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MASTER THESIS REPORT

Integrating circularity in the preliminary design phase: An IAD framework analysis of working rules in Dutch area development projects

Witteveen + Bos

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PREFACE

Dear Reader,

The document presented before you is the result of my final research project for my Master's thesis at the University of Twente. Over the course of six months, I conducted research for Witteveen+Bos, focusing on the often-unknown underlying reasons (working rules) that shape interactions and influence decisions in area development projects in the Netherlands. I specifically examined the rules that directly or indirectly impact how well circularity is incorporated into such projects.

Coming from a background in building construction, where the focus is typically on structures, it was both new and experimental for me to explore the field of area development. This shift in direction presented a fresh challenge and an opportunity to broaden my expertise. At the start, the research was still quite exploratory, but after many evenings and late nights of effort, I am proud to have completed a study that I am truly satisfied with.

I would like to express my gratitude to my supervisor, Marije Schilder, and my supportive colleagues at Witteveen+Bos for their guidance throughout this research. Additionally, I want to thank my academic supervisors, Andreas Hartman and Marc van den Berg, from the University of Twente, for their invaluable academic support. All the guidance and support has contributed to the research report presented before you.

I wish you a very enjoyable and hopefully informative read!

Floris Droste

Voorschoten, 23 January 2025

SUMMARY

This research explores how institutional rules shape decision-making processes and influence the integration of circularity in area development projects. Conducted for Witteveen+Bos (W+B), a consultancy and engineering firm specializing in sustainable and innovative solutions, the study aims to identify actionable strategies to enhance circularity during the preliminary design (PD) phase of a greenfield area development project (ADP). The goal is to identify underlying working rules that affect ADPs and provide practical recommendations for W+B that aligns with W+B's role as a consultant, helping to bridge the gap between sustainability ambitions and real-world practices.

Research design

The Institutional Analysis and Development (IAD) framework (Ostrom, 2005) was used to analyze how shared rules shape decision-making and influence circularity in ADPs. A working rule refers to a shared guideline or norm, formal or informal, that informs decision-making and coordinates actions among stakeholders. The study focused on two greenfield ADPs, Lincolnpark Phase 2 (LP) and Wilderszijde (WZ). Qualitative methods like interviews and observations were employed, to identify these working rules and provide recommendations for W+B to improve circularity in ADPs.

Results

A total of 17 working rules were identified, highlighting key dynamics that influence ADP outcomes and the integration of circularity. In LP, circularity was a project goal, but challenges with collaboration and authority slowed progress. The municipal project manager frequently relied on advice from formal authorities, such as the internal engineering department, which reduced W+B's role. W+B felt their input was not fully acknowledged, and after several circular proposals were declined, they became less motivated to present new ideas. Expert involvement was delayed or absent due to limited budgets and the paying actor's judgment, which was dependent on their assessment of when an expert would be beneficial for the project, ultimately weakening the focus on circularity.

In contrast, WZ did not have a clear ambition for circularity and focused on goals like biodiversity and climate adaptation. Without a dedicated budget for circularity, limited resources made it a lower project priority. Time and budget limitations further restricted opportunities to explore circular solutions more broadly. Despite these challenges, WZ had better team collaboration. Some team members were motivated to go beyond their formal roles and contribute more actively.

Both cases also faced issues with documentation and monitoring. In LP, decisions were limited and not systematically recorded or evaluated. In WZ, W+B saw the value of documentation, but time and budget constraints limited their efforts. Payment structures affected W+B's autonomy. LP's hourly payments required budget approval, limiting freedom, while WZ's lump-sum contract allows for more independent acting.

Fragmented responsibilities also affected both projects. Team members often focused on their individual responsibilities. Unclear roles and responsibilities meant that circularity was often overlooked unless it was explicitly included in the project's scope or contracts.

Recommendations

The recommendations highlight the importance of strategically addressing constraints to improve circularity in projects. W+B, operating without formal authority, depends on early engagement and delivering well-structured advice to influence decision-making. Early-phase efforts are crucial, as initial decisions often determine the potential for circularity throughout the project. By actively including circularity on the agenda of meetings they organize and proposing dedicated sessions, such as workshops, W+B can better inform the client and ensure circularity remains central. This approach embeds circularity into project discussions, fostering understanding and creating opportunities for impactful decision-making.

A strong relationship between W+B and the client is vital to unlocking opportunities for circularity. Building trust and fostering positive experiences can encourage the client to allocate resources or consider adjustments that support circular objectives. Acknowledging contributions of individuals and maintaining open communication create an environment where the involved team members feel motivated to collaborate. This cooperative dynamic makes it easier for W+B to advocate with the client for reallocating budgets or incorporating circular-focused financial incentives, driving decisions that benefit the project's long-term circularity goals.

Internally, W+B can enhance its capacity to promote circularity by strengthening its own processes. Organizing internal workshops and developing a comprehensive knowledge database ensures that circular measures are documented, accessible, and reusable across multiple projects. This structured approach not only helps internal teams align their efforts but also equips W+B to present well-informed, practical solutions to clients. Although implementing such systems may involve initial costs, they offer long-term benefits by improving decision-making and increasing efficiency in later uses, further enabling W+B implement circularity.

Collaboration and knowledge sharing are essential during the design phase to integrate circular principles effectively. By fostering cross-disciplinary discussions involving all relevant actors and demonstrating the benefits of circularity through successful examples, W+B can align diverse stakeholders with circular goals. Exploring funding options, such as subsidies, and aligning project objectives with circular practices can address financial and operational constraints. These efforts ensure that all project actors are informed, motivated, and prepared to incorporate circular solutions, creating a pathway for innovative and practical results that prioritize circularity over traditional practices.

Developed product

To meet W+B's need for a practical and actionable tool, CircuPlan was developed. It guides the efficient use of available budgets while providing tailored suggestions for document-specific circular knowledge. By offering clear, actionable insights on improving circularity within project documents, CircuPlan ensures stakeholders can make effective, informed decisions that align with sustainability goals.

Discussion

This research confirms barriers to circularity identified in the literature, such as regulatory constraints and poor communication, but adds scientific value by uncovering the underlying daily processes and working rules that influence circularity. By identifying 17 working rules and linking them to specific challenges, the study provides a deeper understanding of how systemic barriers interact with individual actions in area development projects, offering new insights into practical dynamics.

However, this study has limitations. The reliance on semi-structured interviews introduces variability in the findings, and the focus on two greenfield case studies limits the generalizability to other contexts, such as brownfield ADPs. Additionally, while the CircuPlan tool is complete, it has not yet been tested in practice, leaving its practical effectiveness to be validated.

Conclusion

This research highlights how institutional rules (working rules) influence decision-making and the integration of circularity in area development projects, offering practical insights and actionable strategies for W+B to bridge the gap between ambition and practice. CircuPlan exemplifies how these insights can be translated into user-friendly solutions, empowering stakeholders to overcome common challenges and prioritize circularity effectively. By addressing barriers like fragmented responsibilities and resource constraints, and highlighting opportunities such as trust-building and knowledge-sharing, the study provides a foundation for meaningful improvements. Aligned with W+B's expertise, the research offers clear strategies to strengthen circularity and sustainability in future area development projects.

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List of Abbreviations

W+B	Witteveen+Bos (Problem Owner)
ADP	Area development project
IAD-Framework	Institutional Analysis en Development Framework
CE	Circular Economy
SK	Sketch-design
PD	Preliminary design
DD	Definitive design
M&M	Management & Maintenance (Municipality department)
MEAT-criteria	Most Economically Advantageous Tender
ECI	Environmental Cost Indicator
TNN	The New Normal (Dutch: Het Nieuwe Normaal)
WZ	Wilderszijde (case study project)
LP	Lincolnpark Phase 2 (case study project)

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1. INTRODUCTION

The Netherlands faces several critical sustainability challenges, such as shrinking green spaces (Tilburg, 2022)**,** high levels of nitrogen and carbon dioxide pollution (Government of the Netherlands, w.d.)**,** and a decline in biodiversity (Hordijk, 2024)**.** In response, the Dutch government implemented the National Climate Agreement setting a clear goal with 55% CO2 reduction (Government of the Netherlands, 2019)**,** and the nature conservation act which aims at protecting the wild animals and plants (Government of the Netherlands, w.d.)**.** While these initiatives aim to address these challenges, they also add significant complexity to projects. Most policies introduce new requirements, requiring existing processes to adapt and evolve. To comply, organizations have to apply for environmental permits when performing certain activities and are forced to adopt to a forward-thinking approach, focusing on minimizing future impacts through careful resource management.

Sustainability is defined by the United Nations (2017, p. 16) as "meeting the needs of the present without compromising the ability of future generations to meet their own needs." This balance is achieved by integrating economic growth, environmental health, and social well-being (Purvis, Mao, & Robinson, 2018)**.** For environmental area development, this translates into five pillars: water and soil management (including climate adaptation), sustainable mobility, biodiversity, sustainable energy, and circularity (Günther, Manshoven, & Paleari, 2023). Each pillar addresses a unique aspect of environmental sustainability, but they are closely interconnected. Decisions in one area often affect others. For example, adopting sustainable energy solutions can improve biodiversity and ecosystem health by reducing pollution and supporting climate adaptation, but these solutions can require new materials unable to recycle negatively affecting circularity. Successfully integrating these pillars into area development requires a holistic approach that ensures compliance with regulations while addressing the broader goals of sustainability. Circularity emerges as a crucial aspect, providing a framework for optimizing resources and reducing waste across the lifecycle of development projects.

Introduction to Circularity

Circularity is a fundamental pillar of sustainability, aiming to transform our existing economic model from a linear, resource-intensive system to a regenerative and restorative one (Ellen McArthur Foundation, 2022). The current system follows a take-make-use-dispose model, relying on extracting raw materials and disposing of them as waste after use. In contrast, the concept of circularity promotes a closed-loop system where materials and resources are kept in use for as long as possible by reusing, refurbishing, and recycling them. This approach aims to extend the lifecycle of materials and reduce waste, thereby lowering the demand for new raw resources and minimizing the environmental footprint (Loon, Diener, & Harris, 2021).

The construction sector is a significant contributor to waste in the Netherlands, accounting for almost 24% of the total waste generated, making it the highest waste-producing sector in the country (CBS, 2019). Therefore, the Dutch government has set an ambitious goal of achieving a 50% circular economy (CE) by 2030 and a fully CE by 2050 (Rijksoverheid, n.d.). Reaching this target requires support from both public and private sectors to transform existing systems and infrastructure built around the take-make-use-dispose model. This shift demands significant time and investment from all stakeholders to change mindsets, policies, and infrastructure towards a circular economy. The government promotes circularity through subsidies, legislation, and guidelines aimed at enhancing sustainable practices. While CE principles hold promise for reducing waste and improving resource efficiency, their implementation in ADPs faces numerous challenges.

The Dutch government frequently uses the 6R-ladder as developed by Potting et al. (2017) framework in research and reports as a key strategy for sustainable resource management and circular economy practices (Rijksdienst voor Ondernemend Nederland, 2020; Lucas,

Brink, & Oorschot, 2022). This framework consists of six hierarchical strategies: Refuse, Reduce, Reuse, Repair, and Refurbish, Recycle, and Recover. Each step on the ladder represents a progressively less desirable intervention, aiming to minimize waste and maximize the use of resources throughout their lifecycle. By aligning the principles of the 6R-ladder with development processes, it becomes a practical tool for guiding circular decision-making.

The first two steps, Refuse and Rethink (R1), prioritize avoiding or radically rethinking the need for products and materials. This could mean choosing not to produce or use certain products altogether or innovating entirely new ways to meet the same need. For instance, replacing single-use items with multifunctional alternatives or intensifying product use through sharing platforms can significantly reduce material demand. These strategies set the foundation for circularity by questioning consumption itself.

Reduce (R2) focuses on minimizing the use of raw materials during production and product usage. Efficient design, resource-saving technologies, and practices that lower material input without compromising functionality is key here. For example, designing lightweight packaging or optimizing manufacturing processes exemplify how businesses can effectively implement reduction strategies.

The third strategy, Reuse (R3), emphasizes extending the lifespan of products by passing them to new users in their original form. Platforms for second-hand goods or products designed for durability fall under this category. Businesses that design products with extended lifespans or support reuse through leasing models contribute to this vital step in the R-ladder.

Repair and Refurbish (R4) highlight ways of maintaining or repurposing the value of existing products. Repair focuses on fixing defects to extend usability, while refurbish involves updating or modernizing older products. Remanufacturing takes parts from used products to create new ones, often to original specifications, while repurposing involves finding entirely new applications for materials or components. These strategies ensure that resources are kept in use for as long as possible.

At the fifth level, Recycling (R5) transforms waste materials into raw materials that can be reintroduced into production processes. This can involve high-quality recycling, where materials retain much of their original value, or lower-quality recycling for less demanding applications. Recycling is essential for managing waste streams and recovering resources from materials that cannot be reused or repaired.

Finally, recover (R6) represents the least desirable option on the ladder, focusing on energy recovery from waste through incineration. While it prevents waste from going to landfills, this step should only be used when all other options are exhausted. The aim in a circular economy is to minimize reliance on recovery by maximizing earlier interventions on the ladder.

These 6 circular strategies provide a framework that can be used to help determine the level of circularity in the project and to identify the best strategies for future designs with the goal of optimizing circularity in the project. Importantly, these strategies are arranged in order of prioritization, with the higher levels representing more desirable approaches for achieving circularity. The ladder helps structure the otherwise vague concept of circularity, offering clarity and direction. By providing a structured approach, it aids in defining and optimizing circularity in area developments, helping decision-makers choose appropriate strategies from the 6R ladder to enhance sustainability outcomes.

Introduction to area development

An Area Development Project (ADP) involves the comprehensive development of a specific area, encompassing all its elements such as infrastructure, buildings, utilities (cables and pipelines), water management systems, and traffic planning, offering a broader scope than, for

example, the development of a single building. ADPs typically spans approximately seven years from the initial concept to the commencement of construction (NEPROM, 2022). However, larger projects may require significantly more time, depending on the project's type and scale. An ADP typically comprises four distinct phases (Kluts & Miliutenko, 2012), which are sequential yet may overlap.

The Initiation phase is the starting point of an ADP. This phase focuses on identifying issues in the area, assessing the need for development, engaging stakeholders, and analyzing the conditions of the location. Research such as environmental and economic studies helps determine whether an ADP is necessary or if alternative solutions are more appropriate. The phase concludes with the development of a structure vision and a feasibility study, leading to a decision on whether to proceed.

The Feasibility phase follows and is divided into three subphases: definition, design, and preparation. During the definition subphase, stakeholders align their ambitions and create a spatial development plan, detailing the vision for land use, infrastructure, and public spaces. The design subphase refines this vision into concrete plans and consists of three stages:

- Sketch Design (SD): Converts initial ideas into a general layout.
- Preliminary Design (PD): Defines specific object locations, adds technical details, like the first materialization, and area studies to ensure plan optimization while maintaining feasibility.
- Definitive Design (DD): Finalizes materials and specifications for permit applications. The preparation subphase focuses on implementing the land-use plan, securing permits, creating detailed construction plans, and ensuring resources are in place for the next phase.

The Realization phase begins after permits are secured and involves the construction of the area based on the definitive design. Contractors are selected, and construction is closely monitored through inspections and progress meetings. Adjustments may be made to address unforeseen challenges, ensuring the project meets its quality and safety standards.

The final phase, Area Management, ensures the functionality and longevity of the developed area through regular maintenance, repairs, and upgrades. This phase continues until substantial redevelopment is necessary, starting the cycle anew. The building environmental permit obtained earlier supports ongoing improvements and adaptations to meet evolving needs.

Introduction to Witteveen+Bos

The problem owner is Witteveen+Bos (W+B). W+B is a large consultancy and engineering firm with approximately 1,450 employees in 10 different countries (Witteveen+Bos, 2024). W+B is a firm that specializes in the development of intelligent and sustainable urban environments. The projects of W+B vary from infrastructure to energy transition, to water management, to urban planning projects. The company has worked on projects all over the world and is dedicated to developing innovative and sustainable solutions to various challenges, contributing to addressing global problems. This research is conducted in collaboration with W+B, with the aim of directly addressing their specific challenge of integrating circularity into ADPs. By partnering with W+B, this study benefits from their expertise and ensures that the solutions proposed are both practical and aligned with their operational goals. One of the challenges W+B currently faces is determining how and at what key decision moments circularity can be effectively integrated into their ADPs, ensuring that sustainability goals are met without compromising other critical project aspects.

1.1 PROBLEM STATEMENT

The structural and successful implementation of circularity is the challenge faced by W+B. The inclusion of circularity in an ADP involves integrating principles such as reducing waste, optimizing resource efficiency, and designing systems for material reuse throughout the project lifecycle. Incorporating circularity into ADPs requires a thorough understanding of CE principles and the area development process. Early integration of circularity can have the most significant impact, but effectively and consistently implementing circularity remains a challenge, even for projects with clear sustainability ambitions. This inconsistency leads to varying levels of success in achieving the desired circularity outcomes, an issue that W+B, as a consultancy and engineering firm, faces in its projects. Balancing circularity ambitions with other project goals such as costs, planning, regulations, and the diverse objectives of stakeholders like municipalities, future residents, and W+B itself is critical for ensuring practical feasibility and maximizing value.

At the beginning of a project, the potential to make the most impact on circularity is at its highest. Especially in the PD stage, the most specific and measurable impact can be achieved, as many key decisions, like spatial design, materialization of bigger components, and project foundation is determined. In this stage, the ambition can be formulated but lacks sufficient information to describe precise requirements. As the project progresses, decisions are made, and more information becomes available. While this reduces uncertainty, it also limits the freedom to make impactful changes, as earlier decisions constrain future options. This iterative process highlights a key tension in integrating circularity effectively into area development projects.

The process W+B uses in its role in area development is widely understood by both the organization and its actors. However, the structural implementation of circularity has not yet been sufficiently realized, indicating ongoing challenges in its consistent and effective application. Despite established sustainability ambitions, circularity is often deprioritized due to competing factors such as costs, timelines, regulations, and conflicting stakeholder objectives. Limited funding or resources to support circularity, as well as tools that are often unknown, underutilized, or constrained by practical limitations, further hinder progress.

As with any complex process, there are implicit reasons that affect the underlying dynamics of how projects are run and that play a significant role in shaping the integration of circularity. Such a reason is called a working rule, on the definition of a working rule (which is sometimes shortened to just "rule" later in the text) will be elaborated on in Chapter 3.2. These implicit rules, while not always explicitly recognized, may inadvertently hinder the successful implementation of circularity in ADPs. Later in the text, the word "rule" is sometimes used to refer to a working rule.

This highlights the need for deeper insight into these dynamics and a more structured analysis to address their influence. From a scientific perspective, understanding these implicit working rules can provide critical insights into the systemic factors that shape decision-making processes in ADPs. Such insights not only advance theoretical knowledge about organizational behavior and systemic barriers, but also guide informal practical strategies that can be used for enhancing the integration of circularity. This research aims to uncover these implicit working rules and explore their impact on circularity to identify actionable ways to systematically and effectively integrate circularity into area development projects.

1.2 RESEARCH OBJECTIVE AND SCOPE

To address the outlined challenges, this research focuses on understanding and improving the integration of circularity within ADPs. This dual approach directly responds to the difficulties faced by W+B in embedding circularity into their area development projects. To tackle these issues, this research aims to achieve two primary objectives: firstly, to gain a better

understanding of the underlying working rules, which are crucial as they influence decision-making processes and stakeholder interactions. These rules contribute to whether circularity is successfully integrated into the ADP process of W+B, shaping both opportunities and barriers to achieving the circular goals. Secondly, the research seeks to develop practical advice to structurally help improve circularity in future ADPs of W+B, aligning theoretical insights with actionable strategies for implementation. This dual focus ensures that the research not only identifies barriers but also provides clear guidance for addressing them.

The research will focus specifically on the PD phase. This phase is critical because many design options are made or can still be adjusted, yet the foundation is established with the known ambitions, vision, and initial requirements. These requirements are often vaguely described at this stage, providing freedom in the design process since much information is still unknown.

The research will be conducted on greenfield ADPs, which involve the development of rural landscapes into urban areas. Unlike brownfield projects, greenfield projects do not have existing buildings or infrastructure, making them less complex and allowing for a more in-depth analysis within the available research time. It also allows designers to optimize the area based on current sustainability principles.

Over the past decade, the prioritization of circularity has increased, and greenfield projects provide an opportunity to incorporate the latest views and methods regarding sustainability. These projects generally face fewer regulatory and external influences, making them less complex. In contrast, redeveloping existing areas often involves challenges such as monumental regulations, harmful materials, polluted soil, and a larger number of influential stakeholders.

Understanding how and when to act in the process to maximize impact in circular solutions is crucial for improving circularity. By identifying whether certain actions hinder or promote circularity, stakeholders can make better-informed decisions. A deeper understanding of the consequences of various decisions and which working rules need adjustment can actively improve circularity.

The first research outcome is the identification of existing working rules and their influence on the level of circularity. Understanding these rules will clarify the reasons behind stakeholders' actions and interactions in the ADP process. This information will be used to assess how circularity is currently integrated into practice and what adjustments are needed to improve circularity in day-to-day operations.

The second research outcome is an advisory report detailing which working rules should be adjusted and how these changes can improve circularity. Additionally, W+B has expressed a desire for a practical, user-friendly tool that includes concrete measures for implementation. The design of this tool will be based on the working rules identified during the research, ensuring it aligns with W+B’s needs and supports effective integration of circular principles into their ADPs.

The primary consideration of this research is to improve the process to better incorporate circularity. While the technical aspects of different circularity measures and the relation of circularity with the other four sustainability pillars will be partly included, they will not be the focus.

1.3 RESEARCH RELEVANCE

Sustainability, and particularly the aspect of circularity, is a critical issue in construction projects. Within ADPs there is significant potential to make impactful changes, as these projects often generate a lot of waste and require a lot of materials. Understanding the existing

working rules that either hinder or contribute to the inclusion of circularity in the preliminary design phase of greenfield area development projects in the Netherlands is essential. Identifying and analyzing these working rules can reveal the underlying reasons behind certain decisions and their effects on the level of circularity. This knowledge is crucial for making informed adjustments that foster a circular mindset and process.

Identifying these working rules involves examining the current practices, interactions, and decision-making processes in ADPs. Understanding why certain decisions are made and how they impact circularity can provide valuable insights into what changes are necessary to enhance circular practices. This research will explore the dynamics between stakeholders, regulatory frameworks, and project-specific factors that influence the level of circularity.

The relevance of this research lies in its potential to contribute to the systematic integration of circularity into W+B's ADP process. By identifying the specific working rules that need adjustment and providing practical advice on how to implement these changes, this research can help stakeholders adopt a more circular approach. This can lead to the more intensive application of circular strategies within ADPs, resulting in environmental gain.

2. RESEARCH DESIGN

The objective of this research will be addressed through two research questions. The first question focuses on identifying the underlying working rules, and the second looks at how the findings can be applied in practice.

Research question 1

What are the underlying working rules in greenfield area development projects in the Netherlands, with a primary focus on the preliminary design phase, and how do these rules impact the level of circularity?

Research question 2

How can the area development process of green field area developments be adjusted to better include circularity in the preliminary design phase considering the identified working rules?

The foundation of this research was established through an extensive literature review, which provided the analytical lens for the study. By examining existing literature on CE concepts, identified challenges, potential solutions, and various research frameworks, the review ensured that the study was grounded in established knowledge. This process not only offered a theoretical basis but also highlighted gaps that required further exploration. The analytical lens developed through this review was essential for maintaining the study's relevance and its focus on addressing both academic and practical challenges.

2.1 PART 1: IDENTIFYING WORKING RULES

The research design was developed to identify the institutional rules within the PD phase of ADPs. By understanding why certain decisions are made, this research aims to uncover opportunities for systematic improvements in future and potentially ongoing ADPs. The working rules will be analyzed within two case studies. The case studies will be projects of the problem owner W+B.

The selection of case studies plays a critical role in this research. Careful consideration was given to defining criteria and selecting projects that provide meaningful insights into the institutional dynamics and decision-making processes affecting circularity. In line with Yin (2009), both practical and substantive considerations were considered:

- Practical considerations included the availability, quality, and relevance of data from the case studies. Yin highlights the importance of ensuring that the chosen cases provide sufficient and meaningful data to support the research goals. Potential challenges, such as misjudging data quality or its applicability, were carefully evaluated to minimize risks.
- Substantive considerations focused on ensuring that the selected projects aligned with a "compelling theoretical framework." In this research, this means selecting projects that provide a clear lens to examine institutional rules and their impact on circularity within ADPs.

Yin (2009) highlights the importance of using multiple case studies to strengthen the research findings. Although including more than two cases could offer broader insights, the complexity of the cases and time limitations made it necessary to focus on just two case studies. This decision ensures a detailed analysis while keeping the research manageable and aligned with its objectives.

To develop a robust set of criteria, discussions were held with employees within W+B. This collaborative process ensured that the criteria were both realistic and tailored to the research

objectives. The goal was to select case studies that not only met the general requirements for a strong case study design but also provided specific insights into the dynamics of circularity in area development. The following criteria were established to guide the selection process:

- Project Status: Projects had to be ongoing to allow for real-time observation and access to stakeholders involved in active decision-making processes.
- Geographical Location: Projects were limited to the Netherlands to ensure uniformity in regulatory and institutional frameworks, avoiding complexities introduced by international variations.
- Development Type: Only greenfield development projects were considered. These projects, starting from an undeveloped state, provide clearer insights into the decision-making process without pre-existing structures influencing outcomes.
- Primary Function: Projects needed to have a primary focus on residential development, as this is the predominant function in area development and aligns with the focus of the research.
- Data Accessibility: Information about the projects had to be publicly accessible or shareable within the organization to ensure comprehensive analysis.
- Project Phase: Projects needed to have completed the PD phase for at least one major element (e.g., a subarea or primary infrastructure), as this is the focus of the research.
- Recency of Decisions: Projects that were too close to completion were avoided, as stakeholders might struggle to recall decisions made during the PD phase.
- Project Ambitions: Projects with varying levels of ambition regarding circularity were prioritized to analyze how these ambitions influenced the decision-making processes.

Based on these research-specific criteria and Yin's (2009) considerations, two case studies were chosen.

Casestudy 1: Lincolnpark phase 2

Lincolnpark phase 2 (LP) is the first case study project and does meet all the criteria. LP is located in Hoofddorp, within the municipality of Haarlemmermeer. The project exemplifies the ambition of integrating sustainability and circularity into urban planning. Positioned at the edge of the city, LP is a greenfield project designed to transform a mostly agricultural landscape into a vibrant and multifunctional urban area. This project aligns with the municipality's broader vision of creating sustainable, inclusive, and future-ready communities.

LP is a residentially focused area development project, with primary ambitions of establishing an energy-neutral, circular, climate-resilient, healthy, and socially inclusive neighborhood. It is characterized by mixed land uses, including diverse housing types, commercial spaces, like a school and sports facility, and green public areas. The overarching design principles emphasize environmental stewardship, promoting active transportation such as walking and cycling, and creating a healthy, livable environment.

LP provides an opportunity to examine how circular ambitions are translated into actionable strategies, how these strategies shape the development process, and which working rules influence decision-making. This makes the project particularly relevant for exploring the practical application of circularity in urban development and contributes significantly to the research objective.

Furthermore, the municipality of Haarlemmermeer is part of two circular initiatives: Cirkelstad and The New Normal (TNN, in Dutch: Het Nieuwe Normaal). The CE initiative, Cirkelstad, operates in the municipality of Haarlemmermeer, which is part of the Amsterdam Metropolitan Region. Cirkelstad focuses on making circular construction the standard by facilitating knowledge exchange, collaborative projects, and community engagement (Cirkelstad, sd). The second initiative TNN is a new standard for circular construction that provides clear circularity

measurement units and calculation methods. Actors can use this standard for defining measurable circularity goals (Het Nieuwe Normaal, sd).

Casestudy 2: Wilderszijde

Wilderszijde (WZ) is the second case study project and does meets all the criteria as well. WZ is a new primarily residential area development project by the municipality of Lansingerland. Positioned between Bergschenhoek, Berkel en Rodenrijs, and Rotterdam, this greenfield project is set to transform the Boterdorpse polder into a multifunctional urban area, supporting the municipality's vision for sustainable, inclusive, and future-ready communities.

The main goals of the project are to enhance biodiversity and ensure climate adaptation. WZ is planned as a connected neighborhood that integrates with the surrounding landscape while fostering interaction and community cohesion through a carefully designed network of green and blue spaces. This network provides accessible, safe, and green environments that encourage recreation, social interaction, and sustainable living. While sustainability is a key aspect of the development, the project focuses on creating a biodiverse and climate-resilient area, with circularity being a secondary consideration. Although circularity is not a primary project objective, the development offers a useful case to explore how circular principles can complement the existing ambitions and what strategies could enhance their implementation.

Casestudy comparison

The characteristics of both projected are given compared in Table 1. WZ and LP are both greenfield ADPs, making them well-suited for comparison in this research. As greenfield developments, neither project faces the constraints of existing infrastructure or buildings, providing a clearer context to study how circularity is integrated into decision-making and working rules. Their similarities in starting from an undeveloped landscape allow for a focused examination of institutional dynamics and the influence of working rules on circularity without interference from external factors common in brownfield projects.

Despite both being greenfield projects, the two case studies have different ambitions regarding circularity, providing a strong basis for comparison. WZ focuses primarily on biodiversity and climate adaptation, treating circularity as a secondary consideration. This allows for an exploration of how circular principles can complement other sustainability goals. In contrast, LP prioritizes circularity as a central ambition, offering insight into how circularity is implemented when it is a primary focus.

These differences in priorities enable an analysis of how working rules are shaped by the emphasis placed on circularity and how this emphasis impacts decisions during the preliminary design phase. By studying the working rules in both projects, the research can uncover how circularity is prioritized, balanced, or integrated into broader sustainability efforts, revealing universal patterns and project-specific dynamics.

The shared context of greenfield developments in their early stages provides a common foundation for analysis, while the differences in ambitions, approaches, and project characteristics allow for deeper insights. Examining these projects together highlights how the difference in goals influence the formulation and application of working rules.

Table 1: Case study attribute comparison

	Wilderszijde (WZ)	**LincoInpark Phase 2 (LP)**
Location	Municipality of Lansingerland	Municipality of Haarlemmermeer
Type of Project	Greenfield project	Greenfield project
Expected size (approximately)	2700 homes	1700 homes

Project ambitions	All the sustainability aspect but with a higher focus on biodiversity and climate adaptive	All the sustainability aspects but with a higher focus on circularity
Important project Characteristics	Ecologic focus, climate adaptation, use of second-hand materials, circular bridges	- High circular ambitions, energy-neutral, socially sustainable, - Circular plan drafted
Project status	First subarea is constructed next sub area plan is in progress	First subarea being tendered

Data Collection

To provide a comprehensive understanding of the institutional rules within the PD phase of ADPs, a combination of qualitative data collection methods is used. These methods complement each other, ensuring both a theoretical base and practical relevance while identifying the working rules influential on the decision-making process.

A document analysis is an important first step in understanding the base and formal status of the case studies. It involves reviewing materials like planning reports, circularity strategies, and internal project documents. These sources help uncover the structural foundations, processes, and objectives shaping the projects. This method provides a clear starting point for understanding how the case studies are organized and approached.

Semi-structured interviews with key stakeholders form a major part of the data collection process for this research. The selection of stakeholders is carried out in collaboration with project managers at W+B. The research objectives are explained to the project managers, and together, potential key stakeholders are identified based on their relevance to the research goals. Following these discussions, a final selection of stakeholders is made.

Key stakeholders are selected from various organizations due to the limited involvement of W+B personnel in the projects and to incorporate external perspectives on W+B's role and actions. For the LP project, only one person from W+B is actively involved during the research, which limits the number of possible relevant interviews. In contrast, the WZ project, being larger, has three people from W+B actively involved, allowing for more interviews. Cobern and Adams (2020) emphasize that the required number of interviews depends on the type of research and necessitates a judgment based on available information. Accordingly, the number of interviews is determined by balancing the need for sufficient input with the potential risk of diminishing returns from excessive interviews. The distribution of responsibilities, especially related to project circularity, also plays a role in this decision. For the LP, the head of the internal engineering bureau of the municipality does not respond to several interview requests, which further limits the number of interviews. This leads to a greater difference in the number of interviews between the case studies than intended.

The main interview questions are prepared, and the interview form is provided in Appendix A. The interviews explore why decisions are made, how institutional rules are applied, and what challenges arise when implementing circularity. The flexible nature of this interview style allows for deeper dives into specific topics, depending on the expertise and perspective of the interviewee. All the interviews are recorded, from which the interview reports are drafted, summarizing the interview answers to find the essence. These interview reports are shared with participants to confirm accuracy and ensure the information can be publicly used. This step adds credibility to the findings and aligns with ethical research practices. The recordings must be kept confidential as agreed with the interviewees.

The interviewed people are shown in Table 2, including their employer, function within the project, and their interview-ID, which is used to refer to the interview later in the project. Each interviewee is informed at the beginning of the interview about the research objective and the

purpose of the interview to guide the discussion in a useful direction. This approach, combined with the main and additional interview questions, allows interviewees to determine what they consider relevant information to share.

Table 2: Research interviewees

Function	Casestudy	Employer	Interview-ID
Project Manager	LP	W+B	LP1
Sustainability Advisor for Civil Engineering and Infrastructure	LP	GM Haarlemmermeer	LP2
Landscape Architect	LP	OKRA	LP3
Project Manager	LP	GM Haarlemmermeer	LP4
Landscape Architect	WZ	W+B	WZ1
Project leader public spaces	WZ	W+B	WZ2
Project Manager	WZ	W+B	WZ3
Project Leader for Development of Construction Sites	WZ	GM Lansingerland	WZ4
Project Manager	WZ	GM Lansingerland	WZ5
Civil Engineering Manager for Residential Areas	WZ	GM Lansingerland	WZ6
Contract and Procurement Expert	Not case specific	W+B	AG1
Circularity Expert	Not case specific	W+B	AG2

Additionally, two informal data gathering methods are used. First, informal conversations with other team members, informal conversations with interviewees, and other people with relevant knowledge about the topic. Unlike formal interviews, these discussions offer a more casual perspective, adding depth and context to the formal data collected through other methods. Second, real-time meetings of both case study projects are attended. Real-time meeting observations offer valuable insights into how stakeholders interact, how institutional rules are applied in practice, and how project goals are negotiated. Observing these processes firsthand gives a clearer sense of how decisions are actually made, beyond what is documented or described in interviews. It also helps validate findings from other methods by showing how theory translates into practice. Any inconsistencies or gaps in the data can be addressed through these observations.

By combining these methods, the study ensures that different data collection approaches complement and confirm each other, providing a more robust understanding of the working rules and their influence on circularity in ADPs. Each method contributes unique strengths, offering insights into both the formal processes and the more subtle, day-to-day dynamics of decision-making. This interplay between methods adds reliability to the findings and provides a clearer view of the challenges and opportunities in leveraging institutional rules to promote sustainable development.

Data analysis

Thematic analysis is used to analyze the interview reports and identify the working rules. Responses are systematically reviewed to understand how these rules influence decision-making within projects, particularly in relation to circularity. By considering the interviewees' roles, the analysis pinpoints the effects of different working rules. For instance, landscape architects focus more on the development of the design, while project managers emphasize the project process. This role-based analysis helps connect specific outcomes to the underlying working rules, providing deeper insight into their impact on project dynamics.

The formulation of the working rules is based on this reasoning, incorporating the observed effects and the decisions made. Additional insights and confirmation of certain rules are obtained through informal discussions with project members and observations during meetings. This approach ensures that the identified working rules capture both the formal structures and the informal, flexible elements of decision-making within the projects.

A cross-case analysis is then conducted to uncover both the similarities and differences between the working rules identified in the two projects. This comparative method helps highlight shared patterns as well as case-specific nuances, offering a more detailed understanding of which rules are unique to each project, and which have broader, mutual relevance. By identifying rules that apply across both cases, it becomes possible to determine which elements are most suitable for inclusion in the formulation of the advice and the eventual development of a practical and usable research product. This step is critical for ensuring that the recommendations derived from the study have both a fundamental base and are applicable to other ADPs.

The analysis process ensures that the working rules capture both shared patterns and unique nuances across the two projects. By integrating insights from thematic and cross-case analyses, the research identifies rules with broader applicability, forming a solid foundation for practical recommendations and tools to enhance circularity in ADPs.

2.2 PART 2: CHANGING WORKING RULES

The identified working rules form the basis for developing recommendations for W+B, the problem owner, to enhance circularity in their ADPs. These recommendations aim to address the findings from the working rules, focusing on practical and actionable solutions. Additionally, W+B expresses a clear desire for a tool that is both practical and easy to use. Depending on the results of the recommendations and identified needs, a tool is developed to support these goals. This tool is specifically designed to align with the working rules, enabling W+B to integrate circularity more effectively into both current and future ADPs.

The recommendations address specific areas in W+B's processes, such as identifying opportunities for early integration of circular principles, improving collaboration among stakeholders, and optimizing decision-making to prioritize sustainability. These steps are designed to fit within W+B's existing operational framework, ensuring that the suggested changes are both realistic and manageable. By focusing on practical and achievable measures, the advice aims to create tangible improvements without requiring significant changes to current workflows.

During interviews with project managers and other stakeholders from the case studies, participants are asked for their ideas on what could help improve circularity. They are also asked what type of tool or product they think would work best in their daily work. This input helps ensure the product addresses the actual challenges faced by the people involved in area development projects.

In addition to the case study interviews, informal discussions are held with experienced W+B colleagues who specialize in circularity and area development. Their function and employer are provided in Table 3. These discussions provide additional input on what kinds of tools are already available and what challenges W+B faces in applying them. These colleagues also share their thoughts on how a new product can support W+B’s goals and improve their work processes.

Table 3: Informal conversations about the most optimal research product

Function	**Employer**
Strategic Sustainability Advisor	Municipality of Amsterdam

Team Leader for Building Project Management	W+B
Project Manager for Sustainable Urban Development	W+B

The information from the interviews and discussions is combined to determine what the product needs to include. It needs to be practical, easy to use, and preferably flexible enough to apply to different types of area development projects, like greenfield or brownfield projects. By focusing on these aspects, the product is designed to meet the needs of its users while supporting W+B's goal of improving CE while minimizing extra costs.

Finally, the type of product that best meets these needs is chosen. This decision is confirmed by talking to project managers about what would help them most in their work. The aim is to develop something that can be used easily within existing processes and does not require major changes to how people work.

3. LITERATURE REVIEW

The literature review aims to identify the key challenges and existing solutions related to implementing CE principles in the design phase of ADPs and to highlight gaps that existing research has not addressed. The insights gained from this review will guide the development of practical recommendations to enhance circularity in future ADPs. Additionally, a suitable framework is selected, accompanied by a justification for its choice, to provide a structured approach for analyzing and addressing the identified challenges and gaps.

3.1 CIRCULAR DESIGN IN AREA DEVELOPMENT PROJECTS

Challenges in circular design

Implementing CE principles in ADPs is a multifaceted process that encounters several interconnected obstacles, particularly during the circular design phase. A significant challenge lies in the lack of a clear strategy for integrating circular design principles to achieve ambitious circularity goals. As introduced in Chapter 1, the Dutch government aims for a 50% circular economy by 2030 and 100% circularity by 2050. However, stakeholders often lack detailed frameworks to guide circular design practices, creating uncertainty and hindering alignment towards common objectives (Darmawan, 2021).

Another key issue is the delay in regulations, often referred to as the 'pacing problem' (Kaal, 2016; Merchant, 2011; Ranchordás, 2015). Regulatory bodies frequently struggle to keep pace with advancements in circular design practices, leaving innovative approaches without sufficient legal support. For instance, outdated building codes may not accommodate modular construction or material reuse, making it difficult for designers to incorporate these elements (Jaillon & Poon, 2013). This regulatory lag forces designers to fall back on conventional methods, hindering the integration of circularity into the design process and limiting the potential for innovative solutions.

The persistent reliance on linear economic models further complicates circular design integration. The "take-make-dispose" mindset, deeply embedded in the sector, resists change despite the growing awareness of circular principles (Longato et al., 2019). Companies often say they focus on circularity mostly because of regulations and public demand for environmental action, rather than seeing the environmental benefits of circularity as valuable enough to pursue on their own (Serna-Guerrero et al., 2022). Without a supporting circular infrastructure, individual projects often cannot justify the financial burden of investing in circular equipment or retraining employees for specialized techniques. Bain & Company (2018) found that 55% of circularity efforts fail due to the lack of infrastructure for circular materials and methodologies, which limits designers' ability to make sustainable choices. This results in missed opportunities to implement circular design strategies, as the costs associated with these innovations are viewed as prohibitively high.

Material selection and reuse introduce significant challenges within the framework of circular design. The construction industry is characterized by a high level of fragmentation across its supply chain, as highlighted by Vrijhoef (2011). This fragmentation stems from the involvement of numerous stakeholders across both the production and usage phases of construction components. Such a fragmented supply chain complicates the transition to circular practices, making the coordination and foresight required for designing reusable materials more challenging. Moreover, the variability in project timelines often disrupts efforts to align design, deconstruction, and reuse (Hossain et al., 2020; Agudelo-Veraa et al., 2013).

The lack of standardized processes for evaluating and certifying reused materials exacerbates these issues, introducing uncertainty regarding their quality and suitability for integration into new designs. Storing reclaimed materials for future use presents further hurdles, including logistical complexities, land requirements, and additional costs (Salles, Cervantes, &

Bragança, 2024). Regulatory considerations, such as those concerning asbestos management or fire safety, add to these complexities by raising costs and limiting the feasibility of utilizing reclaimed components (Oyenuga & Bhamidimarri, 2015).

Proposed solutions for challenges in circular design

Multiple papers propose solutions to different aspects of circularity, like changing how the construction industry creates value to make it easier to reuse materials, as Kulilshaugen (2023) explains. Fixing problems like unclear rules, high costs, and lack of knowledge and training can help move towards circular practices. Suggestions include updating regulations, building strong markets for reused materials, and setting up systems to take back materials for reuse.

Another solution comes from smarter design methods, as Amarasinghe et al. (2024) highlight. Approaches such as Design for Disassembly and Design for Adaptability, commonly used in circular design literature (Incelli et al., 2023; Lima et al., 2023; Guruge et al., 2024), are crucial for facilitating material reuse and extending the lifespan of buildings. Using modular construction and prefabricated parts can also reduce waste and save resources. All these methods align with one of the 6R strategies described in Chapter 1, with the 6R framework from Potting et al. providing a structure to prioritize these strategies. Additionally, practical concrete tools and plans, such as those proposed by Többen and Opdenakker (2022), outline practical steps for incorporating circular ideas into project management. These steps include raising awareness, setting circular goals during project planning, and integrating them into daily management practices. Collaboration and the use of checklists with key actions can further strengthen these efforts.

Solving the problems of circular design in ADPs includes better design guides, investing in tools and technologies for circular design, and sharing useful knowledge. Laws and rules should support circular design as part of the government's goal of creating a circular economy, with flexible building codes and rewards for using modular and adaptable designs. Supporting the use of local and reused materials with financial incentives and creating strong markets for secondary materials can also contribute. Finally, teaching and training programs are needed to equip designers with the skills to effectively implement circular solutions (Salles, Cervantes, & Bragança, 2024).

Integrating circular principles in ADPs requires overcoming systemic barriers and encouraging collaboration among stakeholders. The findings highlight the need for better regulations, innovative design approaches, and practical frameworks. While these frameworks address broad challenges and suggest solutions, they often miss the root causes of these issues. To create more effective and sustainable circular practices, it is essential to understand the daily problems and processes that lead to these barriers.

3.2 FRAMEWORK SELECTION

The Institutional Analysis and Development (IAD) framework, developed by Elinor Ostrom et al. (2005), is a comprehensive analytical tool used to study and understand the structure and functioning of institutions. Institutions, in this context, are the rules, norms, and strategies that govern interactions among individuals within a community or organization. The framework provides a systematic approach to dissecting the components of institutional arrangements, identifying the roles of actors, rules-in-use, and contextual variables, and understanding how these elements influence outcomes. It emphasizes the importance of action situations, arenas where individuals interact and make decisions and explores the interplay of exogenous factors such as biophysical conditions, community attributes, and rules that shape these interactions.

The IAD framework was selected for this research because it is a well-established tool for analyzing decision-making processes and institutional dynamics. The choice of IAD framework aligns directly with the research problem: the structural and successful implementation of

circularity in ADPs. By focusing on the implicit working rules that influence decision-making, the framework provides a structured approach to understanding how institutional arrangements shape stakeholder interactions and the outcomes of those interactions.

The framework's adaptability and systematic nature make it particularly suitable for this research. It offers a way to identify and analyze underlying working rules within the PD phase of ADPs, which is critical for uncovering institutional barriers and opportunities impacting circularity integration. Studies such as Imperial and Yandle (2005) have highlighted the utility of the IAD framework in contexts like fisheries management, demonstrating its capacity to examine how institutional design shapes resource use and stakeholder behavior. Furthermore, McGinnis (2016) illustrates how the IAD framework serves as a foundational tool for analyzing complex policy situations, evolving to address diverse institutional challenges through a focus on key action situations, rules-in-use, and contextual dynamics. These examples underscore the framework's effectiveness in addressing intricate, multi-stakeholder challenges, including sustainability and governance.

Other potentially relevant methodologies include Routine Dynamics and Process Tracing. Routine Dynamics examines how actor routines balance stability while hindering organizational change (Feldman, Pentland, D'Adderio, & Lazaric, 2016). This approach treats routines as dynamic and emergent rather than fixed structures governed by explicit rules, focusing on their evolution and effects over time. Process Tracing, a qualitative research method, carefully examines evidence to understand how events or actions connect through cause and effect (Collier, 2016). However, working rules often operate in the background, influencing behavior without being directly observable, which makes the IAD framework particularly effective for this study.

Using the IAD framework allows this research to systematically explore decision-making during the PD phase, the formation and reinforcement of institutional rules, and their effects on circularity incorporation. The framework's ability to delve deeply into stakeholder interactions, formal and informal rules, and their outcomes makes it uniquely suited to addressing the research objectives. It helps balance circularity ambitions with other project goals and overcome inconsistencies in implementation within large-scale projects.

In summary, the IAD framework was chosen because it is a proven, framework that provides the tools needed to address the specific challenges of this research. Its usefulness is demonstrated by its application in similar contexts and its ability to provide insights into institutional dynamics, the working rules, and decision-making processes, directly supporting the goal of improving the integration of circularity in ADPs.

IAD-Framework Introduction

The IAD framework is a framework developed by Elinor Ostrom (2005), which is used to analyze the complex interactions of people and understand the underlying institutional rules that influence the decision-making process and thus the results. A rule is described by Ostrom (2005, p. 824) as "By rules, I mean shared prescriptions (must, must not, or may) that are mutually understood and enforced in particular situations in a predictable way by agents responsible for monitoring conduct and for imposing sanctions." In essence, a rule establishes clear boundaries for behavior, defining what is permitted, prohibited, or obligatory within a specific context, ensuring consistent governance and accountability.

The framework has been important in providing insight into how institutions function and the timeframes within which they operate. It specifically addresses the significance of the rules and resulting strategies that individuals adopt when interacting with one another. The Framework focuses on actions in which people are influenced by these norms and rules when making decisions. This makes it possible to examine how institutional arrangements impact outcomes and how to change them to get the wanted result (Blomquist, deLeon, & Schlager, 2011, p. 4).

Figure 1 shows the separate elements and visualizes how they interact according to the IAD framework. The Action Arena is the main part of the framework. This is the part where the participants act and interact in the specific action situation. Ostrom (2005) describes an actor as “Participants in many action situations are individual persons, or they may represent a team or composite actor”. Meaning that depending on the context of the situation an actor can be an individual or a team. An action arena is an environment where participants engage in interactions like meetings or gatherings. The exogenous variables provide the different contexts and conditions that influence the Action Arena. The interactions within the Action Arena result in the outcomes. The outcome depends on the intended type of result but can change from a policy change to a reached agreement. The interactions and outcome are evaluated by the evaluative criteria which tests if the outcome is the intended result and if they align with the ambitions and project goal. If the evaluative criteria have determined the outcome does not meet the ambitions or project goal, either the Exogenous Variables or the Action Arena needs to be adjusted (Ostrom, Understanding Institutional Diversity, 2005).

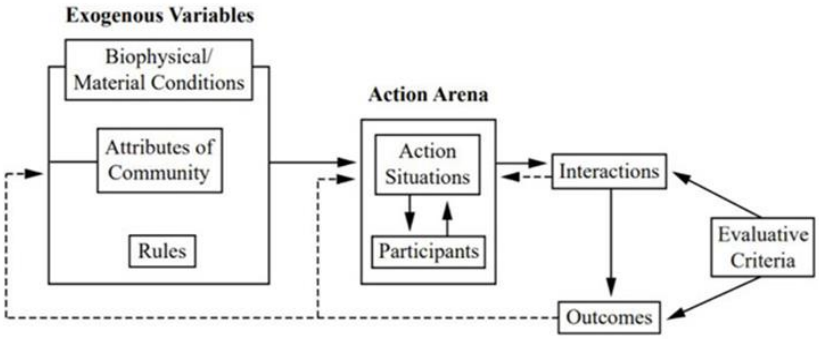

Figure 1: IAD Framework (Ostrom, Understanding Institutional Diversity, 2005)

IAD Framework Application

As described, the IAD framework enables one to break down a complex system and find the different reasons why the actors interact and act the way they do. With the challenge of implementing circularity in area development projects, the reasons why certain people have reacted the way they did, can be a significant addition to predicting and using this by how they will react the next time. By examining how the different actors acted in earlier projects in preferably similar situations and understanding the reasoning behind these actions, these (underlying) institutions can be adjusted to get the actor to act in the way that is needed to improve circularity in the project. In other words, by adjusting the decision-making (Action Arena) environment to a better-suited environment the way the actors change can be adjusted accordingly to the project's aim. In this case, improving circularity. In Figure 2 an adaptation of the IAD framework from Figure 1 is shown where the different rules that influence the actions and interactions from the action arena of are included. Figure 2 shows how the different types of rules impact the actions within the Action Arena. The Figure shows how the different rules affect the Potential Outcomes. As can be seen in the Figure, the Actors are assigned to specific Positions, which in turn influence their Actions.

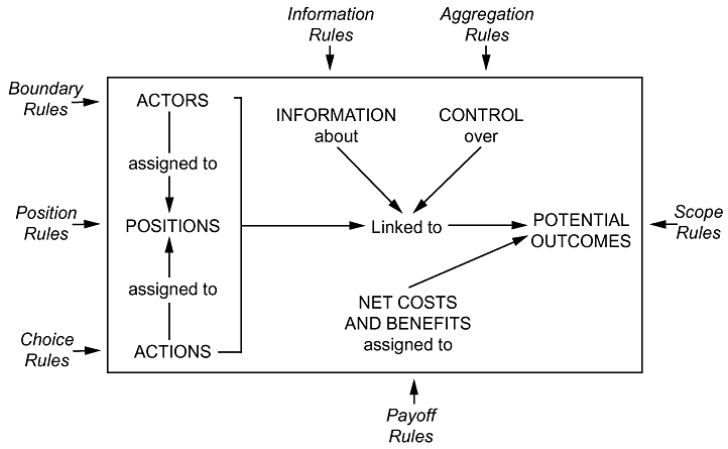

Figure 2: Rules inside the action arena (Ostrom, Understanding Institutional Diversity, 2005)

These actions are influenced by several types of rules: Boundary, Position, Choice, Information, Aggregation, Scope, and Payoff rules. These rules are explained in Table 4 including an example. The interactions within this framework are linked to specific Potential Outcomes, which are shaped by the control of the actors over actions, access to information, and the related net costs and benefits. The adapted framework helps to understand how institutional rules influence behavior and decision-making processes, which eventually have an impact on the outcomes of projects such as ADPs. Therefore, using this Framework helps to determine where change is needed to improve the potential outcome. By identifying which rules influence the potential outcomes, these rules can be adjusted to guide the process towards an improved result, which is the level of circularity in this project. Using this framework provides a better-structured approach to find the reasons why certain interactions take place and decisions are made that influence the level of circularity.

Table 4: Explanation of the different types of Rules including an example situation: a meeting between two stakeholders in an ADP

Type of Rule	**Explanation**	**Example**
Position	Separates the participants into different positions with different levels of authority	One stakeholder works for the government and is responsible for granting the permits, the other is the Area developer who needs the permits
Boundary	Defines how and what actors are included to what position	Only stakeholders involved in the granting of the permits can attend the meeting
Choice	Specifies what actions the participants must, may or may not do	The stakeholder from the government can set extra requirements before granting the permit, while the area developer has to comply, but can make decisions within the set limitations
Aggregation	How actors interact and decisions are made	A permit requires an agreement between both stakeholders
Scope	What is and is not included in the projectscope	Only information related to the set permits is discussed
Information	How information is gathered and how it is handled once it becomes available	Both stakeholders must share the relevant data, required for reaching an agreement and granting the permits
Payoff	What reward or consequences are received by an actor under what conditions	Possible subsidy when exceeding the minimal limit or a penalty for not achieving the minimal limit in time

Earlier applications by Milchram et al. (2019), Neef et al. (2022) and Stevering (2023) further exemplify the framework's versatility. Milchram et al. (2019) used the IAD framework to analyze institutional changes in the energy transition, breaking down complex processes into action

situations influenced by exogenous variables such as infrastructure, community attributes, and rules. Their study examined how values embedded in institutions, technologies, and community norms shaped participant behavior and decision-making. While Milchram et al. describes the concept of a rule within the IAD framework, the study focuses primarily on the role of value changes as a driver for institutional change, rather than on identifying the rules in-use of a specific action situation.

Neef et al. (2022) applied the IAD framework to examine the impact of institutional rule directions on collective decision-making within Dutch infrastructure projects. By identifying specific rule directions they illustrated how these rules shaped collective action outcomes. Their comparative case study approach demonstrated the necessity of active agency, referring to the proactive efforts of stakeholders, in organizing information sharing and commitment. They concluded that systematic understanding of rule directions enhances decision-making processes, particularly in overcoming institutional fragmentation and fostering collaboration in complex infrastructural settings.

Stevering (2023) focused on institutional rules shaping decision-making processes in the context of circularity within project design teams. By categorizing working rules into Ostrom's (2005) framework categories, Stevering identified how these rules influenced the integration of circular solutions on railroad transformations. The working rules identified by Stevering rules are focused on the existing process and occurrences. While the present study aligns with Stevering's method in its focus on identifying and understanding working rules, it diverges in scope and project type, addressing different contexts and challenges within greenfield ADPs in the Netherlands. It partially adopts Stevering’s methodology to explore how working rules influence broader, interdisciplinary decision-making processes and their impact on circularity in large-scale, complex projects.

Defining the Action Arena

The IAD Framework defines the action arena as a core concept that represents the social space where individuals interact, make decisions, and engage in collective activities. It consists of two key components: the action situation, which outlines the structured context of interactions, and the actors or participants, who engage within this context. The specific definition of an action arena depends on the focus of the research.

In this study, the action arena is defined as the PD phase, as this phase is critical for the implementation of circularity in ADPs. Specifically, it is during this phase that many design decisions are made, and the foundation for circularity is established through the initial ambitions, vision, and requirements. Understanding the interactions within this phase is essential for addressing the research questions: identifying the existing working rules (Research Question 1) and determining how they can be adjusted to improve circularity (Research Question 2). The action arena includes all actors and relevant interactions, such as meetings, interactive sessions, presentations, and individual work, that impact the preliminary design plan and the level of circularity within ADPs.

4. PART I: IDENTIFYING WORKING RULES

4.1 WORKING RULES IDENTIFICATION

Table 5 presents the working rules identified within each IAD framework rule category, along with the corresponding case studies where these rules were observed. These rules are formulated in alignment with Ostrom's (2005) definition, as outlined in Chapter 3.2. Each rule includes specific terminology such as *must*, *must not*, *may*, or equivalent descriptions like *determine*. These terms ensure clarity and precision in defining the rules' intent and scope. To improve the clarity and integrality of the rule, the formulation of the rules is slightly adjusted where content-wise feasible, allowing them to align with both case studies.

Each rule serves as a general guideline with either a direct or indirect impact on the circularity of the project. For ease of reference, a unique Rule-ID has been assigned to every rule. When actors are referenced in the rules, this term may represent an individual, a group, or an organization, as elaborated in Chapter 3.2. Following the table, a detailed explanation and analysis of these rules are provided to offer insights into their practical application and implications. The sources from which these rules are derived are comprehensively documented in Appendix C, ensuring transparency and traceability.

Table 5: Identified working rules and their impact on circularity per case study

	Rule - ID	Working rules	Working rule impact on circularity	LP	WZ
Aggregation rule	A1	The municipal project manager determines the value of given advice by considering the authority of the giver and past experiences with the giver.	Advice from actors with formal authority and previous positive experiences may overshadow innovative circular ideas, reducing the likelihood of adopting less conventional circular solutions.	X	X
Boundary rule	B1	The paying actor determines the timing and selection of the involvement of internal and external individuals and experts involved in the project.	When expert involvement depends on the judgment of the paying actor, there is a risk that circular knowledge may not be included at all or not at the right moments, thereby reducing its impact.	X	X
Choice rule	C1	Individuals with decision-making power may choose to base their choices either on the given advice or on their own opinion, experience, and knowledge	Circularity is more likely to be overlooked if decision-makers rely primarily on their own opinions and experiences, especially when their knowledge of circularity is limited.	X	X
Choice rule	C2	Individuals and organizations may choose to focus more on components for which they are responsible, as they have accountability for those components	Fragmented focus limits actors to circular solutions within their own scope, potentially leading to missed opportunities for broader, integrated approaches.	X	X
Choice rule	C3	Individuals may choose to allocate more time and effort to projects where they feel their input is actively acknowledged and valued.	When actors feel valued, they are more motivated to invest in innovative solutions, including those that enhance circularity.	X	-
Choice rule	C4	The municipal project team determines the roles,	Assigning roles without properly including circular responsibilities	X	X

		responsibilities, and desired outcomes for each hired individual or organization	may lead to missed opportunities for integrating circular practices into the project.		
Information rule	I1	The type of unit price payment determines which organization must decide what information to gather.	Depending on the unit price payment, W+B can decide independently to gather circular information or may be restricted by the priorities of the municipality.	X	X
Information rule	I2	Decisions must not be systematically documented, monitored or evaluated because of the extra time and costs.	The absence of required systematic documentation and evaluation reduces opportunities for learning and improving circular practices, impeding progress over time.	X	X
Information rule	I3	Individuals determine what information to gather based on their assessment of information needs and the available budget	Budget constraints or the involvement of individuals who do not (purposely) consider or prioritize circularity can result in essential information being overlooked, hindering the development of circular solutions.	X	X
Payoff rule	Pa1	Hired actors must be paid for work within the contractual scope, with any additional work requiring prior municipal approval	Without circularity in the project scope, continuous municipal approval is needed, limiting the implementation of circular solutions. However, if circularity is explicitly included in the scope, it empowers W+B to advocate for and push through these circular solutions.	X	X
Payoff rule	Pa2	Individuals must be either financially or intrinsically motivated to act	Intrinsic motivations may drive circularity, while financial incentives could either support or hinder sustainable practices, depending on how they are structured.	X	X
Position rule	Po1	The deciding actor must determine that altering early project decisions is sufficiently important, considering the cost of change	The deciding actor can determine that circularity is important enough to justify the additional costs of enabling the implementing circular solutions by adjusting the earlier made decisions.	X	X
Position rule	Po2	Municipal departments with reviewing authority may reject proposed plans if they do not meet their documented requirements	Reviewing municipal departments may block innovative circular methods that are not yet standardized or documented, limiting their adoption.	X	X
Position rule	Po3	The municipal project team holds the responsibility and must make the decisions, with their authority limited to actions permitted by regulations	Regulatory constraints can restrict the number of circular measures that can be adopted, even if these measures align with the municipality's sustainability objectives.	X	X
Position rule	Po4	The meeting organizer can determine the meeting	Without a structured agenda, circularity risks being overlooked	X	X

		structure and agenda based on what they consider important	or inconsistently addressed in discussions.		
Scope rule	S1	Time and resources must be available to prevent limiting the scope of possible outcomes	A lack of time and resources limits the ability to develop and apply circular solutions.	X	X
Scope rule	S2	The project decisions must align with documented political decisions and implemented policies	Policies can either enable or restrict circular solutions based on their alignment with sustainability objectives. Their inclusion and prioritization of circularity significantly impact the extent to which circular solutions are implemented.	X	X

4.2 WORKING RULES EXPLAINED

Rules are often not explicitly stated by interviewees, as many rules emerge from the combination of insights gathered through multiple interviews, attended meetings, and informal conversations as well as smaller elements such as tone and manner of expression of the interviewee. The individual interview quotes can be found in Appendix B and a description of the informal observational data collection methods can be found in Appendix C. Each rule is identified by a unique Rule-ID, which is used as a reference throughout the text. Following each rule, the Rule-IDs of related rules are listed. To minimize repetition, these connections are explained only once, in the order in which the rules are described. Any described links are highlighted in bold.

A1	The municipal project manager determines the value of given advice by considering the authority of the giver and past experiences with the giver.	**B1, C1, Pa2, Po2, Po3**

The municipal project manager determines the value of given advice by considering the authority of the giver and past experiences with the giver. This is because formal authority enables actors to enforce their decisions, while those without formal authority cannot effectively challenge or counter those decisions.

In LP, this dynamic is evident in the way the municipal project manager tends to prioritize internal advice from actors with formal authority. LP4 explained, *"I weigh the options presented in case of disagreements, but generally, it makes sense to go with internal advice."* Here, the term 'internal actor' refers to a reviewing actor, specifically the municipality's internal engineering bureau, which is responsible for assessing and approving plans. This shows that decisions in LP are often driven by formal power rather than solely expertise.

In contrast, in WZ, decision-making appears less reliant on the formality of individuals and more on the context and relationships between individuals. In WZ, collaboration and mutual trust play a much more significant role. For instance, the collaboration between WZ1 from W+B and WZ6 from the municipality was noted for its positive dynamic, where WZ1 emphasized, *"For a good collaboration, it is important that individuals trust each other's work and expertise and that their personalities are compatible."* This combination of trust and expertise forms the foundation for a productive working relationship, where both parties seriously consider each other's advice. This suggests that in WZ, the value of advice is not solely determined by formal authority but by the established working relationships and positive past experiences.

The rule A1 influences other rules. For example, it affects B1, as the timing and involvement of experts will depend on the project manager's perception of their necessity, shaped by formal authority or previous interactions, introducing the risk of undervaluing or overvaluing advice. It aligns closely with C1, as decision-makers may weigh advice differently based on their own

assessments, creating a dynamic feedback loop with the project manager's evaluations. In relation to Pa2, the motivation of individuals to act, whether driven by financial incentives or intrinsic factors, may be influenced by the trust and recognition they receive from the project manager, potentially enhancing or diminishing their engagement. Lastly, Po2 and Po3 are impacted, as the project manager's judgment of advice can determine whether plans meet documented requirements and regulations, directly influencing decisions on what is approved or rejected.

B1	The paying actor determines the timing and selection of the involvement of internal and external individuals and experts involved in the project.	A1, **C4, I1, I3, Po2, S1**

The paying actor, which is dependent on the type of contract, determines when and which internal and external actors or experts are involved in the project. This is influenced by the municipal financial responsibility for engaging these actors, giving them control over the timing and type of expertise included. While W+B can advise the municipality on involving certain experts, the decision ultimately rests with the municipality. This approach carries the risk that experts are not engaged at the right moments, potentially reducing the effectiveness of their contributions. In LP, the municipal sustainability expert (LP2) explained, *"Whether I am involved depends on the project manager."* This highlights that a circularity expert had not been involved since the SD phase, a gap that was also evident during the observed meetings. As a result, decisions were made based on the limited circularity expertise and information available within the team.

WZ3 stated, *"In a lump-sum contract, the project manager at W+B can decide whether to involve a circularity expert, as long as it fits within the budget and project goals. In a unit price contract, it's harder."* This shows how a lump-sum contract gives W+B more control over involving experts, while still staying within budget limits. In contrast, unit price contracts require stricter municipal oversight, making it harder to allocate resources for experts. In LP, the lack of circularity experts after early phases resulted in decisions based on limited knowledge, demonstrating how financial and contractual rules can restrict expert involvement.

The rule B1 influences rule C4 because the roles and responsibilities of hired individuals depend on when and why they are brought into the project, therefore circular expertise can lack depending on the view of the paying actor. It impacts I1 and I3 as the paying actor's decisions influence what information needs to be gathered and by whom, aligning with the budget and perceived priorities. For Po2, the timing and selection of experts can determine whether proposed plans meet the documented requirements, as early involvement of the right experts may prevent rejections. Finally, S1 is influenced since the availability of time and resources depends on the paying actor's decisions about involving the necessary participants, directly affecting the scope of possible outcomes.

C1	Individuals with decision-making power may choose to base their choices either on the given advice or on their own opinion, experience, and knowledge	A1, **C2, C3, C4, Po2, Po3,**

In both LP and WZ, people with decision-making power can choose to rely on their own experience, judgment, or advice from others. This mix of personal expertise and external input affects how new ideas are adopted and how the project develops. While using personal knowledge can help ensure decisions fit professional standards, it can also limit the use of new and innovative solutions, depending on the project's setup. The choice between relying on personal expertise, external advice, or a combination of both often depends on the personality of the decision-maker and the specific context of the situation.

In LP, decisions were strongly shaped by formal authority and personal preferences, which often slowed down innovation. LP2 said, *"The project … a project."* (fully referenced under rule B1) This shows how resistance from powerful individuals can block new ideas like circular

solutions. LP4, who is the municipal project manager and therefore the primary decision-maker, also shared, "*I weigh the given options in case of disagreements, but usually, it makes sense to choose the internal advice*." This focus on internal advice over outside suggestions can make it less likely for innovations to be implemented, as sticking to familiar methods prevented the adoption of new ideas. As a result, innovations, including circular innovations, were often overlooked. Over time, LP2 and LP3 stopped suggesting circular ideas because they felt blocked by constant opposition from the municipality, which reflects rule C3.

In WZ, decision-making was more flexible and open to new ideas. Discussions showed that decisions were less influenced by resistance from powerful individuals, which made it easier to include external advice and consider innovative solutions. As WZ3 explained, *"In a lump-sum contract, the project manager at W+B can independently decide whether to involve a circularity expert. This must fit within the budget and the project goals."* This shows how the lump-sum contract gave decision-makers more freedom to manage resources and involve experts when needed, which supported innovation.

The rule C1 impacts other rules by allowing decision-makers to rely on advice or their own judgment, creating variability in project outcomes. This affects C2, as decision-makers may focus more on components they are directly accountable for, especially if they prioritize their own expertise over external advice. It connects to C3 since individuals may allocate more effort to projects where they feel their input is valued, which ties back to whether decision-makers acknowledge advice. For C4, the determination of roles and responsibilities may reflect the decision-makers' preferences and how much weight they give to external advice versus their judgment. Po2 is influenced because decisions on whether plans meet documented requirements can depend on whether advice or internal knowledge guides the review. Lastly, Po3 is impacted since the municipal project team's decisions must operate within regulatory constraints, which may be interpreted differently depending on the reliance on advice or personal knowledge.

C2	Individuals and organizations may choose to focus more on components for which they are responsible, as they have accountability for those components	C1, **C4, I3, Pa1, Pa2, Po2, Po3, Po4**

Actors often focus on the parts of a project that fall under their responsibilities, prioritizing their own tasks over broader project goals. This focus is driven by financial and contractual obligations that dictate their priorities. In LP, this was evident during the tendering process for a sub-area, where W+B's narrowly defined role limited their influence on decisions beyond their specific responsibilities. Similarly, the maintenance department showed reluctance to adopt circular materials. As LP1 explained, "*If the M&M department receives additional (financial) resources to use circular materials and methods, they are fine with it. Their only goal is maintenance, so as long as they get the necessary resources, they are okay.*" Because circularity was not included in their scope and often exceeded their budget, the department resisted cooperating with circular measures, focusing instead on their core responsibilities. During meetings in LP, participants consistently approached challenges from their own perspectives; for instance, urban planners emphasized urban design issues, while contractors focused on practical feasibility and implementation.

A similar pattern occurred in WZ, where municipal departments concentrated on their own areas of responsibility. WZ5 noted, "*The M&M department is sometimes hesitant about new, circular materials and prefers familiar, reliable ones, particularly concerning future maintenance*." This hesitation stems from the fact that the M&M department does not feel directly responsible for circular solutions. During meetings in WZ, participants also analyzed problems through the lens of their specific expertise, such as urban planners prioritizing spatial concerns and executors addressing practicalities. This focus on individual responsibilities was further confirmed during a WZ meeting, where participants primarily discussed aspects related to their own functions and expertise, further illustrating this rule in practice.

The rule C2 influences other rules by emphasizing accountability, driving individuals and organizations to focus on their specific responsibilities. This impacts C4, as the definition of roles and outcomes must align with the components each party is accountable for, ensuring clarity in responsibilities. It affects I3 because decisions on what information to gather will prioritize areas directly tied to their accountability and resource constraints. For Pa1 and Pa2, the focus on accountable components ensures that work within the contractual scope is prioritized, while additional efforts may depend on approval or intrinsic motivation. Po2 and Po3 are influenced as the emphasis on accountability ensures plans align with documented requirements and regulatory actions, focusing on areas critical to each party's role. Lastly, Po4 is affected as meeting organizers may structure agendas around the components and issues for which participants are responsible, maximizing efficiency and relevance.

C3	Individuals may choose to allocate more time and effort to projects where they feel their input is actively acknowledged and valued.	C2, **I3, Pa2, Po4, S1**

When individuals see their advice being taken seriously and acted upon, they feel motivated to contribute more, knowing their efforts are making a difference. However, if their input is ignored or dismissed, this can lead to frustration and disengagement, as they may feel their time and expertise are not appreciated. This dynamic can significantly impact collaboration and innovation in a project.

In LP, this was evident as several actors felt their input was not valued, leading to decreased motivation. LP3 explained, *"At a certain point, all circular proposals led to discussions with M&M, so I stopped making proposals. No decisions were being made about them anyway."* This shows how the lack of acknowledgment for suggestions discouraged further contributions. Similarly, LP2 stated, *"The people … greater impact."* (fully referenced under rule C1) This shows that resistance from key decision-makers in LP not only slowed down innovation but also caused people to lose interest when their efforts were not appreciated. Because of this, LP2 shifted their attention to other projects where their ideas were more valued and could make a real difference.

In contrast, WZ demonstrated a more positive dynamic. Observations and discussions during WZ meetings showed that advice from W+B was actively acknowledged and acted upon. This acknowledgment fostered trust and higher engagement, as actors felt their contributions were valued and impactful. This supportive environment likely encouraged actors to remain motivated and contribute more to the project, resulting in smoother collaboration and better outcomes. Also confirmed by WZ2 in a presentation where he stated that he has invested more time than billed to the municipality, further elaborated in Pa2.

The rule C3 impacts other rules by highlighting that individuals are more motivated to contribute when their input is recognized and valued. This affects I3 because individuals will prioritize gathering information for projects where they feel their efforts make a meaningful difference, aligning their resources with where they feel appreciated. It influences Pa2, as intrinsic motivation to act can increase when individuals feel valued, complementing financial incentives and driving greater commitment. For Po4, meeting organizers may need to acknowledge participants' contributions explicitly to ensure continued engagement and effective collaboration. Lastly, S1 is impacted as individuals' willingness to dedicate time and effort where they feel valued can help maximize the available resources, broadening the scope of achievable outcomes.

C4	The municipal project team determines the roles, responsibilities, and desired outcomes for each hired individual or organization	B1, C1, C2, **I1, I2, I3, Pa1, Pa2, S1, S2**

The municipal project team plays a key role in defining the responsibilities, roles, and outcomes for each hired actor. By doing so, they control how actors contribute to the project and the

extent of their involvement. The decisions regarding task allocation and role definition can significantly shape project dynamics, as they determine what tasks are delegated to which actors and how their expertise is utilized or limited.

In LP, the effects of this authority were evident. LP1 stated, *"The municipality chose to include public space development alongside real estate in the development procurement for the PD public space. The real estate procurement document is prepared by another company, and this includes the public space."* This decision restricted W+B's role in public space development, delegating key responsibilities to the other firm hired to manage the procurement process. LP1 further added, *"Under the new project manager, W+B has fewer opportunities to do what we were initially hired for."* Similarly, LP4 noted, *"W+B is involved in the early stages of the project but was not specifically requested to guide the procurement process for a subarea. The municipality outsourced this process separately."* These examples show how the municipality's decisions redefined W+B's role, sidelining them during critical phases and limiting their ability to contribute.

In WZ, the municipality also played a decisive role in defining responsibilities in accordance with the development strategy and land positions. WZ6 mentioned, *"W+B provides advice and input for sustainable and ecological solutions, but their influence is limited to public space."* In this context, the municipality defined W+B's responsibilities narrowly, focusing their input on public space while excluding them from housing development decisions. This demarcation of roles demonstrates how the municipality's control over responsibilities determines the areas where an actor's expertise is utilized and limited.

The rule C4 affects other rules by defining the framework within which individuals and organizations operate, shaping the entire project's structure and focus. This influences I1, as the municipal project team's assignment of roles determines which organization gathers specific information. It impacts I2 because decisions about systematic documentation and monitoring hinge on how responsibilities are allocated and the associated costs. For I3, the clarity of roles helps individuals assess their information needs and allocate budgets accordingly. Pa1 and Pa2 are influenced since work payment and motivation depend on the roles and deliverables outlined by the project team, ensuring alignment with contractual expectations. S1 is impacted as well-defined roles can optimize resource use, preventing limitations on outcomes. Lastly, S2 is affected since aligning roles with political and policy decisions ensures that the project meets documented requirements and broader objectives.

I1	The type of unit price payment determines which organization must decide what information to gather.	B1, C4, **I2, I3, Pa1, Pa2, S1**

The actor who decides what information to gather is influenced by the payment type used in the project, which creates distinct dynamics in LP and WZ. In LP, the unit price payment system requires separate budgets for each component, and these budgets must be approved by the municipality. This approach means that W+B depends on the municipalities judgment to determine whether specific information is necessary. If the municipality considers the information unnecessary, too expensive, or irrelevant, it is not collected, as gathering it would incur additional costs. This dependency is linked to rule Pa1, and Pa2, as W+B is unlikely to pursue data collection without financial compensation. In LP, this system limits flexibility and scope, especially for circularity-related insights, which often fall outside approved budgets.

In WZ, the lump-sum contract gives W+B more autonomy to decide what information to gather, if it fits within the fixed budget (lump-sum). WZ3 explained, *"In a … too much."* (fully referenced under rule B1) This structure allows W+B to prioritize internally and decide which information is essential. However, this flexibility is still constrained by the initial allocation of resources. In WZ, W+B can make decisions independently, collecting additional information, such as circularity-related data, would require reallocation of funds from other areas, as these elements

were not initially budgeted for. This creates a tension between autonomy and financial limitations.

The rule I1 affects other rules by linking payment structures to the responsibility for gathering information, shaping how organizations allocate resources. This influences I2, as the decision to document and monitor systematically depends on the cost implications tied to the payment type and who is responsible for those activities. It impacts I3, as the organization gathering information must assess its needs and budget based on its payment obligations. For Pa1, the type of unit price payment ensures that work remains within the contractual scope, guiding information gathering efforts to avoid unnecessary expenses. Pa2 is affected because financial motivation to act aligns with the payment structure, influencing how diligently organizations gather relevant information. Lastly, S1 is impacted since the payment-driven allocation of responsibilities can either optimize or constrain the time and resources available, shaping the scope of achievable outcomes.

I2	Decisions must not be systematically documented, monitored or evaluated because of the extra time and costs.	C4, I1, **Po1, S1**

Decisions in projects are generally not systematically documented, monitored, or evaluated due to the additional time and costs involved. This means that while major decisions are typically recorded, many other choices, both large and small, often go undocumented, leading to significant knowledge gaps. Although actors recognize the value of documentation for improving project quality, limited resources and high costs often make it a lower priority.

In LP, this challenge became evident when LP2 stated, "*There is no systematic registration of sustainable decisions in this project. It would help if this were done.*" While significant decisions are occasionally recorded, the reasoning behind them is usually not captured. Observations in LP confirmed that although key decisions are documented to some extent, their underlying motivations and the smaller, supporting decisions are frequently neglected. This lack of recorded reasoning limits the ability to understand how and why certain measures were taken, particularly for sustainable initiatives. Without this insight, it becomes difficult to evaluate the impact of these decisions and make informed adjustments in future projects.

The same issue is evident in WZ, where resource constraints exacerbate the challenge. WZ1 explained, "*Specific choices and measures are partially recorded in documents. However, many considerations are not documented. These considerations were made in consultation with others, and documentation would take personal time that I now dedicate to a new project, so I do not prioritize it, even though it is important*." Even when decisions are recorded, the rationale behind them is often missing. This means that project teams lose valuable insights into why certain paths were chosen, especially for sustainable or circular solutions. WZ3 emphasized this further, stating, "*Circular and other sustainable decisions were monitored for a while because we at W+B found it important, but it became too costly, as the client did not request it and the time could not be billed.*" This illustrates how a lack of municipal demand and funding hinders the documentation of decisions, making it difficult to build on previous knowledge or ensure consistency across projects.

The rule I2 affects other rules by discouraging systematic documentation and monitoring, prioritizing cost and time efficiency. This impacts Po1, as the lack of thorough documentation may make it harder to justify or execute changes to early project decisions, given the limited recorded rationale. For S1, the absence of systematic processes can constrain the availability of time and resources by increasing the risk of miscommunication or rework, which could limit the scope of possible outcomes despite initial cost savings.

I3	Individuals determine what information to gather based on their assessment of information needs and the available budget	B1, C2, C3, C4, I1, **Pa2, Po4, S1**

Actors collect information when it is seen as necessary for the project and only if it fits within budget constraints. This means decisions about gathering data depend both on the project's priorities and the financial resources available, which can either enable or limit the scope of information collected.

In LP, information gathering was driven by project needs but restricted by budgetary limits. LP3 mentioned, *"OKRA had several meetings with W+B beforehand where the available knowledge was shared. This included an interactive circularity session."* This demonstrates that W+B and OKRA collectively recognized the importance of information at the start of the project and took steps to gather and share it accordingly. However, LP3 also noted, *"Researching circular measures takes time. These hours cannot be billed."* This highlights how financial constraints limited the ability to gather additional information, restricting the scope of knowledge shared among actors and potentially narrowing the project's focus.

In WZ, the need for information was also emphasized, especially to support informed decision-making. WZ3 explained, *"The project manager at the municipality had little knowledge or motivation to implement circular and sustainable measures for the main infrastructure, except slightly for nature inclusivity."* This underlines the importance of gathering data to bridge knowledge gaps. When sufficient funding was available, information gathering was prioritized. As WZ3 noted, *"A comprehensive matrix was created for climate adaptation with concrete proposals. This was developed because the municipality allocated funds for it."* This demonstrates how access to resources directly enabled more detailed research and better-informed proposals.

The rule I3 affects other rules by placing the responsibility for information gathering on individuals, guided by their needs and budget constraints. This influences Pa2, as individuals' intrinsic or financial motivation to act may drive their prioritization of gathering relevant information efficiently. It impacts Po4, as meeting organizers may structure agendas to align with the information that individuals deemed necessary to collect, ensuring discussions are relevant and resourceful. Lastly, S1 is affected because the scope of possible outcomes depends on whether individuals allocate their resources effectively to gather critical information, balancing their budgetary limitations with project needs.

Pa1	W+B must be paid for work within the contractual scope, with any additional work requiring prior municipal approval	C2, C4, I1, **Pa2, Po1, Po3, Po4, S1**

Financial agreements in projects define the responsibilities and limits of each actor's involvement, including payment structures that directly impact their authority and flexibility. W+B is compensated according to the terms of the contract, which gives them a degree of leverage in ensuring their work aligns with the agreed scope. However, for any tasks outside this scope, prior approval from the municipality is required. This reliance on municipal approval underscores the critical role of the contract in shaping the extent of W+B's involvement and their ability to contribute beyond predefined boundaries. While this structure ensures clarity and accountability, it can create challenges when flexibility or additional contributions are needed to align with broader project goals.

In LP, the contractual structure restricted W+B's flexibility to go beyond the agreed scope, as any additional work required prior municipal approval. This strict adherence to the defined scope and budget made it challenging to implement broader sustainability measures without delays. LP1 explained, "*Circular measures often involve costs that are not accounted for in the current budget, so additional approval is needed, which delays progress.*" As a result, the contract limited W+B's ability to take initiative and pursue circularity beyond the predefined boundaries.

In WZ, similar limitations were observed, but the lump-sum contract provided slightly more flexibility within the predefined budget. WZ2 explained, "*Developers are often less inclined to*

pursue maximum sustainability ambitions because they are focused on profit." These differing priorities required negotiations to align objectives, but the contractual limits still restricted actors like W+B from fully exploring circularity or sustainability goals. While the lump-sum contract allowed for some internal adjustments, significant changes still required municipal approval, creating similar delays and constraints as seen in LP.

The rule Pa1 affects other rules by ensuring that payments are strictly tied to the contractual scope, with additional work requiring approval, which reinforces accountability and cost control. This impacts Pa2, as individuals may be motivated to act only when work aligns with their financial or intrinsic interests, particularly within the approved scope. It influences Po1, as altering early decisions may be limited by the need for municipal approval for any additional work, increasing the cost and complexity of changes. For Po3, the municipal project team's authority to make decisions is constrained by these financial boundaries, ensuring actions remain within permitted regulations. Po4 is affected as meeting organizers may focus agendas on issues directly tied to approved work to avoid unauthorized efforts. Lastly, S1 is impacted because the requirement for approval and scope adherence can limit resource flexibility, potentially narrowing the range of possible outcomes.

Pa2	Individuals must be either financially or intrinsically motivated to act	A1, C2, C3, C4, I1, I3, Pa1, **S1**

To engage actors and drive action, they must be motivated either intrinsically or financially. This applies equally to the adoption of circular solutions. Motivation, whether intrinsic or financial, is essential in determining the level of commitment and contribution from actors in a project. Financial incentives can align actors with project goals and encourage participation, while intrinsic motivation can inspire them to go beyond contractual obligations. However, without financial support, intrinsic motivation alone is often insufficient to overcome practical barriers such as limited resources or time constraints, particularly when it comes to implementing circular measures.

In LP, both intrinsic motivation and financial incentives played a role, but their limitations significantly influenced actor contributions. LP4 explained, *"There is a comprehensive reward system for above-legal sustainability measures, with a set amount per house distributed according to a reward system outlined in the tender guidelines."* This financial incentive successfully motivated sustainable housing development. However, not all actors benefited from such incentives. LP3 stated, *"As an external landscape architect, there is no financial incentive for us to incorporate circularity into the project. We aim to achieve the project objectives, but we are also intrinsically motivated to maximize results."* Despite this intrinsic motivation, LP3 highlighted the challenges of working without financial support, adding, *"Researching circular … be billed."* (fully referenced under rule I3) This demonstrates that while intrinsic motivation can drive commitment, the lack of financial incentives can limit the scope and depth of contributions, particularly for tasks like exploring circular solutions.

In WZ, financial limitations similarly affected sustainability efforts. WZ3 noted, *"Circular and … be billed."* (fully referenced under rule I2) Here, intrinsic motivation initially drove action, but the lack of financial compensation eventually curtailed further efforts. Additionally, financial considerations influenced procurement criteria. WZ3 stated, *"Initially, a MEAT criterion was set for the main infrastructure, which underwent several feedback rounds. However, when finalized, the municipality decided to remove the ECI method because it excluded smaller local contractors due to the complexity of information and additional investment costs of €15,000-€20,000."* The MEAT (Most Economically Advantageous Tender, in Dutch: Economisch Meest Voordelige Inschrijving or EMVI) criteria, are designed to evaluate procurement proposals not solely on price but also on additional qualitative aspects, such as sustainability, innovation, and environmental impact. This decision reflects how financial constraints shape project requirements, limiting the scope of sustainability measures to balance costs and broader

project inclusivity. As previously noted in I2, WZ1 also highlighted that they worked more hours than were billed, driven purely by intrinsic motivation.

The rule Pa2 affects S1 by emphasizing that motivation, whether financial or intrinsic, is essential for individuals to contribute effectively to a project. If individuals lack sufficient motivation, it could limit their willingness to allocate time and resources, potentially constraining the scope of possible outcomes. Conversely, strong motivation can enhance engagement and effort, optimizing the use of available resources and broadening what the project can achieve.

Po1	The deciding actor must determine that altering early project decisions is sufficiently important, considering the cost of change	I2, Pa1, **S1**

Early project decisions are rarely changed because the cost of altering them increases significantly as the project progresses. These decisions form the foundation of the project, influencing subsequent choices and creating dependencies that make adjustments more complex and time-intensive. In some cases, earlier decisions can become obstacles when a new direction is desired but no longer feasible due to the constraints imposed by those initial choices. The deciding actor must determine whether altering early project decisions is sufficiently important, considering the cost of change and whether the extra costs are justified.

In LP, this rule is reflected in the continuity of decisions despite changes in project management. LP1 explained, *"The municipal project manager who set up the tender that we won is no longer involved. The current project manager ended up with W+B because we were already part of the project."* This illustrates how earlier decisions, such as the engagement of W+B, were carried forward, leaving limited room for successors to make adjustments. The current project manager may have evaluated whether altering the decision regarding W+B was feasible but likely found the associated costs and contractual implications too significant to justify a change. Observations during LP meetings further confirmed this dynamic, as earlier decisions were consistently referenced and continued to guide the project, with revisiting them deemed impractical.

In WZ, this rule also applies but in a different context. WZ6 noted, *"The previously set requirements and methods for monitoring and evaluation are fixed and cannot simply be adjusted."* This highlights how initial choices, such as monitoring methods, dictate later actions and make changes challenging. Here, the deciding actors likely determined that altering these methods was not worth the added cost and complexity. Revising these decisions would require adjustments to subsequent processes, adding to both cost and complexity. During meetings in WZ, it was observed that decisions made early in the process were consistently followed, reinforcing this rule.

The rule Po1 affects S1 by requiring the deciding actor to carefully weigh the importance of altering early project decisions against the associated costs. This impacts the availability of time and resources, as significant changes can consume these resources and potentially limit the scope of outcomes. Conversely, if changes are deemed critical and managed effectively, they can redirect efforts toward achieving better results within the project's constraints.

Po2	Municipal departments with reviewing authority may reject proposed plans if they do not meet their documented requirements	A1, B1, C1, C2, **S2**

Reviewing actors hold significant authority to approve or reject plans based on documented requirements. This authority ensures that plans align with established criteria, but it also means that the reviewing departments cannot demand more than what is explicitly documented. While this can create clarity and consistency, it often creates barriers when proposed adjustments or innovations, such as circular solutions, fall outside the standard framework. These documented criteria, which reviewing actors use to evaluate compliance, are often not designed to accommodate innovative approaches. As a result, plans that do not align with

these conventional requirements risk rejection, even if they align with broader sustainability or innovation goals.

In LP, the municipality's authority was clear in how they reviewed all plans to ensure they met the documented rules. LP4 said, *"The plans created are reviewed by the municipality."* highlighting their role in approving proposals. However, because reviewing actors could only require what was documented, this often clashed with the flexibility needed for circular solutions. Existing guidelines, like the use of traditional materials, made it difficult to explore new ideas, as changing these rules was seen as unrealistic. This reliance on documented rules could sometimes work to ensure consistency but often worked against the adoption of circular measures, especially when the M&M department's focus on compliance limited room for innovation.

In WZ, reviewing actors similarly prioritized adherence to documented requirements, sometimes at the expense of innovation. WZ6 noted, *"The municipality assesses plans based on previously established requirements, such as zoning plans and building field passports."* highlighting their strict compliance approach. This sometimes led to decisions that conflicted with sustainability goals. WZ3 explained, *"If the … must comply."* (fully referenced under rule C2) This shows how the inability to go beyond documented requirements, driven by the M&M department's focus on established criteria, often worked against innovation and sustainability in both LP and WZ.

The rule Po2 affects S2 by ensuring that municipal departments with reviewing authority align proposed plans with documented political decisions and policies. If plans fail to meet these requirements, their rejection enforces adherence to broader goals and regulations. This process ensures that project decisions remain consistent with implemented policies, supporting the integrity and accountability of the project outcomes.

Po3	The municipal project team holds the responsibility and must make the decisions, with their authority limited to actions permitted by regulations	A1, C1, C2, Pa1, **S2**

The municipality has significant decision-making authority, giving the project team considerable freedom in shaping how plans are implemented. However, this freedom is bound by political set regulations and the ambitions set by the municipal council. This framework can have both positive and negative effects on achieving circular ambitions. On the one hand, the municipality's authority allows for the integration of circular goals if they align with political priorities. On the other hand, rigid adherence to regulations and politically defined objectives can limit flexibility and hinder innovative circular solutions.

In LP, the municipality's authority sometimes sidelined external input. LP1 noted, *"The municipality often does not listen to the advice provided by W+B."* showing how their power could limit external contributions. However, the municipality could still adopt external ideas later in the process. LP3 explained, *"The circular solutions we proposed were often met with objections by the municipality, but at the last moment, they suggested circular asphalt for the bike paths, which was incorporated into the plan."* This highlights how the municipality's authority allowed them to decide on changes, even when these came late in the project.

In WZ, the municipality also held final decision-making power, but their authority was more constrained by regulations. WZ5 stated, *"The municipality has the ultimate decision-making power over the plans and designs."* highlighting their central role in decision-making. However, this authority was limited by political restrictions, as illustrated by WZ5's example: *"The financial flows for realization and M&M are separate systems, which makes it difficult to offset savings in maintenance against investments in realization due to regulations."* This shows how strict financial rules, driven by political frameworks, restricted flexibility and hindered more integrated decision-making.

The rule Po3 affects S2 by emphasizing that the municipal project team's decision-making must align with regulations, ensuring compliance with documented political decisions and implemented policies. This limitation reinforces that all project actions and outcomes must adhere to broader legal and policy frameworks, ensuring consistency and accountability throughout the project.

Po4	The meeting organizer can determine the meeting structure and agenda based on what they consider important	C2, C3, I3, Pa1

The actor that organizes the meeting, or referred to in this rule as organizing actor, can determine the meeting structure and agenda based on what they consider important. This means that actor can influence the flow, focus, and topics discussed, shaping the outcomes of the meeting. By deciding on the agenda and participants, the organizing actor plays a key role in prioritizing certain topics, such as circularity, depending on their knowledge, responsibilities, and motivations.

In LP, meetings follow a structured approach. A fixed biweekly design workshop is organized by W+B, where current topics are discussed. As noted by LP1, *"Once every two weeks, there is a fixed meeting (design workshop) where current topics are discussed. Depending on the subject, different experts are present, but the core team is always involved."* Agendas are prepared beforehand, and minutes are sent afterward, ensuring decisions are documented. Because W+B organizes these meetings, they have the ability to influence the agenda and guide discussions. For instance, by adding a specific agenda item focused on circularity, they can steer the conversation toward sustainable solutions and highlight its importance. This structured approach gives W+B a key role in shaping priorities during the workshops. During attendance at such meetings, this structured process was confirmed, with a premade agenda guiding the discussions and providing W+B an opportunity to promote circularity in the project.

In WZ, however, meetings lack a consistent structure. While there is a fixed biweekly meeting between the municipality and W+B, these meetings often do not occur. As WZ3 explained, *"Once every two weeks, there is a meeting between me and the municipality. This does not follow a fixed structure; each time, we decide what to discuss. Often, the meeting does not happen at all."* When meetings do occur, decisions and the reasoning behind those decisions are minimally documented, which was also seen during an attended meeting. WZ3 further described an internal Monday meeting at W+B, stating, *"Every Monday, there is an internal meeting with all involved from W+B, where current issues are discussed. There is no structure for the agenda of these meetings."* This lack of structure and documentation in WZ limits the ability to prioritize and track topics such as circularity.

S1	Time and resources must be available to prevent limiting the scope of possible outcomes	B1, C3, C4, I1, I2, I3, Pa1, Pa2, Po1

The availability of time and resources defines the scope of actions and outcomes in projects, influencing what can realistically be achieved. Constraints such as budget, manpower, and logistical capacity limit the ability to implement innovative solutions or address additional needs, particularly when these exceed the planned resources.

In LP, resource limitations affected several aspects of the project. LP3 highlighted logistical constraints, stating, *"Reuse of materials faces obstacles: the municipality has limited storage space and lacks the proper equipment."* This shows how physical and logistical resource gaps hinder the adoption of circular measures. Financial constraints further reduced actors' ability to explore sustainability solutions. LP3 noted, *"Researching circular measures takes time. These hours cannot be billed."* Without funding for these efforts, actors were discouraged from dedicating additional time to circularity or sustainability initiatives. These limitations significantly shaped the project's scope, with sustainability measures often sidelined due to resource unavailability.

In WZ, similar constraints were observed, particularly with financial resources. WZ2 explained, *"M&M has a powerful position; they can indicate that a certain budget is insufficient to manage a sustainability measure, which means more budget is needed or the measure is not implemented."* This highlights how financial limitations within the M&M department directly influenced the feasibility of proposed measures. Even when sustainable solutions were prioritized, their implementation was subject to strict budgetary controls. WZ3 added, *"Circular and … be billed."* (fully referenced under rule I2) This illustrates how limited resources and a lack of financial compensation restricted further action, even when actors were intrinsically motivated to pursue sustainability goals.

S2	The project decisions must align with documented political decisions and implemented policies	C4, Po2, Po3

Political decisions and policies shape the scope of actions and outcomes in projects, defining the goals and constraints within which municipal project teams operate. These decisions influence priorities, budget allocations, and regulations, often guiding how resources are distributed and what is permissible in project execution.

In LP, political decisions were pivotal in setting project goals. LP1 stated, *"The municipal council has established seven objectives for the area development in LP, with circularity being one of them, so we and the municipal project team must ensure that the area development meets these objectives."* This highlights how political goals direct the project's focus, requiring alignment with broader governmental aims. However, political decisions also imposed budgetary constraints. LP1 explained, *"There have been years of cuts to M&M budgets because it is politically easier to justify than cutting public swimming pools."* illustrating how politically driven budget cuts hindered the ability to fully achieve circularity ambitions. These constraints limited flexibility and forced actors to prioritize within reduced resources.

In WZ, the impact of political decisions was similarly significant. WZ5 described the influence of politics, stating, *"Many decisions are politically driven, depending on the party in power."* This shows how changes in political leadership can shift priorities, directly affecting project execution. Political decisions also shaped financial structures, as WZ5 noted, *"The financial … these flows."* (fully referenced under rule Po3) This highlights how political and regulatory frameworks restrict flexibility, overlapping with Po3, even when adjustments could improve project outcomes, demonstrating a recurring challenge linked to political influence.

6. PART 2: CHANGING WORKING RULES

6.1 WORKING RULE RECOMMENDATIONS

The working rules represent existing processes that influence interactions and decision-making in projects. To enhance circularity, these rules must either be removed, adapted, or strategically leveraged. W+B, as a hired actor, operates without formal authority, relies on delivering well-crafted advice and solutions that align with the client's objectives. Although rules such as Po3 and S2 are fixed constraints, W+B must navigate these limitations strategically to maximize their influence within these boundaries.

Within the framework of rules impacting project outcomes, W+B's influence can be categorized into three main areas: (1) rules that require client involvement and where W+B can provide compelling arguments, (2) rules that can be addressed internally through process improvements, and (3) rules that can be adapted during the design phase to enhance circularity. By strategically addressing these areas, W+B can navigate its limited formal authority to effectively promote sustainable practices and align project decisions with circular objectives.

Client dependent adjustable rules

W+B operates within constraints where its influence is shaped by the involvement of the client and the internal processes of the project. Since W+B only provides advice and lacks formal authority, their ability to drive decisions heavily depends on the client.

Although Rule A1 cannot be changed directly, its impact can be mitigated by delivering structured, high-quality advice, maintaining a clear approach, and contributing relevant knowledge. By doing so, W+B creates positive past experiences that can help transform Rule A1 into a tool for improving circularity. Rule Po4 aligns closely with this effort, as fostering collaboration and building trust can amplify W+B's influence. While W+B already invests in collaboration, there is room to prioritize developing strong relationships over addressing immediate project interests when necessary. By focusing on mutual understanding and trust at an early stage, W+B can increase their influence over time, building the foundation for greater alignment on circular goals. This doesn't mean allowing everything to proceed unchecked but rather carefully balancing when to push forward and when to invest in relationship-building for the best long-term outcomes.

The importance of fostering positive working relationships is further emphasized by Rule C3, which highlights how actively acknowledging and valuing advice encourages more effective input from all stakeholders. W+B can advocate this principle to their clients, showing how recognition of contributions directly enhances collaboration and results. By emphasizing the value of intrinsic motivation, as described in Rule Pa2, W+B can create a project environment where ideas are genuinely considered, and stakeholders feel motivated to participate. When people know their input is valued and receive clear reasons when advice isn't followed, they work with greater enthusiasm and produce better outcomes.

Additionally, strong relationships foster trust and cooperation, which are crucial for convincing clients to allocate resources toward circular measures. For instance, W+B could demonstrate how reallocating resources from less critical tasks, where effort could be reduced, might free up capacity for sustainable initiatives. This creates a win-win scenario: satisfying project goals while also advancing circularity. By emphasizing these benefits and investing in trust-building, W+B not only increases its own influence but also helps the client see the long-term value of collaborative and sustainable project strategies.

A good collaboration often depends not only on trust but also on the quality and relevance of the input provided. Part of this lies in presenting a professional image, which starts with well-

structured meetings that set the tone for further cooperation. Such meetings are often the first step toward building trust and aligning priorities, but their success also heavily depends on the type of client. It is therefore crucial for the individuals at W+B to carefully assess what the client considers most important and tailor their approach accordingly.

By organizing well-structured meetings, W+B can demonstrate professionalism and, if they are in charge of the meeting, guide the agenda to prioritize circularity more effectively using Rule Po4. Additionally, W+B could organize their own initiatives, such as circularity workshops, to share knowledge and raise awareness. While this is already done occasionally, in cases where the client resists, such as in LP, these efforts are sometimes abandoned rather than pursued more actively. A better strategy could involve following up even when faced with resistance. With strong collaboration, W+B might also be able to influence the contract type, allowing for greater flexibility in incorporating these activities. If W+B does not organize the meeting, they can actively bring the topic of circularity up to include it in the considerations as suggested by AG1 "*As a project leader, you can bring extra attention to circularity by addressing it from the beginning and bringing it up again in meetings*."

However, a more structured project, such as in case study LP, can face challenges if there are personal conflicts or if they feel their input is not valued, leading to less effort which often leads to lower-quality output and reduced success. Good relationships, as Rule C3 explains, rely on mutual understanding and informal interactions, such as shared lunches or team walks, which help to strengthen trust and collaboration. These efforts can enhance W+B's influence and open opportunities to address areas beyond their contractual responsibilities, using Rule C4 to your benefit. When the client enjoys the collaboration and sees positive results, this also builds positive experiences, aligning with Rule A1.

The relationship between W+B and the client directly impacts expert involvement, highlighting how various rules can reinforce one another. Rule B1 demonstrates that the inclusion of experts depends on the client's choices and the available budget, as constrained by Rule S1. To overcome these limitations, a good collaboration helps as well but necessitates provide clear, evidence-based reasoning to justify the need for expert input. When budget constraints arise, W+B could prioritize how the available resources are used, focusing on the most impactful areas while scaling back less critical aspects. This strategic allocation of resources could help ensure that expertise is available at the right time and place, maximizing its effect.

Financial incentives linked to circularity, such as MEAT-criteria or bonuses for achieving sustainability goals (Rule Pa2), further motivate contractors to prioritize sustainability. To ensure these incentives are effective, they must be integrated into contracts from the outset, as adjustments are often impossible later. While W+B depends on the client's willingness to include such incentives, contractual agreements provide a framework for progress. In this context, W+B can apply subtle pressure by emphasizing the long-term benefits of these measures. Furthermore, goodwill (Rule A1) plays a vital role here, as a strong, trust-based relationship can increase the likelihood of gaining client approval for additional contributions. Such collaboration is often easier when mutual understanding has been established, as Rule Pa1 underlines the importance of explicit client consent for changes.

Challenges caused by Rule Po2 can be mitigated by aligning project objectives with the client's goals. For example, W+B can propose compromises, offering options that address both circularity goals and practical needs, such as low-maintenance solutions for M&M departments. This "give-and-take" approach, where clients agree to one aspect in exchange for flexibility in another, could reduce resistance and foster collaboration. At the same time, W+B must remain aware of the broader political context, as the allocation of budgets and priorities is often shaped by political considerations. By understanding this landscape, W+B can strategically advocate for changes to project objectives that better align with circular goals.

Rule C1 introduces another layer of complexity, as seen in case study LP, where stakeholders often relied on personal experience and opinions rather than shared definitions and goals. This challenge is reinforced by AG2's observation that "*Everyone views sustainability from their own knowledge and expertise. Informing everyone about the definitions, goals, and how to achieve those goals is important.*" However, this challenge can also be turned into an opportunity by proactively sharing successful circularity examples and making relevant knowledge easily accessible. Influencing decision-makers in this way could redirect their perspectives, encouraging them to align their opinions with circular goals.

Budget constraints, as outlined in Rule Po3, further complicate the integration of circular principles. The division of budgets between municipal teams responsible for development and maintenance departments often limits flexibility. While local councils may sometimes allow adjustments, such as investing in durable materials to lower long-term costs, such decisions require careful planning and strong justification. W+B could work closely with municipalities to strategically evaluate how available budgets can best support both immediate needs and circularity goals. By balancing the priorities of cost, durability, and maintenance, W+B can help stakeholders make informed decisions that align with sustainability objectives.

In the end, W+B's influence on the decision making process can be improved by creating a clear and collaborative project environment that builds trust and transforms constraints into opportunities. While rules like A1, B1, and Po2 can initially appear restrictive, they can be turned into advantages through goodwill, strategic resource allocation, and high-quality advice. Similarly, rules like Po4, C3, C1, and Pa2 present opportunities to strengthen collaboration and steer the project toward circularity. By strategically shaping meetings and agendas under Rule Po4, W+B can prioritize circularity while using Rule C3 to emphasize the value of recognizing and valuing input to maintain motivation. Rule Pa2 reinforces this approach, as a thoughtful balance of intrinsic and financial incentives can drive more sustainable practices.

Finally, by wisely managing available budgets, choosing which aspects to prioritize and which to simplify, and encouraging reviewing actors to take part in these decisions, W+B can overcome resource limitations and foster collaboration. Through strong relationships, strategic communication, and well-structured agreements, W+B can maximize their impact and advance circularity across projects.

Internal W+B adjustable rules

Adjusting internal processes is an area where W+B has full control. To enhance these processes, W+B can organize internal workshops and meetings to raise awareness about circularity and facilitate knowledge sharing across projects. While initiatives like lunch lectures and general workshops are already in place, a specific workshop focused on practical, applicable solutions for circularity could further contribute to improving internal practices. This workshop should provide concrete, actionable information that project managers can immediately implement, aligning with Rule Po4.

By systematically documenting decisions in an accessible and organized manner, as suggested by Rule I2, W+B can create a resource that is valuable for both internal use and client collaboration. This documentation would enable the review of past successes and failures, the reasoning behind decisions, and a clearer understanding of achieved circular gains. Over time, these practices can evolve into a centralized database of cost-effective and high-quality circular measures. Such a database, although requiring some time and effort to maintain, prevents the need for every project to develop solutions independently. By assigning responsibility to a specific team member or making it mandatory for project managers to contribute updates, W+B can ensure that valuable knowledge is retained rather than lost between projects.

While initial implementation may incur some costs, the database would become increasingly beneficial over time, allowing W+B to overcome financial constraints outlined in Rule S1. This investment strengthens W+B's ability to provide well-informed advice and achieve long-term financial and circular benefits.

Given that project managers often prefer familiar methods, as emphasized by Rule C1, it is crucial to clearly demonstrate the advantages of systematic processes. If an internal project secretary is involved, they could oversee the documentation process, as was effectively done in WZ before being discontinued due to cost concerns. By recognizing the importance of structured decision tracking and allocating the necessary resources, W+B can mitigate limitations caused by Rule S1. This commitment will enable W+B to build and sustain processes that support better decision-making and ensure long-term success in achieving circular objectives.

PD phase adjustable rules

Within a project, certain rules can be adjusted during its progression, particularly in the design phase, to enhance circularity. Rule C2 highlights the importance of fostering collaboration among actors, who might otherwise focus solely on their specific responsibilities. This collaboration can still be influenced during the project by creating opportunities for interaction, such as physical collaboration days or integrated meetings. These events encourage cross-disciplinary dialogue, allowing actors to share insights and develop solutions that extend beyond their individual tasks. Such interactions align efforts with the broader project goals, as outlined in Rule C4. By prioritizing regular and meaningful collaboration, W+B can break down silos, integrate various perspectives, and increase the level of circularity achieved.

Rule C1 can also be strategically influenced by equipping decision-makers with the necessary knowledge and experience to prioritize circular principles. This applies to both internal teams and external stakeholders. Organizing workshops, for example, can serve multiple purposes: sharing practical knowledge, raising awareness about circularity, and showcasing successful reference projects. These workshops, conducted jointly with W+B and the client, help to foster collaboration and shared understanding. If clients are not initially interested, internal workshops can still provide significant value by strengthening W+B's internal knowledge base and enhancing their ability to advocate for circularity. Such workshops not only inform and educate but also create awareness and inspire participants to see circularity as a standard and valuable consideration. Positive experiences, especially those demonstrating tangible benefits, can further reinforce this mindset shift, helping decision-makers adopt circular principles in their practices.

Additionally, W+B can explore subsidies during the PD phase to expand financial possibilities for circular solutions. Subsidies from higher governmental bodies can provide critical funding for implementing ambitious circular measures that might otherwise be restricted by the project's budget. This approach helps mitigate financial constraints outlined in Rule I3 and Rule S1, ensuring that circular goals become more feasible even within tight budgetary frameworks.

Motivation also plays a crucial role in driving meaningful change, as emphasized by Rule C3. When individuals feel that their advice is appreciated and their contributions are recognized, they become more engaged and willing to explore innovative solutions. During the design phase, W+B can establish feedback mechanisms that actively acknowledge input and integrate it into decision-making. This visible recognition fosters a collaborative and supportive environment, strengthening relationships and increasing overall project quality. It also stimulates intrinsic motivation, as described in Rule Pa2, by ensuring that participants feel valued for their contributions. This motivation becomes a driving force for teamwork and synergy, empowering actors to align their efforts with the broader project goals and develop creative, sustainable solutions.

Through these efforts, fostering collaboration, building knowledge, exploring funding opportunities, and cultivating motivation, W+B can significantly enhance the project's circularity. By addressing challenges during the design phase and creating an environment where individuals feel inspired and engaged, the foundation is laid for innovative and sustainable outcomes that align with both project-specific goals and broader circular principles.

6.2 DEVELOPMENT OF CIRCULARITY TOOL

Identifying and providing advice on adjusting the working rules would help improve the level of circularity in an ADP a lot, but this requires a structured change in the way of working. W+B as the problem owner desires a more concrete tool that can help improve circularity directly in the PD phase of an ADP. Due to time limitations only the setup of the tool will be developed, where later the content can be added.

According to Rule S1, a major challenge in implementing circularity is the limited availability of resources such as money, space, equipment, and manpower. A larger budget could significantly enhance the inclusion of circular measures, as highlighted in Rules Po1, I2, I3, and Pa2. W+B's goal of creating a tool for direct use in an ADP that improves circularity depends on prioritizing the allocation of these limited resources. A well-designed tool could help focus available budgets on the most effective circular strategies, making the best use of constrained financial and material assets.

However, financial resources alone are not sufficient to overcome the barriers to circularity. The lack of knowledge about circular possibilities is an equally significant obstacle. Interviewee WZ3 confirmed this, stating, *"It is not clear to me what more I could have done to improve circularity in the project."* This acknowledgment highlights the knowledge gap as a primary reason for the limited inclusion of circularity in projects. While general knowledge of circularity is increasingly available, it often remains insufficient in practical application.

Extensive guides and tools exist at no additional cost, but accessing, understanding, and applying them is often time-consuming and resource intensive. This creates significant challenges for clients and actors like W+B, who may view these efforts as unnecessary, overly complex, or beyond their scope if not explicitly required. Interviews revealed several recurring issues with existing resources, describing them as too general, costly, vague, or demanding excessive time to process. These shortcomings prevent the resources from offering actionable guidance in real-world projects.

By addressing both financial and knowledge barriers together, circularity can be more effectively integrated. With sufficient financial resources, W+B could allocate time and effort to acquire and simplify existing circular knowledge. For example, a larger budget could support the development of tailored, practical tools that break down complex circular concepts into actionable steps. Simplifying access to these tools and providing clear, concrete information would greatly improve their usability and effectiveness. In this way, adequate funding becomes a pathway to overcoming the knowledge gap, enabling clients and actors to make informed, strategic decisions that enhance circularity.

The need for actionable tools becomes even more evident when considering feedback from project participants. While many interviewees emphasized the importance of concrete and practical solutions for driving circularity, they also pointed out that tools must meet other criteria to be truly useful. Beyond content, tools should be easy to use, time-efficient, and relevant to the specific needs of projects. These comments underline that both financial investment and clarity in knowledge are key to overcoming barriers, but practical usability is equally critical to ensure their effectiveness in real-world applications.

Interviewees mentioned aspects like "*Circular solutions need to be concrete; otherwise, they don't work.*" By WZ3, "*Documents must raise awareness and provide concrete proposals to promote circularity.*" by WZ2, and "*Documents must contain concrete proposals for circularity and should not be too abstract, so they can actually be applied.*" by WZ2. All mentioning important aspects of a tool, but also indirect stating a document would be helpful. LP3 mentions directly the need for a simple helpful tool by stating "*It would be helpful if a few circular guidelines were available. This would save us a lot of time in researching circular solutions.*". The findings highlighted the importance of developing tools that meet specific criteria to maximize their effectiveness. Project managers often rely on familiar methods and workflows, so creating a tool with a high likelihood of adoption, and thereby improving circularity, requires careful attention to their needs and habits. From the interviews and informal conversations, the following requirements for an effective tool were identified:

- It must be simple to use.
- It should not require significant time to apply.
- It must have practical and immediate use.
- It should be specific and avoid abstract concepts,
- It should use or complement existing tools.

Based on these criteria and input from the working rules, in collaboration with the interviewees from Table 3, a tool called 'CircuPlan' is proposed as a practical, clickable file that outlines the general phases of a project and the associated documents. This tool provides clear and actionable guidance while being simple to use and immediately applicable across various scenarios. CircuPlan is designed to inform and support stakeholders by bridging the gap between general circular knowledge and document-specific insights, ensuring that the available resources are used as efficiently as possible. By focusing on working rules I1, I3, and S1, CircuPlan simplifies access to relevant knowledge, centralizes information, and ensures practical application within the constraints of a project. While CircuPlan offers a practical, easy-to-implement solution, the working rules identified in this study also highlight that the broader success of circularity in projects depends more on effective collaboration and coordination among stakeholders, a challenge W+B needs to address internally.

The clickable file supports decision-making by providing structured, step-by-step guidance tailored to each project's unique needs. While general knowledge offers a valuable foundation, project-specific knowledge is often more impactful, as AG2 explained: "*Circularity and sustainability goals depend on various factors such as the situation, the ground conditions, and the type of project, so it is not possible to create a fixed standard for this.*" CircuPlan addresses these challenges by focusing specifically on simplifying the application of circularity principles at the document level and aligning with working rules I1, I3, and S1. However, this focus makes it a complementary tool rather than a solution to deeper, systemic challenges like stakeholder collaboration.

To further support decision-making and optimize the use of available resources, Figure 3 provides an overview of knowledge-gaining methods prioritized by their budget requirements and potential to improve circularity. It starts with actions such as involving a circularity expert (P1) and creating a circularity plan (P3) and progresses to advanced methods, including material flow analysis (P4), conducting a circular quick scan (P5), and organizing stakeholder workshops (P6, P7). For projects with minimal or no budget for circular measures, CircuPlan (P8) is the final option. This makes CircuPlan a practical, document-specific tool that complements the methods in Figure 3 by offering general yet actionable guidance for projects operating under strict resource constraints.

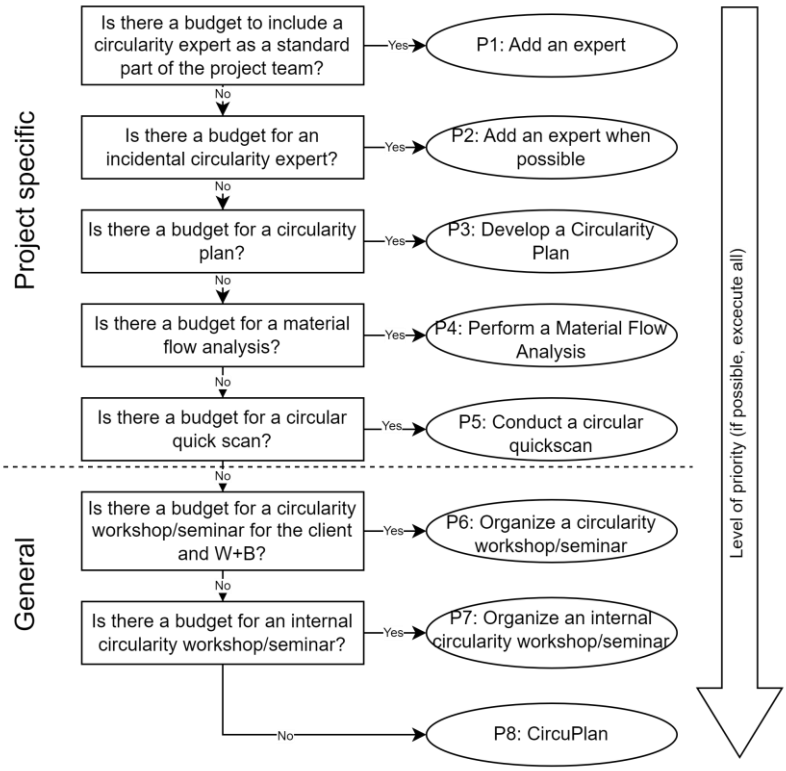

Figure 3: Circular knowledge gaining methods on priority

CircuPlan has been developed as a practical research tool designed to meet key circularity requirements while providing comprehensive guidance. The tool focuses on identifying document specific obstacles during the PD phase, offering strategies to overcome them, and presenting available circularity tools and easily applicable measures. Additionally, CircuPlan references relevant projects and encourages users to consider the direct or indirect implications of material usage in their decisions, as highlighted by the circularity expert AG2: *"When making decisions, it should be considered whether they are directly or indirectly related to material usage."* To ensure that all aspects of circularity are considered, CircuPlan includes a chechlist, enabling users to verify that circularity has been considered sufficiently in the decisions making process.

To ensure the consistent application of CircuPlan, the project secretary can monitor the implementation of CircuPlan throughout the project phases. This role is particularly important because project managers, often accustomed to established workflows, may intentionally or unintentionally overlook the tool. By assigning the project secretary this oversight role, W+B can ensure that circularity principles are integrated effectively across all stages of a project.

CircuPlan offers a clear structure by centralizing the key documents for each project phase, which are outlined in Appendix E. This approach allows stakeholders to quickly access all essential information on a single page, making the tool not only user-friendly and practical but also a gateway to additional relevant resources. By consolidating crucial information, CircuPlan minimizes the time and effort required to effectively apply circular principles.

By combining the prioritization method based on project budgets, as depicted in Figure 3, with CircuPlan's knowledge-driven framework, optimal decision-making is facilitated. CircuPlan acts as a reliable resource that can always be consulted, regardless of budget constraints. This integration of practical tools and strategic guidance empowers stakeholders to seamlessly and effectively embed circularity into their projects.

7. DISCUSSION

This research examined how circularity can be better integrated into ADPs during the project development PD phase, focusing on the influence of institutional working rules and practical challenges. The findings align with existing literature on barriers to circularity while providing new insights into project-specific dynamics and individual motivation.

The challenges identified in this study largely confirm those found in the literature. However, this research goes further by uncovering the underlying reasons why circularity is not effectively embedded in the ADP process. Many actors continue to prioritize traditional approaches, often overlooking the potential benefits of material reuse while focusing on perceived obstacles. For instance, Hossain et al. (2020) and Vrijhoef (2020) emphasize the absence of standardized processes. While this issue persists, the working rules Po4, I2, and B1 identified in this research provide a foundation for addressing these gaps. By understanding these rules, it becomes possible to target the specific areas where improvements can be made, enabling organizations to better support circularity. This approach does not solve the systemic problem but offers a practical pathway to internally address the structural barriers that hinder progress. Similarly, Oyenuga and Bhamidimarri (2015) discuss regulatory complexities hindering circularity, which align with the working rule Po2 and S2. Furthermore, issues related to the reliability and availability of reused materials exacerbate these challenges.

Municipal sustainability goals are often not effectively communicated across departments, leading to fragmented efforts. This study identifies that this fragmentation is not only systemic but also a result of poor internal communication, which prevents circularity goals from being effectively translated into clear actions. This highlights the systemic barriers documented in prior studies and adds depth by exposing internal communication failures. Restrictive regulations, as noted by Salles et al. (2024), further obstruct material reuse, while Oyenuga and Bhamidimarri (2015) emphasize the complexity of regulatory frameworks that hinder circularity. These challenges align with the working rules Po2 and S2, which reflect the regulatory constraints all actors must adhere to. Additionally, the absence of standardized implementation methods fosters inconsistency and confusion. Beyond systemic barriers, this study highlights that decision-making often depends on individual interpretations of circular principles, further limiting their consistent application. For example, financial incentives, as highlighted by Salles et al. (2024) and aligned with the working rule Pa2, can motivate individual stakeholders to drive progress despite systemic barriers. This research identifies an additional factor: intrinsic motivation. The commitment and personal drive of individual actors often determine whether circularity is prioritized in practice.

Többen and Opdenakker (2022) suggest raising awareness, setting circular goals, and using checklists to enhance collaboration. This study approaches these challenges in greater depth and from another perspective by first identifying the underlying working rules that influence day-to-day processes and second, offering advice on how to adjust these rules to contribute to the objective of increasing circularity in an ADP. Similarly, Salles, Cervantes, and Bragança (2024) emphasize financial incentives, stronger markets for secondary materials, and training programs. Rather than expanding on these, this research complements them through CircuPlan, which provides document-specific proposals to connect projects with local and reused materials, ensuring circularity is structurally embedded into processes.

This aligns with Stevering's (2023) application of the IAD Framework, though this study has a different scope as his case studies focused on railroad projects, while this research focuses on ADPs. Stevering's results were more focused on actions and what occurred, while this study dives more in depth into why an actor acted the way they did or why a certain decision was made. Rule A1, for example, offers a more nuanced understanding of how conflicting stakeholder objectives and fragmented responsibilities hinder alignment toward circular goals. Similarly, Rule C1 highlights that actors frequently rely on their own opinions, knowledge, and

experiences when making decisions, while Rule A1 demonstrates how advice from formally empowered actors often takes precedence. These findings illustrate how systemic challenges, combined with individual preferences and interpretations, hinder the adoption of circularity in everyday project workflows.

While this research corroborates existing studies, it underscores the significance of individual efforts and project-specific dynamics in promoting circularity. By connecting working rules to practical challenges, this study deepens the understanding of how institutional frameworks influence circularity adoption. For instance, the nuanced analysis of decision-making behaviors provides critical insights into the interplay between systemic barriers and individual actions.

Nevertheless, this study has limitations. The working rules identified were specifically formulated for the two case studies analyzed in this research. As a result, the findings and recommendations are inherently tied to the unique characteristics of these projects. Semi-structured interviews resulted in varied topics across interviewees and case studies, which may have led to gaps in the analysis. Reliance on interview quotes could have overlooked subtleties, and the focus on two case studies limits generalizability. It remains uncertain whether the identified working rules are broadly applicable to other ADPs or specific to the cases studied, which highlights the need for further validation through additional research. Furthermore, the CircuPlan tool's incomplete development due to time constraints reduces its current applicability, highlighting the need for continued refinement. The tool's current structure provides a valuable framework but requires further expansion to address its potential of helping users acquire and document specific circular knowledge.

To build on the current findings and ensure circularity is further integrated into ADP projects, several steps for future research are recommended. First, testing and expanding CircuPlan is essential. While the tool currently offers a practical framework for applying circular principles, further development is needed to refine its content and increase its applicability. This includes adding more detailed strategies, tools, and examples for each project phase, as well as tailoring the tool to accommodate specific project conditions. Expanding CircuPlan will help make circularity more accessible and actionable for all project stakeholders.

Second, future research should investigate whether the working rules identified for these two greenfield ADPs are applicable in other contexts, including additional greenfield projects and brownfield ADPs. Brownfield projects often involve existing infrastructure, which influences the new design and adds layers of complexity. These constraints significantly impact how circular measures can be implemented. Investigating these differences will clarify how the findings can be adapted to address the specific challenges of brownfield development, where the interaction between the existing situation and new design plays a critical role, and ensure broader applicability of the rules.

Lastly, it is important to explore how the municipality can implement the working rule findings across all its departments. By embedding circular principles into broader municipal processes, the findings can have a wider impact, ensuring that circularity becomes a standard part of project planning and execution. This will require improving communication channels, fostering collaboration between departments, and providing clear, actionable guidelines for implementation.

Together, these research recommendations will help strengthen the integration of circularity into ADPs, making it more effective and scalable across different projects and contexts.

8. CONCLUSION

This research set out to answer two research questions.

Research question 1: *"What are the underlying working rules in greenfield area development projects in the Netherlands, with a primary focus on the preliminary design phase, and how do these rules impact the level of circularity?"*

A total of 17 working rules were identified that influence circularity. These rules were first identified across both case studies, which share the foundation of greenfield ADPs but differ in key aspects. Subsequently, the rules were analyzed to understand how they can be influenced or adapted to promote circularity in ADPs. The two most influential differences between the case studies are the project ambition related to circularity and the quality of collaboration with the client. By comparing both projects based on their unique process characteristics, several interesting findings emerged.

In the LP project, a circularity goal was defined. However, the collaboration between parties faced significant challenges. The internal engineering department of the municipality, acting as an interim plan reviewer, held considerable influence over decisions. This was largely due to the municipal project manager granting them formal authority. This dynamic reflects rule A1, which states that advice from actors with formal authority is prioritized over input from those without it. As a result, W+B, an actor without formal authority, often saw their suggestions overruled.

This imbalance in authority had a ripple effect. W+B felt their input was undervalued, which led to reduced energy and engagement in the project, aligning with rule C3. Fewer proposals were made for complex issues, such as circularity, which were anticipated to be problematic. Consequently, many circular opportunities were missed, highlighting the need for better people management to mitigate such outcomes.

In the WZ project, no explicit circularity ambition was set. Instead, the focus was on biodiversity and climate adaptation. The absence of a specific circularity goal meant that no budget was allocated for circular measures, and no efforts were made to explore circular opportunities. Even the project manager from W+B admitted to being unsure about potential circular actions in the project. This situation aligns with rules I3 and S1, which emphasize the impact of insufficient financial resources.

Despite the lack of circularity ambition, collaboration within the project team was strong. However, the lengthy project duration revealed a challenge: earlier decisions no longer aligned with modernized goals, which corresponds to rule Po1. Unlike LP, the positive collaboration in WZ led to a motivated project team. In some cases, team members worked more hours than reported, driven by intrinsic motivation for the project, as seen in rule Pa2. This outcome might have been different if the team felt their input was disregarded.

Research question 2: *"How can the area development process of green field area developments be adjusted to better include circularity in the preliminary design phase considering the identified working rules?*

The identified working rules provide valuable insights into why certain actions were taken by stakeholders and why they are likely to be repeated. By adjusting these rules, they can be transformed from obstacles into enablers for circularity. The adjustments are categorized into three areas: rules requiring client approval, rules concerning W+B's internal processes, and rules applicable during the PD phase.

Rules that depend on client approval mainly focus on fostering better collaboration. Improved collaboration can positively influence multiple rules, as it encourages more ideas to be shared and motivates people to put in more effort when they enjoy the work. This directly addresses challenges like those outlined in rule C3 and rule Pa2, which emphasize the importance of team dynamics.

For internal processes at W+B, a key recommendation is to systematically document the used circular methods, aligning with rule I3. Currently, this is often seen is to costs intensive given the available project budget, but in the long term, a systematic approach can save resources by avoiding the need to re-evaluate the same circular measures repeatedly. This shift could also ensure consistency and efficiency in applying circular principles across projects.

Some rules can even be adjusted during the PD phase. A stronger focus on collaboration can help prevent situations like those described in rule C2, where individuals concentrate solely on their own tasks and miss opportunities for broader project goals. Enhancing teamwork and communication during this phase ensures that circularity opportunities are not overlooked.

To support these efforts, CircuPlan was introduced as a practical tool for centralizing circular information and providing actionable insights. It simplifies access to document specific circular strategies, enabling users to overcome knowledge gaps and most efficiently use the available resources, making circularity more accessible and actionable during the PD phase.

Ultimately, this research emphasizes that integrating circularity into greenfield ADPs requires a deep understanding of the underlying working rules and a strategic approach to adjust or leverage them effectively. By fostering collaboration, systematically documenting circular methods, and refining tools like CircuPlan, W+B can enhance their ADP process to consistently and effectively include circularity.

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Floris Droste

23/01/2025

APPENDICES

Integrating circularity in the preliminary design phase: An IAD framework analysis of working rules in Dutch area development projects

Witteveen + Bos

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Appendix A: Interview form
Appendix B: Interview quotes
Appendix C: Working rule sources
Appendix D: Additional observational sources
Appendix E: CircuPlan Outline

Statement regarding the use of AI tools
During the preparation of this work, I used the AI tools ChatGPT and ChatWBT to better formulate and structure the texts. After using this tool, I thoroughly reviewed and edited the content as needed, taking full responsibility for the final outcome.

For Chapter 1-2, and 4-8 ChatWBT is used. ChatWBT is an internal AI tool of Witteveen+Bos where text can be used and the information remains internal. Content sensitive information can be pasted in this tool without externally sharing the content, unlike other tools like ChatGPT where it is unknown what will be done with the provided information. For Chapter 3, the Literature Review, the content is already publicly available. Therefore, there is no sensitive information to share.

Interview Formulier

Datum:
Locatie:
Interviewee:
Interviewer: Floris Droste
Project:

Interview doelen

Interview agenda

1. Introductie:
   - Kennismaken
   - Onderzoek en interview doel uitleggen
   - Toestemming vragen voor het opnemen van het interview
   - Afstemmen over controle interview verslag
2. Interview vragen per rule stellen
3. Vragen naar andere relevante informatie/advies
4. Sluiting

Functie in het project:

Hoogst afgeronde opleiding:

Jaar in dienst:

Jaar ervaring in dit werkveld:

		Interview vragen
Position Rule	HV	Wat zijn de rollen en verantwoordelijkheden van individuen en organisaties met betrekking tot de circulaire (duurzaamheids) ambities tijdens de VO fase?
Scope Rule	HV	Hoe worden de gewenste uitkomsten, beperkingen, en bijbehorende algemene en duurzame doelen bepaald tijdens de VO-ontwerpfase en in de aanbestedingsdocumenten?
Boundary Rule	HV	Wie is betrokken bij het VO-ontwerpproces en het opstellen van de contracten, en op basis van welke criteria of expertise wordt deze betrokkenheid bepaald?
Information Rule	HV	Hoe worden de voortgang en de impact van circulaire (duurzaamheids) maatregelen binnen het VO-ontwerp en aanbesteding vastgelegd en gedeeld?
Choice/Authority Rule	HV	Welke keuzes en verantwoordelijkheden hebben invloed gehad op het VO-ontwerp en de aanbesteding met betrekking tot circulaire (duurzaamheids) ambities en welke invloed heeft W+B op deze keuzes?
Aggregation Rule	HV	Hoe verloopt de samenwerking en besluitvorming binnen het project, en hoe beïnvloedt dit de realisatie van de circulaire (duurzame) ambities?
Payoff Rule	HV	Hoe worden beloningen, boetes en financiële structuren ingezet in het project, en welke mogelijkheden en kansen zijn hierin?

APPENDIX B: INTERVIEW QUOTES

The table below presents the interviewees, including their function, case study, employer, and interview-ID. This table is a duplicate from the main report and is included here to assist with navigating the quotes.

Function	Casestudy	Employer	Interview-ID
Project Manager	LP	W+B	LP1
Sustainability Advisor for Civil Engineering and Infrastructure	LP	GM Haarlemmermeer	LP2
Landscape Architect	LP	OKRA	LP3
Project Manager	LP	GM Haarlemmermeer	LP4
Landscape Architect	WZ	W+B	WZ1
Projectleader public spaces	WZ	W+B	WZ2
Project Manager	WZ	W+B	WZ3
Project Leader for Development of Construction Sites	WZ	GM Lansingerland	WZ4
Project Manager	WZ	GM Lansingerland	WZ5
Civil Engineering Manager for Residential Areas	WZ	GM Lansingerland	WZ6
Contract and Procurement Expert	Not casespecific	W+B	AG1
Circularity Expert	Not casespecific	W+B	AG2

All quotes are presented in Dutch to preserve the original statements of the interviewees. This approach ensures that no information is lost in translation and allows readers to interpret the statements directly. Each quote is assigned a Quote-ID, which refers to its corresponding entry in Appendix D. The beginning of the Quote-ID indicates which interviewee, as listed in the table above, made the statement. A clarification is provided when the quote does not sufficiently explain itself.

LINCOLNPARK PHASE 2

Quote-ID	Interview quotes - NL	Interview quotes - EN (translation)	Possible clarification
LP1 - 1	1x in de 2 weken is er een vast overleg (ontwerpatelier) waar de actuele dingen besproken worden. Afhankelijk van het onderwerp zijn er verschillende experts aanwezig, maar het vaste kernteam is altijd aanwezig. Dit zijn vanuit de gemeente de Projectmanager, het hoofd van het intern ingenieursbureau, de contractmanager, de stedenbouwkundige, uitvoering, en vanuit W+B is dat de projectsecretaris, de projectmanager van W+B, eventueel een expert zoals voor	Once every two weeks, there is a fixed meeting (design workshop) where current topics are discussed. Depending on the subject, different experts are present, but the core team is always involved. These are, from the municipality: the Project Manager, the Head of the Internal Engineering Bureau, the Contract Manager, the Urban Planner, and Execution. From W+B: the Project Secretary, W+B's Project Manager, and, if necessary, an expert in areas such as Water	-

	waterhuishouding of circulariteit of ecologie.	Management, Circularity, or Ecology.	
LP1 - 10	Er wordt al jaren bespaard op beheer, is politiek beter te voorkopen dan bezuinigen op bijvoorbeeld openbare zwembaden	Maintenance budgets have been cut for years, as it is politically easier to justify than cuts to public services like swimming pools.	-
LP1 - 11	Tijdens het ontwerpatelier is er een agenda waar de besproken punten in staan. De input van deze punten kan worden aangeleverd maar vaak is het een samenkomst van eerder besproken punten. Hier zit verder geen planning achter.	During the design workshop, an agenda lists the points to be discussed. These points are often a compilation of previously discussed topics, with no further planning behind them.	-
LP1 - 12	Er mag worden afgeweken van de standaard (bijvoorbeeld het soort prullenbak, straatlantaarn) in de gemeente. Als W+B dit wil, moet hier de berekening voor beheer over de jaren bij meegeleverd worden. Eerst beoordeelt beheer het en als beheer het goedkeurt, moet het langs de gemeenteraad om dit extra geld voor beheer beschikbaar te maken. Bij Lincolnpark is deze fase nog niet bereikt.	Deviations from municipal standards (e.g., type of trash can, streetlight) are allowed. If W+B proposes such a deviation, they must provide a cost calculation for maintenance over the years. Maintenance reviews the proposal first, and if approved, it must go to the municipal council to secure additional funding. At Lincolnpark, this stage has not yet been reached.	-
LP1 - 13	Als de beheerder aanvullende middelen krijgt om de circulaire materialen en methodes te gebruiken, vinden zij het prima. Het enige doel van beheer is het beheren, dus als zij de benodigde middelen krijgen is het voor hen goed.	If Maintenance is given the additional resources needed to implement circular materials and methods, they are fine with it. Their sole purpose is to maintain, so if they have the required resources, they are satisfied.	-
LP1 - 14	De verdeling van geld binnen de gemeente en de regels die hieraan vastzitten maken het moeilijk om het geld op een andere manier te verdelen.	The allocation of funds within the municipality and the associated regulations make it challenging to redistribute money differently.	-
LP1 - 15	De gemeenteraad heeft een zevental doelstelling vastgelegd voor de gebiedsontwikkeling LP, circulariteit is een van de zeven doelstellingen, dus wij en het projectteam van de gemeente moeten zorgen dat de gebiedsontwikkeling straks voldoet aan de doelstellingen.	The municipal council has established seven objectives for the Lincolnpark area development, one of which is circularity. W+B and the municipal project team must ensure that the area development meets these objectives.	-
LP1 - 16	W+B heeft voor deelgebied centrum alleen het concept plan VO gemaakt, maar de toetsing heeft niet plaatsgevonden omdat de eisen waaraan er getoetst	For the sub-area Centrum, W+B only created the Preliminary Design (PD) concept plan. However, no review was conducted	-

	moet worden nog niet waren vastgelegd. Dat zijn vervolgstappen die nog moesten gebeuren, maar toen koos de gemeente ervoor het hele deelgebied uit te tenderen.	because the criteria for assessment had not yet been established. These next steps were not taken as the municipality decided to tender the entire sub-area.	
LP1 - 17	De gemeente heeft er tijdens de ontwikkeling van het VO openbare ruimte Centrum ervoor gekozen om naast het vastgoed ook de openbare ruimte onderdeel te maken van de ontwikkelingstender. De vastgoed tenders worden voorbereid door het bureau Alba Concept en hiermee ook de openbare ruimte. De gemeente heeft er voor gekozen om dit traject volledig door Alba te laten uitvoeren en inbreng van W+B was hierin zeer beperkt.	During the development of the sub-area Centrum PD, the municipality decided to include public spaces as part of the real estate development tender. Real estate tenders are prepared by Alba Concept, which also included public spaces in their scope. The municipality chose to have this process fully managed by Alba, leaving W+B with very limited involvement.	Alba is an external party hired by the municipality to guide the tender process.
LP1 - 18	Tijdens het ontwerpatelier is er een agenda waar de besproken punten in staan. De input van deze punten kan worden aangeleverd maar vaak is het een samenkomst van eerder besproken punten. Hier zit verder geen planning achter.	During the design workshop, an agenda lists the points to be discussed. These points are often a compilation of previously discussed topics, with no further planning behind them.	-
LP1 - 19	De gemeente luistert in veel gevallen niet naar de door W+B geleverde adviezen. Dit is uniek bij dit project.	In many cases, the municipality does not follow the advice provided by W+B. This is unique to this project.	-
LP1 - 2	Bij een afgerond VO-ontwerp ondergaat een kleine toetsing door het interne ingenieursbureau.	A completed Preliminary Design (PD) undergoes a minor review by the internal engineering bureau.	-
LP1 - 20	W+B heeft bij deelgebied centrum weinig invloed op de tender en de eisomschrijving en dat zal bij de andere tenders niet veel anders zijn.	W+B has little influence over the tender and requirement descriptions for sub-area Centrum, and this is unlikely to change for future tenders.	-
LP1 - 21	W+B wordt bij veel gebiedsontwikkelingen te laat aangehaakt.	W+B is often involved too late in area developments.	-
LP1 - 22	W+B doet nu alleen de hoofdinfrastructuur bij Lincolnpark.	W+B is currently only working on the main infrastructure at Lincolnpark.	-
LP1 - 23	De projectmanager van de gemeente die de tender heeft uitgezet die wij hebben gewonnen is niet meer betrokken. De huidige	The municipal project manager who set up the tender that we won is no longer involved. The current project manager ended up	-

	projectmanager kreeg W+B er dus bij omdat we al betrokken waren. De strategie die de eerste projectmanager had is dus niet meer van toepassing. Dit zou een reden kunnen zijn dat wij minder betrokken worden.	with W+B because we were already part of the project. The strategy of the initial project manager is no longer applicable. This could be a reason why we are less involved.	
LP1 - 3	Het DO-ontwerp wordt getoetst door beheer.	The DD is reviewed by the Maintenance department.	-
LP1 - 4	De rol van W+B voor deelgebied centrum is heel klein. Dit was eerst niet het plan maar de gemeente heeft ervoor gekozen om het hele deelgebied nu uit te besteden inclusief de openbare ruimte. Eerst zou de gemeente de openbare ruimte zelf doen waar wij het ontwerp voor zouden maken. De gemeente heeft besloten de openbare ruimte mee uit te besteden om de risico's niet zelf te hoeven dragen.	W+B's role in the Centrum sub-area is very small. This was not the initial plan, but the municipality chose to outsource the entire sub-area, including public spaces. Initially, the municipality intended to handle the public spaces themselves, with W+B creating the design. The municipality decided to outsource the public spaces as well to avoid bearing the risks themselves.	-
LP1 - 5	W+B heeft weinig invloed in de tender van deelgebied Centrum.	W+B has little influence in the Centrum sub-area tender.	-
LP1 - 6	W+B heeft bij deelgebied centrum weinig invloed op de tender en de eisomschrijving en dat zal bij de andere tenders niet veel anders zijn.	W+B has limited influence over the tender and requirement descriptions for the Centrum sub-area, and this is unlikely to change for other tenders.	-
LP1 - 7	W+B krijgt onder de nieuwe projectmanager minder de kans om te doen waar we initieel voor zijn ingeschakeld.	Under the new project manager, W+B has fewer opportunities to perform the tasks they were initially hired for.	-
LP1 - 8	Er is geen bestand waar de circulaire keuzes zijn vastgelegd, behalve de toelichting bij de laatste niet complete versie van het VO-ontwerp. Mogelijk zijn er ook niet meer circulaire keuzes dan daar benoemd.	There is no document where the circular choices are recorded, except for the explanation in the last incomplete version of the PD design. It is possible that no more circular choices were made than those mentioned there.	-
LP1 - 9	Als de beheerder aanvullende (financiële) middelen krijgt om de circulaire materialen en methodes te gebruiken, vinden zij het prima. Het enige doel van beheer is het beheren, dus als zij de benodigde middelen krijgen is het voor hen goed.	If the M&M department receives additional (financial) resources to use circular materials and methods, they are fine with it. Their only goal is maintenance, so as long as they get the necessary resources, they are okay.	-

LP2 - 1	De betrokken personen bepalen het project. Als een invloedrijk persoon niet wil innoveren en alles op de oude bekende manier wil doen, beïnvloed dit het hele innovatieproces in een project. Indien dit blijkt maak ik keuzes om mijn energie in andere projecten te stoppen waar ik meer impact kan maken.	The people involved determine the project. If an influential person does not want to innovate and prefers sticking to familiar methods, it affects the entire innovation process in a project. If this becomes apparent, I choose to focus my energy on other projects where I can have a greater impact.	-
LP2 - 2	Wanneer ik betrokken word, hangt af van de projectmanager. Soms word ik erbij gevraagd, maar ik heb geen vaste rol in het kernteam.	Whether I am involved depends on the project manager. Sometimes I am invited, but I do not have a fixed role in the core team.	"I" refers to the municipal sustainability advisor.
LP2 - 3	Sommige collega's lijken circulariteit te duur of te complex te vinden, wat de besluitvorming vertraagt.	Some colleagues perceive circularity as too expensive or complex, which delays decision-making.	
LP2 - 4	Er is geen systematische registratie van duurzame beslissingen in dit project. Het zou helpen als dit wel zou gebeuren.	There is no systematic documentation of sustainable decisions in this project. It would be beneficial if this were implemented.	-
LP2 - 5	Ik ben de enige die zich binnen de gemeente bezig houdt met duurzaam GWW, dus alle vragen van de hele gemeente op dat vlak komen bij mij terecht. Impliceert drukte en gedeelde aandacht.	I am the only person within the municipality focusing on sustainable GRW (civil engineering), so all questions from the entire municipality on this topic come to me. This implies a heavy workload and shared attention.	-
LP2 - 6	De focus ligt vaak op het gebouw en minder op de openbare ruimte, waardoor circulariteit in de openbare ruimte minder aandacht krijgt.	The focus is often on buildings and less on public spaces, which leads to circularity in public spaces receiving less attention.	-
LP2 - 7	De samenwerking met beheer en onderhoud zou beter kunnen verlopen; dit is belangrijk voor het realiseren van circulaire ambities.	Collaboration with Maintenance and Operations could be improved; this is essential for realizing circular ambitions.	-
LP2 - 8	De wisseling van projectleiders kan een reden zijn geweest dat het circulariteitsplan niet is doorgepakt.	A change in project managers may have been a reason why the circularity plan was not pursued further.	-
LP3 - 1	Er hebben meerdere workshops of ontwerprondes plaatsgevonden , maar daar met uitzondering van het begin van de SO-fase was er meestal geen circulariteitsexpert aanwezig.	Several workshops or design rounds took place, but except for the early stages of the Sketch Design (SO) phase, a circularity expert was usually not present. However, circularity was assessed at the	-

	Wel is er getoetst op circulariteit aan het einde van het VO.	end of the Preliminary Design (VO).	
LP3 - 10	Van tevoren heeft OKRA met W+B een aantal afspraken gehad waar de beschikbare kennis gedeeld werd. Hier valt ook een interactieve circulariteit sessie onder.	OKRA had several meetings with W+B in advance, where available knowledge was shared. This included an interactive circularity session.	Okra is the external landscape architect with whom W+B collaborated to successfully secure the tender for LP
LP3 - 11	Voor ons als externe Landschapsarchitect is er geen financiële prikkel om circulariteit in het project te verwerken. Wij willen de projectdoelstellingen halen, maar zijn verder intrinsiek ook gemotiveerd om het maximale eruit te halen.	As external landscape architects, there is no financial incentive for us to incorporate circularity into the project. We aim to achieve the project objectives and are also intrinsically motivated to maximize results.	-
LP3 - 12	De circulaire oplossingen die wij aandroegen stuitten bij de gemeenten vaak op bezwaren, maar op het laatste moment kwamen ze zelf met circulair asfalt voor de fietspaden. Dit is overgenomen in het plan	The circular solutions we proposed often faced objections from the municipality. However, at the last moment, they themselves proposed using circular asphalt for the bike paths, which was incorporated into the plan.	The standard refers to the standard requirements of the reviewing actor.
LP3 - 13	De wisseling van de projectmanager van de gemeente zorgde voor een wisseling in focus van het project. In het begin lag het op de projectdoelstellingen en bij de laatste lag het op beheerbaarheid en technisch ontwerp.	The change of the municipal project manager led to a shift in the project's focus. Initially, the focus was on project objectives, but with the new manager, it shifted to maintainability and technical design.	-
LP3 - 2	Er is door W+B een voorstudie voor circulariteit gedaan welke is gebruikt als input voor het VO	W+B conducted a preliminary study on circularity, which was used as input for the VO.	-
LP3 - 3	Er ontbrak binnen het projectteam veel kennis over de uitvoerbaarheid en toepassing van circulaire materialen. Hier is specifiek kennis voor nodig.	There was a lack of knowledge within the project team about the feasibility and application of circular materials. This requires specific expertise.	-
LP3 - 4	Hergebruik van materiaal stuit op obstakels: zo heeft de gemeente beperkte opslagruimte en geen schoonmaakmachine. In deze ontwerpfases is daarvoor nog geen aannemer in beeld (SO/VO)	Reusing materials faces obstacles: the municipality has limited storage space and no cleaning machine. At these design phases (SK/PD), no contractor is yet involved.	-

LP3 - 5	Hergebruikte materialen moeten vaak ook een tijdje opgeslagen worden. De gemeente heeft hier maar beperkte ruimte voor, dus bij een project van dit formaat wordt het volledig hergebruiken qua benodigde ruimte erg lastig.	Reused materials often need to be stored for some time. The municipality has limited storage space, so fully reusing materials for a project of this size becomes very challenging due to the required space.	-
LP3 - 6	Het toepassen van circulaire ontwerp ideeën leverde veel discussie op met de gemeente. Hoewel ze de circulaire ambities beaamden, bleek praktische invulling op veel bezwaren te stuiten, waardoor circulaire oplossingen toch weer afvielen (hergebruik, circulair beton)	Implementing circular design ideas sparked much discussion with the municipality. While they agreed with the circular ambitions, practical implementation encountered many objections, leading to circular solutions (like reuse and circular concrete) being dropped.	-
LP3 - 7	Het uitzoeken van circulaire maatregelen kost tijd. Deze uren kunnen wij niet declareren.	Researching circular measures takes time. These hours cannot be billed.	-
LP3 - 8	Kleine scope wijzigingen in het stedenbouwkundigplan zijn mogelijk, maar die moeten wel worden afgestemd met de opdrachtgever.	Small scope changes in the urban development plan are possible, but they must be coordinated with the client.	-
LP3 - 9	Op een gegeven moment veroorzaakten alle circulaire voorstellen telkens een discussie met beheer, dus toen ben ik ook gestopt met het voorstellen. Er werden ook geen besluiten over genomen.	At a certain point, all circular proposals led to discussions with M&M, so I stopped making proposals. No decisions were being made about them anyway.	-
LP4 -1	Bij een meningsverschil tussen W+B en het interne bureau wordt door het projectteam en de projectleider een afweging gemaakt tussen de geboden opties of een gezamenlijke oplossing gezocht. Het interne ingenieursbureau heeft hierin een zware rol omdat men verantwoordelijk is voor de goedkeuring van de plannen, ook bij de afdeling beheer en onderhoud. Daarom zullen keuzes sneller in de lijn van de wens van het interne ingenieursbureau vallen.	In cases of disagreement between W+B and the internal bureau, the project team and project leader weigh the options or seek a joint solution. The internal engineering bureau plays a significant role because it is responsible for approving the plans, including those involving the Maintenance and Operations department. As a result, decisions are more likely to align with the preferences of the internal engineering bureau.	"I" refers to the municipal project manager.
LP4 -10	Als een partij niet voldoet aan de in de inzending beloofde duurzaamheidsambitie, zit daar een standaard boetesysteem op.	If a party fails to meet the promised sustainability ambitions submitted in their proposal, a standard penalty system is applied.	-
LP4 -11	In de tender wordt veel nadruk gelegd op duurzaamheid door middel van stimulerende middelen zoals alleen gunning	The tender places significant emphasis on sustainability through incentives such as awarding contracts based	-

	op kwaliteit, circulaire gunningscriteria, beloningsgeld per huis als je boven de gestelde norm zit.	solely on quality, circular award criteria, and financial rewards per house for exceeding the set standards.	
LP4 -12	De gemeenteraad heeft vastgesteld dat de wijk hoge circulariteits- en duurzaamheidseisen moet halen.	The municipal council has determined that the neighborhood must meet high circularity and sustainability requirements.	-
LP4 -13	Bij de toetsing van het VO-plan zoals deze is opgesteld door W+B waren er veel opmerkingen, wat volgens het interne ingenieursbureau voor deze prijs beter had gemoeten.	During the evaluation of the PD plan developed by W+B, there were many comments, as the internal engineering bureau believed the quality should have been better for the price.	Alba is an external party hired by the municipality to guide the tender process.
LP4 -14	W+B is betrokken bij de voorkant van het project, maar niet specifiek uitgevraagd voor de begeleiding van de tender voor deelgebied Centrum. De gemeente heeft dit proces separaat uitgevraagd.	W+B is involved in the initial stages of the project but was not specifically tasked with managing the tender process for the Centrum sub-area. The municipality issued a separate request for this process.	-
LP4 -15	Adviesbureau Alba is ingeschakeld vanwege hun expertise op het gebied van begeleiding opstellen en uitvraag tenderleidraden. Ze zijn gespecialiseerd in circulariteit.	Consultancy firm Alba was engaged due to their expertise in guiding the preparation and tendering of tender guidelines. They specialize in circularity.	Alba is an external party hired by the municipality to guide the tender process.
LP4 -16	De gemeente is grondeigenaar en opdrachtgever, en maakt alle keuzes voor de verdeling in het projectteam met het adviesbureau.	The municipality is the landowner and client, making all decisions regarding the division of responsibilities within the project team, in consultation with the advisory firm.	
LP4 -2	Het projectteam, waar verschillende adviseurs onder vallen, bepaalt het aantal punten per onderdeel bij de gunningscriteria.	The project team, which includes various advisors, determines the points allocation per component for the tender criteria.	-
LP4 -3	Ik maak een afweging tussen de geboden opties bij meningsverschillen, maar in de regel ligt het voor de hand om voor het interne advies te kiezen. Dit is overigens geen uitgemaakte zaak.	I weigh the options presented in case of disagreements, but generally, it makes sense to go with internal advice. This is by no means a foregone conclusion.	-
LP4 -4	W+B heeft niet geadviseerd over hoe de ambities op de markt worden gezet.	W+B did not provide advice on how the ambitions should be presented to the market.	
LP4 -5	De gemeente heeft er niet specifiek naar gevraagd, maar er was ruimte geweest voor W+B om te adviseren over hoe de ambities op de markt worden gezet. De gemeente heeft de	The municipality did not specifically request this, but there was room for W+B to advise on how to market the ambitions. The municipality outsourced tender guidance to the market.	-

	tenderbegeleiding uitgevraagd in de Markt		
LP4 -6	Advies bureau Alba is ook betrokken geweest bij het opstellen en formuleren van het Nieuwe Normaal en begeleid de gemeente bij de uitvraag voor de tenders LP	Advisory firm Alba was also involved in drafting and formulating the "New Normal" and supported the municipality in preparing tenders for the land parcels (LP).	Alba is an external party hired by the municipality to guide the tender process.
LP4 -7	De gemaakte plannen worden getoetst door de gemeente.	The municipality reviews the developed plans.	-
LP4 -8	Het Q-Team en ingenieursbureau toetsen de kwaliteit van de plannen op architectuur, gebouw en openbare ruimte.	The Q-Team and engineering firm assess the quality of the plans concerning architecture, buildings, and public spaces.	Het Q-Team is one of the municpal quality team which reviews the plans
LP4 -9	Er is een uitgebreid beloningssysteem voor bovenwettelijke duurzaamheidsmaatregelen euro per woning, welke wordt verdeeld volgens een bepaald beloningssysteem dat is vastgesteld en benoemd in de gunningsleidraad.	There is an extensive reward system for sustainability measures that go beyond legal requirements, with a specific financial reward per home distributed according to a system outlined in the award guidelines.	-

WILDERSZIJDE

Quote-ID	**Interview quotes - NL**	**Interview quotes - EN (translation)**	**Possible clarification**
WZ1 - 1	De samenwerking wordt als goed ervaren. Er is veel overleg en communicatie. De projectleider en deelprojectleiders hebben regelmatig contact met de gemeente om voortgang en nieuwe inzichten te delen. Voor een prettige samenwerking is het naar mijn mening belangrijk dat de personen inhoudelijk vertrouwen hebben in elkaars werk en deskundigheid en dat de personen samen goed door een deur passen.	The collaboration is perceived as positive. There is frequent consultation and communication. The project leader and sub-project leaders regularly engage with the municipality to share progress and new insights. For a good collaboration, it is important that individuals trust each other’s work and expertise and that their personalities are compatible	-
WZ1 - 2	Specifieke keuzes en maatregelen worden deels vastgelegd in documenten. Er worden echter veel afwegingen niet gedocumenteerd. Deze afwegingen zijn in overleg met elkaar gemaakt en documentatie kost nu naar mijn mij persoonlijk tijd die ik dan steek in een nieuw	Specific choices and measures are partially recorded in documents. However, many considerations are not documented. These decisions are made in consultation, and documenting them takes personal time, which I prefer to invest in a new project (so I don't prioritize it, even though it is important).	-

	project (dus geef ik het geen prioriteit ook al is het belangrijk)		
WZ1 - 3	Beslissingen en veranderingen, zoals het aanpassen van de wegenstructuur of het selecteren van een ander type vleermuis, worden in overleg met de gemeente doorgevoerd. Dit gebeurt op basis van argumentatie en overleg.	Decisions and changes, such as modifying the road structure or selecting a different type of bat species, are implemented in consultation with the municipality. This is done based on reasoning and discussion.	-
WZ1 - 4	Het is belangrijk om vanaf het begin van het proces betrokken te zijn bij de visievorming. Documenteer beslissingen en afwegingen goed, zodat kennis en ervaring kunnen worden overgedragen naar toekomstige projecten. Daarnaast kan ontzorgen van projectleiders bij het documenteren van keuzes helpen om de kwaliteit en consistentie te verbeteren.	It is important to be involved in the vision development from the beginning of the process. Properly documenting decisions and considerations ensures that knowledge and experience can be transferred to future projects. Additionally, relieving project leaders from documenting decisions can help improve quality and consistency.	-
WZ1 - 5	Het zou helpen als W+B nog eerder in het project betrokken wordt om zo de visie en uitvoerbaarheid beter op elkaar te kunnen afstemmen. Een uitvoerend team zou kunnen helpen om de visie te toetsen aan pragmatische uitvoerbaarheid.	It would help if W+B were involved earlier in the project to better align the vision and feasibility. An operational team could help test the vision against pragmatic feasibility.	-
WZ1 - 6	Het is belangrijk om naast boetes ook beloningen te overwegen, zoals extra bouwlagen of lagere grondprijzen voor ontwikkelaars die extra duurzame maatregelen nemen.	It is important to consider rewards in addition to penalties, such as extra building floors or lower land prices for developers who implement additional sustainability measures.	-
WZ2 - 1	Het bieden van financiële stimulansen zoals korting op grondprijzen of toestemming voor extra bouwlagen kan ontwikkelaars motiveren om circulaire maatregelen toe te passen.	Offering financial incentives, such as discounts on land prices or approval for additional building floors, can motivate developers to implement circular measures.	-
WZ2 - 10	Circulariteit moet als een apart hoofdstuk in relevante plannen opgenomen worden, zoals rioleringsplannen, om ervoor te zorgen dat het onderwerp voldoende aandacht krijgt.	Circularity should be included as a separate chapter in relevant plans, such as sewerage plans, to ensure the topic receives sufficient attention.	-
WZ2 - 2	Specifieke eisen voor circulariteit moeten opgenomen worden in contracten en bestekken om ervoor te zorgen dat ze worden nageleefd.	Specific requirements for circularity must be included in contracts and specifications to ensure compliance.	-
WZ2 - 3	Ontwikkelaars zijn vaak minder geneigd om maximale duurzaamheidsambities na te streven omdat ze gericht zijn op	Developers are often less inclined to pursue maximum sustainability ambitions because they focus on profit; the municipality can impose	-

	winst; de gemeente kan striktere eisen stellen, maar dit kan extra kosten met zich meebrengen die moeten worden gecompenseerd, bijvoorbeeld door lagere grondprijzen.	stricter requirements, but this may involve additional costs that must be compensated, for example, through lower land prices.	
WZ2 - 4	Beheer en Onderhoud heeft een machtige positie; zij kunnen aangeven dat een bepaald budget niet voldoende is om een duurzaamheidsmaatregel te beheren, waardoor er meer budget nodig is of de maatregel niet wordt uitgevoerd.	M&M has a powerful position; they can indicate that a certain budget is insufficient to manage a sustainability measure, which means more budget is needed or the measure is not implemented.	-
WZ2 - 5	De opdrachtgever, vaak de gemeente, maakt de beslissingen. Als zij niet overtuigd zijn, gaan duurzame voorstellen de prullenbak in.	The client, often the municipality, makes the decisions. If they are not convinced, sustainable proposals are discarded.	-
WZ2 - 6	Beheer en Onderhoud is cruciaal omdat alles beheersbaar en onderhoudbaar moet zijn, maar ze hebben vaak beperkte budgetten, wat de implementatie van circulaire maatregelen kan bemoeilijken.	Management and Maintenance are crucial as everything must be manageable and maintainable, but they often have limited budgets, which can hinder the implementation of circular measures.	-
WZ2 - 7	De communicatie met de afdeling Beheer en Onderhoud verloopt niet altijd soepel en kan soms tot harde discussies leiden; beheerders zijn vaak terughoudend in het accepteren van nieuwe materialen en methoden, wat leidt tot uitgebreide onderhandelingen.	Communication with the Management and Maintenance department is not always smooth and can sometimes lead to tough discussions; managers are often reluctant to accept new materials and methods, resulting in extensive negotiations.	-
WZ2 - 8	Politieke partijen die op dat moment aan de macht zijn, hebben een grote invloed op de verdeling van budgetten en de prioritering van projecten, wat de voortgang van circulaire projecten kan maken of breken.	Political parties in power at the time have a significant influence on budget allocation and project prioritization, which can make or break the progress of circular projects.	-
WZ2 - 9	Veel beslissingen zijn politiek gestuurd, afhankelijk van de partij aan de macht; bewustwording en educatie kunnen helpen om politieke steun voor circulaire maatregelen te vergroten.	Many decisions are politically driven, depending on the party in power; raising awareness and education can help increase political support for circular measures.	-
WZ3 - 1	Er is zoals bij alle projecten wrijving tussen de beleid en beheer afdeling. Zij hebben andere doelen en belangen die elkaar bij het willen innoveren vaak in de weg staan.	As with all projects, there is friction between the policy and management departments. They have different goals and interests that often conflict when innovation is desired.	-
WZ3 - 10	Er was een tekort aan budget, dus door de besparing van het niet meenemen van de EMVI-criteria en de benodigde MKI berekening heeft ervoor gezorgd	There was a budget shortfall, so the savings from not including the MEAT criteria and the required ECI calculation resulted in the	-

	dat de winnende inschrijver nu 30% lager heeft ingeschreven.	winning bidder submitting a 30% lower bid.	
WZ3 - 11	Financiële motivatie zou zeker helpen, maar dan moet dat geld vanuit iemand komen.	Financial motivation would certainly help, but that money would have to come from someone.	-
WZ3 - 13	Bij een lumpsum opdracht kan er door de projectmanager van W+B zelf bepaald worden of er een circulariteitsexpert betrokken word. Dit moet binnen budget en de projectdoelen passen. Voor een regieopdracht is het moeilijker. Hier kan je af en toe een uur schrijven maar niet te veel.	In a lump-sum contract, the project manager at W+B can decide whether to involve a circularity expert, as long as it fits within the budget and project goals. In a unit price contract, it's harder. You can allocate an hour occasionally, but not too much.	-
WZ3 - 14	Eerst was er voor de hoofdinfrastructuur een EMVI-criteria opgesteld die al meerdere feedback rondes had doorgaan, maar toen hij af was heeft de gemeente bepaald dat de gebruikte meetmethode, MKI, door de complexiteit van de informatie en extra benodigde investeringskosten van de inschrijving (15.000-20.000 euro) kleine lokale aannemers uitsloot. Dus zijn die EMVI-criteria eruit gehaald.	Initially, MEAT criteria were established for the main infrastructure, which had gone through several feedback rounds, but once finalized, the municipality decided that the applied measurement method, ECI, due to the complexity of the information and the additional required investment costs of the bid (€15,000–€20,000), excluded small local contractors. Therefore, the EMVI criteria were removed.	-
WZ3 - 15	Als de beheerder iets volledig overbodigs wil dat niet circulair is, zoals een te groot rioolstelsel, moeten wij als W+B hiernaar luisteren.	If the manager wants something entirely unnecessary that is not circular, such as an oversized sewer system, W+B has to comply.	-
WZ3 - 16	Er is een extern bureau ingeschakeld die de contracten voor de aanbesteding van de hoofd infrastructuur hebben opgesteld.	An external agency was engaged to draft the contracts for the tendering of the main infrastructure.	-
WZ3 - 17	De circulaire en andere duurzame keuzes zijn een tijdje bijgehouden omdat wij dit met W+B zelf belangrijk vinden, maar dit kostte teveel tijd die niet gedeclareerd konden worden aangezien de opdrachtgever er niet om gevraagd had.	Circular and other sustainable choices were maintained for a while because W+B itself considered them important, but this took too much time that could not be billed since the client had not requested it.	-
WZ3 - 18	W+B is niet eindverantwoordelijk voor de producten, maar er wordt natuurlijk verwacht dat wij goede kwaliteit leveren. Als er problemen zijn in door ons geleverde producten dienen wij die op te lossen.	W+B is not ultimately responsible for the products, but it is, of course, expected that we deliver high-quality products. If there are issues with the products we provide, we are expected to resolve them.	-
WZ3 - 19	Er is mij nu niet duidelijk wat ik meer aan circulariteit had kunnen doen bij het project.	It is not clear to me what more I could have done regarding circularity in the project.	-
WZ3 - 2	Bij de projectmanager van de gemeente was er weinig kennis	The municipality's project manager had little knowledge or	-

	en motivatie om circulaire en duurzame maatregelen door te voeren voor de hoofd infrastructuur, behalve lichtelijk voor natuurinclusiviteit.	motivation to implement circular and sustainable measures for main infrastructure, aside from slight efforts for nature inclusivity.	
WZ3 - 20	De kennis van circulariteit was nu niet bij mij en het projectteam voldoende aanwezig om het mee te nemen bij de beslissingen.	The knowledge of circularity was not sufficiently present in me or the project team to incorporate it into the decisions.	-
WZ3 - 4	Er is een uitgebreide matrix opgesteld voor klimaat adaptief met concrete voorstellen. Deze is opgesteld omdat de gemeente hier geld voor beschikbaar heeft gesteld.	A comprehensive matrix with concrete proposals for climate adaptation has been developed. This was created because the municipality made funds available for this purpose.	-
WZ3 - 6	Je mag beheer kosten niet meenemen als onderdeel van je ontwikkelingskosten	You are not allowed to include management costs as part of your development costs.	-
WZ3 - 7	W+B is heel afhankelijk van wat de klant wil. Als de klant het niet wil of er geïnteresseerd naar is worden we niet betaald.	W+B is very dependent on what the client wants. If the client does not want it or is not interested, we are not paid.	-
WZ3 - 8	W+B kan het blijven opbrengen bij vergaderingen. Zo blijft het onder de aandacht. Dit is nu niet goed gebeurd en kon beter. Concrete voorstellen zouden ook veel helpen.	W+B can keep bringing it up during meetings. This keeps it on the radar. This has not been done well and could have been better. Concrete proposals would also help a lot.	W+B can continue to bring up circularity in meetings.
WZ3 - 9	1x in de 2 weken is er een overleg tussen mij en de gemeente. Dit gaat niet volgens een vaste structuur, maar per keer wordt bekeken waar we het over gaan hebben. Vaak gaat die afspraak ook niet door.	Once every two weeks, there is a meeting between me and the municipality. This does not follow a fixed structure; each time, we decide what to discuss. Often, the meeting does not happen at all.	-
WZ4 - 1	Circulaire keuzes moeten worden afgestemd op zowel de haalbaarheid als de beleidsdoelen van de gemeente. Dit vereist overleg tussen alle betrokken disciplines en ontwikkelaars.	Circular choices must align with both the feasibility and policy goals of the municipality. This requires consultation between all involved disciplines and developers.	-
WZ4 - 2	Bij een omgevingsvergunning aanvraag bouwen worden de plannen getoetst door de plantoetsers van de gemeente of ze voldoen aan alle vastgestelde kaders.	In the case of a building permit application, the plans are reviewed by the municipality's planning assessors to ensure they meet all established frameworks.	-
WZ4 - 3	De hoedanigheid (bevoegdheid en verantwoordelijkheden) van projectgroep gemeente is gebaseerd op de samenwerkingsovereenkomst met ontwikkelaars (privaatrechtelijk). De bevoegdheid van plantoetsers is publiekrechtelijk en vloeit voort uit wet- en regelgeving. Conform het legaliteitsbeginsel is uitsluitend het publiekrechtelijk	The role (authority and responsibilities) of the municipal project group is based on the cooperation agreement with developers (civil law). The authority of planning assessors is public law-based and derives from legislation. In accordance with the principle of legality, only the competent public body can establish sustainability measures. The project group adopts these	-

	bevoegd orgaan duurzaamheidsmaatregelen vast te stellen. De projectgroep neemt deze maatregelen als uitgangspunt, vastgesteld kader waaraan VO-DO moet voldoen. Op moment van omgevingsvergunning aanvraag worden de plannen publiekrechtelijk getoetst door afdeling plantoetsing.	measures as a basis, within the established framework that the PD-DD must meet. At the time of a building permit application, the plans are publicly assessed by the planning assessment department.	
WZ4 - 4	W+B kan adviseren en maatwerk leveren, maar de uiteindelijke beslissingen en vastleggingen worden door de gemeente in samenwerking met ontwikkelaars gemaakt.	W+B can provide advice and tailor-made solutions, but final decisions and formalizations are made by the municipality in collaboration with developers.	-
WZ4 - 5	Specifieke disciplines die betrokken moeten worden: stedenbouwkundigen, civiel technici, verkeerskundigen, ecologen, projectleiders, plan-economen, en juristen. Plus duurzaamheidsadviseurs (denk aan expertise op gebied van NulOpdeMeter, GPR scores, Biobased bouwen etc)	Specific disciplines that must be involved include urban planners, civil engineers, traffic engineers, ecologists, project managers, spatial economists, and legal experts. Additionally, sustainability consultants (with expertise in areas such as Zero on the Meter, GPR scores, and Biobased construction, etc.).	It concerns specific disciplines that need to be involved in an ADP
WZ4 - 6	W+B kan adviseren, maar geen eisen stellen namens de gemeente; dit moet verankerd zijn in beleidsregels of bestemmingsplannen	W+B can provide advice but cannot impose requirements on behalf of the municipality; these must be anchored in policy rules or zoning plans.	-
WZ5 - 1	Beslissingsbevoegdheid ligt bij de gemeente en uiteindelijk bij het college van burgemeester en wethouders.	Decision-making authority lies with the municipality and ultimately with the board of mayor and aldermen.	-
WZ5 - 10	De financiële middelen zijn vastgelegd in een projectexploitatie die eindigt in 2033, en er is geen directe link tussen gebiedsexploitatie en de beheerafdeling.	The financial resources are tied to a project development plan that ends in 2033, and there is no direct link between area development and the management department.	-
WZ5 - 11	De gemeente heeft de uiteindelijke beslissingsbevoegdheid over de plannen en ontwerpen.	The municipality has the final decision-making authority over the plans and designs.	-
WZ5 - 12	De beheerafdeling is verantwoordelijk voor het toetsen van de ontwerpen van de openbare ruimte, waaronder duurzaamheid en circulariteit van materialen en infrastructuur.	The management department is responsible for evaluating the designs for public spaces, including sustainability and circularity of materials and infrastructure.	-
WZ5 - 13	W+B maakt voorstellen en ontwerpen voor de hoofdinfrastructuur en de openbare ruimte.	W+B creates proposals and designs for the main infrastructure and public spaces.	-
WZ5 - 14	W+B is betrokken bij het ontwerp en advisering voor de openbare ruimte en heeft samen met de civiele projectleiders van de	W+B is involved in the design and consultation for public spaces and, together with the municipality's civil project managers, sometimes	-

	gemeente soms direct contact met beheerders voor afstemming van ontwerpkeuzes.	has direct contact with managers to coordinate design choices.	
WZ5 - 2	W+B adviseert over duurzame materialen en ontwerpen en heeft invloed op ontwerpkeuzes door argumentatie en onderbouwing van hun voorstellen.	W+B advises on sustainable materials and designs and influences design choices through reasoning and substantiation of their proposals.	-
WZ5 - 3	Bij de kunstwerken is er gekozen om op duurzaamheid te scoren, terwijl bij de hoofdinfrastructuur vooral het (duurzame) ontwerp van W+B is gevolgd.	For the artworks, scoring on sustainability was chosen, while for the main infrastructure, the (sustainable) design by W+B was primarily followed.	-
WZ5 - 4	De beheerafdeling heeft een grote invloed op de goedkeuring van materialen en ontwerpen. Zij willen het liefst dat er bekende materialen gebruikt wordt waar zij van weten hoe ze ermee om moeten gaan.	The management department has significant influence over the approval of materials and designs. They prefer the use of familiar materials that they know how to handle.	-
WZ5 - 5	Besluitvorming over financiële structuren, zoals het reserveren van meer geld voor beheer om duurzame methoden toe te passen, ligt bij de gemeenteraad.	Decision-making on financial structures, such as allocating more funds for management to apply sustainable methods, lies with the municipal council.	-
WZ5 - 6	De afdeling Beheer toetst ontwerpen op basis van de DIOR en LIOR.	The Management department evaluates designs based on the Guideline for Sustainable Design of Public Spaces (GSDP) and Guideline for Design of Public Spaces (GDP) standards.	-
WZ5 - 7	De afdeling Beheer is soms huiverig voor nieuwe, circulaire materialen en geeft de voorkeur aan bekende, betrouwbare materialen, met name in relatie tot toekomstig beheer. Dit vraagt om sterke onderbouwing en kennisdeling om hen te overtuigen. De kennis over circulariteit binnen de gemeente is nog beperkt, en er is behoefte aan meer concrete voorbeelden en initiatieven om de voordelen van hergebruikte materialen duidelijk te maken.	The M&M department is sometimes hesitant about new, circular materials and prefers familiar, reliable ones, particularly concerning future maintenance. This requires strong justification and knowledge sharing to convince them. The knowledge of circularity within the municipality is still limited, and there is a need for more concrete examples and initiatives to clearly demonstrate the benefits of reused materials.	-
WZ5 - 8	De geldstromen voor realisatie en beheer zijn gescheiden systemen, wat het moeilijk maakt om besparingen in beheer direct te verrekenen met investeringen in de realisatie en andersom. Dit komt ook door de strakke regelgeving achter deze geldstromen. Momenteel is het niet mogelijk te schuiven binnen deze potjes. De gemeenteraad heeft overigens wel de bevoegdheid om het geld dat	The financial flows for realization and management are separate systems, which makes it difficult to directly offset savings in management against investments in realization and vice versa. This is also due to the strict regulations governing these financial flows. Currently, it is not possible to shift funds between these budgets. The municipal council does have the authority to increase the funds allocated to management, but this	-

	naar beheer gaat te vergroten, maar dit kost veel tijd en moeite.	requires considerable time and effort.	
WZ5 - 9	Er is de mogelijkheid om duurzaamheidsmaatregelen te laten scoren bij aanbestedingen, en specifieke voorstellen voor duurzaamheid kunnen leiden tot aanpassingen in de begroting.	There is an opportunity to prioritize sustainability measures in procurement, and specific sustainability proposals can lead to budget adjustments.	-
WZ6 - 1	Er kan financiële motivatie worden toegepast door bijvoorbeeld de grondprijzen aan te passen om duurzaamheid en circulariteit te bevorderen.	Financial motivation can be applied by, for example, adjusting land prices to promote sustainability and circularity.	-
WZ6 - 10	W+B wordt wel betrokken bij de verkaveling van de woonvelden en levert input voor deze gebieden.	W+B is involved in the division of residential areas and provides input for these areas.	-
WZ6 - 11	Beheer en Onderhoud heeft vaak het laatste woord bij ontwerpbeslissingen en kan innovatie belemmeren door vast te houden aan bewezen materialen en methoden. Hoewel Beheer nu wel vroeg in het ontwerp betrokken wordt, denken zij niet actief mee aangezien ze met name een toetsende rol hebben.	Management and Maintenance often have the final say in design decisions and may hinder innovation by adhering to proven materials and methods. Although Management is now involved earlier in the design process, they do not actively contribute, as their role is primarily evaluative.	-
WZ6 - 12	W+B levert advies en input voor duurzame en ecologische oplossingen, maar hun invloed is beperkt tot het openbaar gebied en zij staan vaak aan de zijlijn bij woningbouwopgaven.	W+B provides advice and input on sustainable and ecological solutions, but their influence is limited to public areas, and they are often sidelined in residential construction projects.	-
WZ6 - 2	De gemeente toetst de plannen op basis van eerder gestelde eisen zoals in bestemmingsplannen en bouwveldpaspoorten.	The municipality reviews plans based on previously set requirements, such as zoning plans and building field passports.	-
WZ6 - 3	Bij aanbestedingen worden EMVI-criteria gebruikt om duurzaamheid te bevorderen, wat aannemers de mogelijkheid biedt om zich te onderscheiden en financiële voordelen te behalen.	Tendering processes use MEAT criteria to promote sustainability, giving contractors the opportunity to differentiate themselves and gain financial benefits.	-
WZ6 - 4	Ontwikkelaars zijn vaak minder geneigd om maximale duurzaamheidsambities na te streven omdat ze gericht zijn op winst. De gemeente kan striktere eisen stellen, maar dit kan extra kosten met zich meebrengen die moeten worden gecompenseerd, bijvoorbeeld door lagere grondprijzen.	Developers are often less inclined to pursue maximum sustainability ambitions because they are focused on profit. The municipality can impose stricter requirements, but this may involve additional costs that must be compensated, for example, through lower land prices.	-
WZ6 - 5	De samenwerking met Witteveen+Bos bij Wilderszijde verloopt goed, en zij leveren waardevolle input voor	Collaboration with Witteveen+Bos at Wilderszijde is going well, and they provide valuable input for ecological and sustainable	-

	ecologische en duurzame oplossingen. Echter, hun rol is voornamelijk adviserend en zij hebben geen beslissingsrecht.	solutions. However, their role is primarily advisory, and they have no decision-making authority.	
WZ6 - 6	Beheer en onderhoud is een belangrijke speler in het project en heeft vaak het laatste woord bij ontwerpbeslissingen. Hun rol is cruciaal in de toetsing en goedkeuring van ontwerpvoorstellen.	Management and maintenance are key players in the project and often have the final say in design decisions. Their role is crucial in the evaluation and approval of design proposals.	-
WZ6 - 7	W+B heeft een adviserende rol en levert input voor onder andere ecologische plannen en het groenplan van de hoofdinfrastructuur. Ze zijn betrokken bij de engineering van de deelgebieden en adviseren over onder andere duurzaamheid en ecologie.	W+B has an advisory role and provides input on ecological plans and the green plan for the main infrastructure. They are involved in the engineering of sub-areas and advise on topics such as sustainability and ecology.	-
WZ6 - 8	De gemeente is verantwoordelijk voor het opstellen en toetsen van de plannen op basis van eerder gestelde eisen zoals in het Bestemmingsplan, Matenplan, Landschapsplan en de Bouwveldpaspoorten.	The municipality is responsible for drafting and evaluating plans based on previously set requirements, such as the Zoning Plan, Measurement Plan, Landscape Plan, and Building Field Passports.	-
WZ6 - 9	De eerder gestelde eisen en methodes voor monitoring en toetsing zijn vastgelegd en kunnen niet zo maar aangepast worden.	The previously set requirements and methods for monitoring and evaluation are fixed and cannot simply be adjusted.	-

NOT CASE SPECIFIC

The not case specifc quotes are not referenced to in Appendix D. Therefore there is no need for a quote-ID.

AG1	Als projectleider kun je circulariteit extra onder de aandacht brengen door dit vanaf het begin te benoemen en in vergaderingen terug te laten komen.	As a project leader, you can bring extra attention to circularity by addressing it from the beginning and bringing it up again in meetings.”	-
AG2	De circulariteit en duurzaamheidsdoelstellingen zijn afhankelijk van verschillende factoren zoals situatie, ondergrond en soort project, dus je kan hier niet een vaste standaard voor maken.	Circularity and sustainability goals depend on various factors such as the situation, the ground conditions, and the type of project, so it is not possible to create a fixed standard for this	-
AG2	Iedereen beschouwt duurzaamheid vanuit zijn eigen kennis en expertise. Iedereen informeren over de definities en doelen en hoe die doelen te bereiken is belangrijk.	Everyone views sustainability from their own knowledge and expertise. Informing everyone about the definitions, goals, and how to achieve those goals is important.	-
AG2	Bij beslissingen moet gekeken worden of het direct of indirect te maken heeft met het materiaalgebruik.	When making decisions, it should be considered whether they are directly or indirectly related to material usage.	-

APPENDIX C: ADDITIONAL OBSERVATIONAL SOURCES

Additional sources are used to identify or confirm working rules. Using multiple sources and added credibility to the results are improved. The source IDs are used in appendix D.

1. Informal conversation with the projectmanager of W+B for the project WZ (Interviewee WZ3). The source ID used to refer tot his conversation will be IC-1.
   Date: 06-11-2024
   Topic: No specific topic, but rather a more casual conversation about WZ
2. Informal conversation with projectmanager of W+B for the project LP (interviewee LP1). The source ID used to refer tot his conversation will be IC-2.
   Date: 08-11-2024
   Topic: No specific topic, but rather a more casual conversation about LP
3. Informal conversation after MT-WZ with the attendees. They were asked whether this conversation could be categoriek as typical or special. They responded that it was a typical meeting. The source ID used to refer tot his conversation will be IC-3.
   a. Date: 06-11-2024
   b. Topic: about the just finished meeting
4. A meeting was attended for WZ, with the source ID MT-WZ used to refer to this source. Information about the meeting:
   Date: 06-11-2024
   Location: Municipal Building of Lansingerland
   Attendees: WZ3, WZ6, an urban planner from the muncipality
   Topic: Updating each other and discussing topics before an decision is made.
   Structure: A physical meeting was held where attendees could share their points of interest to gather input on what others believed should be included or considered in the decision-making process. The meeting lacked both an agenda and formal minutes.
5. A meeting was attended for LP, with the source ID MT-LP used to refer to this source. Information about the meeting:
   Date: 06-11-2024
   Location: Hybrid, multiple locations
   Attendees: Projectmanager W+B (LP1), Head of the municipal internal enginieuring bureau, municipal Civieltechnisch ontwerper, muncipal landschapsarchitect, municipal projectassistent, projectsecretary W+B
   Topic: Main infrastructure, civil engineering structures, green-blue infrastructure, water management plan
   Structure: A hybrid meeting through Microsoft Teams where
6. WZ1 held an internal presentation before the area development department of W+B explaining the interesting details about the project WZ. Mentioning his intrinsic motivation for the infromation gathering with regards to biodiversity. The source ID used will be PT-1. Information about the presentation:
   a. Date: 31-10-2024
   b. Presenter: WZ1

Appendix D – Working rule sources

The interview quotes partially reveal the existence of the Working Rule and form the foundation for its identification. These quotes are instrumental in understanding the rules and tracing their origins. However, most of the rules are not explicitly mentioned, as they are often unknown to the individuals involved. The supplementary sources, referenced as "additional source - ID," are detailed in Appendix C.

Lincolnpark Phase 2

	Rule - ID	**Working rules**	**Interview Quote-IDs**									**Additional source-ID**
Aggregation rule	A1	The municipal project manager determines the value of given advice by considering the authority of the giver and past experiences with the giver.	LP1 - 19	LP1 - 20	LP4 -1	LP4 -3	LP4 -6	LP4 - 13				IC-2
Boundary rule	B1	The paying actor determines the timing and selection of the involvement of internal and external individuals and experts involved in the project.	LP3 - 1	LP1 - 1	LP1 - 17	LP2 - 2	LP4 -2	LP4 - 15	LP1 - 21			
Choice rule	C1	Individuals with decision-making power may choose to base their choices either on the given advice or on their own opinion, experience, and knowledge	LP2 - 1	LP2 - 3								
Choice rule	C2	Individuals and organizations may choose to focus more on components for which they are responsible, as they have accountability for those components	LP2 - 5	LP4 -4	LP4 -8	LP4 - 15						

Choice rule	C3	Individuals may choose to allocate more time and effort to projects where they feel their input is actively acknowledged and valued.	LP3 - 9	LP2 - 1									
Choice rule	C4	The municipal projectteam determines the roles, responsibilities, and desired outcomes for each hired individual or organization	LP3 - 2	LP1 - 4	LP1 - 5	LP1 - 7	LP1 - 17	LP1 - 20	LP1 - 22	LP4 - 14	LP4 - 15	LP2 - 7	
Information rule	I1	The type of unit price payment determines which organization must decide what information to gather.	LP3 - 3										IC-2
Information rule	I2	Decisions must not be systematically documented, monitored or evaluated because of the extra time and costs.	LP1 - 8	LP2 - 4									MT-LP
Information rule	I3	Individuals determine what information to gather based on their assessment of information needs and the available budget	LP3 - 9										IC-2
Payoff rule	Pa1	W+B must be paid for work within the contractual scope, with any additional work requiring prior municipal approval	LP3 - 11										IC-2, PT-1
Payoff rule	Pa2	Individuals must be either financially or intrinsically motivated to act	LP3 - 7	LP3 - 11	LP2 - 1	LP4 -9	LP4 - 10	LP4 - 11					
Position rule	Po1	The deciding actor must determine that altering early project decisions is sufficiently important, considering the cost of change	LP3 - 13	LP1 - 7	LP1 - 23								

Position rule	Po2	Municipal departments with reviewing authority may reject proposed plans if they do not meet their documented requirements	LP3 - 9	LP3 - 12	LP1 - 2	LP1 - 3	LP1 - 12	LP1 - 13	LP4 -7	LP4 -8	LP1 - 16		
Position rule	Po3	The municipal project team holds the responsibility and must make the decisions, with their authority limited to actions permitted by regulations	LP3 - 6	LP3 - 8	LP1 - 5	LP1 - 6	LP1 - 14	LP1 - 19	LP4 - 14	LP4 - 16			
Position rule	Po4	The meeting organizer can determine the meeting structure and agenda based on what they consider important	LP1 - 1	LP1 - 11	LP1 - 18								IC-2, MT-LP
Scope rule	S1	Time and resources must be available to prevent limiting the scope of possible outcomes	LP3 - 4	LP3 - 5	LP3 - 7	LP1 - 9	LP1 - 10	LP1 - 12	LP1 - 13	LP2 - 3	LP2 - 6		
Scope rule	S2	The project decisions must align with documented political decisions and implemented policies	LP1 - 10	LP1 - 12	LP1 - 15	LP4 - 12							

Wilderszijde

	Rule - ID	Working rules	Interview Quote-IDs															Additional source-ID
Aggregation rule	A1	The municipal project manager determines the value of given advice by considering the authority of the giver and past experiences with the giver.	WZ1 - 1	WZ6 - 5														
Boundary rule	B1	The paying actor determines the timing and selection of the involvement of internal and external individuals and experts involved in the project.	WZ3 - 16															IC-1
Choice rule	C1	Individuals with decision-making power may choose to base their choices either on the given advice or on their own opinion,	WZ6 - 7	WZ3 - 19	WZ3 - 20													IC-1

		experience, and knowledge																
Choice rule	C2	Individuals and organizations may choose to focus more on components for which they are responsible, as they have accountability for those components	WZ5 - 13	WZ6 - 7	WZ6 - 10	WZ4 - 5												MT-WZ
Choice rule	C3	Individuals may choose to allocate more time and effort to projects where they feel their input is actively acknowledged and valued.																
Choice rule	C4	The municipal projectteam determines the roles, responsibilities, and desired outcomes for each hired individual or organization	WZ6 - 7	WZ6 - 12	WZ1 - 5	WZ5 - 2	WZ5 - 13	WZ5 - 14	WZ3 - 16									

Information rule	I1	The type of unit price payment determines which organization must decide what information to gather.	WZ3 - 13															IC-1
Information rule	I2	Decisions must not be systematically documented, monitored or evaluated because of the extra time and costs.	WZ1 - 2	WZ1 - 4	WZ2 - 2	WZ3 - 17												IC-3, MT-WZ
Information rule	I3	Individuals determine what information to gather based on their assessment of information needs and the available budget	WZ3 -2	WZ3 - 10														
Payoff rule	Pa1	W+B must be paid for work within the contractual scope, with any additional work requiring prior municipal approval	WZ3 - 7															IC-1
Payoff rule	Pa2	Individuals must be either	WZ3 - 14	WZ6 - 1	WZ6 - 3	WZ6 - 4	WZ2 - 1	WZ2 - 3	WZ5 - 9	WZ3 - 17	WZ1 - 6							

		financially or intrinsically motivated to act																
Position rule	Po1	The deciding actor must determine that altering early project decisions is sufficiently important, considering the cost of change	WZ6 - 2	WZ6 - 9														MT-WZ
Position rule	Po2	Municipal departments with reviewing authority may reject proposed plans if they do not meet their documented requirements	WZ3 - 15	WZ6 - 2	WZ6 - 6	WZ6 - 8	WZ6 - 9	WZ6 - 11	WZ4 - 2	WZ4 - 3	WZ2 - 4	WZ2 - 6	WZ2 - 7	WZ5 - 4	WZ5 - 6	WZ5 - 7	WZ5 - 12	MT-WZ
Position rule	Po3	The municipal project team holds the responsibility and must make the decisions, with their authority limited to actions permitted by regulations	WZ3 - 6	WZ3 - 14	WZ2 - 5	WZ2 - 6	WZ6 - 5	WZ4 - 4	WZ4 - 6	WZ5 - 1	WZ5 - 3	WZ5 - 8	WZ5 - 10	WZ5 - 11	WZ1 - 3	WZ3 - 1	WZ3 - 18	
Position rule	Po4	The meeting organizer can determine the meeting structure and agenda based	WZ3 - 8	WZ3 - 9	WZ2 - 10													

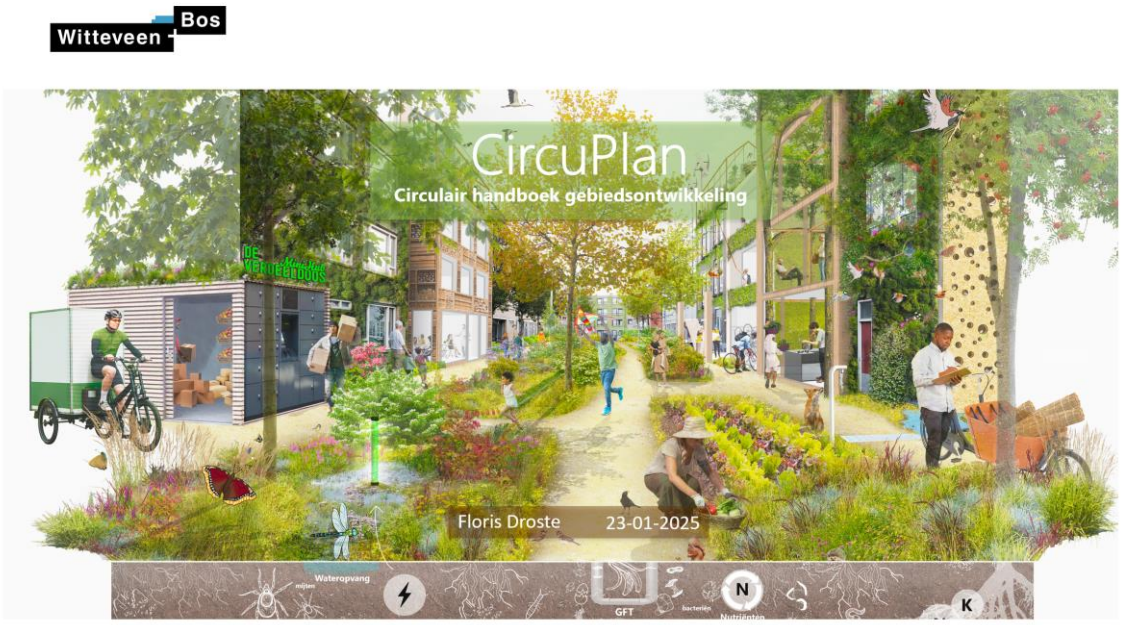
		on what they consider important																
Scope rule	S1	Time and resources must be available to prevent limiting the scope of possible outcomes	WZ3 - 2	WZ3 - 4	WZ3 - 10	WZ3 - 11	WZ3 - 14	WZ6 - 1	WZ6 - 3	WZ2 - 4	WZ4 - 1							
Scope rule	S2	The project decisions must align with documented political decisions and implemented policies	WZ2 - 8	WZ2 - 9	WZ5 - 5													

Appendix E: CircuPlan outline

CircuPlan is the name of the tool designed to improve circularity by offering document-specific guidance on actionable steps for enhancing circularity within each document. The tool is practical and user-friendly, serving as a framework that can be filled in as processes develop. It provides a structured planning outline for each phase, enabling users to navigate quickly and efficiently. By clicking on specific documents, users are directed to the corresponding document-specific pages, ensuring speed and simplicity.

To facilitate ease of use, the tool will be available in Dutch, allowing employees to work with it directly without requiring translation. While W+B has decided not to make the tool publicly accessible, this appendix includes selected slides from the Microsoft PowerPoint file, shared with approval, to give an overview of the tool's layout and developed outline.

The frontpage of CircuPlan



Introduction page to CircuPlan.

Witteveen+Bos

Auteur: Floris Droste

Datum: 23-01-2025

Reden van opstellen: Onderdeel van MSc Scriptie

Korte document introductie

CircuPlan is een tool ontworpen om snel, eenvoudig en kostenefficiënt circulaire informatie beschikbaar te maken in de VO-fase van een gebiedsontwikkeling. De tool biedt een overzicht van document-specifieke informatie, met oplossingen voor veelvoorkomende problemen, "open deuren" om gemiste kansen te voorkomen, referentieprojecten ter inspiratie, en links naar nuttige bronnen en tools. Afsluitend bevat CircuPlan een standaard beslisboom waarmee eenvoudig kan worden gecontroleerd of alle aspecten van circulariteit zijn meegenomen. Zo helpt CircuPlan om document specifieke circulaire kennis bij te brengen zonder dat er extra budget nodig is.

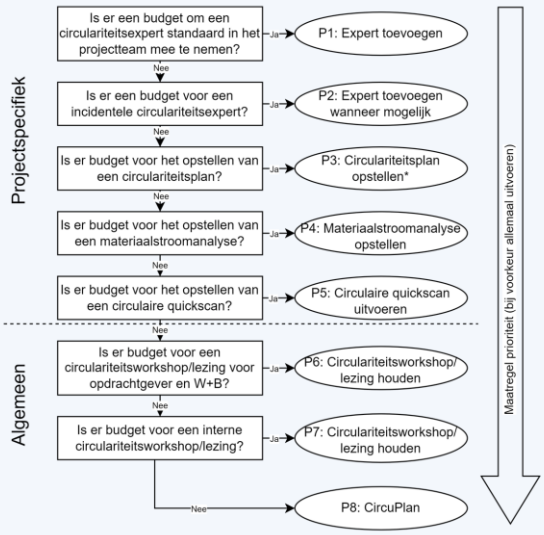
When to apply CircuPlan (repetition of Figure 3).

Witteveen+Bos

Wanneer CircuPlan toepassen?

Kennis kan op verschillende manieren worden ingebracht, waarbij er onderscheid wordt gemaakt tussen algemene kennis en project specifieke kennis. Project specifieke kennis hangt af van factoren zoals de locatie, de bestaande situatie, de omgeving, de betrokken stakeholders en het type opdracht. Voor het succesvol integreren van circulariteit in een project is deze project specifieke kennis essentieel. Het vergaren van deze specifieke informatie kost echter tijd en geld, dus de mate waarin dit gebeurt kan variëren afhankelijk van het beschikbare budget voor circulariteit.

Afhankelijk van dit budget kunnen verschillende maatregelen worden genomen. Om een weloverwogen keuze te maken tussen deze maatregelen, kan de beslisboom worden gevolgd. Deze beslisboom prioriteert de maatregelen, beginnend bij V1 en doorlopend tot V8. Bij voorkeur worden **alle** maatregelen genomen om de circulariteit optimaal te verbeteren.



Main documents per Fase within an ADP.

General outline of a document specific slide.