

CLIMATE CHANGE ADAPTATION DECISION FRAMEWORK FOR MAINTENANCE OF ROAD INFRASTRUCTURE: USING A SYSTEMS APPROACH FOR SUSTAINABLE OUTCOMES

Road asset managers can expect to operate under different climatic regimes in coming decades with the likelihood of higher maintenance costs and lower road asset life expectancy. The objective of this research therefore was to establish a decision support system for maintenance of road infrastructure. A climate change adaptation framework was developed within the construct of a systems approach to ensure all environmental, economic and social aspects and their inter-relationships were integrated into decision making processes. The framework was developed in consultation with DTEI road maintenance managers to assist them identify which sections of the road network in South Australia are most exposed to threats from climate change and will experience the most serious potential consequences of those threats and in deciding effective response options.

The research project involved:

Literature Review: A review of processes, information sources and models that are being used by road authorities both interstate and abroad, to assess climate change impacts on assets.

Consultation: In depth face-to-face and telephone meetings were actioned with a series of asset managers to identify sensitivities of South Australian road assets to climate stimuli and relevant information sources.

Pilot Workshop: On the 1st June an internal DTEI workshop was held with the aim of developing the first climate vulnerability schedule for road pavements in the metropolitan Adelaide.

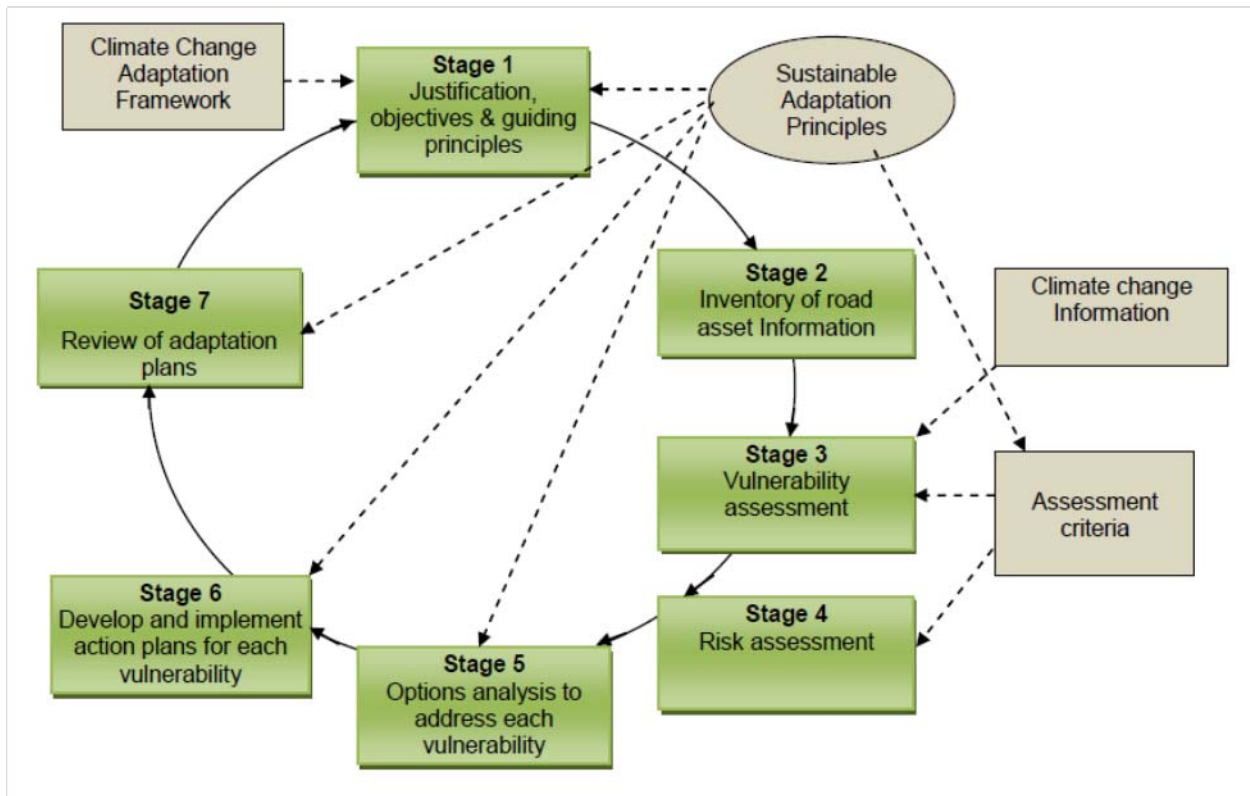
Development of framework: All information collected above was used to develop the framework and ensure DTEI corporate objectives, processes, systems and data sets and technical advice were incorporated.

MAJOR FINDINGS AND OUTCOMES:

The risk based adaptation framework allows road asset managers to explore the implications of various climate change scenarios when deciding how, when and where maintenance should take place. The proposed framework consists of seven primary stages, depicted in Figure 1, which include:

- Stage 1 - Justification, objectives and guiding principles
- Stage 2- Inventory of road asset information
- Stage 3 - Vulnerability assessment
- Stage 4 - Risk assessment
- Stage 5 - Options analysis
- Stage 6 - Development and implementation of adaptation action plans
- Stage 7 - Periodic review and feedback

Figure 1. Climate Change Adaptation Framework for DTEI Road Assets.



The framework provides a much needed and timely first step to better understand and manage the implications of climate change on road assets. At the same time the framework also effectively integrates economic, social and environmental aspects in asset management planning and delivery, which sets it apart from other established frameworks. Given that stages 1-4 are relatively qualitative and rely on existing information and technical expertise it was found that this part of the framework can be completed relatively quickly. However the options analysis stage may take longer and require more reliable quantification methodologies such as multi-criteria assessment, financial modelling and/or forecasting techniques to adequately assess each adaptation option against sustainable adaptation principles applied in the process.

SIGNIFICANCE:

Elements of the framework are now being applied by DTEI as part of a broader adaptation strategy.

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