

Sustainable Asset Management: Selecting Optimal Maintenance Strategies Based on Multi-criteria Decision Making

1 October 2015 - 31 March 2017

In an economic downturn, it is of critical importance to ensure that asset management plans represent the reality of current conditions and the prediction of road performance fits the real behaviour of assets, so that loss of productivity due to mis-allocation of maintenance funds can be avoided.

A significant number of environmental protection measures have emerged over the past few years. The concept of sustainable development calls for a change in the way projects are appropriately managed. To support the integration of sustainable development, there is a need to include sustainability in the maintenance of infrastructure.

This project aims to develop an innovative and effective approach to integrating life-cycle cost, infrastructure performance and environmental considerations into infrastructure asset management to generate optimal maintenance plans.

This research will leverage off national exemplar projects through case studies to develop and test the sustainable asset management tool: Asset management – Great Eastern Highway Upgrade, WA. This project to design and construct the upgrade of the Great Eastern Highway between Kooyong Road and Tonkin Highway in Western Australia has been delivered by Main Roads WA, Leighton Contractors, GHD and NRW. It is a 4.2km section of the highway upgraded to six lanes with a central median strip, on-road cycling facilities and a continuous pedestrian path.

Objectives

- Improve the current life-cycle cost method used in infrastructure asset management to a life-cycle cost and benefit method, by including indirect costs, such as user costs and benefits. Mathematical modelling of two major environmental impacts, i.e. emissions and waste, will also be developed in this project.
- Develop a computerised application (validated in the dTIMS environment) to support optimal maintenance strategy selection based on the aforementioned modelling and a set of priorities on cost, performance and environmental considerations.

Industry Outcomes

This project will:

- Demonstrate how user benefits and costs can be integrated in asset management to reveal the true life cycle cost of asset management plans.
- Demonstrate how environmental impacts can be integrated into the decision making process when selecting maintenance strategies.
- Provide a practical framework and computerized tool to select optimal maintenance strategies based on life cycle cost, performance and environmental considerations.



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