

**House of Representatives Standing Committee on  
Environment and Heritage**

**Inquiry into Sustainable Cities**

**A submission from the Cooperative Research Centre for  
Landscape Environments and Mineral Exploration  
(CRC LEME)**



**November 2003**

## **TERMS OF REFERENCE**

The House of Representatives Standing Committee on Environment and Heritage will inquire into and report on issues and policies related to the development of sustainable cities to the year 2025, particularly:

- The environmental and social impacts of sprawling urban development;
- The major determinants of urban settlement patterns and desirable patterns of development for the growth of Australian cities;
- A ‘blueprint’ for ecologically sustainable patterns of settlement, with particular reference to eco-efficiency and equity in the provision of services and infrastructure;
- Measures to reduce the environmental, social and economic costs of continuing urban expansion; and
- Mechanisms for the Commonwealth to bring about urban development reform and promote ecologically sustainable patterns of settlement.

## **BRIEF INTRODUCTION TO CRC LEME**

CRC LEME – the CRC for Landscape Environments and Mineral Exploration was set up in July 2001 and its mission is to create breakthroughs in mineral exploration and environmental management through generating and applying new knowledge of the regolith. In so doing CRC LEME and its core partners will become world leaders in regolith research and its application to mineral exploration and natural resources management. With its geographic spread of partners, multi-disciplinary project teams and extensive student activities CRC LEME, is well placed to achieve its mission. (Paragraph two of the introduction section of this submission provides a definition of regolith.)

Partners in CRC LEME are: Australian National University, CSIRO Divisions of Exploration & Mining and Land & Water, Curtin University of Technology, Geoscience Australia, Minerals Council of Australia, New South Wales Department of Mineral Resources, Primary Industry and Resources South Australia, and University of Adelaide.

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## 1. INTRODUCTION

Cities in Australia, and world wide, are growing rapidly, and impacting on surrounding rural areas. They are a major and high impact, land use. Recent work (e.g. Bunker and Houston 2003) suggests that the rural-urban fringe is an area of concern for the development of policies regarding urban growth and environmental sustainability.

Cities are built on the regolith (the soil, sediments, and weathered bedrock, that lie between fresh air and fresh bedrock), and thus an understanding of this material is critical to considerations of sustainable cities. Groundwater moves through these regolith materials, mobilising materials which then enter our groundwaters, waterways and land. The regolith thickness is highly variable and ranges from zero (outcropping bedrock) to more than 200 metres. Particularly in suburban areas, most water and soil studies to date have been based on studies of the top couple of metres. There has been little, if any, consideration of the regolith materials below the topsoil, yet these materials often control the nature of the land and groundwater. This is clearly inadequate and needs to be rectified by harnessing geoscience knowledge and particularly the new discipline of regolith science. Strategies to map, predict and incorporate regolith information into urban planning are urgently required.

## 2. COMMENTS ON TERM OF REFERENCE 1

### *The environmental and social impacts of sprawling urban development*

2.1 Urban geoscience is still in its infancy in Australia, although there are examples overseas (e.g. Canada) where geoscience is a fundamental part of urban planning. The geological Survey of Canada produces maps and reports specifically aimed at urban areas (see, for example, the following web site: <http://sts.gsc.nrcan.gc.ca/urban/introduction.asp/>). However, in Australia very little else has been done in the way of providing geoscience, and particularly regolith, information for urban planning.

2.2 There are a number of regolith-related issues that are important for urban planning. Among these, erosion and sediment production, salinity, environmental geochemistry and acid sulphate soils stand out as unsolved problems in urban development. Such planning must take into account the “extended” nature of the environment. For example, any green zones and bush reserves included in urban plans must be protected from impacts triggered elsewhere – flooding and salinity are examples of processes that can have a considerable impact outside the areas where they are initiated.

2.3 It is well known that salinity is a major problem for rural Australia. What is less well known is that salinity also poses major problems for urban Australia. Some areas have taken some steps to address this situation; for example a map of salinity hazards has been prepared for the Western Sydney Regional Organisation of Councils (WSROC), who has also released a set of guidelines for dealing with salinity ([http://www.wsroc.com.au/news\\_detail.asp?key=159/](http://www.wsroc.com.au/news_detail.asp?key=159/)). However, there is a need for the development and application of standards for assessing and dealing with urban

salinity. In each urban area the groundwater and salinity processes and dynamics need to be understood within a three dimensional regolith framework.

2.4 The physical properties of regolith are an important input, along with digital information about the land surface shape, into the development of plans to handle rapid onset geohazards such as flooding, earthquake and tidal waves.

### **3. COMMENTS ON TERM OF REFERENCE 2**

*The major determinants of urban settlement patterns and desirable patterns of development for the growth of Australian cities*

NOT ADDRESSED

### **4. COMMENTS ON TERM OF REFERENCE 3**

*A 'blueprint' for ecologically sustainable patterns of settlement, with particular reference to eco-efficiency and equity in the provision of services and infrastructure*

NOT ADDRESSED

### **5. COMMENTS ON TERM OF REFERENCE 4**

*Measures to reduce the environmental, social and economic costs of continuing urban expansion*

5.1 As noted above, very little account is taken of geoscientific information, especially regolith, in urban planning in Australia. Yet baseline studies could provide a valuable base on which to build an understanding of the impacts of proposed urban expansion. The map of salinity potential in western Sydney is one example. Such maps, using methodologies being developed by CRC LEME for rural land use, could be prepared for all urban fringe areas, both around major cities, and around smaller rural centres.

5.2 CRC LEME has recently begun to carry out baseline geochemical surveys of rural areas, in the first instance surveying part of the Riverina area. Such surveys would provide invaluable baseline data in urban fringe areas against which it would be possible to measure the impact of various land uses. When such baseline data are combined with an understanding of regolith and groundwater flow, the impacts of a variety of land uses could be predicted, and planning of urban fringe areas undertaken accordingly.

5.3 There is a need to include commercial developers in the assessment and planning process. However, these groups require geoscience information and more importantly, the ability to use it. For example, the salinity guidelines produced by WSROC require considerable geoscientific skill for their interpretation and implementation. This is as much a training issue as anything else.

### **6. COMMENTS ON TERM OF REFERENCE 5**

***Mechanisms for the Commonwealth to bring about urban development reform and promote ecologically sustainable patterns of settlement***

6.1 There is a need to utilise wider datasets - such as those acquired by Geoscience Australia (GA) and the State Geological Surveys. The national Geoscience Accord, between GA and the State Surveys, has been very positive in providing basic geoscientific information to help mineral exploration. Similar knowledge sharing could greatly assist in applications to urban planning.

**7. SUMMARY OF RECOMMENDATIONS**

7.1 Coordinated planning, funding and implementation of major programs in support of urban planning activities require effective coordination between the different levels of government at Commonwealth, State and local levels.

One model that warrants consideration is the National Geoscience Agreement (NGA). The NGA covers collaboration between Commonwealth and State geoscience agencies – this has facilitated effective collaboration, avoids duplication, and works towards national standards and objectives. To address urban issues, effective collaboration requires the inclusion of the above geoscience agencies, together with State NRM agencies, CSIRO and CRCs. Presently there is no mechanism to facilitate coordination.

7.2 Regolith mapping and baseline geochemical surveys could provide considerable advantages to planning of urban expansion; it is therefore recommended that such surveys be incorporated into information collection for future urban development. These surveys would include information about the physical properties of the regolith.

**8. REFERENCES**

Bunker, R. and Houston, P. 2003: Prospects for the rural-urban fringe in Australia: observations from a brief history and the landscapes around Sydney and Adelaide, Australian Geographical Studies 41(3): 303-323.