

# Impact of Climate Change on Deteriorations and Life-Cycle Costs of Flexible Pavements

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## Background

This project is one of the cooperative projects between NTEC (Nottingham Transportation Engineering Centre, Nottingham University, UK) and VTTI (Virginia Tech Transportation Institute, Virginia Polytechnic Institute and State University, U.S.).

## Introduction

Predicted climate change will have potential impact on the deterioration of flexible pavements. Qualitative researches have determined that climate change, especially temperature and precipitation increase, is the greatest environmental concern for flexible pavements. These environmental challenges may aggravate pavement deterioration, thus reducing its service life. Therefore, to maintain flexible pavements within serviceability requirements, intervention strategies should be changed. In particular, investigation as to how this change could affect the total Life-Cycle Cost (LCC) of roads is expected to provide a useful assessment. The additional costs caused by climate change can be derived by comparison of pavements' LCC under present climate and under projected future climates. Several mitigation methods will be discussed to investigate economic alternatives for pavements constructions under a warming climate.

## Aims and Objectives

The aim of the study is to assess the additional LCC of road pavements due to climate change. A general framework is established to achieve this, including four modules (Figure 1):

- Module 1: Investigation of climate change
- Module 2: Pavement performance modelling
- Module 3: Maintenance intervention strategies
- Module 4: Life-Cycle Costs Analysis (LCCA)

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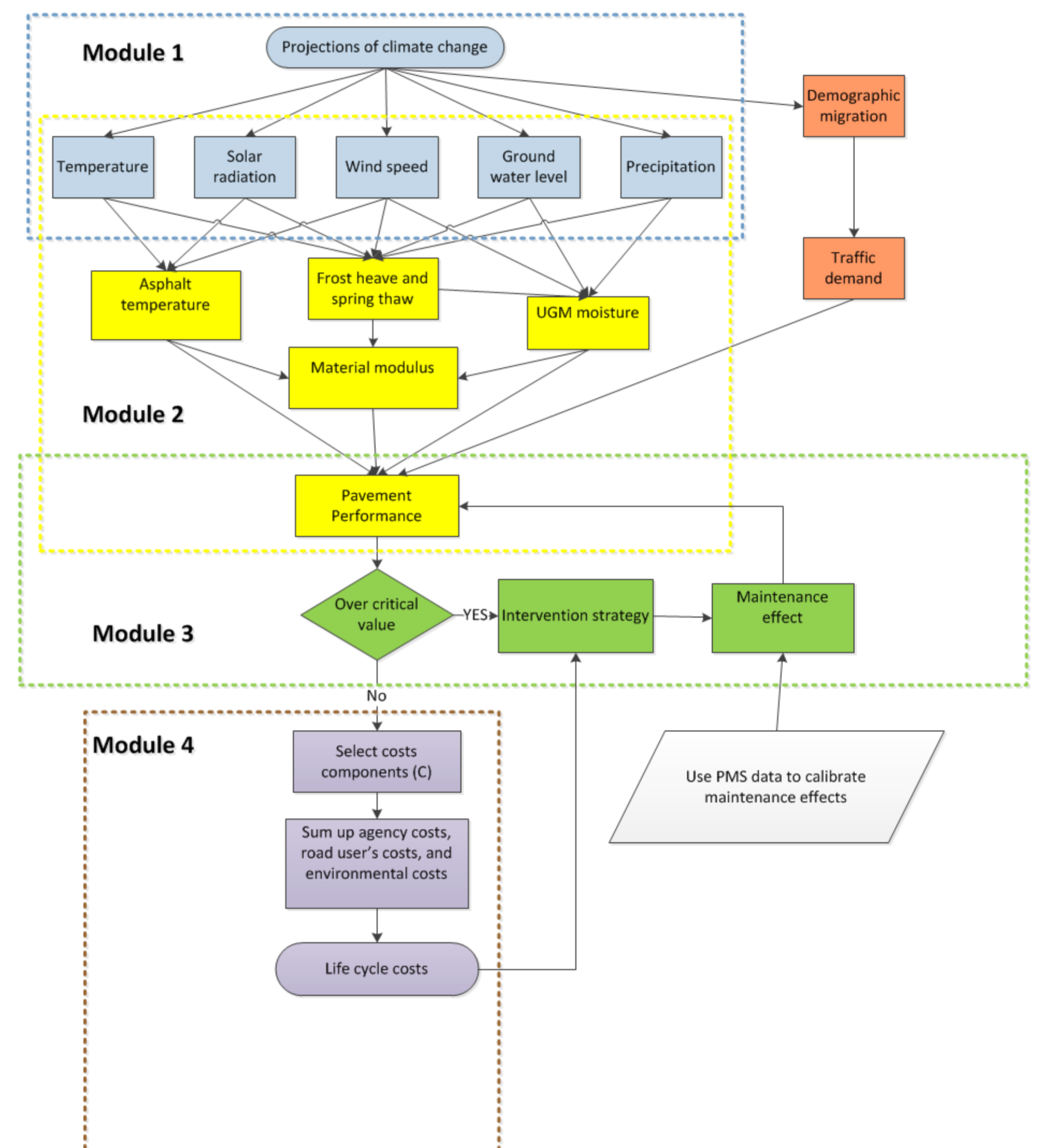


Figure 1 - The general framework of the study.

## Research features

- Analysis of the sensitivities of environmental factors for deterioration of flexible pavements.
- Pavement performance modelling using the Mechanistic-Empirical Pavement Design Guide under different climate change scenarios as defined by the Inter-governmental Panel on Climate Change (IPCC).
- Calibration of HDM-4 maintenance effects models using Virginia PMS data.
- Life-Cycle Costs Analysis (LCCA) for pavements.
- Mitigation methods for flexible pavements under a warming climate.