Improving Vegetation Management Decision Making

What is the situation?

Failure to provide and maintain green infrastructure beside the rail network leads to significant liabilities including:

- Increased environmental, operational and safety risks due to overgrown vegetation (fig.1).
- Greater performance costs and increased disruption.
- Increased risk to spread of invasive, non-native species (fig.4).
- Poorer customer and community relations/increased complaints from neighbouring properties (fig.3).
- Increased capital and management costs to create desirable lineside structure (fig.2).
- Reduced biodiversity.
- Risk of breach of legislation.

fig. 1

fig. 4

fig. 3

fig. 2

This can lead to significant costs and missed opportunities, including:

- £100m cost annually to the UK economy as a result of vegetation impacts on train performance.
- 25,000 complaints per annum relating to vegetation management.
- 200 % Traditional drainage solutions cost twice as much as sustainable drainage systems.

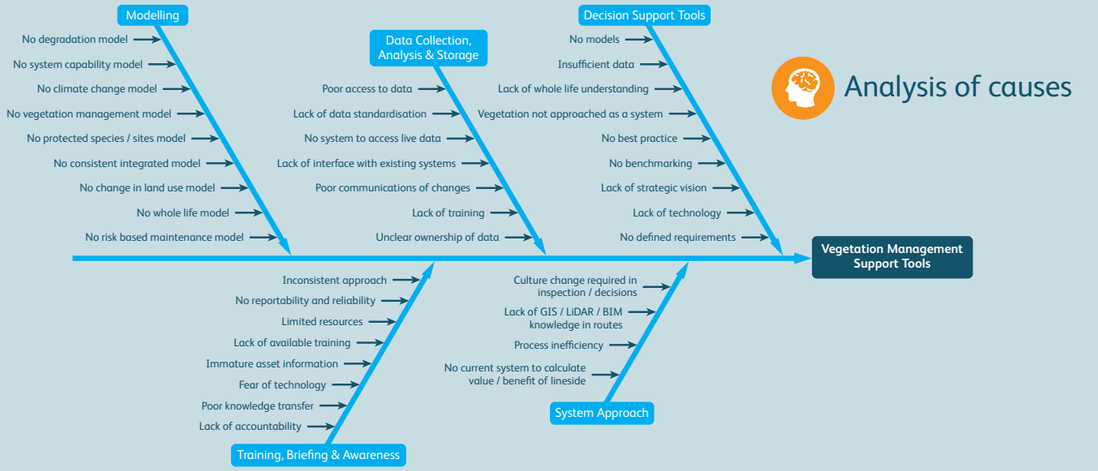
Scope

The ability to make timely and effective decisions is a key factor in managing the assets in accordance to policy and strategy. Whole life costs must be considered in soft estate performance and management assessments to secure more resilient, efficient and cost effective hard infrastructure.

The enablers to supporting better decision making are:

- Data collection, analysis and storage.
- Decision support tools.
- Modelling.
- System approach.
- Training, briefing and awareness.

Providing a solution to the issues highlighted for each individual enabler (see Analysis of Causes) will allow for a safer, more reliable and efficient asset.



Analysis of causes

Priority problems

Specific priority problems

- Mapping data required to enable collaboration with external organisations who have environmental and ecological datasets.
- Lack of decision support tools.
- Tools and datasets needed to manage, view and map vegetation as a system (including a workflow management system).
- Investigations into novel vegetation management techniques to counter any reduction in pesticide use.

Related goals

- To produce a top-down whole life cycle and cost model for vegetation by the end of CP7.
- To produce a bottom-up decision support work-bank tool by the end of CP6.
- Habitats and associated heat maps of potential for protected species identified by the end of CP6.
- The right green infrastructure in the right place by the end of CP7.

Benefits

- The right green infrastructure in the right place along linear infrastructure networks could bring significant benefits including:
  - Enhanced local character and user experience.
  - Revenue generation opportunities and reduced waste from verge harvesting for biomass energy.
  - improved air quality, drainage management and carbon capture.
  - Enhanced biodiversity corridors and quality of life.

Specific research needs

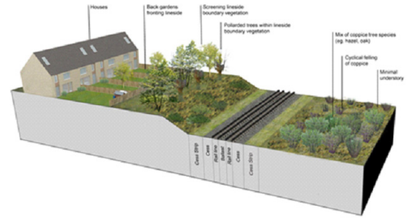
To address these challenges it is expected that R&D actions will need to address the following aspects:

- **Models and top-down whole life modelling tool**
  How can top-down whole life cost modelling of vegetation 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, vegetation growth rates, impacts of pests and diseases, etc.? What models already exist in utility or agricultural industries that can be transferred to use on the rail infrastructure?

- **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? What methods and techniques exist in other industries managing vegetation for products or to improve asset resilience? How do other industries improve the competence and capability of non-technical staff to support them in their roles?

- **Tools and datasets to manage, view, map vegetation as a system**
  How can we map and view vegetation as a system? Tools and datasets are required for the management of vegetation 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, environmental benefits whilst taking into account the length of the life cycles of the systems involved.

- **Investigations into novel vegetation management techniques to counter any reduction in pesticide use**
  What novel techniques are available to enable targeted application of pesticides at lower dosage rates? What manual and mechanical methods can be employed to improve the efficacy of existing or novel pesticides? Are there techniques in development that can provide equal or better control of unwanted plant species when compared with existing techniques? What novel bio-control techniques are applicable to use on the railway infrastructure?



Schematic urban lineside vegetation structure' fig. 5