

SUPPORTING ADAPTATION THROUGH SYSTEMS MAPPING – PRACTICAL PROJECT INSIGHTS

ABSTRACT Transport infrastructure faces growing challenges from climate risks and systemic interdependencies. While stakeholders often understand their own operations, there is limited visibility of wider system interactions, hindering coordinated planning and response. Systems mapping addresses this gap by collaboratively charting the connections between assets and activities, enabling clearer whole-system analysis before intervention decisions. Mott MacDonald implemented systems mapping to support the ARP4 submissions and climate adaptation strategies of two major transport organisations.

For TfL, we engaged 16 asset owners with interconnected infrastructure spanning London's road and rail networks. Through focus groups and a cross-sector workshop, we co-created system maps to inform an interdependency risk assessment for ARP4 submissions. These maps covered critical sectors including water, power, and land use, identifying priority risks and outlining short, medium, and long-term actions for resilience. The participatory approach was fundamental to securing cross-sector engagement, identifying hidden risks, and enabling targeted planning.

For an international airport, we engaged stakeholders to map the entire business as a system, providing clear connections between climate risks, business impacts, KPIs, and adaptation actions. The resulting system maps visualised interactions and cascading climate risks; forming the evidence base for both the ARP4 submission and the airport's adaptation strategy. The determination of links between climate risks and current priority KPIs was key to the analysis of 20 operational risks and 18 interdependency risks. The systems map allowed the development of a practical roadmap for future climate resilience initiatives and interventions to address flooding, air quality, and congestion.

These projects demonstrate how a collaborative approach to systems thinking provides a practical means of tackling evolving climate challenges by demonstrating the links between climate change impacts and the KPIs which drive business decisions now. Whole-system approaches strengthen resilience, improve engagement, and enable coordinated adaptation across transport infrastructure.