



# **COMMONWEALTH GRANTS COMMISSION**

**DRAFT ASSESSMENT PAPER CGC 2003/64**

## **ASSESSING URBAN INFLUENCES**

Prepared for the Commission's 2003 Conferences on Draft Assessments

**AUGUST 2003**

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## INTRODUCTION

1. This paper outlines the approach the Commission intends to use when considering urban influences in the 2004 Review. It sets out the principles which will guide its assessment in different categories. The paper builds on staff proposals in Discussion Paper *CGC 2002/24 The Assessment of Urbanisation Disabilities in the 2004 Review*, and State comments provided in rejoinder submissions, workplace discussions, conferences and bi-lateral discussions.

2. A framework is needed to assist the Commission and the States in dealing with urban influences disabilities, partly because the heading ‘urbanisation’ is misleading. In the Commission context, the term ‘urbanisation’ has been used as shorthand for a wide and disparate set of influences on the costs of services — influences that are usually associated with large urban areas. Sorting the various influences to better reflect the underlying cause and to focus discussion was considered an important first step in the Commission’s considerations.

3. The Commission proposes to replace the term ‘urbanisation,’ with ‘urban influences’. It will continue to assess urban influences, which take a variety of forms.

4. In the 1999 Review, urban influences were recognised in disabilities assessed for many categories. ABS data that classified population by location were often used to differentiate between urban and non-urban service environments, and between different sized urban areas. In other cases, the Commission used population density or contiguous populations. In a few cases, it identified effects attributable to the greater populations of Sydney and Melbourne.

5. The Commission will continue to use different methods as necessary to capture the urban influences. For example, it will continue to allow for ‘locational’ differences in costs, like those currently assessed in socio-demographic joint factors, when the data allow. It will also continue to allow for other specific urban influences on costs. In addition, it will identify and assess other ‘urban complexity’ effects if a case is established in logic and sufficient good evidence exists for it to be quantified with an acceptable margin of error.

6. The ‘urban complexity’ disability, which we consider may apply to Australia’s largest cities, is intended to take account of a residual set of urban influences which may not be fully captured by the available cost data or the specific readily identifiable effects. It is considered separately from the socio-demographic and economic environment cost influences, ‘locational’ urban influences and any specifically identified urban influences already taken into account. Depending on the service, the strength of the case, materiality and data, it could be additional to or a substitute for the other effects.

7. This paper explains our approach. The details of individual assessments of urban influences will be taken up in the draft assessment papers for the relevant categories.

## 1999 REVIEW

8. In the 1999 Review, the Commission accepted that the demand for, and unit cost of providing, some services were affected by influences that were related to urban areas. It allowed for those influences<sup>1</sup> in:

- (i) **Depreciation**, where the population concentration factor reflected the requirements for specialised or more extensive capital stock in larger urban areas, the greater capital requirements of urban transit services in larger urban centres and diseconomies of scale associated with some capital stock in the smaller States;
- (ii) **Debt Charges**, where the depreciation category factor was used to recognise that larger cities had higher capital requirements;
- (iii) **Urban Transit**, where the assessment took account of the greater transport task and the greater revenue raising capacity in large urban areas;
- (iv) **Police**, where the socio-demographic composition factor contained a weight which allowed for the higher crime rates and size of the policing task in Sydney and Melbourne;
- (v) **National Parks and Wildlife Services**, where a factor was assessed to allow for the higher conservation-related expenditures incurred in parks where the boundaries were contiguous with urban areas;
- (vi) **Government Primary and Secondary Education**, where the extra costs of vandalism and security in large urban areas were recognised; and
- (vii) **Roads**, where allowances were made for the higher costs incurred in maintaining highly trafficked roads in densely populated areas and for the extra traffic control costs incurred in Sydney and Melbourne.

9. As shown in Table 1, those assessments redistributed about \$376 million to New South Wales, Victoria, South Australia and the Australian Capital Territory.

10. Figure 1 compares the patterns of redistribution over time. It shows that since the 1999 Review, the grant shares resulting from assessing urban influences have changed. This reflects the change made to the urban influences factor in the National Parks and Wildlife Services category in the 2001 Update and the increase in category standards over the period.

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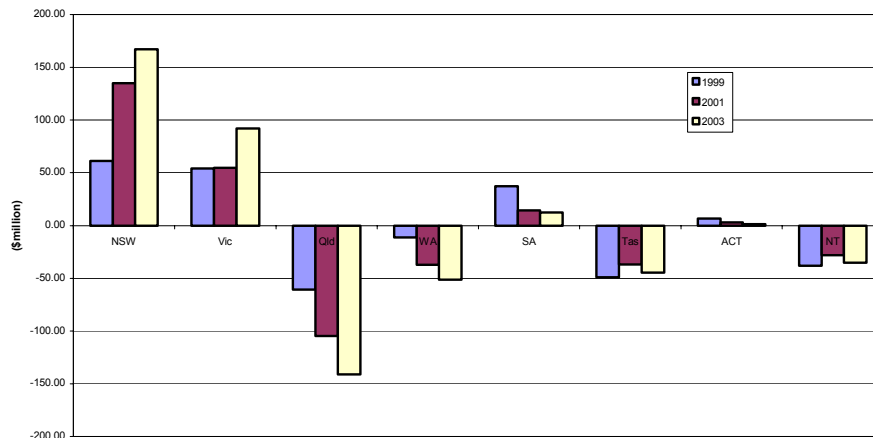
<sup>1</sup> Although they were not necessarily labelled as urban influences disabilities.

**Table 1** REDISTRIBUTIVE EFFECTS OF URBAN INFLUENCES FACTORS, 2003 UPDATE

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Aust
	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m
Depreciation <sup>(a)</sup>	135.0	40.0	-92.8	-41.1	-15.5	-13.9	-3.4	-8.2	175.0
Debt Charges	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Urban Transit <sup>(b)</sup>	-44.2	10.2	14.3	8.1	33.3	-17.5	7.8	-12.0	73.7
Police <sup>(c)</sup>	27.4	29.5	-25.3	-14.4	-9.7	-3.0	-2.4	-2.0	56.8
National Parks & Wildlife Services	38.6	-0.9	-26.1	0.7	7.3	-8.0	0.1	-11.8	46.7
Government Primary & Secondary Education <sup>(d)</sup>	7.6	10.3	-9.5	-3.0	-1.9	-1.9	-0.7	-1.0	18.0
Roads	2.6	2.9	-1.9	-1.6	-1.1	-0.4	-0.1	-0.4	5.5
	167.0	92.0	-141.3	-51.3	12.4	-44.7	1.3	-35.4	375.7

- (a) Urban influences disabilities assessed as ‘population concentration’ and ‘capital requirements’ factors recognised the higher quantities of capital stock required by New South Wales and Victoria, particularly for urban transit services.
- (b) Total amounts redistributed by Urban Transit compared with equal per capita, since the category relates exclusively to services provided in urban areas. Unlike other urban influences factors, the Urban Transit assessment assumed higher revenue for larger cities.
- (c) Urban influences disability assessed as a cost weight in the socio-demographic composition factor.
- (d) Urban influences disability assessed as ‘vandalism and security’ factor.

**Figure 1** AMOUNTS REDISTRIBUTED BY URBAN INFLUENCES <sup>(a)</sup>



- (a) The data underlying this figure omit the effect of the urban influences disability within the Police assessment, as this calculation was not available for all three years.

11. Some assessments also took account of the effect of urban influences on costs within the socio-demographic composition factors. In those cases, location was an extra dimension in the cross-classifications of the demographic data. In particular:

- (i) the socio-demographic composition factors for the **Vocational Education and Training, Hospitals** and **Mental Health** categories included an element that allowed for the effects of where people live on the use they make of services;
- (ii) the socio-demographic composition factor for **Hospitals** included an allowance for the higher incidence of HIV/AIDS and drug-related treatments in Sydney;
- (iii) the **Hospitals** costs factor included a mix of locational influences, such as the cost differences relating to training, research and case complexity mainly associated with tertiary hospitals in major urban areas and cost differences relating to population dispersion;
- (iv) the calculation of notional student numbers for **Government Secondary Education** included an adjustment that allowed for the effects of socio-economic status and urban location on retention rates in the non-compulsory years;
- (v) the **Administration of Justice** assessment allowed for the extra costs per civil case in higher courts which generally reflected issues arising in metropolitan areas;
- (vi) the **Public Safety and Emergency Services** category recognised the need for expenditure in all locations, including urban areas, by using actual expenditure on natural disasters in the physical environment factor for the Natural Disaster Prevention component and fire insurance claims and land valuation data in the economic environment factor in the Fire Brigade component; and
- (vii) urban influences were also captured in the **Land Revenue** and **Housing User Charges** assessments where the tax bases were increased because of the higher values of property in major urban areas and the higher market rents available.

## STATE VIEWS

12. In their main submissions, New South Wales and Victoria argued that the urban influences disabilities assessed in the 1999 Review were inadequate. They said that Sydney and Melbourne incurred higher net per capita service costs due to diseconomies of large scale. They attributed this diseconomy of scale effect to increasing complexity — the increasing complexity of the planning and management task for land development, transport infrastructure and operations, fire suppression and emergency services, environmental

pressures, crime and vandalism. They each referred to a U-shaped cost curve<sup>2</sup>. Victoria also argued that the theory of optimum city size was relevant, and suggested that cities larger than Canberra were subject to diseconomies of scale.

13. Queensland, Western Australia, South Australia, Tasmania, the ACT and the Northern Territory all expressed concerns about the urban influences-based assessments. Their view was that the relationship between population density, city size, or other indicators used as proxies for urban influences did not reflect the costs incurred by States. Queensland proposed that an explicit cost model, such as that used for dispersion, be developed.

14. These States also noted that the costs identified by New South Wales and Victoria were not necessarily due to higher levels of urbanisation. They experienced similar service use and cost pressures, and not always in urban areas.

## STAFF PROPOSALS

15. In the past, discussions of urban influences have covered a wide range of issues and influences. Many of those influences were recognised in, or better considered in, discussions of other disabilities, especially socio-demographic composition and economic environment disabilities.

16. *Discussion Paper CGC 2002/24 The Assessment of Urbanisation Disabilities in the 2004 Review*, therefore proposed a framework to clarify and address the issues involved in assessing disabilities for urban influences.

17. The framework (the latest version of which is reproduced in Attachment A) was intended to sort out the different influences associated with urban areas according to their underlying cause. It was expected that this would clarify discussion by:

- distinguishing urban influences disabilities from other disabilities;
- ensuring that there is no double counting between the urban influences and other disabilities;
- ensuring that any interaction of urban influences with other disabilities is properly recognised; and
- enabling the degree of disability to be estimated in relation to an urban indicator.

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<sup>2</sup> Alonso, W. (1971) 'The Economics of Urban Size,' in *Papers of the Regional Science Association*, 26 pp. 71-83. In 1956, Werner Z. Hirsch postulated a U-shaped curve for per capita municipal costs, and later Alonso postulated optimal city size using the intersection of a downward sloping marginal benefit curve and an upward sloping marginal cost curve.

18. The paper suggested that after taking account of the influences recognised in other disability factors, many of the remaining influences would reflect the need for complex networks and service provision arrangements that arise from urban size and density, the diversity of activities found in big cities and interactions between those influences.

19. The paper indicated that if a separate broad disability were to be assessed for urban effects, it would probably be related to urban size, density or some interaction of them. Staff sought empirical evidence from the States about the relationship between possible measures of urban influences, the use of services and the unit cost of providing them. It was noted that reliable measures of urban effects could be difficult to obtain and that making assessments could require the Commission to exercise considerable judgment.

20. The paper examined some of the conceptual arguments and research advanced by New South Wales and Victoria in support of their arguments that increasing unit costs were associated with increasing population and complexity. The paper noted that considerable research has been done into the questions of optimal city size and the U-shaped cost curve. However, it was difficult to generalise the results of the research because it varied from city to city depending on a range of influences, such as the services considered and economic, demographic and geographic circumstances.

21. The paper noted the conclusion of the Report of the House of Representatives Standing Committee for Long Term Strategies, *Patterns of Urban Settlement: Consolidating the Future?* that 'Cities have no optimal size.'<sup>3</sup> That report noted various estimates of optimal size ranging between 75 000 and three million people. It concluded that optimal size depended very much on a range of social and environmental factors in each city. It also concluded that these factors would change over time to give a variety of optimal sizes.

22. On the subject of the shape of the U-shaped cost curve Discussion Paper CGC 2002/24 noted that a 1992 study in Australia<sup>4</sup> concluded that it was relatively flat. However, a study of Japanese cities concluded that unit costs increased at a faster rate as the intensity of use of government services increased<sup>5</sup>.

23. CGC2002/24 concluded that available research did not confirm or deny that the unit cost of providing government services in Australian cities increased with increasing population size. It suggested that it was hard to know the shape of the curve and where each city was on that curve. It was also hard to untangle all the influences.

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<sup>3</sup> The Parliament of Australia, House of Representatives Standing Committee for Long Term Strategies, *Patterns of Urban Settlement: Consolidating the Future?* AGPS, Canberra, 1992, p xiv.

<sup>4</sup> John Brothie, 'The Changing Structure of Cities', *Urban Futures*, Special Issue 5, February 1992, p13.

<sup>5</sup> Masayoshi Hayashi, 'Congestion, Technical Returns and the Efficiency Scales of Local Public Expenditures: An Empirical Analysis for Japanese Cities (Preliminary)', December 2000, Kinetica. For example, Hayashi estimated that unit costs in Osaka, a city of 2.6 million people, would increase by 40 per cent for a 1 per cent increase in population. This was based on the estimation of an optimum sized city of some 300 000.

24. The key recommendations of the discussion paper were that, subject to the availability of empirical data, other reasonable evidence and materiality, urban influences disabilities would be assessed in relation to:

- (i) the greater complexity of the traffic management task and its impact on costs in the Roads category;
- (ii) the greater need for environmental protection expenses in large urban areas and the impact on costs in General Public Services;
- (iii) the greater risk of damage and need for public safety expenses in densely settled urban areas, particularly those adjacent to hazardous activities;
- (iv) the greater complexity of the planning task for a range of functions in urban areas (public transport, roads, urban development); and
- (v) other areas where urban influences caused greater complexity in service provision, such as in retrofitting infrastructure.

25. The paper also proposed that:

- (i) any impact of higher land costs in urban areas could be assessed as input cost disabilities if appropriate;
- (ii) any higher costs associated with concentrations of people from culturally and linguistically diverse (CALD) backgrounds could be assessed as a socio-demographic composition disability;
- (iii) any higher costs associated with drugs, which affect the provision of Police, Corrective Services, Education and Health services, could be assessed as a socio-demographic composition disability;
- (iv) higher costs associated with vandalism and security should not be assessed as an urban influences disability, but a factor that related costs to measures of social stress or alienation should be used instead; and
- (v) the joint factors used in the hospital costs assessment should be retained, as they captured the effects of location.

### **FURTHER STATE VIEWS**

26. In their rejoinder submissions, all States (except Western Australia, which did not comment directly) supported the general aims and objectives of the proposed framework.

27. New South Wales submitted that population size, overseas migration and urban density were key drivers of urbanisation costs, mainly due to their effect on land costs and demand for services. It emphasised the congestion of the transport system and its consequences in terms of higher maintenance costs and costly retrofitting projects. In particular, it argued that population growth was driving the need to duplicate transport infrastructure and that in many cases this could only be done with costly undergrounding.

28. New South Wales also suggested that a congestion costs formula be introduced into the assessments. It proposed that assessments be based on a mathematical formula derived from theoretical work carried out in the early 1970s. That work considered private demand for public goods, and demand for services of non-federal governments<sup>6</sup>.

29. Victoria argued that the proposed framework did not capture some interactions. It argued that interactions between population characteristics (such as alienation, cultural diversity and level of income) and urbanised areas created complexities, and that these interactions were the main source of disabilities. It said that urbanisation disabilities should be applied to emergency services and counter-terrorism, and that the vandalism and security assessment should be extended to Vocational Education and Training<sup>7</sup>. It did not propose a method for assessing cost impacts due to urbanisation.

30. New South Wales and Victoria argued that Sydney and Melbourne were more costly to service as a result of extra demands and higher unit costs. However, they acknowledged that data may not be readily available.

31. Queensland agreed that there were problems with the past approach to urbanisation and supported a more empirical approach. However, it said that metropolitan residents in different States share similar expectations about services and the evidence to support arguments that demand for services increases as density increases was unclear. Queensland questioned the use of density as an indicator, partly because the impact of large transient populations in areas like the Gold Coast meant Census data for usual residents could be misleading. It also disagreed with treating land values as an input cost disability.

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<sup>6</sup> Borcharding, T.E. and Deacon, R.T. 1972, 'The Demand for the Services of Non-Federal Governments', in *American Economic Review* vol. 62, pp. 842-853.  
Bergstrom, T.C. and Goodman, R.P. 1973, 'Private Demand for Public Goods', in *American Economic Review* vol. 63, pp. 280-296.

According to the formula, the individual amount of service received is a simple fraction – that is, the aggregate level of service divided by the total number of people receiving that service, modified by the congestion parameter:

$$Z = N^\theta \times Z^*$$

where  $\theta$  is the congestion parameter,  $Z$  is the aggregate level of service provided to the total population,  $N$  is the number of people receiving the service, and  $Z^*$  is the level of service provided to each individual.

To calculate the congestion parameter  $\theta$ , various assumptions must be made about the aggregate level of service provided. Diseconomies of scale exist where  $\theta$  is greater than one.

<sup>7</sup> Queensland and Tasmania opposed this change to the VET assessment, on the basis that it would add unnecessary complexity for little benefit.

32. Queensland and Western Australia said that the rate of population growth was an important driver in the cost of providing services. Queensland said that high rates of growth required complex and costly urban planning and environmental solutions.

33. Western Australia, South Australia, Tasmania and the ACT expressed strong reservations about the existence of urbanisation disabilities. Between them, they questioned the feasibility of quantifying the additional cost impacts over and above socio-demographic composition, said there was a risk of double-counting, and expressed concern that disabilities in medium-sized and smaller cities could be overlooked.

34. The ACT expressed support for a more empirical approach. It did, however, have reservations about the lack of evidence of higher costs in large urban areas and the possible use of broad indicators, such as population size and density. The ACT called for empirical data to be collected and tested to identify meaningful cost drivers.

35. The ACT supported assessing new disabilities for environmental protection and urban development, but argued that environmental protection costs were related to co-location of natural and urban environments rather than population size or density.

36. The Northern Territory agreed that urbanisation produced additional costs, and supported a more empirical approach. However, it questioned whether drugs, crime and vandalism problems were urbanisation disabilities. It proposed that the framework diagram (Attachment A) be modified to include disposable income, and that the number and type of activities be linked to complexity rather than the economic environment.

37. States also proposed changes to existing urbanisation disabilities. These will be taken up in more detail in the category-specific draft assessment papers.

## **RESEARCH**

38. Since the discussion paper was released, staff have conducted further desktop research on the costs to government of providing services in urban areas, economies/diseconomies of scale, and optimum city size. Staff also sought information from other OECD countries.

39. Much of the research that has been done overseas and in Australia has been directed to understanding whether there are economies/diseconomies of scale in cities that may result in some U shaped cost curve and optimum city size. The research also considered what broad factors might affect costs in cities.

40. The most pertinent points from that research are outlined below.

### ***Survey of international practice***

41. Information provided to Commission staff by OECD officials indicated that, in a number of OECD countries (including Germany, Austria, Norway, Sweden, and

Canada<sup>8</sup>), urban influences are taken into account in deciding financial assistance received by large cities from their national governments. While the methods or rationale for deciding the amount of that assistance are not clear, they appear to take account of the higher cost of providing services and/or the demand from neighbouring jurisdictions.

### ***Findings of research by others***

42. ***International research.*** There is considerable literature on issues relating to economies/diseconomies of scale, optimum city size, the U-shaped curve, congestion and other urban influences on costs.

43. OECD officials told Commission staff that ‘there is clear evidence from European federal countries (Switzerland and Germany) that the per capita expenditure curve is U-shaped, i.e. very small and very large local governments have higher expenditure than medium-sized ones (around 10 000 to 100 000 inhabitants).’

44. Those results related to local government expenditure but local government in those countries provides some services which are provided by States in Australia. Thus the OECD work may support the possible existence of a U-shaped curve for services provided by State governments in Australian cities. However, the OECD results do not provide a useful indicator of when costs begin to rise or the rate at which they rise.

45. The OECD officials also said that ‘research in the United States and Canada indicates that the cost per capita of about 80 per cent of local services does not increase with size. For large infrastructure services and local network industries, cost actually decreases. These findings suggest that a clear negative density or agglomeration effect is unlikely.’<sup>9</sup>

46. The OECD work implies there is some sort of cycle in which larger cities are perceived to offer a greater range of services and employment opportunities, which attracts lower and higher income groups, which in turn increase the volume of services demanded. As demand across a range of services increases, the range and types of needs become more complex. The result is that some services are delivered differently and some special services are introduced to cater to extra needs — governments offer a greater range of services in larger cities, some of which are more costly per capita to provide.

47. The advice staff have received so far indicates that two main factors operate to drive costs upward in larger OECD cities:

- (i) the socio-demographic characteristics of the populations of those cities; and
- (ii) qualitative differences in services provided.

48. Professor Howard Chernick derived, at the request of Commission staff, elasticities of per capita expenditure relative to population size, based on expenditure data

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<sup>8</sup> Email, 13/6/03, Isabelle Joumard, OECD Economics Directorate, Paris.

<sup>9</sup> Email, 13/6/03, and pers. comm. 19/6/03, Hansjoerg Bloechliger, OECD Economics Directorate, Paris.

from 24 large American cities<sup>10</sup>. He reported that: ‘an elasticity of 0.1 to 0.2 would probably be about correct, i.e. a 10 per cent increase in population implies a 1 to 2 per cent increase in costs.’ The analysis covered expenditure on a range of services that in the Australian context covered both State and local government responsibilities, including schools education, garbage collection, fire protection, police, roads and some health services. He said that his results may be skewed by the inclusion of New York city (with a population of 8 million and very high per capita spending). Taking those findings at face value implies that relative to a city of one million providing the full range of services to a city of two million may cost 10 to 20 per cent more per capita and providing them to a city of four million could cost 30 to 60 per cent more. Nevertheless, given the differences between American and Australian cities, this simple relationship is unlikely to be sufficiently rigorous to be useful in Commission assessments.

49. *Australian research.* New South Wales and Victoria said that diseconomies of large scale exist as a result of urbanisation. They have presented persuasive arguments that some services, or some aspects of them, in Sydney and Melbourne are more complex and require more resources than in other cities. For example, they demonstrated that traffic management in Sydney and Melbourne is more complex and requires more traffic control resources than other cities — but Queensland was able to demonstrate that dealing with similar problems in Brisbane was also costly. New South Wales and Victoria also demonstrated that enlarging, replacing or repairing some infrastructure could be very expensive and require special measures. However, they have not provided evidence that urban complexity influences have extra widespread and general effects on all services that lead to higher per capita expenses.

50. The question of economies/diseconomies of scale was addressed by Max Neutze<sup>11</sup>, who looked at the short and long-run costs, including the quasi long-run costs of expanding the capacity of infrastructure in established urban areas. Neutze’s analysis highlighted the problems of expanding capacity, but found that there was no clear relationship between diseconomies of scale and city size. The scale of demand was shown to be a significant factor in enabling a city to take advantage of new and more efficient technologies, and to take advantage of large additions to capacity that offer cheaper unit costs. Most significantly, the actual pattern of growth strongly affected the marginal cost of increasing network capacity.

51. Subsequent research into economies of scale in the provision of local government services concluded that there were insufficient data upon which to base any conclusions.<sup>12</sup>

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<sup>10</sup> Emails to the Commission dated 20/6/03, 25/6/03, 26/6/03 and 23/7/03 and drawn from Chernick, Howard and Tkacheva, Olesya (December 2001) ‘The Commuter Tax and the Fiscal Cost of Commuters in New York City’, report prepared for the NYSNER Research-in-Progress Conference, December 5, 2001, Rockefeller Institute of Government, Albany, New York.

<sup>11</sup> Neutze, M. July 1994 ‘The Costs of Urban Physical Infrastructure Services’, Urban Research Program Working Paper No. 42, Australian National University, Canberra, Australia.

<sup>12</sup> Byrnes, J. and Dollery, B. 2002 ‘Do Economies of Scale Exist in Australian Local Government? A Review of the Empirical Evidence’, Working Paper No. 2002-2 of the University of New England School of Economics, Armidale, Australia.

52. Queensland and Western Australia suggested that the population growth rate was an important service delivery cost driver. They provided evidence which suggested that areas of high population growth experienced higher per capita costs in some aspects of service delivery, especially infrastructure provision and other planning and establishment costs.

53. However, the length of time over which such influences are relevant is not clear. Moreover, low growth may impact on the cost of service provision in important ways too:

*A growing city can take advantage of new and more efficient technologies that are embedded in capital assets much more rapidly than a stagnant city which must wait for the replacement of the assets in which the old technology is embedded...Lumpiness in additions to capacity is a separate, but related cost characteristic which affects the cost of expansion. It is often cheaper per unit of capacity to install or add a large rather than a small amount of capacity...*<sup>13</sup>

### ***Conclusions from research***

54. The research findings suggest that the conceptual case for diseconomies of large scale is unclear. The research staff consulted indicates that the extremely dense agglomerations of population in ‘mega-cities’ such as Hong Kong and New York are likely to exhibit diseconomies of scale. However, staff have not yet found research to either support or refute the view that Australian cities have reached that point.

55. The research on optimum city size and diseconomies of scale is affected by political, social, economic and geographic circumstances of the cities examined and, in some cases, by assumptions that changes in service technology, service delivery, service demand and urban management will not affect the per capita cost of services. This indicates there are no generic relationships and that issues should be examined on a case by case basis, taking account of the individual services involved.

56. The empirical research in OECD countries suggests that higher per capita costs in larger cities are related more to the socio-demographic composition of those urban populations than to diseconomies of scale. There is, nevertheless, international evidence that the increasing complexity arising from the interaction of demographic, economic and geographic circumstances in large cities does produce higher costs for specific services, if not overall.

57. The arguments made by New South Wales and Victoria (including through workplace discussions) confirm that the provision of some services in Australia’s largest cities faces problems which are more complex than in a smaller city. These may be due to various differences, such as the greater age of the infrastructure, traffic congestion, or other

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<sup>13</sup> Neutze, M. July 1994 ‘The Costs of Urban Physical Infrastructure Services’, Urban Research Program Working Paper No. 42, Australian National University, Canberra, Australia.

types of urban influences on costs. They may also arise from interactions between socio-demographic characteristics and aspects of the large city environment.

58. The findings of the research and analysis we have examined indicate that the complexity of the large urban systems impacts on costs in three main ways:

- (i) greater congestion — intensive demand which results in congestion of a particular service can lead to more costly solutions, as illustrated by the arguments of New South Wales and Victoria that special approaches need to be adopted in undertaking road maintenance;
- (ii) past development, geography, the environment and economic considerations produce greater constraints on what can be provided or how it is provided — as an urban area grows, the provision of some infrastructure can be increasingly constrained and subject to more stringent environmental requirements and higher costs; and
- (iii) qualitative differences in the services supplied in larger cities — as cities reach a certain size, particular sub-groups in the population exert specialised needs, which are often more costly to meet.

59. While complexity may conceptually affect costs through one of these mechanisms, the complexity is very hard to measure and to link to State costs. The research confirms that there is no simple relationship between costs of providing services and summary indicators of urban effects. We also note that while the research indicates that complexity results in higher costs, it has not shown that the costs are higher in per capita terms for all services.

#### ***Other issues***

60. Some other specific issues that arose from the rejoinder submissions were:

- (i) the suggestion that we should apply a congestion formula; and
- (ii) costs of land.

61. ***Congestion formula.*** The congestion formula put forward by New South Wales has limitations as a tool for the assessment of urban influences. Apart from some specific services, especially transport services, it is not clear how congestion affects State costs.

62. On technical grounds the formula is an imperfect representation of what States do. For example, by necessity, it adopts simplifying assumptions about the nature of demand and the ways different types of services are provided. Perhaps more importantly, it is often difficult to measure the aggregate level of service provided, which depending on the approach taken can result in a circular argument — congestion is greater in a city because the population and capital stock is greater.

63. We therefore do not propose to adopt the congestion formula as the basis for assessing urban influences.

64. **Land costs.** There is no firm view among the States on the treatment of higher urban land costs. However, land values can have significant ramifications for public housing, debt charges, and the cost of retrofitting infrastructure. They affect revenues — both operating and capital receipts.

65. To the extent that land value is a relevant consideration, it will be examined in specific assessments.

## AN APPROACH TO ASSESSING URBAN INFLUENCES

### *Clarifying the scope of urban influences*

66. **Analysis.** The existing assessments make many allowances for differences in costs of providing State services that reflect influences associated with urban areas. Some of those assessments are made under the heading of socio-demographic composition disabilities, others are under an economic environment heading and others are under an urban influences heading. As a result many different methods are used to make the assessment depending on the circumstances of the individual service, the factor and the availability of data. Staff previously proposed applying a framework to help clarify what is being done.

67. New South Wales and Victoria have argued that many urban influences have not been adequately assessed — either they have not been assessed at all or the assessments do not reflect the full effects. They suggested this be overcome by a mix of increasing existing allowances, introducing extra allowances in some categories or revising the approach to some allowances to base them on a broad indicator of ‘urbanisation’.

68. By contrast, other States have said that assessing extra urban influences creates a risk of double-counting, as the socio-demographic composition factor already captures the differences in demand and unit cost.

69. **Commission decision.** The Commission accepts that the first step in considering the issues associated with urban influences is to apply a conceptual approach that ensures urban influences are appropriately recognised but are not double-counted.

70. It has concluded that the assessments would be improved by adopting a framework that more clearly distinguishes between urban influences and other influences (such as socio-demographic influences) and then sorts the urban influences according to the nature of their effect and the data available to measure them. We intend to use the framework in Attachment A as a guide in those sorting, classification and presentation tasks.

### ***Existence, identification and measurement of urban influences***

71. ***Analysis.*** The arguments advanced by the States and the implications of the international and Australian research that staff have examined strongly suggest that urban influences operate to increase the diversity of demand for services and the complexity of service delivery. Those complexity effects may not be fully captured by the socio-demographic composition or economic environment factors.

72. ***Commission decision.*** The Commission is convinced that there is a conceptual case that urban influences increase the per capita cost of delivery of at least some services. However, the information we have been given also suggests that urban influences might have different effects on the cost curves of different services. For example, while urban influences may increase the requirements for capital stock or make infrastructure more expensive to construct, they may also increase the ability of urban transit services to raise revenue.

73. There is, however, no conceptual case that urban influences have a similar effect on all services and thus there is no simple or generic approach to measuring those effects. The Commission, therefore, has decided they should be examined and where appropriate assessed on a case by case basis. In each case where the assessment of an urban influences disability is under consideration, the Commission will apply its assessment guidelines approach of examining in turn:

- the validity of the conceptual case that urban influences affect the use or cost of State services;
- the availability of empirical data or other evidence to support the conceptual case;
- the materiality of the effects on relative costs; and
- the confidence with which it can estimate the direction and size of those effects.

74. More specifically, it will adopt the following approach.

- (i) It will examine the influences to see whether they stem from the characteristics of the residents of urban areas (such as poverty, ethnicity and so on). If so, and if the effects are material and if suitable empirical data are available, it would assess the effects in the socio-demographic composition disability. Similarly if the influence relates to economic considerations (such as the location of general practitioners) it would continue to reflect the effect in the economic environment disability.
- (ii) If data to disaggregate the costs of services and their use according to location are available (for example, the cost of inpatient services disaggregated by urban, regional and rural location), the empirical location-based assessments would continue to be capable of

identifying the broad differences in average per capita costs. Such location-based assessments would normally be made as an extra dimension of calculations of socio-demographic composition or economic environment influences.

- (iii) If there is a conceptual case that a specific influence is linked to urban areas and good data are available to measure how its effects on costs vary with city size or other urban characteristics (for example, traffic control costs) and those effects are material, specific factors would be assessed. Such influences could be over and above the broad locational influences assessed in (ii). The approach to the measurement of these allowances may differ from service to service, depending on the nature of the service and the data available. It would generally be evidence driven but some judgement could be used to derive the allowances.
- (iv) If there is a strong conceptual case that an influence associated with urban areas leads to greater complexity for a particular service, we would further consider the issue, using two tests:
  - is there evidence to indicate that the influence is linked to large urban populations over a certain size; and
  - is there evidence that urban complexity affects the costs of the particular service through higher congestion cost impacts, cost impacts due to more significant geographic, environmental and other constraints and more limited options, or through qualitative differences in the services supplied?

If the evidence indicates how complexity is linked to the costs States incur and it establishes that the effects are material, we would assess an allowance. Given the nature of the influences and their potential effects on costs, it is likely that any allowance would be based on judgement, possibly aided by simple relationships based on city size, as was the case with the urban influences allowance for police services in the 1999 Review.

74. Much of the information needed to assess these complexity effects is currently lacking. For example, it is not clear that more per capita is spent on environment protection or urban planning in Sydney and Melbourne than in other cities.

75. *Locational effects.* Attachment B outlines the allowances we currently propose to make for the effects of various influences associated with urban areas. In brief they indicate that adequate data are available for us to make reasonably detailed assessments of locational effects in the following cases:

- (i) Hospital Inpatients, where allowance will be made for differences in the use of hospitals (including clinical complexity) and for differences in the costs of hospitals (including allowance for research and teaching roles) across regions;

- (ii) Urban Transit, where the category assessment is based largely on urban populations, will also reflect the effects of passenger use, uneconomic services and capital requirements;
- (iii) Housing, where the socio-demographic composition factor will allow, *inter alia*, for differences in public housing use and provision rates by location; and
- (iv) Government and Non-government Schools, where the socio-demographic composition factor will allow, *inter alia*, for the effect of location on retention rates in the non-compulsory years and the large city impact on vandalism and security costs.

76. ***Specific influences.*** Other data are available for us to make allowances for specific influences arising in urban areas in:

- (i) Depreciation, where allowance will be made for the different quantities of capital required in urban areas based on the allowances for urban influences assessed in other categories;
- (ii) Debt Charges, which will allow for the different quantities of capital required in urban areas based on the allowances made for depreciation;
- (iii) Roads, which will allow for the effects of high traffic levels in urban areas on the costs of maintaining State arterial roads and the costs of traffic control systems; and
- (iv) National Parks, which will allow for the effects of the proximity of urban populations to parks.

77. ***Complexity of urban areas.*** We have been convinced that there are strong conceptual cases that the complexity of urban areas leads to extra costs in the following cases and that the effects are material. We have used available information and judgement to assess factors. We consider that we are improving the equalisation outcome in this way in the following assessments:

- (i) the Police assessments will allow for the extra costs in Sydney and Melbourne, based on judgement informed by the socio-demographic modelling done for police services in the 1999 Review; and
- (ii) the Roads assessment will allow for the effects of urban complexity and retrofitting of infrastructure in the larger cities.

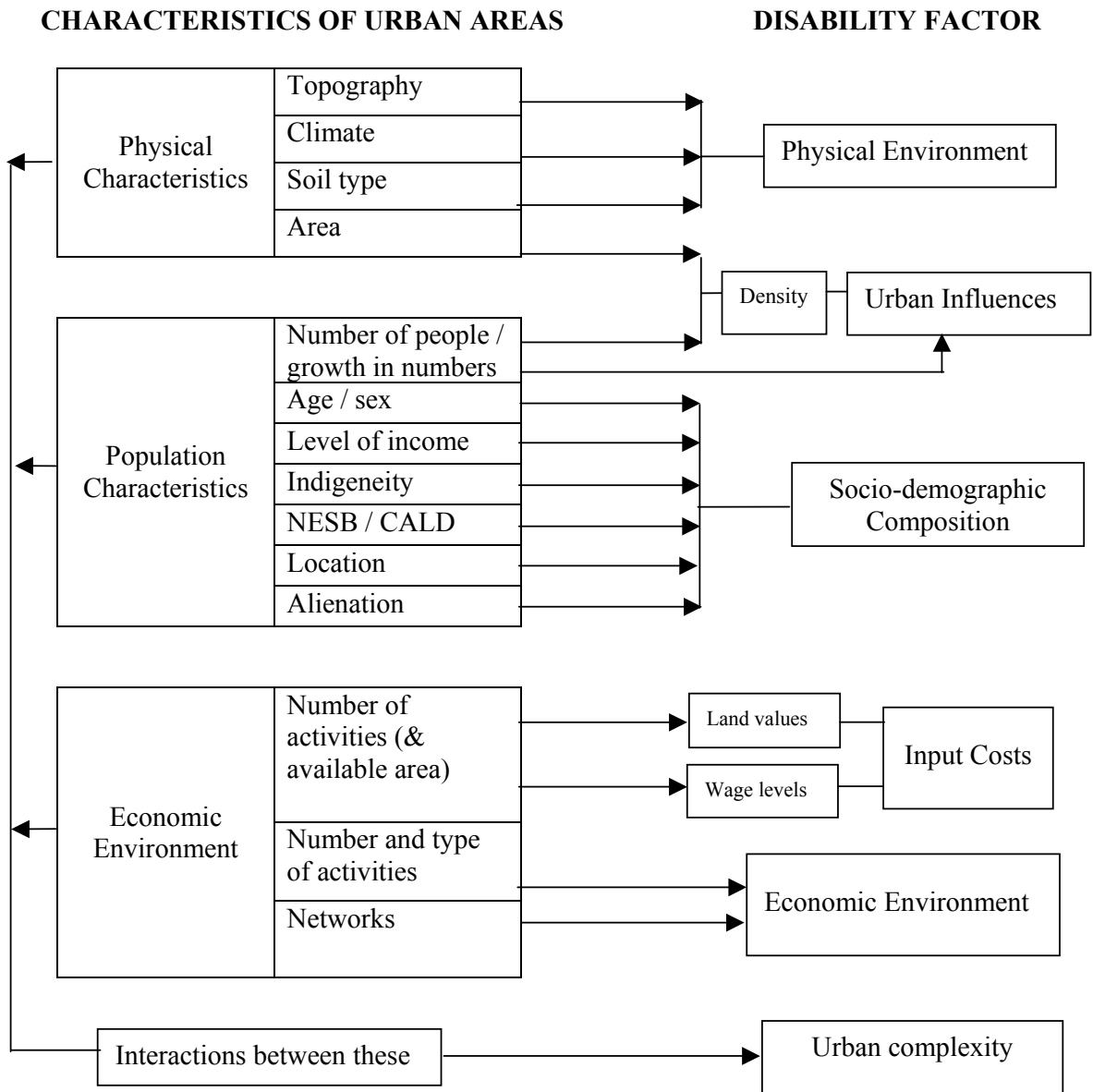
However, these assessments rely heavily on judgment. Additional information to quantify the extent to which per capita costs are higher in Sydney and Melbourne in these areas would give the Commission greater confidence in the assessments.

78. At this stage, we do not have sufficient information to demonstrate a strong conceptual case and/or adequate data to understand the links between other features of urban areas and the costs incurred by States to assure ourselves that we would improve the

equalisation outcomes by exercising our judgement. For example, there is a case that planning tasks are more complex in urban areas. However, there are insufficient data to confirm that per capita expenses increase with the size of urban areas.

# ATTACHMENT A

## FRAMEWORK FOR THE ASSESSMENT OF DISABILITIES



## ATTACHMENT B

### URBAN INFLUENCES FACTORS OVERVIEW TABLE

Category	1999 Review	2004 Review	Changes	Basis of calculation
<b>Government Primary Education</b>	Vandalism and security	This disability has been incorporated in the socio-demographic composition factor.	This disability has been assessed within the socio-demographic composition assessment. It includes a cost weight for capital city populations.	A cost weight of 1.0 per cent has been applied to Sydney and Melbourne populations and one of 0.5 per cent to the populations of Brisbane, Perth and Adelaide.
<b>Government Secondary Education</b>	Vandalism and security	This disability has been incorporated in the socio-demographic composition factor.	This disability has been assessed within the socio-demographic composition assessment. It includes a cost weight for capital city populations.	A cost weight of 1.0 per cent has been applied to Sydney and Melbourne populations and one of 0.5 per cent to the populations of Brisbane, Perth and Adelaide.
<b>Vocational Education and Training</b>	Vandalism and security.	This disability has been incorporated in the socio-demographic composition factor.	This disability has been assessed within the socio-demographic composition assessment. It includes a cost weight for capital city populations.	A cost weight of 1.0 per cent has been applied to Sydney and Melbourne populations and one of 0.5 per cent to the populations of Brisbane, Perth and Adelaide.
<b>In-Patient Services</b>	<p><b>Socio-demographic composition factors:</b></p> <p>A regional element was included in the factors. Region was based on the RMMA classification. The regional breakdown enabled assessment of differential inpatient use rates in the varying State regions. It also enabled economic</p>	The regional element will be continued using an ARIA+ based classification.	The regional classifications used will change.	Regional data will be derived from the National Hospital Morbidity Dataset and 2001 Census data. These data are included with all other socio-demographic composition variable data in an integrated matrix in deriving the

Category	1999 Review	2004 Review	Changes	Basis of calculation
	<p>environment to be taken into account.</p> <p><b>Hospital Costs factor:</b></p> <p>A regional element (based on RRMA) was also included in the hospital costs factor. The regional breakdown enabled assessment of differential inpatient costs (excluding clinical complexity) in the varying State regions.</p>	<p>The regional element will be continued using an ARIA+ based classification.</p>	<p>There are no changes to how region will be assessed in the 2004 Review. The regional classifications used will change.</p>	<p>joint socio-demographic composition factor.</p> <p>Regional data will be derived from the National Hospital Morbidity Dataset, National Hospital Establishment Dataset and 2001 Census data.</p>
<b>Hospital Patient Fees</b>	<p>A regional element was used in the socio-demographic composition factor. Region was based on the RRMA classification. The regional breakdown enabled assessment of differential private patients in public hospital use rates in the varying State regions.</p>	<p>The regional element will be continued using an ARIA+ based classification.</p>	<p>The regional classifications used will change.</p>	<p>Regional data will be derived from the National Hospital Morbidity Dataset and 2001 Census data. These data are included with all other socio-demographic composition variable data in an integrated matrix in deriving the joint factor.</p>
<b>Non-inpatient and Community Health Services</b>	<p>No urbanisation factors assessed.</p>	<p>No urban influences factors proposed.</p>		
<b>Nursing Homes, Mental Health and Community Health Services</b>	<p>No urbanisation factors assessed.</p>	<p>No urban influences factors proposed.</p>		
<b>Population and Preventive Health</b>	<p>No urbanisation factors assessed.</p>	<p>No urban influences factors proposed.</p>		
<b>Police</b>	<p>A weight of 1.1 was applied to the populations of Sydney and Melbourne in recognition of the additional costs of dealing with crime in these large urban areas. The allowance was assessed in the socio-demographic composition factor.</p>	<p>A factor has been assessed. However, the urban influences have been assessed outside the socio-demographic composition factor. The factor is calculated by applying a weight of 1.1 to the population of Sydney and Melbourne.</p>	<p>The same urban influences factor is assessed in three Police components — crime investigation, road safety and traffic management, and other services.</p>	<p>The factor applies a weight of 1.1 to the ABS population data for the cities of Sydney and Melbourne. A weight of 1.0 is applied to the populations outside of Sydney and Melbourne in New South Wales and Victoria, and to the populations of all other States.</p>

Category	1999 Review	2004 Review	Changes	Basis of calculation
<b>Administration of Justice</b>	No urbanisation factors assessed.	No urban influences proposed.		
<b>Corrective Services</b>	No urbanisation factors assessed.	No urban influences proposed.		
<b>Public Safety</b>	No urbanisation factors assessed.	No explicit factor has been assessed but urban influences have been taken into account in the risk and land values factors.		
<b>Depreciation</b>	A factor called population concentration was assessed to recognise the different quantities of capital required due to administrative scale, service delivery scale and urbanisation.	The population concentration factor will not continue. However it will be replaced by separate administrative scale, service delivery scale and urban influence factors.  An urban influences factor based on the assessments made in the Police, Public Safety, General Public Services and National Parks and Wildlife categories has been introduced.	The factor is based on urban influences and complexity assessments in the Police, Public Safety, General Public Services and National Parks and Wildlife categories.	The factor reflects the methods adopted in other categories.
<b>Debt Charges</b>	To the extent that depreciation had urbanisation aspects, they were reflected in debt charges.	To the extent that depreciation is affected by urban influences, they will be reflected in debt charges.		
<b>Roads</b>	There was an urbanisation factor in the arterial roads component, aimed at capturing the effects of urbanisation (other than the volume of traffic) on annual maintenance costs.  An urbanisation factor was also assessed in the other transport component for urban traffic control.	An urban influences factor has been continued in the arterial roads component to allow for the extra costs of maintaining arterial roads in urban areas. An urban complexity factor is also proposed to allow for the higher costs of constructing infrastructure in Sydney, Melbourne and Brisbane.  The urban influences factor for urban traffic control will also	Changes have been made in the methods of calculation	For arterial roads, urban arterial road lane kilometres will be weighted by 1.5.  The proposed allowance for infrastructure has been based on judgement.  The proposed allowance for urban traffic control is also based on judgement and is assessed as 10 per cent for New South Wales and Victoria; and 3 per cent for

Category	1999 Review	2004 Review	Changes	Basis of calculation
		<p>continue.</p> <p>An urban influences factor under the road safety component was considered but a clear conceptual case was not made.</p>		Queensland, Western Australia and South Australia.
<b>Urban Transit</b>	<p>There was no explicit urbanisation assessment however considerations such as city specific propensities had an urbanisation style effect.</p> <p>The joint demand factor for net operating expenditure, took into account the effects of economies of scale, congestion and input costs.</p>	<p>Under the non concessional subsidies component, urban influences will be assessed in the pricing subsidy factor. This factor takes account of the influences on subsidy levels of differences in amounts of uneconomic services required in each State.</p> <p>The capital subsidy factor takes account of the need for maintenance and extensions to urban transport infrastructure according to the type of transport required. This is determined by the size of the urban centre.</p>	The category assessment has changed significantly.	<p>The factor for the pricing subsidy reflects population density.</p> <p>State based data on standards of infrastructure provision and cost.</p>
<b>Housing</b>	No urbanisation factors assessed.	The socio-demographic composition factor includes use weights for people living in metropolitan areas. This is because public housing use is greater in such areas.	The method of assessment for this category has been completely changed.	A cross tabulation of Census data enabled public housing use rates to be calculated by location (ARIA), income, Indigeneity, and age. These weights were applied to the relevant population to calculate the socio-demographic composition factor.
<b>Welfare categories</b>	No urbanisation factors assessed.	No urban influences factors proposed.		

Category	1999 Review	2004 Review	Changes	Basis of calculation
<b>General Public Services</b>	No urbanisation factors assessed.	There is a case that planning tasks are more complex in urban areas. However, there are insufficient data to confirm that per capita expenses increase with the size of urban areas. A factor has not been assessed.		
<b>National Parks and Wildlife Services</b>	An urbanisation factor was assessed to measure the indirect costs associated with populations contiguous to national parks, who are not direct users of parks in each State. In the 2003 Update, the assessment was based on IUCN category II parks only.	A factor similar to that assessed under the 1999 Review methods is proposed. However, the assessment is to be based on all six IUCN categories of parks.	The factor is to be based on populations contiguous to national parks. Only the definition of relevant parks will change – from IUCN category II parks only, to all six IUCN categories of parks.	The factor is based on weighted populations contiguous to relevant national parks (all six IUCN categories of parks). A cost weight of 1.0 is to be applied to populations located within 10 kilometres of parks, and 0.5 to populations located from 10 to 15 kilometres from national parks.