

Putting Sustainability into Project Practice

Strategies for Structuring Sustainability in
Exploration Phases of MIRT-Projects

Master Thesis - Construction Management &
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Exploration Phases of MIRT-Projects

by

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Preface

My mother always calls me a stubborn “alpha”: someone with a natural inclination towards the social and humanistic side of things, yet with a fascination for technical challenges and problem solving. At the end of this thesis, I cannot help but agree with her analysis, as this thesis is, in a sense, a reflection of that intersection. Despite my fascination for technical challenges, it took me some time to find my place in the technical world of TU Delft. My interests were always broad, both within and beyond the university. After a year at TPM and a Bachelor’s in Civil Engineering, I discovered that my true interest lies in the human and organisational dimension of engineering. This led me to the CME master’s programme, where I finally found a place where I could make a meaningful contribution.

This thesis brought together many of the interests I have developed throughout the various side tracks within and beyond my studies: a sense of responsibility for sustainable development, the design of public transport and rail projects, and collaboration in multidisciplinary environments. Although, after eight months of in-depth research, the word “sustainability” now slightly makes me cringe, it has been striking to see how much ambition and awareness exist and, at the same time, how much there is still to gain in practice. This insight marks a good starting point for my ambitions as an engineer. I hope to help keep sustainability high on the agenda while developing practical, technical, and organisational solutions for the challenges ahead. I am grateful to Arup, and to Giorgio in particular, for offering me the opportunity to begin my journey towards achieving those ambitions with them.

For this research, I would like to thank everyone who contributed their time and expertise: the interviewees and experts from Arup, RWS, IenW for participating and connecting me with all the right people. I am also deeply grateful to my committee members. Firstly, Marcel and Ad, for their experienced and enthusiastic supervision, their excitement about the topic, and their guidance in narrowing down my often too broad research scope. A special thanks goes to Yirang for the pleasant and constructive supervision, the academic tips and tricks, and our weekly discussions that helped shape this project. And finally, to Jitske: thank you so much for spending your time supporting me. I truly enjoyed our sometimes idealistic, high-level conversations, and I especially appreciate how you helped me keep things in perspective with encouragement and kind words up until the last days, whenever I got lost in my thesis.

Most importantly, I would like to thank my family for being such an example to me. Your dedication to what each of you is doing in your own field has always set the bar and motivated me to keep going. It is incredibly inspiring what each of you has achieved. Thank you for your patience, your unconditional support, and for giving me the freedom to find my own path — although, after a few detours, I have ended up quite close to a familiar field after all.

Finally, over the course of my studies, my sense of social responsibility has grown steadily. I have seen the impact that university-driven innovations can have on society and sustainable development, and how essential good education is for that. This is something that is increasingly under pressure. In uncertain and polarised times, it is important to speak up and to act on your values. I hope to use the knowledge I gained during my years at TU Delft to contribute to collective action on the major challenges ahead.

“The greatest threat to our planet is the belief that someone else will save it.” - Robert Swan

Thijs van Royen
4606906
Delft, November 2025

Summary

The sustainable development of transport infrastructure is essential to address pressing societal challenges such as climate change, biodiversity loss, and the increasing pressure on urban environments. In the Dutch context, **MIRT** (*Meerjarenprogramma Infrastructuur, Ruimte en Transport / Multi-Year Programme for Infrastructure, Spatial Planning and Transport*) projects play a central role in shaping the physical environment and facilitating socio-economic development. The MIRT framework structures the national decision-making process for major transport infrastructure projects. Projects in the programme must follow four successive phases: the Preparation Phase, the Exploration Phase, the Planning and Study Phase, and the Construction Phase.

The **MIRT Exploration** (*MIRT Verkenning*) is particularly crucial for embedding sustainability considerations. At this stage, fundamental choices can still be made that shape infrastructure systems to be realised ten to twenty years from now. This means that projects must not only meet today's ambitions but also anticipate future sustainability goals and regulations. Translating such ambitions into concrete measures is challenging. Stakeholders hold divergent definitions and priorities regarding sustainability; resources and time are limited, and uncertainty about future developments complicates long-term decision-making. Against this backdrop, this study examines how sustainability is defined, debated, and embedded in MIRT Explorations and identifies strategies to translate ambitions into actionable project objectives.

Objective

The main objective of this research is to improve the structuring and embedding of sustainability considerations in the early stages of MIRT projects. The study seeks to understand how sustainability ambitions are formulated, translated, and embedded during MIRT Explorations, and how this process can be organised more effectively to ensure that sustainability ambitions are safeguarded and lead to the most sustainable project outcomes.

The central research question is:

How can sustainability ambitions be effectively embedded in MIRT projects through the structuring of the MIRT Exploration phase?

Methodology

The research design follows a three-phase approach:

1. **Context & Framework Building:** a literature review and document analysis were conducted to establish a theoretical framework for further analysis.
2. **Empirical Analysis:** two MIRT Exploration projects were examined; Station Dordrecht (as part of the Oude Lijn corridor) and OVAH (a new public transport connection between Amsterdam and Schiphol). For each case, project documents were analysed and semi-structured interviews were conducted to trace how sustainability was defined and embedded in practice.
3. **Synthesis & Toolkit Development:** insights from theory and practice were synthesised into recommendations and a practical toolkit to strengthen the integration of sustainability considerations in MIRT Explorations.

Results

To answer the main research question, the study first examined the characteristics of MIRT projects, which can be defined as **Large Transport Infrastructure Projects (LTIPs)**. These projects are complex, long-term, and multi-stakeholder endeavours that operate within layered governance structures.

Core stakeholder groups that can be identified in these projects are Owners and Sponsors of the assets, Temporary Client Organisations, Partners and Advisors, and Consultancy and Engineering firms.

In the Dutch context, the Exploration phase of the MIRT process forms a critical interface where ambitions are translated from strategic visions into concrete project objectives. This stage has the highest potential to influence outcomes, but also the highest risk of dilution due to inherent complexities and competing priorities.

Second, the research analysed how sustainability is defined and interpreted within both the literature and the MIRT context. In theory, sustainability is understood as a broad concept that includes environmental, social, economic, and institutional dimensions. In practice, the case studies show that its interpretation is strongly context-dependent and largely influenced by site conditions, the scale of the system, and the organisation of the process of embedding sustainability. This variation confirms what is also found in the literature: sustainability in LTIPs is a normative and negotiated concept shaped by the values and interpretations of the actors involved.

Third, the study identified a set of influential factors that determine whether sustainability ambitions are maintained or lost throughout the project. These factors include governance structure, stakeholder collaboration, knowledge continuity, financial constraints, and project scale. They were mapped across the strategic, tactical, and operational management levels to show where in the process sustainability is most vulnerable and where interventions can be most effective.

Finally, the research analysed how the process of embedding sustainability considerations is organised within MIRT Explorations. Although sustainability is structurally recognised within MIRT procedures and supported by *Handreiking Verduurzaming MIRT* (MIRT Sustainability Guideline), its practical application varies across projects. Some projects explicitly embed sustainability in objectives and assessment frameworks, while others address it through parallel processes or reporting. This variation highlights that embedding sustainability is not only a technical consideration but also an organisational one, shaped by how collaboration and decision-making are structured within the project.

Toolkit

The findings show that the challenge of embedding sustainability in MIRT Explorations lies not in the absence of ambition, but in how the concept is structured and managed throughout the process. To address this, the research introduces a different perspective on sustainability: instead of treating it as a separate goal or thematic component, it should function as an organising principle that shapes the logic of the Exploration itself. By organising the process in a sustainable way, projects can account for the normative nature of sustainability.

Building on this perspective, the research presents a practical toolkit that helps project teams translate this organising principle into action. The toolkit combines insights from theory, case studies, and expert validation into a structured sequence of phases and priority actions, and assigns responsibilities to the core stakeholder groups involved. It provides concrete guidance on how sustainability can be anchored in governance, embedded in assessment frameworks, and safeguarded across decision-making moments in the MIRT Exploration process. The complete toolkit can be found in Figure 1.

Conclusion

This research shows that the effective embedding of sustainability in LTIPs depends on how the early phases, particularly the MIRT Exploration, are structured. Rather than treating sustainability as a separate objective, it should serve as an organising principle that shapes governance, collaboration, and decision-making throughout the process. This is necessary because sustainability is inherently project-specific and normative; its meaning depends on the context, the scale, and the organisation of the process. By restructuring this process, sustainability ambitions can be better integrated into the final product, and more sustainable infrastructure systems can ultimately be realised.

The toolkit developed in this research provides a practical instrument to achieve this. By guiding project teams in defining and integrating sustainability ambitions throughout the Exploration phase, it enables a shift from ambition to concrete action, making sustainability an integral and lasting part of how infrastructure projects are planned and delivered.

Sustainable MIRT Exploration

RACI-matrix roles: R = Responsible - executes the task
A = Accountable - ultimately answerable for the result
C = Consulted - Provides input and expertise
I = Informed - kept updated on progress and outcomes



1. Preparatory Phase

Goal: Draft a Start Document that anchors sustainability in the governance structure and main project objectives, including shared high-level sustainability ambitions.

Priority Actions

1. Ensure broad stakeholder representation
2. Compile available knowledge (policies, previous studies, tools)
3. Determine leading aggregation level
4. Embed sustainability in project objectives
5. Anchor sustainability in Governance structure



Who?

No formal structure yet – responsibility lies with the client and owners:
Client: Lead in defining direction and governance setup
Owners: Approve ambition level & strategic fit
Regional & Local Authorities: Provide contextual input and early alignment



Tools

Matrix with sustainability ambitions of the client

Product

Start Document with clear sustainability governance structure



1a. Tender Phase

N.B. Not every MIRT exploration requires a tender procedure; however, when applicable, this phase represents a crucial opportunity to anchor sustainability in the project process.

Priority Actions

1. Include vision on important sustainability themes as an award criterion



Who?

Client leads the process by shaping sustainability criteria, consultants contribute by bringing in their own expertise and perspective



Product

Contractual agreement with sustainability clauses



2. Start Exploration

Goal: Establish a clear red thread on sustainability by holding a structured dialogue that embeds key themes in project products and analyses

Priority Actions

1. Structured Dialogue on Sustainability
2. Adequate Client Representation
3. Include distinguishing themes in assessment frameworks



Who?

	Owner	Client	Partner	Consultant
1.	C	A	C	R
2.	A	R	I	I
3.	A	R	C	I



Tools

- Duurzaam GWW
- Ambitiweb

Product

Vision on sustainability in project



3. Analysis Phase

Goal: Explore the full range of possible solutions without prematurely restricting the scope. A sustainability focused solution area should inform the range of sustainability measures.

Priority Actions

1. Map external context & look for synergies
2. Work out solution area with focus on sustainability themes



Who?

	Owner	Client	Partner	Consultant
1.	I	A	C	R
2.	I	A	C	R



Tools

- Climate resilience analysis
- Design principles (STOMP / environment-led Design)



4. Assessment Phase

Goal: Assess consequences per alternative and define measures for the next phase, ensuring that sustainability is fully visible in reporting.

Priority Actions

1. Test and quantify critical themes
2. Anticipate implications and prepare plan- and study phase actions



Who?

	Owner	Client	Partner	Consultant
1.	I	A	C	R
2.	I	A	C	R



Tools

Quantification tools: DuboCalc / R-ladder / MKBA / MER / embodied carbon study

Product

Integrated sustainability report



5. Preference Decision

Goal: Ensure sustainability considerations are visibly reflected in the decision and embedded in the financial framing of the preferred alternative.

Priority Actions

1. Reflect on sustainability integration in decision-making
2. Integrate in financial planning



Who?

	Owner	Client	Partner	Consultant
1.	A	R	I	R
2.	A	R	C	C



Products

N.A.



6. To Plan- & Study Phase

Goal: Transfer sustainability to next phase with requirements, follow-up measures, and quantifiable thresholds where possible.

Priority Actions

1. Include sustainability considerations in gate reviews
2. Formulate new baseline for the Statement of Principles for the next phase



Who?

Client and owners lead the transition; consultants support by formalising sustainability requirements and ensuring knowledge transfer.



Tools

Use of digital requirement-tracking systems (e.g., DOORS or in-STEP BLUE)

Figure 1: Toolkit for structuring sustainability in MIRT Explorations

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1

Introduction

This chapter provides the background and context for this thesis. It begins by outlining the urgency for more sustainable development (Section 1.1), followed by an introduction to the sustainability challenges faced in infrastructure projects specifically (Section 1.2). After this, the central problem statement that is addressed in this research is introduced (Section 1.3). The Dutch approach to the planning of large transport infrastructure is then discussed, as this is the primary setting of this thesis (Section 1.4). The chapter further identifies the research gap (Section 1.5), presents the research objectives and guiding research questions (Sections 1.6 and 1.7), and gives an overview of the design of the research (Section 1.8). Finally, the final product and relevance of the research are discussed (Section 1.9).

1.1. A World in Crisis

The urgency to integrate sustainable practices into infrastructure projects continues to grow (Fenner et al., 2023). During the last decades, the world has been facing an increasing number of systemic and accelerating crises that impact the stability of the planet. One of these crises is the climate emergency, which is marked by the increase in severe weather events, rising sea levels, and disturbed ecosystems (IPCC, 2021). At the same time, there is a very high rate of biodiversity loss, which undermines the natural systems on which human life depends (IPBES, 2019). In addition to these environmental challenges, global demographic trends point to continued population growth and rapid urbanisation, especially in and around major cities. The United Nations estimates that by 2050, nearly 70% of the global population will live in urban areas. This urbanisation adds pressure to spatial planning systems, natural resources, and essential public services such as housing, energy, water, waste, and mobility (UN-Habitat, 2020). This trend is also visible in Europe and especially the Netherlands. Analyses show that between 2000 and 2018, the built-up area in the Netherlands increased by approximately 15%, making it one of the top four European countries in terms of land take. When looked at in relation to the total land surface, the Netherlands leads the EU, with 1.74% of its territory urbanised during the first two decades of this century (Evers & van Schie, 2023).

These developments are not isolated, but intersect in ways that amplify their individual effects (Fenner et al., 2023). Climate vulnerability is often highest in urbanised regions where infrastructure is outdated or insufficient (Fenner et al., 2023). At the same time, environmental burdens are not distributed equally, and social inequalities deepen as access to clean air, safe mobility, green space, and reliable services remains unevenly distributed across and within urban populations. This shows that the challenge these crises present cannot be seen or treated as a single-sector concern, but requires a system-wide approach that spans spatial planning, ecological resilience, and social equity.

The acknowledgment that there is a need to change unsustainable practices is shared by both researchers, policy makers, and professionals. To address the challenges, a variety of strategic development goals are formulated on different levels of governance. This started in 1987, when the United Nations called for a switch to more sustainable development, which was defined in the Brundtland report as seeking *“the capacity to meet the needs of the present without compromising the ability of future*

generations to meet their own needs” (United Nations World Commission on Environment and Development, 1987). This definition highlights that sustainable development is a continuous process shaped by technological advancements, resource availability, and evolving social structures (Pardo-Bosch & Aguado, 2016).

Over time, the notion of sustainability has been understood in many different ways, to the point where it has become a broad and somewhat ambiguous concept (Sturup & Low, 2019). It is applied across almost all sectors and implemented in different ways, ranging from environmental protection and economic growth to social justice, each domain emphasizing different priorities. However, there are some prominent interpretations that can serve as guiding principles to achieve sustainability across all sectors. Ambitions towards the mitigation of the climate crisis have been made in the Kyoto protocol (UNFCCC, 1997) and the Paris Agreement (UNFCCC, 2015). The current leading example of the interpretation of sustainability is the Sustainable Development Goals (SDGs), launched by the UN in 2015 (United Nations, 2015). These 17 goals form an internationally recognized framework for addressing environmental, social, and economic challenges in an integrated way (see Figure 1.1).



Figure 1.1: Sustainable Development Goals (United Nations, 2015)

1.2. Sustainability Challenges in Transport Infrastructure

This study focuses specifically on sustainability challenges in **Large Transport Infrastructure Projects (LTIPs)**. Within the transition towards more sustainable development, both the construction sector and the transport infrastructure sector play a pivotal role (Frantzeskaki & Loorbach, 2010). Infrastructure, and transport infrastructure in particular, is a core human need and a key factor in enabling and facilitating socio-economic activity (Fenner & Ainger, 2020). Because of the scale, spatial impact, and the importance of public infrastructure for economic development, decisions about placement and design significantly influence the development of the built environment. Moreover, the long design life of infrastructure assets means that decisions and actions taken today will shape the future for decades to come. This also entails the risk of creating path dependencies that exacerbate problems and lead to ineffective or inefficient outcomes in the long term (Leach et al., 2020).

One clear way to understand the importance of infrastructure for sustainable development is by examining its relationship to the SDGs. Of the 169 targets defined across the 17 SDGs, infrastructure influences 121 of them (72%), either directly or indirectly (Thacker et al., 2019). Transport systems, in particular, contribute to achieving targets under SDG 11 (Sustainable Cities and Communities), SDG 9 (Industry, Innovation and Infrastructure), SDG 13 (Climate Action), and SDG 10 (Reduced Inequalities). This illustrates the significant impact of infrastructure and, consequently, highlights the need for careful decision-making and collaboration when planning, developing, or renovating infrastructure.

Despite this critical role, the current state of the transport infrastructure sector shows that it is still falling behind when it comes to delivering on sustainability ambitions. For example, the transport sector is currently the worst performing in terms of carbon reduction in the EU and remains off track to meet established climate targets (World Bank, 2022). It is the only sector in which current greenhouse gas (GHG) emissions are still increasing. In the Netherlands, transport accounted for 12% of total greenhouse gas emissions in 2022 (Centraal Bureau voor de Statistiek, 2022). Beyond their carbon footprint, mobility systems also have a profound impact on urban liveability. They contribute to air pollution, noise nuisance, and the degradation of public space caused by both moving and parked vehicles. For instance, researchers have estimated that the total welfare loss from local air pollution in European cities amounts to €166 billion per year, equivalent to around €1,250 per urban resident (CE Delft, 2020).

Furthermore, the construction and operation of infrastructure make a substantial contribution to greenhouse gas emissions. In the EU, construction activities in the build environment account for 5–12% of total national GHG emissions, arising from material extraction, construction product manufacturing, and building activities (European Commission, 2024). A considerable share of these emissions is associated with the use of carbon-intensive materials such as cement, steel, and aluminium (UNEP & YCEA, 2023). The built environment also exerts immense pressure on natural resources, accounting for roughly 50% of all extracted materials in the EU and generating more than 35% of the Union's total waste (Çimen, 2021).

One reason the transport sector struggles to transition towards more sustainable practices lies in the complex interdependencies that characterise transport systems. Transport systems are socio-technical systems, which consist of a complex configuration of interrelated elements, including technology, policy, markets, user behaviour, infrastructure, cultural meaning, and scientific knowledge (Geels, 2012). This cross-sectoral and multi-scalar character makes the integration of sustainability inherently complex (Frantzeskaki & Loorbach, 2010). As a result, transitioning towards sustainable infrastructure systems requires change across the broader societal structures with which it interacts (Geels, 2002). Efforts to drive change are frequently hindered by a range of obstructing factors, such as conflicting stakeholder interests, behavioural lock-ins among users, and rigid, siloed planning approaches.

Addressing these challenges demands more than technological fixes; it requires rethinking how infrastructure is defined, governed, and planned for. According to the OECD, achieving global development goals in line with climate targets will require an estimated \$69 trillion investment in sustainable infrastructure by 2030, much of it in the transport sector (OECD, 2017). This investment is not only for measures to reduce carbon emissions, but also for efforts to limit material throughput, enhance system flexibility, and promote equitable access to mobility. Transport infrastructure, therefore, must facilitate sustainable transport systems to ensure inclusive, low-impact, and future-proof development.

Ultimately, infrastructure developed and planned today through LTIPs has the potential to provide safety and security, to enable the adaptations required in this century to address climate change, to reduce inequality, and to safeguard the planet's life-support systems.

1.3. Problem statement

Despite broad agreement among policymakers, engineers, urban planners, and clients on the need to integrate sustainability into infrastructure development, a persistent tension remains between long-term policy ambitions and the operational realities of infrastructure planning (Afzal et al., 2017; Leach et al., 2020). The key challenge lies in translating strategic sustainability ambitions into the project-based processes of designing or replacing infrastructure. Integrating sustainability into concrete choices on planning, design, and procurement therefore calls for a critical examination of how sustainability is defined, prioritised, and operationalised within projects and the organisations that deliver them (Fenner et al., 2023).

To better understand how ambitions are diluted or misaligned, it is necessary to examine how LTIPs unfold over time. Most follow a structured life cycle with three main phases: a front-end phase (initiation, exploration, planning/design), a construction phase, and an operational phase. Each phase involves distinct decision-making processes, stakeholders, and constraints. Sustainability ambitions move through these phases by being formulated and translated across strategic, tactical, and operational levels (STO). Figure 1.2 shows the connection between the main phases of infrastructure projects

and the levels at which sustainability ambitions are formulated. At the strategic level, governments set overarching goals such as becoming climate neutral by 2030. In the tactical domain, such goals are specified into programme-level ambitions that guide planning and exploration. Finally, they are operationalised in concrete project requirements and specifications, such as material standards or energy performance criteria.

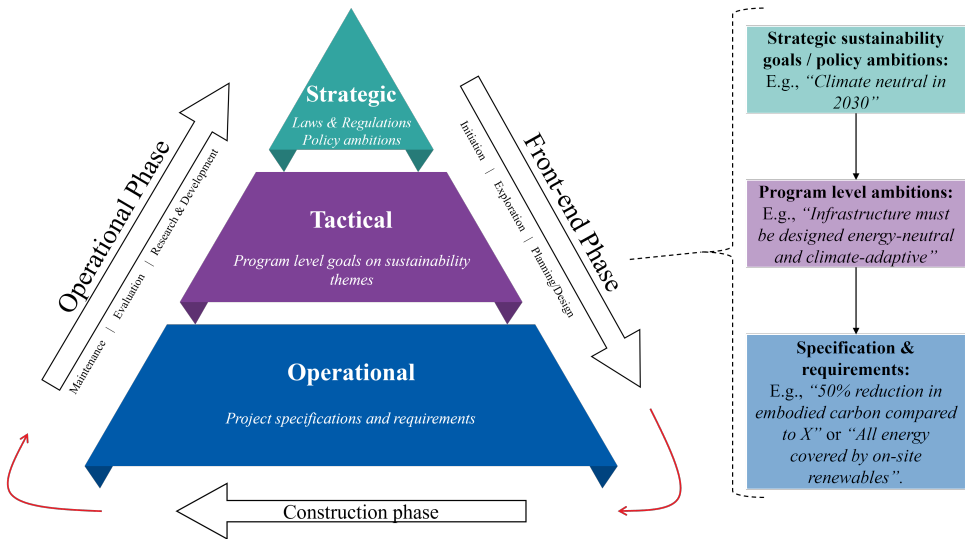


Figure 1.2: Relationship between infrastructure project phases and the levels of sustainability ambition formulation (adjusted from (Veen, 2023))

As the right side of Figure 1.2 shows, the front-end phase plays a central role in this translation, acting as the interface where high-level ambitions must be converted into actionable requirements for later phases. This early phase offers a particularly critical window for integrating sustainability (see Figure 1.3). At this stage, the scope of the project is defined, objectives are set, and strategic alternatives are developed and assessed (Fenner et al., 2023). Key decisions taken here often shape the overall direction and long-term impact of the project.

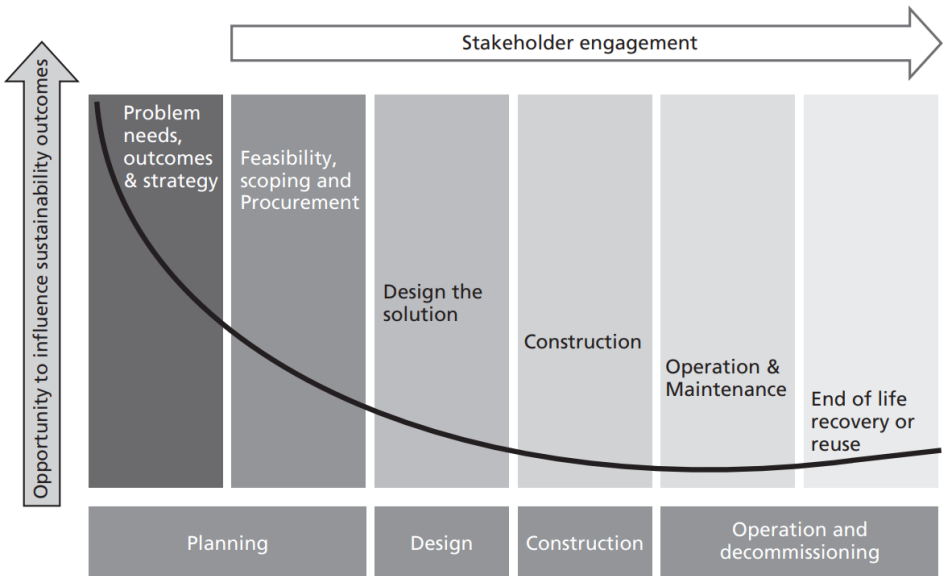


Figure 1.3: Opportunities to influence sustainability outcomes over the project life cycle (Fenner et al., 2023)[p. 75]

While the exploration phase provides a critical window for embedding sustainability, making this trans-

lation in practice is highly complex. LTIPs, such as the design or replacement of transport links in the form of highways, metro lines, or rail connections, unfold within complex networks of stakeholders from policy, engineering, finance, and governance domains (Flyvbjerg, 2014). The stakeholders in those domains bring diverse values and institutional logics, which makes coordination difficult. Under pressures such as tight budgets, time constraints, and bureaucratic inertia, sustainability ambitions are often diluted during implementation (Malyszka, 2024; Milhorange et al., 2022; Veen, 2023). The complexity is further amplified by the fact that sustainability itself is a contested and multifaceted concept. While there is broad agreement on its importance, stakeholders may prioritise different aspects: a contractor may emphasise emissions reduction or material circularity, whereas a city planner may focus on climate resilience or social equity (Gijzel et al., 2019; Yuan, 2017). Such diverging perspectives create misalignment in expectations, trade-offs, and project priorities. Consequently, integrating sustainability into infrastructure is not merely a technical or procedural task, but fundamentally a governance and coordination challenge.

Research into the technical and procedural aspects of infrastructure planning highlights several persistent barriers that help explain why sustainability integration often falls short. These include institutional inertia and siloed responsibilities that hinder collaboration, as well as short-term financial considerations that outweigh long-term value creation (Chileshe et al., 2018; Fathalizadeh et al., 2021; Legacy et al., 2017; Sourani & Sohail, 2011). While long-term benefits may come in the form of life-cycle cost savings, resilience to climate change, or improved social value such as health and liveability, these are often undervalued in practice. Knowledge barriers further complicate this picture, as limited technical expertise and the perception of innovation as risky frequently prevent the adoption of new approaches (Ametepey et al., 2015; Borg et al., 2020).

The front-end phase is particularly sensitive to these challenges. In the Netherlands, the planning of mega-projects can take more than a decade from the initial idea to the decision on the final design and the transition to implementation (Elverding, 2008). During this lengthy period, the previously described complexities converge within multi-stakeholder arenas. Here, all actors are expected to ensure that strategic sustainability ambitions are translated into concrete project decisions. Analysing how this translation occurs is therefore essential for understanding the conditions that either enable or hinder meaningful sustainability integration.

The interplay between the potential of the early front-end phase and the complexities of planning new infrastructure in multi-actor systems forms the foundation of this research. When effectively managed, these processes can play a decisive role in shaping the future of mobility. Because transport infrastructure projects are inherently embedded within broader networks of systems, spaces, and users, they present a unique opportunity to influence not only individual project outcomes but also the wider transition towards a more sustainable and integrated mobility system (Geels, 2012). This research therefore asks how planning processes and stakeholder collaboration can be organised so that sustainability ambitions are not only safeguarded, but actively drive the development of low-carbon, inclusive, and future-proof transport infrastructure, with sustainability themes considered from the very beginning of project development.

1.4. Sustainability and Infrastructure Planning in the Netherlands

This research aims to provide insight into the practicalities of incorporating sustainability ambitions in the front-end phase of new transport infrastructure by examining projects in the Netherlands. The Netherlands is one of the most densely populated countries in Europe, with population growth concentrated in urban regions and large numbers of new homes being built to meet demand. This urban expansion places increasing pressure on existing transport systems (Jorritsma et al., 2023). Large-scale infrastructure projects that respond to these spatial and mobility challenges are developed under the *Meerjarenprogramma Infrastructuur, Ruimte en Transport* (Multi-Year Programme for Infrastructure, Spatial Planning and Transport) or in short: **het MIRT** (Ministerie van Infrastructuur en Waterstaat, 2021). The programme encompasses all projects requiring collaboration between national and regional authorities and financed through national investment from the *Mobiliteitsfonds* (Mobility Fund) or the *Deltafonds* (Delta Fund). To safeguard this public investment, MIRT projects must follow a phased structure that ensures clear problem definition, careful planning, thorough documentation, and broad participation. Projects are divided into four major systems: main roads, rail and public transport, waterways, and

major waters.

Projects within the MIRT follow a phased structure consisting of four stages: the MIRT-onderzoek (Preparation Phase), the MIRT-verkenning (Exploration Phase), the plan- en studiefase (Planning and Study phase), and the aanleg (Construction Phase). The so-called front-end phase comprises the first three stages, before the start of construction. This research focuses specifically on **the MIRT-verkenning**, or **MIRT Exploration**, in which a signalled problem is translated into multiple potential solutions and, ultimately, a single preferred alternative.

In recent years, the Dutch government has increasingly sought to embed sustainability into the planning and development of infrastructure. National strategies such as the *Klimaatakkoord* (Climate Agreement) (Rijksoverheid, 2019) and the *Nationale Omgevingsvisie* (NOVI, National Environmental Vision) (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020) align with broader European goals, including the European Green Deal and the associated Sustainable and Smart Mobility Strategy (European Commission, 2020). These strategies call for integrated planning that advances environmental targets, spatial quality, and social equity. In the Dutch infrastructure domain specifically, *Rijkswaterstaat* (RWS, Directorate-General for Public Works and Water Management) has set the objective of becoming climate-neutral and circular by 2030. Several sector-specific tools support this ambition, including *Duurzaam Grond-, Weg- en Waterbouw* (Duurzaam GWW, Sustainable Ground, Water and Road Construction) and the Circular Design Guideline (Platform Duurzaam GWW, 2023). In addition, a dedicated vision for projects in the MIRT has been developed in the *Handreiking Verduurzaming MIRT* (MIRT Sustainability Guideline), which provides guidance and examples for embedding sustainability throughout the different programme phases (Ministerie van Infrastructuur en Waterstaat, 2020).

At the same time, the Dutch infrastructure sector faces pressure from financial constraints, personnel shortages, and environmental limitations. The most notable example is the nitrogen (stikstof) crisis (Ministerie van IenW & VRO, 2024). In 2023, the Ministry of Infrastructure and Water Management (IenW) announced the postponement of several new infrastructure projects and a shift in focus to maintenance projects. As a result, over €4 billion in planned investments were reallocated to safeguard essential maintenance and ongoing construction efforts (Ministerie van IenW & VRO, 2024). The nitrogen issue in particular has made it increasingly difficult to initiate new developments. While paused, projects remain on the agenda, their continuation depends on future solutions to these pressing challenges. This context underlines the importance of ensuring that projects comply with environmental regulations and integrate sustainability objectives from the outset, as failure to do so risks locking the sector in stagnation. This makes the integration of sustainability equally critical in renewal and replacement projects. It also serves as an example of the tension between long-term ambitions and sustainability commitments and short-term feasibility in Dutch infrastructure planning.

1.5. Research Gap

This research addresses a gap in both literature and practice by evaluating how sustainability is currently structured in LTIPs in the Netherlands. The introduction and problem statement highlight the importance of ensuring that sustainability is effectively considered and integrated in LTIPs, and that the front-end phase offers a critical window for embedding sustainability ambitions. However, because LTIPs unfold within complex socio-technical systems that involve networks of stakeholders from policy, engineering, finance, and governance domains, they are inherently complex. This study therefore focuses on the organisational aspects of LTIPs in the Netherlands and investigates how sustainability considerations can be more effectively embedded from the outset, so that it can be anchored throughout the entire project life cycle. This section discusses previous studies on this topic and identifies how the present research can add to the existing body of knowledge.

Sustainability in infrastructure is widely described by researchers, practitioners, public institutions, and sector organisations (CROW, 2011; Fenner et al., 2023; Thacker et al., 2019). The ambiguity of sustainability and its broad application are evident in the literature, where multiple interpretations of the notion exist. Different terms are often used interchangeably in both practice and academia. Moreover, the meaning and emphasis of sustainability can vary depending on the type of infrastructure under consideration. Of direct relevance to this research, the integration of sustainability into the front-end phase of LTIPs has received increasing academic attention in recent years (Eckersten et al., 2021; Leach et al.,

2020; Molaei et al., 2021; Rincón et al., 2021). Much of this work has focused on barriers, best practices, and frameworks developed to support sustainable outcomes, such as sustainability indicators and critical success factors for project delivery. In parallel, project management studies have emphasised organisational enablers and barriers to sustainability integration in front-end phases (Martens & Carvalho, 2016; Silvius & Schipper, 2014; Tamak, 2017; van Es, 2018).

Within this strand of the literature, recent master's theses by Veen (2023) and Malyszka (2024) specifically address the phenomenon of ambition erosion, defined as the dilution of sustainability ambitions as projects move from strategic intent to technical realisation. While technical limitations contribute to this erosion, these studies emphasise procedural and governance-related factors as influential factors. Examples of such barriers include fragmented coordination, unclear responsibilities, and conflicting stakeholder priorities. This indicates that sustainability integration is highly dependent on the structuring of projects and on the interaction between internal governance arrangements and the wider project environment.

From these perspectives, organisational characteristics of LTIPs becomes crucial. In such complex projects, outcomes are shaped more by ongoing negotiation, alignment, and influence across stakeholder networks, and less by top-down control (Gil, 2023; Vuorinen & Martinsuo, 2018). Key stakeholders typically include public and private commissioning authorities, who act as the owners and sponsors of the final product; temporary client organisations responsible for project delivery; engineering firms and consultants; NGOs; residents; and other societal actors (Denicol et al., 2021). Studies further highlight that stakeholders place different emphasis on sustainability aspects and may even pursue conflicting interests when advancing sustainability ambitions (Gijzel et al., 2019; Yuan, 2017).

The key gap this research addresses is the lack of empirical, project-level analyses that examine how sustainability is defined, negotiated, and realised in practice within the complex organisation of infrastructure projects. This study addresses this gap by focusing on projects under the MIRT framework. While previous studies have primarily identified barriers and success factors from a holistic perspective, little attention has been paid to how these dynamics actually manifest within the specific procedures and governance structures of projects. By mapping how sustainability ambitions evolve during the early phases and how they are translated into measures and narratives for the project, this research aims to identify opportunities for improvement and to derive actionable strategies for strengthening sustainability integration in Dutch infrastructure planning.

Furthermore, this research extends the current discourse by focusing on a relatively underexplored domain: public transport and rail-related infrastructure. Whereas much of the existing literature concentrates on road and underground construction (Malyszka, 2024; Molaei et al., 2021; van Es, 2018; Veen, 2023), MIRT rail and public transport projects have received less attention in this regard. These projects are characterised by long timelines, layered governance, and large stakeholder complexity. This is due to the involvement of multiple public and semi-public rail authorities. These project also hold high societal relevance. Together, these features make them a particularly rich setting for examining how sustainability ambitions are operationalised in complex project environments.

1.6. Research Objectives

The main objective of this research is to improve the structuring of sustainability in the early stages of MIRT projects. The study seeks to understand how sustainability ambitions are formulated, translated, and embedded during the exploration phase, and how this process can be organised more effectively so that ambitions are safeguarded rather than diluted. To achieve this, the following specific objectives are defined:

- **Objective 1: Defining Sustainability in Transport Infrastructure Planning**
To examine how sustainability is defined and conceptualised in both theory and practice within transport infrastructure planning.
- **Objective 2: Identifying Influential Factors**
To investigate the key factors, identified in both literature and practice, that influence the extent to which sustainability considerations can be effectively integrated in MIRT exploration projects. By analysing these factors across theory and practice, this objective aims to identify the conditions that either hinder or enable the integration of sustainability.

- **Objective 3: Analysing the Process of Embedding Sustainability**

To analyse how sustainability is embedded in the processes of MIRT explorations and which stakeholder groups are involved. This objective also examines the application of the principles of the guideline on sustainability in MIRT, and the responsibilities and collaboration in shaping sustainability ambitions.

- **Objective 4: Developing a Toolkit**

To synthesise insights from theory and practice into recommendations in the form of a practical toolkit. The toolkit provides structured approach in organising a sustainable MIRT exploration instead of treating sustainability separately in the project. It includes priority actions and strategies to ensure that sustainability ambitions are effectively embedded and safeguarded throughout the project life cycle.

1.7. Research Questions

To ensure this research will contribute to the objectives, one main research question (MRQ) is formulated, supported by a set of four sub-questions that correspond to the research objectives. Together, this makes up a structured approach to assess the integration of sustainability ambitions in MIRT exploration projects.

Main Research Question (MRQ):

How can sustainability ambitions be effectively embedded in MIRT projects through the structuring of the MIRT Exploration phase?

The main research question is divided into the following sub-questions (SQ), corresponding to the objectives formulated in the previous section:

Objective	Sub-question
Objective 1: Defining Sustainability in Transport Infrastructure Planning	SQ1: How is sustainability defined and conceptualised in theory and in practice within transport infrastructure planning?
Objective 2: Identifying Influential Factors	SQ2: What are the key factors addressed in theory and in practice that influence how sustainability is integrated in MIRT exploration projects?
Objective 3: Analysing the Process of Embedding Sustainability	SQ3: What does the process of embedding sustainability in MIRT explorations look like?
Objective 4: Developing a Toolkit	SQ4: What strategies can be formulated to aid MIRT explorations in becoming sustainable Explorations?

Table 1.1: Research sub-questions linked to the research objectives.

1.8. Research Design Overview

The research design, illustrated in Figure 1.4, follows a structured three-phase approach to answer the main research question. The figure also indicates where each part of the research is addressed in the report, linking the design to the overall outline of the thesis.

- **Phase 1: Context & Framework Building:** combines a literature review and document analysis to examine how sustainability is addressed in the front-end phases of LTIPs and in MIRT projects. This phase establishes the theoretical framework, consisting of the characteristics of LTIPs, theoretical definitions of sustainability, a list of influential factors that affect the effective integration of sustainability considerations, and an explanation of how sustainability is influenced by stakeholder perceptions. (addressing SQ1, SQ2, and SQ3 theoretically)
- **Phase 2: Empirical Analysis:** applies a comparative case study approach to investigate the development and evolution of sustainability aspects across two MIRT exploration projects. It also examines how sustainability is defined and how the process of embedding sustainability consid-

erations unfolds in practice. The analysis results in an evaluation of current practices and an identification of influential factors and strategies used by stakeholder groups to advance sustainability integration within the project. (addressing SQ1, SQ2, and SQ3 empirically)

- **Phase 3: Synthesis & Toolkit Development:** synthesises findings from the theoretical and empirical phases into recommendations for strengthening sustainability integration. The findings are combined in a toolkit that offers a structured approach for embedding sustainability in MIRT projects during the exploration phase. This toolkit is designed to build on and complement the existing guidelines for MIRT projects. Expert validation is used to test and refine these recommendations. (addressing SQ4 and MRQ)

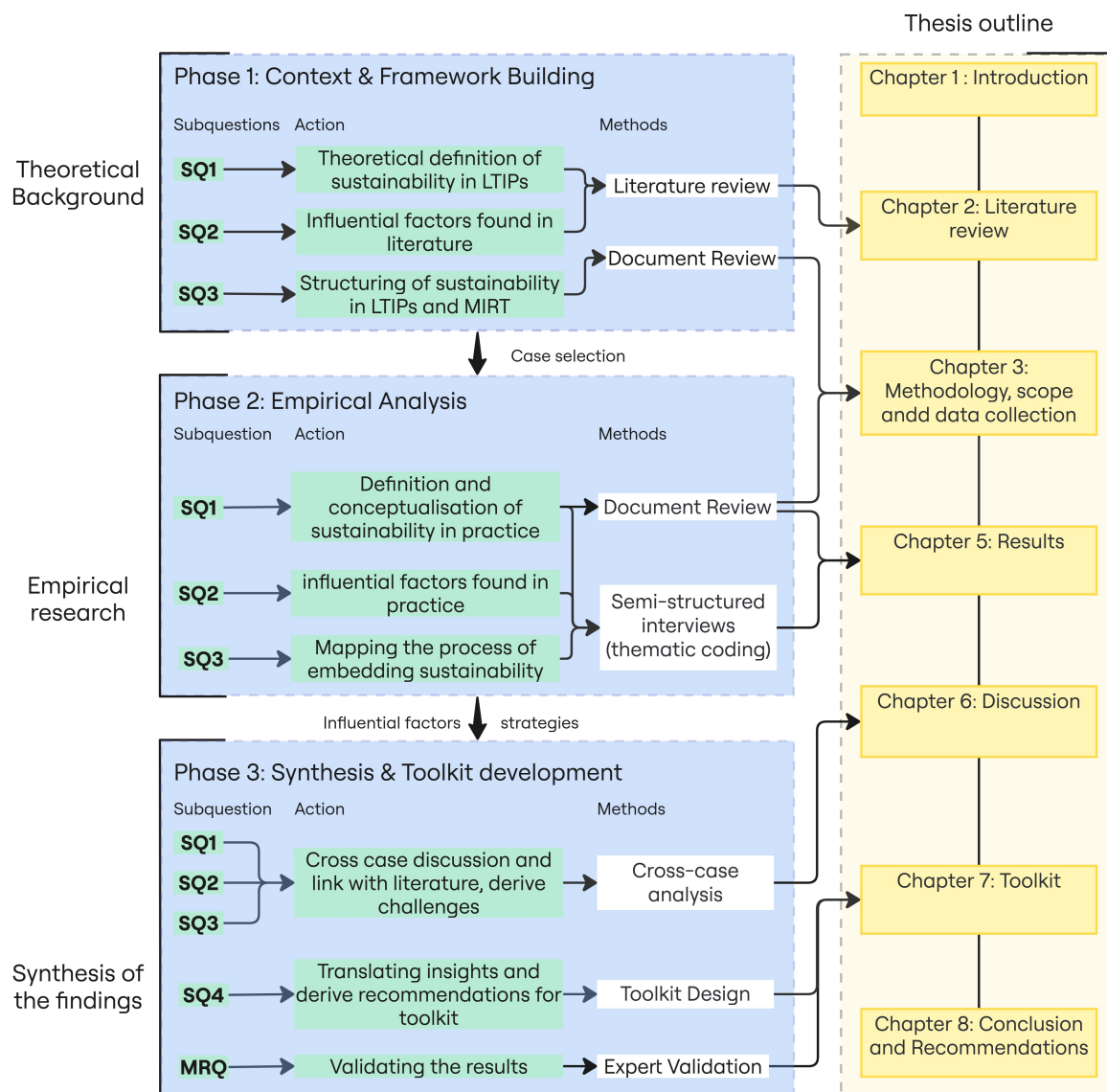


Figure 1.4: Visual representation of the research (own image)

1.9. Final Product and Relevance

The final product of this research is a toolkit that presents a set of priority actions, practical recommendations, and insights to support the integration of sustainability during the exploration phase of MIRT projects. Rather than replacing existing structures, these recommendations are intended to complement and build on the efforts outlined in the MIRT Sustainability Guideline (Ministerie van Infrastructuur en Waterstaat, 2020). This guideline provides broad suggestions for embedding sustainability

throughout the MIRT process and offers direction on translating strategic ambitions into concrete design choices.

This study adds value to the existing guideline by focusing specifically on the exploration phase. Through the analysis of two MIRT exploration projects, it maps how sustainability considerations evolve during this early stage and identifies where integration succeeds or falters. The result is an overview of priority actions that account for the influential factors, structured around the progression of a MIRT exploration project. Particular attention is given to the roles, responsibilities, and opportunities of the various stakeholders involved. In addition, the toolkit provides guidance on how the concept of sustainability can be approached within projects, while taking into account the complex organisational setting of MIRT explorations. Furthermore, it links actions to existing tools and methods that can be used to support the integration of sustainability in practice.

Academic Relevance

From an academic perspective, this study contributes to the literature by evaluating how sustainability considerations are currently integrated into infrastructure planning practice. By examining two case studies, the research connects theoretical insights on influential factors with real-world examples. In doing so, it enhances understanding of how sustainability ambitions are shaped and safeguarded in the complex project environment of LTIPs, thereby adding to existing work on collaboration and governance in public infrastructure development. Furthermore, the study develops a practical, case-informed evaluation framework that can be used in future research to assess the success of sustainability integration during the early planning phases of infrastructure projects.

Societal Relevance

This study responds to the urgent need for structuring sustainability in transport infrastructure. By focusing on the early exploration phase, toolkit helps public and private actors anchor sustainability ambitions before technical or financial constraints dominate. The toolkit is particularly relevant for project teams, contracting authorities, and consultants involved in MIRT procedures, supporting them in creating more future-resilient and broadly supported infrastructure projects. Because many LTIPs across Europe follow similarly phased planning models, the findings may offer a transferable example for strengthening sustainability integration in other contexts and infrastructure programmes.

Altogether, this research offers both a theoretical contribution and a practical tool to improve sustainable infrastructure delivery, starting where it matters most: at the beginning.

2

Literature Review

This chapter provides a structured overview of the academic literature relevant to this research. Section 2.1 introduces the characteristics, life cycle, and organisational structure of Large Transport Infrastructure Projects (LTIPs), to better understand the environment in which sustainability ambitions must be realised. Section 2.2 examines the concept of sustainability in the context of LTIPs, discussing different definitions, conceptual frameworks, and the contribution of sustainability to project success, as well as the normative complexity of its interpretation. Section 2.3 focuses on the role of the project environment and involved stakeholders in shaping sustainability outcomes, highlighting how different stakeholders define sustainability, their influence strategies, and the importance of alignment for effective implementation in complex infrastructure projects. Finally, section 2.4 addresses the factors of importance that influence whether sustainability can be effectively integrated in infrastructure projects. The chapter concludes with a theoretical framework that will inform the subsequent analysis.

2.1. Large Transport Infrastructure Projects (LTIPs)

This section introduces the key characteristics of Large Transport Infrastructure Projects (LTIPs) and situates them within a theoretical context, as a basis for understanding MIRT projects. It outlines their main features, organisational structure, and inherent complexities. In addition, the project life cycle is presented, with particular attention to the front-end phase, which encompasses the exploration stage of MIRT projects.

2.1.1. Characterising Large Transport Infrastructure Projects

Infrastructure projects of the scale and scope relevant to this research are commonly referred to in the academic literature as either *Large Infrastructure Projects* (LIPs) or *Mega-projects*. While these terms are often used interchangeably, this study adopts the term *Large Transport Infrastructure Projects* (LTIPs) to maintain consistency and to reflect the specific focus of the MIRT cases examined here. In much of the existing literature, the term LIPs is used, but for the purposes of this research the additional 'T' for transport has been added, since the projects analysed concern transport infrastructure, and in particular large-scale public transport developments.

Projects in general are defined by Westland (2006) as “a unique undertaking to produce a set of deliverables within a specified time, cost and quality.” Infrastructure projects typically meet these criteria: they are temporary endeavours with clearly defined timescales, approved budgets, and limited resources. Moreover, they aim to bring about change within an existing situation and inherently involve uncertainty and risk.

When focusing on LTIPs, the widespread definitions in the literature mostly emphasise their complexity, scale, and impact. For instance:

- Biesenthal et al. (2018) describe them as “large-scale socio-technical undertakings that are complex and embedded in institutional frames.”

- Brookes and Locatelli (2015) define them as “temporary endeavours characterised by large investment commitment, vast complexity (especially in organisational terms), and long-lasting impact on the economy, the environment, and society.”
- Flyvbjerg (2014) characterises them as “large-scale complex ventures that typically cost €1 billion or more, take many years to develop and build, involve multiple public and private stakeholders, are transformational, and impact millions of people.”
- Frick (2008) captures their essence through the “6 C’s”: *Colossal* in size and scope, *Captivating* in visibility, *Costly*, *Controversial*, *Complex*, and marked by issues of *Control*.

LTIPs attract significant academic attention because of their major influence on regional and national socio-economic development, as well as the substantial public investment they require. A large body of literature examines LTIPs from a project management perspective, with particular emphasis on the considerable challenges they pose. Flyvbjerg (2007) identifies several key issues commonly associated with the management of such projects, including:

- Long life cycles with complex interfaces that increase exposure to uncertainty and risk,
- Non-standardised or evolving technological requirements,
- Involvement of multiple stakeholders with conflicting interests,
- Frequent shifts in project scope and ambition,
- Vulnerability to unplanned events that put pressure on time and cost estimates,
- Systematic misinformation regarding expected costs, benefits, and risks.

These challenges often result in under-performance, typically in the form of cost overruns, benefit shortfalls, and delays. Such shortcomings attract considerable public scrutiny and, in turn, spark interest among other researchers investigating the underlying drivers of complexity in LTIPs. As a result, numerous frameworks have been developed to classify and analyse complexity within such projects. Shi (2020) provides a comprehensive overview of these frameworks, which highlight multiple dimensions of complexity, with technical, organisational, structural, and managerial aspects cited most frequently. This underlines that, beyond technical execution, the organisational and governance-related dimensions of complexity play a critical role in the implementation and ultimate success of LTIPs (Shi et al., 2020).

2.1.2. Organisational Structure of Large Transport Infrastructure Projects

The scale, duration, and uncertainty of LTIPs give rise to complex organisational arrangements that evolve across multiple layers of decision-making. A considerable share of investment is directed not only to physical assets but also to the governance, management, and service structures used to get the project delivered. Examining these organisational dynamics is essential for identifying where and how sustainability considerations are embedded throughout the project lifecycle.

The Project System Organisation (PSO) Framework

One of the most comprehensive conceptualisations of LTIP organisation is the **Project System Organisation (PSO)** framework, developed by Denicol, Davies, and Pryke (2021). The PSO conceptualises megaprojects as dynamic production systems in which organisational boundaries and configurations are constantly evolving. It highlights that such projects operate simultaneously on multiple levels, across supply chain tiers, and throughout different project phases. As illustrated in Figure 2.1, the framework distinguishes two structural layers, six organisational levels, and three overarching phases: development (front-end), delivery (implementation), and operations.

The PSO also helps to clarify inter-organisational relationships by making a clear distinction between client roles. Clients are often made up of a broad group of stakeholders with different roles such as owner, sponsor, client, and partner. These roles are often mixed up in the literature. Stakeholders can also appear in more than one layer when their organisations have multi-layered governance structures. By mapping the formation and evolution of the organisational structure, the PSO provides a useful framework for understanding the dynamics between permanent and temporary organisations, the complexity of stakeholder interaction, and the governance mechanisms that can determine the success or failure of megaprojects.

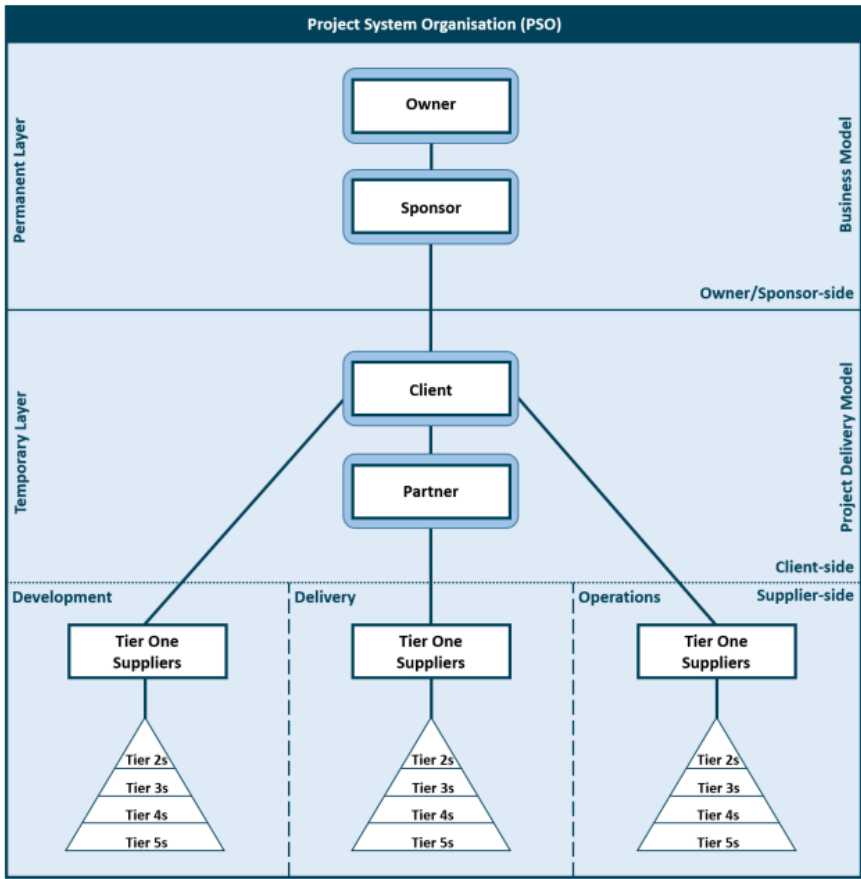


Figure 2.1: Project System Organisation (PSO) conceptual model (Denicol et al., 2021)

Project Lifecycle Models and Temporal Dynamics

The implementation of LTIPs is typically described through the project management life cycle. While the literature varies in the number and naming of phases, there is broad consensus on three overarching stages, also reflected in the PSO framework: a front-end phase, an implementation phase, and an operational phase. Within these stages, smaller sub-phases can be distinguished, often in the front-end. For example, Westland (2006) outlines initiation, planning, construction, and operation, whereas Scott and Levitt (2017) include shaping, design and construction, start-up and commissioning, operations, and demolition. A visual overview is provided by Samset (2008) (see Figure 2.2). These stages are not merely technical milestones, but correspond to changing organisational constellations. Each phase brings in new stakeholders, reshapes decision rights, and shifts priorities. Typically, every phase or sub-phase is separated by a decision gate, a critical moment where key choices are made about the project.

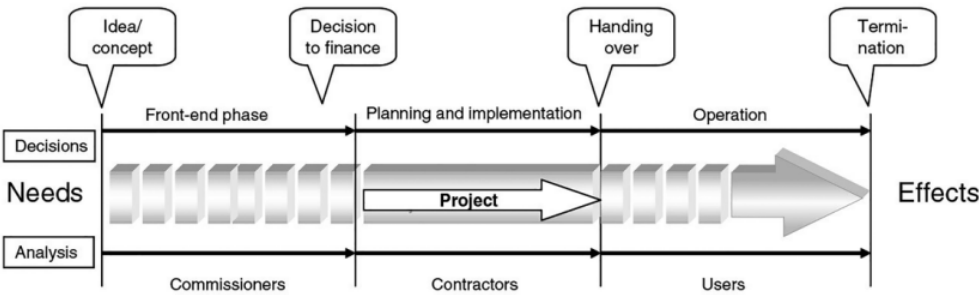


Figure 2.2: Phases of the project life cycle (Samset, 2008)

In LTIPs, decision-making authority is not centralised but distributed across different governance levels that evolve over time, as seen in the PSO framework. To better capture this dynamic complexity, Zidane et al. (2016) introduce the **PESTOL framework** (Project Evaluation on Strategic, Tactical and Operational Levels), which conceptualises project governance across three interrelated layers: strategic, tactical, and operational. This distinction between strategic, tactical, and operational layers builds on established management theories (e.g. Anthony, 1965) and is widely adopted in the project governance literature, as it helps to explain how decision-making authority, responsibilities, and timescales are distributed in large infrastructure projects. These layers are not tied to specific stakeholders but to the types of decisions and the timescales over which they are made.

- The **strategic level** concerns long-term direction, public value creation, and alignment with political and societal goals. Decisions are typically taken by ministers, funding bodies, or senior civil servants, covering agenda setting, investment priorities, and defining sustainability ambitions or policy frameworks.
- The **tactical level** serves as the interface between strategic intent and operational execution. It focuses on medium-term development (5–10 years) by translating high-level ambitions into project definitions, testing feasibility, setting design parameters, and coordinating stakeholders. Project sponsors and client organisations typically operate at this level, making decisions on scope, planning, governance, and procurement.
- The **operational level** relates to delivery: procurement, contract management, construction logistics, and commissioning. Contractors, engineers, and suppliers implement tactical choices in the short term, with efficiency as the main focus, though still strongly shaped by upstream governance.

As projects progress, the dominant governance layer shifts. Early stages are led by strategic stakeholders; over time authority moves to tactical decision-makers and later to operational agents (see Figure 2.3).

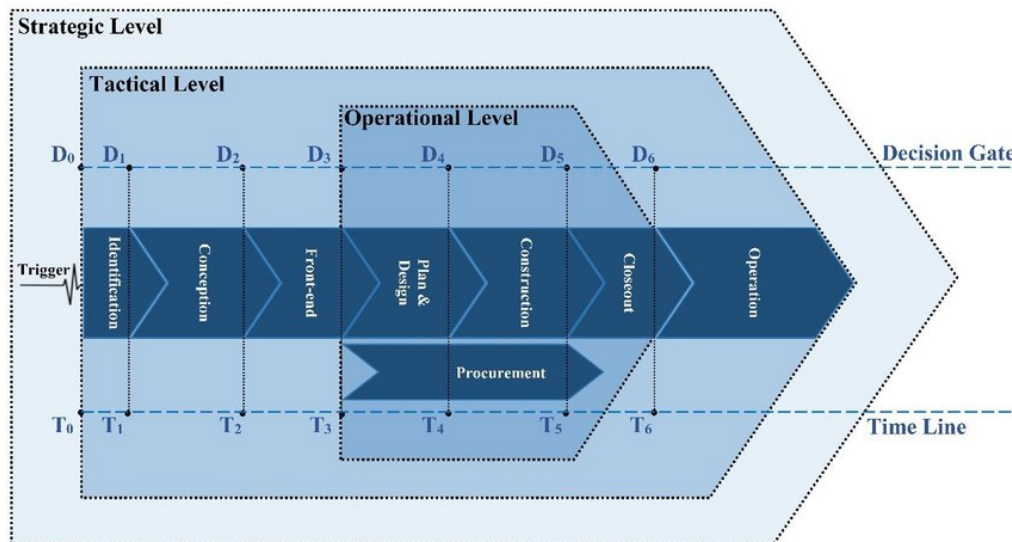


Figure 2.3: Project governance levels across the project lifecycle (Zidane et al., 2016)

Understanding this distribution of governance is critical for sustainability. The effectiveness of integration depends not only on ambitions set at the strategic level, but also on the ability of tactical stakeholders to embed them in plans and the commitment of operational agents to implement them.

2.1.3. Front-end phase

Mapping the front-end phase using PESTOL and PSO

Taken together, the PESTOL and PSO frameworks are highly relevant for this research because they provide complementary perspectives on the front-end phase. They show how LTIPs are organised during this phase and which stakeholders play a role. In the PESTOL framework, the early stages of a

project are dominated by the strategic and tactical levels: long-term ambitions are set and subsequently translated into concrete definitions and plans. When mapped onto the PSO, this corresponds to the development phase. At this stage, a defined group of suppliers is already involved in shaping the project. The term suppliers in the development phase refers to consultancy and engineering firms, architects, planners, and designers who are tasked with developing the design and technical calculations of the planned infrastructure. They operate on behalf of and alongside the temporary client organisation. The owners and sponsors remain active at the strategic layer of PESTOL. Tactical responsibilities are predominantly carried out by the temporary client, who is responsible for shaping the project. The suppliers in the development phase (the consultancy and engineering firms) operate at both the tactical and operational levels. They are tasked with executing specific assignments and translating strategic goals into concrete design alternatives. Figure 2.4 illustrates how the two frameworks overlap in the context of MIRT exploration projects.

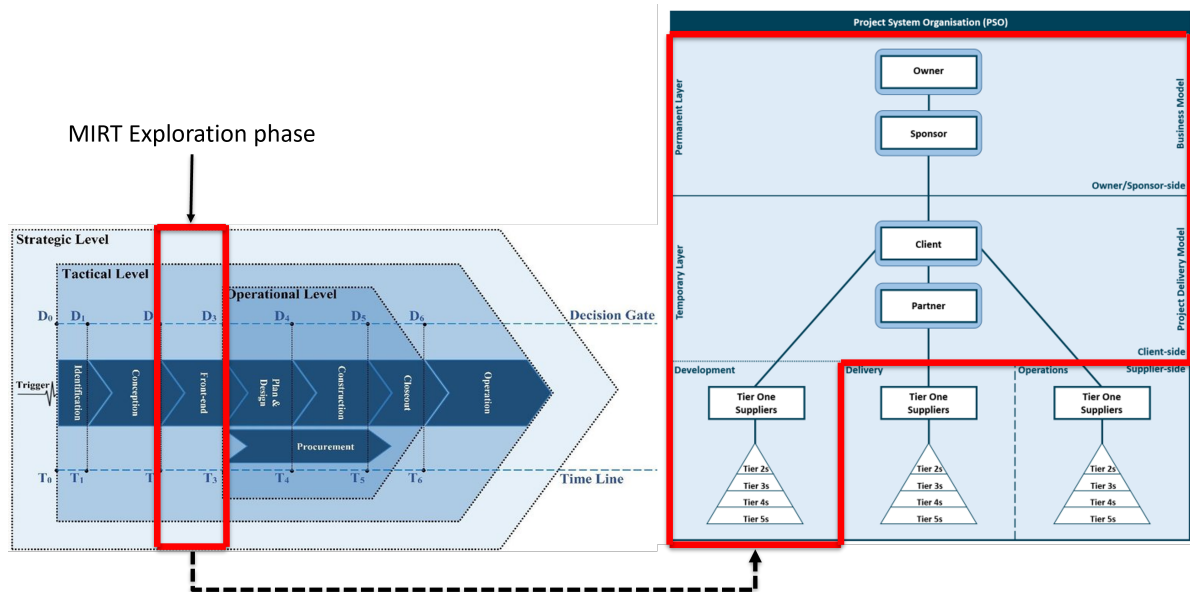


Figure 2.4: Overlay of PSO and PESTOL frameworks in the context of MIRT exploration projects (own image, adjusted from (Denicol et al., 2021; Zidane et al., 2016))

Strategic Importance of the Front-End Phase

The front-end phase is especially critical in public infrastructure projects. Such projects often originate from political agendas and involve lengthy preparation processes (Flyvbjerg, 2007). During this stage, a wide range of stakeholders are already engaged. This creates a window of opportunity to embed the ambitions and formulate shared commitments on sustainability that will guide the project, since core decisions on its scope, purpose, and design direction are taken here (Fenner et al., 2023).

In this phase, strategic alternatives are developed, priorities set, and criteria for evaluation and procurement established. Although detailed technical design and delivery follow much later, the foundational choices made at this stage largely determine both what the project will achieve and how it will be delivered. Project managers can therefore have the greatest impact on sustainability outcomes in the early phases (Borg et al., 2020). As shown in Figure 2.5, the potential to add value is greatest in the initial stages of the project life cycle, when the costs of making changes are still relatively low (Burke, 2003).

Situated between strategic planning and operational execution (see Figure 2.3), the front-end phase plays a pivotal role in translating strategic level ambitions into concrete project outcomes. The stakeholders involved bear significant responsibility for shaping the project's scope, priorities, and delivery strategy. Their ability to interpret strategic goals and embed them in early project decisions determines not only the project's direction, but also its capacity to deliver sustainable, long-term value.

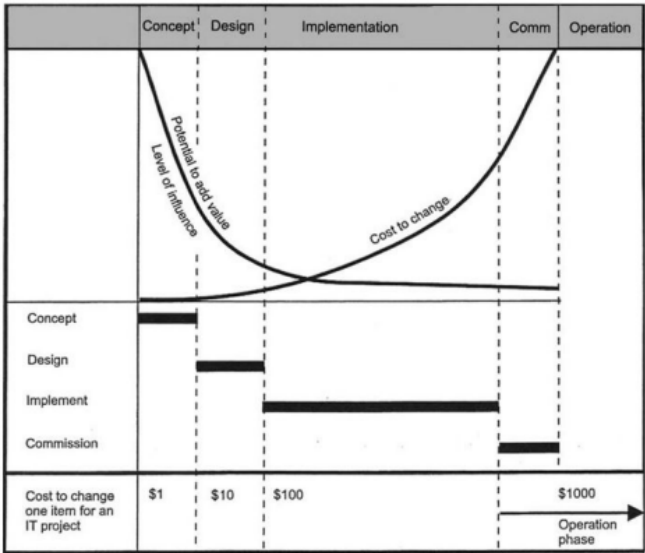


Figure 2.5: Potential to add value in the project life cycle (Burke, 2003)

2.2. Sustainability in Large Transport Infrastructure Projects

Over the past two decades, sustainability has become an increasingly central concern in Large Transport Infrastructure Projects (LTIPs), marking a shift from traditional project success criteria cost, time, and quality, towards delivering broader societal outcomes through projects (Bryde, 2012). This section examines how sustainability is defined in the context of infrastructure and highlights the key considerations that shape its integration. Section 2.2.1 introduces major sustainability frameworks, focusing in particular on the Triple Bottom Line as a leading model. Section 2.2.2 addresses the specific domain of sustainability in LTIPs, including the challenges observed in practice. Section 2.2.3 reviews the literature on sustainable project management and project success. Finally, Section 2.2.4 discusses sustainability as a normative and contested concept, shaped by the values and interactions of those involved in projects.

2.2.1. Introduction to Sustainability Frameworks

Sustainability has become a central concept in contemporary project management, yet it remains a broad concept and context-dependent. While it is often associated with environmental issues such as CO₂ reduction or renewable energy, its scope is far broader. To understand its role in project settings, both the evolution of the concept and the challenges of implementation must be considered. A brief history of the development of sustainability is provided in Appendix A.

The most widely cited definition of sustainability originates from the 1987 Brundtland Report, which frames sustainable development as:

“Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” (United Nations World Commission on Environment and Development, 1987)

This definition highlights the need for a long-term, intergenerational perspective on development and resource use. Upon this first definition of sustainable development multiple frameworks and theories are build that try to operationalise and safeguard this.

The Triple Bottom Line

A prominent interpretation of sustainability comes from Elkington’s **Triple Bottom Line (TBL)** framework. In this framework three interdependent pillars are defined: **People** (social equity), **Planet** (ecological protection), and **Profit**, often reframed as **Prosperity** (economic viability) (Elkington, 1997). These dimensions are commonly represented in a Venn diagram, with sustainability positioned at their intersection. While initially treated as separate domains, more recent literature emphasises that these

pillars are inherently interlinked. True sustainability is not achieved by maximising one pillar in isolation, but by balancing all three in order to reach a baseline in each pillar (Reddy & Thomson, 2015). This baseline is referred to as the “triple bottom line”.

Although the notion of the three pillars is widely used and adopted, the TBL model has also been criticised for its limitations. In practice, it is often considered a “weak” model, as achieving an optimum balance across all three dimensions is highly unlikely. Attempts have therefore been made to strengthen the model by introducing a hierarchy between the pillars, with scholars frequently arguing that the environmental dimension is fundamental and provides the preconditions for the other two to be realised. In line with this reasoning, sustainability cannot be achieved if ecological thresholds are exceeded, regardless of social or economic performance.

Absolute Sustainability

Responding to these critiques, researchers have also sought to move beyond the abstract and qualitative character of the TBL model. Instead of treating sustainability as a relative concept, efforts have been made to develop more quantitative and science-based approaches that allow for comparison between projects or products. These attempts mark a shift from descriptive frameworks to measurable boundaries, laying the foundation for the concept of absolute sustainability. This assesses whether a project, an intervention or an organisation operates within planetary boundaries. Frameworks such as the Planetary Boundaries model developed by Rockström et al. (2009) define biophysical thresholds, for example, for biodiversity loss or climate change, beyond which the risk of irreversible environmental damage increases sharply. This represents a shift from relative, qualitative assessments to quantitative, science-based definitions. Infrastructure projects are thus increasingly expected not only to deliver incremental improvements, but also to respect global ecological ceilings.

2.2.2. Sustainable Transport Mega-Projects

Whereas early literature on Large Infrastructure Projects focused largely on cost overruns and technical complexity, more recent studies stress the need to align LTIPs with long-term environmental and social objectives (Ward & Skayannis, 2019). As a result, academic interest in sustainable LTIPs has grown rapidly, particularly in response to global sustainability agendas (Silvius & Schipper, 2016). Despite this growth, sustainability in LTIPs remains a relatively young research field (Sturup & Low, 2019).

In recent discourse, greater attention has been directed towards the contribution of transport infrastructure to sustainability objectives. LTIPs are no longer assessed solely against traditional performance metrics, but increasingly evaluated for their capacity to generate long-term societal value across environmental, social, and economic dimensions (Fenner & Ainger, 2020; Flyvbjerg, 2014; Silvius & Schipper, 2014). A central question in this literature is: *What makes a transport mega-project sustainable?* While interpretations vary, there is broad consensus that it concerns the delivery of positive outcomes across the three dimensions of sustainability simultaneously over the full project lifecycle (Fenner & Ainger, 2020; United Nations Environment Programme, 2021).

The leading definition of sustainable infrastructure used in this research is from the United Nations Environment Programme (UNEP): “*systems that are planned, designed, constructed, operated, and decommissioned in a manner that ensures environmental, social, economic, institutional, and financial sustainability over their entire lifecycle*” (United Nations Environment Programme, 2021)[p.9]. This definition underscores that sustainability must be embedded from the outset as a guiding principle for governance, planning, and decision-making. It aligns with Elkington’s Triple Bottom Line (TBL) framework (Elkington, 1997). Genuine sustainability requires these three dimensions to be addressed in an integrated way.

- **Environmental Dimension:** Sustainable LTIPs aim to minimise their ecological footprint and deliver environmental benefits. Strategies include reducing greenhouse gas emissions through low-carbon design, encouraging modal shifts towards cleaner transport, using renewable energy sources, and strengthening climate resilience. Circular construction practices, biodiversity protection, and ecosystem restoration are also increasingly central.
- **Social Dimension:** Social sustainability concerns inclusivity, accessibility, and community well-being. Projects should provide affordable and safe mobility, promote social equity, and enhance

urban liveability. Meaningful stakeholder engagement from the early stages is critical to ensure that project outcomes align with societal needs and values.

- **Economic Dimension:** Economic sustainability extends beyond cost control to long-term value creation. This includes regional development, productivity gains, and lifecycle financial viability, supported by cost-benefit assessments that internalise social and environmental impacts. Resilience to market and operational risks is also key.

The literature stresses that these three pillars are interdependent. Rather than seeking trade-offs, sustainable planning aims to identify synergies. For example, electrified rail can reduce emissions (environmental), improve accessibility for underserved communities (social), and stimulate green economic growth (economic).

The leading definition also references the importance of institutional sustainability. This institutional dimension plays a decisive role in the realisation of sustainable infrastructure (United Nations Environment Programme, 2021). Effective governance requires both horizontal coordination across infrastructure sectors and vertical alignment between national, regional, and local levels. Institutions provide the framework within which strategic ambitions can be translated into project level implementation by linking policies, regulations, and funding mechanisms. At the same time, they must support inclusive and transparent stakeholder engagement to ensure legitimacy and long term value creation. Without strong institutional arrangements, capable of overcoming siloes, enabling cooperation, and building local implementation capacity, the integration of social, environmental, and economic sustainability in infrastructure projects remains unlikely.

Current Challenges in Practice

While high-level sustainability definitions are important, their implementation will eventually determine whether or not a project will contribute to sustainable development. Therefore it is also important to look at the practical translations of the critical challenges that must be addressed when designing, planning, or developing sustainable infrastructure. This is done by Fenner et al. (Fenner & Ainger, 2020), who identify seven critical challenges:

1. **Achieving net-zero carbon and addressing the climate emergency:** Infrastructure contributes significantly to global greenhouse gas emissions. Addressing this requires whole-life carbon assessments, retrofitting existing assets, and integrating innovation in technology, business models, policy, and market design. In some cases, the most sustainable solution may be not to build at all.
2. **Delivering the Sustainable Development Goals (SDGs):** Infrastructure has direct or indirect links to most of the SDGs. Embedding sustainability into early-stage planning and recognising system interconnections is essential for accelerating progress.
3. **Delivering social value and serving communities:** Infrastructure can reduce inequality and promote well-being, yet social value is often underemphasised. Maximising it requires early attention to local needs, inclusive planning, and partnerships with communities.
4. **Living within resources and planetary boundaries:** The construction sector is a major consumer of finite natural resources. Staying within ecological limits involves adopting circular economy principles to eliminate waste, retain materials in use, and regenerate natural systems.
5. **Maintaining natural capital and achieving biodiversity net gain:** Biodiversity loss is a critical concern. Infrastructure should contribute to biodiversity net gain through green infrastructure, ecological connectivity, and application of the mitigation hierarchy (avoid, minimise, compensate).
6. **Managing ageing assets:** Many infrastructure systems are approaching the end of their design life, risking service failure and escalating maintenance costs. Investment in refurbishment and adaptive reuse is vital for long-term sustainability.
7. **Delivering services in growing future cities:** Rapid urbanisation, particularly in informal settlements, leads to inadequate service delivery. Sustainable cities require compact, efficient, and adaptive infrastructure designed in collaboration with local communities.

This overview shows that sustainability in LTIPs is broad and multidimensional, encompassing environmental performance, social equity, economic viability, and systemic interdependencies. While these

critical challenges are relevant to all infrastructure projects, their expression differs from case to case, depending on broader transitions in climate policy, urbanisation, governance, and resource use. As a result, the meaning and application of sustainability considerations vary across projects, making it difficult to evaluate in a uniform way.

2.2.3. Sustainable Project Management and Project Success

Traditional project management has long emphasised the “iron triangle” of time, cost, and scope, yet the literature increasingly recognises project success as a multi-dimensional construct (de Wit, 1988; Shenhar et al., 2001). Particularly in public infrastructure, success is no longer measured solely by technical delivery, but also by a project’s contribution to long-term societal and environmental value. For example, long-term value can be assessed through a project’s total cost of ownership, which includes not only initial investment and construction costs, but also long-term operation, maintenance, and decommissioning expenses. In addition, it considers broader societal impacts such as public health, accessibility, and environmental quality. A transport project that reduces air pollution, for instance, may entail higher upfront costs but generates long-term benefits in the form of lower healthcare expenditure, improved liveability, and increased economic productivity.

Sustainable Project Management (SPM) builds on this perspective by extending beyond the boundaries of conventional approaches (Silvius & Schipper, 2014). It incorporates economic, social, and environmental considerations across the full project life cycle—from initiation and planning to operation and decommissioning. SPM emphasises fairness, transparency, and inclusivity in decision-making and stakeholder engagement (Armenia et al., 2019), and actively engages with external societal and ecological systems rather than focusing only on internal project constraints.

Research shows that embedding sustainability principles throughout the project life cycle can enhance stakeholder satisfaction, operational flexibility, and public legitimacy (Martens & Carvalho, 2016). Projects that proactively address environmental and social concerns are better aligned with public expectations, regulatory developments, and long-term resilience strategies (Shenhar et al., 2001; Silvius & Schipper, 2016). As such, sustainability is increasingly regarded not as a constraint, but as a critical driver of project value and success.

2.2.4. Sustainability as a Normative Concept

In their work on sustainable development and mega-infrastructure, Sturup and Low (2019) argue that while the growing emphasis on quantification of different aspects of sustainability is valuable, sustainability cannot be reduced to a purely technical goal or a set of indicators. At its core, sustainability is a normative concept, involving value judgements. It raises fundamental questions such as: What should be sustained? Why should it be sustained? And how should it be sustained? These questions have no universal answers, as they reflect societal priorities, ethical positions, and political worldviews.

Because of this, sustainability is often described as a contested concept (Dobson, 1998). What one group views as “sustainable” may be seen by others as insufficient or even harmful. According to Sturup and Low (2019), these differences go beyond semantics and stem from deeper tensions between competing perspectives, such as anthropocentric (human-centred) versus ecocentric (nature-centred) views, or short-term versus long-term priorities. In infrastructure planning, this contestation is especially evident: projects may be labelled “sustainable” while primarily reflecting the goals of dominant institutions, thereby overlooking alternative perspectives.

Institutionalising sustainability can help track progress, but it also risks narrowing the concept to a checklist or approval procedure. In such cases, sustainability may lose its deeper meaning and become more about compliance than transformative change. A key insight from Sturup and Low’s analysis is that sustainability should be recognised as a normative and evolving idea. This calls for critical reflection on how it is framed in infrastructure projects, whose interests are prioritised, and which trade-offs are deemed acceptable.

2.3. Stakeholder considerations on sustainability in LTIPs

Because sustainability is a normative concept shaped by the worldviews, priorities, and values of those involved it is essential to examine who the relevant stakeholders are, how they define and interpret

sustainability, and in what ways their interactions influence project outcomes. This section looks into these dynamics to explain why sustainability is framed differently across projects and why its integration often reflects negotiation and contestation rather than consensus. This section is organised as follows. Section 2.3.1 introduces the main categories of stakeholders in LTIPs. Section 2.3.3 examines how different groups interpret sustainability and the tensions this creates. It also discusses the strategies stakeholders employ to influence project decisions and sustainability integration.

2.3.1. Project Stakeholders

The complexity of LTIPs makes effective stakeholder engagement (SE) a critical success factor—particularly in the early stages of the project life cycle. As Erkul et al. (Erkul et al., 2016) emphasise, SE is not merely a communication process but a governance mechanism through which legitimacy, trust, and shared ownership can be built around complex infrastructure initiatives.

In the front-end phase, SE serves several purposes: it enables early identification of interests, concerns, and expectations; it looks for mutual understanding between project initiators and affected parties; and supports the co-creation of socially robust solutions. This is especially vital in public infrastructure projects, where democratic accountability and political visibility are high. Early engagement can help mitigate conflict, improve transparency, and strengthen decision quality (Erkul et al., 2016).

A key challenge, however, lies in the asymmetry of power and information between stakeholder groups. Strategic-level actors, such as sponsors or government departments, may dominate decision-making, while local communities and civil society organisations often lack access to timely and relevant information. Without deliberate engagement strategies, these imbalances can lead to resistance, reputational damage, or costly delays (Mathur et al., 2008).

To see what the most important stakeholders in LTIPs are, the PSO again provides a solid framework to categorise them (Denicol et al., 2021). Within the PSO framework, the most central groups are the **owners and sponsors**, typically public commissioning authorities (national or regional governments) that set strategic objectives, allocate budgets, and ensure alignment with wider policy goals. The **client organisation**, often a temporary project delivery body, translates these ambitions into project definitions and coordinates decision-making. **Partners**, such as advisors or consultancy firms, provide specific (technical and) advisory expertise to shape feasibility studies, designs, and evaluation frameworks. **Suppliers**, including engineering firms, contractors and their supply chains, contribute delivery capacity and become more prominent as the project moves towards implementation. In addition, a wide range of **external stakeholders**, such as residents, NGOs, scientific institutes, regulators, and local businesses, may not hold formal authority but influence project legitimacy, permitting, and public support, often bringing forward new sustainability and equity considerations.

2.3.2. Roles and responsibilities through RAM

Given the diversity of stakeholder groups in LTIPs and the layered nature of their involvement across the project life cycle, it becomes essential to clearly define how responsibilities are distributed. Stakeholder groups often interact across institutional boundaries and project phases, resulting in overlapping mandates and blurred lines of accountability (Bourne, 2015). Without a structured approach to assigning roles, misunderstandings can arise regarding who is expected to act, decide, or be consulted on sustainability-related issues. To support transparent and effective collaboration in such complex governance settings, tools from project management theory can be valuable.

One such tool is the Responsibility Assignment Matrix (RAM). This is a method that originated in systems engineering and project control practices in the 1970s, and was further formalised through standards like the Project Management Body of Knowledge (PMBOK) and PRINCE2 (AXELOS Limited, 2017; Project Management Institute, 2017). The RAM is designed to systematically map project activities or deliverables against stakeholder roles, thereby clarifying who is responsible for what. It acts as a governance device that reduces ambiguity, distributes accountability, and supports coordination between actors with different mandates (Turner, 2007). Beyond project delivery, RAMs are also used in data governance frameworks. For instance, the Dutch GEMMA model applies a RACI matrix to define responsibilities for data stewardship, quality, and compliance across municipal roles, illustrating the broader value of RAMs in complex multi-actor settings (Vereniging van Nederlandse Gemeenten (VNG), 2019).

A widely adopted implementation of the RAM is the RACI model, which distinguishes four types of involvement:

- Responsible (R): The actor(s) who carry out the task or activity — they are directly involved in execution and implementation.
- Accountable (A): The actor ultimately answerable for the correct and complete outcome of the task — usually the one who approves or signs off.
- Consulted (C): Stakeholders whose input is sought prior to decision-making — often subject-matter experts or affected parties.
- Informed (I): Stakeholders who need to be kept updated on progress or results but are not directly involved in execution or decision-making.

By classifying roles this way, the RACI model provides a clear picture of involvement, control, and communication structures across complex projects (Morris & Pinto, 2006). It helps identify potential gaps (e.g., a task with no accountable party), overlaps (e.g., multiple actors attempting to control a task), and communication bottlenecks (e.g., uninformed stakeholders). As such, the RAM does not only structure work allocation, but also promotes clarity in governance and inter-organizational relationships. This is particularly relevant in sustainability governance, where roles are often fluid or contested.

The use of a Responsibility Assignment Matrix (RAM), particularly in the form of a RACI model, provides a practical structure to clarify roles and responsibilities within complex project environments. It can help reduce ambiguity, improve coordination, and enhance mutual understanding among stakeholders by making explicit who is responsible, who is accountable, and who needs to be consulted or informed (AXELOS Limited, 2017). This clarity supports more effective communication and decision-making, especially in settings where diverse actors operate across organizational and temporal boundaries.

At the same time, the RAM offers only a simplified representation of reality. In layered governance contexts such as LTIPs, actors may hold multiple roles or shift responsibilities over time, making static role assignments less precise. Moreover, while a RAM shows who is involved at different levels, it does not capture how tasks are negotiated, contested, or adapted in practice. Its effectiveness depends on a shared understanding among stakeholders and regular updating as projects evolve.

2.3.3. Stakeholders views on Sustainability in LTIPs

Stakeholders can put different emphasis on sustainability considerations in LTIPs, this is shaped by their institutional roles, values, interests, and anticipated benefits. These attitudes can potentially influence how sustainability is interpreted and operationalised in projects.

One example where research shows that stakeholders have different perspectives on sustainability is from Gijzel et al. (2019). In their study on sustainable tunnel development, they identify four distinct perspectives on sustainability: the energy perspective (focused on efficiency and measurable energy performance), the resilience perspective (functional flexibility and life-cycle value), the social perspective (local engagement, liveability, and health), and the transition perspective (systemic change and circular economy). Each perspective highlights different priorities which can lead to tensions or conflicts within projects. This diversity has significant implications. There is little consensus on which sustainability aspects are most important, making interpretations highly subjective and dependent on individuals. At the same time, recognising these perspectives provides project teams with tools to address differences more consciously, develop targeted management strategies, and integrate sustainability in a more systematic way. The authors therefore argue for a dual approach: general criteria to ensure consistency with national and international climate goals, combined with project-specific criteria tailored to the context and stakeholders involved.

Similarly, Machiels et al. (2023) used Q-methodology to examine how stakeholders perceive uncertainty in the A102 infrastructure project in Flanders. They show that what one group interprets as a risk, another may view as an opportunity. A concrete example is the uncertainty over the environmental impact of the A102 on its immediate spatial, human, and ecological environment. For one of the specified groups (concerned with potential project redundancy due to modal split), this uncertainty was ranked as very important. They saw long-term environmental impacts as a significant risk, directly linked to fears that expensive mitigation measures might drain resources from liveability projects, thereby threatening

both environmental outcomes and social acceptance. In contrast, another group (focused on societal and political support) ranked the same uncertainty as relatively unimportant. For them, environmental impacts during construction were considered calculable, containable, and technically manageable. Rather than a major risk, these impacts were perceived as routine challenges that should not obstruct project approval. These diverging perceptions critically shape how sustainability challenges are prioritised. Environmental concerns such as emissions during construction, or societal aspects like local liveability emerged as central themes across stakeholder groups. Although Machiels et al. do not explicitly frame their research in terms of sustainability, their findings highlight that many of the uncertainties are directly linked to environmental, social, and mobility-related dimensions of projects.

Gil (2023) also addresses the stakeholder aspect of LTIPs and applies New Stakeholder Theory (NST) in LTIPs to show how perceptions influence value creation. NST emphasises that organisations must go beyond compliance and co-create value with stakeholders. Perceptions are central because they shape whether stakeholders experience value distribution as fair; if not, they may resist or withdraw support. Importantly, NST also states that ideological opponents of the project, such as activists or affected communities, must still be engaged, as their views strongly affect both project legitimacy and long-term outcomes. NST also links directly to sustainability by encouraging organisations to create value in a wider sense, beyond narrow financial performance. This involves generating outcomes that are socially meaningful and that address today's "grand challenges," including climate change, biodiversity loss, social inequality, and political polarisation. NST also describes a paradox in project approval: when "value for money" is measured only in financial terms, the wider social and environmental benefits of a project are often ignored. As a result, managers have little incentive to factor in environmental costs or to involve stakeholders seriously before approval. NST argues that this requires a change in mindset: stakeholder engagement should not be seen only as "good business," but as a core responsibility that is directly connected to the purpose of the project and essential to deliver on sustainability considerations.

Yet, Eskerod and Huemann (2013) state that many standards in project management remain rooted in a "management-OF-stakeholders" approach. This means stakeholders are primarily viewed as providers of resources and are managed according to their potential to help or harm the project. For example, actors with high political influence or financial leverage tend to receive more attention than community groups with less direct power. They argue that a "management-FOR-stakeholders" approach is more fitting. This approach assumes that all stakeholders have legitimate interests and deserve attention, regardless of their influence. Here, concerns from local residents or environmental NGOs are not treated as peripheral, but as valuable inputs that can help define project goals and success criteria. Moving towards this perspective requires recognising diverse views on sustainability and allowing them to actively shape project definitions, trade-offs, and long-term outcomes.

Vittori et al. (2023) highlight how organisational culture, maturity, and external pressures shape the way sustainability requirements are perceived and implemented. Their research shows that, although sustainability is increasingly expected by communities, regulators, and investors, internal actors may still regard it primarily as a cost or risk unless a clear alignment with organisational values is established. Perceptions of additional costs, knowledge gaps, and short-term priorities remain persistent barriers, underscoring the importance of continuous engagement and strategic alignment across the entire project life cycle.

Vuorinen and Martinsuo (2018) start from the premise that stakeholders hold different views on sustainability within a project. They examine how actors select influence strategies depending on their interpretation of sustainability and the type of project value they seek to safeguard. The authors distinguish three key value dimensions: *environmental and social value* (ecological and community impacts), *financial value* (costs, compensation, funding), and *systemic value* (integration within wider infrastructural or service systems). Based on three Finnish transport projects, they identify four main influence strategies: *communicating* through media and public debate, *complaining and dispute resolution* via legal or negotiation channels, *rule-setting and supervision* by regulators, and *exercising decision-making authority* by institutional actors. Each strategy is closely tied to the value at stake: for instance, environmental concerns are often pursued through communication and regulation, whereas financial issues tend to trigger formal disputes or political intervention. The study highlights that influence strategies depend on stakeholder goals, resources, and positions. Especially in sustainable infrastructure projects, recognising diverse value orientations in early phases of the project can strengthen governance and

help embed sustainability more effectively.

Taken together, these studies demonstrate that sustainability in LTIPs is not a neutral or uniform concept but one that is shaped through diverse perspectives, value orientations, and institutional arrangements. Stakeholders differ in how they prioritise sustainability, in the influence strategies they deploy, and in the ways they perceive risks and opportunities. Organisational culture and external pressures further condition whether sustainability is embraced as a source of value or resisted as a cost. This diversity highlights both the challenge and the necessity of consciously structuring sustainability during the exploration phase. Rather than leaving sustainability ambitions vulnerable to erosion through fragmented interpretations or conflicting priorities, projects must establish clear processes for dialogue, alignment, and negotiation.

2.4. Influential factors on Integration of Sustainability

This section turns to the practical considerations in project management that shape how sustainability is integrated in LTIPs. Beyond differing viewpoints, a range of organisational, procedural, and contextual factors strongly affect whether sustainability ambitions can be successfully embedded. The following subsections examine these influential factors, highlighting both the barriers that undermine integration and the success factors that enable sustainability integration.

2.4.1. Barriers to the preservation of Sustainability ambitions

In their recent theses, Veen (2023) and Malyszka (2024) discuss a range of theoretical barriers that hinder the integration of sustainability in large infrastructure projects. These barriers highlight the organisational, financial, political, and cultural challenges that can cause sustainability ambitions to erode over the course of project development. The following overview summarises their key findings, structured around the main categories of barriers identified in the literature. Table 2.1 shows the related literature.

- **Insufficient collaboration:** Insufficient collaboration and weak communication between stakeholders can erode sustainability ambitions. Limited involvement of relevant actors (e.g. environmental experts, academia, or local communities) reduces opportunities to integrate sustainability perspectives early in the project. Poor information sharing and inadequate documentation between phases further undermine progress.
- **Financial constraints:** Financial constraints and short-term cost considerations are among the most frequently identified barriers. Sustainability can be perceived as expensive, with unclear returns on investment or long pay-back times. This leads to prioritisation of immediate budget and time constraints over long-term value, especially under tight public budgets or in competitive tendering contexts.
- **Knowledge and awareness gaps:** A lack of sustainability knowledge and awareness is a major obstacle. Many stakeholders are unfamiliar with relevant tools, methods, and standards, or lack specialised expertise. Rapidly changing policies and technologies make it difficult to stay up to date. Misunderstandings about the benefits of sustainable practices and limited educational resources reinforce this barrier.
- **Market limitations:** The construction market often lacks sufficient demand and supply for sustainable products and skilled labour. Limited availability of innovative, affordable materials and a shortage of specialised workforce hinder adoption. Market inertia towards conventional practices reduces incentives for suppliers to invest in sustainable alternatives.
- **Organisational and managerial barriers** Weak organisational support, limited leadership commitment, and fragmented governance can block sustainability integration. When sustainability is not embedded in core values, vision, and managerial systems, efforts remain superficial. Resistance within hierarchies and misalignment between organisational levels further obstruct progress.
- **Political and regulatory barriers:** Political and regulatory contexts strongly shape project ambitions. Inconsistent or weak legislation, shifting policy priorities, bureaucratic hurdles, and lobbying interests all undermine long-term sustainability goals. Short electoral cycles incentivise short-term results, while weak enforcement further erodes trust and ambition.

- **Socio-cultural:** Societal norms, values, and resistance to change can limit sustainability uptake. Stakeholders often prioritise cost and efficiency over environmental or social goals. Cultural inertia within organisations and industries discourages experimentation and long-term thinking. Sustainability ambitions may therefore lose priority when they conflict with prevailing economic or institutional logics.
- **Process-related obstacles:** A lack of clear standards and measurement methods makes it difficult to translate strategic ambitions into operational actions. The gap between high-level sustainability goals and practical implementation leads to ambition erosion during project delivery. Unclear indicators and fragmented processes hinder systematic evaluation and learning.

In summary, the literature shows that barriers to sustainability integration in infrastructure projects arise from a wide range of organisational, financial, political, and cultural challenges. These barriers explain why sustainability ambitions often erode over the course of project development. However, when they are recognised early and managed proactively, many of these obstacles can be turned into opportunities. For example by strengthening collaboration, investing in knowledge and capacity, or embedding long-term financial perspectives. Awareness of these barriers is therefore essential.

Table 2.1: Overview of barriers to the preservation of sustainable ambitions and related literature

Barrier	Key References
Insufficient collaboration	Aarseth et al., 2017; Varnäs et al., 2009; Elkhailifa, 2016; Ojo et al., 2014
Financial constraints	Sourani and Sohail, 2011; Fathalizadeh et al., 2021; Blair and Wright, 2012; Royal Institution of Chartered Surveyors (RICS), 2011; Chileshe et al., 2018; Du Plessis, 2007; Borg et al., 2020; Tokbolat et al., 2020; Ametepey et al., 2015
Knowledge and awareness gaps	Conte, 2018; Hakiminejad et al., 2015; Zhao et al., 2020; Borg et al., 2020; Sourani and Sohail, 2011; Silvius and Schipper, 2016; Banihashemi et al., 2017; Ametepey et al., 2015; Häkkinen and Belloni, 2011
Market limitations	Ojo et al., 2014; Ametepey et al., 2015
Organisational and managerial barriers	Häkkinen and Belloni, 2011; Zhao et al., 2020; Fathalizadeh et al., 2021; Borg et al., 2020; Sourani and Sohail, 2011; Aarseth et al., 2017; Silvius and Schipper, 2016; Ahsan et al., 2013; Pham et al., 2020; L. Y. Shen et al., 2010; Osaily, 2010; Banihashemi et al., 2017; Krueger and Gibbs, 2007; Kiani Mavi et al., 2021; While et al., 2004; Grin et al., 2010; Koistinen et al., 2022; Sharma and Henriques, 2004
Political barriers	Banihashemi et al., 2017; Sourani and Sohail, 2011; Jiang et al., 2021; Wong et al., 2016; Ghansah et al., 2021; Ogunsanya et al., 2022; L. Shen et al., 2017
Socio-cultural obstacles	Ametepey et al., 2015; Sourani and Sohail, 2011
Process related obstacles	Loewe and Rippin, 2015; Weitkamp, 2015

2.4.2. Success factors for sustainability integration

The literature also discusses guidance on how to structure projects for successful sustainability integration. Many of these recommendations mirror the barriers outlined in the previous section: where clarity, resources, and collaboration are lacking, ambitions tend to erode; where they are present and actively managed, they act as success factors. For this section, results from two representative studies from Molaei et al. 2021 and Thounaojam et al. 2022 are integrated. Together, they point to several factors that describe the organisational and institutional conditions under which sustainability ambitions are most effectively translated into project outcomes. Table 2.2 presents an overview of the most important factors.

- **Clear goals, policy & regulation** provide direction and compliance: clearly defined sustainability scope and ambitions, internal policies, supportive regulation, targeted incentives/sanctions, and explicit contract clauses make sustainability operational rather than aspirational.
- **Organisational capacity & processes** turn intent into practice: effective information sharing across phases, monitoring and feedback loops, sustainability-oriented risk management, realistic planning, procurement/contracting that supports sustainability, adequate resources, and the use of standards/certifications (e.g., ISO 14001, LEED).
- **Stakeholder involvement & collaboration** build legitimacy and learning: regular client involvement, broad stakeholder engagement, open cooperation among project parties, support from consultants/professional bodies, safeguards from multilateral agencies, and learning-by-mimicking from peer projects.
- **Team & culture** sustain momentum: competent multidisciplinary teams, visible top-management commitment, personal affinity with sustainability, targeted training and vocational programmes, organisational competence, and explicit commitments that normalise sustainability as a core project value.

Table 2.2: Combined overview of sustainability success factors and institutional drivers for infrastructure projects, adapted from Molaei et al. (2021) and Thounaojam et al. (2022).

Category	Generic Success Factors / Drivers
Clear goals, policy and regulation	- Clearly defined sustainability scope, goals, and ambitions - Formal sustainability policy guiding practices - Environmental and social legislation and regulatory mechanisms - Government incentives and penalties to support sustainability - Inclusion of sustainability clauses in contracts
Organisational capacity and processes	- Effective information sharing across teams and phases - Monitoring, control, and feedback mechanisms for sustainability - Risk management targeted at sustainability issues - Systematic and realistic project planning - Contracting and procurement strategies that support sustainability - Availability of adequate and efficient resources - Standards, certifications, and performance monitoring tools (e.g. ISO 14001, LEED)
Stakeholder involvement and collaboration	- Active collaboration between project parties - Regular client involvement in sustainability-related decisions - Broad stakeholder engagement to improve legitimacy and support - Influence of consultants and professional bodies promoting green practices - Involvement of international/multilateral agencies with sustainability safeguards - Learning from peer projects and mimicking successful practices
Team and culture	- Competent, multidisciplinary project teams - Top management commitment and leadership support - Personal affinity and motivation for sustainability within the team - Training and vocational programmes on sustainability practices - Organisational knowledge and competence regarding sustainability - Explicit goals and commitments to sustainability within the organisation

2.4.3. Summarizing Influential Factors

As indicated in the previous section, many of the barriers and drivers identified in the literature correspond with each other. Each factor can contribute either positively or negatively to the success of a project, depending on how it is managed and in which context it appears. To capture this duality, this study merges the barrier and drivers into a framework of **influential factors**. This is a more neutral approach, which highlights that every factor can act both as an obstacle and as an enabler for the successful integration of sustainability in infrastructure projects.

To further structure these factors, they are grouped according to the three management layers intro-

duced earlier in the literature review:

- **Strategic level:** concerned with long-term direction, political context, policy frameworks, and the definition of high-level sustainability ambitions.
- **Tactical level:** focused on translating strategic ambitions into concrete project structures, such as contracting strategies, stakeholder engagement, and knowledge processes.
- **Operational level:** dealing with day-to-day project delivery, including the competences of project teams, the use of tools and methods, and resource allocation.

This layered perspective clarifies where in the project system each factor primarily exerts influence, and provides a more integrated understanding of how sustainability ambitions evolve throughout the project lifecycle. An overview of the influential factors selected as theoretical framework can be found in Table 2.3

Table 2.3: Influential factors for sustainability integration, structured by management layer

Layer	Cluster	Factor
Strategic	Political	- High-level sustainability policies and ambitions - Political tendencies
	Rules and regulations	- Rules and regulations
Tactical	Leadership and vision	- Client commitment - Vision and goals
	Stakeholder dynamics	- Broad stakeholder involvement - External professional and institutional knowledge - Collaboration
	Knowledge and awareness	- Information sharing - Knowledge transfer
	Cultural values	- Socio-cultural factors - Personal affinity
Operational	Contextual factors	- Financial
	Project governance	- Sustainability in contractual frameworks - Clear scope and goals - Monitoring and control - Tools and methods
	Team	- Competent and multidisciplinary teams - Learning from peer projects

2.5. Conclusion

This literature review has outlined the key theoretical foundations for analysing the integration of sustainability in Large Transport Infrastructure Projects (LTIPs).

First, the LTIPs were defined and their inherent complexities were discussed. The structural complexity of LTIPs could be effectively understood through the Project System Organisation (PSO) framework. This framework provides a detailed categorisation of the different actors involved, their organisational layers, and their respective responsibilities across the project lifecycle. It helps to identify the relevant stakeholders and their roles in specific phases. The PESTOL framework complements this structure by mapping governance functions onto the progression of the project. This project life cycle lens shows that the dominant governance level in the front-end phase is the tactical level. By combining PSO and PESTOL, the key stakeholders who play a leading role at that level and point in time can be identified. The emphasis of sustainability analysis in MIRT exploration projects should therefore lie on

tactical planning. This level serves as a bridge between strategic intentions and the operational delivery phases that follow, making it particularly crucial for shaping long-term project outcomes.

Second, sustainability within LTIPs is a broad and multi-dimensional concept. Often, it is framed through the lens of the Triple Bottom Line (TBL) across environmental, social, and economic dimensions. A sustainable LTIP should at least address the key practical challenges identified in Section 2.2.2. Moreover, sustainability is increasingly considered a component of overall project success and has driven a shift toward Sustainable Project Management (SPM). A central insight for this research is that sustainability should be seen as a normative concept: its definition does not only stem from objective criteria but arises from the interpretations, values, and priorities of the stakeholders involved. These perspectives shape where sustainability efforts are focused and how they are communicated and implemented. Sustainability cannot therefore be reduced to a fixed checklist; it must be viewed as a negotiated and evolving goal.

Third, stakeholders are central to both the challenges and the opportunities of sustainability integration. Stakeholder engagement in LTIPs is an important part of the governance process that influences legitimacy, trust, and shared ownership. Stakeholders differ in how they define and interpret sustainability, depending on their institutional roles, interests, and values. They use a variety of influence strategies to shape project outcomes, ranging from communication and legal procedures to regulatory oversight and direct decision-making. Recognising this diversity is essential, as stakeholder perspectives ultimately determine which aspects of sustainability are prioritised and realised in practice.

Finally, the literature identifies a wide range of barriers and drivers for sustainability integration. In this study, these are reframed as **influential factors**, acknowledging that the same condition can act as either an enabler or a constraint depending on context and management. These factors are summarised in Table 2.3, structured along strategic, tactical, and operational levels. The table provides the theoretical basis for the empirical analysis in this research, serving as a reference for assessing how sustainability ambitions evolve and are translated into project practices. Together, these insights provide the foundation for the analytical framework used in the empirical chapters. They underscore the importance of governance structures, stakeholder dynamics, and institutional context in shaping sustainability outcomes in complex infrastructure environments.

3

Methodology, context, and cases

This chapter sets out the methodology of the research. The starting point is the case study approach, which provides an in-depth perspective on how sustainability is embedded in large transport infrastructure projects. The rationale for selecting the cases is explained, as well as the considerations that guided the research design.

Since both cases are embedded in the MIRT, the next section outlines the institutional and procedural context of this programme. Introducing the MIRT is essential for understanding the framework in which decisions are made and sustainability considerations are integrated.

After this, the two case studies are described in more detail. Each case is introduced with its background, objectives, governance structure, and the specific relevance for the research. These introductions provide the foundation for the empirical analysis.

Finally, the chapter explains the methods of data collection and analysis. This includes the review of relevant documents and policy papers, as well as the series of semi-structured interviews with key stakeholders. The section also clarifies how the data were coded and analysed in order to identify patterns, drivers, and barriers in the integration of sustainability.

3.1. Methodology: multiple case study

This section introduces the overall research design. It explains why a qualitative, multiple case study approach was chosen and how this design supports the aim of exploring stakeholder dynamics and the integration of sustainability in infrastructure projects.

3.1.1. Qualitative research

Given the complex, multi-actor context of infrastructure projects a qualitative research strategy was selected. This study employs a frequently used type of research in the field of qualitative methodology: a multiple case study (Starman, 2012). Qualitative research allows for in-depth analysis and offers flexibility during data collection, which is valuable when new insights emerge during conversations (USC, 2016; Verschuren & Doorewaard, 2010). Most data were obtained through semi-structured interviews with key project actors. In contrast, a quantitative approach was deemed unsuitable, as the cases are highly context-sensitive and the limited sample size would restrict statistical reliability (Neuman, 2014).

This research is explicitly practice-oriented. The observed problem, the challenge of integrating sustainability considerations during the front-end phases of infrastructure projects, is not purely theoretical but emerges directly from daily project practice. This aligns with the definition of practice-oriented research, where knowledge is used to intervene in and improve real-life situations (Verschuren & Doorewaard, 2010).

To ensure reliability and validity, several measures were taken: triangulation of data sources (e.g., interviews and documents), validation of interpretations, and reflective analysis to avoid bias during

interviews. Nonetheless, the qualitative method comes with limitations, including the challenge of generalisation, dependency on researcher skill, and the time-intensive nature of data collection and analysis.

3.1.2. Case Study Design

This research applies an exploratory, holistic multiple-case study design, following the principles outlined by Yin (2014). The aim is to explore sustainability considerations are integrated in the early phases of public transport infrastructure projects developed under the MIRT framework. Each case is treated holistically, which means that the project as a whole is studied in its full governance and planning context.

The overall approach toward the case studies is exploratory. This means that the research does not start from fixed hypotheses, but rather aims to gain a deeper understanding of a relatively underexplored phenomenon by identifying patterns, mechanisms, and perspectives as they emerge. Such an approach is particularly suitable when practices are still evolving and when flexibility is needed to capture the variety of stakeholder views and project dynamics (Yin, 2014; Stebbins, 2001).

A multiple-case study design was selected for its methodological advantages. It reduces observer bias by allowing recurring patterns to be verified across settings, enables comparison between cases to better understand variation, and provides a stronger basis for theory-building as mechanisms can be abstracted beyond single-case idiosyncrasies (Yin, 2014). However, multiple-case designs are time-intensive, requiring significant effort in data collection and analysis across different contexts. The exploratory nature implies that not all variables or mechanisms can be fully observed or understood, and outcomes may remain context-specific and difficult to generalise. Furthermore, the depth of analysis per case is sometimes constrained by the need to cover more than one setting.

Two MIRT exploration projects were selected based on their relevance to the research topic, the availability of stakeholders for interviews, and variation in regional context and governance structure. The selected cases serve as real-life examples to assess how sustainability ambitions are shaped, negotiated, and transformed during the exploration phase.

3.2. Research Context: The MIRT

This section introduces the institutional context of this research: the **Meerjarenprogramma Infrastructuur, Ruimte en Transport (MIRT)**, the Dutch *Multi-Year Program for Infrastructure, Spatial Planning and Transport*. The section first outlines the origin, purpose, and phased structure of the MIRT. It then zooms in on the exploration phase, which forms the focus of this study, and finally discusses the role of sustainability within the framework, based on the MIRT Sustainability Guideline *Handreiking Verduurzaming MIRT*. Appendix B provides additional background information and facts about the MIRT (partially in Dutch).

3.2.1. Origin and Purpose of the MIRT

The **MIRT** is the central planning and investment framework through which the Dutch national government collaborates with regional authorities on major infrastructure and spatial projects. It encompasses all national infrastructure programmes and projects aimed at addressing accessibility, water management, and spatial-economic development in the Netherlands (Ministerie van Infrastructuur en Waterstaat, 2021). Projects fall under one of four modalities: roads, rail and public transport, water, and waterways. The program is further organised within five geographical areas. A key criterion for inclusion as a MIRT project is funding: projects are (partly) financed through the national **Mobility Fund (Mobiliteitsfonds)** and the **Delta Fund (Deltafonds)**.

The current structure of the MIRT is the result of institutional learning and reform. In the early 2000s, a parliamentary inquiry into large projects such as the Betuweroute and HSL-Zuid revealed systemic shortcomings in Dutch infrastructure planning and called for stronger oversight. The most influential reform was introduced by the Elverding Committee in its 2008 report *Sneller & Beter* ("Faster and Better") (Elverding, 2008). Building on the earlier MIT (*Meerjarenprogramma Infrastructuur en Transport*; or *Multiple Year Program Infrastructure and Transport*), the Committee recommended earlier stakeholder involvement, an improved governance culture, and a phased decision-making model. These

reforms resulted in the current four-phase structure of the MIRT: Preparation, Exploration, Planning and Study, and Construction. The addition of “Ruimte” (spatial planning) to the title of the program reflected the recognition that infrastructure planning is intrinsically linked to land use and development.

Since then, the MIRT Rulebook (*spelregelkader*) has formalised the principles and procedures for MIRT projects. Over time, the programme has developed into an instrument of collaborative and adaptive governance, particularly relevant in the Dutch context of dense urbanisation and limited space. Figure 3.1 shows an overview of the MIRT process. The exploration phase is highlighted in yellow and begins with the Starting Decision (*Startbeslissing*) and concludes with the Preference Decision (*Voorkeursbeslissing*).

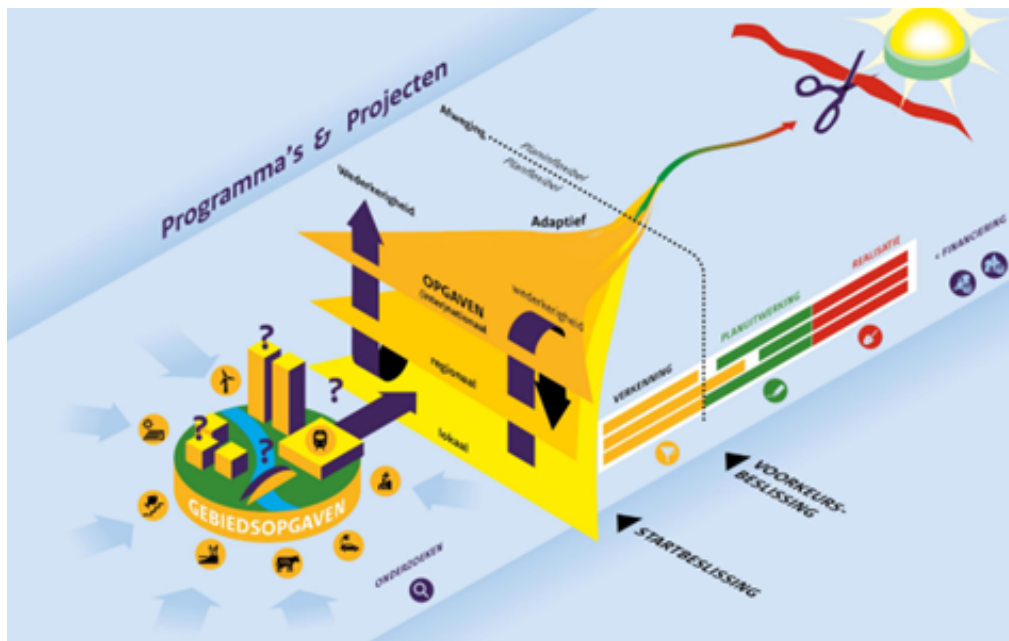


Figure 3.1: Overview of the MIRT process (Ministerie van I&W, n.d.)

Despite its structured and technocratic appearance, the MIRT is inherently political. It concerns large-scale public investments, often worth billions of euros, and therefore depends strongly on political priorities, coalition agreements, and budgetary constraints. While the phased structure and accompanying guidelines provide consistency and transparency, final decisions are shaped by political negotiation and strategic alignment between levels of government.

Two important governance moments illustrate this dynamic: the **BO MIRT** (*Administrative Consultation on MIRT*) and the **BO Leefomgeving** (*Administrative Consultation on the Living Environment*). These high-level meetings bring together ministers, state secretaries, provincial executives, and municipal representatives to assess project progress, set priorities, and decide on funding commitments. The BO MIRT focuses primarily on infrastructure and mobility, whereas the BO Leefomgeving includes broader spatial and environmental issues. These meetings form crucial junctures where long-term ambitions are translated into concrete budgetary and programmatic choices.

Finally, MIRT projects are embedded within the broader Dutch legal framework. The **2024 Environment and Planning Act (*Omgevingswet*)**, which integrates 26 separate laws into a single framework, provides the legal basis for MIRT projects. This Act streamlines spatial, environmental, and infrastructural legislation, and shapes how national and regional governments collaborate in planning and executing large-scale infrastructure projects.

3.2.2. The Exploration Phase in the MIRT Process

The **Exploration Phase (*Verkenningfase*)** is a crucial stage within the MIRT process. It begins with a formal **Start Decision (*Startbeslissing*)** and concludes with the **Preference Decision (*Voorkeurs-***

beslissing), which determines whether and how a project proceeds to the plan elaboration phase. During this stage, strategic ambitions are translated into concrete project directions, giving the phase a defining role in shaping both the scope and the societal impact of the project.

Importance and Timing

The exploration phase is critical because it combines two key conditions: flexibility and increasing formalisation. When a project enters this phase, a substantial financial commitment has already been made (typically with 75% of the funding secured). Yet, the project's scope, design alternatives, and even its core assumptions remain relatively open to discussion. At the same time, the phase marks the start of structured analysis, formal stakeholder engagement, and decision-making under the MIRT guidelines. It is also the first stage in which public participation becomes formally embedded. Stakeholders such as citizens, companies, NGOs, and regional governments are actively involved, especially when directly affected. This ensures that the preferred solution is not only technically and economically feasible but also socially acceptable.

Process of a MIRT Exploration

Before a project enters the official MIRT exploration phase, it is typically preceded by the MIRT Preparation Phase (also known as the *MIRT Research Phase*). In this preliminary stage, national and regional authorities jointly analyse the underlying problem and determine whether an intervention is required. The research phase establishes that there is a substantiated societal or spatial challenge within a broader regional programme. Only once this need is confirmed, and potential directions for solutions have been identified, does the project formally advance to the exploration phase. At that point, a temporary project organisation is formed to prepare for the formal MIRT exploration procedures. This begins with drafting a formal **Start Document** (*Startdocument*), in which the problem is defined and the project objectives are formulated.

In some cases, an additional Tender Phase takes place before the start of the exploration. During this stage, a consultancy, design, or engineering firm (or a consortium) is contracted to carry out the exploration on behalf of the commissioning authorities. This occurs mainly in large or complex projects, particularly in multimodal or urban environments, where specialised analytical and design capacity is required. The contracted firm then supports the temporary client organisation and is responsible for coordinating the analytical and assessment work throughout the exploration.

However, this is not mandatory. Smaller or less complex explorations, especially in the water domain (the so-called “wet projects” or *natte projecten*), are often executed internally by governmental implementation agencies. In such cases, Rijkswaterstaat (RWS) typically carries out the exploration itself, drawing on its in-house technical, policy, and environmental expertise. The choice between outsourcing and in-house execution depends primarily on the project's scale, complexity, and required specialisation.

After this, the formal MIRT Exploration begins. The phase is structured into four main steps (see Figure 3.2), each building on the previous:

1. **Start Exploration (*Start Verkenning*)**

Admission of the project to the Exploration phase. The decision defines the problem, objectives, and key stakeholders, and requires that at least 75% of the funding is secured for the most likely alternative.

2. **Analysis Phase (*Analysefase*)**

A wide range of potential solutions is explored and qualitatively assessed. During this phase, various solution spaces are developed and compared. The work includes defining the spatial and functional scope, evaluating societal goals, and identifying potential synergies with related domains such as housing, energy, mobility, and climate adaptation. The phase concludes with an assessment of the most promising solution directions.

3. **Assessment Phase (*Beoordelingsfase*)**

The most promising solution spaces are further developed into concrete alternatives. These alternatives are analysed and assessed in greater depth for their technical feasibility, indicative costs, and societal impacts. This includes mandatory studies on environmental impact and legal and financial feasibility studies.

4. Preference Decision (*Voorkeursbeslissing*)

The most suitable solution is formally selected based on its effectiveness, expected impacts, financing, and stakeholder support. A formal go/no-go decision is taken. The preferred alternative may include an adaptive package of short- and long-term measures.

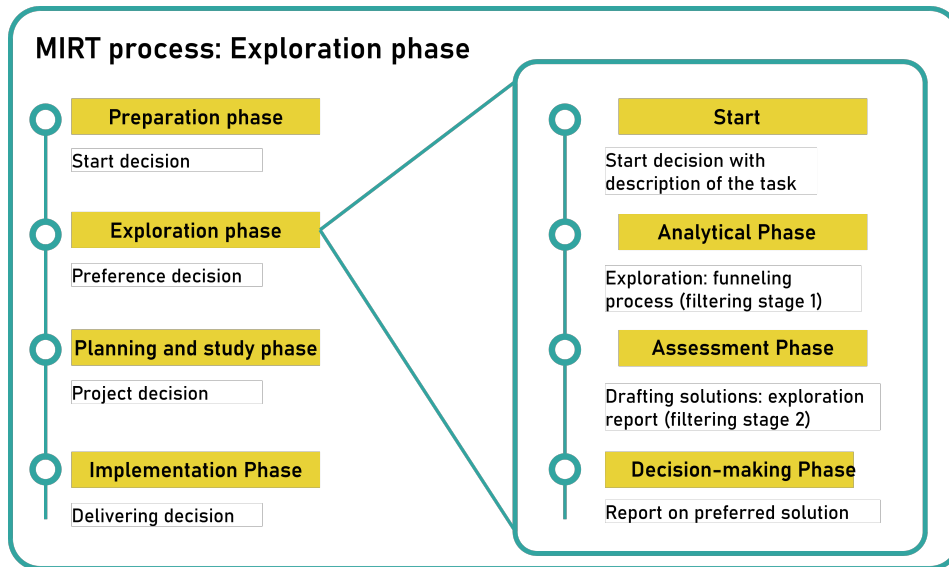


Figure 3.2: Overview of the MIRT exploration phase (adjusted from OVAH, 2024)

Following a positive decision during the BO-MIRT, the project proceeds to the Planning and Study phase (Plan- en Studiefase). In this stage, the preferred alternative is translated into a design that can be tendered and ultimately implemented.

Design Method and Decision-Making Model

The aim of the exploration phase is to arrive at a well-founded and feasible **Preference Decision (*Voorkeursbeslissing*)** (Ministerie van Infrastructuur en Waterstaat, 2021). This is based on a thorough problem analysis and a broad inventory of possible solutions. Within this phase, the process typically includes:

- examining the task broadly where needed and in a focused manner where possible,
- concretising objectives and refining the problem analysis, and
- transparently assessing the available alternatives.

The exploration phase follows a funnel-shaped design method, known in Dutch policy as the “**Funneling Process (*trechteringsproces*)**”. It starts broadly by identifying many potential solutions, including at least one non-infrastructure alternative. These are gradually assessed, refined, and narrowed down based on feasibility, effectiveness, environmental impact, and policy alignment. Over time, the number of alternatives decreases until a preferred option is selected (see Figure 3.3). This logic reflects the recommendations of the Elverding Committee: investing sufficient time and resources at the front end of the process enables faster and better decisions downstream. It encourages divergent thinking initially (broad exploration), followed by convergent thinking (focused selection) as more information becomes available.

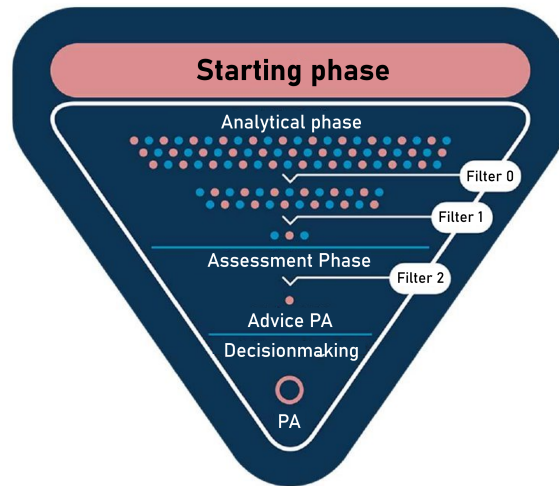


Figure 3.3: Funneling towards the Preferred Alternative (PA) (adjusted from OVSA, 2025)

During the Analysis Phase, different *solution spaces* are explored. These are not yet concrete alternatives but represent possible sets of measures that could address the identified problems. Each solution space is constructed by combining different *building blocks*, such as transport modality (e.g., tram, bus, metro), route alignment, and vertical positioning (elevated, surface-level, underground). This produces a wide range of possible configurations.

A longlist is first developed containing all possible combinations of these building blocks. This is then filtered into a shortlist of more promising solution spaces through a preliminary step known as **Filter 0 (Zeef 0)**. A smaller set of promising alternatives is subsequently elaborated in **Filter 1 (Zeef 1)**, guided by a structured assessment framework. The results are documented in the **Note on Promising Solutions (Notitie Kansrijke Oplossingen, NKO)**, which presents the most viable solution spaces.

In the subsequent Assessment Phase, the most promising solution directions are further developed into concrete alternatives. At this point, the analysis shifts from conceptual exploration to detailed assessment. The alternatives are analysed in greater depth for their technical feasibility, indicative costs, and expected societal impacts, using tools such as the **Social Cost–Benefit Analysis (Maatschappelijke Kosten-Batenanalyse, MKBA)** and the **Environmental Impact Assessment (Milieu Effecten Rapportage, MER)**, complemented by legal and financial feasibility studies.

A final filtering step, **Filter 2 (Zeef 2)**, identifies the Preferred Alternative (*Voorkeursalternatief*), which is then submitted to the Administrative Consultation on the MIRT (*Bestuurlijk Overleg MIRT, BO-MIRT*) for political decision-making. Each filtering stage applies a progressively refined assessment framework: while Filter 0 considers high-level feasibility and budget estimates, Filter 2 is based on the detailed outcomes of the MER and MKBA.

The **MIRT Rulebook (Spelregelkader MIRT)** provides the formal procedural framework for MIRT projects and has a legal basis within Dutch infrastructure and environmental legislation. It specifies the required information profiles and deliverables for each step of the exploration process. These information profiles are legally mandatory: every solution direction or alternative must be assessed according to the prescribed criteria, and the resulting information must be made available for decision-making and public disclosure. This ensures that all alternatives are transparently evaluated and that the underlying evidence base for the preference decision is both traceable and accessible.

Key outputs of the exploration phase include:

- **Start Document (Startdocument):** Defines the project's intent, rationale, and preliminary scope (prepared by the commissioning authority).
- **Scope and Detail Level Memorandum (Notitie Reikwijdte en Detailniveau, NRD):** Establishes the scope and level of detail for the MER, specifying which environmental aspects will be studied and how.

- **Note on Promising Solutions (*Notitie Kansrijke Oplossingen, NKO*):** Explains which alternatives are further developed and why others are discarded, marking the transition from analysis to assessment.
- **Participation Report (*Participatieverslag*):** Documents how stakeholders and the public have been involved, a mandatory element under the MIRT framework.
- **Exploration Report (*Verkenningenrapport*):** Contains the elaborated alternatives and all supporting documentation.

While the Rulebook specifies what must be delivered, many documents are format-free, allowing flexibility in structure and presentation depending on the project's complexity.

3.2.3. Sustainability in the MIRT Framework

With the introduction of the Environment and Planning Act (*Omgevingswet*), the rules and requirements within the MIRT process have been partially updated. In the most recent version of the information profile for the exploration phase, several sustainability-related elements are made explicit. These include:

- a description of sustainability ambitions and synergies (*meekoppelkansen*) to be achieved within the preferred alternative,
- a quantitative assessment of CO₂ emissions for each alternative, including the non-infrastructure scenario, and
- a description of how climate-resilient construction will be addressed.

These requirements ensure that sustainability is considered in the development and assessment of project alternatives. However, the format in which these aspects are presented remains open, leaving room for different interpretations and approaches. To support project teams, IenW and RWS developed a dedicated guideline: the **MIRT Sustainability Guideline (*Handreiking Verduurzaming MIRT*)** (Ministerie van Infrastructuur en Waterstaat, 2020). This document does not have any legal status but describes how practitioners can approach sustainability in MIRT projects.

The Guideline provides a framework to structurally embed sustainability into the Dutch MIRT process. To operationalise this ambition, the Guideline outlines five general principles:

- Engage in early conversations about sustainability ambitions to align expectations and strategic goals;
- Integrate sustainability into the development of alternatives so that it is not treated as an add-on;
- Include sustainability themes in the assessment and evaluation frameworks used in decision-making;
- Embed sustainability in funding considerations to prevent future trade-offs or marginalisation of sustainable options;
- Make sustainability explicit in all formal decision moments, from project definition to approval and procurement.

These principles are integrated into the phased MIRT process (see Figure 3.4). Their interpretation differs per phase and is guided by two central questions. In the early phases (*MIRT Preparation and Exploration*), the focus is on the question: “*Are we doing sustainable things?*”. In the later phases (plan elaboration and realisation), the focus shifts to: “*Are we doing things sustainably?*”. Early phases are crucial for shaping strategic ambitions and influencing broader spatial challenges, such as housing, modal shift, or energy integration. Once a preference decision is made, the focus moves to implementation, including low-emission construction methods, circular materials, and climate-resilient infrastructure.

The Guideline also highlights five priority sustainability themes, reflecting their national policy relevance and direct connection to spatial and mobility challenges in MIRT projects:

- **Climate** – mitigation, emissions reduction, and sustainable mobility;
- **Energy** – transition and integration;
- **Circular economy** – reuse and material efficiency;

- **Climate adaptation** – flood safety and heat resilience;
- **Healthy living environment** – air quality, noise reduction, and wellbeing.

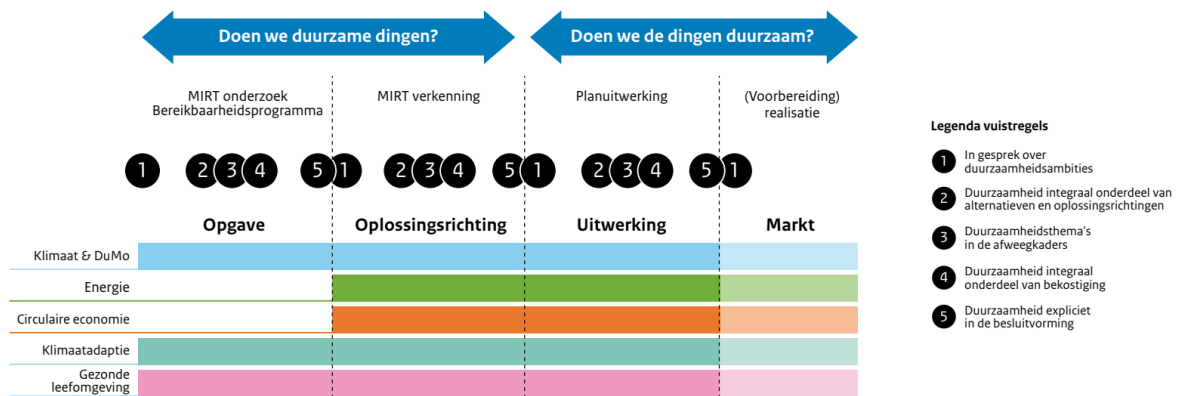


Figure 3.4: Application of principles and themes across the MIRT phases (Ministerie van Infrastructuur en Waterstaat, 2021)

3.3. Case studies

This section introduces the two case studies. The cases were selected according to four criteria: the availability of information, the relevance to the research topic, the accessibility of stakeholders for interviews, and variation in regional context and governance structure. The selected projects are the **Station Dordrecht** project and the **Openbaar Vervoer Verbinding Amsterdam Haarlemmermeer (OVAH)**.

Both cases are ongoing, which represents a limitation of this research, as many processes and decisions are still in progress. Furthermore, both projects fall under the rail and public transport modality of the MIRT. The cases differ primarily in scale and type of infrastructure. Station Dordrecht concerns the exploration of the redevelopment of a single station area, whereas the OVAH project explores the development of an entirely new public transport line. This contrast allows for meaningful comparison across different project sizes and levels of complexity.

The introduction of these cases is based on project documents and policy reports that were part of the document analysis conducted for this research (see Section 3.4.1).

3.3.1. Case 1: Station Dordrecht

Dordrecht Station is one of the four node projects within the overarching **MIRT exploration “Oude Lijn”**. The “Oude Lijn” (Old Line) refers to the railway track between Amsterdam and Dordrecht, which is one of the oldest railway corridors in the Netherlands. The programme aims to increase public transport capacity and quality in response to major urbanisation along the Leiden–Dordrecht rail corridor. The official exploration project focusing on Dordrecht node began in 2023, while the larger Oude Lijn programme was launched in 2020.

The Oude Lijn comprises five sub-studies: four nodes (Leiden, Laan van NOI/The Hague, Schiedam Centrum, and Dordrecht) plus the CitySprinter & New Stations (CS&NS) study. Each of these is a separate MIRT exploration, steered jointly by the national government and regional partners. The programme is commissioned by the two ministries (VRO and IenW), the Province of South Holland, the Metropoolregio Rotterdam Den Haag (MRDH), and the participating municipalities; ProRail also plays a key role. Within this broader context, the present case study focuses exclusively on the **Dordrecht node**. While part of the larger Oude Lijn exploration, the node forms the leading unit of analysis here. This means the study concentrates on how sustainability is addressed in the redevelopment of Dordrecht Station and its surroundings, rather than on the corridor as a whole.

Dordrecht acts as a key hub in the Drechtsteden region (300,000 inhabitants) and an important link to Rotterdam. With strong population and employment growth expected, the current station already struggles to handle passenger flows. The MIRT exploration addresses this by improving safety and

capacity, better integrating the monumental station building, and enhancing the station area with more space for walking and cycling, creating a smooth and attractive transfer hub.

The project is closely connected to Dordrecht's urban development strategy, which includes 10,000 new homes and 4,000 jobs at sites such as Thureborgh/Weizigtpark and Maasterras. By prioritising public transport over car use, it aims to reduce congestion on the A15 and A16 while preserving green areas for recreation and nature. A new cross-rail connection will further strengthen accessibility and support a healthy, liveable city. An image of the project area is shown in the figures below.



Figure 3.5: Project area of Dordrecht Station (Arup & VenhoevenCS, 2024)

Project Goals and Objectives

The ambition of the project partners for Dordrecht has been translated into a set of overarching objectives and concrete tasks. The objectives outline the strategic vision for the development of the station area, while the tasks specify the key elements that must be addressed to realise this ambition.

Main objectives:

1. Establishing a high-quality, multimodal hub that optimally facilitates and connects transport flows. This includes creating a well-connected, two-sided station that supports seamless transfers and attracts travellers.
2. Enabling sustainable area development by ensuring long-term accessibility and improving the spatial quality of the station area and Dordrecht junction. This involves reducing the barrier effect of the railway bundle, for example through the addition of an inter-district connection (whether directly linked to the station or not).
3. Enhancing the role of the monumental station building so that it contributes to the first two objectives. This includes creating an attractive entrance and maximising the building's heritage values to enrich the passenger experience.

The project objectives have been translated into five concrete tasks, which specify the main elements required to achieve the ambition of the Dordrecht Station project.

Task	Description
Task 1	• Connect the <i>CitySprinter</i> to logical pedestrian flows, with clear routing from inside to outside and vice versa (contributes to Objective 1). • Solve transfer bottlenecks on platforms, vertical circulation, and pedestrian connections (Objective 1). • Provide chain mobility functions: positions, numbers, and management of bicycle parking facilities (including shared two-wheelers); positions and numbers of other chain facilities (Kiss & Ride, Park & Ride, taxi, shared cars); and good transfer connections to/from the bus (Objectives 1 and 2).
Task 2	Remove the railway barrier by improving the quality of the existing inter-district link and creating a new slow-traffic inter-district connection at the level of <i>Weizigtpark</i> and <i>Stationsplein</i> (Objective 2).
Task 3	Utilise the station building by providing appropriate and inviting (commercial) passenger facilities, offering comfort, convenience, and experience (Objectives 1, 2, and 3).
Task 4	Connect the transport hub to its surroundings by creating an attractive public space. This includes a convincing crossing of <i>Burgemeester De Raadsingel</i> , the <i>Spuiboulevard</i> , and the city centre; integrating the <i>Maasterras</i> route; and connecting to the Metropolitan Cycling Route Rotterdam–Dordrecht (Objective 2).
Task 5	Realise a sustainable and climate-adaptive station hub as a precondition for Objectives 1, 2, and 3.

Timeline

This section presents a high-level timeline for the Dordrecht node within the broader Oude Lijn programme. It covers the run-up from the initial Start Decision through procurement, to the formal MIRT exploration for Dordrecht Node, which began at the end of 2022. A consortium started delivery in late 2023. The exploration is currently in the Assessment Phase, working toward the 85% node deliverable in September 2025.

Future scheduling depends on the integrated Oude Lijn programme review during the annual BO-MIRT meetings. The Preferred Alternative (VKA) is expected in 2026, while the exact post-VKA steps remain uncertain.

Run-up (until 2022):

- 26 Nov 2020 — BO-MIRT decides to prepare a Start Decision for the Oude Lijn MIRT exploration (infrastructure + four nodes + CitySprinter & New Stations).
- Summer 2021 — Programme partners endorse the draft Start Decision and develop a *Plan van Aanpak* (Plan of Approach).
- 1 Sep 2022 — *Plan van Aanpak Dordrecht Node* (v1.0) adopted, initiating the start and analysis setup for the node.
- 10 Nov 2022 — Start Decision for the Oude Lijn exploration formally adopted; the exploration officially begins.

Procurement / Tender:

- Jul 2023 — Request for Proposal (RFP) issued and registration opens.
- 21 Dec 2023 — Award notice published.
- Jan 2024 — Consortium mobilises and begins work.

Formal phases of the Dordrecht Node exploration:

- **Start Phase** (Jan–Feb 2024): Kick-off weeks to refine plan of approach, scope, work packages, and the assessment framework; alignment with line-wide choices.

- **Analysis Phase** (Mar–Sep 2024): Concluded with the Note on Promising Alternatives (NKO v1.0) on 17 Sep 2024, marking the transition to the assessment phase.
- **Assessment Phase** (Sep 2024–Nov 2025, ongoing): Effects and costs of promising solutions developed as decision input.
 - Sep 2025 — 85% node deliverable submitted.
 - Nov 2025 — Programme-level governance meetings (BO–Oude Lijn) to determine integrated progress and phasing across sub-projects.
- **Preferred Alternative (VKA)** (expected in 2026): Adoption foreseen at BO-MIRT, dependent on programme-level decisions.

Post-VKA (indicative, subject to programme logic):

- Plan-development phase — technical and design elaboration of the preferred alternative, including procedures and permits.
- Realisation phase — procurement, delivery, and construction of measures.
- Operations & maintenance — commissioning and life-cycle management.

Project Organisation and Governance

The project for the Node Dordrecht is embedded in a complex, multi-layered governance system. Within the MIRT, several large programmes oversee specific spatial areas. The MoVe programme, which addresses the mobility challenges of the Province of South Holland, provides the overarching framework. Within MoVe, the Oude Lijn functions as a sub-programme, and the Node Dordrecht project is again positioned as a sub-project within this structure. This illustrates the nested, multi-layered governance design, which is visualised in Figure 3.6. The figure also indicates the different governance levels that apply to this case.

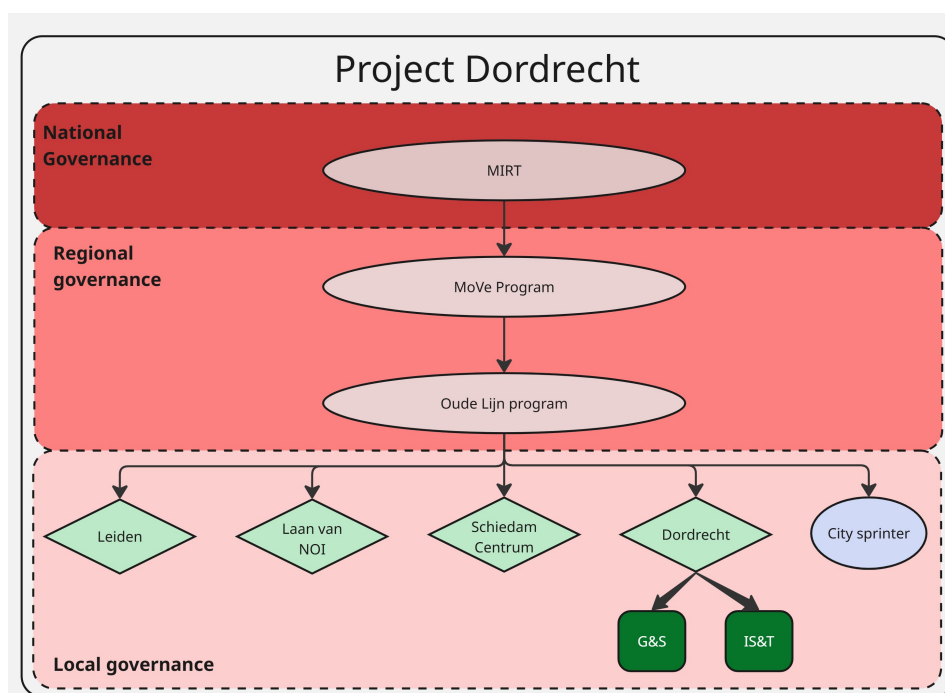


Figure 3.6: Position of Node Dordrecht project in larger programme developments (adapted from project documents, 2024).

The multi-layered design of the governance translates into a complex organisational structure. The specific governance of the Node Dordrecht project, and its linkages with the governance of the Oude Lijn programme, are shown in Figure 3.7. This figure also positions the actors according to the layers

defined in the Project System Organisation (PSO) framework (see Section 2.1). For a more detailed explanation of the general MIRT governance structure, see Appendix B.

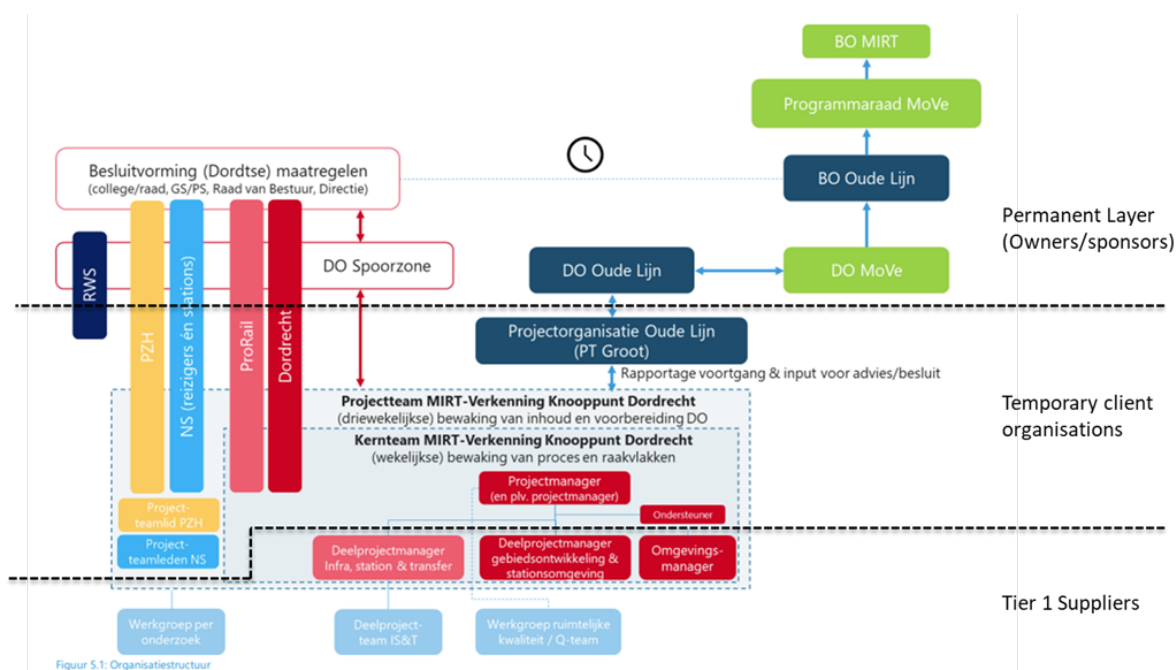


Figure 3.7: Governance and organisational structure of the Node Dordrecht project (adapted from project documents, 2024).

Programme level: The Oude Lijn exploration is governed by a dedicated Directors' Board (DO) and Administrative Board (BO). These bodies set the scope, time, budget, and overall course for the five sub-projects (the four nodes, the CitySprinter & New Stations study). The DO MoV and the MoVe Programme Board do not reassess content, but safeguard coherence with the wider MoVe programme in terms of resources, process, planning, and capacity. Formal decisions for the Oude Lijn are taken at BO level.

Dordrecht Node level: Delivery for the Dordrecht node is directed through the Project Organisation Oude Lijn. The Dordrecht project manager acts as contractor for the node and participates in PT-Groot (programme project team), which monitors progress and prepares agendas and papers for the programme DO.

Bodies at node level:

- **Core team** – weekly coordination on process, project management, and interfaces across work packages, sub-projects, and short-term measures. Members: project manager (Dordrecht), sub-project leads S&T (ProRail) and G&S (Municipality), environment/engagement manager, and project support (Municipality/ProRail).
- **Project team** – content coordination every 2–3 weeks; prepares DO Spoorzone Dordrecht. Members: Municipality of Dordrecht, NS, ProRail, Province of South Holland.
- **DO Spoorzone (Dordrecht)** – frames the node, aligns with wider Spoorzone tasks outside the exploration, and oversees short-term measures. Members: Municipality, NS, ProRail, Province of South Holland, Rijkswaterstaat.

Dordrecht does not have a separate BO; financial decisions are ratified by the Municipal Council/Executive (Dordrecht), the Provincial Executive/States (South Holland), and the Boards of NS and ProRail.

Sub-projects and working groups:

- **S&T sub-project** – led by ProRail; executed in close connection with the programme's CS&NS track; team includes Municipality, NS, Province. Contract executed by Royal HaskoningDHV.

- **G&S sub-project** – led by Municipality of Dordrecht; team includes Municipality, NS, ProRail, Province. Executed by consortium Arup & VenhoevenCS.
- **Research working groups** – set up per study under project-team leadership; Municipality also participates in CS&NS working group.
- **Spatial Quality working group / Q-team** – advisory body for design and placemaking. Members: Municipality, NS, ProRail, Province of South Holland, Mecanoo (municipal adviser), Bureau Spoorbouwmeester. During analysis and assessment phases, a Q-team (BSM, NS, ProRail, Municipality) advises on spatial-quality criteria.

Stakeholders

The governance of the Dordrecht node involves a wide range of stakeholders, each with distinct roles and responsibilities within the PSO framework. An overview of these actors and their involvement is provided in Table 3.2.

Table 3.2: Overview of stakeholders involved in the governance of the Dordrecht node.

Party	PSO role	Involvement	Short note
Ministry of Infrastructure & Water Management (IenW)	Sponsor (permanent)	BO-MIRT; BO Oude Lijn; DO Oude Lijn; MoVe Programme Board/DO MoVe	National sponsor; sets scope, time, and budget at programme level.
Ministry of BZK / VRO (Housing & Spatial Planning)	Sponsor (permanent)	BO/DO Oude Lijn; MoVe Programme Board/DO MoVe	Programme-level co-sponsor from the urbanisation side.
MRDH (Metropolitan Region Rotterdam–The Hague)	Regional partner (permanent)	BO/DO Oude Lijn	Programme governance participant.
Province of South Holland (PZH)	Regional sponsor (permanent)	Project Team (node); DO Spoorzone; BO/DO Oude Lijn	Co-steers content/resources; member of node project team and local DO.
Municipality of Dordrecht	Local public client (permanent, client function)	Core Team; Project Team; DO Spoorzone; BO/DO Oude Lijn	Site owner; content lead for G&S; local ratification via council/executive.
ProRail	Owner & contracting authority (permanent)	Core Team; Project Team; DO Spoorzone; BO/DO Oude Lijn; Q-team	Content lead for S&T; contracting authority for consultancy lots; represented across node and programme fora.
NS (NS Reizigers & NS Stations)	Partner: operator and asset owner (permanent)	Project Team; DO Spoorzone; BO/DO Oude Lijn (when needed)	Passenger/station operations perspective; member of node project team.
Bureau Spoorbouwmeester	Partner	Spatial Quality WG / Q-team	Advises on design & spatial quality; part of quality review.
Rijkswaterstaat (RWS)	Partner (permanent)	DO Spoorzone	Member of local DO for corridor interfaces.
Project Organisation Oude Lijn (PT-Groot)	Programme client (temporary)	Prepares DO/BO Oude Lijn	Monitors content/process; prepares agendas and papers.
Royal HaskoningDHV	Consultancy firm (temporary supplier)	Working groups; alignment with Core/Project Team	S&T consultancy contractor under ProRail; supports station/transfer scope.
Arup	Consultancy firm (temporary supplier)	Working groups; Core/Project Team; design reviews	G&S consultancy contractor (with VenhoevenCS) under ProRail; node analysis & design.

Continued on next page

Table 3.2 – continued from previous page

Party	PSO role	Involvement	Short note
VenhoevenCS	Architect (temporary supplier)	Working groups; Core/Project Team; design reviews	G&S consultancy contractor (with Arup) under ProRail; architectural/urban design.
Mecanoo (urban design)	Urban designer	Spatial Quality WG / Q-team	Municipal adviser in Spatial Quality working group.
Rover	External / participation	Stakeholder sounding board	Passenger advocacy; input during Analysis/Assessment.
Fietsersbond	External / participation	Stakeholder sounding board	Bicycle access/parking proposals and feedback.
Dordrecht Business Association (DOV)	External / participation	Stakeholder sounding board	Local business perspective for station area.
Advisory Council on Social Support (WMO) & disability advocates	External / participation	Stakeholder sounding board	Accessibility and inclusion perspective.
Stichting De Stad	External / participation	Stakeholder sounding board	Urban quality & liveability input.
Group A	Independent research partner (temporary)	Ad-hoc research briefings / design reviews	Study on Paris-Proof station principles (embodied carbon).
Flux	Independent research partner (temporary)	Ad-hoc research briefings / design reviews	Study on climate adaptation for stations and design building blocks.

3.3.2. Case 2: Public Transport Connection Amsterdam - Haarlemmermeer (OVAH)

In November 2022, the Ministry of Infrastructure and Water Management (IenW) together with regional partners launched the official MIRT exploration into the Amsterdam–Haarlemmermeer Public Transport Connection (OVAH). This exploration focuses on the southwest flank of Amsterdam, in particular the corridor between Amsterdam Zuid, Schiphol and Hoofddorp. The route is of national and international importance, linking the capital to the country's main airport and serving as a key gateway for international travel.

The urgency of the OVAH project stems from strong demographic and economic growth within the Metropolitan Region Amsterdam (MRA), home to over 2.4 million inhabitants and generating around 21% of Dutch GDP. Ambitious housing targets will place mounting pressure on an already strained mobility system. Public transport demand in the Schiphol corridor has risen sharply in the past decade, with passenger growth of 41% at Schiphol Airport station and 66% at Amsterdam Zuid between 2013 and 2019.

These trends expose critical bottlenecks. The Schiphol rail tunnel is already at capacity and is essential not only for regional services but also for intercity and high-speed connections to Rotterdam, Utrecht, Brussels, Paris and London. Overcrowding at Schiphol and Amsterdam Zuid stations has led to operational crowd management measures in recent years. Without intervention, accessibility and the international competitiveness of the region will be jeopardised.

Against this backdrop, OVAH follows the standard MIRT “funnel process”, progressing from a longlist of potential alternatives toward a single preferred choice. Both national and regional governments have committed to the process, with the state fully financing the exploration phase. Building on earlier studies, a metro alignment via Schiphol Northwest to Hoofddorp has emerged as the leading candidate, though the exploration considers multiple scenarios. Figure 3.8 shows the project area of OVAH.

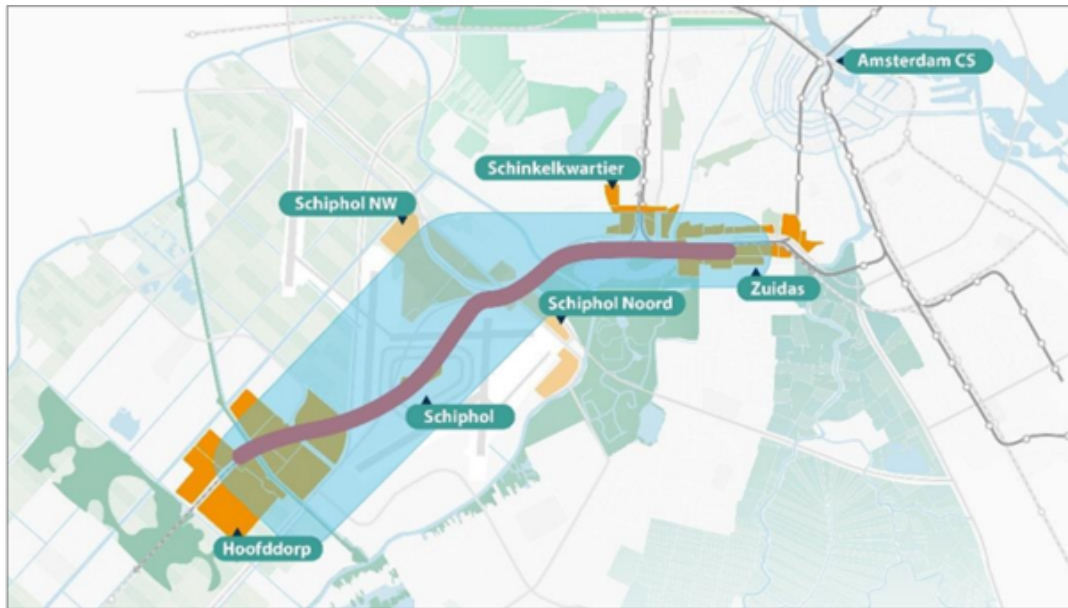


Figure 3.8: Project area of the Amsterdam–Haarlemmermeer Public Transport Connection (OVAH) (project documents, 2024).

Project Goals and Objectives

The OVAH project addresses four interconnected challenges in the southwest corridor of the Amsterdam Metropolitan Region (MRA):

1. **Capacity constraints at the Schiphol rail tunnel.** With only four tracks and a maximum of 26 trains per direction per hour, the tunnel cannot accommodate projected passenger and freight growth toward 2040. This limitation hampers both national ambitions for high-frequency rail services and the expansion of international connections.
2. **Crowding and safety issues at major transfer hubs.** Schiphol Airport and Amsterdam Zuid stations face severe pressure on platforms, escalators, and transfer spaces during peak hours. This can lead to unsafe situations, longer transfer times, or even temporary platform closures.
3. **Stagnating urban node development.** Key development areas such as Zuidas, Schinkelkwartier, Schiphol-Noordwest, and Hoofddorp are highly dependent on sufficient public transport accessibility. Without substantial improvements, housing and employment growth targets of the MRA may be delayed or downsized.
4. **Insufficient alternatives to short-haul flights.** While destinations such as Brussels, Paris, London, Düsseldorf, Frankfurt, and Berlin could in principle be served by train, the limited capacity of the Schiphol tunnel prevents the necessary frequency increase. This undermines sustainability ambitions and weakens international competitiveness.

In response to these challenges, the OVAH exploration pursues four main objectives:

1. Resolve the capacity constraints of the Schiphol tunnel, enabling the national rail network to grow in line with the OV-Toekomstbeeld 2040 and the ambitions for high-frequency, “timetable-free” rail operations.
2. Reduce transfer problems at Schiphol Airport and Amsterdam Zuid stations by providing sufficient platform and transfer capacity, thereby avoiding reliance on crowd management measures.
3. Improve public transport accessibility to new residential and employment areas in the southwest of Amsterdam, supporting the realisation of the MRA’s large-scale urbanisation agenda.
4. Facilitate the expansion of international train services, offering a credible alternative to short-haul flights and contributing to sustainable mobility and stronger international competitiveness of the region.

Timeline

2002–2014: Early corridor studies

The origins of the OVAH project date back to the early 2000s. In 2002, the Regional Public Transport Authority (ROA), predecessor of the Amsterdam Transport Authority (VRA), carried out the first exploratory study under the name *CASH* (Corridor Amsterdam–Schiphol–Haarlemmermeer). This was followed by long-term studies in the framework of OV SAAL, addressing accessibility challenges on the Schiphol–Amsterdam–Almere–Lelystad axis. In 2014, regional and national stakeholders adopted the *Structuurvisie Mainport Amsterdam Schiphol Haarlemmermeer*, which formulated an integrated ambition for accessibility, spatial planning, and economic development in the corridor. That same year, the *EnterNL* development strategy underlined the need for high-quality public transport to support internationally competitive residential and business environments in the southwest corridor.

2017–2021: ZWASH – the MIRT research phase

In 2017, under the national–regional programme Samen Bouwen aan Bereikbaarheid (SBaB), the ZWASH (Zuidwest Amsterdam–Schiphol–Hoofddorp) MIRT-research was launched. This unusually detailed research phase combined problem analysis, longlist–shortlist procedures, and cost-benefit assessments, which are often only carried out in later phases.

- **ZWASH phases 1–2 (2018–2019):** Focused on the southwest corridor, identifying problems and potential solutions across modes (rail, metro, bus, road, cycling) under four spatial development perspectives. The SBaB programme board decided in April 2019 to take the “Hotspots” scenario—concentration of development around major nodes such as Schiphol, Amsterdam Zuid, and Hoofddorp—as starting point.
- **ZWASH phase 3 (2019–2020):** Expanded scope to include northwest Amsterdam and examined accessibility for freight and car traffic alongside public transport.
- **ZWASH phase 4 (2020):** Narrowed focus to rail (Airport Sprinter) and metro (extension of the North/South line), also testing road measures. It concluded that both road and public transport required a major scale leap, but their measures did not strongly interact; road packages were therefore separated into another track. Importantly, the extension of the North/South line to Hoofddorp was identified as a promising solution to free capacity in the Schiphol tunnel and enable growth of the (inter)national train system.
- **ZWASH phase 5 (2021):** Prepared the National Growth Fund (NGF) application. This included a detailed problem analysis, an inventory of 30+ solutions, qualitative assessment, elaboration of five most promising alternatives, and a full cost-benefit analysis (MKBA). Endorsed in late 2021, these results formed the substantive basis for launching the OVAH exploration.

2022: Start of the OVAH exploration

On 11 November 2022, during the BO-MIRT for Northwest Netherlands, the Minister of Infrastructure and Water Management decided to start the OVAH exploration. The Startdocument, published in October 2022, formalised the problem definition and objectives. Because ZWASH had already delivered extensive pre-research, the first phase of the exploration mainly refined and formalised the *trechtering* (funnelling) steps that were already completed during the research phase.

2023: Tender process

A market consultation with engineering and consultancy firms took place on 4 July 2023. The formal tender call was published with a submission deadline of 16 October 2023. After evaluation, the contracting authority issued a notice of intent to award in February 2024.

2024–2025: Analysis phase

The analysis phase started in March 2024. This phase developed a longlist and shortlist of alternatives, assessed them against project objectives, and engaged stakeholders. On 13 March 2025, the Notitie Kansrijke Oplossingsrichtingen (NKO) was adopted, resulting in five promising alternatives: one Bus Rapid Transit option, two train/sprinter options, and two metro options.

2025–2026: Assessment phase (current)

The project has now entered the assessment phase. The five alternatives are elaborated in detail and assessed in terms of goal achievement, environmental impacts, costs, and a Social Cost–Benefit Analysis (MKBA). This will provide the basis for the Preference Decision (*Voorkeursbeslissing*), expected

in November 2026 during BO-MIRT.

Organisation and Governance

The OVAH exploration is organised through a multi-layered governance and delivery structure. Within the MIRT framework, OVAH falls under the regional programme Samen Bouwen aan Bereikbaarheid (SBaB) for the Amsterdam Metropolitan Area. SBaB provides the institutional and regional context in which mobility and spatial development issues are addressed in an integrated manner. As illustrated in Figure 3.9, OVAH functions as a dedicated MIRT-exploration under SBaB.

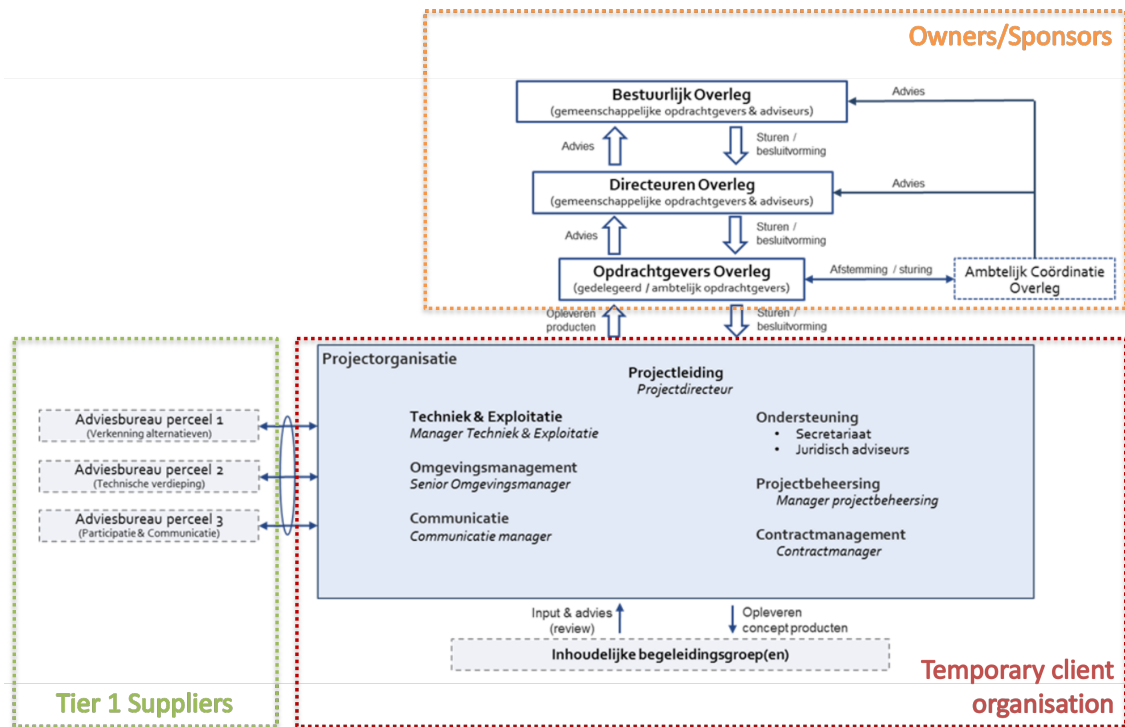


Figure 3.9: Governance structure of the OVAH exploration (adapted from project materials, 2024).

Decision-making and oversight are anchored in dedicated governance bodies. The Bestuurlijk Overleg (Steering Committee) is the central forum for political and strategic decisions. The Directors' Meeting prepares these decisions by bringing together senior representatives of the commissioning authorities, while the Clients' Meeting provides operational guidance at the administrative level.

In these forums, the Ministry of Infrastructure and Water Management (IenW) and the Amsterdam Transport Authority (Vervoerregio Amsterdam) act as contracting authorities, joined by the municipalities of Amsterdam and Haarlemmermeer, the Province of North Holland, Schiphol Area Development Company, Royal Schiphol Group, and NS. ProRail, GVB, and KLM participate as advisers, bringing in operational expertise. Decision-making is further supported by an Administrative Coordination Group, which aligns the preparation of decisions across the participating organisations.

Project delivery organisation

Day-to-day execution is entrusted to an independent project organisation, hosted by the Municipality of Amsterdam's Department for Special Projects, which provides facilities such as housing, HR, and ICT support. The organisation follows the Integrated Project Management (IPM) structure, widely applied in Dutch infrastructure projects. This model divides responsibilities across five roles: project management, technical management, environmental management, contract management, and project control. The adoption of the IPM model ensures clarity of responsibilities, consistency with other national projects, and efficient interfaces with the commissioning authorities.

The project team is led by a dedicated project director and organised across functional domains: technical and operational design, environmental management, communication, project control, and contract

management. This structure allows the team to work at arm's length from the individual interests of the parent organisations, while drawing on their knowledge and networks.

Consultancy contracts

To carry out the substantive work, the project organisation is supported by three specialised consultancy contracts (*percelen*), each with distinct focus and deliverables:

1. **Exploration of alternatives** – developing, analysing, and narrowing down possible solutions, including preparation of the Notitie Kansrijke Oplossingsrichtingen (NKO) and input for the Environmental Impact Assessment (MER).
2. **Technical analysis** – conducting in-depth technical studies, modelling, and cost assessments to support evaluation of alternatives.
3. **Participation and communication** – facilitating stakeholder participation, reporting on consultation outcomes, and developing communication strategies to ensure transparency and legitimacy.

Advisory groups

Substantive input is provided by specialised working groups (inhoudelijke begeleidingsgroepen, IBG), which review draft products and give expert feedback. In addition, an Administrative Support Group coordinates inputs for higher-level decision-making, ensuring alignment with the political and administrative processes of all participating authorities.

Stakeholders

The OVAH exploration involves a broad range of stakeholders, each contributing from different institutional roles within the PSO framework. Their responsibilities, involvement, and interests are summarised in Table 3.3. This overview helps to clarify the institutional complexity of the project and the variety of perspectives represented.

Table 3.3: Overview of stakeholders involved in the governance of the Dordrecht node.

Party	PSO role	Involvement	Short note
Ministry of Infrastructure & Water Management (IenW)	National sponsor / co-client	BO/DO OVAH, Clients' meeting, ACO	Co-financier, formal contracting authority, owner and regulator of national rail. Safeguards integration with OV-Toekomstbeeld 2040 and Schiphol tunnel capacity expansion.
Ministry of BZK (Domestic Affairs and Kingdom Relations)	Co-sponsor	BO MIRT	Involved due to link with housing and employment development in the corridor.
Vervoerregio Amsterdam (VRA)	Regional authority / co-client	BO/DO OVAH, Clients' meeting, ACO	Co-financier, contracting authority for local/regional public transport; system manager for metro and tram. Focus on regional accessibility.
Municipality of Amsterdam	Local sponsor / co-client	BO/DO OVAH, Clients' meeting, ACO	Co-financier, owner of local infrastructure, responsible for spatial procedures. Hosts the independent project organisation (UIE/Bijzondere Projecten).
Municipality of Haarlemmermeer	Local sponsor / co-client	BO/DO OVAH, Clients' meeting	Co-financier, responsible for spatial planning and local safety. Focus on integrating Haarlemmermeer into the MRA.

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Table 3.3 – continued from previous page

Party	PSO role	Involvement	Short note
Province of North-Holland	Regional sponsor / partner	BO/DO OVAH	Co-financier, authority for provincial planning. Focus: link between OV accessibility and housing (esp. Hoofddorp), plus stronger ties to North-Holland North.
Royal Schiphol Group (RSG)	Regional sponsor / owner	BO/DO OVAH	Co-financier, owner of Schiphol Plaza station and airport infrastructure. Interest: sustainable accessibility of Schiphol as an international hub.
Schiphol Area Development Company (SADC)	Regional sponsor / developer	BO/DO OVAH	Co-financier, land and real estate developer. Interest: OV accessibility for high-quality business environments.
Nederlandse Spoorwegen (NS)	Rail operator / co-sponsor	BO/DO OVAH	Co-financier and concession holder HRN. Interest: free capacity in Schiphol tunnel, reduced transfer pressure, more (inter)national trains.
ProRail	Infrastructure manager / advisor	IBG, advisory role in BO/DO	National rail infrastructure manager. Advises on capacity and safety; supports disentangling flows on the Amsterdam OV-ring.
Rijkswaterstaat (RWS)	National infrastructure advisor	IBG, advisory role	Provides expertise on large-scale infrastructure and connections with other MIRT projects.
GVB	Urban operator (Amsterdam) / advisor	IBG, ACO	Advises on metro/tram operations; ensures efficient and cost-effective operation and maintenance.
KLM	Airline / advisor	IBG, ACO	Interest in strong rail access to Schiphol and substitution of short-haul flights. Supports air–rail shift in line with Sustainable Aviation Agreement.
Connexxion (Transdev)	Regional bus operator / advisor	IBG, advisory role	Advises on regional bus integration in the Schiphol–Haarlemmermeer corridor.
Contract 1 – Exploration of alternatives (Arcadis, TwynstraGudde, Antea Group, PosadMaxwan)	Consultancy consortium	Core project delivery	Responsible for longlist/shortlist, exploration of alternatives, NKO, and MER input.
Contract 2 – Technical analysis (Sweco, Arup)	Consultancy consortium	Core project delivery	Provides technical analyses, modelling, cost assessments, engineering support.
Contract 3 – Participation (Bureau Buhrs)	Consultancy consortium	Core project delivery	Responsible for participation and communication deliverables.

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Table 3.3 – continued from previous page

Party	PSO role	Involvement	Short note
Interest and community organisations	Stakeholder groups	Public consultations, roadshows, IBG	Includes e.g. Stichting Oeverlanden Blijven!, residents' groups, sports/recreation clubs, and local business forums. Input gathered via "soft map" and MER process.

3.4. Data Collection

To investigate how sustainability ambitions are embedded and influenced within the two case studies, two complementary data collection methods were employed: a document review and semi-structured interviews. These methods provide both contextual and experiential insights, enabling triangulation between factual information and stakeholder perspectives.

3.4.1. Document Analysis

The document review served to establish a baseline understanding of the institutional setting, project ambitions, and formalised stakeholder structures. Sources included publicly available planning documents, policy frameworks, and internal reports. Reviewing these materials helped to:

- Identify how sustainability ambitions are formally framed within each case;
- Understand the governance structure and formal roles of stakeholders;
- Trace the development of the projects over time.

The main documents analysed for both case studies are summarised in Table 3.4 (Dordrecht) and Table 3.5 (OVAH).

Table 3.4: Overview of key documents reviewed for the Dordrecht case study.

Date	Document title
Aug/2022	"Kader ruimtelijke kwaliteit", versie Definitief [Spatial Quality Framework, final version]
Sep/2022	"Plan van aanpak t.b.v. MIRT-Verkenning Infrastructuur en Knooppunten, Starten analysefase, Projectnummer: BER100935 Versie 1.0" [Project plan for the start of the analytical phase of the MIRT Exploration]
Nov/2022	Startbeslissing MIRT-verkenning Oude Lijn [Official start decision for the Oude Lijn MIRT Exploration]
Jun/2023	Startnotitie Dordrecht Klimaatneutraal 2040 [Initial memorandum: Dordrecht Climate Neutral 2040]
Jul/2023	Aanbestedingsleidraad MIRT-Verkenning Oude Lijn Adviesdiensten Knoop Dordrecht - R-588040 Versie 1.0 TenderNed nummer: 408871 [Tender guide for consultancy services for the Dordrecht node]
Jul/2023	Alle bijlagen bij de aanbestedingsleidraad [All appendices to the tender guide]
Oct/2023	Tenderdocumenten consortium Arup/VenhoevenCS plus bijlagen (G2, G3, G4) [Tender submission documents by the Arup/VenhoevenCS consortium, including appendices]
Dec/2023	Klimaatadaptieve Stations Oude Lijn [Climate-adaptive Stations Oude Lijn report]
Sep/2024	Algemene presentatie MIRT-verkenning Oude Lijn [General presentation of the Oude Lijn MIRT Exploration]
Sep/2024	MIRT-verkenning Oude Lijn Knoop Dordrecht Notitie Kansrijke Oplossingsrichtingen (NKO), versie 1.0 [Note on Promising Solutions (NKO) for the Dordrecht node, version 1.0]
Sep/2024	Bijlagen bij de NKO [Appendices to the NKO]
–	Duurzaamheidstabel_input beoordeling Dordrecht [Sustainability input and evaluation table for Dordrecht]
Jul/2023	MIRT Oude Lijn Knopen – Generieke kaders duurzaamheid [Generic sustainability framework for Oude Lijn nodes]

Table 3.5: Overview of key documents reviewed for the OVAH case study.

Date	Document title
Nov/2019	Eindrapport MIRT-verkenning Multimodale Knoop Schiphol [Final report of the MIRT Exploration for the Multimodal Schiphol Node]
Nov/2021	MKBA-Eindrapport propositie doortrekken Noord/Zuidlijn [Cost–benefit analysis for extending the North/South metro line]
Nov/2021	Rapportage Ruimtelijk-economische ontwikkelingen ZWASH [Report on spatial–economic developments in the Zuidwest Amsterdam–Schiphol corridor]
Oct/2022	Startdocument MIRT-verkenning OV-verbinding Amsterdam–Haarlemmermeer [Start document for the MIRT Exploration Amsterdam–Haarlemmermeer public transport connection]
Sept/2023	Selectieleidraad Raamovereenkomsten adviesdiensten MIRT-verkenning OVAH [Selection guide for framework agreements – OVAH consultancy services]
Jan/2024	Vraagspecificatie: Raamovereenkomsten adviesdiensten MIRT-verkenning [Terms of reference for framework agreements – consultancy services MIRT Exploration]
Jan/2024	Aanbestedingsleidraad Raamovereenkomst OVAH, versie 1.3 [Tender guide for OVAH framework agreement, version 1.3]
Mar/2024	Ontwerp–Notitie Reikwijdte en Detailniveau (NRD) [Draft memorandum on Scope and Level of Detail (NRD)]
Jul/2024	OVAH Halfjaarrapportage [OVAH semi-annual progress report]
Dec/2024	OVAH Halfjaarrapportage [OVAH semi-annual progress report]
Feb/2025	OVAH Participatieverslag Analysefase [Participation report for the analytical phase]
Feb/2025	OVAH Participatieplan Verkenningfase [Participation plan for the exploration phase]
Mar/2025	NKO – Notitie Kansrijke Oplossingsrichtingen [Note on Promising Solutions (NKO)]
Mar/2025	NRD – Notitie Reikwijdte en Detailniveau [Memorandum on Scope and Level of Detail (NRD)]

Semi-Structured Interviews

To complement the document review, semi-structured interviews were conducted. Interviewees were selected based on their involvement in the exploration phase of the two MIRT projects. Interviews were conducted online or in person, recorded with consent, transcribed, and anonymised. The interviews were guided by a semi-structured protocol covering four key themes: first an introduction into the participant's role and experience within the project is discussed. Second, the position and treatment of sustainability within the project is discussed by looking at the evolution of sustainability and the application of the principles of the MIRT Sustainability Guideline. In the third theme the stakeholders were asked to reflect on their own role and dependencies on sustainability considerations. Finally to summarize everything discussed in the interviews, the key barriers and strategies for effective integration are discussed. These themes were chosen to explore how sustainability ambitions are shaped, negotiated, and embedded during the MIRT exploration phase. For the full interview protocol, see Appendix C.

The selection of participants was designed to represent different perspectives of the main stakeholder groups within MIRT processes, including client organisations, sponsors, owners, and consultancy and engineering firms (suppliers of the development phase). Ensuring diversity across these categories helped to capture a broad range of perspectives on how sustainability is interpreted, negotiated, and embedded throughout the project life cycle. Interviews were conducted between June 10 and August 19 2025, with durations ranging from 43 to 60 minutes. Respondents were identified through a combination of purposive sampling and snowball techniques, and the distribution across the two cases was reasonably balanced.

For Dordrecht seven interviewees were selected. These all are active in the project. A diverse set of perspective was generated by selecting representatives from as much different stakeholders as possible. Following the PSO structure all of the interviewees were active in either the temporary client layer or the supplier layer (e.g. consultancy and engineering firms), no interviews were held with representatives of the owners who had decision making responsibilities. Most of the interviewees were active in either the Project Team, Core Team or the consortium. Information on the interviewees can be found in table 3.6

Table 3.6: Overview of interviewees for the Dordrecht case study.

Code	Role	PSO Role	Date	Experience / Time active
Dor-1-IB1-Ar	Advisor Sustainability	Consultancy and engineering firm	10/06/2025	15+ years / 2 years
Dor-2-PA1-SB	Advisor Station Design	Temporary client (advisor to client)	13/06/2025	30+ years / 4 years
Dor-3-IB2-VCS	Architect Urban Design	Architect	17/06/2025	9 years / 2 years
Dor-4-PC1-PR	Developer	Owner / sponsor	20/06/2025	30+ years / 5 years
Dor-5-PDO-GD	Project Leader	Project organisation	20/06/2025	30+ years / 2 years
Dor-6-IB3-Ar	Project Manager	Consultancy and engineering firm	26/06/2025	20+ years / 5 years
Dor-7-PA-NS	Station Advisor	Owner / sponsor	09/07/2025	15+ years / 5 years

A total of five interviewees were selected for the OVAH case study (see Table 3.7). To ensure coverage of different perspectives, at least one representative was included from each of the main PSO roles. Compared to Dordrecht, the representatives in OVAH are positioned further apart in the governance structure and are involved in the project in different ways. Two respondents are active in the Administrative Coordination Group (ACO), one was one interviewee serves as the designated sustainability lead within the project organisation, and another is responsible for sustainability reporting on behalf of the consultancy consortium. This composition provided a diverse range of perspectives on how sustainability ambitions are addressed.

Table 3.7: Overview of interviewees for the OVAH case study.

Code	Role	PSO Role	Date	Experience / Time active
OVAH-1-PDO1-Ams	Sustainability lead, client organisation	Temporary client organisation	12/06/2025	6 years / 8 months
OVAH-2-PC1-GH	Member IBG; sustainability advisor	Owner / sponsor	27/06/2025	30+ years / ± 2 years
OVAH-3-IB1-TG	Leading author sustainability report	Consultancy and engineering firm	02/07/2025	10+ years / ± 2 years
OVAH-4-PA1-GVB	Member ACO	Advisor	13/08/2025	20+ years / ± 2 years
OVAH-5-PC2-Ams	Member ACO	Owner / sponsor	19/08/2025	10+ years / ± 1 year

All participants were informed about the purpose and scope of the research and signed an informed consent form prior to the interview. A data management plan was drawn up in accordance with TU Delft research integrity guidelines. With permission, all interviews were recorded and transcribed. Transcripts were subsequently returned to participants for verification and optional correction, ensuring the accuracy and validity of the material.

3.4.2. Data analysis

The data collected from the semi-structured interviews is systematically analysed using thematic coding. This structured approach allowed for the identification of patterns and themes relevant to the research questions, while maintaining traceability to the original source material.

The following steps were followed in the analysis process:

1. **Data preparation:** All transcribed and verified interviews were organised and assigned to their respective case and stakeholder role. This ensured that the material could be traced back to the appropriate context.

2. **Open coding:** An inductive approach was initially used to assign descriptive codes to meaningful segments of text. This phase involved identifying key concepts, recurring ideas, and stakeholder interpretations without being constrained by predefined categories.
3. **Thematic coding:** Related codes were grouped into higher-order categories to construct overarching themes. These themes were then aligned with the core areas of inquiry: sustainability integration, influential factors, and stakeholder considerations.
4. **Interpretation of findings:** Emerging patterns and contrasts across cases were interpreted to draw analytical conclusions.
5. **Incorporation in recommendations:** The analysed insights directly informed the development and refinement of the sustainability integration framework, ensuring it reflects empirically observed dynamics and is grounded in stakeholder practice.

This stepwise approach facilitated a consistent, transparent, and replicable analysis of qualitative data, supporting the reliability and analytical generalisation of findings across both case studies.

A summary of the quotes that are selected and used for analysis can be found in Appendices D and E

Having outlined the research design, data collection, and analysis procedures, the next chapter turns to the empirical findings. The results of the two case studies are presented and compared to examine how sustainability ambitions are interpreted, negotiated, and embedded within MIRT exploration projects.

4

Results

This chapter presents the findings from the two case studies: the Dordrecht node and the OVAH project. For each case, the analysis begins with a chronological account of how sustainability was addressed over time, tracing the evolution of the process around the formulation and integration of sustainability ambitions.

Building on insights from interviews, the chronological reconstructions, and the reviewed documents, the results are further structured around three main areas of inquiry. These areas correspond to the sub-questions of this study and the themes of the interview protocol: (i) the definition of sustainability and its role within the project, (ii) the key factors shaping the integration of sustainability, and (iii) the organisation and evaluation of sustainability considerations, including an assessment of the five guiding principles of the MIRT Sustainability Guideline (Ministerie van Infrastructuur en Waterstaat, 2020), as well as the strategies and roles of the different stakeholder groups involved.

The analysis of the area's is primarily grounded in a combination of the interviews and document reviews.

For the chronological analysis the project timeline is divided into six steps.

1. Preparatory Phase: early scoping and background. This phase includes a description of the optional Tender phase (Phase 1a) in which the procurement of the consultancy and engineering firms is described
2. Start Exploration: mobilisation and kick-off
3. Analysis phase (analytische fase): development of options and the Notitie Kansrijke Oplossingen (NKO).
4. Assessment phase (beoordelingsfase):
5. Preference Decision (voorkeursbeslissing):
6. Run-up to plan elaboration phase (opmaat naar plan- en studiefase):

Steps 1 represents the *run-up* prior to the official start of a MIRT exploration, Steps 5 to 5 correspond to the formal MIRT stages (see Section 3.2.2), and Step 6 is added as the bridge towards the subsequent plan elaboration phase. This is based on a combined review of project documents and semi-structured interviews.



Figure 4.1: Steps used in analysis of the development of sustainability

4.1. Case 1: Dordrecht node

Chronological description (six steps)

This section will provide a summary of the evaluation of sustainability considerations throughout the project. It will be a structured chronological timeline which shows how sustainability was handled and considered during the project.

Phase 1: Preparatory Phase

The idea for the Oude Lijn programme originated before 2020, with the MIRT research phase (*MIRT-onderzoekfase*). In this phase, a pre-exploration of the Oude Lijn corridor was conducted, focusing on the challenges and anticipated developments across the wider region.

As a result, the Oude Lijn project structure was established as a collaborative effort: municipalities and provinces deliberately combined the mobility and housing agendas under a single MIRT programme. This joint approach not only strengthened the case for national funding, but also made local projects such as Dordrecht dependent on the wider regional agenda:

“This MIRT exploration is special, because several municipalities along the ‘Oude Lijn’ joined forces [...] They wanted to combine both housing and mobility in one MIRT exploration. That is how they tried to increase the chances of being admitted for funding.” (Dor-2-PA1-SB)

Initially, Dordrecht was not included on the list of priority stations. One project leader recalled how this quickly changed:

“Dordrecht was not on the list of priority nodes [...] but it was evident that it should be included, because it was clear it met the criteria to be considered as a critical node in the corridor.” (Dor-4-PC1-PR)

Following the pre-exploration, the decision was taken to proceed towards a formal MIRT exploration. In this process, the Oude Lijn programme was divided into several subprojects. Each priority station was assigned its own MIRT exploration with a dedicated governance structure, complemented by a corridor-wide study on frequency increases and the addition of new stations. To guide this and ensure integrated working, the commissioning parties drafted an overarching assessment framework applicable to all nodes. Within this framework, sustainability themes were explicitly embedded in the following themes:

1. **Theme 3: Mobility** — Effect on the mobility system (highways, regional roads, cycling, public transport, pedestrians), modal shift and traffic flow.
2. **Theme 5: Sustainability**
 - Aspect A: Circularity and CO₂ footprint, sustainable use of the sub-surface, material choices, and emissions from construction logistics.
 - Aspect B: Climate resilience — anticipating drought, heat and extreme rainfall; contributing to a climate-resilient city.
3. **Theme 6: External Effects** — Mostly regulatory standards (air quality, noise, vibrations, nature and landscape, water and soil, archaeology and cultural history, health, external safety).

On the basis of this framework, start documents were formulated for each node, including Dordrecht. For Dordrecht specifically, three main objectives were set out:

1. A high-quality multimodal node, interconnecting transport flows, breaking down the barrier effect of the rail bundle, and improving connections to the city through an inter-neighbourhood link and a pedestrian-friendly promenade.
2. Facilitating sustainable area development, improving spatial quality and reconnecting the station area with its surroundings. The monumental station building was intended to play a central role as a catalyst for urban development.
3. Giving meaning to the monumental station building, ensuring that it actively contributed to both transport efficiency and spatial quality.

These objectives were further detailed into five project tasks (*opgaven*), of which the fifth explicitly focused on sustainability: *Task 5: The realisation of a sustainable and climate-adaptive station node.*

As several interviewees underlined, sustainability was deliberately framed as a precondition rather than as a separate goal:

“We made sustainability deliberately a precondition. You cannot call it a separate goal; it must be inherent in the design... you design for something that will be built ten years from now, and you already have to meet the legislation of that future moment.” (Dor-4-PC1-PR)

Thus, sustainability entered the Dordrecht project as a cross-cutting theme, with the explicit ambition that it should permeate all design choices and be integral to every alternative under consideration.

Phase 1a: Tender phase

In the tendering process for Dordrecht, sustainability was explicitly positioned as one of the key challenges, but it was mostly expressed as high-level ambitions rather than through concrete criteria or methodologies. All documents that had informed the start decision and the plan of approach were shared with the consortia. These already contained the formulated objectives, including the requirement of *realising a sustainable and climate-adaptive station node* as a precondition for all other goals. As one advisor explained, the commissioning parties deliberately avoided prescribing exact methods:

“Policy-wise the goals say ‘we want climate-neutral’ and that it ‘must be sustainable and circular’ [...] But what it practically means and how to translate it into a project... we cannot rely on earlier results. We really want to explore and map these sustainability goals within the project, but we do not prescribe exactly ‘how’.” (Dor-2-PA1-SB)

Instead, part of the strategy was to let sustainability be explored in a more holistic manner at the level of the wider *Oude Lijn* programme, with side-studies commissioned separately:

“We said: make it part of the larger question but do not impose a method. [...] With a small study budget [we] asked another bureau to explore this. And at a certain point you create cross-pollination and feed it back into the major projects.” (Dor-2-PA1-SB)

For the Dordrecht tender, bidders were asked to submit not only their vision for the urban, architectural and mobility aspects of the station area, but also to identify “opportunities for sustainability in a broad sense, including CO₂-neutral, circular, climate-adaptive and nature-inclusive measures.” Sustainability thus became a formal assessment criterion in the procurement.

The winning consortium indeed presented narratives on sustainability ambitions and opportunities, ranging from nature inclusivity and biodiversity networks to circular and modular building principles. However, after the contract was awarded, the sustainability vision presented in the tender did not play a central role in subsequent project steps. While sustainability remained part of the overall scope, the vision itself did not receive integral follow-up after the award. The design work quickly shifted to solving spatial and technical puzzles:

“[...] in the tender assessment there was a criterion ‘vision on sustainability’. We made a proposal for that, which was scored with some critical remarks. However after the tender I don’t believe we looked back at it, because you immediately move on to the design and technical challenges. I think it only returned in the assessment of the solution directions.” (Dor-6-IB3-Ar)

In summary, in the tender phase sustainability was formally present. It was embedded in the project tasks (*opgaven*) that contributed to the primary objectives, it featured in the integrated evaluation frameworks of the *Oude Lijn*, and it was an explicit criterion in the tender for which points were awarded. However, the formulation did not include reference to concrete methods or strong contractual anchors. Sustainability was treated primarily as an ambition and an assessment category. After the award, its prominence diminished in practice, overshadowed by technical complexity and budgetary constraints.

Phase 2: Start phase of the exploration

At the formal start of the MIRT exploration, the commissioning parties (including ProRail, NS, Bureau Spoorbouwmeester, and the municipality) explicitly set out to operationalise the sustainability criteria included in the overarching assessment framework. ProRail took the lead in compiling an inventory of the different policies and ambitions of each organisation, in order to align them with the agreed assessment criteria:

“At the start of the exploration phase we sat down with all the parties – the four nodes, the Ministry of Infrastructure and Water Management (IenW), and the other collaborating partners – and looked at how we would define sustainability here specifically. What I did then was make a column with what was stated about sustainability in the assessment framework we had received at the start decision... we then looked at how that came back in the policies of ProRail, NS, Bureau Spoorbouwmeester, and later also the municipality.” (Dor-4-PC1-PR)

This mapping exercise was considered useful, yet it was deliberately not translated into binding requirements in the *Programme of Requirements (Programma van Eisen, PvE)*. Instead, the outcomes were incorporated into the PvE as guidelines (*handvatten*) for the consortium, rather than as strict demands, in order to avoid constraining the design too much:

“We did not translate that into a hard Programme of Requirements. In the PvE we referred to this document... we called them guidelines, not requirements, to be used by the designers.” (Dor-4-PC1-PR)

In parallel, several preparatory studies had already been carried out by Bureau Spoorbouwmeester and external consultants, such as the *Climate Adaptive Stations* programme (*Klimaatadaptieve Stations*) and the *Paris-proof Stations* research. These studies provided crucial early insights into climate adaptation, embodied carbon, and material choices. One advisor emphasised that such background studies were vital in order to frame design choices:

“An important guideline we used at the start of the project is the Climate Adaptive Stations programme, specifically the version developed for the Oude Lijn. This forms the basis of the assessment on climate adaptability of the different options. There are also important documents from Bureau Spoorbouwmeester on embodied and operational carbon.” (Dor-1-IB1-Ar)

It was noted positively that there was a wealth of input available to translate the ambitions into the project and the designs. However, interviewees also underlined that there had been no integrated dialogue between the commissioning parties and the consortium to develop a shared storyline or set of priorities:

“We received a backpack full of policy documents – three A4s from the municipality, long strategy documents, CO₂ guidelines from Bureau Spoorbouwmeester... It’s useful, but there was never a moment to sit down together and extract a red thread. It remained fragmented.” (Dor-3-IB2-VCS)

“But actually, at the start, we could have organised a joint workshop on sustainability to establish ambitions together with all parties. Later on, that provides a clear framework to base decisions on.” (Dor-6-IB3-Ar)

“We as NS, ProRail, and Bureau Spoorbouwmeester did make an effort to align our own sustainability goals into a joint document... but for the Dordrecht project I have the impression it stopped there. It was passed on as input to the consortium, but not further developed into a real working framework together with them.” (Dor-7-PA2-NS)

The reasons for this were not straightforward: a combination of time pressure and lack of initiative to organise such a process. At other nodes (*knooppunten*), similar workshops were sometimes held.

Thus, while sustainability was formally present from the outset and embedded in the assessment framework, its role at this stage remained guiding rather than directive. It was included as a theme and supported by external studies, but without concrete methods or strict requirements. So, sustainability was an important aspect in the project due to the efforts and requirements set out in earlier phases. However, when the project started these efforts were not always explicitly integrated (for example the vision of the consortium) in the process, and the conversation about sustainability priorities remained fragmented across parties.

Phase 3: Analysis phase

The Analysis phase of the Dordrecht MIRT exploration was aimed at exploring the problem space as broadly as possible, before narrowing down towards feasible solutions. The process began with drafting a *longlist* of options, constructed from different “building blocks” such as pedestrian crossings, station passages, and cycling facilities – each of which could be configured in different ways (e.g. above-ground vs. underground).

At first, the project team considered treating sustainability as a separate building block, but this quickly proved unworkable:

“We had sustainability as a separate building block, but that didn’t work. Because that building block must be present in all other building blocks. You cannot say: in this variant we only focus on energy, and in this one only on greenery, and in another one only on nature inclusiveness. We realised all sustainability features must be included in all solution directions – in more or less degree depending on the option.” (Dor-3-IB2-VCS)

This approach aligned with the overall project framing, where sustainability was treated as a precondition rather than as a stand-alone goal. The broadness of the concept also made it difficult to operationalise.

Stakeholders considered the breadth of the analysis to be an important strength. By exploring all options, including the most expensive, unsustainable, and complex ones, the project avoided overlooking potential opportunities:

“We did a 360-degree scan of all possible options, also expensive and complex and unsustainable. That prevents someone later from saying: ‘this wasn’t investigated.’ It’s good that all those complex options were on the table.” (Dor-5-PDO-GD)

“At the start you must be able to explore as many solution directions as possible. If you were to say from the beginning: only above-ground construction is allowed, because that is the most sustainable, then too many options would be excluded.” (Dor-6-IB3-Ar)

From the longlist, the team applied an initial filtering step (*zeef 0*) to eliminate infeasible options. The surviving combinations of building blocks were grouped into solution directions, each thematically labelled based on project goals. One of these was explicitly named the “sustainable alternative”. This did not mean that the other solutions were unsustainable, but rather that this option emphasised sustainability measures more explicitly.

ProRail stressed the importance of testing at least one such option:

“I always say: I am looking for the feasible solution. And it must also be feasibly sustainable. If we get CO₂ budgets imposed in the future, that must already be incorporated. That’s why we said in the NKO phase: good that we explore all alternatives, but we want at least one option in which sustainability is central.” (Dor-4-PC1-PR)

Initially, the municipality was hesitant:

“We said we wanted to include one option fully focused on sustainability. Initially, the municipality didn’t like it, but we argued: this is the NKO phase, we must explore broadly. If it doesn’t work, it will fall away in the filtering.” (Dor-4-PC1-PR)

Despite this, all interviewees agreed that sustainability was not a decisive factor in the Analysis Phase. The leading considerations were still goal achievement and costs. Sustainability was framed as a precondition but perceived as subordinate.

Toward the *Nota Kansrijke Oplossingen* (NKO) phase, the remaining alternatives underwent the first formal assessment round (*zeef 1*). Sustainability was explicitly included as part of the evaluation framework, particularly through climate adaptation and CO₂-reduction criteria. To support this, two streams of analysis were used:

1. Within the consortium, a sustainability advisor qualitatively assessed the alternatives.
2. External studies, carried out by Group A on behalf of Bureau Spoorbouwmeester, quantified the embodied carbon of each option based on required material volumes.

Together, these inputs informed the filtering process. An important outcome was that the so-called “sustainable alternative” emerged as the most promising option. However, this was not primarily because of its environmental performance. Interviewees largely referred to sustainability in terms of material use, energy demand, and opportunities for greenery, but they stressed that cost and spatial feasibility were the decisive criteria:

“We have ultimately dropped the underground solutions. It could have been a real debate, but in the end it wasn’t – they were simply too expensive. If budget had not been a problem, we might have kept them on the table and maybe even chosen more sustainable underground options. But now they dropped out purely on cost.” (Dor-4-PC1-PR)

“The most sustainable variant was the above-ground one. That’s true, but that was not the argument at the time. That’s why it’s important to be clear about the real reasoning. If you reject underground solutions, you automatically end up with certain negative effects. But if you frame that as a sustainability choice, you may mislead people.” (Dor-5-PDO-GD)

“Specifically in Dordrecht, all underground options were dropped. That of course had a sustainability aspect, even if it was not the decisive argument – it was mainly feasibility and limited space.” (Dor-7-PA2-NS)

Thus, the “sustainable alternative” advanced not because of its sustainability features, but because cost-efficiency and technical feasibility aligned most closely with the project goals. Interviewees consistently stressed that sustainability was neither distinctive nor decisive. It played a role in framing and in the assessment criteria, but in practice it reinforced choices already driven by budgetary and spatial constraints.

Phase 4: Assessment phase

In the assessment phase of the Dordrecht MIRT exploration, sustainability no longer played a distinctive role in the comparison of alternatives. Because all underground options had already been filtered out in earlier stages, the remaining solutions were all above-ground and therefore, by definition, relatively less material-intensive and more sustainable. As a result, the differences between the alternatives in terms of material use, energy demand, or biodiversity impact were minor.

As one architect reflected:

“This year we have been so focused on solving the spatial puzzle, that the sustainability aspect was not on the foreground at all. On the one hand, you might think that that’s a bad thing. But on the other hand: I don’t think you can work out projects like this with sustainability as the starting point. Certainly not from climate adaptation; CO₂ maybe, but not from climate resilience.” (Dor-3-IB2-VCS)

The assessment framework still included sustainability, with criteria for climate adaptation and CO₂ emissions. Each alternative was tested against these criteria, but stakeholders noted that, at this stage, the metrics did not add much differentiation:

“In the Oude Lijn studies, sustainability is always part of the assessment. Models can literally be scored against it, but in practice it is no longer the decisive factor.” (Dor-3-IB2-VCS)

“Now you notice that sustainability risks becoming less distinctive. Everything is above-ground, and the question is: where can you still make a difference? And because there is pressure not to carry out more in-depth studies, sustainability in this phase becomes less relevant.” (Dor-6-IB3-Ar)

Budget restrictions in the exploration phase further limited the scope for developing sustainability ambitions formulated earlier by the consortium. More detailed studies were avoided, as they would have gone beyond the required level of abstraction:

“We had to work within a tight budget, which meant we could not go into great depth. In the first phase that may not be a problem, but the more concrete the assessment, the better you can assess the sustainable ambitions and the more concrete the sustainable solutions can be integrated into each option. We even had ideas on how to assess and improve

biodiversity, but could not develop them because the project budget was cut.” (Dor-1-IB1-Ar)

“Because of budget constraints we would have to have a really good story about why extra sustainability studies would have to be done in this phase. But I don’t think it is a distinctive enough aspect to put in the limited hours available.” (Dor-6-IB3-Ar)

In parallel, financial frameworks were being constructed. Cost estimates were central in this stage, but no explicit allocations or reservations were made for sustainability measures. Elements such as solar panels or water features were sometimes included in variants, but not treated as a separate budget category:

“It’s about measures that are incidentally included in one of the variants – PV on a canopy, or water features. You can afterwards label those as sustainable. But there is no separate budget line for sustainability. It is hidden in the building blocks of the variants.” (Dor-6-IB3-Ar)

Phase 5: Preference Decision

At the time of writing, the Dordrecht MIRT exploration is in the finalisation of the 85% report, which will serve as input for the next *BO-MIRT* decision in November 2025. The aim of this phase is to identify a preferred alternative and ensure that all options have been sufficiently assessed.

Stakeholders stressed the importance of documenting the pros and cons of each model, including those that will not be selected. This way, future parties can build on the current work without reopening rejected options unnecessarily:

“Per model – also for the alternatives that are not chosen – we must document the pros and cons, also on sustainability. Future parties can then build on that and not revisit rejected options unnecessarily.” (Dor-3-IB2-VCS)

In the assessment of the preferred alternative, sustainability, as considered by the interviewees, is not expected to serve as a decisive criterion. In this sense interviewees refer largely to the environmental sustainability aspects and the way it is framed in the assessment frameworks (CO₂ and climate resilience). Interviewees emphasised that the essential sustainability themes must be safeguarded and explicitly referenced in the reporting, so that they return in the subsequent design stages.

“You could also pay attention to issues that were brought up early on – ambitions, guidelines, principles – and that will become relevant again later. For example energy use, materialisation, water quality. These may not be central now, but must be taken up in the next phase.” (Dor-5-PDO-GD)

Phase 7: Run-up to the Planning and Study Phase

Looking ahead to the plan elaboration phase (*plan- en studiefase*), stakeholders highlighted several priorities to ensure continuity of sustainability. A recurring suggestion was to embed sustainability so deeply in the design logic that it cannot be removed without undermining the spatial concept:

“The most important part of sustainability must be built in so that you cannot remove it without also taking out something essential from the design. The more it is an inherent part of the spatial solution, the better.” (Dor-1-IB1-Ar)

Another idea was to work towards binding threshold values (*plafondwaarden*) for CO₂ or material use in the next phase. These could be set as contractual requirements in procurement or incentivised financially:

“What we would like to see – and we must still see if we can get it arranged – is making CO₂ ceiling values a precondition. That would mean any design party in the next phase must demonstrate that their variant stays below such a CO₂ ceiling.” (Dor-2-PA1-SB)

Stakeholders also underlined the importance of selecting the right expertise for the next stage, particularly given the combination of technical and heritage challenges in Dordrecht:

“Of course we want to bind the best bureau to us. How? By asking for proven expertise in working with monuments, or proven innovation capacity on sustainability. That does not have to be shown in a new design yet, but can be evidenced with reference projects.” (Dor-4-PC-PR)

Across interviews, there was broad confidence that sustainability would remain on the agenda, reinforced by national and sectoral goals:

“I am not afraid that the sustainability theme will be lost – all organisations underline that it is an important topic, and we have clear targets. By 2050 we must be Paris Proof.” (Dor-7-PA2-NS)

Summary

Table 4.1: Chronological overview of the Dordrecht MIRT-exploration

Phase	Summary of key points
1. Preparatory Phase	• Oude Lijn programme initiated; municipalities and provinces joined forces (housing + mobility). • Dordrecht added later as a priority node. • Overarching assessment framework with explicit sustainability themes. • Sustainability framed as a <i>precondition</i> in project objectives.
1a. Tender Phase	• Included as a formal award criterion in procurement. • Winning consortium presented sustainability vision.
2. Start Exploration	• Joint mapping of policies and ambitions by commissioning parties. • Sustainability included as guidelines in Programme of Requirements (not binding). • Input from external studies (Climate Adaptive Stations, Paris-proof Stations). • Lack of integrated dialogue/workshops on sustainability priorities.
3. Analysis Phase	• Broad exploration of options via “building blocks” approach. • Sustainability first considered as separate block, later integrated across all options. • “Sustainable alternative” tested explicitly, but cost/feasibility were decisive. • Quantitative CO₂ analysis performed; underground options dropped mainly for cost.
4. Assessment phase	• Remaining alternatives all above-ground → limited differentiation on sustainability. • Sustainability included in framework, but as such not decisive. • Tight budgets prevented detailed sustainability studies (e.g. biodiversity). • No separate budget lines for sustainability; incidental measures included in variants.
5. Preference Decision	• 85% report prepared for BO-MIRT decision (Nov 2025). • Sustainability not expected to be decisive, but must be explicitly documented. • Importance of recording pros/cons of rejected options for future use.

Phase	Summary of key points
6. Run-up to plan elaboration phase	• Need to embed sustainability in design logic so it cannot be removed. • Proposal for CO₂/material “ceiling values” as binding conditions in procurement. • Stress on selecting right expertise for next stage (monuments + sustainability). • Broad confidence sustainability remains due to national/sectoral goals.

4.1.1. Objective 1: Definition of sustainability

In the Dordrecht MIRT exploration, sustainability received explicit attention from the outset and was positioned as an integral part of the project rather than a separate goal. It was primarily framed in environmental terms, with emphasis on reducing CO₂ emissions and material use, promoting circularity, and strengthening climate resilience, and was expected to be embedded across all design choices. At one point, a dedicated “sustainable solution direction” was developed to explicitly maximise sustainability measures. Several analyses were carried out to map the sustainability themes that had been defined at the start, supported by background studies on climate adaptation and embodied carbon. The collaborating parties expressed a clear ambition to keep sustainability firmly on the agenda throughout the exploration.

Across the interviews, stakeholders largely defined sustainability in line with the project-specific frameworks, with a strong emphasis on the same environmental aspects. There were no major differences in how sustainability was approached or understood; interviewees tended to refer to similar, project-based examples when discussing sustainability. At the same time, several stakeholders noted that the framing and broadness of the concept made it difficult to operationalise. In principle, almost any design measure could be interpreted through a sustainability lens, which risks turning the discussion into a generic narrative. What ultimately proved decisive in the selection of solution directions were considerations of goal achievement, feasibility, and financial constraints, rather than sustainability itself.

4.1.2. Objective 2: Influential factors

This section shows an overview of frequently mentioned influential factors for the case Dordrecht. A total of 17 influential factors were derived by means of thematic coding of the interviews.

1) Top management (Client) support

Strong buy-in from the commissioning parties was considered essential. Interviewees stressed that without the explicit support of ProRail, NS, and Bureau Spoorbouwmeester (the architectural and design advisory office of ProRail and NS), sustainability would not have had a real chance in Dordrecht. Their commitment created a baseline expectation that sustainability had to be included. This support worked both through active championing (e.g. boards embracing sustainability even if it caused complexity) and through passive reinforcement (reminding stakeholders of existing policies).

“Had we not had NS and ProRail - parties that really advocate sustainability — as clients, then as advisors we would have had no chance. Fortunately, the boards of NS and ProRail embraced this. They find it genuinely important, and accept the discomfort it causes.” (Dor-2-PA1-SB)

“In Dordrecht this works well, with the municipality and the other partners. It can hardly be otherwise, because every party has its own sustainability policy. Sometimes you have to remind people that they have it, but you can’t really argue against it. Everyone pursues the same goal.” (Dor-4-PC1-PR)

2) Quantification tools and methods

A recurring theme in the Dordrecht exploration was the difficulty of making sustainability measurable and tangible. External studies (e.g. on embodied CO₂ and climate adaptation) helped to translate ambitions into comparable figures, turning sustainability into a design parameter rather than a vague

aspiration. However standardised methods are not available yet. Interviewees said that if quantified, sustainability themes could be better incorporated in overall consideration and perhaps also relate to financial implications. Interviewees also stated that methods for concretising proved useful when they were simple, transparent, and matched the level of abstraction of the exploration phase. Overly detailed or unreliable methods risked producing irrelevant “pseudo-reality.”

“Tools could help, especially if you can use them to show easily: look, this is the consequence, and this is the quantitative benefit for sustainability. The more concrete the assessment, the better... not a vague story in long texts, but ideally just a number or a colour code.” (Dor-1-IB1-Ar)

“The CO₂ calculation is straightforward: from the bill of quantities you can say, this is so many cubic metres of this material, and you can calculate emissions. For climate adaptation, we used analyses of local climate effects” (Dor-4-PC-PR)

3) Location-specific factors

The need to resolve the spatial and functional challenges of the Dordrecht station area was a decisive influence throughout the exploration phase. Core objectives such as ensuring transfer capacity, overcoming the barrier effect of the tracks, and respecting the monumental station building took precedence over sustainability.

On the one hand, this focus helped sustainability considerations because it caused technically complex and unsustainable underground options to be avoided. The project advanced more sustainable outcomes. On the other hand, the dominance of spatial integration often overshadowed sustainability as a driver of decisions. Sustainability considerations were layered onto solutions only after the main spatial objectives had been secured, which meant they rarely determined which alternatives advanced.

“Space shortage is usually a decisive factor in these MIRT explorations... Different claims on space clash, and that often forces you underground with lots of concrete, which has a heavy negative impact on sustainability. In Dordrecht, fortunately, that was less the case.” (Dor-2-PA1-SB)

“In Dordrecht there is little space: a monumental station on one side, a park on the other. To build a tunnel you’d need long track closures. Dordrecht is an island, everything is wet — underground construction is very complex. The fact that this fell away also brought a huge sustainability gain.” (Dor-7-PA2-NS)

4) Project goals & Assessment frameworks

An important factor in Dordrecht was that sustainability was explicitly formulated as a project objective and embedded in the overarching assessment framework. By making it a *precondition* rather than an optional add-on, all alternatives had to align with Paris Proof ambitions. This ensured that sustainability could not be sidelined in later stages: every solution was assessed against sustainability criteria from the outset.

On the one hand, this created a level playing field: instead of choosing between a “green” and a “non-green” alternative, all designs were required to integrate sustainability. On the other hand, the themes sometimes remained abstract, leaving room for interpretation in how ambitions would be made concrete.

“We made sustainability a precondition. All alternatives are assessed from a sustainable perspective. It is not that decision-makers must choose one specific sustainable option; the intention is that all alternatives come close to the Paris Proof target.” (Dor-4-PC-PR)

“Formulating sustainability as one of the main objectives and embedding it in assessment frameworks forces you to think about it carefully from the start. That is not done for nothing; it is necessary.” (Dor-7-PA2-NS)

5) Sustainability policies

Another influential factor was that all commissioning parties already had their own sustainability policies. This meant that sustainability could not be ignored: from the outset it had to be discussed and aligned

in order to translate organisational ambitions into the project context. The early comparison of policies created a shared baseline and helped to avoid later disputes, ensuring that sustainability remained a cross-cutting theme throughout the process.

“We made an overview to see per sustainability theme what are the goals of ProRail, NS, and Bureau Spoorbouwmeester, and how can we translate them into the challenges of the MIRT Oude Lijn exploration. That was a valuable exercise, because it forces you to have a broad discussion and created a joint goal at the table.” (Dor-7-PA2-NS)

“We collected: this is how our company sees sustainability, this is how it appears on our websites, and this is how it fits with the assessment framework. We translated it into a joint summary on themes like materials, energy, and climate adaptation.” (Dor-4-PC-PR)

6) Sustainability Champion (Bureau Spoorbouwmeester)

Bureau Spoorbouwmeester acted as a key sustainability champion in the Dordrecht exploration. Although not a commissioning party with financial stakes, their advisory role made them an influential agenda-setter. They consistently raised sustainability in discussions, provided tools and studies (e.g. on climate adaptation and embodied CO₂), and reminded stakeholders that the project would have to meet future environmental regulations. This helped to translate abstract ambitions into concrete project considerations. Several interviewees suggested that without their involvement, sustainability would likely have received less attention.

“You notice that from the current Spoorbouwmeester, sustainability is a key focus. If it was not raised, often the Spoorbouwmeester’s advisor would bring it up. They are one of the drivers in the MIRT explorations for putting sustainability on the table.” (Dor-7-PA2-NS)

“At Spoorbouwmeester [...] sustainability is really guiding. Their line is: be aware that you are designing something that will only be built in 2030. It must comply with the regulations of that future moment.” (Dor-4-PC1-PR)

7) Financial considerations

Financial constraints were mentioned as a recurring obstacle in the Dordrecht case. Large infrastructure projects almost always exceed initial budgets, and as costs rise, measures considered “nice-to-have” — such as green and blue interventions or material upgrades — are especially vulnerable. Even when ambitions are high, limited funds make it difficult to safeguard these measures. Interviewees stressed that budget overruns tend to trigger a process of cutting extras, with sustainability measures often at risk.

At the same time, cost efficiency also worked as a driver for sustainability. Underground construction was not only prohibitively expensive but also highly carbon-intensive, which naturally pushed the project towards above-ground alternatives. Reuse of existing infrastructure was another example where financial efficiency aligned with circular economy principles, high on the R-ladder (refuse, reduce, reuse). In this sense, financial discipline both constrained ambitions and, in certain cases, steered the project in a more sustainable direction.

Interviewees also pointed out that this duality may shift over time: while cost considerations in the exploration phase favoured sustainable options, in later stages budget cuts could just as easily undermine sustainability ambitions.

“In this phase the costs were on our side, but in the next phase it may well be the other way around. Then everything that costs extra money is ruthlessly cut. If you want solar panels on a platform roof or other nice-to-haves, you will hear: ‘we won’t do that, the roof must be reinforced and that costs too much extra.’ Money is always the big danger: that all ambitions are lost. Exactly the add-on measures are at risk.” (Dor-4-PC-PR)

“Cost efficiency and efficiency of the design are ultimately the most important to actually deliver the project. These kinds of projects almost always go over budget several times, so everything that can be removed will be removed. You must make sure that sustainability ambitions are not among the elements cut.” (Dor-1-IB1-Ar)

“What I really find difficult is the costs. We all know what a good station looks like, we all know our ambitions, and we all see the opportunities, but budget feels very much like a limiting factor that forces you to abandon ambitions.” (Dor-7-PA2-NS)

8) Rules and regulations

Safety and comfort rules were described as important aspects of station design that can clash with sustainability ambitions. Regulations impose strict requirements for platform width, accessibility, and emergency safety, leaving little flexibility to prioritise sustainability. Comfort measures, such as escalators, improve accessibility but also increase energy use. This creates a structural tension: safety and comfort are firmly anchored in regulation and therefore tend to outweigh sustainability when trade-offs are made.

“Safety is something we value highly. Comfort and safety are not always the best friends of sustainability — cars are safer and more comfortable but also consume more energy. That same tension is present in these projects.” (Dor-2-PA1-SB)

9) Shared sustainability vision

Although the commissioning organisations (NS, ProRail, Bureau Spoorbouwmeester, municipalities) documented their own ambitions, there was no joint session with the consortium at the start to interpret these goals and translate them into a shared storyline. As a result, sustainability guidance was fragmented across documents and difficult for the consortium to interpret. The sustainability vision presented during the tender was also not actively used afterwards.

This absence of a common frame of reference meant that sustainability lacked a clear storyline on sustainability throughout the project. Interviewees noted this as a missed opportunity: a structured vision could have kept sustainability more central in discussions, even if it would not necessarily have changed the final outcome.

“No, it [sustainability] was not decisive. I think that is also because we did not have that common vision at the beginning. There is no red thread of sustainability running through the project. Whether that is a problem, I don’t know, but it is what I observe.” (Dor-6-IB3-Ar)

“I don’t think a conversation about sustainability was applied in the beginning of the process, at least not together. It would have been interesting as a tool, to really have sustainability as a central topic on the table. I would definitely recommend it — better than just sending the documents without elaboration and prioritisation” (Dor-3-IB2-VCS)

10) Getting the right people at the table

Another challenge was the representation of sustainability expertise in the project dialogue. While technical specialists such as traffic and urban planning advisors were actively involved, no dedicated sustainability experts from the commissioning parties participated in the Dordrecht discussions. Because sustainability is such a broad concept, municipal specialists were not directly connected to the project, making it difficult to integrate their perspectives. This absence did not block progress, but it meant that sustainability received less visible and less consistent attention compared to other topics with strong representation (e.g. traffic or spatial planning).

“We spoke with urban planners and traffic advisors. But we did not have an ecologist or sustainability advisor at the table. Then you also see, as far as I know, that it is not at the top of their list.” (Dor-3-IB2-VCS)

11) Budget

Budget constraints in the exploration phase restricted the scope for sustainability analysis. Ambitions such as biodiversity studies or climate adaptation measures could not be developed due to lack of funding. The tight budget also discouraged the consortium from proposing additional initiatives, as every extra study had to be strongly justified.

“Our ambitions were reduced to what was truly necessary and urgent. With sufficient resources we might have realised more sustainable solutions, but this was not the time.” (Dor-5-PDO-GD)

“We had to request budget per component, and it was strictly monitored. Many items were cut at the start, which discourages you from bringing in extra studies, like more attention to sustainability.” (Dor-6-IB3-Ar)

12) Conflicting interests

The multiplicity of stakeholders brought a wide range of perspectives and interests into the project. ProRail, NS, Bureau Spoorbouwmeester, municipalities, and provinces each had their own definitions and priorities for sustainability. While these perspectives sometimes overlap, they also diverge, creating fragmentation and potential tension. Interviewees pointed out that aligning these views is a major challenge, and that the final decision-making moment could be critical for whether ambitions converge or conflict.

“The biggest obstacle is that there are so many different parties, each with another perspective and another interest. What ‘sustainability’ means also differs. Creating unity between them is the main challenge.” (Dor-1-IB1-Ar)

“These are all the policy documents of the municipality. Good luck integrating them into every model. Everyone has a slightly different focus — and who do you keep satisfied?” (Dor-3-IB2-VCS)

13) Level of Aggregation

A recurring insight from the Dordrecht case is the importance of working at the right level of Aggregation when embedding sustainability. In the exploration phase, sustainability should focus on fundamental choices (such as underground versus above-ground construction) rather than on minor add-on measures. Too much attention to details (e.g. materials, small energy savings) risks distracting from the structural decisions that shape long-term impact.

At the same time, stakeholders stressed that functionality and sustainability must be weighed together. Stations must first function as efficient, attractive hubs to facilitate modal shift, but pursuing functionality without considering design and material impacts can undermine sustainability goals.

“We should not stare blindly at screwing in LED lamps everywhere, but look carefully at how you actually build those stations.” (Dor-2-PA1-SB)

“The fundamental choices are made in the exploration phase. Later on, details like solar panels can be added, but this is the stage to set the course.” (Dor-5-PDO-GD)

“What is the most important element? Getting people out of cars and into trains. If you design a climate-adaptive station that does not function properly, you have already failed your goal.” (Dor-3-IB2-VCS)

“We want very good, comfortable nodes to attract travellers out of cars. But if that means building a complex structure with huge amounts of concrete, you risk undermining your own goal of sustainable mobility with an unsustainable station building.” (Dor-2-PA1-SB)

14) Framing

Another influential factor in Dordrecht was how alternatives were framed and communicated. The chosen option was labelled the “sustainable alternative,” referring mostly to the environmental benefits of the solution (no underground structure, efficient material (re)use) but interviewees stressed that this was misleading: the selection was driven primarily by cost, feasibility, and spatial integration. The environmental sustainability aspect was a positive side effect rather than the decisive motive.

Some warned that framing a design as explicitly “the sustainable alternative” risks creating unrealistic expectations or resistance among decision-makers, as purely sustainability-driven options are difficult to justify against other priorities such as safety, capacity, and finance. A more effective approach is to present sustainability as integrated into the project logic, showing that it strengthens cost-efficiency, spatial quality, or resilience, rather than treating it as a stand-alone label. This makes sustainability more acceptable in a multi-stakeholder setting and avoids the impression of green-washing.

15) Personal affinity

Several interviewees noted that the prominence of sustainability in discussions often depended on the personal affinity of the individuals representing each organisation. While all parties formally have sustainability policies, the extent to which these were actively brought into the project varied with the person at the table.

“Every company, and also municipalities, say on their websites that sustainability is important. If you ask, you get piles of brochures. But whether it is really acted upon depends on the person representing the organisation at the table.” (Dor-4-PC-PR)

16) Anticipating future developments

Stakeholders stressed that designing for long-term infrastructure requires anticipating future regulations and standards. Sustainability was therefore deliberately framed as a *precondition*, to ensure that the design would remain compliant and relevant when built a decade later.

“We made sustainability a precondition. You are designing something that will only be built in ten years. You must already meet the legislation of that future moment, even if you do not yet know exactly what it will be.” (Dor-4-PC-PR)

17) Learning from peer projects

The Dordrecht exploration also benefitted from lessons and tools developed in other station projects. The assessment model used in the project was adapted from frameworks applied at other nodes. This knowledge was obtained by the contracting parties in other station design projects. In addition, the *Climate Adaptive Stations* programme drew directly on experiences from earlier examples elsewhere in the Netherlands, providing concrete guidance on measures for Dordrecht. This transfer of knowledge helped to make sustainability ambitions more practical and credible.

summary

Table 4.2 shows the list of influential factors and which interviewees addressed them during the interviews.

Table 4.2: Influential factors mentioned by interviewees

Influential factor	Dor-1	Dor-2	Dor-3	Dor-4	Dor-5	Dor-6	Dor-7
Top management (client) support	✓	✓		✓		✓	
Sustainability policies				✓			✓
Project goals & assessment frameworks	✓		✓	✓			✓
Quantification tools and methods	✓	✓	✓	✓		✓	
Sustainability Champion	✓			✓		✓	✓
Location-specific factors	✓	✓	✓	✓			✓
Financial considerations	✓	✓	✓	✓	✓	✓	✓
Rules and regulations	✓	✓		✓	✓		
Shared sustainability vision			✓			✓	✓
Getting the right people at the table			✓			✓	
Budget	✓				✓	✓	
Conflicting interests	✓	✓	✓		✓		✓
Level of Aggregation		✓	✓		✓		
Framing	✓			✓	✓	✓	
Personal affinity		✓		✓			✓
Anticipating future developments	✓	✓	✓	✓		✓	
Learning from peer projects	✓					✓	

4.1.3. Objective 3: Process of embedding sustainability

This section addresses the third research sub-question and looks into how is sustainability embedded in the processes of the MIRT explorations. The analysis is structured in two steps. First, it examines

how the five principles from the *Handreiking Verduurzaming MIRT* were applied in the Dordrecht exploration. Second, it discusses how different stakeholder groups organised responsibilities and strategies to integrate sustainability into the process.

Application of the guideline principles

Table 4.3 summarises the application of the five principles in the Dordrecht case. Many of the interviewees were aware of the *Handreiking Verduurzaming MIRT* and of tools associated with it, such as the *Ambitiweb*. However, only few had detailed knowledge of the content of the guideline and the concrete principles it offers. This does not mean that the principles were absent in the project: several of them can clearly be identified in the Dordrecht process, yet not as a direct consequence of explicitly applying the guideline. Rather, they emerged more implicitly through the project logic and collaboration among stakeholders.

Principle (<i>Handreiking Verduurzaming MIRT</i>)	Addressed in Case?	Dordrecht — Practice & Findings
1. Discuss sustainability ambitions	Partly	Ambitions were inventoried across NS, ProRail, <i>Bureau Spoorbouwmeester</i> , and the municipality. However, no joint workshop with the consortium produced a shared storyline. External side-studies (<i>Paris-proof</i> , <i>Climate Adaptive Stations</i>) provided input.
2. Integrate sustainability in alternatives and solution directions	Yes	Initially treated as a separate “building block”, sustainability was later integrated across all alternatives. One explicit “sustainable alternative” was developed, but final choices were driven by cost and feasibility.
3. Include sustainability themes in assessment frameworks	Yes	Explicitly included (CO ₂ , circularity, climate adaptation). Options were tested qualitatively and quantitatively (e.g. embodied-carbon study). At later stages differences were limited, as all solutions were above-ground.
4. Integrate sustainability in financing	Limited	No dedicated budget lines for sustainability. Measures (e.g. PV, water features) were embedded in variants. Budget constraints limited ambitions.
5. Make sustainability explicit in decision-making	Partly	Above-ground solutions were sometimes framed as “sustainable”, but costs and spatial feasibility were decisive. Sustainability was treated as a precondition, ensuring it was always present but not decisive. It was, however, included in the MER and MKBA, which hold weight in decision-making.

Table 4.3: Application of guideline principles in the Dordrecht case

Stakeholder responsibilities and strategies

Collaboration around sustainability was generally constructive, with stakeholders showing a shared willingness to embed sustainability in the project logic. Four main stakeholder groups can be distinguished: permanent owners and sponsors, the temporary client project team, partners and advisors, and the consultancy and engineering consortium. Each group applied different strategies to keep sustainability on the agenda.

Owners and sponsors: The permanent sponsors (I&W, ProRail, NS, Municipality of Dordrecht) held the most formal responsibilities. They embedded sustainability in objectives and assessment frameworks, integrated ambitions into procurement, steered the project through their own sustainability policies, engaged experts, and clarified priorities across themes.

Temporary project team: The core project team coordinated the exploration phase and facilitated dialogue. Their strategies focused on organising joint sessions, embedding ambitions consistently in assessment frameworks, documenting trade-offs to safeguard ambitions, and keeping sustainability visible in design discussions.

Partners and advisors: Bureau Spoorbouwmeester acted as an advisor with a clearly defined sustainability agenda. By conducting analyses on a more holistic level (such as studies on climate adaptation around the stations within the broader Oude Lijn project) they were able to function as a knowledge broker, transferring information and expertise between projects. Their role involved setting the agenda, providing tools and studies (for example on climate adaptation and embodied CO₂), and contributing a future-oriented perspective by reminding partners of long-term regulatory developments and sustainability goals.

Consultancy and engineering consortium: The design and engineering consortium (Arup and VenhoevenCS) operationalised sustainability in concrete alternatives. They proactively proposed measures, clarified trade-offs in solution directions, and introduced innovations by leveraging experience from other projects.

4.2. Case 2: OVAH

Chronological description (six steps)

This section will provide a summary of the evaluation of sustainability considerations throughout OVAH.

Phase 1: Preparatory Phase

The OVAH project is a continuation of earlier studies exploring how to accommodate the growing transport demand in the Amsterdam–Schiphol–Hoofddorp corridor. From the outset, these studies have been linked to broader sustainability objectives at an aggregated level: shifting mobility towards international rail, reducing reliance on short-haul flights, and enabling spatial developments in the region.

The Municipality of Amsterdam emphasises that Schiphol's growth is not only associated with economic benefits, but also with significant negative externalities such as noise pollution, air quality impacts, and the obstruction of urban development projects (e.g. student housing in Amstelveen that has been stalled for years):

“Area development projects in the region cannot go ahead because Schiphol is there, such as the student housing at Kronenburg which has been stuck for many years. [...] There are many unnecessary flights, such as to Brussels, Düsseldorf or Paris, which can easily be done by train. [...] Projects like OVAH are a precondition for that transition to sustainability; that is one of the main reasons the project has a right to exist in the first place.” (OVAH-5-PC2-Ams)

To find the best solution that would contribute to these objectives, multiple interrelated studies have been performed.

Schiphol Multimodal Hub (early predecessor) An early study that closely intersected with the development of OVAH was another MIRT Exploration that looked at Schiphol as a Multimodal Hub. The Schiphol Multimodal Hub was a project aimed at addressing short-term capacity development and how this could be accommodated up to 2035. The MIRT Exploration for the Multimodal Hub Schiphol (MKS) would have to identify cost-effective measures that could absorb growth up to around 2035 (equivalent to approximately 135,000 train passengers per day, either boarding, alighting or transferring at Schiphol).

One central conclusion of this study was that technical expansion within the existing tunnel tubes was impossible. This meant that an additional mode of transport had to be introduced:

“The platforms are in a tunnel tube, and we investigated whether they could be widened [...]. The answer was ultimately: no, that really isn't possible. And that is why you need to add another mode of mobility.” (OVAH-2-PC-GH)

Although sustainability assessments were carried out within this study, they were not included in the formal Gate Review by Rijkswaterstaat, which focused primarily on design and capacity issues:

“When there is a change in phases, Rijkswaterstaat can organise a Gate Review, so the next suppliers know the ins and outs of the project. At the Schiphol Multimodal Hub sustainability studies were performed, however I don’t see them included in the Gate Review, which might be an interesting observation.” (OVAH-2-PC-GH)

ZWASH programme line As part of the same BO-MIRT consultations that launched the MIRT Exploration for the Multimodal Hub, it was decided to launch a separate MIRT study (*MIRT-onderzoek*) focusing on a long-term solution (from 2030–2035 onwards) for Schiphol and other mobility bottlenecks in the Southwest Amsterdam region (ZWASH). This MIRT study is the formal predecessor of the OVAH project, and therefore laid the basis for the current formulation of the project goals and the type of solutions that are being explored.

Most notably, it developed the concept of the “Green Metro Line”, which incorporated measures on circular construction, energy-neutral operation, climate adaptation, and bio-based materials. For this alternative, a *Milieukosten Indicator* (MKI) assessment was carried out, demonstrating that sustainable implementation would be highly cost-effective, particularly during the operational phase:

“The project team has major ambitions in the field of sustainability and circularity. [...] The MKI results show that sustainable implementation of the project is highly worthwhile.” (ZWASH, final report)

Continuity towards OVAH The final report of ZWASH formulates a desire to embed high sustainability ambitions in the next MIRT phase. It included suggestions on how to embed sustainability in MIRT Explorations:

“As a precursor, we also had ZWASH. The sustainability objectives that were formulated there were already established politically before the OVAH project, this project was set up with almost the same objectives.” (OVAH-1-PDO-Ams)

However, the documents do not specify the specific ambitions. In the official *Startdocument* for the Exploration phase, sustainability is not listed as one of the four primary project objectives, which are formally:

1. Solving the capacity problems in the Schiphol tunnel and thereby enabling the national rail network in line with the *OV-Toekomstbeeld 2040*;
2. Reducing transfer problems at Schiphol and Amsterdam Zuid stations;
3. Improving public transport accessibility of new housing and working locations;
4. Increasing international train traffic.

Sustainability is not formulated as a primary objective. Instead, it is addressed in a separate paragraph (3.2 *Duurzaamheid*), where the document stresses the high ambitions regarding sustainability and circularity. It explicitly builds on earlier ZWASH concepts such as the “energy-neutral line” and the “green line”, as well as previous explorations of innovations. The *Startdocument* concludes that implementing circular and energy-saving measures in both construction and operation is highly cost-effective, and that sustainability ambitions should be further elaborated in the Exploration phase, using instruments such as the *Handreiking Verduurzaming MIRT*.

In addition, sustainability is structurally embedded in the project’s organisation. It is designated as a cross-cutting work package, with a dedicated sustainability report to be delivered as one of the substantive and procedural outputs. Within the IPM system, sustainability is placed under the “Management, Technique & Operations” responsibility. Moreover, an environmental manager from the client organisation was appointed as lead for the sustainability report, under the role of Project Leader for Sustainability and Innovation.

Phase 1a: Tender Phase

From the beginning, it was clear that the commissioning parties wanted sustainability to be part of the project, and that specific work packages would be outsourced for this purpose. These work packages were allocated to *Perceel 1*, which also included responsibility for preparing the *Plan-MER* and the *MKBA*, both of which inherently address elements of sustainability. In the product breakdown structure, it was already established that a sustainability report had to be delivered within *Perceel 1* (Product 7.13: *Rapportage Duurzaamheid en Innovatie*). However, the content and methodology of this report were not prescribed, leaving it up to the contractor to decide how to approach it.

What is noteworthy is that sustainability was not included as an award criterion in the tender. This was also pointed out by one of the advisors:

“Sustainability was not an award criterion in the tender phase [...] We did mention it in our proposal, but that was more from our own initiative since it was not assessed. It was not distinctive [...] it was simply one of the work packages you had to offer [...] but there was no real request for a vision on sustainability.” (OVAH-3-IB1-TG)

This lack of emphasis on sustainability within the bidding process was also noted during the market consultation. Market parties suggested that, while the owners and sponsors formulated high ambitions on sustainability, the tender documents did not describe how bidders could differentiate themselves on sustainability within the procurement process (see *Verslag Marktconsultatie*).

Phase 2: Start Exploration

After the award of the contract, the three engineering consortia started their work. Sustainability was structurally embedded in the project organisation. Within the framework contract between IB1 and the project organisation, a specific *NOK* (*nadere overeenkomst* – supplementary agreement) was established for the sustainability report. Specific hours were allocated to this task within *Perceel 1* (IB1):

“There are really specific hours reserved for the sustainability report, set aside as a separate task for IB1.” (OVAH-1-PDO-Ams)

In describing the timeline of the start phase, the IB1 advisor explained how their involvement developed from the tender into the design process:

“We started writing the proposal for the supplementary agreement in April '24, and by the end of August we had begun the actual work. That was during the *elementaire ontwerp* (elementary design) phase.” (OVAH-3-IB1-TG)

For sustainability, the first step was collecting the policies and strategies of all project partners to analyse which aspects could be anchored in the project:

“We had to do something with sustainability in this project, and all project partners wanted that as well. The challenge was: how do we arrive at one shared set of sustainability goals, despite the different interests?” (OVAH-1-PDO-Ams)

On 26 September 2024, IB1 organised an *ambitiweb* (ambition web) session with representatives of all project partners (eight in total, including Schiphol, NS, Haarlemmermeer and SoDC). According to one participant:

“What the engineering firm in IB1 did very well was that they first inventoried which policy documents each partner had – Amsterdam, Haarlemmermeer, ProRail, Schiphol – and what was stated there on sustainability.” (OVAH-2-PC-GH)

During the session, the *ambitiweb* was filled in collectively and a first set of sustainability objectives was formulated. The session was experienced positively. One participant emphasised:

“The session was valuable because we not only discussed ambitions, but also explicitly looked at where the project could have the greatest impact – both positive and negative.” (OVAH-3-IB1-TG)

However, as one project advisor noted, not all stakeholders were equally involved at this stage:

“At OVAH we were not specifically included in the early sustainability discussions. At the MIRT-exploration OVSA*, for example, they also organised a session and asked us to join as advisor partner at the table.” (OVAH-4-PA1-GVB)

*OVSA is another MIRT exploration for a large public transport project in Amsterdam.

The results of the *ambitiweb* were later presented in the *Inhoudelijke Begeleidingsgroep* (IBG) Techniek (*Substantive Guidance Group for Technology*), where all project partners are represented, to ensure broad support for the objectives. The exercise showed that the most important themes were energy and materials, with climate adaptation also highlighted due to the amount of paving involved. Another interviewee recalled:

“For this type of OV-infrastructure project the biggest environmental factors are material mass and energy – you’re literally digging tunnels and pouring concrete. So those scored relatively high in the ambition web.” (OVAH-2-PC-GH)

Alongside these main themes, nature was included because of the proximity to sensitive areas, and spatial quality (*ruimtelijke kwaliteit*) was added to ensure the metro line would be well integrated into the urban fabric.

The project was also registered as a frontrunner under national programmes for Zero Emission Building (ZEB, *Zero Emissie Bouwen*) and KCI (*Koploper Circulariteit en Innovatie – Frontrunner Circularity and Innovation*):

“We want to be a frontrunner project on ZEB and KCI.” (OVAH-1-PDO-Ams)

The *ambitiweb* session concluded with a shared motto that summarised the ambition of all partners:

“Bij OVAH zetten we slim ontwerp en innovaties in om een duurzame toekomst dichterbij te brengen.” (*At OVAH, we use smart design and innovations to bring a sustainable future closer.*)

Phase 3: Analysis phase

In the Analysis phase, the first funnel step (*trechteringsstap* – filtering step) was carried out to work towards the *Notitie Kansrijke Oplossingen* (NKO – Note on Promising Alternatives). This was done through the design of a filter system (*zeef* – sieve), in this case Zeef 1.

The process started with a longlist of 33 potential solutions. These were supplemented with 25 additional alternatives and optimisations proposed during participation rounds (*zienswijzen* – stakeholder input). All solutions were assessed against a predefined assessment framework (*toetsingskader*). This framework included the four primary project objectives — solving the capacity problem in the Schiphol tunnel (1), reducing transfer problems at Schiphol and Amsterdam Zuid (2), increasing international train traffic (3), and improving accessibility of new residential and work areas (4) — alongside technical or legal “showstoppers” and financial feasibility. Notably, the assessment framework did not contain any specific sustainability references:

“In the assessment framework you only have the four project objectives, plus costs, technical feasibility and planning. Sustainability is not in there, so it is not part of the formal decision-making process and cannot be a distinguishing factor.” (OVAH-3-IB1-TG)

Instead, sustainability was mainly considered in parallel processes such as the design trade-off matrix:

“In the design process, you constantly have to make choices, and there they did look more broadly than the assessment framework. Sustainability was included there, but it has no legal framework, so it still feels somewhat voluntary. It depends on the ambitions of the project partners rather than on formal assessment criteria.” (OVAH-3-IB1-TG)

Through stepwise filtering, the longlist was reduced to a shortlist, which was further refined by comparing and combining alternatives. This ultimately resulted in five *basisalternatieven* (basic alternatives).

This process ran partly in parallel with the start of the sustainability discussions. As one IB1 advisor explained:

“We had set the ambitions at the beginning, but then the question was: what do we do next? We conducted several sustainability studies – on energy, on materials with an MKI calculation, on climate adaptation, and also on nature. These were partly carried out within the framework of the Plan-MER. In addition, a study on spatial quality was done, which is not strictly part of sustainability, but is still one of the themes in our ambition web.” (OVAH-3-IB1-TG)

This was an effort by the project organisation and IB1; interaction with project partners (clients and sponsors) on sustainability remained limited during this phase:

“In this phase we did not have much interaction with the project partners on sustainability. It was discussed in the IBG (*Inhoudelijke Begeleidingsgroep* – Substantive Guidance Group) when we presented it there and when they carried out a review. But I think the real interaction with project partners will only come once the sustainability report is available and is part of the review process.” (OVAH-1-PDO-Ams)

Finally, several measures or opportunities were recognised but not yet implemented in the design alternatives, as timing was considered premature:

“Some measures or opportunities have already been included in the design of one alternative. But for others, it is simply too early and too much hassle to incorporate them now. Instead, we document them properly and make sure they will be included if this design is chosen. For example, you can already decide to place the storage facility elsewhere, which avoids the need to build an expensive structure – and that makes a huge difference in CO₂ emissions and material use.” (OVAH-1-PDO-Ams)

As a result, the NKO itself still made only limited reference to sustainability objectives. Alternatives developed during the ZWASH phase, such as the *groene lijn* (green line), were not explicitly selected for further elaboration in this phase.

Phase 4: Assessment Phase

In the assessment phase, the five *basialternatieven* (basic alternatives) were worked out in more detail. This included technical elaborations, design studies and the first cost estimates (still with a 25% margin). For sustainability, three reports were of particular importance in this phase: the *Plan-MER* (*milieu-effectrapportage* – Environmental Impact Assessment), the *MKBA* (*maatschappelijke kosten-baten analyse* – Social Cost-Benefit Analysis), and the sustainability report (*duurzaamheidsrapportage*). Together, these formed the main decision information on sustainability for the client organisation.

The MER: direct local impacts The MER looks at the direct environmental effects of each alternative on its surroundings. Because all alternatives involve significant new infrastructure, the environmental impacts are structurally negative. As one interviewee explained:

“Sustainability has, in a sense, an important relationship with the MER. For large infrastructure projects a MER is mandatory, with a fixed protocol, and sustainability is also addressed there.” (OVAH-2-PC-GH)

The first results of the MER showed only limited differences between the alternatives:

“If I summarise the first MER results, the differences between the five alternatives are relatively small. The main distinction is the degree to which the alignment goes underground. If you are more above ground, you get more noise. But if you go underground, you reduce noise but increase soil disturbance.” (OVAH-2-PC-GH)

The MKBA: system-level effects While the MER focuses on local and direct environmental effects, the MKBA looks at system-level effects in the future. It weighs all societal costs and benefits, including potential modal shift. One interviewee highlighted how these two tools produce different “realities”:

“The MER always shows a negative effect, because you are adding something – for example, digging a 5 km tunnel means CO₂ emissions and energy use. What MER does not include is the reduction of car emissions if you shift travellers to metro or train. That is included in the MKBA, which can even show a positive effect.” (OVAH-2-PC-GH)

At the same time, the MKBA results need to be interpreted carefully:

“Politicians sometimes think many people will switch from car to public transport. In reality, modal shift is often 0.5–1%. But because traffic volumes on the A4 are so large, even that small shift still matters for emissions.” (OVAH-2-PC-GH)

Sustainability report With the five basic alternatives defined, more targeted sustainability studies could be carried out. The assessment phase therefore brought renewed attention to the sustainability report. Because the designs were still not detailed, many stakeholders stressed that it was very difficult to conduct specific, quantitative assessments at this stage. It was also challenging to identify distinctive differences between the alternatives, as all involved major new infrastructure.

For this reason, the sustainability report was structured around measures. For each alternative, the report assessed the impact of individual measures on the pre-defined sustainability themes from the *ambitiweb sessie* (energy, materials, climate adaptation, nature, spatial quality). As one interviewee explained:

“We looked at how the alternatives scored, partly using results from the MER, but also in workshops with the design leaders for BRT, metro and train. They reflected on the findings and brainstormed about what opportunities could be developed further in this phase, and what should be carried over to the next phase. This mainly concerned optimisations – for instance, trying to reduce material use as much as possible. Some energy measures were included, and one or two on climate adaptation. But overall, it remained rather limited at this stage.” (OVAH-3-IB1-TG)

These discussions also highlighted the importance of considering spatial requirements for future-proofing:

“If you want to include, for example, nature-friendly banks, you need more space than for standard concrete embankments. That space has to be claimed now, otherwise it becomes very difficult to integrate later.” (OVAH-3-IB1-TG)

The sustainability report therefore served not only to document measures, but also to flag what needed to be picked up in subsequent phases. As another interviewee summarised:

“It is about clearly signalling which measures are already included, and which sustainability studies still need to be done in the next phase. So that at the start of that next phase, everyone knows what to work on further.” (OVAH-1-PDO-Ams)

Phase 5: Preference Decision

This phase has yet to unfold within the project. However, some remarks can be made about the expectations for this stage. In the phase of selecting the *voorkeursalternatief* (preferred alternative), costs are expected to become an increasingly dominant factor. While sustainability studies have been carried out, interviewees stressed that the final choice between alternatives will be primarily shaped by investment costs and expected societal benefits such as travel time savings. As one project director noted:

“Including sustainability costs in the cost estimate is tricky, because if you put something on paper, it can be taken off again. But if you don’t include it now, it’s much harder to add later. That’s why I think a sustainability budget must be included if you want to meet your targets.” (OVAH-1-PDO-Ams)

Another interviewee pointed out that sustainability differences were too limited to be decisive in selecting the alternative:

“In infrastructure projects the distinction is not on sustainability. It’s mainly on costs of construction and on societal benefits like travel time savings. Sustainability differences are usually very small.” (OVAH-2-PC-GH)

Still, the reserved sustainability margin in the budget was seen as an important enabler:

“In cost estimates you often include a small margin, like 0.5–1%. That may sound little, but in a multi-billion project it still gives you a lot of room for sustainability.” (OVAH-2-PC-GH)

Alongside costs, the decision will also be informed by the three sustainability-related reports: the *duurzaamheidsrapportage* (sustainability report), the *MER* (Environmental Impact Assessment), and the *MKBA* (Social Cost-Benefit Analysis). These are provided as part of the decision documentation for the alternatives study. The sustainability report is included as an annex to the explanatory note of the *inpassingsontwerp* (design justification), making it formally available to the commissioning parties and BOs when selecting the preferred alternative.

Phase 7: Run-up to Planning and Study Phase

Interviewees emphasised that real decisions on sustainability will only be made in the plan and study phase (*plan- en studiefase*). Until then, all identified opportunities and measures are being documented and carried forward without being locked in:

“For now, we have listed all measures and opportunities, and that is how we report them. But in the plan and study phase, actual choices will have to be made, because we will be working with thirteen project partners, many of whom own land or will have direct stakes in which measures are implemented.” (OVAH-1-PDO-Ams)

It is expected that sustainability will be worked out in more detail once the preferred alternative is set, including in financial terms:

“There is already a standard budget line included. In the plan and study phase a number of sustainability measures will definitely be developed further and the real choices will be made.” (OVAH-2-PC-GH)

At that point, the governance structure will also change, and more formal commitment from other stakeholders will become necessary. This will require new agreements and coordination on sustainability:

“In this phase we are not yet the party responsible for implementation. But once the plan and study phase starts, a new cooperation agreement will be required. Then we as partners will have to sign and commit, and sustainability will likely be one of the elements in that agreement and will have to meet our standards as well. It is important to already take that into consideration when finalising this phase.” (OVAH-4-PA1-GVB)

To safeguard continuity, the project will also use formal systems to record sustainability issues and transfer them to the next phase:

“There is a software system — I think it’s called Lever — where all requirements are tracked, including client demands and attention points. It’s like a reminder list: things we cannot solve now, but that must be addressed in the next phase. Sustainability opportunities and risks will also be entered there. Our integrated sustainability report provides the thematic overview, and those items will then be transferred into the system for follow-up.” (OVAH-3-IB1-TG)

In this way, sustainability ambitions and opportunities identified in the exploration phase will be translated into a structured list of commitments, risks and opportunities that can be picked up in the plan and study phase, where they are expected to become concrete design choices and financial commitments.

Summary

Table 4.4 provides a summary of all the phases with the most important aspects

Table 4.4: Chronological overview of OVAH phases and sustainability

Phase	Key points (sustainability)
Preparatory (ZWASH → OVAH)	• Modal shift, fewer flights, spatial development. • Amsterdam flags Schiphol's externalities. • ZWASH: "Green/Energy-neutral line", MKI showed cost-effectiveness. • Advised embedding ambitions in OVAH.
Tender	• Sustainability as work package (Perceel 1, incl. MER/MKBA). • Report required, method open. • Not an award criterion; market noted missed chance.
Start	• NOK with IB1; budget for report. • Ambitiweb themes: energy, materials, climate, nature, spatial quality. • Shared motto; frontrunner (ZEB, KCI).
Analysis Phase	• Zeef 1: 58 → 5 alternatives. • Framework: goals, cost, feasibility; no sustainability. • Sustainability only in parallel trade-offs/studies.
Assessment	• MER: local impacts; underground vs. surface trade-offs. • MKBA: long-term; small modal shift still matters. • Sustainability report: measures per theme; flagged future needs.
Preferred alternative	• Decision mainly on cost and travel time. • Sustainability differences small; budget margin reserved. • MER, MKBA, and sustainability report inform decision.
Next phase (plan & study)	• Real commitments, detailed design and pricing. • Use of gate review + tracking system. • New cooperation agreement with formal sustainability role.

4.2.1. Objective 1: Definition of sustainability

In the OVAH exploration, sustainability was given an explicit place in the process. The governance structure included sustainability as a full-fledged part of the project required a sustainability report. A structured discussion was organised through an *ambitiweb* session, which led to the selection of a focused set of sustainability themes, primarily environmental aspects such as energy, materials, climate adaptation, and nature. These themes were subsequently elaborated in a dedicated sustainability report that functioned as a formal product within the project organisation. Broader dimensions of sustainability, including social and economic effects, were considered but deliberately excluded from the sustainability definition here, as they are addressed in other analyses (MER, MKBA, and goal orientation).

Despite this clearer organisational position, interviewees indicated that sustainability was not expected to be a distinctive or decisive factor in the selection of alternatives. The identified themes did not have an explicit position in the assessment frameworks, where decisions were primarily guided by goal achievement, technical and spatial feasibility, and financial considerations.

Stakeholders generally interpreted sustainability in similar ways and referred to comparable project-based examples. At the same time, they acknowledged the difficulty of framing such a broad concept, noting that almost any measure can be interpreted through a sustainability lens and that tensions arise

between impacts at different levels of aggregation.

4.2.2. Influential factors

This section shows an overview of frequently mentioned influential factors for the case Dordrecht. A total of 15 influential factors were derived through thematic coding

1) Financial Considerations

Interviewees consistently emphasised that in OVAH, cost considerations outweigh sustainability.

“In infrastructure projects the distinction is not made on sustainability, but on costs and travel time savings.” (OVAH-2-PC-GH)

“In the process, euros are often considered more important than sustainability, even though the two can reinforce each other.” (OVAH-4-PA1-GVB)

Still, respondents noted that cost efficiency and sustainability can align, for example by avoiding material-intensive designs:

“If a certain structure is extremely costly because it requires large amounts of material, we will also ask whether it can be designed more intelligently. In that way, cost and sustainability go hand in hand.” (OVAH-3-IB1-TG)

A total cost of ownership (TCO) approach was applied, extending the scope to long-term maintenance and operations, though insights remain limited. Sustainability is particularly challenging for costly underground construction near Schiphol:

“Is sustainability going to be the norm later in design? In some areas, definitely not, especially when you go underground. That is why you will need to allocate a sustainability budget if you want to meet your objectives.” (OVAH-1-PDO-Ams)

Because specific measures cannot yet be detailed, a general budget margin has been reserved instead of earmarking funds. This allows flexibility for future innovations:

“Say you now reserve money for low-cement concrete. Maybe in four years it will be much cheaper, or maybe we will already have a better type of material. So in terms of innovation you do not want to lock too much in already.” (OVAH-3-IB1-TG)

Although material costs are a small part of total project expenses, even a 1–2% margin can provide substantial room:

“We managed to include 2% of the construction sum for each alternative. It may sound minor, but on such large budgets it makes a real difference.” (OVAH-3-IB1-TG)

Finally, respondents warned that sustainability must be budgeted from the outset:

“Including sustainability in the cost estimate is risky, because if you put something on the table, it can easily be removed again. But the risk of not including it now is even greater.” (OVAH-1-PDO-Ams)

2) Getting the right people at the table

Interviewees highlighted that embedding sustainability requires having the right experts at the table. The *Ambitiweb* session was seen as valuable because it enabled a joint conversation and produced a shared framework across partners.

At the same time, respondents stressed that sustainability expertise within organisations is fragmented, making it difficult to ensure consistent input:

“Often you have a delegate for sustainability, but they are not in the IBG, so they do not really know the project. [...] The people in the IBG are there more for their role of project owner, with different interests. So there is a gap there.” (OVAH-3-IB1-TG)

Client representatives confirmed this challenge:

“Mapping our sustainability perspective is quite difficult. Different directorates are involved, each with their own view. [...] Because it is so fragmented, it is very difficult to see how our sustainability policy should land in such a project.” (OVAH-5-PC2-Ams)

This fragmentation also affects representation in the *Inhoudelijke Begeleidingsgroep* (IBG):

“Within the municipality, for example, there is not a single person for sustainability. You have someone for energy, someone for climate – it is completely fragmented, so it does not arrive via one person in the IBG.” (OVAH-3-IB1-TG)

Finally, this challenge was also indicated from the advisory side, who said the experts they supply were not necessarily the sustainability experts:

“The experts we really have at the table are traffic engineers [...] but they are not the sustainability specialists we do have in-house.” (OVAH-4-PA1-GVB)

In short, while OVAH illustrates the added value of ambition sessions, it also shows how organisational fragmentation and the absence of dedicated sustainability advisors can limit consistent integration of sustainability in decision-making.

3) Level of aggregation

A recurring theme was the level of aggregation at which sustainability impacts are assessed. In the exploratory stage, detailed materialisation choices are postponed, while the focus is on system functionality and capacity.

“It is an elementary design [...] you have to think about capacity and safety, but whether the platforms have white tiles or wooden planks is not included.” (OVAH-2-PC-GH)

Relieving the congested Schiphol tunnel was seen as the key sustainability condition:

“One of the main goals OVAH has is relieving the Schiphol tunnel. That is not directly sustainability, but on an aggregate level it is the crucial point. If we cannot relieve that tunnel, then we score badly on sustainability anyway.” (OVAH-5-PC2-Ams)

“The biggest concern now is, are you going to build something that will actually be used? [...] If you spend billions on a project that does not relieve it and people do not use it, then you are not being sustainable. That is more important now than whether it is energy-neutral.” (OVAH-3-IB1-TG)

At the same time, local environmental impacts remain significant. The MER highlights both perspectives:

“If you are talking about building five metres from a residential house, then there is always a negative impact on the living environment. But if you look at the bigger picture – fewer short-haul flights or fewer cars on the highway – then it is positive again.” (OVAH-4-PA1-GVB)

This tension between regional benefits and local consequences was summarised by one respondent:

“Health and well-being of people living near the metro is just as much part of sustainability. Their situation will probably deteriorate but for those now next to the highway or under Schiphol’s landing routes, the situation will improve. And how do you weigh that?” (OVAH-4-PA1-GVB)

4) Location-specific factors

Spatial integration around Schiphol makes OVAH uniquely complex. Dense urban surroundings, overlapping interests, and the need to tunnel under runways and taxiways mean that underground works are unavoidable. These solutions are technically feasible but extremely resource- and energy-intensive, creating a structural tension between functionality and sustainability. In addition, Natura 2000 protections add legal and ecological constraints, requiring compensation and careful trade-offs.

“It is already an enormous challenge to fit this into such a densely built area, where there are so many developments, so many interests, and different transport modes all mixed together.” (OVAH-1-PDO-Ams)

“There are quite a few tunnels in the project, because you cannot approach Schiphol at ground level – the runways and taxiways are there. [...] You always have to approach Schiphol with a tunnel.” (OVAH-2-PC-GH)

“If it becomes a metro and you go under Hoofddorp, you end up between a Natura 2000 area. There, sustainability is then seen more as a limitation than as an opportunity.” (OVAH-4-PA1-GVB)

5) Shared sustainability vision

Interviewees underlined the importance of establishing a clear vision early, achieved mainly through the *Ambitiweb* session. This collective exercise set high ambitions, created commitment among partners, and provided a framework to guide later phases. Respondents stressed the value of formulating ambitious goals even when feasibility remains uncertain, though they also noted the tension between aspiration and practical constraints.

“In a scoping phase, not everything is feasible. But you still want to put reasonably high ambitions on the table, also because it is still quite a long period until construction starts.” (OVAH-3-IB1-TG)

“We want to be a frontrunner project on KCI and ZEB, and that always sounds good to say. But it also raises the question of what that really means in practice, especially if you need to build underground emission-free.” (OVAH-1-PDO-Ams)

“The Ambitiweb session was valuable because we not only discussed ambitions, but also explicitly looked at where the project could have the greatest impact – both positive and negative.” (OVAH-3-IB1-TG)

6) Sustainability policies

Existing policy frameworks of the project partners were an important lever to anchor sustainability in OVAH. Since sustainability was not part of the formal assessment framework, these policies were used to hold parties accountable to their own commitments. The project organisation actively inventoried these documents, identifying common ambitions such as climate neutrality and circular construction. At the municipal level, guidelines and internal rules (e.g. “sustainable, unless”) further ensured that sustainability could not be sidelined.

“The ambition has been established, but it is not part of the assessment framework. [...] The only thing we can use is reminding project partners of their own policies.” (OVAH-3-IB1-TG)

“What the project organisation did very well was to make an inventory of which policy document each partner has. [...] Then you immediately find a lot of common things that all parties agree on.” (OVAH-2-PC-GH)

“In our transport department we now apply the standard ‘sustainable, unless.’ For every decision we must explain how sustainability has been considered.” (OVAH-5-PC2-Ams)

7) Political and internal stakeholder considerations

Sustainability in OVAH is shaped by political debate and unresolved internal positions of project partners, especially municipalities. Local rules, such as Amsterdam’s requirement of six square metres of green space per new dwelling, can create “sustainability-against-sustainability” conflicts, where ambitions for green preservation limit housing development. These tensions must be resolved politically before positions on project alternatives are finalised.

Interpretations of sustainability also differ across parties, with city councils debating whether the project facilitates unsustainable tourism or enables necessary capacity relief. Ultimately, decision-making authority lies with public bodies, even if stakeholders such as Schiphol contribute financially.

“We have a law in the municipality which says you have to create a certain amount of green space for every square meter of housing or infrastructure you want to build. [...] This rule leads to a kind of sustainability-against-sustainability conflict, where ambitions for green preservation directly limit the ability to realise housing or infrastructure development.” (OVAH-5-PC2-Ams)

“The Party for the Animals said this project mainly facilitates travellers and tourists at Schiphol. Other parties disagree. These discussions on the perceived sustainability impact take place in the city council.” (OVAH-5-PC2-Ams)

“In the end it is public authority that makes the choice. Schiphol can voice their preference, but it is political authority that has the decisive say.” (OVAH-4-PA1-GVB)

8) Anticipating future developments

A recurring challenge in OVAH is designing for a future context where regulations, technologies, and standards will have shifted. Interviewees stressed the need to anticipate innovations while avoiding premature lock-in, and to ensure “first time right” construction to prevent costly redesigns later.

“It takes a long time before we put a shovel in the ground, so it is about looking ahead: what will be business as usual, what innovations will exist, and what level of detail do we design for?” (OVAH-1-PDO-Ams)

“Construction will only start in about ten years. And things like cement-free concrete already exist today; so in ten years it may be the standard.” (OVAH-2-PC-GH)

9) Top management (client) support

The priority given to sustainability in OVAH strongly depends on the commitment of top management and client organisations. Without active championing, sustainability risks receiving limited attention compared to cost considerations. Respondents noted that while the theme is discussed at milestones, it is not always embedded in formal decision-making, and political debates often reduce ambition when costs rise.

“In policymaking some reports are simply looked at less carefully. Yes, sustainability can suffer from that. It is more about how you ensure it really comes to the table and is actually considered.” (OVAH-1-PDO-Ams)

“Politicians are of course very supportive of sustainability – it is good for their image. But then comes the question: does it cost a lot? I have often seen that if you put a bit less sustainability in, the project becomes cheaper.” (OVAH-2-PC-GH)

10) Project goals & assessment framework

One element that stood out in OVAH was that sustainability is not formally embedded in the project objectives or the assessment framework. This makes it largely voluntary and limits its weight in political decision-making. Some argued that sustainability is implicitly part of higher-level goals, such as relieving the Schiphol tunnel to enable the mobility transition. Others also commented on this by highlighting that differences between alternatives on sustainability impacts are small and not decisive and therefore not really considered in the assessment framework.

“Sustainability is not in there, so it is simply not assessed in the political decision-making process – it is not distinctive. [...] It has no legal framework; it is still a bit voluntary so to say.” (OVAH-3-IB1-TG)

“For all alternatives you need energy and concrete. If you make that greener, they all improve equally. The differences between the five do not change, so sustainability does not become a decisive criterion.” (OVAH-2-PC-GH)

11) Conflicting interests

At the strategic level, stakeholders largely share ambitions on sustainability, but tensions are expected once concrete choices must be made. Local land use, Natura 2000 areas, and differing organisational priorities (e.g. municipalities versus Schiphol) are likely to create friction when specific alignments are decided. While the process so far has been cooperative, respondents anticipate compromises will be needed in later phases.

“Everyone is more or less pointing in the same direction on sustainability, but at detail level – such as around Natura 2000 – it becomes more difficult.” (OVAH-4-PA1-GVB)

“Right now there is no tension, because no choice has yet been made. But once a decision is required, it could arise. [...] There is never a perfect variant – you need to find a compromise everyone can accept.” (OVAH-5-PC2-Ams)

12) Documenting and reporting

The role of sustainability in OVAH is strongly shaped by the institutional weight of key documents. The MER (*Environmental Impact Assessment*) is legally binding and ensures sustainability is addressed, though it mainly records negative local impacts of construction. The MKBA (*Social Cost-Benefit Analysis*) captures system-wide benefits such as modal shift, offering a more positive picture, while the sustainability report provides detail but lacks formal status or urgency. Together, these instruments frame how seriously sustainability is considered in decision-making.

“Sustainability has, in a certain sense, a relationship with the MER. A MER is mandatory for large infrastructure projects, and in that protocol sustainability is also considered.” (OVAH-2-PC-GH)

“These documents all have a different kind of urgency. If something has to be in the MER, then it must be done. But if it is only in a separate sustainability report, I wonder how it would be taken into account.” (OVAH-1-PDO-Ams)

13) Personal affinity

The extent to which sustainability is prioritised in OVAH often depends on the personal affinity of individuals. Dedicated sustainability professionals are described as highly motivated, ensuring the theme is placed on the agenda. At the same time, reliance on individuals means that attention to sustainability can vary significantly across organisations and discussions.

“If you bring together the sustainability people from organisations, then they are driven professionals – in a positive sense they are fanatics, and they are motivated on this topic.” (OVAH-2-PC-GH)

“You see that it still depends very much on people. At some parties there are individuals who find it very important and bring it in, but at others that knowledge is not always present.” (OVAH-3-IB1-TG)

14) MIRT System

The procedural logic of the MIRT framework strongly shapes how sustainability is addressed in OVAH. Strict timelines linked to administrative decision-making create time pressure that makes in-depth sustainability discussions difficult. At the same time, the competitive nature of MIRT funding encourages regions to prioritise cost efficiency over sustainability when budgets are tight.

“It is almost day-to-day work, it sometimes really feels like a production line. We try to find time with the designers to look at measures, but there is enormous time pressure because you are in such a MIRT system.” (OVAH-1-PDO-Ams)

“MIRT leads to a struggle between regions over who gets what. [...] With limited funding, it becomes a competition, and when lobbying is high, sustainability considerations that cost money are not necessarily helped.” (OVAH-5-PC2-Ams)

15) Knowledge transfer

Because OVAH spans many years, staff turnover poses a risk for losing knowledge and momentum on sustainability. Documentation helps, but tacit insights and informal agreements are difficult to capture. Formal transfer mechanisms, such as gate reviews, were seen as essential to safeguard continuity and embed sustainability in the next project phase.

“When we move to the plan and study phase it will probably be with other people. [...] With every change of the guard, some knowledge is lost, even if you document it as extensively as possible.” (OVAH-1-PDO-Ams)

“It depends very much on how, for example, the sustainability report is taken along in the gate review.” (OVAH-2-PC-GH)

Table 4.5: Influential factors in the OVAH case, per interviewee

Theme / Driver	OVAH-1	OVAH-2	OVAH-3	OVAH-4	OVAH-5
Financial considerations	✓	✓	✓	✓	✓
Getting the right people at the table			✓	✓	✓
Level of aggregation		✓	✓	✓	
Location-specific factors	✓	✓	✓	✓	✓
Shared vision	✓		✓		
Sustainability policies		✓	✓		✓
Political and internal stakeholder considerations				✓	✓
Anticipating future developments	✓	✓	✓	✓	✓
Top management (client) support	✓	✓	✓		✓
Project goals & assessment framework	✓	✓			✓
Conflicting interests		✓	✓		✓
Documenting and reporting	✓	✓		✓	
Personal affinity		✓	✓		
MIRT system	✓				✓
Knowledge transfer	✓	✓			

4.2.3. Objective 3: Process of embedding sustainability

In the OVAH case, the organisation of sustainability in the process was perceived as well-structured. Already in the tender phase it was made explicit that products would be delivered to map sustainability, including a dedicated sustainability report. This task was systematically taken up by IB1, who began by collecting the ambitions of all project partners and subsequently organised and facilitated a structured discussion around sustainability.

The governance structure also reflected this explicit attention. Within the project organisation there was a designated representative for sustainability, and the work package was formally embedded under the responsibility of the Project Leader for Sustainability and Innovation. Discussions on sustainability were channelled into the *Inhoudelijke Begeleidingsgroep* (IBG) Techniek, where representatives of all project partners were present. This ensured that sustainability ambitions were not only documented but also anchored in the broader project dialogue.

Overall, collaboration around sustainability was described as constructive and conducive to integration. Stakeholders highlighted that the structured approach, dedicated roles, and joint sessions created shared ownership and facilitated embedding sustainability across the project organisation.

This section now turns to the five principles set out in the *Handreiking Verduurzaming MIRT*, and considers how each of these principles has been applied in the OVAH project. Table 4.6 shows the results.

Table 4.6: Application of MIRT sustainability guideline principles in OVAH

Principle (Handreiking Verduurzaming MIRT)	Addressed in Case?	OVAH – Practice & Findings
1. Discuss sustainability ambitions	Yes	In OVAH, this was done through an <i>ambitiweb</i> session with all project partners, where themes such as energy, materials, nature, climate adaptation and spatial quality were identified. The session also resulted in a shared motto on sustainability.
2. Integrate sustainability in alternatives and solution directions	Yes	The main sustainability themes were translated into specific studies (energy, MKI for materials, climate adaptation, nature and spatial quality). Some measures were not yet incorporated in the designs at this stage, but were documented to be integrated if the relevant alternative is selected.
3. Include sustainability themes in assessment frameworks	Limited	The formal assessment framework used in the analysis phase contained only the primary project goals, technical and legal feasibility, and costs. Sustainability was not explicitly included and therefore had limited influence in the comparative assessment of alternatives.
4. Integrate sustainability in financing	Yes	In the cost estimates, a reservation was made for sustainability measures as a percentage of the construction budget. This budget is intended to finance sustainability measures, but its concrete allocation has not yet been defined, since the preferred alternative is not yet chosen and the available products and innovations for the future are still uncertain.
5. Make sustainability explicit in decision-making	Partly	Sustainability is made available in decision-making through a sustainability report, which is attached to the design and provided as decision information to the clients and BOs. However, as it has no formal basis in the assessment framework, and there is no legal status or public consultation attached, their role is considered less prominent and largely non-binding. However, sustainability themes are also included in the MER and MKBA, which do have a more prominent place in decision making.

Stakeholder responsibilities and strategies

The organisation of sustainability in OVAH was not only supported by the governance structure, but also by the specific roles taken up by different stakeholder groups. Each group had distinct responsibilities and strategies in how sustainability was brought into the process.

Owners and sponsors: The owners and sponsors (Ministry of Infrastructure and Water Management, ProRail, Municipality of Amsterdam, Municipality of Haarlemmermeer, NS) hold the ultimate authority over the project. Their responsibility is to steer the overall direction and ensure that sustainability is considered in line with their policy frameworks. Interviewees noted that these parties consider sustainability to be very important, but that their position is often complicated by competing priorities. For example, municipalities face difficult trade-offs between environmental goals and local spatial development pressures, such as housing in Natura 2000 areas. As one interviewee explained, *“I think that Amsterdam and Haarlemmermeer also really find sustainability important, but more often they face a choice between two evils in this project.”* Thus, while sponsors embed sustainability in objectives and policies, their ultimate steering role means they must also balance it against broader political and financial considerations. The representatives of the Municipality of Amsterdam also have the task of aligning the many different departments involved, such as Spatial Planning and Housing. Regular coordination meetings were organised to ensure that ambitions were shared across departments and could be integrated into the project.

Temporary client organisation: The temporary client organisation (project team) was primarily responsible for ensuring that sustainability ambitions landed on the right tables. This required both formal and informal strategies. Sustainability topics were brought into project governance through memos, presentations to the IBG (*Inhoudelijke Begeleidingsgroep*), and documentation in reports, but also through informal conversations to keep directors and managers engaged. As one project team member put it, *“Sometimes it is just having a coffee with the project director to explain why this is important and what we are working on. That helps a lot.”* In this way, the temporary client acted as the main broker to keep sustainability present in decision-making processes.

Partners and advisors: Partners, including future possible operators, were mainly involved to provide input for later phases of the project. Their role was to ensure that the design and sustainability ambitions would remain compatible with future use and operations of the infrastructure. In practice, this meant signalling needs and raising concerns early on, so that the project could take these into account before major commitments were made. While their role in this phase was more limited, their input was valuable in shaping the broader sustainability conversation and ensuring that operational concerns were not overlooked.

Consultancy and engineering consortium: The consultancy and engineering firms (IB1, ASconnect and others) acted as the technical drivers of sustainability in OVAH. IB1 carried primary responsibility for delivering the sustainability report, conducting analyses, and facilitating structured discussions such as the *ambitieweb* session. Their task was to translate the ambitions of the commissioning parties into concrete studies and to ensure an integrated view of sustainability across the alternatives. They organised the process systematically, but also highlighted that there was sometimes a gap between the high-level ambitions of owners/sponsors and their practical commitment to achieve those ambitions. Collaboration with the client team was generally described as very good, allowing the engineering consortium to act as a linking pin between abstract ambitions and concrete design implications.

Overall, the distribution of roles in OVAH created a well-structured process. The sponsors set ambitions but balanced them against other interests, the temporary client ensured that sustainability remained on the agenda across departments and governance layers, partners provided future-oriented input, and the consultancy consortium delivered the technical backbone of analyses and facilitation. Together, these contributions resulted in a collaborative process that gave sustainability a more explicit place.

5

Discussion

This chapter reflects on the key findings of the case studies and situates them within the wider academic and policy debate on sustainability in large-scale infrastructure projects. The discussion is organised into four main sections.

First, the definitions and practical applications of sustainability across the projects are compared. Second, the most influential factors are examined and contrasted with insights from the literature, assessing the extent to which the empirical findings confirm, challenge, or enrich existing theoretical perspectives. Key differences are highlighted and their underlying causes discussed. Third, the chapter addresses the integration of sustainability into the project process and the organisation of related discussions. Particular attention is given to how differing interests, interpretations, and institutional positions shape the integration of sustainability. This includes a comparison of how the general principles (vuistregels) of the MIRT Sustainability Guideline have been interpreted and applied in practice.

Finally, this chapter offers concluding reflections and key interpretations that provide the foundation for developing the toolkit.

5.1. Definition of Sustainability in MIRT-explorations

The results demonstrate that sustainability is a central theme in both case studies, yet its meaning and use in practice differ substantially from the broad and multidimensional definitions found in the literature. This section discusses how the definition of sustainability was framed in the two cases, what factors determined its content and role in decision making, and how stakeholders interpreted and negotiated its meaning in the MIRT context.

5.1.1. Environmental focus

In the literature, sustainability in infrastructure is defined holistically as infrastructure that is “planned, designed, constructed, operated, and decommissioned in a manner that ensures environmental, social, economic, institutional, and financial sustainability over their entire lifecycle.” (United Nations Environment Programme, 2021)[p.9]. This definition explicitly covers multiple dimensions including the three of Elkington’s 1997 triple bottom line: environmental, economic and social. These definitions show that all dimensions must be addressed together across the entire project lifecycle.

The case studies reveal a relatively narrow application of the concept of sustainability. In both projects, the term sustainability was predominantly associated with environmental aspects. Interviewees mainly explained sustainability in terms of environmental performance, focusing on themes such as energy efficiency, material use, and emissions reduction. Social and economic dimensions were addressed elsewhere in the projects, for instance through accessibility objectives or cost–benefit analyses (MKBA), yet these were rarely framed explicitly as sustainability considerations. This narrow association was further reinforced by the way the label sustainability was used in both cases, consistently referring to environmental themes rather than to the other dimensions. Several interviewees also described sustainability as subordinate to other project goals, particularly cost efficiency and problem-solving

capacity, often expressed in terms of accessibility. Paradoxically, these same aspects (economic feasibility and social accessibility) are, from a theoretical standpoint, integral dimensions of sustainability. In practice, however, sustainability was often reduced to a set of measures aimed at improving environmental performance, which were subsequently weighed against or limited by financial constraints and functional objectives. As a result, the concept was largely confined to its environmental interpretation, even though the projects as a whole pursued broader societal value.

This narrowing is not accidental but emerges from procedural choices. This is reflected in the documentation, the reports and the formal frameworks: in Dordrecht, sustainability in the assessment framework was defined in terms of CO₂ reduction and climate adaptation, whereas in OVAH the stakeholders identified energy, material use, nature, climate adaptation and spatial quality as the leading themes in the ambition web session, leaving the other themes for consideration and evaluation elsewhere in the project.

At the same time, interviewees stressed that economic, social, and environmental aspects were never treated in isolation. Trade-offs between costs, spatial integration, and environmental impacts were continuously brought up, and synergies were sought where possible. However, within this discussion, interviewees often stated that what they considered as “sustainability” was often subordinated to other considerations. This reinforces the strong association between the term and its environmental dimension.

5.1.2. What Determines the Definition of Sustainability?

Both projects explicitly and extensively address sustainability within the planning for new infrastructure. The themes addressed and the extent to which they are analysed differs per project. This shows that the definition of sustainability is not given but constructed through project specific discussions. Literature has emphasised that sustainability is inherently normative and contested, shaped by values and institutional choices rather than by a universal checklist (Sturup & Low, 2019). The results confirm this view: in both Dordrecht and OVAH, what counted as sustainability was determined by how external conditions, project scope and procedural aspect were interpreted in the MIRT exploration.

A couple of factors stand out in determining how sustainability is interpreted in a project and the extent to which ambitions can be realised. First, location-specific factors shape which sustainability ambitions are considered and to what degree they can be achieved. In Dordrecht, space constraints and ground conditions steered the project away from underground solutions and into a narrower solution space that was labelled “sustainable.” In OVAH, the connection to Schiphol made tunnelling unavoidable, which created a very large ecological footprint and made materials and energy unavoidable topics in the sustainability debate.

Second, the scale at which the system creates impact influenced which ambitions were prioritised. In Dordrecht, the emphasis was on accessibility and integration with the urban environment on a local level, while in OVAH the potential for modal shift, international connectivity, and long-term regional development framed sustainability discussions.

Third, the way the process was organised also played a decisive role. In Dordrecht, the overarching Oude Lijn assessment framework defined sustainability primarily in terms of C₂ reduction and climate adaptation, making these themes central throughout the decision process. In OVAH, an early ambition web session gave partners the opportunity to collectively identify key themes, which ensured that materials, energy, and spatial quality were consistently part of the reporting and remained visible during the exploration.

Taken together, these factors confirm that sustainability is not a fixed category but a normative and transactional concept. The definition depends on how contextual conditions, system-level effects, and procedural choices are negotiated in practice. This echoes Sturup and Low's (2019) observation that sustainability requires answering fundamental questions such as: What should be sustained? Why should it be sustained? And how should it be sustained? Yet the cases also show a critical divergence from the theoretical ideal: whereas the literature treats these questions as open debates about values and priorities, in practice the answers are often constrained early by technical feasibility, financial rules, and institutional frameworks. This means that the scope for sustainability ambitions is not only the result of negotiation, but also of the way projects are procedurally structured and framed at the start of

the exploration.

5.1.3. Interpretation of the concept

The literature frequently highlights that sustainability is interpreted differently by stakeholders, shaped by their institutional roles, values, and perceptions of risks and opportunities (Gijzel et al., 2019; Machiels et al., 2023). These studies underline its contested character, showing how different groups can hold diverging priorities and even incompatible views of what counts as sustainable. In this light, sustainability is portrayed as a source of tension, negotiation, and conflict.

The case studies confirm that stakeholders recognised sustainability as a broad and somewhat ambiguous term. In Dordrecht, for example, the labelling of one direction for solutions as “the sustainable alternatives” could raise questions about whether other alternatives were therefore not sustainable, and it remained unclear which specific dimensions of sustainability were being emphasised. In OVAH, interviewees described sustainability as a container concept that could be applied at multiple levels and timescales, which made it difficult to pin down a single definition. Such observations mirror the literature in showing how the term can generate ambiguity in decision making.

At the same time, the results also suggest that within each project interpretations converged more than the literature might predict (Gijzel et al., 2019). Because sustainability was explicitly embedded in the process stakeholders generally referred to a similar set of themes when they discussed it. Small differences remained, largely linked to the roles and responsibilities of individual actors, such as which assets they managed or which risks they prioritised. This relative convergence contrasts with the more fragmented picture described in the literature, and points to the role of procedural structuring in reducing ambiguity. By establishing frameworks and shared reference points early in the exploration, MIRT projects appear able to align stakeholder views around a common narrative of sustainability, even if underlying values and priorities still differ.

5.2. Influential Factors

This section discusses the most important influential factors. First, a comparison is made between the factors observed in the case studies. Next, the factors that are most important within the MIRT exploration context specifically are addressed. Finally, a general overview of the factors considered in designing the toolkit is presented, by coupling the factors found in practice with the factors found in literature (see 2.4.3)

5.2.1. Cross-case comparison of influential factors

Table 5.1 summarises the occurrence of influential factors observed in practice. Overall, there is substantial overlap between the cases.

Key differences

- **Quantifying methods:** In Dordrecht, quantifying studies played a leading role in shaping the sustainability narrative and were frequently referenced in discussions. The node-level focus, the presence of the Oude Lijn assessment framework, and external studies on climate adaptation and embodied CO₂ made it possible to link interventions to measurable effects. In OVAH, similar studies were also conducted, but they were less central because the project was at an earlier stage and key modal choices were still unresolved. The broader scope and lower level of detail help explain why quantification was not emphasised as strongly in the interviews.
- **Role of sustainability champion:** In Dordrecht, the Spoorbouwmeester acted as a visible advocate for sustainability, which explains why this factor was frequently mentioned in the interviews. The presence of an identifiable figure gave sustainability a recognisable face within the project. In OVAH, no individual champion was identified; instead, workshops such as the ambition web session provided a collective way of framing sustainability. This shows that the absence of a personified champion does not mean that sustainability is not championed, but rather that advocacy can also be embedded in the process itself. Because advocacy was more procedural than personified in OVAH, the role of a champion was less prominent in the interviews.
- **Rules and Regulations:** In Dordrecht, rules and regulations were mentioned as an influential

factor, while in OVAH they did not feature in the interviews. This cannot be explained by the projects themselves, since regulatory requirements apply equally, but may reflect the flow of the conversations and a weaker association with sustainability in OVAH.

- **Framing effects:** In Dordrecht, one solution direction was explicitly themed as “sustainable”, which explains why framing was raised in the interviews. It created questions about whether other options were less sustainable and which aspects were actually meant. In OVAH, alternatives were not labelled this way, so framing effects were probably less salient for stakeholders and therefore did not surface in the interviews.
- **Learning from peer projects:** In Dordrecht, sustainability discussions could build on experiences from comparable projects along the Oude Lijn and other station renovations, which explains why learning from peers was mentioned in the interviews. OVAH, by contrast, was seen as a much larger and more unique project, making direct references to similar cases less relevant and therefore less present in the interviews.
- **Political considerations:** Political dynamics were more pronounced in OVAH due to the multi-jurisdictional setting (multiple areas, interests, municipalities, and public bodies). In Dordrecht, with fewer political stakeholders at the table, political interests were comparatively less conflicting.
- **Process documents on sustainability:** In OVAH, process documents on sustainability were discussed more extensively in the interviews than in Dordrecht. Since MIRT requires the same decision information in both projects, this difference is less about formal obligations and there is no clear explanation for the difference. It may reflect the way sustainability was embedded in the OVAH process and therefore more strongly associated with documentation by stakeholders.
- **MIRT system:** In OVAH, interviewees noted that the MIRT framework shaped sustainability, with strict timelines and competition over funding seen as barriers. This theme did not appear in the Dordrecht interviews, even though the same framework applied. The difference likely reflects the flow of specific conversations and the stronger perceived relevance of MIRT procedures in the larger and more complex OVAH project.
- **Knowledge transfer across phases:** In OVAH, knowledge transfer across phases was mentioned more often, likely because the project had a long history of preliminary studies. This made stakeholders more conscious of the need to carry knowledge forward. In Dordrecht, although earlier studies also existed, the shorter project history may explain why knowledge transfer was less explicitly discussed in the interviews.

Factor	Dordrecht	OVAH
Top management support	✓	✓
Sustainability policies	✓	✓
Project goals & assessment frameworks	✓	✓
Quantification tools and methods	✓	
Sustainability champion	✓	
Location-specific factors	✓	✓
Financial considerations	✓	✓
Rules and regulations	✓	
Shared vision	✓	✓
Getting the right people at the table	✓	✓
Budget	✓	
Conflicting interests	✓	✓
Level of aggregation	✓	✓
Framing	✓	
Personal Affinity	✓	✓
Anticipating future developments	✓	✓
Learning from Peer Projects	✓	
political and internal stakeholder considerations		✓
Documenting & Reporting		✓
MIRT system		✓
Knowledge transfer		✓

Table 5.1: Comparison of influential factors across Dordrecht and OVAH cases

5.2.2. Factors distinctive to the MIRT exploration context

The following factors stand out as distinctive for the *MIRT* exploration context. They are tightly coupled to the characteristics of MIRT exploration projects such as early-phase of the project, multi-stakeholder arena, and politically sensitive projects. These factors influence the extend to which sustainability ambitions can be operationalised, and ultimately weighed in decisions.

Financial Considerations

Financial considerations are always closely connected to sustainability, a point often emphasised in the literature. Ambitions are frequently constrained by the perception that they create additional costs or lack clear returns on investment (Armenia et al., 2019; Silvius & Schipper, 2014). In MIRT explorations this tension is clearly visible, but it takes on a particular form because of the early phase of the project. Political deliberations focus strongly on funding commitments, and one of the main outputs of the exploration is the cost estimate of the preferred alternative. These figures are concrete and easy to communicate, whereas long-term sustainability benefits are harder to express in monetary terms and often remain uncertain at this stage. This difficulty in valuing lifecycle benefits means that short-term financial information tends to dominate the discussion, and sustainability aspects risk being sidelined unless they are translated into similarly tangible numbers, such as quantified impacts, ranges, or shadow costs.

Level of Aggregation

A recurring challenge in MIRT explorations is to align sustainability ambitions with the scale at which a project generates impact. For system- or network-level interventions, sustainability is mainly framed in terms of systemic effects such as modal shift, regional accessibility, or cumulative emissions. For node- or site-level projects, the focus is more local and design-specific, for example material choices or climate adaptation measures. In the MIRT context this distinction is particularly relevant because

explorations take place in an early phase, where thinking must shift from broad system-level ambitions to more location-specific assessments. While MIRT projects share the same procedural framework, they differ strongly in scale and level of impact, which means that the definition and operationalisation of sustainability also vary with the level of detail that can realistically be examined at this stage. While this factor is less explicitly present in literature, it aligns with the definition of sustainable infrastructure and the specific challenges developing new infrastructure should address (Fenner et al., 2023)

Location-specific factors

Both cases illustrate how location specific conditions such as heritage restrictions, ground conditions, spatial barriers or environmental designations directly shape the range of feasible solutions. These constraints do not simply limit technical options but also affect which sustainability themes can realistically be prioritised. For example, ground and space limitations in Dordrecht ruled out underground alternatives, thereby reducing the scope for certain environmental gains, while in OVAH the unavoidable tunnelling brought material use and energy demand to the forefront of the sustainability debate. An important implication is that the attainable dimensions of sustainability are partly bounded by situational context.

Project goals and assessment frameworks

MIRT explorations work with clear project goals and decision gates. Progress is ultimately judged on goal attainment and finance. To safeguard sustainability, themes can be made explicit in goals or embedded in assessment criteria; however, over-specifying them too early can unduly restrict the solution space and run counter to the explorative character of MIRT (which aims to keep options broad before converging). The balance is to define sustainability broadly at the outset, then progressively focus on the themes that are material to the specific project—while keeping them explicitly labelled as sustainability rather than collapsing the concept into a single, project-contingent dimension.

Getting the right people at the table

Both cases show that the presence or absence of sustainability expertise strongly shapes how ambitions are translated into project choices. In OVAH, the ambition web session created a shared framework, yet fragmentation across departments made consistent input difficult. In Dordrecht, sustainability experts from the client side were largely absent, so the topic received less attention compared to fields like traffic or spatial planning.

Because MIRT projects involve many stakeholders and rely heavily on inputs from commissioning parties and municipalities, the translation of sustainability ambitions depends on whether relevant expertise is effectively represented in the project dialogue. In large public organisations, sustainability responsibilities are often divided across multiple directorates, which makes it difficult to bring a clear and unified perspective into the project. As a result, sustainability may be considered in principle, but without dedicated and integrated representation its role in decision-making remains fragmented.

The literature also stresses the importance of expertise and stakeholder engagement for embedding sustainability (Erkul et al., 2016; Eskerod & Huemann, 2013). In the MIRT context this challenge is more specific and practical and a result of fragmented responsibility on sustainability, strict timelines, the lack of dedicated sustainability experts in key meetings directly limits how ambitions are taken up in the project dialogue.

MIRT system

In OVAH, interviewees noted that the procedural logic of the MIRT framework influenced how sustainability was addressed. Strict timelines linked to BO-MIRT created time pressure, while competition over limited funding encouraged cost efficiency to take precedence over sustainability. Although less central than other factors, this shows how institutional procedures can indirectly constrain the depth of sustainability discussions.

5.2.3. Synthesis of influential factors

The influential factors identified in practice were combined with those from the literature (see Section 2.4.3). Some literature-derived factors did not explicitly surface in the interviews but are included

because of their relevance to the project. In several cases they were inherent to the context and therefore not discussed at length. For example, the MIRT programme already safeguards broad stakeholder participation and early involvement, making this factor implicit rather than interview-driven.

The consolidated set of factors was grouped into thematic clusters. These clusters were then mapped onto the management layers in which they primarily manifest. These layers are: *strategic*, *tactical*, and *operational*. The interpretation of the factors and their characteristics are outlined in Section 2.1.2. This layering clarifies where each factor is most actionable and how responsibilities for embedding sustainability are distributed across decision levels.

Table 5.2: Influential factors for sustainability integration, grouped by layer and theme

Layer	Theme	Factor	Dor.	OVAH	Lit.
Strategic					
	Regulations and policies	- Sustainability policies/ambitions	x	x	x
		- Rules and regulations	x		x
	Politics	- Political and internal stakeholder considerations		x	x
Tactical					
	Commitment	- Top management support	x	x	x
		- Shared vision	x	x	x
	Stakeholders	Broad stakeholder involvement			x
		- Sustainability champion	x		x
		- Collaboration			x
		- Conflicting interests	x	x	
	Future-proof scaling	- Level of aggregation	x	x	
		- Anticipating future developments	x	x	
	Knowledge & awareness	- Information sharing			x
		- Knowledge transfer		x	x
		- Learning from peer projects	x		x
Operational					
	Formal integration	- Project goals & assessment frameworks	x	x	x
		- Contractual Strategies		x	x
		- Documenting and reporting		x	x
	Resources	- Budget	x		
		- Quantification tools and methods	x		x
	Contextual dependencies	- Financial considerations	x	x	x
		- Location-specific factors	x	x	
	Team	- Competent and multidisciplinary teams			x
		- Personal affinity	x	x	x
		- Getting the right people at the table	x	x	

Two factors were deliberately excluded from this consolidated overview. First, the *MIRT system* was mentioned in interviews but is strongly intertwined with other themes such as governance and politics. Leaving it out allows for a clearer analytical structure and ensures that the results can be more easily translated to other project contexts. Second, *framing effects* were excluded as a separate factor because they are more directly related to the contested nature of the sustainability concept itself. This aspect will be further addressed in the subsequent reflection on the definition of sustainability.

A detailed overview of all influential factors identified in this research is included in Appendix G. This

appendix summarises the final set of factors derived from both literature and empirical analysis, grouped according to the strategic, tactical, and operational layers of project governance. It provides a complete overview of how frequently each theme occurred across interviews

5.3. Process of embedding sustainability

This section discusses the third area of analysis, the organisation of the process on sustainability within MIRT explorations. The organisation of sustainability within the MIRT explorations can best be understood as an evolving trajectory that follows the distinct phases of the process: (1) pre-phase, (1a) tender, (2) start of exploration, (3) analytical phase, (4) assessment phase, (5) preference decision, and (6) transition to the plan- and study phase.

In the early phases (pre-phase and tender), sustainability typically enters the project as a broad set of ambitions originating from the diverse project partners. In Dordrecht this was largely framed as part of the Oude Lijn programme, with sustainability included in the integrated assessment framework and as a criterion in the tender. In OVAH it was explicitly formalised as a separate work package, with requirements for a sustainability report and dedicated responsibilities within the project organisation.

As the exploration progresses (start, analytical, and assessment phases), these ambitions are translated into concrete frameworks and products. Dordrecht mainly integrated sustainability through the programme logic and supporting studies, while in OVAH the Ambitiweb and joint sessions ensured systematic structuring and continuous dialogue among partners. Across both cases, sustainability shifted from a high-level aspiration to a more specific and operational set of themes, tested against technical, financial, and spatial considerations.

Towards the decision and handover phases (preference decision and plan/study transition), the challenge becomes to secure sustainability ambitions for continuity. In Dordrecht, sustainability was included as a precondition in the project tasks but risked dilution when weighed against dominant decision criteria. In OVAH, the sustainability report and its embedding in governance structures aimed to carry ambitions forward to the next phase.

Overall, the results show that sustainability in MIRT explorations evolves from broad partner-driven ambitions into a more specific, institutionalised position within the project. This dynamic highlights the importance of organisational structures that safeguard ambitions throughout the phases and ensure that sustainability is not treated as an add-on but as an integral part of the project logic.

5.3.1. Comparison of the Principles of the sustainability guideline

This evolutionary process also provides a lens to evaluate the application of the Handreiking Verduurzaming MIRT. While few interviewees could reproduce the exact principles, many of them were present in practice. In OVAH, the guideline was explicitly referenced and used as a basis for the sustainability narrative. In Dordrecht, the principles emerged more implicitly, shaped by collaboration and programme-level requirements rather than conscious use of the guideline.

Analysis per Principle

Table 5.3 shows a summary of the application of each principle and a possible explanation for the difference in which the principle constitutes in both projects.

Table 5.3: Comparison of sustainability integration across principles

Principle	Dordrecht	OVAH	Key difference / explanation
1. Discuss sustainability ambitions	Partly – Ambitions were inventoried (NS, ProRail, Spoorbouwmeester, municipality), at the level of the Oude Lijn, but no joint workshop or shared storyline with the consortium was made for the specific Dordrecht Node. Furthermore, the sustainability vision presented in the tender by the consortium was not integrated further	Yes – Different policy and ambition documents of the stakeholder were collected and analysed. An <i>ambitiweb</i> session was organised with all project partners, where themes such as energy, materials, nature, climate adaptation and spatial quality were identified. The session also resulted in a shared motto on sustainability and served as base for the sustainability report.	OVAH had a larger and more diverse partner group and treated sustainability as a distinct workstream (with budget, reporting, and deliverables), making a more formalized ambition-setting process logical. Dordrecht had not assigned specific resources on sustainability.
2. Integrate sustainability in alternatives and solution directions	Yes – Initially considered as separate “building block”, later integrated across all alternatives. One explicit “sustainable alternative” included, but final choices driven mainly by cost and feasibility.	Yes – The main sustainability themes were translated into specific studies (energy, MKI for materials, climate adaptation, nature and spatial quality). For all alternatives sustainability impact is measured and documented mainly through scenario analysis and potential measures.	Dordrecht had a narrower scope, allowing sustainability to be integrated more specifically into concrete design options. OVAH still faced fundamental uncertainty between modal solutions, so sustainability was addressed more at the level of “what-if” scenarios and broader impact assessments.
3. Include sustainability in assessment frameworks	Yes – Explicitly part of the assessment framework (CO ₂ , circularity, climate adaptation). Options tested qualitatively and quantitatively (e.g. embodied carbon study). By assessment phase, differences were minimal as all options were above-ground.	Limited – Addressed via parallel reporting (sustainability report, MER) but not fully embedded in the assessment framework used to filter alternatives. Arguably sustainability was instead considered indirectly, for example through project goals such as achieving a modal shift.	In OVAH, alternatives were not very distinct on sustainability (all underground with heavy infra), while in Dordrecht material use and design options made clearer differences.

Continued on next page

Table 5.3 continued from previous page

Principle	Dordrecht	OVAH	Key difference / explanation
4. Integrate sustainability in financing	Limited – No dedicated sustainability budget lines; some reservation for measures (e.g. PV, water features) embedded in variants. The project works struggled with a tight budget and alternatives exceeding targets.	Yes – In the cost estimates, a reservation was made for sustainability measures as a percentage of the construction budget. This budget is intended to finance sustainability measures, but its concrete allocation has not yet been defined, since the preferred alternative is not yet chosen and the available products and innovations for the future are still uncertain.	The difference mainly reflects project scale: Dordrecht is one node within the Oude Lijn, with smaller budget and tight interdependencies between subprojects. OVAH is a much larger stand-alone project, with more financial partners. Adding a percentage to construction costs has less impact on the total budget.
5. Make sustainability explicit in decision-making	Partly – The above-ground option, which was chosen to evaluate further, was framed as “sustainable,” but in practice costs and spatial feasibility were decisive. Sustainability functioned more as a precondition than a deciding factor. Still, themes such as CO ₂ and climate adaptation were embedded in the MER and MKBA, which carry greater formal weight in decision-making.	Partly – Sustainability is documented in a dedicated report attached to the design and provided as information to clients and BOs. Yet, because it is not formally anchored in the assessment framework, and the report has no legal status or public consultation, its role remains limited and largely non-binding. As in Dordrecht, sustainability themes reappear more prominently through the MER and MKBA.	In both projects the final decision has not yet been made, so the exact influence of sustainability remains uncertain. In neither case does sustainability appear to play a dominant or decisive role, since it is not a clearly distinguishing factor between alternatives.

5.3.2. Stakeholder Collaboration

The organisation of sustainability in MIRT explorations is strongly shaped by the interplay of different stakeholder groups, each bringing distinct responsibilities and strategies. In line with the PSO framework (Denicol et al., 2021), these roles can be understood across the permanent layer and the temporary tactical/operational layers.

Owners and sponsors (e.g. Ministry of Infrastructure and Water Management, ProRail, NS, municipalities) hold the ultimate authority over the projects. They steer overall direction, embed sustainability in objectives and frameworks, and formally anchor ambitions in procurement and assessment. At the same time, their position is complicated: municipalities must balance environmental ambitions with pressing issues such as housing development, while national actors face financial and political constraints.

Temporary client organisations (project teams) function as the central brokers of sustainability. They ensure that ambitions land on the right tables, using both formal mechanisms (reports, sessions, governance structures) and informal strategies (personal meetings, continuous dialogue). Their task is to maintain continuity and visibility of sustainability across departments and phases, bridging between ambitions and decision-making.

Partners and advisors (such as Bureau Spoorbouwmeester or future operators) bring in expertise and long-term perspectives. Their role is often advisory, providing thematic studies, signalling operational concerns, or acting as knowledge brokers. In this way, they support agenda-setting and help keep sustainability linked to broader regulatory and societal developments.

Consultancy and engineering consortia translate ambitions into concrete studies and alternatives. They operationalise sustainability by developing scenarios, quantifying impacts, and facilitating structured dialogue (e.g. Ambitiweb sessions). Their role connects the abstract ambitions of sponsors with technical feasibility, ensuring that sustainability is embedded in the design logic.

The cross-case analysis highlights two main challenges in the organisation of sustainability within MIRT explorations. First, the greatest difficulty lies between the permanent strategic layer and the temporary project teams and consortia. The executional level typically has strong expertise and affinity with sustainability, but strategic actors are often confronted with the political and financial dilemmas of their own ambitions. This strategic–tactical gap reflects findings in the literature on the erosion of sustainability ambitions in large infrastructure projects.

Second, tension within the permanent layer itself is visible. Sponsors such as municipalities face conflicting goals, for example between sustainability targets and pressing spatial development needs such as housing. This frequently leads to trade-offs that weaken the implementation of sustainability in later phases.

5.4. Summary: rethinking the term "sustainability"

The cross-case analysis shows that sustainability plays an important role in both cases, but is a negotiated concept in MIRT explorations. In both Dordrecht and OVAH it received explicit attention and a formal place in project documents, yet its working definition was shaped in practice by conversations, scoping choices, and other project specific factors. As a result, what counted as “sustainability” varies by project and phase. In both cases, however, the emphasis converged on environmental themes: CO₂ and climate adaptation in Dordrecht; energy, materials, climate adaptation, nature, and spatial quality in OVAH. Social and economic dimensions were addressed elsewhere (e.g., accessibility goals, MER/MKBA), which reinforced an environmentally oriented use of the term “sustainability” in day-to-day discourse.

This fluidity of the concept has consequences. First, the breadth of “sustainability” can invite ambiguity (Sturup & Low, 2019): almost any measure can be framed as sustainable, which risks generic narratives and weak prioritisation unless themes are made explicit early and tied to decision points. Second, framing effects matter: labelling an solution as “the sustainable option” may obscure the actual rationale for choices (cost, feasibility, spatial fit), and can complicate communication with stakeholders. Third, project- and location-specific conditions (heritage, geology, Natura 2000 constraints, tunnelling needs) constrain the feasible solution space and shift where meaningful sustainability gains can be realised. At times impact is more on system-level effects (e.g., modal shift) than on local materialisation, or vice versa.

The process of embedding sustainability throughout the project is an important aspect that determines outcomes and perceived success. Where the process provides structured dialogue (e.g., ambition sessions), explicit theme selection, and traceable documentation (e.g., a dedicated sustainability report), sustainability remains visible and actionable throughout the exploration, even when not decisive in formal assessments. Conversely, when sustainability themes were not anchored in assessment frameworks or budgets, their influence diminishes relative to financial narratives and spatial feasibility.

Across stakeholders, interpretations were largely aligned once themes were specified, but responsibilities differed. Sponsors set ambition while balancing wider political and fiscal constraints; temporary client teams brokered attention to sustainability across governance layers; partners signalled operational needs for later phases or provided input of expertise from other projects; and engineering consortia translated ambitions into studies, options, and measures. Where a recognisable champion or knowledge broker was present, continuity improved; where expertise was fragmented, integration proved harder. Finally, the level of aggregation remained pivotal: early-phase, network-scale explorations call for different sustainability information than node-scale, design-focused studies, and conflated

ing these levels can mask trade-offs.

Taken together, when comparing the findings with theory, we can deduct that the role of sustainability in MIRT explorations depends less on using the term in general, and more on how it is defined and applied in practice. Because the concept "sustainability" is broad and sometimes ambiguous, and because it can be framed in different ways depending on the project, there is a risk that its meaning in practice becomes unclear. This underlines the importance of treating sustainability with more nuance: agreeing early on what it means in the specific context, making conscious choices about which themes to include, and clarifying how these will be carried forward in the process. Structured discussions, explicit theme selection, and proper documentation can help to keep sustainability visible, while anchoring it in assessments, budgets, and procurement further strengthens its influence. These observations indicate that a more careful and nuanced perspective on sustainability is needed in MIRT projects. The next chapter takes this as a starting point and introduces a toolkit to support project teams in structuring responsibilities, shaping discussions, and aligning sustainability with the main decision moments in the MIRT process. .

6

Sustainable MIRT projects

The previous chapters have shown that sustainability in MIRT explorations is not a fixed or universally defined concept, but a negotiated and evolving one. While sustainability is widely recognised as a priority, the broad framing and different interpretations among stakeholders make it difficult to consistently embed ambitions throughout the project life cycle.

This chapter directly addresses this challenge and discusses the fourth objective of this research: *What strategies can be formulated to aid MIRT explorations in becoming sustainable Explorations?* It does so by introducing a new perspective on sustainability in MIRT projects, one that treats explorations themselves as sustainable explorations. This shift offers a new way be structured so that sustainability ambitions are more robustly embedded in governance, financing, design, and knowledge transfer.

The chapter is organised as follows. First, a new perspective is presented that reframes how sustainability can be understood and operationalised in the MIRT context. Next, a practical toolkit is introduced, translating the insights from literature and the case studies into a structured set of strategies and priority actions that can guide project teams in practice. Finally, the chapter describes the validation of these results, in which experts from both Rijkswaterstaat and consultancy practice assessed the toolkit and reflected on its applicability to ongoing explorations.

6.1. Changing the Perspective on Sustainability

The toolkit is based on the principle that sustainability in a MIRT exploration should not be treated as a separate criterion or as an environmental add-on. Instead, it must function as a holistic, normative principle that shapes project organisation from the outset. This perspective is informed by three recurring insights from the literature and the case studies.

First, sustainability is inherently normative: its meaning is shaped by the values, ambitions, and institutional contexts of the actors involved. Literature highlights this ambiguity, and the case studies confirm that different contexts lead to different interpretations and prioritisation of sustainability. Second, framing issues often obscure the debate. While the label “sustainability” is frequently used, its content is regularly narrowed down to a limited set of themes or reduced to a single score, checklist, or predominantly environmental focus. In practice, however, multiple overlapping dimensions (environmental, social, economic, and institutional) are relevant. Third, although stakeholders emphasise different aspects, the case studies show that discussions at the project level often converge on similar themes or challenges. This suggests that despite divergent framings, common ground can be found when sustainability is approached in a structured and systematic way.

Changing the perspective therefore requires moving beyond treating sustainability as an “add-on” within a MIRT exploration, towards conducting the exploration itself as a **sustainable MIRT exploration**. In this view, sustainability is not delivered through isolated measures, but becomes an **organising principle** that shapes the entire logic of design, assessment, and decision-making. This shift reframes sustainability from a separate domain to the foundation on which the exploration process is built.

An organising principle refers to a foundational, ordering logic that structures the elements and functioning of a system. It is not simply a rule or checklist, but the underlying pattern, value or idea that gives coherence and direction to decision-making, behaviour, and institutional design. In organisational theory, it is often described as the “deep core pattern from which everything present and expressed can be understood” (Kessels & Smit, 2011) and in planning contexts, it defines the guiding rationale for how complex projects are framed, prioritised, and executed. Depending on the domain, different organising principles may apply: in mobility policy, for example, some scholars argue that concepts like equity or market orientation serve as central organising logics (Löfgren, 2015; Sheller, 2018). The defining feature of an organising principle is not that it is always made explicit, but that it shapes what is seen as relevant, valuable, or legitimate throughout the system. It thus influences how objectives are formulated, how choices are framed, and how trade-offs are negotiated.

In the context of a MIRT exploration, adopting sustainability as an organising principle has specific implications. It shifts the connotation of sustainability from a discrete criterion, often associated primarily with environmental impact or financial costs, to a holistic structuring logic that underlies the entire exploration process. Environmental, social, economic, and institutional aspects are no longer treated as separate topics that are added, evaluated, and worked on independently. Instead, they are viewed as interconnected parts of a single sustainability perspective. This integrated approach makes it easier to weigh trade-offs between these aspects, because they are considered together as essential elements of what sustainability means in the project. This also places greater emphasis on the underlying themes, such as climate adaptation, transport accessibility, and economic development, while creating space for discussions about which dimensions matter most in a given project context. As a result, decisions are no longer framed around adding sustainability at the end but around designing a planning process in which sustainability is embedded from the outset. This approach avoids fragmentation and reductionism and ensures that the outcome of a sustainable MIRT exploration will not only be a sustainable alternative but one that can also be developed in a sustainable way.

Definition of a sustainable MIRT exploration:

A funnel process that systematically explores alternative technical or functional solutions for an identified transport infrastructure problem, leading to a governance agreement on the fair distribution of impacts, costs, and risks. The process is underpinned by a conditional plan ensuring that the chosen solution contributes to a more sustainable system and includes early consideration of how to implement it in the most sustainable way possible.

Under this holistic interpretation, it becomes essential to identify the dimensions and themes that must be addressed within each project. Frameworks such as the SDGs, the Omgevingswijzer, Ambitiweb, future-proofing principles, or even planetary boundaries can provide handles for this identification. Which themes are most relevant will differ per project, and should be determined iteratively as the exploration unfolds.

This perspective is not entirely new. Organisations such as the Municipality of Amsterdam and Rijkswaterstaat already apply principles that resonate with this logic: Municipality of Amsterdam works with the idea of “duurzaam, tenzij” (“sustainable, unless”), while Rijkswaterstaat frames its approach as “alles wat we doen, doen we duurzaam” (“everything we do, we do sustainably”). These principles make it mandatory to report on sustainability considerations in an action or a project. The contribution here lies in positioning sustainability as an explicit organising principle for MIRT explorations. This helps to anchor it more firmly in governance, make it inherent to design, and ensure broader ownership among all stakeholders involved.

This approach also reflects the logic of procedural rationality. Because MIRT explorations unfold in multi-actor environments with diverse interests and values, stakeholders may not always agree on the substantive definition of sustainability. However, they can often agree on transparent, jointly established procedures that structure how decisions are made. Procedural rationality holds that under conditions of uncertainty and value pluralism, the legitimacy of outcomes depends less on agreement over substantive goals and more on the perceived fairness, transparency, and inclusiveness of the process (Kroes et al., 2009). If the decision-making process is seen as balanced and legitimate, outcomes are more likely to be accepted, even if they are not optimal for every party involved. In practice, this means that sustainability can be safeguarded not only by prescribing substantive goals, but also by

embedding it in the agreed steps, criteria, and evaluation methods of the exploration process (Bolis et al., 2017). In this way, sustainability becomes structurally embedded both in the content of project outcomes and in the process that delivers them.

6.2. Toolkit

This section introduces a toolkit that was developed to support the change in perspective on sustainability in MIRT explorations. The toolkit brings together the insights from literature, case studies, and stakeholder interviews, and translates them into a structured set of priority actions. Its aim is to restructure sustainability as an organising principle within explorations, ensuring that sustainability considerations are systematically embedded in project organisation, the development of alternatives, and the basis for long-term decision-making across the project life cycle.

6.2.1. Added Value

The added value of the toolkit lies in structuring and safeguarding a perspective on sustainability that treats it as an organising principle rather than as a separate add-on. It provides concrete guidance on how the exploration process can be designed so that sustainability considerations are consistently integrated into every step: from problem analysis, to the structuring of alternatives, to the evaluation of options, and finally to the selection of a preferred alternative. In doing so, the toolkit bridges the gap between broad strategic ambitions and the procedural requirements of the MIRT framework.

This focus on the early phase makes the toolkit complementary to the existing MIRT Sustainability Guideline. Where the guideline remains deliberately broad to cover the entire life cycle, the toolkit zooms in on the exploration, offering proposals for embedding sustainability into decision gates, workshops, and assessment criteria. This specificity makes it easier for project teams to operationalise sustainability in practice, especially when navigating the complexity of multi-stakeholder environments.

The toolkit helps translate sustainability from an abstract concept into something concrete and project-specific. It clarifies what sustainability means for a particular project and provides guidance on how to keep those ambitions on board throughout the whole further life cycle of the project. The result is a baseline for sustainability which makes important themes more actionable and easier to carry forward during the subsequent planning and design phases. An additional value of the toolkit is that it helps to reduce trade-offs between sustainability dimensions, ensures continuity across project stages, and prevents sustainability from becoming an afterthought.

6.2.2. Why a Toolkit?

The choice for a toolkit format is deliberate. Sustainability integration in MIRT explorations requires not only new perspectives but also concrete instruments that help practitioners structure discussions and allocate responsibilities. The existing MIRT Sustainability Guideline provides high-level principles, but leaves considerable room for interpretation. This research shows that this can result in inconsistent application or different interpretation.

This toolkit provides added value by offering a structured and practical set of actions that can be directly applied within the specific context of MIRT projects. It defines priority actions per phase, assigns stakeholder responsibilities, and links sustainability considerations to the formal decision-making moments in the MIRT process. In this way, the toolkit functions as a bridge between broad policy ambitions and the procedural reality of project delivery, making sustainability tangible, actionable, and resilient over the course of the project life cycle.

The term toolkit was deliberately chosen over alternatives such as roadmap or framework because the instrument does not prescribe a stepwise path that must be followed sequentially to achieve a transition. Instead, it serves as a set of practical actions that helps project teams navigate the exploration process from a sustainability-oriented perspective. The toolkit offers flexibility to adapt to the specific context, project scale, and maturity of collaboration, while providing a coherent structure for integrating sustainability considerations throughout the process. Moreover, it has an inherently expandable nature: it can be complemented and refined over time by linking existing tools and methodologies that support the identified priority actions. Some of these are already addressed and connected to the phases where they can be applied most effectively. Examples include the Ambitiweb and the Aan-

pak Duurzaam GWW, as well as quantitative instruments such as embodied carbon studies. Together, these elements make the toolkit both practical and evolvable, an integrative collection of instruments that connects strategy and practice in sustainable infrastructure planning.

6.2.3. Input, Process, and Output

The toolkit translates the broad spectrum of sustainability ambitions into actionable project outcomes. The **input** is the wide variety of ambitions that stakeholders bring to the table, ranging from climate adaptation, CO₂ reduction, and circularity to accessibility, social equity, and spatial quality. These ambitions are often diverse and sometimes conflicting, but they form the starting point of the process.

The **process** is structured as a stepwise approach that follows the phases of a MIRT exploration. By providing guidance on how to organise discussions, set criteria, and align ambitions with decision moments, the toolkit helps project teams to anchor the abstract goals into concrete alternatives and assessment frameworks. This ensures that sustainability is not treated as an afterthought, but as an integral consideration throughout the exploration.

The **output** is a preferred alternative in which sustainability is inherently embedded. Rather than being an optional layer added afterwards, sustainability becomes a guiding principle of the design and decision-making process. The preferred alternative is also accompanied by a set of measures and considerations that provide continuity into the later phases of the MIRT process. In this way, the toolkit not only anchors sustainability in the exploration and also lays the groundwork for its integration throughout the project life cycle.

6.2.4. Phased Approach

A central feature of the toolkit is that it identifies key priority actions for each stage of a MIRT exploration project. In doing so, it ensures that sustainability considerations are systematically embedded throughout project decision-making. The toolkit distinguishes six phases:

1. **Preparatory phase:** early scoping and background (including subphase 1a, the optional Tender phase);
2. **Start Exploration:** mobilisation and kick-off;
3. **Analysis phase (analytische fase):** development of options and the *Notitie Kansrijke Oplossingen* (NKO);
4. **Assessment phase (beoordelingsfase);**
5. **Preference Decision (voorkeursbeslissing);**
6. **Run-up to Planning and Study phase (opmaat naar plan- en studiefase).**

This structure largely follows the sequence used in the analysis of the case studies presented in Chapter 4, with one exception: the preparatory and tender stages are now combined into a single phase, with the tender represented as an optional subphase. This adjustment reflects the fact that not every MIRT exploration requires a tendering process.

The resulting overview provides a clearer and more comprehensive timeline: Step 1 represents the run-up prior to the official start of a MIRT exploration; Steps 2 to 5 correspond to the formal MIRT stages (see Section 3.2.2); and Step 6 serves as a bridge towards the subsequent plan elaboration phase. The design of this structure is based on a synthesis of project documentation and insights gathered from semi-structured interviews.

6.2.5. Allocation of Priority Actions and RACI Roles

The allocation of the priority actions within the toolkit was based on a Responsibility Assignment Matrix (RAM). The RACI model (Responsible, Accountable, Consulted, and Informed) was used to clarify how the identified strategies and actions relate to the different stakeholder groups involved in MIRT explorations. This model is explained in section 2.3.2. The categorisation of responsibilities draws directly from the third theme of the interviews, which explored how stakeholders perceive their own responsibilities and spheres of influence in relation to sustainability, as well as how they view those of other groups. From these interviews, a comprehensive overview was developed that links stakeholder perceptions

to concrete strategies and actions for improving the integration of sustainability. The quotes supporting these allocations are included in Appendices D and E, under the third thematic category of the interview analysis: T3 — Stakeholder strategies and considerations on sustainability. The stakeholder responsibilities and strategies are also discussed in the result section under the third objective.

For the first phase (and the optional tender phase 1a) as well as for the final phase, actions were not assigned to specific stakeholder groups. In these stages, no formal collaboration structure yet exists, and roles are therefore still fluid. The RACI allocation should be interpreted as indicative rather than prescriptive. Given the layered and interdependent nature of collaboration in MIRT projects, responsibilities may overlap or shift across organisational levels, and a stakeholder can in some cases be both responsible and accountable.

The RACI allocation illustrates how accountability and responsibility evolve across the project life cycle. At the beginning of the project, accountability primarily lies with the permanent governance layer (owners and sponsors), while the client organisation carries most of the operational responsibility. During the execution and elaboration phases, this balance shifts downward: the temporary client organisation becomes the main accountable party, and consultancy consortia or engineering firms take on responsibility for delivery. As the project approaches formal decision-making moments, accountability gradually shifts back to the permanent layer, ensuring political legitimacy and policy alignment.

Partners and advisors primarily fulfil a consultative role, supporting both the permanent and temporary layers through expert advice and knowledge transfer. However, the findings from the interviews highlight that these actors should adopt a more assertive stance in order to ensure that sustainability ambitions remain visible and influential throughout the process.

By distinguishing these roles, the framework reduces overlap and misunderstandings, while making collaboration more transparent. Within this toolkit, the RACI framework also highlights which stakeholders are most crucial for advancing the project's sustainability ambitions.

A visual representation of the toolkit can be found in Figure 6.1. The following subsections elaborate briefly on each phase, state which influential factors are addressed, and outline the corresponding priority actions.

Phase 1: Preparatory phase

In the pre-project phase, the foundations of the MIRT exploration are established. The key task is to draft the Start Document, defining governance and overarching objectives. This moment determines whether sustainability is framed as an optional ambition or as a structural precondition for all later design and decision-making.

Goal: Draft a Start Document that anchors sustainability in governance and main project objectives, with shared high-level ambitions.

1. Ensure broad stakeholder representation

Involve all relevant parties (ministries, regional and local governments, infrastructure managers, operators, advisors, external experts) to secure legitimacy and shared ownership. This avoids fragmented agendas and strengthens sustainability from the outset.

Factors: Broad stakeholder involvement, Conflicting interests

2. Compile and adopt a comprehensive knowledge base

Collect policies, previous studies, and guidelines to ground ambitions and anticipate future regulations. Recognise that construction will take place years ahead, under changed external conditions.

Factors: Knowledge transfer, Sustainability policies, Rules and Regulations, Anticipating future developments

3. Determine the leading level of aggregation

Match the level of aggregation to project scope and maturity:

- *Broad scope / early stage (e.g. OVAH):* Focus on system-wide impacts such as modal shift and reduction of short-haul flights.

DRAFT toolkit for Sustainable MIRT Explorations

RACI-matrix roles:

- R = Responsible - executes the task*
- A = Accountable - ultimately answerable for the result*
- C = Consulted - Provides input and expertise*
- I = Informed - kept updated on progress and outcomes*



1. Preparatory Phase

Goal: Draft a Start Document that anchors sustainability in the governance structure and main project objectives, including shared high-level sustainability ambitions.

Priority Actions

1. Ensure broad stakeholder representation
2. Compile policies and previous studies
3. Determine leading aggregation level
4. Embed sustainability in project objectives
5. Anchor sustainability in Governance structure
6. Independent R&D and tool development

Who?

No formal structure yet – responsibility lies with the client and owners:
Client: Lead in defining direction and governance setup
Owners: Approve ambition level & strategic fit
Regional & Local Authorities: Provide contextual input and early alignment



Tools

Matrix with sustainability ambitions of the client

Product

Start Document with clear sustainability governance structure



1a. Tender Phase

N.B. Not every MIRT exploration requires a tender procedure; however, when applicable, this phase represents a crucial opportunity to anchor sustainability in the project process.

Priority Actions

1. Use Sustainability as an award criterion

Who?

Client leads the process by shaping sustainability criteria, consultants contribute by bringing in their own expertise and perspective



Product

Contractual agreement with sustainability clauses



2. Start Exploration

Goal: Establish a clear red thread on sustainability by holding a structured dialogue that embeds key themes in project products and analyses

Priority Actions

1. Structured Dialogue on Sustainability
2. Adequate Client Representation
3. Include distinguishing themes in assessment frameworks

Who?

	Owner	Client	Partner	Supplier
1.	C	A	C	R
2.	A	R	I	I
3.	A	R	C	I

Tools

- Duurzaam GWW
- Ambitiweb

Product

Vision on sustainability in project



3. Analysis Phase

Goal: Explore the full range of possible solutions without prematurely restricting the scope. Sustainability should inform the analysis but not yet serve as a limiting requirement

Priority Actions

1. Map external sustainability factors
2. Look for synergies

Who?

	Owner	Client	Partner	Supplier
1.	I	A	C	R
2.	-	A	C	R

Tools

- Climate resilience analysis
- Design principles (STOMP / environment-led Design)



4. Assessment Phase

Goal: Assess consequences per alternative and define measures for the next phase, ensuring that sustainability is fully visible in reporting and financially safeguarded.

Priority Actions

1. Document sustainability considerations
2. Test and quantify critical themes
3. Reserve 1–3% of estimated construction costs for sustainability

Who?

	Owner	Client	Partner	Supplier
1.	I	A	C	R
2.	I	A	R	R
3.	A	R	-	I

Tools

Quantification tools: DuboCalc / R-ladder / MKBA / MER / embodied carbon study

Product

Integrated sustainability report



5. Preference Decision

Goal: Ensure that integrated sustainability reporting is part of the formal decision-making package for the preferred alternative.

Priority Actions

1. Include integrated sustainability report as formal decision input

Who?

	Owner	Client	Partner	Supplier
1.	A	R	I	I

Products

N.A.



6. To Plan- & Study phase

Goal: Transfer sustainability to next phase with requirements, follow-up measures, and quantifiable thresholds where possible.

Priority Actions

1. Include sustainability considerations in gate reviews
2. Translate critical outcomes into binding criteria

Who?

Client and owners lead the transition; consultants support by formalising sustainability requirements and ensuring knowledge transfer.



Tools

Use of digital requirement-tracking systems (e.g., DOORS or in-STEP BLUE)

Figure 6.1: Conceptual Toolkit for sustainability integration in MIRT exploration projects used for expert validation

- *Narrow scope / later stage (e.g. Dordrecht)*: Prioritise local-scale impacts such as embodied CO₂ and spatial integration.

Use this framing consistently to avoid being too detailed too early or too abstract too late.

Factor: Level of aggregation

4. **Formulate and embed sustainability in project objectives**

Make sustainability a precondition in the Start Document, ensuring it is integral rather than optional.

Factors: Shared Vision, Project goals & Assessment frameworks, Top management support

5. **Set up governance that institutionalises sustainability**

Integrate sustainability into the IPM-structure, appoint a sustainability lead, define related work packages, reserve budget, and create formal review checkpoints. This secures ambitions with structure and resources.

Factors: Competent and multidisciplinary teams, Budget, Documenting and Reporting, Information Sharing, Contractual Strategies, Sustainability Champion, collaboration

6. **Support independent R&D and tool development**

Tier 1 suppliers and advisors can develop methods and tools (e.g. CO₂ calculators, climate adaptation frameworks) outside the project, ensuring lessons learned benefit future explorations.

Factors: Learning from peer projects, Quantification tools and methods, Anticipating future developments

Phase 1a: Tender Phase

In the tender phase, sustainability must be contractually anchored as a formal award criterion. This ensures that selected consortia share the vision and have the expertise to deliver.

Goal: Establish the contractual framework for project delivery, using sustainability as a formal award criterion. The selection of consortia should be guided by their ability to deliver on sustainability objectives.

1. **Use sustainability as award criterion**

Include sustainability explicitly and with clear weighting. Require either a general vision or proposals on specific themes (e.g. CO₂ reduction, circularity, climate adaptation). Tender documents must translate owner frameworks into clear criteria, ensuring ambitions are consistent and binding.

Factors: Contractual strategies, Shared vision

Phase 2: Start Exploration

At project start, broad intentions must be translated into concrete practice. Following the MIRT Sustainability Guideline, this begins with a structured dialogue on sustainability across all stakeholders, aligning visions, setting priorities, and embedding themes into project products and analyses. Competent technical representation ensures sustainability is integrated into spatial and technical discussions.

Goal: Establish a clear red thread on sustainability by holding a structured dialogue that embeds key themes in project products and analyses.

1. **Structured dialogue on sustainability**

Hold multi-session dialogues to align visions, prioritise themes, and map them into MER, MKBA, cost estimates, or design studies. *Key elements:*

- Align policies with supplier visions
- Use structured tools (e.g. Ambitiweb, Duurzaam GWW)
- Prioritise relevant themes (e.g. CO₂, energy, biodiversity)
- Include sector-wide developments (e.g. KCI, ZEB, carbon taxing)
- Document outcomes in a priorities list and mapping overview

Factors: Shared Vision, Location-specific factors, Level of Aggregation, Collaboration

2. Adequate client representation

Ensure sustainability is represented by technically engaged experts from commissioning bodies, able to translate high-level ambitions into project requirements.

Factors: Getting the Right people at the table, Personal affinity

3. Embed distinguishing themes in assessment

Focus on sustainability aspects that create different outcomes across alternatives (e.g. embodied CO₂ for above- vs. underground, or energy use for metro vs. light rail). Only include themes that are decisive in assessment frameworks.

Factor: Project goals & Assessment frameworks, Location-specific factors, Level of aggregation

Phase 3: Analysis Phase

In the analytical phase, all possible solution directions are explored. Hard sustainability requirements should not yet be imposed, as they may limit the scope. Instead, sustainability acts as a lens to study external factors and context.

Goal: Explore the full range of solutions without prematurely restricting scope; use sustainability to inform, not constrain, analysis.

1. Map external sustainability factors

Conduct background studies on environmental and social context (e.g. climate risks, flooding, transport poverty). These provide essential knowledge for later evaluation without prescribing solutions.

Factors: Location-specific Factors, Quantification tools and methods

2. Look for synergies

Identify opportunities to link sustainability with other projects or developments (e.g. housing, energy, water safety). Such “meekoppelkansen” increase the chances of realising ambitions by aligning with broader agendas and investments.

Factors: location specific factors, Anticipating future developments

Phase 4: Assessment Phase

In the assessment phase, alternatives are evaluated and compared. This is the moment to translate ambitions into measurable impacts and to ensure resources are reserved for sustainability during later phases.

Goal: Assess consequences per alternative and define measures for the next phase, ensuring that sustainability is fully visible in reporting and financially safeguarded.

1. Anticipate and document sustainability issues

Record expected sustainability challenges early (e.g. carbon emissions, biodiversity, energy demand). Documenting them ensures they remain visible throughout the decision-making process and cannot easily be ignored later.

Factors: Knowledge transfer, Documenting and reporting, Anticipating future developments

2. Test and quantify critical themes

Where possible, use indicators and tools to quantify key themes such as embodied CO₂, energy use, or climate adaptation. This makes sustainability comparable across alternatives and strengthens its weight in decision-making.

Factors: Quantification tools and methods, Project goals & Assessment frameworks, Documentation and reporting

3. Reserve 1–3% of costs for sustainability

Allocate a fixed percentage of estimated construction costs to sustainability measures. This creates financial security for ambitions and prevents them from being cut under budget pressure.

Factors: Financial considerations, Top management support, Political and internal stakeholder considerations

Phase 5: Preference Decision

In the decision phase, the preferred alternative is selected. At this stage, sustainability must be fully integrated into the formal decision-making package, ensuring it has equal weight alongside costs, risks, and technical feasibility.

Goal: Ensure that integrated sustainability reporting is part of the formal decision-making package for the preferred alternative.

1. **Include integrated sustainability report as decision input**

Deliver a consolidated report that combines all sustainability analyses (e.g. CO₂, circularity, climate adaptation, social impacts). The report must be a formal input for the decision on the preferred alternative, making sustainability an inseparable part of the governance process.

Factors: Documenting and reporting, Project goals & Assessment frameworks, Accountability

Phase 6: Toward Plan Elaboration Phase

In the plan elaboration phase, sustainability ambitions must be safeguarded and translated into binding project requirements. This ensures that outcomes from earlier phases carry through into design, procurement, and delivery.

Goal: Transfer sustainability to the next phase with requirements, follow-up measures, and quantifiable thresholds where possible.

1. **Include sustainability in gate reviews**

Make sustainability a formal checkpoint in project reviews, ensuring ambitions remain visible and are not diluted during elaboration.

Factors: Knowledge Transfer

2. **Translate outcomes into binding criteria**

Convert critical results (e.g. CO₂ ceilings, circularity targets) into enforceable requirements or thresholds. These can be carried forward as contract criteria in subsequent procurement rounds.

Factors: Project goals & Assessment frameworks, Contractual strategies, Client commitment, Top Management Support

6.3. Validation

To assess whether the proposed toolkit contributes to its intended goal, a validation session was organised with a group of experts actively involved in MIRT projects. The toolkit aims to structure sustainability within MIRT projects and facilitate the collection of ambitions and strategies from partners and clients so that a shared vision is created and sustainability is anchored throughout the project life cycle. The session was held online, lasted approximately two hours, and was supported by a PowerPoint presentation that introduced the research background, objectives, and results.

Six experts participated in the session: three from Arup, each currently engaged in MIRT exploration projects, and three from Rijkswaterstaat (RWS), with explicit involvement in the MIRT system and sustainability.

6.3.1. Session Set-up

The session followed four steps. First, the research background and objectives were introduced, followed by a short overview of the theoretical foundations. Next, the main results were presented. Finally, three key themes were discussed interactively:

1. **Influential factors** – Participants reflected on the factors identified in practice, especially those that extended beyond the literature, and assessed whether important factors were missing.
2. **Principles of the MIRT Sustainability Guideline** – The group discussed how these principles were applied in practice and identified points of attention for each.
3. **Toolkit validation** – Each phase of the toolkit was examined, and the proposed priority actions were scored and discussed.

A Mentimeter tool was used to collect interactive input and prioritisation scores from the participants. The detailed results of this exercise are presented in Appendix F.

This section provides an overview of the most important points that were discussed.

6.3.2. Validation of Influential Factors

During the validation session, the participants reflected on the influential factors identified in the research and discussed their relevance and applicability. Several factors were confirmed, while others were refined or supplemented. First specific attention was given toward the factors that were derived from the case study specifically.

- **MIRT system and BO-MIRT procedure** – The BO-MIRT decision was recognised as a source of pressure in exploration projects. However, participants stressed that this does not inherently disadvantage sustainability. The rules of the MIRT system allow sufficient flexibility; the challenge lies in ensuring that all stakeholders remain engaged and aligned throughout the trajectory.
- **Stakeholder involvement and awareness** – Participants confirmed that one of the most decisive factors is the extent to which stakeholders recognise the value of sustainability. Knowledge is important, but structural embedding requires broad recognition and commitment across all layers of the project organisation.
- **Concretisation of sustainability** – Because sustainability is broad and multi-dimensional, it must be translated into specific and manageable elements. Participants emphasised that the more complex a design becomes, the harder it is to embed sustainability. Early concretisation is therefore essential.
- **Aggregation level and assessment frameworks** – The right level of analysis should be linked to appropriate assessment frameworks. Even when detailed design is not yet possible, sustainability can be embedded by defining criteria relevant to the specific phase and scope of the project.

Additional Influential Factors

In addition to the factors already identified in the research, the validation session surfaced further points of attention that are relevant to embedding sustainability:

- **Sustainability champion** – The idea of a dedicated “champion” was supported, but participants stressed that the real value lies in ensuring consistent responsibility and accountability. This role should exist on both the client side and the project delivery side. At RWS, for instance, a sustainability advisor is usually appointed to the project from within the organisation.
- **Scale of the project** – The project scale directly affects the ability to secure adequate representation. Smaller projects often struggle to involve all relevant stakeholders, while larger projects more easily include the necessary expertise and institutional support.
- **Mandate from the Ministry** – Projects often have the drive to integrate sustainability, but lack a clear directive from the commissioning authority. Participants stressed that sustainability should be explicitly included in the initial project mandate, rather than being added later in the process, to ensure ambitions are anchored from the start.

6.3.3. Validation of the Principles of the MIRT Sustainability Guideline

The second part of the validation session focused on the discussion of how the principles of the MIRT Sustainability Guideline can be implemented in practice. The following key points emerged:

- **Conversation about sustainability** – Participants agreed that a structured dialogue on sustainability is necessary, similar to ambition-web sessions that are already common practice. While technical and financial feasibility are systematically discussed in projects, an equivalent conversation on sustainability is often missing. Facilitating such a dialogue is a choice for the project organisation and depends on the knowledge and expertise available within the team.
- **Including sustainability in the alternatives** – A distinction must be made between *solution directions* (oplossingsrichtingen) and *alternatives* (alternatieven) (see section 3.2). In the analysis phase, focusing on solution directions, it can be useful to explicitly develop a “sustainability-focused” solution direction that explores the outer boundaries of the project’s possibilities. This allows the project team to map the full range of sustainability levers (e.g. material use, resilience, circularity). Although not all projects may be able to define a fully sustainable alternative due

to their specific objectives and context, this method helps identify opportunities that can later be incorporated into the preferred alternative. A parallel was drawn with the MER system, in which a “most environmentally friendly alternative” must be assessed, even if it is not ultimately selected.

- **Embedding sustainability in assessment frameworks** – Participants noted that including sustainability in assessment criteria is both feasible and useful. It helps create insight into how alternatives differ in their sustainability impacts. However, because sustainability is a broad concept, it is essential to carefully select which themes are most relevant. At early stages, this can be done qualitatively, but later in the process, more quantitative assessment is preferred. Establishing clear boundaries and criteria at the start of the project is therefore important to avoid vagueness and ensure comparability.
- **Financial aspects** – Labeling “sustainability measures” in financial budgets is complex, since not all measures lead to additional costs. At this early stage, measures also remain general, making it difficult to assign concrete amounts. Nevertheless, it was advised to reserve space in financial planning for sustainability. If treated as an explicit budget item, sustainability becomes a conscious trade-off: overruns or reallocations must then be justified as directly affecting the sustainability budget. Participants also questioned whether ministries would be willing to increase budgets if a more sustainable alternative was chosen. The more effective lever, however, may be to integrate sustainability into the project objectives and boundary conditions from the outset.
- **Decision-making** – Finally, participants observed that decision-making typically boils down to three factors: goal achievement, feasibility, and finances. While decision information can include sustainability analyses, whether a mandatory sustainability report should be part of the decision dossier remains debatable. The strongest lever for embedding sustainability in decision-making lies in setting clear sustainability objectives at the start of the project.

6.3.4. Validation of the Toolkit

After introducing the concept of a *sustainable MIRT exploration* and the perspective shift towards embedding sustainability as an organising principle, the toolkit was validated. The session presented each phase of the toolkit, after which participants were asked to score the proposed priority actions on a scale from 1 (completely disagree) to 5 (fully agree). Scores were then discussed, and participants were invited to provide short explanations. The main feedback per phase is summarised below.

Phase 1: Preparatory Phase

- The proposed action of “development of tools by engineering and consultancy firms” raised questions. Participants asked whether this referred to project-specific assessment frameworks or more generic methods. The intention was clarified as tools to *concretise and quantify sustainability*. This action received low scores because many such tools already exist (e.g. from RWS). Participants questioned what independent firms could add specifically. Instead, this could be reframed as collecting and applying available knowledge rather than creating new tools as a separate task.

Phase 1a: Tender Phase

- Participants advised caution in the use of the word “tender.” Not all MIRT explorations are externally procured; some are executed directly by the government (RWS).
- At RWS, BPKV criteria (award criteria) usually include sustainability, but this mainly concerns the sustainability of the firm itself, not how sustainability is embedded in the project.
- Many explorations are outsourced under framework agreements (particularly those of RWS), so introducing a separate selection phase is not always necessary.

Phase 2: Start Exploration

All proposed actions in this phase were scored positively. No specific concerns or critical remarks were made.

Phase 3: Analysis phase

- The action on “synergies and co-benefits” raised questions. Again terminology is important because these are different things. Participants asked whether this action referred specifically to synergies on sustainability or also to broader spatial opportunities (co-benefits). The intention

is to focus on sustainability synergies (e.g. with programmes such as ZEB, KCI, or municipal initiatives).

- Participants noted that looking for too much synergies increases complexity as well. It may not be necessary to assign too much weight to sustainability synergies at this stage; instead, a broad mapping of area wishes and developments should be made, with potential sustainability opportunities identified among them.
- From a MIRT perspective, identifying co-benefits is already mandatory.

Phase 4: Assessment phase

- Documenting sustainability considerations was valued, but participants questioned the long-term value of separate documentation. Sustainability could be more effectively embedded by including it explicitly in the *assessment framework*, rather than through a stand-alone report.
- Participants addressed the timing of the allocation of explicit budgets for sustainability. Cost estimates are usually only fixed after narrowing alternatives towards the preferred option (VKA). Participants warned that a dedicated sustainability budget might lead to undesirable spending at the end (e.g. “using up” funds on superficial measures).

Phase 5: Preference Decision

- The recommendation in this phase was seen as strongly influenced by the OVAH case. Normally, the selection phase involves a comprehensive trade-off of all considerations, with sustainability as one of the key aspects. A separate sustainability report as decision information was seen as unnecessary.
- What may be more useful is a more reflective element describing the implications of the preferred alternative: which sustainability measures are included, their costs, and their relationship to project objectives. If the preferred alternative results in higher costs due to sustainability requirements, this should be explicitly highlighted to indicate that additional budget is needed to deliver the ambitions.

Phase 6: Run-up to plan elaboration

- Participants advised caution in the use of the term “procurement criteria” at this stage, since procurement does not immediately follow the exploration. It would be more accurate to speak of “principles and conditions for the next phase.”
- The most useful outcome would be the refinement and establishment of a new baseline, forming the starting point for the plan elaboration phase. The term “baseline” was considered particularly appropriate to capture this.

6.3.5. Conclusions from the Validation

The validation session confirmed the overall relevance and usefulness of the proposed toolkit while also providing important refinements. Several conclusions can be drawn:

- **Confirmation of influential factors** – The majority of influential factors identified in the research were recognised and confirmed by the experts. Particular emphasis was placed on stakeholder involvement and awareness, the need for early concretisation, and the importance of appropriate aggregation levels linked to assessment frameworks. The session highlighted further points of attention that strengthen the framework, such as the interpretation of the sustainability champion, the influence of project scale, and the importance of a sustainability mandate from the owner/sponsors at the start of a project. MIRT system was removed as influential factor.
- **Principles of the MIRT Sustainability Guideline** – The principles of the MIRT Sustainability Guideline were broadly supported, but participants stressed that their impact depends strongly on how they are implemented in practice. Structured conversations on sustainability, careful definition of relevant themes in assessment frameworks, and the integration of financial considerations at the right stage were identified as key levers.
- **Toolkit phases** – Most proposed actions in the toolkit were positively received and seen as valuable guidance. However, refinements were suggested: avoid duplication of existing tools

(Phase 1), clarify the distinction between selection and award criteria (Phase 2), limit unnecessary complexity when identifying synergies (Phase 4), embed sustainability in assessment frameworks rather than in stand-alone reports (Phase 5), frame sustainability in the preferred alternative as part of the overall trade-off (Phase 6), and emphasise baseline setting rather than procurement criteria in the run-up to plan elaboration (Phase 7).

The validation showed that the toolkit provides a solid basis for structuring sustainability in MIRT explorations. It translates broad ambitions into concrete actions, while allowing flexibility to adapt to project-specific contexts. The refinements identified in the validation mainly concern terminology, timing, and focus, rather than the substance of the approach. This indicates that the toolkit is both relevant and applicable in practice, provided that these refinements are taken into account in its final design.

6.4. Final Toolkit

Following the expert validation session, several refinements were made to the toolkit to improve its clarity, applicability, and alignment with current MIRT practice. The feedback mainly concerned the level of detail of certain actions, the overlap between phases, and the need to better reflect practical differences between projects.

Phase 1 – Preparatory phase

Priority action 1.6 (Develop project-specific R&D tools) was removed and integrated into action 1.2. Experts emphasised that numerous research and development tools already exist across the sector. Rather than developing new instruments, it is more effective to map and evaluate which existing tools are relevant and applicable to the specific project context. Independent tool development can remain a secondary option if clear gaps are identified, but the primary focus should be on a comprehensive inventory to avoid repeatedly “reinventing the wheel.”

Phase 1a – Tender Phase

The actions in this phase were rewritten to clarify their applicability. Not all MIRT explorations involve external parties or require formal tendering of consultancy or engineering firms. Furthermore, sustainability criteria related to company operations are often already included in tenders. The revised action therefore focuses on explicitly requesting a vision or interpretation of sustainable project delivery and on identifying the key sustainability themes that should guide the exploration.

Phase 2 – Start Exploration

No changes were made in this phase.

Phase 3 – Analysis Phase

The original action on identifying “synergies and co-benefits” was reconsidered and integrated into the broader task of mapping the external context. Participants highlighted that the term “synergies” can be confusing, covering both sustainability synergies and wider spatial opportunities. From a MIRT perspective, identifying co-benefits is already mandatory; therefore, this action now focuses specifically on identifying sustainability-related synergies within the general area analysis, rather than treating it as a separate objective.

In addition, a new action (4.2) was added. This action encourages the explicit development of a *sustainability-focused solution direction* during the analytical phase. Similar to the MER approach of developing a “most environmentally friendly alternative,” this helps teams explore the outer boundaries of sustainability possibilities even if this alternative is not ultimately selected. This process supports learning and identifies measures that can later be integrated into the preferred alternative.

Phase 4 – Assessment Phase

The previous action on documenting sustainability considerations was reformulated. Instead of producing a separate document, the emphasis is now on *executing and preparing* the defined sustainability goals and identifying actions that need to be taken forward into the subsequent plan- and study phase. The financial action originally included here was moved to phase 6, as participants considered it more appropriate to address financial integration after the preferred alternative has been established.

Phase 5 – Preference Decision

The idea of producing a separate sustainability report as decision information was considered too case-specific, largely influenced by the OVAH project. Experts argued that if sustainability has been properly integrated throughout earlier phases, it will naturally appear in the general decision documentation. However, a new reflective action was introduced, focusing on revisiting the initial sustainability ambitions and evaluating how these were represented and weighed in the final decision-making process.

Additionally, a new financial principle was added (6.2). The initial proposal to reserve a fixed percentage of the total budget for sustainability was considered too rigid, as the appropriate amount depends on project type and context. Instead, two possible approaches are now suggested:

- (1) Reserve a flexible percentage of the construction costs for sustainability measures; or
- (2) Link sustainability measures directly to project objectives and estimate their costs accordingly.

Phase 6 – Transition to Planning and Design Phase

The term “procurement criteria” was replaced, as this phase does not yet involve procurement. Instead, the focus is on refining the project’s baseline and feeding the outcomes of the MIRT exploration into the *Statement of Principles (Nota van Uitgangspunten)* for the next planning and design phase.

The final toolkit can be found in Figure 6.2

Sustainable MIRT Exploration

RACI-matrix roles:

- R = Responsible - executes the task
- A = Accountable - ultimately answerable for the result
- C = Consulted - Provides input and expertise
- I = Informed - kept updated on progress and outcomes



1. Preparatory Phase

Goal: Draft a Start Document that anchors sustainability in the governance structure and main project objectives, including shared high-level sustainability ambitions.

Priority Actions

1. Ensure broad stakeholder representation
2. Compile available knowledge (policies, previous studies, tools)
3. Determine leading aggregation level
4. Embed sustainability in project objectives
5. Anchor sustainability in Governance structure



Who?

No formal structure yet – responsibility lies with the client and owners:
Client: Lead in defining direction and governance setup
Owners: Approve ambition level & strategic fit
Regional & Local Authorities: Provide contextual input and early alignment



Tools

Matrix with sustainability ambitions of the client

Product

Start Document with clear sustainability governance structure



1a. Tender Phase

N.B. Not every MIRT exploration requires a tender procedure; however, when applicable, this phase represents a crucial opportunity to anchor sustainability in the project process.

Priority Actions

1. Include vision on important sustainability themes as an award criterion



Who?

Client leads the process by shaping sustainability criteria, consultants contribute by bringing in their own expertise and perspective



Product

Contractual agreement with sustainability clauses



2. Start Exploration

Goal: Establish a clear red thread on sustainability by holding a structured dialogue that embeds key themes in project products and analyses

Priority Actions

1. Structured Dialogue on Sustainability
2. Adequate Client Representation
3. Include distinguishing themes in assessment frameworks



Who?

	Owner	Client	Partner	Consultant
1.	C	A	C	R
2.	A	R	I	I
3.	A	R	C	I



Tools

- Duurzaam GWW
- Ambitiweb

Product

Vision on sustainability in project



3. Analysis Phase

Goal: Explore the full range of possible solutions without prematurely restricting the scope. A sustainability focused solution area should inform the range of sustainability measures.

Priority Actions

1. Map external context & look for synergies
2. Work out solution area with focus on sustainability themes



Who?

	Owner	Client	Partner	Consultant
1.	I	A	C	R
2.	I	A	C	R



Tools

- Climate resilience analysis
- Design principles (STOMP / environment-led Design)



4. Assessment Phase

Goal: Assess consequences per alternative and define measures for the next phase, ensuring that sustainability is fully visible in reporting.

Priority Actions

1. Test and quantify critical themes
2. Anticipate implications and prepare plan- and study phase actions



Who?

	Owner	Client	Partner	Consultant
1.	I	A	C	R
2.	I	A	C	R



Tools

Quantification tools: DuboCalc / R-ladder / MKBA / MER / embodied carbon study

Product

Integrated sustainability report



5. Preference Decision

Goal: Ensure sustainability considerations are visibly reflected in the decision and embedded in the financial framing of the preferred alternative.

Priority Actions

1. Reflect on sustainability integration in decision-making
2. Integrate in financial planning



Who?

	Owner	Client	Partner	Consultant
1.	A	R	I	R
2.	A	R	C	C



Products

N.A.



6. To Plan- & Study Phase

Goal: Transfer sustainability to next phase with requirements, follow-up measures, and quantifiable thresholds where possible.

Priority Actions

1. Include sustainability considerations in gate reviews
2. Formulate new baseline for the Statement of Principles for the next phase



Who?

Client and owners lead the transition; consultants support by formalising sustainability requirements and ensuring knowledge transfer.



Tools

Use of digital requirement-tracking systems (e.g., DOORS or in-STEP BLUE)

Figure 6.2: Final toolkit for sustainability integration in MIRT exploration projects after validation

Conclusion, Limitations and Recommendations

7.1. Conclusion

This research set out to answer the main question:

How can sustainability ambitions be effectively embedded in MIRT projects through the structuring of the MIRT exploration phase?

Objective 1

How is sustainability defined and conceptualised in theory and in practice within transport infrastructure planning?

In theory, sustainability in transport infrastructure is defined as a broad, multidimensional concept. It is most commonly framed through the Triple Bottom Line (people, planet, prosperity) (Elkington, 1997) or through broader definitions such as the UNEP description of sustainable infrastructure, which describe sustainable infrastructure as infrastructure that, throughout its entire life cycle, is environmentally, socially, economically, and institutionally sound (United Nations Environment Programme, 2021). When operationalising sustainability across these dimensions, projects must deliver on a number of critical challenges: reducing emissions, using resources efficiently, creating societal value, and contributing to the Sustainable Development Goals (Fenner et al., 2023). At the same time, a large body of literature shows that the interpretation of sustainability within infrastructure projects is shaped by the values and interests of the multiple stakeholders involved (Eskerod & Huemann, 2013; Gijzel et al., 2019). As such, sustainability is not a neutral or fixed standard, but a normative concept that emerges through negotiation and dialogue (Sturup & Low, 2019). Stakeholders apply different strategies to pursue their own priorities, which makes sustainability inherently contested and dynamic (Vuorinen & Martinsuo, 2018).

The case studies confirm this broad, multidimensional, and ambiguous view of sustainability. Across both Dordrecht and OVAH, sustainability ambitions were present, and the importance of sustainable infrastructure development was acknowledged and treated as an integral part of the process, receiving considerable attention in project documentation and ambition sessions. Yet they also confirmed that it is challenging to operationalise the broad theoretical concept in the early phases of the project lifecycle. Looking at how the concept was interpreted in practice, it became clear that sustainability was most often reduced to environmental performance, particularly CO₂ reduction, material use, and climate adaptation. Other dimensions, such as social inclusivity or economic value, were certainly present (for example in overall project goals, regional development, or cost–benefit analyses), but were rarely explicitly labelled as “sustainability.” This environmental focus can be explained by the way sustainability was institutionally framed and operationalised within MIRT projects. Environmental aspects such as CO₂ reduction and material efficiency were the most tangible and measurable, and these were the

themes most often addressed in assessment tools and sustainability reports under the label of sustainability. In contrast, social and economic dimensions were typically embedded in other procedures (e.g., accessibility goals or cost–benefit analyses) and therefore received less explicit attention under the heading of sustainability.

Moreover, the specific interpretation of sustainability differed between projects, underlining its normative and context-dependent nature. Three factors proved especially decisive:

1. **Local-specific conditions** constrained which ambitions were feasible (e.g. soil and space restrictions in Dordrecht, or the need for tunnelling in OVAH).
2. **The scale of system impacts** influenced which ambitions were prioritised (local accessibility versus regional modal shift and connectivity).
3. **Organisation of the process** determined which themes remained central throughout the exploration (e.g. the Oude Lijn assessment framework in Dordrecht versus the ambition web session in OVAH).

In sum, the comparison shows that sustainability in infrastructure projects is not a fixed category but is continually constructed through the interplay of context, system-level goals, and process organisation. While theory prescribes a holistic understanding, in practice the environmental dimension tends to dominate the discourse, with social and economic aspects addressed under different labels. This highlights the importance of making sustainability explicit at the outset of a project and ensuring that all relevant dimensions are embedded structurally in the decision-making process.

Objective 2

What are the key factors addressed in theory and in practice that influence how sustainability is integrated in MIRT exploration projects?

The implementation of sustainability in infrastructure projects is often challenged by a range of factors that make it difficult to safeguard ambitions throughout the project lifecycle. Such factors can lead to ambitions being scaled down or even eroded as projects progress. It is therefore essential to understand which factors influence the extent to which sustainability ambitions are translated into practice.

The literature identifies a broad set of indicators, typically framed as barriers and drivers (Ametepey et al., 2015; Banihashemi et al., 2017; Molaei et al., 2021; Sourani & Sohail, 2011; van Es, 2018). Frequently mentioned are financial and technical barriers, such as high upfront costs, uncertain payback times, or limitations in available methods and technologies. Equally important, however, are organisational factors, including fragmented responsibilities, siloed processes. Finally, literature underlines the role of the organisation and stakeholders: sustainability outcomes are strongly shaped by stakeholder engagement, governance structures, formal integration and by the knowledge and expertise available in the project environment.

The distinctive characteristics of MIRT explorations, being situated in a very early project stage, involving a broad set of stakeholders, and operating in the dense Dutch spatial context, provide new insights into the factors that shape the translation of sustainability ambitions. The analysis shows that ambitions are strongly bounded by location-specific conditions, as heritage, soil, and spatial constraints directly determine which goals remain feasible. It also became clear that the difficulty of linking ambitions across different scales, from local design choices to system-level effects such as modal shift, plays a crucial role in how extensively sustainability can be considered. Furthermore, getting the right people at the table, and ensuring that sufficient time and expertise are available, proves decisive for whether ambitions are embedded and safeguarded. This connects directly to the broader set of stakeholder-related factors such as affinity, the presence of sustainability champions, and client commitment, which were repeatedly identified in both cases and emphasised again during the validation, where they were rated among the most important influences.

The comparison of Dordrecht and OVAH also illustrates that these factors do not manifest uniformly across projects. In some cases they were clearly visible, while in others they remained more implicit or were expressed in different ways. For example, the role of a sustainability champion took very different forms. In Dordrecht it was personified by the Spoorbouwmeester, giving sustainability a recognisable advocate, whereas in OVAH it was more embedded within the project organisation and ambition web

process, making it less attributable to a single actor. This variation confirms that while the underlying factors are broadly similar, their influence depends on the specific project setting and the way processes and responsibilities are organised in practice.

Taken together, the comparison of theory and practice provides a comprehensive overview of influential factors which can be found in section 5.2.3. These factors have been grouped into themes and mapped across different management levels (strategic, tactical, operational). This structuring not only shows where factors are most likely to influence the translation of ambitions, but also where they can be addressed most effectively. The analysis underlines that sustainability ambitions are never simply implemented as intended: their survival depends on the interaction of financial, technical, organisational, and contextual factors. Recognising these factors explicitly provides opportunities to mitigate their constraining effects and to use them instead as levers to strengthen sustainability integration.

Objective 3

What does the process of embedding sustainability in MIRT explorations look like?

MIRT explorations are relatively advanced in integrating sustainability. National regulations require that environmental and social aspects are included in analyses, and the MIRT Sustainability Guideline offers further strategies. MIRT explorations follow a comparable structure and in each of these phases sustainability is embedded in a different way. In the earliest stages, sustainability typically enters the project as a broad set of ambitions originating from the involved partners. As explorations progress, these ambitions are gradually translated into frameworks, studies, and products that make them more operational, while also testing them against technical, financial, and spatial considerations. Towards later phases, the challenge shifts to safeguarding continuity.

With the existence of the MIRT Sustainability Guideline, it becomes relevant to evaluate to what extent its principles are applied in explorations and what these guiding elements mean specifically in the exploration phase of the MIRT. Although most interviewees were not familiar with the detailed content of the guideline, they did recognise the document itself, and many of its principles were visible in the projects, either explicitly or implicitly. This indicates that the guideline has practical relevance, even if its use is not always conscious.

At the same time, clear differences appear in the way principles are applied across projects. In some explorations, sustainability is directly embedded in assessment frameworks and project objectives, whereas in others it is addressed more through parallel processes and reporting. Approaches to the financial dimension also differ, with some projects reserving a dedicated budget for sustainability measures, while others treat them within existing financial structures. These contrasts highlight that the guideline provides a shared reference point, but its impact depends on how principles are operationalised in project-specific contexts.

Another defining element of embedding sustainability within MIRT explorations is the multi-stakeholder arena. The complex organisational structure, with many different partners and intricate dependencies, exerts a significant influence on the process, including sustainability. While actors often share the same overarching goals, frictions emerge once ambitions are confronted with competing priorities. The analysis of responsibilities across PSO stakeholder groups highlights two main challenges. First, a permanent–temporary layer gap is visible: project teams and consortia often show strong expertise and affinity with sustainability, while strategic actors face political and financial dilemmas that weaken translation into practice. Second, tensions exist within the permanent layer itself, where sponsors such as municipalities must balance sustainability with other pressing development needs, such as housing, leading to trade-offs that can dilute ambitions in later phases.

In sum, sustainability is structurally embedded in the MIRT process and supported by dedicated instruments, but the degree of integration depends on how the process is organised, carried forward, and how the different competing sustainability themes are balanced. The structured approach of MIRT explorations makes it possible to analyse which aspects are important at which points in the project and which actors are best positioned to act on them. This analysis forms the basis for the recommendations and the development of the toolkit.

Objective 4

What strategies can be formulated to aid MIRT explorations in becoming sustainable Explorations?

This research demonstrates that effectively embedding sustainability in MIRT explorations requires a fundamental shift in perspective. Instead of treating sustainability as a separate ambition or checklist item, it must function as an organising principle that shapes the entire exploration process. Because sustainability is inherently normative and context-dependent, its meaning cannot be fixed in advance. It emerges through interaction between actors, governance structures, and project-specific priorities. By recognising this, MIRT explorations can move from viewing sustainability as an external requirement to positioning it as a procedural logic that guides design, assessment, and decision-making.

Adopting this new perspective changes the definition of what a *sustainable MIRT exploration* entails. It is not only a study that produces a technically and financially feasible solution, but a funnel process that ensures the chosen solution contributes to a more sustainable system. This includes the early identification of key sustainability themes, the fair distribution of impacts and benefits, and the anticipation of long-term effects. In this definition, the exploration itself becomes a sustainability intervention: a structured and transparent process that ensures ambitions are translated into choices, rather than added as a separate layer at the end.

The developed toolkit provides the practical means to operationalise this perspective. It translates abstract ambitions and lessons from literature and case studies into concrete actions, responsibilities, and decision moments throughout the MIRT process. By following the phased approach, project teams can systematically organise discussions, embed sustainability in assessment frameworks, and ensure continuity of ambitions across phases. The toolkit therefore strengthens both the substantive and procedural embedding of sustainability—making it part of the project's DNA instead of an optional extra.

The toolkit's input is the set of diverse sustainability ambitions and policy goals that stakeholders bring to the table. Its process structures how these ambitions are converged, translated into criteria, and aligned with decision gates throughout the exploration. The output is a preferred alternative in which sustainability is inherently integrated and accompanied by clear measures and financial considerations that can be carried forward into the planning and design phase. In this way, the toolkit offers a practical framework for conducting truly sustainable MIRT explorations and ensures that sustainability ambitions remain tangible and actionable across the entire project life cycle.

Answer to the Main Research Question

How can sustainability ambitions be effectively embedded in MIRT projects through the structuring of the MIRT exploration phase?

Transport infrastructure has a major influence on socio-economic development, yet it also leaves a substantial ecological footprint. At the same time, it has the potential to reduce transport poverty and enhance sustainable accessibility. Balancing these potential positive and negative impacts makes sustainable infrastructure development both a necessity and a responsibility.

Effectively embedding sustainability in Large Transport Infrastructure Projects (LTIPs) requires attention to the early stages of project development, where strategic ambitions are first translated into project-level objectives. Within the Dutch MIRT framework, this translation takes place during the exploration phase. This research argues that the objective should not merely be to add sustainability as a discrete goal, but to structure the exploration process itself around sustainability as an organising principle. An organising principle represents the underlying logic that guides how decisions are made and priorities are set. In the MIRT context, this means that sustainability becomes the guiding rationale that shapes the entire exploration. It ensures that all dimensions are considered in an integrated and balanced manner from the outset. This approach allows the process to address both the complexity of LTIPs and the conceptual ambiguity of sustainability itself.

Findings from both literature and case studies support this perspective, showing that sustainability is inherently normative and that its meaning is shaped by the project's context, scale, and the way the process of embedding sustainability is organised. Because contextual and scale-related factors are often difficult to influence, improving sustainability integration primarily depends on how the process is structured. MIRT projects are complex, multi-stakeholder endeavours that operate within socio-technical

regimes, where sustainability is still too often treated as an add-on. By reframing sustainability as the organising principle of the exploration, this research shows that conceptual ambiguity can be reduced and that trade-offs between themes can be assessed more transparently.

To enable this, the study introduces a practical toolkit that helps structure the broad range of sustainability ambitions throughout the exploration. The toolkit supports project teams in explicitly defining what sustainability means for their specific project through structured dialogue and shared interpretation. It strengthens coordination and ensures that sustainability is treated as a shared responsibility across governance layers. Importantly, it provides a dynamic framework that helps MIRT explorations conclude with a sustainable preferred alternative that can also be developed in a sustainable way.

By applying this toolkit, project teams can translate long-term sustainability ambitions into practical decision-making, aligning strategic goals with the operational realities of infrastructure planning. This ensures that sustainability becomes a structural and enduring part of how projects are conceived, assessed, and delivered.

7.2. Limitations

This research is subject to several limitations that should be considered when interpreting its findings. First, the empirical analysis was based on two case studies that differ considerably in scale, scope, and institutional setting. While this contrast provided valuable insights into how sustainability is embedded under different conditions, it also limits the extent to which findings can be generalised across all MIRT explorations. The conclusions should therefore be interpreted as indicative rather than universally representative.

Second, the number of interviewees for the OVAH case was relatively limited compared to the Dordrecht case. Although the interviews provided rich qualitative data, a larger sample might have captured a wider range of perspectives, particularly regarding inter-organisational collaboration and client–consultant dynamics.

Third, both projects were ongoing at the time of research. As a result, the eventual influence of sustainability ambitions on final decision-making, design elaboration, and implementation could not yet be observed. The analysis therefore focuses primarily on processes, perceptions, and organisational arrangements, rather than on long-term project outcomes.

Fourth, the research focused on public transport and rail-related MIRT projects, which represent only one of the three main domains within the MIRT system. The other domains (roads and waterways) operate under different governance models, institutional cultures, and technical requirements. As RWS, the main actor in waterway projects, follows a distinct approach to project delivery, the transferability of the results across all MIRT domains may be limited. Furthermore, the study did not distinguish between renovation projects and new infrastructure developments, even though the dynamics and sustainability challenges may differ substantially between them.

Fifth, it was not always possible to fully reconstruct the reasoning behind specific organisational or procedural choices. Many interviewees were currently involved in the projects but referred to predecessors for decisions made in earlier stages. This limited the ability to trace the complete historical development of sustainability-related structures and decisions.

Sixth, the study did not examine the operational or management phases of infrastructure projects. Sustainable operation and maintenance are essential to understanding life-cycle sustainability performance, where long-term impacts can outweigh those of the construction phase. Broader life-cycle considerations were not systematically assessed and the integration of life-cycle considerations was not made very explicit in the toolkit. A more holistic analysis, incorporating life-cycle assessment, could provide deeper insight into where the most significant sustainability impacts occur.

Seventh, sustainability in public infrastructure planning inevitably involves political and value-laden decision-making. Political priorities and personal values of decision-makers influence how sustainability is interpreted and acted upon. While processes and tools can support structured decision-making, the ultimate success of embedding sustainability depends on the willingness of actors to internalise these principles. Changing mindsets and organisational cultures may therefore be more decisive than

procedural optimisation alone.

Finally, time constraints restricted the depth of analysis that could be achieved within each case. Although the comparative design allowed for cross-case learning, a single, more longitudinal in-depth case study might have provided a deeper understanding of the decision-making processes and institutional mechanisms that shape the embedding of sustainability in practice. Ultimately, the key limitation of this research is that the proposed toolkit has not been tested in practice. Its effectiveness in supporting the embedding of sustainability throughout the different project and life-cycle stages therefore remains to be demonstrated. Such an evaluation would require longitudinal application and monitoring across multiple projects, which lies beyond the scope and timeframe of this study.

Despite these limitations, the research offers valuable insights into the organisation of sustainability in MIRT explorations. The triangulation of multiple data sources, combined with theoretical grounding and expert validation, helps to mitigate these limitations and ensures the robustness and relevance of the findings. It offers both scientific as practical contribution as the next sections will show.

7.3. Scientific Contribution

This research contributes to the academic discourse on sustainability in large transport infrastructure projects by advancing understanding of how sustainability is conceptualised, organised, and embedded in the early planning phases of complex, multi-stakeholder projects. The study builds on existing literature on sustainable infrastructure and project governance but extends it in several important ways.

First, the research provides new empirical insight into how sustainability it is interpreted and applied in practice compared to how is framed in theory. While academic literature presents sustainability as a broad, multidimensional concept, the case studies show that, in practice, it is shaped by project-specific contexts, stakeholder values, and institutional settings. This finding reinforces the notion that sustainability is not a fixed or universal concept but a normative one that evolves through negotiation and interpretation within projects. Furthermore, the findings nuance some of the literature that highlights wide variation in how stakeholders interpret sustainability within projects. In contrast, this research found a relatively high degree of consensus among actors about the meaning and scope of sustainability within each case. This suggests that a structured approach to organising sustainability dialogues and decision-making can foster shared understanding and collectively supported sustainability objectives.

Second, the study identifies and refines a set of influential factors that affect how sustainability ambitions are maintained throughout the project lifecycle. Moreover, this research introduces a new analytical contribution by positioning these factors across the strategic, tactical, and operational levels of management. This multi-level perspective clarifies how sustainability ambitions move through organisational layers and where interventions can be most effective.

Third, the research contributes conceptually by analysing how sustainability can be embedded in the front-end phase of infrastructure development. Existing studies often focus on the overall project or implementation phases, whereas this study zooms in on the exploration as the pivotal translation point between strategic ambitions and concrete project outcomes. It shows that sustainability can be operationalised more effectively when it is integrated into the structure of the exploration process itself, rather than being addressed as an external requirement.

Finally, this research advances the theoretical framing of sustainability in infrastructure planning by proposing that sustainability should be understood as an organising principle rather than a performance criterion. This perspective accounts for the normative and contested nature of the concept and aligns with the logic of procedural rationality. Instead of judging whether a project is “sustainable” or “more sustainable,” the emphasis shifts to ensuring that the procedures through which sustainability is interpreted and applied are transparent, legitimate, and collectively supported. When all actors agree on how sustainability is to be defined and embedded, the resulting process fosters shared ownership, enhances acceptance of sustainable measures, and strengthens the durability of outcomes across the project life cycle.

7.4. Practical Contribution

This research provides several practical contributions to the planning and management of large transport infrastructure projects under the Dutch MIRT framework. It offers actionable guidance for project teams, policymakers, and consultants seeking to strengthen the integration of sustainability in the early project phases.

First, the study evaluates the practical application of the *Handreiking Verduurzaming MIRT* and provides insight into how its principles are interpreted and implemented in real projects. While the guideline forms an important foundation for integrating sustainability across the MIRT process, its use in practice is often implicit rather than explicit. The research identifies how the principles of the handreiking manifest in actual projects, where they prove most effective, and where additional support or clarification is needed. This evaluation helps bridge the gap between policy intentions and project-level implementation.

Second, the research captures a wide range of practical experiences and perspectives from professionals actively involved in MIRT projects. Through interviews with experts from national authorities, regional governments, and consultancy practice, the study brings together multiple viewpoints on how sustainability is understood and managed in complex multi-stakeholder environments. This diversity of perspectives strengthens the validity of the findings and reflects the realities of day-to-day decision-making in infrastructure planning.

Third, the study contributes by clarifying how sustainability can be embedded specifically in the exploration phase of MIRT projects. Building on the principles already outlined in the handreiking, it provides a more detailed and phase-specific interpretation of how ambitions can be organised, structured, and safeguarded during this critical early stage. By focusing on the exploration phase, the research offers concrete guidance for project teams operating in the front-end of the project lifecycle, where the potential to influence long-term outcomes is greatest.

Finally, the research delivers a practical tool, which translates the study's insights into a structured set of actions and roles that project teams can directly apply in practice. It helps teams organise discussions, define sustainability objectives, and embed these in assessment frameworks and decision gates. The toolkit is designed to be flexible and adaptable to different project contexts, ensuring that sustainability ambitions remain visible, actionable, and consistent throughout the exploration.

In sum, the research offers a practical contribution by connecting national sustainability policy with project practice, by reflecting the lived experiences of professionals across the MIRT system, and by providing concrete instruments that enable teams to organise MIRT explorations as truly sustainable explorations.

7.5. Future research agenda

Building on the findings and limitations of this research, several directions for future study can be identified to further advance the understanding and practical implementation of sustainability in large transport infrastructure projects.

First, future research should further examine and validate the concept of sustainability as an organising principle. This study argues that sustainability should not be treated as a separate design objective but as a guiding logic that shapes governance, collaboration, and decision-making throughout the exploration. Future studies could explore how this principle functions in other sectors, such as water management, housing, or energy infrastructure, to assess its wider applicability and potential as a unifying framework for complex, multi-actor projects.

Second, research should aim to integrate life-cycle considerations more explicitly into the front-end phase of infrastructure planning. While this study focused on the exploration phase, long-term sustainability performance depends heavily on how early decisions anticipate use, maintenance, and renewal. Incorporating life-cycle thinking at this stage would help identify where the largest sustainability impacts occur and how trade-offs between short-term feasibility and long-term value can be better managed.

Third, in extension of this, future work should investigate how life-cycle benefits and long-term value can be monetised and embedded in decision-making. Economic assessment tools such as the *Maatschap*-

pelijke Kosten-Batenanalyse (MKBA) could be expanded to include broader sustainability metrics, enabling project teams and policymakers to make better-informed trade-offs that capture both immediate and future benefits. This would strengthen the economic rationale for sustainability and align long-term value creation with financial decision-making. This also requires better understanding of the factor regarding the aggregation levels of impact, particularly how sustainability outcomes can be assessed across different scales of time, geography, and system boundaries. Developing methods to connect local project impacts with regional or national sustainability goals would improve the coherence between micro-level project actions and macro-level policy ambitions.

Fourth, the research could be extended to analyse the planning and study phase of MIRT projects, where the baseline created in the exploration must be translated into concrete design, procurement, and implementation choices. Studying this phase would offer valuable insight into how sustainability further transition in the project life cycle towards an operational reality in design and delivery.

Finally, future research should test the application of the developed toolkit in practice. Applying the toolkit in ongoing or future MIRT explorations would help evaluate its usability, adaptability, and impact on project outcomes. Such empirical testing could refine the framework, enhance its practicality, and confirm its value as a tool for systematically embedding sustainability in infrastructure planning.

Together, these directions would strengthen both the theoretical foundation and practical application of sustainability integration in infrastructure planning, bridging the gap between ambition and implementation, aligning long-term system value with early decision-making, and advancing the transition towards infrastructure projects that are not only sustainable in outcome but in the very way they are conceived and delivered.

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A brief history of Sustainability and Sustainable Development

Sturup and Low (2019) provide a comprehensive overview of the history and development of the term sustainability. The first use can be traced back to the 18th century. In 1713, German mining official Hans Carl von Carlowitz introduced the idea of “nachhaltige Nutzung” (sustainable use) in response to deforestation caused by industrial wood demand (Thiele, 2013). His aim was to ensure long-term economic benefits by managing forests in a way that allowed them to regenerate. In the 1970s, this thinking expanded in response to rising scientific awareness about environmental boundaries. The influential Limits to Growth report (1972) modeled global ecological systems and warned of the risks of uncontrolled economic and population growth (Meadows et al., 1972). It argued that growth must be guided to prevent ecological collapse and to ensure basic needs can be met.

These ideas were formalized in the 1987 Brundtland Report of the United Nations, which defined sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” (United Nations World Commission on Environment and Development, 1987) It introduced sustainability as a balance between economic, social, and environmental goals, emphasizing that the environment and development are deeply interconnected. Since then, sustainability has been embedded in global policy through the Millennium Development Goals (n.d.) and the Sustainable Development Goals (2015).

To evaluate sustainability in practice, Elkington (1997) introduced the Triple Bottom Line (TBL) framework, which proposes a balance between three core dimensions: economic viability (Profit), social equity (People), and environmental protection (Planet). This model became widely adopted for assessing sustainability in projects and organizations, as it aligned with the conceptual division of sustainability into three pillars: economic, social, and environmental. These three dimensions still remain central to the concept of sustainability, though the understanding of their roles and interrelations has evolved over time (Reddy & Thomson, 2015) (see figure A.1). Initially, the pillars were often treated as separate domains, yet in reality they are inherently interdependent. Sustainability is not achieved by optimizing a single dimension in isolation, but rather when all three interact constructively and reach a balanced baseline. This idea is frequently illustrated using the “circles of sustainability” model, in which the overlap of the three dimensions represents an ideal sustainable outcome. However, the model has also faced criticism, particularly for representing a form of weak sustainability. Critics argue that achieving full overlap is rarely feasible in practice, and that treating all three pillars as equal may downplay the foundational role of ecological limits.

In response, scholars like Hart (1997) and Daly (1996) advocate for a strong sustainability perspective. They propose a nested model in which the economy operates within society, and both are embedded within the biosphere. In this view, environmental integrity is not one of three equal pillars, but the ultimate boundary that constrains all human activity. Daly (1996) further emphasizes that the economy should be understood as an open system, dependent on inputs from nature and subject to the limits

of waste absorption and resource renewal. Sustainability, from this perspective, requires keeping the scale of human activity within the Earth's carrying capacity.

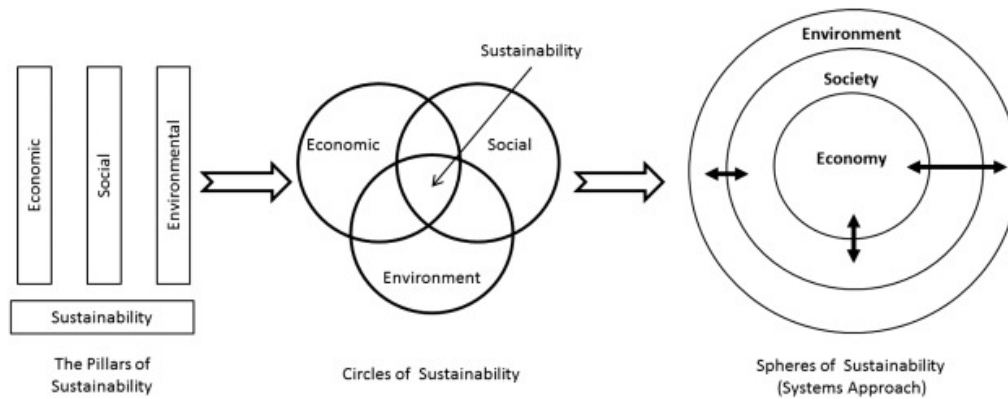


Figure A.1: Evolution of the three dimensions of sustainability

This has led the discourse on sustainability to evolve and produced the planetary boundaries framework, introduced by Rockström et al. (2009). This framework identifies nine critical Earth system processes such as climate change, biodiversity loss, and freshwater use. They attempt to quantify safe operating limits to the use of these processes to preserve a stable and resilient planet. The framework marks a shift from relative and context-dependent interpretations of sustainability to a more scientifically defined set of absolute ecological thresholds. Crossing these thresholds increases the risk of irreversible environmental change (see A.2).

In parallel, the concept of absolute sustainability has gained traction (Andersen et al., 2024). While traditional sustainability assessments often focus on making individual projects “more sustainable” relative to others, absolute sustainability evaluates whether a project or system operates within the ecological limits of the planet. This approach ties sustainability performance directly to the Earth’s biophysical boundaries. It changes the perspective from incremental improvement of sustainability to adherence to global environmental limits.

Together, these developments reflect a growing emphasis on quantifiable, science-based definitions of sustainability that build upon the earlier frameworks centered on balance and trade-offs between social, economic, and environmental goals. It also shows the evolving and changing conception of the concept and the way to approach the challenge.

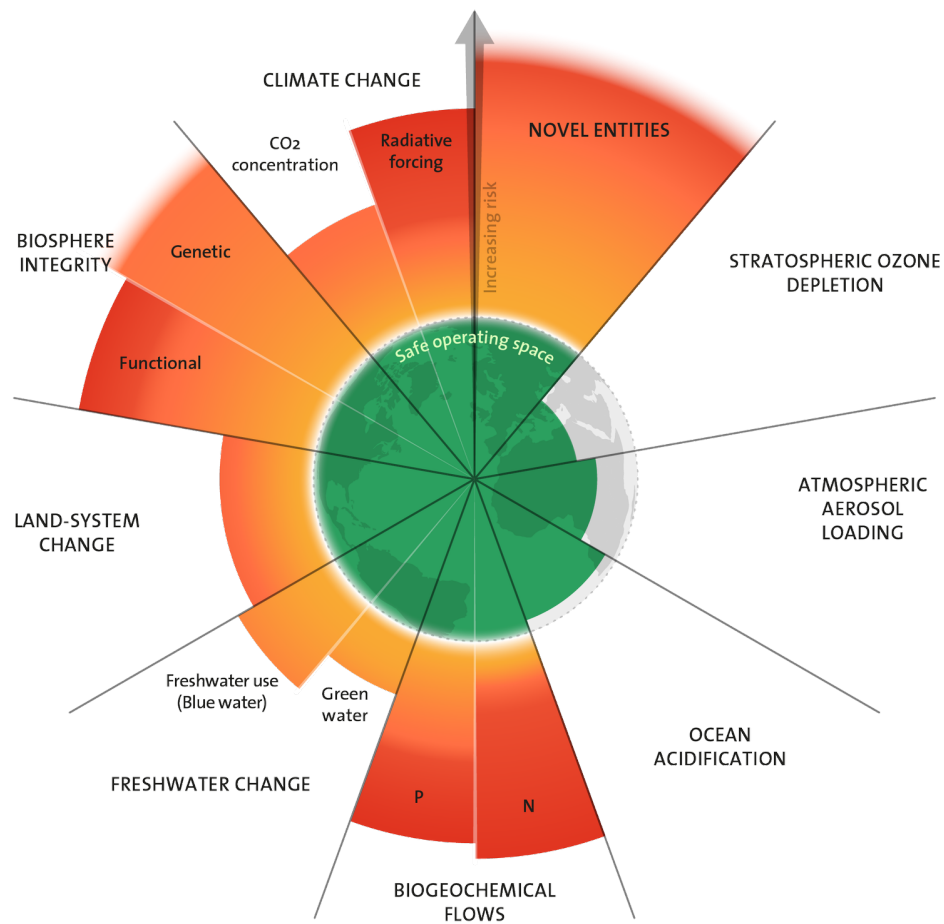


Figure A.2: Planetary boundary framework (Rockström et al., 2009)

B

Explanation MIRT (Dutch)

B.1. Inleiding: Wat is het MIRT?

Het Meerjarenprogramma Infrastructuur, Ruimte en Transport (MIRT) is het centrale beleids- en investeringskader van de Nederlandse Rijksoverheid voor grootschalige infrastructurele en ruimtelijke projecten. Binnen dit programma werken het Rijk, provincies, gemeenten, vervoerregio's en andere stakeholders samen aan het verbeteren van bereikbaarheid, leefbaarheid, waterveiligheid en klimaatadaptatie.

MIRT-projecten bestrijken meerdere beleidsvelden en kennen een hoge mate van bestuurlijke complexiteit, lange doorlooptijden en aanzienlijke maatschappelijke impact. In die zin vormt het MIRT niet alleen een projectportfolio, maar ook een governance-instrument voor integrale gebiedsontwikkeling en duurzame mobiliteit. Er zijn 5 MIRT-regio's en goederenvervoerscorridors (zie figuur B.1)



Figure B.1: MIRT regio's

B.2. Financiering: Langjarige fondsen

De financiële basis van het MIRT wordt gevormd door twee langjarige fondsen:

- **Mobiliteitsfonds (MF):** Voor investeringen in mobiliteit, zoals wegen, spoor, vaarwegen, fietsverbindingen en buisleidingen. Gemiddeld circa 9 miljard euro per jaar, met een totale raming van 133 miljard euro (2025–2038).
- **Deltafonds (DF):** Voor waterveiligheid, waterkwaliteit en zoetwatervoorziening. Jaarlijks ongeveer 2 miljard euro, oplopend tot 26 miljard euro (2025–2038).

B.3. Fases binnen het MIRT-proces

Het MIRT-proces kent vier fasen:

1. **Startbeslissing:** Projecttoelating tot de verkenning, met minimaal 75% financiële dekking.
2. **Verkenningsfase:** Onderzoek van alternatieven, inclusief maatschappelijke kosten-batenanalyse (MKBA), milieueffectrapportage (MER) en participatie.
3. **Projectbeslissing (planuitwerking):** Technisch ontwerp, financiering, aanbesteding en risicobeheersing worden uitgewerkt.
4. **Opleveringsbeslissing (realisatie):** Afronding, evaluatie, overdracht naar beheer en onderhoud.

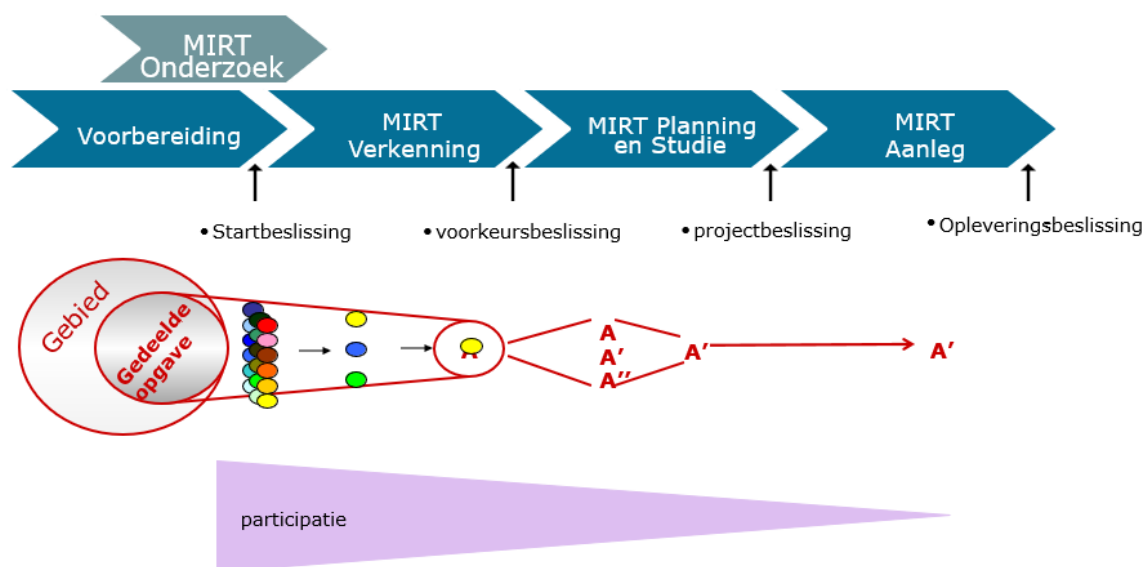


Figure B.2: De stappen van het MIRT-proces

B.4. MIRT-Spelregels en afwegingskaders

Gedurende het proces gelden spelregels zoals:

- Inzet van objectieve analysemethoden (zoals MKBA, MER).
- Participatie van belanghebbenden in elke fase.
- Financiële spelregels over cofinanciering en dekking.
- Gelijke behandeling van initiatieven.

B.5. De jaarlijkse MIRT-cyclus

De MIRT-cyclus bestaat uit:

- **Voorjaar:** Commissiedebat Strategische Keuzes Bereikbaarheid
- **Juni:** Bestuurlijk Overleg Leefomgeving met een MIRT-Kamerbrief
- **Juli:** Commissiedebat MIRT.

- **Prinsjesdag:** Publicatie van het MIRT-overzicht.
- **Najaar:** Bestuurlijk Overleg MIRT, Notaoverleg in de Tweede Kamer.

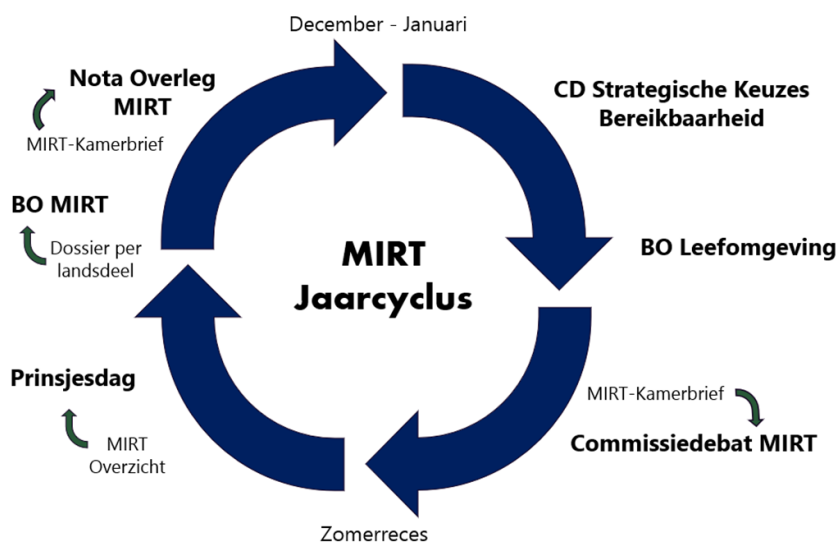


Figure B.3: Jaarlijkse MIRT-cyclus

Het Bestuurlijk Overleg MIRT (BO MIRT) vindt jaarlijks plaats in november en vormt een essentieel moment binnen de MIRT-cyclus. Tijdens dit overleg komen bewindspersonen van het Ministerie van Infrastructuur en Waterstaat (IenW), de minister voor Volkshuisvesting en Ruimtelijke Ordening (VRO) en regionale bestuurders bijeen om gezamenlijk te spreken over gebiedsopgaven en mogelijke investeringsbeslissingen.

Voor elke MIRT-regio (Noord, Oost, Zuid, Zuidwest, Noordwest) wordt een afzonderlijk overleg georganiseerd, evenals een overleg voor de goederenvervoercorridors. In deze overleggen wordt besproken welke projecten in aanmerking komen voor verdere uitwerking of financiering. De uitkomsten worden gebundeld in de zogenoemde MIRT-brief van het najaar, die ter informatie en verantwoording aan de Tweede Kamer wordt aangeboden.

De voorbereiding op het BO MIRT vindt plaats via zogeheten Rijk-regio Directeurenoverleggen, waarin ambtelijke vertegenwoordigers van beide overheidslagen de inhoudelijke agenda's voorbereiden en regionale prioriteiten afstemmen. Deze overlegstructuur draagt bij aan transparante besluitvorming en een nauwe samenwerking tussen rijk en regio.

Governance op projectniveau

Het *MIRT-overzicht* (<https://www.mirtoverzicht.nl>) is een digitaal toegankelijke samenvatting van alle projecten en programma's.

B.6. Gebiedsgerichte samenwerking

MIRT-projecten zijn ingebed in gebiedsgerichte bereikbaarheidsprogramma's waarin rijk en regio samenwerken aan:

- Integratie van mobiliteit, woningbouw, klimaat en economie.
- Regionale thematische werkgroepen.
- Een gezamenlijke governance-structuur.

B.7. Kracht en uitdagingen van het MIRT-systeem

B.7.1. Krachten

- Langetermijnfinanciering via fondsen.
- Integrale, gebiedsgerichte aanpak.

- Participatie en transparantie.
- Gebruik van meetinstrumenten en analyses.

B.7.2. Uitdagingen

- Tekorten in lopende projecten.
- Beperkte capaciteit bij uitvoeringsorganisaties (zoals RWS).
- Tekort aan stikstofruimte.
- Bestuurlijke complexiteit en uiteenlopende belangen.

B.8. Slotopmerking

Het MIRT is een krachtig instrument om complexe opgaven op het gebied van infrastructuur, ruimte en duurzaamheid aan te pakken. De combinatie van lange-termijnplanning, gezamenlijke financiering, en een integrale werkwijze maakt het MIRT tot een uniek beleidsmechanisme binnen de Nederlandse bestuurspraktijk. Tegelijkertijd vraagt de maatschappelijke opgave om voortdurende vernieuwing in samenwerking, afwegingen en uitvoering.

B.9. Governance and Organisational Model of MIRT Explorations

The governance of MIRT explorations is typically represented as an hourglass structure, where decision-making narrows at the top before broadening again towards delivery (see Figure B.4). At the top, strategic and political choices are made; in the middle, the project organisation coordinates and translates these choices; and at the bottom, engineering and market parties turn plans into concrete outputs.

B.9.1. Explanation of the layers

BO – Bestuurlijk Overleg (Administrative/Political Steering Committee)

The highest layer of the structure. At this level, national, provincial, and municipal executives take the formal decisions on direction and preferred alternatives. It is about strategic steering: setting the overall course while balancing political and societal interests.

DO – Directeurenoverleg (Directors' Committee)

This level prepares the political and administrative decision-making. The directors of the involved organisations discuss the advice emerging from the lower levels and determine which proposals are mature enough to be escalated to the Steering Committee.

ACO – Ambtelijk Coördinatieoverleg (Coordination Committee)

A preparatory meeting in which policy officers and project leaders from the commissioning organisations coordinate analyses, recommendations, and design options, ensuring a consistent basis for directors and executives.

AOG / OGO – Ambtelijk Opdrachtgeversoverleg (Clients' Committee)

Here, civil service representatives of the commissioning organisations align their positions and interests. The first joint choices are made at this level, before being passed upward through the ACO and DO to the Steering Committee.

PO – Project Organisation

The central hub of the hourglass. The project organisation connects strategic decision-making at the top with operational delivery at the bottom. It coordinates studies, translates policy frameworks into project plans, and reports results back upward.

Advisory, research and engineering firms

These parties deliver analyses, designs, and supporting studies. Their work provides the evidence base and technical input for decision-making at higher levels.

Delivery (market parties and contractors)

The lowest layer of the hourglass. This is where the actual implementation takes place by market parties and contractors. At this stage, the plans are made tangible and realised in practice.

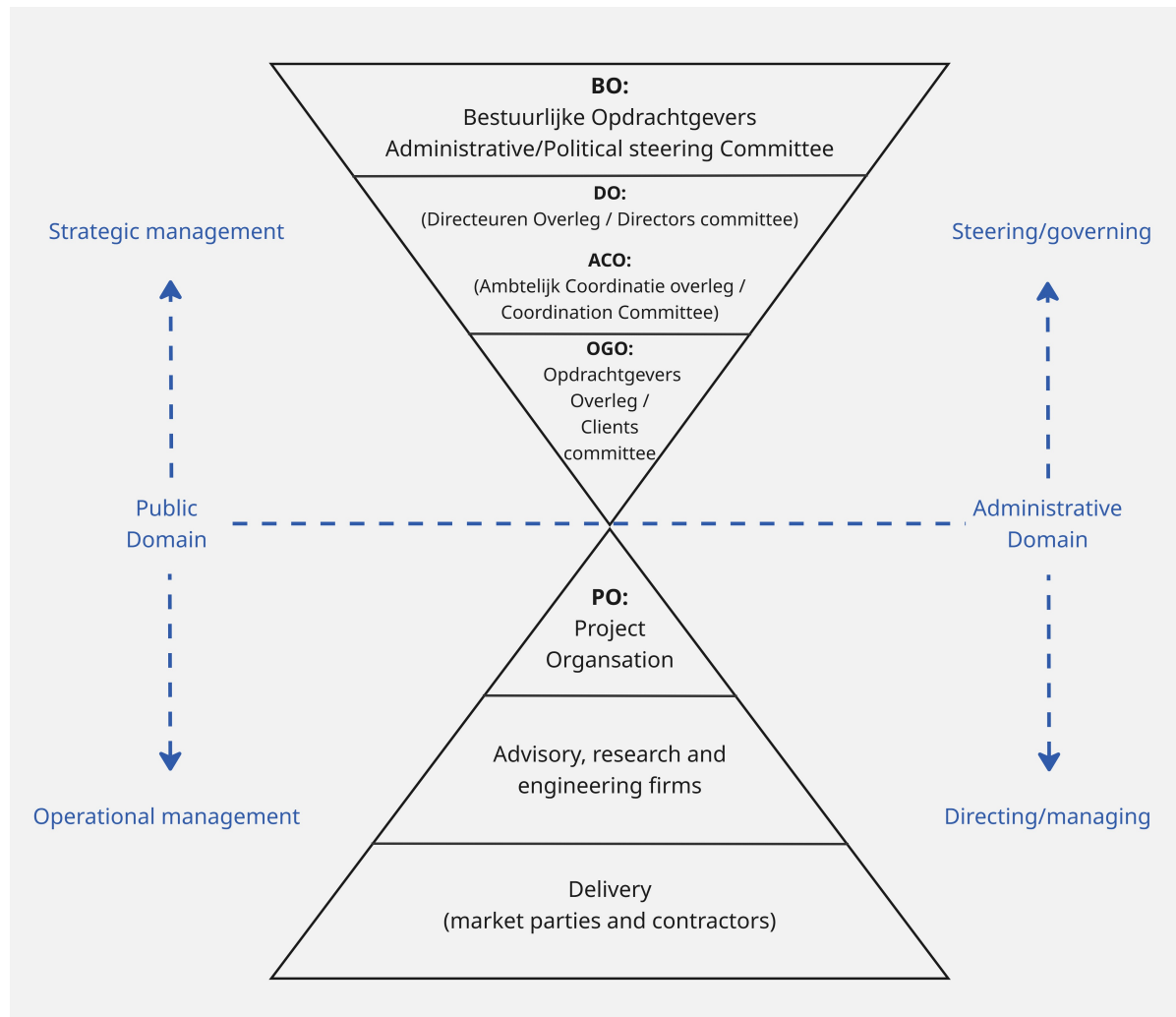


Figure B.4: Governance structure of MIRT explorations

B.9.2. Public and Administrative Domains

The hourglass also distinguishes between the Public Domain and the Administrative Domain. On the public side, the emphasis is on the societal environment. At the top of the structure this means strategic stakeholder management, where political and societal interests are weighed. Lower in the hourglass it becomes more operational, focusing on engagement with residents, users, and local businesses during design and construction.

On the administrative side, the emphasis lies within the governmental and bureaucratic environment. Higher up, this involves political and administrative decision-making, while further down it translates into directing and managing: project leadership and engineering teams translating decisions into designs, contracts, and execution.

B.9.3. Relation to the PSO framework

The Project–Supplier–Owner (PSO) framework (Denicol et al., 2021) provides a similar layered perspective. The BO and DO mainly represent the permanent layer (Owner), where long-term institutions and governance structures ensure continuity and authority. From the AOG down to the PO, including parts of the advisory and research organisations, governance falls within the temporary layer (Client), which connects strategic decision-making with project execution. Finally, the market parties and contractors at the bottom correspond to the tiered suppliers, who deliver design, construction, and implementation in successive layers.



Interview protocol

Onderzoeker: Thijs van Royen

Afstudeeronderzoek: TU Delft (CME) i.s.m. Arup

Looptijd interviews: 12 juni t/m 10 juli 2025

Duur: 60–90 minuten

Checklist vooraf:

- ☐ Heeft u het informed consent formulier gelezen en ondertekend?
- ☐ Mag ik dit gesprek opnemen zodat ik het later kan transcriberen en analyseren?
- ☐ Uw gegevens worden vertrouwelijk en anoniem verwerkt. U kunt op elk moment stoppen of vragen overslaan.
- ☐ De opname en transcriptie worden uitsluitend gebruikt voor dit onderzoek. U heeft het recht om passages in te zien of terug te trekken.

**** Start opname ****

Introductie van het onderzoek

Dank dat u wilt deelnemen aan dit interview. Het onderzoek richt zich op de manier waarop duurzaamheid wordt ingebed in de verkenningsfase van MIRT-projecten. Deze fase is bepalend voor de ontwikkeling en vormgeving van een project, en dus ook voor de manier waarop duurzaamheid daarin een plek krijgt.

Mijn focus ligt op de samenwerking en afwegingen tussen betrokken partijen: hoe wordt duurzaamheid geïnterpreteerd, wie heeft waarop invloed, en welke mechanismen zorgen ervoor dat ambities wel of niet landen in ontwerpkeuzes en beoordelingskaders.

Het interview is semigestructureerd. Dat betekent dat er enkele vragen zijn voorbereid op basis van een aantal hoofdthema's. Omdat het een casestudy betreft, staan uw ervaring en perspectief op dit specifieke project centraal.

Thema 1 – Rol en ervaring binnen het project

Doel: Inzicht krijgen in de achtergrond, positie en betrokkenheid van de geïnterviewde.

Vragen:

- Wat is uw rol binnen dit project, en namens welke partij?
- Hoe lang bent u betrokken, en op welke manier?
- Welke ervaring heeft u met duurzaamheid in infrastructuurprojecten?

Thema 2 – De positie van duurzaamheid binnen het project

Doel: Begrijpen hoe duurzaamheid wordt ingevuld en behandeld – formeel én informeel.

Vragen:

- Bent u bekend met de duurzaamheidsstrategieën binnen dit project?
- Hoe zijn deze tot stand gekomen en welke thema's spelen een rol?
- Bent u bekend met de Handreiking Verduurzaming MIRT? Hoe wordt deze toegepast?
- Loop langs de speerpunten van de Handreiking, hoe zijn deze toegepast in het project?
- Komt duurzaamheid voor in contracten of in de NOK?
- Op welke momenten kwam duurzaamheid aan bod, en hoe ontwikkelde dat zich?
- Worden ambities concreet vertaald in de verkenning? Hoe draagt u bij?
- Wat gaat goed in hoe duurzaamheid wordt meegenomen?
- Zijn er ambities afgeschaald of opgeschort? Wat was daarvan de oorzaak?

Thema 3 – Invloed, verantwoordelijkheden en perceptie van stakeholders

Doel: Inzicht krijgen in ervaren invloed en de verdeling van rollen binnen het netwerk.

Vragen:

- Welke duurzaamheidsthema's zijn specifiek belangrijk in deze verkenning?
- Op welke integratieaspecten had u invloed (besluitvorming, contract, etc.)?
- Waar had u minder invloed op, en waarom?
- Welke partijen ziet u als sleutelspelers voor duurzaamheid?
- Waar kunt u zelf bijdragen aan verduurzaming?
- Welke ondersteuning van anderen is belangrijk voor verduurzaming?

Thema 4 – Middelen en strategieën voor integratie

Doel: Verzamelen van ervaringen, leerpunten en ideeën voor effectievere integratie.

Vragen:

- Wat zijn volgens u de grootste obstakels voor integratie van duurzaamheid?
- Welke strategieën of middelen werkten goed (hier of elders)?
- Wanneer is een ambitie werkbaar of goed geformuleerd?
- Hoe kunnen ambities worden geborgd in de volgende MIRT-fase?

Afsluitende vragen

Doel: Ruimte geven voor aanvullingen of niet-besproken onderwerpen.

Vragen:

- Zijn er onderwerpen die we niet besproken hebben maar die u belangrijk vindt?
- Heeft u nog een laatste reflectie of suggestie voor dit onderzoek?

**** Stop opname ****

Dankuwel voor uw participatie!



Overview Codes Dordrecht

This appendix presents the coding structure and results of the qualitative interview analysis conducted as part of this research. The interviews were held between **June 10 and July 9, 2025**, involving key stakeholders from the *MIRT exploration of Station Dordrecht* project. The aim of the interviews was to explore how sustainability is interpreted, discussed, and embedded in practice during the exploration phase of large transport infrastructure projects.

The coding process followed a **thematic analysis** approach, guided by the three analytical themes defined in the research framework:

1. **Evolution of Sustainability in the Project** – tracing how sustainability ambitions developed throughout the project phases, from pre-project initiatives to the preparation of subsequent stages.
2. **Influential Factors for Sustainability Integration** – identifying organisational, procedural, and contextual factors that either facilitated or hindered the integration of sustainability ambitions.
3. **Stakeholder Strategies and Considerations** – analysing the perspectives, roles, and actions of different stakeholders in shaping and maintaining sustainability ambitions within the project.

These themes were derived from the theoretical framework introduced in Chapter 2 and correspond with the main research objectives. Interview transcripts were coded both inductively and deductively: first by identifying recurring patterns in the data, and subsequently by categorising them according to the three overarching themes. This allowed for a systematic comparison between empirical findings and the conceptual framework of influential factors.

The resulting overview in this appendix shows the **coded excerpts** per interviewee, grouped by theme, description, and project phase. Codes highlighted in green indicate those that were (translated and) directly incorporated into the main report. Together, these data provide the empirical foundation for the analysis presented in Chapters 4 and 5, illustrating how sustainability ambitions evolve in practice and how they are shaped through collaboration, governance, and decision-making dynamics in the MIRT exploration context.

Overzicht codes Dor-1-IB1-Ar

Datum: 10/06/2025

Gesprekspartijen:

- Interviewer/onderzoeker: Thijs van Royen (TvR)
- Label geïnterviewde: Dor-1-IB1-Ar

N.B.: Codes zijn afgeleid van een (deels automatisch gegenereerde) transcript, de context van de code kan worden teruggevonden in het bijbehorende transcript: "Dor-1-IB1-Ar - Anonymized transcript.dox"

Codes zijn ingedeeld in 3 verschillende thema's waarop analyse is gedaan:

- 1e thema: verloop van Duurzaamheid in het project
- 2e thema: Influential factors voor integratie duurzaamheid
- 3e thema: Strategieën en overwegingen van stakeholders op het gebied van duurzaamheid

Als een code gemarkeerd is met een groene kleur is deze (vertaald) opgenomen in het eindverslag.

Thema 1: verloop van duurzaamheid in het project

Quote	Beschrijving	Fase
<i>Bepaalde partijen – bijvoorbeeld de spoorbouwmeester, maar ook vanuit de gemeente en ProRail – hameren er echt op en vinden het belangrijk. Met name op het gebied van embodied carbon zijn er duidelijke ambities. Het is fijn dat dat nog steeds het geval is. Dat komt ook doordat er richtlijnen of uitgangspunten zijn vanuit al die verschillende partijen om duurzaamheid echt door te voeren.</i>	Wat gaat er goed?	2. Pre-project
<i>De exacte definitie, of hoe men duurzaamheid precies ziet, is echter niet in één document terug te vinden; daarvoor moet je verschillende stukken raadplegen om een compleet beeld te krijgen van wat er precies mee bedoeld wordt en wat de uitgangspunten zijn.</i>	Documentatie is gefragmenteerd	3. Start project
<i>Een belangrijke leidraad die we gebruiken is onder andere het programma Klimaatadaptieve Stations, specifiek de uitgewerkte versie voor de Oude Lijn. Dit vormt de basis om de klimaatadaptatie van de verschillende onderzochte opties te beoordelen. Daarnaast zijn er andere belangrijke documenten, waaronder stukken van de spoorbouwmeester over embodied carbon en operational carbon. Met name het aspect embodied carbon speelt hierbij een rol. De methodes hiervoor zijn volgens mij nog in ontwikkeling bij de spoorbouwmeester, maar inmiddels worden er wel steeds concretere richtlijnen en handvatten geboden.</i>	Methodes en leidraden die gebruikt zijn bij de start van het project	3. Start project

<i>Ik heb het idee dat we in de eerste fase wel iets verder hadden kunnen gaan als er meer budget beschikbaar was geweest. In eerste instantie hadden we bijvoorbeeld het idee om alvast te kijken hoe de plannen zouden kunnen bijdragen aan het verbeteren van biodiversiteit op die plek. Daar hadden we ook ideeën over, maar we konden dat nog niet uitwerken omdat het budget voor het hele project werd ingekrompen</i>	Afschalen ambities	4. analysefase
<i>Klimaatadaptieve stations, bijvoorbeeld, dat is al best een concreet document. Over de CO₂ en de embodied carbon zijn nu ook behoorlijk concrete documenten in de maak. Maar dat was nog iets wat eigenlijk gaande was toen de start werd gemaakt met dit project. Voor de beoordelingsfase gaan we dit nu wel meenemen, ook met een verdere verdiepingsslag.</i>	Documenten die helpen om concreet te maken	5. Beoordelingsfase
<i>Tot nu toe is het echter redelijk hoog over gebleven. We hopen het nu concreter te kunnen maken.</i>	Wat gaat er minder goed? Concretiseren blijft lastig	5. Beoordelingsfase
<i>Bovendien moesten we binnen een vrij krap budget werken. Dan kun je niet enorm de diepte in gaan. Voor de eerste fase is dat misschien geen probleem, maar hoe concreter je de beoordeling kunt maken, hoe beter. Vooral omdat er dan duidelijke voordelen uitkomen – waarschijnlijk ook financiële voordelen – waardoor het makkelijker is om de duurzaamheidsambities vast te houden.</i>	Studiebudget was beperkende factor om de diepte in te gaan waardoor er minder concreet uitgezocht kon worden	5. Beoordelingsfase
<i>Het belangrijkste onderdeel van duurzaamheid moet zo ingebouwd zijn dat je het niet kunt verwijderen zonder ook iets essentieels van het ontwerp weg te halen. Hoe meer duurzaamheid echt onderdeel is van de ruimtelijke oplossing, des te beter. Als je het eruit haalt, verdwijnt bijvoorbeeld ook de flow door het gebouw, en dan werkt de opgave niet meer.</i>	Verankeren in ontwerp voor volgende fase	7. Voorbereiden volgend fase

Thema 2: Influential factors

Quote	Beschrijving	Thema
<i>Tot nu toe is het echter redelijk hoog over gebleven. We hopen het nu concreter te kunnen maken. Dat het tot nu toe vrij globaal is gebleven, heeft ook een reden: de alternatieven waren nog vrij rudimentair uitgewerkt; het ging meer om hoofdideeën die zijn getoetst.</i>	Werken op hoog abstractieniveau maakt concretiseren lastig	Concretising and quantifying
<i>En ik denk dat tools daarbij zouden kunnen helpen, vooral als je ze zo kunt inzetten dat het makkelijk wordt om te laten zien: kijk, dit is het gevolg, en dit is het kwantitatieve voordeel voor duurzaamheid.</i>	Concretiseren en kwantitatief in beeld brengen kan meer inzicht bieden	Concretising and quantifying
<i>Ik denk dat hoe concreter je de beoordeling kunt maken, hoe beter. Uiteindelijk komt het neer op het kwantificeerbaar maken van zaken. Dat kan deels doordat je in een later stadium meer gegevens hebt, bijvoorbeeld om oppervlaktes te berekenen of andere meetbare waarden vast te stellen. Maar het gaat ook om het analyseren van de potentie van een locatie op het gebied van duurzaamheid. En dat moet niet een vaag verhaal worden in lange teksten, maar het liefst gewoon een cijfer of een kleurcode.</i>	Concretiseren en kwantitatief in beeld brengen kan meer inzicht bieden	Concretising and quantifying

<i>Daarnaast zijn er ook de handreikingen vanuit de spoorbouwmeester, bijvoorbeeld rond CO₂. Dat is onder andere een soort rekentool die ontwikkeld is. De manier van beoordelen op klimaatadaptiviteit is ook vrij pragmatisch – eigenlijk bijna een tool op zich. Er is bijvoorbeeld al gezegd: “Dit is de situatie in Dordrecht, dit is geanalyseerd, en dit zijn de punten waar je op moet letten.” Dat maakt het heel concreet, en zo kun je er makkelijk op beoordelen.</i>	Gebruikte tool en handreikingen van spoorbouwmeester maakten duurzaamheid concreter	Concretising and quantifying
<i>Duurzaamheid moet concreet zijn. Wat mooi was in de verkenningsfase, is dat de duurzame optie eigenlijk de beste optie bleek. Dat laat zien dat duurzaamheid niet op zichzelf staat, maar dat een duurzame aanpak ook kostenefficiënt kan zijn, ruimtelijke voordelen kan hebben en een positieve impact op de omgeving kan bieden.</i>	Koppeling duurzaamheid aan kostenefficiëntie	Concretising and quantifying
<i>Ik denk dat het grootste obstakel is dat er zoveel verschillende partijen zijn, met elk een ander perspectief en andere belangen. Daardoor verschilt ook wat ‘duurzaamheid’ betekent voor iedere partij, of hoe belangrijk men duurzaamheid vindt. Het is dus een uitdaging om daarin eenheid en consistentie te krijgen. Die eenvormigheid creëren tussen al die partijen is denk ik de grootste opgave – of het grootste obstakel – om dit goed te realiseren.</i>	Verschillende interpretaties van wat duurzaamheid betekent en hoe belangrijk men het vindt	conflicting interest
<i>Dingen die ‘nice to have’ zijn, kunnen altijd verwijderd worden, en dat zal ook gebeuren. Daarom moet je duidelijk bepalen welke onderdelen van duurzaamheid absoluut essentieel zijn en niet verloren mogen gaan.</i>	Nice-to-have's vallen af	Financial considerations
<i>Kostenefficiëntie en efficiëntie van het ontwerp zijn uiteindelijk het belangrijkste om het project echt uit te kunnen voeren. Dit soort projecten gaan vaak meerdere keren over de kop qua budget, dus alles wat eruit gehaald kan worden, gaat eruit. Je moet zorgen dat dat niet gebeurt met de duurzaamheidsambities.</i>	Kostenefficiëntie is belangrijkste beweeegreden	Financial considerations
<i>Een belangrijke leidraad die we gebruiken is onder andere het programma Klimaatadaptieve Stations, specifiek de uitgewerkte versie voor de Oude Lijn. Dit vormt de basis om de klimaatadaptatie van de verschillende onderzochte opties te beoordelen. Daarnaast zijn er andere belangrijke documenten, waaronder stukken van de spoorbouwmeester over embodied carbon en operational carbon. Met name het aspect embodied carbon speelt hierbij een rol. De methodes hiervoor zijn volgens mij nog in ontwikkeling bij de spoorbouwmeester, maar inmiddels worden er wel steeds concretere richtlijnen en handvatten geboden</i>	overkoepelende leidraden die gebruikt kunnen worden	Peer projects
<i>Arup en VenhoevenCS wilden dit aanpakken door duurzaamheid meetbaar te maken en de impact van de verschillende onderzochte opties feitelijk in kaart te brengen. Dat uitgangspunt is gedurende het proces steeds verder doorgevoerd, waarbij voortgebouwd werd op de kennis die al bij Arup en VenhoevenCS aanwezig was vanuit andere projecten ook.</i>	Kennis aanwezig in het consortium gebruiken voor dit project	Peer projects
<i>Dus ik denk dat duurzaamheid eigenlijk altijd onderdeel kan zijn van de algemene beoordeling van de verschillende opties – zelfs bij puur technische oplossingen. Neem bijvoorbeeld de vraag of er roltrappen nodig zijn, en zo ja, hoeveel. Minder</i>	Koppeling duurzaamheid aan andere voordelen	Project goals & Assessment frameworks

<i>roltrappen is kosten-efficiënter, maar kan ook gunstig zijn voor de doorstroming, omdat er minder routes langs elkaar lopen. Als je dat steeds kunt terugkoppelen – dit is beter voor de passagiersstroom én voor duurzaamheid – dan versterk je beide kanten.</i>		
<i>Duurzaamheid moet onderdeel zijn van de algehele discussie. Nu is het nog maar een onderdeel- “tje”; de grootste uitdaging is natuurlijk: hoe krijg je zo 'n project voor elkaar? Duurzaamheid is dan één van de randvoorwaarden. De allergrootste opgaves liggen in vragen als: hoe moet het station operationeel functioneren, aan welke minimale eisen moet het voldoen, en hoe sluit het aan op de omgeving? Duurzaamheid is dan eigenlijk altijd een tweede gedachte want er zijn zoveel puzzelstukjes die eerst moeten worden gelegd.</i>	Niet onderscheidend: functionaliteit is belangrijker	Project goals & Assessment frameworks
<i>Eigenlijk moet je ervoor zorgen dat duurzaamheid geen apart kopje is, maar een vanzelfsprekendheid – een grondbeginsel van het voorkeursalternatief. Je zou het bijna willen ‘verstoppen/verkappen’ in het basisconcept van dat voorkeursalternatief, zodat er eigenlijk niets meer vanaf te snoepen valt.</i>	Duurzaamheid moet inherent zijn aan je ontwerp en dus niet vertrouwen op add-on maatregelen	Project goals & Assessment frameworks
<i>Nou, duurzaamheid is nooit een hoofdonderdeel. Het is niet de ruimtelijke inpassing;</i>	Niet onderscheidend: Ruimtelijke inpassing is belangrijker	Project goals & Assessment frameworks
<i>Bovendien moesten we binnen een vrij krap budget werken. Dan kun je niet enorm de diepte in gaan. Voor de eerste fase is dat misschien geen probleem, maar hoe concreter je de beoordeling kunt maken, hoe beter. Vooral omdat er dan duidelijke voordelen uitkomen – waarschijnlijk ook financiële voordelen – waardoor het makkelijker is om de duurzaamheidsambities vast te houden.</i>	Studiebudget was beperkende factor om de diepte in te gaan waardoor er minder concreet uitgezocht kon worden	Resources
<i>Ik heb het idee dat we in de eerste fase wel iets verder hadden kunnen gaan als er meer budget beschikbaar was geweest. In eerste instantie hadden we bijvoorbeeld het idee om alvast te kijken hoe de plannen zouden kunnen bijdragen aan het verbeteren van biodiversiteit op die plek. Daar hadden we ook ideeën over, maar we konden dat nog niet uitwerken omdat het budget voor het hele project werd ingekrompen</i>	Studiebudget was beperkende factor om de diepte in te gaan waardoor er minder concreet uitgezocht kon worden	Resources
<i>Bepaalde partijen – bijvoorbeeld de spoorbouwmeester, maar ook vanuit de gemeente en ProRail – hameren er echt op en vinden het belangrijk. Met name op het gebied van embodied carbon zijn er duidelijke ambities. Het is fijn dat dat nog steeds het geval is. Dat komt ook doordat er richtlijnen of uitgangspunten zijn vanuit al die verschillende partijen om duurzaamheid echt door te voeren.</i>	Rol van Spoorbouwmeester + client policies	sustainability champion

Thema 3: Strategieën en overwegingen van stakeholders op het gebied van duurzaamheid

Quote	Beschrijving	Aspect
<i>En wie dan uiteindelijk rondom duurzaamheid de meeste invloed op heeft... ik denk dat iedereen wel een rol te spelen heeft bij duurzaamheid.</i>	Samenwerking is key	Stakeholders: Collectively

<i>Uiteindelijk kom je samen tot een voorkeursalternatief. De weg daar naartoe wordt altijd bewandeld met input van de opdrachtgever, maar de uitwerking gebeurt door het ontwerpteam. Die discussie moet gewoon gevoerd blijven worden gedurende het proces, en dat is volgens mij ook redelijk goed gebeurd</i>	Samen afstemmen en discussie blijven voeren	Stakeholders: Collectively
<i>Ja, maar bij de algemene besluitvorming denk ik dat ik vrij weinig invloed heb gehad, omdat ik daar eigenlijk heel weinig aan tafel zat. Maar indirect heb ik toch wel enigszins sturend gewerkt, omdat ik onderdeel ben van het ontwerpteam.</i>	Strategie: Sturende werking vanuit de ontwerpteam	Stakeholders: Consultancy & Engineering
<i>Ik denk dat het goed is als het ontwerpteam daar regelmatig aandacht voor blijft vragen. Zo voorkom je dat duurzaamheid ondersneeuwt tussen andere aspecten, of dat het alleen terugkomt in het beoordelingsschema – een tabelletje waarin staat hoe goed iets scoort op duurzaamheid.</i>	Strategie: Blijven agenderen van Duurzaamheid	Stakeholders: Consultancy & Engineering
<i>Althans, wij zijn nu zelf bezig met de ontwikkeling van dat soort tools. Dus dat is een manier om het te doen.</i>	Tools door IB	Stakeholders: Consultancy & Engineering
<i>Daarnaast zijn er ook de handreikingen vanuit de spoorbouwmeester, bijvoorbeeld rond CO₂. Dat is onder andere een soort rekentool die ontwikkeld is. De manier van beoordelen op klimaatadaptiviteit is ook vrij pragmatisch – eigenlijk bijna een tool op zich. Er is bijvoorbeeld al gezegd: “Dit is de situatie in Dordrecht, dit is geanalyseerd, en dit zijn de punten waar je op moet letten.” Dat maakt het heel concreet, en zo kun je er makkelijk op beoordelen.</i>	Concreet maken	Stakeholders: Partners / advisors
<i>Het is eigenlijk een ruimtelijke vertaalslag van wat duurzaamheid kan betekenen. Het gaat niet om één groen boompje meer of minder, maar om hoe je je door het gebouw beweegt, en dat juist die ontwerpkeuzes zorgen voor duurzaamheid. Het is misschien niet heel helder geformuleerd, maar het belangrijkste is dat duurzaamheid niet als een plakplaatje achteraf wordt toegevoegd.</i>	strategie: veranker duurzaamheid in het ontwerp	Strategy: Anchor sustainability in design
<i>Het is een wisselwerking: hoe duidelijker de opgave vanuit de opdrachtgever, hoe beter het te kwantificeren. Maar het is ook de vraag: hoe zorg je ervoor dat die vraagstelling zo duidelijk mogelijk is? Dat is deels iets wat vanuit het ingenieurbureau richting de opdrachtgever kan worden aangereikt.</i>	Wisselwerking tussen formuleren doelstelling en kwantificeren	Strategy: clear goal setting
<i>En dat heeft zichzelf nu ook een beetje bewezen in de eerste fase: het feit dat we voortborduren op het duurzame alternatief zegt al iets. Duurzaam betekent ook efficiënt, en betekent ook kostenefficiënt. Als je dat weet voort te zetten...</i>	Koppelen van duurzaamheid aan andere voordelen	Strategy: Integral approach

Overzicht codes Dor-2-PA1-SB

Datum: 13/06/2025

Gesprekspartijen:

- Interviewer/onderzoeker: Thijs van Royen (TvR)
- Label geïnterviewde: Dor-2-PA1-SB

N.B.: Codes zijn afgeleid van een (deels automatisch gegenereerde) transcript, de context van de code kan worden teruggevonden in het bijbehorende transcript: "Dor-2-PA1-SB - Anonymized transcript.docx"

Codes zijn ingedeeld in 3 verschillende thema's waarop analyse is gedaan:

- 1e thema: verloop van Duurzaamheid in het project
- 2e thema: Influential factors voor integratie duurzaamheid
- 3e thema: Strategieën en overwegingen van stakeholders op het gebied van duurzaamheid

Als een code gemarkeerd is met een groene kleur is deze (vertaald) opgenomen in het eindverslag.

Thema 1: verloop van duurzaamheid in het project

Quote	Beschrijving	Fase
<i>Ja kijk, deze MIRT-verkenning is bijzonder, omdat bij de hele 'Oude Lijn' een aantal gemeentes eigenlijk de handen in elkaar geslagen. Die hebben gezegd; met de verstedelijkingsopgave die in de westelijke Randstad speelt en de mobiliteitstransitie, willen wij eigenlijk gezamenlijk zowel de woningbouw als ook de mobiliteit in één MIRTverkenning stoppen. Dat wil zeggen dat het mobiliteitsvraagstuk, dat gerelateerd is aan die woningbouwopgave, in die oude lijn verkenning zit. Dat hebben ze gezamenlijk gedaan als een club ook.</i>	Aanloop naar de verkenning Oude lijn	1. Ver voor project
<i>En wat je dan ziet is dat de MIRT-verkenningen in de systematiek vereist het dat er allerlei voorstudies worden gedaan om mee te mogen doen bij MIRT-verkenning. Dat wil zeggen dat je eigenlijk al aan de voorkant verkend wat de opgave is, wat misschien de daarmee gemoeide kosten zijn. Je moet eigenlijk soort voor huiswerk doen om bij de MIRT verkenning toegelaten te worden.</i>	Veel voorbereidend werk in aanloop naar de verkenning	2. Pre-project
<i>Hè dus beleidsmatig staat overal "we willen klimaatneutraal" en dat "moet duurzaam en circulair". Dat is allemaal hoog over, maar wat dat dan praktisch betekent en hoe je dat dan om moet zetten in een project daarvoor kunnen we niet terugvallen op eerdere resultaten. Dus wat wij in de eerste instantie ook doen in het formuleren van de projectdoelen, is dat wij zeggen dat wij die duurzaamheidsdoelen echt ook in het project willen onderzoeken en in kaart willen brengen.</i>	Formuleren van de projectdoelen	2. Pre-project

<i>Maar de “hoe” (hiermee wordt bedoeld: de manier waarop dat gedaan moet worden door de bureaus) dat schrijven we niet helemaal voor.</i>		
<i>Maar we hebben gezegd, maakt het wel onderdeel van het grote vraagstuk maar leg niet een methode op. Daarnaast we hebben gezegd, nou, we doen dat elders in een ander domein wel, met als voorbeeld deze projecten, want het zijn goede testcases. Daar hebben met een klein studiebudget dat een ander bureau uitlaten zoeken hè? En op gegeven moment doen we dan een soort kruisbestuiving en leg je het eigenlijk weer terug in de grote projecten.</i>	Aanpak met de duurzaamheids-afwegingen en studies	2. Pre-project
<i>Ja, dus in de analysefase van de MIRT-verkenning hebben we gezegd: we hebben in de MIRT-verkenning een aantal hoofdmaken te pakken gehad voor Dordrecht om het station te verbouwen. Dat was met twee bovengrondse traverses of één hele grote ondergrondse fietsenstalling en passage, of dan een centrale passage boven langs en dat hebben we dan eigenlijk in kaart gebracht. [...] n. En ook gevraagd naar kun je reduceren binnen deze 3 concepten. Zou je bijvoorbeeld met slim materiaal gebruik, het gebruik van meer Biobased materialen bijvoorbeeld – dus hout in plaats van staal als hoofdconstructie – zou je dan kunnen reduceren</i>	Onderzoeken van de impact van de oplossingsrichtingen	4. analyse fase
<i>Nou ja bij Dordrecht, denk ik, vind ik heel fijn dat partijen gezegd hebben “dan gaan we toch wel vanuit duurzaamheidsoverwegingen naar een bovengronds oplossing”. Maar dan clash je eigenlijk met de andere belangen waar ik zelf ook wel voor aan de lat sta. Want we hebben gezegd, dit is een rijksmonument, dus we willen er in de verbouwing eigenlijk rekening mee houden dat we de cultuurhistorische waarden zo sterk mogelijk proberen te behouden en zo niet zelfs te verbeteren</i>	gevolg van kiezen voor duurzaamheids alternatief	5. Beoordelingsfase
<i>Wat wij graag zouden willen zien — en we moeten nog afwachten of we dat voor elkaar kunnen krijgen — is bijvoorbeeld voor CO2 het hanteren van plafondwaarden randvoorwaardelijk maken. Dat zou betekenen dat een partij die in een vervolgfase meedoet aan het maken van een ontwerp, verplicht wordt om door te rekenen en aan te tonen dat die ontwerpvariant onder een bepaalde CO2-plafondwaarde blijft</i>	Toewerken naar plafondwaardes	7. Voorbereiden volgend fase

Thema 2: Influential factors

Quote	Beschrijving	Thema
<i>Daar zit dus ontzettend veel CO2 in en onze stelling is dat we ons niet moeten blindstaren op overal maar led lampjes in te schroeven, want dat is in verhouding veel minder milieuwinst. Maar je moet heel goed kijken hoe je die gebouwen daadwerkelijk bouwt</i>	Driver: kijk naar impact op hoog aggregatieniveau	Aggregation level
<i>En dan gaat het er eigenlijk altijd om, om met de kennis die je hebt te verwijzen naar methodes of naar een aanpak die je beschikbaar hebt. Of te zeggen van; nou ja als wij blijven door onderzoeken naar ondergrondse oplossingen dan kun je eigenlijk voorspellen dat je altijd op CO twee uitstoot, een heel negatief project hebt, hè? Dan moet je wel 100.000'en kilometers met</i>	Welk abstractieniveau van duurzaamheid wil je meeste impact maken	Aggregation level

<i>treinen en bussen rijden om die voetprint weer weg te werken. Ja, en past dat in het beeld wat je wil creëren</i>		
<i>Dus hoe kan een duurzaamheidsambitie misschien ook wel op een integrale manier vastgoedwaardes versterken. En hoe kan dat dan weer mobiliteitsaspecten versterken. Dus we proberen het eigenlijk veel integraler te beschouwen. En, Dat is super ingewikkeld ook in deze planfase, omdat er nog heel veel in beweging is. Maar tegelijkertijd zie je eigenlijk dat de meest belangrijke besluiten eigenlijk juist in deze fase genomen worden. Want je kunt dat later niet meer met een houten paneeltje ergens compenseren.</i>	Meer integraliteit heeft tot gevolg dat complexiteit toeneemt	Aggregation level
<i>Dus je kunt zeggen: “ja, we willen heel goeie, comfortabele knooppunten hebben” – en dat doen we dus vooral om de reiziger verleiden en uit de auto te krijgen – maar dat zou kunnen betekenen dat je daar oneindig veel beton voor nodig zult hebben. Daarmee kan je eigenlijk je eigen doelen die je hebt – namelijk duurzame mobiliteit – onderuithaalt door een niet duurzaam stationsgebouw te maken</i>	Welk aggregatieniveau wil je de meeste impact maken?	Aggregation level
<i>De wettelijke normen van beton, die zijn er. En je zou kunnen zeggen, nou ja, als je beton moet gebruiken, dan gaan we nog met gerecycled granulaat werken, maar zelfs als je dat probeert te doen, dan ga je nog steeds heel veel betonstorten. Je moet dus echt structurele keuzes gaan maken en dat komt niet uit je ambitie web.</i>	Structurele keuzes hebben meer impact dan kijken naar wettelijke minimum	Aggregation level
<i>Maar het begint met goede opdrachtgevers. Hadden we NS en ProRail niet gehad — partijen die dit ook echt willen — dan hadden wij als adviseur geen kans gemaakt. Gelukkig hebben de directies van NS en ProRail dit omarmd. Ze vinden het ook echt tof, en nemen de buikpijn die dit allemaal veroorzaakt misschien ook wel voor lief.</i>	Goede opdrachtgevers die duurzaamheid omarmen	client support
<i>Nou ja zo 'n Ambitiweb tja... Kijk meten is weten uiteindelijk in dat ambitie web, het is vrijblijvend en het is niet gestold op hard onderzoek. En dat vind ik het nadeel van het ambitie web, want iedereen kan dat met de beste bedoelingen invullen. Maar the proof is in the pudding. Je moet het gewoon echt ook op het bouwwerk los kunnen laten en wij denken dat de methode die wij nu aandragen eigenlijk daar veel meer inzichten kan leveren.</i>	Je ambities vertalen naar concretiseren en inzichtelijk maken in een project is beter dan een gesprek	Concretising and quantifying
<i>Nou maar wat wij eigenlijk hier in het zeggen, hè? De GVPA is eigenlijk een soort gamechanger. Want je kunt niet later, in de plan en studiefase pas na gaan denken over CO2- reductie. Dat moet je echt heel vroeg doen in alle uitgangspunten die je neemt</i>	Tools voor implementeren	Concretising and quantifying
<i>Je zou dus kunnen zeggen dat er een stapeling van goede bedoelingen is, maar hoe je dat dan in de praktijk daadwerkelijk in kaart moet brengen dat is allemaal echt helemaal nieuw land op dit moment. Dat hebben we eerder nog niet gedaan, dus dit zijn echt de pilotprojecten waar we aan het ondervinden zijn hoe dat allemaal moet.</i>	vertaling van ambities naar de realiteit is nog onverkend gebied	Concretising and quantifying
<i>Bij zo een multi-stakeholder project als een MIRT-verkenning, waar je dus ook nog provincies erbij hebt en allerlei andere clubs zoals de gemeentes, en al die organisaties hebben dan ook nog allemaal hun eigen indianenstammen – hebben wij ook hoor –, zit je met heel veel mensen in een Poolse landdag aan tafel. En dan gaat het er eigenlijk altijd om, om met de kennis die je hebt te</i>	Bij een multi-stakeholder project functioneren organisaties als eilandjes, dus moet je	conflicting interest; getting the right people

<i>verwijzen naar methodes of naar een aanpak die je beschikbaar hebt.</i>	met onderbouwde methodes aankomen	
<i>Het is heel ingewikkeld om dat ook aan de bureaus te vragen. Je proeft ook daar een soort onzekerheid, en misschien nog wel ook weerstand, ook bij de opdrachtgevers. Want ja, wat is nou een goede methode? Er is geen methode met een 10 genormeerde of een NEN-genormeerde aanpak op dit moment.</i>	Nog geen standaard methoden om duurzaamheid uit te meten	Contracting strategy
<i>En het is pas in de latere fase waar je denkt, ja, ik wil hier nog een houten paneeltje hebben, die, dat houten paneeltje, wordt dan wegbezuinigd. Maar een houten constructie, dat vroeg je in de vroege planfase al eigenlijk aan het ontwerp toe.</i>	Nice-to-have's vallen af	Financial considerations
<i>Ja, hoewel wij daar ook wel achter komen, dat als je het dan bijvoorbeeld hebt over ondergronds bouwen met beton of bovengronds bouwen met circulaire biobased materialen, dat ook het financiële aspect van onder ons bouwen er veel zwaarder er inhakt in zo een begroting dan bovengronds bouwen</i>	Koppeling duurzaamheid aan kostenefficiëntie	Financial considerations
<i>omdat dit allemaal echt parallel loopt en omdat het ook geen hard onderdeel aan de uitvraag aan het consortium van Arup was. De uitkomst hebben we daarna over de schutting gegooid bij Arup en als kennis meegeven aan iedereen die aan de MIRT-verkenning nu werkt.</i>	parallele studies en interessante informatie in het project verder verspreid	Knowledge transfer; peer projects
<i>De insteek is nu — en nu komt die, dat is ook een heel duurzame insteek — om zoveel mogelijk her te gebruiken van de bestaande perrons. En dan zie je dus opeens dat er afwegingen ontstaan tussen mobiliteitswensen en hergebruik van bestaande infrastructuur. En op de R-ladder weet je dat “re-use” eigenlijk altijd heel hoog scoort; dit zit bijna tegen “refuse” aan. En daarmee hebben we dus een bepaalde winst.</i>	Koppeling duurzaamheid aan mobiliteitswensen en hergebruik en projectspecifieke omstandigheden	Location-specific factors
<i>Ik moet zeggen dat ruimtegebrek meestal een heel bepalende factor is in deze MIRT-verkenning. Je ziet dat bij zo'n multimodaal knooppunt eigenlijk de capaciteitsvraag opgevoerd wordt: er moeten meer treinen, meer fietsen, meer bussen worden verwerkt. En er moet makkelijk overgestapt kunnen worden. Dat is allemaal heel goed bedoeld vanuit de mobiliteitstransitie, want we willen mensen uit de auto krijgen. Maar die extra capaciteit moet wel ergens worden opgevangen.</i>	Meest bepalende factor in het ontwerp is eigenlijk altijd ruimtelijke inpassing	Location-specific factors
<i>Die verschillende claims op de ruimte botsen dus met elkaar. Ruimtegebrek is daarom vaak een van de factoren die ertoe leidt dat we ondergronds met veel beton moeten gaan stapelen, wat een zware negatieve impact heeft op duurzaamheid.</i>	Ruimtegebrek zorgt soms voor niet duurzame alternatieven	Location-specific factors
<i>Ja precies, dus je ziet dat we dat gedaan hebben bij Laan van Noi, Dordrecht. En dat is eigenlijk allemaal met dezelfde methodiek gedaan. We hebben daar dan ook een paar conclusies aan verbonden, wat je allemaal zou kunnen doen, hoe je dat beter zou kunnen doen, en waar je kunt reduceren</i>	Zelfde methodiek gebruikt op meerdere projecten	Peer projects
<i>Dat zou echt helpen, want er valt nog veel te verkennen en te verbeteren. En dan is samenwerking — en dat bepleiten wij ook heel erg — samenwerking en kennisuitwisseling echt ontzettend belangrijk</i>	Kennisuitwisseling is belangrijk om verder te gaan	Peer projects
<i>Het is niet alleen maar dat je zegt: duurzaamheid is op nr 1 en alle andere dingen volgen. Je zit continu ook wel andere maatschappelijke aspecten af te wegen die je als projectdoelen hebt vastgesteld in zo'n ontwerp.</i>	Duurzaamheid is niet per se onderscheidend: Maatschappelijke aspecten wegen mee	Project goals & Assessment frameworks

<i>En ja ik moet zeggen, er zijn ook projecten waar men zeg, wij nemen de negatieve milieu impact voor lief, omdat wij echt andere ruimtelijke problemen daarmee gaan oplossen. Omdat ze verkeersveiligheid belangrijker vinden of naar andere zaken kijken. Dat komt ook wel eens voor.</i>	Ondergeschikt aan comfort en veiligheid	Rules and regulations (comfort en veiligheid)
<i>Dus veiligheid is iets wat we heel belangrijk vinden. Het is sowieso een dilemma dat je kunt ontdekken, want comfort en veiligheid zijn niet altijd de beste vrienden van duurzaamheid. Dat zie je eigenlijk ook maatschappij breed: auto's worden steeds groter, breder, comfortabeler en veiliger, maar ze slurpen ook steeds meer energie en benzine. Dat spanningsveld zie je op allerlei fronten, en dus ook in dit soort projecten. Wij hebben comfort en veiligheid heel goed weten te verankeren in wet- en regelgeving de afgelopen jaren.</i>	Barrier: Spanningsveld met comfort en veiligheid	Rules and regulations (comfort en veiligheid)

Thema 3: Strategieën en overwegingen van stakeholders op het gebied van duurzaamheid

Quote	Beschrijving	Aspect
Vanuit comfort hebben we eigenlijk altijd gezegd: we willen liever ondergrondse passages. Maar wij, ook als spoorsector dan ook als BS, zeggen inmiddels dat kan eigenlijk niet meer als je duurzaamheid heel serieus wilt nemen. Dus ondergronds bouwen is eigenlijk door de hele linie beschouwd als misschien wel heel comfortabel en heel esthetisch, maar het is niet duurzaam.	shift in het denken en implementeren	Stakeholders: Collectively
Weet je, er is totaal geen gebrek aan ambities. Echt niet.	Geen gebrek aan ambities	Stakeholders: Collectively
Bij zo een multi-stakeholder project als een MIRT-verkenning, waar je dus ook nog provincies erbij hebt en allerlei andere clubs zoals de gemeentes, en al die organisaties hebben dan ook nog allemaal hun eigen indianenstammen – hebben wij ook hoor –, zit je met heel veel mensen in een Poolse landdag aan tafel. En dan gaat het er eigenlijk altijd om, om met de kennis die je hebt te verwijzen naar methodes of naar een aanpak die je beschikbaar hebt.	Rommelig met veel stakeholders	Stakeholders: Collectively
Maar het begint met goede opdrachtgevers. Hadden we NS en ProRail niet gehad — partijen die dit ook echt willen — dan hadden wij als adviseur geen kans gemaakt. Gelukkig hebben de directies van NS en ProRail dit omarmd. Ze vinden het ook echt tof, en nemen de buikpijn die dit allemaal veroorzaakt misschien ook wel voor lief.	afhankelijkheid van opdrachtgevers	Stakeholders: Owners / sponsors
En duurzaamheid is daar één regel in een heel lange Excel. En daar vind ik, is onze rol om partijen er ook af en toe aan te herinneren, van nou ja, het is maar één knopje, maar als je het heel serieus wilt nemen moet, moet dit knopje wel een heel dik knopje zijn op je mengpaneel om allerlei afwegingen te maken. En dat is wat wij proberen te adviseren. Maar daar is geen pasklare machine voor waar je het allemaal ingooit.	Rol van de adviseurs	Stakeholders: Partners / advisors
Maar wat ons misschien wel een beetje onderscheid als partij, is dat wij specifiek voor stations, als BS zijnde, in de afgelopen twee jaar heel concreet hierover hebben gezegd, laat ons dat dan maar onderzoeken; wat betekent dat (hiermee wordt bedoeld: hoe kun je duurzaamheidsdoelen vertalen in zo'n project)? En dat kun je dan een aantal onderdelen uit elkaar pluizen. We hebben een vraagstuk	Onderdelen van duurzaamheid voor stations	Stakeholders: Partners / advisors

over klimaatadaptatie, [...] een handleiding voor laten schrijven en onderzoek naar laten doen door flux bijvoorbeeld – die kijkt naar wat er voor bouwstenen te bedenken zijn in deze opgave [...], en een document over ‘The Paris-proof stations’ die keek naar de mariaalgebonden CO2 uitstoot		
Dat is zeker zo kijkt wij moeten het hebben van soft power, want wij zijn maar adviseur. Dus ik ben geen opdrachtgever, dus ik moet sowieso mijn eigen interne opdrachtgevers, NS en ProRail, meekrijgen.	Hoe beïnvloed je het process als adviseur/partner	Stakeholders: Partners / advisors
Dus daarin wordt rekening gehouden met dat je die grondstoffen moet delven, je moet ze vervoeren, je moet ze bewerken en dat je beton gaat storten, waar staal in zit. Zo kijk je dus naar de hele CO2 footprint die eigenlijk in zo een bouwwerk zit, voordat het überhaupt kan presteren als zijnde een functioneel product of een infrastructureel product	Strategie: Breng de Embodied CO2 in kaart	Strategy: early inventarisation of important themes
Ja, dus voor de aanlegfase is het naar onze mening - en dat kun je ook goed onderbouwen – eigenlijk veel belangrijker om dat te doen (hiermee wordt bedoelt: te kijken naar de CO2 uitstoot van je project). En eigenlijk wat we daar in het verlengde ook van zeggen is dat je dan eigenlijk ook al in de planvorming fase, of zelfs in de PvE fase – als je dat allemaal in je achterhoofd hebt – je eigenlijk heel scherp moet zijn in de keuzes die je maakt.	Strategie: wanneer moet je het inzichtelijk maken	Strategy: early inventarisation of important themes
Nou maar wat wij eigenlijk hier in het zeggen, hè? De GVPA is eigenlijk een soort gamechanger. Want je kunt niet later, in de plan en studiefase pas na gaan denken over CO2- reductie. Dat moet je echt heel vroeg doen in alle uitgangspunten die je neemt	Tools voor implementeren	Strategy: early inventarisation of important themes
En het is pas in de latere fase waar je denkt, ja, ik wil hier nog een houten paneeltje hebben, die, dat houten paneeltje, wordt dan wegbezuinigd. Maar een houten constructie, dat vroeg je in de vroege planfase al eigenlijk aan het ontwerp toe.	Strategie: veranker duurzaamheid in kern van het ontwerp	Strategy: focus on the big impacts
Dus hoe kan een duurzaamheidsambitie misschien ook wel op een integrale manier vastgoedwaardes versterken. En hoe kan dat dan weer mobiliteitsaspecten versterken. Dus we proberen het eigenlijk veel integraler te beschouwen. En, Dat is super ingewikkeld ook in deze planfase, omdat er nog heel veel in beweging is. Maar tegelijkertijd zie je eigenlijk dat de meest belangrijke besluiten eigenlijk juist in deze fase genomen worden. Want je kunt dat later niet meer met een houten paneeltje ergens compenseren.	Nu een betere integrale kijk	Strategy: Integral approach
Wat wij graag zouden willen zien — en we moeten nog afwachten of we dat voor elkaar kunnen krijgen — is bijvoorbeeld voor CO2 het hanteren van plafondwaarden randvoorwaardelijk maken. Dat zou betekenen dat een partij die in een vervolgfase meedoet aan het maken van een ontwerp, verplicht wordt om door te rekenen en aan te tonen dat die ontwerpvariant onder een bepaalde CO2-plafondwaarde blijft	Strategie: toewerken naar plafondwaardes	Strategy: translate outcomes into new baseline for next phase

Overzicht codes Dor-3-IB2-VCS

Datum: 17/06/2025

Gesprekspartijen:

- Interviewer/onderzoeker: Thijs van Royen (TvR)
- Label geïnterviewde: Dor-3-IB2-VCS

N.B.: Codes zijn afgeleid van een (deels automatisch gegenereerde) transcript, de context van de code kan worden teruggevonden in het bijbehorende transcript: “Dor-3-IB2-VCS - Anonymized transcript.dox”

Codes zijn ingedeeld in 3 verschillende thema’s waarop analyse is gedaan:

- 1e thema: verloop van Duurzaamheid in het project
- 2e thema: Influential factors voor integratie duurzaamheid
- 3e thema: Strategieën en overwegingen van stakeholders op het gebied van duurzaamheid

Als een code gemarkeerd is met een groene kleur is deze (vertaald) opgenomen in het eindverslag.

Thema 1: verloop van duurzaamheid in het project

Quote	Beschrijving	Fase
<i>Ja, het was wel een hele goede pre-verkenning, maar op dit vlak — duurzaamheid — kan ik me niet herinneren dat er echt een groot aandeel in zat. Dan in de analytische fase hebben we er denk ik meer over nagedacht, meer geïntegreerd dan nu.</i>	Duurzaamheid in de preverkenning	1. Ver voor project
<i>Hier projectdoelen: Het gaat om het oplossen van de transferknelpunten, het bieden van goede ketenmobiliteit, het opheffen van de barrièrewerking van het spoor en het beter benutten van het stationsgebouw, aansluiten op een aantrekkelijk verblijfsgebied. Tegelijkertijd staat er ook: “Het realiseren van een duurzaam en klimaatadaptief ontworpen stationsknoop.” Dat dat noemen zij een randvoorwaarde voor de andere doelen</i>	plaats van duurzaamheid in de projectdoelen	2. Pre-project
<i>Volgens mij niet echt in de contracten, maar het komt wel terug in het Programma van Eisen (PvE). Daar wordt duurzaamheid wel benoemd. Wij worden ook getoetst op bepaalde momenten, dat is super goed: voldoen we aan het PvE?</i>	duurzaamheid in het PvE	2. Pre-project
<i>we zijn vorig jaar begonnen met de analytische fase. Toen kregen we vanuit de gemeente drie A4'tjes toegestuurd met hun duurzaamheidsdoelstellingen voor deze MIRT-verkenning. Daarin stonden eigenlijk vooral algemene thema's, die ook weer verwezen naar gemeentelijk beleid — zoals het beleid rond groen en blauw. En dan kom je vervolgens bij beleidsstukken van 80 pagina's over hoe Dordrecht bijvoorbeeld haar blauwgroene netwerken wil versterken</i>	Begin vanuit perspectief opdrachtnemers	3. Start project

<i>Voor de Oude Lijn hebben ze bijvoorbeeld elk station onderzocht. Dat is best nuttig, want dan krijgen wij weer meer achtergrond over bijvoorbeeld dat de bodem hier verzakt, of dat de waterstand erg hoog is — waardoor ondergronds bouwen extra lastig wordt. Zulke informatie hebben we dus ook meegekregen, zeker in het kader van die klimaat adaptieve stations langs de Oude Lijn.</i>	voorstudies erg nuttig	3. Start project
<i>Maar volgens mij is dat vanuit MIRT hier niet toegepast. In ieder geval niet samen. Dat zou interessant zijn geweest als tool, om duurzaamheid ook echt als hoofdonderwerp op tafel te hebben. Ik zou het ook echt aanraden — beter dan gewoon vijf A4'tjes over de schutting gooien zonder prioritering.</i>	geen ambitieweb sessie voor dordrecht specifiek	3. Start project
<i>Dit zijn alle beleidsstukken van de gemeente. Ja, succes om dit in elk document of elk model te integreren. Het is veel. En misschien ook soms wel wat tegenstrijdig. Iedereen heeft net een andere focus. En wie ga je dan tevreden houden?</i>	Documentatie is gefragmenteerd	3. Start project
<i>En toen hadden we vorig jaar ook duurzaamheid ook nog als een losse bouwsteen, maar dat werkte uiteindelijk niet. Omdat die bouwsteen moet in alle andere bouwstenen terecht komen. Je kunt namelijk niet zeggen: bij deze variant focussen we alleen op energie, en bij deze op blauw en groen, bij die andere alleen op natuurinclusiviteit. We hadden het idee, we moeten alle duurzaamheidskenmerken zouden op alle oplossingsrichtingen moeten worden – in meer of mindere mate, afhankelijk van de oplossingsrichting.</i>	Aanpak analyse fase: duurzaamheid als bouwsteen	4. analyse fase
<i>aarnaast heb je de beoordeling zelf — ik weet niet precies hoe het bij andere MIRT-trajecten is, maar in ieder geval bij de Oude Lijn-studies zijn die allemaal het zelfde. Daarin is duurzaamheid daar een onderdeel van. Er kan dan letterlijk getoetst worden welk model in theorie beter scoort op duurzaamheid dan de anderen.</i>	duurzaamheid in beoordelingskader	5. Beoordelingsfase
<i>dit jaar zijn we zó gefocust geweest op het leggen van de ruimtelijke puzzel, dat het duurzaamheidsaspect echt totaal niet op de voorgrond lag. En ja, aan de ene kant kun je denken: “dat is super kwalijk”. Maar aan de andere kant: ik denk ook dat je bij dit soort projecten niet kunt starten vanuit duurzaamheid als uitgangspunt. In ieder geval niet vanuit klimaatadaptief, CO2 misschien wel. Maar vanuit klimaatbestendigheid ga je dit station niet ontwerpen.</i>	Barrier: je kan niet starten met duurzaamheid als uitgangspunt	5. Beoordelingsfase
<i>En ik denk ook dat per model — dus ook bij de alternatieven die niet gekozen worden — we in de rapportage moeten opnemen wat de pro's- en con's zijn, ook op het gebied van duurzaamheid. Dan kunnen toekomstige partijen dat teruglezen en erop voortbouwen</i>	voorbereiding op volgende fase: pro's en con's per alternatief	6. Voorkeursbeslissing

Thema 2: Influential factors

Quote	Beschrijving	Thema
<i>Want, wat is het belangrijkste onderdeel? Dat is dat je mensen uit de auto en in de trein krijgt. We moeten een werkbaar station maken. Als je dan wel een superklimaatadaptief station hebt, maar het werkt totaal niet, dan heb je je doel al helemaal niet bereikt. CO₂ daarentegen — dat is iets waar we wél logische keuzes in kunnen maken. Bijvoorbeeld: niet ondergronds bouwen als het</i>	prioriteren van aspecten	Aggregation level

<i>niet hoeft, en geen grote nieuwe constructies neerzetten als het niet nodig is.</i>		
<i>Dit zijn alle beleidsstukken van de gemeente en betrokken partijen. Ja, succes om dit in elk document of elk model te integreren. Het is veel. En misschien ook soms wel wat tegenstrijdig. Iedereen heeft net een andere focus. En wie ga je dan tevreden houden?</i>	Verschillende interpretaties van wat duurzaamheid betekent en hoe belangrijk men het vindt	conflicting interest
<i>Duurzaamheid hoeft natuurlijk niet per definitie heel erg duur te zijn. Het hangt er ook vanaf wat je precies onder duurzaamheid schaaft — het hoeft niet per se duurder te zijn. Maar nu is het vooral inderdaad: het voor elkaar krijgen dat het station toekomstvast is, dat het überhaupt goed kan functioneren. Daar zitten de miljoenen in, in het spoor</i>	Duurzaamheid hoeft niet per se duur te zijn, de grote kosten gaan ergens anders in zitten	Financial considerations
<i>We spreken wel met stedenbouwkundigen en verkeerskundigen. Maar we hebben niet met ecooloog of duurzaamheidsadviseur aan tafel gezeten. Dan zie je ook bij hen, zover ik weet, dat het niet boven aan het boodschappenlijstje staat</i>	Goede mensen aan tafel krijgen	Getting the right people
<i>Dat soort dingen zijn zeker bekeken, maar duurzaamheid is nooit echt het leidend motief geweest in dit project. En dat is misschien ook wel teleurstellend, maar waarom is dat eigenlijk zo? De reden is vooral dat de opgave hier zo complex is qua spoor. Het is echt zo ingewikkeld om deze puzzel te leggen en om überhaupt de ruimtelijke oplossing passend te krijgen. En we denken dan: als we die puzzel eenmaal gelegd hebben, gaan we vervolgens kijken hoe we die zo duurzaam mogelijk kunnen maken.</i>	Niet onderscheidend: Ruimtelijke inpassing is belangrijker	Location-specific factors
<i>dit jaar zijn we zó gefocust geweest op het leggen van de ruimtelijke puzzel, dat het duurzaamheidsaspect echt totaal niet op de voorgrond lag. En ja, aan de ene kant kun je denken: “dat is super kwalijk”. Maar aan de andere kant: ik denk ook dat je bij dit soort projecten niet kunt starten vanuit duurzaamheid als uitgangspunt. In ieder geval niet vanuit klimaatadaptief, CO2 misschien wel. Maar vanuit klimaatbestendigheid ga je dit station niet ontwerpen.</i>	Niet onderscheidend: Ruimtelijke inpassing en je kan niet starten met duurzaamheid als uitgangspunt	Location-specific factors
<i>Ja, nou ja — het is eerst zaak dat we de opdracht in de basis oplossen. En dan zorgen dat die duurzaamheid er goed overheen gaat.</i>	Niet onderscheidend: functionaliteit is belangrijker	Project goals & Assessment frameworks
<i>Maar volgens mij is dat vanuit MIRT hier niet toegepast. In ieder geval niet samen. Dat zou interessant zijn geweest als tool, om duurzaamheid ook echt als hoofdonderwerp op tafel te hebben. Ik zou het ook echt aanraden — beter dan gewoon vijf A4'tjes over de schutting gooien zonder prioritering.</i>	Geen gesprek gevoerd over de verzamelde ambities en beleidssukken	Shared vision
<i>a, Bureau Spoorbouwmeester heeft — met [naam] aan het roer nu — Wel heel erg één focus, en die zijn ze ook allemaal aan het onderzoeken. Dat gaat vooral over dat CO₂- neutraal bouwen. Met Group A hebben zij dus ook met ons project Dordrecht drie varianten, drie van die varianten van vorig jaar uitgetoetst en gekeken hoeveel CO₂ het grofweg kost om te bouwen</i>	Rol van spoorbouwmeester	sustainability champion; concretising and quantifying

Thema 3: Strategieën en overwegingen van stakeholders op het gebied van duurzaamheid

Quote	Beschrijving	Aspect
<i>Klopt. Als ik het goed heb, ging het om CO₂-uitstoot en klimaatbestendigheid. Ik heb toen ook meegeholpen aan de basis van die beoordeling, samen met [naam]. Je ziet dan bijvoorbeeld: deze optie was ondergronds, deze ook, en deze was bovengronds. Qua klimaatbestendigheid scoorden de ondergrondse varianten ook iets minder goed. En dan had je nog de optie 'niks doen', of 'zo min mogelijk doen' — die zaten ook allemaal in het bovengrondse spectrum</i>	Definitie van duurzaamheid binnen beoordeling	Definition of sustainability
<i>Wat ik het lastigst, maar ook het leerzaamst vind, is de taal die je moet spreken met alle stakeholders. Hoe betrek je iedereen? Soms voelt het meer als people management dan als het uitwerken van alternatieve varianten</i>	Lastig voor opdrachtnemers	Stakeholders: Consultancy & Engineering
<i>We hebben genoeg expertise in huis, dus zou eigenlijk wel beter zijn als we duurzaamheid actiever meenemen. Als ik zo hardop kritiek op mezelf mag geven mogen we daar actiever in zijn. Het blijft natuurlijk altijd de vraag: is duurzaamheid hier een hoofdzaak of niet?</i>	actievere houding in agenderen van duurzaamhed	Stakeholders: Consultancy & Engineering
<i>Vooral dat we bij elk model dat we presenteren ook iets over duurzaamheid zouden moeten zeggen. We hebben dat wel in ons eigen achterhoofd — dat model A bijvoorbeeld meer impact heeft op de omgeving of meer gebouwd moet worden dan model B — maar we benoemen dat eigenlijk niet expliciet naar onze stakeholders.</i>	strategie: bij elk ontwerp beoordeling meegeven aan stakeholders	Stakeholders: Consultancy & Engineering
<i>Ja, en [dat helpt (focus op specifiek duurzaamheidsdoel) ons ook om] te leren! Bijvoorbeeld als je dan een opdracht krijgt waar je echt CO₂- neutraal of volledig biobased moet gaan, dan kunnen we dat de volgende keer ook beter toepassen.</i>	Leren door projectdoelen	Stakeholders: Consultancy & Engineering
<i>We hebben genoeg expertise in huis, dus zou eigenlijk wel beter zijn als we duurzaamheid actiever meenemen. Als ik zo hardop kritiek op mezelf mag geven mogen we daar actiever in zijn. Het blijft natuurlijk altijd de vraag: is duurzaamheid hier een hoofdzaak of niet?</i>	Consortium heeft intrinsiek niet veel toegevoed voor duurzaamheid	Stakeholders: Consultancy & Engineering
<i>Ja, ik denk dat als er vanuit ProRail of het Bureau Spoorbouwmeester echt was gezegd: "opgave X is: een klimaatneutraal station," dan hadden wij vorig jaar geen vijf opties ontworpen met ondergrondse oplossingen. Het is goed dat we vrijheid kregen om alles af te wegen, maar het had ons ook geholpen als we meer houvast kregen. Als duurzaamheid een hoofddoel was geweest, hadden we het project anders ingestoken.</i>	discussie tussen opnemen als kern en ontwerp vrijheid	Stakeholders: Owners / sponsors
<i>Het bijt zich altijd om alles in een keer te willen hebben. Dat is een uitgesproken visie — en dat werkt goed. Je kunt ook zeggen: "We willen alles een beetje," maar een uitgesproken richting geeft gewoon meer focus. Ik vind het wel heel sterk als je daar een boutte uitspraak over doet</i>	duidelijkere focus en priotisering	Stakeholders: Owners / sponsors
<i>We spreken wel met stedenbouwkundigen en verkeerskundigen. Maar we hebben niet met ecoloog of duurzaamheidsadviseur aan tafel gezeten. Dan zie je ook bij hen, zover ik weet, dat het niet boven aan het boodschappenlijstje staat</i>	Goede mensen aan tafel krijgen	Stakeholders: Owners / sponsors
<i>k zou ProRail, NS en de gemeente ook echt willen adviseren om daar nu al focuspunten in aan te brengen. Wat vinden jullie écht belangrijk? Maak die roos, of matrix, samen met het nieuwe consortium dat het uiteindelijk gaat ontwerpen</i>	priotiseren van aspecten in gezamenlijk overleg	Stakeholders: Owners / sponsors

<i>Want, wat is het belangrijkste onderdeel? Dat is dat je mensen uit de auto en in de trein krijgt. We moeten een werkbaar station maken. Als je dan wel een superklimaatadaptief station hebt, maar het werkt totaal niet, dan heb je je doel al helemaal niet bereikt. CO₂ daarentegen — dat is iets waar we wél logische keuzes in kunnen maken. Bijvoorbeeld: niet ondergronds bouwen als het niet hoeft, en geen grote nieuwe constructies neerzetten als het niet nodig is.</i>	priotiseren van aspecten	Strategy: focus on the big impacts
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Overzicht codes Dor-4-PC1-PR

Datum: 20/06/2025

Gesprekspartijen:

- Interviewer/onderzoeker: Thijs van Royen (TvR)
- Label geïnterviewde: Dor-4-PC1-PR

N.B.: Codes zijn afgeleid van een (deels automatisch gegenereerde) transcript, de context van de code kan worden teruggevonden in het bijbehorende transcript: "Dor-4-PC1-PR - Anonymized transcript.dox"

Codes zijn ingedeeld in 3 verschillende thema's waarop analyse is gedaan:

- 1e thema: verloop van Duurzaamheid in het project
- 2e thema: Influential factors voor integratie duurzaamheid
- 3e thema: Strategieën en overwegingen van stakeholders op het gebied van duurzaamheid

Als een code gemarkeerd is met een groene kleur is deze (vertaald) opgenomen in het eindverslag.

Thema 1: verloop van duurzaamheid in het project

Quote	Beschrijving	Fase
<i>Dordrecht stond toen nog niet op de lijst met prioritaire knooppunten, en een van de eerste successen – de gemeente Dordrecht mag me bedanken – is dat dat station ook zou worden meegenomen. De andere drie knopen, Laan van NOI, Leiden en Schiedam Centrum zouden al mee worden genomen. Maar het was evident dat Dordrecht ook mee moest, want het voldeed duidelijk aan de criteria van prioritaire knooppunten. Sindsdien ben ik hier actief bij betrokken.</i>	2020 begin pre-verkenning Dordrecht nog niet op lijst	1. Ver voor project
<i>We hadden drie hoofddoelen geformuleerd, die we vertaald hebben naar vijf opgaven. Duurzaamheid hebben we daarbij bewust randvoorwaardelijk gemaakt. Dat kun je geen opzichzelfstaand doel noemen; het moet inherent zijn aan het ontwerp. Zoals Spoorbouwmeester ook zegt: je ontwerpt iets dat pas over tien jaar gebouwd wordt. Je moet dus voldoen aan de wetgeving van over tien jaar, ook al ken je die nu nog niet. Dus je moet dat als randvoorwaardelijk meenemen</i>	Formuleren van de projectdoelen	1. Ver voor project
<i>Bij de start van de verkenning hebben we met de partijen gezeten – dus de vier knooppunten, IenW en de andere samenwerkende partijen – en gekeken: hoe vullen we duurzaamheid hier specifiek in? Wat ik toen heb gedaan: ik heb een kolom gemaakt met wat er over duurzaamheid staat in het beoordelingskader dat we bij de startbeslissing van de opdrachtgevers hebben meegekregen.</i>	verzamelen verschillende beleidsopvattingen op thema's	3. Start project

<i>Duurzaamheid is natuurlijk een containerbegrip, dus we hebben op de relevante thema's gekeken hoe dat terugkomt in het beleid. Bijvoorbeeld in de duurzaamheidsstrategie van ProRail, die van NS, bij Spoorbouwmeester en later ook bij de gemeente</i>		
<i>We hebben verzameld: dit is hoe wij vanuit ons bedrijf naar duurzaamheid kijken, dit is hoe het op onze websites staat, en dit is hoe het past bij de thema's uit het beoordelingskader. Uiteindelijk hebben we dat vertaald naar een gezamenlijke samenvatting op de thema's materiaal, energie en klimaatadaptatie</i>	samengevat wat duurzaamheid inhoud en welke thema's belangrijk zijn	3. Start project
<i>Daarna hebben we dat niet vertaald naar een keihard programma van eisen. In het PvE wordt naar dit document verwezen, dat is wel wat gemakzuchtig. Dus we hebben het geen eisen, maar "handvatten" genoemd: richtlijnen die je meegeeft aan ontwerpers op die thema's. En straks, als je wilt toetsen, gebruik je diezelfde handvatten</i>	hoe vertaal je dat in de opdracht	3. Start project
<i>Ze krijgen een programma van eisen mee en een vraagspecificatie. Dat is niet apart benoemd. Ze kregen de stukken mee zoals wij die met de partners hadden geformuleerd. Het plan van aanpak dat we als projectteam hadden opgesteld, en waar we op basis daarvan van het bestuurlijk overleg Oude Lijn de opdracht voor kregen. Dat heeft Arup meegekregen.</i>	waar gaat projectteam mee aan de slag	3. Start project
<i>Ja, die ken ik. In de beginjaren heb ik die aanpak voor een aantal projecten gedaan. Maar op den duur kom je toch wel weer op hetzelfde uit. Ik vind die methode heel methodisch klinken, maar je kunt ook gewoon met elkaar om de tafel en tot dezelfde bevindingen komen. Dat is mijn ervaring. Dus ja, we hadden het kunnen doen, maar ik heb het achterwege gelaten.</i>	in gesprek over duurzaamheidsambities: ambitieweb	3. Start project
<i>Ik zeg zelf altijd: ik ben op zoek naar de maakbare oplossing. En die moet óók duurzaam maakbaar zijn. Als we straks bijvoorbeeld CO₂-budgetten opgelegd krijgen, moet dat meegenomen zijn. Daarom hebben we in de Nota Kansrijke Oplossingen, met hulp van [naam], gezegd: "goed dat we allemaal alternatieven aftasten, maar we willen minimaal één alternatief uitwerken waarin duurzaamheid centraal staat".</i>	meenemen van duurzaamheidsalternatief	4. analyse fase
<i>Maar goed, we zitten nu nog midden in de alternatievenstudie. Het draait echt vooral om doelbereik en kosten. Je kan wel zeggen: "Ja maar we moeten ook duurzaamheid integreren en ervoor gaan!!", maar het is echt niet onderscheidend in deze fase</i>	duurzaamheid niet onderscheidend in deze fase	4. analyse fase
<i>En in dat spel, met [SB] erbij, hebben we gezegd: we willen er één oplossing bij hebben die helemaal inzet op duurzaamheid. Aanvankelijk vond de gemeente dat maar niks. De toenmalige projectmanager van de gemeente wilde dat eigenlijk niet. Maar wij hebben gezegd: het is nu de NKO-fase, dus we moeten breed kijken. Laten we dit uitproberen. En als het niks is, strandt het wel op de zeef van de NKO.</i>	meenemen van duurzaamheidsalternatief	4. analyse fase
<i>We hebben de ondergrondse oplossingen uiteindelijk laten vallen. Het had een strijd kunnen zijn, maar die strijd is er niet gekomen omdat ze simpelweg te duur waren. Het geld was er niet. Als budget geen probleem was geweest, dan hadden we die discussie waarschijnlijk wél gevoerd en waren er misschien ook duurzamere ondergrondse oplossingen in beeld gebleven. Nu was dat niet nodig, want het viel op kosten gewoon af.</i>	Kosten waren doorslaggevend aan het kiezen voor duurzaam alternatief	4. zeef naar beoordelingsfase

<i>Wat we gedaan hebben, is duurzaamheid randvoorwaardelijk maken. Dat betekent dat alle alternatieven die we uitwerken vanuit een duurzame blik worden beoordeeld. Dus welk alternatief de bestuurders ook kiezen, we zorgen ervoor dat duurzaamheid daarin een plek krijgt. Het is niet zo dat bestuurders verplicht één specifiek duurzaam alternatief moeten kiezen. Nee, de bedoeling is dat alle alternatieven in de buurt komen van de Paris Proof-doelstelling.</i>	Duurzaamheid als randvoorwaarde	6. Voorkeursbeslissing
<i>Wel willen we natuurlijk het beste bureau aan ons binden. Hoe doe je dat? Bijvoorbeeld door te zeggen: we willen een architect met aantoonbare ervaring in het werken met monumenten. Of: we willen een bureau dat bewezen expertise en innovatiekracht heeft op het gebied van duurzaamheid. Dat hoeven ze niet in een nieuw ontwerp te laten zien, maar kunnen ze aantonen met referentieprojecten.</i>	Uitvragen voor volgende fase	7. Voorbereiden volgend fase

Thema 2: Influential factors

Quote	Beschrijving	Thema
<i>Als er straks een winnende oplossing hebben gevonden, en bestuurders zeggen: “ja hier hebben wij het budget voor over” – en dat budget zal altijd hoger zijn dan wat nu gereserveerd is – dan komt er nog tijd genoeg om duurzaamheid verder vorm te geven.</i>	Nu nog niet aan de orde om duurzaamheid heel specifiek in te vullen	Aggregation level
<i>Hun lijn is: wees je ervan bewust dat je iets ontwerpt dat pas in 2030 gebouwd wordt. Dan moet het voldoen aan de regelgeving van dat moment.</i>	Je bent iets aan het ontwerpen voor in de toekomst	Anticipating future developments
<i>Zoals Spoorbouwmeester zegt: let op, je hebt straks in 2035 gewoon te voldoen aan de regelgeving. Het is leuk dat je nu denkt dat het prioriteit is, maar je moet het gewoon doen. De maakbare oplossing die we met elkaar formuleren moet dus duurzaam zijn, anders is hij niet maakbaar</i>	Duurzaam is in de toekomst inherent aan maakbaarheid, niet duurzaam is niet maakbaar	Anticipating future developments
<i>In Dordrecht lukt dat goed, met de gemeente en de andere partners. En het kan ook bijna niet anders, want iedere partij heeft zijn duurzaamheidsbeleid. Soms moet je mensen eraan herinneren dat ze het hebben, maar je kan er eigenlijk geen ruzie over maken. Iedereen streeft hetzelfde na.</i>	Strategie: herinner stakeholders aan hun eigen doelen	Client policies
<i>Bij de start van de verkenning hebben we met de partijen gezeten – dus de vier knooppunten, IenW en de andere samenwerkende partijen – en gekeken: hoe vullen we duurzaamheid hier specifiek in? Wat ik toen heb gedaan: ik heb een kolom gemaakt met wat er over duurzaamheid staat in het beoordelingskader dat we bij de startbeslissing van de opdrachtgevers hebben meegekregen. Duurzaamheid is natuurlijk een containerbegrip, dus we hebben op de relevante thema's gekeken hoe dat terugkomt in het beleid. Bijvoorbeeld in de duurzaamheidsstrategie van ProRail, die van NS, bij Spoorbouwmeester en later ook bij de gemeente. Elke partij heeft wel een duurzaamheidsbeleid dus het daaraan koppelen is erg waardevol, ook om de aansluitingspunten te kunnen laten zien</i>	verzamelen verschillende beleidsopvattingen op thema's	Client policies; Shared vision
<i>In Dordrecht lukt dat goed, met de gemeente en de andere partners. En het kan ook bijna niet anders, want iedere partij</i>	Alle ambities liggen vast, je moet mensen er	client support

<i>heeft zijn duurzaamheidsbeleid. Soms moet je mensen eraan herinneren dat ze het hebben, maar je kan er eigenlijk geen ruzie over maken. Iedereen streeft hetzelfde na.</i>	gewoon aan herinneren en aan houden	
<i>Hoe gaan we dan thema's van beoordelingskader nu proberen toch kwantitatief in beeld te brengen? Ja, dat is eigenlijk dit: Je maakt voor je kostenramingen, bouwt het ingenieursbureau zijn hoeveelheden staten op. Nou aan de hand van die hoeveelhedenstaten dan kan je ook zeggen: "dit is zoveel kuub van dit materiaal type" en dan kan je een berekening maken op CO2.</i>	Hoe kwantificeer je thema's in het beoordelingskader	Concretising and quantifying
<i>Ja, zeker als het botst met andere functionaliteiten. Wij kunnen zeggen: 30% van het stationsoppervlak moet groen of blauw zijn. Maar dan zegt de provincie: wij claimen 60% voor ons busstation. Dan zoeken we een compromis. Bijvoorbeeld: maak de overkapping van het busstation groen. Dan vinden we elkaar weer. Dus: in theorie hebben we allemaal hetzelfde beleid. Maar uiteindelijk draait het om prioriteit.</i>	afweging tussen doelen en zoeken naar compromis	conflicting interest
<i>Maar voor stations werkt dat bijna niet, die kan je niet echt D&C op de markt brengen. Stations zijn van iedereen: ProRail, NS, de gemeente. Iedereen voelt zich eigenaar. Voor je een station op de markt kunt zetten moet je het ontwerp echt tot een definitief niveau hebben uitgewerkt.</i>	Type contractvorming maakt het lastig om te ontwerpen vanuit duurzaamheid	Contracting strategy
<i>Wel willen we natuurlijk het beste bureau aan ons binden. Hoe doe je dat? Bijvoorbeeld door te zeggen: we willen een architect met aantoonbare ervaring in het werken met monumenten. Of: we willen een bureau dat bewezen expertise en innovatiekracht heeft op het gebied van duurzaamheid. Dat hoeven ze niet in een nieuw ontwerp te laten zien, maar kunnen ze aantonen met referentieprojecten.</i>	Zoeken naar een bureau met affiniteit of expertise op bepaalde duurzaamheidsaspecten bij de tenderfase	Contracting strategy
<i>In deze fase zaten de kosten aan onze kant, maar in de volgende fase kan het wel eens omgekeerd zijn. Dan wordt alles wat extra geld kost rücksichtslos weggestreept. Als je dan zonnepanelen op je perronkap wilt of andere nice-to-haves, dan hoor je: "doen we niet, want de perronkap moet je er te veel voor verzwaren, en dat kost te veel extra." Geld is altijd het grote gevaar: dat alle ambities sneuvelen. Het zijn precies de add-on-maatregelen die dan een groot risico lopen.</i>	Geld is altijd het grote gevaar, nu werkte dat duurzaamheid in de hand, maar volgende fase kunnen alle add-ons worden weggestreept	Financial considerations
<i>We hebben de ondergrondse oplossingen uiteindelijk laten vallen. Het had een strijd kunnen zijn, maar die strijd is er niet gekomen omdat ze simpelweg te duur waren. Het geld was er niet. Als budget geen probleem was geweest, dan hadden we die discussie waarschijnlijk wél gevoerd en waren er misschien ook duurzamere ondergrondse oplossingen in beeld gebleven. Nu was dat niet nodig, want het viel op kosten gewoon af.</i>	Kosten waren doorslaggevend	Financial considerations
<i>Dat alternatief hebben we uitgewerkt in de NKO-fase, en toen bleek dat ook op kosten dat dit alternatief het dichtst bij de kansrijke in de buurt kwam. Helemaal niet zo vreemd natuurlijk met minder ingrepen. En dit is ook wel waarom het interessant is om dit soort fundamentele alternatieven uit te werken in de verkenning, omdat je dan nog echt praat over de echte, structurerende keuzes waar grote sommen geld bij komen kijken.</i>	Kostenefficiëntie kan duurzaamheid ook helpen	Financial considerations
<i>Successfactor? Ja, geld eigenlijk. Omdat ondergronds bouwen in Dordrecht door de bodemgesteldheid en de monumentale context extreem duur. Daarnaast zoude er ook enorm veel</i>	Kostenefficiëntie was doorslaggevend, maar bleek ook duurzaamste	Financial considerations

<i>buitenwerkstellingen nodig zijn, en vervangend vervoer is extreem duur. Daardoor vielen alle ondergrondse oplossingen af. Dat hielp enorm om de bovengrondse, en toevallig ook de duurzaamste, oplossingen naar voren te schuiven.</i>	oplossing in de hand te spelen	
<i>Maar in de praktijk draait het vooral om: hoe zit het met het doelbereik, en hoe zit het met de kosten? Als je dat sluitend krijgt, ben je al heel succesvol. Alleen bij projecten waar duurzaamheid intrinsiek als doel is geformuleerd, komt het nadrukkelijk bovendrijven. Hier gebeurde dat minder.</i>	waar draait het om? Doelbereik en kosten	Financial considerations; Project goals
<i>Op het gebied van klimaatadaptiviteit zie je hetzelfde. Toevoegen van groen en water vraagt om best grote volumes. Niet zozeer op mijn terrein, want daar liggen de sporen, dus ik kan weinig anders. Dan ben ik afhankelijk van de gemeente, die op hun terrein iets moet doen om samen onze doelstellingen te halen. Denk bijvoorbeeld aan de compensatie van verhard oppervlak. Maar dat kan botsen met andere ruimteclaims.</i>	Ruimtegebrek zorgt soms voor niet duurzame alternatieven	Location-specific factors
<i>Daarmee kan je ook aan de hand van een toolkit kijken welke oplossingsrichtingen denkbaar zijn. En dan ben je een paar maanden verder het eigenlijk op neer: “zoveel mogelijk groen en blauw.” Dat is namelijk overal goed voor: klimaatadaptatie én voor de ruimtelijke kwaliteit. Reizigers waarderen groen ook echt</i>	Koppeling duurzaamheid aan reizigers wensen en ruimtelijke kwaliteit	Peer projects
<i>Ik denk dat het heel afhankelijk is van personen, ja. Elk bedrijf, en ook gemeenten, hebben op hun website staan: duurzaamheid vinden wij belangrijk. Als je ernaar vraagt, krijg je stapels brochures. Maar of dat echt beleefd wordt en een plek krijgt, dat hangt af van de persoon die namens die organisatie aan tafel zit.</i>	Hoe duurzaamheid wordt behandeld is heel afhankelijk van de personen aan tafel	Personal affinity
<i>Misschien verschilt het ook per project maar hier krijg je het echt nog niet geagendeerd. Eerlijk gezegd interesseert het geen enkele bestuurder op dit moment zijn in deze fase niet bezig met groene daken. Ik moet eerst maar kijken of ik een betaalbare oplossing die de problemen oplost kan aandragen. Als dat lukt, zijn we al heel blij.</i>	Geen bestuurder die op dit moment denkt aan groene daken, eerst moet oplossing gevonden worden	Project goals & Assessment frameworks
<i>Wat we gedaan hebben, is duurzaamheid randvoorwaardelijk maken. Dat betekent dat alle alternatieven die we uitwerken vanuit een duurzame blik worden beoordeeld. Dus welk alternatief de bestuurders ook kiezen, we zorgen ervoor dat duurzaamheid daarin een plek krijgt. Het is niet zo dat bestuurders verplicht één specifiek duurzaam alternatief moeten kiezen. Nee, de bedoeling is dat alle alternatieven in de buurt komen van de Paris Proof-doelstelling.</i>	Duurzaamheid als randvoorwaarde	Project goals & Assessment frameworks
<i>Dus die discussie, comfort vs. stroomgebruik kan ook zeker nog komen, maar dat zijn meer de detaildiscussies</i>	Comforteisen kunnen clashen met duurzaamheids doelstellingen	Rules and regulations (comfort en veiligheid)
<i>Bij Spoorbouwmeester – je hebt [naam] gesproken – is duurzaamheid wel echt richtinggevend. Hun lijn is: wees je ervan bewust dat je iets ontwerpt dat pas in 2030 gebouwd wordt. Dan moet het voldoen aan de regelgeving van dat moment</i>	Rol van Spoorbouwmeester	sustainability champion

Thema 3: Strategieën en overwegingen van stakeholders op het gebied van duurzaamheid

Quote	Beschrijving	Aspect
<i>Maar inderdaad, kijk: ProRail heeft als missie “ProRail verbindt, verbetert en verduurzaamt”. Dat zit er dus wel degelijk in. En dat geldt voor ons, maar ook als je kijkt naar NS Stations, naar de gemeenten en naar Bureau Spoorbouwmeester. Je zou toch een vreemd bedrijf zijn als je anno nu géén aandacht voor duurzaamheid in je missie of beleid hebt.</i>	Geen gebrek aan ambities	Stakeholders: Collectively
<i>Ja, dat gebeurt in groot werkteamverband. Met de stedenbouwkundige van de gemeente, de experts van ProRail, en de experts van het consortium.</i>	Hoe komt het meenemen van een duurzaamheids alternatief tot stand	Stakeholders: Collectively
<i>Bij Arup heb ik dat niet sterk beleefd, maar het komt voor dat bureaus willen laten zien dat ze duurzaamheid hoog in het vaandel hebben. Dan komen ze uit eigen beweging met voorstellen. Dat ken ik wel van andere projecten. Ik herinner me dat niet zo nadrukkelijk bij Arup en VenhoevenCS in dit project, maar dat was ook niet nodig. In het samenspel met Spoorbouwmeester, de gemeente en NS kwam dat toch wel voldoende op tafel.</i>	Strategie: intrinsieke beweging met voorstellen komen	Stakeholders: Consultancy & Engineering
<i>Bij Arup heb ik dat niet sterk beleefd, maar het komt voor dat bureaus willen laten zien dat ze duurzaamheid hoog in het vaandel hebben. Dan komen ze uit eigen beweging met voorstellen. Dat ken ik wel van andere projecten. Ik herinner me dat niet zo nadrukkelijk bij Arup en VenhoevenCS in dit project, maar dat was ook niet nodig. In het samenspel met Spoorbouwmeester, de gemeente en NS kwam dat toch wel voldoende op tafel.</i>	Consortium heeft intrinsiek niet veel toegevoed voor duurzaamheid	Stakeholders: Consultancy & Engineering
<i>Tegenwoordig werkt dat anders: iedereen voelt zich eigenaar van een station. ProRail zegt: “het is mijn station want ik ben verantwoordelijk voor perrons, tunnels en de toegang tot treinen”. NS-Stations zegt ook, “het is mijn station”, want die beheert de stationshal en de commerciële ruimten. Gemeenten zien het station als de poort naar hun stad en koppelen er stedelijke ontwikkelingskansen aan.</i>	gezaamenlijk eigenaarschap stations	Stakeholders: Owners / sponsors
<i>Dus we zijn eigenaar, hangen onder I&W als financier, en we worden erkent in het brengen van expertise. Vanuit die drie posities kunnen wij invloed uitoefenen. Dus we kunnen ons bedrijfsbeleid en ons duurzaamheidsbeleid ook op die drie posities inbrengen. Om het zo te laten landen in het project, en die positie wordt ons ook zeker gegund.</i>	Invloed van ProRail erg groot	Stakeholders: Owners / sponsors
<i>In Dordrecht lukt dat goed, met de gemeente en de andere partners. En het kan ook bijna niet anders, want iedere partij heeft zijn duurzaamheidsbeleid. Soms moet je mensen eraan herinneren dat ze het hebben, maar je kan er eigenlijk geen ruzie over maken. Iedereen streeft hetzelfde na.</i>	Strategie: herinner stakeholders aan hun eigen doelen	Stakeholders: Owners / sponsors
<i>Maar in de praktijk draait het vooral om: hoe zit het met het doelbereik, en hoe zit het met de kosten? Als je dat sluitend krijgt, ben je al heel succesvol.</i>	Doelbereik en kosten	Strategy: clear goal setting
<i>Die studie gaat over CO2 in rekeningen brengen: stop je hout in je ontwerp: dan kan je kan je netto winnen, en stop je er heel veel beton in gaan, dan scoor je slechter. Heel ingewikkeld is het niet</i>	strategie: CO2 in kaart brengen	Strategy: early inventarisation of important themes

<i>in een verkenningfase, omdat je dan nog vooral grondstoffelijk bezig bent.</i>		
<i>Misschien verschilt het ook per project maar hier krijg je het echt nog niet geagendeerd. Eerlijk gezegd interesseert het geen enkele bestuurder op dit moment zijn in deze fase niet bezig met groene daken. Ik moet eerst maar kijken of ik een betaalbare oplossing die de problemen oplost kan aandragen. Als dat lukt, zijn we al heel blij.</i>	duurzaamheid niet onderscheidend in deze fase	Strategy: focus on the big impacts
<i>Hooguit kun je het in het verhaal meenemen. Want uiteindelijk gaat het niet alleen om de beoordelingskader of de cijfertjes, maar om het overtuigende verhaal. Je moet een wervend verhaal kunnen geven: “Kies voor Dordrecht, en kies met deze oplossing.” In dat verhaal kan duurzaamheid een duidelijke plek krijgen: bijvoorbeeld door te benadrukken dat de oplossing zo goed als CO₂-neutraal is, en door de belofte mee te geven dat we in de volgende fase bij de materiaalkeuzes verder zullen sturen op volledig CO₂-neutraal. Als je dat in het verhaal verwerkt, komt het bij de bestuurders wel aan. Maar duurzaamheid moet niet de kern zijn; eerst moeten we zorgen dat er überhaupt een oplossing ligt waarvoor het budget beschikbaar is.</i>	Neem het op in het verhaal, maar maak het niet de kern	Strategy: make a convincing story
<i>Ja, zeker als het botst met andere functionaliteiten. Wij kunnen zeggen: 30% van het stationsoppervlak moet groen of blauw zijn. Maar dan zegt de provincie: wij claimen 60% voor ons busstation. Dan zoeken we een compromis. Bijvoorbeeld: maak de overkapping van het busstation groen. Dan vinden we elkaar weer. Dus: in theorie hebben we allemaal hetzelfde beleid. Maar uiteindelijk draait het om prioriteit.</i>	Prioritiseren van aspecten	Strategy: prioritise and compromise sustainability themes
<i>We zijn niet echt aan het ontwerpen, dus veel blijft schijnwerkelijkheid. Ik zou zeggen: het kan allemaal nog best globaal, want het is ook een beetje schijnwerkelijkheid. De hoeveelhedenstaten die we nu maken zijn nodig om de kostenramingen op te stellen. Maar we zijn nog niet echt aan het ontwerpen, dus wie weet wat er in de volgende fase allemaal nog gaat gebeuren. Voor mij had het dus ook kwalitatief gekund: je kunt aantonen dat de ene oplossing natuurlijk duurzamer is dan de andere, en daarmee klaar.</i>	hoeft niet per se kwantitatief	Strategy: qualitative vs quantitative
<i>Maar tegenwoordig – ook dankzij acties van Spoorbouwmeester en ProRail samen, met onder andere Group A – is er een methode ontwikkeld waarmee je zelfs in de verkenningfase met cijfers kunt werken. Quick and dirty, maar het helpt. Als die berekeningen heel ingewikkeld waren geweest, had ik gezegd: laten we het niet doen. Maar omdat de methodiek aansluit bij het abstractieniveau van de verkenning, konden we het gebruiken.</i>	Ontwikkel tools die matchen bij abstractieniveau MIRT-verkenning	Strategy: tools to translate

Overzicht codes Dor-5-PO-GD

Datum: 20/06/2025

Gesprekspartijen:

- Interviewer/onderzoeker: Thijs van Royen (TvR)
- Label geïnterviewde: Dor-5-PO-GD

N.B.: Codes zijn afgeleid van een (deels automatisch gegenereerde) transcript, de context van de code kan worden teruggevonden in het bijbehorende transcript: "Dor-5-PO-GD - Anonymized transcript.dox"

Codes zijn ingedeeld in 3 verschillende thema's waarop analyse is gedaan:

- 1e thema: verloop van Duurzaamheid in het project
- 2e thema: Influential factors voor integratie duurzaamheid
- 3e thema: Strategieën en overwegingen van stakeholders op het gebied van duurzaamheid

Als een code gemarkeerd is met een groene kleur is deze (vertaald) opgenomen in het eindverslag.

Thema 1: verloop van duurzaamheid in het project

Quote	Beschrijving	Fase
Dus uiteindelijk hebben we gekozen voor een duurzamere oplossing, maar dat was eigenlijk toeval. Het was de zoektocht naar een eenvoudiger, simpeler alternatief dat meer gebruik kon maken van wat er al lag.	keuze duurzame alternatief	4. analyse fase
De alternatieven die we nu vergelijken komen voort uit de eerste fase, na de nota kansloze oplossingen. Daarin is een 360-graden scan gedaan van alle mogelijke opties, ook dure en complexe. Dat voorkomt dat iemand later iemand komt met een idee en dat je moet zeggen: "dit hebben we niet onderzocht." Want dan krijg je een soort doos van Pandora waar je weer alles open moet breken. Dus het is goed dat al die dure en complexe opties ook in beeld zijn geweest.	Goed dat alle oplossingen zijn onderzocht	4. analyse fase
Dus er is wel degelijk [met duurzaamheid] geëxperimenteerd. Maar het is geen onderscheidend element geweest in de totstandkoming van de uiteindelijke oplossingen. Het is geprobeerd, maar niet structureel doorgezet.	geprobeerd als bouwsteen mee te nemen	4. analyse fase
Jij zegt: de meest duurzame variant was de bovengrondse. Dat is waar, maar dat was destijds niet het argument. Daarom is het belangrijk stil te staan bij het échte argument. Als je kiest tegen ondergrondse oplossingen, kies je automatisch voor bepaalde effecten die het logisch gevolg zijn van die keuze. Als je dat	Oppassen met het verpakken van de keuze in duurzaamhed	4. zeef naar beoordelingsfase

ophangt aan duurzaamheid, zet je mensen misschien op het verkeerde been.		
En wat zou je eventueel nog kunnen toevoegen, dat hebben we toen niet uitgebreid gedaan, maar je zou ook aandacht kunnen besteden aan zaken die aan de voorkant waren meegegeven—ambities, richtlijnen, uitgangspunten— en die later opnieuw relevant worden. Dan zou je per onderwerp kunnen aangeven wat in de volgende fase op dat gebied relevante issues worden. Dat kan gaan om energiegebruik, materialisatie, waterkwaliteit—zaken die nu nog niet aan de orde zijn, maar in de volgende fase wel degelijk terug moeten komen	Doorgeven naar volgende fase, dingen die meegegeven zijn en later opnieuw relevant worden	6. Voorkeursbeslissing

Thema 2: Influential factors

Quote	Beschrijving	Thema
Als je vraagt: is duurzaamheid dan niet relevant? Ja, maar welk aspect van duurzaamheid is op welk moment relevant? De fundamentele keuzes zitten in de verkenningsfase. Daar bepaal je de koers. Maar de vraag of en op welke perronoverkappingen (overkappingen van nieuwe perrons hebben geen monumentale status) je zonnepanelen legt, kan later prima nog beantwoord worden.	Welk aspect van duurzaamheid is op welk moment relevant	Aggregation level
Dus in klassieke projectmanagement taal: die gefaseerdheid is erg belangrijk om in kaart te brengen (van schetsontwerp, naar voorlopig ontwerp naar definitief ontwerp). Je begint niet op dag één met de kleurkeuze van de badkamertegels. Je zorgt er eerst voor dat het toilet groot genoeg is en de leidingen goed liggen.	Driver: kijk naar de gefaseerdheid	Aggregation level
Dat maakt dat ik eigenlijk vaak, ook vanochtend weer, tegen dingen aanloop waarvan ik denk: we zien het nog te veel als een ontwerpproces waarbij we achteraf de kosten uitrekenen van de oplossingen die we bedenken. Terwijl het juist gaat, ook in de lijn van Elverding, wat is hier nou de essentie, die de publieke en private partijen samen moet brengen? Het echte gesprek aan de voorkant is het meest wezenlijk. De uitwerking, waar je uiteindelijk voor kiest, dat komt daarna.	MIRT verkenningen moeten niet te veel als ontwerpproces worden gezien, kijk naar de essentie	Aggregation level
Natuurlijk, het kan waardevol zijn om in een detailontwerp nog te kijken naar combinaties, bijvoorbeeld bij de entree aan de zuidzijde en de verbinding met het Weizigtpark. Dan kun je eventueel elementen toevoegen die duurzaamheid raken. Maar we draaien het niet om: het is niet zo dat we koste wat kost de meest duurzame entree willen. Dat kan later altijd nog, dan moet je goed kijken hoe dat verschilt van de oorspronkelijke aanpak en of er draagvlak en middelen voor zijn.	Je gaat niet ontwerpen vanuit duurzaamheid	Aggregation level
Ten eerste: Het is een lastig proces, omdat je je echt moet verdiepen in de beweegredenen en criteria van anderen, die met een ander belang en een andere achtergrond aan dezelfde opgave werken.	Barrier: Verschillende perspectieven en andere belangen	conflicting interest
Daarnaast, als het gaat om duurzaamheid zal niemand tegen zijn, maar als het er echt om spant —zeker bij situaties waarin duurzame oplossingen in zijn investeringskosten kostbaarder zijn,	Bij hoge investeringskosten voor duurzaamheid kans op concurrentie	Financial considerations

los van de exploitatievoordelen die je later terugkrijgt— dan moeten ze concurreren met andere grote beoordelingscriteria		
Dus bij elk onderdeel kan je met de bril van duurzaamheid kijken, maar het is tot op heden geen onderscheidend criterium in het zoekgebied waar wij op dit moment mee bezig zijn.	Niet onderscheidend: Alles zou met duurzaamheidsbril kunnen bekeken worden	Framing
Je kunt duurzaamheid wel gebruiken in je beoordeling: door te zeggen dit alternatief is óók nog de meest duurzame. Maar als je zegt: we hebben gekozen vóór duurzaamheid en het is toevallig ook nog betaalbaar, dan krijg je al snel de reactie: maak het dan maar wat minder duurzaam, want dat was toch niet het hoofdargument.	Framen van duurzaamheid	Framing
Jij zegt: de meest duurzame variant was de bovengrondse. Dat is waar, maar dat was destijds niet het argument. Daarom is het belangrijk stil te staan bij het échte argument om met die oplossingsrichting door te gaan	Framen van duurzaamheid	Framing
En het duurt lang, waardoor tegen de tijd dat je een stap verder bent veel mensen alweer vertrokken zijn en je dus met nieuwe mensen opnieuw moet opbouwen.	Lange doorloop van projecten	Knowledge transfer
onze ambities zijn teruggebracht tot wat echt noodzakelijk en urgent is. Met voldoende middelen hadden we misschien duurzamere oplossingen kunnen realiseren, maar dit is daar niet de tijd voor. De opgave voor de voorkeursbeslissing is vooral: dat we een beslissing maken dat de opgave van dit station dekt, hoe kunnen we met zo min mogelijk inspanningen de perrons voldoende breed maken om de trappen kwijt te kunnen? Dat is al ingewikkeld genoeg.	beschikbare studieruimte (Tijd en budget) maakt uitwerken duurzaamheid beperkt	Resources

Thema 3: Strategieën en overwegingen van stakeholders op het gebied van duurzaamheid

Quote	Beschrijving	Aspect
Mijn taak is om de juiste partijen bij elkaar te brengen als projectmanager. Ik heb dus geen persoonlijke voorkeur. Het gaat erom welke argumenten langskomen, welke afwegingen worden gemaakt, en of die afwegingen op de juiste plek plaatsvinden. Hoe zorgen we dat de adviseurs en ingenieurs ons voorzien van de juiste informatie? Ik zie mezelf dus als een soort zandloper zou je kunnen zeggen. Onder mij functioneert een projectorganisatie met allerlei adviseurs en overlegstructuren met de achterban van de betrokken organisaties. Boven mij zit een directeurenoverleg en uiteindelijk een bestuurlijk overleg. En daarboven nog de centrale projectorganisatie van de Oude Lijn, met ook een directeurenoverleg en een bestuurlijk overleg waarin de vijf deelstudies samenkomen. Ik ben eigenlijk de verbindingsofficier tussen de inhoud die we genereren—over plannen, kosten, risico's en alle andere discussies—en degenen die uiteindelijk de besluiten nemen	Functieomschrijving projectmanager	Stakeholders: client organisation / project team
Maar voor dit station gaat hun [SB] rol nu minder over verduurzaming van de stationsomgeving of materialisatiekeuzes. Ook voor hen geldt: wanneer zet je welk deel van je inzichten en	Rol van Spoorbouwmeester	Stakeholders: Partners / advisors

rol die je hebt ook in? Ze begrijpen ook dat je niet hoeft te benadrukken dat de ene oplossing duurzamer scoort dan de andere—dat wisten we zelf al.		
Tegelijkertijd moet je in de eerste fase ook niet-duurzame oplossingen onderzoeken. Dan zie je of die vanzelf afvallen, zoals in Dordrecht, of dat je er een discussie over krijgt. Soms ben je zelfs genoodzaakt een niet-duurzame oplossing te kiezen, maar dan weet je tenminste waarom.	Je moet niet-duurzame oplossingen verkennen	Strategy: broad exploration of the project
Daarom is het cruciaal om te snappen welke keuzes wanneer worden gemaakt. Ik gebruik zelf vaak het begrip ‘contra-mal’. Het is ongelooflijk belangrijk om vast te leggen: dit zijn keuzes waar bestuurders later eigenlijk niet meer op terug kunnen komen. En om daarbij de criteria te documenteren die toen speelden—soms is dat geld, soms andere factoren.	contra-mal	Strategy: contra-mal
We zeiden: dit gaat nog veranderen, maar laten we minutieus vastleggen in een componentenboek welke keuzes we maakten, en vooral ook waarom we niet voor bepaalde alternatieven kozen. Nu, 13 jaar later, zit er niemand meer op dezelfde stoel. Ik weet niet of ze dat boek vaak erbij pakken, maar het helpt wel als naslag om te zien hoe er destijds consensus was.	contra-mal	Strategy: contra-mal
Je moet altijd alert zijn: zijn er uitzonderlijke zaken die je niet kunt doorschuiven met de gedachte “dat lossen we later wel op”?	Wat is belangrijk op welk moment?	Strategy: early inventarisation of important themes
Dus in klassieke projectmanagement taal: die gefaseerdheid is erg belangrijk om in kaart te brengen (van schetsontwerp, naar voorlopig ontwerp naar definitief ontwerp). Je begint niet op dag één met de kleurkeuze van de badkamertegels. Je zorgt er eerst voor dat het toilet groot genoeg is en de leidingen goed liggen.	strategie: kijk goed naar de gefaseerdheid, wat hoort in welke fase	Strategy: focus on the big impacts
Je kunt duurzaamheid wel gebruiken in je beoordeling: door te zeggen dit alternatief is óók nog de meest duurzame. Maar als je zegt: we hebben gekozen vóór duurzaamheid en het is toevallig ook nog betaalbaar, dan krijg je al snel de reactie: maak het dan maar wat minder duurzaam, want daar zit niet het hoofdargument in	Niet het hoofdargument	Strategy: framing
Deze verkenningen neigen ernaar, zeker omdat we vijf verkenningen in één construct proberen te stoppen, om ongelooflijk veel in detail te gaan. Dat leidt tot talloze gesprekken en discussies over dingen die later ongetwijfeld weer terugkomen. De essentie is dat je steeds teruggaat naar de belangrijkste beoordelingscriteria.	Te veel als ontwerpproces en te veel in detail willen treden is niet goed	Strategy: what is the essence
Dus het is een trechteringsproces, daar komen we straks nog wel op, leidend tot een bestuurlijke afspraak over de verdeling van de kosten en risico's. Daaronder ligt een plan waarvan je in zijn essentie niet zomaar meer kan afwijken.	wat is het doel van een verkenning	Strategy: what is the essence

Overzicht codes Dor-6-IB3-Ar

Datum: 26/06/2025

Gesprekspartijen:

- Interviewer/onderzoeker: Thijs van Royen (TvR)
- Label geïnterviewde: Dor-6-IB3-Ar

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- 3e thema: Strategieën en overwegingen van stakeholders op het gebied van duurzaamheid

Als een code gemarkeerd is met een groene kleur is deze (vertaald) opgenomen in het eindverslag.

Thema 1: verloop van duurzaamheid in het project

Quote	Beschrijving	Fase
<i>Daar zit volgens mij ook een stukje duurzaamheid in. Ik heb daar eigenlijk na de inschrijving nooit meer naar teruggekeken. Dat komt omdat je daarna meteen bezig bent met het ontwerp van het station zelf.</i>	visie bij aanbesteding, wat is daar nog mee gedaan	2. Pre-project
<i>Je zult dat vast ook van de opdrachtgever hebben gehoord: in de beoordeling was er een criterium 'visie op duurzaamheid'. Wij deden daar een voorstel voor, dat werd beoordeeld en gescoord – met wat kritische kanttekeningen. Maar tijdens de uitvoering kwam het eigenlijk alleen terug bij de beoordeling van de oplossingsrichtingen. En misschien nog bij dat traject rond 'klimaatadaptief station', dat later werd ingebracht.</i>	visie bij aanbesteding, wat is daar nog mee gedaan	2. Pre-project
<i>Bij OVSA hebben we ook zo 'n ambitie-websessie gehad, waarin enorm veel aspecten genoemd werden. Maar in de praktijk kun je die in dit stadium nog niet allemaal meenemen. Wat je ziet, is dat die ambities later meer als toetskader gaan werken.</i>	Heel veel aspecten waar je rekening mee moet houden, komt terug als toetskader	3. Start project
<i>Maar we hadden eigenlijk al eerder, bij de start, een gezamenlijke werksessie over duurzaamheid kunnen organiseren. Dat is een belangrijke les uit OVSA: daar hebben we met alle partijen ambities vastgesteld. Dat geeft later een duidelijke kapstok om keuzes aan op te hangen</i>	Bij de start hadden ze een gezamenlijke sessie kunnen organiseren om een beter integraal beeld te stechsrn	3. Start project

<i>Als je aan het begin al heel strikte kaders vastlegt, dan wordt het te benauwend. Je houdt jezelf dan tegen om de verkenning breed genoeg te doen. Je moet in het begin juist zoveel mogelijk oplossingsrichtingen kunnen onderzoeken. Als je vanaf het begin bijvoorbeeld zou zeggen: er mag alleen bovengronds gebouwd worden, omdat dat het meest duurzaam is, dan valt er te veel af. Dan ontwerp je niet eens meer ondergrondse oplossingen. Terwijl die tunnel oplossingen nu pas zijn afgevallen – maar dan om financiële en technische redenen, en vanwege de enorme kosten</i>	Niet te benauwend werken met oplossingsrichtingen in het begin	4. Analyse fase
<i>Duurzaamheid kwam vooral terug in de beoordeling van de oplossingsrichtingen. In de MIRT-verkenning, tijdens de analytische fase, zijn we gekomen tot zes oplossingsrichtingen: drie ondergronds, één bovengronds en twee benchmarks.</i>	duurzaamheid pas weer teruggekomen bij beoordeling	4. zeef naar beoordelingsfase
<i>Nu merk je dat duurzaamheid dreigt minder onderscheidend te worden. Alles is bovengronds, en de vraag is waar je dan nog onderscheid kunt maken. Bovendien wordt er gevraagd om geen uitgebreide studies meer te doen, omdat men zo snel mogelijk naar een voorkeursalternatief wil. Dat maakt duurzaamheid in deze fase minder relevant.</i>	duurzaamheid minder relevant in beoordelingsfase	5. Beoordelingsfase
<i>Dan gaat het om de maatregelen die toevallig al in een variant zijn meegenomen. Bijvoorbeeld PV-panelen op een luifel, of glas en waterpartijen. Dat kun je achteraf wel labelen als duurzaam. Maar er is niet een losse reservering 'duurzaamheid'. Het zit verstopt in de bouwstenen van de varianten.</i>	Geen specifieke kostenpost duurzaamheid	5. Beoordelingsfase
<i>Maar dit project werkt binnen een raamovereenkomst. Dat betekent dat we per onderdeel budget moesten aanvragen, en dat werd vrij streng bewaakt. Er werd in het begin ook veel weggestreept, en dat motiveert niet om extra dingen aan te dragen die buiten het ontwerp vallen. We hadden daarvoor echt een overtuigend verhaal moeten houden: waarom duurzaamheid nú meegenomen moest worden.</i>	Contract en beschikbaar studiebudget zorgde voor mindere diepgang bij consortium	5. Beoordelingsfase

Thema 2: Influential factors

Quote	Beschrijving	Thema
Wat je hier ziet, heeft veel te maken met de opdrachtgevers. Bij dit soort projecten zijn er namelijk meerdere opdrachtgevers en die hebben allemaal hun eigen visie op duurzaamheid.	Het hangt erg af van de support van de opdrachtgevers en een stakeholder die duurzaamheid blijft agenderen	conflicting interest; client support
Eind december is besloten vooral door te gaan met bovengrondse oplossingen, juist omdat die zo min mogelijk aanpassingen aan het spoor vereisen. Dat was puur budgetgedreven. Er was ook een oplossingsrichting die het label 'duurzaam' kreeg, maar dat was eigenlijk gewoon een van de bovengrondse varianten. Dat moet je niet té letterlijk nemen. Misschien was dat een moment geweest om onze visie nog eens tegen het licht te houden: wat betekent deze keuze voor duurzaamheid? Had je dat gedaan, dan had je ook kunnen zeggen: oké, we kiezen nu voor bovengronds, maar dan moeten we in de vervolgfase nog wel aandacht besteden aan duurzaamheid	Reden voor de keuze voor bovengronds is puur budget	Framing

Bij Dordrecht merkte ik dat de gemeente minder sterk betrokken was. Er zat soms een duurzaamheidsadviseur bij, maar ik heb nooit het idee gehad dat de gemeente echt een duidelijke visie neerlegde of met de vuist op tafel sloeg over dit thema. Misschien komt dat ook omdat ze hun focus meer op andere onderdelen hebben liggen, zoals verkeer en mobiliteit rond het station, of het gebruik van het monumentale stationsgebouw.	Gemeente niet heel actief op duurzaamhed	Getting the right people
We hebben wel op een gegeven moment een duurzaamheidsexpert betrokken. Vanuit hun ervaring hebben we gekeken hoe we bepaalde oplossingsrichtingen duurzamer konden maken. Bijvoorbeeld: wat heb je nodig om een zo duurzaam mogelijke oplossing te maken als tegenhanger van een tunnelvariant? Dat was meer op ervaring gebaseerd dan op handreikingen of richtlijnen vanuit dit project.	Experts met ervaring met eerdere vergelijkbare opgaven helpen en zijn belangrijker in het ontwerp	Knowledge transfer
Maar het is wel belangrijk om vast te leggen wat je wél en níet doet op het gebied van duurzaamheid. Want wat je niet meeneemt, zul je misschien later op een andere manier moeten compenseren. Dat hoeft niet per se binnen het stationsgebied zelf; dat kan ook ergens anders gebeuren.	Documentatie van je overwegingen is erg belangrijk	Knowledge transfer
Dat zou kunnen [dat de mate van agendering te maken heeft met de persoonlijke affiniteit van degene die er namens de opdrachtgever aan tafel zit]. Dordrecht is een grote gemeente, maar misschien hebben ze duurzaamheid bij andere projecten sterker ingevuld. Ik zie in elk geval niet dat er iemand stevig namens duurzaamheid aan tafel zit.	Invloed van de persoon die aan tafel zit	Personal affinity; getting the right people
Ik denk dat het goed is dat de ontwikkeling en de ambities parallel lopen en dat ze op een gegeven moment samenkomen. Maar of duurzaamheid onderscheidend of doorslaggevend is in de keuze voor het voorkeursalternatief? Ik denk niet dat een voorkeursalternatief alleen tot stand komt door alleen maar duurzaamheidsoverwegingen. Die keuze wordt vooral bepaald door andere factoren.	Niet onderscheidend: andere factoren zijn belangrijker	Project goals & Assessment frameworks
Maar dit project werkt binnen een raamovereenkomst. Dat betekent dat we per onderdeel budget moesten aanvragen, en dat werd vrij streng bewaakt. Er werd in het begin ook veel weggestreept, en dat motiveert niet om extra dingen aan te dragen die buiten het ontwerp vallen. We hadden daarvoor echt een overtuigend verhaal moeten houden: waarom duurzaamheid nú meegenomen moest worden.	Contract en beschikbaar studiebudget zorgde voor mindere diepgang bij consortium	Resources
Maar ik denk dat we er meer stempel op hadden kunnen drukken. Daar was ruimte voor geweest, maar de focus lag vooral op het laten kloppen van de puzzel: het functioneel en technisch werkend krijgen van het geheel. Daarnaast hebben we ook gekeken hoe we het projectteam efficiënt konden inrichten, met de uren die beschikbaar waren.	Focus richtte zich meer op het laten kloppen van functioneel en technisch ontwerp	Resources
Dat is ook precies de moeilijkheid met duurzaamheid: je legt ergens de lat, bijvoorbeeld dat het station een bepaald duurzaamheidsniveau moet halen. Maar er zijn ook al basiseisen meegegeven waar elke oplossing sowieso aan moet voldoen. Daardoor wordt het minder onderscheidend.	Wat is onderscheidend voor duurzaamheid naast de basiseisen?	Rules and regulations

Nee, het zal niet doorslaggevend zijn. Dat komt denk ik ook doordat we aan het begin niet dat kapstokje hadden. Er loopt geen rode draad van duurzaamheid door het project. Of dat erg is, weet ik niet, maar het is wel wat ik constateer.	Niet onderscheidend: geen rode draad	Shared vision
Maar we hadden eigenlijk al eerder, bij de start, een gezamenlijke werksessie over duurzaamheid kunnen organiseren. Dat is een belangrijke les uit OVSA: daar hebben we met alle partijen ambities vastgesteld. Dat geeft later een duidelijke kapstok om keuzes aan op te hangen.	Gezamenlijk gesprek kan zorgen voor meer rode draad	Shared vision

Thema 3: Strategieën en overwegingen van stakeholders op het gebied van duurzaamheid

Quote	Beschrijving	Aspect
<i>In de uitvraag werd wel om een visie op duurzaamheid gevraagd, maar uiteindelijk komt dat pas bij de beoordeling terug. Eigenlijk zou die vraag meer bij de opdrachtgever thuishoren. Aan de andere kant: wij hebben er zelf ook niet heel hard op gestuurd, dat hadden we misschien meer kunnen doen.</i>	Wie heeft wat gedaan rondom duurzaamheid	Stakeholders: Owners / sponsors
<i>Bij Dordrecht merkte ik dat de gemeente minder sterk betrokken was. Er zat soms een duurzaamheidsadviseur bij, maar ik heb nooit het idee gehad dat de gemeente echt een duidelijke visie neerlegde of met de vuist op tafel sloeg over dit thema. Misschien komt dat ook omdat ze hun focus meer op andere onderdelen hebben liggen, zoals verkeer en mobiliteit rond het station, of het gebruik van het monumentale stationsgebouw.</i>	Gemeente niet heel actief op duurzaamheid	Stakeholders: Owners / sponsors
<i>Ja, dat vraag ik me ook af. Als je aan het begin al heel strikte kaders vastlegt, dan wordt het te benauwend. Je houdt jezelf dan tegen om de verkenning breed genoeg te doen. Je moet in het begin juist zoveel mogelijk oplossingsrichtingen kunnen onderzoeken. Als je vanaf het begin bijvoorbeeld zou zeggen: er mag alleen bovengronds gebouwd worden, omdat dat het meest duurzaam is, dan valt er te veel af. Dan ontwerp je niet eens meer ondergrondse oplossingen. Terwijl die tunnel oplossingen nu pas zijn afgevallen – maar dan om financiële en technische redenen, en vanwege de enorme kosten.</i>	Je moet niet-duurzame oplossingen verkennen	Strategy: broad explration of the project

Overzicht codes Dor-7-PA2-NS

Datum: 09/07/2025

Gesprekspartijen:

- Interviewer/onderzoeker: Thijs van Royen (TvR)
- Label geïnterviewde: Dor-7-PA2-NS

N.B: Codes zijn afgeleid van een (deels automatisch gegenereerde) transcript, de context van de code kan worden teruggevonden in het bijbehorende transcript: "Dor-7-PA2-NS - Anonymized transcript.dox"

Codes zijn ingedeeld in 3 verschillende thema's waarop analyse is gedaan:

- 1e thema: verloop van Duurzaamheid in het project
- 2e thema: Influential factors voor integratie duurzaamheid
- 3e thema: Strategieën en overwegingen van stakeholders op het gebied van duurzaamheid

Als een code gemarkeerd is met een groene kleur is deze (vertaald) opgenomen in het eindverslag.

Thema 1: verloop van duurzaamheid in het project

Quote	Beschrijving	Fase
<i>Er is niet een echte methode voor, maar ik kan je wel uitleggen hoe dat bij de MIRT-verkenning gegaan is. Ten eerste merk ik dat het vanaf de start, vanaf de MIRT-verkenning duurzaamheid als thema wel direct wordt meegenomen. Er is door de overkoepelend is er een beoordelingskader opgesteld die eigenlijk binnen alle onderdelen, dus alle deelprojecten van de MIRT-verkenning gehanteerd wordt om al het studiewerk, alle alternatieven die we genereren, om die te beoordelen. Daar zit ook duurzaamheid als belangrijke thema in, maar nog wel vrij abstract. Dus wij zijn als NS en ProRail en Bureau Spoorbouwmeester gezamenlijk op tafel kan zitten van hoe kunnen we nou deze abstracte thema's vanuit het beoordelingskader binnen ons project nader invullen of hoe moeten we die interpreteren en hoe krijgen we onze eigenlijk gezamenlijke doelstellingen daarin.</i>	hoe is de aanloop gegaan	3. Start project
<i>Ja er werd toch op een of andere manier een soort urgentie gevoeld om dat te gaan doen. Ook omdat het als thema dus benoemd staat in dat beoordelingskader. Dus we moeten er iets mee en dan is het wel fijn om te weten ja hoe kunnen we daar invulling aan gaan geven.</i>	urgentie voor het opzetten van zo'n inventarisatie door beoordelingskader oude lijn	3. Start project

<i>Daar merk ik wel wat verschil tussen Laan van NOI en Dordrecht. Ik merk dat het in Dordrecht is het naar mijn idee hierbij gebleven dus ik denk dat dit als input naar het consortium gegaan is, als onderdeel van de effectenbeoordeling. Dus als die straks een rapport gaan schrijven over het thema duurzaamheid, verschillende alternatieven beoordelen op de verschillende duurzaamheidsaspecten verwacht ik dat ze het gaan gebruiken. Dat is mijn verwachting en als ze het niet doen dan zal ik ze de vraag stellen.</i>	Gebleven bij de eerste inventarisatie	3. Start project
<i>Wat je wel ziet, specifiek bij Dordrecht hebben we in de vorige fase alle ondergrondse oplossingsrichtingen laten afvallen. Ja. Dat heeft natuurlijk een gewoon duurzaamheidsaspect, alhoewel dat niet het meest zwaarwegende argument was om het niet te doen. Het was voornamelijk vanuit maakbaarheid In Dordrecht is er niet veel ruimte.</i>	Kiezen voor het duurzaamheidsalternatief	4. zeef naar beoordelingsfase
<i>Ik ben niet bang dat we thema duurzaamheid ergens gaan kwijtraken want je merkt weer door alle organisaties dat het echt een belangrijk onderwerp is. En er zijn ook gewoon doelstellingen afgesproken. Je moet gewoon parisproof zijn in de 2050.</i>	Blijft duurzaamheid relevant?	7. Voorbereiden volgend fase

Thema 2: Influential factors

Quote	Beschrijving	Thema
<i>Ik ben niet bang dat we thema duurzaamheid ergens gaan kwijtraken want je merkt weer door alle organisaties dat het echt een belangrijk onderwerp is. En er zijn ook gewoon doelstellingen afgesproken. Je moet gewoon parisproof zijn in de 2050.</i>	Organisaties vinden het belangrijk en doelstellingen moeten worden gehaald	Client policies
<i>Ik ben niet bang dat we thema duurzaamheid ergens gaan kwijtraken want je merkt weer door alle organisaties dat het echt een belangrijk onderwerp is. En er zijn ook gewoon doelstellingen afgesproken. Je moet gewoon parisproof zijn in de 2050. Elke partij heeft gewoon echt harde doelstellingen en dat moeten we gewoon straks, ja het is gewoon de werkelijkheid.</i>	Voldoen aan eisen	Client policies; anticipating future developments
<i>Dus wat we gedaan hebben en die heb hier ook voor me, gewoon per thema op rij gezet wat zijn nou de doelstellingen van ProRail, wat zijn die van NS, wat zijn die van de bureau SB hoe kunnen we dat gezamenlijk vertalen naar de opgaves die we zien in de MIRT-verkenning oude lijn. En dat is denk ik een hele zinvolle expositie geweest omdat je dan ook aan tafel met de andere stakeholders natuurlijk de provincie, gemeente, MRDH en programma NH. Al veel meer gevoed vanuit oké de spoorse partijen kijken we op deze manier tegenaan dit zijn onze gezamenlijke doelstellingen. Het wordt dan meer een soort gezamenlijk doel en dat is denk ik ontzettend waardevol.</i>	Verzamelen van alle beleidsstukken en gezamenlijk verhaal maken	Client policies; Shared vision
<i>Het meest duurzame station is helemaal niks verbouwen, helemaal niks doen. Of een hele kale traverse. Maar we willen ook goede stations maken en dat merk je dat dat soms aan tafels discussie optreedt.</i>	Afweging tussen belangen kan zorgen voor discussie	conflicting interest
<i>of en dat ziet ook wel als het risico dat je maatregelen voor je uitschuift. Dus dat je zegt bijvoorbeeld nou we hebben in de eerste fase geen geld voor een fietsenstalling, dat houden we op maaiveld.</i>	Maatregelen vooruitschrijven kan	Financial considerations

<i>Nou, dat betekent dat je 1 grote oppervlakte op maaiveld nodig hebt wat toch betegeld is en misschien wel een halve verharding krijgen daar gaan we uiteraard dan wel naar kijken, maar omdat het dan een tijdelijke maatregel is wil je niet te veel doden geld uitgeven.</i>	duurzaamheid in de weg staan	
<i>En dan nog is er ook nog het budget natuurlijk, want dat is nu ook wel binnen de MIRT-verkenning oude lijn een belangrijk onderdeel. Je merkt dat huidige kostenramingen echt iets heel anders laten zien aan kostenramingen van 4 jaar geleden en nu veel meer ziet op wat er eigenlijk allemaal moet gebeuren wat je eigenlijk allemaal aanraakt en ook gewoon inflatie en dergelijke kosten zijn gewoon ook echt toegenomen. Dus je ziet eigenlijk dat we als je alles doet wat je zou willen dat dat gewoon niet past binnen een beschikbaar budget.</i>	Naar mate het kostenplaatje duidelijker word, komen de ambities ook ingevaar	Financial considerations
<i>Wat ik echt lastig vind is kosten. We weten echt wel allemaal wat een goed station is, we weten echt wel wat onze ambities zijn, we zien ook echt wel de kansen, maar budget voelt heel erg als een beperkende factor waardoor je ambities moet laten varen,</i>	Budget voelt als een beperkende factor	Financial considerations
<i>Ik denk het ondersteunen daarvan, het zien als een gezamenlijke opgave, ook het inbrengen van onze expertise daar waar het we hebben daar ook echt wel onze mensen voor in huis.</i>	De goede mensen vroeg betrekken binnen alle stakeholders	Getting the right people
<i>Soms bij hele specifieke opgaven neem ik een collega mee omdat ik denk nou jij zit daar, jij weet daar nog veel meer van dan ik. Dus ik ben geen expert maar ik probeer wel uit van de experts af te tappen en dat in te brengen in de projecten. En dat doen we echt wel ook in nauwe samenwerking met ProRail en Bureau Spoorbarammeester.</i>	De goede mensen meenemen	Getting the right people
<i>Het was voornamelijk vanuit maakbaarheid In Dordrecht is er niet veel ruimte. Je hebt aan de ene kant een monumentaal stationsgebouw aan de andere kant een park om dat op te bouwen. Dus daarvan hebben de experts net als je hier een goede tunnel wil aanleggen moet je gewoon je sporen heel lang buiten dienst nemen. Bovendien Dordrecht is een eiland dus alles is nat. Het is echt complex om daar veel ondergronds te doen. En dat heeft natuurlijk denk ik ook een enorme duurzaamheidwinst dat dat is afgevallen.</i>	Locatie zorgde voor het afvallen van minder duurzame opties	Location-specific factors
<i>Bij Laan van NOI heb ik een andere adviseur te maken dan in Dordrecht, dus het is ook een beetje persoonlijk hoe zij daarin staan, hoe ze duurzaamheid inbrengen</i>	Persoonlijke affiniteit is belangrijk en bepalend in een project	Personal affinity
<i>Omdat de MIRT-verkenning oude lijn zo'n grote paraplu is eigenlijk, omdat er meer deelprojecten onder hangen met gewoon uiteindelijk 1 proces ben je ook wel genoodzaakt om daar heel gestructureerd van tevoren bijvoorbeeld zo'n beoordelingskader voor vast te leggen</i>	Integrale aanpak helpt bij het gestructureerd invullen van eisen/beoordelingskaders	Project goals & Assessment frameworks
<i>je wilt het enigszins kunnen vergelijken om daar een gezamenlijke besluitvorming over te kunnen laten plaatsvinden en daardoor worden denk ik dat je ook gedwongen bent om daar van tevoren heel goed over na te denken. En door het thema duurzaamheid als een van de hoofddoelstellingen te formuleren om het op te nemen in beoordelingskaders denk ik dat daar Dat is niet voor niks gedaan, dat is ook nodig</i>	opnemen in doelstellingen en beoordelingskaders helpt ook bij vergelijken	Project goals & Assessment frameworks
<i>en daar hebben we de tabel uitgebreid. Dus ook hun gevraagd wat zijn jullie doelstellingen en welke overlap zien we daarin. En dat is vervolgens weer wat abstracter gemaakt want je krijgt natuurlijk een enorme excel Er zitten wel dubbelingen in als het goed is, maar het was wel een goede oefening om iedereen ervan bewust te maken dat duurzaamheid een belangrijk onderdeel is van de MIRT-</i>	Verschillende beleidsstukken naast elkaar leggen en in gesprek gaan	Shared vision

<i>verkenning, dat het ook bij die vroege planfase al hoort, ook tot na het denken zetten van nou wat kunnen we in die vroege planfase daar wel mee.</i>		
<i>Ja, dat is eigenlijk wat ik net liet vallen. Je merkt dat er vanuit de huidige spoorbouwmeester dat enige belangrijke speerpunt is. Dus als het als een keertje niet ter sprake is geweest dan is vaak de adviseur van brood Spoorbouwmeester wel degene die dat even laat vallen.</i>	Rol van Spoorbouwmeester	sustainability champion

Thema 3: Strategieën en overwegingen van stakeholders op het gebied van duurzaamheid

Quote	Beschrijving	Aspect
<i>Daarnaast natuurlijk ook wel de ingenieursbureaus die dat gewoon ook echt als onderdeel van de opgave moet het meenemen. Specifiek Laan van NOI is er een adviseur ook op duurzaamheid. Die sluit niet standaard aan bij werksessies, dat soort dingen, maar door destijds ook in de aanbesteding expert duurzaamheid mee te nemen naar de presentaties merk je dat dat ook vanuit die partijen actief wordt aangedragen</i>	Wat kan ingenieursbureau doen	Stakeholders: Consultancy & Engineering
<i>Ja, dat is eigenlijk wat ik net liet vallen. Je merkt dat er vanuit de huidige spoorbouwmeester dat enige belangrijke speerpunt is. Dus als het als een keertje niet ter sprake is geweest dan is vaak de adviseur van brood Spoorbouwmeester wel degene die dat even laat vallen.</i>	Rol van Spoorbouwmeester	Stakeholders: Partners / advisors
<i>Ja, we investeren niet mee aan de voorkant al. Maar wij investeren mee op basis daarvan waarvan wij, de aspecten waar wij van zijn. Dus we hebben nu nog geen investeringsbedragen afgegeven, omdat we eerst gewoon nodig hebben hoe het station eruit gaat zien en op welke aspecten kunnen wij iets bijdragen. Er is voor ons ook een business case te vinden.</i>	NS niet mee investeren aan de voorkant dus moet een goede businesscase te vinden zijn	Stakeholders: Partners / advisors
<i>en daar [bij project Laan van NOI] hebben we de tabel uitgebreid. Dus ook hun [extra stakeholders zoals gemeenten en vervoerders] gevraagd wat zijn jullie doelstellingen en welke overlap zien we daarin. En dat is vervolgens weer wat abstracter gemaakt want je krijgt natuurlijk een enorme excel Er zitten wel dubbelingen in als het goed is, maar het was wel een goede oefening om iedereen ervan bewust te maken dat duurzaamheid een belangrijk onderdeel is van de MIRT-verkenning, dat het ook bij die vroege planfase al hoort, ook tot na het denken zetten van nou wat kunnen we in die vroege planfase daar wel mee.</i>	strategie: leg de plannen naast elkaar en ga in gesprek	Strategy: align policy ambitions
<i>Ik denk dat we best wel goed op weg zijn door het echt als thema te benoemen, het serieus aan te pakken met partijen gezamenlijk om tafel, dat we als opdracht mee te geven aan consortia. Ik denk dat we bij de richting Oude Lijn best wel een voorbeeld kunnen zijn voor andere projecten.</i>	positieve houding tov het meenemen van duurzaamheid in het project	Strategy: be an example project

<i>Maar je merkt dat nu in die beginfase van de MIRT-verkenning toch vooral van belang is ja hoe gaat de hoofdropzet eruitzien? Hoe gaan we straks die toenemende reizigerstroom faciliteren</i>	Wat is belangrijk op welk moment?	Strategy: clear goal setting
<i>De overige thema's zijn dan energie. Nou je merkt dat we daar eigenlijk in deze fase van de MIRT-verkenning niet heel erg mee bezig zijn. Welke variant, welke alternatief kan we meer energie verbruiken dan de ander.</i>	Wat is belangrijk op welk moment?	Strategy: early inventarisation of important themes
<i>Het thema duurzame mobiliteit dat is natuurlijk iets wat we altijd nastreven en vaak vergeten misschien als voorzegger want dat is toch logisch. Maar dat is denk ik wel een van de factoren waar wij heel veel impact meemaken dat als we zoveel mogelijk mensen überhaupt met het OV laten reizen, toegankelijk maken, comfortabel maken, gemakkelijk maken en comfortabel dat dat dat zeker bij de duurzame mobiliteit bijdraagt aan de duurzaamheidsopgave van het geheel.</i>	Wat is belangrijk op welk moment?	Strategy: focus on the big impacts
<i>Kunnen die goed onderhouden worden? Hebben die een langer levensduur? Dat zijn natuurlijk wel allemaal doelstellingen en die zullen ook faseafhankelijk relevant worden.</i>	strategie: kijk goed naar de gefaseerdheid, wat hoort in welke fase	Strategy: look at life cycle
<i>Soms bij hele specifieke opgaven neem ik een collega mee omdat ik denk nou jij zit daar, jij weet daar nog veel meer van dan ik. Dus ik ben geen expert maar ik probeer wel uit van de experts af te tappen en dat in te brengen in de projecten. En dat doen we echt wel ook in nauwe samenwerking met ProRail en Bureau Spoorbarammeester.</i>	De goede mensen meenemen	Strategy: make sure the right knowledge lands in the project



Overview Codes OVAH

This appendix presents the coding structure and results of the qualitative interview analysis conducted for the *OVAH* project. The interviews were held between **June 12 and August 19, 2025**, involving key stakeholders from multiple organisations, including national agencies, regional authorities, and engineering consultancies. The goal of this analysis was to understand how sustainability is perceived, discussed, and operationalised throughout the planning and exploration phases of the project.

The coding process followed a **thematic analysis** approach, applying the same analytical framework as in the Dordrecht case. The analysis was structured around three central themes:

1. **Evolution of Sustainability in the Project** – examining how sustainability ambitions developed and were addressed across project phases, from pre-phase explorations to preparation for subsequent stages.
2. **Influential Factors for Sustainability Integration** – identifying internal and external factors that affected the degree to which sustainability objectives were embedded in decision-making and design processes.
3. **Stakeholder Strategies and Considerations** – analysing the perspectives, priorities, and strategies of the various stakeholders in shaping and maintaining sustainability ambitions.

These themes were derived from the theoretical framework introduced in Chapter 2 and correspond directly with the research objectives. The interviews were coded using a combination of inductive and deductive methods: recurring patterns were first identified from the transcripts and then categorised according to the three overarching themes. This enabled a systematic comparison between findings across cases and against the conceptual framework.

The resulting overview in this appendix lists the **coded excerpts** per interviewee, grouped by theme, description, and project phase. Codes highlighted in green indicate those that were (translated and) incorporated into the main report. Together, these codes form the empirical foundation for the cross-case analysis presented in Chapters 4 and 5, offering insights into how sustainability ambitions are shaped through collaboration, institutional frameworks, and decision-making processes within complex MIRT exploration projects.

Overzicht codes OVAH-1-PDO-Ams

Datum: 12/06/2025

Gesprekspartijen:

- Interviewer/onderzoeker: Thijs van Royen (TvR)
- Label geïnterviewde: OVAH-1-PDO-Ams

N.B.: Codes zijn afgeleid van een (deels automatisch gegenereerde) transcript, de context van de code kan worden teruggevonden in het bijbehorende transcript: "OVAH-PDO1-Ams - Anonymized transcript.dox"

Codes zijn ingedeeld in 3 verschillende thema's waarop analyse is gedaan:

- 1e thema: verloop van Duurzaamheid in het project
- 2e thema: Influential factors voor integratie duurzaamheid
- 3e thema: Strategieën en overwegingen van stakeholders op het gebied van duurzaamheid

Als een code gemarkeerd is met een groene kleur is deze (vertaald) opgenomen in het eindverslag.

Thema 1: verloop van duurzaamheid in het project

Quote	Beschrijving	Fase
<i>En als voorloper erop, we hebben ook de ZWASH, zo heette toen ook bij eigenlijk. Die doelstellingen, en dat is bijna vergelijkbaar, die zijn ook bestuurlijk vastgelegd.</i>	ZWASH had duurzaamheidsdoelstellingen die bestuurlijk zijn vastgelegd	1. Pre-phase (ZWASH)
<i>Dus wat wij toen hebben gedaan, we moeten iets met duurzaamheid in dit project en dat willen alle projectpartners ook, maar hoe zorgen we ervoor dat we 1 gedragen, ja de duurzaamheidsdoelstellingen gedragen zijn door alle projectpartners en dat zijn er natuurlijk best wel. En ook nog eens verschillende belangen daarin. [...] . Toen hebben we dat gelijk een vervolg, toen zijn er ambitie websessies geweest en daarin zijn de, grote sessies en daarin zijn de duurzaamheidsdoelstellingen voor dit project benoemd.</i>	Begin van het project: hoe kom je tot 1 gedragen duurzaamheidsdoelstelling	3. Start project
<i>Ik durf nu eigenlijk niet te zeggen of het een aparte NOK is of dat het volgens mij zit die erbij, maar het is wel specifiek benoemd. Er zijn echt specifieke uren voor die duurzaamheidsrapportage en dat is echt apart uitgezet bij IB1.</i>	Apart traject/NOK (uren schrijven) voor de duurzaamheidsrapportage	3. Start project
<i>Dat hebben wij hier niet per se, zeker ook omdat we een koplopers project willen zijn op ZEB (Zero Emission Builing) en KCI.</i>	Aangemeld als koploperproject ZEB en KCI	3. Start project

<i>Inhoudelijke Begeleiding Groepen. Daar zitten eigenlijk alle projectpartners leveren daar experts of adviseurs van uit dat gebied. [...] Ja, en die kijken mee, wel op een hoog niveau, van nou ja we zijn dit eens met de richting waar het op gaat, zeg maar. En daar zijn die duurzaamheidsdoelstellingen langs geweest. Van nou ja, dit is waar we mee gaan werken in deze fase, of hier willen we staan voor en dit willen we meenemen daarin</i>	Duurzaamheidsdoelstellingen langs de IBGs	4. analyse fase
<i>Daarom zijn er, indien met die maatregelen, is er ook echt met ontwerpers gekeken van hoe kunnen we nu al kijken of het ontwerp anders kan omdat het duurzamer kan. Dit is niet precies een voorbeeld, maar wel een voorbeeld op de duidelijkheid.</i>	Gesprekken met de ontwerpers hoe duurzaamheid nu al kan worden ingepast in het ontwerp	4. analyse fase
<i>Sommige maatregelen of kansen zijn soms al wel meegenomen in het ontwerp van dat ene alternatief. Maar andere, dat is allemaal te kort dag, dat wordt veel te veel gedoe om nu al mee te nemen in het ontwerp. Maar we schrijven het goed op en we borgen het dat dat wordt meegenomen als dit ontwerp het wordt. Ja, precies. Dat je hiernaar kan kijken en al kan zeggen van we doen de opbergplaats ergens anders want dan hoeft je niet een heel kunstwerk te maken, dat scheelt heel veel in je CO2-uitstoot en materiaalgebruik.</i>	Wat komt er precies in de duurzaamheidsrapportage en hoe wordt daarover	4. analyse fase
<i>Daardoor hebben die stukken allemaal wel ook een andere soort van urgentie hadden of dat moest ook van gebeuren omdat het in het plan-MER moest. Dus als je dat zo, ja dat is logisch, maar het is ook geïntegreerd in andere stukken waardoor als het alleen losstaand een duurzaamheidsrapportage was geweest ben ik benieuwd hoe dat was meegenomen. Dat was waarschijnlijk ook goed gekomen, maar het goed is dat er heel veel onderdelen ook gewoon terug in andere onderdelen zoals een plan-MER komen.</i>	koppeling met plan-MER. Veel onderdelen van het plan-MER linken aan duurzaamheid	4. analyse fase
<i>Nu heel duidelijk signaleren oké wat zijn de maatregelen die genomen worden, welke onderzoeken op het gebied van duurzaamheid zouden daar nog voor gedaan moeten worden in de volgende fase? Zodat je van het begin van de volgende fase gelijk weet waar je verder mee aan de slag moet gaan.</i>	Wat zijn ze nu aan het doen? Signaleren van onderzoeken die nog gedaan moeten worden in volgende fase	4. analyse fase
<i>Voor in deze fase hebben we op duurzaamheid niet veel interactie met de projectpartners. In het IBG komt het wel aan bod, als we het daar laten landen en als zij daar een review van doen. Dan is het belangrijk dat zij ook natuurlijk gewoon goed kijken van hoe duurzaamheid wordt meegenomen en of dat conform is hoe zij daar ook dat zien. Maar de interactie met projectpartners komt denk ik echt pas als die duurzaamheidsrapportage er ligt en als die dus ook in de review gaat en als die mee daarin gaat</i>	Nu geen interactie met de projectpartners, wel IBG	4. analyse fase
<i>En budgettair ook; we maken nu ook een kostenraming voor die 5 alternatieven. Daarin willen we ook mee geven aan de bestuurders wat gaat elk alternatief ongeveer kosten, wel echt met marge van 25 procent. Maar we zijn wel bezig om daar duurzaamheid ook in mee te nemen</i>	kijken of ze budgettair ook duurzaamheid mee kunnen nemen	5. Beoordelingsfase

<i>Om daar duurzaamheid ook te kijken van ja kunnen we dat ook daarin meenemen, dat daar nu al wel rekening mee gaan doen moet worden. Wat natuurlijk ook wel spannend is, je wilt ook niet als er iets op staat kan ook iets eraf gehaald worden. Dus dat is altijd een stuk waar je nu ligt. Ja, maar ja, dat wil je natuurlijk niet. Maar ik vind wel het risico te groot als je het nu niet meeneemt</i>	Budgettair meenemen van duurzaamheid?	6. Voorkeursbeslissing
<i>Maar we hebben voor nu gezegd, dus hebben ze allemaal al die maatregelen, al die kansen. En zo rapporteren we dat ook, maar in de plan studiefase moet daar echt de keuze over gemaakt worden omdat we ook met die 13 projectpartners zitten. En veel van die projectpartners hebben ook grond of hebben daar belang bij welke mogelijkheden worden. Welke maatregelen kunnen ze doen.</i>	Keuzes voorbereiden voor in de volgende fases	7. Naar volgende fase

Thema 2: Influential factors

Quote	Beschrijving	Thema
Het meenemen van duurzaamheidskosten in de kostenraming is natuurlijk ook wel spannend, want als je er iets op zet kan het er ook makkelijk weer af gehaald worden. Dus dat is altijd een optie om het weg te strepen. Ja, maar ja, dat wil je natuurlijk niet. Maar ik vind wel het risico te groot dat je het nu niet meeneemt, want het later erbij plussen is altijd lastiger dan het dan het eraf gaat.	Meenemen van duurzaamheid in het budget	Finances
Is duurzaamheid de norm bij ontwerpen later? Ik denk bij een paar dingen sowieso niet, wat dat leert de praktijk nu niet, zeker als je ondergronds gaat. Dus je zal een duurzaamheidbudget mee moeten nemen als je aan je duurzaamheidsdoelstellingen wil voldoen.	Meenemen van duurzaamheid in het budget	Finances
Nou, waar ik benieuwd naar ben, maar ik weet dus eigenlijk niet of dat, hoop niet dat het een obstakel opzicht zei, omdat je natuurlijk in die verschillende fases werkt. We gaan straks over naar een andere fase toe. Dat ga je waarschijnlijk ook weer met andere mensen doen. Ik ga er ook niet meer zijn als we naar de naar de plan- en studiefase gaan. Niet dat het nou om mij hangt, maar voor heel veel mensen is het, het is voor die ingenieurs natuurlijk ook een inhuur structuur en mensen die in de projectorganisatie zitten. Ja, logischerwijs projectorganisatie, dat wisselt ook. Dus hoe zorg je ook wel dat wat in deze fase wordt gedaan, dat goed overgaat naar de volgende fase doen.	lange doorloop, dus wisseling van mensen tussen projectfases	Knowledge transfer
dat heb je met elke wisseling van de wacht dat er toch een deel kennis verloren gaat, ook al zit je het nog zo uitgebreid mogelijk op papier.	kennis gaat verloren door lange doorlooptijd	Knowledge transfer
Het is al een enorme uitdaging om in zo'n drukstedelijk gebied en waar zoveel ontwikkelingen zijn en zoveel belangen en modaliteiten die ook door elkaar gaan, om dit in te passen is gewoon heel veel.	ruimtelijke inpassing is al erg moeilijk	Locatie-afhankelijke factoren
Maar aan de andere kant, en dat heb je bij meer projectorganisaties van de infra, het is niet een day-to-day maar het is wel echt productie draaien en het is gewoon heel	Tijdsdruk van de MIRT-systematiek en druk op het project is groot	MIRT systematiek

erg druk [...] Dus we hebben wel af en toe wel de tijd vinden van de ontwerpers en van de mensen om bij elkaar te zitten en om te kijken van hé hoe kunnen we dit, kunnen we de cheffen of op zn minst hoe kunnen we op de maatregelen komen omdat er gewoon een enorme tijdsdruk op zit, omdat je in zo'n MIRT-systematiek zit.		
Daardoor hebben die stukken allemaal wel ook een andere soort van urgentie hadden of dat moest ook van gebeuren omdat het in het plan-MER moest. Dus als je dat zo, ja dat is logisch, maar het is ook geïntegreerd in andere stukken waardoor als het alleen losstaand een duurzaamheidsrapportage was geweest ben ik benieuwd hoe dat was meegenomen. Dat was waarschijnlijk ook goed gekomen, maar het goed is dat er heel veel onderdelen ook gewoon terug in andere onderdelen zoals een plan-MER komen. Ja,	Koppeling met plan-MER	products
En dan is duurzaamheid, dat vindt iedereen ook echt wel belangrijk. Alleen er zit iets minder deadline of urgentie op van ja, als je dit nu niet doet, ja. Het hangt er iets minder vanaf.	Geen zienswijze of consequenties aan duurzaamheidsrapportage dus minder urgentie gevoeld	products
Nou waar je spanning mee inzit en dat ik denk ook bij grotere infraprojecten, het duurt zeker MIRT-verkenningen of in MIRT-processen. Het duurt nog best wel lang voordat we een schep in de grond gaan zetten. Dus het is ook vaak nog toekomst kijken wat is dan business as usual, wat is er dan al wel, wat is er dan al niet, welke innovaties zijn er dan al, waar ga je op voortbouwen. En het is nog best wel een ingewikkelde inpassing, best wel een groot infra project, waar het echt om heel veel geld gaat. Dus die vertaalslag is altijd zoeken naar welk niveau ga je dat doen.	ontwerpen voor de toekomst maakt inschatten van detailniveau moeilijk	Anticipating future developments
Maar ja dat ken je inmiddels denk ik ook wel, als je een paar gesprekken hebt gehad, in beleidsland worden sommige dingen of rapporten ook gewoon minder goed naar gekeken. Ja, duurzaamheid kan daar misschien wel onder lijden. Maar tegelijkertijd moet het allemaal wel goed uitgevoerd worden want er kunnen ook zomaar vragen gesteld worden. Dus het gaat er meer om hoe je ervoor kan zorgen echt op tafel komt en dat er ook echt naar gekeken wordt.	Ondanks documentatie door bijvoorbeeld een duurzaamheidsrapportage, kan er ook nog minder goed aandacht besteed worden	top management support
We willen een koploperproject zijn op KCI en ZEB, en dat klinkt altijd mooi om te zeggen, maar het roept ook de vraag op wat dat in de praktijk allemaal betekent, zeker wanneer je bijvoorbeeld emissieloos ondergronds moet bouwen, want dat heeft natuurlijk grote consequenties.	Koploper project, leuk, maar hoe doe je dat?	visie

Thema 3: Strategieën en overwegingen van stakeholders op het gebied van duurzaamheid

Quote	Beschrijving	Aspect
Hoe doe je dat het best? Daar schrijven we een memo's voor naar de projectpartners en die lichten we het kort toe; we gaan langs het IBG; we zetten het in een paar verslag, ja dat verschilt wel een beetje. Maar ook gewoon de informele koffetjes af en toe even met de projectdirecteur bijpraten en te laten zien waar we mee bezig zijn en waarom dit belangrijk is. Ja. Dat helpt ook al	Strategie: Hoe krijg je duurzaamheid gedragen door alle projectpartners? Het projectteam moet zorgen dat het op de goede tafels komt	Stakeholders: Client organisation
Nou, dat is voornamelijk door zo'n duurzaamheidsrapportage dat we daar echt een apart product van hebben, een apart document, om daar goed in te borgen. En het is ook langs het IBG, langs het kernteam van de projectorganisatie, dat dat bij meer mensen leeft dan dat het alleen een bijproduct is wat eigenlijk nog niet leeft in de organisatie. Maar dat je dat wel naar de aandacht brengt op de manier waarop ze willen vinden.	Apart product om in te brengen voor de volgende fase, manier om het goed door te geven. Maar laat het ook leven in je project organisatie	Strategy: advocate it in organisation
Is duurzaamheid de norm bij ontwerpen later? Ik denk bij een paar dingen sowieso niet, wat dat leert de praktijk nu niet, zeker als je ondergronds gaat. Dus je zal een duurzaamheidbudget mee moeten nemen als je aan je duurzaamheidsdoelstellingen wil voldoen.	Meenemen van duurzaamheid in het budget	Strategy: budget
Of er moet hier een bouwplaats komen, opslagplaats komen. Soms kan je kijken van als we dat op een ander stukje grond kunnen leggen dan hoeven we dat niet ondergrond te maken, maar kunnen we dat gewoon van hout op maaiveld maken. Nou dat is veel duurzamer dan dat je de ondergrond in moet of dat je een heel kunstwerk moet optuigen om die opslagplaats daar te krijgen.	Welke dingen kan je nu al doen? Kijken naar de placering van opslagterreinen bijv	Strategy: early inventarisation of important themes
Ja, het [verschil tussen aanleg en exploitatiefase] wordt wel meegenomen. Ja, maar wel daar, we zien wel daar het onderscheid erin en ook de exploitatiefase. Wat dat heel erg verschil gaat maken is hoe de dienstregeling is en dat weten we natuurlijk gewoon nog niet. Nee. Dus daar gaat het ook heel erg van af hangen, het energieverbruik van de gekozen modaliteit	Verschil tussen aanlegfase en exploitatiefase gaat vooral over energieverbruik. Hangt sterk af van de modaliteiten	Strategy: kijk naar life cycle van het project

Overzicht codes OVAH-2-PC-GH

Datum: 27/06/2025

Gesprekspartijen:

- Interviewer/onderzoeker: Thijs van Royen (TvR)
- Label geïnterviewde: OVAH-2-PC-GH

N.B.: Codes zijn afgeleid van een (deels automatisch gegenereerde) transcript, de context van de code kan worden teruggevonden in het bijbehorende transcript: "OVAH-2-PC-GH - Anonymized transcript.dox"

Codes zijn ingedeeld in 3 verschillende thema's waarop analyse is gedaan:

- 1e thema: verloop van Duurzaamheid in het project
- 2e thema: Influential factors voor integratie duurzaamheid
- 3e thema: Strategieën en overwegingen van stakeholders op het gebied van duurzaamheid

Als een code gemarkeerd is met een groene kleur is deze (vertaald of deels) opgenomen in het eindverslag.

Thema 1: verloop van duurzaamheid in het project

Quote	Beschrijving	Fase
<i>Maar goed de perrons liggen in een tunnelbuis en dat hebben we onderzocht in de Multi-Modale op Schiphol. Kun je die heel makkelijk verbreden of zelfs als ik energie erin stop kan ik het dan verbreden? En antwoord daarom was uiteindelijk nee, dat gaat echt niet. En daarom moet je toch een andere mobiliteit toevoegen. Dus je moet goed kijken naar je probleem en welke oplossingsrichtingen er zijn.</i>	Onderzocht of je op schiphol perrons kan verbreden (multi-modale knoop schiphol)	1. Pre-phase (Multi-modale knoop schiphol)
<i>Nou dit zijn alle documenten die bij een gate review, dat is de overgang van de ene fase en de andere fase is houdt Rijkswaterstaat of kan Rijkswaterstaat een gate review houden. Dat wilde ze graag. Want ze zijn de volgende opdrachtnemers ja, weten wie wat de de ins en outs zijn de kwetsbaarheden van het ontwerp wat ze meekrijgen? zodat er geen kennis verloren gaat. Dus daar zit de duurzaamheid zit daar niet bij, de ontwerpen wel. Dat is opzich wel interessant</i>	Gatereview van de Multi-modale knoop schiphol (2016), werd het duurzaamheidsplan niet in opgenomen	1. Pre-phase (Multi-modale knoop schiphol)
<i>Nou, het project OVAH is opgezet, onder andere voor het probleem van de drukke treinpólons op Schiphol. En de bedoeling is als je metro toevoegt dat mensen niet allemaal in die trein gaan zitten, maar dat ze dan ook een keuze hebben om in de metro te gaan zitten. En dan verdeel je de stroom reisspeten over verschillende modaliteiten. Ja.</i>	aanleiding voor het opzetten van Project OVAH	1. Pre-phase (ZWASH)

<i>En inderdaad die een duurzaamheidsessie gaf voorbij alle projectpartners, want we hebben 8 projectpartners hé. Schiphol, NS, Haarlemmer, SodC om tafel gehad en wat de projectorganisatie heel goed gedaan had was, lees ik dus de mensen van Arcadis, die hebben geïnventariseerd welke beleidsdocument heeft elke projectpartner. Dus hebben we gekeken naar Amsterdam, naar de gemeente, of naar Haarlemmeer, of naar ProRail. En wat staat er in de duurzaamheid?</i>	Ambitieweb sessie gedaan en heel goed geïnventariseerd in alle beleidsdocumenten wat er in staat over duurzaamheid	3. Start project
<i>En voor dit project hebben we dus in die sessie over dat ambitie web gekeken naar wat zijn de belangrijkste milieuaspecten voor OV-infrastructuur en eigenlijk zijn dat er 2. Het zijn projecten die veel massa met zich meebrengen. Letterlijk, je gaat gaten graven in tunnels, je gaat betonnen dingen erin stoppen [...] . Dus het is een massa intensief project en het is een energie intensief project. [...] Dus dat zijn de 2 thema's in het ambitie web waar relatief hoog op gescoord is zeg ik uit mijn hoofd.</i>	In het ambitieweb vastgesteld wat de grootste invloedsfactoren zijn voor dit project: Massa en Energie	3. Start project
<i>Duurzaamheid heeft een zekere zin, dat is ook wel weer belangrijk te zeggen, een relatie met de milieueffectrapportage, de MER. Een MER is ook een verplicht onderdeel bij grote infraprojecten dat er een MER wordt uitgevoerd. Daar is een apart protocol op voor en daar wordt ook naar duurzaamheid gekeken.</i>	Relatie met het MER	5. Beoordelingsfase
<i>En ik heb de eerste MER-resultaten al gezien en als ik dat samenvat is eigenlijk zijn er relatief kleine verschillen tussen de 5 alternatieven. Het maakt niet zo heel veel uit. Belangrijkste is wel de mate waarin je in de ondergrond zit. Want we hebben hele lange tunnels erin zitten en kortere. En je kunt snappen als jij meer over het maaiveld gaat, over de begane grond, heb je meer geluidsoverlast. Geef een voorbeeld. En als je langer in de tunnel zit heb je minder geluid. Maar omgekeerd bodemverstoring is bij zo'n tunnel weer groter</i>	eerste MER resultaten nu binnen, niet veel onderscheid tussen de alternatieven	5. Beoordelingsfase
<i>Ja, in combinatie met de ontwerprapportage. Dus ik vertelde net we zijn gestart met een elementair ontwerp. We zitten nu in de laatste fase van het inpassingsontwerp. Dus dat is een nader gedetailleerd ontwerp met meer relatie met de omgeving. En daar moet ongetwijfeld in de rapportage een paragraaf zitten over hoe zijn we duurzaamheid omgegaan en hoe ben het vertaald.</i>	Duurzaamheid zou moeten worden benoemd in de ontwerpverantwoording van het IO	5. Beoordelingsfase
<i>Nou, dit is zo'n voorbeeld dat de keuze duurzaamheid en ontwerp exploitatie dat dat in gesprek is geweest. Ja. En en hoe is dat nou opgelost? Er is toch uitgaan van die 14 meter halve tafel, Maar in de duurzaamheidsnota die komt of er is, zal staan als u in project verder nog een verbetering wil aanbrengen in plan- en studie fase, kunt u kijken naar deze kans. Dus er is als kans geformuleerd om op te pakken.</i>	voorbeeld van het opstel terrein op 14 meter uiteindelijk als kans geformuleerd voor in de volgende fase	5. Beoordelingsfase
<i>Cruciaal bij MER is dat je kijkt naar de milieu-effecten voor mitigatie en compensatie. Dus je brengt in beeld als ik een tunnelbuis aanbreng van 5 kilometer. Dan heb ik zoveel materiaal nodig en dan heb ik zoveel CO2-uitstoot. En ik heb stroom nodig om die metro's laten rijden. En dan is het milieueffect wat ik toevoeg is x. Wat milieueffect rapportage</i>	MER en MKBA	5. Beoordelingsfase

<i>niet doet is kijken als ik nou mensen uit de auto haal en die ga ik in de trein krijgen of in die metro krijgen, dan heb ik ook een reductie van emissies van auto. Dat zit niet in de milieueffectrapportage. Waardoor de milieueffectrapportage per definitie altijd zegt het milieueffect negatief</i>		
<i>Politiek denken mensen altijd er gaan heel veel mensen de auto het OV. Dat is niet waar. Het is vaak een half procent tot 1 procent als het echt verbetert. Maar omdat het zo'n autoverkeer rijdt over de A4 bij Schiphol is een half procent of 1 procent van afname van de emissies van het autoverkeer telt best mee</i>	Interpretatie van de MKBA	5. Beoordelingsfase
<i>Nou, mijn ervaring is dat bij infrastructuurprojecten het onderscheid niet op duurzaamheid zit. Dat is echt heel beperkt. Het onderscheid zit hem op wat kosten aanleg van een mobiliteit. Maar aan de maatschappelijke baten vooral hoeveel reistijd winst boek ik met een bepaalde mobiliteit die ik toevoegt. Ja</i>	Besluitvorming rondom duurzaamheid	6. Voorkeursbeslissing
<i>Dus wat er vaak gebeurt met dit project is dat je zegt weet je wat we doen over het gehele duurzaamheidsopslag van 1 procent en dan kun je alles wat je aan ambities hebt mee betalen. Ja. Nou, ik weet nog niet hoe het hier precies gedaan is, maar mijn verwachting is, ik geef dat een ander project ken, is dat omdat je het nog niet door kan detecteren dat je het nu met een soort marge erop meeneemt in de kostenraming. Mhmm. Maar dat het een kleine marge is, wat ook niet erg is, want ook met een half procent van 5000000000 hou je nog steeds heel veel geld over.</i>	Meenemen in financiering	6. Voorkeursbeslissing
<i>Eigenlijk heb ik het antwoord al onderweg gehad. Je hebt een verhaal van duurzaamheid nodig met een paragraaf kansen erin. Wat zou je nog kunnen oppakken? Aanbevelingen. Idealiter landen die ook in het eindrapport of een verwijzing met het eindrapport naar dat kansendocument. En in de gate review moet je terugkomen. Dat je echt dat met elkaar door het poortje, de gate, dat is de doorslager, daar doorheen stuurt, terwijl het zichtbaar is voor de volgende club die ermee aan de slag komt.</i>	hoe geef je het door naar de volgende fase? Kansen document met referentie, en gatereview opnemen	7. Naar volgende fase
<i>En in de plan- en studiefase ga je zeker voor duurzaamheid geldt ook een aantal dingen echt verder uitwerken. En dan maak je de echte keuzes. Dus er is zeker een duurzaamheidgedachte, er is ook een ambitie document geschreven</i>	Nu nog ambities, verder uitwerken in plan- en studiefase	7. Naar volgende fase

Thema 2: Influential factors

Quote	Beschrijving	Thema
<i>Maar voor want voor de verkenning is belangrijk dat die 5 actiever onderling vergelijkt. En voor al die 5 moet je, daar gaat energie sowieso in, daar gaat beton in. Dus als je dat beton groener maakt of die energie neutraal maakt, ja dan is het voor alle 5 hetzelfde. Dus of ze komen allemaal dit niveau of een niveauje hoger, maar de onderlinge verschillen tussen die 5 veranderen er niet door. En de kern van de erkenning is dat je een keuze moet maken wat is de beste van de 5. En die ga je vervolgens wel optimaliseren</i>	Meeste duurzaamheidsmaatregelen kunnen over alle alternatieven worden genomen, dus het wordt dan geen onderscheidend iets waar je je keuze op baseert	assessment framework

<i>Dus wetende dat die maatschappelijke gevoeligheid er is, zou het, en dat merk ik bij hare en meer, wordt er kritisch gekeken naar hoe het moet met het vervoer van Schiphol omgaan tegelijkertijd. En daarom moet duurzaamheid en ik zie dat Schiphol zelf ook doen. Maar het is allemaal vanuit het perspectief dat Schiphol onduurzaam is en dat je daar wel een slag op wil maken zonder ja wat veel gemeente ook wil zonder Schiphol af te knippen in capaciteit. ja ja dus Schiphol maar ook SADC, Schiphol Area Development Company. Mhmm. Die willen ook een hele duurzaam ingerichte bedrijventerrein dat dat ook kwalitatief hoogwaardig is om ruimtelijk ook goed Schiphol, dat is ook leuk. Daar worden ook boompjes zijn er, hè. Dat zijn vooral berkenboompjes. Maar het feit is dat Schiphol zo onduurzaam is, zie ik partijen heel vaak nadenken over hoe kan ik als iets toevoegen toch zo duurzaam mogelijk doen als we compensatie daarvoor</i>	Schiphol	Conflicting interests
<i>Nou, mijn ervaring is dat bij infrastructuur projecten het onderscheid niet op duurzaamheid zit. Dat is echt heel beperkt. Het onderscheid zit hem op wat kost de aanleg van een mobiliteit. Maar aan de maatschappelijke baten vooral hoeveel reistijd winst boek ik met een bepaalde mobiliteit die ik toevoegt. En dat zijn eigenlijk de de hoofdfactoren</i>	Onderscheid niet op duurzaamheid, maar op rijstijd en kosten	Finances
<i>Ja. Nou, ik weet nog niet hoe het hier precies gedaan is, maar mijn verwachting is, ik geef dat een ander project ken, is dat omdat je het nog niet door kan detecteren dat je het nu met een soort marge erop meeneemt in de kostenraming. Mhmm. Maar dat het een kleine marge is, wat ook niet erg is, want ook met een half procent van 5000000000 hou je nog steeds heel veel geld over</i>	hoe neem je duurzaamheid mee in de kostenraming, omdat je nog niet aan het detaileren bent	Finances
<i>Dan komt ook de vraag, ik heb het ook vaker meegemaakt, als een huis wat minder duurzaamheid erin stoppen, wordt het project dan veel goedkoper. En mijn stelling is je merkt het niet, omdat die getallen bij infrastructuur altijd zo groot zijn dat je bijna alle duurzaamheidsmagen in ieder geval binnen 1 procent van je projection kun je doen</i>	Kosten voor extra duurzaamheidsmaatregelen merk je bijna niet want het gaat maar om een klein deel van je totale budget	finances
<i>Als je naar die tussentijdse beleidsevaluatie KCI kijkt, daar zit ook een paragraaf in over kosten. Van hoeveel extra heeft het nou gekost om die andere manier van werken te doen? Ja, en dan blijkt dat best beperkt te zijn. Eigenlijk ook weer dezelfde reden dat het aanleg van infrastructuur zo duur is dat de duurzaamheidscomponent ervan eigenlijk niet de kostbare prijs is.</i>	Aanleg van infra is zo duur dat duurzaamheidscomponent niet heel onderscheidend is	finances
<i>Maar het kosten van zo'n miljardenproject, want dat is het, daar zijn je moet je voorstellen als dit de kosten zijn, veel, groot druk, dan is ongeveer de helft menswerk en procedures en praten en kletsen en uitrekenen en god weet wat. En niet te vergeten dus een heel groot stuk risico-opslag in van als het fout gaat en wat betalen we dan. En daar zit een heel belangrijk stuk is begrip ook altijd met wat zijn de bouwkosten. Bouwkosten is materieel, bouwkosten is personeel. Maar die kostenopbouw, daar zitten nog heel veel andere kosten in. Ja, als ik echt naar het materiaalgebruik ga kijken en wat daar de prijs van is, is dat maar een klein deel</i>	Opbouw van een miljardenproject, de kosten gaan m maar voor een klein deel in materiaalgebruik zitten	Finances; materialen

<i>Idealiter landen die ook in het eindrapport of een verwijzing met het eindrapport naar dat kansendocument. En in de gate review moet je terugkomen. Dat je echt dat met elkaar door het poortje, de gate, dat is de doorslager, daar doorheen stuurt, terwijl het zichtbaar is voor de volgende club die ermee aan de slag komt.</i>	Duurzaamheidsrapportages in de gate review om kennisoverdracht te waarborgen naar volgende fase	Knowledge transfer
<i>Nou, het is een elementair ontwerp. Echt wat zijn mijn conceptuele eisen, hoe moet het kunnen werken? Dus je moet wel bedenken ik wil 12 keer per uur of 20 keer per uur kunnen rijden. Dus je moet wel nadenken van capaciteit. Dus je moet het ontwerp zo bedenken dat dat gegarandeerd veilig is en daar moet je dus ook een aantal maatregelen voor treffen die geld kosten. Dus in de kostenraming komt dat wel terecht. Maar staat er al in of de perrons witte tegels, grijze tegels moeten hebben of planken of hè? De materialisatie staat er niet in.</i>	Het is een elementair ontwerp, je kijkt naar de maatregelen die je moet nemen, maar niet naar de materialisatie	Level of aggregation
<i>Er zitten dus nogal wat tunnels in het project, want je kunt bij Schiphol niet over zeg maar over het maaiveld aankomen, want daar liggen de runways, de landingskramen en de Lastarraan. Dus je moet daar of overheen, maar goed vliegtuig gaan al omhoog. Ja, precies. Je komt er heel snel achter, als je iets technisch ernaar kijkt, dat je dus Schiphol altijd met een tunnel moet benaderen.</i>	Locatie rondom schiphol vereist tunnels in het project	Locatieafhankelijke factoren
<i>Wat ook zal gebeuren. Als jij duurzaamheidsmensen bij elkaar haalt van organisaties, dan zijn het gedreven professionals die duurzaamheid heel belangrijk vinden, want dat is hun vak. Ja. En of die nou bij Amsterdam werken of bij Haarlemmermeer of Schiphol dat zijn in positieve zin vakidioten. En ook mensen die gemotiveerd zijn op dit onderwerp. Dus op werkvloer niveau is die ambitie hoog</i>	Op werkvloer niveau is de ambitie erg hoog	Persoonlijke affiniteit
<i>Duurzaamheid heeft een zekere zin, dat is ook wel weer belangrijk te zeggen, een relatie met de milieueffectrapportage, de MER. Een MER is ook een verplicht onderdeel bij grote infraprojecten dat er een MER wordt uitgevoerd. Daar is een apart protocol op voor en daar wordt ook naar duurzaamheid gekeken.</i>	Relatie met het MER	products
<i>Cruciaal bij MER is dat je kijkt naar de milieu-effecten voor mitigatie en compensatie. Dus je brengt in beeld als ik een tunnelbuis aanbreng van 5 kilometer. Dan heb ik zoveel materiaal nodig en dan heb ik zoveel CO2-uitstoot. En ik heb stroom nodig om die metro's laten rijden. En dan is het milieueffect wat ik toevoeg is x. Wat milieueffect rapportage niet doet is kijken als ik nou mensen uit de auto haal en die ga ik in de trein krijgen of in die metro krijgen, dan heb ik ook een reductie van emissies van auto. Dat zit niet in de milieueffectrapportage. Waardoor de milieueffectrapportage per definitie altijd zegt het milieueffect negatief, want je voegt iets toe</i>	Uitleg wat een MER inhoud	products
<i>In de mkba moet wel gekeken worden naar het afname van autoverkeer en dan kan ik vertellen dat het effect op de modal shift. Politiek denken mensen altijd er gaan heel veel mensen de auto het OV. Dat is niet waar. Het is vaak een half procent tot 1 procent als het echt verbetert. Maar omdat het zo'n autoverkeer rijdt over de A4 bij Schiphol is een half procent</i>	MKBA brengt wel de positieve veranderingen in beeld en schetst dus een ander beeld	products

<i>of 1 procent van afname van de emissies van het autoverkeer telt best mee. Dus je gaat straks zien dat de MER zegt milieueffecten zijn best groot negatief en dat misschien de mkba zegt de milieueffecten zijn misschien wel positief omdat het effect van die auto's die je vermindert groter is dan het effect dat je zelf veroorzaakt</i>		
<i>Ja. Als ik een wetenschaps-pet opzet, dat die 2 methoden elkaar eigenlijk ja op een andere manier naar de werkelijkheid krijgen. En ja ze zijn beide van de besluitvorming. Dus hoe we de wethouders gaan uitleggen is best een lastige</i>	Twee methoden die zelfde in kaart proberen te brengen maar andere werkelijkheden beschrijven	products
<i>Ja. En inderdaad die een duurzaamheidsessie gaf voorbij alle projectpartners, want we hebben 8 projectpartners hé. Schiphol, NS, Haarlemmer, SodC om tafel gehad en wat de projectorganisatie heel goed gedaan had was, lees ik dus de mensen van Arcadis, die hebben geïnventariseerd welke beleidsdocument heeft elke projectpartner. Dus hebben we gekeken naar Amsterdam, naar de gemeente, of naar Haarlemmeer, of naar ProRail. En wat staat er in de duurzaamheid? Nou, dan kom je de dingen tegen die iedereen wel wilt op het gebied van klimaatneutraal bijvoorbeeld, of we willen veel mogelijk circulair bouwmaterialen gebruiken.</i>	inventarisatie van beleidsstukken laat overeenkomsten snel zien	Sustainability policies
<i>En je moet ook voorstellen het bouwen vindt pas plaats over 10 jaar. Dus je moet met de kennis van nu anticiperen op die regelgeving en de technologische innovaties. Er bestaat bijvoorbeeld cementvrij beton, Daar heb ik in de Floriade 2 jaar geleden Almere heb ik daar brugdekken van gezien. Dat was toen nieuw, brugdek van beton waar geen cement in zit. Maar straks over 10 jaar is dat misschien gewoon de standaard. Dan zeggen we met elkaar ja, vroeger maakte we een heel ander beton.</i>	innovaties in de toekomst	Toekomstrijken
<i>Dan is vervolgens de vraag ga ik op datzelfde hoog niveau door in de besluitvorming als ik bij de politici kom en zij stellen de vraag natuurlijk is er hartstikke voor duurzaamheid, dat is voor hun imago ook goed. Maar wel de vraag kost het een hoop? En als het geld kost en het project is toch al flink aan de prijs. Dan komt ook de vraag, ik heb het ook vaker meegemaakt, als we er wat minder duurzaamheid erin stoppen, wordt het project dan veel goedkoper</i>	Hoe vertaal je ambitie van de werkvloer naar de besluitvorming, daar focussen ze zich erg veel op kosten	top management support

Thema 3: Strategieën en overwegingen van stakeholders op het gebied van duurzaamheid

Quote	Beschrijving	Aspect
<i>Wat ook zal gebeuren. Als jij duurzaamheidsmensen bij elkaar haalt van organisaties, dan zijn het gedreven professionals die duurzaamheid heel belangrijk vinden, want dat is hun vak. Ja. En of die nou bij Amsterdam werken of bij Haarlemmermeer of Schiphol dat zijn in positieve zin</i>	Op werkvloerniveau is de ambitie en de drive voor duurzaamheid heel hoog	Stakeholders: collectively

<i>vakidioten. En ook mensen die gemotiveerd zijn op dit onderwerp. Dus op werkvloer niveau is die ambitie hoog</i>		
<i>Dus wetende dat die maatschappelijke gevoeligheid er is, zou het, en dat merk ik bij hare en meer, wordt er kritisch gekeken naar hoe het moet met het vervoer van Schiphol omgaan tegelijkertijd. En daarom moet duurzaamheid en ik zie dat Schiphol zelf ook doen. Alles waar ze wel invloed op hebben willen ze dan zo duurzaam mogelijk doen</i>	schiphol wil alles zo duurzaam mogelijk doen	Stakeholders: Owners / Sponsors
<i>Maar het feit is dat Schiphol zo onduurzaam is, zie ik partijen heel vaak nadenken over hoe kan ik als iets toevoegen toch zo duurzaam mogelijk doen als we compensatie daarvoor</i>	compenserend gedrag van schiphol	Stakeholders: Owners / Sponsors
<i>Dat vind ik ook exact hetzelfde. Daar zit ook als je op de knop duurzaamheid drukt, dan krijg je een paar mensen die daar hun leven van gemaakt hebben. En als vakidioten naar kijken en met kennis van zaken doen. Dus die nee, die zijn zeker zo gedreven. Van kan er niet wat meer.</i>	Ook voor de opdrachtnemende partijen is de ambitie groot, duus geen gebrek daar	Stakeholders: Owners / Sponsors
<i>hebt 2 smaken om mee om te gaan. 1 als je het al weet hoe je het gaat doen, dan kun je gewoon in de kostenraming opnemen. Dus laten we dan even dat groene beton weer als uitkomst kunnen nemen. Er zijn projecten met beton zonder cement gedaan. Daar is een andere eenheidsprijs voor dan grijs beton en die kun je de kostenraming alvast nemen. Dan hoeft je niet een marge of geheel nog te doen, dan heb je hem gewoon afgeprijsd.</i>	twee manieren om het op te nemen in je financiën: als je al gedetailleerd weet wat je gaat gebruiken -> afprijzen; als je nog niet weet: opslag op totale budget ->	Strategy: budget
<i>En voor dit project hebben we dus in die sessie over dat ambitie web gekeken naar wat zijn de belangrijkste milieuaspecten voor OV-infrastructuur en eigenlijk zijn dat er 2. Het zijn projecten die veel massa met zich meebrengen. Letterlijk, je gaat gaten graven in tunnels, je gaat betonnen dingen erin stoppen [...]. Dus het is een massa intensief project en het is een energie intensief project. [...] Dus dat zijn de 2 thema's in het ambitie web waar relatief hoog op gescoord is zeg ik uit mijn hoofd.</i>	In het ambitieweb vastgesteld wat de grootste invloedsfactoren zijn voor dit project: Massa en Energie	Strategy: early inventarisation of important themes
<i>Eigenlijk heb ik het antwoord al onderweg gehad. Je hebt een verhaal van duurzaamheid nodig met een paragraaf kansen erin. Wat zou je nog kunnen oppakken? Aanbevelingen. Idealiter landen die ook in het eindrapport of een verwijzing met het eindrapport naar dat kansendocument. En in de gate review moet je terugkomen. Dat je echt dat met elkaar door het poortje, de gate, dat is de doorslager, daar doorheen stuurt, terwijl het zichtbaar is voor de volgende club die ermee aan de slag komt.</i>	hoe geef je het door naar de volgende fase? Kansen document met referentie, en gatereview opnemen	Strategy: run-up next phase

Overzicht codes OVAH-3-IB1-TG

Datum: 02/07/2025

Gesprekspartijen:

- Interviewer/onderzoeker: Thijs van Royen (TvR)
- Label geïnterviewde: OVAH-3-IB1-TG

N.B.: Codes zijn afgeleid van een (deels automatisch gegenereerde) transcript, de context van de code kan worden teruggevonden in het bijbehorende transcript: "OVAH-3-IB1-TG - Anonymized transcript.dox"

Codes zijn ingedeeld in 3 verschillende thema's waarop analyse is gedaan:

- 1e thema: verloop van Duurzaamheid in het project
- 2e thema: Influential factors voor integratie duurzaamheid
- 3e thema: Strategieën en overwegingen van stakeholders op het gebied van duurzaamheid

Als een code gemarkeerd is met een groene kleur is deze geheel of in delen vertaald opgenomen in het eindverslag.

Thema 1: verloop van duurzaamheid in het project

Quote	Beschrijving	Fase
<i>Duurzaamheid was geen gunningscriteria in de tenderfase [...] We hebben het wel genoemd in onze aanbod, maar dat was meer vanuit eigen initiatief want er werd niet op getoetst. Het is niet onderscheidend geweest [...] was gewoon een ja meer een van de werkpakketten die je dan moet aanbieden [...] maar er is niet echt om een visie gevraagd op duurzaamheid</i>	hoe werd duurzaamheid behandeld in de tenderfase	2. Tender
<i>Eind augustus zijn we gestart met de werkzaamheden, tijdens de fase van het elementaire ontwerp. Op dat moment waren er al vijf alternatieven in beeld. In ons proces zijn we begonnen met het verzamelen van alle beleidsstukken van de projectpartners op het gebied van duurzaamheid. Op basis daarvan hebben we een ambitiesessie georganiseerd, waarin we gezamenlijk het ambitie-web hebben ingevuld. Vervolgens hebben we doelstellingen geformuleerd bij de verschillende ambities en deze besproken in de integrale begeleidingsgroep (IBG). Daar zijn de uitkomsten voorgelegd aan de projectpartners met de vraag: "Klopt dit met wat jullie willen?"</i>	Ambitiweb sessie gedaan en heel goed geïnventariseerd in alle beleidsdocumenten wat er in staat over duurzaamheid	3. Start project
<i>De sessie was waardevol omdat we niet alleen ambities bespraken, maar ook expliciet keken waar in het project de grootste impact gemaakt kan worden – zowel positief als negatief. Daaruit bleek dat de belangrijkste thema's vooral energie en materiaalgebruik zijn. Daarnaast kwam naar voren dat klimaatadaptatie een belangrijk aandachtspunt is, omdat er veel verharding wordt aangebracht.</i>	Resultaat ambitiweb was hoofdthema's die verder onderzocht moesten worden	3. Start project

<i>is dat afwegingskader en daar zit duurzaamheid niet in. Dus in het afwegingskader zitten die 4 projectdoelstellingen en dan kosten, Technische haalbaarheid en planning dus dan wordt daar gewoon niet in het bestuurlijk proces op beoordeeld, dus niet onderscheidend.</i>	Niet in doelstellingen of afweegkader	4. analyse fase
<i>Dus in het ontwerp moest Natuurlijk de hele tijd eigenlijk al keuzes maken. En dan kijken ze wel breder dan het afwegingskader en daar zit het duurzaamheid aspect bijvoorbeeld wel in. Maar ja, dan is het een van de zoveel onderdelen [...] Maar duurzaamheid heeft Natuurlijk geen wettelijk kader. Het is niet wettelijk verplicht. Dus daarin ja is het nog steeds. Eigenlijk, ja, Het is gewoon stom om te zeggen, maar nog wel een beetje vrijblijvend.</i>	Geen wettelijk kader of verankering dus "vrijblijvend"	4. analyse fase
<i>We hebben wat ik aan het begin zei die ambitie gedaan. Vervolgens moet je te kijken van oké en nu, We hebben die ambities. Wat gaan we nu doen? Toen hebben we een aantal verschillende duurzaamheid studies gedaan voor Energy voor materialen, zodat het aan MKI berekening. Voor klimaatadaptatie we een studie gedaan. Natuur is ook een studie voor gedaan. Dat is sowieso ook gedaan in het kader van het plan mer. En, er wordt ook een dat staat ook los van duurzaamheid, maar er wordt ook een studie gedaan naar ruimtelijke kwaliteit, dus het zijn eigenlijk al die Thema's die in onze ambitie web worden aangehaald.</i>	Aanpak bij start duurzaamheids-rapportage	4. analyse fase
<i>Daar hebben we eigenlijk gekeken van. Oké hoe, hoe scoren nou al die alternatieven? Dat meegenomen in het mer? Maar vervolgens is er ook zijn er ook verschillende ja soort van werksessies gedaan met de ontwerp leiders. Van BRT van Metro en van trein. Waarbij we die ja zo van die resultaten aan hen hebben voorgelegd en zij gaan brainstormen van, hé, welke kant ze zien we nou nu in deze fase in het ontwerp. Dan ging het wel vooral over het IO dus integraal ontwerp. En welke kansen zien we nou voor een vervolgfase en de kansen die in deze fase gevonden zijn? En dat ging dan met name over optimalisaties. Dus je wilt Natuurlijk het liefst. Ja vooral qua Als je naar materialen kijkt, dan weet ik het liefst al zoveel mogelijk optimaliseren, zodat je zo min mogelijk materiaal gebruik nodig hebt. Daar hebben we naar gekeken. Zijn we maatregelen voor opgenomen? Voor Energy zijn een aantal maatregelen opgenomen en voor klimaatadaptatie volgens mij ook een of twee We zijn zijn moet wel echt zeggen dat het best wel nog beperkt is in deze fase.</i>	uitvoering van het duurzaamheids-rapport	5. Beoordelings-fase
<i>Als je bijvoorbeeld natuurvriendelijke oevers wil. Dat vraagt gewoon hoeveel meer waterverbruik of water om ruimte gebruik dan gewoon de standaard. Ja meer gewoon betonnen bakken, zeg maar. Dus die ruimte moet je wel hebben en die moet je dan wel gaan claimen en dus Dat was elke maatje de hele de vraag van Als we dit niet nu al in deze fase benoemen of meenemen, kan het dan nog wel in een volgende fase?</i>	wat breng je in deze fase in kaart?	5. Beoordelings-fase
<i>Er is een gewoon een soort softwaresysteem. Ik ben even de naam daarvan kwijt. Kan zo even opzoeken om het in te ontwikkelen en daarin worden allerlei eisen bijgehouden. Zijn bijvoorbeeld klanteisen. Dat zijn dan wensen van partijen van hé, Als je daar gebouwen, dan moet dat wel aan dit in dit voldoen. Maar daar zitten ook allerlei. Ja, een soort aandachtspunten. Je kan het ook zien als een soort van je herinnerings lijstje van. Want niet Alleen vanuit duurzaamheid, Maar het komt ook in je ontwerp kun je Natuurlijk ook van alles tegen waarvan je denkt, hier gaan we nu niet iets mee doen. Maar In de volgende fase moeten we hier zeker naar kijken. Dus daar in dat soort van systeem. Daar kon komen ook allerlei duurzaamheids. Kans risico's aandachtspunten in staan</i>	Hoe geef je het door naar volgende fase	7. Naar volgende fase

Thema 2: Influential factors

Quote	Beschrijving	Thema
<i>Ja, en daar is de duurzaamheid niet in, dus dan wordt daar gewoon niet in het bestuurlijk proces op beoordeeld, dus niet onderscheidend. [...] Het is niet wettelijk verplicht. Dus daarin ja is het nog steeds. Eigenlijk, ja, Het is gewoon stom om te zeggen, maar nog wel een beetje vrijblijvend</i>	Doordat het niet in afweegkader zit kan het als vrijblijvend geïnterpreteerd worden	assessment framework
<i>Nou dat een aantal partijen inderdaad ambitieuzer zijn dan andere gemeente Amsterdam en een VRA is echt Super vooruitstrevend sadc ook. Maar voorbeeld, een Schiphol, ja. Ja, die heeft ik gewoon andere belangen. Die hebben natuurlijk een heel ander business model, dus Het is Natuurlijk allemaal te verklaren.</i>	Schiphol	Conflicting interests
<i>Dus dat dat bepaalde kosten ook overtijd kunnen veranderen, dus stel dat je nu. Dat je nu geld zou opnemen voor cement arm beton. Misschien is dat over 4 jaar veel goedkoper. Of Misschien hebben we dan alweer een beter TYPE materiaal, cement, roos, beton, geope polymeer, beton wat heel sterk is en wel bepaalde.Constructies kan worden gebruikt. Wat het nu niet het geval is, dus je wilt Natuurlijk ook.Ook een beetje qua innovatie wil je niet nu al zoveel vastklikken?</i>	kosten voor duurzame maatregelen kunnen nog veel veranderen	finances
<i>Maar ja, dan is het een van de zoveel onderdelen, dus Als je dan ziet van hé dit, en dan zie je ook dat duurzaamheid vaak toch ook wel samenvalt met kosten. Ook In de positieve zin dus als een bepaald kunstwerk super duur is, Omdat je er heel veel materialen voor nodig hebt. Dan wordt er ook al vanuit de kosten gekeken van, hé, kunnen we dat niet even iets slimmer ontwerpen?</i>	combineren kosten en duurzaamheid	Finances
<i>Ja, dat hebben wij ook gedaan. We hebben voor elk alternatief is er 2% opgenomen van de totale bouwsom. Dus Dat is niet standaard, daar hebben we wel even voor moeten vechten, maar wel uiteindelijk akkoord op gekregen. En Ik ben ook vooral blij dat het 2% is geworden en niet een een is inderdaad vrij standaard. Ja je denkt een of twee, wat maakt het uit? Maar dat gaat Natuurlijk om zulke grote. Bouwkosten dat het al wel echt even verschil uitmaakt.</i>	2% van de bouwkosten	finances
<i>Wat ik al eerder noemde dat er dus een beetje een gat zit tussen de de. We hebben ja, laat ik zeg Maar de moet maar even de duurzaamheids ambassadeurs van al die partijen dat die eigenlijk niet genoeg aangehaakt zijn bij dit project. Ik vind het eigenlijk meer hun taak eerlijk gezegd, Als ik van de gemeente Amsterdam zou zijn en ik zou aan duurzaamheid werken, dan wil je Natuurlijk het liefst dat in zo 1 grote gebiedsontwikkeling in jouw gemeente. Dat duurzaamheid daar hoog op de agenda staat. Dus Als het dan niet in het afwegingskader is meegenomen. Dan vind ik het de taak van de gemeente van die persoon om het wel de hele tijd maar te blijven agenderen</i>	Aanhaken duurzaamheidsadviseurs	Getting the right people at the table
<i>Maar bij andere partijen zie je dat die kennis niet zit in het In de afgevaardigde in zo een inhoudelijke begeleidingsgroep en dat binnen zo'n organisatie ook heel ingewikkeld geregeld dus binnen de gemeente heb je niet een persoon van</i>	Kennis zit niet in de IBG omdat het geframenteerd is in de organisaties	Getting the right people at the table

<i>duurzaamheid. Je hebt iemand van zekere tijd iemand van klimaat is helemaal versnipperd, waardoor dat niet. Terecht komt via een persoon bij zo een inhoudelijk begeleidingsgroep.</i>		
<i>Maar je ziet dat bij andere partijen dat dat vaak een afja meer een afgevaardigd is met duurzaamheid, maar die zit niet in het IBG, dus die kent het project verder ook niet goed. Die staat behoorlijk op afstand. Dus ja de Mensen van duurzaamheid van al die partijen. Die willen Natuurlijk het liefst dat het zo duurzaam mogelijk is. Alleen de Mensen die in het IBG zitten en meer vanuit de opdrachtgeversrol vanuit al die partijen. Die hebben andere belangen die kijken nu meer naar die projectdoelstellingen. En ja, ander TYPE belangen dus daar zit wel een gat.</i>	ibg afvaardiging verschilt van ambitiewebsessie afvaardiging	Getting the right people at the table
<i>Maar ik kan hem ook wel weer begrijpen, zeg maar, Ik vind duurzaamheid super belangrijk. En ik zou het. Stom vinden, zeg maar Als je z'n grote infrastructurele ingreep gaat doen, Omdat dan niet mee te nemen. Dus wordt ook echt wel meegenomen. Maar ik snap hem ook wel weer, want Het gaat om zoveel geld en dan is vooral nu ook de. Ja de grootste zorg is van ga je wel iets bouwen wat straks gebruikt wordt? En de hele reden is Natuurlijk dat je die schipholtunnel wil ontlasten. Ja, Als je dan straks miljarden steekt In de project waarbij die toen nog niet eens wordt ontlast en Mensen niet gaan gebruiken, dan ben je Natuurlijk ook niet duurzaam bezig en Dat is wel nog even iets belangrijker. Dan is het straks Energy neutraal.</i>	wat heeft nu de prioriteit	Level of aggregation
<i>En, je hebt over een, Ik weet even niet meer de hoeveelheid kilometers. Ik heb er in mijn hoofd 11, maar Misschien wel langer heb je die tunnel boormachine. Ja, die is enorm impactvol, maar stel dat hij nou wel het beste eruit komt dat hij een schipholtunnel het meest ontlast, dat hij voor zorgt dat veel Mensen het OV gaan gebruiken. Dat die woon werklocaties beter worden ontsloten en dat het ook een oplossing biedt voor internationaal treinverkeer wat gestimuleerd wordt. Ja dan is dat Natuurlijk wel. Dat zegt dan bijvoorbeeld meer dan ja, dan een buslijn die je Misschien iets beters kort, maar Misschien wel minder goed die doelstelling behaald.</i>	Afweging tussen opties hang af van beste inpassing	Locatieafhankelijke factoren
<i>Het is nu. Zie je dat het nog heel erg aan personen afhangt. Dus voorbeeld de VRA, daar zit wel iemand van in in die kaniel Camilla vanaf haar naam kwijt. Ik heb haar naam daardoor gestuurd. Hoe zou een baard van de gemeente Haarlemmermeer? Ja, die vinden het heel belangrijk. Die weten er ook veel van oud, dus die brengen het daardoor ook wel in. En die stellen wel vragen daarover. Maar bij andere partijen zie je dat die kennis niet zit</i>	Hangt af van de persoon	Persoonlijke affiniteit
<i>De eigen ambitie die is vastgesteld, Maar het is niet onderdeel van het afwegingskader. Het is even nog geen wettelijk kader, dus dan moet je het best wel doen met. Zeg maar, het haakje wat We hebben, is het beleid van al die projectpartners.</i>	Beleid van de partners kan worden gebruikt als anker van je duurzaamheids verhaal in afwezigheid van duurzaamheid in het beoordelingskader	Sustainability policies

<i>Ook een beetje qua innovatie wil je niet nu al zoveel vastklikken? Omdat het overtuigd kan veranderen en dat datzelfde gaat forceren omissie bouwen. Ja, een aantal jaar geleden was dat eigenlijk nog best wel ondenkbaar en nu is het al steeds meer normale gang van zaken.</i>	Toekomst kan anders zijn	Toekomstrijken
<i>En Als je dan kijkt naar onze opdrachtgever het ova projectteam waar dus esseline zit, daarin trekken we wel echt op als team vind ik. Dus daar, daar voel ik niet. Ik voelde het wel, zeg maar een gezamenlijke opdracht van skyline en mij. En ook een bim bijvoorbeeld, dus ik ik voel voorbeeld niet dat ik dit vooral draag als opdrachtnemer zeide. Ik heb het wel, Het is het, zit hem meer. Ik voel meer een soort gat tussen. Bova en IB een en de projectpartners.</i>	betrokkenheid van de projectpartners op duurzaamheid is soms lastig vorm te geven	top management support
<i>want Het is toch allemaal niet haalbaar, vooral niet in een verkenningsfase. Dan wil je ook wel. Ja nog wel redelijk ambities neerzetten, ook Omdat het ja een behoorlijk lange periode is nog waarin je plannen gaat uitvoeren en wanneer je pas start met de bouw. Dus dan is het ook wel heel demotiverend om nu al te zeggen dat alles niet haalbaar is. Dus in die zin was het een goede sessie en ook Als je kijkt naar de vertaalslag naar die doelstellingen, denk dat we best wel op sommige punten al best concreet zijn geworden.</i>	nu hoge doelstellingen en visie	visie

Thema 3: Strategieën en overwegingen van stakeholders op het gebied van duurzaamheid

Quote	Beschrijving	Aspect
<i>Nou in die zin vind ik wel dat dat we Wij zijn naar het opdrachtnemers IB1. En Als je dan kijkt naar onze opdrachtgever het OVAH-projectteam waar dus [X] (de omgevingsmanager) zit, daarin trekken we wel echt op als team vind ik. Dus daar, daar voel ik niet. Ik voelde het wel, zeg maar een gezamenlijke opdracht van [X] en mij. En ook een bim bijvoorbeeld, dus ik ik voel voorbeeld niet dat ik dit vooral draag als opdrachtnemer zijde. Ik heb het wel, Het is het, zit hem meer. Ik voel meer een soort gat tussen OVAH en IB1 en de projectpartners.</i>	Samenwerking tussen ib1 en OVAH goed, gat met de opdrachtgever	Stakeholders: collectively
<i>. in deze fase kan je natuurlijk nog heel veel dingen roepen van dit, Dit is belangrijk en dit moeten we meenemen. Tot nu. Kan het nog allemaal uitgezocht worden in het plan fase maar ja, je merkt wel dat, het heeft gewoon nog geen. Het is niet de grootste prioriteit duurzaamheid.</i>	Wat kan IB doen?	Stakeholders: Consultancy engineering
<i>Nou ja. Het lastigste is dat? Wat ik al eerder noemde dat er dus een beetje een gat zit tussen de laat ik zeg Maar de ik noem het maar even de duurzaamheidsambassadeurs van al die partijen dat die eigenlijk niet genoeg aangehaakt zijn bij dit project</i>	Welke mensen vaardigen de partijen af	Stakeholders: Owners / Sponsors
<i>Dus Als het dan niet in het afwegingskader is meegenomen. Dan vind ik het de taak van de gemeente van die persoon om het wel de hele tijd maar te blijven agenderen. En dan zal je zien dat Schiphol dat voorbeeld Misschien minder doet. Maar dan kan je dat weer onderling wel met zo een inhoudelijke begeleidingsgroep met elkaar bespreken</i>	verantwoordelijkheid voor agenderen	Stakeholders: Owners / Sponsors

<i>Maar ik vind Ja dat de gemeente Amsterdam hier wel echt 1 grote Kans laat liggen. Opmerkingen of ja, daar je ziet dat het daar gewoon niet leeft, Omdat het denk ik niet de juiste Mensen aan tafel zitten en niet ze niet worden bijgepraat</i>	Gemeente amsterdam niet goed vertegenwoordigd	Stakeholders: Owners / Sponsors
<i>We hebben ook voorbeeld voorbeeld van een project van Arcadis in Frankrijk. Daar hebben ze gewoon een bonus uitgedeeld van je krijgt volgens mij miljoen kun je krijgen Als je x aantal CO2 reduceerde in je ontwerp! Nou, dan gaan Mensen wel rennen hoor, dan gaan ze echt hele innovatieve dingen bedenken. Maar dan zit het, dan zit het helemaal In de scope, nu is het gewoon. Nu is. Het ontwerp heeft een scope en we wij zijn van duurzaamheid en wij proberen met ideeën te komen</i>	iets mee richting geven en statements maken in je opdracht	Stakeholders: Owners / Sponsors
<i>Nou dat een aantal partijen inderdaad ambitieuzer zijn dan andere. Kan het ook wel gewoon doen. gemeente Amsterdam en een VRA is echt. Super vooruitstrevend SADG ook. Maar voorbeeld, een Schiphol, ja, die heeft ik gewoon andere belangen. Dat zou ook heel raar zijn als die enorm duurzaamheid duurzaamheid van Het is gewoon</i>	Wie heeft welke blik op duurzaamheid	Stakeholders: Partners / advisors
<i>Ja wat ik wat me wel opvalt, Maar dat dat daar hebben, we denk ik ook gewoon een beetje pech mee zat. Ik heb dus veel van ProRail gewerkt. En die vind ik ook helemaal afwezig in dit project qua duurzaamheid. Terwijl die daar wel echt een team op hebben, of een hele afdeling. Er zat toen ook iemand bij die ambitie web sessie, maar die kende die kende de methode van ambitie web niet eens. Dus die was duidelijk niet. Die kwam duidelijk niet van die afdeling</i>	ProRail niet adequaat vertegenwoordigd	Stakeholders: Partners / advisors
<i>Ja wat mij logisch lijkt, is dat die inhoudelijke begeleidingsgroep die leden daarvan dat die zich Laten bijpraten door hun duurzaamheidsadviseurs. En het je ziet dus waarbij een aantal Mensen waarbij ze goed gaat. Dat komt Omdat zij al een dubbele pet hebben intern gezien</i>	Zorg dat afvaardiging bijgepraat is op duurzaamheids onderwerpen	Strategy: Informed representation
<i>Als je een lange adem hebt en dat je ook de ruimte krijgt als. Opdrachtnemer zijnde om. Dat je tijd hebt om, zeg maar al die projectpartners erbij te halen. Dus als mijn opdracht groter was geweest, ook voor een [x] bijvoorbeeld, dan had ik veel meer willen inzetten op veel afstemmen met al die beleids ambassadeurs, duurzaamheid, ambassadeurs van die organisatie te ben een keer gedaan bij de gemeente Amsterdam. . Maar ik denk dat. Dat ik meer energie zou willen steken in die projectpartners er beter bij te betrekken en steeds te Laten zien. Van ja, Dit is niet onze ambitie, ik bedoel. Het is ook gewoon jullie beleid dus.</i>	Met meer tijd en aandacht zou je de juiste mensen beter kunnen zoeken en betrekken	Strategy: Informed representation
<i>Dus bij mijn andere projecten? Was het, laat ik het goed formuleren, maar daar was het ook niet altijd onderscheidend, maar wat zat ik wel bijvoorbeeld in het kernteam bijvoorbeeld en in voortgangsoverleg? Ik was gewoon onderdeel van. Ik zat op veel meer plekken. Dat is bijvoorbeeld ook al een manier Waarom je waar dat je wel altijd op de agenda staat. En nu is het wel iets meer een los proces. Dus Ja in die zin merk ik wel dat ik minder invloed heb op besluitvorming ook vanwege dat afwegingskader Natuurlijk, maar ook Omdat we gewoon meer als een soort werkpakket worden behandeld.</i>	Geef duurzaamheid een integralere plek aan tafel dan komt het op meer plekken terug	Strategy: more integral approach
<i>Maar bij andere partijen zie je dat die kennis niet zit in het In de afgevaardigde in zo een inhoudelijke begeleidingsgroep en dat binnen zo'n organisatie ook heel ingewikkeld geregeld dus binnen</i>	Afvaardiging en welke overleggen landt duurzaamheid	Strategy: juiste overleggen

<i>de gemeente heb je niet een persoon van duurzaamheid. Je hebt iemand van zekere tijd iemand van klimaat is helemaal versnipperd, waardoor dat niet Terecht komt via een persoon bij zo een inhoudelijk begeleidingsgroe</i>		duurzaamheid laten landen
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Overzicht codes OVAH-4-PA1-GVB

Datum: 13/08/2025

Gesprekspartijen:

- Interviewer/onderzoeker: Thijs van Royen (TvR)
- Label geïnterviewde: OVAH-4-PA1-GVB

N.B.: Codes zijn afgeleid van een (deels automatisch gegenereerde) transcript, de context van de code kan worden teruggevonden in het bijbehorende transcript: "OVAH-4-PA1-GVB - Anonymized transcript.dox"

Codes zijn ingedeeld in 3 verschillende thema's waarop analyse is gedaan:

- 1e thema: verloop van Duurzaamheid in het project
- 2e thema: Influential factors voor integratie duurzaamheid
- 3e thema: Strategieën en overwegingen van stakeholders op het gebied van duurzaamheid

Als een code gemarkeerd is met een groene kleur is deze (vertaald) opgenomen in het eindverslag.

Thema 1: verloop van duurzaamheid in het project

Quote	Beschrijving	Fase
<i>Bij OVAH zijn we niet specifiek bij de duurzaamheidsgesprekken vooraf betrokken geweest. OVSA is bijvoorbeeld wel hé, die heeft gezegd joh we doen een duurzaamheidssessie en we willen jullie als partner daar ook in aan tafel hebben.</i>	Project adviseurs niet direct betrokken geweest bij ambitieweb	3. Start project
<i>Het is lastig om concreet te meten hoe de oplossingsrichtingen bijdragen aan duurzaamheid: de aanleg kan veel CO₂ kosten, maar op lange termijn kunnen oplossingen als betere treinverbindingen juist bijdragen aan minder kortereafstandsvluchten en dus een duurzamere uitkomst.</i>	Op welke baten moet je je focussen en hoe kan je dat concretiseren	4. analyse fase
<i>Ja maar daar zit je volgens mij veel meer binnen beoordelingskader van zo'n MER. Ja. Maar daar is wel een onderdeel van.</i>	Beoordeling van duurzaamheidsaspecten vooral in het MER	5. Beoordelingsfase
<i>"Vanuit kostenperspectief wordt gekeken naar de total cost of ownership, dus wat kost de bouw en wat kost later beheer en onderhoud."</i>	financieel gezien worden ook de exploitatiekosten meegneomen	5. Beoordelingsfase
<i>Want zeker in deze fase wij zijn eigenlijk nog niet de partij naar wie dit de uitvoering straks toegaat. Op het moment dat je die plan- en studiefase ingaat, dan weet je dat de metroverbinding wordt. De kans is groter dat de metroverbinding wordt, laat ik het zo zeggen. Dan moet je echt wel gaan werken met commitment in de vorm van een nieuwe samenwerkingsovereenkomst en dan zijn wij ineens wel partij om dat te ondertekenen en dat commitment af te brengen. Dat</i>	Nieuwe fase betekend nieuwe overeenkomst, maar die moet dan dus ook te accepteren zijn voor de nieuwe partners die actiever betrokken gaan izjn	7. Naar volgende fase

<i>moet ook aan ons gevraagd worden, vind ik. En duurzaamheid is dan een element waarschijnlijk binnen de samenwerkingsovereenkomst</i>		
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Thema 2: Influential factors

Quote	Beschrijving	Thema
<i>Iedereen heeft de neuzen ongeveer dezelfde kant op als het gaat om het grotere geheel van duurzaamheid, maar op detailniveau – zoals bij Natura 2000 – wordt het lastiger</i>	iedereen heeft globaal de neuzen dezelfde kant op, frictie kan op detailniveau ontstaan	Conflicting interests
<i>In het proces worden euro's vaak belangrijker gezien dan duurzaamheid, terwijl het elkaar kan versterken.</i>	financiële overwegingen domineren	finances
<i>“Vanuit kostenperspectief wordt gekeken naar de total cost of ownership, dus wat kost de bouw en wat kost later beheer en onderhoud.”</i>	financieel gezien worden ook de exploitatiekosten meegeneomen	finances; exploitatie
<i>De experts die wij echt aan tafel hebben die zijn verkeerskundig [...] Maar deze mensen zijn niet hoofdzakelijk echt duurzaamheids specialisten [...] En duurzaamheid komt ook daar steeds verder in DNA bij die afdeling van de organisatie. [...] Maar het zijn niet de duurzaamheidsspecialisten die we hier wel in huis hebben.</i>	Duurzaamheidsspecialisten betrekken van de verschillende organisaties	Getting the right people at the table
<i>Wat ook nog lastiger vindt is de mate waarin de voetprint wordt onderzocht als je het hebt over bijvoorbeeld de metro hè? Ik geloof dat het in de MER zit, daar wordt er gekeken naar hè joh op het moment dat je zo'n metrolijn aanleg nou ja, dan zit er natuurlijk een impact achter. [...] En kijk je 5 meter van een woonhuis af ja, dan is er altijd een negatieve impact. Als je het hebt bijvoorbeeld over leefomgeving van die mensen. [...] Waar kijk je naar het grotere geheel, afname van een aantal korte afstandsvluchten of minder auto's op die snelweg, ja dan is die weer positief.</i>	Aggregatie niveau van de impact van het aanleggen van zo'n lijn in kaart brengen is erg lastig. Vooral de afweging daartussen	Level of aggregation
<i>Ik vind de leefomgeving van mensen die daar in de buurt wonen net zo'n goed onderdeel van duurzaamheid. Zeker matissociale eten. Ja. Hè die is net zo belangrijk. Ja.Ja. Gezondheid wel zijn eigenlijk van van mensen die daar in die omgeving wonen en dat zal altijd dik bij zo'n metro op aan. Verslecht hè. Maar die mensen die nu bij die auto wonen of onder de landing zijn bij al een aanvulling van Schiphol zal dat verbeteren. Ja en en hoe weeg je dat nou precies af.</i>	Wie geef je prioriteit (leefomgeving vs goed functionerende knoop)	Level of aggregation
<i>Wat je wel ziet is dat, als het bijvoorbeeld een metro wordt, dat je op een gegeven moment als je onder hoofddorp doorgaat kom je ergens tussen een Natura 2000 gebied of iets dergelijks. Daar wordt duurzaamheid dan meer als beperking wordt gezien dan als kans. en die rigiditeit en discussie daarin is logisch maar maakt afweging en compensatie nodig</i>	Duurzaamheid kan frictie veroorzaken wanneer het botst met natuurwetgeving en gebiedsbeperkingen; het wordt dan eerder als obstakel dan als kans ervaren.	Locatieafhankelijke factoren
<i>Maar uiteindelijk is het de betaler die de keuze maakt hè. Ja. En dan telt vooral zo'n DO dus. Maar weet je eigenlijk ook een Schipholgroep die wel hé betalende partner is, dus een stem heeft in het geheel, heeft ook maar beperkte inspraak. Het is uiteindelijk politiek gezag wat ook de keuze gaat maken. Dan mag je als partner straks wel zeggen joh, dit zou mijn voorkeurs alternatief zijn gebaseerd op puntje puntje puntje. Ja. En hopelijk beïnvloed je</i>	Keuze is uiteindelijk politiek en die hebben de doorslaggevende stem	political and internals stakeholder considerations

<i>daarmee behoefte zacht voldoen. Ja. Maar Schiphol maakt ook zelf niet de keuze. Maar die mag er wel meer vinden als dat wij er ook gewoon mogen vinden. Wij staan erbij en we kijken ernaar. Hè wij zorgen dat we met name op die inhoud dus in het project de juiste mazelen geven.</i>		
<i>Je wilt niet dat het spoor een vreemde knik moet maken om zo'n natura2000 gebied te ontwijken, want dat is ook niet duurzaam; dan moet je elke vijf jaar het spoor vervangen.</i>	een ogenschijnlijk duurzame oplossing kan leiden tot inefficiënt en niet-duurzaam beheer	political and internal stakeholder considerations
<i>Je hebt natuurlijk zowel binnen OVAH als OVSA binnen je plan-MER zitten natuurlijk ook al milieurespecten dergelijke in. Ja. Hè als je kijkt naar de impact van en hoe je dat eventueel wil gaan compenseren ergens anders. En wat daarvoor nodig is.</i>	Plan mer wordt ook al veel in meegenomen, dus is al deels gewaarborgd in het proces	products
<i>Denk ik dat we daar nog een aantal kansen hebben als ik kijk naar het hele proces vanuit MIRT. Heb ik daarstraks ook even opgeschreven. Dan zie ik met name ook in het first time right bouwen. Vaak kosten gekomen, maar ook zorgen dat je dus geen voetprint extra moet realiseren om dingen aan te passen op het moment dat het geen zin is. Ik denk dat daar nog wel kansen liggen.</i>	First time right bouwen. Anticiperen op de situatie zoals die tijdens uitvoer zal zijn om late aanpassingen te voorkomen	Anticipating future developments
<i>Dus je zult iets moeten doen met een grotere werkplaats. Ja. Die meteen die hele lijn aan kan. Dat "werk met werk" wil je wel in 1 keer gerealiseerd hebben. En nu niet kijken met de scope die heel erg beperkt is. Kijk altijd naar het totale plaatje ondanks dat hé scope maar een bepaald interesse. Anders krijg je dus niet first time right en moet je later weer aanpassingen inbouwen</i>	Werk met werk combineren. Zorg ervoor dat je het complete plaatje in beeld hebt van je impact	Anticipating future developments

Thema 3: Strategieën en overwegingen van stakeholders op het gebied van duurzaamheid

Quote	Beschrijving	Aspect
<i>"Iedereen heeft de neuzen ongeveer dezelfde kant op als het gaat om het grotere geheel van duurzaamheid, maar op detailniveau – zoals bij Natura 2000 – wordt het lastiger</i>	iedereen heeft globaal de neuzen dezelfde kant op, frictie kan op detailniveau ontstaan	Stakeholders: collectively
<i>Ik denk dat bijvoorbeeld Amsterdam en Haarlemmermeer duurzaamheid ook wel echt belangrijk vinden, maar misschien ook wel vaker voor een keuze uit 2 kwade staan in dit project. Bijvoorbeeld wanneer ze moeten kiezen van ja we vinden die metrolijn ook wel belangrijk die je een stukje doet dat het duurder 2000 gebied moet.</i>	Gemeentes hebben vaker meerdere belangen en moeten intern ook afstemming vinden voordat ze keuzes maken	Stakeholders: Owners / Sponsors
<i>We zijn natuurlijk een organisatie maakt gebruik van publieksgeld. Betekent niet dat je om al je ambitie meteen keihard gaat inzetten en alles wat het kost.</i>	Organisaties die met publiek geld werken moeten draagvlak hebben voor hun ambities	Stakeholders: Partners / advisors
<i>De basisdoelstelling is minder kortafstandsvluchten, en dat kan voor Schiphol financieel veel betekenen, maar de Schiphol Groep gaat daar gewoon netjes volledig in mee.</i>	Schiphol ziet de vermindering van kortafstandsvluchten niet als bedreiging, maar ondersteunt dit doel als onderdeel van de gezamenlijke duurzaamheidsambitie	Stakeholders: Partners / advisors
<i>Energie is enorm belangrijk, ingegeven vanuit netcapaciteit: wij willen zeker weten dat we niet stil komen te staan bij pieken."</i>	Energie is een belangrijk thema in dit project, ook vanuit netcongestie geredeneerd	Strategy: early inventarisation of important themes

<i>Dat soort elementen, die zorgen daar wel dat je ook net wat meer positie kunt nemen in het belang van de keuzes die straks gemaakt worden. Ja. Want ik geloof heel erg in het proces dat als je het aan de voorkant niet doet dan krijg je er een aan de achterkant niet meer voor elkaar. Ja. Zowel financieel niet als andere deelnemers.</i>	vooraf betrekken van alle stakeholders is belangrijk voor ze om een positie te kunnen innemen	Strategy: First time right
<i>Duurzaam bouwen is niet voldoende, je moet ook kijken naar duurzaam uitvoeren, dus exploitatie, beheer en onderhoud.</i>	Je moet niet alleen de bouwfase materiaalgebruik in overweging nemen	Strategy: kijk naar life cycle van het project

Overzicht codes OVAH-5-PC2-Ams

Datum: 19/08/2025

Gesprekspartijen:

- Interviewer/onderzoeker: Thijs van Royen (TvR)
- Label geïnterviewde: OVAH-5-PC2-Ams

N.B.: Codes zijn afgeleid van een (deels automatisch gegenereerde) transcript, de context van de code kan worden teruggevonden in het bijbehorende transcript: "OVAH-5-PC2-Ams - Anonymized transcript.dox"

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- 1e thema: verloop van Duurzaamheid in het project
- 2e thema: Influential factors voor integratie duurzaamheid
- 3e thema: Strategieën en overwegingen van stakeholders op het gebied van duurzaamheid

Als een code gemarkeerd is met een groene kleur is deze (deels) vrij vertaald opgenomen in het eindverslag.

Thema 1: verloop van duurzaamheid in het project

Quote	Beschrijving	Fase
<i>Als gemeente zeggen we nu dat er ook aandacht moet zijn voor de minder positieve kanten van Schiphol, zoals geluidsoverlast en vervuiling, in plaats van altijd maar groeien [...] Gebiedsontwikkelingsprojecten in de regio kunnen geen doorgang vinden omdat Schiphol er is, zoals de studentenwoningen bij Kronenburg die al jarenlang vastzitten. [...] Er zijn veel onnodige vluchten, zoals naar Brussel, Düsseldorf of Parijs, die prima met de trein kunnen. [...] Projecten als OVAH zijn randvoorwaardelijk voor die verduurzaming, dat is een van de belangrijkste oorzaken dat het project überhaupt bestaansrecht heeft</i>	De hele aanleiding van OVAH is in de kern al duurzame ontwikkeling	1. Pre-phase (Multi-modale knoop schiphol)
<i>een van de hoofddoelen van OVAH is het ontlasten van de Schipholtunnel. Dat is niet direct duurzaamheid, maar op een hoger aggregatieniveau wel cruciaal om de mobiliteitstransitie mogelijk te maken. Daarin ligt de verduurzaming eigenlijk al besloten: als het slecht scoort op al die hoofddoelen, scoort het project ook slecht op duurzaamheid, omdat we de mobiliteitstransitie dan niet kunnen realiseren</i>	Het zit eigenlijk al in de doelstelling verwoven want als je doelen niet bereikt draag je niet bij aan de transitie	2. Tender

Thema 2: Influential factors

Quote	Beschrijving	Thema
<i>Vaak is het al wel zo dat het project an sich vooral bijdraagt aan duurzaamheid. Dus in het hele afwerkingskader waarom zouden we dit moeten doen? Speelt duurzaamheid daar vaak al een basis rol in.</i>	aanleiding voor het project zit duurzaamheid vaak al in	assessment framework
<i>En een van de hoofddoelen die OVAH heeft is het kunnen ontlasten van Schiphol tunnel. Dat is niet direct duurzaamheid, maar dat is wel op een aggegratie niveau het cruciale punt. Daarin zit duurzaamheid eigenlijk al gewaarborgd want als hij kan slecht storen of al die wielen. Dus scoort je eigenlijk ook slecht op duurzaamheid, omdat wij dan de mobiliteitstransitie niet kunnen maken.</i>	Aggegratieniveau	assessment framework; Level of aggregation
<i>Dat gaat nog wel komen, maar nu zijn we natuurlijk op het punt dat er geen keuze is. Nu zijn we naar een keuze tot dit moment. We zijn voor ons een ongeluk voor niks te kiezen, dus wat zijn we allemaal heel erg met een paar eens. Dus is er denk ik vaak weinig reden voor spanning. Dat zou natuurlijk nu wel kunnen komen als we nu met zijn allen een keuze gaan maken. En de vraag wat die keuze gaat worden en iets iedereen kan vinden in de keuze. De ene variant heeft natuurlijk weer heel veel het voordeel ten opzichte van een ander variant, maar ook weer nadelen. Er is nooit de perfecte variant, dat bestaat niet. Er is altijd, zeker met dit soort complexe arena's, er altijd iemand die zegt van ik wil dit niet. Daarom moet je wel met zijn allen denken voor iemand zijn conditie vinden. Dus ik weet niet of zo zeer op dat moment zit aan duurzaamheid.</i>	Nog geen spanning, maar komt op het moment dat er keuzes gemaakt moeten worden	Conflicting interests
<i>Er is een aparte directie Duurzaamheid die zich bezighoudt met het verduurzamen van logistieke processen, zoals kantoren die volledig circulair functioneren [...] Ook bij materiaalgebruik geven wij als opdrachtgever eisen mee: als wij iets laten ontwikkelen, moet dat volgens duurzame principes gebeuren [...] De directie Duurzaamheid kijkt naar uiteenlopende aspecten, van catering en materiaalgebruik tot bredere processen, maar is niet direct aanwezig in projectoverleggen.</i>	Duurzaamheid organisatorisch verankerd, maar niet specifiek op projectniveau afgevaardigd	Getting the right people at the table
<i>Maar ik merk gewoon dat het [in kaart brengen van duurzaamheid] is best wel lastig om het in de praktijk te brengen. Dat het over zoveel verschillende afleidingen gaat. En dat er verschillende directies bij betrokken zijn die er allemaal iets van vinden. Ik denk echt dat heel veel mensen het grootste van die mensen die hier werken duurzaamheid ook heel erg belangrijk is. Maar omdat het allemaal zo versnipperd zit op allerlei verschillende directies is het heel moeilijk in kaart te brengen hoe ons duurzaamheidsbeleid moet landen in zo'n project. En Het is heel lastig om daar gewoon een eenduidig horizontale laag daartussen, dat is lastig te vinden</i>	versnipperde organisatie	Getting the right people at the table
<i>Want ik sta op zich best wel achter het hele concept van dat MIRT is. Maar ergens onbewust merk je toch wel dat MIRT, zeker als je de berichtgeving leest, best wel leidt tot een strijd tussen alle landsdelen zeg maar van wie krijgt nou wat binnen. En intern heb je ook een hele overlegcyclus. Want de bedoeling is natuurlijk van MIRT, wat ik heel goed</i>	Politisering van de systematiek	MIRT systematiek

<i>snap, is dat het ministerie zegt ik heb, we hebben een pot met geld en laat maar zien wat het belangrijkste project is. Maar dat er nu ook heel veel projecten zijn waar geen geld voor gaat zijn. Die dan wel een soort van een enorme concurrentiestijd met elkaar kan krijgen. En als er hoge druk op de lobby voor geld staat helpt dat duurzaamheidsoverwegingen die geld kosten ook niet per se.</i>		
<i>En wat hier specifiek ingesteld wordt is dat er is een Amsterdamse beleidsregel die zegt voor elke woning die jij wil bouwen moet jij 6 vierkante meter groen realiseren [...] En dat is niet iets wat wij met de externe partners hebben, omdat daar Haarlemmermeer heeft daar niets over te zeggen. Ja, dus jullie probleem niet zeker een eigen interne puntje begeleid, maar intern is best wel een ding. En hebben wij daar wel veel gesprekken over van. Want je kan niet zomaar groen verwijderen op die manier. Dat is wel een soort van duurzaamheid op duurzaamheidconflict.</i>	Intern beleid kan ook voor conflict zorgen waar partners eerst een positie over moeten bepalen voordat ze dat kunnen meenemen naar een project	political and internals stakeholder considerations
<i>Het is ook een kwestie van perspectief. De Partij voor de Dieren in de gemeenteraad van Amsterdam heeft bijvoorbeeld een opiniestuk geschreven waarin zij stellen dat we met dit project vooral de reizigers en toeristen van Schiphol faciliteren door een metro aan te leggen. Daar ben ik het niet mee eens. Beleidsmatig is het hele bestaansrecht van dit project juist dat we de Schipholtunnel willen ontlasten</i>	Je kan het van verschillende perspectieven benaderen en zeker binnen gemeentes zit daar politieke discussie achter	political and internals stakeholder considerations
<i>In al onze projecten hebben wij nu de standaard "duurzaam, tenzij" En daar moeten wij bij ieder, ieder bestuurlijk besluit dat wordt nodig. Alles wat we naar de wethouder gaan.</i>	Beleid van opdrachtgever zorgt ervoor dat er over duurzaamheid gerapporteerd moet worden bij elke keuze	Sustainability policies
<i>Duurzaamheid staat niet op nummer 1, maar we bespreken het wel degelijk bij elke mijlpaal [...] We pakken dan niet het handboek erbij, maar kijken intern hoe wij duurzaamheid zien en nemen dat mee.</i>	Wanneer komt duurzaamheid aan bod?	top management support

Thema 3: Strategieën en overwegingen van stakeholders op het gebied van duurzaamheid

Quote	Beschrijving	Aspect
<i>IBI helpt ons daar goed in; ze geven tijdig aan wat er opgeleverd moet worden en betrekken ons daarbij.</i>	Samenwerking tussen de Tier 1 suppliers en de ACO is goed	Stakeholders: Consultancy engineering
<i>Het is ook een kwestie van perspectief. De Partij voor de Dieren in de gemeenteraad van Amsterdam heeft bijvoorbeeld een opiniestuk geschreven waarin zij stellen dat we met dit project vooral de reizigers en toeristen van Schiphol faciliteren door een metro aan te leggen. Daar ben ik het niet mee eens. Beleidsmatig is het hele bestaansrecht van dit project juist dat we de Schipholtunnel willen ontlasten</i>	Je kan het van verschillende perspectieven benaderen en zeker binnen gemeentes zit daar politieke discussie achter	Stakeholders: Owners / Sponsors
<i>innen de gemeente Amsterdam zijn er veel verschillende afdelingen betrokken, en een van mijn taken is om daar continu het gesprek over te voeren.</i>	interne coordinatie is groot bij een stakeholder als de gemeente amsterdam	Stakeholders: Owners / Sponsors

<i>De afdeling Ruimtelijke Ordening speelt bijvoorbeeld een belangrijke rol in het Schinkelkwartier, maar daarnaast zijn er ook veel andere afdelingen die meedenken. Met al die partijen organiseren we regelmatig overleg om alles goed af te stemmen.</i>		
<i>Soms praat het makkelijker zonder externe partijen, omdat je dan vrijer kunt spreken. De uitkomsten delen we daarna wel met de projectorganisatie.</i>	Overlegstructuur intern in grotere opdrachtgevers	Stakeholders: Owners / Sponsors
<i>want uiteindelijk zijn wij hun opdrachtgevers. Het ministerie betaalt het wel, maar de meer dagelijkse uitvoering gebeurt door ons. Daarom is het belangrijk dat wij de juiste context meegeven.</i>	ministerie minder aanwezig, gemeentes belangrijker als opdrachtgever	Stakeholders: Owners / Sponsors
<i>Duurzaamheid wordt al snel een containerbegrip, maar binnen de gemeente hebben we veel handreikingen en werkboeken die verduurzaming concreet maken.</i>	containerbegrip binnen de gemeente amsterdam	Strategy: gebruik de beleidsdocumenten en handboeken van partners om duurzaamheid concreet te maken
<i>Duurzaamheid staat niet op nummer 1, maar we bespreken het wel degelijk bij elke mijlpaal [...] We pakken dan niet het handboek erbij, maar kijken intern hoe wij duurzaamheid zien en nemen dat mee.</i>	Wanneer komt duurzaamheid aan bod?	Strategy: keep it on agenda



Validation session - Mentimeter

The validation session was held on September 18 - 2025



Validatiesessie onderzoek Duurzaamheid in MIRT verkenningen

Waardeer de onderstaande factore



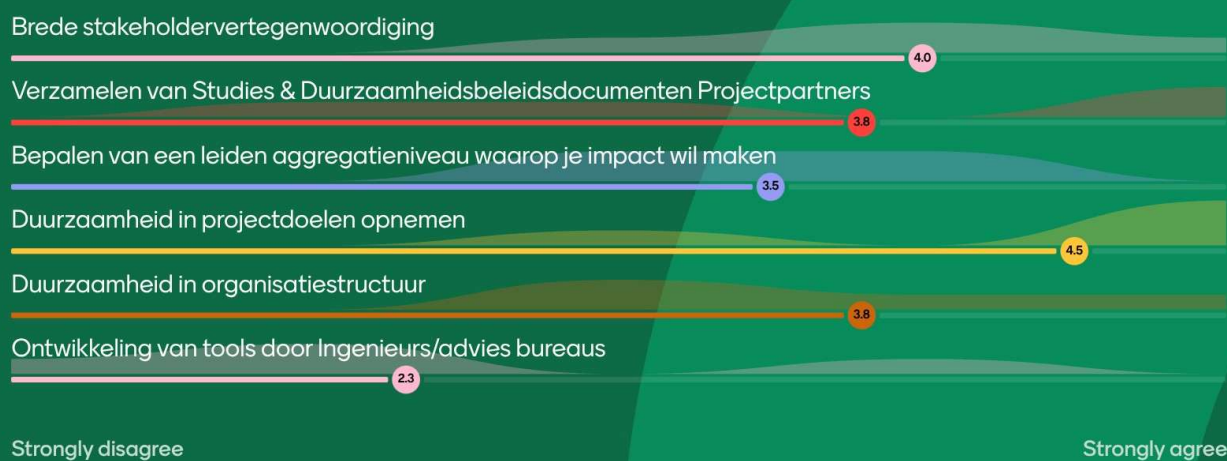
Zijn er factoren die niet genoemd zijn?



Toolkit



Acties voor de aanloopfase



Acties voor in de Tenderfase

Duurzaamheid als gunningcriterium

4.0

Strongly disagree

Strongly agree



Acties voor de start van de MIRT verkenning

Dialogoog over duurzaamheid aan de start van de MIRT verkenning

4.2

Toewijzen van adequate duurzaamheids vertegenwoordigers van de klant

4.4

Opnemen van onderscheidende duurzaamheidsthema's in afweegkaders

4.8

Strongly disagree

Strongly agree

Acties voor de analysefase

Achtergrond studies

4.4

Meekoppelkansen

3.4

Strongly disagree

Strongly agree

Acties voor de Beoordelingsfase

Documenteer duurzaamheidsoverwegingen

4.0

Beoordeel onderscheidende thema's en kwantificeer waar mogelijk

5.0

Reserveer 1-3% van de bouwkosten voor duurzaamheidsmaatregelen

2.8

Strongly disagree

Strongly agree

Acties voor bij de Voorkeursbeslissing

Neem de duurzaamheidsrapportage mee als beslisinformatie

3.3

Strongly disagree

Strongly agree



Neem duurzaamheidsafwegingen mee in gate reviews

3.7

Vertaal belangrijke thema's naar aanbestedingscriteria (plafondwaarden)

4.5

Strongly disagree

Strongly agree

Andere overwegingen?



Overview of Influential Factors

This appendix presents an overview of the final set of influential factors identified in this research. The overview summarises how different organisational, contextual, and procedural factors affect the integration of sustainability ambitions in MIRT exploration projects. These factors were derived from the combined literature review, the cross-case analysis of the Dordrecht and OVAH explorations, and the thematic coding of interviews.

The factors are grouped according to the strategic, tactical, and operational management layers introduced in Chapter 2, reflecting their position within the project governance structure. Each theme (e.g., “Commitment”, “Stakeholders”, or “Contextual dependencies”) represents a cluster of related mechanisms that either enable or constrain the preservation of sustainability ambitions throughout the project life cycle.

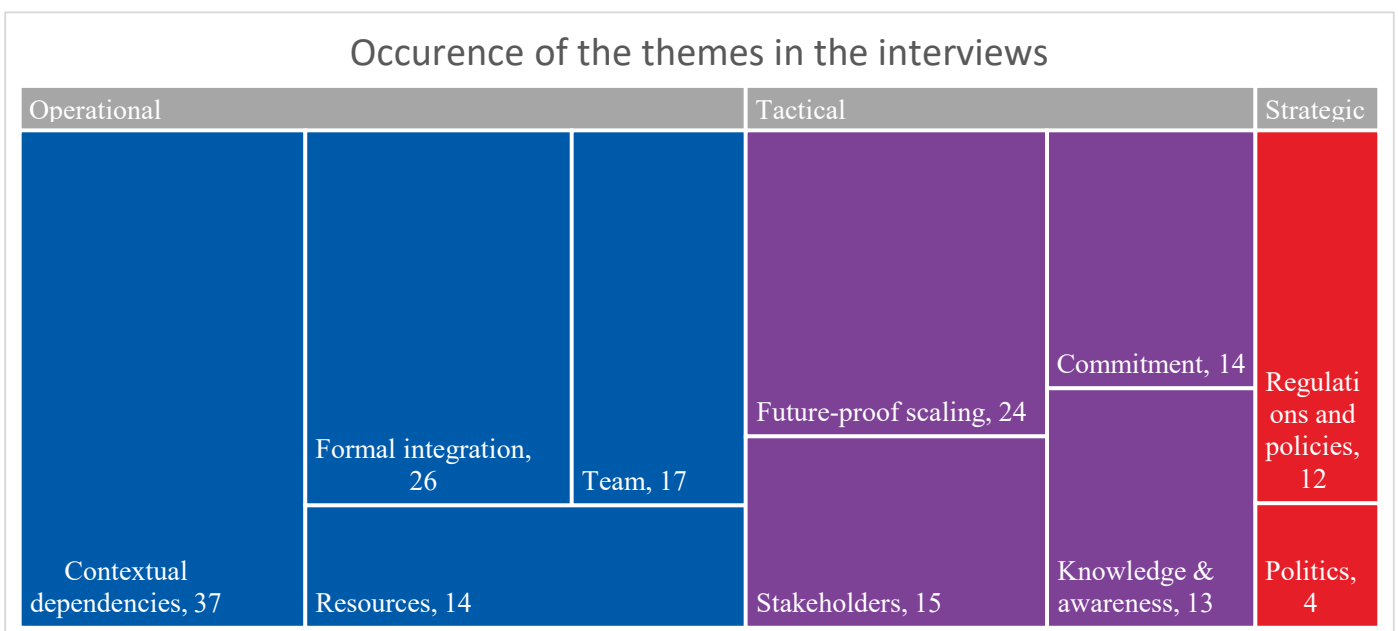
In addition to the qualitative descriptions, the appendix includes a quantitative overview showing how frequently each theme was mentioned across the interviews. This provides an indication of their relative prominence in practice and supports the synthesis of the most influential conditions for sustainability integration presented in Chapter 5.

Together, these tables form the empirical foundation for the toolkit developed in Chapter 6, where the identified factors are translated into practical strategies and priority actions for structuring sustainable MIRT explorations.

Table with final influential factors

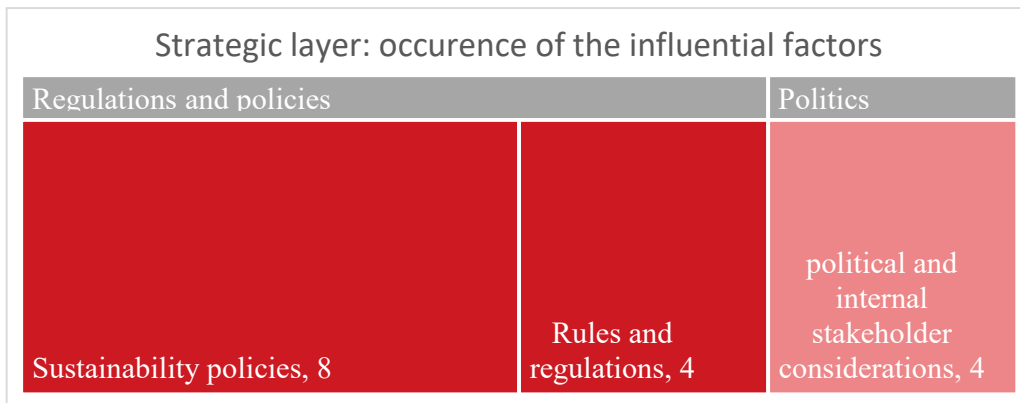
Layer	Theme	Factor
Strategic	Regulations and policies	Sustainability policies
		Rules and regulations
	Politics	political and internal stakeholder considerations
Tactical	Commitment	Top management support
		Shared vision
	Stakeholders	Broad stakeholder involvement
		Sustainability champion
		Collaboration
		Conflicting interests
	Future-proof scaling	Level of aggregation
		Anticipating future developments
	Knowledge & awareness	Information sharing
		Knowledge transfer
		Learning from Peer projects
Operational	Formal integration	Project goals & Assessment frameworks
		Contractual strategies
		Documenting and reporting
	Resources	Budget
		Quantification tools and methods
	Contextual dependencies	Financial considerations
		Location-specific factors
	Team	Competent and multidisciplinary teams
		Personal affinity
		Getting the right people at the table

Number of codes found in interviews per theme



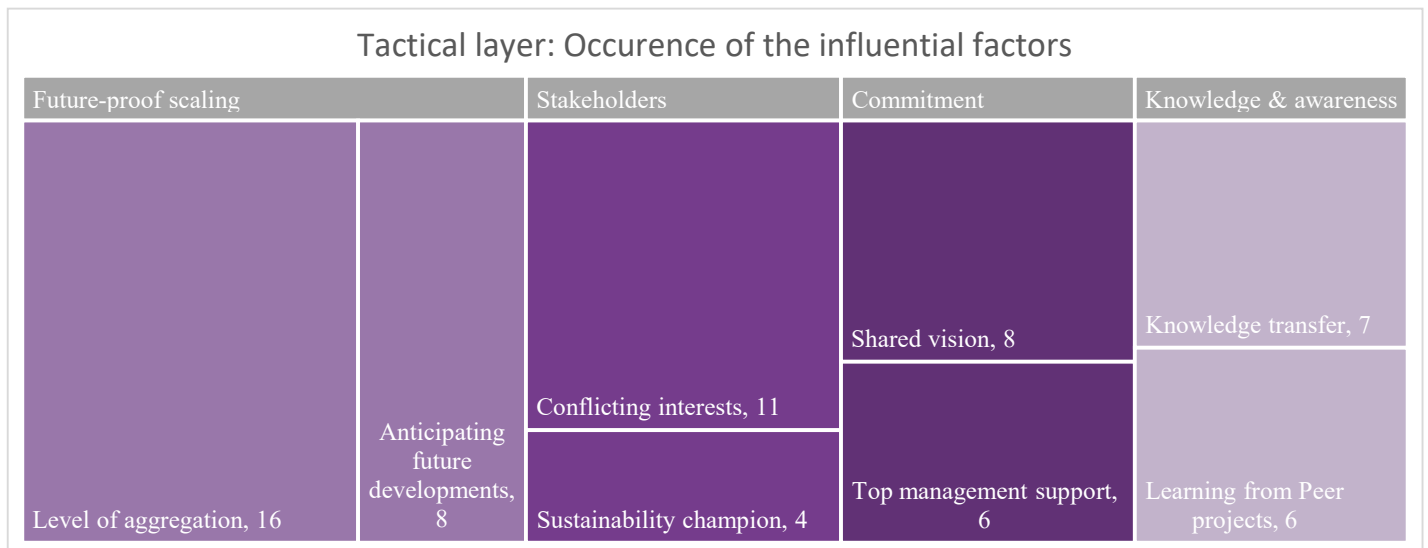
Influential factors from Strategic level

Theme	Factor	count
Regulations and policies	Sustainability policies	8
	Rules and regulations	4
Politics	political and internal stakeholder considerations	4



Influential factors from Tactical level

Theme	Factor	Count
Commitment	Top management support	6
	Shared vision	8
Stakeholders	Broad stakeholder involvement	0
	Sustainability champion	4
	Collaboration	0
	Conflicting interests	11
Future-proof scaling	Level of aggregation	16
	Anticipating future developments	8
Knowledge & awareness	Information sharing	0
	Knowledge transfer	7
	Learning from Peer projects	6



Influential factors operational level

Theme	Factor	Count
Formal integration	Project goals & Assessment frameworks	16
	Contractual strategies	3
	Documenting and reporting	7
Resources	Budget	5
	Quantification tools and methods	9
Contextual dependencies	Financial considerations	26
	Location-specific factors	11
Team	Competent and multidisciplinary teams	0
	Personal affinity	5
	Getting the right people at the table	12

Operational Layer: occurrence of the influential factors

Contextual dependencies	Formal integration		Team	
Financial considerations, 26	Project goals & Assessment frameworks, 16		Getting the right people at the table, 12	Personal affinity, 5
	Resources			
Location-specific factors, 11	Documenting and reporting, 7	Contractual strategies, 3	Quantification tools and methods, 9	Budget, 5