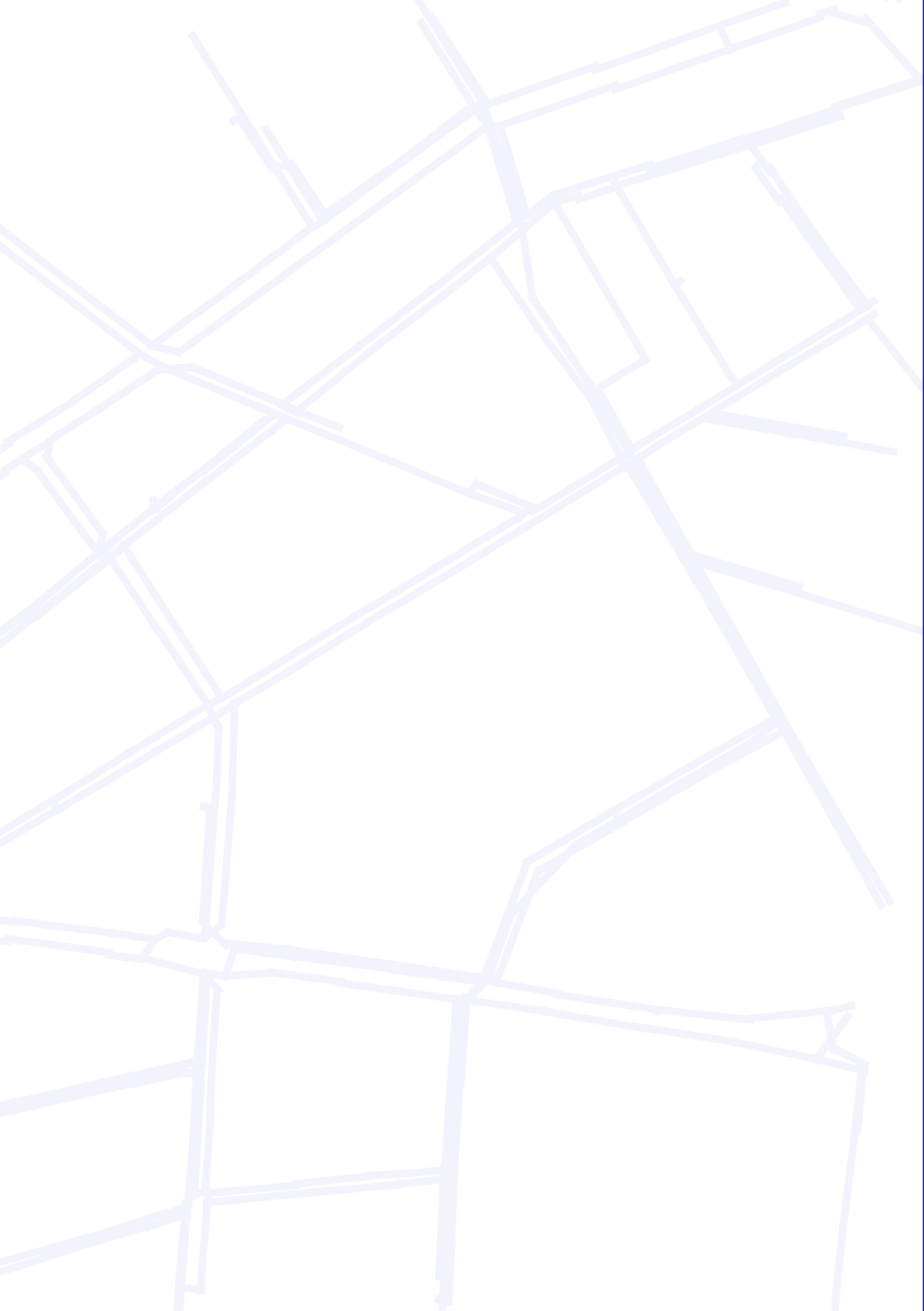# SEMA plus

Deterioration forecasts for sewer systems

KWB

Sewers are important infrastructures of our cities which must be maintained for future generations. With SEMAplus, we provide innovative, sustainable and cost-saving solutions to address this challenge.

Do you require information about the current state of your entire sewer network as well as a rehabilitation plan for the decades to come?

SEMAplus provides rapid and accurate information as well as a foundation for targeted short-term maintenance and long-term investment planning. To accomplish this, SEMAplus requires only a limited amount of inspection and sewer data (age, material, diameter, etc.) and, if available, data on other ageing-relevant sewer properties and environmental factors. This saves you resources, costs and time. SEMAplus also simplifies communication between decision-makers thanks to its easily understandable interactive dashboards.

How does SEMAplus work?

SEMAplus uses statistical methods as well as machine learning techniques. By simulating the effect of different rehabilitation strategies on the development of the condition of the infrastructure, a customised and optimised rehabilitation concept can be created according to your individual requirements.
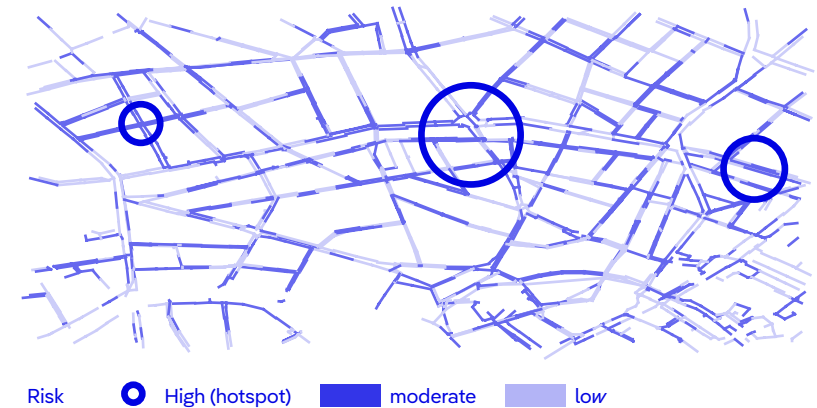
Notable highlights:
- **Precision** – even with incomplete data, the models deliver reliable results.
- **Transparency** – you can carry out and adjust the ageing fore-casts in-house.
- **SEMAplus Community** – become part of a growing community which collaboratively develops and optimises the tools. This community includes the Berliner Wasserbetriebe, the largest municipal water supply and wastewater disposal company in Germany.
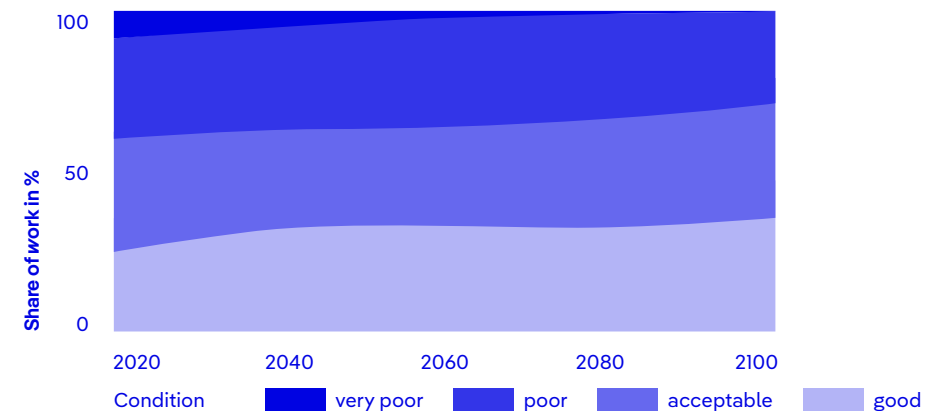
SEMAplus Simulators

The **SEMAplus Pipe Simulator** determines the current condition of each sewer pipe and helps localise urgent rehabilitation needs.

Hotspots for inspections basend on the forecasted rehabilitation requirements
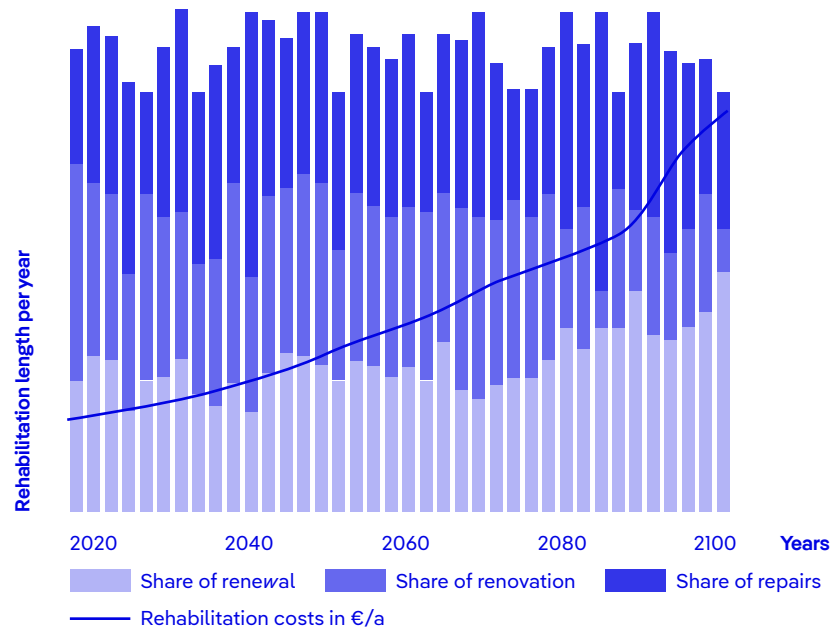

Risk   ⭕ High (hotspot)   ▬ moderate   ▬ low

The **SEMAplus Strategy Simulator** forecasts the long-term structural condition of your complete network over several decades, taking all preventive measures into account.
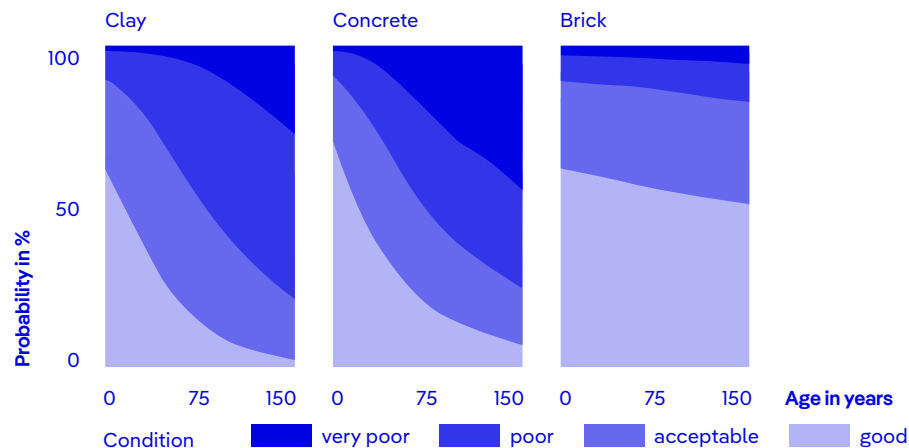
Network development

Condition   ▬ very poor   ▬ poor   ▬ acceptable   ▬ good

Rehabilitation requirements

Rehabilitation length per year

- Share of renewal
- Share of renovation
- Share of repairs
- Rehabilitation costs in €/a

2020 2040 2060 2080 2100 **Years**

Deterioration patterns (*without rehabilitation*)

Clay Concrete Brick

Probability in %

0 75 150 0 75 150 0 75 150 **Age in years**

Condition
- very poor
- poor
- acceptable
- good

Benefit from our expertise!

Our SEMAplus service package contains various modules *w*hich can be adapted individually to the specific challenges of your se*w*er net*w*ork.

SEMAplus Pipe Simulator
Calculates the probability of se*w*er pipe damage and locates hotspots in urgent need of rehabilitation.

SEMAplus Strategy Simulator
Forecasts the condition of se*w*er net*w*orks over long periods of time, taking various rehabilitation scenarios into account.

+ Individual model adjustment:
Consider additional customer-specific data to increase the forecasting quality.
- Quality testing of the condition assessment
- Consider additional data from the geographical area
- Translation and uniformisation of various defect coding systems
- Support *w*ith the optimisation of the inspection strategy and selecting the rehabilitation measures

+ Filling data gaps:
If there are gaps in the data, information on the year of construction and the material of the pipes, *w*hich is required for the simulators, can be supplemented using modelling.

+ SEMAplus Community:
Join the SEMAplus community of municipal users and benefit from:
- Moderated technical discussions
- Optimisation of tool use
- Exclusive use of upgrades
Improves forecasts, allo*w*s for regular discussions and keeps you up to date *w*ith the latest technical developments.

About SEMAplus

SEMAplus is a deterioration forecast tool for sewer systems. It was developed for direct practical application by the Berlin Centre of Competence for Water (KWB) in close cooperation with Berliner Wasserbetriebe, and has been operational in Berlin since 2019. In the first year of its pilot phase, SEMAplus was awarded the highly-acclaimed Innovation Prize of the German Association of Municipal Companies.

Who we are

KWB, founded in 2001, is a non-profit research organisation providing innovative, practical solutions to water management challenges. Berliner Wasserbetriebe is the largest municipal water supply and wastewater disposal company in Germany.

Through the close cooperation between our experts and the direct use of knowledge from the latest research and technology, we offer customised solutions for managing urban water infrastructures which have been tried and tested at the practical level.

KWB

in cooperation with **Berliner Wasserbetriebe**