

Ramboll Rail

Sustainability Service Offering

RAMBOLL

Bright ideas.
Sustainable change.

2024

Our Mission

Create sustainable societies
where people and nature flourish



The partner you can trust

We build successful and enduring partnerships with our clients.



The hallmarks of our relationships with clients are:

- 01 Deep understanding of needs
- 02 Proven track record
- 03 Empathetic, passionate and responsible behaviour
- 04 Collaboration and co-creation
- 05 Bringing next practice

What our Clients say

“

Working in close collaboration with Ramboll, we have been able to solve complex engineering and sustainability challenges.

Dr Kemi Ayodele

Development Manager
Argent

“

We feel that Ramboll is ambitious on our behalf, yet always with a focus on the human side of things.

Steven Springhorn

SGMA Technical Assistance
Manager | Department of
Water Resources,
California

“

Ramboll really wants to know what our key issues are and how they can help.

Gunnar Hagman

Vice President | Skanska,
Sweden

“

The proactive approach from Ramboll is key – that’s how we make sure that we are successful together.

Michael Flynn

Programme Director
Digital Railway

“

Ramboll could supply a solution that was 20% cheaper than what the competitors had to offer and could deliver a better thought out solution owing to its wide palette of competencies.

Zhang Yi

Project Manager
Chinese Power Investment
Corporation

Driving the sustainable change with our clients

BANE NOR

TRAFIKVERKET



NetworkRail

sporveien

Finnish Transport Infrastructure Agency



SIEMENS



facebook

City of Helsinki



Ørsted



SKANSKA

STOCKHOLM
Vatten

SAINT-GOBAIN



TESLA

Statens vegvesen

amazon

storebrand

Carlsberg

NCC



novo nordisk



VATTENFALL

HOFOR

On track for Sustainable Change

OUR STRATEGY 2022-25

Applying **Life Cycle Approaches** to accelerate the **Decarbonisation of the rail sector**, setting new standards and challenging existing practices to achieve **low carbon rail infrastructure design**

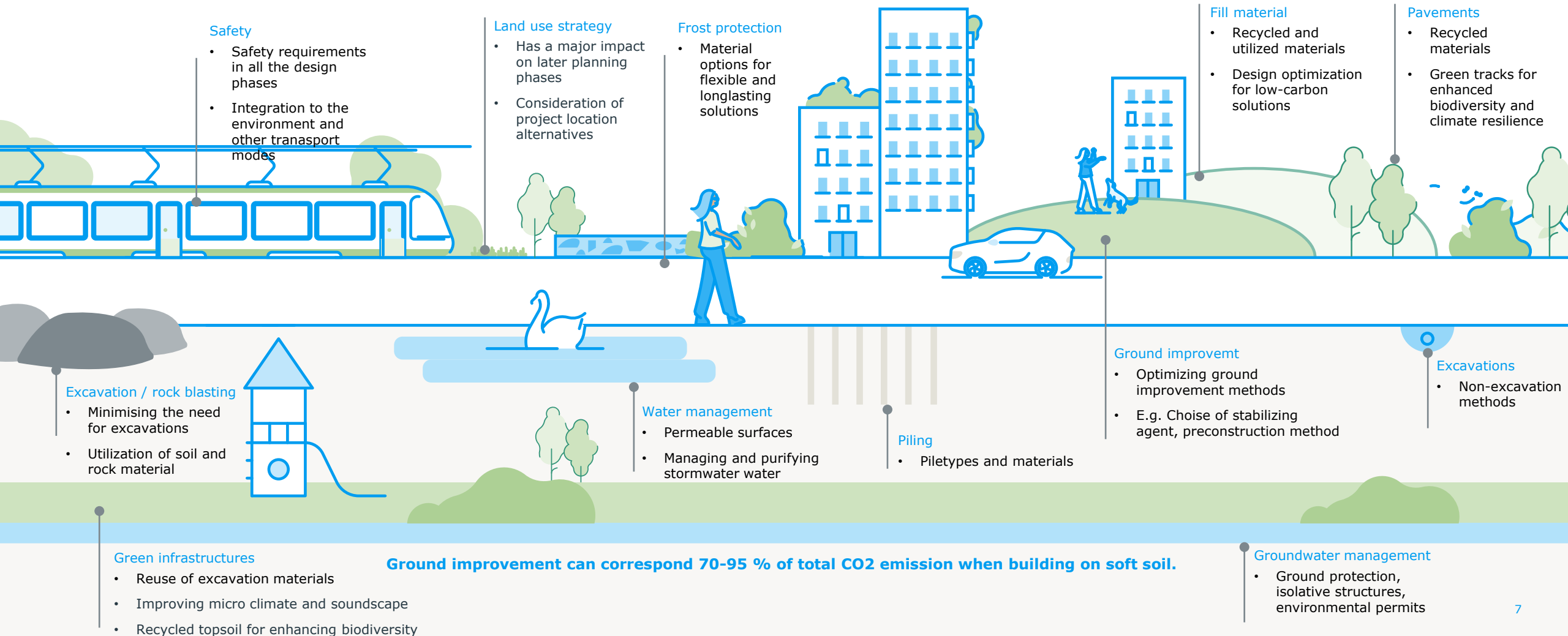
Using **innovative and recyclable materials alongside progressive approaches to Asset Management** to increase the life of the asset and **put circularity at the core of our design**



Providing **strategic and operational advice** promoting **resilient and liveable societies** through the development of **integrated transport systems with rail at the core**

Taking a **holistic sustainability approach** across the full project life cycle in **both assessments and design to maximise biodiversity and support ecosystems**

Resource wise and integrated sustainability solutions



Decarbonise
for net zero
Low carbon
design

01

Metro Copenhagen

Climate impact from wheels and rails, Denmark

Challenge

- Metroselskabet's focus on CO2 footprint.
- Contribution from replacement of wheels and rails

What we did

- Analyse possibilities for reducing the use of steel
- Market dialogue to understand where suppliers are
- Prepare a climate footprint for the current situation
- Suggest options for reducing CO2 footprint.

Impact

- Insight in rail/wheel market on CO2 reduction
- Insight in CO2 footprint from operation
- Insight in calculation methods (LCA analysis)



Nordhavn Tunnel

Denmark

4 objectives for the work on sustainability to be implemented in the project:

- Reduction of CO2-eq emissions in the construction phase
- Support a CO2-neutral operation of the Nordhavn Tunnel
- Reuse and recycling of materials
- Support biodiversity in the Nordhavn.

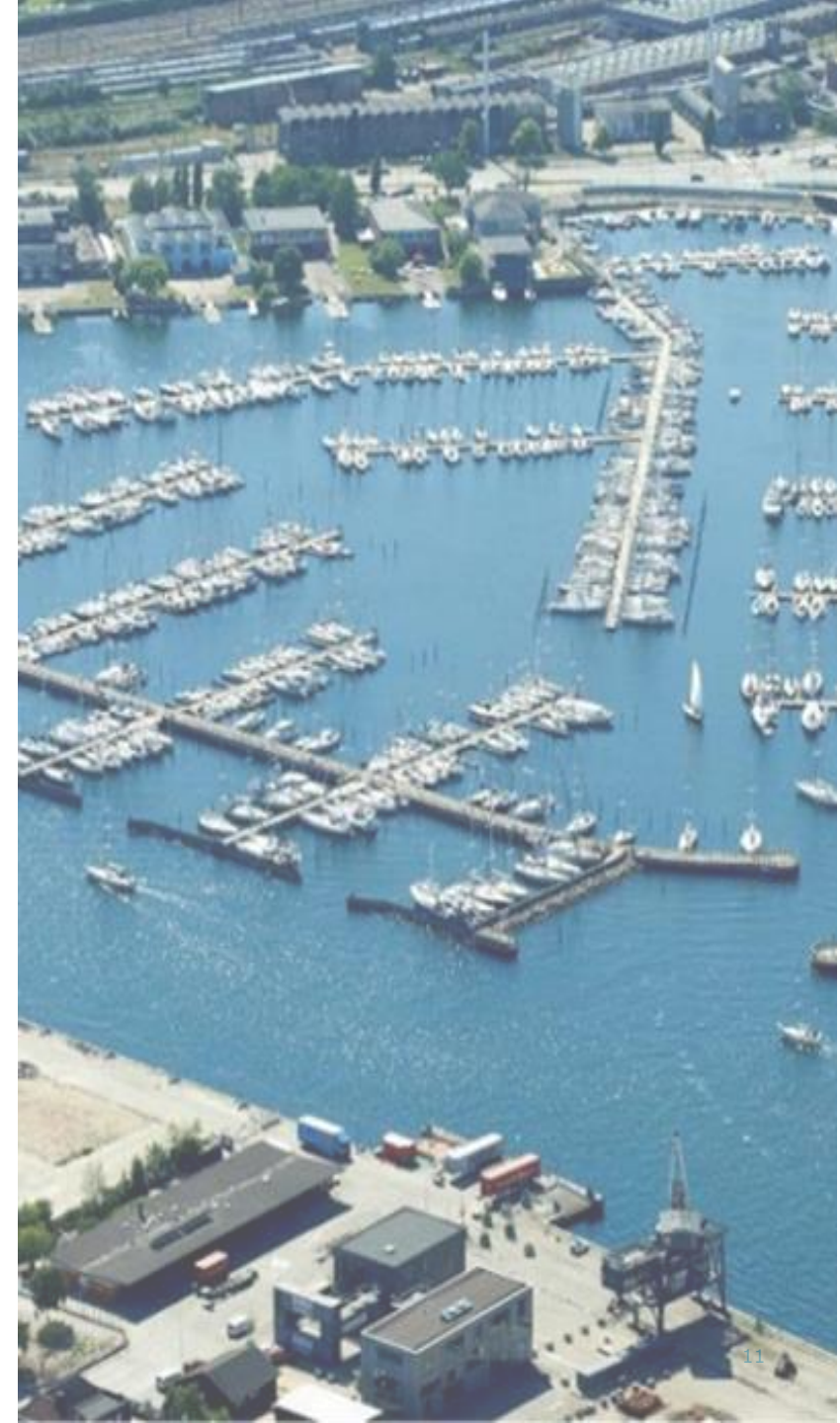
What we did

- Implementation of focus areas and actions were selected based on previous BREEAM Infrastructure (previous CEEQUAL) screening. A sustainability coordinator role was created and topic-focused coordination was implemented as part of the project. Both internal and external coordination of sustainability actions was undertaken in the project. As a coordination tool, the Commitment Register was used, where actions and their handling in the project were recorded.

Effect

- Targeted sustainability coordination ensured a focused multidisciplinary effort for the implementation of selected focus areas and actions. Concrete sustainability measures in the project include 1) At site level, 2) Requirement of EPDs, 3) Use of InfraLCA, 4) Partnership agreements 5) Stakeholder management

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Life-cycle sustainable tramway projects

Quality requirements for the investment

Finland

Challenge

- In zoning, planning and construction, it is not known how different solutions affect the costs and climate emissions during the whole life cycle of the tramway.

What we are doing

- The project affects the life-cycle sustainability of tramway projects, the life-cycle costs and emissions of maintenance by increasing the dialogue between planning, construction and the owner, taking into account the requirements of use and maintenance in earlier project phases.

Effect

- In this project we produce general tramway infrastructure quality requirements for the investment project, which guide the planning and construction phases to use solutions that can promote maintenance of the tramway infrastructure's year-round service level in a cost- and resource-efficient and climate-wise manner. 2) Information is produced for the investment project to support decision-making about the effects of various design and construction solutions on the life cycle costs, emissions and resources of the tramway.



Resource management and circular economy: circularity at the core of Rail design

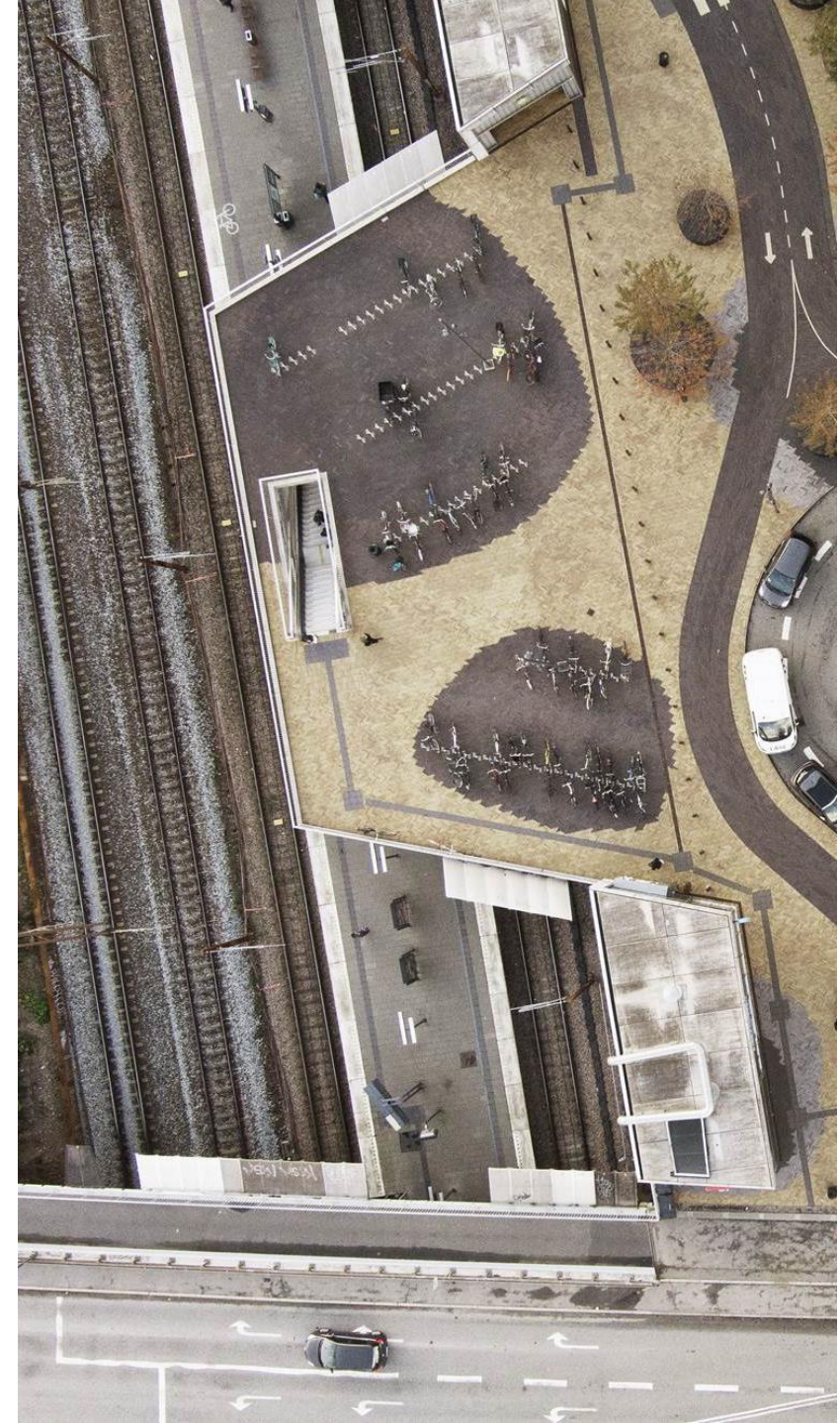
02

Circular economy and resource management

Ramboll applies an interdisciplinary approach to tackle circular economy challenges in rail sector by providing a one-stop shop of leading experts across various domains.

Our adept team concentrates on the judicious use of materials, their recycling, and management, vital for forging sustainable and liveable cities connected by efficient rail systems.

- LCA
- Circularity assessments
- Solutions to minimise and prevent waste generation
- Regulatory mapping
- Auditing
- Permitting



Vantaa Light Rail Resource and carbon management

Finland

Challenge

- The light rail is a significant investment into Vantaa's future. Key design principles are sustainability, greenness, ecology and accessibility.

What we did

- Resource-wise coordination was used to apply sustainable key principles during the design phase. The purpose of the coordination was to involve the design team and client to reach sustainability goals by defining low carbon solutions.
- Carbon accounting was used to recognize emission intensive structures and decrease amount of embodied carbon. Results were used to provide information for project design which was adjusted to decrease emissions in comparison to conventional solutions.

Impact

- Vantaa light rail is a model example for a project led according to sustainability values. Decisions made based on the resource and carbon management were taken into design documents and reported. The project will contribute for developing best low carbon practices in build environment.
- Preliminary results: up to 30% saving in emissions in ground and pavement structures



Thames Link Structural Strengthening

UK

Challenge

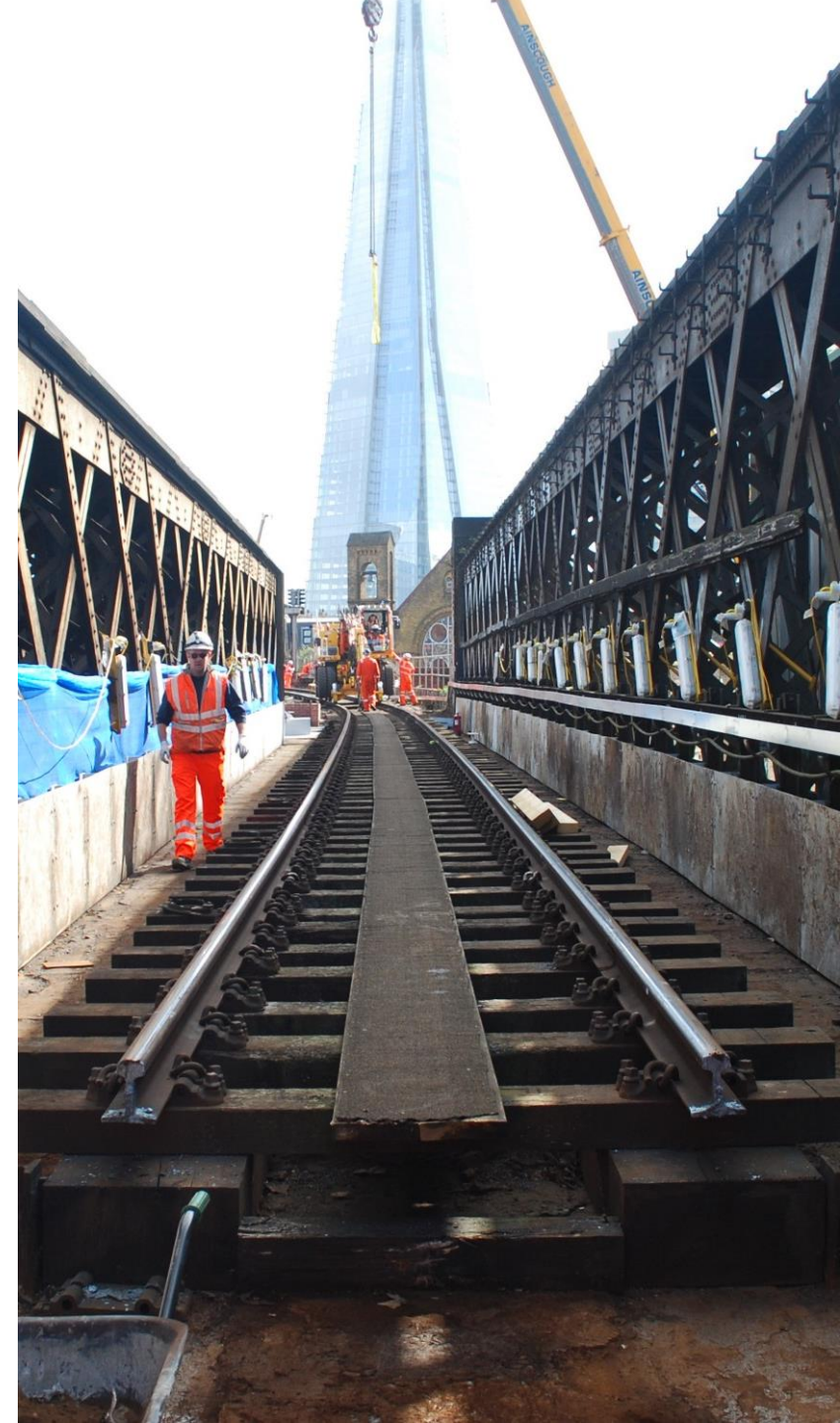
- Review the structures (both new and existing) to facilitate the proposed track realignments between Blackfriars and New Cross

What we did

- Initial assessments showed that many structures were under capacity but through careful analysis and design of strengthening we were able to reuse them.

Impact

- 33 structures that would have otherwise needed replacement were reused with huge benefits in embodied carbon.



Reading Station Redevelopment

UK

Challenge

- Civils and Rail Infrastructure works associated with the station re-construction in a constricted urban environment, including new bridges, retaining walls and major embankment works.

What we did

- We reviewed the materials on site and developed processes for identifying, remediating and reusing site won material and the use of recycled aggregate

Impact

- The contractor was able to significantly reduce vehicle movements (~6,000 less lorry trips) into the site by re-using material on site and avoiding importation of quarried material



Biodiversity and ecosystems: Rail design to enhance biodiversity and ecosystems

03

High speed rail Gothenburg-Borås

Sweden

Challenge

- To include sustainability in a large and complex infrastructure project.

What we did

- Developed a structured and transparent method for choosing route locations based on a wide range of sustainability parameters, including realising ecosystem services benefits.

Impact

- The result constitutes an important part of the decision-making process for the Swedish Transport Administration to enable the route that optimises environmental, social and economic benefits, and predict potential trade-offs between sustainability goals.



Intelligent Environmental Estate -tool

National Highways, UK

Challenge

- Assess the feasibility of the application of digital technologies to capture and automate the detection of environmental improvement sites.

What we did

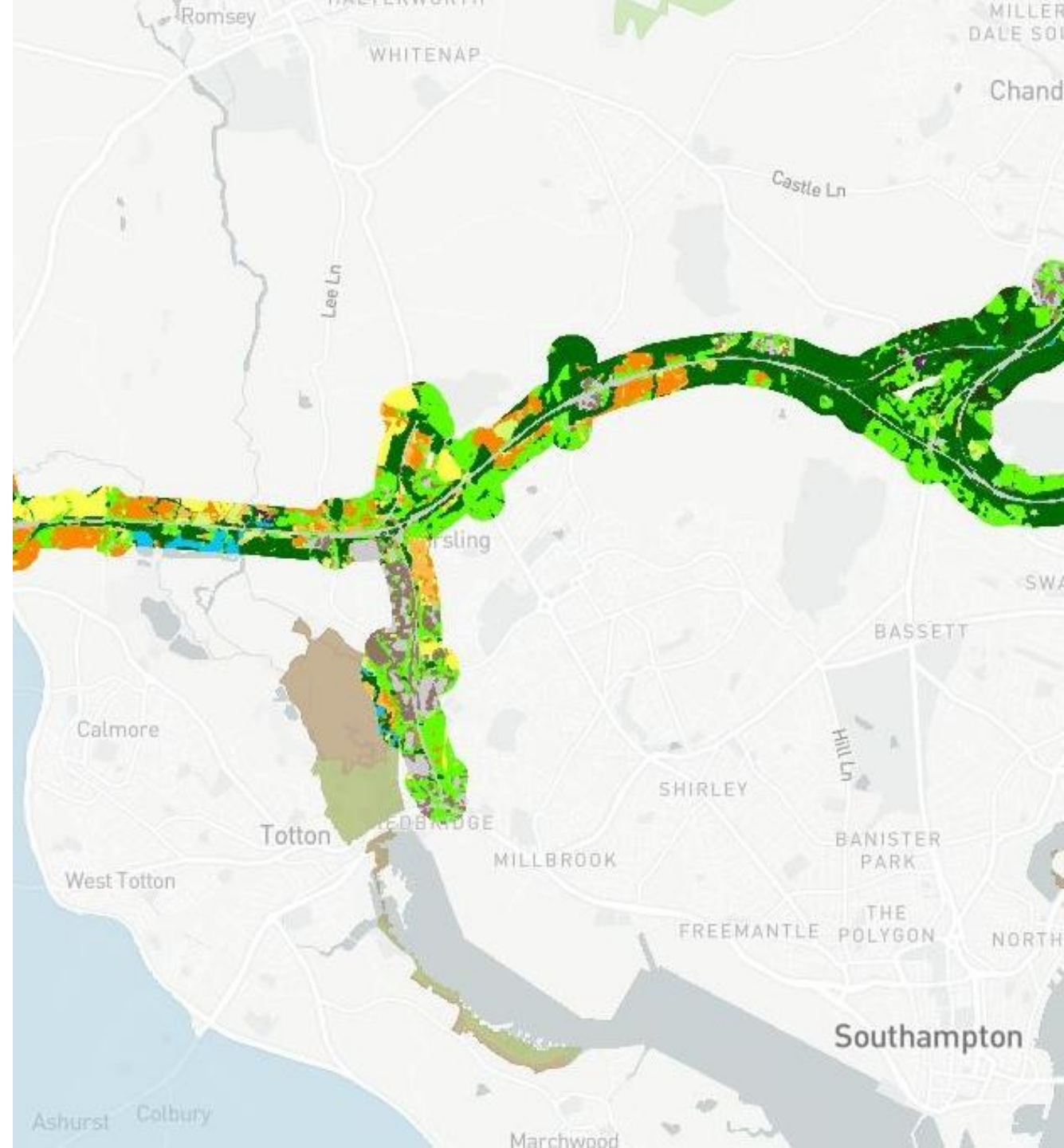
- Developed the 'Intelligent Environmental Estate' tool which enables habitat identification using satellite data, as well as identification of objects on the National Highways network using drive by imagery.

Impact

- Affordable site monitoring enabling action where needed in order to maintain a healthy environmental estate – contributing to creating a sustainable society and climate resilient future.

[Click here to read full description](#)

Ramboll



High Speed Rail 2

UK

Challenge

- To support delivery of the most sustainable high-speed railway in the world, with the considerable risks to ecology and landscape that require novel and cutting-edge mitigation measures.

What we did

- Analysis of thousands of ecological survey results spanning 80km. We have designed swathes of new tree planting, pond creation, species translocation and habitats enhancements.

Effect

- Plans allowing for up to 50 years of monitoring and maintenance.
- We helped the client balance the many interacting functions and stakeholder requirements of this complex scheme.



[Click here to read full description](#)





Resilience & Liveability: Rail Innovations for more Sustainable Societies

04

ERTMS signalling system in Denmark, countrywide replacement of existing signals

Denmark

Challenge

- Introducing ERTMS in order to strengthen rail-connections between European cities.
- Denmark is the first European country upgrading its complete signalling systems to ERTMS, programme has been running since 2010 and Rambøll been a part of it from the beginning.

What we are doing

- Setting up framework for Safety Management, Interoperability and RAM process
- Defining Safety and RAM targets
- Prepare tender specifications for Safety and RAM
- Ensuring full circle of Safety Management and approval process on integration level in close corporation with client and suppliers

Effect

- Ensure high uniform safety level
- Ensure reliable system with high availability



Femern Belt Tunnel Safety Management

Denmark

Challenge

- Longest immersed tunnel in the world with a total length of 18.2 km with a combination of both rail and road.
- The fixed link enables reaching the two countries in 7 minutes by train and 10 minutes by car, and it is a major part of the future sustainable and transnational European transport system

What we are doing

- Setting up framework for Safety and Interoperability Management processes across complete programme
- Establishing full Safety Management System for end client for final commissioning
- Ensuring full circle of Safety Management and approval process in close corporation with client and suppliers to ensure final APIS

Effect

- Ensure high uniform safety level
- Final APIS



Circular economy information management maturity matrix

Finland

Challenge

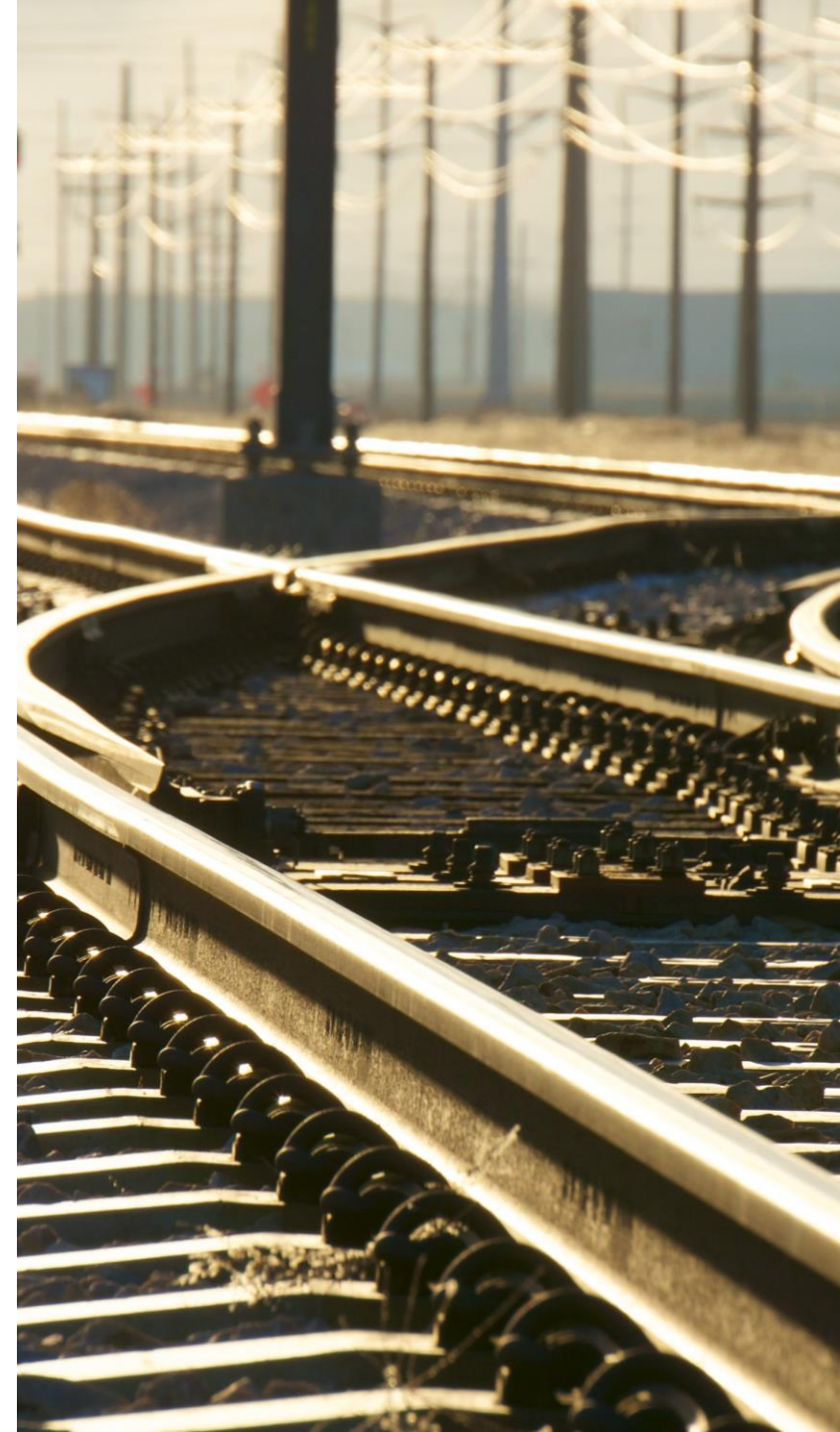
- The aim of the project was to identify what kind of challenges information management poses to the implementation of the circular economy, and how by developing information management of the circular economy, better conditions can be created for the circulation of materials in highway projects for certain materials. .

What we are doing

- In project 1) the current challenges, strengths and suggestions for further measures were clarified with the help of the processes during the use of the materials 2) Different materials were placed in the circular economy information management maturity matrix 3) A plan was drawn up to improve circular economy information management.

Effect

- The maturity level of circular economy information management describes how the processes and information management support the implementation of the circular economy for each material. The maturity level indicates the level of development of systematic information management and processes.



DTU Light rail vibration study

Denmark

Challenge

- The main challenge was the concern over potential malfunction of vibration-sensitive equipment at DTU due to the planned light rail line between Ishøj and Lyngby-Taarbæk municipalities, with Lundtofte as the terminal station.

What we did

- Mapping all potentially affected parties through surveys.
- Estimating current vibration levels and establishing vibration limits based on equipment specifications, measured background levels, and guidelines.
- Developing transfer functions based on seismic vibration measurements and room measurements to estimate vibrations at the DTU buildings.
- Providing recommendations for possible light rail vibration mitigation measures to comply with the established limits. This involved a range of strategies like using mats under ballasted tracks and implementing floating slab tracks where necessary and providing estimated costs for those interventions.

Effect

- Necessary vibration damping measures were proposed to protect the critical equipment, which has implications on costs for track modifications. The results ultimately contribute to maintaining the city's technological infrastructure without impeding urban development and life quality.



Noise and Vibration Reduction from Metro Operation

Denmark

Challenge

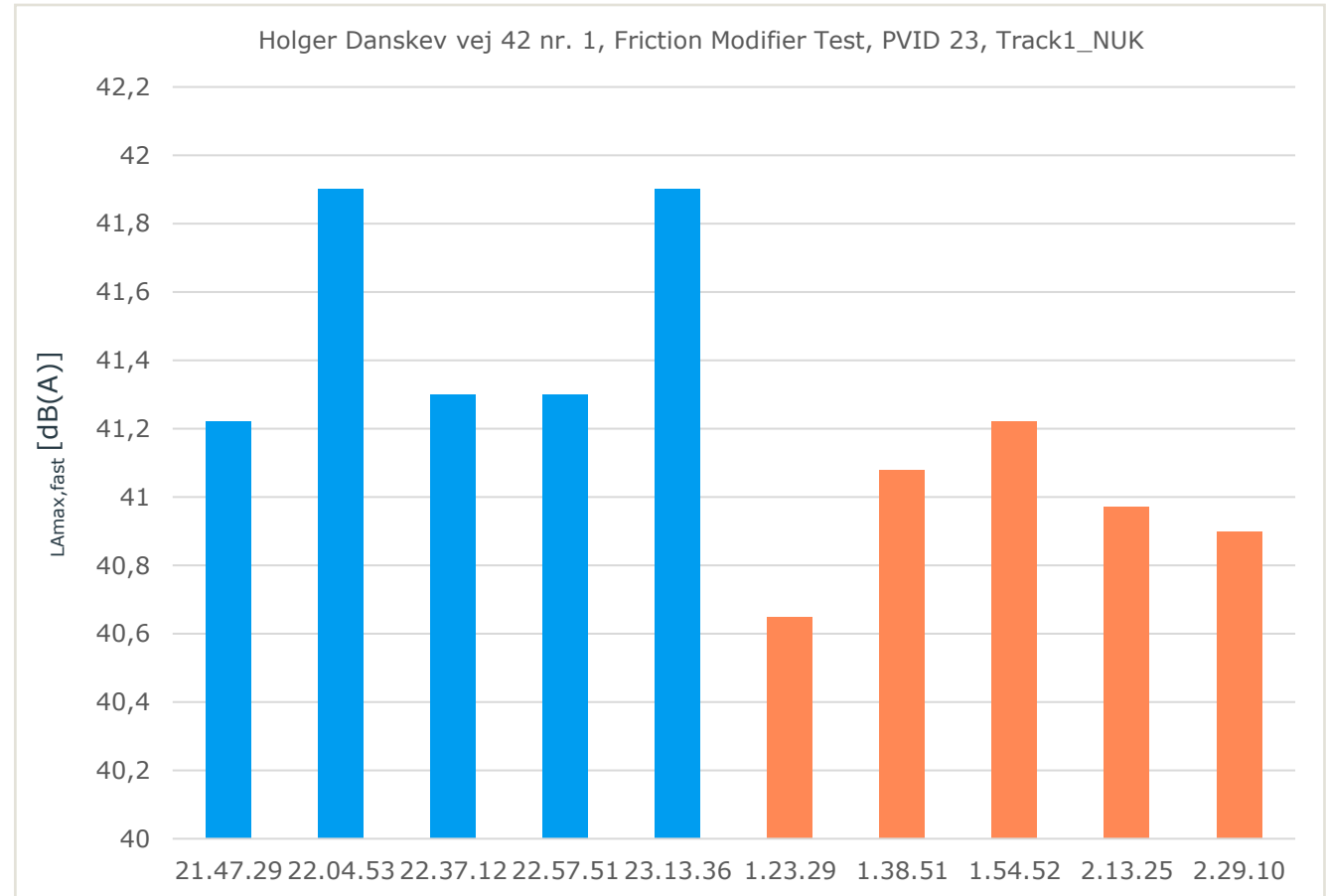
- Neighbour's complaints about noise from the train operation.
- Although the noise levels are below the assumptions from the EIA, Metroselskabet wants to further avoid noise nuisances

Our approach

- Analyse data from vibration sensors in tunnel, suggest alternatives for reducing noise
- Measure noise levels in neighbouring houses, set-up correlations between noise, vibrations, speed, wheel and rail condition etc.

Effect

- Promoting the community well-being by decreasing noise levels from the railway, which will likely improve the quality of life for residents in neighbouring houses and benefit the local environment.



Green solutions in improving the soundscape

Finland

Challenge

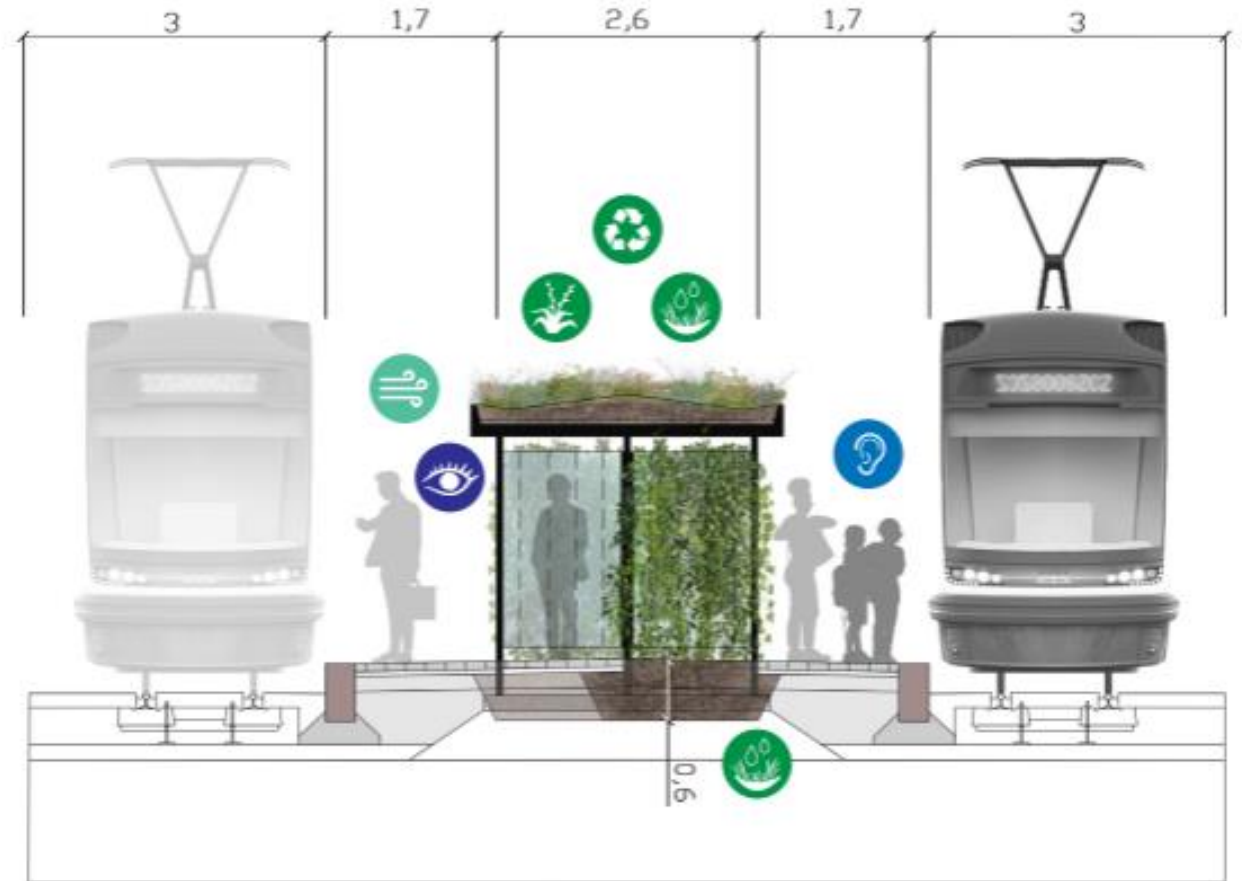
- Helsinki will densify its urban structure in the coming years along busy entrance routes. This raises challenges in terms of a pleasant walking environment, especially in terms of noise.

Our approach

- We explored how green structures can be utilized in noisy street pedestrian environments to improve the sound environment. Research literature and benchmarking were used as background material. The result was principle plans for green sound environment structures suitable for Helsinki's conditions.

Effect

- The principal solutions can be utilized in the further planning of the area as well as in other similar planning projects. In addition to improving the sound environment, green structures have an impact on e.g. biodiversity, urban enrichment and natural stormwater management.

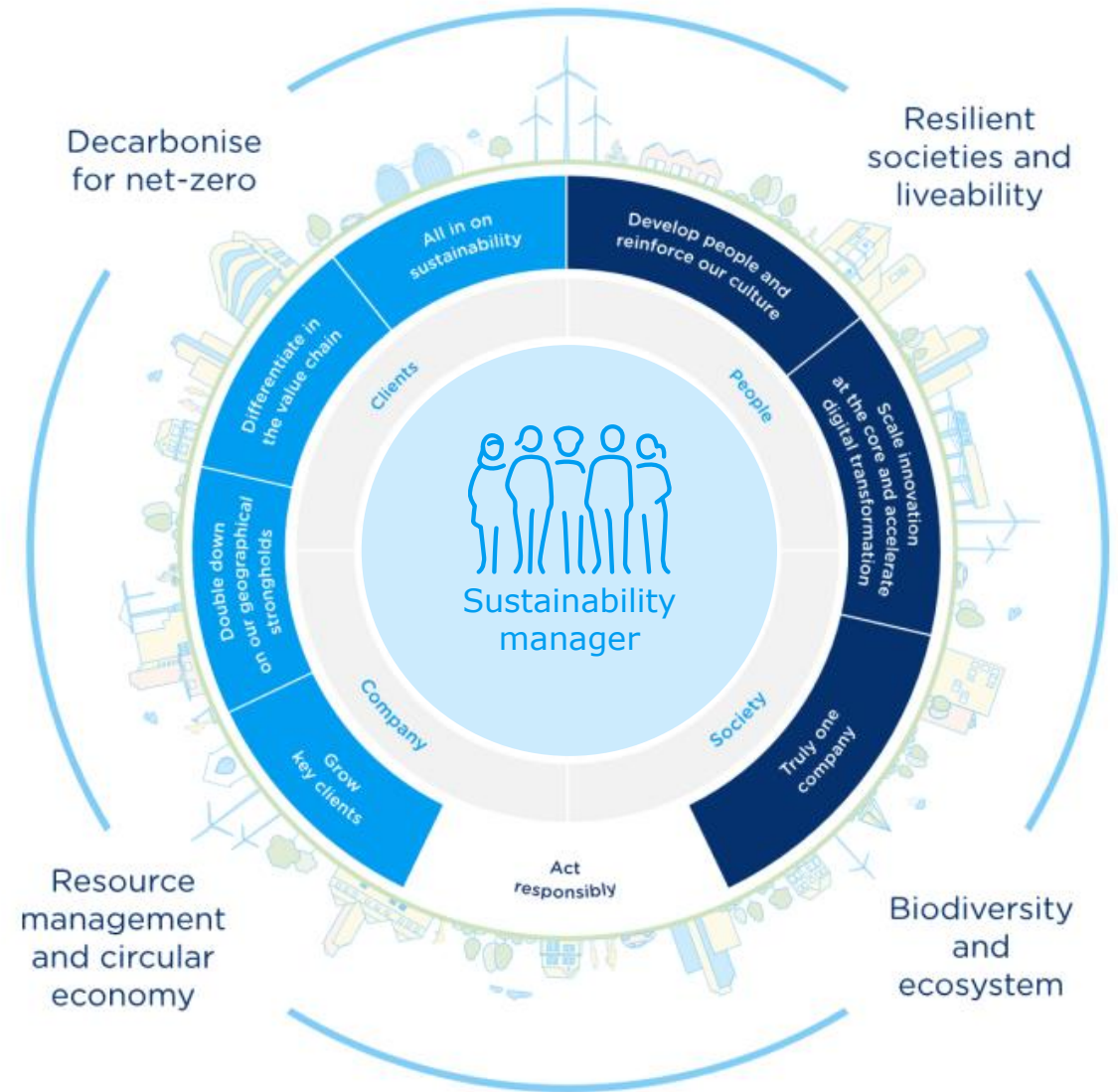


Integrating sustainability into all project phases

Sustainability managers in projects are...

- The driving force
- The key to securing Ramboll's strategy
- The client's and team's partner for sustainable change
- Responsible for continuous focus on sustainability
- A unifying role for all disciplines and themes

We are as sustainable as our projects are



Brynsbakken Rail, a holistic sustainability management

Norway

Challenge

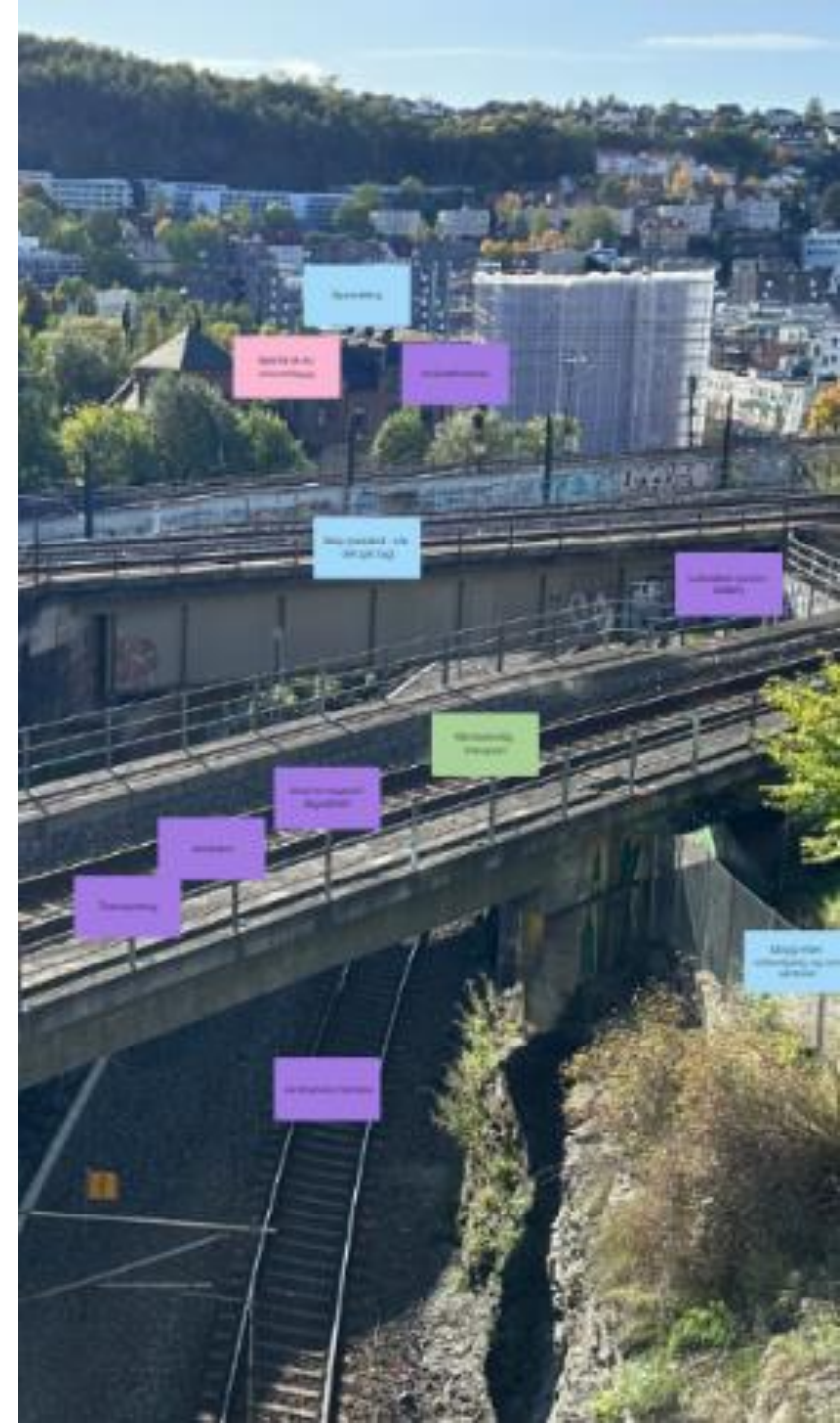
- The goal was to ensure the project objectives are comprehensive and reflect the sustainable development within its multiple dimensions, particularly the social aspect which felt insufficiently covered.

What we did

- The Sustainability Manager took an active role, employing a matrix/scorecard approach and developing a tailored methodology for an inventive process to assess alternatives, while also addressing goal conflicts in a workshop setting.

Impact

- The approach led to new perspectives for the client, uncovering findings like potential new locations for conservation-worthy buildings, which might positively affect sustainability parameters. Additionally, public participation was increased to better understand community needs and desires, and BREEAM Infrastructure certification was initiated for a more holistic sustainable development assessment. The impact of these efforts has broadened the view of sustainability within the project, adding value and paving the way for informed decisions on alternatives.



E39 Bokn Bømlafjorden for Norwegian Public Roads Administration

Norway

Proactive sustainability manager in the management team

- Innovation Project: Sustainability Rose Use of the Sustainability Rose in the Screening Phase (alternative search) and in the Impact Assessment Dilemmas uncovered and discussed. Focus on all three dimensions Sustainability Action Plan for the current project phase and future phases

Client

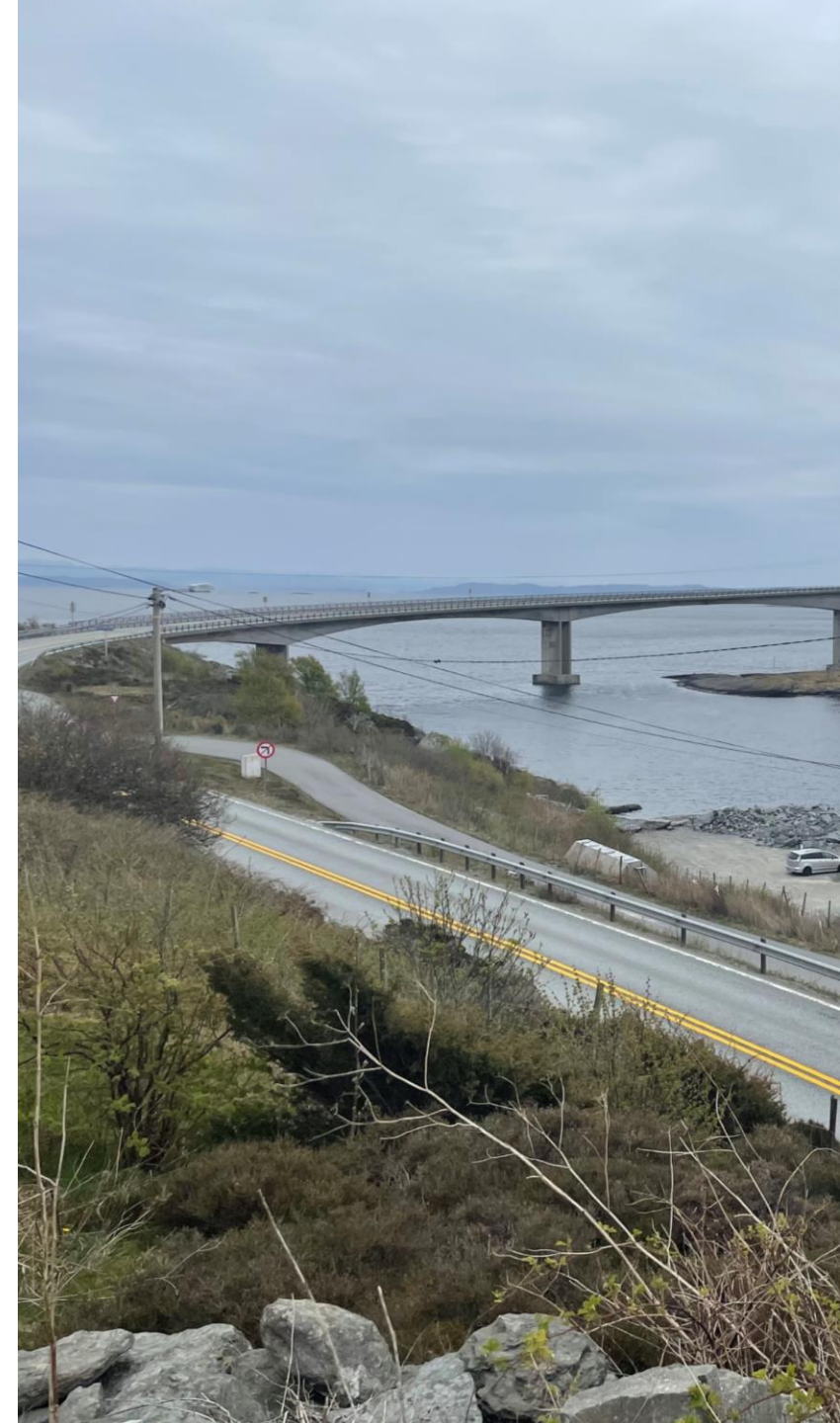
- Norwegian Public Roads Administration

Phase

- Municipal sub-plan with Impact assessment

Facts:

- Three municipalities
- Two county municipalities
- 70 km of road
- Motorway four lanes, 110 km/h



E6 Ulsberg Vindåsliene, CEEQUAL/Breeam Infrastructure

Norway

Challenge

- Design a safer and wider stretch of the E6 highway south of Trondheim while minimizing the impact on the environment and with the lowest possible greenhouse gas emissions.
- The project is tasked with achieving a 50% reduction in greenhouse gas emissions in the building phase and 80% in the operations phase.

What we did

- Rambøll structured the design process around the CEEQUAL system. The project's ambitious goals for greenhouse gas emission are a central element in the planning and design process across all disciplines. Rambøll developed tools to maximise the frequency and accuracy of greenhouse gas and financial accounting. Each decision about the placement of the route was evaluated on all merits with input from all disciplines.

Impact

- Rambøll's work with the greenhouse gas budgeting and accounting gives the broader team the ability to make decisions – large and small - based on the effects on the CO2 emissions level.
- The E6 Ulsberg Vindåsliene project will be the first of its kind to achieve CEEQUAL certification in Norway.



Innovation & Digital Solutions



Driving innovation and sustainability through partnerships

We partner with vendors, universities, and industry associations to translate ideas and technology into viable, sustainable, and innovative solutions for the benefit of our clients and end users

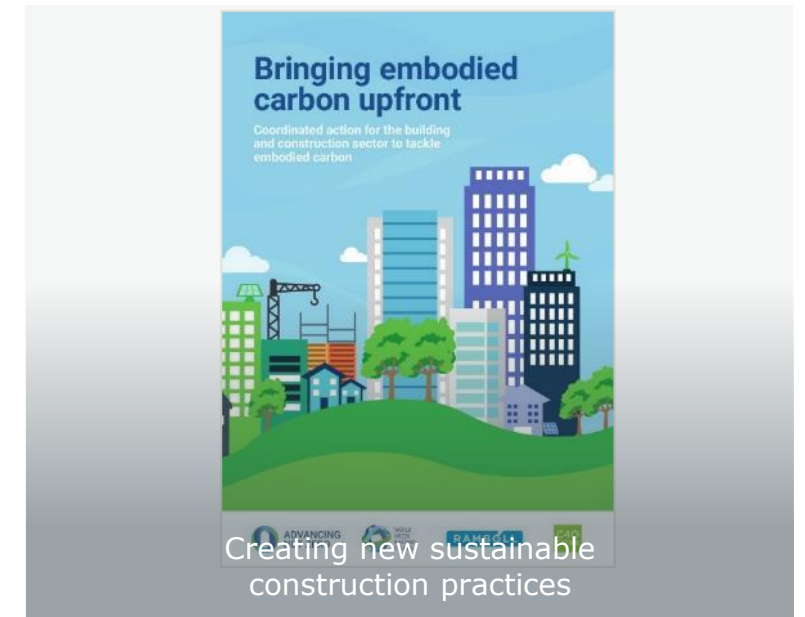
Tech partners with Autodesk



Danish-German hydrogen cluster



World Green Building Council



Digital solutions for smart and sustainable development of the built environment



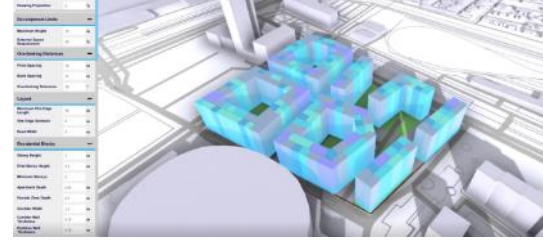
Galago

Delivering evidence-based insights to enable better commercial and sustainable decisions



Zero

Enabling data-driven decisions to achieve carbon neutrality



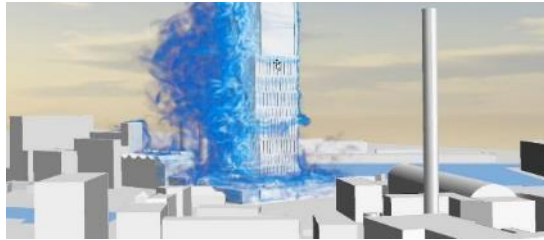
VU.CITY

Making better design and planning decisions, earlier and faster



Smart design and optimised asset management

Using digital twins to make informed decisions on asset lifetime inspections and extensions



Visualise – evaluate – optimise

Using digital simulations to quickly explore alternative scenarios and improve certainty in decision making



Streamlining railway planning

Pioneering use of parametric design models on rail projects to integrate, streamline, and automate workflows



Automated hospital robots

Freeing up time to focus on patients' well-being



Crowd modelling – optimise space

Predict how pedestrians move through buildings before they are built – creating safe and efficient environments

Euston RCM

UK

Challenge

- To implement an Artificially Intelligent (AI) Remote Condition Monitoring (RCM) system that enables Network Rail maintenance staff to develop a predictive maintenance regime.

What we did

- Ramboll designed the interface between the lineside signalling equipment and the AI RCM equipment to enable the lineside equipment to be monitored at a centralised location.

Effect

- Targeted maintenance interventions significantly reduce disruption to the customer and minimises the maintenance workforce's exposure to hazardous conditions.



Digital Twin for railway platform at Aarhus Central Station

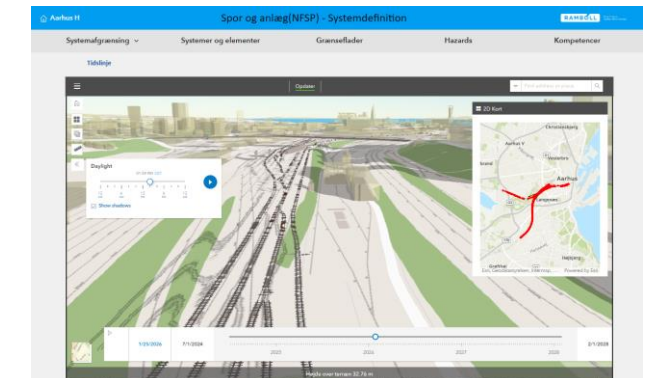
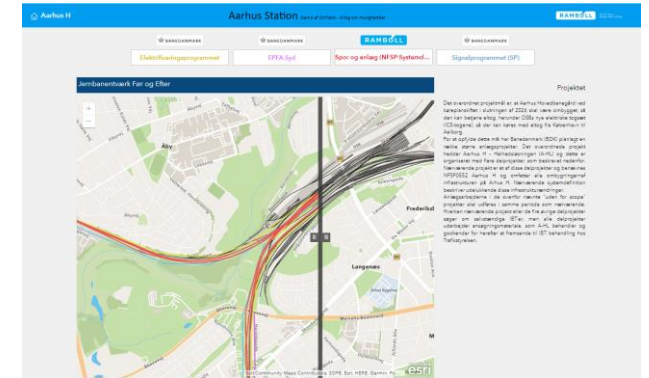
Denmark

Project description

- Rail projects are often multi-disciplinary and complex, with each discipline maintaining its own data and operating in silos. The rail safety process relies on inputs from all disciplines and requires an in-depth project overview.
- The absence of a collective platform renders the safety process incomplete, leading to an unclear safety scope, lengthy assessment procedures, and resources being spent on non-essential issues.

What we did

- We developed a GIS platform that visualises the railway project using data available from the early program phase. This platform makes a complex rail project appear transparent across all phases and disciplines.
- The model is formatted to show compliance with safety approval requirements. It demonstrates how users can access all relevant activities of each project phase, retrieve project documents through a digital-twin model, and highlight the inclusion of various project requirements, such as design requirements, safety requirements, and as-built documentation.



[Explore the app](#)

Digital Twin Cities Centre

Description

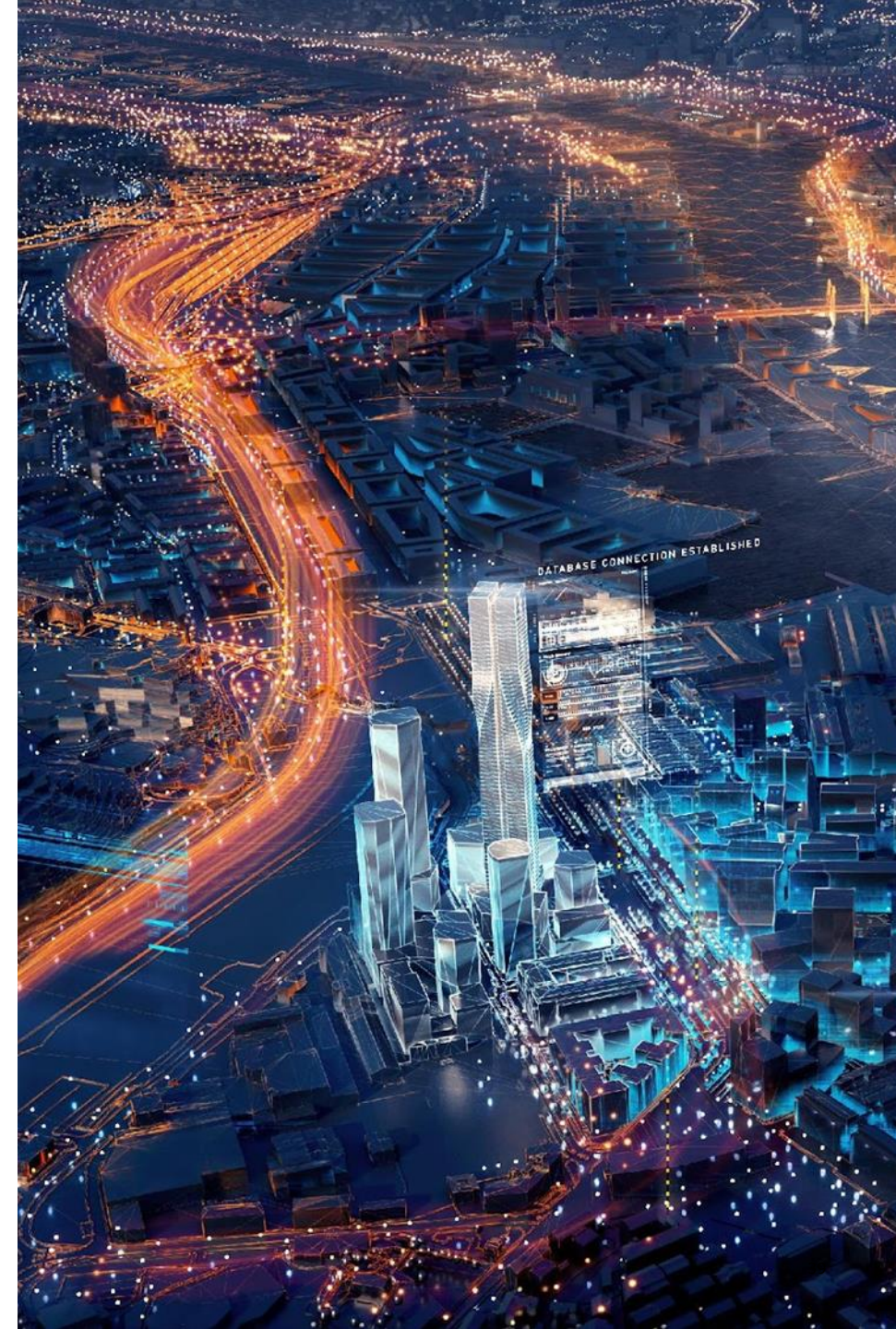
- A Vinnova funded national competence centre.
- 100 MSEK
- 2020-2024 (Optional 2025-2029)

Purpose

- The centre's vision is to investigate and develop Digital Twin City concepts as the foundation for digital planning, design, construction, and management of sustainable, intelligent, and liveable cities and regions throughout Sweden by 2030
- <https://dtcc.chalmers.se>

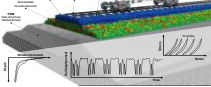










30 Partners and growing

- Municipalities: Göteborgs Stad, Helsingborg, Linköping, Höganäs, Ale...
- Academia: Chalmers, FCC, Sofia, GATE, Aristotle
- Private industry: NCC, PEAB, Sweco, AFRY, White, Liljevalls, Tengbom Akademiska Hus, Västfastigheter, Landvetter Söder, VGR, others



Research collaboration brings state of art to our clients and projects

Selection of our research partners

 <p>DigiRAIL</p>	 <p>Non exhaust emissions</p>	 <p>SMART</p>	 <p>DTCC</p>
 <p>Ramboll PhD SMART Geo</p>	 <p>Ramboll Fond PhD</p>	 <p>CODE PROBE</p>	 <p>Digital Roads of the Future</p>
 <p>Ramboll PhD</p>	 <p>Ramboll Fond PhD</p>	 <p>Ramboll PhD Designed plant communities</p>	



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