original ideas, challenges boundaries, and explores new experimental approaches. The committee consists of interdisciplinary experts who recognise



Fig. 12: *FEMME pissoire*, Chateau Marmont by J. Yolande Daniels (1992).

and report work as ADRO. For this, they assess the innovative character and originality, the relevance of the contributions to design-led research, and the thoroughness with which the research is conducted. The ambition of presenting design work to this commission upon invitation is to receive peer-reviewed recognition of knowledge production in non-conventional forms of output. I was invited to present the architectural models and drawings as part of this research project for peer review in November 2026. The design work produced as part of this research was awarded two ADRO labels: one for *Design Exploration I–II* and another for the *Critical Cartography*, which concerns the architectural mapping underlying the research. The design work will be discussed in Chapters 3–5 on *Design Exploration I–III*.

Research-by-Design

As researcher Hanna Erixon Aalto (2017) explains in her doctoral thesis on design-based and transdisciplinary research in architecture, design-based research is an emerging, pluralistic field that goes by many different names: Research-through-Design, Research-by-Design, Research-as-Design, Practice-based Research, Artistic Research and Art-based Research. The term ‘Research-by-Design’ remains somewhat open and ill-defined because it lacks an operational definition. Erixon Aalto states that there is a need to acknowledge the disciplinary specificity of design as a practice and a mode of research. In recent decades, she notes, design-based research has gained an increasingly independent identity, demonstrating that design itself has the capacity to generate knowledge and that methodological approaches and theories are not only borrowed from other research disciplines. Following the absence of a universal definition, Nel Janssens (2012) states that design-based and transdisciplinary approaches can reveal unexpected potential by breaking free from the initial problem, as opposed to more traditional research methods. The specific design approach in Research-by-Design is therefore different and tailored to the research question. In addition to providing reflections on the question under study, the methodology developed as part of this research also constitutes a contribution to the field of Research-by-Design.

On a similar note, architectural design researcher Nigel Cross argues that there are forms of knowledge that are distinctive for how designers think and work, which he calls ‘designerly ways of knowing and thinking’ (2006, 2025). He considers the concept of intelligence in relation to design, distinguishing design cognition as a specific and fundamental form of human intelligence that differs from typical scholarly and scientific activity. Furthermore, the researcher in design theory, Fredrik Nilsson (2004), emphasises that design has the capacity to think comprehensively and to reveal the underlying relationships between seemingly unrelated functions. In contrast to scientists who study a specific problem, Cross (2025) speculates that designers acquire knowledge mainly by exploring various solutions. He notes that design is fundamentally a synthesising activity in which designers are trained to seek patterns and identify systems rather than isolate individual problems:

“Design is not a search for the optimum solution to the given problem, but design is exploratory. The creative designer interprets the design brief not as a specification for a solution, but as a kind of partial map of unknown territory [...] and the designer sets off to explore, to discover something new, rather than to return with yet another example of the already familiar.” (Cross 1999: 28, original emphasis)

In relation to the main question under study in this research (RQ), and the search for design fields that pursue change, critical design and speculative design soon emerged. Critical design originated in the field of applied art and was later coined by Anthony Dunne and Fiona Raby (2013) in the field of product design. They state that their positionality as critical designers grew out of a concern with the uncritical drive behind technological progress and the assumption that technology can solve any problem. Dunne and Raby argue that technology is not inherently bad, but rather that it should be approached and implemented critically, instead of being blindly adopted into daily life from the laboratory. For this reason, critical design projects always consider the culture and technologies under study from a critical perspective.

This strong belief in technology, linked to techno-solutionism, has also been criticised by scholars in feminist science and technology studies (STS), among others (Haraway 2016). They are particularly critical

of the oversimplified reduction of complex problems and of the fragmented technological interventions used to address them. Along similar lines, a significant body of critical design is therefore rooted in STS. Like the field of STS, Dunne and Raby analyse the influence of technology on designed objects and infrastructure. The convergence of STS with speculative and critical design brings issues of concern to the fore and contributes to the exploration of alternative futures. They differ, however, in that the field of STS does not typically speculate or work towards transforming the near future through design. Whereas STS investigates design analytically, without involving the act of designing itself, critical design uses design prescriptively as a method of exploration. Here, the act of designing is not aimed at realising marketable products, but rather at raising challenging ideas for the public about the user’s relationship with design (Malpass 2012). Similarly, the toilet designs created for this research raise concerns and challenge users’ toilet habits by obstructing and challenging their current, unsustainable routines.

Ramia Mazé and Johan Redström (2007), researchers in design, write that critical design practice, as a method of research, aims not at simplification but at diversifying how we might understand design problems, ideas, and boundaries. They state that critical ‘designing’ is a form of material critical thinking: a way of thinking about concerns through design. In addition, Dunne and Raby (2013) state that critical design is the translation of critical thought into material form. They claim that it involves thinking through design rather than through words, using the language and structure of design to engage people. This diversification in ways of thinking through design prevents a universally applicable definition of critical design practice. Consequently, they defined critical design as an attitude or position rather than a clearly outlined field with a set of defined criteria or methodology:

“Our definition was that critical design uses speculative design proposals to challenge narrow assumptions, preconceptions, and givens about the role products play in everyday life.” (Dunne and Raby 2013: 34)

Although critical design is an open attitude rather than a methodology, common strategies and approaches in design proposals include making the design unfamiliar

or odd, adding a seductive layer, positioning it within a situated narrative or context, suggesting a parallel world, and stimulating a balance between believing and not quite believing that the design is real (Malpass 2012). In addition, strategies of defamiliarisation, estrangement, ambiguity, disturbance, friction, and provocation through design are recurrent. These strategies aim to distance users from their usual ways of doing things, revealing or making invisible aspects of everyday life visible (Dunne and Raby 2013). This is necessary to overcome conditioned familiarity and prompts users to consider how they might use a given design differently. According to Dunne and Raby (2013), critical design is one possibility for using design to craft ideas, as a means of speculating about how things could be. As a related field, they describe how speculative design uses scenarios to question how the future can be shaped by proposing diverse directions from the present situation:

“This form of design thrives on imagination and aims to open up new perspectives on what are sometimes called wicked problems, to create spaces for discussion and debate about alternative ways of being, and to inspire and encourage people’s imaginations to flow freely. Design speculations can act as a catalyst for collectively redefining our relationship to reality.” (Dunne and Raby 2013: 2)

In relation to the aspect of imagination, there is a difference between ‘design’ in the field of product design and architectural design. What fundamentally distinguishes product design from architecture, and their respective interpretations of critical design, is that product design focuses on objects typically displayed in galleries and experienced ‘in a state of attention’. In contrast, as mentioned by architectural design researcher Jonathan Hill, architecture engages with the spatial design of daily living environments and “is promoted as something that is most often encountered ‘in a state of distraction’” (Benjamin cited in Hill, 1998: 144).

The use of a critical design attitude has also been discussed in depth in relation to urbanism by Nel Janssens in her thesis *Utopia-Driven Projective Research* (2012). Janssens points to the difference between commission-driven urban design and conceptual critical design. Whereas the former is restricted to interpreting and refining a predefined vision of

urbanism into spatial quality, the latter ascribes an investigative character, which she considers to be of great importance for the fields of urbanism and architecture because of its research potential. She also emphasises that an important aspect of critical design is that criticising or exposing presupposed ‘truths’ is necessary for freeing the imagination from fixed ideas and dogmatic thinking. This enhanced and freed imagination, she argues, is required to develop prospective alternatives and open minds to other possibilities. The field of architecture has also been related to critical practice and criticism in the book *Critical Architecture: Between Criticism and Design* (Rendell, Hill et al. 2007). When organising a conference on Critical Architecture at the Bartlett School of Architecture in London in 2004, the organisers realised that this term challenged the traditional distinction between design and criticism. Whereas design concerns the production of buildings, criticism is often expected to be performed by critics who judge architecture through essays. Critical Architecture instead proposed a form of architectural critical practice operating within an interdisciplinary context to rethink this relationship. While this book explores architectural criticism and considers how critical architectural practice operates through buildings, drawings, and texts, I adopt a critical design attitude as described by Dunne and Raby (2013).

Within this methodological framework, I primarily follow a Research-by-Design approach as the main driver of the research. This approach involves developing toilet designs in close relation to fieldwork at the case study, allowing them to be experienced within the real-life context of the Blikfabriek. As aforementioned, critical design deliberately introduces the uncanny or slightly disturbing into the everyday to provoke reflection on accustomed habits and ways of living. Habits, herein, are repetitive actions that become ingrained over time. However, when these routines are disrupted, friction arises. In this respect, critical design offers a productive lens for challenging established toilet habits in a real-world setting. By adopting such a critical design attitude, the designs aim to communicate ideas, provoke debate, and inspire new behaviours (Dunne and Raby 2013). The toilet, arguably the most mundane architectural space and a site of daily routine, provides a particularly relevant context for this exploration. Within this Research-by-Design, I therefore

created a variety of toilet designs that disrupt everyday routines and draw attention through estrangement, disturbance, friction, or unfamiliarity. In doing so, they expose aspects of daily life that are typically normalised or left unquestioned.

2.4 Structuring the Research-by-Design

As noted earlier, there is no single, universally applicable definition of Research-by-Design, since the approach is largely shaped by the specific research question under study through design. The research presented here not only provides reflections on the questions under study but also constitutes a methodological contribution to the field of Research-by-Design. In the case of this research, the process is structured into three *Design Explorations*, or research cycles, which are supported by a *Critical Cartography* and consist of multiple toilet designs, referred to as *Design Scenarios*. As will be explained below, the designs are introduced and put into discussion in the case study as *Conversation Pieces*, to challenge the toilet habits on the site of the Blikfabriek.

Design Explorations

The Research-by-Design process comprises three *Design Explorations*, discussed in Chapters 3–5, which form the main body and structure of the research through an iterative process over time. A *Design Exploration* is a combination of Research-by-Design actions in which an idea is tested through spatial design. From the analysis of these actions and designs, a form of raw data or findings emerges. The goal of these research activities is to explore and trace a subject through architectural design, in this case by introducing toilet designs into the case study site to challenge and change ingrained toilet habits on-site. Each research cycle has a distinct focus and investigates a specific part of the Blikfabriek case study: *Design Exploration I* aims to test the contemporary norms surrounding the toilet at the case study site and challenges the status quo by questioning why certain toilet designs are (not) acceptable; *Design Exploration II* investigates how toilets can participate in wetland conservation by collecting and treating waste in a constructed wetland on-site; and *Design Exploration III* proposes a renovation

of the public composting toilets at the Blikfabriek site, assembling three design strategies to shift mindsets regarding human bodily waste. The three *Design Explorations* unfold sequentially, with each new cycle of the research process refining the research questions.

In terms of the specific Research-by-Design actions, I have deployed three methodological principles that emerged from the process and are transferable to a broader research context. They constitute the methodological contribution of this research to the field of Research-by-Design. The principles include a drawing as *Critical Cartography*, toilet designs or *Design Scenarios*, and the presentation of architectural designs as *Conversation Pieces*. These three methodological principles have been used as a toolkit throughout the research, generating insights into the research question under study through architectural design. Each of these methodological principles is discussed in more detail in the sections below.

Critical Cartography

“Mapping, in its performative and discursive character, is an invaluable tool for drawing attention to hidden situations and complex relationships. Mapping is not merely a representation technique but a productive tool that stimulates reflection and speculation, in anticipation of new readings and imaginings of the world. Through alternative and explorative practices of mapping, the aim is to unsettle assumed narratives and spatial expressions that have dominated the representation of the environment, from the territory to the city to its architecture.” (Aedo Jury et al. 2023: 29)

To ground the research in a real-world setting, I have deployed *Critical Cartography* as a prominent design tool to draw attention to a hidden situation. Traditionally, this field analyses existing maps to oppose the idea of mapping as an objective and neutral reflection of the environment, by revealing the hidden agendas of cartography as a tool of socio-spatial power (Crampton and Krygier 2005). Although I use *Critical Cartography* as an active Research-by-Design tool, the mapping relates to this field because it renders certain hidden aspects of our daily living environments

visible, while moving others to the background. More specifically, I deploy *Critical Cartography* as a continuous design tool to assemble crucial insights from literature review, fieldwork in the case study, and reflections from the *Design Explorations*, which are positioned on the map.

Researcher in the history of consciousness, Donna Haraway (2016), uses string figure games as a theoretical trope for world-making and the creation of other potential worlds through threading, felting, tangling, tracking, and sorting. She explains that playing string figure games is about giving and receiving patterns, dropping threads, and failing, but it is also sometimes about finding something that works that was not there before, or relaying meaningful connections, telling stories, and shaping other conditions for finite flourishing on this earth. In this way, the *Critical Cartography* is drawn up as an architectural mapping – or architectural string figure – connecting all relevant aspects to display the ‘system’ of wastewater treatment in Flanders (Fig. 13).

While the *Critical Cartography* initially emerged from the collection and synthesis of primarily quantitative material on the infrastructural sewage system, qualitative aspects became increasingly significant in the research process. As a result, the mapping reveals the urban flushing toilet system as both a physical infrastructure and a system of thought that it sustains, meaning the beliefs, cultural narratives, and habits that it perpetuates. Like an architectural string figure, the purpose of the *Critical Cartography* is to tie things together, pass patterns back and forth, and reveal a system that would normally remain hidden in our everyday environments. In particular, I deployed the *Critical Cartography* to ground the research in a real-world setting and to provide a detailed narrative of the context under study. To introduce this context during discussion moments and presentations, I converted the drawing into a video that narrates the daily environments in which the designs have an influence. This is because unfamiliar or challenging designs require a detailed narrative to make them more imaginable in everyday life (Malpass 2012). The *Critical Cartography*, therefore, plays a crucial role in embedding and contextualising the speculative, and sometimes even provocative, *Design Scenarios* within a recognisable environment and problematic.

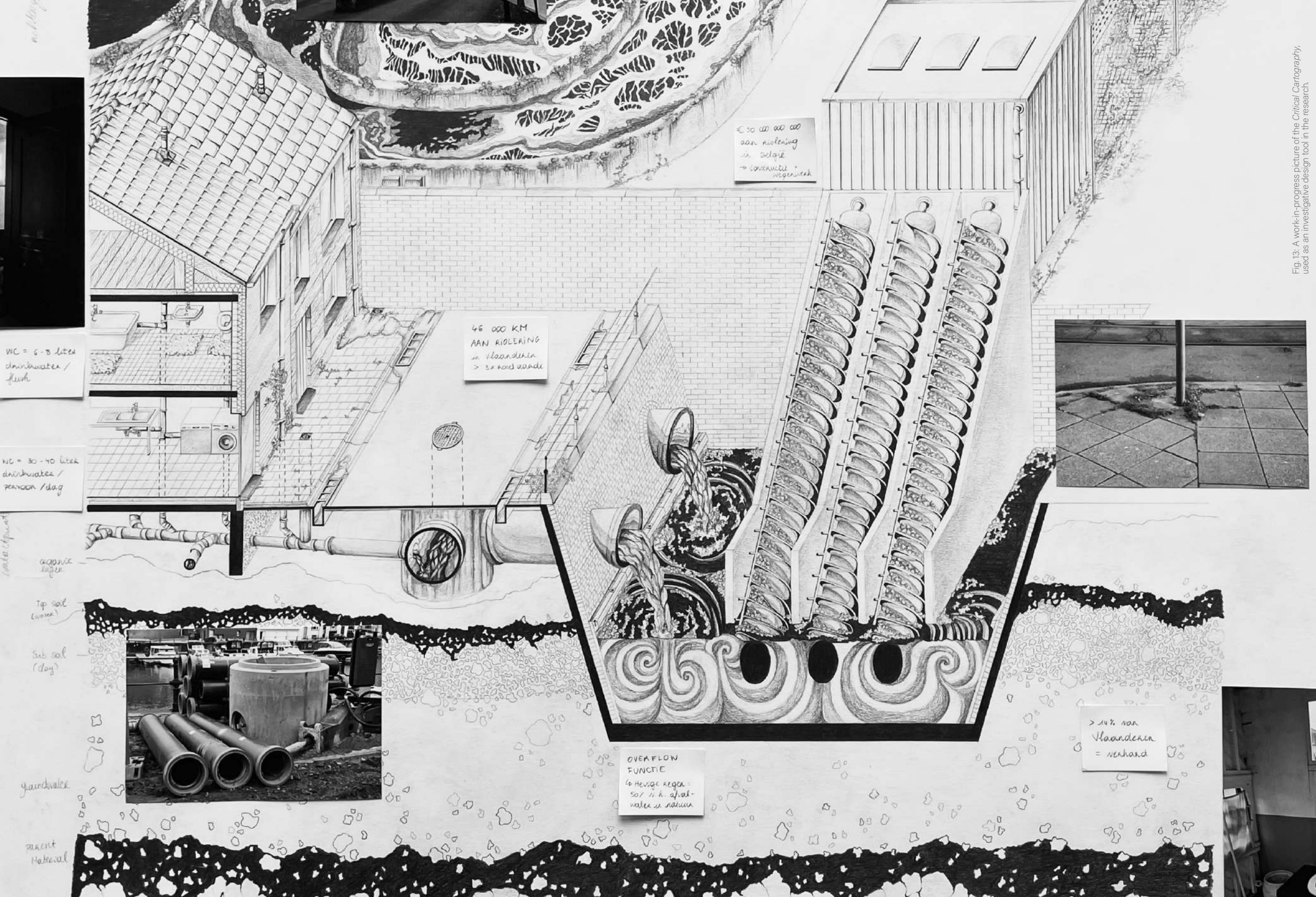


Fig. 13: A work-in-progress picture of the Critical Cartography, used as an investigative design tool in the research.

The *Design Scenarios*, as part of this research, concern the various toilet designs which I created over three *Design Explorations*. The term ‘scenario’ originated in the field of speculative design, shifting the focus from the technical to the cultural aspects of toilet design. The *Design Scenarios* are the core of this Research-by-Design and embody the ‘designerly’ exploration of the research question of how architectural design can trigger a shift in mindsets by shaping new toilet habits. As mentioned earlier, Nigel Cross (2025) argues that there are ‘designerly ways of knowing and thinking’, forms of knowledge that are unique to the way designers think and work. He sees design herein as “a kind of partial map of unknown territory” where the designer “sets off to explore or discover something new, rather than to return with yet another example of the already familiar” (Cross 1999: 28, original emphasis). Similarly, I also explore unknown territory in a Research-by-Design manner, whereby the *Design Scenarios* and approaches gradually become more refined and targeted throughout the process.

Composing the *Design Scenarios* constituted an intensive design process, involving continuous movement between literature review, fieldwork, designing the toilets, reworking them, and setting up design discussions at the site of the case study. Before arriving at the *Design Scenarios* as presented in this thesis, numerous pre-studies and intermediate designs were developed over extended periods of time, often spanning months, before culminating in the toilet designs presented in Chapters 3–5 (Fig. 15–16).

In addressing the main research question, I argue that the field of architecture has agency in shaping habits and accompanying patterns of living. As noted by Dunne and Raby (2013), designers are not positioned on a higher moral plane but, like everyone else, are immersed in the cultural system. Likewise, as the architect-researcher within this cultural context, I am part of the culture and system under study. From this position, I can raise issues and concerns through design, which may encourage users to consider new perspectives. Because architects design living environments, they influence how people relate to their surroundings, not only at the scale of buildings but also in relation to the human body through the design of spatial praxis (Mathews 2019).

Specifically, I scrutinise one unsustainable daily habit: the habit of toileting, which is clearly and directly related to the human body. Even though many alternative systems exist to manage human bodily waste locally, we remain dependent on an enormous centralised system that is on the verge of collapse and can no longer be updated (Verlinden and Vanoppen 2021). In part, this can be attributed to the fact that the toilet today has become the spatial translation of a taboo (Gershenson and Penner 2009). In urbanised Western Europe, the architectural element of the toilet is a sensitive spot, containing valuable information about the norms and values under study. The flushing toilet and the comfort it provides are so ingrained in our architecture, infrastructure and lifestyles that the idea of changing them causes friction and big pushbacks (Ibid.). As such, the toilet is not just any habit but a particularly difficult one to change.

“Critique is not necessarily negative; it can also be a gentle refusal, a turning away from what exists, a longing, wishful thinking, a desire, and even a dream. Critical designs are testimonials to what could be, but at the same time, they offer alternatives that highlight weaknesses within existing normality.” (Dunne and Raby 2013: 34–35)

The materialised *Design Scenarios* consist of architectural models or physical artefacts that I created in response to insights gathered from literature review and fieldwork at the Blikfabriek. Fieldwork, in particular, was necessary to explore mindsets on-site and offered a real-world setting in which the *Design Scenarios* are introduced and experienced. The toilet designs present alternative scenarios for coping with human bodily waste, for instance, by altering how the toilet is used, how the system of waste treatment is maintained, and how the case study’s community engages with the human bodily waste produced on-site. Herein, I adopt a critical design attitude, aiming to challenge, stand out, prompt, or trigger by design, introducing friction in one of the most mundane everyday spaces. In discussing the level of challenge in design, Johan Liekens (2020), a researcher in (interior-) architectural design, describes a spectrum ranging from invitation, to provocation, to a shock ‘to thought’. What is shocking or provocative remains subjective and person-dependent. Provocation can be understood as an idea considered too radical or



Fig. 14: Architectural model of the Assemblage of Kitchen and Toilet (scale 1:33) as part of *Design Exploration 1*, discussed in Chapter 3: *Toilets Exploring Mindsets on Human Bodily Waste*.

unrealistic for conventional brainstorming. In some cases, however, provocation can be useful because it forces us to think outside the box, move beyond the known, and ultimately generate new ideas. As also noted by Liekens (2020), when an architectural design becomes too provocative, it risks being set aside as art and is therefore not taken seriously. Architecture, therefore, requires a sense of reality, as it ultimately designs environments for everyday living.

The concept of provocation is approached differently in architecture than in product design, which deals with the design of objects. Architecture entails different expectations, as it involves the design of living environments. Especially in relation to the toilet, and even more so in the case of public toilets, its design addresses an elemental human need. This raises questions such as: ‘Who does the design include or provide access for?’ and ‘How provocative can public toilets be when they must remain accessible and usable for a diverse range of visitors?’ As mentioned before, architecture is encountered ‘in a state of distraction’ (Hill 1998). Toilets, however, are spaces that are often visited in a state of urgency or need. Considering that access to safe sanitation is a basic human need raises the question of how unfamiliar or challenging a toilet space can become before it is perceived as unusable or unsafe. In urbanised Western Europe, toilets remain an avoided topic in both conversation and design. Designing for or with something that is rejected by a given society is challenging in itself (Gershenson and Penner 2009). Consequently, the subject of toilets can inherently trigger friction for some, even when the proposed design itself is not explicitly challenging or provocative.

In creating challenging or provocative designs – whether as an invitation, a provocation, or a shock (Liekens 2020) – it is crucial to have a nuanced understanding of the culture and norms under study. Approaches such as estrangement, ambiguity, disturbance, and friction can only be used productively when one is familiar with both the cultural context and the critique being developed. Before conducting a comprehensive literature review, I therefore created an initial range of *Design Scenarios* as part of *Design Exploration I*, in order to explore and interrogate prevailing toilet norms and values. According to environmental philosopher Freya Mathews (2019), the norms and values that genuinely inform consciousness originate less in discourse or debate than in the specific forms of ‘praxis’ in which a society is engaged. In her definition, praxis

refers to the socially and historically situated practices through which people provision their livelihoods, and through which their values, identity, and consciousness are formed. Architectural design herein has the agency not only to reveal but also to destabilise and challenge contemporary norms. Moreover, this research is grounded in the understanding that we naturally make sense of the world through interacting with artefacts, and that design enables a more immediate grasp of matters than abstract theories allow (Franke 2009). Since this doctoral research aims to effect change in ingrained ways of living, the ability to trace and scrutinise norms through design is of utmost importance. Throughout the Research-by-Design process, I therefore developed an increasingly refined understanding of dominant toilet habits and cultural approaches to human bodily waste.

“Robinson highlights ‘the essential connection between the power of objects to affect the way in which the world is seen and the mechanism through which that happens.’ He points out the importance of ‘recognising that the artefacts people interact with have enormous impact on how we think’.” (Dunne 1999: 23)

This research approach stems from the recognition that designers, through practice, can often identify and critically engage with cultural norms more rapidly than through theoretical or literature-based inquiry alone. Architect-designers are typically expected to conform to existing norms. However, they also possess the capacity to provoke and challenge dominant norms through design. The reception of designs that challenge norms is inherently unpredictable, yet the reaction to them contains valuable cultural information. Critical design proposals, in particular, can trigger a certain degree of resistance in the encounter, illuminating how a design is received and interpreted within a specific cultural context. In this research project, critical design served as a valuable tool for testing and triggering cultural change through the composition of *Design Scenarios*. In order to position my design approach as one that challenges conventional toilet habits, I adopt a particularly sensitive and thoughtful approach, in which toilet designs function as invitations or delicate provocations to encourage debate, discussion, or reflection. This sensitive design approach is particularly important because it is grounded in and

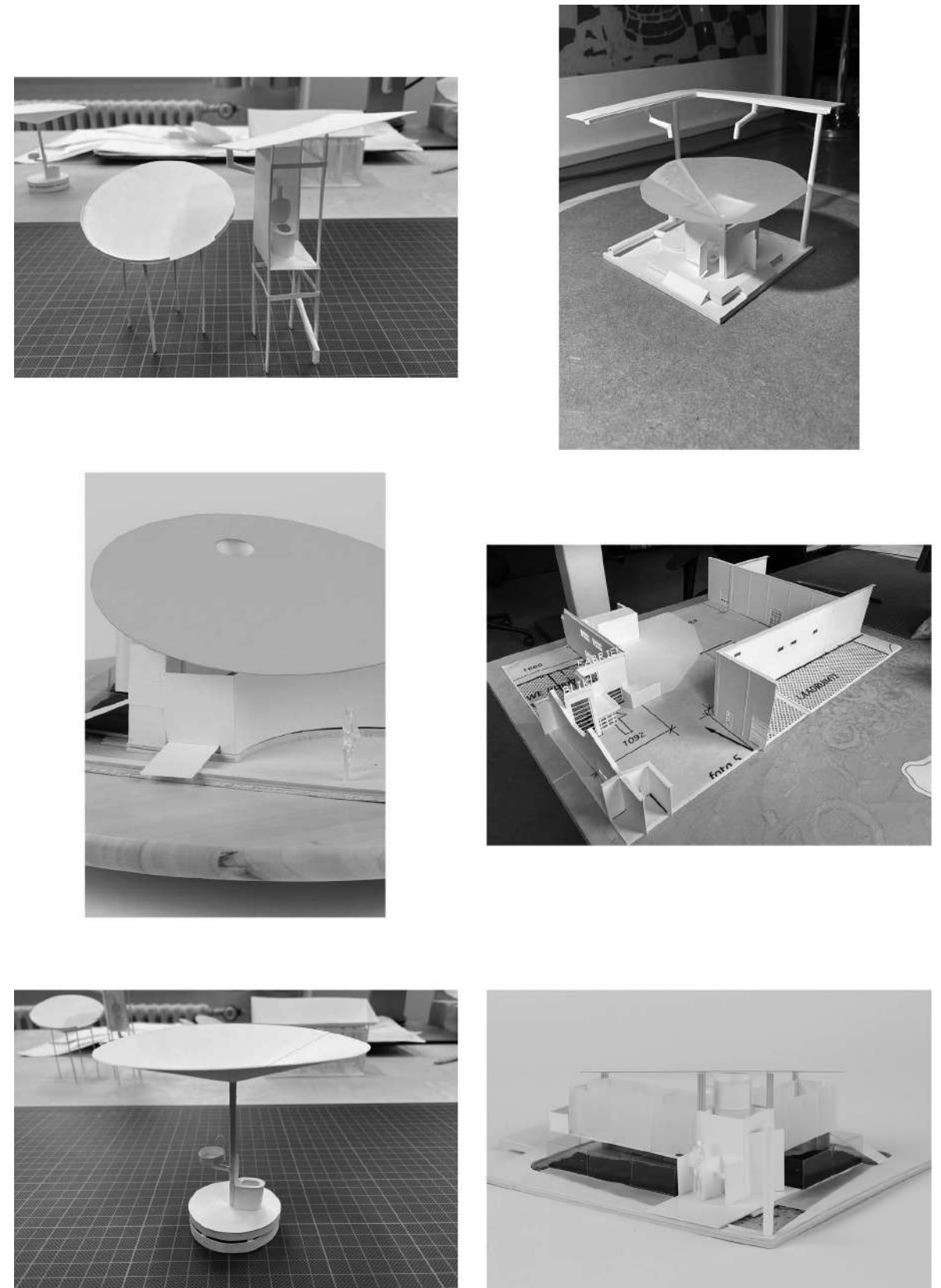
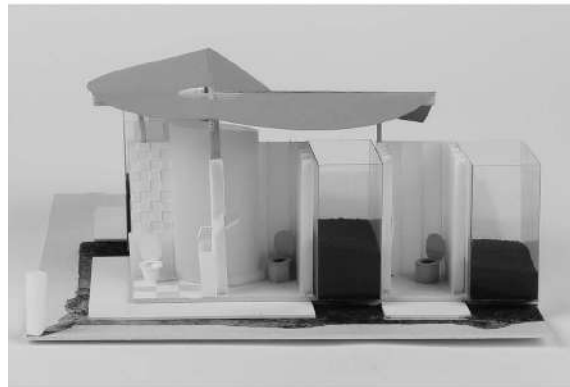
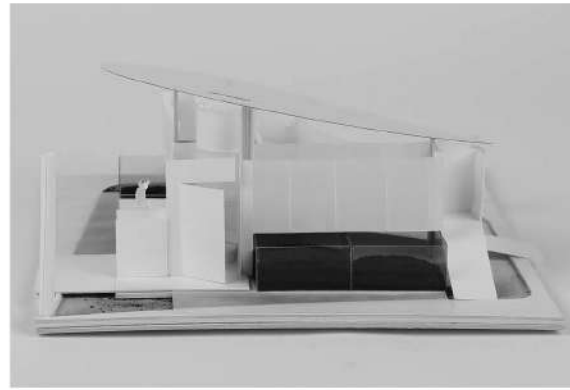
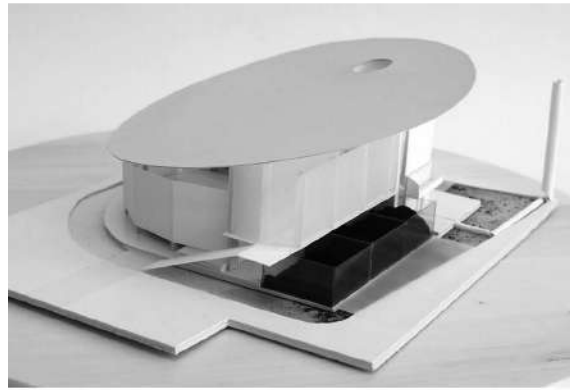


Fig. 15: Images from some of the preliminary studies and intermediate models that were developed during the design process.



investigates the real-world context of Blikfabriek, a case study that faces real-world issues and concerns. I observed that the appreciation of provocation is person-dependent and therefore not always beneficial in stimulating conversation, which is the main goal of the toilet designs. Moreover, it can even trigger the opposite effect. The intention of the *Design Scenarios* created for this context is therefore primarily to stimulate conversation, discussion, or debate by putting a design on the table as a *Conversation Piece* to be actively considered

Conversation Pieces

“We make things because we see objects as powerful communicators [...] a way of summarising is that the design historian critiques from the outside, what we’re trying to do is to critique from the inside.” (Ralph Ball in Malpass 2012: 172)

Since the main goal of the *Design Scenarios* is to stimulate conversation, the toilet designs are introduced as *Conversation Pieces* during discussion moments to challenge toilet habits in the context of the case study. In the field of design fiction, this term refers to a designed object that connects an idea to its expression as an instantiated object – like a prop that aids speculation, reflection and imagination – linked to a diegetic prototype (Kirby 2010). In the field of modern art history, Grant Kester (2004) has described a *Conversation Piece* as a work of art that challenges or disrupts the viewer’s expectations about a given image, object, or system of meaning, and that viewers, in turn, require this disruption to overcome their reliance on habitual forms of perception. The term is also used by architectural design researcher Arnaud Hendrickx and further developed within the Material Narratives research group, where

Fig. 17: The Assemblage of Kitchen and Toilet (scale 1:33) as part of *Design Exploration I*, presented at the case study as a *Conversation Piece* during a discussion moment.



it originated from a curatorial context in which designed artefacts are placed together in a spatial constellation and begin to act in conversation, both with the audience and in relation to each other (Janssens et al. 2025).

In this research, the term *Conversation Piece* refers to the way in which Research-by-Design artefacts are introduced into a real-life context to challenge prevailing assumptions and perceptions about architectural design, here focusing on the design of toilets. It is related to the critical design attitude described by Dunne and Raby (2013), and is closely tied to Kester’s (2004) definition, which argues that this disruption is necessary for viewers to break free from their habitual ways of perceiving things. Instead of presenting ideas about how to cope with waste and the design of toilets linguistically, the models display a variety of toilet scenarios that challenge current assumptions about what a toilet is or can be. They are not designed as solutions, but rather as tools to present an idea and ‘to kick-start a discussion’, as Fiona Raby (2015) describes it. Once the *Design Scenarios* are materialised as architectural models, they are introduced into focus groups and put up for discussion, further referred to as discussion moments. The focus group technique is particularly advantageous in this context, since the research aims to gain impressions of a design and insight into people’s thinking about a specific subject (Mortelmans 2013).

A focus group is a qualitative research technique in which the researcher acts as a moderator who encourages a group of people to talk freely about a particular topic (Mortelmans 2013), here focusing on responses to a toilet design. It is in the discussion among participants, in relation to the design and each other, that the scientific data of interest is found. Focus groups are analysed primarily at the group level rather than as a series of individual interviews (Ibid.). This is important since the focus of this research is designing for a semi-public setting where individuals also influence each other’s toilet use. A key requirement for the focus group is that participants have the capacity to engage in discussion about the research subject or object. It is therefore important to assemble a group with diverse experiences and expertise related to the topic. In this research, participants included, among others, toilet

cleaning staff, members of the nature preservation association Natuurpunt, members of the Blikfabriek community, visitors to the case study, and architecture students in the Master Design Studio *Sanitopia* at the Faculty of Architecture, KU Leuven. Because the participants largely constituted a non-designer audience, the *Design Scenarios* needed to be sufficiently comprehensible in their materialisation to be discussable and imaginable as *Conversation Pieces*.

Next to the materialisation of the artefacts, I employed other research strategies to stimulate conversation and kick-start a discussion on the designs. In *Design Exploration I*, for instance, I provided participants with statements and asked them to relate these to the designs presented (Fig. 17). This active technique encourages participants to form associations and open a discussion about the designs. Another strategy was asking participants to evaluate the presented designs by discussing reasons for accepting or refusing the design. Once further in the focus group discussion, I also employed the technique of imagination to prompt questions as ‘imagine you would be using the design, what stands out?’ or ‘imagine you could alter the design, what would you change?’.

In composing and discussing design proposals, Dunne and Raby emphasise not only desired futures but also the changes proposed for discussion, questioning their realism and necessity. Asking the question ‘What is holding us back?’ can reveal those aspects that are crucial for change. For them, the future is “not a destination or something to be strived for but a medium to aid imaginative thought, to speculate with” (2013: 34). Their main focus is the reality of today and the limitations of our imagination, which can be loosened or removed. They argue that the focus should not be on the future itself, but on alternatives, and that there should be “much more diversity of approaches to thinking about what comes next” (Ibid.). In the search for alternative ways to manage human bodily waste, the challenge lies in doing things differently today, rather than in a distant future when it may be too late to change our habits and lifestyles. After all, why wait?

“A key feature is how well it simultaneously sits in this world, the here-and-now, while belonging to another yet-to-exist one. It proposes an

alternative that through its lack of fit with this world offers a critique by asking, “why not?” If it sits too comfortably in one or the other it fails. That is why for us, critical designs need to be made physical. Their physical presence can locate them in our world whereas their meaning, embodied values, beliefs, ethics, dreams, hopes, and fears belong somewhere else.” (Dunne and Raby 2013: 43–44)

Moreover, they defined different types of futures: the probable, plausible, and possible futures, and argue that designers should consider and operate not only in the desired, but mainly in a ‘possible’ future:

“The next cone is the possible. The skill here is making links between today’s world and the suggested one. ... In the scenarios we develop we believe, first, they should be scientifically possible, and second, there should be a path from where we are today to where we are in the scenario. A believable series of events that led to the new situation is necessary, even if entirely fictional.” (Ibid. 3–4)

Like Dunne and Raby, I intend to create *Design Scenarios* that lead to a possible future. Therefore, the *Design Scenarios* are challenging and carefully provocative, in an attempt to open minds towards alternatives. However, they should not be read as fictional since they are created for and encountered in a real-life context where they are put to discussion as *Conversation Pieces*. According to Dunne and Raby, in moving towards the future, this exactly is the role of design: not to define how things should be, but to facilitate alternative worlds and visions. The *Conversation Pieces* are about posing questions, triggering debate, and opening minds to new ideas.

2.5 Research Cycles

As set out at the beginning of the chapter, the qualitative research question and abductive research proposal are refined over an iterative process throughout the research. It is structured into three *Design Explorations*, positioned on the *Critical Cartography*, and unfolds through repeated cycles of interconnected research activities. More specifically, the process expands from literature review and fieldwork at the case study (1) to the development of *Design Scenarios*, or toilet designs (2), which are then introduced and experienced as *Conversation Pieces* during discussion moments at the case study site (3). Each research cycle, or *Design Exploration*, ends with a subsequent transcript and design analysis (4), which is further developed iteratively throughout the research process and indicates the beginning of a new *Design Exploration*. The sequence of subsequent research activities throughout the process is as follows:

- 1. Literature review and fieldwork at the Blikfabriek case study.
- 2. Composing *Design Scenarios* or toilet designs.
- 3. Discussions on the toilet designs as *Conversation Pieces*.
- 4. Transcript and design analysis.

As explained in the step-by-step process, the *Design Explorations*, or research cycles, are driven by observations emerging from literature review and fieldwork. These observations generate insights and ‘designerly sensing’, which is necessary to compose a *Design Scenario* or toilet design. The design is then introduced into the case study site and discussed as a *Conversation Piece*, after which the analysis of the designs and transcripts leads to reflections and further observations that initiate a subsequent research cycle:

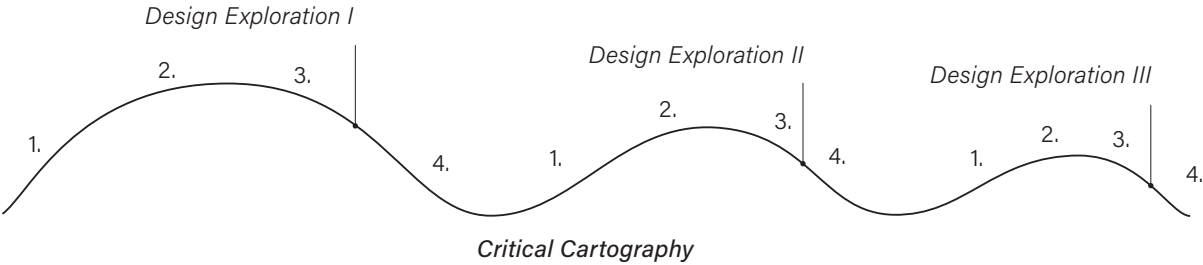


Fig. 18: Overview of the research activities throughout the process, moving from literature review and fieldwork at the case study (1), to composing *Design Scenarios* (2), to design discussions on the *Conversation Pieces* (3), and ending with the transcript and design analysis (4).

Observations

(From literature review, fieldwork, and former design discussions)



‘Designerly’ sensing

(Insights necessary for the composition of a *Design Scenario*)



Design Scenario

(A design for the site of the case study)



Conversation Piece

(The design discussion on the *Design Scenario* in the case study)



Reflections

(Transcript and design analysis, leading to novel observations)

Throughout this process, six sub-research questions (1–6) have emerged abductively, which are explored by design in Chapters 3–5 on *Design Explorations I–III*. Sub-research questions 1–3 are addressed in the chapter on *Design Exploration I*, while sub-research questions 4–6 are examined in the chapter on *Design Exploration II*. These questions are grounded in specific observations, to which I responded with speculative *Design Scenarios*, leading to the delineation of intermediate design strategies following the analysis of the discussions. The sub-research questions are as follows:

1. Following the observation that the absence of wastewater infrastructure in daily living environments results in a lack of awareness and accountability regarding waste treatment, what influence would the presence of toilet designs and infrastructure have on users’ mindsets?
2. How can architectural design reposition the toilet as a space that holds users accountable for what they leave behind, in the face of the current system’s ‘flush-and-forget’ attitude and obliviousness to human bodily waste?

3. What is the influence of the collective and public context on changing individual toilet habits in relation to the Blikfabriek as an urban and semi-public case study?
4. In contrast to the current user-centred approach to toilet design, how can architectural design expand relationality towards non-human species and adopt a more responsive attitude towards the needs of its surrounding environment?
5. In relation to implementing a new system – tied to new habits – for dealing with human bodily waste, how far should the speculative design proposal deviate from the existing situation to stimulate imagination and consideration?
6. In terms of the role of the architect-designer, should architects respond to prevailing cultural desires, or can they also convey ideology and shape new ecological-spatial values by design?

In response to these sub-research questions, I have not only gathered data, but I also created design-led research output as part of *Design Exploration I–III*. This includes a continuous literature study, fieldnotes, a *Critical Cartography* or architectural string figure, *Design Scenarios* or toilet designs at varying scales, transcripts of discussions on the designs as *Conversation Pieces*, and a toilet pavilion, which was discussed to be built on an embodied scale at the case study site in Chapter 5: *Toilets that Challenge on a Real-life Scale*. Typical of the Grounded Theory approach is the constant comparison of data through cyclical collection and analysis. In this process, data are continuously compared, and earlier analyses are adapted and refined accordingly (Mortelmans 2013). In moving between analysis–creation–analysis in particular, Donald Schön, a researcher in philosophy, conceptualised this iterative process as a “reflective conversation with a situation” (1983: 68). In this creative process, the designer ‘reflects-in-action’ and becomes ‘a researcher in the practice context’, as is typical for Research-by-Design.

“Schön’s reflection-in-action is a real-time process that occurs during events or activities as they happen. Donald Schön (1983) refers to this type of reflection as ‘knowing-in-action’ or thinking on

your feet, whereby practitioners deal with unexpected events and problems as they emerge, often without consciously breaking away from the flow of the activity itself” (Erixon Aalto 2017: 71).

In the first phase of the process, discussions on the designs were transcribed, coded, and labelled in NVivo before being linked and combined using concepts and themes. This was done using an abductive and iterative Grounded Theory approach (Schreier 2018). At a certain point, the research process reaches a stage where new information becomes scarce, and the researcher can almost accurately predict participants’ reactions. This stage is defined as theoretical saturation (Mortelmans 2013). Consequently, the discussion moments on the designs as *Conversation Pieces* were concluded once data saturation was reached.

Since this research involves human participants, all discussion moments were set up in accordance with ethical standards and approved by the Social and Societal Ethics Committee (SMEC) of KU Leuven (G-2024-8082). SMEC evaluates research on human subjects in the humanities and social sciences, with a multidisciplinary panel of experts reviewing the ethical conduct of the study.

2.6 The Role of the Researcher

Throughout this Research-by-Design process, which consists of interconnected research activities, I have taken on different roles as both a researcher and a designer. As the architect-researcher, I created the *Critical Cartography*, as well as the toilet designs and architectural models. I carefully curated the drawing and video presentations, and I am the editor of the video. In addition, I am also the researcher who presented the *Critical Cartography* as a narrative and the moderator who brought the *Design Scenarios* into discussion as *Conversation Pieces* in the case study.

In the discussion moments in particular, I acted as a moderator by joining the conversation and posing questions that probed knowledge, opinions, values, and sensory perceptions or experiences in relation to the presented design. In analysing the discussions, I paid specific attention to the conversations that arose in confrontation with the design, and to the social meaning-making that emerged through this process within the case study (Mortelmans 2013).

My fieldnotes and observations were based on the use of language and on what is expressed between participants in relation to the presentation of the toilet design. In this transcript analysis, as Mortelmans explains, it was also important to take into account the group dynamics, as participants continuously influence one another and their positions may shift throughout the conversation. When discussing a change in individual toilet habits, the influence of the collective in shifting mindsets regarding human bodily waste can therefore not be underestimated.

Normalisation and the Role of the Architect

In relation to the role of the architect more broadly, this research raises the question of whether architects can work towards the introduction and normalisation of new values through architectural design. According to the Cambridge Dictionary, ‘normalisation’ is the process by which something that is not standard or is abnormal is gradually considered normal, often through repeated exposure or acceptance within a society. As a material practice, architecture here has the ability to expose people to change through design, even if it is unconventional or uncomfortable. In this context, the research intends to reveal and challenge unsustainable habits that no longer fit in contemporary society.

Today, architects are often seen as mere executors of demands, adhering to client- or user-centred approaches. They are expected to assume and be limited to a norm-following role. This can be explained by the fact that architecture remains a professional service, where clients depend on and pay architects in return for a realistic design. However, as design researcher Guy Julier (2006) writes, the designer’s role is essentially to create ‘value’. In architectural design practice, this is most obviously commercial value, but it may also include social, cultural, political, ecological, and symbolic value. With this research, I focus on the creation of ecological-spatial value through architectural design. Against the backdrop of common expectations of architecture, I explore the role and impact of the architect-researcher as an active co-shaper of environments who can disseminate new values.

One real-world example where values have been introduced through toilet design is the

implementation of gender-inclusive toilets in public spaces. While traditional male/female segregated toilets are not accessible to everyone, gender-inclusive toilets are designed for use by anyone, regardless of their sex or gender identity. This promotes comfort, safety, and privacy, particularly for transgender, non-binary, and gender-diverse people (Transgender Law Centre 2005). While these toilets may initially seem uncomfortable or conspicuous, integrating them into public spaces normalises their presence, which is essential for the acceptance and inclusion of all genders, tied to the value of equality. It acknowledges that multiple genders exist and that everyone should have access to public toilets, as this is a basic human need. What makes this example relevant to this research is that when new habits are implemented and accepted in public spaces, the values they represent are also disseminated. In the long term, this can contribute to cultural change, however slight.

3. Toilets Exploring Mindsets on Human Bodily Waste

In the previous chapter, I explained the methodological framework and research design, outlining the structure of the Research-by-Design over successive cycles. This chapter concerns the first of three *Design Explorations* and is titled: *Toilets Exploring Mindsets on Human Bodily Waste*. A *Design Exploration* is a combination of Research-by-Design actions to explore and trace a subject through architectural design to challenge toilet habits at the site of the case study. The first *Design Exploration* tests the contemporary norms surrounding the toilet at the Blikfabriek and is created to challenge the status quo by asking participants why certain toilet designs are (not) acceptable. To introduce the chapter, I will guide you through the *Critical Cartography* by exploring the journey of bodily waste in Flanders, from the toilet to a water treatment plant. I have created a navigation through cut-outs of the drawing, using numbers in the text. I will begin with a brief history of the flushing toilet system, explaining how this wastewater system came into being and how historical design decisions continue to shape the built environment.

3.1 Setting the Context by Critical Cartography

Since this research concerns the creation of new toilet habits, it ventured from an exploration of contemporary toilet habits tied to infrastructural systems **1**, and an examination of how these systems have emerged and evolved over the years. In terms of the flushing toilet, Barbara Penner (2012) states that we should question not only how this technology was established, but also how it became so ‘locked in’ that further change and progress came to seem impossible. She notes that, as initial investments in this large-scale wastewater infrastructure were immense, it has hardly changed since its implementation, despite evolving circumstances making change desirable. The decision to adopt this system many years ago still has a significant impact on the built environment today. In *The Smallest Rooms in the Big City*

[Dutch: *De Kleinste Kamertjes in de Grootstad*], historian Claire Billen and geographer Jean-Michel Decroly (2003) describe the emergence of public toilets in Brussels, the capital of Belgium. Following this material implementation, they highlight the cultural and ideological changes that prompted the disciplining of bodily functions, including defecation. The brief history listed under the following subheading is based on the historical events described in their book.

The Rise of the Flushing Toilet and Sewers in Urban Areas: A Brief History

Billen and Decroly (2003) begin their history of public toilets in Belgium in the Middle Ages and the beginning of the Modern Era, where it was still common for people to relieve themselves in the street. This visible and odorous presence of human bodily waste largely defined the built environment in cities. In terms of waste management, rivers and branches served to carry waste away. At this time, the capital of Brussels was becoming increasingly urbanised, and its population was growing. The city could no longer locally absorb the amount of manure produced by its inhabitants. With epidemics like the plague ravaging Europe, the disturbing odour of human bodily waste quickly led to expressions of fear. Faced with difficulties in overcoming this waste problem, the city of Brussels had to invent new sanitary customs and increasingly complex regulations.

At the same time, Billen and Decroly (2003) describe how the privileged class felt aversion towards lifestyles that allowed bodily functions to be performed in public and sought to distinguish themselves through refined manners. They wanted to distance themselves as much as possible from anything or anyone considered dirty. By the 18th century, the privileged class had latrines or ‘privies’ at home, hidden away in their cloakrooms and completed with ingenious systems to prevent any contact with the smell of their bodily waste **2**. As such,

Fig. 19: Snapshot from the *Critical Cartography of the wastewater system in Flanders*.

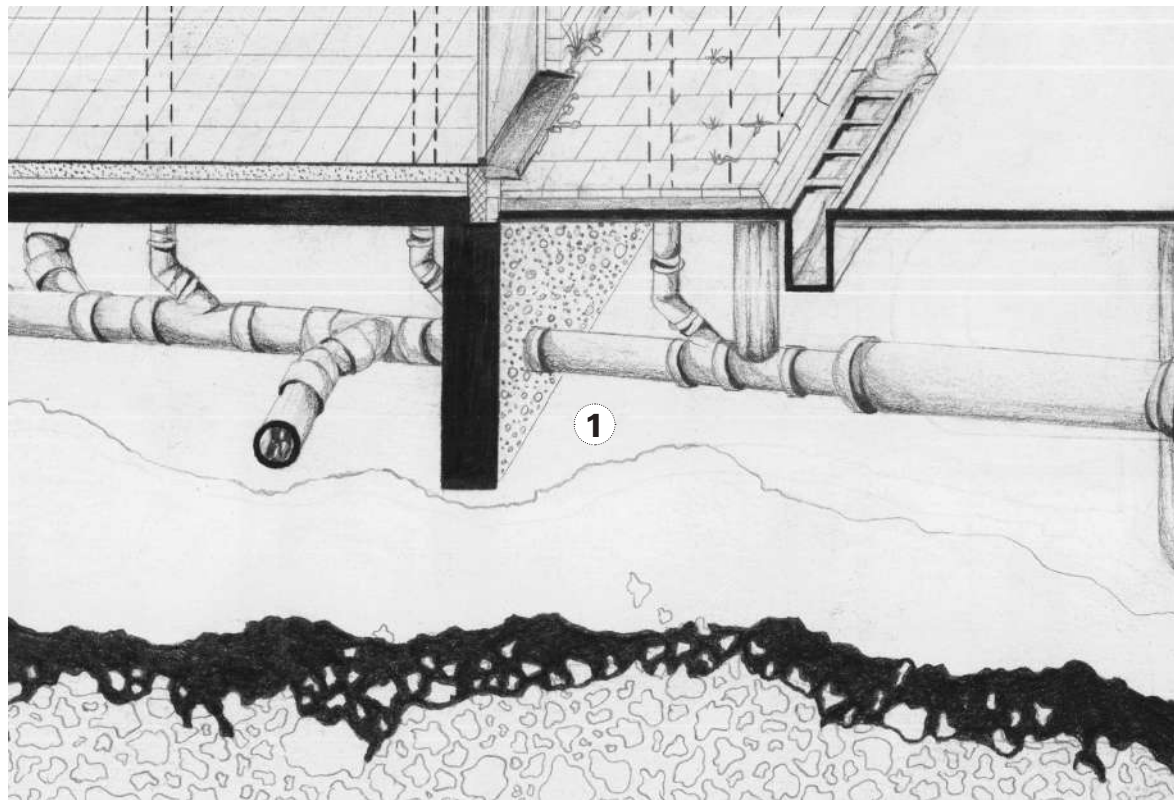
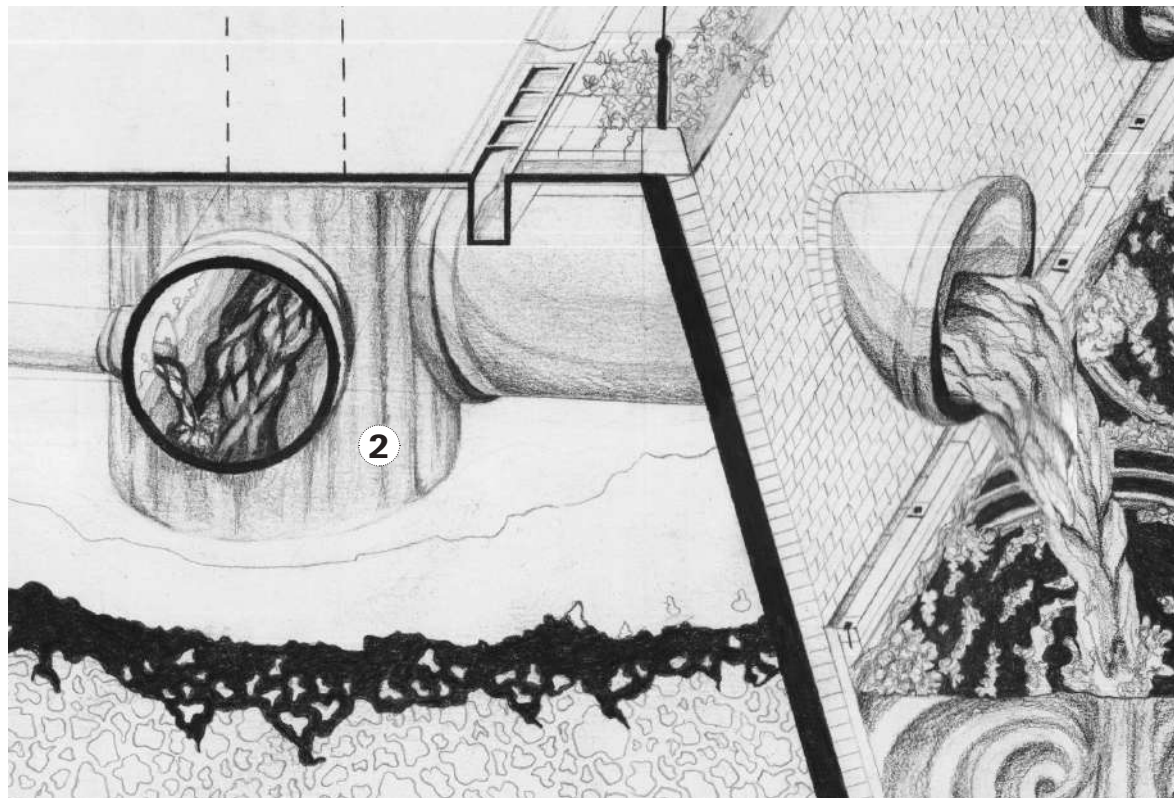


Fig. 20: Snapshot from the *Critical Cartography of the wastewater system in Flanders*.



the cultural concept of cleanliness emerged. The 19th century became the era of public toilets in Brussels, according to Billen and Decroly (2003). The city authorities installed public urinals on pavements and promoted new sanitary values to improve overall hygiene in the city. Following the example of Paris, a leader in the field in Western Europe, health education had a significant impact on addressing public urination and defecation. The city of Brussels combined medical ideas about smell with moral arguments, presenting modesty as an important civic value. To support these new sanitary habits, the city implemented policies and imposed punishments for offending the public. With this, the vocabulary to describe human bodily waste and related topics was replaced with euphemistic language. The toilet object and space were translated into the washroom, privy, netty or loo, and the use of a toilet was cryptically described as going to the restroom, powdering your nose, or relieving yourself.

The municipality initially promoted these public facilities as focal points of innovation, progress and cleanliness. However, nobody wanted to be associated with the urinals, nor did they want them in their street or neighbourhood. As the mindset of the general public did not align with or accept the implementation of these designs, the city council felt obliged to remove them just a few days after installing them. Billen and Decroly (2003) explain that very little is known about those first urinals, as no list was ever drawn up. They note that, for reasons of modesty, it was at that time considered unthinkable to talk openly about matters relating to the sexual organs and their functions. In this context, I discovered that not only is the design of public toilets an understudied topic, but it is also largely absent from archives.

Based on what is known about the urinals, Billen and Decroly (2003) set out what I interpret as initial design strategies employed by the city of Brussels to make these unwanted facilities more acceptable to its inhabitants. The decision to install urinals was linked to the fact that public toilets at that time were primarily intended for men. To make the urinals more acceptable, they were designed to blend into the built environment and be invisible in the streetscape. Initial designs even attempted to combine the urinals with other economically viable functions to make them more appealing (Fig. 21). In want of changing sanitary habits, the city authorities first installed urinals in places where they were most noticeable. Over time, however, residents demanded that the urinals be relocated to narrow streets where there were no pavements ③. This evolution of

where urinals were installed indicated a growing concern to shield public toilets from the sight and smell of passers-by. When Brussels and other cities realised that increasing the number of public urinals did not fundamentally improve the sanitary situation, the focus to cope with human bodily waste shifted from the public to the private sphere. The 20th century, therefore, focused on bringing toilets into households and disposing of wastewater underground and out of sight ④. While the first semi-underground systems caused many problems due to the narrow diameter and irregular slope of the pipes, the city of Brussels later chose to follow London's example. This sewerage system relies on kilometres of underground sewers to dilute and remove waste through water flow. Following this implementation, the Belgian capital had a modern water distribution network and an effective sewerage system.

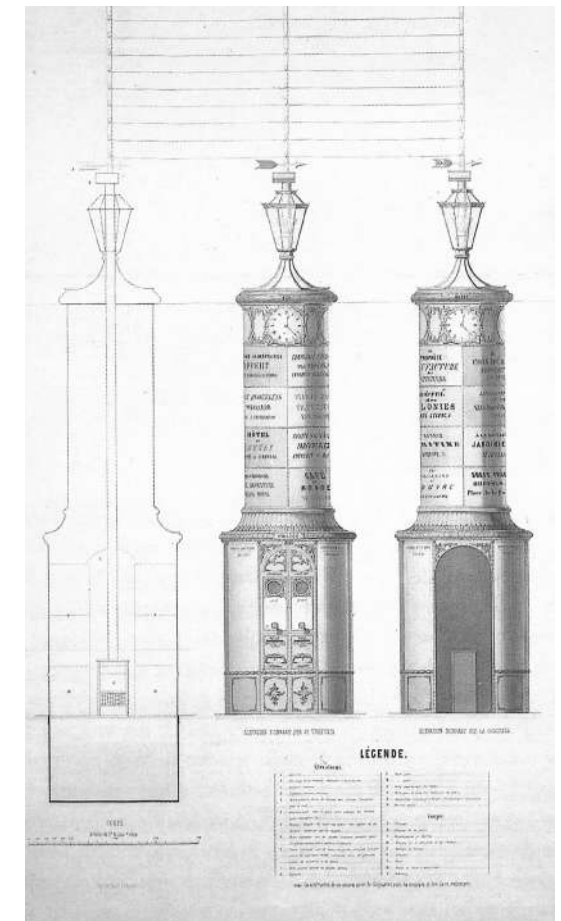
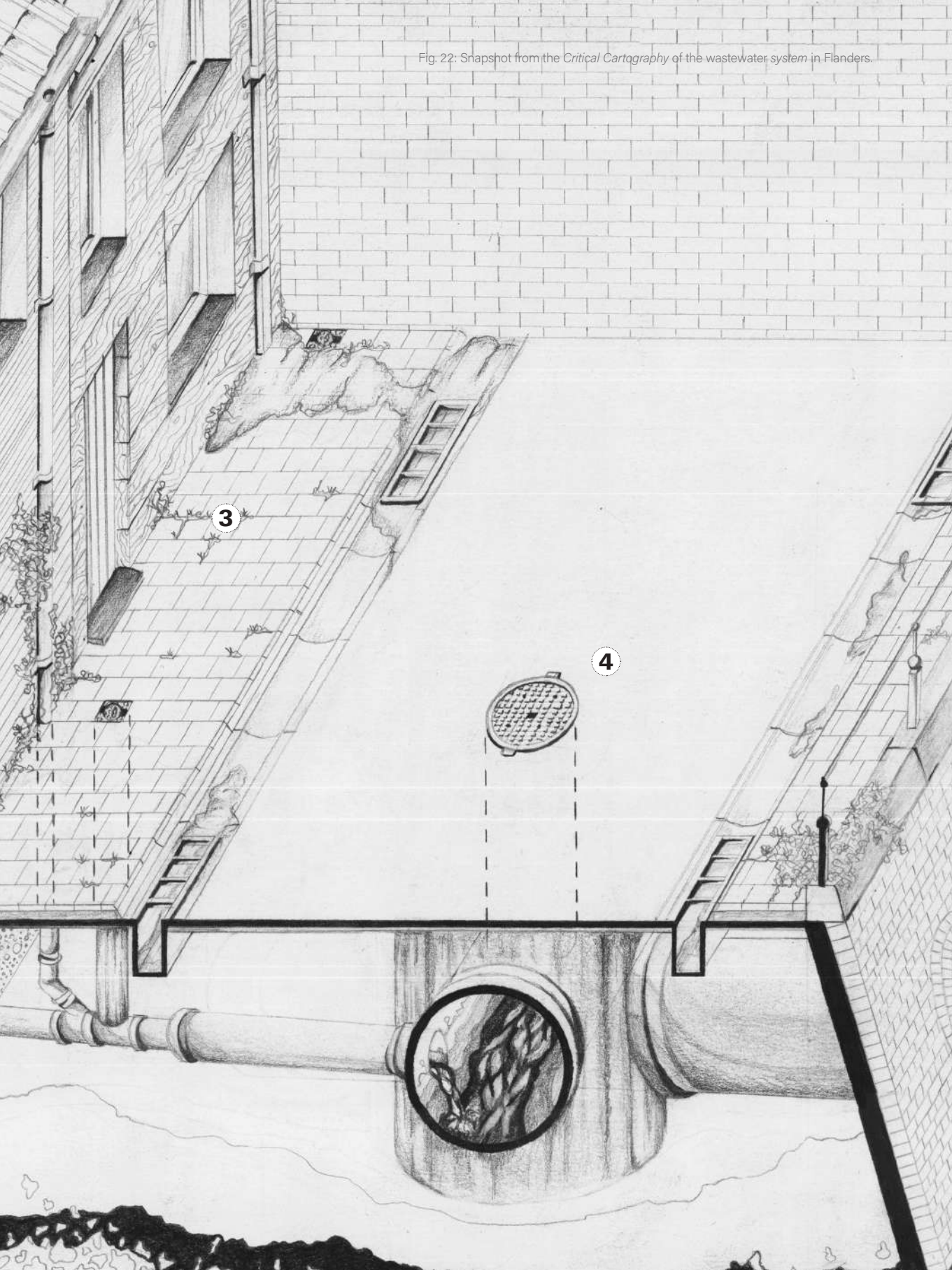


Fig. 21: *Utility Columns* [French: *Colonnes Utiles*] as structures assigned to public services and needs (1870-1900) in Billen and Decroly 2003: 40.

Fig. 22: Snapshot from the *Critical Cartography* of the wastewater system in Flanders.



When flushing toilets were first introduced to the private sphere, architects excluded kitchens and toilets from their area of expertise. As Billen and Decroly (2003) state, architects were primarily focused on aesthetics and deemed such mundane details to be less important. Waste disposal and toilets were confined to whatever space remained rather than being deliberately designed, setting a cultural precedent for later approaches to toilet design. Although the privileged class was the first to have private flushing toilets, they initially preferred the chamber pot system. They found this familiar and comfortable since they had domestic staff to empty the chamber pots. The convenience of being connected to the water supply and drainage networks, however, coupled with the variety of sanitary appliances available, ultimately convinced them to accept and ingrain the flushing toilet system. Despite a difficult start, the flushing toilet gradually became established. From 1936 onwards, every house in Brussels was required to be equipped with a ‘water closet’, or WC, making the flushing toilet a compulsory facility.

While the history of the flushing toilet demonstrates that implementing infrastructural – and, consequently, habitual – change is difficult, particularly concerning long-standing habits, it also highlights the strategies employed by the City of Brussels to promote new sanitary facilities. The history above is relevant to this research as it describes how the city sought to introduce new habits to deal with human bodily waste in an urban context, at a time when it was challenged by population growth. Whereas this overview describes an increasing need for a new waste management system in the interests of hygiene and human health, this doctoral research, *Architecture Drawn from the Toilet: Challenging Mindsets by Critical Design*, is set in a different era and is characterised by contemporary challenges. Today, in 2026, the sewer infrastructure is outdated, with some sewers even dating back to their construction in 1860. Due to climate emergency and population growth, this system to evacuate and treat wastewater is no longer sustainable ⑤ and is now facing infrastructural collapse (Verlinden and Vanoppen 2021). This underground system relies on an extensive network of sewers and pipes hidden beneath the streets and pavement, making it difficult and highly expensive to update ⑥.

Infrastructural Systems to Cope with Human Bodily Waste in Flanders

To discover the underground wastewater system in Flanders, I have drawn up a *Critical Cartography*, of which cut-outs are spread throughout the introduction of this chapter. Geographically, Flanders is the northern region of Belgium and is a densely built-up area with a population density of 504 inhabitants per square kilometre (Flemish Government 2025). The drawing was created to map and string together all relevant aspects to display the flushing toilet system and its accompanying habits. The process of drawing the underground was greatly hindered by the fact that precise information on the sewer network remains hidden, and responsibility for it in Belgium is extremely fragmented.

Venturing from an architectural section of a house, the *Critical Cartography* reveals the strict separation of rainwater, grey water, and black water, which are channelled to the underground via separate pipes ⑦. As in many other urbanised contexts, flushing toilets are widespread in Flanders, using six to eight litres of drinking water per flush ⑧. In total, this accounts for 30 to 40 litres of drinking water used for flushing per person every day, forming part of the 90 litres of water used by the average Belgian each day in 2023 (VMM n.d.). From here, wastewater flows through complex plumbing systems inside the walls and into underground pipes. After sedimentation in a septic tank, the water passes through an inspection pit located between the house and the street ⑨. For users, this marks the end of their responsibility for the wastewater, which continues its way to long-distance treatment plants (VMM 2019) ⑩. Following this way of evacuating wastewater, for users and producers of bodily waste, it is not clear where this wastewater heads to, how it gets there, and who is responsible for it after it has been flushed away. This sustains a ‘flush-and-forget’ attitude towards the management of their bodily waste.

In Belgium, sewage management is dispersed, with different sewer operators responsible for different provinces, which greatly complicates wastewater regulation. The Flemish Government aims to progress to a separate sewer system, whereby wastewater and rainwater are collected separately. As explained by water researchers Toon Verlinden and Marjolein Vanoppen (2021), however, only 10 per cent of sewers in Belgium were divided in 2021. This means that

Fig. 23: Snapshot from the *Critical Cartography of the wastewater system in Flanders*.

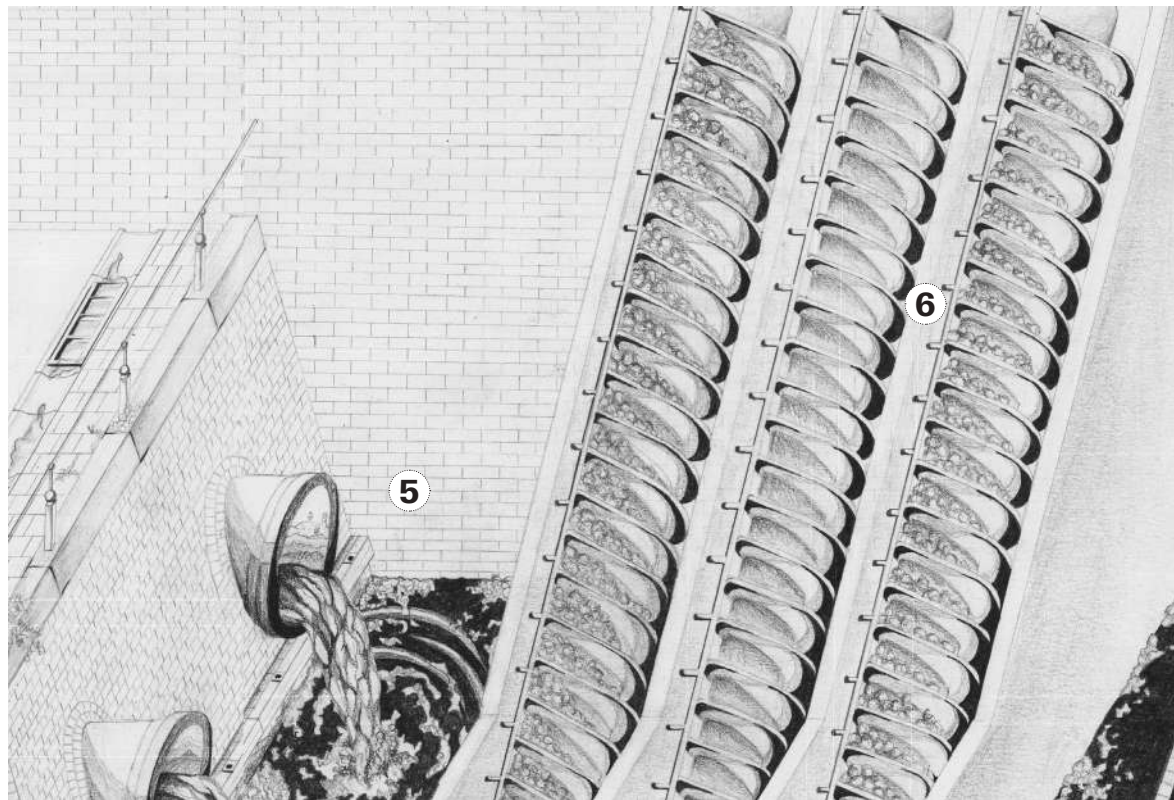
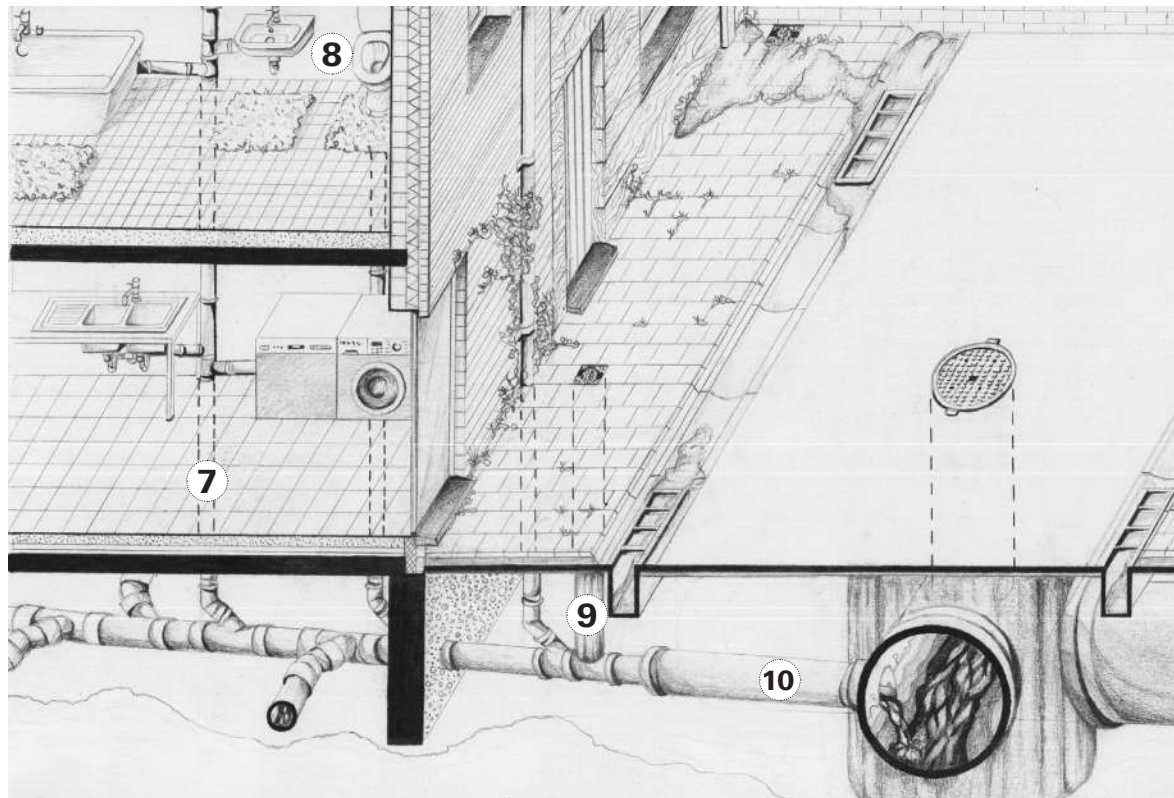


Fig. 24: Snapshot from the *Critical Cartography of the wastewater system in Flanders*.



rainwater and wastewater still merge in 90 per cent of sewers beneath the streets, creating a mixture that is diluted and therefore far more difficult to treat.

Due to the climate emergency and population growth since the Flemish sewage system was built, sewers now exceed their capacity far more frequently than could have been predicted (Ibid.). In such situations, rainwater and diluted wastewater are evacuated into nature to protect the underground infrastructure and built environment ¹¹. Because of climate change and heavy rainfall, these overflows are occurring at an accelerated rate. This means that even when houses are connected to the sewer system, their wastewater still ends up in nature in times of abundant inflow. Furthermore, as of 2022, 400,000 households in Flanders were not connected to the sewers, meaning they discharge their untreated wastewater directly into the natural environment (Verelst 2020). In 2025, this still accounted for twelve per cent of all Flemish households (Demeulemeester 2025).

According to Verlinden and Vanoppen (2021), 46,000 kilometres of sewer pipes have been laid to connect almost 90 per cent of the Flemish building stock to the sewer system ¹². Although Flanders covers just 14,000 square metres, this length is equivalent to the circumference of the Earth plus an additional 6,000 kilometres. The smallest room in the home is thus much more prominent underground, due to the large number of sewers required to transport waste outside the city (Persoone 2023).

Aside from the underground network, a lot of urban development has also taken place above ground in this densely built-up area, resulting in the soil being heavily paved. Specifically, Verlinden and Vanoppen (2021) state that 14 per cent of Flanders' surface area is covered by paved roads, driveways, houses and businesses, which is twice the European average. Consequently, rainwater does not have the opportunity to seep into the ground as it is swiftly drained via sewers and transported to wastewater treatment plants ¹³. From there, it rapidly flows into streams, rivers, and eventually the sea. Thanks to the sewage system, Belgium has become an expert in quickly draining water. While this technological skill has saved us a lot of flooding in the past, Verlinden and Vanoppen (2021) argue that it is now coming back to haunt us. The excessive paving of our built environments today prevents litres of rainwater from penetrating the soil. As a result, Belgium has been

classified by the World Resources Institute as a region with 'high water stress' (Ibid.).

Through this investigation and navigation using *Critical Cartography*, I not only want to demonstrate that centralised wastewater treatment systems are outdated and unsustainable, but more importantly, that they perpetuate our collective obliviousness to the issue (Persoone 2023). With this research, I therefore address the broader lack of accountability surrounding human bodily waste, which is materially supported by current wastewater infrastructure ¹⁴. As Barbara Penner (2012) argues, the ultimate goal of the flushing toilet system is to 'flush and forget', and our everyday routines, standards of hygiene and understanding of civility are all based on this ordinary fact. This way, she states that the flushing toilet system is designed to render not only the user but also the impact of use invisible.

While more sustainable alternatives to the flushing toilet system already exist, such as constructed wetlands or composting techniques, they are not yet widely adopted in a real-world context. This is largely because the general public's mindset does not align with their implementation, obstructing any change to the current toilet system. Yet, recent newspaper articles increasingly problematise the current infrastructure for being destructive to the environment (Verelst 2020), emphasising that awareness of sewage pollution is growing and that perspectives are noticeably shifting. Broader infrastructural or systemic change, however, is still struggling to be implemented.

Focusing on a cultural approach, this research aims to challenge and loosen unsustainable, ingrained habits that are left unquestioned and currently obstruct change. By shaping new toilet habits, it seeks to materially support those changes that are struggling to come into being by investigating how architectural design can effectively trigger a shift in mindsets regarding how we deal with human bodily waste. In response to the current unsustainable flushing toilet system, outlined above, this research aims to reposition the toilet as a space that holds users accountable for what they leave behind.

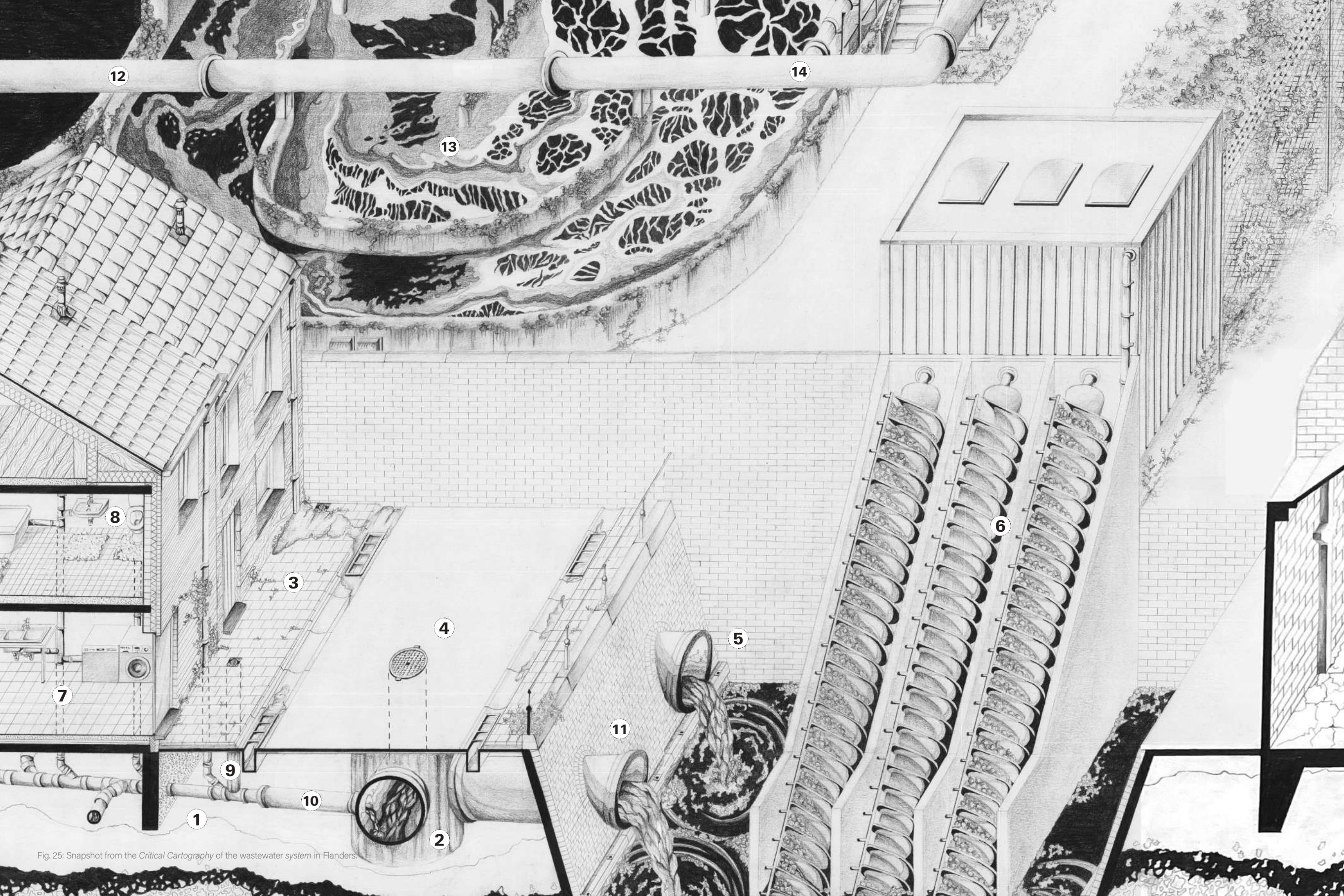


Fig. 25: Snapshot from the *Critical Cartography* of the wastewater system in Flanders.

3.2 The Case of the Blikfabriek in Antwerp, Belgium

The research is grounded in the former factory site of the Blikfabriek in Antwerp, Belgium, which serves as an urban and semi-public case study. One of the case study's key ambitions is to organise the site and its operations in the most sustainable and self-sufficient way possible, with the ultimate goal of becoming off-grid. Due to the wide range of activities taking place on site, the Blikfabriek attracts large numbers of visitors, with over 1,000 people each week. Consequently, this semi-public community space produces substantial volumes of waste. The site relies on multiple kitchens and catering facilities (Fig. 26), which generate considerable quantities of organic waste, including food waste and human bodily waste. This presents a significant challenge within the case study with regard to the storage and treatment of waste produced on-site.

Real-world Issues and Concerns

From the ambition to reduce reliance on municipal waste collection and the conventional sewer system, the team of the Blikfabriek aspires to retain and treat all organic waste on-site. They began experimenting with public composting toilets as a potential solution.

Yet, in contrast to the current wastewater treatment system, which enables a 'flush and forget' attitude, retaining human bodily waste on-site presents a drastic change, both spatially and psychologically. It introduces a new habit of dealing with human bodily waste that is unfamiliar to the mindsets present on-site and culturally stigmatised as dirty or even dangerous. As a practical consequence, the composting facilities are rarely used by visitors and are sometimes even avoided by organisers themselves. The composting toilets are thus not accepted by the general mindset of the audience present on site, who instead prefer and heavily rely on the conventional flushing toilets inside.

Within this context, I was introduced to the Blikfabriek in 2021 by architect Jan Dekeyser as part of the project *DE STELLING* [English: The Scaffolding], which brought together people from diverse fields to collectively reflect on alternative futures of working and living together. This reflection included the question of how to cohabit with living matter, such as organic and human bodily waste. This provided a real-life context for this research and a practical challenge to address through design. Focusing on forms of cohabitation with human bodily waste in an urban context, the situation of the composting toilets drew my particular attention. The Blikfabriek team invited me, in my role as design



Fig. 26: One of the kitchens and catering facilities at the Blikfabriek site. © Lies Augustus



Fig. 27: The terrace on the main square of the former industrial site of the Blikfabriek in Antwerp, Belgium. © Lies Augustus



Fig. 28. The terrace on the main square of the former industrial site of the Blikfabriek.
© Lies Augustus

Fig. 29: The composting toilets at the Blikfabrik, located in a corner of the central square, next to the terrace and catering facilities.



researcher, to develop a new design for the public composting toilets, as they considered the existing ones to be a failed experiment. They hoped that a more architectural design would persuade visitors to use the composting facilities, which could lead to these toilet alternatives being adopted in real-world contexts. In response to this request and in the context of exploring this issue, I am investigating the role that architectural design can play in shaping more sustainable toilet habits at the Blikfabriek site.

3.3 Toilets Exploring Mindsets on Human Bodily Waste

As outlined in Chapter 2: *Methodology and Research Design*, the research process is divided into three research cycles, or *Design Explorations*, which form the main body and structure through an iterative process over time. While I ultimately explore how architectural design can trigger a shift in mindsets regarding human bodily waste, each *Design Exploration* as part of the research has a distinct focus, revolves around specific sub-research questions, and investigates a different part and situation of the case study. In the research process, I began by creating speculative toilet designs, as part of *Design Exploration I*, and gradually progressed towards a design to be realised at a real-life scale, as part of Chapter 5 on *Design Exploration III*.

Situated Focus

“We are less likely to identify ideological positions within our own society and culture because they have become ‘normalised’.” (Crouch and Pearce 2012, original emphasis)

Design Exploration I constitutes the first research cycle and is developed to test contemporary norms around toileting at the site of the Blikfabriek case study. As I outlined above, we have gradually become accustomed to the high level of comfort and low level of responsibility that the flushing toilet system provides. We have become oblivious to its convenience and highly dependent on it, leaving the system largely unquestioned. As part of *Design Exploration I*, I therefore examine the deeply ingrained habits and routines that shape the way we deal with human bodily waste before they can be effectively

challenged and reshaped. In this research cycle, I introduce various toilet designs, or *Design Scenarios*, into the case study site to challenge the on-site status quo, raising questions and prompting negotiation around whether these designs are, or are not, acceptable to participants. By presenting the *Design Scenarios* as *Conversation Pieces*, my primary intention is to render these toilet designs discussible, as a first step, and perhaps even imaginable within the context of the Blikfabriek.

Methodological Process and Sub-research Questions

Methodologically, the Research-by-Design process unfolds from a literature review and fieldwork at the case study site to the development of *Design Scenarios*, or toilet designs, which are subsequently introduced and experienced as *Conversation Pieces* during discussion moments at the Blikfabriek case study. Through the literature review and fieldwork conducted as part of *Design Exploration I*, a series of observations emerged throughout the research process, prompting the following sub-research questions (1–3):

- 1. Following the observation that the spatial or visual absence of wastewater infrastructure in daily living environments results in a lack of awareness and accountability regarding waste treatment, what influence would explicitly rendering this infrastructure present through the design of toilets have on users’ mindsets?
- 2. How can architectural design reposition the toilet as a space that holds users accountable for what they leave behind, in the face of the current system’s ‘flush-and-forget’ attitude and obliviousness to human bodily waste?
- 3. What is the influence of the collective and public context on changing individual toilet habits in relation to the Blikfabriek as an urban and semi-public case study?

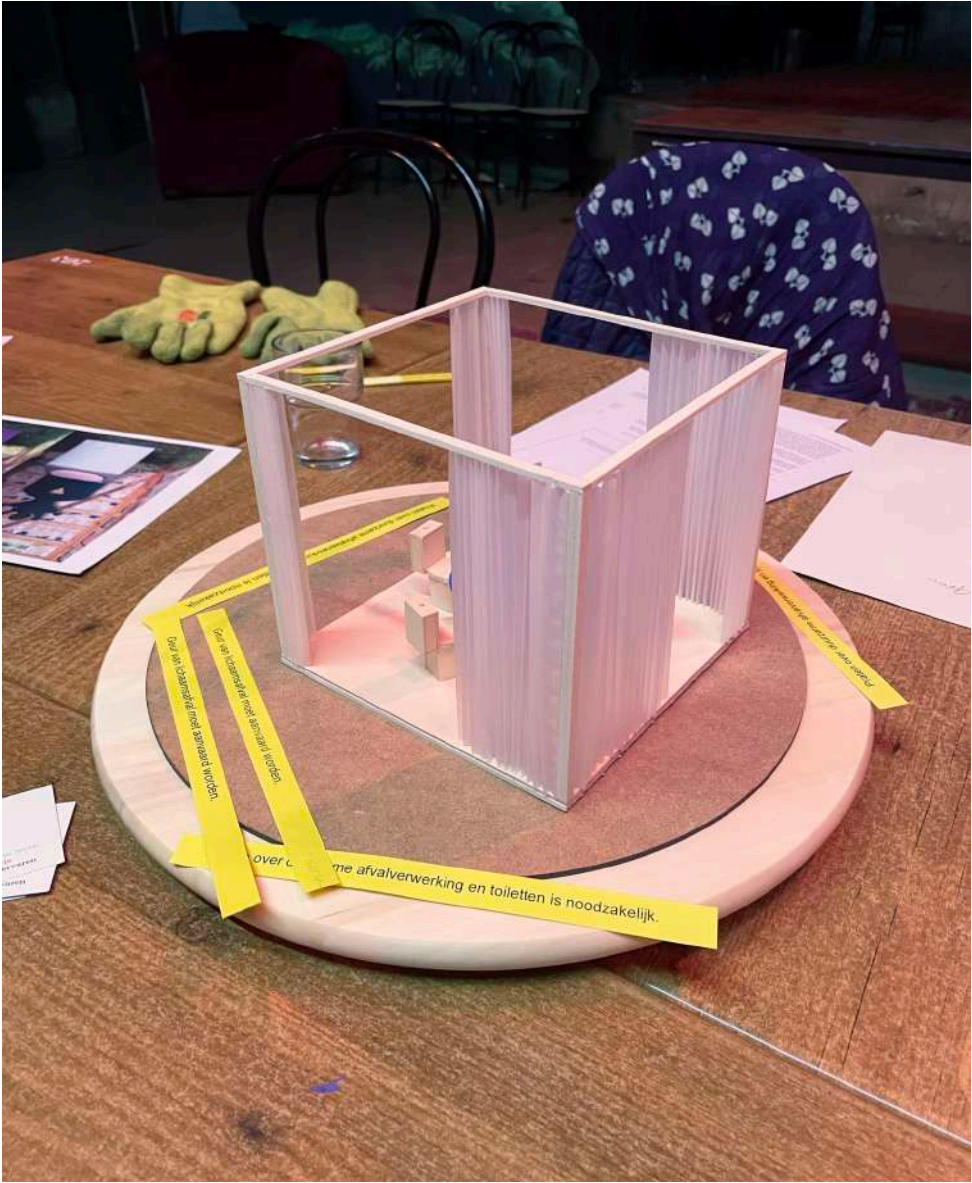
In response to these sub-research questions, I created an initial series of speculative *Design Scenarios*. This intensive design process involved a continuous movement between literature review, fieldwork, designing, reworking the design, and setting up design discussions at the case study site. Numerous preliminary studies and intermediate designs were developed over a period of months to advance the toilet designs as part of this chapter. Once finalised, I introduced

and presented the scenarios for discussion as *Conversation Pieces* at the Blikfabriek case study (Fig. 30). From these discussion moments, I produced transcripts and conducted a design analysis, resulting in the delineation of a first set of intermediate design strategies. These will be discussed at the end of the chapter and mark the conclusion of *Design Exploration I* and the beginning of *Design Exploration II*.

The overall aim of the *Conversation Pieces* is to stimulate dialogue and open minds to new perspectives and ideas. In raising the *Design Scenarios* for discussion as *Conversation Pieces* at the case study

site, I made deliberate design choices to facilitate conversation on this sensitive or taboo subject. Firstly, all *Design Scenarios* are grounded in the Blikfabriek site and revolve around specific problems and questions emerging from the case study. As such, the designs stand in direct relation to, and confrontation with, a real-world context, fostering a sense of reality and encouraging a more tangible imagination of the design proposals. Secondly, as the participants constituted a non-designer audience, the *Design Scenarios* needed to be sufficiently recognisable and comprehensible. Participants included toilet cleaning staff, members of the nature

Fig. 30: Architectural model of The Toilet as a Meeting Place (scale 1:33) presented as a Conversation Piece during discussion moments at the Blikfabriek.



conservation association Natuurpunt, members of the Blikfabriek community, and visitors to the site, among others. For this reason, the models materially articulate enough detail to function as discussable *Conversation Pieces*. Lastly, beyond the grounding and materialisation of the models, I consciously adopted the role of moderator during the design discussions to stimulate imagination. For instance, after briefly describing the toilet designs, I presented participants with a series of statements and invited them to relate these to the toilet designs displayed before them. Examples of these statements include:

- “Locally produced waste should also be treated locally.”
- “The use of drinking water for flushing toilets should be prohibited.”
- “Toilet spaces should be given adequate space.”
- “The size of a toilet space should be proportionate to the human body.”
- “Time spent on the toilet should not be limited.”

I invited participants to respond to these statements by linking them to a specific *Design Scenario*. I used the statements as prompts to initiate reactions to the toilet designs, to identify their main concerns and values. As the discussions progressed, I asked participants to evaluate the proposals by articulating their reasons for accepting or rejecting them, while also introducing techniques to stimulate imagination. For example, I posed questions such as: “Imagine you were using the design, what stands out?” or “Imagine you could alter the design, what would you change?” Through this moderated process, the discussion gradually shifted from a general conversation about a sensitive and taboo subject to an active imagining of the *Design Scenarios* within the urban and semi-public context of the Blikfabriek.

Setting the Scope of the Research-by-Design

Before discussing the toilet designs in detail, I once more want to set the scope of this Research-by-Design, acknowledging that the subject of the toilet spans multiple areas. Because the toilet spatially represents a daily habit, many people can relate to it and have personal experiences to share. As a result, similar anecdotes and related topics frequently recurred in the design discussions. Some of these, however, fall outside the scope of this research, investigating the

agency of architectural design in triggering a shift in mindsets regarding how we deal with human bodily waste. In examining the case of the toilet, I specifically address the broader lack of accountability surrounding bodily waste, which is materially supported by current wastewater infrastructure. Although awareness of sewage pollution is growing and perspectives are noticeably shifting towards more sustainable attitudes, systemic change is still awaiting. The research ambition in this context is not merely to design more sustainable toilets but to materially and spatially shape other habits through architectural design, as a way to trigger a shift in mindsets.

As this research is critical of current toilet habits and their harmful impact on the environment, issues such as gender or disability inclusivity are considered, but are not at its centre. In Chapter 2: *Methodology and Research Design*, I briefly touched upon the role of architecture in working towards normalisation. Here, I referred to gender-inclusive toilets as real-world examples of how architectural design can disseminate values of equality. While issues of gender and inclusivity are important in the design of (semi-) public toilets, under study in this research, their in-depth exploration falls outside the scope of this research. These topics are therefore considered insofar as they are addressed by current regulations, but they are not redesigned. In terms of gender inclusivity, all toilets designed in this research are gender-inclusive and are therefore not segregated by sex or gender. They are designed to accommodate and include all genders, recognising that multiple genders exist and that everyone should have access to public toilets.

Especially when moving from speculation towards the realisation of public toilets to be implemented on the site of the Blikfabriek in *Design Exploration III*, issues of accessibility and inclusivity in toilet spaces became increasingly important. In terms of accessibility regulations, crucial developments took place during the 20th century, most notably with the American ‘Disability Act of 1990’, which contributed to making public toilets more inclusive for diverse human bodies (Penner 2012). Influenced by this societal shift, current Flemish regulations state that at least one accessible public toilet should be integrated, including access for people with a stoma, wheelchair users, elderly people, and those travelling with young children, among others (Inter n.d.). In response to this regulation, I ensured that at least one toilet per *Design Exploration*, or series of toilets, was

designed as an accessible semi-public toilet. Across the three research cycles, these accessible public toilets include: *The Smallest Hidden Room* (Chapter 3: *Design Exploration I*), *The Design Scenario of Post-Industrial Care* (Chapter 4: *Design Exploration II*), and *The Wasteful Toilet as a Sterile Environment* (Chapter 5: *Design Exploration III*).

The emergence of menstrual inclusivity has likewise been considered, drawing on *Menstrual Dirt* (2022) by sociologist Josefin Persdotter, by providing diverse facilities to address menstrual needs. Improving menstrual inclusivity in toilet design or policy, however, is not the focus of this research. The same applies to the design of the most ergonomic and comfortable toilet. This is not part of the Research-by-Design process, which takes a critical design approach to challenge existing habits and user-centred desires for comfort. I am also aware of how cultural differences are increasingly shaping the design of public toilets in an ever-changing society. This research, however, focuses on a very local micro-culture: the Blikfabriek in Antwerp (Belgium). When designing toilets for this case study, I consider that Antwerp is a majority-minority city, meaning multiple minority groups combined make up over 50 per cent of its population (Geldof et al. 2023).

As indicated in Chapter 1: *Introduction*, I am also aware of recent developments in high-tech toilet research and have incorporated some technologies and inventions to explore their potential as sustainable alternatives. The research, for instance, includes waste treatment systems and technologies such as thermophilic composting techniques combined with bio-heap systems, constructed wetland techniques, and PeePower batteries that convert urine into electricity (UWE Bristol 2017). In integrating these techniques, however, I refrain from adopting them in a techno-solutionist manner. Rather than deploying these technologies as a ‘quick fix’ or solution to structural and cultural change, I approach them as more sustainable alternatives to the current flushing toilet system. In this sense, the research remains grounded in the premise that architecture should not be addressed solely through technological means, but must also be approached culturally, as a way of supporting long-term changes in patterns of inhabitation.

To review, the focus of this research is to challenge current ‘flush-and-forget’ habits surrounding human bodily waste, whether in toilets for people with disabilities, gender-inclusive toilets, or other

toilet spaces. It addresses both the environmental effects and the lack of accountability embedded in contemporary toilet habits across all user groups and spaces that rely on this unsustainable system. Specifically, I examine the spatial and material consequences of supporting a shift away from the mindless evacuation of human bodily waste beyond the boundaries of users’ responsibility. In doing so, I seek to shape new toilet habits from a socio-ecological perspective, create alternative spatial values, and reposition the toilet as a space that holds users accountable for their bodily waste.

The choice of wording for ‘human bodily waste’ and ‘to relieve oneself’ herein encompasses a diverse range of experiences and bodily matter or fluids, including urine, faeces, and menses, among others. More broadly, ‘toileting’ is a wide-ranging subject that extends beyond urination and defecation to include, for instance, menstruation, potty training, changing stoma bags, and changing diapers. Where I address these activities and matters generally throughout the thesis, I do in fact mean the wide variety in bodily functions that take place in toilet spaces. This deliberate choice of language is linked to the fact that existing toilet terminology is often either too medical and distant, such as ‘to have a bowel movement’, or too blunt, such as ‘pooping’ or ‘peeing’, which are typically only socially tolerated for children up to a certain age. For this reason, and partly because of its more natural connotation, I refer to going to the toilet as ‘relieving oneself’.

3.4 Design Scenarios as part of Design Exploration I

In the following section, I present five *Design Scenarios*, or toilet designs, which I have raised for discussion by participants as *Conversation Pieces* at the site of the case study. The designs are accompanied by direct transcripts of the reactions that emerged during the discussions around the conversation table, on smaller pink pages. These conversational excerpts are presented alongside a reasoned analysis and discussion of the *Design Scenarios*. Before the analysis, each *Design Scenario* begins with images of the toilet design and an experiential description written in the second person, where ‘you’ refers to you, the reader, inviting you into the envisioned toilet experience.



Fig. 31: Fragment of the architectural model of *The Smallest Hidden Room* (scale 1:33).

Hidden away deep between two thick walls, you discover a door marked with the word 'WC'. It opens to a small room with a toilet and sink. Furthermore, there is a toilet roll and a mirror mounted on the wall, a small waste bin tucked in the corner, and a footstool for when seated on the toilet. At first sight, it's a cosy little space where no one can disturb you once you've locked the door. Nothing unfamiliar.

Having closed the door, you notice that there is, in fact, something peculiar about the room. There is no noise whatsoever from the outside. It is as if you have left the world waiting outside, so you can just let go and relax for a moment. Once seated on the toilet, you now understand the thickness of the walls in a new way. The complete acoustic seclusion in this modest room puts you at ease while relieving yourself.

“Bathrooms, far from being straightforward pieces of technology, are culturally determined and historically specific.” (Penner 2012)

Like in other regions in urbanised Western Europe, the toilet is in Flanders traditionally known as ‘the smallest room’ of the home. As I discussed in a paper titled *The ‘Thigmophilic’ Composting Stove* (Persoone 2023), which explored the comfort and love of nesting in small spaces, we can experience the greatest feeling of rest in this tiny toilet space while relieving ourselves. Locking ourselves up in the toilet space, it allows us to keep the whole world at a distance by simply turning the ‘occupied’ sign. In Flanders, this private room often has a subordinate role towards the other functions in the home. The object of the toilet is hidden between four walls and is stigmatised by shame and embarrassment because of the unspeakable action happening inside. Throughout history, many names have been made up to keep this natural act as private and concealed as possible. The toilet object and space have been translated into the washroom, privy, netty, or loo, and the use of a toilet has been cryptically described as going to the restroom, powdering your nose, or relieving yourself. Though it covers one of our most elemental human needs, the toilet is enclosed and hidden away in our architecture as well as in our use of language (Ibid.).

In response to the culture of shame and prevailing toilet norms surrounding human bodily waste, the design of *The Smallest Hidden Room* is created as an ideal toilet space for users. The design reflects contemporary needs and desires in toilet spaces through features such as thick insulated walls to ensure privacy, a footstool for ergonomic reasons to facilitate bowel movements, a sink and bin addressing menstruation needs, and fragrance sticks to conceal odour. In the toilet space, there is neither confrontation with bodily waste produced nor transparency or awareness of how waste is treated after evacuation. This enables a ‘flush-and-forget’ attitude, as there is no accountability for what is left behind. In discussions on this *Design Scenario*, participants naturally interpreted the design as a private toilet in a domestic setting. In this

P1:

A ‘noisy’ toilet visit is embarrassing. And then smell is another issue. Especially when it's someone else's smell... Or being able to see traces of someone else's ‘waste’ is definitely also a barrier.

P2: Yes,

and the toilet space must be warm and comfortable, without

P3: any time pressure.

Do you know that it used to even be called ‘t gemakske’ [English: “at ease”].

P2:

What would increase this feeling of being at ease, which is even necessary to ‘go to the toilet’, are cosiness and decoration.

P1:

“Home is where your toilet is”

P2:

Yes! Similarly to furnishing and decorating a home, you can provide an attractive toilet-style!

(P1, P2, P3: Blikfabriek Experts 2023)

P1:

I think that the goal is for people to use this toilet, and aesthetics are a big driver for people to partake in new things.

P2:

And I guess the hygienic part too. It can be a nice design and all that, but I think it must have a hygienic appearance.



Fig. 32: Architectural model of The Smallest Hidden Room (scale 1:33).

The Smallest Hidden Room

Hidden away deep between two thick walls, marked with the word 'WC'. It opens to a small toilet and sink. Furthermore, there is a toilet mounted on the wall, a small waste bin tucked and a footstool for when seated on the toilet. a cosy little space where no one can disturb you, locked the door. Nothing unfamiliar.

Having closed the door, you notice that there is something peculiar about the room. There is no noise from the outside. It is as if you have left the world behind, so you can just let go and relax for a moment on the toilet, you now understand the thickness of the walls in a new way. The complete acoustic seclusion in the room puts you at ease while relieving yourself.

“Bathrooms, far from being straightforward places, are culturally determined and historically specific.”

Like in other regions in urbanised Western Europe, Flanders traditionally known as ‘the smallest room in the house’. As I discussed in a paper titled *The ‘Thigmophilic’ Bathroom* (Persoone 2023), which explored the comfort and coziness of small spaces, we can experience the greatest feeling of privacy in a toilet space while relieving ourselves. Locking our door, it allows us to keep the whole world at a distance, turning the ‘occupied’ sign. In Flanders, this private space has a subordinate role towards the other functions in the house. The toilet is hidden between four walls and is stigmatised because of the unspeakable action. Throughout history, many names have been made for this space, but the act as private and concealed as possible. The toilet has been translated into the washroom, privy, nee, etc. The use of a toilet has been cryptically described as going to powdering your nose, or relieving yourself. Though it is one of the most elemental human needs, the toilet is enclosed in our architecture as well as in our use of language.

In response to the culture of shame and prevalence of privacy surrounding human bodily waste, the design of *The Smallest Hidden Room* is created as an ideal toilet space for users. To address contemporary needs and desires in toilet spaces, the design includes thick insulated walls to ensure privacy, a footstool to facilitate bowel movements, a sink and bin address hygiene needs, and fragrance sticks to conceal odour. In this design, there is neither confrontation with bodily waste produced nor awareness of how waste is treated after evacuation. It follows a ‘flush-and-forget’ attitude, as there is no accountability behind. In discussions on this *Design Scenario*, participants have interpreted the design as a private toilet in a domestic setting.

P3:
I don't understand
why the toilet should be
'aesthetic' because it's just some-
thing that we need? We all go
there every day whether we
want it or not.

P4:
Maybe the question
is: 'How do we get people to
want to visit that place?'. Today, toilets
are just places that we need to visit. We
don't really look for anything more there.
So maybe if we would implement new
type of toilets, we can put the fo-
cus on something else?

P1:
I think this toilet
takes up a lot of space. Espe-
cially, if we were to imagine putting it
in a house, or apartment? Today we have
a lack of housing, and a lack of space.
And usually, the toilet is then not
in the centre of attention...

P2:
If I were to
build a house on a lim-
ited plot, I would probably
also prioritise a bigger living
room, kitchen, or bedroom.

I think the toilet space is
what I would give
up first.

P3:
Even the number of
facilities in a toiletspace matter,
because maybe you also want to install
a bidet there? In Turkey, for example, we
have them integrated in the WC. So, it saves
space, but it also saves water in a way?
It's like taking a small bath or shower
or something.

P4:
Yes, also in warmer
countries, before you go in-
side a building, there are always
fountains at the entrance where
you can drink or wash your
hands, whatever.

P3:
In mosques,
for example, too.
You always have to
wash yourself be-
fore getting in.

(P1, P2, P3, P4: Students Master Design Studio
Sanitopia 2025)



Fig. 32: Architectural model of The Smallest Hidden Room (scale 1:33).

research, however, I focus on designing toilets for a semi-public case study. This distinction is crucial, as the requirements and expectations that shape the acceptance of public toilets differ significantly from those in private contexts. Public facilities are often distrusted precisely because they are shared by many different users, raising concerns about hygiene, control, and proper maintenance. In investigating the design of public toilets, these spaces are therefore also inherently tied to questions of whom – or what – we design for, and who is excluded by our design decisions. In response to the question of who or what this toilet design is ideal and desirable for, it represents a user-centred space, focusing solely on human needs. In this era of climate emergency, I argue that it is necessary to expand the relationality and impact of toilet spaces to include other living species and the wider environment, not just the human user. This is especially important given that the current flushing toilet system is no longer sustainable and will not remain reliable in the future.

The current system of managing human bodily waste is designed to render not only the user but also the impact of use invisible (Penner 2012). In *Bathroom* (2013), Barbara Penner charts the evolution of the toilet and the habits and lifestyles to which it gave rise. While in her book, she explores plumbing and water systems in architecture more broadly, in UK English the term ‘bathroom’ functions as a euphemism that conceals the toilet itself. As Penner (2012) explains, we have become accustomed to the limited responsibility that the flushing toilet system places on users, and our everyday routines, standards of hygiene, and notions of civility are built around this seemingly ordinary expectation. As I explained at the beginning of the chapter, attempts throughout history to alter the conventional toilet design have repeatedly been met with public resistance, even when changing circumstances made such design changes desirable. Because the flushing toilet and the comfort it provides are so deeply embedded in our architecture, infrastructure, and lifestyles, the prospect of changing it generates resistance and strong pushback from users (Ibid.). While Penner investigates changes in toilet design from a socio-political perspective, particularly gender issues in public toilets, this research intends to shape new toilet habits from a socio-ecological perspective, repositioning toilets as spaces that hold users accountable for their bodily waste.

Although the toilet is one of the most mundane architectural spaces and embodies a fundamental human need, its design has remained largely unchallenged in architectural design research. This is well expressed by AMO, the research branch of the architecture office OMA, who state in *Elements of Architecture* that “throughout history no architectural treatise has ever declared the toilet as a primordial element of architecture to start thinking from in relation to our present and future worlds” (Koolhaas et al. 2018: 1557). That the design of the flushing toilet remains largely unchanged can partly be explained by the fact that it concerns a routine performed regularly and deeply ingrained in our daily living environments, to the point that it is rarely questioned today. This entrenchment is further reinforced at a systemic level: even in terms of taxation, payment for wastewater treatment is included as standard, regardless of whether toilets are connected to the sewer

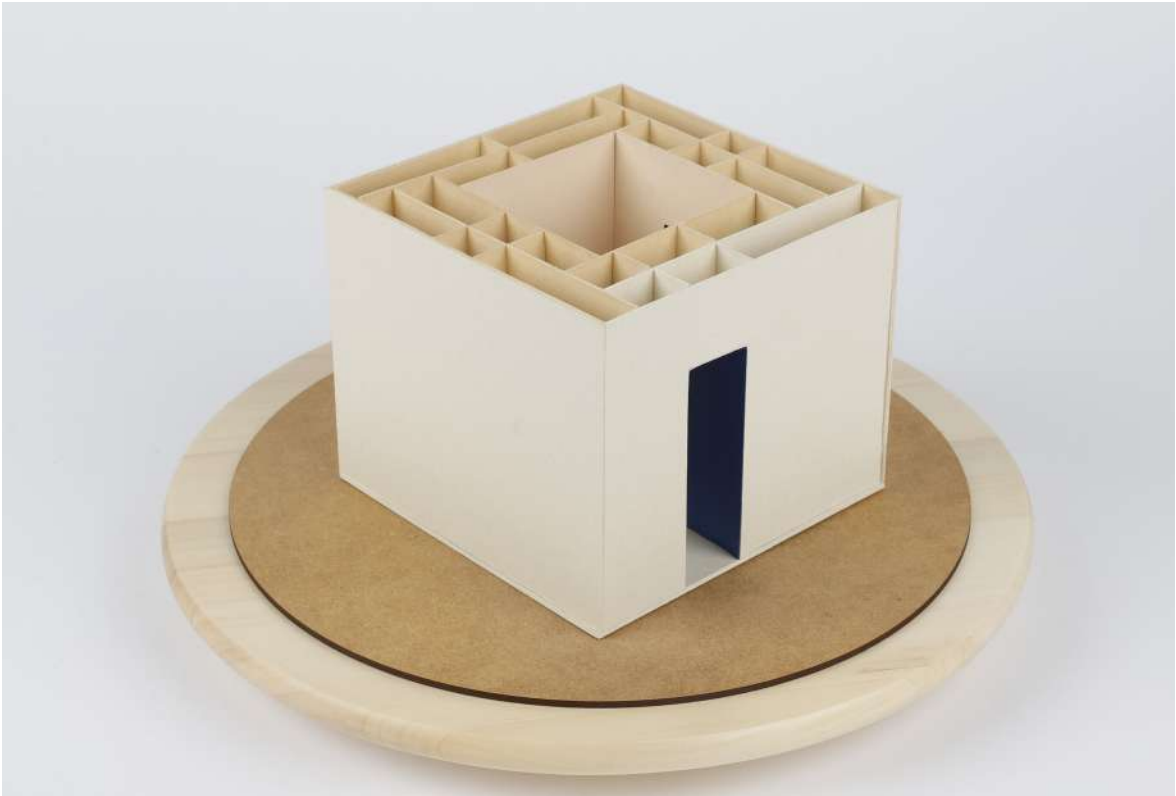


Fig. 33: Fragment of the architectural model of *The Smallest Hidden Room* (scale 1:33).



Fig. 34: Fragment of the architectural model of *The Smallest Hidden Room* (scale 1:33).

system (Pano 2020). Consequently, alternative toilet designs and waste treatment systems are neither actively promoted nor considered viable options. Public toilets, in particular, are often designed in a standardised way and copied with minimal variation. This standardisation is closely tied to the extensive regulations that govern their design and operation. More specifically, a toilet cubicle is typically compact, approximately 1.5 square metres, providing just enough room for a person to enter and sit, but little more. Depending on the context of use, these spaces may be further optimised to enhance accessibility, privacy, or comfort for users. Contemporary toilet design is largely shaped by governmental regulation (Penner 2012). Belgian legislation, for instance, specifies the required number of toilets in relation to visitor capacity and addresses issues such as gender separation and inclusivity. In addition, toilets are among the most functional features of our built environment, noticed mainly when they are different, missing, or not working properly. Consequently, our common expectation of toilets is that they should efficiently enable us to evacuate what we want to avoid, while providing users with comfort and control.

As a result, the appreciation of toilets is today often limited to purely functional spaces that serve to evacuate bodily waste and adhere only to user-centred desires. The practice of evacuating and treating wastewater underground, combined with the absence of visible wastewater infrastructures in daily living environments, sustains an obliviousness to the impact of this system and a lack of accountability for the bodily waste produced. In response, I seek to move beyond user-centred values with this research to reposition the toilet as a space that holds users accountable for their bodily waste. In shaping new toilet habits, I therefore question whether the presence and visibility of these designs and infrastructures in daily living environments can influence users' mindsets regarding human bodily waste.



Fig. 35: Architectural model of *The Smallest Hidden Room* (scale 1:33).

Upon entering the toilet space, a round table with five seats around it catches your eye. The room resembles a meeting room, separated from its surroundings by delicate sliding curtains. As is typical in meeting rooms, all the seats around the table face the centre. Suddenly, you notice each chair around the table is... a toilet?

Do you dare to take a seat on one of the toilets, being alone in the room? Or would you only be capable of doing so in communion with others? And then, with whom? There is one detail that heightens the unfamiliarity of this situation even more, and that is the toilet roll. In the middle of the table, there is only one toilet roll, as a shared commodity.

In contrast to *The Smallest Hidden Room* as the most ideal and user-centred toilet space, *The Toilet as a Meeting Place* is conceived as the most challenging *Design Scenario* within the cultural context under study. By gathering users around a discussion table and seating them on toilets instead of chairs, the solitary act of using the toilet is transformed into a shared experience. This stands in sharp contrast to the private experience we are accustomed to within a culture of shame surrounding toileting. Similarly, in *The Phantom of Liberty* (1974) by film director Luis Buñuel, the film's most famous scene depicts guests sitting on toilets around a dinner table, casually relieving themselves in front of one another, while eating is treated as something shameful that must be done privately in a separate room (Fig. 38). By reversing these habits, Buñuel challenges the idea that certain bodily functions are 'disgusting' or taboo while others are considered polite and civilised. His point is that these rules are not natural truths, but arbitrary social conventions that people blindly accept, and that what appears shocking or improper is often simply a matter of cultural conditioning. At the same time, Buñuel connects this mockery of polite habits to a broader critique of society: while people carefully adhere to etiquette, humanity is also destroying the environment and behaving irrationally in far more serious ways. The toilet scene is therefore not merely a joke, but a surreal means of questioning morality, normality, and the contradictions of civilised human behaviour.

In relation to this scene by Buñuel, *The Toilet as a Meeting Place* challenges the cultural limits of what is considered acceptable in a toilet, attempting to surface the absolute minimum requirements for its usability. Unlike user-centred designs, with this *Design Scenario*, I challenge what is commonly expected or considered desirable in public toilets. By deliberately disrupting toilet norms, the design tests the limits and effects of provocation. What spatial aspects of a design are shocking or provocative to someone will always be partly subjective and personal. Additionally, what is considered acceptable or provocative in a toilet depends on both the person using it and the context for which the design was created. As noted earlier, Johan Liekens introduced in his PhD thesis *Architecture's Provoking Instrumentality* a spectrum that extends

P1:
I think that new mind-sets, new ideas, or new habits, can only come from some provocation. Because, if it would align with the ideas that are already present in society, it would not introduce any difference. So, some provocation or shock to people is necessary for a new start.

P2:
I feel that oftentimes, when something is provocative, it splits the group in two, though. One loves it and another hates it even more, in a way.

P3:
I don't think provocation is necessarily the opposite of comfort. For instance, you can provoke something with a bidet, or with squatting toilets as well. They are in fact more hygienic because my hands don't touch anything, I flush with my foot and done. It's gone. But it can be provocative in the sense of that you're not used to seeing it. So, it's outside of our cultural comfort zone.

P2:
I mean, if you want to reach a broader public, with a design that is uncomfortable... Why would anyone be motivated to change? I think you must somehow invite people still, because it's not what you're used to, then you will stay in your comfort zone, but you don't really learn. For me changing your mindset is never comfortable.

P2:
I think it should be kind of a mix. You should be comfortable in it, but the design can still be different than what we are used to.

P4:
This will always depend on the person, but I think the broader public will always be afraid of change...

P2:
Even though we need to promote big changes in response to climate change, the reality is that change only happens in small steps.

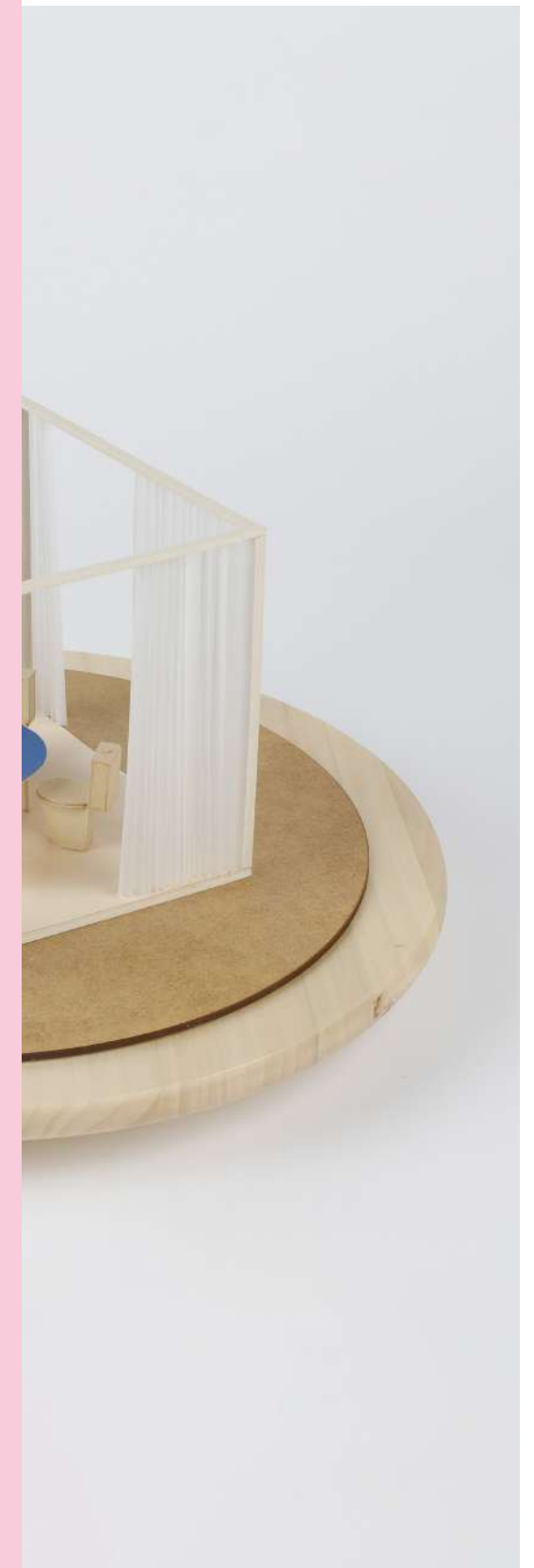


Fig. 36: Architectural model of *The Toilet as a Meeting Place* (scale 1:33).

The Toilet as a Meeting Place

Upon entering the toilet space, a round table around it catches your eye. The room resembles a meeting room, separated from its surroundings by double glass walls. As is typical in meeting rooms, all the people face the centre. Suddenly, you notice each person is... a toilet?

Do you dare to take a seat on one of the toilets in the room? Or would you only be capable of discussing the situation with others? And then, with whom? There is a heightens the unfamiliarity of this situation as the toilet roll. In the middle of the table, the toilet roll, as a shared commodity.

In contrast to *The Smallest Hidden Room* as the most centred toilet space, *The Toilet as a Meeting Place* is a more challenging *Design Scenario* within the cultural context. By gathering users around a discussion table and instead of chairs, the solitary act of using the toilet becomes a shared experience. This stands in sharp contrast to the experience we are accustomed to within a culture of solitary toileting. Similarly, in *The Phantom of Liberty* (1974) by Luis Buñuel, the film's most famous scene depicts people sitting around a dinner table, casually relieving themselves, while eating is treated as something shameful and done privately in a separate room (Fig. 38). By reversing these roles, the film challenges the idea that certain bodily functions are a taboo while others are considered polite and civilised. These rules are not natural truths, but arbitrary social conventions that people blindly accept, and that what appears shocking is often simply a matter of cultural conditioning. At the same time, it connects this mockery of polite habits to a broader critique of the environment and behaving irrationally in far more everyday situations. The toilet scene is therefore not merely a joke, but a serious act of questioning morality, normality, and the constraints of human behaviour.

In relation to this scene by Buñuel, *The Toilet as a Meeting Place* challenges the cultural limits of what is considered acceptable. It attempts to surface the absolute minimum requirements for a toilet. Unlike user-centred designs, with this *Design Scenario*, what is commonly expected or considered desirable is deliberately disrupted. By deliberately disrupting toilet norms, the design explores the effects of provocation. What spatial aspects of a design are provocative to someone will always be partly subjective. Additionally, what is considered acceptable or provocative depends on both the person using it and the context in which the design was created. As noted earlier, Johan Liekens in his thesis *Architecture's Provoking Instrumentality* a spec-

P1:	P2:
Don't you think we need extreme ideas or examples to shift a little bit?	Yeah, but it can remain on the level of an idea. It doesn't have to be a practical built thing...
P1:	P2:
But if you are going to create a new idea that is close to the situation today, then like there is not going to be any change?	
P1:	P4:
I think a design will strike people more if it's uncomfortable. You're going to remember it more if it's uncomfortable, because if it's familiar or something you are used to, then you're maybe not even going to notice the details that are different, or the points that the designer intended for you to notice.	But how are you going to bring it to the public if it is "uncomfortable"? Maybe it's harder to notice if it's very comfortable. You just go to the toilet, go out and you don't think about it, but if it's a bit uncomfortable, you're going to question, like, why is it like this? Maybe you get annoyed at first, but when you look into it and you figure it out, like: "Oh, that's why they are trying to consider this, and this thing at the back".
P2:	P3:
Yeah, yeah, I think that could be the case because, if a design is provocative, then it's maybe just for one time "productive", but it won't be necessarily used. But if the design is imaginative, and more usable in a way, then it's like still easier to remember.	Yes. I agree. Provocation can work as like a first image, but not for a design that is often used. Because why would you want to use something often that you already know is going to provoke you?

(P1, P2, P3, P4: Students Master Design Studio Sanitopia 2025)



Fig. 36: Architectural model of *The Toilet as a Meeting Place* (scale 1:33).

from an invitation over a provocation, to a shock ‘to thought’ (Liekens 2020). The definition of a provocation is an idea considered too radical and unrealistic for brainstorming. However, in some cases, provocation can be useful because it forces us to think outside the box, move beyond the known, and ultimately lead to new ideas. As Liekens also noted, if an architectural design is too provocative, it is dismissed as art and not taken seriously. Since architecture involves designing daily living environments, it requires a sense of reality, even in the case of speculative design proposals.

In the discussions on *The Toilet as a Meeting Place*, I observed that the provocative nature of the *Design Scenario* resulted in people interpreting it as fictional and not taking it seriously as an architectural proposal. In the search for an appropriate design approach to trigger a shift in mindset by design, a critical distance between the speculative design and reality proved crucial. When the distance between the design and reality is too narrow, it is not challenging, but when it is too large, it will only be discussed as fictional and not as a realistic proposal. It is in this tension, between reality and what is obstructed from becoming real, that assumptions are exposed and debate is encouraged (Malpass 2012). Although a design may be unusual or speculative, it is important to maintain a sense of reality or believability, since the proposal must not be too far removed from reality to be effective. Consequently, the *Design Scenarios* are deployed to trigger ideas and open perspectives to alternatives but still respond to the real-world issues and challenges at the Blikfabriek, while in need of a sense of grounding and reality. Even though I did not present this *Design Scenario* as being implementable in public space, the proposal certainly did not stimulate conversation about this taboo subject, which is the first step in triggering a shift in mindsets. In addition to Liekens (2020), who states that provocative design is often dismissed as art and not taken seriously as architecture, I marked that provocation becomes more tolerable only when it is presented as a change far in the future, where it does not threaten the habits and lifestyles today. This too is connected to a greater or ‘safe’ distance between the speculative design and reality, being pushed to the boundaries of fiction to preserve today’s ‘business as usual’.

In discussing the effects of provocation in the *Design Scenarios*, I observed that, when a toilet design or idea is conceived as too unrealistic by participants, it led to polarisation. While this *Design Scenario* did not open mindsets to new perspectives, it created greater distance, making compromise or consideration of the toilet design impossible and even resulting in distrust. As the goal of discussing the designs as *Conversation Pieces* is ultimately to stimulate conversation and convince people to consider changing their toilet habits – out of sustainability reasons – provocation was not always productive. In the case of this *Design Scenario*, it even had the opposite of the desired effect.

In the design of public toilets in specific, there seems to be another reason to be careful with provocation then just because it concerns a taboo subject. The level of provocation can interfere with accessibility requirements. Public toilets are exemplary spaces for functionality and relate to an elemental human need. Inclusivity and recognisability are



Fig. 37. Architectural model of *The Toilet as a Meeting Place* (scale 1:33).



Fig. 38. Snapshot from the movie *The Phantom of Liberty* (1974) by Luis Buñuel.

therefore essential values to consider in these spaces. In relation to the spectrum outlined above, public toilets tolerate even less provocation than other architectural spaces. While architectural design is often encountered ‘in a state of distraction’ (Hill 1998), toilets are particularly visited in ‘a state of urgency’ or ‘need’. Aside from the level of realism, necessary for participants to discuss the *Design Scenario*, the common toilet bowl or seat also proved to be a necessary anchor point for conversation. When proposing a completely new design for public toilets, it proved important to maintain some degree of recognisability to make the designs imaginable. This also relates to materiality and detailing of the toilet designs, since the audience consisted of mainly non-designers. As a result, the models stayed close to their imagination and to reality. This will become even more evident in discussions on the life-size, fully functioning public toilets at the Blikfabriek site as part of *Design Exploration III*.

A fundamental question in this investigation concerns how the design of public toilets is treated and valued. As expressed by participants during the discussion moments, they expected that architecture can ‘lure’ people into trying new toilet practices through design, as if architecture possesses persuasive powers. This belief in architectural persuasion appears, in the discussion moments, closely tied to a perception of architecture as a primarily aesthetic practice that produces trendy and aesthetically appealing designs. A specific reference that frequently emerged in the discussions was the series of public toilets designed by several star architects for the 2020 Olympic Games in Tokyo. Developed as part of *The Tokyo Toilet* project, these designs attract large numbers of tourists each year, who come to admire what have been described as ‘sanitary gems’ (Gomez-Jorge 2025). In addition, the film *Perfect Days* by Wim Wenders (2023) is set in several of these toilets, further contributing to their visibility and popularity. More specifically, the film challenges the commonly held perception of toilet cleaning and maintenance as an inferior job, in part by highlighting the architectural value and public appreciation of these spaces.

Where the public toilets as part of *The Tokyo Toilet* project reposition toilets through the beauty and impressiveness of design, with this research, I aim to demonstrate that architecture can do more than persuade through aesthetic appeal alone. The ability to reposition toilets through the shaping of new habits directly engages with the role and agency of the architect in this context. In line with the ambition to reposition toilets not merely as ‘sanitary gems’, but as spaces associated with a degree of responsibility for bodily waste, this *Design Scenario* uses the public nature of the setting to encourage the proper use and cleaning of the toilet. More specifically, by turning public toilets into confrontational spaces, the design no longer responds to user-oriented desires but uses aspects of shame and social control in relation to other users. In considering how the public context and the collective can influence individual toilet habits, responsibility is thereby positioned as a collective matter.



Fig. 39: Architectural model of *The Toilet as a Meeting Place* (scale 1:33).

When entering the toilet space, you take off your shoes right next to the door. The soles of your feet touch the gently heated floor. In front of you, you notice a large hearth with a part where you can sit snugly with your body. In experiencing the hearth, it resembles a brick toilet, due to its opening in the seat. After hesitating a bit, you decide to take a seat. The shape of the toilet now wraps around your upper body. Your feet fit just right on the small step in front of you. You feel warm and sheltered as you relieve yourself. A moment later, you're done and clean yourself with the toilet paper to your left side. Once finished, you end your toilet visit by pouring a small bucket of sawdust into the toilet and washing your hands with warm water at the sink. The sink consists of two parts, each with its own tap installed to face opposite directions. One sink faces the kitchen area of the room. The kitchen is in the same room as the toilet, but can be separated by a sliding curtain. When you approach the kitchen area, the smooth kitchen tiles under your feet feel colder. The countertop is made of heat-resistant stainless steel and connects to an oven built into the wall of the brick toilet. What is an oven doing inside a brick toilet, you wonder?¹

In an ever-changing world that is constantly facing new challenges, it is important to question ingrained spatial habits, no matter how long they have been in place. In response to ideas on repositioning the toilet, I move beyond purely functional expectations of toilet spaces, with *An Assemblage of Kitchen and Toilet*, by integrating other functions and exploring new spatial typologies and potential benefits. Although the kitchen and the toilet habitually never appear in the same room or assembled, both require high standards for hygiene and similar infrastructure, such as a water supply and drainage system. Additionally, they can both generate heat, by ovens and stoves in the kitchen and composting processes in the toilet. Where the activities associated with these spaces – such as cooking and eating or defecating and urinating – are traditionally kept separate in building norms, it is interesting to note that cooking and composting have similar safety requirements. For instance, both activities kill bacteria harmful to human health at temperatures above 60°C. While these habits may seem incompatible at first glance, the *Design Scenario* challenges the current norms surrounding these spaces by proposing a new typology: *An Assemblage of Kitchen and Toilet*.

In asking participants the question what a kitchen could mean for the toilet, and what a toilet could mean for the kitchen, the discussion on the *Conversation Piece* quickly shifted to the creation of energy. Some pointed to the concept of 'gamification' as an attraction, while others equated value creation with the creation of a benefit or extractable resource. I observed that participants were more willing to change their toilet habits in return for a benefit, for example, by using technologies to harvest energy. The question remained, however, as to who or what the benefit was created for. Concrete ideas around the table ranged from

¹Thermophilic composting of human bodily waste can reach temperatures of up to 65°C (149°F). This residual heat can be used to warm the floor and water, and even the toilet itself, via a tiled masonry stove combined with a 'bio-meiler' or bio-heap system (Persoone 2023).

P1:

To mask the smell and make the process nicer, perhaps dried flowers can be used as sawdust? Or a candle or match can be lit to eliminate odour.

P2:

In terms of creating a sense of hygiene and security, waste is not only 'dirty' but can even be toxic, since it spreads diseases if not handled properly.

P3:

The oven and toilet need not be placed together as they do not necessarily depend on each other. The oven can only be slightly heated by the compost, and waste may not compost at the temperature of the oven. However, heat or biogas can be added to create a circular system.

P4:

So, the kitchen benefits from the toilet but not really the opposite way around.

P3:

What is also possible is to produce hot water yourself via a Biomeiler [English: compost heater].

P4:

Yes! And showcasing it in the design to let people experience it. Perhaps the waste system can become even bigger? If we start to include other waste too, e.g., food scraps and gardening waste.

P3:

Yes.

Everything is allowed on a compost heap. It shrinks over time, leaving just a small but very valuable residual product at the end.

(P1, P2, P3, P4: Blikfabriek Visitors 2023)



Fig. 40: Architectural model of An Assemblage of Kitchen and Toilet (scale 1:33).

When entering the toilet space, you take off your shoes next to the door. The soles of your feet touch the floor. In front of you, you notice a large heart-shaped rug. You can sit snugly with your body. In experience it resembles a brick toilet, due to its opening resembling a bit, you decide to take a seat. The rug now wraps around your upper body. Your feet are on the small step in front of you. You feel warm and you relieve yourself. A moment later, you're finished and you end your toilet visit by pouring a small bucket of water on the toilet and washing your hands with warm water. The sink consists of two parts, each with its own faucet facing opposite directions. One sink faces the kitchen. The kitchen is in the same room as the toilet, separated by a sliding curtain. When you appear in the kitchen area, the smooth kitchen tiles under your feet and the countertop is made of heat-resistant stainless steel. The oven built into the wall of the brick toilet is doing inside a brick toilet, you wonder?'

In an ever-changing world that is constantly facing challenges, it is important to question ingrained spatial habits and norms they have been in place. In response to ideas on reimagining space, I move beyond purely functional expectations of the kitchen and toilet. *An Assemblage of Kitchen and Toilet*, by integrating and exploring new spatial typologies and potential between the kitchen and the toilet habitually never appear in the same space. Assembled, both require high standards for hygiene and infrastructure, such as a water supply and drainage system. Both generate heat, by ovens and stoves in the kitchen and the processes in the toilet. Where the activities associated with cooking and eating or defecating and urinating are usually kept separate in building norms, it is interesting to see how composting and composting have similar safety requirements. Both activities kill bacteria harmful to human health at 60°C. While these habits may seem incompatible, *Design Scenario* challenges the current norms surrounding the kitchen and toilet by proposing a new typology: *An Assemblage of Kitchen and Toilet*.

In asking participants the question what a kitchen and toilet could mean for the future, the conversation on the *Conversation Piece* quickly shifted to the creation of a space pointed to the concept of 'gamification' as an attributed value creation with the creation of a benefit. I observed that participants were more willing to engage with toilet habits in return for a benefit, for example, to harvest energy. The question remained, however, what benefit was created for. Concrete ideas around the

P1:
For me personally, this one goes beyond my limits. Because I don't know... cooking, when, you can smell someone's 'shit'?! It's not really pleasant. It's important to get out of your comfort zone to change from mindset, but perhaps there is a limit? And this just takes it a bit too far for me.

P2:
I agree. Not that it is shocking, but I don't see the functions happening at the same time.

P4:
Yes, I would use the toilet and then, I would use a lot of anti-odour spray (laughs). And clean the counter once more before cooking.

P3: I
also think that some people are open to radical change, but the majority will always be a bit afraid of change. So maybe it's better to start with something that is a little bit closer to what they're used to? Like having a clean toilet is important for many people, especially when it's public toilets.

(P1, P2, P3, P4: Master Design Studio Sanitopia Students 2025)

P1:
For me, it instigates directly at a conversation. If I enter this space, in someone's home for example, and there is a kitchen next to a toilet, I will just start talking about it. And then probably that will teach me more about when it is okay to use it?

P2:
In a lot of houses, the kitchen is next to the toilet because the installations go in the same direction. But this is very exposed and you can see how things work. And I think, people spend a lot of time in the kitchen and like to socialize in the kitchen. So, it can also open up a conversation.



Fig. 40: Architectural model of An Assemblage of Kitchen and Toilet (scale 1:33).

compost heaters and ovens in the kitchen to manage the temperature of the composting heap, to toilets that produce biogas from urine or recycle warmth produced by slightly warming the toilet seat. Participants clearly took the time to consider this *Design Scenario*, as evidenced by the many counterproposals, suggestions for spatial adjustments and ideas for compromises in exchange for changing their toilet habits. While the previous two *Design Scenarios* presented ideas and sparked discussion, this design went a step further by supporting imagination. Still, participants considered the toilet design provocative, as was evident from their numerous suggestions for addressing the odour and privacy issues emerging from this spatial combination. The proximity of food preparation to the disposal of human bodily waste was met with strong reluctance and deemed unacceptable, largely due to fears of contamination. Assurances that strict hygiene standards would be upheld and efficient waste disposal systems implemented were not enough to convince participants. To make the *Design Scenario* workable in real life, they instead suggested visible partitions, ventilation systems and other measures to keep the odours from both spaces in place. From these discussions, I observed that all their points of compromise concerned anthropocentric or user-centred requirements and benefits.

When talking about keeping things in place, the work of anthropologist Mary Douglas, is of utmost importance. In her book *Purity and Danger* (1966), Douglas famously defines dirt as any matter out of place. This means that dirt is judged as ‘out of place’ according to cultural norms and shared values. In a given social system, waste represents what we want to discard: the inappropriate, the rejected, and the excluded (Ibid.). In designing public toilets and dealing with human bodily waste, this theory points to the established boundaries of symbolic systems and, in the context of this research, how these boundaries can be challenged. According to Douglas, nothing is intrinsically dirty, since waste is not an inherent quality of an object. Rather, she explains that dirt is a powerful indicator of a system, since waste is merely a product of a system of social classification. This system of classification establishes boundaries of an ideal order, which categorises and decides who and what belongs where. Following this explanation, dirt is essentially disorder or that which disturbs the ideal (Frichot 2019). Douglas (1966) also reveals that these classification systems vary between societies, so what one group rejects may be completely acceptable to another. In Western contexts, she explains, our ideas of pollution and purification are dominated by knowledge of bacteria and other pathogenic microbes. In the case of public toilets, this is tied to fear of disease, distrust of others, and the desire of users to be in control. The aspects of hygiene and cleaning are herein of utmost importance. Douglas underlines that, when we reflect honestly on our busy cleaning routines, we are not primarily trying to avoid disease, but we are setting boundaries and making visible statements about the kind of home – or in this case, toilets – we want to create.

Purity and Danger by Mary Douglas (1966) not only concerns the boundaries of a symbolic system but also elucidates the taboos that accompany and sustain it. Douglas here argues that every culture develops

P3:

I can imagine this to work more in a private environment. Because then you don't have to deal with the fact that there is someone else sitting on the toilet while you're cooking, or if you are living with someone that you're really familiar with, for instance.

P4:

Maybe if it would have been designed diagonally with their backs to each other, then suddenly the toilet is divided by the fireplace from the kitchen. And then I think a lot of people would have been much more okay with this.

P1:

Yes, it would be way more comfortable with like a wall or glass or something in between... to have like an actual visual diversion between those two places, even if you can see through them.

P4:

Yeah. And also, if they were made from the same material, I think it would create this idea that the kitchen part is also dirty. Right? Because it's different in material, it's mentally cleaner because it's separate. And it is also easier to clean because you can disinfect it.

P5:

I think still that the smell of the composting toilet would bother me.

P3:

I have never used one, but is it normally supposed to not smell?

P5:

No, I mean, after you have used the toilet, the room will smell.

P3:

Maybe when the oven is on, you smell the food burning instead of...?

P5:

Yeah, but it's the fact that it's in the same room. When you're not cooking, then it's totally fine. But, when they are in a separate room, you can just open a window and wait a bit.



Fig. 41: Architectural model of An Assemblage of Kitchen and Toilet (scale 1:33).

compost heaters and ovens in the kitchen to manage the composting heap, to toilets that produce biogas and cycle warmth produced by slightly warming the toilet. We clearly took the time to consider this *Design Scenario* and many counterproposals, suggestions for spatial adjustments and compromises in exchange for changing their toilet. Previous two *Design Scenarios* presented ideas and this design went a step further by supporting imagination. Participants considered the toilet design provocative, and their numerous suggestions for addressing the oddities emerging from this spatial combination. The proximity to the disposal of human bodily waste was maintained and deemed unacceptable, largely due to fear. Assurances that strict hygiene standards would be met and waste disposal systems implemented were not enough for participants. To make the *Design Scenario* workable in the real world, we suggested visible partitions, ventilation systems and ways to keep the odours from both spaces in place. From the workshop, I observed that all their points of compromise correlated with either contraindicatory or user-centred requirements and benefits.

When talking about keeping things in place, the anthropologist Mary Douglas, is of utmost importance. In her book *Purity and Danger* (1966), Douglas famously defines dirt as anything that is 'out of place' according to a set of norms and shared values. In a given social system, dirt is what we want to discard: the inappropriate, the rejected, the excluded (Ibid.). In designing public toilets and dealing with waste, this theory points to the established boundaries of systems and, in the context of this research, how they can be challenged. According to Douglas, nothing is inherently dirty; waste is not an inherent quality of an object. Rather, dirt is a powerful indicator of a system, since waste defines the boundaries of a system of social classification. This system of classification establishes boundaries of an ideal order, which categorise things and what belongs where. Following this explanation, disorder or that which disturbs the ideal (Frichot 2012) also reveals that these classification systems vary between what one group rejects may be completely accepted by another. In Western contexts, she explains, our ideas of pollution are dominated by knowledge of bacteria and other microorganisms. In the case of public toilets, this is tied to fear of others, and the desire of users to be in control. Hygiene and cleaning are herein of utmost importance. It is clear that, when we reflect honestly on our busy city lives, we are not primarily trying to avoid disease, but we are making visible statements about the kind of community we want to create, toilets – we want to create.

Purity and Danger by Mary Douglas (1966) not only defines the boundaries of a symbolic system but also elucidates how to maintain a company and sustain it. Douglas here argues that

	P3: Or put a sign on the door saying: check the kitchen first and then go to the toilet...
P5: And, privacy- wise, I can imagine some guests not wanting to share this home.	P3: I really see the space as a private home.
P1: Yeah, privacy would be important for me too. Because you know you are vulnerable at that moment and in need of relaxation. And I wouldn't be able to relax with some- one else in the room.	P3: Indeed, I view this one as comfort- able except for the privacy aspect. Everything is the same: you have toilet paper, you even have a toilet seat, you just don't flush. So, it's just a differ- ent system. And I feel like, if you have privacy, then it's almost a common toilet.
P5: Hmm... maybe I'm com- fortable using the toilet too, but I'm not comfortable using the kitchen. So, it's actually not a problem for the toilet. It even has a heated seat!	

(P1, P2, P3, P4, P5: Master Design Studio
Sanitopia Students 2025)



Fig. 41: Architectural model of An Assemblage of Kitchen and Toilet (scale 1:33).

particular ‘pollution beliefs’, or culturally specific ideas of dirt, which serve to protect the system by maintaining, supporting, and structuring it through the establishment of spatial limits as well as physical and verbal signals. She defines pollution behaviour as the tendency to reject or condemn any object or idea that challenges established classifications. Such beliefs and behaviours function to safeguard and regulate the system precisely at the points where it is most vulnerable: its margins. In relation to the human body, bodily fluids are provocative mainly when they transgress the body’s boundaries. Likewise, in the case of the flushing toilet, the concern and desire lie in a controlled evacuation of bodily waste into the sewer system. As noted by sociologist Josefin Persdotter in her 2022 doctoral thesis, *Menstrual Dirt*, pollution behaviours may also manifest as strong emotional responses associated with dirtiness. She argues that when something is perceived as polluted, it elicits negative emotions, including disgust, fear, or shame. These reactions inform us about the boundaries between clean and dirty, thereby defining what is considered threatening, dangerous, or even contagious. According to Persdotter, shame is particularly connected to the transgression of social boundaries, as it signals the risk of being rendered ‘out of place’ and, consequently, socially excluded. In designing public toilets, the influence of shame and position of the individual within a shared community can therefore not be underestimated.

Where Mary Douglas (1966) primarily focused on how classificatory systems are maintained, she also emphasised that such systems may differ and evolve over time. In light of this statement, I question whether architectural design can actively contribute to challenging and transforming established cultural systems. This directly touches upon the agency and role of architect-designers when aiming to foster cultural change. With the *Assemblage of Kitchen and Toilet*, I therefore disrupted the order and boundaries established between two habitually separate spaces. This proved particularly challenging and provocative to participants. The *Design Scenario* clearly touched a nerve in the discussions, prompting the question of what might happen when spatial elements begin to move between established categories, thereby destabilising and challenging existing boundaries.



Fig. 42: Fragment of the architectural model of An Assemblage of Kitchen and Toilet (scale 1:33).

A narrow footbridge over the pond leads you to the toilet. This small room is elevated about a meter above the ground and built on a platform. At the end of the walkway, you climb two small steps and enter the space. The little room is just big enough to fit a toilet bowl. Once inside, you close the curtain behind you and take a seat. After using the toilet, you clean yourself with toilet paper, flush, and descend the steps back to the footbridge below. Beneath this bridge, you notice a thick pipe channelling the toilet's wastewater directly into the pond. The pond is filled with large aquatic plants that rise all the way to your hips. Installed on the side of the walkway is a sink. You wash your hands here after your toilet visit. When you turn on the tap, the water flows over your hands, into the basin, through the drain. Soon after, you hear water trickling slowly and being released directly into the pond beneath your feet. All the water you're using gradually adds to the pond's volume. As you look out across the surface, you notice a small opening at the edge of the pond, leading to another drainage pipe. If you follow this pipe to its end, you arrive at a point where the water is discharged into a buffer, and from there, you see it flowing back into the natural surroundings.²

Toilets are typically the smallest architectural spaces, but they are much more prominent underground. They rely on an extensive network of pipes and sewers designed to quickly and efficiently transport bodily waste away from our living environments. In Flanders, too, as one of the most densely built-up regions in Europe, this infrastructural system is almost completely absent above ground, but it is saturated in the underground to support the densely built world above. As a result, this infrastructural wastewater system remains hidden and concealed, hardly involving any presence or confrontation with the evacuation and processing of human bodily waste. In response to the visual absence of wastewater infrastructures in the built environment, *The Toilet as a Constructed Wetland and Interior Pond* originated from the intention to create a toilet space that expands in size and visibility, to increasingly become a central thing. The design revolves around the question whether the spatial presence of toilet designs and infrastructure in daily living environments can influence mindsets on how we deal with human bodily waste. Because the design drastically takes up more space, it stands in opposition to the *Toilet as Smallest Hidden Room*.

The design of *The Toilet as a Constructed Wetland and Interior Pond* features a flushing toilet and pond collecting and treating wastewater locally on-site by means of constructed wetland techniques. To reposition the toilet space as a central event, rendering its design present on the site of the Blikfabriek, the *Design Scenario* transforms the toilet space into an infrastructural installation that openly displays the treatment of wastewater. For this ecological treatment system to function effectively, the wastewater needs to come into maximum contact with the roots of the wetland plants (Rousseau et al. 2021). The toilet space is therefore

² Constructed wetlands are technological ecosystems that mimic natural wetlands to treat wastewater by using natural ecological processes. They consist of aquatic plants, soil, and various microbial communities, which work together to filter pollutants and improve water quality (Rousseau et al. 2021).

The Toilet as Constructed Wetland
and Interior Pond

P1:

I think visibility is
key! Now the composting
toilets are somewhere in the
corner of the square, but they
should become the central
event.

P2:

Yes, learning
about compost
requires visibility to
inspire, like being able to
pass under the compost

P1:

Going to the
toilet can be an event,
where people share stories
while waiting in line. No longer
that sneaky visit and uncomfort-
able feeling of passing the
next user.

heap, or even enter it.

P2:

Yes, wow can we
create that feeling of 'Yay!
I can go to the toilet'? A place
that you visit with pride and
come out of with pride.

(P1, P2: Toilet Cleaning Experts at Blikfabriek 2023)

P1:

For me, a design should
be kind of fun and entertaining, for
example by being part of the process. It's
not just a machine that is working without us.
The design is working because we use it and
that can be fun in terms of learning how a
cycle or process works or how compost
is made.

P2: Yes, it's the
experience really!

P1:

And going to the toilet is also
a bit of a mundane habit in everyday life. So,
I think if you come up with a really different concept,
you also need to make it fun to make it a bit more of a
novelty. In order for people to actually use it and be-
come triggered by or interested in it.



Fig. 43: Architectural model of *The Toilet as a Constructed Wetland and Interior Pond* (scale 1:33).

A narrow footbridge over the pond leads you to a small room elevated about a meter above the ground on a platform. At the end of the walkway, you take a few steps and enter the space. The little room is just a toilet bowl. Once inside, you close the curtain and take a seat. After using the toilet, you clean yourself with paper, flush, and descend the steps back to the ground. Beneath this bridge, you notice a thick pipe carrying the toilet's wastewater directly into the pond. The large aquatic plants that rise all the way to the surface on the side of the walkway is a sink. You wash your hands after your toilet visit. When you turn on the tap, you hear water trickling slowly and being released into the pond beneath your feet. All the water you use adds to the pond's volume. As you look out at the pond, you notice a small opening at the edge of the pond where the water is discharged into the natural drainage pipe. If you follow this pipe to the end, you see it flowing back into the natural drainage system.

Toilets are typically the smallest architectural spaces, often more prominent underground. They rely on an extensive network of pipes and sewers designed to quickly and efficiently move waste away from our living environments. In Flanders, the most densely built-up regions in Europe, this infrastructure is almost completely absent above ground, but the underground to support the densely built world. This infrastructural wastewater system remains hidden, hardly involving any presence or confrontation with the processing of human bodily waste. In response to the lack of wastewater infrastructures in the built environment, the *Constructed Wetland and Interior Pond* originated from a desire to create a toilet space that expands in size and visibility to become a central thing. The design revolves around the spatial presence of toilet designs and infrastructural environments can influence mindsets on how we deal with waste. Because the design drastically takes up more space in opposition to the *Toilet as Smallest Hidden Room*.

The design of *The Toilet as a Constructed Wetland and Interior Pond* features a flushing toilet and pond collecting and treating wastewater locally on-site by means of constructed wetland technology. The toilet space as a central event, rendering it the site of the Blikfabriek, the *Design Scenario* transforms into an infrastructural installation that openly displays wastewater. For this ecological treatment system to work, the wastewater needs to come into maximum contact with the wetland plants (Rousseau et al. 2021). The toilet

P2:
And after a while, it can become more of the norm. But I believe that, in order to get people to use these things, it helps to make them fun.

P3:
I was thinking about the toilet as an element in itself. If we need to change the toilet in order to shift our mindset, which is a bit connected to the fun or aesthetic or comfortable discussion. Because if I look at the model, it looks like a normal toilet, which could work? If it really feels like just going to a normal toilet. But maybe we also need to rethink the look of the toilet bowl?

P4:
Yes, what should a toilet look like? It's such an ingrained image in our brain. Well, besides the difference between a squatting toilet and a sitting one. I can't even imagine a different shape of it.

P3:
Even in the composting toilets at the Blikfabriek, the toilet seat was kind of built on top of a box, even though it is based on a completely different infrastructure.

P5:
Something else I wanted to ask is: I know some examples where water was contaminated and where a whole village got infected because of black water that got into the underground... What are the risks of that happening here?

P5:
Yeah, I have read an article too that spoke about the fact that women use contraception pills. And today they see that hormones are appearing in our water flows, and even in our drinking water. So, I was also thinking how do we treat and deal with this?

P6:
Yes, or what if someone used medication, like antibiotics?

(P1, P2, P3, P4, P5, P6: Master Design Studio Sanitopia Students 2025)



Fig. 43: Architectural model of *The Toilet as a Constructed Wetland and Interior Pond* (scale 1:33).

raised in the design to allow wastewater to flow by gravity into the constructed wetland, where it is naturally filtered. A raised path crossing the pond makes the journey to the toilet visible, deliberately inviting users to engage with the spatial design rather than treat it as a hidden routine. Through visible pipes and an exposed water basin, the design's functioning is made explicit, allowing the wastewater to remain close to the toilet space and enabling users to trace its journey before being discharged into nature. The design's spatial presence is tied not only to making the toilet a prominent on-site feature, but also to raising awareness and facilitating collective learning by clearly displaying its inner workings. Similar to the way public toilets were promoted as symbols of innovation and progress in the 19th century to demonstrate technological control over water (Billen and Decroly 2003), this *Design Scenario* explores the concept of toilets becoming focal points that embody the beliefs and ideals of the Blikfabriek: to organise the site and its operations in the most sustainable and self-sufficient manner possible, with the ultimate goal of getting the site off-grid. The toilet design promotes off-grid wastewater management and treatment by managing wastewater on-site in a visible and public manner, rather than concealing it.

When discussing this *Design Scenario*, it was not so much the visibility but rather the discharge of wastewater back into nature – after treatment – that caused friction among participants. They seemed to share the same conviction and concern, that discharging wastewater into a natural environment, regardless of it being filtered in a treatment wetland, is an inherently polluting act. The strong reaction and resistance of the participants in response to this design decision made it clear that they are concerned about the natural environment and want to protect it as much as possible. While releasing untreated wastewater into nature can indeed contaminate water bodies, causing oxygen depletion, eutrophication, harmful algal blooms, and toxicity for aquatic life, this is not the case for constructed wetland systems (Rousseau et al. 2021). The latter are treatment systems that rely on natural processes involving wetland vegetation, soils, and their associated microbial communities to improve water quality. Despite assuring participants that the design incorporates a controlled purification process, resistance to the proposed treatment system and idea of returning wastewater to nature persisted. It became clear to me that this shared and dominant conviction is deeply rooted in the mindsets on site, hindering change and making it difficult to open perspectives to alternative sanitation systems. The shared narratives on water pollution among participants were difficult to challenge or loosen by design, obstructing the ability to explore alternative wastewater management systems.

The Toilet as a Constructed Wetland and Interior Pond is created for a cultural context and time in which awareness and concern over the climate emergency is growing. While the *Design Scenario*, including a controlled wastewater treatment based on natural processes, was considered provocative by some participants, the sewer system is in fact far more polluting. This is evidenced by newspaper articles that appeared monthly throughout the research period, between 2021 and 2026, which repeatedly reported on the pollution of Flemish waters caused by



Fig. 44: Architectural model of *The Toilet as a Constructed Wetland and Interior Pond* (scale 1:33).



Fig. 45: Architectural model of *The Toilet as a Constructed Wetland and Interior Pond* (scale 1:33).

sewer overflows. When dealing with an ingrained habit and a taboo subject such as the toilet, there is a strong tendency to ‘keep things in place’ and avoid fundamental change. Yet the reality of the contemporary wastewater treatment system suggests that things are already getting out of place, and with that, out of hand.

As collective beliefs on contamination, not only for human health but also for the natural environment, are widely held in a cultural system, they prove to be very difficult to question, let alone change. Particularly in public toilets, the shared narratives surrounding this space are highly influential since it concerns a public context where toilet spaces are to be shared with others. As mentioned in Chapter 2: *Methodology and Research Design*, social constructs strongly influence how individuals think and behave, often becoming internalised through cultural narratives and expectations. Where individuals interpret and assimilate information through their social relations, they also contribute to the shaping of existing societal narratives. For this reason, I argue that changes in habits should be approached collectively and within a public context, even though visiting the toilet is culturally considered an individual act. Moreover, by showcasing the inner workings of the toilet design on site, it can be transformed into an installation that draws attention and triggers conversation among visitors. This way, the design can engage users in a process of collective learning, for which the semi-public nature of the Blikfabriek is particularly well suited. In shaping new toilet habits for the case study site, the public nature and influence of the on-site community can significantly impact engagement with the design.



Fig. 46: Fragment of the architectural model of *The Toilet as a Constructed Wetland and Interior Pond* (scale 1:33).

A Scenario of Composting and Gardening
to Remove Soil Contamination

With the help of a staircase, you climb one level up onto a platform. To your left, you find a door that leads to the toilet. Only a toilet and a sink are installed inside this small space. After sitting on the toilet, you relieve yourself and clean your body, but you can't seem to find the flush of the toilet. Behind the toilet is only a container, not filled with water as you expected, but with sawdust. Instead of flushing by pressing a button, you scoop a small bucket of sawdust from the bin and pour it into the toilet bowl. Once you've thrown in the sawdust, you notice a foot pedal next to the toilet. Gently pressing it with your foot, a lid starts to open at the bottom of the bowl. The mixture of your excrement and sawdust falls through the opening, after which the lid closes again. The bowl is now empty and ready for the next user. You wash your hands at the sink and head downstairs to see where your waste has gone. Beneath the platform, a blue barrel is mounted horizontally underneath the toilet space. It is positioned so that it can rotate around its axis, mixing the contents inside. Once the barrel has stopped turning, you notice a hatch that can be opened. It is filled with a brown, soil-like matter inside. The hatch is perfectly aligned with the height of a wheelbarrow, allowing the contents to be easily scooped out. A group of volunteers fills the wheelbarrow and transports the mass to a nearby hemp field.³ They gently spread out the mass and mix it into the top layer of the soil.

What often recurred in the design discussions was the conviction that, if toilet users would understand how a treatment system or practice works, they would be more eager to change their toilet habits. These participants believed that the design of a toilet could encourage people to try it out by showing them the benefits that can be gained from human bodily waste for the wider environment. In response to this type of approach, the *Scenario of Composting and Gardening to Remove Soil Contamination* presents a composting toilet combined with a gardening practice to remove chemicals from the soil. It proposes an engagement with the living layer of soil through community gardening, not to produce food but to remove contamination, introducing a very different relationship to soil than the extractive one we are accustomed to. This *Design Scenario* was specifically discussed in relation to the part of the Blikfabriek that is in direct contact to the soil, also engaging with its contamination with 'forever chemicals' (OVAM 2022).

The design features a toilet space scaled to the human body, occupying a standard size of 1.5 square metres. Beneath it sits a rotating compost bin that mixes the collected sawdust and bodily waste until it matures into fertile compost. The bin is positioned high enough for a wheelbarrow to fit underneath, allowing the compost to be easily harvested once ready. Once matured, the compost is then spread onto the soil of the surrounding hemp field, where it serves as fertiliser for the hemp plants. Using phytoremediation techniques,

³ Studies have proven that growing hemp can remove PFAS from contaminated soils (Turner, Sloan, and Currell 2019).

A Scenario of Composting and Gardening
to Remove Soil Contamination

P1:

The more complex
the toilet is to use, the more
difficult it becomes to imple-

P2:

ment in public spaces. As a way to
convince people to use the
composting toilets, you can also
grow mint – which grows fast – and
then make mojito from it? When people
see what can be made from their
waste, they become aware of the
benefits.

P3:

A rotating bin for
compost may be less physi-
cally demanding but is stink-prone
due to a mix of new and old compost
together. There must always be a phase
of loading a compost heap, which
shrinks over time and where the
bottom is maturing.

(P1, P2, P3: Blikfabriek Visitors 2023)

P1:

What is considered
'dirt' also depends on where
the waste comes from. Toilet waste
is valued differently than vegeta-
ble waste.

P2:

I actually think
that everything is just
a matter of habit. In rural
areas, the use of dry toilets
is already common. Everyone
there thinks it's the most nor-
mal thing in the world.

P3:

I can im-
agine that people
are disgusted by this
design, but if they learn
from it, and really see
the benefit, then I think
it could really change
attitudes.

P1:

I think if you
hear that other people
are using it, the word might
spread. But maybe we should
start by implementing this
project in other contexts?
Like in rural areas.



Fig. 47: Architectural model of A Scenario of Composting and Gardening to Remove Soil Contamination (scale 1:33).

A Scenario of Composting and Gardening to Remove Soil Contamination

With the help of a staircase, you climb one level up to a platform. To your left, you find a door that leads to a toilet. Only a toilet and a sink are installed inside the toilet space. After sitting on the toilet, you relieve yourself. The toilet bowl is only a container, not filled with water but with sawdust. Instead of flushing by pressing a foot pedal next to the toilet. Gently pressing the foot pedal next to the toilet. Gently pressing the foot pedal, the lid starts to open at the bottom of the bowl. The excrement and sawdust falls through the opening of the lid and the lid closes again. The bowl is now empty and ready for the next user. You wash your hands at the sink and then you go outside to see where your waste has gone. Beneath the toilet, a barrel is mounted horizontally underneath the toilet. The barrel is positioned so that it can rotate around its axis. Once the barrel has stopped, a hatch that can be opened. It is filled with a mass of compost. The hatch is perfectly aligned with a wheelbarrow, allowing the contents to be emptied. A group of volunteers fills the wheelbarrow with compost and mix it into the top layer of the soil.

What often recurred in the design discussions was that toilet users would understand how a treatment system works. They would be more eager to change their toilet habits if they believed that the design of a toilet could encourage them to do so. Out by showing them the benefits that can be gained from using the toilet. In response to this, the *Scenario of Composting and Gardening to Remove Soil Contamination* presents a composting toilet combined with a garden. The garden is a layer of soil through community gardening, not to remove contamination, introducing a very different approach than the extractive one we are accustomed to. This is specifically discussed in relation to the part of the design that is in direct contact to the soil, also engaging with its 'forever chemicals' (OVAM 2022).

The design features a toilet space scaled to the human body, with a standard size of 1.5 square metres. Beneath it sits a barrel that mixes the collected sawdust and bodily waste until it becomes compost. The bin is positioned high enough for a person to reach, allowing the compost to be easily harvested once it is ready. The compost is then spread onto the soil of the surrounding garden. It serves as fertiliser for the hemp plants. Using phytoremediation, the hemp plants absorb the contaminants from the soil.

- P4: And maybe also giving it to people for a very low cost could encourage them. They will be more likely to use it, if it is available to them.
- P5: Perhaps, we also need to make it a bit more visible, not just in the areas where we think it could work – like rural areas – but also in cities or places where we don't think it would work at this moment. It could be a way to make it more visible, also for people who are just passing by.
- P3: I also think it can be interesting to actually see how waste is treated, to become aware of the process.
- P4: Yes, unless it prevents other activities from happening, of course.
- P1: I really think the process shouldn't be hidden. You don't want to see piles of excrement on the streets, of course, but it could be clearly indicated where the waste treatment is located. But again, this really depends on the type of waste...
- P1: Yeah. People tend to struggle a bit more with toilet stuff.
- P2: Maybe it's just about taking baby steps and making it a little bit more visible over time?
- P3: And in terms of collectivity, when you're discussing things in a group and you hear different opinions, I think it can be useful to be open to other perspectives.
- P3: Yeah. I think it's nice because then you also don't feel like you're the only one changing your habits.
- P2: Yes, going to the toilet is mostly something that you do by yourself. It's an individual habit. But also, the collective thing or the discussion is important.

(P1, P2, P3, P4, P5: Master Design Studio Sanitopia Students 2025)



Fig. 47: Architectural model of A Scenario of Composting and Gardening to Remove Soil Contamination (scale 1:33).

which involve removing or rendering toxic environmental contaminants harmless using plants and microorganisms, the hemp plants cleanse the soil of hazardous substances (Turner et al. 2019). Through this *Design Scenario*, I reimagine human bodily waste as a resource by using it to grow hemp and remediate soil contamination at the Blikfabriek site. By incorporating community gardening practices using compost made from human bodily waste, the composting toilet moves beyond user-centred desires and expands relationality towards the soil. It promotes care and engagement with the non-human species that flourish in this living layer, introducing new ecological-spatial values to toilet design.

In aspiring to practice soil care – and to promote it through architectural design – the ethics of care as defined by scholars in political science, Berenice Fisher and Joan Tronto (1990), became especially influential. They define care, in its broadest sense, as “a species activity that includes everything that we do to maintain, continue, and repair our ‘world’ so that we can live in it as well as possible. That world includes our bodies, ourselves, and our environment, all of which we seek to interweave in a complex, life-sustaining web.” (Ibid.: 40, original emphasis). This broad definition has since been widely adopted, including by Maria Puig de la Bellacasa, a researcher in feminist science and technology studies (STS), who reformulates it as follows: “care is everything that ‘is’ done to maintain, continue, and repair the world so that ‘all’ can live in it as well as possible” (Tronto cited in Puig de la Bellacasa 2017: 161, original emphasis). She describes the dominant human relation with soil to pace its fertility with production demand, inextricably bringing the resource to exhaustion. While soil is habitually used as a resource of extraction value for human consumption, this *Design Scenario* unusually presents a community gardening of cleaning or caring for soil, and not for the purpose of feeding or eating. In relation to the latter definition of ‘care’ and building on the debate around the vital role of non-human communities in repairing the world, this *Design Scenario* explores what a toilet – as mundane yet highly technological architectural element – can mean in the move towards more sustainable habits. While toilet users today blindly depend on the presence of sewage systems, materially supporting a ‘flush-and-forget’ attitude, I instead aim to reposition the toilet as a space that holds users accountable for what they leave behind.

In promoting a more responsive approach to architectural design, and to ways of inhabiting the world, I found inspiration in the fields of feminist STS (Haraway 2016; Puig de la Bellacasa 2017), new materialism (Bennet 2010), posthumanism (Braidotti and Bignall 2019), and traditional ecological knowledge (TEK) (Nelson and Shilling 2018). Within new materialism, Jane Bennet, a scholar in political philosophy, introduces in her *Vibrant Matter* (2010) the idea of a vital materiality which can be found in matter and things, as opposed to their usual consideration as inert or passive stuff. Instead, she encourages engagement with the vibrant capacity of inanimate things to act, to trigger, to impede, to block the will or to produce effects dramatic and subtle and see how that could change analyses of political events. This perspective becomes especially relevant when designing with and for matter such as human bodily waste through toilet design, using its agency to affect habits. Posthumanism has likewise been influential to the research and design decisions, as it proposes a move beyond human-centred architecture and

P1:
We are now
really dealing with
an excess of ‘waste’

P2:
Our dream is
therefore to create an initiative
called ‘Compostella’. It was an idea
to invite the neighbourhood to bring
their organic waste to the Blikfabriek,
and then we would turn it into
compost for them.

P3:
And we would
turn the design into a
real party, with tunnels and
different processes you have
to go through, and windows so
you can see what’s happening.
That would be wonderful, with a
glass wall so you can see the
different bins and watch
the worms crawling
around.

P1:
Yes, but also
in a way that you
can come visit and see
everything happening.

P2: And
maybe we could col-
laborate with a dry toilet company
for the management. I think it’s a good
business idea, but someone has to
start it...

P1:
So far, we
couldn’t convince
people to help set
it up...

P2:
But we just need a
better system to manage it:
With gloves, a grid on the floor,
good boots, ...

P1:
Yes, that’s really
the design issue. Also in terms
of materialisation: Which parts are
made of wood, and which parts are
grids? Also with nice, more attrac-
tive buckets.

P2:
It will also be
more enjoyable to
work there in the back,
when the space is more
appealing and better
organised.

(P1, P2, P3: Blikfabriek Experts 2024)

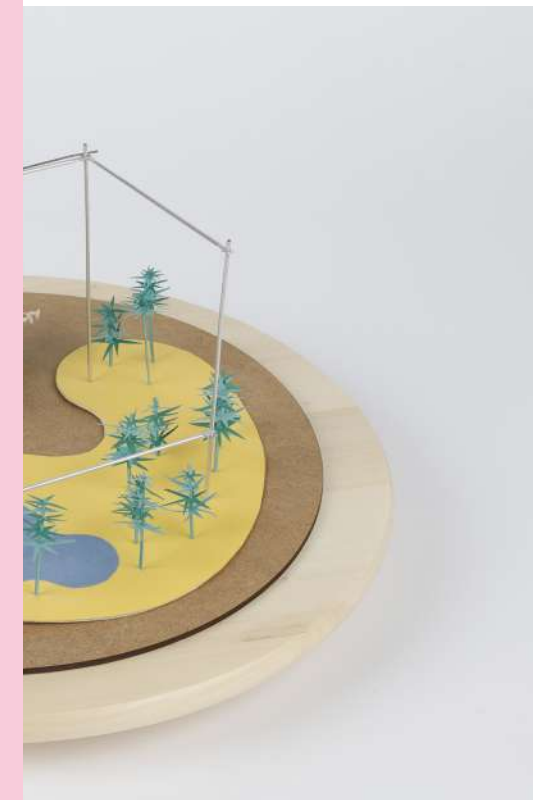


Fig. 48: Architectural model of A Scenario of Composting and Gardening to Remove Soil Contamination (scale 1:33).



Fig. 49: Architectural model of A Scenario of Composting and Gardening to Remove Soil Contamination (scale 1:33).

which involve removing or rendering toxic environments harmless using plants and microorganisms, the hemp of hazardous substances (Turner et al. 2019). Through I reimagine human bodily waste as a resource by using remediate soil contamination at the Blikfabriek site. Community gardening practices using compost made from human composting toilet moves beyond user-centred desires and activity towards the soil. It promotes care and engagement with species that flourish in this living layer, introducing new values to toilet design.

In aspiring to practice soil care – and to promote its design – the ethics of care as defined by scholars in political theory (Fisher and Joan Tronto (1990), became especially influential. Care, in its broadest sense, as “a species activity that involves what we do to maintain, continue, and repair our ‘world’ so that it is as well as possible. That world includes our bodies, ourselves, and others, all of which we seek to interweave in a complex web of care” (Ibid.: 40, original emphasis). This broad definition has been widely adopted, including by Maria Puig de la Bellacasa, a researcher in science and technology studies (STS), who reformulates care as everything that ‘is’ done to maintain, continue, and repair that ‘all’ can live in it as well as possible” (Tronto cited in Puig de la Bellacasa 2017: 161, original emphasis). She describes the dominance of soil to pace its fertility with production demand, its use as a resource to exhaustion. While soil is habitually used as a commodity value for human consumption, this *Design Scenario* explores the possibility of community gardening of cleaning or caring for soil, as a way of feeding or eating. In relation to the latter definition of care, on the debate around the vital role of non-human communities in the world, this *Design Scenario* explores what a toilet – as a technological architectural element – can mean in the context of sustainable habits. While toilet users today blindly depend on sewage systems, materially supporting a ‘flush-and-forget’ approach, this aim to reposition the toilet as a space that holds users and their waste, they leave behind.

In promoting a more responsive approach to architecture, to ways of inhabiting the world, I found inspiration in the work of STS (Haraway 2016; Puig de la Bellacasa 2017), new materialism (Barad 2007, 2010), posthumanism (Braidotti and Bignall 2019), and embodied knowledge (TEK) (Nelson and Shilling 2018). Within the work of Donna Haraway, a scholar in political philosophy, introduces in (2010) the idea of a vital materiality which can be found in the world as opposed to their usual consideration as inert or passive. This encourages engagement with the vibrant capacity of the world to act, to trigger, to impede, to block the will or to produce. This perspective becomes especially relevant when designing interventions such as human bodily waste through toilet design, using composting toilets. Posthumanism has likewise been influential to architectural decisions, as it proposes a move beyond human-centred



Fig. 48: Architectural model of A Scenario of Composting and Gardening to Remove Soil Contamination (scale 1:33).



Fig. 49: Architectural model of A Scenario of Composting and Gardening to Remove Soil Contamination (scale 1:33).

instead explores architecture's potential as a responsive medium (Harrison 2012). As explained by feminist and posthumanist scholar, Rosi Braidotti, and political philosopher, Simone Bignall (2019), posthumanism rejects the idea that people are superior to other species, while still recognising a particular human responsibility, given that much of the damage to the planet is caused by human activity. By bringing these ideas together, they aim to develop new ways of thinking about what humans can do, what humans are responsible for, and what humans are capable of in a world where humans are no longer seen as the only or central actors. In relation to the agency of architecture, posthumanism has informed this research by providing a lens through which to examine how design can contribute to reconfiguring our relationships with the environment and expanding responsibility towards other living species.

Additionally, traditional ecological knowledge (TEK), is a broad field of knowledge that highlights a holistic ecological reality, allowing for different meanings and definitions depending on an Indigenous background or home ecosystem (Nelson 2018). Whereas traditional Western science mainly describes the environment and what happens, providing descriptive knowledge, TEK is prescriptive and offers an account of how people ought to act in relation to nature (McGregor 2018). Rather than merely describing the human-caused climate crisis through facts, TEK prescribes what we morally must do or change in response to it, marking a fundamental distinction between facts and values. TEK expands relationality to include animals, which are considered vulnerable populations when defining 'health' or risk assessment (McGregor 2004). With 80 per cent of the earth's biodiversity hotspots located on Indigenous lands, Indigenous people are ecologically important far beyond their small populations (Martinez 2018). There is a striking correspondence between their long-term presence, spanning tens of thousands of years, and the survival of biodiversity in the lands they inhabit, suggesting enduring environmental sustainability (Ibid.). In ethical terms, TEK is tied more to manners and behaviours – grounded in actions and practices – than to abstract principles (Nelson 2018). TEK constitutes a way of living shaped by what is proper or correct for a specific person to do, with responsibilities differing across individuals, and the 'doing' defined by acting upon these responsibilities (Ibid.). Relatedly, feminist scholars have developed an ethics of responsibility grounded in care, obligation, and attentiveness to others (McGregor 2018). Taken together, the fields of feminist STS, new materialism, posthumanism, and traditional ecological knowledge (TEK) provide a lens through which I approach the research, informing both the design decisions and the reframing of research questions throughout the process.

In terms of the habit of going to the toilet, in Flanders this commonly concerns an individual habit. The public character of a site, however, can be of great influence in raising awareness and facilitating collective learning. The Blikfabriek team also believes that a collective learning approach can help to change habits and encourage a broader shift in mindsets. They believe that a community project to collectively manage the composting toilets can set an example for other sites and help convince visitors of their ideology. They have, for instance, long envisioned a *Compostella* project in which all organic food waste and human bodily waste on their site is collected and composted near the composting toilets. They aspire this project to consist of a semi-public toilet design that is highly present and visible on-site, clearly reflecting the



Fig. 50. Fragment of the architectural model of A Scenario of Composting and Gardening to Remove Soil Contamination (scale 1:33).

composting process. To support the project, they would ask volunteers for help in compost management, and they would organise workshops to explain and educate visitors about how the toilet works and what benefits can be generated from it. They believe the design must be well-organised, from a logistical perspective, and appear clean and attractive to visitors to make this project successful in the future. They argued that only under these conditions could they realistically ask volunteers to help manage the composting project and encourage their involvement in what the Blikfabriek members called this “shitty job”.

Returning to the initial ambition of the research, shifting mindsets by architectural design constitutes a process. This is even more true concerning sensitive subjects, such as toilets and ways to cope with human bodily waste. While the Blikfabriek believes that an aesthetically pleasing and hygienic composting toilet design can encourage engagement with rejected matter such as bodily waste, I argue that this must be done gradually and with consideration for the mindsets of residents and visitors to the site. It is, moreover, important to acknowledge that working against well-established systems or ingrained habits inevitably generates friction. As Meadows (2008) explained, the more radical the intervention aimed at altering social systems through new structures and behaviours, the greater the resistance it tends to provoke. With the *Scenario of Composting and Gardening to Remove Soil Contamination*, I intend to have an impact through a community practice of care and repair of soil. Yet I am aware that fostering engagement with bodily waste presents a significant challenge, far removed from the familiarity of the current system. A sudden implementation of such a design would require great dedication from users, and a certain level of conviction or belief in the ideology which the design represents. Before moving on to convey ideology through design, I therefore explore how architectural design can raise awareness of the unsustainability of the current flushing toilet system and encourage users to take greater responsibility for their bodily waste, as a first step in shifting mindsets. The *Design Scenarios* are created not as implementable proposals but from the intention to trigger ideas as *Conversation Pieces* that encourage reflection on our habitual ways of dealing with bodily waste in a non-radical or non-shocking way, for conversation and imagination to remain possible. I seek, herein, not only to unsettle existing patterns of habitation, but also to support and propose alternative ideas and spatial habits through architectural design.



Fig. 51: The composting bins at the Blikfabriek site, hidden behind the composting toilets.

3.5. Summary of Design Exploration I

Intermediate Reflections and Key Insights

I have argued that the toilet is a key entry point and a situated application of the research focus. It represents an unsustainable daily habit for which technological alternatives are emerging but have not yet been widely adopted. While more sustainable systems already exist, their implementation does not align with the mindset of the general public. This obstructs change to the familiar toilet system. The flushing toilet system as a whole can be understood as a spatial manifestation of the tendency to conceal and avoid rejected matter, such as bodily waste, out of sight and out of mind, resulting in a significant impact on the built environment. During the course of this research, general awareness of sewage pollution appears to be growing in Flemish news media. News articles highlight problems caused by sewer systems by adopting a human standpoint, for instance, by describing how people are restricted in their daily habits from engaging in certain activities. While these newspaper articles are mostly written from an anthropocentric perspective, this perspective is also noticeably shifting towards problematising the flushing toilet system as environmentally destructive (Verelst 2020). Within this shift, the focus moves from sewage systems as an innovation for human health to sewerage as a major source of pollution and environmental damage (Symons and Loosveld 2025). Tapping into tendencies and concerns that are emerging in society, I use the architectural element of the toilet as a spatial entry point to challenge and loosen ingrained habits that are currently obstructing change. By investigating how architectural design can trigger a shift in mindsets, I seek to materially support a change in how we deal with human bodily waste.

As part of this chapter, I presented the first research cycle of *Design Exploration I*. It was developed to test contemporary norms around toileting within the real-world setting of the case study. Over time, we have gradually become accustomed to the high level of comfort and low level of responsibility that the flushing toilet system offers. We have become so oblivious to its convenience and so dependent on it that we have largely left the system unquestioned. As part of *Design Exploration I*, I therefore examined the deeply ingrained toilet habits and routines that shape

the way we deal with bodily waste through architectural design. I have done this by introducing various toilet designs, or *Design Scenarios*, into the case study site in order to challenge the on-site status quo. More specifically, I have done this by raising questions and prompting negotiation around whether these designs are, or are not, acceptable to participants in this semi-public setting. By presenting the *Design Scenarios* and raising them for discussion, I primarily intended to render the toilet designs discussible and, perhaps, even imaginable within the context of the case study.

In putting the designs up for discussion as *Conversation Pieces*, in situ and in confrontation with local mindsets, I was able to test approaches to shifting mindsets in a real-world context. By analysing these initial design discussions, I identified emerging themes, reactions, and convictions that helped delineate a set of intermediate design strategies. Moreover, this chapter served as a first methodological step in establishing a research cycle, moving from observations in theory or fieldwork to design, leading to insight or ‘designerly sensing’, which then informed a subsequent series of designs. Through the literature review and fieldwork conducted as part of *Design Exploration I*, a series of observations emerged throughout the research process, prompting the following three sub-research questions (1–3) discussed below. These questions were addressed through speculative *Design Scenarios* and, after analysis of the discussions, resulted in the delineation of intermediate design strategies.

The Design Strategy of Rendering Present

1. Following the observation that the spatial or visual absence of wastewater infrastructure in daily living environments results in a lack of awareness and accountability regarding waste treatment, what influence would explicitly rendering this infrastructure present through the design of toilets have on users’ mindsets?

Sub-research question 1 relates to the fact that the flushing toilet is designed to render not only the user but also the impact of use invisible (Penner 2012). This ‘flush-and-forget’ attitude supports a broader lack of accountability surrounding human bodily waste and is materially supported by the current toilet system, which this research interrogates. The *Design Scenario* of *The Smallest Hidden Room*, for

instance, is the spatial articulation of an idealised user-centred toilet space and answers to the anthropocentric desire for comfort and privacy (Fig. 34). It becomes an ideal feature in a shame culture over human bodily waste. Conversely, in other *Design Scenarios* as part of this chapter, I made the toilet more visible and allowed it to occupy more space, rendering it explicitly and experientially present on the case study site. For example, *The Toilet as a Constructed Wetland and Interior Pond* is deliberately conceived as a large interior pond that captures and treats wastewater locally on-site, after it has been evacuated in the toilet space elevated on a scaffolding structure (Fig. 43). The design repositions the toilet and its treatment system as a central or visible element, rather than concealing it, as is currently the case. *The Scenario of Composting and Gardening to Remove Soil Contamination* also repositions the toilet and its treatment system into a central and present element that takes up space, even extending towards the surrounding hemp field (Fig. 47). In both cases, the toilet includes more interaction with the visible and spatial presence of on-site storage and treatment of bodily waste.

By rendering the toilet’s function and impact more present and explicit, I delineated the Design Strategy of Rendering Present. This strategy repositions the toilet as a visible and present element, explicitly incorporating wastewater infrastructure and treatment into the design. Consequently, the toilet becomes a central and prominent on-site feature that occupies space and makes its function explicit, fostering greater awareness and promoting collective learning through design.

The Confrontational Design Strategy

2. How can architectural design reposition the toilet as a space that holds users accountable for what they leave behind, in the face of the current system’s ‘flush-and-forget’ attitude and obliviousness to human bodily waste?

While the current toilet system is largely shaped by user-centred desires, primarily responding to the needs of comfort and functionality, sub-research question 2 questions whether the toilet as an architectural element can be deployed to make users more responsible for their bodily waste. This way, it intends to emphasise the broader impact of the toilet design

and reposition it as a confrontational, instead of a purely comfortable element. For example, *The Toilet as a Meeting Place*, gathering users around a table on toilets, is composed as a highly challenging toilet space for the micro-culture of the case study, testing the absolute minimal requirements for usability of toilets (Fig. 36). The design was intentionally composed to be far removed from the familiar toilet experience. During the discussion moments, however, the toilet design proved too provocative, hindering the conversation and ultimately being set aside as a piece of art. As such, it did not effectively stimulate discussion or imagination of the scenario on the site of the case study.

In composing *An Assemblage of Kitchen and Toilet*, I used another approach to move beyond the purely functional and comfortable expectations associated with toilet spaces (Fig. 40). This toilet design combines the activities of cooking and eating with toileting to challenge existing categories and investigate new combinations and typologies. While this *Design Scenario* was also received as provocative, it did stimulate discussion and imagination, exemplified by the numerous suggestions that emerged in the conversations to address the odour and privacy issues. In particular, the proximity of food preparation to the disposal of human bodily waste was met with strong reluctance and deemed unacceptable, largely due to fears of contamination. The issues of concern that arose in response to the design thus redirected the discussion again towards user-centred requirements rather than emphasising the toilet design’s broader environmental impact or presenting it in a confrontational manner.

With *The Toilet as a Constructed Wetland and Interior Pond*, I addressed the environmental impact of the toilet design by incorporating a small wetland to treat the collected wastewater locally. In a deliberately confrontational manner, the design quite literally counters a ‘flush-and-forget’ attitude by allowing what is evacuated in the toilet to reappear in the pond after it has been flushed away. The constructed wetland within the pond, along with the wastewater being treated, is made visible and even emphasised by a small bridge leading over the pond to the toilet space. A sink is installed on the bridge, with an open pipe discharging directly into the pond after use, demonstrating that all water flows towards the central treatment pond (Fig. 46). This way, the toilet is no longer merely a comfortable or purely functional space.

By composing these *Design Scenarios* and analysing the transcripts of the conversations surrounding them, the Confrontational Design Strategy emerged. Whereas *An Assemblage of Kitchen and Toilet* repositioned the toilet as a new typology by combining it with other functions and activities, *The Toilet as a Constructed Wetland and Interior Pond* rendered it a confrontational element on-site, inviting users and visitors to engage with the design and treatment of bodily waste by holding them accountable for what they leave behind. Within this design strategy, the toilet is no longer conceived as a space that merely responds to user desires for comfort and rapid waste evacuation, but instead as an extended spatial and infrastructural condition whose functioning and effects engage with the wider environment.

The Public Design Strategy

- 3. What is the influence of the collective and public context on changing individual toilet habits in relation to the Blikfabriek as an urban and semi-public case study?

The design of public toilets differs greatly from private ones, as do the requirements for their acceptance. Since public toilets must be shared with other users, expectations regarding hygiene and cleanliness are higher. As I have explained in this chapter, the shared narratives within a given culture are highly influential in shaping what is culturally expected of a toilet design. I have therefore argued that a shift in toilet habits must be addressed collectively, even though visiting the toilet is habitually an individual act. In *The Toilet as a Meeting Place*, I leverage the public character of the case study by gathering users around a table within the same toilet space to encourage correct use and cleaning of the toilet (Fig. 37). Through the design, I actively deploy aspects of shame and social control present in public toilets, tying them to a degree of responsibility. Accountability is thus framed as a collective responsibility, where users hold each other accountable for their bodily waste. In *A Scenario of Composting and Gardening*, I also established a community practice of composting and gardening, not for consumption, but to remediate soil contamination. Moving beyond user-centred desires, the toilet design deploys the presence of a community on-site to facilitate learning and engagement by centring on a collective practice

of care and interaction with soil species. With this *Design Scenario*, I therefore aim to trigger a commitment in users to engage with and learn about human bodily waste through the design of public toilets.

As a result, the Public Design Strategy emerged. This design strategy utilises the presence of a community on-site to challenge dominant – and especially obstructive – narratives through toilet design, as a way to materially support a transformation in toilet habits. It not only employs social control to encourage proper management of toilet spaces but also facilitates collective engagement, learning, and reflection within the micro-culture of the case study, which must ultimately use and accept the design as a shared condition.

Altogether, the Design Strategy of Rendering Present, the Confrontational Design Strategy, and the Public Design Strategy are intermediate design approaches that emerged from *Design Exploration I* as a first research cycle. These intermediate strategies will be further refined and extended in *Design Explorations II* and *III*, discussed in the following chapters. In Chapter 4: *Toilets of Care as a Recovery Activity*, the strategies will be elaborated, and three subsequent strategies will be developed based on observations from this research cycle. In Chapter 5: *Toilets that Challenge on a Real-life Scale*, these strategies will be further advanced into broader approaches for shifting mindsets through architectural design.

4. Toilets of Care as a Recovery Activity

This chapter concerns the second of three research cycles or *Design Explorations* and is titled: *Toilets of Care as a Recovery Activity*. A *Design Exploration* is a combination of Research-by-Design actions to explore and trace a subject through architectural design to challenge habits at the site of a case study. *Design Exploration II* investigates how toilets can participate in wetland conservation by collecting and treating human bodily waste in a constructed wetland on-site, instead of evacuating it through underground pipes and sewers. To introduce the chapter, I will guide you through a part of the *Critical Cartography*, combined with a landscape model, that focuses on the Blikvelden as the vulnerable wetland under study. Similar to the previous chapter, I have created a navigation through cut-outs of the drawing and landscape model, using numbers in the text. I will first explain the origins of the Blikvelden before delving deeper into the challenges it presents in terms of soil care and presenting the *Design Scenarios* created for this area.

4.1 Setting the Context by Critical Cartography: The Blikvelden

Whereas the *Critical Cartography*, as part of *Design Exploration I*, revealed contemporary toilet habits tied to infrastructural systems, examining how these emerged and evolved over time, *Design Exploration II* focuses on a specific location in the Blikfabriek case study: the natural wetland of the Blikvelden [English: Can Fields]. Situated at the rear of the property ①, this wetland has long been shielded from human presence. The wetland is quite the exception within the urbanised area of Hoboken (Antwerp), particularly around the Blikfabriek, as it is the only part of the site that remains in direct contact with the soil ②. As the Blikfabriek is a former industrial site, most of its surface area is covered by dense concrete paving, which was once required to support truck access to the factory sheds ③. As these exceptionally robust floor slabs make de-paving

impractical, the Blikfabriek team's current greening efforts rely on placing boxes with soil and plants on top of the paved surfaces.

As outlined in Chapter 3: *Toilets Exploring Mindsets on Human Bodily Waste*, the soil in Flanders is heavily paved. Verlinden and Vanoppen (2021) even state that 14 per cent of Flanders' surface area is covered by paved roads, driveways, houses, and businesses, which is twice the European average. In the area of the Blikfabriek as well, rainwater falling in the neighbourhood does not have the opportunity to seep into the ground, as it lands on paved surfaces, from where it searches for a way into the sewers ④. Especially in times of heavy rainfall, the combination of paved surfaces and the lower elevation of the area makes it difficult for rainwater to drain away, causing the Blikfabriek to face regular floods in autumn and winter. Since this excessive paving of the built environment prevents litres of rainwater from penetrating the soil, Belgium in general has been classified by the World Resources Institute as a region with 'high water stress' (ibid.).

By contrast, the Blikvelden wetland is located in the heart of this neighbourhood and has long escaped urban development due to its concealment behind the surrounding factory sheds ⑤. The 2.5-hectare wetland, situated in the middle of this former industrial area and residential neighbourhood, was able to develop relatively undisturbed during a long period of shelter. It was discovered in 2021 and made accessible to the public with the support of the city of Antwerp. Although the industrial sheds shielded the area from human presence for many years, it still became polluted by heavy metals and PFAS chemicals originating from industry (Antwerp City n.d.). The urban area of Hoboken at large came under societal scrutiny in 2022 because of its heavily contaminated soils. The industrial pollution concerns 'forever chemicals' or non-biodegradable substances known to be extremely persistent and capable of lasting over 1000 years (ibid.). Up to 2023, the Blikvelden and the wider area of Hoboken were subject to restrictions

Fig. 52: Image of the Critical Cartography and landscape model, focusing on the Blickvelden wetland.



on the use of and contact with soil, while ‘no-regret measures’ were implemented to prevent people from contamination by exposure to the soil (Flemish Government n.d.). On-site, these measures included not allowing children to play in the soil, regularly cleaning the paved areas with water, and preventing fallow or loose soil from drifting or blowing away, among others. Composting with green waste from these areas was also not permitted. Even though the Blickvelden wetland and its wider surroundings are still facing forms of industrial pollution, such as heavy metals, the ‘no-regret measures’ for PFAS contamination are no longer in place. As a result, the area was opened in 2021 as a new public park right behind the Blickfabriek.

Today, the Blickvelden is known as the garden of the Blickfabriek, with different entrances providing access from the neighbourhood. It is cared for by Natuurpunt, an independent volunteering association that protects and restores vulnerable and endangered nature in Flanders. The organisation carries out monthly management activities in the park and has

proposed a plan to restore and protect the Blickvelden in its original state. Since this zone had not been accessed or managed by humans for years, it is evolving from a wetland into a forest with reeds (6), partly as a result of urbanisation taking place in the surrounding area (Natuurpunt 2025). In recent years, species such as hornbeam, soft birch (7), black cherry, willow, and European and American oak (8) have colonised a large part of the original wet grasslands (9). According to Natuurpunt, this creates a great deal of shade on the grasslands (10), while leaf fall has caused additional scrub encroachment. The network of Natuurpunt Hoboken, in response, aims to implement basic nature management and care for the area with the help of volunteers.

Taking together the regular floods, industrial pollution, and gradual transformation of the wetland into a forest, this narrative presents the Blickvelden as an area that poses many challenges in terms of soil care.

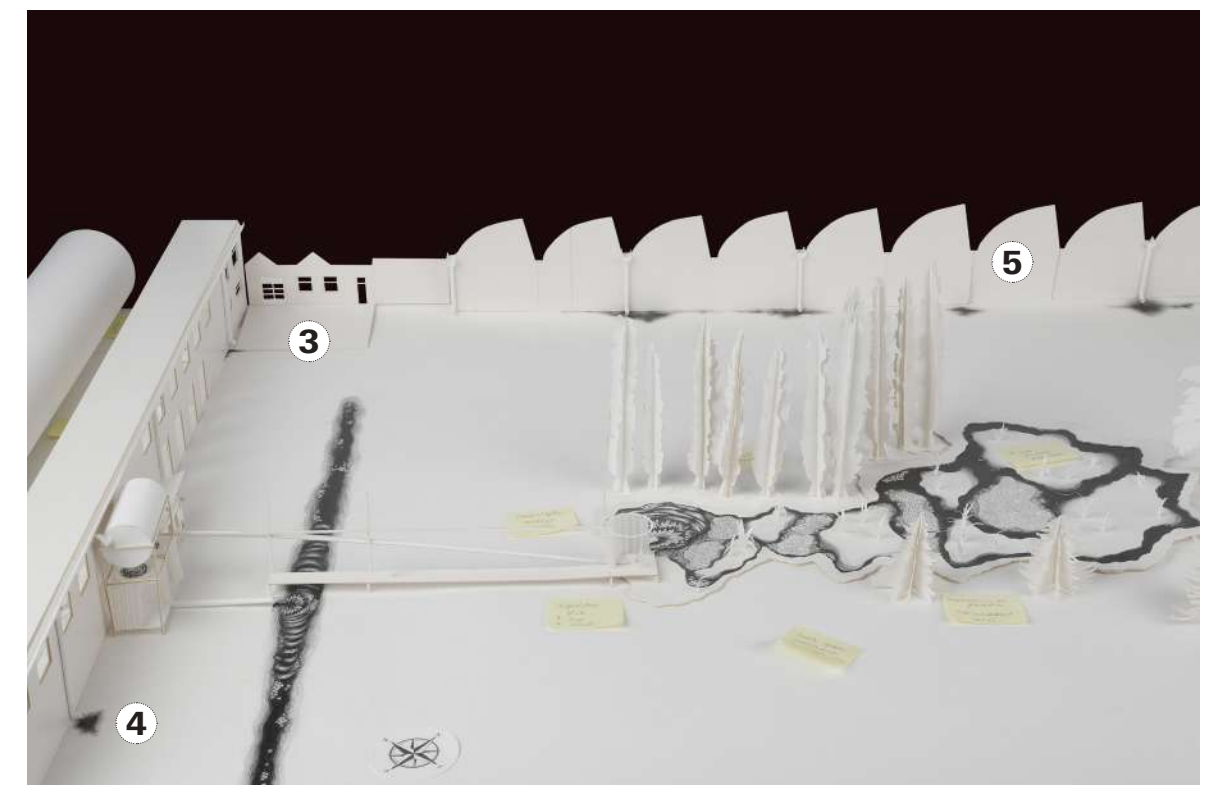


Fig. 53: Image of the Critical Cartography and landscape model, focusing on the Blickvelden wetland.

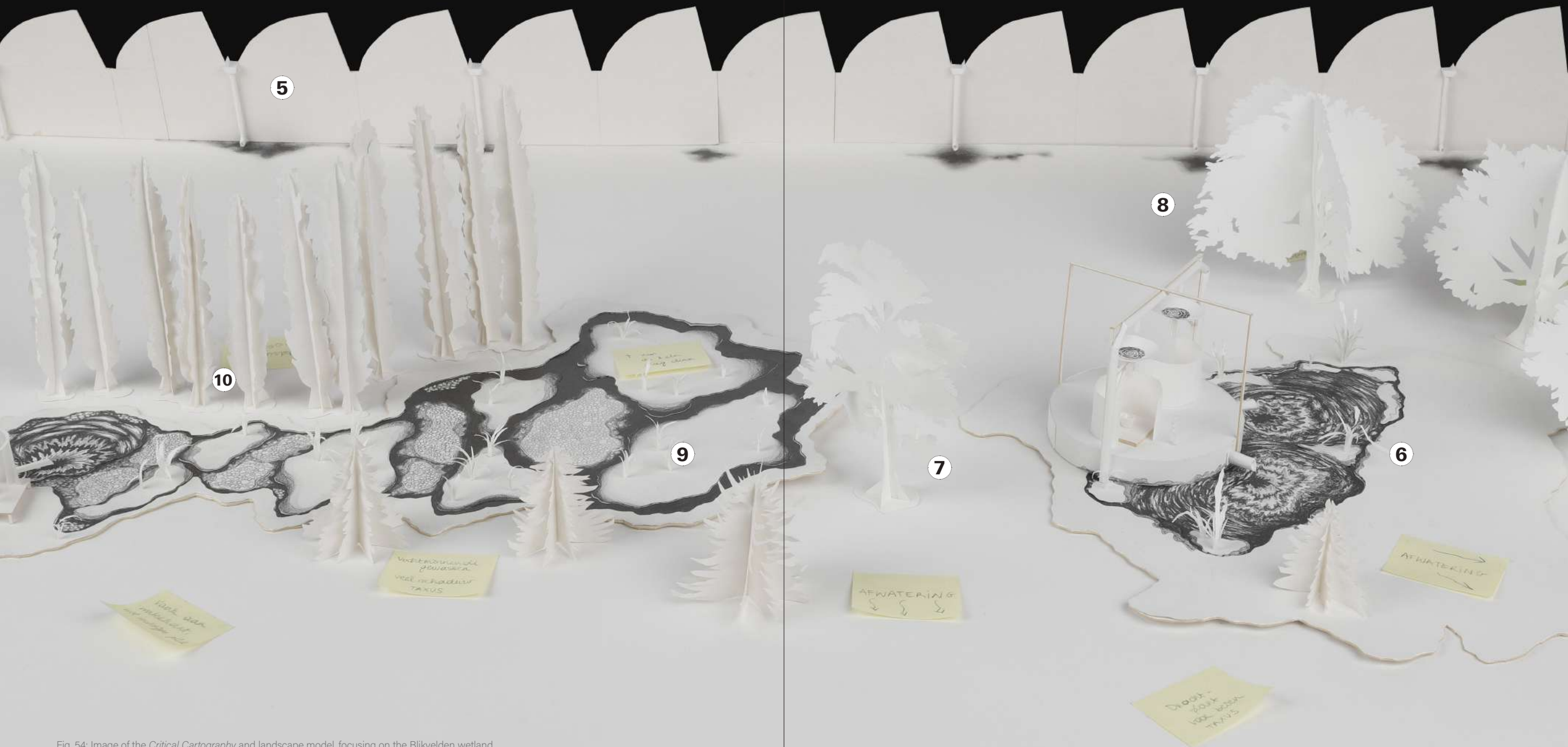


Fig. 54: Image of the *Critical Cartography* and landscape model, focusing on the Blikvelden wetland.

- Italian poplars (*Populus nigra* 'Italica')
- * Yews (*Taxus baccata*)
- English oak trees (*Quercus robur*)
- ✕ White willow (*Salix alba*)
- / Silver birch (*Betula pendula*)

Fig. 55: Plan of the Blikfabriek site, including the former industrial sheds and the Blikvelden wetland in the back, with indication of the sedge fields (1), the reed fields (2), the water buffer (3), and the kitchen of Pirre Kooft (4).



4.2 The Case of the Blikfabriek: The Blikvelden Wetland

The Blikvelden wetland, situated at the back of the former industrial site of the Blikfabriek, has been significantly impacted by urban development and, relevant to this research, the implementation of sewers (Fig. 58). Originally, the stream of the Hollebeek ran through this area, providing the wetland with water (Antwerp City 2020). Due to urban development, however, parts of the Hollebeek were drained to enable sewage infrastructure and houses to be constructed in the neighbourhood. As a result, the natural stream now leads into the sewers and runs largely underground through pipes. For the Blikvelden, this infrastructural intervention drastically reduced the water supply, meaning that the area is now dependent solely on rainwater. This caused the natural wetland to gradually dry out, resulting in overgrowth and low-diversity vegetation, which in turn produced more shade and leaf fall. Natuurpunt (2025) argues that dominant or 'exotic' species are spreading, increasing the risk of a monoculture rather than a biodiverse wetland and accelerating the area's transformation into a forest. For this reason, Natuurpunt has designated the area as a vulnerable wetland in urgent need of care.

Real-life Issues and Concerns

Diverting parts of the original Hollebeek stream into sewers has caused the Blikvelden to lose much of its natural character and reduced its water storage capacity. Moreover, due to the current climate emergency, we are facing more extreme weather and rainfall, causing severe flooding in the Blikfabriek neighbourhood every year. The city of Antwerp is in response investigating the possibility of reopening and restoring the Hollebeek to its original riverbed. This would create more buffer space to store water for longer periods, thereby protecting the neighbourhood from flooding. At the same time, Natuurpunt has developed a plan for monthly nature management in the Blikvelden to help restore the area to its natural state. By mowing, removing 'exotic' species, and clearing fallen trees, they aim to encourage the return of native fauna and flora. These efforts also prevent further afforestation, allowing the original wet grassland to breathe again and redevelop as a natural water buffer. As a result, the area is expected to become more attractive to amphibians, small mammals, and a variety of bird species. In this way,

their approach fosters rich biodiversity within a relatively small space and enhances the liveability of this vulnerable wetland.

4.3 Toilets of Care as a Recovery Activity

Returning to the research process, it is divided into three research cycles, or *Design Explorations*, which form the main body and structure through an iterative process. While I ultimately explore how architectural design can trigger a shift in mindsets regarding human bodily waste, each *Design Exploration* has a distinct focus, revolves around specific sub-research questions, and investigates a different part and situation of the case study. In the situated context presented above, this chapter examines whether and how toilets can contribute to wetland restoration. Although the combination of a vulnerable wetland and toilets, discharging and treating wastewater in the surrounding environment, may seem unconventional at first, *Design Exploration II* arose from the conviction that they can be valuable to each other when assembled. This approach draws on the restoration plan proposed by Natuurpunt to manage the Blikvelden, which involves preventing afforestation, creating more space to collect water and increasing biodiversity. As such, with *Design Exploration II*, I intend to reposition the toilet into an element that cares for and repairs its natural surroundings.

Situated Focus

From the design discussions during *Design Exploration I*, I observed that proposing wastewater treatment systems other than the familiar underground sewer system triggered friction and distrust. Nevertheless, there are many other systems for treating wastewater locally or on a neighbourhood scale, such as constructed wetlands, biogas toilets, and composting techniques. Although many low- and high-tech alternatives to the current system exist, they are not yet adopted or appearing in real-world public contexts. As explained in Chapter 1: *Introduction*, the mindset of the general public does not yet align with other ways to cope with human bodily waste and toilets, hindering their implementation and use. With this research, I therefore argue that a change in values and habits is necessary to trigger a shift in mindsets. As habits are spatial issues closely intertwined with cultural norms and values, they are considered key entry points in supporting cultural change in how we deal with human bodily waste.

Fig. 56: The back of the Blikfabriek site, located next to the Blikvelden wetland.



Fig. 57: One entrance from the Blikfabriek site to the Blikvelden wetland



Fig. 58: The continuous updating of sewers in Flanders, the northern part of Belgium and the context under study.



Fig. 59: The back of the Blikfabriek site, located next to the Blikvelden wetland.

In *Recent Trends in Wastewater Treatment and Water Resource Management* (2020), researchers in wastewater and sustainable technologies, Seema Sukhani and Hoysall Chanakya, state that the disposal of sewage has been a major issue in urban areas and that its entry into bodies of water is now inevitable. They state that while nutrient inputs into waterbodies have always been considered a liability, they can now be converted into a blessing. Their study has proven that feeding a wetland with a limited amount of sewage water, when carefully designed and monitored, can stimulate the restoration of a water body. Not only is this research theoretically valuable to the objective of *Design Exploration II*, but it also indicates a shift in technology and engineering towards a more cultural approach. While welcoming human bodily waste in natural water streams might at first glance be unconventional and provocative, it can include a transformation in appreciation of bodily waste, from liability to a blessing. Another surprising, albeit unintentional, real-world example is the sewage farm in Melbourne, which attracted attention due to its appeal to 300 different bird species, earning the title of a ‘mythical place’ from birdwatchers in The Guardian (Convery 2025). At first glance, a sewage farm may seem an unlikely haven for birds, but the article explains how the Western Treatment Plant has become home to abundant birdlife thanks to its constant supply of wastewater, which also protects the area from drought. As reported by Convery, the treatment plant remains operational as an industrial site, receiving 200 billion litres of sewage each year, taking approximately 35 days to reach the final lagoon, where it is further recycled or pumped into the nearby bay. The large number of birds attracted to the site is a direct result of this process.

Both of these real-world examples can be related to the question by political scientist, Aaron Wildavsky: “Wouldn’t it be wonderful if society’s rubbish heaps were to turn out to be its transformers?” (1980: 736). As previously noted, deeply ingrained cultural ideas about toilets and human bodily waste are currently preventing progress in exploring alternative toilet practices. With this research in the field of architecture, I intend to loosen dominant narratives by design, in support of those societal changes that are struggling to come into being. Venturing from the idea of converting sewage disposal into a blessing, the question at the centre of *Design Exploration II* is whether toilets can take part

in Natuurpunt’s plan for the recovery and repair of the Blikvelden wetland. While this might seem like an unconventional proposal, it is theoretically valuable to investigate it as a way to challenge and reshape dominant narratives on human bodily waste.

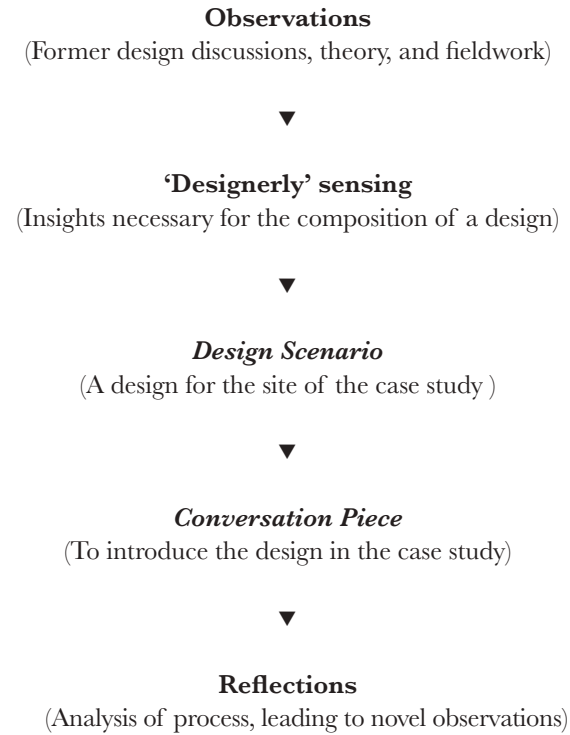
Drawing inspiration from the interconnectedness of humans and nature as outlined in fields such as feminist STS, new materialism, posthumanism, and traditional ecological knowledge (TEK), I have developed another series of *Design Scenarios* as part of *Design Exploration II*. The *Design Scenarios*, furthermore, strongly engage with the ethics of care as described by Fisher and Tronto (1990) as a relational moral framework focused on the practices of maintaining and repairing the world through attentiveness, responsibility, and responsiveness to others’ needs – here, the needs of the wetland. This way, the scenarios aim to move beyond user-centred toilet designs and instead foster a more responsive relationship between the wetland and its visitors. In line with the example of the sewage farm in Melbourne, the toilet designs seek to shift the dominant narrative of sewage dumping and the pollution of natural waters by presenting toilets as a means of restoring a vulnerable wetland. To investigate this ingrained narrative and open it up to discussion, I introduced the *Design Scenarios* once more at the Blikfabriek as *Conversation Pieces*.

Methodological Process and Sub-research Questions

By analysing the design discussions around the initial series of *Design Scenarios*, discussed in Chapter 3: *Toilets Exploring Mindsets on Human Bodily Waste*, I identified recurring themes, reactions, and convictions. From this analysis, I delineated a first set of intermediate design strategies to shift mindsets through architectural design. These strategies include: the Design Strategy of Rendering Present, the Confrontational Design Strategy, and the Public Design Strategy. Moving from *Design Exploration I* to *II*, these intermediate design strategies and reflections indicated the beginning of a second research cycle, discussed in this chapter, in which these strategies are further refined and extended.

As outlined in Chapter 2: *Methodology and Research Design*, every research cycle begins with analysing the previous design discussions, reviewing theory, and carrying out fieldwork at the situated part of the Blikfabriek under study. From these observations,

I delineated sub-research questions (1–6), to which I responded with speculative *Design Scenarios*. After analysing the design discussions, I was able to delineate intermediate design strategies. At the end of each research cycle, the reflections constitute the beginning of a new *Design Exploration*, where observations and intermediate design strategies are further refined:



In relation to the first research cycle discussed in Chapter 3, this chapter on *Design Exploration II* concerns a subsequent series of *Design Scenarios*, focusing on a situated research question and specific location at the Blikfabriek case study: the Blikvelden wetland. The three *Design Scenarios* created as part of this research cycle aim to investigate whether toilets can take part in the restoration plan proposed by Natuurpunt for the recovery and repair of this vulnerable wetland. Through volunteering work carried out during fieldwork with Natuurpunt in the Blikvelden, I discovered that the wetland comprises three distinct biotopes, which differ in terms of soil composition and vegetation. Based on these three very different biotopes, I created three *Design Scenarios*, one for each biotope, which are tailored to the needs of their surrounding area and non-human inhabitants.

In terms of the main research question (RQ) of how architectural design can trigger a shift in mindsets on human bodily waste by shaping new toilet habits, *Design Exploration II* presents a different design approach than the previous research cycle. As part of this chapter, in particular, I intend to reposition the toilet by shaping a more responsive relationship between toilet users and the surrounding wetland. As such, I aim to shift the dominant narrative ingrained in mindsets on-site from sewage dumping and pollution of natural water streams towards toilet designs that instead help restore a vulnerable wetland. Moreover, the reflections and key insights that formed part of *Design Exploration I* led to the following sub-research questions (4–6), addressed in *Design Exploration II* through architectural design:

- 4. In contrast to the current user-centred approach to toilet design, how can architectural design expand relationality towards non-human species and adopt a more responsive attitude towards the needs of its surrounding environment?
- 5. In relation to implementing a new system – tied to new habits – for dealing with human bodily waste, how far should the speculative design proposal deviate from the existing situation to stimulate imagination and consideration?
- 6. In terms of the role of the architect-designer, should architects respond to prevailing cultural desires, or can they also distribute ideas, values, or beliefs and shape new ecological-spatial values by design?

In response to sub-research questions 4, 5, and 6, I created three new speculative *Design Scenarios*. This intensive design process involved continuous movement between literature review, fieldwork, designing, reworking the design, and setting up design discussions at the case study. Numerous preliminary studies and intermediate designs were developed over a period of months to advance the toilet designs as part of this chapter. Once finalised, the *Design Scenarios* were again introduced as *Conversation Pieces* at the Blikfabriek site. As in previous design discussions, I only briefly explained the designs to participants, focusing on the design’s inner workings. This left them with sufficient freedom to interpret and imagine the scenarios unfolding in the Blikvelden

wetland. Participants in the discussions this time consisted of diverse groups of experts, including toilet cleaning staff, volunteers of Natuurpunt, the Blikfabriek team, visitors of the case study, design experts from the research group Material Narratives, and also students in the Master Design Studio *Sanitopia* at the Faculty of Architecture, KU Leuven.

Since the *Design Scenarios* are based on a real-world, vulnerable wetland, they are developed using a challenging yet sensitive and mindful design approach. With this design approach, I considered the real-life stakeholders involved in caring for this area, such as Natuurpunt. The question presented to participants in the contours of the Blikvelden was how these presented scenarios could become qualitatively acceptable in this urban and semi-public setting. The toilet designs herein are created as scenarios that stand somewhere between the current situation of dealing with human bodily waste and a possible post-intervention scenario in the future. Through a moderated process of discussion about the designs as *Conversation Pieces*, the focus of the conversation gradually shifted from imagining the design scenarios to thoroughly considering them in the near future, either in the Blikvelden or elsewhere.

4.4 Design Scenarios as Part of Design Exploration II

In the following section, I present the three most diverse areas, or biotopes, in terms of soil composition and vegetation in the Blikvelden wetland. I have created three distinct *Design Scenarios*, one for each biotope. What follows is the presentation of the *Design Scenarios*, including images of the toilet design and an experiential description written in the second person, where ‘you’ refers to you as the reader, to invite you to the envisioned toilet experience. This is followed by an explanation of the design, with numbers and drawings layered over a picture to clarify its inner workings. I conclude each part with a discussion of the toilet design, accompanied by direct transcriptions of the reactions that emerged during the discussions around the conversation table, on smaller pink pages. These conversational excerpts are presented alongside a reasoned analysis and discussion of the *Design Scenarios*.

Design Scenario of Post-Industrial Care

Biotope I: Sedge Fields

The first biotope is a sedge field (*Carex* sp.) sheltered from the wind by a row of large Italian poplars (*Populus nigra* ‘Italica’) and bordered by silver birches (*Betula pendula*) to the north. The sedge field is exposed to the sun throughout the day but is partially shaded by the surrounding poplars. The biotope maintains a good water balance in summer, becoming very wet in winter with abrupt changes in between. This biotope prefers nutrient-rich soils and intensive rooting, as evidenced by the presence of species such as marsh sedges. In terms of soil care, Natuurpunt suggests that the sedge field and its diverse species would benefit from being moistened and overflowed with water. This is planned to happen in the future, once the Hollebeek stream has been opened up and restored. In the case of the Blikvelden area, this means that the wetland would be flooded all year round and accessible to human visitors only via boardwalks or jetties. The *Design Scenarios* I developed are based on this future situation. Moreover, the number of toilets is calculated according to the surface area of the wetland, ensuring its capacity to treat the collected wastewater over changing seasons.



Fig. 60: View over the sedge fields in the Blikvelden as the first biotope.



Fig. 61: Architectural model of the Design Scenario of Post-Industrial Care, created for the sedge fields (scale 1:100).

In search of the toilets, you spot two doors marked 'WC'. Both rooms look identical from the outside. You open one door and notice a toilet bowl in the centre, with a large funnel directly above it, opening downward. You go in and sit down under the funnel to slowly relieve yourself. Once finished, you can't seem to find the button to flush. Aside from the toilet and a rotary knob on the wall, the room is empty. When turning the weird knob on the wall, you hear the funnel above you filling up with water from somewhere on top of the roof. When the sound comes near, all of a sudden, a mass of water pours from the funnel into the toilet bowl. By turning the knob further, you increase the force of the flow even more, allowing the water to flush the bowl clean. After checking if the toilet is clean, you wash your hands in the stream of water falling from the funnel. You close the tap and leave the room clean and tidy. Upon exiting the toilet, you discover another sign mentioning 'WC', right next to a long path stretching out toward the Blikvelden. You did not notice this one before and follow a narrow path all the way to the end. On the pathway, a long extensive pipe runs next to you, mounted as a railing along the bridge. It seems to be heading in the same direction. At the end of the walkway is a platform, with another toilet installed. This toilet sits in the middle of a field, full of green sedge, and can be separated from the path by a small curtain. It is a toilet sheltered by nature, with a view over the sedge fields and forest. No one can see or hear you when you would crouch down onto this toilet seat. Next to the same knob as in the previous toilet space, you also notice a bidet sprayer for cleaning your body and hands after using the toilet. You want to test it out and turn the knob. Slowly, you hear water nearing through the long pipe mounted along the bridge, flushing water straight into the toilet bowl. Moments later, you hear a volume of water being discharged into the sedge field.¹

As the Blikvelden area is under threat from drought due to urbanisation, Natuurpunt suggests that the wetland urgently needs to capture and retain more water in order to prevent its transformation into a forest. In addition to drought, the soils of the Blikvelden are also suffering from industrial pollution. From a posthuman perspective (Braidotti and Bignall 2019), it is in this context important to recognise that humans bear a particular responsibility for much of the environmental damage on site. This raises the question of how architectural design might respond to, and help repair, the degradation of the Blikvelden wetland resulting from generations of human settlement. Where the Blikfabriek's factory sheds were once regarded as polluters of the surrounding environment, this *Design Scenario* seeks to shift this widespread narrative by repositioning the former industrial site as a factory of *Post-industrial Care*. In response to this posthuman way of thinking, and to the ethics of care proposed by Fisher and Tronto (1990), I developed the scenario

¹ Constructed wetlands are technological ecosystems that mimic natural wetlands to treat wastewater by using natural ecological processes. They consist of aquatic plants, soil, and various microbial communities, which work together to filter pollutants and improve water quality (Rousseau et al. 2021).

The Design Scenario of Post-Industrial Care

P1:
Here you have
a lot of social control
(laughs and points to the
open pipe) and a very visi-
ble filter...

P2:
Isn't the visible fil-
ter there a bit lost? I don't
know. It seems to be tucked
away in the bushes.

P1:
Yes, and when
you're eating, your table is
also quite close to the sew-
age pipes draining...

P3:
Yes.

P1: That's not
very nice when eating...

P4:
And how long
does it take for waste to
completely dissolve in water
or in a wetland?

P1:
How fast does that
happen? Because if you just 'do
your business' in nature, it happens very
quickly. In only two days, it has
already shrunk.

P3:
Yes,
and it also
gets eaten
by animals.

P1:
Yes, in
a pond,
the fish eat
it too.

P4:
So, in theory,
this is not bad for
nature?

P2:
Okay... And do some
plants need this amount of
nitrogen? Doesn't that depend on
the type of plant? Like nettles, for
example?

(P1, P2, P3, P4: Blikfabriek Visitors 2024)

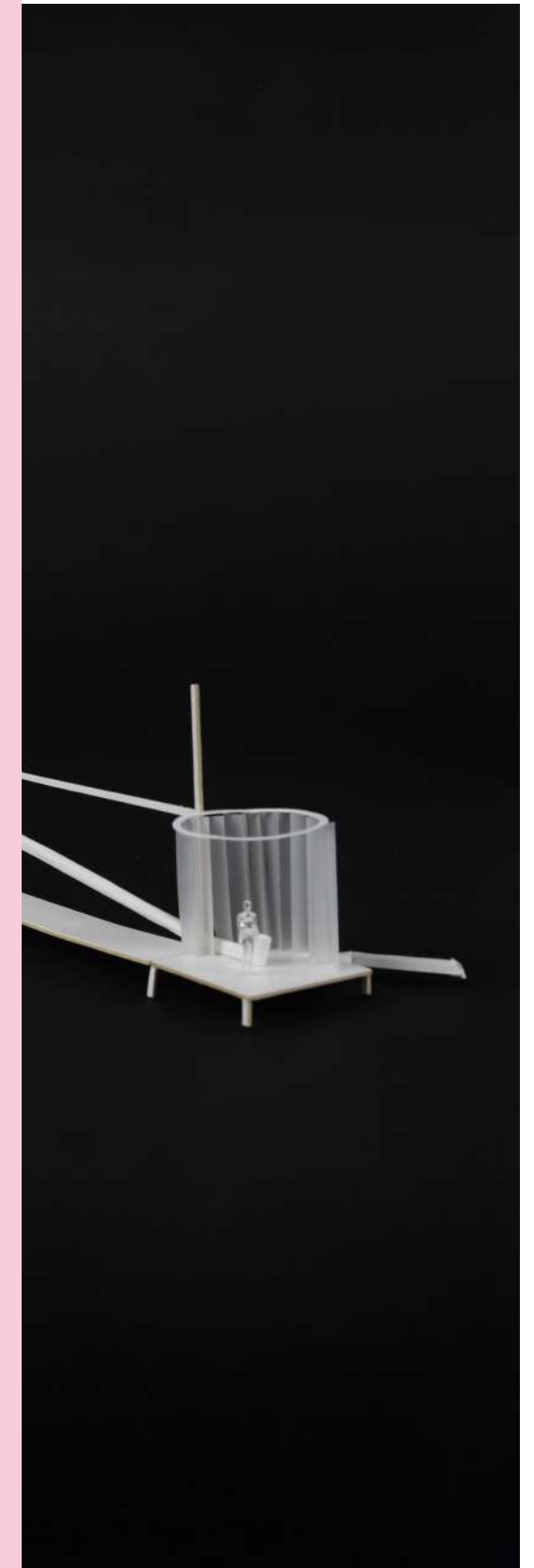


Fig. 62: Architectural model of the Design scenario of Post-Industrial Care, consisting of three toilet spaces (scale 1:100).

In search of the toilets, you spot two doors in the rooms look identical from the outside. You notice a toilet bowl in the centre, with a large funnel above it, opening downward. You go in and sit on the toilet. The funnel slowly relieves you. Once finished, you find the button to flush. Aside from the toilet knob on the wall, the room is empty. When you turn the knob on the wall, you hear the funnel above you. Water comes from somewhere on top of the roof. Water comes near, all of a sudden, a mass of water falls into the toilet bowl. By turning the knob, you increase the force of the flow even more, allowing the bowl clean. After checking if the toilet is clean, you wash your hands in the stream of water falling from the tap and leave the room clean and tidy. Upon leaving the toilet, you discover another sign mentioning a long path stretching out toward the Blikveld. You notice this one before and follow a narrow path to the end. On the pathway, a long extensive pipe is mounted as a railing along the bridge. It seems to be in the same direction. At the end of the walk, you find another toilet installed. This toilet sits in a field, full of green sedge, and can be separated from the sedge fields and forest. No one can see or hear you. You would crouch down onto this toilet seat. Next to it, as in the previous toilet space, you also notice a sign for cleaning your body and hands after using the toilet. To test it out and turn the knob. Slowly, you hear water flowing through the long pipe mounted along the bridge straight into the toilet bowl. Moments later, you hear the sound of water being discharged into the sedge fields.

As the Blikvelden area is under threat from drought, Natuurpunt suggests that the wetland urgently needs to retain more water in order to prevent its transformation into a dry landscape. In addition to drought, the soils of the Blikvelden are contaminated from industrial pollution. From a posthuman perspective (Bignall 2019), it is in this context important to reconsider the responsibility for much of the environmental damage on site. This raises the question of how architecture can respond to, and help repair, the degradation of the environment resulting from generations of human settlement. As factory sheds were once regarded as polluters of the environment, this *Design Scenario* seeks to shift this perception by repositioning the former industrial site as a facility for *Care*. In response to this posthuman way of thinking about care proposed by Fisher and Tronto (1990), I develop a

P1: Well, there will certainly be discussion about this if you put pipes above ground. That's for sure. P3: And if it looks nice, well... why not? P2: Come on, I think it has something cool? Isn't it beautiful? It reminds me of the Centre Pompidou in Paris, but on a smaller scale. P4: Yes, but then it really has to be beautifully designed – truly architectural – and it needs to be explained. Otherwise, it's just some pipe running through the air? P2: If it's immediately visible, then yes! P4: If it looks nice, like a real installation, then most definitely. But if we just see some long pipes running across the ground? P4: Yes, but then it really has to be beautifully designed – truly architectural – and it needs to be explained. Otherwise, it's just some pipe running through the air?

(P1, P2, P3, P4: Blikfabriek Experts 2024)

P1: This toilet also gives you a better idea of your own consumption, of water and toilet paper and so on. Tampon use, for example, too. P2: I think it's really good that you can see it visually. I believe that can work if you see, wow, I really do use a lot of toilet paper. That you might then become more careful in your use, or start using less. P1: A lot of it has to do with smell, too. People tend to flush multiple times because of the smell. You want it to be clean, of course, for the person who's coming after you...

(P1, P2: Natuurpunt Experts 2024)

P1: It could be interesting to maybe invite some play in the toilet as well. For example, by choosing to flush normally or to create a big flush with lots of water. And then to see how people react, or to use this as a game to teach them.

(P1: Student in Master Design Studio Sanitopia 2025)



Fig. 62: Architectural model of the Design scenario of Post-Industrial Care, consisting of three toilet spaces (scale 1:100).

as an exploration of how toilets, in combination with the vast scale and roofs of the Blikfabriek, might address environmental damage and perform care for the surrounding environment. Since the Blikfabriek consists of large-scale sheds with huge roofs, they can capture and retain lots of rainwater. In the toilet design, rainwater travels from the enormous roof of the Blikfabriek to the toilets where it mixes with human bodily waste, containing high levels of nitrogen, phosphorus, and potassium. Inside the toilet bowl, the mixture of wastewater travels through visible plumbing and pipes to a point where it is discharged over a filter into the Blikvelden. At this point of evacuation, all solid waste sinks to the bottom, while the remaining wastewater gradually dilutes and dissolves into a large sedimentation pond. At first, the waste will float. Then it will settle, break down, and infiltrate into the soil, gradually passing through the different stages of the wetland into a purified form.

In a process of diluting human bodily waste into water, waste gradually transforms into a new substance. It settles into wastewater, travels through the treatment wetland, becoming increasingly purified until, over time, it becomes part of the wetland itself. Following Douglas’ theory (1966), this process blurs the established boundaries of human bodily waste, and with that, challenges the category to which it belongs. After evacuating, it remains unclear if the substance concerns wastewater, rainwater, or is immediately absorbed and instantly becomes part of the wetland. Similarly to this process of dilution, which challenges established boundaries, the *Design Scenario of Post-industrial Care* is created to deconstruct the toilet space and its treatment system. In combining and extending both the toilet space and its system of wastewater treatment, the design makes the entire treatment process visible, showing a journey from rainwater to wastewater, and from wastewater into the wetland. Pulled apart into separate elements, the design spatially displays an infrastructure created to harvest rainwater from the roof, to be mixed with waste in the toilets, and to be visibly discharged as wastewater into the Blikvelden². In this way, the *Design Scenario* builds on the Design Strategy of Rendering Present, discussed in Chapter 3, by spatially expanding the toilet in size and visibility to increasingly become a central thing. By extending and ‘diluting’ the process of waste evacuation and treatment, the toilet design aims to weaken ingrained notions of dirt by identifying the elements of the toilet design that cause friction.

The dominant narrative ingrained in the mindsets present at the Blikfabriek is that human bodily waste forms a significant pollutant when entering natural environments and waterbodies. As the only alternative and one-size-fits-all solution, wastewater is therefore collected centrally and transported outside of the city to be treated in wastewater treatment plants. As I explained in the introduction chapter, this wastewater system is now facing infrastructural collapse. Due to the climate emergency and population growth since the Flemish sewers were built, their capacity is exceeded far more frequently than could have been predicted. Consequently, sewer overflows regularly cause untreated wastewater to end up in nature

² In the design, a large body of rainwater is harvested and transported to the wetland by means of a gravitational flush. The water is collected by the 7500m² roof (1) and travels from the gutter (2) to a collection tank connected to the façade serving as a toilet cistern (3). The volume of the water tank is calculated to provide water for three toilets (4). The accessibility of the toilets depends on the season and presence of rainwater. This way, the toilets function in times of heavy rainfall and are out of order during periods of drought. When a toilet is used, waste gets mixed with rainwater in the toilet bowl and is flushed to the Blikvelden (5). This happens in different trajectories through visible plumbing and pipes above ground, up to a point where the wastewater is discharged over a filter in the wetland (6).

P1:
I also think the material of the models makes everything seem a bit clinical, or sterile. It is all very, very clean. And the link with nature has kind of disappeared. It almost resembles a hospital environment.

P2: Yes, I agree.

P1:
I find it almost confusing, perhaps? Because I think it's a very good idea to make waste more visible. And to be more okay with the fact that not everything has to be so clean.

P2: That's also an evolution.

P1:
But yes, you're talking about bodily waste and nature, and then this is misleading.

(P1, P2: Natuurpunt Experts 2024)

P1:
In terms of scenography and performative aspect of the model, the walk to the toilet and the act of using it is really turned into a public and theatrical activity, which is a shocking change.

(P1: Design Expert Material Narratives 2024)

P1:
The walk to the toilet is really a walk of shame (laughs).

P2:
I think it's great that it's a walk because you have time to think about it while you take it in.

P1:
I would even do something with that visual discharge, to draw even more attention to it.



Fig. 63: Architectural model of the Design scenario of Post-Industrial Care, extending towards the sedge fields (scale 1:100).

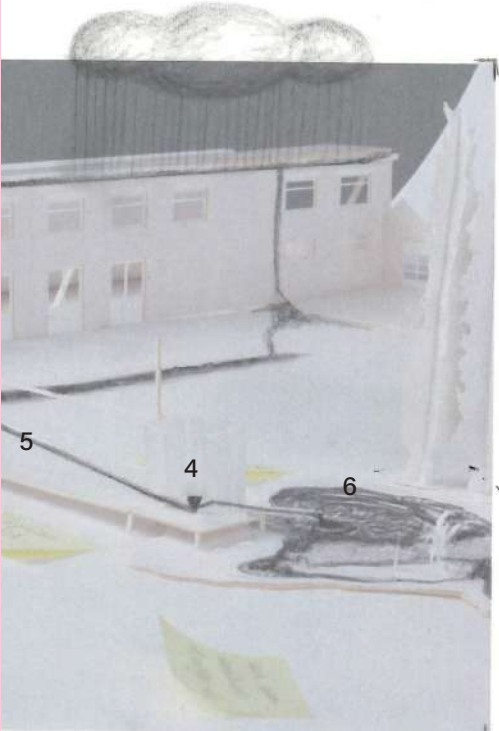


Fig. 64: Drawing layered over an image to explain the inner workings of the Design Scenario of Post-Industrial Care.

as an exploration of how toilets, in combination with roofs of the Blikfabriek, might address environmental care for the surrounding environment. Since it consists of large-scale sheds with huge roofs, they collect lots of rainwater. In the toilet design, rainwater travels from the roof of the Blikfabriek to the toilets where it is used for bodily waste, containing high levels of nitrogen, phosphorus, and potassium. Inside the toilet bowl, the mixture of wastewater and visible plumbing and pipes to a point where it is directed into the Blikvelden. At this point of evacuation, all the way to the bottom, while the remaining wastewater gradually dissolves into a large sedimentation pond. At first, it is just a mixture. Then it will settle, break down, and infiltrate into the ground, passing through the different stages of the wetland process.

In a process of diluting human bodily waste, the wastewater gradually transforms into a new substance. It settles, travels through the treatment wetland, becomes purified until, over time, it becomes part of the landscape. Following Douglas' theory (1966), this process blurs the boundaries of human bodily waste, and with that, the category to which it belongs. After evacuating, it is not if the substance concerns wastewater, rainwater, or groundwater absorbed and instantly becomes part of the wetland. This process of dilution, which challenges established notions of the *Design Scenario of Post-industrial Care* is created by the toilet space and its treatment system. In combination with both the toilet space and its system of wastewater treatment, the design makes the entire treatment process visible to the public, from rainwater to wastewater, and from wastewater to wetland. Pulled apart into separate elements, the design displays an infrastructure created to harvest rainwater, to be mixed with waste in the toilets, and to be treated and infiltrated into the Blikvelden². In this way, the design is on the Design Strategy of Rendering Present, displayed in chapter 3, by spatially expanding the toilet in size and visibility, making it become a central thing. By extending and detailing the process of waste evacuation and treatment, the toilet design challenges ingrained notions of dirt by identifying the elements of the design that cause friction.

The dominant narrative ingrained in the mind of the Blikfabriek is that human bodily waste forms a barrier when entering natural environments and water bodies. The alternative and one-size-fits-all solution, wastewater is collected centrally and transported outside of the site to be treated in wastewater treatment plants. As I explained in chapter 1, this wastewater system is now facing a crisis in its lapse. Due to the climate emergency and population growth, the Flemish sewers were built, their capacity is being exceeded more frequently than could have been predicted. Consequently, overflows regularly cause untreated wastewater

P2:
I think that
visible pipes and the
sound of a flush also
make you think: 'what
is that?'

P1:
But if you really
want to make your waste-
water, as in black water, visible,
it might cause too much aversion.
You could go too far with that for
the general public...

(P1, P2: Natuurpunt Experts 2024)

P1:
These three areas
are not only different biotopes,
but also three different ecosystems.
Everything that you add or remove will
have an impact on the rest of your (eco-)
system. And that leads to more or less biodi-
versity. Of course, if you add – as you said
yourself – toilet water, which is seen as ferti-
lizer, you are adding a lot of phosphorus
and nitrogen, and then yes, you
can talk about fertilization.

P2:
Purely for a context
like a nature reserve, this sce-
nario is considered fertilization. And
that is not really the intention for areas
like a local nature reserve, for example.
But it could be okay for agricultural
land, and for grasses and
such.

P1:
Is our waste a
source of food for oth-
er organisms? For certain
plants and animals: Definitely!
But you are always going to have
an influence on the natural ecosys-
tem. And this area is already being
affected by human activity. So, I'm not
a big fan of it.

...

But on the other hand, I also know
that there is a need for it, and
that it is much more sustain-
able to process waste
locally...

P2:
It's always
a bit of a com-
promise.

(P1, P2: Natuurpunt Experts 2024)

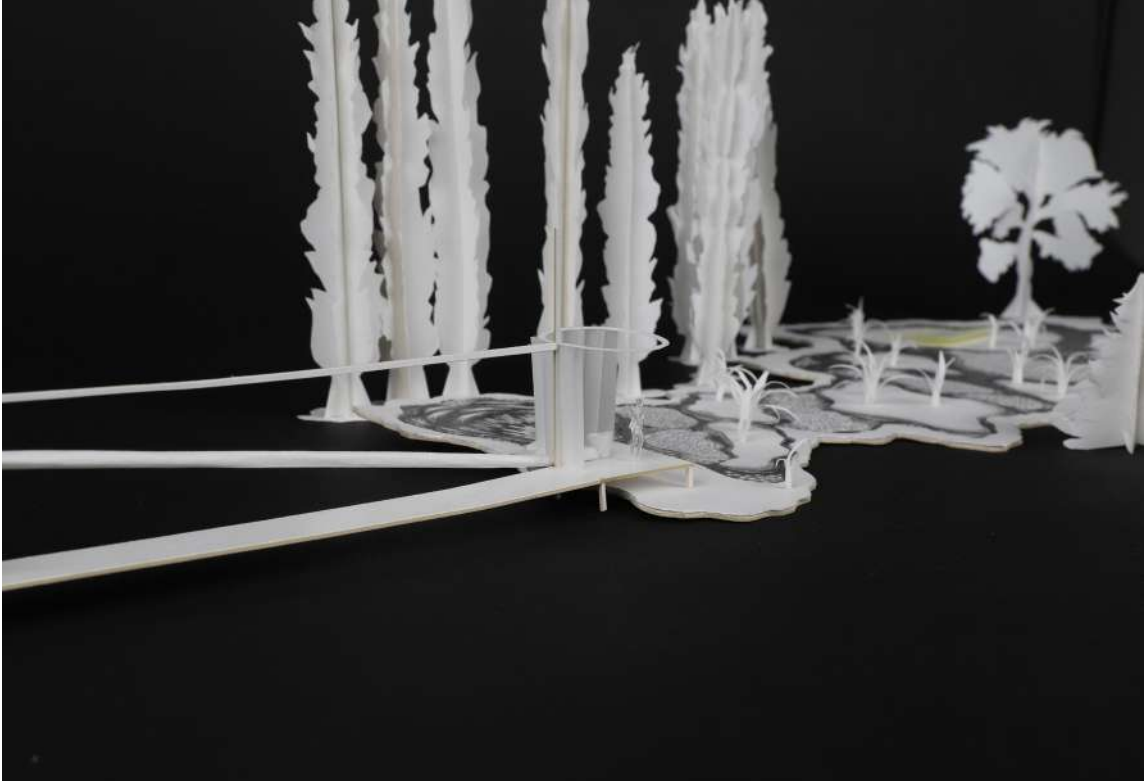


Fig. 63: Architectural model of the Design scenario of Post-Industrial Care, extending towards the sedge fields (scale 1:100).

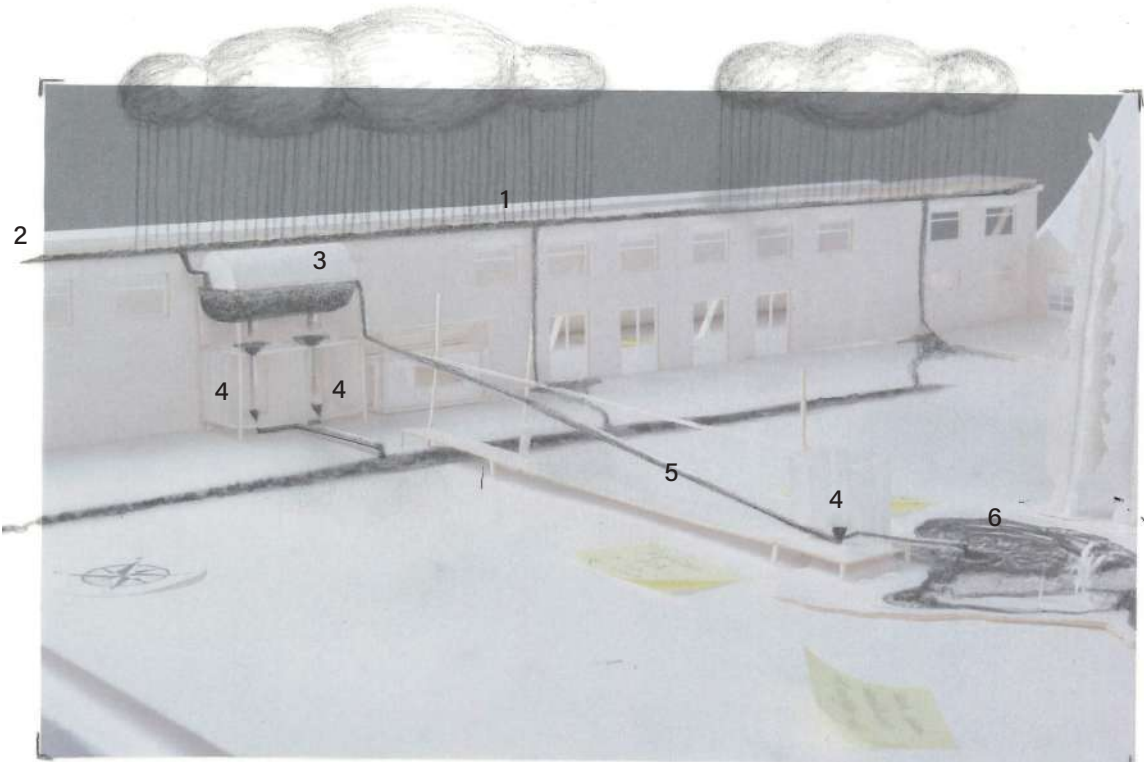


Fig. 64: Drawing layered over an image to explain the inner workings of the Design Scenario of Post-Industrial Care.

(Verlinden and Vanoppen 2021). While the *Design Scenario* of *Post-industrial Care* is deliberately created to question and challenge contemporary toilet habits, in theory, it could be a better or even unharmed alternative to deal with human bodily waste. The scenario intends to open the minds of participants to other perspectives by displaying an alternative way to cope with human bodily waste, in sharp contrast to the current system. Adopting an ethics of care (Fisher and Tronto 1990) into the field of architecture, this *Design Scenario* challenges the ingrained idea of sewage as a burden that we want to get rid of by transforming it instead into a nutrient which can nurture and repair soils.

As the toilet, traditionally the smallest and most private room in architecture, expands in size and visibility, it inevitably becomes a more central spatial event. When created for an urban, semi-public context, the formerly private act of using the toilet also becomes more public, introducing elements of shame and social control. Like the Public Design Strategy, outlined in Chapter 3, this *Design Scenario* uses shame surrounding toilet visits, in combination with visibility and social control, to encourage proper toilet use and cleaning. A common problem of the flushing toilet system, for example, is that also other types of waste, and even objects, are being flushed down the toilet and end up at the wastewater treatment plant (Aquafin 2026). The main issue I address here is the lack of accountability for bodily waste that is sustained by the current flushing toilet system. In response to this ‘flush-and-forget’ attitude and to prevent the toilet being misused, this *Design Scenario* features a mechanical filter that retains and displays everything that should not be flushed into the wetland. As such, responsibility for what is flushed away remains with the user in this design, as prohibited matters reappear on the filter after being flushed. Where the current wastewater system evacuates waste far outside of the boundaries of the toilet space, this design includes a second confrontation with waste nearby, after it has been flushed. The toilet design protects the wetland from misuse of human visitors and ensures that only wastewater, containing valuable nutrients, passes through.

The long and visible pathway towards the toilet in the sedge fields is another intentional design decision aimed at encouraging the proper use of the facility. By extending the walk towards the toilet and making it highly visible and present within its surroundings, the *Design Scenario* seeks to anticipate forms of social control in public space. It not only encourages visitors to maintain and clean the public toilets more carefully for other users, but also helps protect the wetland by preventing misuse of the toilet itself. In this way, the design makes the toilet more visible in order to stimulate awareness, while also encouraging better management of the facility through the potential embarrassment associated with toileting in public settings. Both design decisions deliberately challenge the idea that architecture is made only for humans or controlled exclusively by humans (Harrison 2012), by incorporating measures that steer users’ behaviour in ways that safeguard the surrounding environment.



Fig. 65: Model of the *Design scenario of Post-Industrial Care* (scale 1:100).

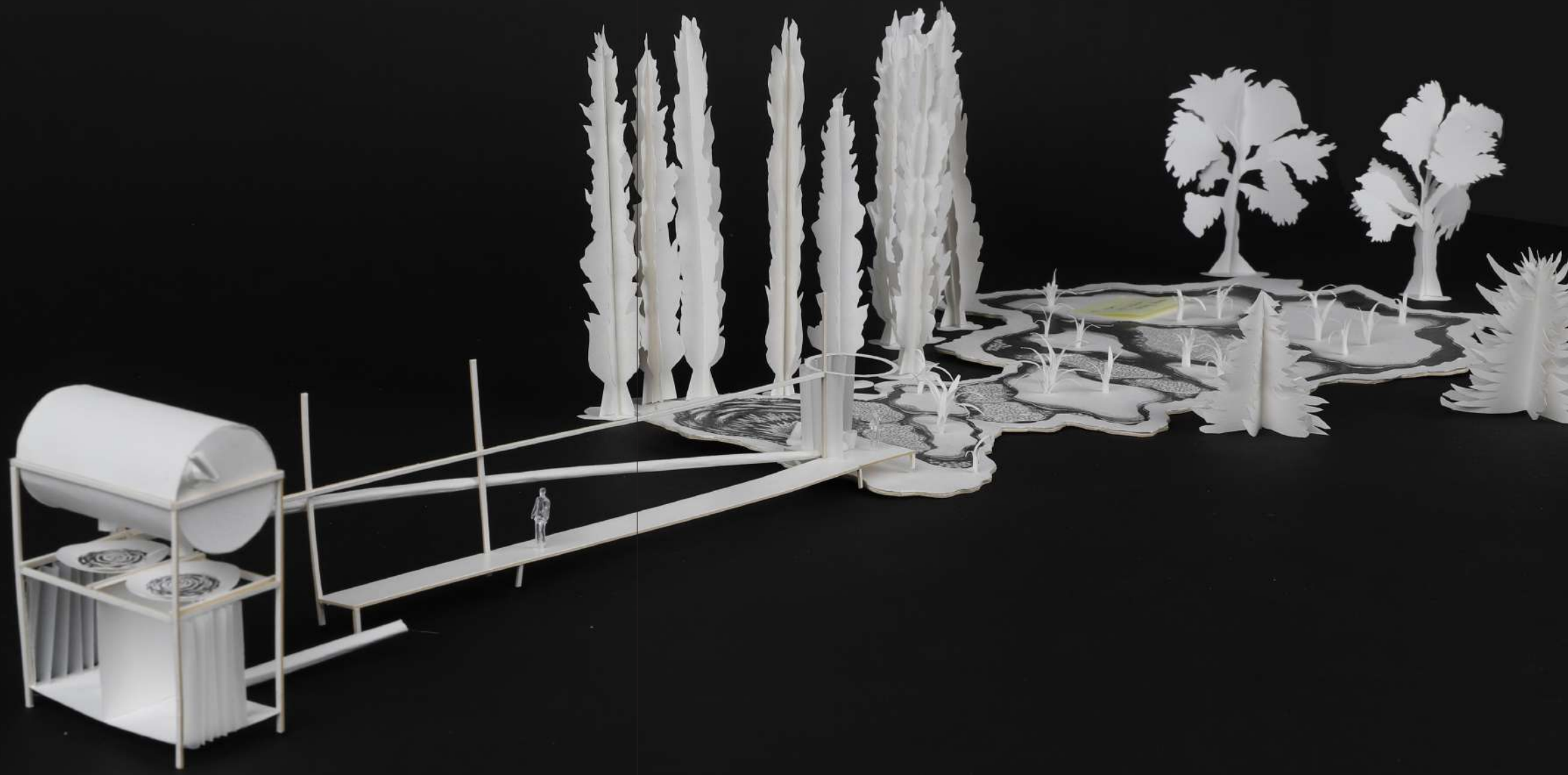
This positions the design within a posthuman shift, in which the environment is no longer understood as a passive backdrop to architecture. Instead, it breaks down the traditional separation between nature and culture, framing the environment as relational and hybrid (Ibid.).

In using the public character of the site to reinforce social control, the *Design Scenario* is created right beside the kitchen and terrace of Pirre Kookt (Fig. 55). The area is particularly attractive for visitors to sit and have lunch, thanks to its proximity and view over the Blickvelden wetland. The toilet design is deliberately created near a kitchen and lunch area, which participants found to be additionally challenging. This not only transforms the toilet into a public event, but it also affects the larger lunch area, turning it into a place where cooking, eating, and digesting food happen directly alongside the transportation, evacuation, and treatment of human bodily waste. By incorporating elements of shame and social control, I created the *Design Scenario* of *Post-Industrial Care* to be challenging and may be perceived as uncomfortable by some. As Penner (2012) also critiques, there is an emerging consensus that new sanitation systems must be desired by users if they are to truly take hold. If that desire is absent, a combination of persuasion, hygiene education and business techniques is employed to encourage adoption. In response to contemporary approaches to toilet design that are limited to functionality and the fulfilment of user-centred desires, I propose *Design Scenarios* that seek to raise awareness of environmental impact on their surroundings. Adopting an ethics of care (Fisher and Tronto 1990; Puig de la Bellacasa 2017), the toilet designs primarily care for the wetland, while also imposing greater accountability on toilet users in relation to their bodily waste. In doing so, the designs encourage more sustainable toilet habits and expand responsiveness to the needs of the wetland. The toilet is, as such, repositioned not merely as a functional facility, but as a space capable of caring for and contributing to the repair of its surrounding environment.



Fig. 66: Fragment of the *Design scenario of Post-Industrial Care* (scale 1:100).

Fig. 67: Model of the *Design scenario of Post-Industrial Care* (scale 1:100).



Biotope II: Reed Fields

Further north in the Blikvelden, a reed bed (*Phragmites australis*) covers an area with a few silver birches (*Betula pendula*) on the east side and some older English oak trees (*Quercus robur*) on the west side. Some yews (*Taxus baccata*) grow around the moistest soils. The most dominant vegetation here is the two-metre-high reed. The reed field receives a fair amount of sun throughout the day, which causes the soil to be rather dry compared to other areas. It also has an active soil life consisting of red earthworms (*Lumbricus rubellus*), woodlice (*Isopoda*) and red ants (*Formica rufa*). The reed is a particularly robust species and is thriving in this area due to the nutrient- and nitrogen-rich soil.



Fig. 68: A path through the reed beds, located in the middle of the Blikvelden wetland.



Fig. 69: Architectural Model of the Design Scenario of Low-Tech Regeneration of Waste, created for the biotope of the reed fields (scale 1:100).

Along a small boardwalk, navigating you through the reed fields, you notice a toilet pavilion. It has a circular shape and stages two cylindrical structures, with a complex network of pipes and funnels visibly suspended in the air. As you approach one cylinder, you notice an opening the size of a doorway. Inside, a toilet bowl is set on a small square platform³. A large funnel hangs overhead, directly above the toilet. You take a seat on the toilet, now noticing that the bowl is divided into two sections⁴. The front part has a small opening, and the larger section at the back contains a shallow pool of water. Relieving yourself, you see how the front section collects urine and drains it away through a small tube, while the larger section collects the solid waste. Once finished, you clean yourself and walk over to the knob on the wall. When you turn it on, you can hear a pump being activated. Immediately afterwards, you hear water shooting forcefully through the pipes and filling the funnel above. Moments later, a small amount of water is released into the toilet bowl, depending on how hard you turn on the knob. After checking the toilet bowl for last stains, you wash your hands in the stream of water falling from the funnel, turn the knob back and are ready to continue your walk in the park. Upon exiting the toilet cylinder, you hear a volume of water being discharged into the reed fields.

The *Design Scenario of Low-tech Regeneration of Waste* originated in response to the great belief in technology in urbanised Western Europe, such as Flanders. As outlined in Chapter 1: *Introduction*, the most common solutions to the current climate crisis in architecture take the form of fragmented ‘technofixes’ (Haraway 2016). These updates to existing infrastructures allow us to maintain our habits and lifestyles, even when these habits are demonstrably harmful to the environment. This approach to responding to the climate emergency is closely linked to the field of techno-solutionism, which is also criticised by Haraway (2016), for its blind faith in technology. Examples of fragmented ‘technofixes’ in the field of architecture include green design and green aesthetics, without including concrete impact on environmental damage. At the governmental level in Flanders, strategies are also emerging to mitigate the impact of climate change on our built environment, such as ‘climate-robust’ design interventions (Flemish Government n.d.). Like fragmented ‘technofixes’, ‘climate-robust’ design interventions stem from the human desire to adapt the environment and reduce the impact of the climate crisis on our built environment so that we can continue our current ways of living.

While we should embrace technology in architecture rather than view it as an enemy, it is important to remain critical towards ingrained technologies – like the toilet – no matter how long they have been in place and reproduced. In relation to critical design, Dunne and Raby (2013) state that their positionality as critical designers grew out of a concern with the uncritical drive behind technological progress, when technology is assumed

³ The urine collected from the toilet travels to a PeePower battery, which activates the pump. PEE POWER® is a system that can convert urine into electricity by microbial fuel cells (MFCs). These cells work by employing live microbes, which feed on urine for their growth and maintenance. The MFC taps a portion of the biochemical energy used for microbial growth and converts that directly into electricity or PEE POWER® (UWE Bristol 2017).

⁴ A source separating toilet, also called a urine diverting or urine separating toilet, collects urine and solid waste separately at the point of their production, e.g. a toilet or urinal.

The Design Scenario of Low-Tech Regeneration of Waste

P1:

Could this design not be turned into a larger wastewater treatment system, turning the landscape into a full-functioning constructed wetland? The activity of ‘flushing’ to transport waste is also a crucial element of a toilet design. However, the scenarios here do not present a similar ‘relieve’ or evacuation of waste, while it appears and ends up again nearby.

(P1: Architectural Design Expert 2024)

P2: Pee-Power? That sounds good.
P1: Yes! (laughs) Indeed.
P2: That’s really giving people a reward for their ‘donation.’

P1: And it also becomes a bit of a game. It’s like gamification, and I think that can work.
P2: Yes, I also see great added value in that, if it really applies to utilities and generating electricity and such.

P1: If you add some kind of reward, maybe that could work, like charging your cell phone or something like that... Like those examples of riding a bike at a festival to generate power, linking those interactive things to it? I do believe that things like that will work.

P3: And was it also a specific choice to make everything very visible? Because in your toilet scenarios, you really display everything, right? You also place people on a platform, with the pipes coming out. That’s all deliberate, right?



Fig. 70: Architectural model of the Design scenario of Low-Tech Regeneration of Waste (scale 1:100).

Along a small boardwalk, navigating you through you notice a toilet pavilion. It has a circular structure, with a complex network of cylindrical structures, with a complex network of cylinders visibly suspended in the air. As you approach you notice an opening the size of a doorway. It is set on a small square platform³. A large funnel directly above the toilet. You take a seat on the toilet, and the bowl is divided into two sections⁴. a small opening, and the larger section at the shallow pool of water. Relieving yourself, you notice the smaller section collects urine and drains it away through the larger section while the larger section collects the solid waste. After you clean yourself and walk over to the knob, you turn it on, you can hear a pump being activated. afterwards, you hear water shooting forcefully into the funnel above. Moments later, a stream of water is released into the toilet bowl, depending on how long you turn on the knob. After checking the toilet bowl, you wash your hands in the stream of water falling from the knob. After you are done, you turn the knob back and are ready to continue your walk. Upon exiting the toilet cylinder, you hear the sound of water being discharged into the reed fields.

The Design Scenario of *Low-tech Regeneration of Water* is a response to the great belief in technology in urban environments such as Flanders. As outlined in Chapter 1: *Introduction*, common solutions to the current climate crisis in architecture are often fragmented 'technofixes' (Haraway 2016). The existing infrastructures allow us to maintain our habits, even when these habits are demonstrably harmful to the environment. This approach to responding to the climate emergency is part of the field of techno-solutionism, which is also criticised for its blind faith in technology. Examples of fragmentation in the field of architecture include green design approaches without including concrete impact on environmental issues. At the governmental level in Flanders, strategies are also developed that ignore the impact of climate change on our built environment. 'climate-robust' design interventions (Flemish Government 2023) are fragmented 'technofixes', 'climate-robust' design interventions are not based on the human desire to adapt the environment to the needs of the climate crisis on our built environment so that we can continue our current ways of living.

While we should embrace technology in architecture, it is not an enemy, it is important to remain critical towards technologies – like the toilet – no matter how long they have been reproduced. In relation to critical design, Dunne and Raby (2011) argue that their positionality as critical designers grew out of a desire to challenge the uncritical drive behind technological progress, when

P1:
But you also give people the feeling that what you're doing there contributes to the climate. Or to sustainability, or nature, right? Is that the mindset you want to foster? That awareness.

P2:
Something like this scenario would actually be perfect for a sculpture park. If you could create something, that works within a certain area, it could really raise awareness. I understand why you chose the Blickvelden here, but I can really see it working very well as an installation. Especially because it's an easy way to introduce people to an idea or another system, like you're proposing.

(P1, P2, P3: Natuurpunt Experts 2024)

P1:
Oh, wow
Pee-power?!

P2:
Wow. It's amazing what they can do these days. That's crazy.

P3:
I think it's really cool!

P4:
If we can benefit from it, I do think people would want this type of toilet.

P5:
And if it looks very architectural – kind of cool and well designed – in my imagination, you're sitting there a bit higher and you have to walk up a bit on your way to the toilet. That would just be so cool.

P3:
Yes, it's really a bit adventurous.

P4:
But also, it just has to look clean.



Fig. 70: Architectural model of the Design scenario of Low-Tech Regeneration of Waste (scale 1:100).

Fig. 71: Architectural model of the *Design scenario of Low-Tech Regeneration of Waste* (scale 1:100).



to be capable of solving any problem. They argue that technology is not inherently bad, but rather that it should be approached and implemented critically, rather than blindly copied and pasted from the lab into daily life. Their explorations by design, therefore, always incorporate a perspective on the culture and technologies under study to articulate and materialise issues of concern. Moreover, as I explained in Chapter 1: *Introduction*, Ichioka and Pawlyn argue that the “long-term necessary changes [in rising to our planetary emergency] lie primarily in cultural, rather than technological, transformation, and this must occur at the level of mindsets – the shared ideas that determine to a large extent how society works” (2021: 2). They too are critical of the primarily technological approach to sustainability in architecture, and in response search for other concepts, like regenerative design.

In searching for a cultural shift in how we cope with human bodily waste – and, with that, in how we inhabit the world – this research draws on the fields of feminist STS (Haraway 2016; Puig de la Bellacasa 2017), new materialism (Bennett 2010), posthumanism (Braidotti and Bignall 2019; Harrison 2012), and traditional ecological knowledge (TEK) (Nelson and Shilling 2018). Although these fields emerge from different disciplinary traditions, they share the critique of a worldview that positions humans as autonomous and separate from the environments they inhabit. In *Staying with the Trouble* (2016), Haraway argues that we must drastically change our relationship with the environment now rather than waiting for the future. Similarly, from the field of posthumanism, Braidotti and Bignall (2019) argue that humans are always shaped by relationships with non-human systems, and that our ethics and values should be reframed to take those relationships seriously. From the field of architecture, architect and scholar Ariane Lourie Harrison writes that “a posthuman territory reflects the entangled and co-constitutive relation of human, technology, and environment” (2012: 13), thereby challenging the understanding of architecture as a purely anthropocentric discipline. Bennett (2010) further critiques Western humanism for overestimating human control and underestimating the activity of non-human systems, arguing that humans are not sovereign actors standing above the world, but are embedded within material systems. Taken together, these theoretical positions suggest that environmental degradation must be addressed through a broader cultural transformation in how humans understand their relationship to the environment. Within this context, architectural design becomes significant because it investigates design embedded in a specific context and operates at the intersection of bodies, materials, technologies, and ecological systems. By shaping everyday practices, architecture has the capacity to reconfigure customary sets of habits that characterise our ways of living, and can cultivate more responsive and ecologically situated forms of inhabitation. This research, therefore, positions toilet design not merely as a functional or technical problem, but as an architectural and cultural site through which new relationships between humans, waste, and the environment can be imagined and enacted.

Within this framework, the *Design Scenario* of *Low-tech Regeneration of Waste* is created to challenge the cultural perception of technology as something that can be deployed in architecture to extract benefits or resources.⁵ The inclusion of Pee-Power (UWE Bristol 2017) in the *Design Scenario*, in specific, raises the question of whether toilet technologies can stimulate

⁵ The design pumps up groundwater from the reed field (1) to provide water (2) and flush two toilets. The toilet fixtures (3) are source separating toilets, resulting in a separate collection of solids and urine. After the toilets are flushed, the urine travels to a Pee-Power battery (4) that uses urine as a source of power and generates electricity to charge the water pump. The solid waste travels to a septic tank (5) where bacteria break down faeces over a longer time. In terms of accessibility, the toilets are not to be used during periods of drought. Since the wetland requires all water in summer, during this season, the composting toilets are opened. Considering that the temperatures are higher in summer, the thermophilic composting process will treat waste more efficiently during this period.

P3:
Yes, and that's not the
case right now. I don't think it neces-
sarily has to be high-tech, but it does have
to be attractive. And clean. And that can
also be achieved with very low-
tech solution?

P4:
Also in terms of smells...

P6: Maybe also with
materials that last longer
before they rot?

P5:
Yes, and that's also
just a matter of maintenance.
We just have to manage the
toilets every day.

P2:
That's actually the
case with everything. Even
with the 'normal' toilets
here.

(P1, P2, P3, P4, P5, P6: Blikfabriek Experts 2024)

P1:
The heightened
walking paths that lead to
the toilets will be necessary. The
problem is that this area is a low-lying
area, prone to flooding – as is the entire
Lageweg zone, in fact – and the intention is
for the Blikvelden area to be able to col-
lect as much water as possible, which
is better for the protection of the
neighborhood, of course.

P2:
Interesting!

P1:
Yes, I certainly
find it interesting too. You
normally don't think much
about it all, but after the
explanation you gave.

P2:
The first time I was
also hesitant like... 'hmm
yeah, okay.'

P1:
But after going
through the entire
drawing and the story,
you've finally grasped it. I ha-
ven't actually questioned the
sustainability before, with
the overflow areas
and all that.



Fig. 72: Architectural model of the Design scenario of Low-Tech Regeneration of Waste (scale 1:100).



Fig. 73: Drawing layered over an image to explain the inner workings of the Design Scenario of Low-Tech Regeneration of Waste.

to be capable of solving any problem. They argue that inherently bad, but rather that it should be approached critically, rather than blindly copied and pasted from them. Their explorations by design, therefore, always incorporate the culture and technologies under study to articulate the culture and technologies under study to articulate the culture and technologies under study to articulate the culture of concern. Moreover, as I explained in Chapter 1: In Pawlyn argue that the “long-term necessary changes [of a tertiary emergency] lie primarily in cultural, rather than technological, and this must occur at the level of mindsets — determine to a large extent how society works” (2021: 10) of the primarily technological approach to sustainability in response search for other concepts, like regenerative

In searching for a cultural shift in how we cope with waste — and, with that, in how we inhabit the world on the fields of feminist STS (Haraway 2016; Puig 2019; new materialism (Bennett 2010), posthumanism (Braidotti 2019; Harrison 2012), and traditional ecological knowledge (Shilling 2018). Although these fields emerge from different traditions, they share the critique of a worldview that sees the human as autonomous and separate from the environments that surround them. *with the Trouble* (2016), Haraway argues that we must re-examine our relationship with the environment now rather than in the future. Similarly, from the field of posthumanism, Braidotti argues that humans are always shaped by relationship with other beings, systems, and that our ethics and values should be re-examined in relation to these relationships seriously. From the field of architecture, Ariane Lourie Harrison writes that “a posthuman perspective challenges the entangled and co-constitutive relation of human, technology, and environment” (2012: 13), thereby challenging the understanding of architecture as a purely anthropocentric discipline. Bennett (2010) challenges Western humanism for overestimating human control over the activity of non-human systems, arguing that humans are not actors standing above the world, but are embedded within it. Taken together, these theoretical positions suggest that the degradation must be addressed through a broader critique of the dominant ways in which humans understand their relationship to the world. In this context, architectural design becomes significant as a means of design embedded in a specific context and operates as a means of negotiating bodies, materials, technologies, and ecological systems. Through these practices, architecture has the capacity to reconfigure the habits that characterise our ways of living, and can offer alternative and ecologically situated forms of inhabitation. Therefore, positions toilet design not merely as a functional object, but as an architectural and cultural site through which the relationship between humans, waste, and the environment can be interrogated.

Within this framework, the *Design Scenario of Low-Tech Regeneration of Waste* is created to challenge the cultural perception of waste as something that can be deployed in architecture to extract value from it. The inclusion of Pee-Power (UWE Bristol 2017) in this specific, raises the question of whether toilet technology

P2:
During this talk I've
never felt anything like, 'Oh, I'm
so ashamed' or so utterly disgusted,
and I actually think that if such a
toilet were there, I'd simply
use it.

P1:
There's really nothing
dirtier than a 'Dixie toilet.' That's
really disgusting. And it's even made out
of plastic! But hey, if you have to go, you
have to go... So, everyone still uses
them, at festivals and such.

(P1, P2: Natuurpunt Experts 2024)



Fig. 72: Architectural model of the *Design scenario of Low-Tech Regeneration of Waste* (scale 1:100).

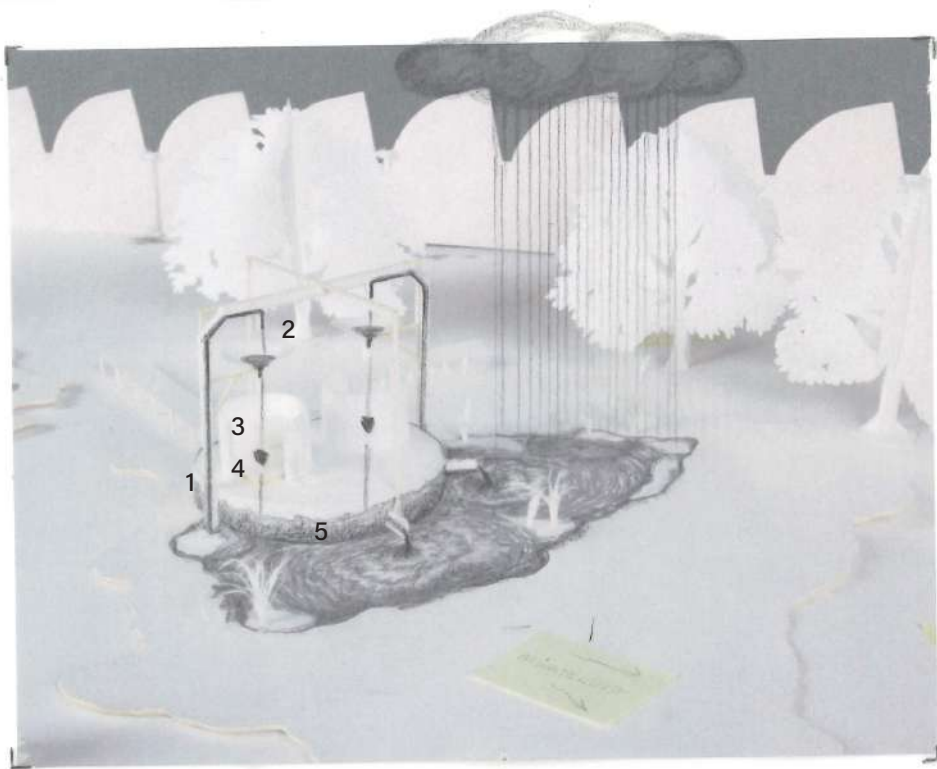


Fig. 73: Drawing layered over an image to explain the inner workings of the *Design Scenario of Low-Tech Regeneration of Waste*.

attraction to the design and consequently lead to a change in toilet habits. This technology is integrated into a circular toilet design that uses waste-water to generate energy, which is then used to power a pump that draws groundwater from deep underground to flush the toilet. This means that the toilet design is not dependent on the availability of rainwater for flushing over different seasons, as it can permanently extract water directly from the water table. These energy-generating urine batteries are, therefore, used as novel technology or gadgets to encourage visitors to engage with the toilets. The design also showcases the entire trajectory of pumping groundwater to using it for flushing. It starts from water being pumped up underground, from where it moves through pipes and funnels that run above visitors' heads, to a discharge of wastewater into the wetland after sedimentation in a septic tank. The *Design Scenario* is deliberately composed to resemble the complex plumbing infrastructure used for navigating water, with a specific technological aesthetic. This design decision is intended to trigger feelings of safety and trust, as well as a sense of technological expertise and control over water. The discharge of wastewater into the surrounding reed fields here challenges dominant narratives on-site, as it reminds users of sewage pollution. The toilet design, however, actually concerns a safe and controlled treatment wetland. This way, the *Design Scenario* raises the question of who or what benefits from this low-tech toilet design, lowering the water table underground and drying out soils for the purpose of flushing. While reed is a robust species that can handle dry soils, this impact of the design still prompts consideration of the values created beyond an anthropocentric perspective.

In terms of aesthetics, the toilet design is far removed from the familiar flushing toilet system. It consists of a technological installation of pipes and funnels running above visitors' heads, yet it still proved sufficiently recognisable to participants because of the toilet bowl as an anchor point. While the design may appear far removed from reality at first glance, the toilet still serves merely as a functional space and remains accessible to users over changing seasons by pumping deep groundwater to flush. The *Design Scenario*, however, does not include a feeling of relief when flushing. A feeling we are used to in the current system, evacuating and treating human bodily waste far from our daily living environments in the current system. In the design, the evacuated wastewater reappears in the surrounding environment, feeding the reed fields as part of the treatment wetland. These deliberate elements of challenge relate to the critical distance between a speculative *Design Scenario* and reality which I mentioned before. When the distance between the proposed design and reality is too narrow, it is not challenging; but when it is too large, it is no longer discussable as a realistic proposal. In the design discussions, I noticed that when a proposal resembles the ordinary system, the conversation easily shifts toward small updates to the existing one, thereby preventing imaginaries of a completely different system. Conversely, when a design strongly deviates from the existing system, it is often set aside as fictional or unrealistic. In seeking to shape new toilet habits by design – and, in doing so, to reshape ideas about human bodily waste – this distance raised the question: how radical, or how recognisable, should the speculative *Design Scenario* be to stimulate the imagination of a completely new system, one that goes beyond merely updating the current one?

Biotope III: The Water Buffer

The third biotope is distinct from the sedge and reed fields in both soil composition and vegetation. It concerns a water buffer tucked between reedbeds in the northeast of the Blikvelden. As all water gradually seeps into this corner, it has become an ideal habitat for a white willow (*Salix alba*). What makes this area exceptional is the extreme fluctuation in water levels throughout the year: while the water buffer dries out completely in summer, it becomes so heavily flooded in winter that it is inaccessible to human visitors.



Fig. 74: The water buffer and white willow are located in the east corner of the Blikvelden.

You walk through a reed field on a narrow, elevated boardwalk. The path stops at a door with a semi-circular shape mounted on it. When entering the space, you're not actually enclosed in a room. You instead look out over a long, narrow pond, over which a weeping willow hangs. The water in the pond lies still. Above you is a tube-like pipe with an opening facing downward. At the base of this pipe are two raised footprints, ribbed to prevent slipping. Since there is no toilet bowl, you assume this is a squat toilet built into the floor. You decide to place your feet on the ribbed marks, lower your pants, and squat down. You focus your eyes on the still water surrounded by reeds and the drooping branches of the willow. You can relieve yourself in peace and privacy. Once finished, you notice how your urine flows away from you and towards the pond.⁶ Using the bidet sprayer mounted on the wall, you clean your body and walk over to the rotary knob on the wall. When opening the tap, you can hear the water on the roof start to move until it falls. You manage to increase the pressure by turning the knob further, flushing the remains of your bodily waste into the pond. Once more, to be sure, you check the toilet and use the bidet sprayer for some final cleaning. Standing above the squat toilet, you end your visit by washing your hands in the stream of water falling from the pipe above. You turn off the tap, have a last look at the room and over the pond, and leave the space clean for the next visitor.

The *Design Scenario of Climate Responsiveness* emerged as a critical reflection on the aforementioned 'climate-robust' design interventions, which aim to mitigate the impact of climate change on our built environment (Flemish Government n.d.). Climate-robust interventions are commonly created from the human intention to adapt our environments so that climate change interferes less with our daily lives. Yet this interruption of daily habits is often the only moment when people are confronted with the effects of climate change and environmental damage. As mentioned in Chapter 1: *Introduction*, newspaper articles that highlight problems caused by the sewers frequently adopt a human standpoint to raise awareness among the general public. The ban on open-water swimming in summer, for instance, is often the primary way for people in Flanders to encounter issues of water quality and pollution. Whereas these newspaper articles are mostly written from an anthropocentric perspective, describing how people are prohibited in their habits from doing something, this *Design Scenario* instead prioritises the needs of the wetland. Adopting a posthumanist approach to architecture and exploring its potential as a responsive medium (Harrison 2012), the *Design Scenario* empowers and gives a voice to the non-human agents thriving in the wetland. This shifts the established power dynamic between toilet users and the surrounding environment. What is eminently different between creating 'climate-proof' interventions and the *Design Scenario of Climate Responsiveness* is the change in perspective

⁶ After the toilet is used, urine and rainwater gently flow over a slope on the floor, gradually seeping into the constructed wetland, where it undergoes a primary treatment by means of a sedimentation pond.

P1:
In terms of 'shifting mindsets', the biggest difference in this one, I would say, since the landscape is here turned into the 'commissioner', while the human is reduced to a mere 'visitor'. One that is allowed to enter with the sole purpose of feeding the wetland. And after the wetland is repurposed, and the toilet designs disappear again, will they leave a lasting imprint of 'care'?

(P1: Design Expert Material Narratives 2024)

P1:
Okay, so all scenarios are climate-dependent? There is no buffer to take extra water from?

P2:
I think this one is really nice, actually.

P3: Yes, me too.
P4: If I had to choose between all three, I would go for this one.

P5:
Hmm, it reminds me a little too much of a French toilet on the beach. If it's overused, and not flushed, it just becomes a mountain of piled up waste.

P1: And what about if you have to walk over the ground in your sandals?

P5:
I think this is a really great idea, but more for your own home. But not for a public toilet.

P2:
But the idea is very nice!



Fig. 75: Architectural model of the *Design Scenario of Climate Responsiveness*, positioned in the water buffer (scale 1:100).

Discussion of Toilet Design

You walk through a reed field on a narrow, e The path stops at a door with a semi-circular on it. When entering the space, you're not ac a room. You instead look out over a long, na which a weeping willow hangs. The water in Above you is a tube-like pipe with an opening At the base of this pipe are two raised footpri vent slipping. Since there is no toilet bowl, yo squat toilet built into the floor. You decide to the ribbed marks, lower your pants, and squ your eyes on the still water surrounded by re ing branches of the willow. You can relieve y privacy. Once finished, you notice how your from you and towards the pond.⁶ Using the b ed on the wall, you clean your body and wali knob on the wall. When opening the tap, you on the roof start to move until it falls. You m the pressure by turning the knob further, flus of your bodily waste into the pond. Once mo check the toilet and use the bidet sprayer for Standing above the squat toilet, you end you your hands in the stream of water falling fro You turn off the tap, have a last look at the ro pond, and leave the space clean for the next

The *Design Scenario* of *Climate Responsiveness* eme reflection on the aforementioned 'climate-robust' tions, which aim to mitigate the impact of climate environment (Flemish Government n.d.). Climate are commonly created from the human intention ments so that climate change interferes less with o Yet this interruption of daily habits is often the on people are confronted with the effects of climate c mental damage. As mentioned in Chapter 1: *Intro* articles that highlight problems caused by the sew a human standpoint to raise awareness among the The ban on open-water swimming in summer, for primary way for people in Flanders to encounter and pollution. Whereas these newspaper articles a an anthropocentric perspective, describing how p their habits from doing something, this *Design Sce* the needs of the wetland. Adopting a posthumani tecture and exploring its potential as a responsive 2012), the *Design Scenario* empowers and gives a v agents thriving in the wetland. This shifts the esta namic between toilet users and the surrounding e eminently different between creating 'climate-pro the *Design Scenario* of *Climate Responsiveness* is the

P1:

The chance of it mal-
functioning and getting dirty is too
high for it to survive in a public context.
Especially because it might be too dry
during the summer, and people
might still try to use it.

P2:

Yeah, okay,
if you don't have
toilet paper or anything
at hand, then... and I know
that a few people are 'going
to go' on top of that. And
then it gets really disgust-
ing, really quickly. Then
they will start pooping
next to it.

P4:

Most things
you want to exper-
iment with in public
spaces really have
to be simple and
'child-proof.'

(P1, P2, P3, P4, P5: Blikfabriek Experts 2024)

P1:

Ah yes,
I see, it's
a French
toilet...

P2:

I really wonder
what the reaction would be
on that ecosystem and the veg-
etation there if waste were to
simply 'flow' into that pond,
into that buffer.

P1:

I wonder if it
wouldn't be better to just
put it in an agricultural area.
Because that context can handle
it better than a natural area. Those
types of soils can handle a lot
more nutrients, they're much
richer in nutrients.

P2:

Is it also your goal
to actually implement
this somewhere?



Fig. 75: Architectural model of the *Design scenario of Climate Responsiveness*, positioned in the water buffer (scale 1:100).

from which the decisions over the wetland are made. By being operationalised, the design creates the idea that agency is granted to the wetland to impose its needs and that the human users are required to adapt their habits in case the toilet is out of order. Where toilet spaces are commonly human-controlled or user-centred designs, this toilet design presents a scenario that is climate-imposed.

Rather than evacuating waste far outside the boundaries of the toilet space, which can have severe environmental consequences, this *Design Scenario* meets the wetland's needs by allowing it to decide when it can be fed. In the toilet design, rainwater used for flushing is collected on the roof, meaning that the toilet can only be used when sufficient water has been captured.⁷ Consequently, the toilet is not always functional for users, and its accessibility varies with the seasons. The periods during which the toilet can be used correspond to the moments and conditions when the wetland both needs and can process the levels of nitrogen contained in human bodily waste. This occurs in autumn and spring, when the water in the wetland is at an intermediate level. Whereas the previous *Design Scenario* was intentionally made to resemble an infrastructural system that evokes a sense of technical control over wastewater, that feeling is absent in this toilet design, as it concerns a very basic, yet natural and safe, treatment system.

Aesthetically, the toilet design intends to evoke the experience of relieving yourself directly into a natural environment. While some participants questioned and distrusted this system and its lack of technological treatment, others found the serene experience particularly appealing. As a result of these design decisions, the *Design Scenario of Climate Responsiveness* explores how we might adopt a more responsive attitude toward the needs of the wetland. Basing the design on landscape functions – such as inflow, overflow, sedimentation, infiltration, and dilution – the toilet allows the climate to influence its use and compels users to adjust their habits accordingly. As such, the wetland becomes ‘the commissioner,’ granted with agency to determine how and when the toilet can be used across changing seasons and water levels, while users are reduced to mere visitors. With this *Design Scenario*, I therefore deploy architectural design to mediate an alternative way of cohabiting with human bodily waste in a vulnerable wetland. This relates to Harrison’s (2012) objective for architecture to become relational, ecological and systemic, rather than merely aesthetic.

When looking into the established power structures in the Blikvelden, the most dominant human agent is Natuurpunt, which positions itself to represent the wetland’s needs. Today, this natural landscape is conserved and cared for by this association, which has labelled it a ‘vulnerable area’. Specifically, they propose an approach of care for certain species in the wetland by marsh restoration activities, while exhausting and removing so-called ‘exotic’ species. These restoration activities include, among others, preventing overgrowth and succession by keeping the sedge field and grasslands open. According to Natuurpunt, the current forest development would lead to eutrophication, desiccation, and more shading, while the wetland restoration, as they propose, would lead to an increase in biodiversity in the area. This is because

⁷ The design collects rainwater on top of an open roof (1) functioning as a cistern to flush the squatting toilet. After the toilet is used, water gently flows over the floor (2), causing the wastewater to gradually seep into the water buffer, where it undergoes a primary treatment in the sedimentation pond (3). In terms of accessibility, the toilet can be used in autumn and spring at intermediate water levels

P1:
But even if it doesn't
work. As a pavilion, for example,
which may not work exactly yet, it could
get kind of the conversation going. But
ofcourse, an installation is still different
from actually seeing the design
working in front of you.

P2:
I certainly
ly believe in the
sustainability of these
systems. But in a recog-
nized nature reserve (which
the Blikvelden are not of
course), I don't think this
would be a good match
for the idea you are
presenting.

P1:
But I
would find that it
verythought-provok-
ing and fascinating, just
as a pavilion, because
it confronts you with
how we deal with
our wastewater
today.

P2:
yes,
it's again
that
visibility
aspect.

P1:
It's a kind of
unfamiliarity, and
yes, if you hadn't told us
about it today, I wouldn't
have been aware of it
either.

P2:
No, that's true.

P1:
It's
through conver-
sations like this that
people start thinking
about it and that it
becomes clear that
it needs to be
thought about.

(P1, P2: Natuurpunt Experts 2024)



Fig. 76: Architectural model of the Design scenario of Climate Responsiveness in the water buffer (scale 1:100).



Fig. 77: Drawing layered over an image to explain the inner workings of the Design Scenario of Climate Responsiveness.

from which the decisions over the wetland are materialised, the design creates the idea that agency wetland to impose its needs and that the human user adapt their habits in case the toilet is out of order. are commonly human-controlled or user-centred design presents a scenario that is climate-imposed

Rather than evacuating waste far outside the landscape space, which can have severe environmental consequences, *Design Scenario* meets the wetland's needs by allowing it to be fed. In the toilet design, rainwater used for flushing the roof, meaning that the toilet can only be used when rain has been captured.⁷ Consequently, the toilet is not for all users, and its accessibility varies with the seasons. The scenarios in which the toilet can be used correspond to the moments when the wetland both needs and can process the waste contained in human bodily waste. This occurs in scenarios when the water in the wetland is at an intermediate level. The previous *Design Scenario* was intentionally made to evoke a structural system that evokes a sense of technical complexity, that feeling is absent in this toilet design, as it is yet natural and safe, treatment system.

Aesthetically, the toilet design intends to evoke a sense of relief. Participants questioned and distrusted this system and the technical treatment, others found the serene experience. As a result of these design decisions, the *Design Responsiveness* explores how we might adopt a more open attitude toward the needs of the wetland. Basing the design decisions – such as inflow, overflow, sedimentation, infiltration – the toilet allows the climate to influence its use and adjust their habits accordingly. As such, the wetland as 'missioner,' granted with agency to determine how it can be used across changing seasons and water levels, reduced to mere visitors. With this *Design Scenario* architectural design to mediate an alternative way of human bodily waste in a vulnerable wetland. This (2012) objective for architecture to become relational and systemic, rather than merely aesthetic.

When looking into the established power structure of the landscape, the most dominant human agent is the Nation itself to represent the wetland's needs. Today the landscape is conserved and cared for by this association as a 'vulnerable area'. Specifically, they propose an alternative for certain species in the wetland by marsh restoration, exhausting and removing so-called 'exotic' species. Activities include, among others, preventing overgrowth, keeping the sedge field and grasslands open. According to the current forest development would lead to eutrophication, and more shading, while the wetland restoration would lead to an increase in biodiversity in the area.

Maybe
one final question
on the architectural or general
design quality: how big is that role?
And does it then become an assignment
or task for us, that we should take up. Because
now, the toilet is the easiest room in an architecture plan. It's almost completely a readymade thing,
that we do not even consider a design challenge anymore, for architecture. How can we change the
position of toilets, in terms of their importance,
in architecture? Is that something important
or is it something you say, okay, it would
be nice, but we have more urgent
things to consider?
P1: I think toilets are important, but I think it should start with the sewage system. How the wastewater that comes from toilets, goes out of the house.
P2: Yes. Because you can start designing the toilet completely different on the plan itself and like in the home, but it will still be connected to all the pipes and all the things that go through the home and outside.
P3: Maybe it has to go hand in hand or something. Because you have to convince people that toilets should be different, but you still design it according to the clients' needs. And they also should feel comfortable using their toilets. So, ...
P4: I see, like the toilet itself for me, doesn't have a lot of issues also you're using a lot of standardized products, so making your own product is costly. And as you said, for me, what 'happens to the flush or how you flush', that is more of the question. But I think architecture and the role of the architect is more informative and to test different ways to go forward in the future. Because you can make a toilet and it just looks like a pretty cool building and it's just a cool toilet. So as visitor you might be like, oh, it's a cool toilet. I'm going to go once, maybe twice. So, that way architecture can invite people into the toilet, which then leads to another discussion or trial, ...

(P1, P2, P3, P4: Students Master Design Studio Sanitopia 2024)

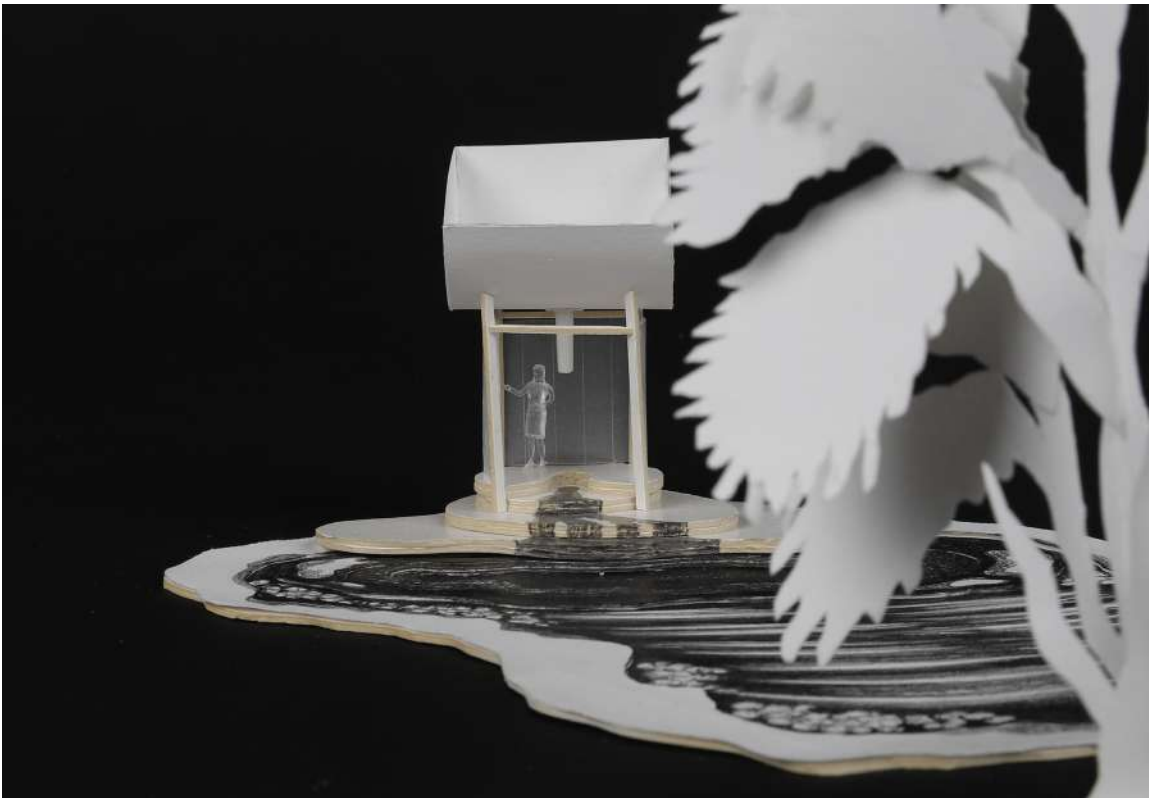


Fig. 76: Architectural model of the Design scenario of Climate Responsiveness in the water buffer (scale 1:100).

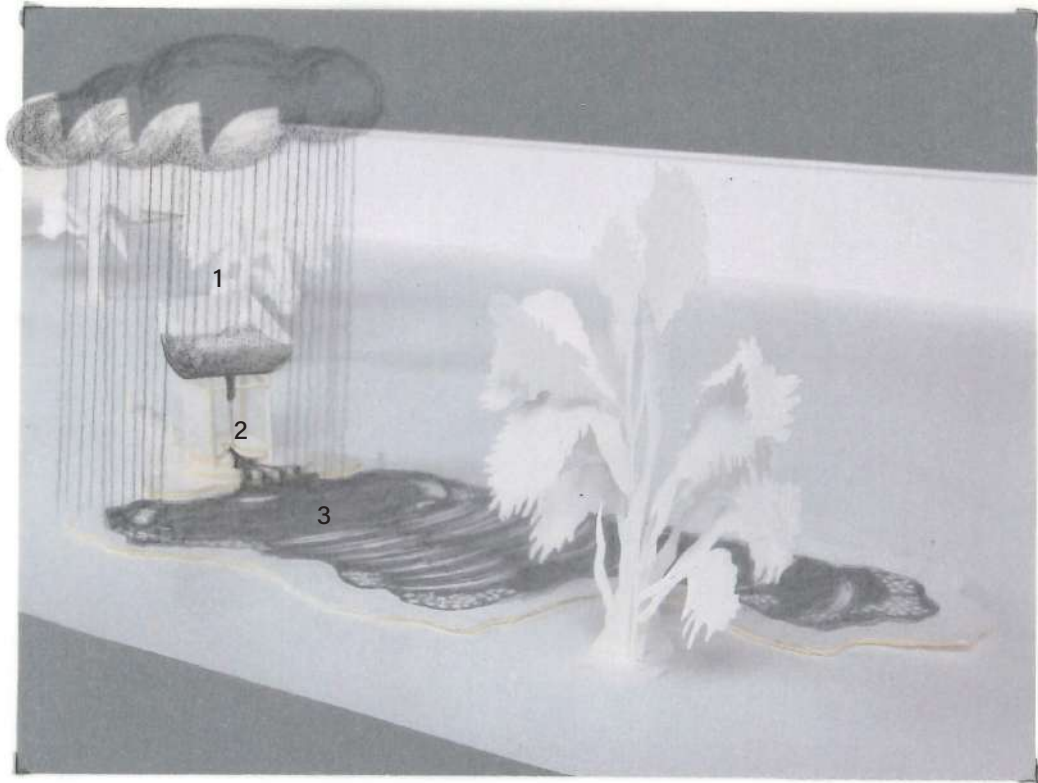


Fig. 77: Drawing layered over an image to explain the inner workings of the Design Scenario of Climate Responsiveness.

wetlands are biodiversity hotspots and breeding places for many species. While Natuurpunt positions itself as the representative and voice of the wetland's needs, in reality, the association serves as the human decision-maker and established authority that rules over the area. It is a dominant human voice that tries to shed light on the non-human agents in their decision process. Like other decision-makers, Natuurpunt presents a certain narrative. One that stands for the conservation of native species and the eradication of 'exotic' ones to work towards the restoration of the natural wetland character.

What this *Design Scenario* intends to reveal is not whether the approach to care proposed by Natuurpunt is valid, but rather that there exists a broader tension between humans and their surrounding environments, as has also been theoretically explored within the fields of feminist STS (Haraway 2016; Puig de la Bellacasa 2017), posthumanism (Braidotti and Bignall 2019; Harrison 2012), and new materialism (Bennet 2010), among others. Our research cell, Architecture & Wicked Matters, is likewise engaging with this debate from within the field of architecture, particularly in relation to the challenge of adopting posthuman concepts and an ethics of care that extend beyond a solely human perspective (Fisher and Tronto 1990; Puig de la Bellacasa 2017). Such a cultural change requires a transformation of narrative and change in discourse, language, concepts, and perspective. This *Design Scenario*, which I composed in response, presents another way of talking and thinking about waste, as that is crucial for a cultural shift to take place.

Returning to *Design Exploration I*, common expectations of toilet design emerged from discussions at the Blikfabriek. These included that toilets should function well, provide comfort, and be sufficiently attractive, among others. Their potential to transmit ideas, values, or beliefs, however, and to actively impact the surrounding environment in a reparative way is far less acknowledged or utilised. As noted by cultural theorist and philosopher Slavoj Žižek (2008), the moment we enter a toilet space, we are already knee-deep in ideology. As Barbara Penner (2012) explains, Žižek's point is that ideology follows us even into those private spaces we assume to be separate from the outside world, where it shapes the equipment we use so mindlessly. This raises questions about the agency and role of architect-designers in this context. Are architects, as suggested by participants, merely normative designers who execute the demands of human commissioners, resulting in norm-following or user-centred designs? Or can they also act as active shapers of culture, introducing changes in values and beliefs in an almost activist manner?

In aspiring to move beyond prevailing norms and cultural desires, this *Design Scenario* is created with the intention of spreading ecological-spatial values through architectural design. As discussed earlier in Chapter 2: *Methodology and Research Design*, Mathews (2019) argues that norms and values that genuinely inform consciousness originate less in discourse or debate than in the specific forms of 'praxis' in which a given society or community is engaged. 'Praxis' here refers to the socially and historically situated practices through which people provision their livelihoods, and through which their values, identity, and consciousness are formed. According to Mathews, truly changing norms



Fig. 78: Architectural model of the *Design scenario of Climate Responsiveness in the water buffer* (scale 1:100).

and values requires more than articulating or demonstrating the rational superiority of proposed alternatives:

“One might give intellectual assent to such alternatives, but as long as one continues to engage in one’s original form of praxis, or the forms of praxis that have shaped the normative status quo of one’s society, one will not achieve any real or lasting normative reorientation or rearrangement of one’s identity.” (Mathews 2019: 581)

Ultimately, she argues that significant changes in societal values – and, with that, in our environmental relationships – can only be achieved through a change in praxis. Drawing on Mathews (2019), I advocate with this research that architect-designers can meaningfully impact environments and cultures, as they are shapers of praxis and have the capacity to challenge and support changes in ingrained habits. As architect-designers are part of the cultures and systems they study, they are granted agency to raise issues of concern through design and to invite users to form their own positions in interaction with these designs. In terms of shaping new toilet habits and expanding relationality towards non-human species, architects can expose users to and normalise new practices of managing human bodily waste that are inextricably tied to shifts in cultural norms and values. While alternative toilet practices may initially appear uncomfortable or conspicuous, their integration into public spaces can gradually normalise their presence. As these new spatial habits are implemented and accepted, the values they embody are likewise disseminated. Over time, this may contribute to broader changes in beliefs or ideals, resulting in long-term cultural change, however slight.

4.5 Summary of Design Exploration II

Intermediate Reflections and Key Insights

This chapter investigated the role and meaning of toilets in wetland conservation by collecting and treating human bodily waste in a constructed wetland on-site, rather than evacuating it through underground pipes and sewers. In doing so, it focused on a situated research question and a specific location within the intrinsic case study of the Blikfabriek: the Blikvelden wetland. The three *Design Scenarios* developed during this research cycle aimed to investigate whether toilets can contribute to the restoration and repair of this vulnerable wetland, as proposed by the nature conservation association Natuurpunt. In relation to the main research question (RQ), *Design Exploration II* repositioned the toilet by fostering a more responsive relationship between toilet users and the surrounding wetland. This way, it shifted the dominant narrative currently ingrained in on-site mindsets from sewage dumping and the pollution of natural water streams towards toilet designs that contribute to the restoration of a vulnerable wetland.

Building on the reflections and key insights from *Design Exploration I*, combined with insights from the literature review and fieldwork, additional sub-research questions (4–6) arose from the process. Similar to the previous research cycle, I addressed these questions through a series of *Design Scenarios*, introduced and raised for discussion in situ and in confrontation with local mindsets at the case study. The central question for participants in this context was how the toilet designs might become qualitatively acceptable in this urban and semi-public environment. The designs are herein conceived as scenarios that position themselves between the current situation of dealing with human bodily waste and a possible post-intervention future. Through a moderated process of discussion on the designs, presented as *Conversation Pieces*, the focus gradually shifted from imagining the scenarios to more concretely considering their near-future implementation, whether in the Blikvelden or elsewhere. *Design Exploration II*, therefore, engaged with and responded to the following three sub-research questions (4–6) through architectural design.

The Responsive Design Strategy

- 4. In contrast to the current user-centred approach to toilet design, how can architectural design expand relationality towards non-human species and adopt a more responsive attitude towards the needs of its surrounding environment?

As part of the chapter, I have argued that perspectives on wastewater infrastructure are increasingly shifting towards a greater concern for their negative impact on the natural environment. In this context, sub-research question 4 asks how architectural design can materially support this societal shift and encourage a more responsive design attitude towards the needs of our surroundings. In general, the *Design Scenarios* developed as part of *Design Exploration II* are composed primarily to adhere to the needs of the wetland, prioritising these over the desires of human users. All three *Design Scenarios* as part of this chapter are therefore inextricably bound to – and actively care for – the surrounding wetland, becoming wetland-centred designs. Building on this intention, I deliberately shifted my focus as a designer toward generating a beneficial effect on the wider environment through the mediation of toilets. The design of the toilet thus centres on repairing and impacting its direct surroundings, reconfiguring the power dynamic between human users and the environment through the toilet itself.

This is most clearly exemplified in the *Design Scenario* of *Climate Responsiveness*, where the toilet effectively positions the wetland as the commissioner, imposing its needs onto the design, while human users are reduced to visitors (Fig. 75). The wetland’s needs are deliberately prioritised, and toilet users are expected to adapt their habits accordingly. The toilet in this scenario, as well as in the *Design Scenario* of *Post-Industrial Care*, is no longer permanently functional but instead depends on the availability of rainwater across changing seasons. Within these toilet designs, rainwater is treated as a scarcity, human bodily waste is valued as a resource, and the toilet is repositioned as a space that asserts a positive impact on its surroundings. In contrast to the current toilet system, this approach to toilet design demonstrates how relationality and responsibility can be expanded. As such, it unsettles dominant relationships and moves beyond an anthropocentric logic.

As a result, I delineated the Responsive Design Strategy. In this approach to architectural design, the toilet becomes a means to encourage a shift in mindsets by generating benefits for and positively impacting its environment. This entails a shift in the positionality of architect-designers, who no longer operate in a purely user-centred manner but instead engage in a climate-responsive approach. Accordingly, toilets are designed and evaluated based on their capacity to produce the most beneficial impact on the environment.

The Design Strategy of Critical Distance

- 5. In relation to implementing a new system – tied to new habits – for dealing with human bodily waste, how far should the speculative design proposal deviate from the existing situation to stimulate imagination and consideration?

Sub-research question 5 is tied to the critical distance between the design and reality, which I explained is crucial to consider when composing speculative *Design Scenarios*. I argued that while a scenario that strongly deviates from the existing situation may be interpreted as fictional or unrealistic, one that remains too close to the current system risks resulting in minor optimisations and remediations, rather than stimulating the imagination of a fundamentally different system. Participants, for instance, found the *Design Scenario of Post-Industrial Care* accessible and only gently provocative because it offered multiple toilet options and, in that sense, incorporated different levels of challenge to toilet habits (Fig. 62). Whereas two of the toilets were installed in recognisable and accessible toilet cubicles, another toilet was placed at the end of a long and exposed pathway, almost taking the form of a catwalk. The latter also included a visible filter, removing inappropriate materials from the wastewater that are prohibited from entering the natural environment and visibly exposing them on the filter.

The *Design Scenario of Low-tech Regeneration of Waste* is, aesthetically, further removed from the familiar flushing toilet system, consisting of a visible installation of pipes and funnels running above visitors’ heads (Fig. 70). Yet, it remained sufficiently recognisable to participants due to the presence of the toilet bowl as an anchor point. While this design may appear far removed from reality, the toilet continues to operate as a functioning flushing toilet, remaining

accessible across changing seasons by pumping deep groundwater for flushing. The ideas generated in response to the design primarily focused on optimising it to produce additional benefits for human users, such as energy generation, rather than benefits for the natural wetland. In terms of the system of waste treatment, the *Design Scenario of Climate Responsiveness* is the furthest removed from the current situation (Fig. 75). Whereas the previous *Design Scenario* was intentionally made to resemble an infrastructural system that evokes a sense of technical control over wastewater, that feeling is absent in this scenario, as it concerns a very basic, yet natural and safe, treatment system. By basing the design on landscape functions – such as inflow, overflow, sedimentation, infiltration, and dilution – the toilet allows the climate to influence its use and compels us to adjust our habits accordingly. While some participants questioned and distrusted this system and its lack of technological treatment, others found this serene experience particularly appealing.

The recognisability of the proposals, alongside a sufficient degree of deviation from the current situation, proved to be crucial in developing challenging architectural designs to support a shift in mindsets. In response to this observation, I developed the Design Strategy of Critical Distance. Since the ambition of the *Design Scenarios* is to stimulate and sustain discussion around alternative toilet proposals, recognisability emerged as an important criterion. As such, the design strategy safeguards the readability of the designs, enabling them to be understood and considered as plausible toilet scenarios within a situated context in the near future. It proved particularly useful that the designs are grounded in a real-world and recognisable environment, bringing them closer to everyday experience. While the *Design Scenarios* discussed in Chapter 3 do not engage directly with a specific context in their materialisation, the toilet designs in this chapter are deliberately contextualised within a landscape model of the Blikvelden wetland. This enabled participants to read and understand the designs better before engaging with them critically.

The Design Strategy of Ecological-Spatial Value

- 6. In terms of the role of the architect-designer, should architects respond to prevailing cultural desires, or can they also distribute ideas, values, or beliefs and shape new ecological-spatial values by design?

In contemporary public toilet design, architects typically respond to government regulations and prevailing standards of comfort, acting primarily as executors of cultural desires. They follow existing expectations and norms rather than actively co-shaping them. By contrast, this research deliberately shapes alternative toilet habits that aim to disseminate new ecological-spatial values. In this context, I argued that ingrained toilet norms should first be explored and exposed, before they can be challenged and reshaped through architectural design. As a first step in this process, I have identified the creation of awareness, followed by triggering collective learning and engagement. Where the distribution of ideas, values, or beliefs represented by the design is the last stadium, a shift or transformation in mindsets can also consist of ‘the willingness to a favourable state of mind’.

In the *Design Scenario of Low-Tech Regeneration of Waste*, I approached the creation of value by incorporating benefits or rewards in the design, for instance, through the use of novel technologies or gadgets to stimulate attraction and engagement (Fig. 70). Although the design intended to generate ecological-spatial values, the responses it elicited tended instead towards the reinforcement of anthropocentric values. This design approach was, therefore, further refined in the *Design Scenario of Climate Responsiveness*, designed around the sense of serenity associated with relieving oneself in nature, as a means of attracting visitors and generating ecological-spatial value (Fig. 76). In this design, the toilet is deliberately embedded within a natural environment and intended to encourage relationality and care by spatially expressing the positive impact of the toilet on its surroundings. Because such engagement demands a certain level of commitment, the creation of ecological-spatial values through designing with human bodily waste became essential.

While some architects might operate as executors of demands, adhering to a client- or user-centred approach, I advocate for their value and impact as active shapers of environments and cultures, with the ability to challenge ingrained habits. With this research, I argue that architect-designers are part of the cultures and systems they study, which grants them the agency to raise issues of concern by design and to invite users to form their own positions in interaction with these designs. In terms of shaping new toilet habits and expanding relationality towards non-human species through them, I contend that

architects possess significant agency. By exposing users to new habits, inextricably tied to shifts in cultural norms and values, they can support the dissemination and normalisation of these new values.

In relation to sub-research question 6, I developed the Design Strategy of Ecological-Spatial Value. This design strategy positions toilets as focal points that express and promote alternative practices of dealing with human bodily waste. By shaping new values and facilitating engagement and collective thinking through design, this design strategy intends to render proximity and cohabitation with waste acceptable within urban and semi-public settings

Altogether, the Responsive Design Strategy, the Design Strategy of Critical Distance, and the Design Strategy of Ecological-Spatial Value are intermediate design approaches that emerged from *Design Exploration II* as the second research cycle. Together with the Design Strategy of Rendering Present, the Confrontational Design Strategy, and the Public Design Strategy as part of *Design Exploration I*, these intermediate strategies will be advanced into broader approaches for shifting mindsets through architectural design in Chapter 5: *Toilets that Challenge on a Real-life Scale on Design Exploration III*.

5. Toilets that Challenge on a Real-life Scale

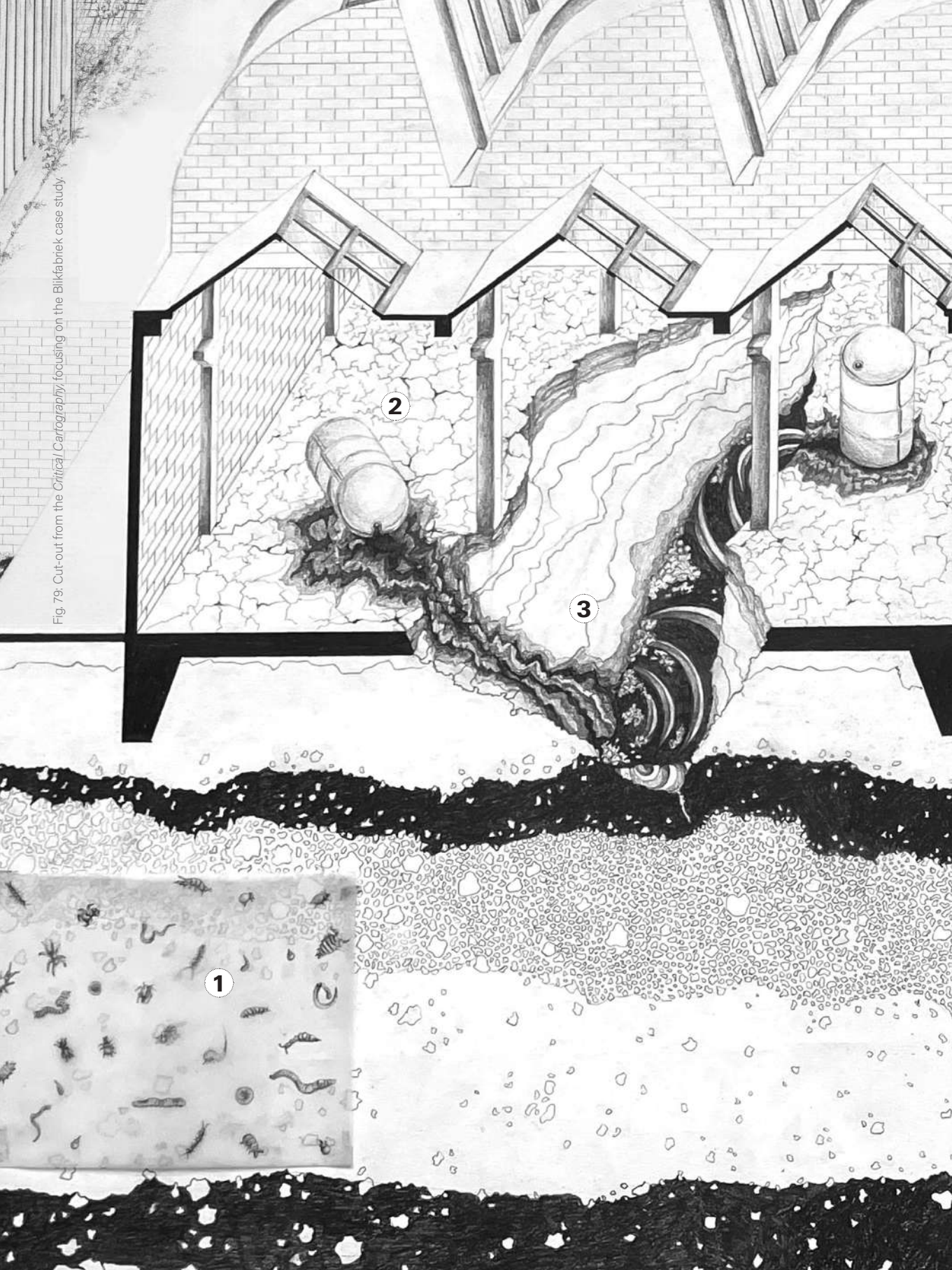
This chapter concerns the last of three research cycles or *Design Explorations* and is titled *Toilets that Challenge on a Real-life Scale*. A *Design Exploration* is a combination of Research-by-Design actions used to explore and trace a subject through architectural design, to challenge habits in the context of a case study. *Design Exploration III* proposes a renovation of the public composting toilets at the Blikfabriek site, assembling three design strategies to shift mindsets regarding human bodily waste. To introduce the chapter, I will guide you through the *Critical Cartography* as a form of recap of different aspects of the Blikfabriek case study. As in Chapters 3–4, I created a navigation through cut-outs of the drawing, using numbers in the text. The first part of this navigation describes the concrete situation under study, tied to real-world issues and concerns, and sets out the situated context for which a real-life design is created as part of *Design Exploration III*. In part, this narrative repeats elements from previous chapters, as it brings together all relevant aspects of influence within this situated part of the Blikfabriek case study.

5.1 Setting the Context by Critical Cartography: The Composting Toilets

The part of the *Critical Cartography* outlined above brings into focus some of the most difficult challenges the Blikfabriek must navigate, from soil contamination and seasonal flooding to the off-grid management of large quantities of organic waste. Diving into the soil underground, the drawing illustrates a complex interplay of industrial contamination alongside an abundance of soil species that inhabit and flourish in this living layer ①. Like many industrial sites in the surrounding area, the Blikfabriek is affected by significant soil contamination (Antwerp City n.d.), which is visually represented in the drawing by leaking vessels ②. Due to the extent of the pollution, the site was labelled a ‘brownfield’ in 2022 (VLAIO n.d.). This classification is given to former

industrial or contaminated areas that have been damaged to such an extent that they require structural remediation before they can be used or reused safely. As part of this designation, protective measures have been implemented to safeguard human health, including restrictions on breaking up pavement or handling soil without proper protection ③. For the Blikfabriek, this means navigating a complex situation of severe soil contamination and a desire to protect the biodiversity that established itself in the Blikvelden wetland. As discussed in Chapter 4: *Toilets of Care as a Recovery Activity*, the Blikvelden area is a green space located behind the Blikfabriek, which was spared from urban development and remained shielded from human presence for many years. The 2.5-hectare open space had not been managed until it was discovered and labelled a vulnerable area by Natuurpunt in 2020. This volunteering association has observed that the area is threatened by drought and is gradually transforming from a natural wetland to a forest. As this transformation endangers the area’s biodiversity, Natuurpunt Hoboken is committed to preserving this vulnerable wetland through nature management and conservation, with the help of local volunteers.

More broadly, this afforestation is linked to drought and seasonal flooding in the wider area. The Blikfabriek and its surroundings are lower in topography than neighbouring areas, resulting in rainwater flowing to this point and seeking to infiltrate the soil. As explained in Chapter 3: *Toilets Exploring Mindsets on Human Bodily Waste*, Flanders has twice the European average of paved surfaces (Verlinden and Vanoppen 2021). Large volumes of rainwater are therefore prevented from seeping into the ground, which is drying out the underlying soil ④. Instead, rainwater is channelled into underground sewers where it mixes with wastewater, causing sewers to overflow during periods of heavy rainfall. For the area of the Blikfabriek, in particular, this means that the site is regularly affected by seasonal flooding in winter and extreme drought in summer.



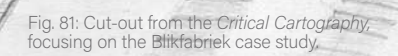
Another major challenge the Blikfabriek team is facing concerns one of their key ideological goals: to organise the site and its operations in the most sustainable and self-sufficient way possible. As part of this ambition, the case study aims to ensure that the site is off-grid in terms of both waste management and treatment. Since the Blikfabriek is a semi-public community space that hosts many events and welcomes up to 1,000 visitors each week, it faces challenges regarding the on-site storage and treatment of substantial volumes of organic waste. More specifically, several kitchens and catering facilities operate on-site to serve these large groups (5), producing considerable quantities of food waste. In combination with the amounts of produced human bodily waste, an estimated one kilogram of organic waste per visitor is added to the compost pile (6). Although most of the organic waste is currently being collected and removed from the site, the Blikfabriek team is motivated to reduce its dependency on the municipality by storing and processing as much waste as possible locally, using composting systems and techniques. In response to this challenge, of storing and treating substantial quantities of organic waste generated daily on-site, a couple of organisers have initiated experiments with public composting toilets as a potential solution. In reality, however, these facilities are rarely used by visitors, or even by some of the organisers themselves.

Zooming in on the public composting toilets at the Blikfabriek site, the current design is constructed from recycled materials, reflecting the site's characteristic DIY aesthetics (7). From discussions and fieldwork at the Blikfabriek, I observed that the existing design falls short of the hygiene and cleanliness standards visitors expect and require to use the toilets. The Blikfabriek team believes that this is the main reason why the current composting toilets are not being used and perceives the design as unsuccessful. These public facilities were initially constructed as an urban experiment, with the composting area hidden at the back of the toilets, being deliberately concealed from public view (8). The Blikfabriek team was afraid that showing visitors the process of composting human bodily waste on-site would disgust them and instead avoided any confrontation with waste or disturbance to visitors. As a result, the actual composting process discreetly takes place at the back, turning this area into a behind-the-scenes zone for manually maintaining and managing the compost pile and toilets. Since this area behind the

design has been set up somewhat ad hoc throughout their experiment, there is insufficient space to store sawdust, manually empty all the buckets under the toilets, and harvest the compost when it is ready.

As a result, this area is known within the Blikfabriek team for being very dirty. Some organisers of the Blikfabriek have even expressed reluctance to visit the area, citing concerns about its unappealing and poorly managed system of composting. This part of the composting toilets is found to be particularly dirty because of the messy-looking process and moisture running out of the compost, which, together with the sawdust on the paved floors, creates permanent puddles of brown sludge surrounding the compost heaps (9). In addition, the large volumes of human bodily waste produced on-site also exceed the current processing capacity of the design. This makes manual management of the compost heaps highly impractical, and for some, even impossible due to the weight of this large mass of waste and sawdust. As a result, opinions within the Blikfabriek team are divided on the composting toilets due to feelings of unhygiene, a poor compost management system, and the intense physical labour involved. While some organisers want to replace the composting toilets with a new design, others see them as a failed experiment in this urban, semi-public context and would prefer them to be removed altogether.





[illegible]

Within the broader Blikfabriek case study, this chapter focuses on the specific situation of the public composting toilets and the real-life issues and challenges they entail. Located prominently in a corner of the central square, the composting toilets are an unavoidable feature upon entering the site (Fig. 82). They are positioned between the catering and kitchen of Kapitan and the entrance of the studios of DE STELLING. The latter is a large scaffolding structure with workspaces that aims to bring residents from diverse fields together to collectively reflect on a different future of working and living together. The project was set up by architect Jan Dekeyser in 2021, who initially introduced me to the Blikfabriek site in the context of this project. Today, DE STELLING serves as a workspace and neighbouring activity to the composting toilets, accommodating a diverse community of artists, a brewer, and a nail salon, among others. Directly opposite the toilets is the terrace of CANTIN, which is the central neighbourhood pub and beating heart of the Blikfabriek (Fig. 84). It offers a variety of activities in combination with eating and drinking, ranging from theatre and music concerts to a high ropes course and adventure playground for children. Altogether, this creates a lively central square of the Blikfabriek where different activities intermingle and where different projects, or residents as they are called, must coexist.

The composting toilets and accompanying compost heaps are another project the residents on the central square must cohabit with, which is not always easy, given the negative perception of the toilets by visitors to the site (Fig. 88). In particular, the design of the dry toilets has major implications for the Kapitän kitchen and DE STELLING project, as they are adjacent to the toilets and all the associated odour and sludge issues. Mainly in situations of heavy rainfall, a lot of sludge seeps out of the compost heaps, which cannot find its way into the paved ground and runs across the central square until it can seep away into the sewers. This is a particularly troublesome side effect of the ad hoc toilet design, adding to the fact that it is avoided and perceived as

Taking a closer look, the composting toilets and urinals have been constructed of recycled and readily available materials, such as timber and coloured glass. These include windows salvaged from an old bus and sinks installed on foldable terrace tables. The urinals are made from recycled long plastic barrels to function as gutters that channel urine into the sewers. In the toilet's interior, there is a simple wooden cubicle box, painted black with a hole in it and topped with a toilet lid, designed to resemble a conventional flushing toilet. Next to it is a bin filled with sawdust to cover urine and excrement after use, along with a broom for cleaning up any debris on the floor. Not only is the decision to retain and treat human bodily waste locally on-site a drastic change, but the aesthetics of the composting toilets are also far removed from the flushing toilet system and the hygiene standards that accompany it. In my fieldwork at the Blikfabriek site, I observed that the existing design falls short of the cleanliness standards required by visitors to consider using the composting toilets. The Blikfabriek team believes the toilet design has a negative reputation due to its construction from recycled materials and its characteristic DIY aesthetic, stating that this is the main reason why it is not being used. Although the facilities are cleaned and maintained as regularly as the flushing toilets inside the CANTIN, the perception that dry toilets are unhygienic remains widespread on-site.

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Fig. 83: The terrace of CANTIN, the central neighbourhood pub and beating heart of the Blikfabriek.
© Lies Augustus



Fig. 84: The lively central square of the Blikfabriek during a dance and music performance.
© Michael Thomas Jones

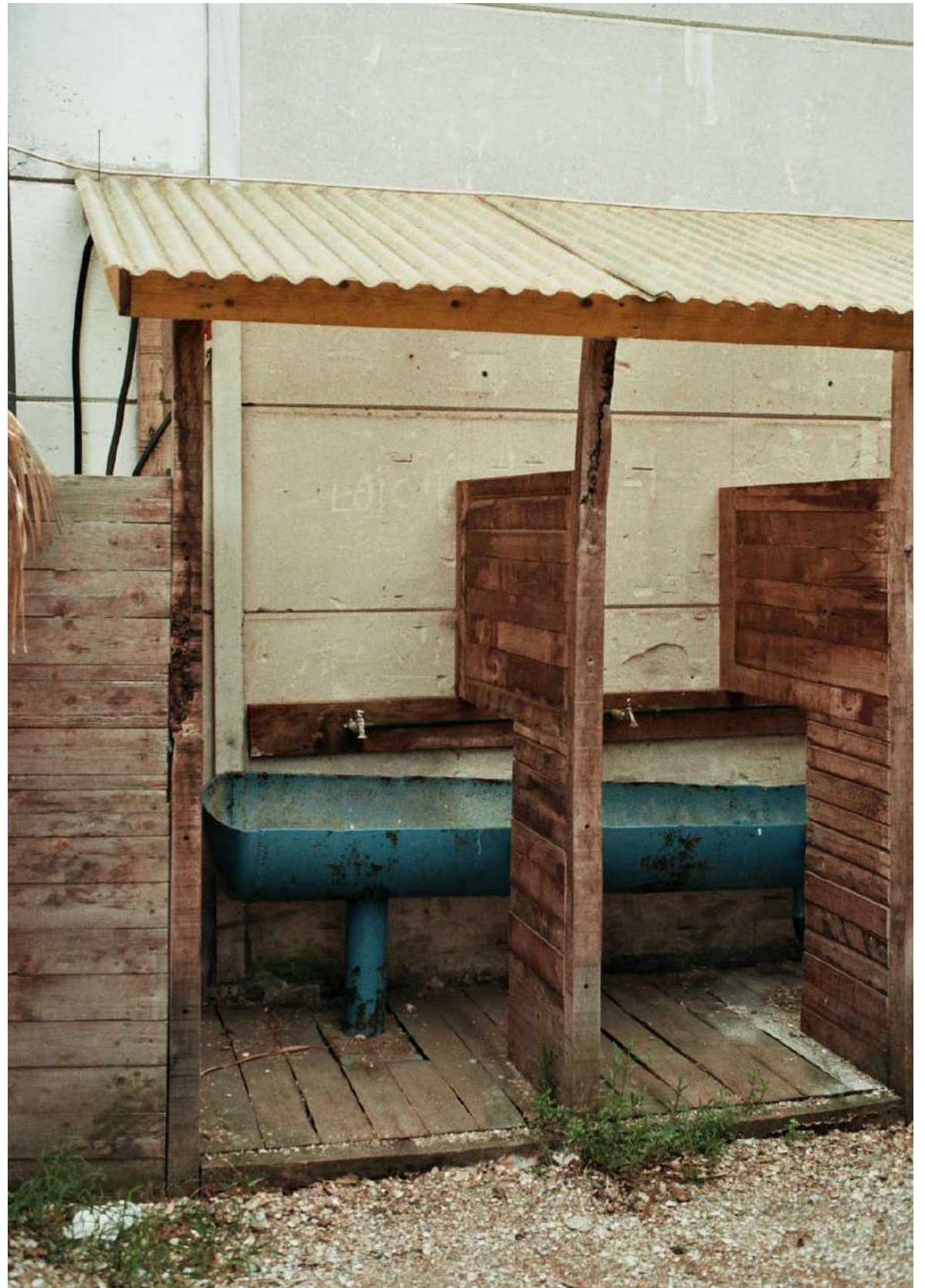


Fig. 85: The urinals and toilets on the site of the Blikfabriek, representative of the typical DIY aesthetics and recycled materialisation.

Fig. 86: Current design of the composting toilets, located in the corner of the central square.



Fig. 87: The compost heaps hidden in the back of the composting toilets, shielded from public sight.



Fig. 88: Interior of the composting toilets on the site of the Blikfabrik, representative of the typical DIY aesthetics and recycled materialisation.

5.3 Toilets that Challenge on a Real-life Scale

While the current design of the composting toilets is perceived as unsuccessful or even non-functional as public toilets by some organisers, others argue that a ‘more thoughtfully designed’, ‘architecturally refined’ design could generate greater attraction and perhaps even desirability. There is a clear divide in enthusiasm and in the willingness to invest time and effort in renovating or preserving these public facilities. This outlines a real-world challenge associated with introducing public composting toilets and relates directly to the Blickfabriek’s aspirations and ideology in organising their semi-public site. In their request for my help in composing a new design, this tension was evident from the outset, carrying with it certain expectations on the agency of the architectural design. Despite differing opinions on the composting toilets, the entire organising team remains strongly committed to its ideological goal of managing the site and its operations in the most sustainable and self-sufficient way possible. This way, they hope to become an example to similar sites, educating and persuading others to adopt their ideology.

Situated Focus

When I considered the request to design new composting toilets for the Blickfabriek site, I realised that this was a real-world example of the problem I had set out to investigate at the beginning of the research, as described in Chapter 1: *Introduction*. In the context of the case study, the composting toilets are (low-) tech solutions to a waste problem that do not (yet) gain traction in practice, since the general public’s mindset does not align with this decision or its implementation. Today, in 2026, opinions on the composting toilets remain divided, also within the Blickfabriek team. Only two out of six organisers take responsibility for the heavy compost management, while the others neither use nor take care of these spaces. Among other reasons, they raise concerns regarding the limited use by visitors and noted that children, in particular, get distressed when having to use them. Consequently, the public composting toilets are not widely accepted within their semi-public community space and are hardly ever used.

In my observation, the sudden implementation of composting toilets does not consider the cultural

layer and the mindsets that are present on-site. More specifically, in the ad hoc construction of composting toilets as an urban experiment, the Blickfabriek team did not consider the potential reception and effects of introducing this unconventional low-technology in a real-life context. As I explained in Chapter 1: *Introduction*, many alternatives to the flushing toilet already exist, also coming from fields of technology and engineering. However, these toilet alternatives do not find their way to reality. The flushing toilet and the comfort it presents are so ingrained into our lifestyles that they have become normalised and are left unquestioned. Specifically for the toilet, as an ingrained and highly comfortable technology, it cannot be underestimated that it concerns a sensitive spot in Western cultures. As I identified mindsets as effective points of intervention and engagement when aiming for cultural change (Meadows 1999), those of the public visiting the Blickfabriek should also be considered.

Methodological Process

Design Exploration III is the third and final research cycle centred on the Blickfabriek site as a case study. It responds to the concrete request from the Blickfabriek to develop new composting toilets, moving towards a real-world investigation of the main research question (RQ). This presented an opportunity to move beyond speculative *Design Scenarios* and work toward the full-scale realisation of a composting toilet design, situated in a semi-public setting. Within this context, I took on my role as a design researcher to gather diverse mindsets on-site and develop a new design in conversation with the Blickfabriek. Through design discussions, consultations, and iterative proposals, I supported the shaping of a community, gathered around the question of how such toilets could become acceptable on this site. *Design Exploration III* required participants to consider the design thoroughly and practically, gradually advancing it toward realisation and eventually construction. The design discussions, therefore, resembled realistic architectural consultations. Unlike the previous *Design Scenarios*, this proposal is intended to be realised at full scale. This ambition is fundamentally different from presenting models and ideas on a table, at a safe distance, since it directly engages with and even threatens the daily habits on-site. This process of working towards realisation is integral to the research ambition itself: to challenge and loosen,

through design, those ingrained spatial practices that are left unquestioned and ultimately obstruct change.

In response to the request of the Blickfabriek, I composed a composting toilet pavilion for their site that includes three distinct Design Strategies to change mindsets by architectural design. The toilet pavilion, as part of *Design Exploration III*, is a retake on the current composting toilet design and is an updated version in the sense that it is created for the same location on the central square, with four composting toilets instead of three. It is created as a renovation, including and reflecting the same ideology or values as present in the current design made by the Blickfabriek.

From Design Strategies to Architectural Design

In composing the toilet pavilion as part of *Design Exploration III*, I build further on the reflections and key insights from *Design Exploration I* and *II*. Within these previous research cycles, the following intermediate design strategies were developed: the Design Strategy of Rendering Present, the Confrontational Design Strategy, the Public Design Strategy, the Responsive Design Strategy, the Design Strategy of Critical Distance, and the Design Strategy of Ecological-Spatial Value. In this chapter, these intermediate strategies are advanced into broader approaches for shifting mindsets through architectural design.

As outlined in Chapter 2: *Methodology and Research Design*, every research cycle begins with analysing previous design discussions, reviewing theory, and carrying out fieldwork at the situated part of the Blickfabriek under study. Accordingly, I re-analysed the many conversations, reactions, and ideas gathered from design discussions over the past four years and long-term collaboration with the case study. In this broader analysis, it was remarkable to observe that similar design suggestions often recurred. In response, I categorised the most recurring reactions and remarks according to similarities in approach. A selection of these reactions is listed below:

- *Toilets should be hygienic: clean or cleanable with e.g. white-tiled walls and a white toilet bowl. The ultimate dream would be to have Japanese toilets: with buttons to clean everything!*
- *Perhaps we can expose also the discharge of wastewater, visual or auditory, by allowing wastewater to flow from the toilet and washbasins into the sewers.*

- *We could measure water consumption of users in the toilet, like the amount of water used per flush, the washbasin and the water for cleaning, e.g. with a water-meter?*
- *A toilet space that measures or displays your consumption of water and even toilet paper! We could visually represent how many sheets are used by use of a ruler.*
- *Visual filters could be installed before the wastewater flows into the sewers: to show what is flushed away? This way we could prevent clogging at the source instead of the wastewater treatment plant.*
- *The toilet could include more facilities to clean everything, so you can provide cleanliness for others or to have control over it yourself.*

- **Outlining Design Strategy:** To design a toilet as a sterile and ‘wasteful’ architectural element

- *Can we give people some sort of ‘reward’ in exchange for switching to a dry toilet? As a motivation not to use the flushing toilet.*
- *‘Gamification’ could perhaps make the visit to the toilet more engaging and playful.*
- *Could we combine the toilets with other functions on the square like the height parkours, the restaurant’s terrace, the caterer, the brewer or artists in ‘De Stelling’?*
- *We should transform ‘going to the toilet’ into a fun or adventurous experience, instead of aiming for the most comfortable.*
- *The composting toilets should be a central event that is present on the square. The visibility and interaction with the design could raise awareness by its presence.*
- *The toilet habit should extend beyond the toilet space: the path towards the toilet, the view, the interaction, ... Allow it to take some time and space.*

- **Outlining Design Strategy:** To design a toilet as an experience or reward ‘in return’ for a change in habits

- *The compost heap should not be disguised but kept close, in proximity to the toilet space.*
- *Waste should be appreciated as a ‘resource’ and not be simply discharged as if it was just an end-product. The real value of our excretions is in the fertilizer.*

- The toilet visitors should receive the feeling that going to the toilet contributes to the environment or surrounding area. To something bigger than themselves.
- If we show and display the composting process clearly, this could educate and change people's behavior).
- The compost heaps and process should be moved to the fore instead of hiding it away at the back like it is now. People need this confrontation to really understand.
- We should demonstrate the connection between humans, or human bodily waste, and the soil or nature. A lot of people are not yet aware of this.

- **Outlining Design Approach:** To design a toilet as part of an ecosystem, in proximity to human bodily waste

Following this categorisation, and considering the intermediate design strategies listed above, I advanced three more general design strategies to change mindsets through architectural design, acknowledging that this shift remains personal and subjective to individual mindsets. These strategies are further developed and materially articulated in three *Design Scenarios* as part of *Design Exploration III*, combined into a design for a toilet pavilion, created for the semi-public context of the Blikfabriek case study. Designing the toilet pavilion involved an intensive process of continuously moving between reviewing literature, conducting fieldwork, designing, reworking designs and setting up design discussions at the case study site. Over a period of months, numerous preliminary studies and intermediate designs were developed to advance the toilet designs as part of this chapter. Once finalised, the *Design Scenarios* were introduced and discussed again in situ, confronting the mindsets of the Blikfabriek team and constructors on-site. Rather than presenting the toilet pavilion as a final result, it is a retake on the current design of the composting toilets, composed as an assemblage of three approaches to shift mindsets by architectural design. All toilets in the pavilion, therefore, share a similar ambition yet remain distinct in their design approach or strategy.

5.4 Design Scenarios as Part of Design Exploration III

In the following section, I present the toilet pavilion as a renovation of the public composting toilets created for the Blikfabriek case study. The design consists of three distinct *Design Scenarios*. I begin by explaining the inner workings of the toilet pavilion, clarifying how the toilets spatially relate to one another, before moving to the design's maintenance protocol. I then discuss the *Design Scenarios* one by one through images of the toilet designs, accompanied by an experiential description written in the second person, where 'you' refers to you, the reader, inviting you to the envisioned toilet experience. Afterwards, I examine the toilet design in greater depth, accompanied by direct transcriptions of reactions that emerged around the conversation table, presented on smaller pink pages. These conversational excerpts are discussed alongside a reasoned analysis of the toilet design.



Fig. 89: Architectural model of the toilet pavilion, created as a renovation for the public composting toilets at the Blikfabriek (scale 1:33).

The Toilet Pavilion: Assembling Three Design Scenarios and Strategies

The toilet pavilion combines three *Design Scenarios*, discussed in the next pages: *The Wasteful Toilet as a Sterile Environment*, *The Toilet as an Architectural Experience in Return*, and *The Toilet as Part of an Ecosystem*. Each of these toilet designs represents a distinct design strategy and approach to shifting mindsets, given that this shift remains personal and subjective. The pavilion offers multiple toilet experiences and spatial practices, advanced to the point where it can be realised and used at full scale as public composting toilets at the Blickfabriek.

What immediately stands out in the pavilion is the yellow, circular roof that slopes downward¹, including one round opening in it (Fig. 90). Its bright colour attracts attention, making the design stand out as a present and central element on the Blickfabriek's central square. As the Blickfabriek is a former industrial site, the most common colours are yellow, turquoise, and dark green, deriving from the colour coding used in the old factory buildings. Through the round opening in the roof, a water tank collects rainwater from the surrounding sheds of the Blickfabriek via a drainage pipe. Four toilet spaces are arranged around the rainwater tank: three are composting toilets, and one is a conventional flushing toilet or 'WC'. The latter, *Wasteful Toilet*, is the smallest of the four toilet spaces but is most dependent on the water source, since it uses rainwater for flushing, handwashing, and thorough cleaning of the space. Whenever a toilet space uses water from the buffer, a signal is sent to all other toilet spaces to indicate water consumption. This is achieved by means of a pump being activated and the water level dropping visibly. This way, aspects of shame and social control over water usage and toilet habits are incorporated into the pavilion.

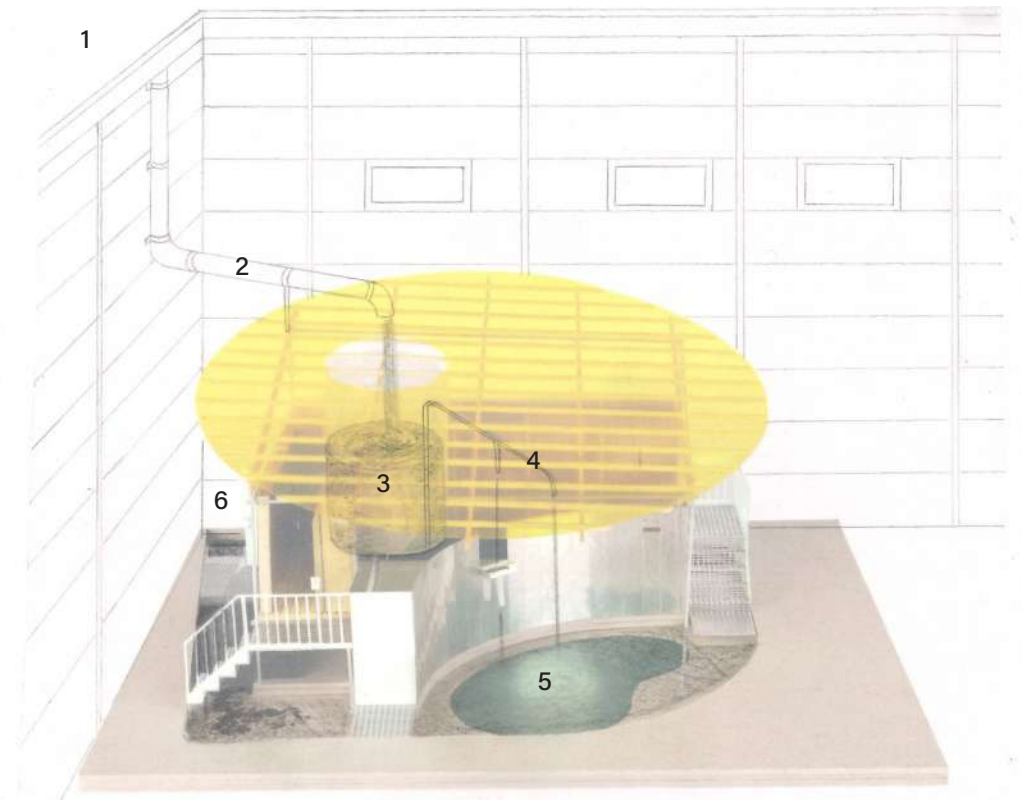
In contrast, the composting toilets do not use rainwater for flushing and redirect the surplus water to other functions. One such purpose is a tap, in the *Toilet as an Architectural Experience*, that releases a gentle stream of water onto the ground to nourish the sedge field growing beneath. The sedge grows in a slightly lower part of the central square and is connected to a gutter that directs excess rainwater and sludge towards the rear of the pavilion via a gentle slope. Since the toilet pavilion is built on top of a heavily paved industrial surface, infiltration into the ground is not possible. As a result, the gutters

guide the stream of sludge by gravitational force towards a drainage pipe in the back, from where it seeps into the sewers. The compost bins underneath *The Toilet as Part of an Ecosystem* are also linked to this evacuating gutter, allowing them to drain into it when the compost becomes too wet. This way, any compost runoff mixes with rainwater and dilutes into sludge in the gutter. Additionally, water hoses are installed next to the compost bins and connected to the water supply, enabling the community to rinse the gutters on-site and manage the compost during dry periods or in the event of blockages. Altogether, the toilet pavilion becomes an active installation where rainwater is captured and utilised, and where human bodily waste is evacuated, transformed, or ultimately 'flushed away'.

Maintenance Protocol

Whereas the flushing toilet system requires almost no effort from its users in terms of transporting and treating wastewater, composting toilets involve the on-site retention, storage, and treatment of human bodily waste. This entails additional maintenance work for the community present on-site. The current composting area has been arranged somewhat ad hoc, resulting in a space that is impractical for maintaining and managing the compost piles and toilets. More specifically, there is insufficient room to store sawdust, manually empty the buckets placed beneath the toilets, and harvest the compost once it is ready. As a result, the manual management of the compost heaps becomes highly impractical and, for some, even impossible due to the weight of the large mass of bodily waste and sawdust. In composing the toilet pavilion, I therefore took these needs into account and included the toilet cleaning staff in the design discussions, as they bring a specific perspective and expertise to this matter.

In terms of cleaning, the composting facilities are maintained regularly by toilet cleaning staff, at similar times during the week as the flushing toilets inside the CANTIN. The toilet fixtures resemble standardised toilet bowls and are cleaned in much the same way as flushing toilets, with the difference that only biodegradable cleaning products can be used and that the water used for cleaning drains directly into the compost heaps below. The sawdust is stored in transparent cabinets integrated into the walls, serving both as insulation and as a visible spatial separation.



¹ In the toilet pavilion, rainwater is harvested from the roofs of the surrounding sheds (1), from where it travels through a drainage pipe (2) to the rainwater tank at the centre of the pavilion (3). In addition to being used to flush the toilet at the back and for handwashing, the rainwater also nourishes a sedge field (5) through a stream of water activated by turning a tap (4). From there, the water flows along a gentle slope through gutters toward the back of the pavilion, where it is discharged into the sewers (6).

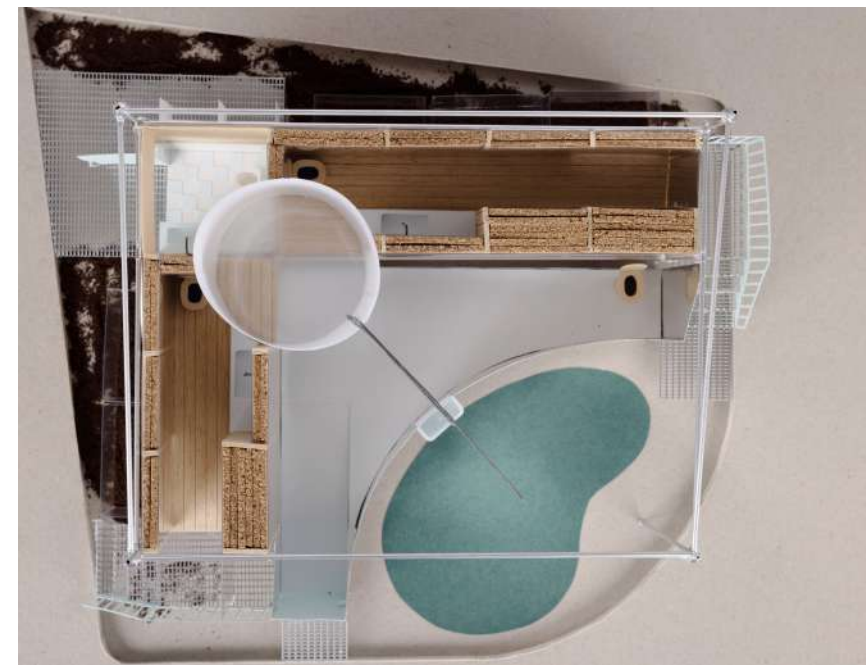


Fig. 91: Top view of the design of the toilet pavilion, displaying four toilet spaces around a central water buffer.

Fig. 92: Architectural plan of the toilet pavilion, with indication of *The Wasteful Toilet as a Sterile Environment* (A), *The Toilet as an Architectural Experience in Return* (B), and *The Toilet as Part of an Ecosystem* (C), which consists of two toilets.

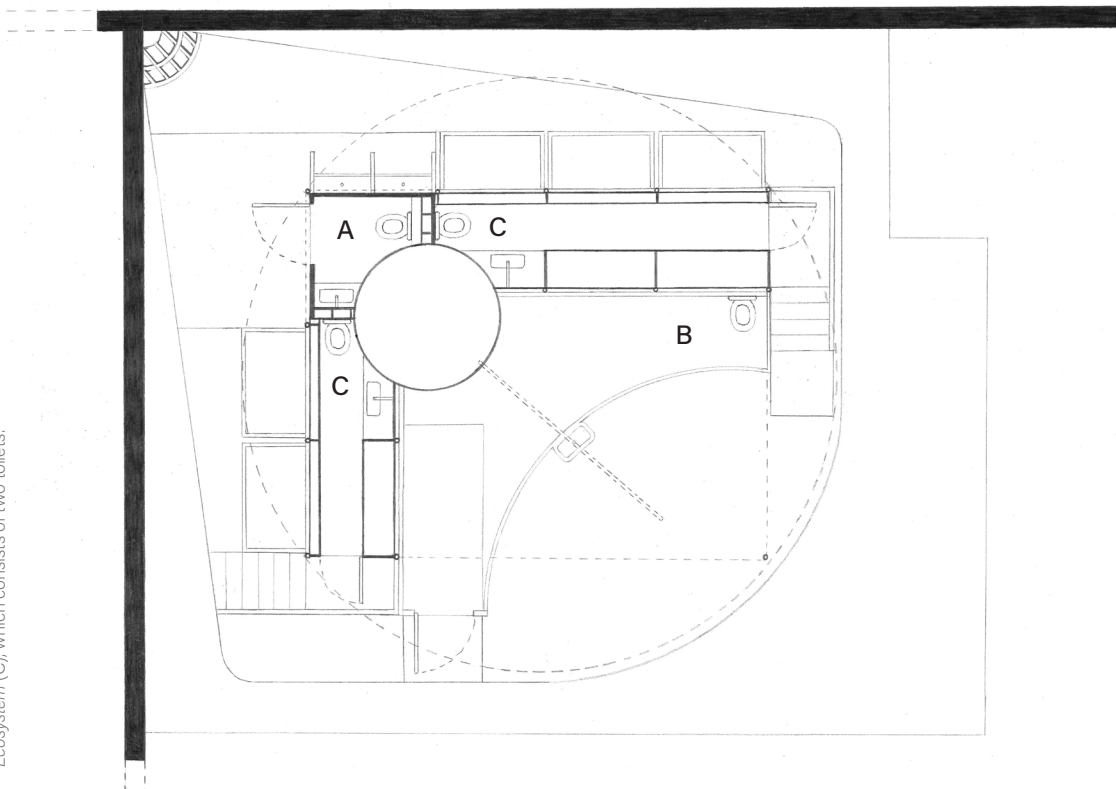
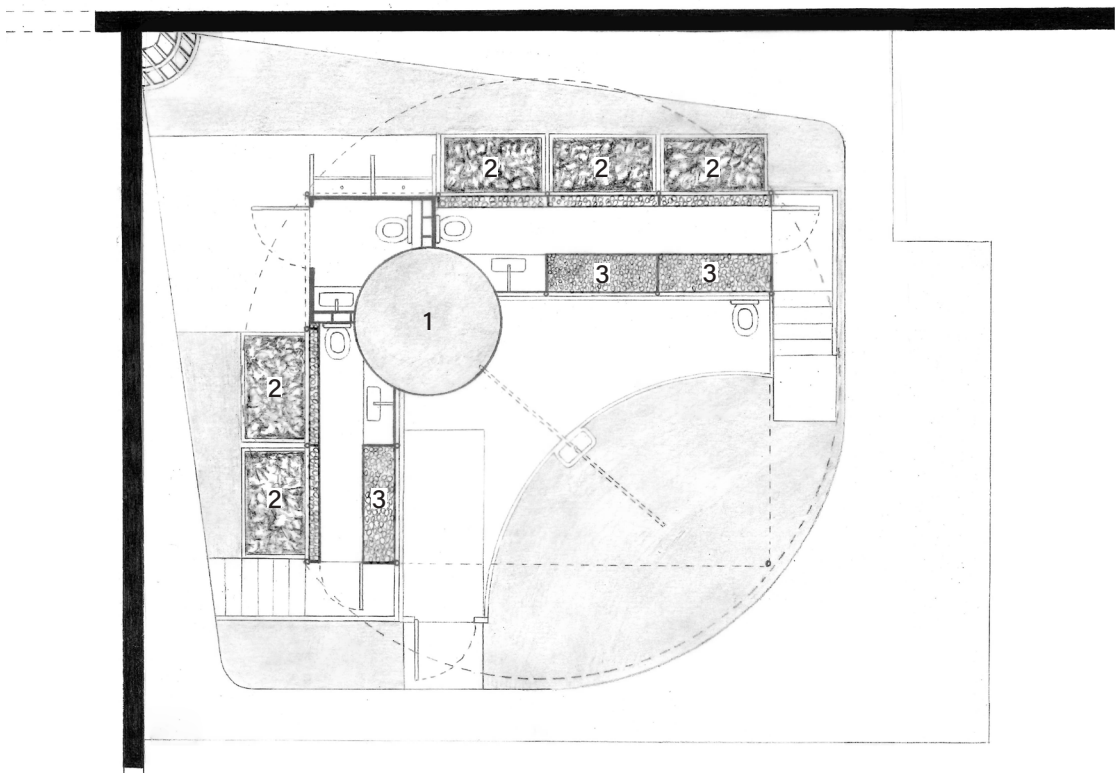


Fig. 93: Architectural plan of the toilet pavilion, with indication of rainwater in light grey (1), composting bins (2), and walls stacked with sawdust (3).



An opening near the ground is incorporated to ensure that leftover sawdust debris can easily be swept onto the compost heaps below. In terms of the gutters surrounding the pavilion, which allow excess moisture from the compost piles to drain away, these can be cleaned using the two water hoses at the back and connected to the rainwater tank.

The compost heaps are managed by the team of the Blickfabriek, who are responsible for their monitoring and maintenance. Their tasks include, for instance, checking the carbon-to-nitrogen ratio, the moisture of the compost heap, and whether the temperature targets are reached (Jenkins 2019). On a weekly basis, they visually inspect the heaps and check their odours, record the temperatures at three locations or depths within the heap, and conduct a moisture check to assess the dryness or wetness of the pile. Whereas the current system relies on buckets placed beneath the composting toilets, the mixture of bodily waste and sawdust is here collected directly in the bins below the toilets. Once a compost bin is full, it is moved to the side where the compost can shrink and mature into rich and fertile humus.

Every month, the heaps need to be turned in order to aerate the piles thoroughly, while the carbon or nitrogen composition can also be adjusted if necessary. For the manual turning of the piles, the compost bins, which are placed on wheels, can be moved from below the toilet pavilion to create more space around them. This allows the compost operators to easily take the bins out, position themselves on a stand if needed, and turn the piles or scoop out the contents of the bins. Moreover, the mobile bins can also be used to block the corridor when, for instance, *The Wasteful Toilet as a Sterile Environment* – the only flushing toilet in the pavilion – would be out of order due to a water shortage. When a heap is too dry, it can be moistened using the water hoses located at the back of the pavilion and connected to the rainwater buffer. When the heaps are too wet, excess liquid drains into the gutter, from where it flows away into the sewers. After the monthly check and turning process, the bins are placed back in their designated spot, where the compost can continue to mature and shrink. This process takes about six months before the fertiliser can be taken out, harvested, and used on the soil (Ibid.).



Fig. 94: Architectural model of the toilet pavilion (scale 1:100) implemented on the site of the Blickfabriek in the corner of the central square.

You're standing outside in the rain, looking for the toilets. An arrow on the central square points you in the direction of 'WC' in the corner. In front of you is a large yellow circle gently sloping downward. Rain is falling onto the circular roof and quickly runs down into the gutter underneath. The sign marked 'WC' directs you into a narrow passageway between a wall and two well-stocked compost bins. The moment you step into the passageway, the air changes. A moist, earthy scent rises from the composting heaps piled to your right. As you continue, the pavement beneath your feet transitions into a permeable pathway. Looking through the surface, you see how a brown liquid is diluted in the rain, drifting toward a drain in the corner at a fast pace. Right behind the compost bins, you find a small door, leading you into the toilet room. Here, you're sheltered from the rain, pelting loudly on the roof above. The interior feels neat, with white-tiled floors and walls gleaming at you under the yellow light as you enter. In the room stands a giant water-filled cylinder. It collects rainwater and is slowly filling up its volume. To its left is a toilet, and to its right a small sink. You take a seat on the toilet and spend some time relieving yourself. When done, you reach for the flush. The instant your finger presses the button, a low buzzing sound vibrates through the room, rising from somewhere inside the cylinder. Slowly, the water level inside the tank begins to drop, descending until the toilet bowl is completely flushed. Before leaving, you go over to the sink to wash your hands. As you turn the tap, the same mechanical buzzing returns. Again, the water inside the cylinder falls, inch by inch, responding to each second the tap runs. Curious, you test turn the tap once more – open, close, open – and each time, the level recedes as expected. When you've used enough water, you take a final glance around the spotless room, then step back out into the rain. Passing the compost bins again, their moist, earthy scent wraps around you as you walk over the sludge stream on your way back to the square.

The Wasteful Toilet as a Sterile Environment is composed in response to the question of how informing users through design about the unsustainability of the flushing toilet system could influence them in their toilet habits. It corresponds to the first advanced design strategy as part of *Design Exploration III* and is refined from intermediate design strategies that were tested in Chapters 3–4. When looking back at the design discussions in *Design Exploration I* and *II*, one of the most recurring remarks was the suggestion to emphasise – through design – the sustainability issues that surround the flushing toilet system. After multiple presentations on the problem setting under study, narrated by the *Critical Cartography*, many participants believed that toilet designs should inform users about the broader issue behind them: the fact that the large-scale underground infrastructure can no longer keep up with

P1: So, this toilet is still conventional, isn't it? Apart from the fact that the toilet flushes with rainwater, it is not more 'uncomfortable', I think?

P2: I think it's good for the awareness that there is a large roof that makes something visible and clearly shows how it collects rainwater.

P3: I have a silly question. If, for example, it doesn't rain for a month, do you still

P2: have to switch to drinking water?

In that case, wouldn't it just be great to say: Look, the toilet is currently out of order.

P3: Since there's no water, you must use the composting toilets right now due to water shortage.

P4: And what about the 'wee tray'? I mean, that's another question, but would there be something for a small wee as well?

Or do you have to go to the regular toilet for that too?

P3: Yes, we need a urinal that could be flushed with rainwater too.

P4: The 'wee tray' gets used quite a bit.

P3: Yes, it gets used regularly. Otherwise, people always pee against our

P4: wall, so it's good that there is one.

But of course, it's also a matter of space.



You're standing outside in the rain, looking far away on the central square points you in the corner. In front of you is a large yellow sloping downward. Rain is falling onto the concrete, quickly runs down into the gutter underneath. The 'WC' directs you into a narrow passageway between two well-stocked compost bins. The moment you enter the passageway, the air changes. A moist, earthy smell from the composting heaps piled to your right. As you step onto the pavement beneath your feet transitions into a different way. Looking through the surface, you see how the rain is diluted in the rain, drifting toward a drain at a fast pace. Right behind the compost bins, you are led into the toilet room. Here, you're standing in the rain, pelting loudly on the roof above. The interior is with white-tiled floors and walls gleaming with a yellow light as you enter. In the room stands a large white cylinder. It collects rainwater and is slowly filling. To its left is a toilet, and to its right a small sink. You sit on the toilet and spend some time relieving yourself. When you reach for the flush. The instant your finger hits the button, a low buzzing sound vibrates through the air somewhere inside the cylinder. Slowly, the water level in the tank begins to drop, descending until the toilet is completely flushed. Before leaving, you go over to the sink and wash your hands. As you turn the tap, the same music returns. Again, the water inside the cylinder, responding to each second the tap runs. Curious, you turn the tap once more – open, close, open – and the water recedes as expected. When you've used enough water, you take a final glance around the spotless room, then you step out into the rain. Passing the compost bins again, the scent wraps around you as you walk over the concrete, your way back to the square.

The Wasteful Toilet as a Sterile Environment is composed of the question of how informing users through design for the sustainability of the flushing toilet system could influence toilet habits. It corresponds to the first advanced concept of *Design Exploration III* and is refined from ideas and strategies that were tested in Chapters 3–4. When the design discussions in *Design Exploration I* and *Design Exploration II*, a recurring remark was the suggestion to emphasize the sustainability issues that surround the flushing toilet. In multiple presentations on the problem setting and the *Critical Cartography*, many participants believe that the design should inform users about the broader issue behind the large-scale underground infrastructure can no longer be ignored.

P1:
That's right. So now
in the corner there is a 'rain pipe'
where the urine flows to. Everything
actually just flows into that pipe and
from there to the sewers.

P2:
The urine also
smells very strongly. The
faeces actually aren't really
that bad... They don't
smell.

P2:
Yes, the idea
to work with buckets,
I think that could
be good. Portable for
just one person.

P1:
And do you
think... because now we're
letting the urine run out. But you
wouldn't do that, Right? We let the
urine run away into tubes and
pipes that are connected to
the sewer system.

P1:
But I do
believe that if it's a
pleasant area, that is
well-designed, that there
will be people who are
willing to commit to
maintaining it.

P2:
Was it
your intention
to make this toilet
something very
antisocial?

P3:
But that's
why we need a re-
ally good system for
emptying the toilets
and so on.

P3:
I think if we
empty the buckets
every day, it's doable,
but it's really utopian to
think that we'll have the
discipline to empty those
buckets every day. It
would be the ideal,
but...

P4:
And is com-
post really a must,
or can we do without
it, for example by only
using WC's that flush with
rainwater? Or is that a
problem because we are
stuck with food waste
that we cannot
get rid of?



Fig. 95: Architectural model of the Wasteful Toilet as a Sterile Environment, located in the corner of the composting area, isolated from the composting toilets.

today's climate challenges and population demands, causing sewer overflows and water pollution. Like efforts of changing consumer behaviour, where information and awareness are used to influence everyday choices, some participants were convinced that informing people about the unsustainability of the current system could motivate them to try alternative, and perhaps initially uncomfortable, toilets. According to them, information has the power to influence and change deeply rooted habits. The Blikfabriek team also believes that information is essential for raising awareness and triggering change. Their solution is, therefore, quite literally to put up informative posters and banners to explain to visitors why composting toilets are more sustainable alternatives.

Following the suggestions to inform and raise awareness on sustainability issues that surround the flushing toilet system, *The Wasteful Toilet as a Sterile Environment* investigates how a toilet design can communicate and inform users, by making certain issues visible or tangible through embodied experience. The pipes and plumbing for the toilet and sink run above ground on their way to a septic tank, where they connect to the central sewage network. This way, the design spatially displays wastewater infrastructure, making its functioning explicit and rendering it present on the site of the Blikfabriek. The design clearly shows the descending water level inside the water buffer, emphasising the large quantity of rainwater used for flushing. Aside from raising awareness through design choices such as making rainwater present and visible in the design, the public context is also used to encourage individual toilet users to change their habits. More specifically, all toilets are positioned around the transparent water buffer, sending a clear message to other users when rainwater is being used via the descending water level and the sound of a pump being activated. By communicating individual water usage to other toilet spaces, the design intends to encourage proper use of the toilet spaces, playing on feelings of shame and social control. To preserve some recognisability and to provide users with different options, this toilet is the only flushing toilet in the toilet pavilion and is labelled a 'WC'. It is the only toilet space that uses rainwater for flushing. In return for this 'wasteful' habit, the water consumption of users is made explicit and present as a design element.

Another recurring reaction during the design discussions as part of *Design Exploration I* and *II* was that toilets, even composting toilets, should always be sufficiently hygienic for use. Some participants pointed to the example of the popularised Japanese high-tech toilets with 'buttons to clean everything'. This is again a user-centred expectation that does not consider or allow the presence of non-human species in toilet spaces. In response, this *Design Scenario* features a small toilet space that, at first glance, appears to meet all desires of toilet users for cleanliness and a spotless environment to relieve themselves. Given that public toilets are more often distrusted and perceived as dirty spaces, the required standards to be considered hygienic are high. In response, the interior of the toilet space is clad and decorated from top to bottom with white tiles and equipped with a glossy white toilet bowl, allowing users to see and control every speck of dirt. Multiple taps and facilities are installed to clean the toilet bowl and every corner of the space, providing users

P1:
Well, that's the whole discussion. We have all this human waste, and we want to turn it into something useful. But the problem today is that we can't do it properly because the design and installation isn't good, which means there's little support for it.

P2:
We want to raise public awareness and use the human waste in a way that is different from actually seeing it as 'waste'. So, it's really a bit of an ideological choice to do it that way. Is there a demand for more flushing toilets?

P1:
No. That's the whole point: if the composting toilets look pleasant, there will be no more resistance to it. Then ...

P3:
I would also use mainly composting toilets, and then the flushing toilet would just be an example of how much water it uses. Our intention is still to get as many people as possible to use the dry toilets.

P4:
So now the design includes four toilets in total? One flushing and three dry?

P3:
I'm not sure if that many are necessary.

P1:
Yes, now they are hardly ever used because everyone uses the normal toilets inside.



today's climate challenges and population demands for clean water and less pollution. Like efforts of changing behaviour, where information and awareness are used to influence choices, some participants were convinced that in the long run, the unsustainability of the current system could not be an alternative, and perhaps initially uncomfortable, but in the long term, information has the power to influence and change habits. The Blikfabriek team also believes that information is key for raising awareness and triggering change. They chose to communicate quite literally to put up informative posters and banners to inform visitors why composting toilets are more sustainable.

Following the suggestions to inform and raise awareness about the ability issues that surround the flushing toilet system, the design *as a Sterile Environment* investigates how a toilet design can educate and inform users, by making certain issues visible and creating an embodied experience. The pipes and plumbing for rainwater run above ground on their way to a septic tank, with the pipes visible to the central sewage network. This way, the design makes the wastewater infrastructure, making its functioning visible and present on the site of the Blikfabriek. The design shows the descending water level inside the water buffer, emphasizing the quantity of rainwater used for flushing. Aside from the visible pipes, through design choices such as making rainwater visible, the design, the public context is also used to encourage users to change their habits. More specifically, all around the transparent water buffer, sending a clear message to users when rainwater is being used via the descending water level and the sound of a pump being activated. By communicating the use of the toilet spaces, the design intends to encourage the use of the toilet spaces, playing on feelings of shame and guilt. To preserve some recognisability and to provide users with options, this toilet is the only flushing toilet in the area, which is labelled a 'WC'. It is the only toilet space that uses a flushing toilet. In return for this 'wasteful' habit, the water consumption is made explicit and present as a design element.

Another recurring reaction during the design process of *Design Exploration I* and *II* was that toilets, even composting toilets, should always be sufficiently hygienic for use. Some participants mentioned the example of the popularised Japanese high-tech toilets to clean everything'. This is again a user-centred design approach that does not consider or allow the presence of non-human spaces. In response, this *Design Scenario* features a toilet design that at first glance, appears to meet all desires of toilet users: a clean and a spotless environment to relieve themselves. Composting toilets are more often distrusted and perceived as dirty. The standards to be considered hygienic are high. In response, the interior of the toilet space is clad and decorated from top to bottom with white tiles and equipped with a glossy white toilet bowl, and equipped with multiple taps and controls to clean the toilet bowl and every corner of the space.

P3:

How many are needed will also depend on how hard we can convince visitors, the people on the terrace, to use them.

P1:

If they look really hygienic and are cleaned and so on, that's the intention, of course, that as many people as possible use the dry ones.

P2:

It would be cool if they were SO nice and cool that you'd rather go to the composting toilets than use the toilets inside.

(P1, P2, P3, P4: Blikfabriek Experts 2024)

P1:

This one I see it more as an informative design than a provocative one. I mean, for me, it's more like, to show to the general public that actually there's this whole system behind a simple toilet that we use every day, and that we need to make them aware that it's like this huge infrastructure and that water goes somewhere. And it brings out more the attention, as a first step.

P2:

What I like in particular about this design is that it creates awareness on 'why we need to change' or why a shift in mindsets is needed, whereas in the other ones that is not so obvious. And I think creating awareness or giving a reason to people why they need to change actually gives them a motivation to be uncomfortable and to do it.



Fig. 96: Architectural model of the Wasteful Toilet as a Sterile Environment, located in the corner of the composting area, isolated from the composting toilets.

with a feeling of control. The design can be considered a comfortable toilet in the sense that it meets contemporary expectations on cleanliness, but it also challenges users by communicating their water consumption to the toilets around the central water buffer. Whereas using a toilet is habitually an individual activity, allowing for a 'flush-and-forget' attitude, the water consumption of one user is now communicated collectively to other toilets and users depending on the same water source. Although all toilets use rainwater from the same tank to some extent, this toilet is by far the most wasteful, as it uses water for flushing the toilet, washing hands, and cleaning of the toilet space.

According to these participants, the user-centred expectation of toilet spaces is that they should be sterile environments, free from any form of bacterial contamination. As also mentioned by design futurist Reon Brand (2019), humans are the only creatures who choose to surround themselves with dead materials and things. The Oxford Languages Dictionary defines sterile as 'free from any living micro-organisms'. While the *Design Scenario* may appear a sterile space, it should be noted that rainwater will always contain micro-organisms, when considered from a non-human perspective. The decision to use rainwater for flushing can cause a toilet bowl to turn brown, yellow, or green over time by a buildup of minerals like iron, urine residue, or bacteria in the water (Villeroy & Boch 2024). In *The Wasteful Toilet as a Sterile Environment*, the choice for rainwater is a deliberate design decision, as the toilet bowl will require frequent cleaning and scrubbing to be considered sufficiently hygienic. While in other toilets, the coloured residue can be seen as an annoying side-effect, this *Design Scenario* deliberately requires more engagement and repetitive cleaning to continuously remove all traces of bacteria and other micro-organisms. Only through thorough and continuous cleaning over time will the toilet be considered hygienic enough for visitors of the site to use it. As a result, time becomes a tangible and visible aspect of the design in the form of residue building up inside the toilet bowl. This means that the toilet space will not remain spotless if it is not sufficiently cared for by cleaning practices. For the team of the Blikfabriek, this will result in a genuine engagement and commitment to toilet maintenance.

In the conventional flushing toilet system, we are used to toilets being primarily functional spaces, where flushing is supported by a connection to the water network. In Flanders, most urban regions even use drinking water for the purpose of flushing toilets (Vanoppen and Verlinden 2021). In this wide-spread system, toilets mainly stand out when they are out of order or not functional. Conversely, in this *Design Scenario*, the relation to water supply is different as the toilets depend on a finite rainwater buffer for flushing and the availability of rainwater is therefore seasonal. The inclusion of season-dependency in a design, to treat rainwater as a scarce resource, was also part of *Design Exploration II*, where the functionality of toilets depended on the availability of rainwater, and the needs of a wetland were prioritised. In terms of priority in this *Design Scenario*, the toilet will be unusable and unable to flush in times of little availability of rainwater, since priority will be given to washing hands in the other toilets. As this toilet is the most

P3:
And I think it
also serves as a paradox, because you mentioned that the space is sterile, but on your way there, there's like compost and waste. So, it's making people question 'Is this really sterile'? And white shows the dirt very easily. So, I think it's also like an open topic or open question to make people wonder what is dirty and to what extent they can live in a clean space.

P4:
I think
also using the right material is important. I mean, there's other ways to create a very sterile feeling. Because if it's a white floor and I see footsteps all over the floor, I find that more annoying. Also, due to some experiences of living with roommates and stuff. But if the floor is dark, like, I don't mind it the same. As long as it looks clean, it is clean.

P5:
I also
think in terms of the statement that 'collective ownership can lead to passivity and not activate people', I think this is a realistic risk because we do tend to look at things from a very positive mindset and we tend to say that everyone will use it and things like that. For example, for this project, I think, it would be easier to activate people because it is kind of more passive and more about the collection of water and how that process functions, let's say behind the scenes, not, having people put on the spot, whereas this one really puts people on the spot, which is also an interesting outlook to engage people. They are a bit 'forced to' change.

with a feeling of control. The design can be considered a toilet in the sense that it meets contemporary expectations, but it also challenges users by communicating a new assumption to the toilets around the central water buffer. This toilet is habitually an individual activity, allowing for a different attitude, the water consumption of one user is not directly related to other toilets and users depending on the availability of rainwater. Although all toilets use rainwater from the same tank, this toilet is by far the most wasteful, as it uses water for flushing, toilet, washing hands, and cleaning of the toilet space.

According to these participants, the user-centred design of the toilet spaces is that they should be sterile environments to avoid bacterial contamination. As also mentioned by Brand (2019), humans are the only creatures who surround themselves with dead materials and things. The Cambridge Dictionary defines sterile as ‘free from any living organisms’. While the *Design Scenario* may appear a sterile space, the reality is that rainwater will always contain micro-organisms from a non-human perspective. The decision to use rainwater for flushing can cause a toilet bowl to turn brown, yellow, or develop a buildup of minerals like iron, urine residue, or bacteria (Villeroy & Boch 2024). In *The Wasteful Toilet as a Design Scenario*, the choice for rainwater is a deliberate design decision that will require frequent cleaning and scrubbing to be considered hygienic. While in other toilets, the coloured residue is an annoying side-effect, this *Design Scenario* deliberately engages users with engagement and repetitive cleaning to continuous maintenance. Only through continuous cleaning over time will the toilet be considered clean for visitors of the site to use it. As a result, time becomes a visible aspect of the design in the form of residue on the toilet bowl. This means that the toilet space will not be clean if it is not sufficiently cared for by cleaning practices. At Blikfabriek, this will result in a genuine engagement with toilet maintenance.

In the conventional flushing toilet system, we are used to being primarily functional spaces, where flushing is directly connected to the water network. In Flanders, most people do not use drinking water for the purpose of flushing toilets (Vanderlinden 2021). In this wide-spread system, toilets are often not functional when they are out of order or not functional. Contrary to the *Design Scenario*, the relation to water supply is different as it is based on a finite rainwater buffer for flushing and the availability of rainwater is therefore seasonal. The inclusion of season-dependent rainwater treatment as a scarce resource, was also part of the *Design Scenario II*, where the functionality of toilets depended on the availability of rainwater, and the needs of a wetland were prioritized. In this *Design Scenario*, the toilet will be used to flush in times of little availability of rainwater, similar to washing hands in the other toilets. As this

P1:
Yes, and what
I like, is that there is just
one wasteful toilet because
then maybe you go and it's already
taken. But that kind of brings you to
the next point of like, 'having to try'. I
would be like, okay, then I will try one of
the other options at least. And maybe
that helps? Like to get some people to
try them. Or maybe there is a big line
next to the composting heaps, and
they have to just stand there
and wait until it's free
(laughs).

P3:
I think this one
is more comfortable
than the one way closer to
the waste. I think this one is at
a kind of point that most people
would go to it. And I mean, maybe
it's the 'stages thing', like once or
twice they can use this one, and
then they can be like, 'oh, I
can take the next step and
go to the other.'

(P1, P2, P3, P4, P5: Students in Master Design
Studio Sanitopia 2025)



Fig. 97: Architectural model of the *Wasteful Toilet as a Sterile Environment*, located in the corner of the composting area, isolated from the composting toilets.

wasteful in terms of water usage, it will therefore only be functional when there is sufficient water in stock. At times when this toilet were to be closed, as the only flushing toilet in the pavilion, the other composting toilets remain available.

Altogether, *The Wasteful Toilet as a Sterile Environment* presents one design strategy to shift mindsets by architectural design. In discussing the *Design Scenario*, I am critical of whether a genuine shift in mindsets can be achieved by shaping spatial practices that merely expose or demonstrate the unsustainability of the conventional flushing toilet system. As noted earlier by Freya Mathews, “one might give intellectual assent to such alternatives, but as long as one continues to engage in one’s original form of praxis, or the forms of praxis that have shaped the normative status quo of one’s society, one will not achieve any real or lasting normative reorientation or rearrangement of one’s identity” (2019: 581). A significant change in societal values – and, with that, in our environmental relationships – can only be achieved through a change in praxis, she argues. This toilet design is considered more realistic and easier to implement in real life, as it remains close to the status quo. The question remains as to whether it will effectively generate new ecological values and change beliefs or ideals, resulting in long-term cultural change. This concern closely relates to the question raised in the chapter on *Design Exploration II*, regarding how far a new system should break with the ordinary to move beyond incremental updates or optimisations of existing infrastructures. Since the *Design Scenario*, depending on a flushing toilet, strongly resembles and depends on the conventional system, I expect it to be accessible to many users due to its recognisability. In terms of its agency to make an entirely new system imaginable and conceivable, however, it should also sufficiently break with the familiar system. As such, *The Wasteful Toilet as a Sterile Environment* can be seen as a first step to shifting mindsets on human bodily waste, by exposing and fostering awareness on the sustainability issues that surround the current flushing toilet system.

Fig. 98: Detail of the compost heaps behind the composting toilets at the Blikfabriek.



You pass the large yellow circle in the corner of the central square. It is a circular roof constructed on a scaffolding structure. A sedge field is flourishing in front of it. When getting closer, the ground beneath your feet changes into a permeable path. Beneath it, you see how a muddy liquid is gently flowing in the gutters around the toilet, all the way to the back of the toilets. You decide to take the ramp in front of you, leading towards a door. Once inside, the ramp continues upward and ends at a large cylinder, filled all the way to the top with water. You decide to have a closer look. Suddenly, a buzzing noise is being activated, and you notice how the water level starts to decrease. When the noise stops, the water level remains even. On your right side, you see a sink installed with a very long tab above it, hanging from the ceiling. On your left, you notice the toilet bowl in the corner of the room. You take a seat on the toilet and notice an opening right in front of you, the size of a letterbox. Through the opening, you see the tips of the sedge in front of you, and between them, glimpses of the central square peeking through. Right next to the toilet is a weird rotary knob. You're not sure what to use it for but turn it anyway. When turning the knob, that same buzzing noise appears again, and the water level inside the cylinder starts to lower. In front of you, you see a small stream of water falling onto the sedge field. The entire toilet space begins to fill with the sound of running water. It feels like artificial rain, or the echo of a giant bath being filled. Your mind and body get distracted by the running water. Having used enough water, you turn the knob again, and the water level in the cylinder balances out. Only after you're finished do you notice that the toilet is not a flushing toilet. The walls behind you are, in fact, all filled with sawdust, and through an opening in the wall, you can scoop some out with a small bucket. After pouring sawdust into the toilet, you see a pedal next to the toilet bowl. When gently pressing the pedal with your foot, a flap opens at the bottom of the toilet bowl. The mixture of bodily waste and sawdust falls, upon which the flap closes again. The toilet bowl is now empty and ready for the next visitor. Before leaving the room, you quickly wash your hands at the sink, overlooking the sedge and the central square hidden behind it.

The Toilet as an Architectural Experience in Return focuses on the human reward system as an approach to changing habits by design. It addresses how integrating other activities can transform the toilet visit into a playful experience, influencing users to change their habits. Unlike the previous toilet space, the *Toilet as an Experience in Return* is not a flushing toilet but a composting toilet. The *Design Scenario* is based on composting toilets using sawdust instead of water for flushing, saving a significant amount of water. The central question in designing this toilet is therefore: What can be created from the surplus water that is no

P1: What do you mean with 'a water curtain'? P2: Like a water-fall (laughs)?

P1: And if you want to go, you have to shout: "Is anyone there??" P3: Or stick your head through.

P4: So, the experience toilet is then the conviction to let people know: It's okay, right? That people go there and think next time, I'd like to visit that again?

P1: Imagine if they come back to the 'Blikfabriek' especially for the toilets. P2: Yes, yes! It really needs to be an installation that surprises you, so that it stays with you and you think about it a bit more.

P1: I'm talking about the whole thing, all the toilets together are the installation. I think that's cool, yes. P2: I just had another fantasy about this adventure toilet. Imagine if we created a fake cave in that toilet with water and plants and built it with pieces of the pavement, and that it could become a kind of 'utopian water cave.' That could be really cool, combined with architecture and plants growing through it and such.

P1: That it becomes a kind of wild urban situation. Where water is very present and where things come together, you know? I can see that.

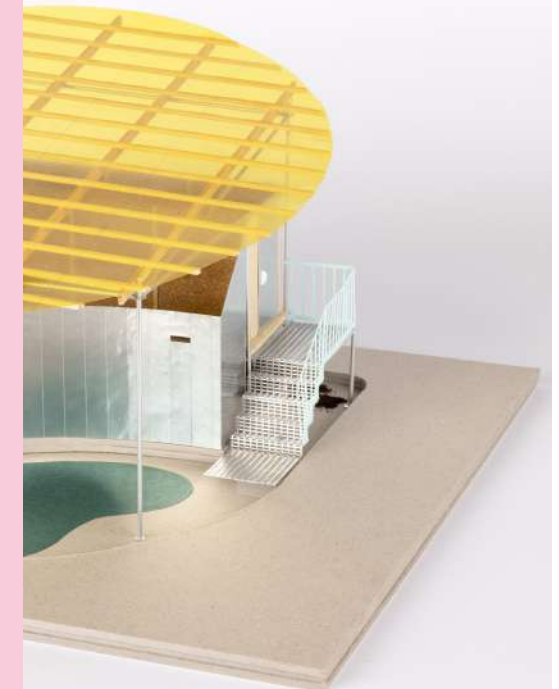


Fig. 99: Architectural model of *The Toilet as an Architectural Experience in Return*, located opposite *The Wasteful Toilet* and facing towards the public square and terrace of the Blikfabriek.

You pass the large yellow circle in the corner square. It is a circular roof constructed on a structure. A sedge field is flourishing in front of it. closer, the ground beneath your feet changes path. Beneath it, you see how a muddy liquid the gutters around the toilet, all the way to the You decide to take the ramp in front of you, I a door. Once inside, the ramp continues up a large cylinder, filled all the way to the top and decide to have a closer look. Suddenly, a buzz activated, and you notice how the water level When the noise stops, the water level remains right side, you see a sink installed with a vertical it, hanging from the ceiling. On your left, you bowl in the corner of the room. You take a seat notice an opening right in front of you, the sink. Through the opening, you see the tips of the sedges you, and between them, glimpses of the central through. Right next to the toilet is a weird room not sure what to use it for but turn it anyway knob, that same buzzing noise appears again. level inside the cylinder starts to lower. In front a small stream of water falling onto the sedge toilet space begins to fill with the sound of rain feels like artificial rain, or the echo of a giant Your mind and body get distracted by the rain used enough water, you turn the knob again, in the cylinder balances out. Only after you've notice that the toilet is not a flushing toilet. I you are, in fact, all filled with sawdust, and then in the wall, you can scoop some out with a spoon pouring sawdust into the toilet, you see a pedestal bowl. When gently pressing the pedal with your opens at the bottom of the toilet bowl. The mass waste and sawdust falls, upon which the flap toilet bowl is now empty and ready for the next leaving the room, you quickly wash your hands looking the sedge and the central square hidden

The Toilet as an Architectural Experience in Return for reward system as an approach to changing habits. It explores how integrating other activities can transform the toilet into a playful experience, influencing users to change the previous toilet space, the *Toilet as an Experience* from a flushing toilet but a composting toilet. The *Design* composting toilets using sawdust instead of water a significant amount of water. The central question of the toilet is therefore: What can be created from the

P2:
I think the
idea you mentioned, that if we don't
use the water for the
toilet, we can do other,
more enjoyable things
with it, is a really
good idea.

P1:
Showing
what we can do
with compost could
also be part of this idea,
right? Like I said with the
green cave, for example,
where plants grow on plant
beds in soil with compost.

P2:
That's also
the thing, it remains a very ugly
white large corner
with walls.

P1:
Banana trees or something like that, they'd
be very happy with
our compost, I
think.

P2:
Yes, I can
imagine a green
zone there too.

P1:
I always think of
a kind of scaffolding-like
structure. That makes it a bit
like a technical laboratory, with
enough compartments to
store compost.

P2:
Maybe we
should do something with 'a jungle
toilet' with plants growing
inside or something. I
also think it will make a lot
of noise if you create this
half-round shape. If you
let a stream of water fall
in there, I think it also
helps when you
'need to go.'

P4:
What would
also be really nice is
to reward people for using
those toilets for six months,
for example by giving
them a bag of compost?

P2:
(laughs)
If you've been
10 times, you get
half a kilo of
compost?



Fig. 99: Architectural model of *The Toilet as an Architectural Experience in Return*, located opposite the public square and terrace of the Blickfabriek.

longer used for flushing? Rather than collecting rainwater to transport human bodily waste, it is deployed to create an architectural experience for users in exchange for them changing their toilet habits. The idea to offer visitors something in return for stepping outside their comfort zone also emerged from the discussions on *Design Exploration I* and *II*. Participants believed that offering a reward would motivate users to try something new and transform the toilet into a surprising and fun experience.

The Blikfabriek team believes that incorporating an element of surprise or even adventure in the composting toilets could help to attract and engage users by design. They suggested combining the toilets with other activities and functions on the central square to make the toilet pavilion more prominent. Rather than searching for the most comfortable toilet option, they aspire to design a composting toilet that people would want to visit for the experience it offers. They believe that, in this way, toilet visitors would change their habits motivated by the prospect of receiving something in return. This design strategy is based on the human pleasure-seeking reward system that makes us psychologically susceptible towards short-termism, which is particularly pertinent when it comes to motivating people to take uncomfortable measures (Gilbert 2006). Driven by an ambition to reposition toilets from comfortable and functional spaces into spaces that hold users accountable for unsustainable toilet habits, this reward system should not be underestimated in the short term.

In terms of moving beyond pure functionality, this *Design Scenario* increases the size and visibility of the toilet space, turning it into a more present and public event on the Blikfabriek's central square. This directly opposes the previous *Wasteful Toilet*, as the toilet space is no longer limited to two square metres, but takes up more space and time. The effect of this composting toilet is prolonged over time, as it provides an architectural experience and involves a process of compost maturation and care for a growing sedge field underneath. Upon entering the toilet space, a gentle slope leads visitors along a curved path to the toilet. There is a tap installed next to the toilet and a small peephole in front of it, providing a view of the square and sedge field. By gently turning the tap, visitors can water and nourish the sedge field growing in front of them. The 'flush' they generate can be heavier or lighter depending on how far the tap is turned and how much rainwater is available over time. As in the previous *Design Scenario*, rainwater is not just present as a commodity but only seasonally available. After turning the tap, the excess of rainwater seeps out to the sides of the toilet pavilion, diluting the compost sludge and rinsing the gutters. This way, the *Toilet as an Architectural Experience in Return* induces an artificial flush from the water buffer, into the sedge field, and evacuates the excess of water to the sewers via a drainpipe in the corner.

As with the previous *Design Scenario*, this toilet design takes the public context and the role of collectivity into account. While water consumption is communicated internally to all toilet spaces via the central water buffer, the design also signals its water consumption to the central square by watering the sedge field as part of the toilet visit.

P4:
That way, it
would be distributed
quickly, of course. In
little bags.

P1:
Yes, like 'Premium
Blik-Compost!' With a clean
design and everything.

P2:
Sold in a
metal bucket.

P4:
You want it to
have a positive image,
don't you?

P1:
Of course.

P2: And
I also find that heating
element interesting, because
that's basically heat that's just
going to waste right now.

P1:
Wow, awe-
some, yes for a
sauna!

P2:
Yes, that
would be cool. Like a
biomeiler made with
horse manure.

P4:
And what
could we use that
hot water for then?

P2:
Heating, of
course! In the
toilets.

P4:
Ah, right,
to heat the toilets
themselves then.

P3:
But if
you sit right
next to the
compost, that
will give off a
lot of heat too,
won't it? If you
sit in between
them like
that.

P2:
Yes, then
you don't need
that.

P1:
I find that feeling
of 'sitting in the compost'
quite powerful. That you are
isolated from the outside
world there.

(P1, P2, P3, P4: Blikfabriek Experts 2024)



Fig. 100: Fragment of *The Toilet as an Architectural Experience in Return*, facing towards the public square and terrace of the Blikfabriek.

longer used for flushing? Rather than collecting raw human bodily waste, it is deployed to create an arena for users in exchange for them changing their toilet habits. To offer visitors something in return for stepping out of the zone also emerged from the discussions on *Design Scenario*. Participants believed that offering a reward would encourage them to try something new and transform the toilet into a new experience.

The Blikfabriek team believes that incorporating surprise or even adventure in the composting toilets could engage users by design. They suggested combining other activities and functions on the central square pavilion more prominent. Rather than searching for a toilet option, they aspire to design a composting toilet that would want to visit for the experience it offers. This way, toilet visitors would change their habits motivated by receiving something in return. This design strategy is a human pleasure-seeking reward system that makes users more susceptible towards short-termism, which is particularly effective when it comes to motivating people to take uncomfortable actions (Kahneman et al. 2006). Driven by an ambition to reposition toilets as functional spaces into spaces that hold users accountable for their toilet habits, this reward system should not be seen in short term.

In terms of moving beyond pure functionality, the design increases the size and visibility of the toilet space, making it more present and public event on the Blikfabriek. This directly opposes the previous *Wasteful Toilet*, which was no longer limited to two square metres, but takes up more time. The effect of this composting toilet is prolonged, as it provides an architectural experience and involves the user in post maturation and care for a growing sedge field. By entering the toilet space, a gentle slope leads visitors along a path to the toilet. There is a tap installed next to the toilet peephole in front of it, providing a view of the square. By gently turning the tap, visitors can water and nurture the growing in front of them. The 'flush' they generate is a lighter depending on how far the tap is turned and how long it is available over time. As in the previous *Design Scenario*, the toilet is just present as a commodity but only seasonally available. When the tap, the excess of rainwater seeps out to the square, diluting the compost sludge and rinsing the green. *Toilet as an Architectural Experience in Return* induces a cycle: from the water buffer, into the sedge field, and eventually from the sedge field, water to the sewers via a drainpipe in the corner.

As with the previous *Design Scenario*, this toilet is designed for a public context and the role of collectivity into accounting for consumption is communicated internally to all toilet visitors. In the central water buffer, the design also signals its watery nature to the central square by watering the sedge field as part of the

P1:
You should also consider that, let's suppose a child leaves the tap running, or a child turns on the tap, and the buffer just runs completely empty. Just for fun.

P2:
It's risky. What if someone makes a mistake.

P1:
Or if they sabotage it.

P2:
We've had that happen before, years ago, with some teenagers throwing cigarettes into the compost. The whole compost was smoking, and I could smell it from far away... (laughs) So, things like that do happen. That's how it goes in public spaces...

P2:
What we could do is pour a bit of soil here at the edge, so that sedge plants start to grow to keep the water in place.

P1:
I would plant something there anyway. We can start that process ourselves. A coffee bag with some soil in it, so that everything stays together. Or even just sowing grass? Something we don't have complete control over.

P2:
Yes, a wild corner in front of a sleek design.

P1:
That's cool, right?
P2:
Some wild growth will look good there....

(P1, P2: Blikfabriek Experts 2025)



Fig. 100: Fragment of *The Toilet as an Architectural Experience in Return*, facing towards the public square and terrace of the Blikfabriek.

This 'general flush' of its surroundings will be sense-able and present outside of the toilet space, and of influence on nearby activities. While the toilet space creates an intimate experience in the interior, overlooking the square from a peephole in the wall, it is much more present in its effect on the outside. This deliberate design strategy intends to attract attention to the toilet pavilion by confronting visitors and inviting them to engage with the design. As such, the *Design Scenario* expands the visit to the toilet to the exterior and audience at the Blikfabriek, creating a tangible experience that highlights and celebrates rainwater.

While the toilet design is primarily intended to meet user-centred needs, using excess of rainwater to create an architectural experience from a non-human perspective, it involves nurturing a sedge field that is growing underneath. Sedge is a species that can be found throughout the whole Blikfabriek site, both in the Blikvelden and in plant boxes on paved surfaces. As sedge requires a lot of water, the design collects rainwater to nourish the field sufficiently, treating it as a valuable nutrient. The toilet space, therefore, treats rainwater as a scarce resource that should not be wasted. The sedge field is even prioritised for watering over the *Wasteful Toilet*, which is closed during periods of water scarcity. This way, *The Toilet as an Architectural Experience in Return* adopts a responsive attitude towards the needs of its direct environment and surroundings. In terms of responsiveness, the *Design Scenario* also addresses contemporary issues relating to water storage and sewer overflows. Current rainwater management regulations in Flanders state that anyone who builds or paves must take measures to store water, allow it to infiltrate into the soil, or flow slowly into the sewer system (Flemish Government n.d.). Unlike the investigation into the Blikvelden as part of *Design Exploration II*, it is not possible to infiltrate the water directly into the soil here, since the toilet pavilion is built on a densely paved industrial surface. Rather, the design temporarily buffers the rainwater, slowing its movement and creating a delayed discharge into the sewer, much like a wadi system. As such, it addresses the challenges relating to excessive paving and increased flooding set out in the introduction, making a valuable contribution to contemporary urban issues.

Going back to the design discussions, participants frequently referred to creating an interactive or even playful toilet design with activities that appeal specifically to children. The topic of 'potty training' repeatedly emerged as a reference point when addressing the research's key ambition: to change toilet habits through design. From these recurring associations, I observed that shifting toilet habits and practices is, within on-site mindsets, still largely perceived as a concern limited to the education of children. In contrast, I direct this research primarily at the generations above children, who are arguably more in need of being re-potty trained in their toilet habits, having fully adopted and internalised a 'flush-and-forget' attitude in terms of accountability for their human bodily waste. It is this group that plays a crucial role in transmitting toilet habits to future generations, thereby perpetuating established ways of relating to bodily excretions. In observing the tension and discomfort that arose in the design discussions when it became clear that users would have to abandon their comfortable toilet habits,

P1:
A design can
be provocative as well,
but I think then it's some-
thing that like an average per-
son wouldn't use. But, if it has like
this surprising element, this element
of newness or like this imaginative
feeling. Then I mean, it's remembered
more easily and then it stays in your
mind and then you can like think about
the actual concept and the meaning
of the whole thing afterwards. So,
it needs to have, I don't know,
not necessarily provocative
but like a really striking
element in it.

P3:
Yeah, I think
a toilet should be fun.
Because if you look from an-
other point of view, I have friends
who study medicine and they
explained to me, like, how important
it is that you can relax while you go to
the toilet because a lot of people 'do
it' wrong. And I think if it's fun, you're
automatically more relaxed. Or if
you just look at your environ-
ment then you stop thinking
about actually 'going
to the toilet.'

P3:
I think this de-
sign is a different ex-
perience. So, it might be
a bit uncomfortable at first,
but where else could you try
this? It's a new environment
and a new experience. If
someone is open to it,
it can be a fun.

P2:
Yes,
because you,
you mentioned this
'experience toilet'
and the rainfall and
perhaps plants, which,
I wouldn't say is really
provocative, but it's
imaginative.

P4:
I think
that the fact that
'architectural design
should be imaginative'
really connects to the fun
aspect because I think that
many people are stuck in
these habits. And in order for
them to, like, do something a
bit more uncomfortable, the
toilet should be an event
which is easy, which is fun,
which is encouraging
them to do something
different than what
they are used
to.

P1:
I think it should be
fun. Nobody likes to go to
this type of toilet other-
wise.



1: Fragment of the gutters going around *The Toilet as an Architectural Experience in Return* and leading into the sewers behind the pavilion.

This ‘general flush’ of its surroundings will be sent outside of the toilet space, and of influence on the toilet space creates an intimate experience in turning the square from a peephole in the wall, it is more its effect on the outside. This deliberate design strategy draws attention to the toilet pavilion by confronting visitors to engage with the design. As such, the *Design Scenario* leads from the toilet to the exterior and audience at the Blickfabriek, a tangible experience that highlights and celebrates the toilet.

While the toilet design is primarily intended to address the needs, using excess of rainwater to create an archipelago from a non-human perspective, it involves nurturing the sedge field growing underneath. Sedge is a species that can grow on the whole Blickfabriek site, both in the Blickvelden and on the paved surfaces. As sedge requires a lot of water, the design uses water to nourish the field sufficiently, treating it as a resource. The toilet space, therefore, treats rainwater as a resource that should not be wasted. The sedge field is even prior to the *Wasteful Toilet*, which is closed during peak city. This way, *The Toilet as an Architectural Experience* is a responsive attitude towards the needs of its direct surroundings. In terms of responsiveness, the *Design Scenario* addresses contemporary issues relating to water flows. Current rainwater management regulations require anyone who builds or paves must take measures to ensure water to infiltrate into the soil, or flow slowly into the sewer (Government n.d.). Unlike the investigation into the *Design Exploration II*, it is not possible to infiltrate into the soil here, since the toilet pavilion is built on an industrial surface. Rather, the design temporarily slows down its movement and creating a delayed discharge, much like a wadi system. As such, it addresses the issue of excessive paving and increased flooding set out in the *Design Scenario*, making a valuable contribution to contemporary urban design.

Going back to the design discussions, participants referred to creating an interactive or even playful environment that appeal specifically to children. The topic of play repeatedly emerged as a reference point when addressing the key ambition: to change toilet habits through design. During the design discussions, I observed that shifting toilet habits within on-site mindsets, still largely perceived as a challenge, is the education of children. In contrast, I direct this to the generations above children, who are arguably more re-potty trained in their toilet habits, having fully internalised a ‘flush-and-forget’ attitude in terms of accounting for human bodily waste. It is this group that plays a crucial role in passing on toilet habits to future generations, thereby perpetuating the cycle of relating to bodily excretions. In observing the effort that arose in the design discussions when it became clear that they would have to abandon their comfortable toilet habits

P5:
Yes, I agree. I think it's almost the only way. When you make it an experience, people are more likely to participate.

P1:
Also, what is often considered dirty is when you hear the flushing, you hear the splashing, but in this composting toilet, you actually don't hear all of this...

P5:
I think especially when you mentioned 'the big flush' that's sometimes children would find super cool.

P2:
Yes, this for sure would be something that children would use.

(P1, P2, P3, P4, P5: Students in Master Design Studio Sanitopia 2025)

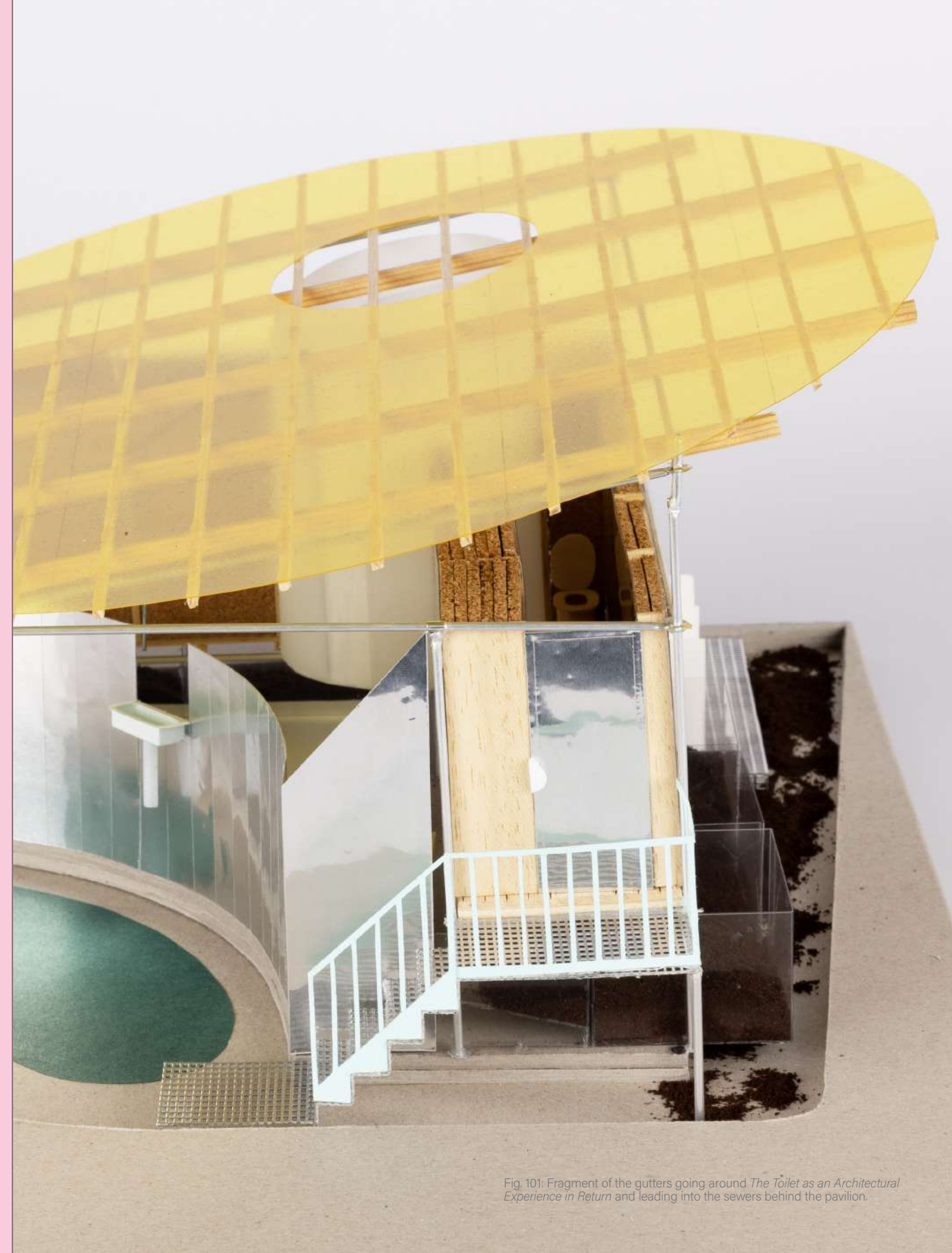


Fig. 101: Fragment of the gutters going around *The Toilet as an Architectural Experience in Return* and leading into the sewers behind the pavilion.

I noticed a deviation in focus toward another group in society: children. Aside from the tactic of postponing potentially uncomfortable changes in habits to a distant future, directing the focus to another group also appeared to function as a way for participants to engage with, and render imaginable, an otherwise uncomfortable design proposal. Over three *Design Explorations*, I have, therefore, created *Design Scenarios* intended to become imaginable to individuals who are heavily reliant on the familiar flushing toilet system. This is in anticipation of a future in which reliance on this system may no longer be possible.

In the search for a shift in mindsets through architectural design, the concept of imagination proves highly important, as it constitutes the first step in a process of habitual change through design. Whereas *Design Explorations I* and *II* advanced from making toilet designs discussible, imaginable, and considerable, *Design Exploration III* moves to a real-life scale by rendering the toilet design realisable for the site of the Blikfabriek. In this real-world investigation into designing a full-scale composting toilet, the key question remains the critical distance between the proposed speculative design and the existing system. While a new design that remains close to the existing one will not stimulate the imagination of an entirely new system, a speculative design that deviates too much from the existing one will not be considered recognisable enough to be realised and implemented as functioning public toilets in a semi-public context. A critical distance from the existing system is, therefore, necessary if the toilet is to be repositioned as a playful architectural experience that holds users accountable for their waste.

Although *The Toilet as an Architectural Experience in Return* is composed from an intention to create an architectural experience centred on users, it also impacts its surroundings by introducing a spatial practice of feeding a growing sedge field. In doing so, it enhances relationality toward non-human species and performs care for the nearby environment of the toilet pavilion. From this position of responsiveness to the needs of the sedge field, the *Design Scenario* generates new ecological-spatial values that emerge through cohabitation with composting matter in an urban and semi-public context. With this *Design Scenario*, I seek to change toilet habits not solely through a reward in return, but also by promoting engagement in the care for the sedge field, shaping new values, and thereby attempting to convey an underlying ideology.



Fig. 102: Detail of the compost heaps behind the composting toilets at the Blikfabriek.

You're following a gutter, going around the yellow circle in the central square. It seems to be transporting the mud-like liquid flowing beneath it. On both sides of the circular roof, there is a small staircase leading to a level about one meter above the ground. You take the stairs and can't avoid the giant heaps of brown composting matter piled up to the left. It smells like a warm and earthy mixture. At the top, you bump up to a door between two thick walls. The walls are transparent and are filled from bottom to top with sawdust. Inside the toilet space, it is warm and cosy. The space is almost completely constructed from wood and cabinets filled with sawdust. At the end of the room, you notice a sink to your right, a toilet bowl to your left, and a large cylindrical tank in front of you. The tank is filled with water. When taking a seat next to the cylinder, you notice that the toilet is slightly heated. It's a nice feeling on your bare bum. Warmed and isolated from the noises outside, you're at ease. Once finished, you take a small bucket of sawdust through the opening in the wall and pour it into the toilet. In doing so, you notice a pedal next to the toilet bowl. By gently pressing it with your foot, a flap opens at the bottom of the toilet bowl. The mixture of your bodily waste and sawdust falls, upon which the flap closes again. The toilet bowl is now empty and ready for the next visitor. Before leaving the room, you wash your hands at the sink and notice a buzzing noise being activated when turning the tap. On your left, you see how the water level inside the cylinder decreases as you're using more water. When turning off the tap, the water level remains even. Curious about where your waste went, you head downstairs again. Beneath the toilet area, you find a series of bins where a huge amount of bodily waste and sawdust is collected, maturing into compost. The mass sits there in various stages of slow decomposition, gradually breaking down and shrinking over time.

The design of *The Toilet as Part of an Ecosystem* is created in response to the question of how showcasing a composting process and its benefits could encourage users to engage in its management and facilitate collective learning. It concerns the third and last advanced design strategy as part of *Design Exploration III*, refined from intermediate design strategies. As a last *Design Scenario*, it emphasises the relationship between humans, their bodily excretions, and the wider living environment. By retaining human bodily waste in proximity to the bodies of toilet users and making the composting process visible, the design encourages active participation in soil care and fosters collective learning. Similar to *The Wasteful Toilet* approach, participants believed that information and awareness could trigger a shift in mindset, including educating users about the value of composting. Whereas *The Wasteful Toilet* aims to encourage people to change their toilet habits by revealing the unsustainability of flushing toilets, this toilet design intends to influence users by

P1:
What's also a
big problem with the
composting toilets today is
the 'sludge' that seeps out of the
compost. It would be interest-
ing to think about where it
could flow to.

P2:
Indeed, the
sludge is quite unpleasant.
I think that's really the reason
why no one wants to use
them anymore.

P3:
Yeah...

P4:
That's true,
it looks very un-
pleasant, but it's
not at all dirty
actually.

P2:
Yes, I
don't think
so. It's just
moisture.

P4:
Mud or
something?

P2:
Yes, because
if there's compost or
sawdust on the ground, it
becomes mud in the
rain.

P1:
Actually,
it's super con-
centrated.

P2:
You can see
that when there are
worms in it, they die imme-
diately in the mud. When the
sludge runs out and I scoop it
up, and there's a worm next
to it, it's immediately
paralysed.

P4:
I think that
for some people
it's the smell, be-
cause when we've
just turned over the
pile, it's really
disgusting.

P2:
Yes, but if more
sawdust and straw would be
added, it would be fine. Now a lot
of green waste has been thrown on
top again in a very short time.
So, it's not nice.

P1: Maybe
something should be on the floor,
a heightened path or something, to step
over the sludge?



The Toilet as Part of an Ecosystem

You're following a gutter, going around the y central square. It seems to be transporting th flowing beneath it. On both sides of the circu a small staircase leading to a level about one ground. You take the stairs and can't avoid ti brown composting matter piled up to the left warm and earthy mixture. At the top, you bu tween two thick walls. The walls are transpa from bottom to top with sawdust. Inside the it is warm and cosy. The space is almost con from wood and cabinets filled with sawdust. room, you notice a sink to your right, a toilet and a large cylindrical tank in front of you. T with water. When taking a seat next to the cy that the toilet is slightly heated. It's a nice fee bum. Warmed and isolated from the noises c ease. Once finished, you take a small bucket the opening in the wall and pour it into the t you notice a pedal next to the toilet bowl. By with your foot, a flap opens at the bottom of mixture of your bodily waste and sawdust fa flap closes again. The toilet bowl is now emp next visitor. Before leaving the room, you wa the sink and notice a buzzing noise being act ing the tap. On your left, you see how the wa cylinder decreases as you're using more wat the tap, the water level remains even. Curious waste went, you head downstairs again. Ben you find a series of bins where a huge amoun and sawdust is collected, maturing into com there in various stages of slow decompositio ing down and shrinking over time.

The design of *The Toilet as Part of an Ecosystem* is to the question of how showcasing a composting j could encourage users to engage in its managemen tive learning. It concerns the third and last advance part of *Design Exploration III*, refined from interm egies. As a last *Design Scenario*, it emphasises the re humans, their bodily excretions, and the wider livi. By retaining human bodily waste in proximity to t users and making the composting process visible, t active participation in soil care and fosters collecti to *The Wasteful Toilet* approach, participants belie and awareness could trigger a shift in mindset, inc about the value of composting. Whereas *The Was* courage people to change their toilet habits by rev ability of flushing toilets, this toilet design intends

- P1: I think the biggest challenge is how we're going to do that, because when you arrive here with containers full of food waste, which are heavy, and then you empty them there (points), it's already a challenge to get that onto the pile with just one person.
- P2: Oh, is that what you do?
- P1: Yes.
- P2: Hmmm.
- P1: A slope that goes up in two stages, so you don't have to climb too steep, would also be pleasant to drive up with a wheelbarrow. So, the technical area could definitely also be upstairs if it's not too steep.
- P2: We're also working with volunteers at the moment. If the toilets would look 'good', we could really organise volunteer activities, to use the compost but also to turn it over and so on...
- P2: What I find most problematic about this design proposal is actually the logistics. How are we going to fill things up with sawdust, empty and move the bins, etc.? I can't really see where we're going with the wheelbarrow, or how we're going to get up so high, for example.
- P3: What I do now is, I just dump the food waste on the ground and sprinkle all the coffee peels over it so that it's already mixed before I shovel it into the compost heap.
- P1: Yes.
- P2: Hmmm.
- P3: That could also add a bit of a show element.
- P1: Yes, it could easily become a machine.



Fig. 103: Architectural model of the *Toilet as Part of an Ecosystem*, located on both sides of *The Wasteful Toilet* and displaying the open compost bins.

demonstrating the benefits of the composting toilet system, emphasising the connection between human bodily waste, soil, and nature. Given that a shift in mindsets remains personal and subjective to individuals, this design requires a certain openness in perspective to be used and appreciated as public toilets in an urban context.

According to participants in the design discussions, many people are still unaware of the advantages of composting, or even of the existence of composting toilets more generally. In response, they suggested visibly exposing the composting process and integrating it prominently into the design. They believe this could offer users a sense of genuine contribution to the environment or to something larger than themselves, simply by using a toilet and relieving themselves. In this way, they anticipated that users might change their toilet habits from a genuine intention to care for and repair the surrounding natural environment. The Blikfabriek team, however, remains doubtful whether this approach would resonate with all visitors within the diverse audience of their site. In consideration of this concern, they initially opted to conceal the composting bins safely from public sight at the back of the current composting toilet design. Providing composting toilets still aligns with their key ideological vision: to manage the site and its operations in the most sustainable and self-sufficient way possible. Above all, the team prioritises the facilities' functionality as accessible public toilets for a wide and diverse audience. While they agree that collective learning is essential to shift mindsets, the *Design Scenario* triggered friction as it openly displays the compost heaps. Especially when matter such as faeces or toilet paper is visible, the team believes this could be too shocking or repulsive to some users, hindering use of the toilets.

Inspired by these discussions, *The Toilet as Part of an Ecosystem* is guided by the intention to make all stages of the composting process visible – from receiving and storing to processing, maturing, and harvesting compost – rather than hiding the process at the back. In this way, it aims to raise awareness by rendering both the composting process and the toilets present on the central square of the Blikfabriek. In its interior, the composting toilet creates an experience of relieving oneself while being surrounded by living, decomposing matter, as the walls are stacked with sawdust and human bodily waste is kept close to the body, directly beneath the toilet space and visible from the outside. Human bodily waste here mixes with sawdust, which is rich in carbon and gradually absorbs the nitrogen from users' bodily waste. The design also allows the toilet seat to be gently warmed by the bodily waste of other users decomposing and producing warmth below. In this process of 'thermophilic' composting, heat-loving bacteria and fungi develop within the compost heap to break down matter and destroy organisms and pathogens potentially harmful to human health (Jenkins 2019). As such, the toilet space connects users' bodies to the bodily waste they and others leave behind, and to the warm compost piling up and transforming underneath. The composting process itself is given ample space and time within the design, enabling the matter to mature gradually into rich and fertile compost. This unfolds over a period of at least six months, where composting bins are filled, then moved aside to rest, until the compost

P1:

Yes, a compost zone where you go once a month. That's also a matter of planning. And those are huge volumes, when you see them. You can't just scoop that up or anything. Now, you can easily turn over the first half metre, but you can't get any further than that half metre. It's physically impossible.

P2:

It is true that we have far too much food waste from the kitchen and can no longer keep up. It is mainly the fact that we do not have enough space to store that much... We recently received a large number of straw bales, which we can process, but the volume is too large. So, we

don't have enough space

P1:

to stack it all up. And in which material do you see that? The compost compartment?

P2:

Are those glass walls? Because that would be really cool!

P1:

I would prefer it if we use a combination of recycled materials that we have or can find second-hand and combine that with what is needed structurally. I wouldn't want to build something completely new with new materials and plastics and such. That seems a bit at odds with our way of working...

(P1, P2, P3, P4: Blikfabriek Experts 2024)

104: Architectural model of the *Toilet as Part of an Ecosystem*, located on sides of *The Wasteful Toilet* and displaying the open compost bins.



demonstrating the benefits of the composting toilet, the connection between human bodily waste, soil, and that a shift in mindsets remains personal and subjective. This design requires a certain openness in perspective, which is appreciated as public toilets in an urban context.

According to participants in the design discussions, many are still unaware of the advantages of composting, or the existence of composting toilets more generally. In response, the design visibly exposes the composting process and integrates it into the design. They believe this could offer users a contribution to the environment or to something larger than themselves, simply by using a toilet and relieving themselves. The anticipated that users might change their toilet habits, but the intention to care for and repair the surrounding environment. The Blikfabriek team, however, remains doubtful that this would resonate with all visitors within the diverse site. In consideration of this concern, they initially designed the composting bins safely from public sight at the back of the composting toilet design. Providing composting toilets with a key ideological vision: to manage the site and its environment in a sustainable and self-sufficient way possible. Above all, it emphasises the facilities' functionality as accessible public facilities for a diverse audience. While they agree that collective action can shift mindsets, the *Design Scenario* triggered friction between the compost heaps. Especially when matter such as waste is visible, the team believes this could be too shocking for some users, hindering use of the toilets.

Inspired by these discussions, *The Toilet as Part of an Ecosystem* is guided by the intention to make all stages of the composting process visible – from receiving and storing to processing, maturing the compost – rather than hiding the process at the back of the building to raise awareness by rendering both the composting process and toilets present on the central square of the Blikfabriek. The composting toilet creates an experience of relieving oneself surrounded by living, decomposing matter, as the human waste mixes with sawdust, which is rich in carbon and nitrogen from users' bodily waste. The design intends the toilet seat to be gently warmed by the bodily waste of composting and producing warmth below. In this process of composting, heat-loving bacteria and fungi develop in the post heap to break down matter and destroy organically potentially harmful to human health (Jenkins 2019). The space connects users' bodies to the bodily waste that is behind, and to the warm compost piling up and transforming underneath. The composting process itself is given ample space within the design, enabling the matter to mature and become fertile compost. This unfolds over a period of at least six weeks. When the composting bins are filled, they are moved aside to reveal the compost heap.

P1:
But what if
the compost containers
behind start to leak,
and the sludge flows
to the front...

P2:
With a slope, it won't
flow forward, will it?

P3:
We just
have to make
sure that we
still invite people
to come closer,
of course.

P1:
And, urine and
faeces will come
together in the com-
post heap?

P2:
Yes, otherwise
we would have to in-
stall 'urine separat-
ed-toilets.'

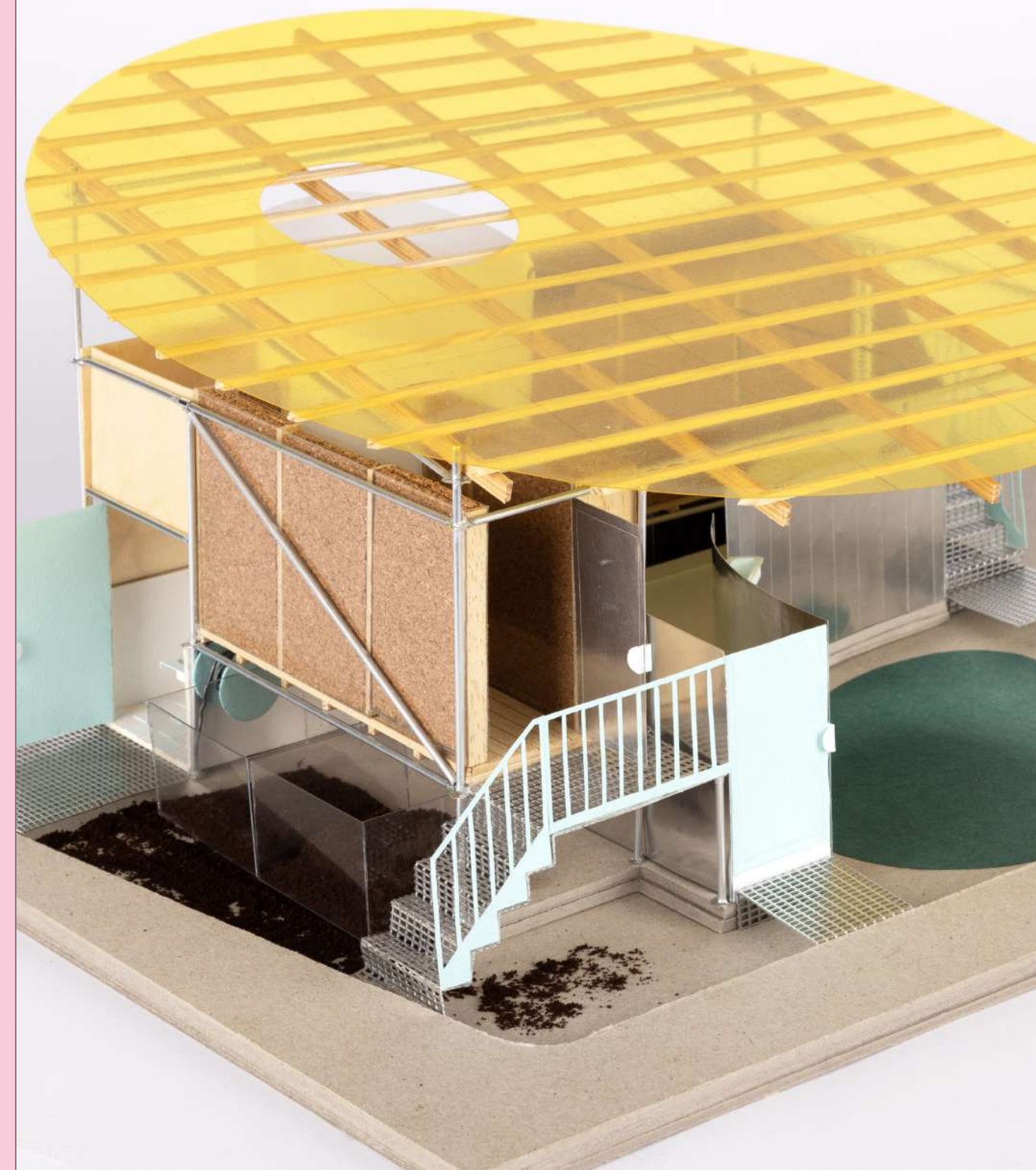
P1:
Yes, but
that's not really an
option anymore, be-
cause children would just
poo in the urine part... Truly
horrible to clean. So we got
rid of that. In this case, it
has to end up together
in the compost
bins.

P1:
The advantage here is
that there's a flap,
so you're not so close
to the ... yeah, the
waste of the person
who came before you.

(P1, P2, P3: Blikfabriek Experts 2025)

P1:
The composting
toilets today don't have the
nicest façade and could be used by
people more often, but then it needs to
be a bit ... not necessarily more aesthetic,
but kind of a different design. Because,
when I went there to ask some people
about their daily routines, they all
told me that they do not
use it.

Fig. 104: Architectural model of the *Toilet as Part of an Ecosystem*, located on both sides of *The Wasteful Toilet* and displaying the open compost bins.



can be harvested in a final stage. As end product, humus – similar to compost – increases the soil’s capacity to absorb and retain water when broken into the earth (Ibid.). Similar to this process of absorption, the design becomes a scenario of carefully holding, observing, and spending time with compost matter in transformation.

While some of the design decisions in this *Design Scenario* may be perceived as difficult or provocative within an urban, semi-public context in Flanders, they may be appreciated quite differently elsewhere. Such a design, for instance, could be more readily accepted in the countryside, within a private home, or in cultural contexts with different habits of dealing with human bodily waste. When composing *The Toilet as Part of an Ecosystem*, I drew inspiration from traditional ecological knowledge (Nelson and Shilling 2021) and from the ethics of care (Fisher and Tronto 1990; Puig de la Bellacasa 2017). This led me to want to raise awareness of our connection to, and coexistence with, bodily waste as living matter. This intention stands in strong contrast to conventional flushing toilets, which are desired to be sterile environments intended to evacuate waste as quickly and invisibly as possible. In response, this design strategy is grounded in the realisation that humans are part of a larger ecosystem, and that our bodily waste, too, participates in that system. It therefore seeks to demonstrate through design the entanglement between users, their bodily excretions, and the natural environment. While inspiration can be drawn from traditional ecological knowledge (Nelson and Shilling 2021), I observed that such knowledge cannot simply be transferred from one cultural context to another. Unlike certain other European contexts – such as Sweden, where a culture of ‘utedass’ [in English: outhouse] exists – in Flanders the presence of composting toilets in urban and semi-public settings remains rare. Dealing with composting toilets in this cultural context is highly specific, even more so within the micro-culture of the Blikfabriek in Antwerp. The design of composting toilet should, therefore, be approached from within this cultural context and the shared ideas, or mindsets, that shape it.

Like in the *Design Scenarios* as part of *Design Exploration II*, where human bodily waste is diluted into water, gradually transforming into something else, also in a composting process, waste transforms over time into rich, fertile compost through the quiet work of microorganisms. Faeces, layered with sawdust, slowly heat up as they decompose, giving off a gentle warmth as the material slowly changes – darkening, softening, and crumbling beneath the touch. What was once discarded as waste becomes a living, nutrient-rich matter, teeming with vitality. In analogy to this process, the maturation of mindsets may likewise require time. Since this research investigates the agency of architect-designers in the search for a shift in mindsets, I argue that architects should not merely respond to prevailing cultural desires by creating user-centred designs. Rather they should also convey ideology and shape new ecological-spatial values through design.

As explained by Crouch and Pearce (2012), the ways in which practices operate on us often become invisible; it is therefore part of the researcher’s task to reveal the ideas, theories, and ideologies that form

P2:
Yeah, yeah, I
have a similar experi-
ence. Even if I went inside
the toilets, people came and told
me that I shouldn’t and that there
are normal toilets over there. So, you
also get the feeling that you’re a weird
person if you use the ‘dirty’ compost-
ing toilets because it can make you
dirty or they don’t want you to
have a dirty visit, so they are
a bit embarrassed and
over it as well.

(P1, P2: Students Master Design
Studio Sanitopia 2025)

P1:
I would
try all three
toilets. Just to
get the feeling
of how it works
and out of
interest.

P2:
I agree. I
mean, I’m excited to
try them in this context,
for sure. But if it were to
be included in my everyday
life, it’s different and I would
take some time to make a
decision.

P1:
I was just thinking of
something. It also just depends on the
mindset of a certain event or context. If you go
to a festival, and there are these plastic toilets, where
at a certain moment everyone’s waste is just all piled
up. But you still ‘have to go’. Or when you’re travelling
with a mobile home, and go to the toilet, it’s also
just in a bucket. And then you have to empty
it. So, I don’t know when it is more
easily accepted?

P3:
Maybe that is be-
cause it’s temporary?

(P1, P2, P3: Students Master Design
Studio Sanitopia 2025)



5: Architectural model of the *Toilet as Part of an Ecosystem*, located on
des of *The Wasteful Toilet* and displaying the open compost bins.

can be harvested in a final stage. As end product, compost – increases the soil's capacity to absorb a broken into the earth (Ibid.). Similar to this process, design becomes a scenario of carefully holding, of time with compost matter in transformation.

While some of the design decisions in this *Design Scenario* may be perceived as difficult or provocative within an urban context in Flanders, they may be appreciated quite differently elsewhere. Such a design, for instance, could be more relevant in the countryside, within a private home, or in cultures with different habits of dealing with human bodily waste. In *The Toilet as Part of an Ecosystem*, I drew inspiration from ecological knowledge (Nelson and Shilling 2021) and from the care (Fisher and Tronto 1990; Puig de la Bellacasa 2017) to want to raise awareness of our connection to, and our responsibility for, human bodily waste as living matter. This intention stands in contrast to conventional flushing toilets, which are designed and implemented intended to evacuate waste as quickly and efficiently as possible. In response, this design strategy is grounded in the understanding that humans are part of a larger ecosystem, and that composting toilets participate in that system. It therefore seeks to design the entanglement between users, their bodily waste, and the natural environment. While inspiration can be drawn from ecological knowledge (Nelson and Shilling 2021), this knowledge cannot simply be transferred from one context to another. Unlike certain other European contexts – where a culture of 'utedass' [in English: outhouse] and the presence of composting toilets in urban and suburban areas remains rare. Dealing with composting toilets in the Netherlands is highly specific, even more so within the micro-culture of Antwerp. The design of composting toilet should therefore be approached from within this cultural context and the mindsets, that shape it.

Like in the *Design Scenarios* as part of *Design Ecology*, human bodily waste is diluted into water, gradually becoming something else, also in a composting process, waste is transformed into rich, fertile compost through the quiet work of microorganisms. Faeces, layered with sawdust, slowly heat up, giving off a gentle warmth as the material slowly decomposes, softening, and crumbling beneath the touch. What was once waste becomes a living, nutrient-rich matter, teeming with life. In analogy to this process, the maturation of mindsets requires time. Since this research investigates the role of designers in the search for a shift in mindsets, I argue that designers should not merely respond to prevailing cultural conventions or user-centred designs. Rather they should also convey and negotiate new ecological-spatial values through design.

As explained by Crouch and Pearce (2012), the practices that operate on us often become invisible; it is the researcher's task to reveal the ideas, theories, and



Fig. 105: Architectural model of the *Toilet as Part of an Ecosystem*, located on both sides of *The Wasteful Toilet* and displaying the open compost bins.

the context for the agency of the designer. In other words, toilets can be turned into focal points that promote and convey ideology by facilitating engagement and collective thinking through design. This goes beyond merely raising awareness and extends toward the creation of new ecological-spatial values. This way, the process of shifting mindsets moves from awareness toward genuine commitment and engagement with human bodily waste, grounded in belief and conviction in the accompanying ideology. Since designers are co-producers of habitats and, consequently, of cultures, it lies within their agency and role to reshape both design and the ideology connected to it. Architectural design can thus take responsibility for exposing and introducing new toilet habits, tied to shifting cultural norms and values. When such spatial habits, shaped through design, are implemented and accepted in public space, the values they embody are likewise disseminated. Over time, this may contribute to cultural change, however gradual. While confrontation with unfamiliar or uncomfortable habits through challenging architectural designs may not immediately be accepted or trigger change, through gradual exposure, architectural design can slowly move toward acceptance and, perhaps eventually, normalisation.



Fig. 106: Access to the composting area behind the composting toilets at the Blikfabriek.

5.5 Finalisation of Design Exploration III: Toilets that Challenge on a Real-life Scale

As in the previous research cycles, the toilet designs that form part of *Design Exploration III* have been introduced and discussed several times within the Blikfabriek case study. Whereas in *Design Exploration I* and *II*, I presented the designs as *Conversation Pieces*, the design proposal in this chapter fits less clearly within that definition. Returning to Chapter 2: *Methodology and Research Design*, I use the term *Conversation Piece* to describe the way in which Research-by-Design artefacts are introduced into a real-world context to challenge prevailing assumptions and perceptions about architectural design – here, focusing on toilets. Rather than presenting ideas linguistically, the models display a variety of toilet scenarios that question current assumptions about what a toilet is or could be. In the context of *Design Exploration III*, however, working towards the realisation of a toilet design at full scale, the models became more akin to realistic preliminary design proposals. This shift marks a significant difference from presenting models as *Conversation Pieces* to convey ideas and initiate discussion, as the design decisions now directly engage with, and even threaten, daily routines and habits on site. Over the course of the research

process, the use of architectural models therefore gradually evolved. It moved from the creation of speculative toilet designs intended to stimulate discussion to the development of an advanced composting toilet design discussed for realisation at the case study site. Because this toilet pavilion now challenges the site at a real-life scale, discussions with the Blikfabriek around the design became more complex.

Stage 1: Design Discussions 2024

The discussions surrounding the new composting toilet design began in September 2024 and developed into a lengthy process spanning six months, involving multiple intermediate proposals. Since the previous experiment with public composting toilets had been deemed unsuccessful due to a lack of use, some organisers believed that architectural intervention could address this issue. Others, however, were more hesitant to reinvest in what they considered an underused and potentially redundant facility. This tension influenced the process and resulted in the construction of the toilet pavilion being postponed several times. One practical reason for these delays was the unpredictability of available funding, as the Blikfabriek relies heavily on external funders to invest in the renovation project and help make it a reality. As I progressed with designing public toilets to be



Fig. 107: Discussion moment with constructors and members of the Blikfabriek team to discuss the renovation of the composting toilets.

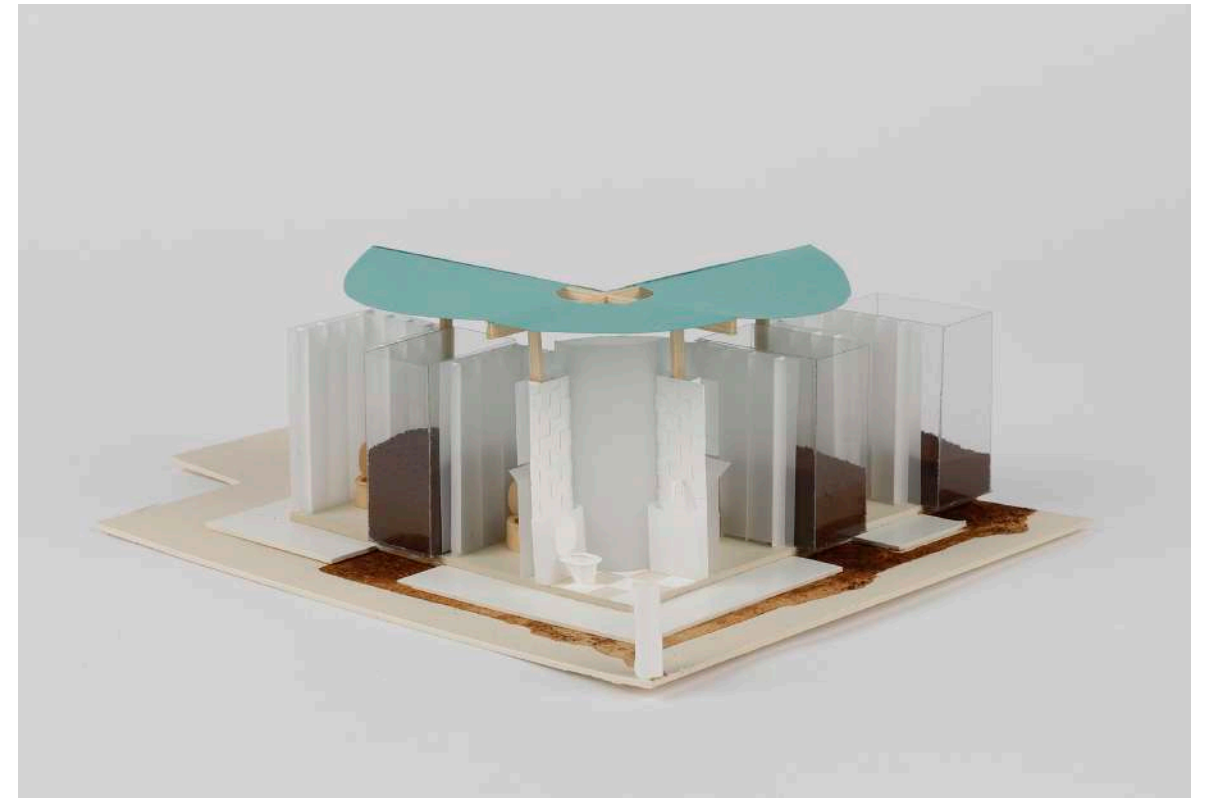


Fig. 108: Intermediate models and proposals for the toilet pavilion.



Fig. 109: Intermediate models and proposals for the toilet pavilion.

realised at full scale, I also began to question my role as a design researcher in this context. Although I am comfortable with using design as a research method, I did not feel adequately prepared to manage the construction of this type of project. Having completed only a master's in architecture and no practical internship, I lacked hands-on experience in this field. Moreover, I questioned my role in persuading investors, through architectural design, to support and realise the project.

The postponement and possible cancellation of the construction were unexpected but also partly reflect the nature of this type of case study and its reliance on ad hoc or project-based funding. More generally, depending on a case study partner and building on their site highlights one of the inherent challenges of practice-based research and Research-by-Design when taking the form of a 1:1 intervention. In relation to the main ambition of this doctoral research, however, the full-scale realisation and use of public composting toilets at the Blickfabriek site would still represent a significant step forward. As the project gradually neared a standstill, it became clear that additional motivation or persuasion through design was necessary before construction could be seriously considered. This became particularly important in the transition from a speculative proposal to a fully functioning toilet design at a real-world scale. In response, I created a more advanced and detailed model of the same design in November 2025 in an attempt to persuade through architectural design (Fig. 112). Given the high level of investment and risk involved for the Blickfabriek, a certain degree of persuasion proved crucial in moving the project towards realisation.

Stage 2: Design Discussions 2025

With an advanced model that clearly articulated the details and materiality of the toilet pavilion, I initiated another design discussion with the Blickfabriek team, revisiting the same proposal one year later. Although the updated model was based on the same design, the organisers and constructors received it with greater enthusiasm, appreciating it as more realistic than the previous model. They felt that the level of detail now sufficiently expressed the choice of materials and structural logic. Moreover, the existing composting toilets at the Blickfabriek had visibly deteriorated in the year since our initial conversations.

The organisers, therefore, stressed the urgent need for new off-grid toilets, emphasising the need for facilities that remain accessible at all times, even when the CANTIN and its flushing toilets are closed. Regarding the presented model, accompanied by architectural plans (Fig. 92–93), the Blickfabriek team accepted the design but noted that it still lacks certain structural and technical details before it can be developed at a 1:1 scale. In particular, they expressed the need for greater clarity on the plumbing system and the structural detailing of the scaffolding, if the proposal is to be considered truly realisable and to move towards construction. The primary challenges to its realisation, therefore, lie in practical and technical questions concerning logistics and the functioning of the design. This suggests that the project has reached a realistic design stage, but that a transition from speculative Research-by-Design to pragmatic, real-world practice would require collaboration for its construction. If the pavilion were to be built in the future, the Blickfabriek is therefore in search of partners to help construct the design and make it a reality.

From a management perspective, the team emphasised that composting toilets require careful organisation and maintenance, potentially involving a team of volunteers. However, they also argued that, in order to encourage volunteers to engage with this composting practice, the toilet pavilion must offer a pleasant and well-organised environment for engaging with matter such as compost and bodily waste. I observed here that the team remains convinced that architectural design, as an aesthetic practice, holds persuasive power and can encourage visitors to use, and perhaps even help manage, the composting process. With regard to the requirement for sufficient cleanliness, their main concern about the proposed design was the risk of gutters filling up with sludge from the compost heaps. They did, however, appreciate the inclusion of water hoses to rinse away odours, maintain a clean appearance, and moisten the compost heaps if needed. To truly motivate users to engage with the design, the team further emphasised that clear explanation and communication about the benefits and proper use of composting toilets is crucial. In their view, the primary source of disgust or distrust among visitors stems from unfamiliarity with this type of toilet system. As they believed that architectural design alone cannot adequately inform the general public or transmit its ideas through



Fig. 110: Discussion moment with constructors and members of the Blickfabriek team to discuss the renovation of the composting toilets.



Fig. 111: Discussion moment with constructors and members of the Blickfabriek team to discuss the renovation of the composting toilets.

interaction and use, they insisted on the installation of informative posters and banners. Only in this way, they argued, could both the concept of the design and its underlying principles be properly explained, as well as the correct use of the composting toilets.

While presenting an alluring architectural model helped to restart the design discussions, the aspect of time may also have influenced the acceptance of the design. Although the proposal for the toilet pavilion did not require many spatial changes to be considered acceptable to the team, it nevertheless took a relatively long time to reach this stage. It was as if the presentation of the design also needed to ‘mature’ in the mindsets of those on site. Since the model was considered clear and understandable in its materiality, even to a general audience, it was exhibited on the Blikfabriek’s site for several months in order to seek out and persuade potential partners (Fig. 112). As such, the discussion around the design continued within the context of the case study itself, independent of my presence.

To this day, the toilet pavilion has not yet been realised. Nevertheless, in the transition from speculative proposals – operating at the level of ideas – to a design deemed realisable in a real-world context, a process of collective thinking and reflection emerged around new toilet habits at the Blikfabriek. In this transition, mediated by architectural design, the project reached a stage at which the preliminary design was considered finalised and ready to proceed to the construction phase. Where the central ambition of this research has been to materially support societal changes that struggle to come into being through architectural design, this ambition has, at least in part, been reached. As a result, the principal value of *Design Exploration III* and this real-world investigation lies in this process of collective thinking and reflection, which emerged on site through architectural design, in response to a shared challenge.

5.6 Summary of Design Exploration III

Intermediate Reflections and Key Insights

As part of the final research cycle, *Design Exploration III*, I introduced another level of challenge through architectural design by making a toilet pavilion to be realised and constructed in the real-world setting of the case study. In this last phase of the research, a valuable threshold was crossed by transgressing

from speculative critical design towards the realisation of a realistic design, challenging on-site toilet habits in a sensitively provocative manner. In this context, I observed that designers are granted less freedom when nearing a realistic design, and I became even more reliant on materiality and aesthetics as architecture’s persuasive powers. In the discussions on the design, taking place in situ and in confrontation with the Blikfabriek team and constructors, the conversation moved from making the proposal considerable, to making it realisable and buildable in this real-world setting and situation.

In composing the toilet pavilion, I build further on the reflections and key insights from *Design Exploration I* and *II*. More specifically, within these previous research cycles, the following intermediate design strategies were developed: The Design Strategy of Rendering Present, the Confrontational Design Strategy, the Public Design Strategy, the Responsive Design Strategy, the Design Strategy of Critical Distance, and the Design Strategy of Ecological-Spatial Value. As part of this chapter, these intermediate strategies were refined and assembled into advanced design strategies for shifting mindsets. In addition, I re-analysed the many conversations, reactions, and ideas gathered from design discussions over the past years and long-term collaboration with the case study and categorised the most recurring reactions according to similarity of approach. From this selection and the refinement of previous design strategies, I advanced three design approaches, discussed in greater depth below. These strategies are materially articulated in *The Wasteful Toilet as a Sterile Environment*, *The Toilet as an Architectural Experience in Return*, and *The Toilet as Part of an Ecosystem*. While these three toilet designs share a common intention, they remain distinct in their approach, acknowledging that a shift in mindsets is inherently personal and subjective to individuals.

The Informational Design Strategy

- 1. To design a toilet as a sterile and ‘wasteful’ architectural element

In response to the many reactions and suggestions to inform users through design about the unsustainability of the flushing toilet system, I composed *The Wasteful Toilet as a Sterile Environment* (Fig. 95).



Fig. 112: Final model of the toilet pavilion, exhibited at the Blikfabriek.

This toilet is created to raise awareness of the unsustainability and lack of accountability over human bodily waste, materially supported by the current system, as a way to influence users' toilet habits. The design relates to the Design Strategy of Rendering Present by spatially emphasising those aspects that make the current system unsustainable, thereby increasing feelings of responsibility through interaction with or use of the design. This *Design Scenario*, for instance, includes pipes and plumbing from the toilet and sink that run above ground to a septic tank, from where they connect to the central sewage network. As such, the design displays wastewater infrastructure, making its functioning explicit and rendering it present as a design element on site.

The *Wasteful Toilet as a Sterile Environment* also draws on the Confrontational Design Strategy, for instance, by showing the descending water level inside the water buffer to emphasise the large quantity of rainwater used for flushing. This toilet is the only flushing toilet in the toilet pavilion, to provide users with different options, and is labelled a 'WC' to preserve recognisability. By making the water consumption of users explicit in the design, it showcases the 'wasteful' toilet habits embedded in this space to spatially confront users and influence their decisions. Aside from raising awareness, the public context is also deployed in the design to encourage a change in habits. All toilets are positioned around the transparent water buffer, sending a clear message to other users when rainwater is being used via the descending water level and the sound of a pump being activated. By communicating individual water usage to other toilet spaces, the design intends to encourage sustainable or proper use of the rainwater, playing on feelings of shame and social control. The design, therefore, also incorporates the Public Design Strategy, aiming at collective learning in a public context.

Assembled into one advanced design strategy, the Informational Design Strategy emerged as a broader approach to shifting mindsets through architectural design. This design strategy intends to inform and confront users through architectural design, to influence them in their ingrained routines and daily habits. This strategy thus relies on increasing user awareness to shift ideas, values, and behaviour. In adopting this approach, the resulting design will be realistic and relatively easy to implement in public contexts, as it primarily showcases its effects or emphasises the aspects that make current habits unsustainable.

For this reason, I expect the designs adhering to this approach to be accessible to many users due to their familiarity and proximity to the current situation. In terms of the agency of the design to make an entirely new system imaginable and conceivable, however, the design must also sufficiently depart from the familiar system. In this respect, the strategy may be less effective in conveying new ideas, values, and beliefs, as it does not deliberately support new spatial-ecological values beyond those embedded in the status quo. It can therefore be understood as a first step in shifting mindsets: To confront users with and raise awareness of the sustainability issues surrounding the current system that materially support unsustainable habits and values.

The Rewarding Design Strategy

- 2. To design a toilet as an experience or reward 'in return' for a change in habits

The second design strategy, as part of *Design Exploration III*, focuses on the human reward system to change habits by design, and is spatially articulated in *The Toilet as an Architectural Experience in Return* (Fig. 99). Unlike the *Wasteful Toilet as a Sterile Environment*, this *Design Scenario* is not a flushing toilet but a composting toilet and is based on the fact that the latter saves a significant amount of water. The central question in designing this toilet was: What can be created from the surplus water that is no longer used for flushing? Rather than collecting and using rainwater to transport human bodily waste, this design deploys it to create an architectural experience for users in exchange for a change in toilet habits.

The toilet design relies on the Public Design Strategy as it directly engages with the public context for which the design is created. The water consumption of the toilet space, for instance, is not only communicated internally to all toilet spaces via the central water buffer, but the design also signals the consumption to the central square by watering the sedge field as part of the toilet visit. This 'general flush' of its surroundings is intentionally created to be sense-able and present outside of the toilet space, and of influence on nearby activities. While the toilet space creates an intimate interior experience, overlooking the square from a peephole in the wall, the toilet is much more present in its effect on the outside. This deliberate decision intends to attract

attention to the toilet pavilion by confronting visitors and inviting them to engage with the design. As such, the *Toilet as an Architectural Experience in Return* expands the visit to the toilet to the exterior and audience at the Blikfabriek, creating a tangible experience that highlights and celebrates rainwater.

The toilet design also draws on the Responsive Design Strategy, introducing a shift in my perspective as a designer towards an environment-centred approach to designing. Although this strategy primarily focuses on creating an experience for users in return for a change in toilet habits, the experience inside the toilet also impacts its surroundings by performing care and nurturing a growing sedge field. It enhances relationality towards the nearby environment and non-human species below. In terms of responsiveness, the *Design Scenario* also addresses contemporary issues relating to water storage and sewer overflows. Whereas it is impossible for rainwater to infiltrate directly into the soil, since the toilet pavilion is built on a densely paved industrial surface, the design temporarily buffers rainwater, slowing its movement and creating a delayed discharge into the sewer, much like a wadi system. This way, the design addresses challenges related to excessive paving and increased flooding, making a valuable contribution to contemporary urban issues.

The *Design Scenario* also incorporates the Design Strategy of Critical Distance, considering that a design should not be too similar to the familiar system to convey beliefs, but also not so different that it is no longer considered usable. A critical distance from the existing system is, therefore, necessary if the toilet is to be repositioned as a playful architectural experience that holds users accountable for their bodily waste. Specifically in relation to the needs of the sedge field, the *Design Scenario* also generates new ecological-spatial values that emerge through co-habitation with composting matter in an urban and semi-public context. With this design, I therefore seek to change toilet habits not solely through a reward, but also by shaping new spatial values and beliefs, promoting engagement in caring for the sedge field.

As such, I delineated the Rewarding Design Strategy, which I advanced from the intermediate design strategies. It concerns the second design strategy as part of *Design Exploration III* and focuses on the human reward system as an approach to changing habits through architectural design. As a broader design strategy, it intends to generate benefits through

architectural design, for instance, by integrating additional activities or transforming the design into a playful or architectural experience in return for a conscious change in toilet habits. This 'experience in return' can be centred on users, but can also include a more responsive attitude towards the needs of the surrounding natural environment, promoting new ideas, values and beliefs.

The Connecting Design Strategy

- 3. To design a toilet as part of an ecosystem, in proximity to human bodily waste

In response to the many suggestions that emerged from the design discussions to showcase the composting process and its benefits, as a way to encourage users to engage in its management and facilitate collective learning, I composed the *Toilet as Part of an Ecosystem* (Fig. 103). This toilet design was created to influence users by demonstrating the benefits and impact of the composting toilet system on the natural environment. In terms of intermediate design strategies, it relates to the Responsive Design Strategy, emphasising the interconnected relationship between humans, their bodily excretions, and the wider living environment, to encourage participation in practices of care for soil and compost. More specifically, the design makes all stages of the composting process visible – from receiving and storing to processing, maturing, and harvesting compost – rather than hiding the process in the back. As such, it aims to raise awareness by rendering both the composting process and the toilets present on the central square of the Blikfabriek. In its intention to stimulate engagement by demonstrating the positive impact of the toilets on the wider environment, this design strategy even facilitates collective thinking and learning through architectural design.

The Toilet as Part of an Ecosystem also draws on the Design Strategy of Critical Distance, as the design may be further removed from the current situation and is more challenging, yet still aims to change toilet habits by showcasing its impact and non-anthropocentric benefits. In its interior, the composting toilet creates an experience of relieving oneself while being surrounded by living, decomposing matter, as the walls are stacked with sawdust and human bodily waste is kept close to the body, directly beneath the toilet space. The design even allows the toilet seat to be gently warmed by the bodily waste of

other users decomposing underneath. By producing warmth, the users' bodies are connected to the warm compost heaps piling up and maturing underneath. While more demanding than the Informational and Connecting Design Strategies, this *Design Scenario* requires a certain openness in perspective to be used and appreciated as public toilets in an urban context. Although this approach to designing may lead to designs that are less readily accepted in public spaces, due to their significant distance from the current situation, the strategy remains valuable to generate new spatial-ecological values through design.

The toilet design also incorporates the Design Strategy of Ecological-spatial Value. Moving beyond a purely anthropocentric mode of designing, this *Design Scenario* presents a toilet created as a focal point to promote and convey new ideas, values, and beliefs. This goes beyond merely raising awareness and extends toward the creation of new values, stimulating commitment and engagement with human bodily waste from the perspective of a true adoption of the ideology it represents. While confrontation with unfamiliar or uncomfortable habits through challenging architectural designs may not immediately be accepted and trigger change, through gradual exposure, architectural design can slowly move toward acceptance and, perhaps eventually, normalisation.

As a result, the Connecting Design Strategy emerged. This is the third and last advanced approach to shifting mindsets through architectural design, demonstrating the connection between human users, the design, and its positive impact on the wider natural environment.

Altogether, the Informational Design Strategy, the Rewarding Design Strategy, and the Connecting Design Strategy are developed as advanced design strategies for shifting mindsets through architectural design. As design strategies, they are applicable beyond the situated case of the toilet and allow for broader application, becoming transferable to the field of critical design in architecture more generally. The strategies are discussed as approaches transferable to other research contexts in Chapter 6: *Reflections on Contributions*.

6. Reflections on Contributions

Whereas Chapter 1: *Introduction* outlined the research focus and clarified the structure of the doctoral thesis, Chapter 2: *Methodology and Research Design* discussed the theoretical framework and the rationale behind the chosen mixed-methods approach. The latter specified how Research-by-Design is employed as a driver and how theories and methods are embedded within the research project. Chapters 3–5 presented *Design Explorations I, II, and III*, serving as research cycles to structure the process, and investigated the research questions and objectives through architectural design.

Chapter 6: *Reflections on Contributions* is the final chapter of the doctoral thesis and presents the main contributions by reflecting on the key insights and findings developed throughout the research. I begin with a summary of the initial research ambition, followed by an explanation of the three methodological principles that emerged and informed each *Design Exploration*. These principles concern *Critical Cartography*, *Design Scenarios*, and *Conversation Pieces*, forming a transferable toolkit to the field of Research-by-Design. Subsequently, I discuss the intermediate design strategies that emerged from the process, refining them into advanced strategies for shifting mindsets by critical design in architecture. The chapter concludes with a discussion of key threads of reflection that proved crucial to the research ambition and are considered relevant for further investigation.

6.1 Initial Research Ambition

In this doctoral research, I interrogated the effectiveness of existing sustainability approaches in architecture. Situated within the context of the global climate crisis, I argued that these approaches are today predominantly technological, prioritising the search for technological solutions. This reliance on ‘fragmented techno-fixes’ (Haraway 2016) has been exemplified by the growing adoption of green design and green aesthetics without sufficient consideration

of their concrete impact on environmental damage. I examined these largely anthropocentric and technocentric approaches to sustainability in architecture, arguing that such responses to the climate emergency risk being insufficient. This is because they primarily seek to preserve ‘business as usual’, thereby allowing harmful practices to persist without requiring bigger structural or cultural change.

Instead, I argued that architecture should engage more explicitly with the cultural level, focusing on the role and agency of architectural design in supporting a shift in how we inhabit the world. In searching for effective points of intervention for cultural change, mindsets were identified as key leverage points. Here, I argued that architects can have a significant impact, since they shape spatial environments and can influence the ‘praxis’ embedded within them. ‘Praxis’ here refers to the socially and historically situated routines and habits through which people provision their livelihoods. These habits and routines, in turn, reproduce particular habitats or daily living environments shaped by specific identities, forms of consciousness, values, and mindsets. Habits are therefore considered key entry points, constituting a spatial issue closely intertwined with cultural norms and values.

Within this framework, the research centred on one unsustainable habit as a case: the habit of toileting. The toilet proved to be a particularly compelling entry point into the subject. It represented both a sensitive and often avoided topic, as well as an unsustainable daily habit for which technological alternatives are emerging but have not yet been widely adopted. Throughout the research, I argued that this is because the general public’s mindset does not align with the sudden implementation of such unconventional changes in toilet habits. In this context, the effects of daily habits became of particular interest. Where spatial routines can, over time, become deeply ingrained in our lives, they become so familiar that they remain unquestioned and unchallenged. In the case of the flushing toilet

in particular, the comfort it provides is so embedded in everyday lifestyles that it has become normalised and remained understudied, including within architectural design research. Consequently, I examined public toilets as architectural elements and spatial entrances to challenge and loosen what is ingrained, left unquestioned, and currently obstructing change. In doing so, the toilet proposals which I created in this research materially supported a change in toilet habits, transforming dominant narratives, discourse, language, concepts, and perspectives by investigating the following research question:

RQ: “How can architectural design trigger a shift in mindsets regarding how we deal with human bodily waste by shaping alternative toilet habits?”

From the general ambition to support a cultural transformation, I argued that the first step in this process was to challenge and transform established habits through architectural design before it could support and realise changes in patterns of habitation. In this way, the research steps moved from exploring, to exposing, to challenging, and ultimately to supporting a shift in mindsets by architectural design. At the outset of the research, I expected that architecture would be able to evoke a cultural shift by altering toilet design and shaping more accountable and sustainable toilet habits. Accordingly, the research was initially guided by the following three research objectives (O1–O3):

- O1: To investigate new customs of cohabitation, or living together, with bodily waste by keeping it a local and internal matter on-site instead of externalising it through underground and hidden infrastructures that ultimately lead to long-distance water treatment facilities.
- O2: To shape alternative spatial practices and typologies to deal with human bodily waste as a valuable resource, leading to architectural practices that inherently incorporate and literally make room for storing, recovering, cultivating, or even gardening living matter.
- O3: To establish collectives that explore new forms of community collaboration in collectively dealing with human bodily waste on-site, but also new collectives that actively include and respond to non-human species.

In relation to current ways of dealing with human bodily waste, I showed that socio-cultural changes are already underway, and that a shift is becoming increasingly noticeable as awareness grows around water pollution caused by sewer overflows. As I explained, perspectives are gradually moving away from anthropocentric or user-centred desires towards a greater concern for natural water streams and environments. I observed, however, that corresponding structural and cultural changes were struggling to become a reality. In response, I attempted to support and help realise these changes through architectural design by composing alternative scenarios for dealing with human bodily waste, tied to different toilet habits, within the situated context of a real-world and semi-public case study.

6.2 Three Methodological Principles:
A Transferable Toolkit

In terms of methodology, this research in architecture employed a mixed-methodology with Research-by-Design as its primary method and driver to address the main research question (RQ). As there is no general definition of Research-by-Design, the specific design approach of this research was tailored to the research question and constitutes an important methodological contribution to the field of Research-by-Design.

The Research-by-Design process comprised three *Design Explorations*, or research cycles, discussed in Chapters 3–5, which formed the main body and structure through an iterative process over time. Each research cycle had a distinct focus and investigated a specific part of the Blikfabriek case study. Chapter 3: *Toilets Exploring Mindsets on Human Bodily Waste* on *Design Exploration I* tested the contemporary norms surrounding the toilet at the case study and challenged the status quo by questioning why certain toilet designs are (not) acceptable in this semi-public context. Chapter 4: *Toilets of Care as a Recovery Activity* on *Design Exploration II* investigated how toilets could participate in wetland conservation by collecting and treating waste in a constructed wetland on-site. And Chapter 5: *Toilets that Challenge on a Real-life Scale* on *Design Exploration III* proposed a renovation of the public composting toilets at the Blikfabriek site, assembling three design strategies to shift mindsets through design. The three *Design Explorations* unfolded sequentially, with each new

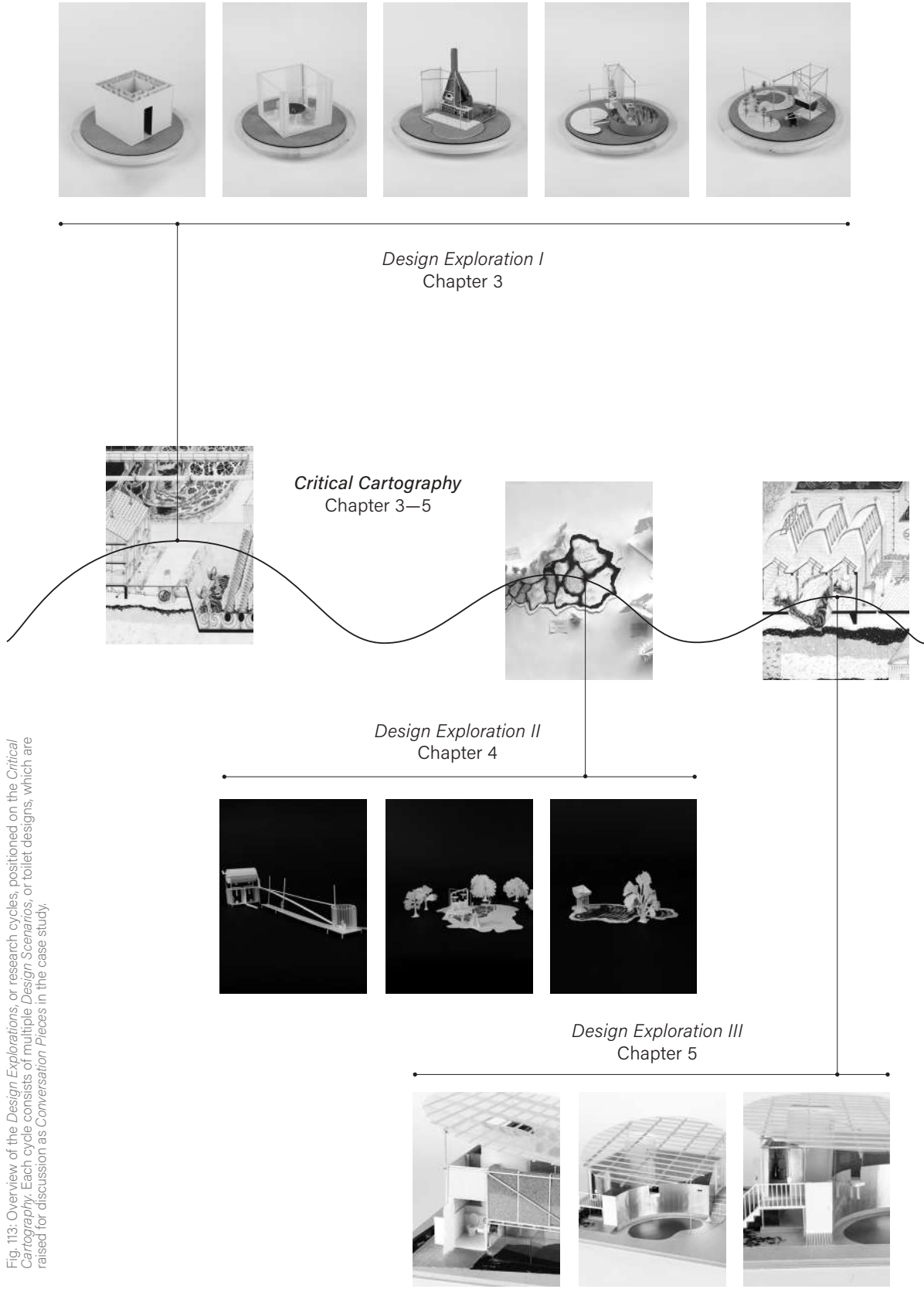


Fig. 113: Overview of the *Design Explorations*, or research cycles, positioned on the *Critical Cartography*. Each cycle consists of multiple *Design Scenarios*, or toilet designs, which are raised for discussion as *Conversation Pieces* in the case study.

cycle of the research process refining the research questions and advancing the key insights (Fig. 113).

In terms of the specific Research-by-Design actions as part of *Design Exploration I, II* and *III*, I deployed three methodological principles that emerged from the process and are transferable to a broader research context as a toolkit. The principles include an architectural string figure or *Critical Cartography* underlaying the research, toilet designs or *Design Scenarios*, and the presentation of architectural designs as *Conversation Pieces* at the case study. These three methodological principles have been employed throughout the research to generate insights into the research question under study through architectural design. The following section provides a more detailed reflection on each of the methodological principles.

Critical Cartography

As part of the Research-by-Design, I deployed *Critical Cartography* as an investigative design tool that served three purposes: to reveal the problematic under study, to narrate on the research subject, and to contextualise the designs in a recognisable environment. It was initiated as a continuous design tool, on a 10-metre roll of paper, to assemble crucial insights from the literature review, fieldwork in the case study, and reflections from the *Design Explorations*. Throughout the research, it developed into an architectural mapping – or string figure – connecting all relevant aspects to display the ‘system’ of wastewater management in Flanders. While the *Critical Cartography* initially emerged from the collection and synthesis of primarily quantitative material on the infrastructural sewage system, qualitative aspects became increasingly significant in the process. The mapping reveals the urban flushing toilet ‘system’ as both a physical infrastructure and the system of

thought it sustains. By bringing the drawing into conversation in the case study, I was able to surface the beliefs, cultural narratives, and spatial habits that are materially supported by the represented system. Like an architectural string figure, it ties things together, passes patterns back and forth, and draws attention to a system that would normally remain hidden within our everyday environments.

The *Critical Cartography* proved to be a particularly useful research tool for three reasons. Firstly, I deploy the drawing to explore and reveal the flushing toilet system as an unsustainable infrastructure that sustains ‘flush-and-forget’ habits. As discussed in Chapter 3 on *Design Exploration I*, the process of mapping the underground was greatly hindered by the fact that precise information on the sewer network remains hidden, and that responsibility for it in Belgium is highly fragmented. The initial intention behind the mapping was to visually expose the underground sewage system and highlight the urgent and ‘close to home’ problem of sewer failures and pollution caused by overflows in Flanders.

Secondly, I used the *Critical Cartography* as a presentation tool to narrate the situated problem and context under study. Every discussion moment with participants began with an introduction using the drawing as a point of departure for the conversation. The drawing functioned as a narrational tool, deployed in a storytelling manner, proving valuable and effective in fostering awareness of the research subject. In line with this intention and use throughout the research, Chapters 3–5 on *Design Exploration I, II* and *III* begin with sections of the drawing to shed light on the situated problem and context. The use of this methodological principle in a narrational manner, therefore, helped to inform participants about the unsustainability of the common toilet system and its associated habits.

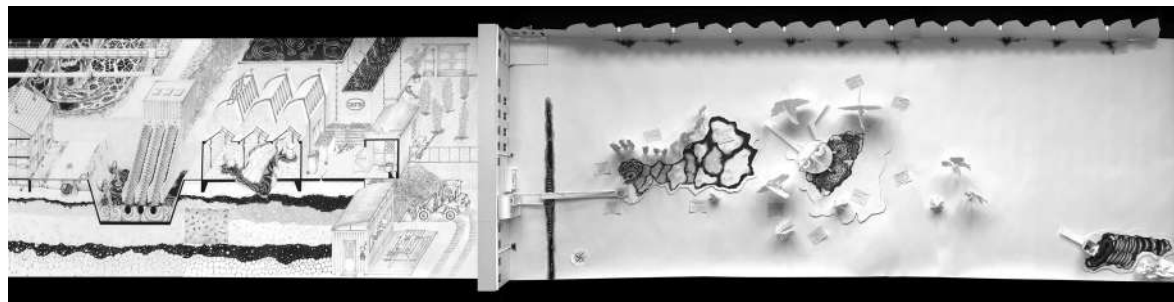


Fig. 114: Overview of the *Critical Cartography* of the urban wastewater system in Flanders.

Lastly, the *Critical Cartography* served to ground and contextualise the toilet designs, or *Design Scenarios*, within the daily living environments in which they operate and exert influence. Here, I often combined the drawing with images of the case under study. Embedding the designs within a real-world context was crucial, as I did not create the speculative proposals as fictional scenarios. The drawing became an especially valuable tool, serving as a detailed narrative through which the speculative designs could be anchored within a situated context. Particularly in Chapters 4 and 5 on *Design Explorations II* and *III*, the sections of the drawing became more closely linked to the case study, making the designs imaginable and relatable for participants as scenarios that could potentially unfold there in the near future. From conversations with participants, this contextualisation of the speculative designs proved essential for participants to engage in real-life discussions about the designs.

Although I initiated the *Critical Cartography* on a ten-metre roll of paper, I ultimately used only four metres of the roll by the end of the research. Especially at the beginning, in setting up *Design Exploration I*, the drawing proved helpful to investigate the infrastructural underground sewer system in Flanders, which constituted a long process of drawing, discovering, and redrawing. As a methodological tool, it was time-consuming, particularly when detailing it in such a way that it became usable for storytelling to a non-expert audience. The drawing became a tool for sharing and communicating knowledge with others in a non-linguistic manner. Methodologically, it proved valuable for raising awareness and communicating a situated problem, while also allowing for the visual gathering and assembling of key insights. As the research progressed, its importance increasingly came to centre on its deployment within discussions. The last part of the drawing on *Design Exploration III*, in particular, proved less effective in discussions at the Blikfabriek, as these took place on-site with an audience already familiar with the environment depicted. Conversely, when presenting the research in other environments, such as conferences, seminars, or during the research stay at Chalmers University (January–June 2023), the drawing became a necessary means of communication, revelation, and narration of the context for which the *Design Scenarios* were composed. The latter *Design Scenarios*, or toilet designs, concern the second methodological principle of this research and are discussed next.

Design Scenarios

The methodological principle of *Design Scenarios* concerns the various toilet designs developed across *Design Explorations I, II*, and *III* and embody the ‘designerly’ exploration of the main research question (RQ). They were initiated as scenarios to shift the focus from the technical to the cultural aspects of toilet design and form the core of this Research-by-Design. I have used the toilet – as both a technology and an architectural space – to question and articulate habits that have become so normalised that they escape critical reflection or remain largely unnoticed. As they describe a ‘scenario’, the toilet designs are not stand-alone things but describe a situation where they actively influence and affect their surroundings. Composing the *Design Scenarios* constituted an intensive design process, involving continuous movement between literature review, fieldwork, designing the toilets, reworking them, and setting up design discussions at the site of the Blikfabriek. Before arriving at the *Design Scenarios* as presented in this thesis, numerous pre-studies and intermediate designs were developed over extended periods of time, often spanning months, before culminating in the toilet designs as presented in Chapters 3–5.

The first series of *Design Scenarios*, discussed in Chapter 3: *Toilets Exploring Mindsets on Human*



Fig. 115: The *Design Scenario* of The Toilet as a Meeting Place (scale 1:33) as part of *Design Exploration I*, discussed in Chapter 3.

Bodily Waste on Design Exploration I, tested contemporary norms surrounding the toilet and challenged the status quo by questioning why certain designs are (not) acceptable in the context of the case study. The second series, discussed in Chapter 4: *Toilets of Care as a Recovery Activity on Design Exploration II*, examined how toilets can participate in wetland conservation by collecting and treating waste in a constructed wetland on-site. And the final series, discussed in Chapter 5: *Toilets that Challenge on a Real-life Scale on Design Exploration III*, proposed a renovation of the public composting toilets at the Blikfabriek site, assembling three design strategies to shift mindsets through design. In moving from *Design Exploration I* to *III*, I observed a clear progression. Whereas the first exploratory series of toilet designs was primarily intended to trigger initial reactions, the final series aimed to stimulate collective thinking on toilet habits in a situated real-world context. Accordingly, the intention of the *Design Scenarios* and my design approach evolved from making toilet designs and their underlying themes discussible and imaginable, towards making them considerable and ultimately realisable within the real-life setting of the case study. In this sense, the first designs function as transmitters of ideas, while the final toilet pavilion, developed in *Design Exploration III*, constitutes a realisable proposal for the Blikfabriek site.

Drawing on the critical design attitude described by Dunne and Raby (2013), and the spectrum from invitation to provocation, to a shock ‘to thought’ as described by Liekens (2020), I developed a design approach that is challenging in a sensitively provocative manner within a real-world context. Consequently, one of the main contributions of the

research is to the field of critical design in architecture. On the one hand, this approach is guided by the grounding of the designs and the collaboration with the Blikfabriek case study, which entails real-world issues and concerns. In respect of the long-term collaboration, I sought to avoid a hard disruption of existing habits and lifestyles on-site, as the intention was to gradually test the intrinsic motivation among users to adopt ecological-spatial values through architectural design. A careful approach was therefore essential to sustain the collaboration with this intrinsic case study, extending over several years. Only in this way could I observe a shift in mindsets over time, which constituted a process. On the other hand, this approach proved most effective when testing diverse design approaches in *Design Exploration I*, discussed in Chapter 3. In discussions on *The Toilet as a Meeting Place* (Fig. 121) and *An Assemblage of Kitchen and Toilet* (Fig. 122), in particular, I observed that the use of stronger provocation at times interfered with the recognisability of the scenarios. This led to the designs being perceived as unrealistic. In relation to the real-life context under study, provocation limited the ability to open the mindsets of participants to new perspectives and instead created greater distance.

As a result, the research contribution operates on two levels: the situated impact on the level of the case study, and the broader, more transferable contribution to the field of critical design in architecture. On the situated level, the contribution concerns the gradual shifts triggered by the toilet designs through their discussion and use in the case study site. This relates to the local impact of the designs as transmitters of ideas within a local community and micro-culture. From analysing

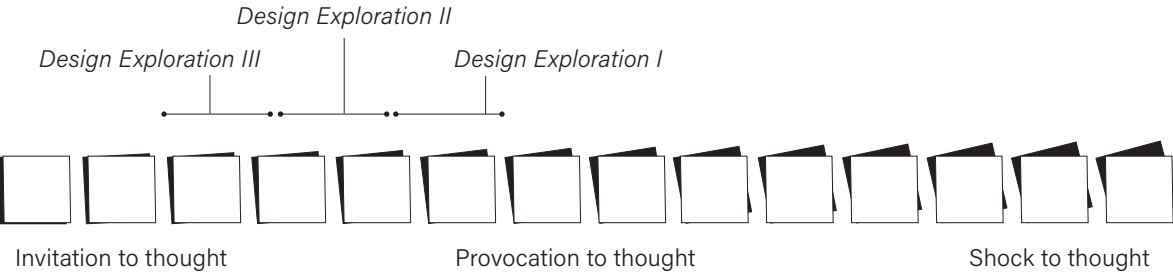


Fig. 116: Positioning of the design approach developed in this doctoral research on the spectrum from invitation, to provocation, to a shock ‘to thought’ by Johan Liekens (2020).

the feedback and reactions of participants, I observed an openness towards more sustainable ways of designing toilets. This suggests that the designs may have had some success in influencing or changing people’s attitudes toward rethinking current toilet habits.

On a broader, more transferable level, I contribute to the field of critical design in architecture with a design approach that fits within a specific position on the spectrum extending from invitation, to provocation, to a shock ‘to thought’ (Liekens 2020). This design approach is situated between invitation and provocation, and works by sensitively challenging through architectural design. While I deployed a more provocative design approach in *Design Exploration I*, the design in *Design Exploration III* was a more gentle invitation to thought (Fig. 116). In moving from speculative design proposals to a design created to be realisable and functional for the site of the case study, the latter tolerated less provocation.

In this way, the design approach developed in this research extends beyond the specific case of the toilet and offers relevance for architectural design more generally. The strategies outlined below are a

tangible application of this design approach and are, as such, also relevant to audiences outside the context of the case study.

Conversation Pieces

The initial goal of the *Design Scenarios* was to stimulate conversation on an avoided or taboo subject. The toilet designs were therefore introduced in the case study as *Conversation Pieces* to challenge on-site toilet habits. Presenting the designs in this way is about posing questions, triggering debate, and opening up space for new ideas to emerge. In this sense, the discussions and reactions generated in response to the designs are more important than the act of provoking through architectural design itself.

Throughout the research process, I have used the term *Conversation Pieces* to describe how Research-by-Design artefacts are introduced into a real-world context to question prevailing assumptions and perceptions about architectural design, here centred on the design of toilets. Rather than presenting ideas about how to cope with waste and toilet design linguistically, the models offered a variety of scenarios that challenge existing assumptions about what a toilet is

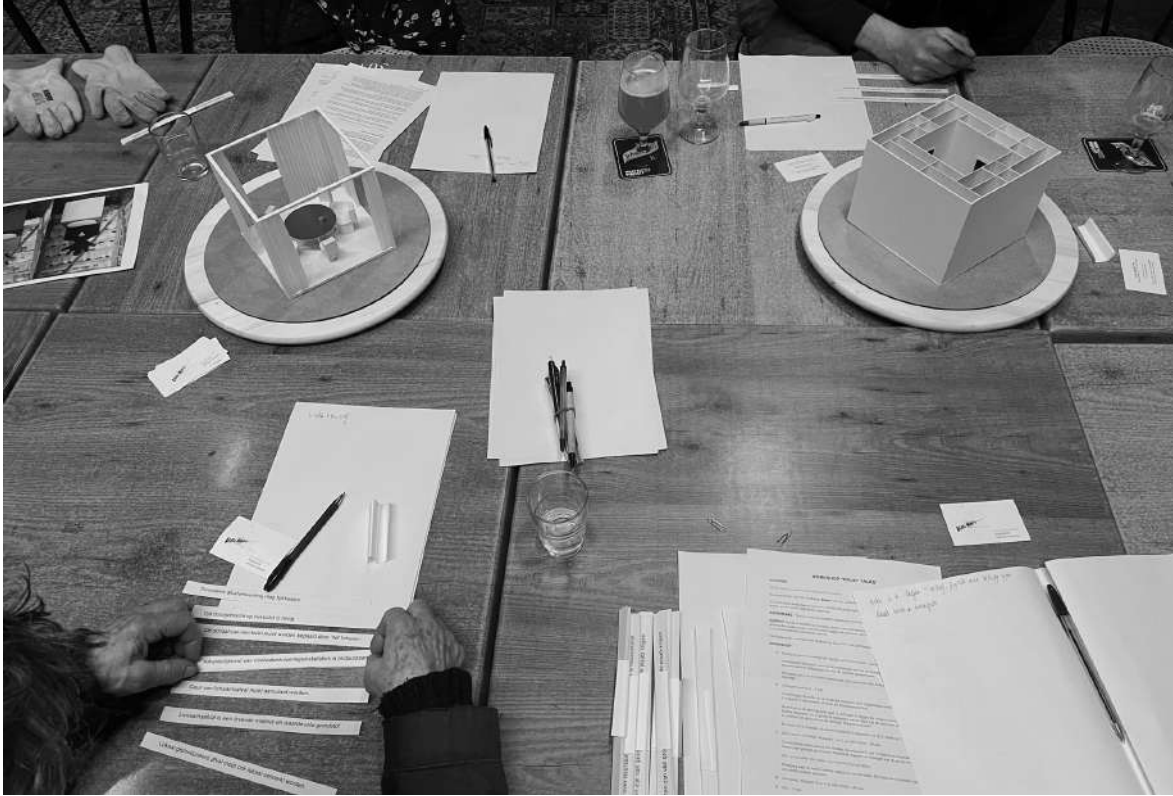


Fig. 117: Discussion moment at the Blikfabriek where I presented toilet designs as Conversation Pieces.

or can be. The aim of the designs is not to prescribe how things should be, but to facilitate alternative worlds and visions. For this reason, I explained the *Conversation Pieces* only briefly to participants, as a non-designer audience, focusing on the design's inner workings. This left sufficient room for participants to imagine and interpret the designs. These interpretations are made tangible in the thesis through conversational excerpts on the smaller pink pages, which showcase the reactions and questions that emerged in response to the designs.

Initially, I deployed the methodological principle of *Conversation Pieces* exploratively to test different design strategies in situ and in confrontation with local mindsets. The focus here was on how the presented designs shaped conversations and influenced mindsets in the case study. In relation to the audience, consisting largely of non-designers, the materialisation and aesthetics of the designs proved crucial in safeguarding discussion on this sensitive subject. The designs needed not only to remain sufficiently recognisable, but architecture's aesthetic capacity also played an important role in attracting participants and stimulating their imagination. As an architect-designer, I deployed various strategies

when composing the designs, considering materialisation, aesthetics, and provocation. This way, I used architectural design to produce models that engage participants and encourage interaction with the designs. The materialisation of the models here proved especially valuable, as it supported and stimulated conversation, discussion, and debate, even on a subject that is culturally perceived as dirty or difficult. In *Design Exploration III*, specifically, where a design was discussed to be constructed in the case study, the quality of the model strongly influenced and steered the conversations. In deploying architectural design as *Conversation Pieces*, the models are therefore deliberately materialised to be engaging and inviting.

To use designs as *Conversation Pieces*, they needed to be sufficiently functional too, to be considered as realistic proposals by participants. In the case of public toilets, in particular, a careful balance is required between functionality and the element of challenge when employing critical design, as provocation can interfere with accessibility requirements. Public toilets are, in fact, commonly visited in moments of need or urgency. During the discussion moments, I observed that this element of challenge sometimes diverted the conversation away from the research

subject or created greater distance, with participants no longer considering the proposal as a realistic scenario. Especially when moving towards the discussion of a design to be realised at full-scale in a semi-public setting, the aspect of provocation influenced the use of the designs as *Conversation Pieces*. Whereas the use of the toilet designs in *Design Explorations I* and *II*, discussed in Chapters 3 and 4, fits within the definition of *Conversation Pieces*, the discussions on the toilet pavilion in *Design Exploration III* more closely resembled real architect consultations. These were aimed at developing a realistic and implementable design, entering the field of real architectural practice. In this sense, the pavilion moved beyond the scope of a *Conversation Piece*, which is intended primarily to challenge prevailing assumptions and to facilitate alternative worlds and visions.

6.3 Design Strategies to Shift Mindsets by Architectural Design

The design approach outlined above, of careful provocation to challenge by architectural design, is exemplified through a series of intermediate design strategies. These emerged and were developed throughout the research in relation to the main research question (RQ). After delineating intermediate design strategies, I assembled them into broader strategies, enabling the design approach to become transferable to other contexts and publics. This approach for shifting mindsets through design extends beyond the specific case of the toilet and establishes its relevance to the field of architecture more generally.

Intermediate Design Strategies to Shift Mindsets on Human Bodily Waste

The Design Strategy of Rendering Present

The Design Strategy of Rendering Present emerged in response to the observation that the spatial absence of wastewater infrastructure in daily living environments leads to a lack of awareness and accountability regarding human bodily waste. This attitude, summed up as 'flush-and-forget', is supported by the flushing toilet system, which this research interrogates. In response, I composed *Design Scenarios* that make the toilet more visible and allow it to occupy more space, rendering it explicitly and experientially present at the case study. For example, as part

of Chapter 3 on *Design Exploration I, The Toilet as a Constructed Wetland and Interior Pond* was conceived as a large interior pond designed to capture and treat wastewater locally on-site after it is evacuated from the toilet space elevated on a scaffolding structure (Fig. 119). This way, the design repositions the toilet and its treatment system as a central, visible element, rather than concealing it as is currently the case. Building on this approach, the *Design Scenario of Post-Industrial Care*, discussed in Chapter 4 on *Design Exploration II*, extends the toilet space and its treatment system in a long-stretched trajectory that captures, evacuates, and treats wastewater in the nearby wetland (Fig. 120). By visually displaying and showcasing this infrastructural trajectory, the toilet design occupies more space and intentionally confronts users with the on-site treatment of bodily waste.

While this design strategy constitutes a highly unconventional and drastic shift in relation to the current flushing toilet system, both psychologically and spatially, it renders the toilet's function and impact explicit, thereby fostering greater awareness through design. It responds to the initial objective of shaping new customs of cohabitation (O1) by

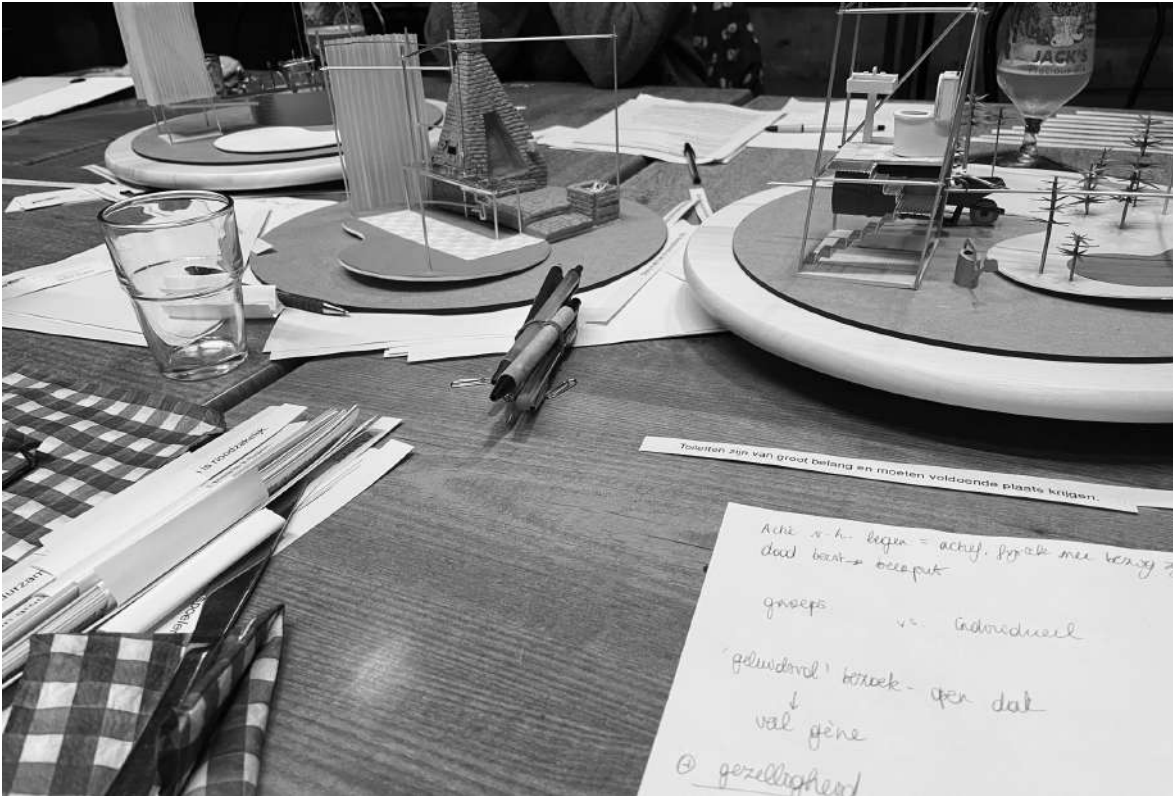


Fig. 118: Discussion moment at the Blikfabriek where I presented toilet designs as *Conversation Pieces*.



Fig. 119: Fragment of the model of the Toilet as a Constructed Wetland and Interior Pond (scale 1:33).



spatially addressing human bodily waste on-site as a local and internal matter. This strategy repositions the toilet as a visible and present element, explicitly incorporating wastewater infrastructure and treatment into the design. In this way, the toilet becomes a prominent on-site feature that occupies space and makes its function explicit, promoting awareness by revelation and exposure. Within the broader process of triggering a shift in mindsets through architectural design, this strategy entails a crucial first step.

The Confrontational Design Strategy

The Confrontational Design Strategy emerged from the intention to reposition the toilet as a space that holds users accountable for what they leave behind. Whereas the current system is largely shaped by user-centred desires, primarily responding to comfort and functional needs, this strategy instead uses the toilet as a means of making users more responsible for their bodily waste. In doing so, it emphasises the broader impact of the toilet, which may be uncomfortable for users, repositioning it as a confrontational element. For instance, *The Toilet as a Constructed Wetland and Interior Pond*, discussed in Chapter 3 on *Design Exploration I*, deliberately obstructs a ‘flush-and-forget’ attitude by allowing what is evacuated in the toilet to reappear in the pond after it has been flushed away (Fig. 122). The constructed wetland within the pond, which treats the collected wastewater, is deliberately made visible and brought into focus through a small bridge that leads users over the pond to the toilet space. A sink is also installed on the bridge, with an open pipe leaking directly into the pond after use, demonstrating that all water flows to the central wastewater treatment pond. In this way, the toilet is no longer merely a comfortable or functional space but a provocative element. In another attempt to move beyond the purely functional expectations of toilets, *An Assemblage of Kitchen and Toilet*, also part of Chapter 3, combines activities of cooking and eating with toileting to challenge existing categories and investigate new combinations and typologies (Fig. 121). In this respect, it relates to the objective of shaping alternative spatial practices and typologies to deal with human bodily waste as a valuable resource (O2). While this design repositions the toilet within a new typology, it does not directly emphasise the broader impact of the toilet design

or render it confrontational. As a result, the issues of concern that surfaced in response to the design tended to redirect the discussion again towards user-centred requirements for privacy and comfort as conditions for its use.

Drawing on these insights from *Design Exploration I*, the *Design Scenario of Post-Industrial Care*, discussed in Chapter 4 on *Design Exploration II*, incorporated similar challenges in relation to wastewater evacuation and the combination with other activities (Fig. 123). This *Design Scenario* proposed a toilet infrastructure constructed adjacent to a lunch area at the Blikfabriek, evacuating wastewater directly into the natural wetland. Here, wastewater passes visibly through a filter before entering the wetland, where matter prohibited from entering the natural environment is removed. When inappropriate materials are flushed, they remain visibly present on the filter. In this way, the toilet design quite literally holds users accountable for what they flush away, encouraging more careful and responsible use of the toilet and its surroundings. Whereas conventional flushing toilets offer a sense of relief after flushing, this relief is deliberately disrupted, as what is flushed away reappears in proximity to the toilet. Like *An Assemblage of Kitchen and Toilet* (Fig. 121), the *Design Scenario of Post-Industrial Care* generated friction among participants. In the latter case, however, participants’ concerns shifted away from user-centred requirements and towards the needs of the wetland. Notably, these concerns mirrored those that informed the design itself, namely, the broader environmental impact of the toilet system.

Altogether, the Confrontational Design Strategy transforms the toilet into a slightly provocative and confrontational element. Throughout the research, I adopted this strategy, among others, by repositioning the toilet as part of an assemblage with other functions, leading to new typologies (O2), and by rendering it more explicit and confrontational on-site, inviting users and visitors to engage with the design and the treatment of bodily waste. Following this approach, the toilet is no longer conceived as a space that merely responds to user desires for comfort and rapid waste evacuation, but instead as an extended spatial and infrastructural element whose functioning and effects engage the wider environment.

Fig. 121: Fragment of the architectural model of *An Assemblage of Kitchen and Toilet* (scale 1:33).

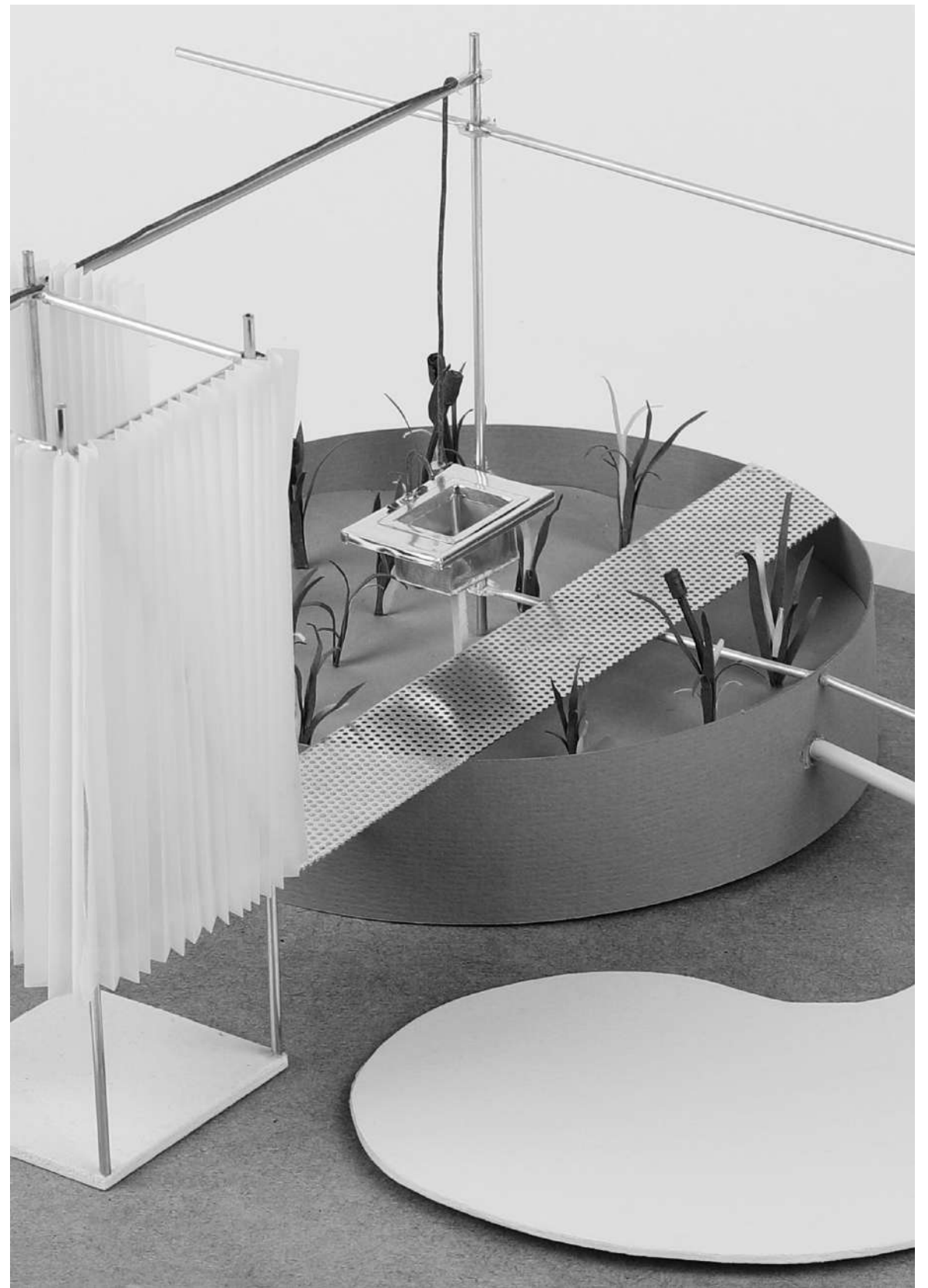
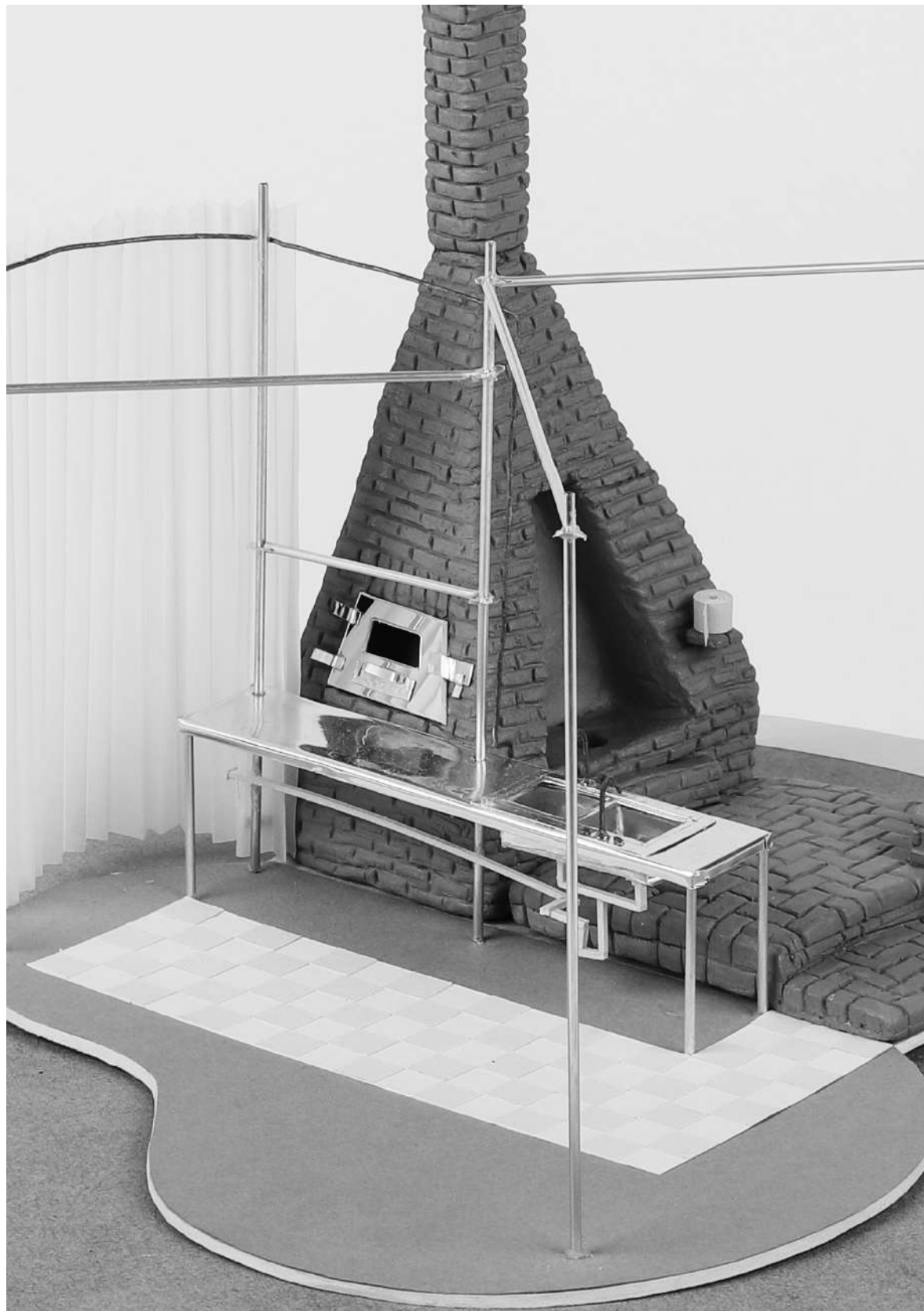


Fig. 122: Fragment of the architectural model of *The Toilet as a Constructed Wetland and Interior Pond* (scale 1:33).



The Public Design Strategy

Considering the semi-public character of the case study, the Public Design Strategy emerged in response to the question of how a public context can influence changes in individual toilet habits. Although visiting the toilet is habitually an individual act, I argued that a shift in toilet habits must be addressed collectively. In Chapter 3 on *Design Exploration I, A Scenario of Composting and Gardening* established a community practice of composting and gardening, not for consumption, but to remediate soil contamination (Fig. 124). Moving beyond user-centred desires, the toilet design was thus centred on a collective practice of care and engagement with soil species, facilitating learning and stimulating engagement. Building on this approach, in Chapter 4 on *Design Exploration II, the Design Scenario of Post-Industrial Care* mobilised aspects of shame and social control within a public context to encourage proper use and cleaning of the toilet space (Fig. 125). To reinforce this element of social control, the design was constructed adjacent to a kitchen and lunch area at the Blikfabriek. In addition to the visible filter described earlier, a long and exposed pathway – almost taking the form of a catwalk – leads towards the toilet through the sedge fields, turning the act of going towards the toilet into a public event. By extending

and emphasising this trajectory, the design makes the journey to the toilet an observable element, encouraging users to better maintain and clean the space for others. Since users hold each other accountable for their bodily waste in this design, it frames accountability as a collective responsibility.

As I have argued in the thesis, shared narratives and convictions significantly shape what is culturally expected from the design of toilets in public settings. Particularly because such spaces must be shared with other users, expectations regarding hygiene and cleanliness are typically higher. Socially constructed beliefs are especially influential, as they largely determine how individuals think and behave. For instance, the direct discharge of wastewater into a natural environment, as proposed in the *Design Scenario of Post-Industrial Care* (Fig. 125), noticeably triggered friction among participants. This indicated that sewage disposal in nature is deeply ingrained in the mindsets on-site as an inherently polluting act. While this observation confirmed that care for the environment is strongly present on-site, it also revealed the difficulty and potential limits of opening perspectives towards alternative toileting practices, which are also viable and safe.

As a result, the Public Design Strategy utilises the presence of a community on-site to challenge dominant narratives through design, particularly where these narratives obstruct change, as a way to materially

support a transformation in toilet habits. In this regard, the research argued that a change in individual habits should begin collectively, since shared narratives strongly influence behaviour in public contexts. Moreover, collective learning through design takes place in public rather than in private settings. The Public Design Strategy, therefore, not only employs social influence to encourage proper management of toilet spaces but also facilitates collective engagement, learning, and thinking. In this research, this took place within the micro-culture of a case study, which must ultimately use and accept the design as a shared condition.

Fig. 124: Fragment of the architectural model of A Scenario of Composting and Gardening (scale 1:33).





The Responsive Design Strategy

I argued in the thesis that perspectives on wastewater infrastructure are increasingly shifting towards a greater concern for the natural environment. The Responsive Design Strategy supports this shift by encouraging a more responsive attitude towards the surrounding environment through architectural design. The strategy was initiated in Chapter 3, on *Design Exploration I*, through *A Scenario of Composting and Gardening* (Fig. 126). In this design, the toilet was conceived as an element of care that contributed to restoring the surrounding environment by remediating the soil through composting practices. It engaged directly with environmental damage by exploring how toilets can participate in the process of soil recovery. Building on this intention, the *Design Scenarios* in Chapter 4 on *Design Exploration II* primarily adhered to the needs of the natural environment rather than those of human users. As a result, I deliberately shifted my focus as a designer towards generating a beneficial effect on the surrounding environment through the toilet.

In this regard, the Responsive Design Strategy introduces a shift in perspective for designers, moving

from a user-centred approach towards the creation of environment-centred or responsive designs. By prioritising the needs of the surrounding environment, the power dynamic between human users and the environment is reconfigured through the mediation of the toilet design. This is most clearly exemplified in the *Design Scenario of Climate Responsiveness*, part of *Design Exploration II* (Fig. 127). This scenario effectively made the wetland the commissioner, imposing its needs onto the design, while users were reduced to mere visitors. The wetland's needs are deliberately prioritised over those of toilet users, who are expected to adapt their habits accordingly. Moreover, the toilet is no longer permanently functional, but instead depends on the availability of rainwater across changing seasons. In this way, the design treats rainwater as a scarcity, values human bodily waste as a resource, and repositions the toilet as a space that asserts a positive impact on its surroundings. In contrast to the current toilet system, this design approach demonstrates how relationality and responsibility can be expanded. As such, it unsettles dominant relationships and moves beyond an anthropocentric logic.

In summary, the Responsive Design Strategy seeks to expand relationality towards non-human



Fig. 126: Architectural model of A Scenario of Composting and Gardening to Remove Soil Contamination (scale 1:33).

Fig. 127: Architectural model of the *Design Scenario of Climate Responsiveness* (scale 1:100).



species and to adopt a more responsive attitude towards the surrounding environment through architectural design. The toilet, in this context, becomes a means to encourage a shift in mindsets by generating benefits for and positively impacting its environment. This entails a shift in the positionality of the architect-designer, who no longer operates in a purely user-centred manner but instead engages in a climate-responsive manner. Accordingly, toilets are designed and evaluated based on their capacity to have the most beneficial impact on the environment.

The Design Strategy of Critical Distance

In relation to implementing a new toilet system tied to new habits and unconventional change, the Design Strategy of Critical Distance revolves around the distance between existing and proposed systems. It emerged in response to the question of how far a speculative design proposal should deviate from the current situation to stimulate imagination and

consideration. I argued that while a *Design Scenario* that strongly deviates from the existing situation may be interpreted as fictional or unrealistic, one that remains too close to the current system risks resulting in minor optimisations and remediations, rather than stimulating the imagination of a fundamentally different system.

The Toilet as a Meeting Place, discussed in Chapter 3 on *Design Exploration I*, concerns the most challenging toilet space in the research, testing the absolute minimal requirements for usability (Fig. 128). Although I intentionally created the design to be provocative and far removed from the familiar experience, gathering toilet users around a table on toilets, it proved too provocative when presented as a *Conversation Piece*, hindering conversation and ultimately being set aside as an art piece. As such, it did not effectively stimulate discussion or consideration of the scenario. Conversely, the *Design Scenario of Low-Tech Regeneration*, discussed in Chapter 4 on *Design Exploration II*, challenged the strong cultural



Fig. 128 and 129: Fragments of the architectural models of *The Toilet as a Meeting Place* (scale 1:33) and the *Design Scenario of Low-Tech Regeneration of Waste* (scale 1:100).

belief in technology by incorporating technological elements to extract benefits or resources (Fig. 129). In aesthetic terms, this design was far removed from the familiar flushing toilet system, consisting of a visible installation of pipes and funnels running above visitors' heads. Yet, it remained sufficiently recognisable to participants due to the presence of the toilet bowl as an anchor point. While this design may initially appear far removed from reality, the toilet continued to function as a permanently available flushing toilet, remaining accessible across changing seasons by pumping deep groundwater for flushing. As a result, the ideas generated in response primarily focused on optimising the design to produce additional benefits for human users, such as energy generation, rather than benefits for the natural wetland.

In developing challenging architectural designs, to support a shift in mindsets, the recognisability of the proposals, alongside a sufficient degree of deviation from the current situation, proved to be crucial. Since the ambition of the *Design Scenarios* is to stimulate and sustain discussion around alternative toilet proposals, recognisability emerged as an important criterion. In this regard, the Design Strategy of Critical Distance safeguards the imaginability of the designs, enabling them to be understood and considered as plausible toilet scenarios within a situated context in the near future. The designs as part of this research are therefore materially grounded in a real-world and recognisable environment, bringing them closer to everyday experiences. While the *Design Scenarios* discussed in Chapter 3, on *Design Exploration I*, do not engage directly with a specific context in their materialisation, those in Chapters 4 and 5 are more advanced and are contextualised within a landscape model of the wetland and a context model of the case study. This proved necessary and enabled participants to read and understand the designs better before engaging with them critically.

The Design Strategy of Ecological-Spatial Value

The last intermediate Design Strategy, of Ecological-Spatial Value, emerged in response to the question of whether architects should merely respond to prevailing cultural desires or whether they can also convey beliefs and actively shape new ecological-spatial values through design. Whereas contemporary public toilet design typically responds to government regulations and prevailing standards of comfort, architects tend to act primarily as

executors of cultural desires. In this sense, they follow existing expectations and norms rather than actively co-shaping them. This approach was first outlined in *The Scenario of Composting and Gardening to Remove Soil Contamination*, discussed in Chapter 3 on *Design Exploration I* (Fig. 130). The *Design Scenario* stimulated engagement with practices of soil care and the composting of human bodily waste, as a way to create ecological-spatial value. While initial *Design Scenarios* focused on fostering awareness as a means of shifting mindsets, this scenario advanced towards facilitating engagement and collective learning through architectural design. Conversely, the *Design Scenario of Low-Tech Regeneration*, discussed in Chapter 4 on *Design Exploration II*, approaches the creation of value by incorporating benefits or rewards, for instance, through the use of novel technologies or gadgets to stimulate attraction and engagement (Fig. 131). Although the latter design focused on the reparative effect on the wetland, the responses it elicited tended instead towards the reinforcement of anthropocentric values.

Drawing on these initial explorations, the strategy was further refined in the *Design Scenario of Climate Responsiveness*, discussed in Chapter 4 on *Design Exploration II* (Fig. 132). This scenario is designed around the sense of serenity associated with relieving oneself in nature, as a means of attracting visitors and generating ecological-spatial value. This toilet is deliberately embedded within a natural environment and intended to trigger care in users by expressing the proximity and impact of the toilet on its surroundings. In relying on this approach, the design strategy not only addresses the challenge of making cohabitation with human bodily waste qualitatively acceptable (O1) but also requires convincing visitors to meaningfully engage with the toilets within an urban and semi-public context. Because such engagement demands a certain level of commitment, the creation of ecological-spatial values through designing with human bodily waste becomes essential.

Altogether, the Design Strategy of Ecological-Spatial Value positions toilets as focal points that express and promote alternative practices of dealing with human bodily waste. The focus here lies on demonstrating a reparative effect on the surroundings of the design. In doing so, it renders proximity and cohabitation with bodily waste acceptable within an urban and semi-public context, shaping new ecological-spatial values and facilitating engagement and collective thinking through design.

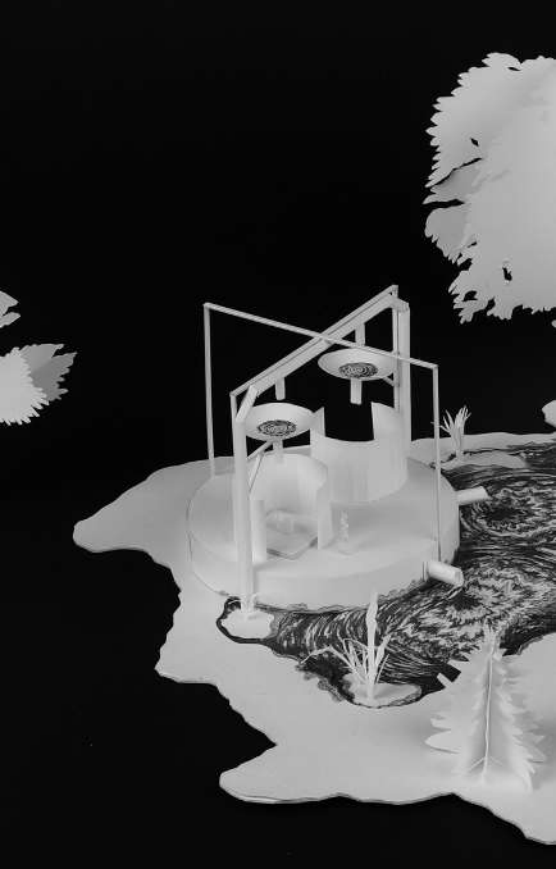


Fig. 130 and 131: Fragments of the architectural models of A Scenario of Composting and Gardening to Remove Soil Contamination (scale 1:33) and the Design Scenario of Low-Tech Regeneration of Waste (scale 1:100).



Fig. 132: Architectural model of the Design Scenario of Climate Responsiveness (scale 1:100).

Advanced Design Strategies to Shift Mindsets by Architectural Design

The six intermediate design strategies listed above are assembled and refined into advanced design strategies to shift mindsets through architectural design, applicable beyond the situated case of the toilet. In this way, they allow for broader application and become transferable to the field of critical design in architecture, and even to architectural education and practice more generally. These distinct approaches or advanced design strategies are materially articulated as *Design Scenarios*, discussed in Chapter 5: *Toilets that Challenge on a Real-life Scale on Design Exploration III*. While the three design strategies share a common intention, they remain diverse in their approach, acknowledging that a shift in mindsets is inherently personal and subjective to individuals.

The advanced design strategies comprise the Informational Design Strategy, spatially articulated in *The Wasteful Toilet as a Sterile Environment*; the Rewarding Design Strategy, articulated in *The Toilet as an Architectural Experience in Return*; and the Connecting Design Strategy, articulated in *The Toilet as Part of an Ecosystem*. In the following part, the strategies are discussed more broadly as approaches transferable to other contexts.

The Informational Design Strategy

The Informational Design Strategy emerged as a way of informing and confronting users through architectural design, in order to influence ingrained routines and daily habits. Specifically in relation to unsustainable habits, this strategy relies on increasing user awareness to shift ideas, values, and behaviour. This approach is assembled and refined from three intermediate design strategies. Firstly, it relates to the Design Strategy of Rendering Present, emphasising and visibly exposing aspects that render the current design and situation unsustainable, thereby increasing accountability and reinforcing feelings of responsibility through use and interaction. Secondly, it draws on the Confrontational Design Strategy, for instance, by foregrounding the negative impact of the design and situation, spatially confronting or provoking users to influence their habits and decisions. And lastly, it incorporates the Public Design Strategy by making the inner workings of the design explicit, thereby enabling it to function as an educational

device through engagement in public contexts and fostering collective learning and awareness.

This design strategy is challenging in a very sensitive way. In adopting it, the resulting design remains realistic and relatively easy to implement in public contexts, as it primarily showcases its effects or emphasises what renders a common habit unsustainable. For this reason, it is expected to be accessible to many users due to its familiarity and proximity to the current situation. In terms of the agency of the design to make an entirely new system imaginable and conceivable, however, it must also sufficiently depart from the familiar system. In this respect, the strategy may be less effective in conveying new ideas, values, and beliefs, as it does not deliberately support new ecological-spatial values beyond those embedded in the status quo. The strategy can therefore be understood as a first step in shifting mindsets: revealing and exposing by design, as a way to raise awareness and confront users with the sustainability of the current system, which materially supports contemporary habits and values.

The Rewarding Design Strategy

The Rewarding Design Strategy focuses on the human reward system as an approach to changing habits through design. More specifically, the strategy emerged from the intention to generate benefits through architectural design, for instance, by integrating additional activities or transforming the design into a playful or architectural experience in return for a conscious change in habits. This approach is assembled and refined from three intermediate design strategies.

Firstly, it relates to the Public Design Strategy, as it directly engages with the public context for which the designs are created. For example, by expanding the design and establishing it as a present and central on-site event, it seeks to attract and engage a wide range of visitors in a public setting. Secondly, it draws on the Responsive Design Strategy, introducing a shift in perspective for designers towards environment-centred design. Although this strategy primarily focuses on creating an experience for users in return for a change in habits, this experience may also incorporate a reparative impact on the natural environment when creating an experience or reward. In this way, the design can extend relationality towards non-human species and incorporate an act

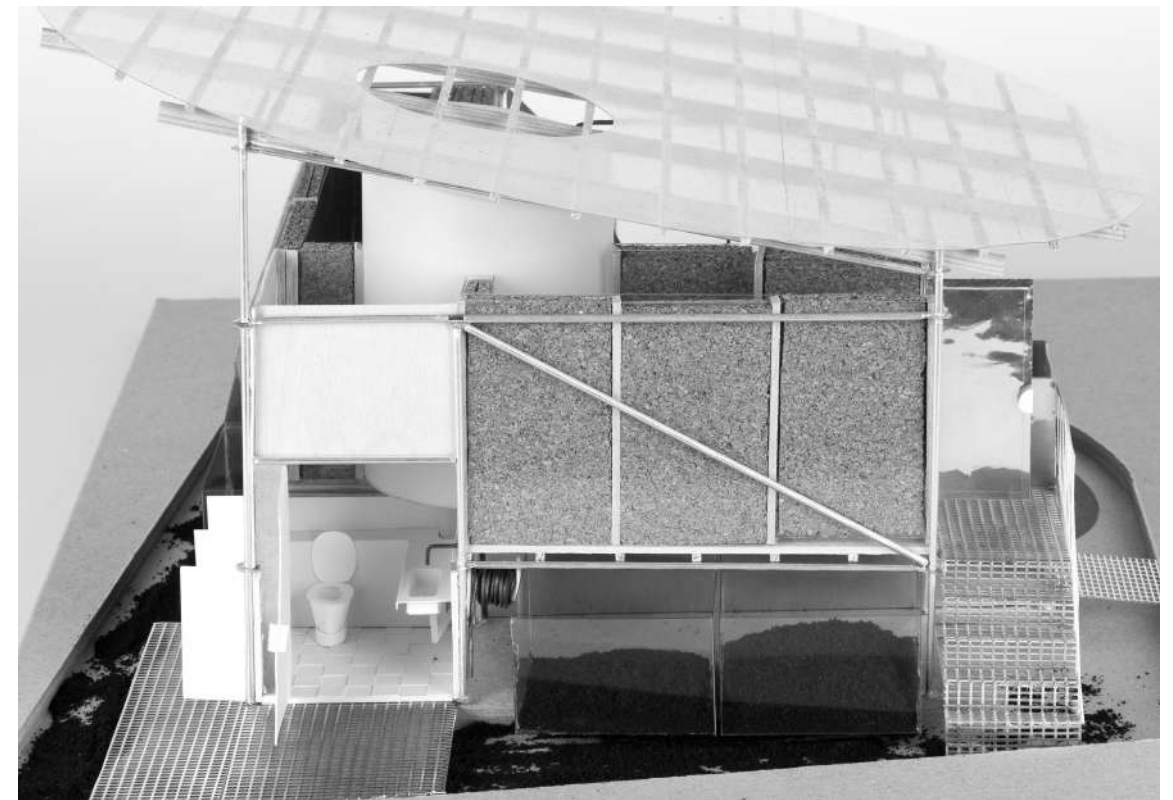


Fig. 133: Architectural model of *The Wasteful Toilet as a Sterile Environment* (scale 1:33), representing the Informational Design Strategy.

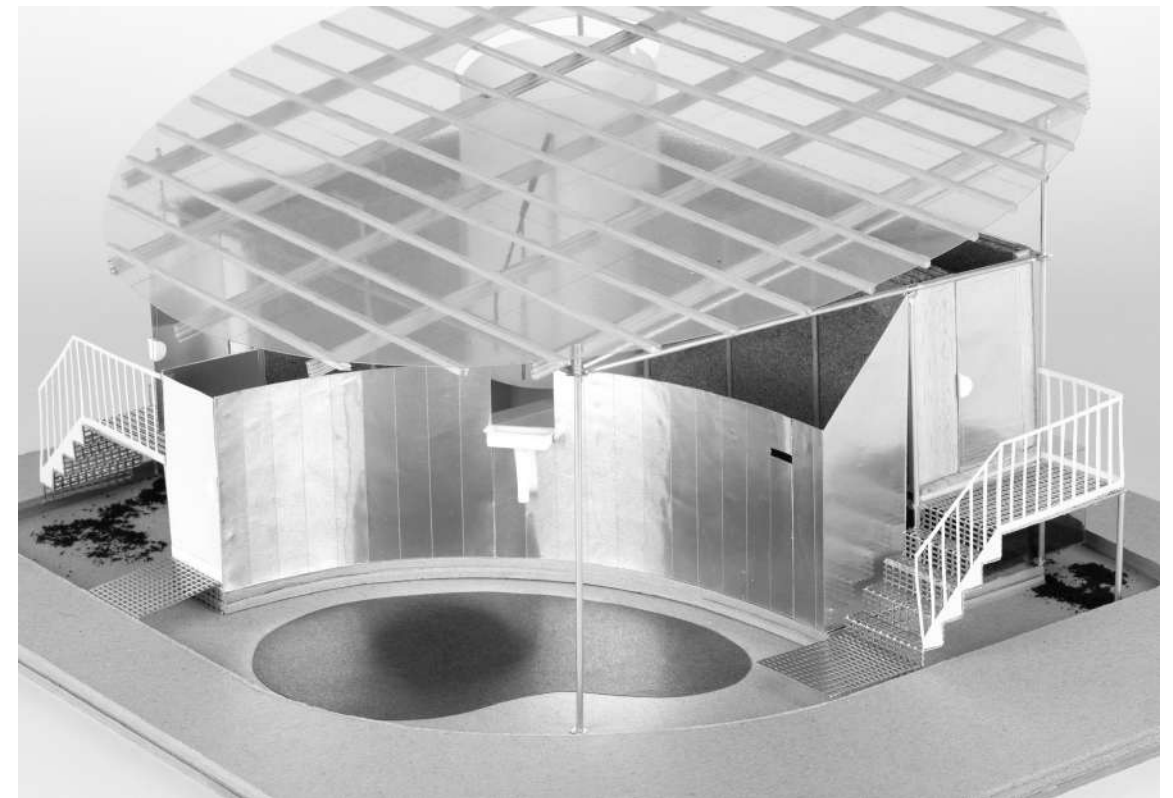


Fig. 134: Architectural model of *The Toilet as an Architectural Experience in Return* (scale 1:33), representing the Rewarding Design Strategy.

of care as part of the exchange for a change in daily habits or routines. Lastly, the approach incorporates the Design Strategy of Critical Distance, considering that designs should not be too similar to familiar systems to convey beliefs, but also not so different that they are no longer considered usable.

The Connecting Design Strategy

The Connecting Design Strategy emerged as an approach to demonstrate the relationality between the design, human users, and the design's restorative impact on the wider natural environment. This approach is assembled and refined from three intermediate design strategies. Firstly, it relates to the Responsive Design Strategy, emphasising the interconnected relationship between human users and non-human species. This strategy seeks to encourage participation and engagement in practices of care by demonstrating the reparative effects of the design for the wider environment. This way, it facilitates collective thinking and learning through architectural design. Secondly, it draws on the Design Strategy of Critical Distance, as it composes designs that may be further removed from the current situation and are therefore more challenging, yet still aim to change

habits by showcasing the impact and non-anthropocentric benefits of the design. Since this approach is more demanding than the previous two advanced design strategies, it requires a certain level of openness from users to open up to the designs and reconsider or change their habits. Although it may lead to designs that are less readily accepted in public spaces, due to their significant distance from the current situation, the strategy remains valuable in generating new ecological-spatial values through design. This brings me to the last design strategy incorporated, namely the Design Strategy of Ecological-Spatial Value. Moving beyond a purely anthropocentric mode of designing, this strategy extends beyond raising awareness through architectural design towards the creation of new ecological-spatial values by, for instance, stimulating commitment, engagement, and care for the environment, thereby attempting to convey the beliefs and values it represents.

Altogether, the Informational Design Strategy, the Rewarding Design Strategy, and the Connecting Design Strategy constitute advanced approaches to shifting mindsets through architectural design. As design approaches, they are transferable to other contexts, such

as architectural design research, critical design in architecture, architectural education, and architectural practice more generally. The design strategies are, as the output of this research, created in the first place to trigger shifts in users' mindsets, since the design of daily living environments significantly influences how people relate to the world around them. In addition, they are also directed at architect-designers, both in practice and in training. They can adopt these design strategies in the broad field of architectural design, entering real-world settings and contexts in which ways of designing can be transformed and passed on to future generations, such as in education. The 'shift in mindsets' thus concerns both the agency of the design and what it triggers, as well as the activity of and approach to designing itself. Accordingly, the design strategies and the lens they entail form the core of the research, centring on the creation of awareness and conscious mindset change through architectural design.

6.4 Key Threads of Reflection

In reflecting on the research, three key threads emerged as crucial in relation to the main ambition and are considered relevant for further investigation. The first concerns the relationship between technology, architectural design, and culture. The second addresses the creation and adoption of ecological-spatial values through architectural design, and the last examines the role of architecture in effecting change by elaborating on the process of moving from speculation towards normalisation.

Technology, Architectural Design, and Culture

This investigation into the agency of architectural design took a specific cultural approach, focusing on the role of architecture in triggering a shift in mindsets and supporting a transformation in how we inhabit the world. In doing so, it interrogated the effectiveness of existing sustainability approaches in architecture, which follow a predominantly technological approach in search of tech-solutions. The research critiqued this dominance of technological and anthropocentric tendencies over architectural design approaches that support a cultural change. In the context of the global climate emergency, I argued that a techno-solutionist approach risks being insufficient because it avoids radical or uncomfortable

change, in favour of the status quo, and is largely steered by the mindset and desires of the general public. When proposing changes that diverge significantly from established and comfortable systems, I argued that a purely techno-solutionist approach cannot, on its own, trigger a cultural shift in patterns of habitation. Consequently, this research examined how architecture can spatially and materially shape 'triggers' through design to foster cultural shifts and long-term transformation in associated patterns of habitation. In this context, habits and spatial practices were identified as key points of influence on mindsets, closely intertwined with cultural norms and values. From the outset, the dynamic relationship between architectural design and culture thus provided a valuable framework for investigation.

In taking a deliberate cultural approach, the conversations on the *Design Scenarios* proved crucial, offering insight into how participants imagined the designs through recurring opinions, cultural convictions, shared narratives, and the socially constructed reality on-site. This is also related to the grounding of the research in a real-world setting and local micro-culture. When discussing the designs with the audience on-site, I observed that some designs triggered friction, making me aware of the cultural norms or values being challenged and destabilised. In such a manner, I scrutinised contemporary toilet norms and surfaced those spatial aspects that were crucial for compromise in changing toilet habits. Whereas I deliberately took a cultural approach in the research, it proved highly difficult to explain in the analysis of the *Design Scenarios* what makes the toilet designs specifically culturally relevant. I therefore fell back on technical and instrumental approaches in the analysis. While a technological tendency was noticeable throughout the process, the research ambition should not be confused with a search for new sustainable sanitation systems or technical solutions.

Firstly, this tendency may be explained by the fact that the toilet, as both an architectural element and a technology, is inextricably linked to technical aspects such as plumbing infrastructure and systems of waste treatment. The inclusion of a technical waste treatment system in the *Design Scenarios* was even deemed necessary by participants, who sought reassurance regarding potential risks of contamination from bodily waste in the unfamiliar toilet design. Secondly, the conversations at the Blikfabriek case study further steered both the research and the



Fig. 135: Architectural model of *The Toilet as Part of an Ecosystem* (scale 1:33), representing the Connecting Design Strategy.

designs in a more technical direction. When I did not pay specific attention as a moderator to maintaining a discussion on the cultural acceptance of toilet design, the conversation automatically shifted towards practical aspects: the design's inner workings, plumbing systems, the logistics of managing bodily waste, and off-grid treatment systems. In this regard, the case study's expectations concerning architectural design were also influential, focusing primarily on a toilet design that functions well, is comfortable, and aesthetically pleasing, rather than on one that acts as a transmitter of ideas or new habits.

Aside from situated reasons specific to the research subject and methodology, there are broader explanations for this tendency towards an instrumental-technological approach in architecture. As architecture is a future-oriented practice, in which architects are primarily trained in problem-solving and finding spatial solutions to specific problems, one explanation may be that the technical aspects of design are simply easier to test than cultural aspects. In my role as design researcher in this context, I have analysed a specific context and culture, broken it down, and searched for spatial solutions or ways to make a valuable contribution. The fact that it became especially difficult to address these challenges culturally reflects a broader tendency within the field of architecture.

Moreover, when a design is discussed to be realised at full scale, such as in Chapter 5 on *Design Exploration III*, the integration of technological and practical aspects even emerged as crucial. When moving from speculation towards realisation, the technical dimension proved to be an inherent part of architectural design. Nearing the realisation, it was almost as if technology came to support architecture, since it cannot be completely detached from it. Within the apparent dichotomy between culture and technology, I therefore argue that it is important not to abandon technology altogether or to view it as the enemy in the pursuit of a cultural approach to architectural design. Instead, the critical integration of technologies in architectural design must be safeguarded, as they are an inherent part of and shape culture. While I argue that technology should be embraced within architecture, I want to add that it remains important to stay critical towards ingrained technologies – such as the toilet – regardless of how long they have been in place and reproduced. When integrating technologies into architectural design,

designers should therefore remain attentive to who or what benefits from, or is affected by, their designs. Through this research, I argue that designers have a responsibility and moral duty to critically question the impact of their designs in a post-anthropocentric manner, with care for the surrounding environment.

Shaping Ecological-Spatial Values by Architectural Design

Moving beyond an anthropocentric perspective, I advocated the importance of questioning who – or what – desires or benefits from architectural design, and of considering its broader impact on the surrounding environment. In the case of the toilet, I addressed the broader lack of accountability surrounding human bodily waste, which is materially supported by current wastewater infrastructure. I argued that the entire flushing toilet system can be understood as a spatial manifestation of the attitude of concealing or avoiding rejected matter, such as bodily waste, out of sight and out of mind, resulting in a significant impact on the built environment. In response to this attitude, I introduced a new relationality with the natural environment through toilet design, repositioning toilets as spaces that hold users accountable for what they leave behind. In this way, I shifted the perspective from user-centred to environment-centred design, rethinking and reshaping behaviour and values.

As outlined at the beginning of the chapter, societal changes in dealing with human bodily waste are already underway, and this shift is becoming increasingly noticeable as awareness of water pollution caused by sewer system failures grows. As argued, recent newspaper articles increasingly problematise wastewater infrastructure as destructive to the environment (Verelst 2020), reframing sewerage from an innovation for human health to a major source of pollution and environmental damage (Symons and Loosveld 2025). Such shifts in perspective highlight the emergence of new values in response to the global climate emergency: a growing desire to care for the environment, alongside an increasing awareness of climate change and environmentally destructive habits.

With this research, I materially support this shift in perspective by shaping alternative habits tied to new ecological-spatial values through architectural design. In response to the current anthropocentric approach to architecture, the research instead contributed to a

form of architectural design that affects its surroundings in a reparative manner. Herein, I deployed design to shift perspectives and raise awareness of environmental needs, as a way to influence users to adopt other values. Architectural design, therefore, became a material transmitter of ideas and ecological-spatial values. The field of architecture, however, still struggles to include non-human species in its focus on design, as it remains difficult to voice or attend to the needs of the environment, while anthropocentric and client-centred traditions remain robust. In response, I argued that a transformation of dominant narratives, discourse, language, concepts, and perspectives is necessary and can be materially supported through architectural design.

As set out at the beginning of the chapter, the initial research ambition is to stimulate a shift in mindsets tied to the adoption of ecological-spatial values through design. This differs from merely convincing people to use a design, as discussed in Chapter 5 on *Design Exploration III*. The ambition of composing architectural designs is therefore not simply for the designs to be used, but to convey new ecological-spatial values tied to ideas or beliefs, as this represents a genuine shift in mindset. While the adoption of a set of beliefs and ideas, represented by the design, marks the final stage in the process of shifting mindsets, this transformation may also consist of fostering openness to alternative perspectives or a willingness to adopt a more favourable mindset. This became particularly tangible during the design discussions on the *Design Scenarios*, where negotiations and compromises concerning the design could be observed. While the initial 'points of compromise' that surfaced remained largely user-centred, for some participants, ecological values and the impact of the toilets on the surrounding environment proved influential. For others, the motivation to change toilet habits stemmed from a perspective of receiving a direct benefit, rather than from ideological reasons. Consequently, the potential use of the architectural design does not automatically equate to the adoption of the values it proposes, which remains the core ambition of the research.

Returning to the 'greater good' of the research, a true adoption of the ideas, values, or beliefs proposed by architectural design requires a certain level of engagement and commitment. This became particularly evident in the case of public composting toilets, where the management of the public toilets, human bodily waste, and compost heaps remains an

uncomfortable and unappealing task. Nevertheless, the central challenge of this research remained to support accountability and engagement with bodily waste through architectural design, thereby triggering the adoption of new ecological-spatial values. As I argued, architectural design here does not simply serve to execute cultural norms and desires, but can be deployed to actively rethink and co-shape habits tied to cultural values and beliefs, leading to long-term changes in patterns of habitation.

The Role of the Architect in Effecting Change: From Speculation to Normalisation

On a more general level, triggering a shift in mindsets may be as small as a slight change in perspective or angle, yet still capable of setting us on a completely new trajectory. As I argued, this could ultimately lead to long-term changes in patterns of living. Here, architects have significant agency, as they shape daily living environments and can influence how people relate to the world around them. In this role, they can respond to user- or client-centred desires, but they can also practise beyond a norm-following future. By establishing a distinct design approach and process that challenged the status quo, I contributed to this move away from a norm-following future, materially supporting changes that are yet to become reality through critical architectural design.

While exposure to unfamiliar or uncomfortable habits through challenging designs may not result in immediate acceptance or behavioural change, it can initiate a gradual process of adaptation. Through repeated exposure by design, such habits may become increasingly accepted and, over time, potentially normalised. In terms of inducing change, I argued that it lies within architects' agency to speculate on alternative habits. This could introduce and expose people to other ways of relating to the environment through design. The exposure by design, embedded within their agency, could gradually lead to the normalisation of these habits and the values they represent, becoming part of everyday routines and lifestyles. From the conviction that architects are active co-shapers of environments, I argued that more architectural design projects should include a similar process: starting with speculation and the transmission of ideas, leading towards long-term cultural changes in patterns of habitation.

In this process of moving from speculation towards normalisation, I developed initial *Design*

Scenarios to trigger debate, pose questions, and open up space for new ideas to grow, primarily acting as transmitters of ideas. Whereas the initial designs did so by informing or fostering greater awareness, subsequent designs advanced towards stimulating engagement and commitment, as this more directly challenged but also demonstrated a genuine adoption of ideas, beliefs, and values. Throughout the research process, the purpose of the designs gradually evolved towards the discussion of a toilet pavilion to be realised at full scale in a real-world context. Here, the intention of the speculative designs shifted from making the ideas and themes they represent discussible towards making the designs imaginable, considerable, and eventually realisable within a real-world context. What distinguished the first *Design Scenarios*, intended to spark reaction and reflection, from the design developed in *Design Exploration III*, discussed in Chapter 5, is that the latter no longer posed the question of ‘what if’ or ‘imagine that’, but instead proposed a fully functioning and realistic design.

Nearing the realisation of the design at full scale within an urban and semi-public setting, more practical challenges emerged than in the first *Design Scenarios*. Whereas the initial scenarios were appreciated as sufficiently distant and safe within the case study, a design intended to be built in reality – even on their site – required greater efforts of persuasion to be considered realisable. By developing the design to a level suitable for construction, it came much closer to reality, marking a clear departure from earlier stages. In this way, the design struck closer to home for the community on-site and was able to challenge habits and lifestyles more directly. As a result, the design proposal allowed for less provocation than the initial speculative designs. The design was, at this stage, not only discussed with users but also with those who would potentially construct it at a 1:1 scale. Although the toilet design has not yet been realised at full scale, the research nevertheless fostered an engaged community on-site and supported a process of collectively thinking on the research subject. In this way, the process of working towards realisation brought people together and generated collective thinking and learning.

Throughout these final discussions around the realisable design, I observed that they unfolded more smoothly and with greater ease than those surrounding the initial proposals. To some extent, this suggested a degree of normalisation within the case study

in how the proposal was received and discussed. The toilet pavilion, however, still represents an unconventional shift and introduces alternative habits relative to the current situation. For this reason, I expect that such a design would not be immediately accepted by visitors to the site who were not part of this extended process of collaboration and gradual normalisation. I therefore argue that the process from speculation towards realisation or normalisation should take place in situ, in confrontation with on-site mindsets, to challenge and support change through architectural design.

How the general public visiting the site would receive the design in real life remains an open and valuable question, raising new challenges associated with building in an urban and public context. I remain convinced that a full-scale, embodied realisation would open up an entirely new field of inquiry. Such a step would inevitably involve engaging with additional challenges related to building in public spaces and confronting often-avoided subjects, such as human bodily waste and toilets, within everyday contexts. At the same time, the realisation of unconventional designs, such as public composting toilets, remains inherently unpredictable in terms of patterns of use, levels of acceptance, and their capacity to effectively convey the ideas, beliefs, and values they seek to embody. Investigating these questions through a full-scale realisation would therefore constitute a valuable direction for further research.



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Appendix 1: Design Discussion Script (Design Exploration I)

January 2023
12 participants
180 min.

INTRODUCTION

18.00: Welcoming everyone and introducing myself

The design discussion will last 120 min. and will be followed by a dinner for those interested. The difference between this design decision, or workshop, and a group interview is that I provide participants with an assignment and methodology, whilst the interview is conducted using a pre-prepared questionnaire.

(Popularised) Main research question (RQ):
“How can architectural design change or influence mindsets regarding ecological ‘toilets’?”

What I intend to gather is insight into current mindsets regarding toilets and more sustainable toilet alternatives. The focus here is to find answers to the ‘why’ (and ‘why not’) questions. The outcome of the workshops will be incorporated into the design process at a later stage.

18.15: Going through the information letter and informed consent form (ICF).

18.30: Start of design discussion (workshop)

A. Presentation of Critical Cartography of the current wastewater system

Background information on how we currently manage wastewater in Flanders, and an introduction to the problems and challenges that are associated with this system.

Transition to what I am doing with this research in this context, and how the design discussion, or workshop, contributes to that.

B. Explaining the assignment: linking statement to models

The participants are handed 10 statements, next to 5 models of toilets, serving as *Conversation Pieces*. The models are only briefly explained. The description includes their title (e.g. *The Constructed Wetland and Interior Pond*)

and a small explanation of their inner workings (e.g. the fact that the toilet is connected to a wetland treatment system). Participants are invited to imagine and interpret the models by themselves, and are encouraged to ask questions for clarification if needed.

The assignment requires participants to associate up to two statements with each model, based on which statements they consider most relevant. The group then discusses each model using the assigned statements as a starting point. Following the discussion, participants are asked whether they agree with the statements in relation to the models and to explain the reasons for their agreement or disagreement.

This happens in 2 rounds: the first round consists of 2 models (*The Smallest Hidden Room* and *The Toilet as a Meeting Place*), and the second round consists of the last 3 models (*An Assemblage of Kitchen and Toilet*, *The Constructed Wetland and Interior Pond*, and *A Scenario of Composting and Gardening to Remove Soil Contamination*). This is because the first two models represent more general scenarios, whereas the remaining three were developed as situated scenarios that could potentially unfold within the Blikfabriek case study.

C. Start of the workshop: Discussion of models 1 and 2

Using the models as a point of reference, the group explores and discusses various toilet-related narratives. The discussion is directed toward examining perceived boundaries and limitations. This process aims to identify and clarify the values, interests, and priorities that shape the group.

D. Transition to discussion of models 3, 4, and 5

Same flow as in subsection ‘C’. As the conversation progresses, I shift the focus to the real-world context in which the workshop takes place: the Blikfabriek. The speculative designs are then discussed within this concrete, real-world setting.

E. Conclusion

Together with the group, I summarise the main points from the design discussion.

20.30: Conclusion of the evening by a group dinner with time for informal conversations

Appendix 2: Design Discussion Script
(Design Exploration II)

June 2024
10 participants
The workshop was conducted on two occasions:
once with residents and visitors of the Blikfabriek,
and once with members of the local Natuurpunt
Hoboken network.
120 min.

INTRODUCTION

18.00: Welcoming everyone and introducing myself

The design discussion will last 120 min.

(Popularised) Main research question (RQ): “How
can architectural design change or influence
mindsets regarding ecological ‘toilets’?”

This research aims to develop insight into current mind-
sets surrounding toilets and more sustainable alterna-
tives. The emphasis lies on uncovering the underlying
motivations and reservations, addressing both ‘why’ and
‘why not’ questions. The findings from the workshops
will subsequently inform the design process.

I am creating speculative designs for the Blikfabriek as a
case study. This series of models is set within the context
of the Blikvelden (in direct contact with the soil, an area
threatened by desiccation as a result of urbanisation
and the Hollebeek being channelled underground) and
features designs for toilets that are based on a construct-
ed treatment wetland.

We will discuss three toilet scenarios in the Blikvelden,
which are not designed as solutions or outcomes but
rather as (challenging) Conversation Pieces that touch on
themes and aim to make them open for discussion.

18.15: Going through the information letter and informed
consent form (ICF).
18.30: Start of design discussion (workshop)

A Presentation of Critical Cartography
of the current wastewater system

Background information on how we currently man-
age wastewater in Flanders, and an introduction to

the problems and challenges that are associated with
this system.

Transition to what I am doing with this research in
this context, and how the design discussion, or work-
shop, contributes to that.

B. Start of the workshop:
Discussion of models

In-depth discussion of the presented design propos-
als, going over them one by one, and briefly explain-
ing the scenarios of *Post-Industrial Care*, *Low-tech
Regeneration of Waste*, and *Climate Responsiveness*
according to the following descriptions:

*The first toilet focuses on the industrial scale of the
Blikfabriek and explores how the vast roof area can be
used to collect rainwater and flush the toilets into the
Blikvelden, where the wastewater is treated in a construct-
ed wetland. The rainwater is collected in this toilet and
transported to the wetland by means of a gravity flush.
The water is collected by the 7,500 m² roof and flows
from the gutter to a collection tank connected to the façade,
which serves as a toilet cistern. The volume of the water
tank is calculated to supply water for three toilets. When
the toilets are flushed, the wastewater travels via visible
pipes that carry the waste above ground to the Blikvelden.
The availability of the toilets depends on the presence
of rainwater. The toilets are therefore operational during
periods of heavy rainfall (winter and autumn) and out of
service during periods of drought.*

*The second model addresses the widespread belief
in our society that technology will solve the problems
created by our unsustainable habits – described by Donna
Haraway (2016) as fragmented ‘techno-fixes’. Instead,
this scenario explores how low-tech interventions can pave
the way for more sustainable designs. The toilet design
pumps groundwater from the reed bed to supply water and
flush two toilets. The toilets are specific source-separated
toilets with a separate collection of solid waste and urine.
After the toilets are flushed, the urine goes to a Pee-Power
battery, which uses the liquid as an energy source and
generates electricity to charge the water pump. The solid
waste goes to a septic tank where bacteria break down the
faeces over a longer period. As regards accessibility, the
toilets may not be used during periods of drought. Because
the wetland needs all the water in summer, the composting
toilets are open during this season. As temperatures are
higher in summer, the thermophilic composting process will*

*process the waste more efficiently during this period.
And the last model evolved from an intention to shift the
current power dynamics from human domination to a
design dictated by the climate. It makes the wetland the
‘client’ by giving it the freedom to decide how and when
the toilet can be used, regardless of the seasons and water
levels. This emerged as a response to ‘climate-resilient’
designs that originate from a human perspective, aiming
to minimise the impact of the climate crisis on our daily
lives. The toilet design collects rainwater on an open roof
that acts as a cistern to flush the squat toilet. After using
the toilet, the water flows gently across the floor, allowing
the wastewater to gradually seep into the water buffer and
undergo primary treatment in the settling pond. The water
level determines the toilet’s accessibility: it is operational
during autumn and spring when water levels are moderate.*

Using the models as a point of reference, the group
explores and discusses various toilet-related narra-
tives for the wetland of the Blikvelden. The discus-
sion of the models is directed toward examining the
boundaries and limitations of what is possible in
this specific situation, asking the question of what is
holding us back, and searching for potential points
of compromise. This process aims to identify and
clarify the values, interests, and priorities that shape
the group.

C Conclusion

Together with the group, I summarise the main
points from the design discussion.

20.30: Conclusion of the evening with time for informal
conversations

Appendix 3: Design Discussion Script (Design Exploration III)

September (2024)–November (2025)
30 participants
This workshop was conducted on multiple occasions, with residents and visitors of the Blikfabriek, as well as with students in the Sanitopia Master Design Studio at the Faculty of Architecture, KU Leuven (February–June 2025). The discussions with the Blikfabriek were organised more as architecture consultations on a preliminary design, without following a design discussion script. The discussions with the students concerned the presentation of the designs as part of *Design Exploration I* and *II* in February 2025, and *Design Exploration III* in June 2025. The workshop from June centred on the design of the toilet pavilion for the case study, and followed the script below.
120 min.

INTRODUCTION

09.00: Welcoming everyone and introducing the research

This PhD research investigates how architectural design can shape new toileting habits that encourage a shift in mindsets regarding how we deal with human bodily waste. The case study of this research is the Blikfabriek in Hoboken, Antwerp, which also serves as the site for the studio. The Blikfabriek currently hosts composting toilets in a semi-public, urban context. However, these toilets are largely considered unsuccessful, as they are rarely used. As a result, the Blikfabriek faces a significant challenge: how to make composting or off-grid toilets acceptable in an urban, semi-public setting. This represents a fundamentally architectural and spatial question. As part of the final stage of my PhD, I am developing a toilet design in dialogue with the Blikfabriek, with the potential of it being realised on-site. What is presented on the table reflects different steps and approaches within this design process. Now that you have all studied the Blikfabriek site, the aim of this workshop is to invite you to respond to the designs. You will be asked to agree or disagree with a series of statements placed on the table and to relate these to the different models. The research would greatly

benefit from your input, as it offers an opportunity to test these ideas with architecture students and designers in training, with a particular focus on spatial and architectural aspects, issues, and parameters.

The assignment is structured as follows:

You will receive a brief introduction to the models on the table, which consist of three different toilets or three distinct design approaches. You will then be given time to read the statements and place them under ‘agree,’ ‘disagree,’ or ‘neutral.’ Once all statements have been sorted, we will discuss them collectively as a group.

09.15: Start of design discussion (workshop)

A. Start of the workshop:
Presentation of scenarios 1, 2, and 3

In-depth discussion of the presented design proposals, going over them one by one:

‘The Wasteful Toilet’ is a toilet design that visibly displays the amount of water consumed for flushing and cleaning. The roof functions as a large bowl to collect rainwater, which is stored centrally in a water reservoir. When a toilet is flushed, the water level on the roof and reservoir goes down, which is visible on the outside as well as in the other 2 toilet spaces. The toilet looks like a sterile object – with white walls and floors – which gives the impression that everything can easily be cleaned and controlled. (Definition of sterile = what does not contain living micro-organisms). After flushing, the wastewater travels from the toilets and sinks via pipes above ground to the septic tank and from there, it goes to the sewers. Instead of concealing, craters are designed to depave the ground and create a visible connection with the underground network. In addition, the craters cause the soil to infiltrate with water and develop into small swamps.

Themes to be discussed by the students:

- ▶ Generating awareness by design e.g., by revealing systems of treatment
- ▶ The shame over our waste and the obsession with cleanliness
- ▶ What is considered hygienic is culturally dependent

Next: ‘The toilet as an architectural experience’. Unlike the previous toilet, this one is a dry toilet, and it is located opposite the wasteful toilet. The toilet as an ‘experience’ deals with the question of what can be done with the amount of water that is no longer used for flushing. So, the intention is that the users receive something ‘in exchange’ or ‘in return’ for changing their habits. At this point, the water experience is not specified (or agreed upon with the Blikfabriek), but to give you some of the examples that are being discussed, it could be: A tap which you can turn from sitting on the toilet, to let water fall in very small drops onto the floor (visual rain curtain, but also sound effect), or a seed bed where plants are growing at eye level of the toilet seat, or it can be used to design a large flow which cleans and flushes a part of the square. So, this toilet intends to create a fun or different experience which you would want to visit. It is supposed to become something engaging, which is also more extended in space. It is the only luxurious toilet in terms of space usage. The focus is not on pursuing as much comfort as possible but rather on creating a playful, engaging experience (since the Blikfabriek asks for ‘something new’, ‘something fun’, ‘something adventurous’ to happen in this space).

The third and last toilet consists of 2 toilet spaces and intends to connect the body in coexistence with living matter. It is the most challenging toilet in the sense that human bodily waste is stored in close proximity to the body, more specifically, right underneath the toilet seat. So, this means that in winter, the seats of these toilets can also be slightly heated from the waste that is decomposing in the compost heap underneath. This design intends that the carbon material (sawdust, which is used instead of water for flushing) is stored inside the thick walls, which create an insulation for the toilet space and a visual barrier to provide privacy. In some details of the models, you might also notice that the walls are not touching the ground, so that the sawdust can easily be brushed with a broom onto the compost heap when the toilets are cleaned. And the intention is also that these 2 toilets are visually connected to the water reservoir, where they will see the water level shrink when the ‘wasteful’ toilet is being flushed. In terms of a connection to the ‘toilet as an experience’, it is possible that the water coming from this toilet will be used to flush the mud that comes from the compost heaps. = A complete toilet pavilion that is flushed into the sewers.

Ultimately, the goal of the toilet pavilion, assembling these ‘Design Scenarios’ is to provide three very different toilets under one roof, presenting toilet users with a variety of options, since changing habits is an individual and person-dependent process.

B Design Discussion of scenarios 1, 2, and 3

The group is given time to read a series of statements and sort them into three categories: ‘agree,’ ‘disagree,’ or ‘neutral.’ The statements include, among others: ‘Urine and excrement should be considered resources,’ ‘Waste should be concealed because it can be harmful to our health,’ ‘Waste treatment should be hidden from view,’ and ‘To shift mindsets, architectural design should be provocative, aesthetic, imaginative, or comfortable.’ Additional statements include ‘Going to the toilet should be a fun experience’ and ‘Waste should not be located close to toilet spaces.’ Once all statements have been sorted, the group discusses their choices collectively.

C. Conclusion

Together with the group, we summarise the main points from the design discussion

11.00: Conclusion of the session with time for informal conversations

Appendix 4: Use of Generative AI

I did not use generative AI assistance tools during the research/writing process of my thesis, except for mere language assistance. DeepL Translate, DeepL Write, Microsoft Copilot, and ChatGPT were used as translation tools from Dutch to English, and to improve the clarity and readability of the PhD manuscript. This included suggestions regarding sentence structure, grammar, conciseness, and the specificity of word choice.

In relation to the subject of toilets and human bodily waste in particular, I observed that generative AI assistance tools consistently concealed these topics, instead using euphemisms and indirect language. For this PhD manuscript, however, it was necessary to use direct language to address these commonly avoided topics. When using generative AI, I was aware that it collects and disseminates normative contemporary discourse, including on taboo subjects. I therefore considered its output to be mere suggestions that I evaluated carefully before adopting them in my PhD manuscript.

The text and images in this thesis are my own, unless otherwise specified, and generative AI has only been used in accordance with the KU Leuven guidelines, and appropriate references have been added. I have reviewed and edited the content as needed, and I take full responsibility for the content of the thesis.





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