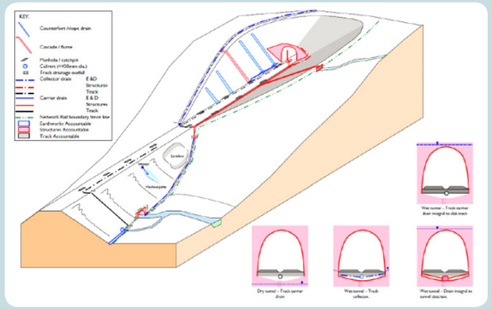
Improving Drainage Asset Management Decision Making

What is the situation?



The effective control of water is essential to the safe and economic management of railway infrastructure.

Drainage has an important role in reducing the degradation mechanisms caused by water; such as the long-term softening of materials that form the track support system and earthworks.

Neglect of the drainage system can have significant cost and safety implications for the parent asset; such as delay minutes, poor track geometry, line closures and a likelihood of earthwork failures.

Analysis of causes

Priority problems

Specific priority problems

- Lack of models including a top-down whole life modelling tool.
- Insufficient decision support tools.
- Insufficient tools and datasets to manage, view, map drainage as a system including a workflow management system.

Related goals

- To produce a top-down whole life cycle and cost model for drainage by CP7.
- To produce a bottom-up decision support work-bank tool by CP6.
- Drainage systems identified, connected, linked to system and mapped by CP6.
- Models to support planning via intervention scenarios at the system level.

Benefits

- This will enable more efficient and effective decision making that will provide both cost and safety benefits.
- Asset management underpins the whole life cycle of an asset base. Fit for purpose decision support tools, models and datasets will allow for informed decisions to be made that will improve life extension, safety, performance, resilience.

Scope

The ability to make timely and effective decisions is a key factor in managing the assets in accordance with policy and strategy. Better decision making can help target drainage interventions and manage the system at an optimum whole life cost. Efficient, accurate and traceable decision making can also provide significant safety benefits by improving the condition of the parent assets and reducing the likelihood of failure.

The enablers to supporting better decision making are:

- Data Management.
- Decision Support Tools.
- Modelling.
- Systems Approach.
- Competency.

Providing a solution to the issues highlighted for each individual enabler (see below) will allow for safer, more reliable and efficient drainage systems.

fig. 1

fig. 2

Specific research needs

To address these challenges it is expected that R&D actions will need to address the following aspects:

1. **Models and top-down whole life modelling tool**

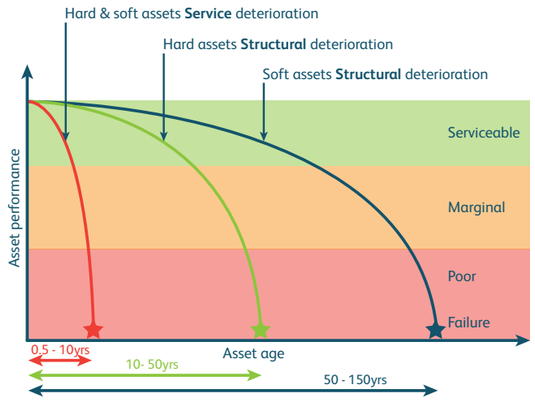
   How can top-down whole life cost modelling of drainage be achieved? What new models need to be developed and combined with existing models to account for factors such as degradation, capability analysis, flood risks due to land use change, climate change, weather resilience etc.?

2. **Decision support tools**

   How can current and new processes be managed better with decision support tools? What is required to develop a live bottom-up work-bank tool and how would this integrate with existing systems? How can intervention scenarios be modelled at a system level in order to support business planning?

3. **Tools and datasets to manage, view, map drainage as a system**

   How can we map and view drainage as a system? Tools and datasets are required for the management of drainage from a holistic systems approach. The developed tools should support the decision-making process and allow for timely interventions providing both whole life cost and safety benefits.



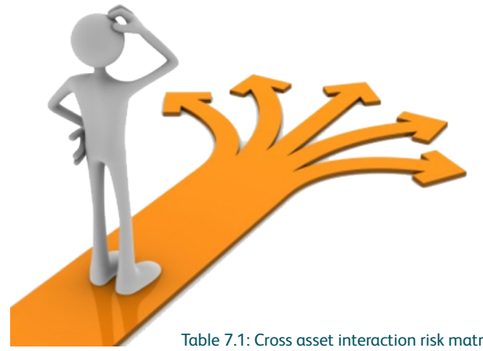


Table 7.1: Cross asset interaction risk matrix

Drainage performance	Track, earthworks or asset condition (related to drainage)		
	Serviceable	Marginal	Poor
Serviceable	Lowest risk	Slight risk	High Risk
Marginal	Slight risk	Moderate risk	High Risk
Poor (including under capacity)	Moderate risk	High Risk	Highest risk
Serviceable	Slight risk	Moderate risk	Highest risk