Residential Development Council
PROPERTY COUNCIL

HOUSING FORM IN AUSTRALIA AND ITS IMPACT ON GREENHOUSE GAS EMISSIONS

An Analysis of Data from the Australian Conservation Foundation *Conservation Atlas*

Submitted to the
Residential Development Council
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DEMOGRAPHIA

FORWARD

The issues of housing form, urban growth and the 'top of mind' concern about environmental sustainability and climate change are increasingly finding their way into all channels of public policy.

When it comes to urban planning and population growth, our media and politicians tend to operate with a wide range of assumptions about the consequences of various public policy approaches. Well intended though these presumptions are, they remain only presumptions in many cases. In some cases, they are factually mistaken.

One such area of presumption involves what some like to pejoratively call 'urban sprawl' (though there is virtually no evidence of its existence in Australia – planning schemes have not permitted unplanned and unserviced outer urban growth in decades). There is a wide spread assumption that suburban development (the detached house in a new housing development) has negative ecological impacts in the form of high greenhouse gas emissions and the per capita eco-footprint.

The assumption is that this type of housing is by nature not sustainable, and that its auto-dependent occupants and their commuting lifestyle are somehow a combination which augurs poorly for a future in which we want to produce fewer greenhouse gas emissions and to reduce mankind's impact on climate change.

So when media reports emerged in 2007 of a new study that suggested quite the opposite, it was natural to investigate further. Indeed, the study – by the Australian Conservation Foundation – found that the suburban housing form and lifestyle was typically producing lower per capita greenhouse gas emissions and leaving a smaller per capital eco footprint than their inner-city counterparts.

The Residential Development Council represents leading developers of both infill (high and medium density housing) and suburban housing. It supports public policy which will deliver lower cost regulatory and tax regimes in order to promote improved housing affordability. It is also committed to environmentally sustainable housing growth. And part of that commitment means working in a well informed policy framework, influenced by evidence and fact and science, rather than presumption.

For that reason, the RDC commissioned the Wendell Cox Consultancy to examine this report's findings in detail, and to suggest possible public policy implications.

This is their report.

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Climate change concerns have propelled the issue of reducing greenhouse gas[1] emissions to the top of the public policy agenda. A large share of greenhouse gas emissions are the product of fossil fuel combustion and, as a result, particular emphasis is being placed upon reduction of fossil fuel use.

For some years urban planning policy has sought to contain urban expansion (often pejoratively called "urban sprawl") and encourage instead higher density housing development through policies referred to as "urban consolidation."[2] One claimed objective of urban consolidation has been to reduce automobile use, which it is assumed will naturally occur as a result of higher urban densities.[3]

Urban Consolidation and GHG Theory: The urban consolidation agenda is perceived by many to be an appropriate strategy for reducing GHG emissions. Part of this is due to the fact that automobiles are an obvious example of fossil fuel use.

Generally, urban planning policy assumes that greenhouse gas emissions are higher in portions of urban areas that are more suburban, especially areas in which there is a preponderance of single-family detached housing. There is also the assumption that greenhouse gas emissions are lower in higher density areas, especially where there are more high-rise condominium and apartment buildings. And, as noted above, a parallel perception is that greenhouse gas emissions are greater in portions of the urban area that rely more on cars, and less where there is greater dependence on public transport. Finally, higher population densities are associated with lower GHG emissions.

As a result, an assumption has emerged that reducing GHG emissions will require less automobile use and more compact cities. Indeed, there is the potential that the urban consolidation agenda might "hijack" policy development on the unchallenged assumption that its strategies are best suited for GHG emission reduction.

The Reality: However, reducing GHG emissions is not so simple as to be achieved through the urban consolidation agenda. Indeed, there is considerable evidence to the contrary.

GHG emission estimates from the recently published Australian Conservation Foundation Consumption Atlas, indicates virtually the opposite of the generally held perceptions. The data shows that lower density areas, which rely more on automobiles, tend to produce less in GHG emissions than the high density, more public transport dependent areas that are favored by urban consolidation policies.

[1] Principally carbon dioxide and methane.
[2] These arguments are critiqued in Scholo Angel, *Housing Policy Matters: A Global Analysis:* Oxford University Press, 2000, Robert Bruegmann, Sprawl: A Compact History(Chicago: University of Chicago Press, 2005), and Wendell Cox, *War on the Dream: How Anti-Sprawl Policy Threatens the Quality of Life* (New York: Iuniverse, 2006).
[3] In fact, despite the densification that is occurring in capital cities, automobile use keeps rising. Between 1999 and 2006, the per capita distance traveled by automobile in the largest five capital cities rose 11 percent, ranging from an increase of 5 percent in Melbourne to 26 percent in Perth (http://www.demographia.com/db-ausmv.pdf).

The reality, as indicated by data from the Australian Conservation Foundation's Consumption Atlas is virtually the opposite.[4] In fact (Table ES-1):

* Lower GHG emissions are associated with urban fringe locations, not the core.
* Lower GHG emissions are associated with higher rates of detached housing.
* Lower GHG emissions are associated with greater automobile use.
* Lower GHG emissions are associated with lower population density.

Table ES-1
Consistency with Urban Consolidation Planning Assumptions
5 Largest Capital Cities: Individual Instances

Planning Assumptions	Reality
Higher GHG Emissions Associated with Longer Distance from Core	Lower GHG Emissions Associated with Longer Distance from Core
Higher GHG Emissions Associated with Detached Housing	Lower GHG Emissions Associated with Detached Housing
Higher GHG Emissions Associated with More Auto Use	Lower GHG Emissions Associated with More Auto Use
Higher GHG Emissions Associated with Lower Population Density	Lower GHG Emissions Associated with Lower Population Density

The Consumption Atlas: The Australian Conservation Foundation Consumption Atlas relies on a holistic approach, which allocates greenhouse gas emissions to final consumption at the household level. This includes not only direct energy consumption (such as household electricity use and automobile use) but also a much larger component, indirect energy consumption, which includes GHG emissions from manufacturing, processing and otherwise producing consumer products. The Consumption Atlas also estimated per capita water use and ecological footprint.[5] The Consumption Atlas provides a ground-breaking model for GHG emission analysis that establishes a model for the field, not only nationally but also internationally.

The focus of the Consumption Atlas on consumption is appropriate. The purpose of virtually everything produced is consumption. Greenhouse gas emissions are virtually all the result of consumption. Fossil fuel power stations produce electricity for consumer, government, commercial and industrial use, but, in fact all government, commercial and industrial activity is ultimately consumed by residents of local areas. Thus, the greenhouse gas emissions from meat production are, in the final analysis, consumer greenhouse gas emissions. Similarly, the greenhouse gas emissions produced by Australian Defence Force are for the benefit of Australia's citizens and can thus be considered a form of consumption.

[4] *Consumption Atlas*, http://www.acfonline.org.au/custom_atlas/index.html.
[5] Eco-footprint is the land area required to support the lifestyle of the average person.

The approach of the Consumption Atlas avoids what could deteriorate into agenda-driven approaches that focus only on the particular GHG producing sectors that are in the political sites of interest groups. Approaches that begin at any level other than allocating all GHG emissions to specific final consumption run this risk. For example, the authors of the Consumption Atlas note that emphasis on direct consumption (such as automobile use and land use policy) may be "misdirected since direct energy use constitutes remarkably small portion of the total energy requirement over a range of incomes."[6]

The more important risk is that agenda-driven policies may fail to achieve the objective of substantially reducing GHG emissions. Any serious, good-faith program for reducing emissions must be based upon comprehensive analysis that does not begin with pre-conceived notions, despite their popularity even at the highest policy levels.

This Report: This report analyzes the local area GHG emissions data, as well as the water use and eco-footprint data from the Consumption Atlas with respect to geographical locations within the capital cities and various demographic factors.

Data is provided for all of the capital cities on GHG emissions by proximity to the core and by housing categories, automobile availability, income and population density. The report begins with a summary of the findings and includes detailed sections for each of the capital cities.

[6] Manfred Lenzena, Christopher Deya, Barney Foran, "Analysis: Energy requirements of Sydney households," *Ecological Economics 49* (2004), 395.

Climate change concerns have propelled the issue of reducing greenhouse gas[7] emissions to the top of the public policy agenda. A large share of greenhouse gas emissions is the product of fossil fuel combustion and, as a result, particular emphasis is being placed upon reduction of fossil fuel use.

Greenhouse Gas Emissions in Capital Cities

The Australian Conservation Foundation has published a Consumption Atlas, which allocates greenhouse gas emissions to final consumption at the household level at the statistical local area[8] level. This includes not only direct energy consumption (such as household electricity use and automobile use) but also a much larger component, indirect energy consumption, which includes GHG emissions from manufacturing, processing and otherwise producing consumer products. The Consumption Atlas provides a model for GHG emission analysis that establishes a model for the field, not only nationally but also internationally.

This report analyzes the local area GHG emissions data, as well as the water use and eco-footprint data from the Consumption Atlas with respect to geographical locations within the capital cities and various demographic factors. Data is provided for all of the capital cities on GHG emissions by proximity to the core and by housing categories, automobile availability, income and population density. The report begins with a summary of the findings and includes detailed sections for each of the capital cities.

The national and capital city analyses are presented in two formats:

> Proximity to the Core: In the capital cities of over 1,000,000 populations, such as Sydney, data is summarized by analysis zone into four geographical categories: core, inner ring, Second Ring and Outer.
>
> Demographic Factors: Data is presented by analysis zone[9] for the prevalence of detached housing, prevalence of household car ownership and median income.

Analysis by Proximity to Core

Among the nation's five capital cities with more than 1,000,000 populations, the highest greenhouse gas emissions are produced in the core areas, at 27.87 annual tonnes per capita. By comparison, inner ring areas produce 21.11 annual GHG tonnes per capita - 24 percent less than in core areas. Annual GHG tones per capita in the second ring are 18.82 tonnes - 32 percent less than in core areas. The outer areas average 17.46 annual GHG tones per capita - 38 percent less than in core areas (Figure 1).

[7] Principally carbon dioxide and methane.
[8] As defined by the Australian Bureau of Statistics.
[9] In Sydney, Melbourne and Brisbane, "analysis zones" are statistical subdivisions as defined by the Australian Bureau of Statistics. In the other capital cities, analysis zones are defined by ABS statistical local areas. An index of statistical local areas, statistical subdivisions and analysis zones is provided in Appendix B.

The national relationship of lower GHG emissions in areas farther from the core is evident in all five of the capital cities over 1,000,000 (Table 1 and Figure 2) and in the capital cities with under 1,000,000 population.

Table 1
GHG Emissions by Proximity to Core
Analysis Zones in Capital Cities Over 1,000,000

	Sydney	Melbourne	Brisbane	Adelaide	Perth
Core	30.05	28.03	26.51	22.48	24.07
Inner Ring	21.78	21.18	22.81	18.12	20.04
Second Ring	19.76	19.37	19.11	16.68	17.08
Outer	17.46	17.82	16.95	18.35	16.74
Total	20.74	20.37	19.54	17.59	18.38

Housing: GHG emissions are lower where there are more detached houses (Figure 3). This pattern is found in all five larger capital cities. This is contrary to the generally held belief that lower density living produces higher GHG emissions.

Cars: GHG emissions are lower where there are more cars (Figure 4). This pattern is found in all five larger capital cities. This also reflects the national pattern, which is contrary to the generally held belief that automobile based mobility produces higher GHG emissions.

Income: GHG emissions are lower where population incomes are lower (Figure 5). This pattern is found in all five larger capital cities. This reflects the relationship suggested by the Consumption Atlas authors.

Population Density: GHG emissions are lower where population densities are lower (Figure 6). This pattern is found in all five larger capital cities. This reflects the national pattern, which is contrary to the generally held belief that higher densities are associated with lower GHG emissions.

Water and Ecological Footprint: Virtually the same relationship exists with water usage and the ecological footprint as with GHG emissions. Water usage and the ecological footprint are the highest in the core areas and decline toward the outer areas (Table 2). This pattern is found in all five larger capital cities.

Table 2
Consumption Factors by Proximity to Core
Analysis Zones in Capital Cities Over 1,000,000 Annual Per Capita

	GHG Emissions (Tonnes)	Water Use (Litres)	Eco-Footprint (Hectares)
Core	27.87	900,000	7.76
Inner Ring	21.11	820,000	6.89
Second Ring	18.82	760,000	6.55
Outer	17.40	670,000	6.15
Total	19.88	770,000	6.66

Analysis by Demographic Characteristics

Similar relationships are evident from an analysis of GHG emissions based upon the demographic characteristics of detached housing, car availability and median household income.

Housing: There is an association between a greater share of detached housing and lower GHG emissions per capita (Figure 7), without regard to proximity to the core. The highest GHG emissions per capita (27.86 tonnes annually) are in analysis zones with the lowest share of detached housing (less than 30 percent). The lowest GHG emissions per capita (17.38 tonnes annually) are in analysis zones with a the highest share of detached housing (90 to 100 percent). The same general relationship between detached housing and lower GHG emissions per capita is evident in all of the capital cities (below).

Cars: There is an association between greater automobile availability share and lower GHG emissions per capita (Figure 8), without regard to proximity to the core. The highest GHG emissions per capita (29.13 tonnes annually) are in analysis zones with the lowest share of households with cars (70-74 percent) and presumably where public transport dependency is greatest. The lowest GHG emissions per capita area in analysis zones with the highest share of households owning cars (17.38 tonnes annually). The same general relationship between a higher share of households with cars lower GHG emissions per capita is evident in all of the capital cities (below).

Income: GHG emissions are lower where population incomes are lower (Figure 9), without regard to proximity to the core. This pattern is found in all five larger capital cities. This relationship exists in all of the capital cities except Canberra (below).
Outside Canberra, this reflects the relationship suggested by the Consumption Atlas authors.

Population Density: GHG emissions per capita are the highest where population density is the highest (Figure 10), without regard to proximity to the core. This pattern is found in all capital cities.

Water and Ecological Footprint: Again, generally the same relationship is evident in waster use and eco-footprint. Water use and the eco-footprint tend to decrease where there is more detached housing, more cars and higher median household incomes (Table 3). This reflects the national pattern, which is contrary to the generally held belief that higher densities are associated with lower GHG emissions.

Table 3
Consumption by Demographic Characteristics
Analysis Zones in All Capital Cities Annual Per Capita

	GHG Emissions (Tonnes)	Water Use (Litres)	Eco-Footprint (Hectares)
Detached Share of Housing			
Under 30%	27.86	930,000	7.66
30% - 49%	25.20	930,000	7.75
50% - 59%	21.25	850,000	6.73
60% - 69%	20.84	810,000	6.79
70% - 79%	19.11	770,000	6.57
80% - 89%	18.56	730,000	6.43
90% - 100%	17.38	690,000	6.39
Total	19.86	770,000	6.65
Households with Autos			
70% - 74%	29.13	920,000	7.74
75% - 79%	25.38	940,000	7.56
80% - 84%	20.00	810,000	6.54
85% - 89%	19.93	780,000	6.59
90% - 94%	19.12	750,000	6.63
95% - 100%	17.65	700,000	6.35
Total	19.86	770,000	6.65
Weekly Median Household Income			
$700-$799	17.84	720,000	6.46
$800-$899	17.05	690,000	5.88
$900-$999	18.04	720,000	6.36
$1,000-$1,099	18.03	720,000	6.53
$1,100-$1,199	20.34	780,000	6.69
$1,200-$1,299	24.45	810,000	7.27
$1,300-$1,399	21.90	810,000	7.44
$1,400-$1,499	23.60	900,000	7.38
$1,500-$1,599	23.84	900,000	7.20
$1,600-$1,699			
$1,700-$1,799	22.34	890,000	7.08
Total	19.86	770,000	6.65
Population Density (Persons per Square Kilometer)			
Under 500	18.07	710,000	6.45
500-999	18.73	760,000	6.42
1,000-1,999	19.68	780,000	6.73
2,000-2,999	21.24	820,000	6.65
3,000-3,999	25.85	950,000	7.51
4000 & Over	26.64	930,000	7.55
By Analysis Zone			

Conclusions

The analysis of the data provided in the Australian Conservation Foundation Consumption Atlas indicates that the patterns of GHG emissions per capita are strongly or generally inconsistent with the prevailing assumptions of urban consolidation policy (Tables 4 and 5). This conclusion applies overall and in each of the five large capital cities. To the contrary of the urban consolidation assumptions:

* Lower GHG emissions are associated with locations farther from the core.
* Lower GHG emissions are associated with more detached housing.
* Lower GHG emissions are associated with greater auto use.
* Lower GHG emissions are associated with lower population density.

The assertion by the authors of Australian Conservation Foundation Consumption Atlas of a strong association between higher household incomes and higher GHG emissions per capita is generally supported. Caution, however, is appropriate with respect to the income conclusion. A comparison by the authors of households with similar incomes in inner and outer Sydney found that per capita energy use was more in inner areas than outer areas (which suggests that location may be an important factor in consumption, independent of income).[10]

Table 4
Consistency with Urban Consolidation Planning Assumptions
5 Largest Capital Cities: Individual Instances

Planning Assumption	Strong Consistency	General Consistency	No Relationship	General Inconsistency	Strong Inconsistency
Higher GHG Emissions Associated with Longer Distance from Core	0	0	0	1	4
Higher GHG Emissions Associated with Detached Housing	0	0	0	4	1
Higher GHG Emissions Associated with More Auto Use	0	0	0	3	2
Higher GHG Emissions Associated with Lower Population Density	0	0	0	2	3
Instances:	0	0	0	10	10
Percentage	0%	0%	0%	50%	50%

Table 5
Consistency with Urban Consolidation Planning Assumptions
Capital Cities

Planning Assumption	Strong Consistency	General Consistency	No Relationship	General Inconsistency	Strong Inconsistency
Higher GHG Emissions Associated with Longer Distance from Core					●
Higher GHG Emissions Associated with Detached Housing				●	
Higher GHG Emissions Associated with More Auto Use				●	
Higher GHG Emissions Associated with Lower Population Density					●
INSTANCES: Overall	0	0	0	0	4

[10]See Manfred Lenzena, Christopher Deya and Barney Foran, "Analysis: Energy requirements of Sydney households," *Ecological Economics 49* (2004), 375-399, Table 6. Per capita direct and indirect energy use in the inner areas was estimated at more than 75 percent higher than in the outer areas.

Related Issues

Beyond the findings of the Consumption Atlas, there is evidence that private transport and detached housing are not as environmentally damaging as suggested. For example:

> Substantial progress is being made in improving new houses. "Five Star" Energy Star rated new houses represent a two-thirds improvement over conventional house construction.
>
> Separate Sydney research indicates that GHG emissions per capita are higher in high-rise and mid-rise condominium buildings than in single family detached or attached houses (Figure 11). Much of this difference has to do with energy intensive common functions in the condominium buildings, such as lifts, swimming pools, and lighting in halls, lobbies and parking lots, which can equal or exceed direct household consumption.[11]
>
> While the average car is less fuel efficient per passenger kilometer (a kilometer traveled by a person) than the average public transport bus, the difference is not as great as might be imagined. It is estimated that the average public transport bus produces approximately one quarter less in GHG emissions per passenger kilometer than the average family car.[12] However, improvements in automobile vehicle technology are underway. The "National Average Fuel Consumption Target" has been set for 2010 at virtually the same level as public transport buses.[13] Already, the average hybrid car (Toyota Prius) emits 50 percent less in GHGs than the average public transport bus and emerging diesel-hybrid technology will reduce that figure another 10 percent (Figure 12).[14]

It might be argued that GHG emissions from automobiles could be neutralized by building far larger public transport systems or by an aggressive policy of high density housing construction, on the assumption that this would lead to greater public transport use. Besides the fact that Consumption Atlas data suggests that these patterns of transport and development are more GHG intensive, it must be recognized that construction can produce significant GHG emissions. For example, according to the US Federal Transit Administration, a proposed Seattle light would require 45 years just to recover its construction related GHG emissions from reduced automobile use.[15]

While automobiles are routinely characterized as a major GHG emission culprit, they produced less than eight percent of national emissions in 2005.[16] Automobile use in the five large capital cities accounted for less than five percent of national GHG emissions.[17]

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[11] These estimates do not include GHG emissions from construction of buildings. See: Paul Myors. EnergyAustralia. &. Rachel O'Leary & Rob Helstroom, *Multi Unit Residential Buildings Energy & Peak Demand Study*, http://203.15.106.215/information/common/pdf/alts_adds_req/energy_mu_study.pdf.

[12] It has been estimated that the fuel used by urban buses emits between 120 and 230 grams of GHG emissions per passenger kilometer in the five largest capital cities, with an average of 150 grams (see *Life-cycle Emissions Analysis of Alternative Fuels for Heavy Vehicles* http://www.greenhouse.gov.au/transport/publications/lifecycle.html,) . By comparison, the average family car emits approximately 210 grams per passenger kilometer (assumes the Sydney vehicle occupancy rario).

[13] *National Average Fuel Consumption (NAFC) target,* http://www.greenhouse.gov.au/transport/env_strategy.html#nafc.

[14] The Toyota Prius emits 72 grams per passenger kilometer (assumes the Sydney vehicle occupancy ratio). Toyota Prius emissions data from *Life-Cycle Emissions Analysis of Fuels for Light Vehicles*, http://www.greenhouse.gov.au/transport/publications/pubs/lightvehicles.pdf

[15] http://www.globaltelematics.com/pitf//globalwarming.htm

[16] Calculated from national greenhouse gas emissions inventory, http://unfccc.int/files/national_reports/annex_i_ghg_inventories/national_inventories_submissions/application/x-zip-compressed/aus_2007_nir_8may.zip and http://www.greenhouse.gov.au/projections/pubs/transport2006.pdf.

[17] Estimated from based upon share of national automobile use in capital cities, from *Survey of Motor Vehicle Use, Australia, 12 months ended 31 October 2006,* http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/9208.012%20months%20ended%2031%20October%202006?OpenDocument.

Implications

Objective and rigorous analysis is the only reliable basis for reducing GHG emissions. Preconceived notions should be discarded, because they can lead to ineffective or even counter-productive strategies. As the Consumption Atlas data indicates, things are not always as they are perceived. The issue of GHG emissions reduction is complex and requires comprehensive analysis. Those who would, for example, rush to place serious restrictions on car use may not be aware of the fact that livestock are responsible for 75 percent more GHG emissions than cars.[18]

Restrictions on Driving are not the Answer: Further, policies that seek to restrict automobile use, for example, could significantly reduce employment opportunities, by reducing the employment and shopping opportunities that can be accessed in a reasonable period of time. Moreover, there simply is no alternative public transport service for many trips. This means that trips would not be made or they might take much longer, because public transport tends to take longer for travel except to the comparatively small share of trips that go to city centres.[19] This would reduce economic activity by such households, which could be to further exacerbate the income gap between lower income and higher income households. Generally, greater economic output is associated with shorter travel times. In the modern, suburban city, the automobile has generally improved travel times and made more destinations accessible.[20]

Technology Advancement is Crucial: The appropriate strategy with respect to GHG emissions from indirect consumption is the same as it is in direct consumption. In both housing and automobiles, two of the more important elements of direct consumption, technological advances are already significantly reducing GHG emissions. The key, with respect to both direct and indirect consumption will be to reduce GHG emissions, principally through technological advances, while maintaining economic growth and reducing poverty. It is only through such strategies that genuine sustainability can be achieved --- environmental, economic and social.

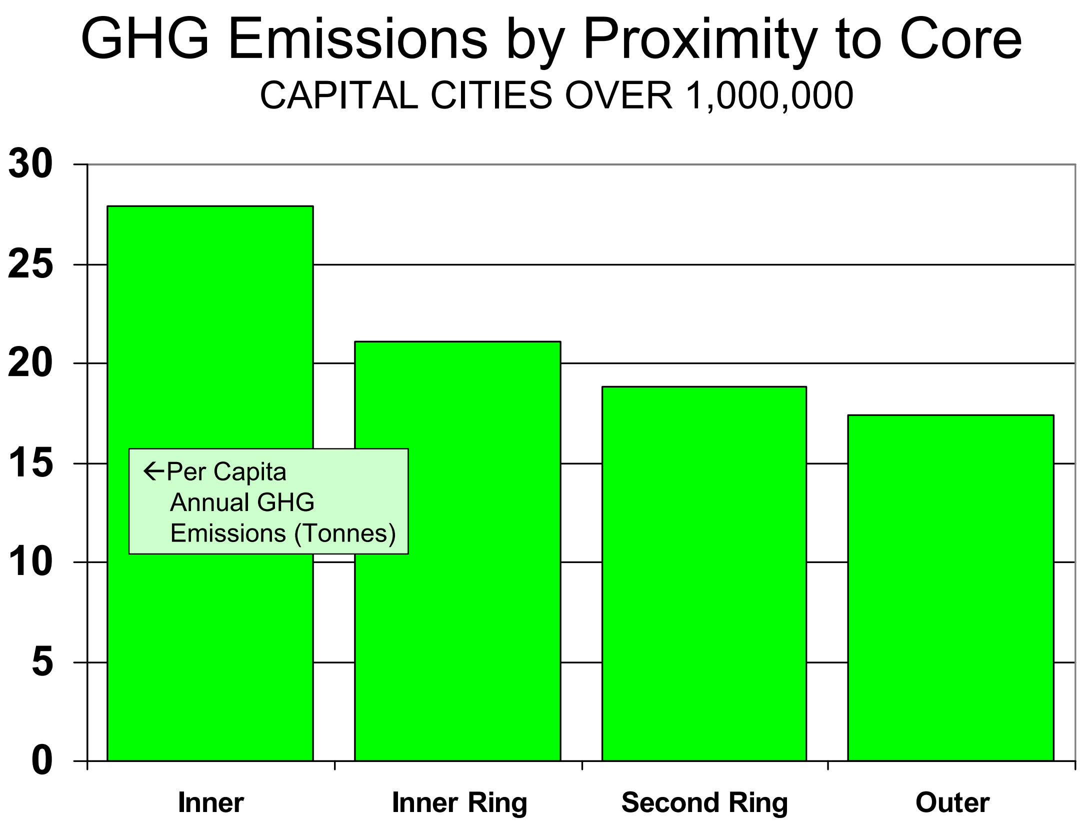
Consumption is Necessary: As the Consumption Atlas shows, most GHG emissions are the result of indirect, rather than direct consumption. It would be a mistake, however, to assume that call for wholesale reductions in consumption. Reducing consumption would reducing the demand for labor, thus destroying jobs This would reduce economic growth and thereby increase poverty, both in Australia and in nations from which Australia imports goods.

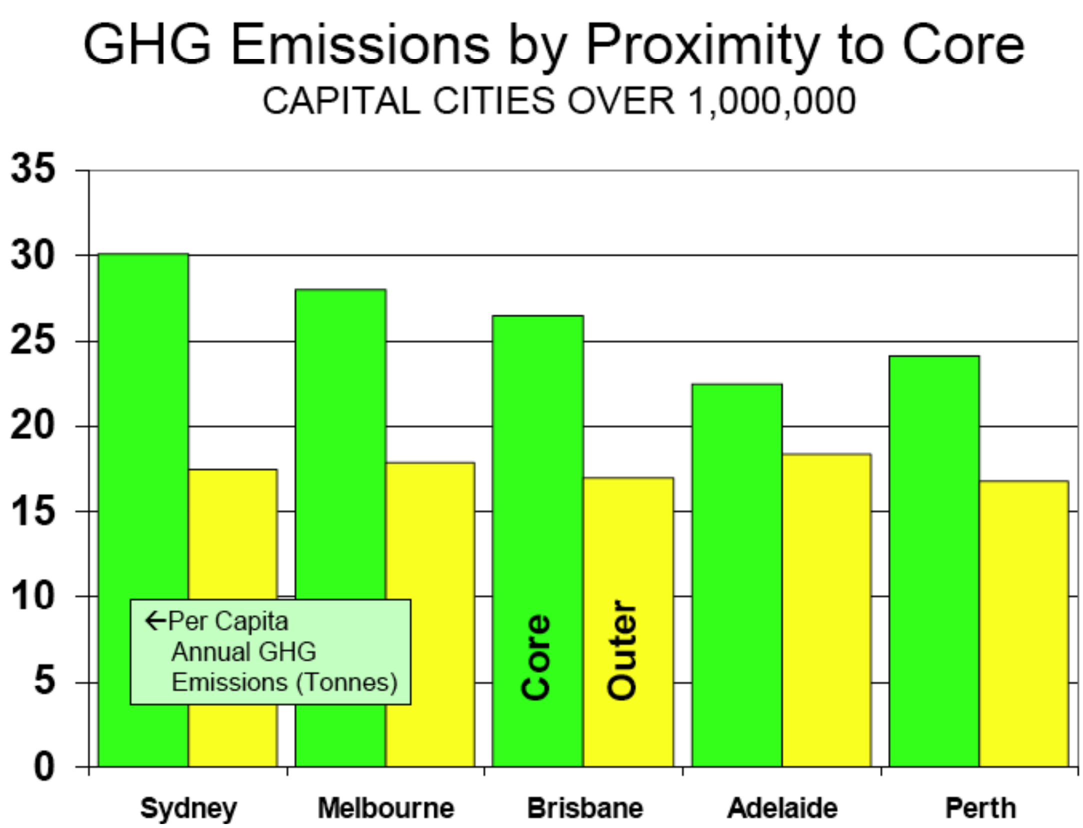
[18] Calculated from national greenhouse gas inventory and http://www.greenhouse.gov.au/projections/pubs/agriculture2006.pdf.
[19] Centre city employment was 16.5 percent of employment in the five largest capital cities according to 2001 census data.
See: http://www.publicpurpose.com/db-auscapcbd.pdf.
[20] Research documenting the relationship between mobility and productivity is summarized in Wendell Cox, *Urban Transport and Productivity,* presentation to Seminario de Transporte Urbano
Inter-American Development Bank, Santiago de Chile, October 2007 http://www.publicpurpose.com/db-idb-prod.pdf.

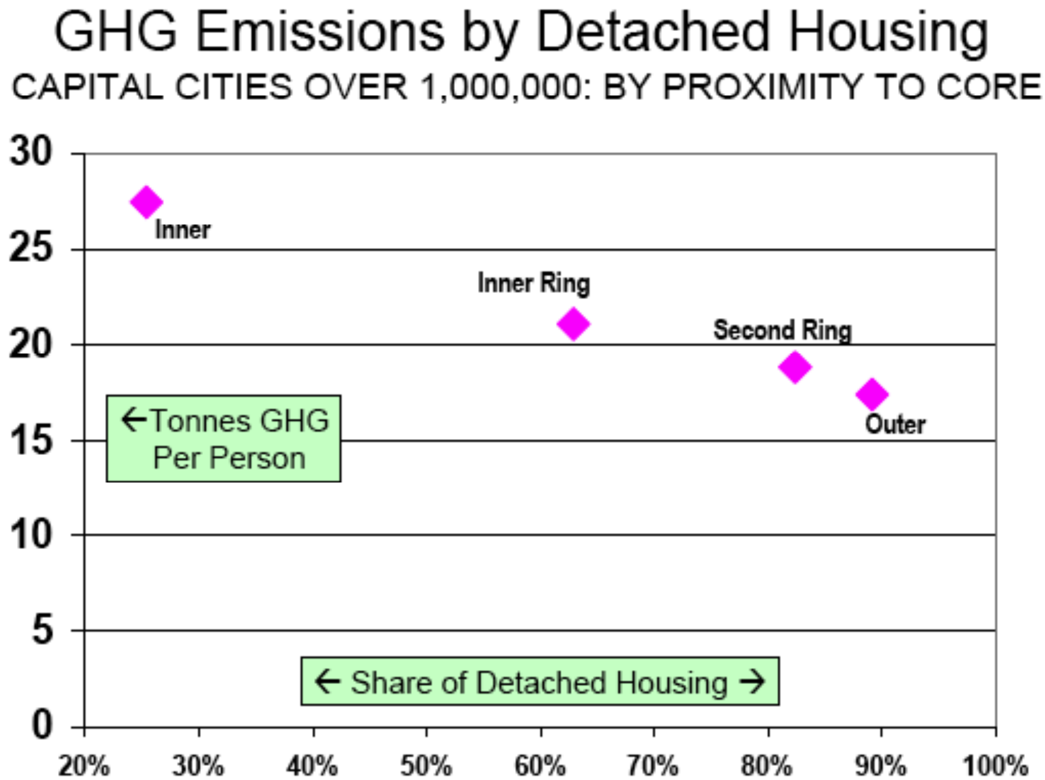
Economic Growth Required for GHG Reduction: Moreover, a serious reduction of consumption would likely lead to a less environmentally friendly society. Compelling evidence of this was provided by Soviet era Eastern Europe and the Soviet Union, with their astonishing levels of pollution. Put in stark terms, a society will eat and pay for basic necessities before it will make material expenditures for environmental protection. It would seem that sustainable development includes both environmental sustainability and economic sustainability, which requires continued economic growth and poverty alleviation. The failure to sustain economic growth is likely to lead to an insufficiency of resources to address GHG emission reduction objectives.

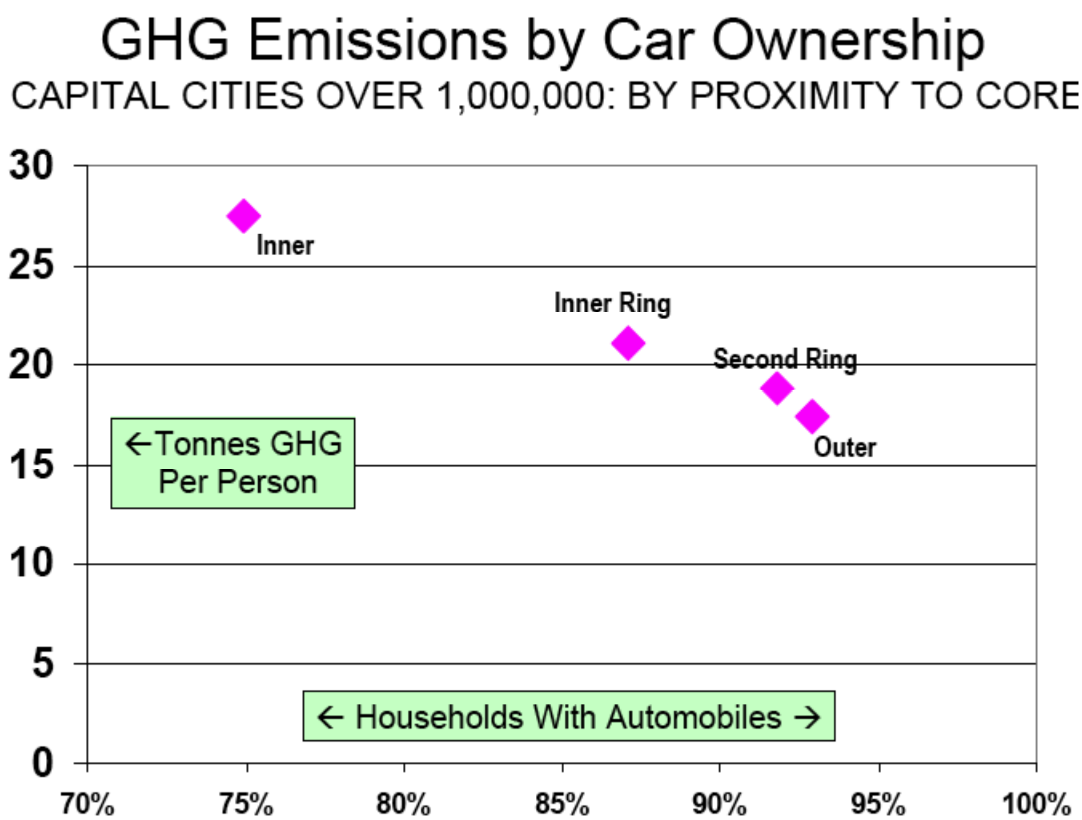
Economic Growth is Necessary: Finally, the long term sustainability of modern societies requires economic growth. Benjamin Friedman argues in The Economic Consequences of Economic Growth, that economic growth is more than desirable; it is a necessity for social cohesion (Friedman, 2005). Public policies need to be developed in light of this reality. Urban areas are critical to economic growth and this depend, in large measure, on urban transport systems that quickly and efficiently move people and goods within, through and between urban areas.

Effective GHG Reduction Policy: All of this indicates the importance of rational, rather than "knee-jerk" GHG reduction strategies or strategies based upon pre-conceived notions. There is a necessity for policies that are based in comprehensive and objective analysis that yields produces the best economic performance while meeting public policy goals.

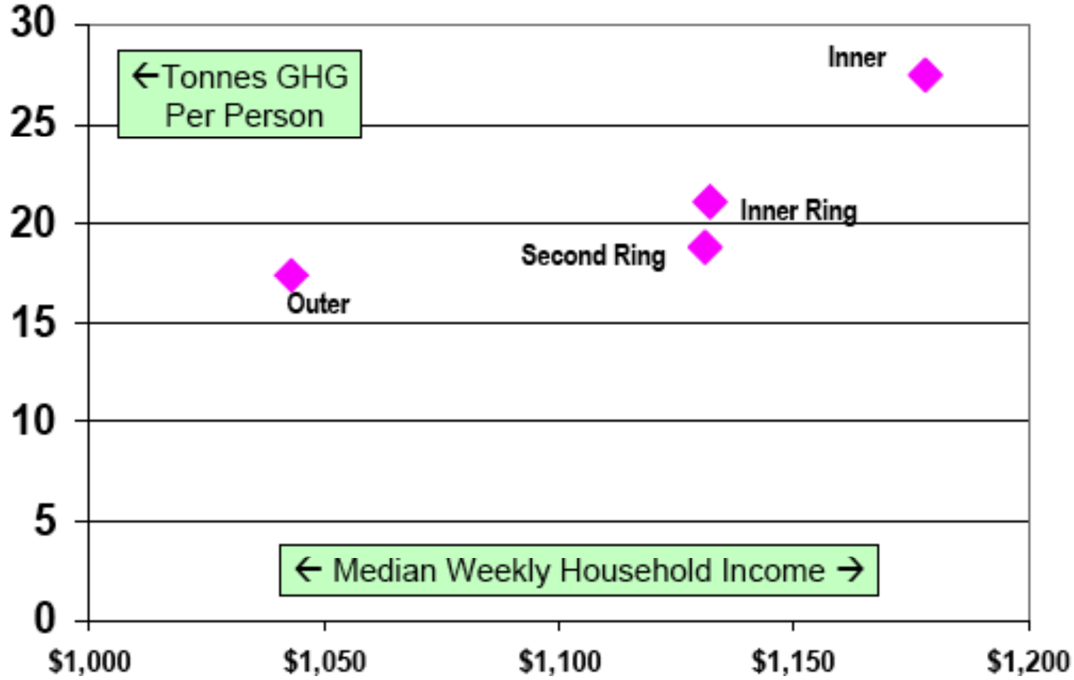

GHG Emissions by Proximity to Core
CAPITAL CITIES OVER 1,000,000
30
25
20
15
10
5
0
←Per Capita Annual GHG Emissions (Tonnes)
Inner
Inner Ring
Second Ring
Outer


GHG Emissions by Proximity to Core
CAPITAL CITIES OVER 1,000,000
35
30
25
20
15
10
5
0
←Per Capita Annual GHG Emissions (Tonnes)
Core
Outer
Sydney
Melbourne
Brisbane
Adelaide
Perth

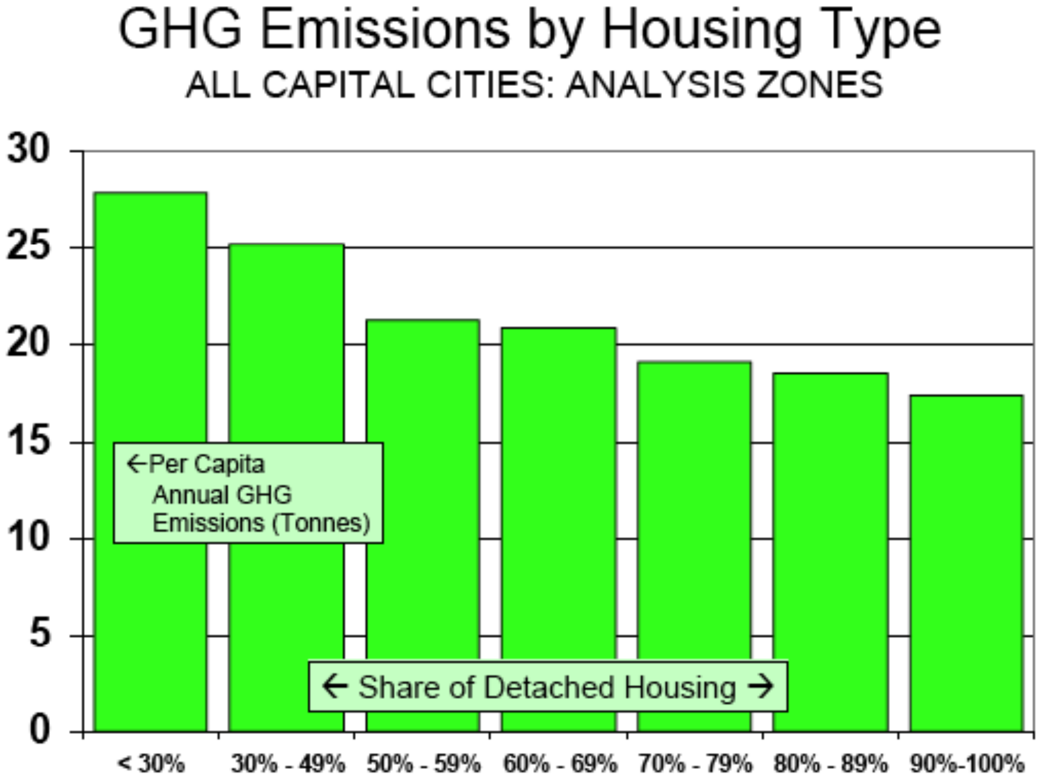

GHG Emissions by Detached Housing
CAPITAL CITIES OVER 1,000,000: BY PROXIMITY TO CORE
30
25
20
15
10
5
0
Inner
Inner Ring
Second Ring
Outer
←Tonnes GHG Per Person
← Share of Detached Housing →
20%
30%
40%
50%
60%
70%
80%
90%
100%

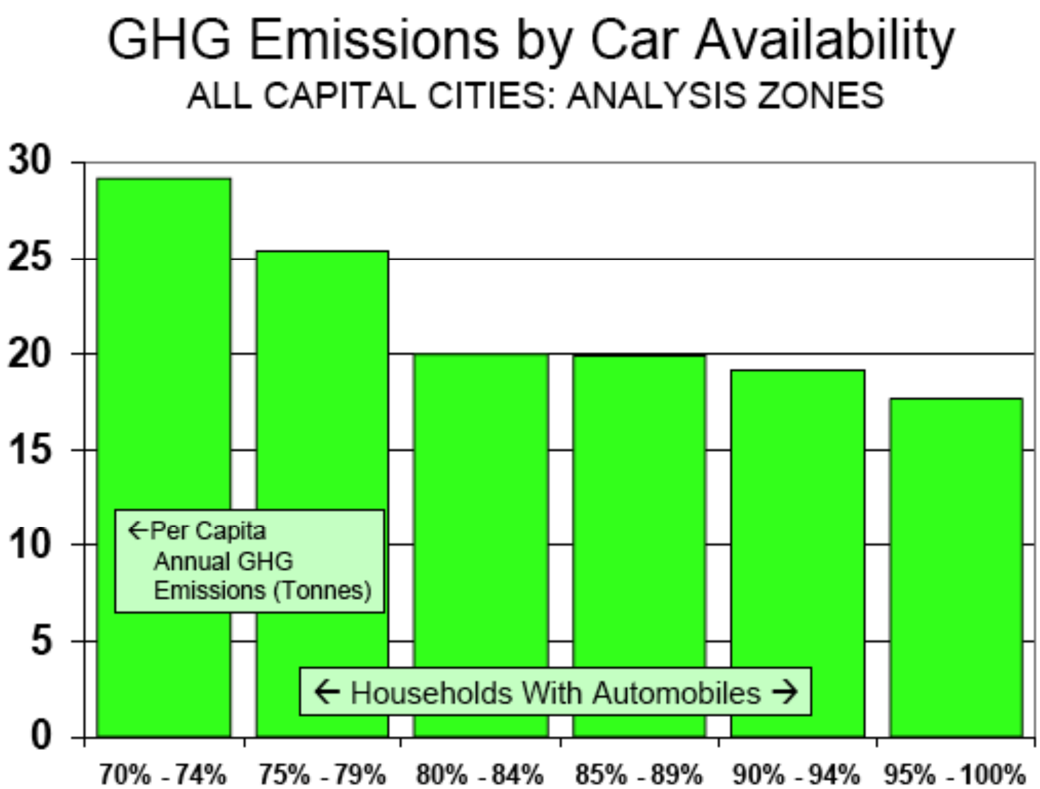

GHG Emissions by Car Ownership
CAPITAL CITIES OVER 1,000,000: BY PROXIMITY TO CORE
30
25
20
15
10
5
0
Inner
Inner Ring
Second Ring
Outer
←Tonnes GHG Per Person
← Households With Automobiles →
70%
75%
80%
85%
90%
95%
100%

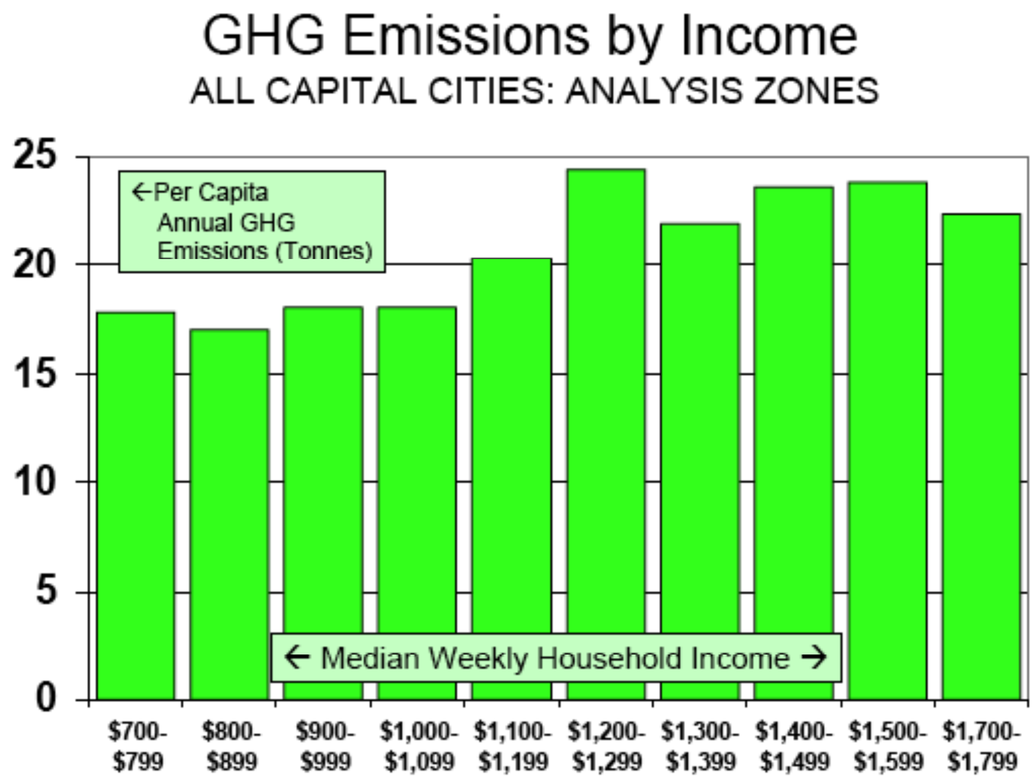
GHG Emissions by Median Income
CAPITAL CITIES OVER 1,000,000: BY PROXIMITY TO CORE

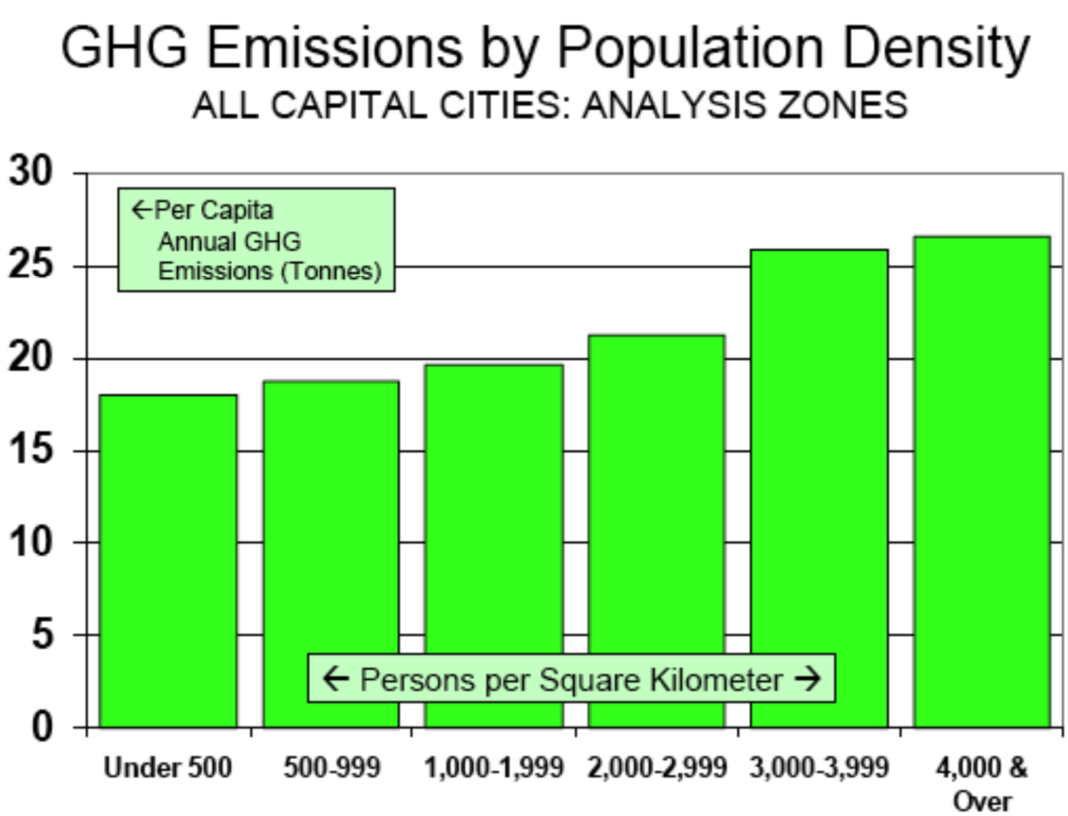


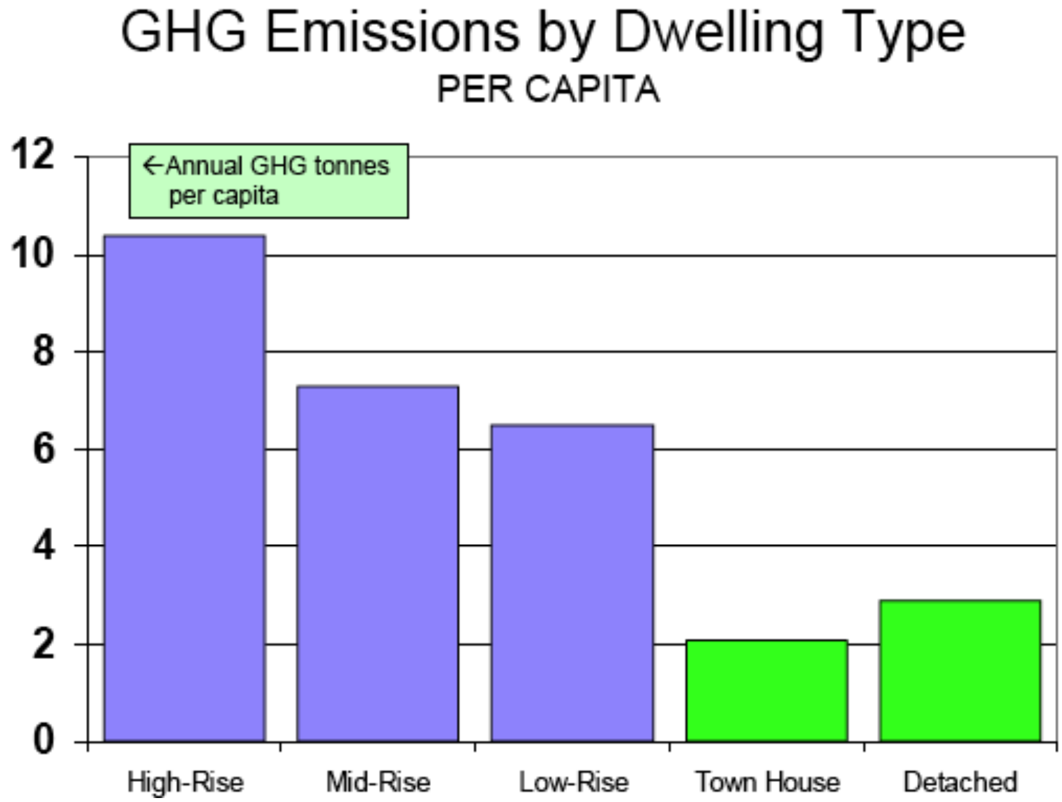
GHG Emissions by Population Density
CAPITAL CITIES OVER 1,000,000: BY PROXIMITY TO CORE


GHG Emissions by Housing Type
ALL CAPITAL CITIES: ANALYSIS ZONES
30
25
20
15
10
5
0
←Per Capita Annual GHG Emissions (Tonnes)
← Share of Detached Housing →
< 30%
30% - 49%
50% - 59%
60% - 69%
70% - 79%
80% - 89%
90%-100%

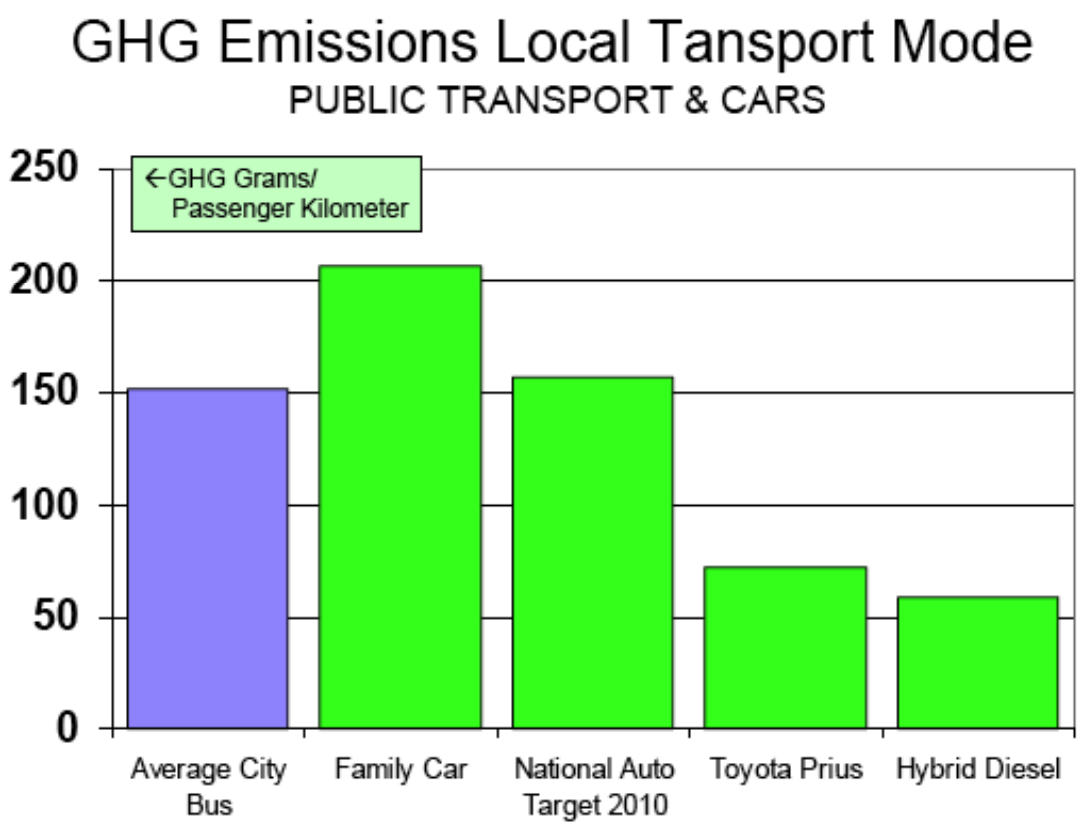

GHG Emissions by Car Availability
ALL CAPITAL CITIES: ANALYSIS ZONES
30
25
20
15
10
5
0
←Per Capita Annual GHG Emissions (Tonnes)
← Households With Automobiles →
70% - 74%
75% - 79%
80% - 84%
85% - 89%
90% - 94%
95% - 100%


GHG Emissions by Income
ALL CAPITAL CITIES: ANALYSIS ZONES
←Per Capita Annual GHG Emissions (Tonnes)
← Median Weekly Household Income →
0
5
10
15
20
25
$700-$799
$800-$899
$900-$999
$1,000-$1,099
$1,100-$1,199
$1,200-$1,299
$1,300-$1,399
$1,400-$1,499
$1,500-$1,599
$1,700-$1,799


GHG Emissions by Population Density
ALL CAPITAL CITIES: ANALYSIS ZONES
←Per Capita Annual GHG Emissions (Tonnes)
← Persons per Square Kilometer →
0
5
10
15
20
25
30
Under 500
500-999
1,000-1,999
2,000-2,999
3,000-3,999
4,000 & Over



GHG Emissions by Dwelling Type
PER CAPITA
←Annual GHG tonnes per capita
12
10
8
6
4
2
0
High-Rise
Mid-Rise
Low-Rise
Town House
Detached



GHG Emissions Local Tansport Mode
PUBLIC TRANSPORT & CARS
←GHG Grams/ Passenger Kilometer
250
200
150
100
50
0
Average City Bus
Family Car
National Auto Target 2010
Toyota Prius
Hybrid Diesel

Greenhouse gas emissions for Sydney are analyzed in two formats:

> Geographical sectors: Data is summarized by analysis zones into four geographical categories: core,[21] inner ring, second ring and outer, based upon proximity to the core.
>
> Demographic Factors: Data is summarized by analysis zone based upon the prevalence of detached housing, prevalence of household car ownership median household income and population density.

Analysis by Proximity to Core

Greenhouse gas emissions per capita area higher toward the core and are lower farther from the core. This is consistent with the national pattern and contrary to the assumption that GHG emissions are lowest in the core. The highest GHG emissions are produced in the core area of Sydney, at 30.05 annual tonnes per capita. By comparison, inner ring areas produce 21.78 annual GHG tonnes per capita 28 percent less than Sydney's core. Annual GHG tones per capita in the second ring is 19.76 tonnes, 34 percent less than Sydney's core. The outer areas average 17.46 annual GHG tones per capita, 42 percent less than Sydney's core (Figure 13).

Housing: Sydney GHG emissions are lower where there are more detached houses (Figure 14). This reflects the national pattern, which is contrary to the generally held belief that lower density living produces higher GHG emissions.

> Sydney's core, with the highest GHG emissions per capita, has the lowest share of detached housing, at 22 percent. The inner ring, with the second highest GHG emissions per capita, has the second lowest share of detached housing, at 52 percent. The second ring, with the second lowest GHG emissions per capita, has the second highest share of detached housing, at 74 percent. The outer areas, with the lowest GHG emissions per capita, has the highest share of detached housing, at 86 percent.

Cars: Sydney GHG emissions are lower where there are more cars (Figure 15). This reflects the national pattern, which is contrary to the generally held belief that automobile based mobility produces higher GHG emissions.

> Sydney's core, with the highest GHG emissions per capita, has the lowest share of households with cars, at 70 percent. The inner ring, with the second highest GHG emissions per capita, has the second lowest share of households with cars, at 65 percent. The second ring, with the second lowest GHG emissions per capita, has the second highest share of households with cars, at 89 percent. The outer areas, with the lowest GHG emissions per capita, has the highest share of households with cars, at 90 percent.

[21] The core is the Inner Sydney statistical subdivision.

Income: The relationship between higher median household income and higher GHG emissions per capita is not fully evident in Sydney. The highest median household income is in the second ring, which has the third highest GHG emissions per capita. In the other geographical sectors there is a more evident association between higher incomes and greater GHG emissions per capita (Figure 16) Moreover, a comparison by the authors of households with similar incomes in inner and outer Sydney found that per capita energy use was more in inner areas than outer areas. This would indicate that location may be an important factor in consumption, independent of income).[22]

Population Density: Generally, Sydney geographic sector GHG emissions are higher where population density is higher (Figure 17). This reflects the national pattern, which is contrary to the generally held belief that lower densities produces higher GHG emissions.

Water and Ecological Footprint: Virtually the same relationship exists with water usage and the ecological footprint as with GHG emissions in Sydney. Water usage and the ecological footprint are the highest in the core area and decline toward the outer area (Table 6).

Table 6
Consumption Factors by Proximity to Core
Sydney: Analysis Zones Annual Per Capita

	GHG Emissions (Tonnes)	Water Use (Litres)	Eco-Footprint (Hectares)
Core	30.05	910,000	7.85
Inner Ring	21.78	870,000	6.87
Second Ring	19.76	800,000	6.50
Outer	17.46	660,000	5.98
Total	20.74	800,000	6.62

Analysis by Demographic Characteristics

Similar relationships are evident from an analysis of GHG emissions based upon the demographic characteristics of detached housing, car availability and median household income.

Housing: There is an association between a greater share of detached housing and lower GHG emissions per capita (Figure 18). This reflects the national pattern and is contrary to the generally held belief that areas with more detached housing produces greater GHG emissions. The highest GHG emissions per capita (27.85 tonnes annually) are in statistical subdivisions with the lowest share of detached housing (less than 30 percent). The lowest GHG emissions per capita (17.55 tonnes annually) are in statistical subdivisions with a higher than average share of detached housing (70 to 79 percent).

Cars: There is an association between greater automobile availability share and lower GHG emissions per capita (Figure 19). This reflects the national pattern and is contrary to the generally held belief that areas with higher automobile use produce greater GHG emissions. The highest GHG emissions per capita (27.85 tonnes annually) are in the core area, which has the lowest share of households with cars (less than 80 percent).

[22] Caution, however, is appropriate with respect to the income conclusion. A comparison by the authors of households with similar incomes in inner and outer Sydney found that per capita energy use was more in inner areas than outer areas (which suggests that location may be an important factor in consumption, independent of income). Per capita direct and indirect energy use in the inner areas was estimated at more than 75 percent higher than in the outer areas. See Manfred Lenzena, Christopher Deya, Barney Foran, "Analysis: Energy requirements of Sydney households," *Ecological Economics 49* (2004), 375-399, Table 6.

Income: Generally, the predicted relationship is evident between higher median household incomes and greater GHG emissions per capita (Figure 20). The lowest GHG emissions per capita are in the lowest income categories ($800 to $899 and $900 to $999 weekly). However, the highest GHG emissions per capita in the $1,200 to $1,299 median income category, which is well below the highest income category ($1,700 to $1,799).

Population Density: The highest Sydney GHG emissions are where population density is higher (Figure 21). This reflects the national pattern, which is contrary to the generally held belief that lower densities produces higher GHG emissions.

Water and Ecological Footprint: Again, generally the same relationship is evident in waster use and eco-footprint. Water use and the eco-footprint tend generally to decrease where there is more detached housing, more car usage and lower median household incomes (Table 7).

Table 7
Consumption by Demographic Characteristics
Sydney: Analysis Zones Annual Per Capita

	GHG Emissions (Tonnes)	Water Use (Litres)	Eco-Footprint (Hectares)
Detached Share of Housing			
Under 30%	27.85	930,000	7.70
30% - 49%	24.64	950,000	7.47
50% - 59%	19.33	790,000	6.37
60% - 69%	19.50	800,000	6.43
70% - 79%	17.55	760,000	6.05
80% - 89%	18.86	730,000	6.29
Households with Autos			
70% - 74%	30.05	910,000	7.85
75% - 79%	25.01	960,000	7.49
80% - 84%	19.57	810,000	6.36
85% - 89%	19.59	780,000	6.44
90% - 94%	19.86	780,000	6.54
Weekly Median Household Income			
$800-$899	17.83	710,000	5.96
$900-$999	17.55	760,000	6.05
$1,000-$1,099	19.33	790,000	6.37
$1,100-$1,199	18.78	740,000	6.29
$1,200-$1,299	30.05	910,000	7.85
$1,300-$1,399			
$1,400-$1,499	23.14	890,000	7.18
$1,500-$1,599	25.74	970,000	7.69
$1,600-$1,699			
$1,700-$1,799	22.34	890,000	7.08
Population Density (Persons per Square Kilometer)			
Under 500	19.06	740,000	6.34
500-999	19.00	790,000	6.37
1,000-1,999	18.93	760,000	6.33
2,000-2,999	18.72	780,000	6.17
3,000-3,999	24.64	950,000	7.47
4,000 & Over	27.85	930,000	7.70

By Analysis Zone

Conclusions

The analysis of the data provided in the Australian Conservation Foundation Consumption Atlas indicates that the patterns of GHG emissions per capita are strongly or generally inconsistent with the prevailing assumptions of urban consolidation policy in Sydney (Table 8). To the contrary of the urban consolidation assumptions:

✱ Lower GHG emissions are associated with locations farther from the core.

✱ Lower GHG emissions are associated with more detached housing.

✱ Lower GHG emissions are associated with greater auto use.

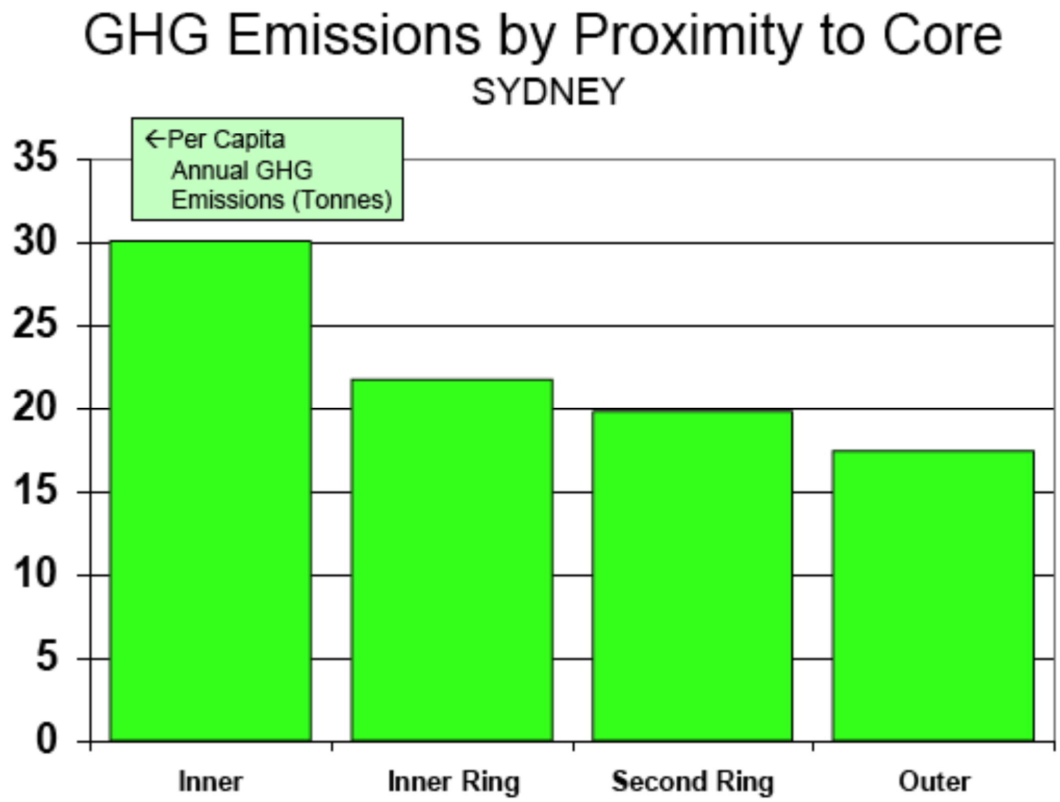
✱ Lower GHG emissions are associated with lower population density.

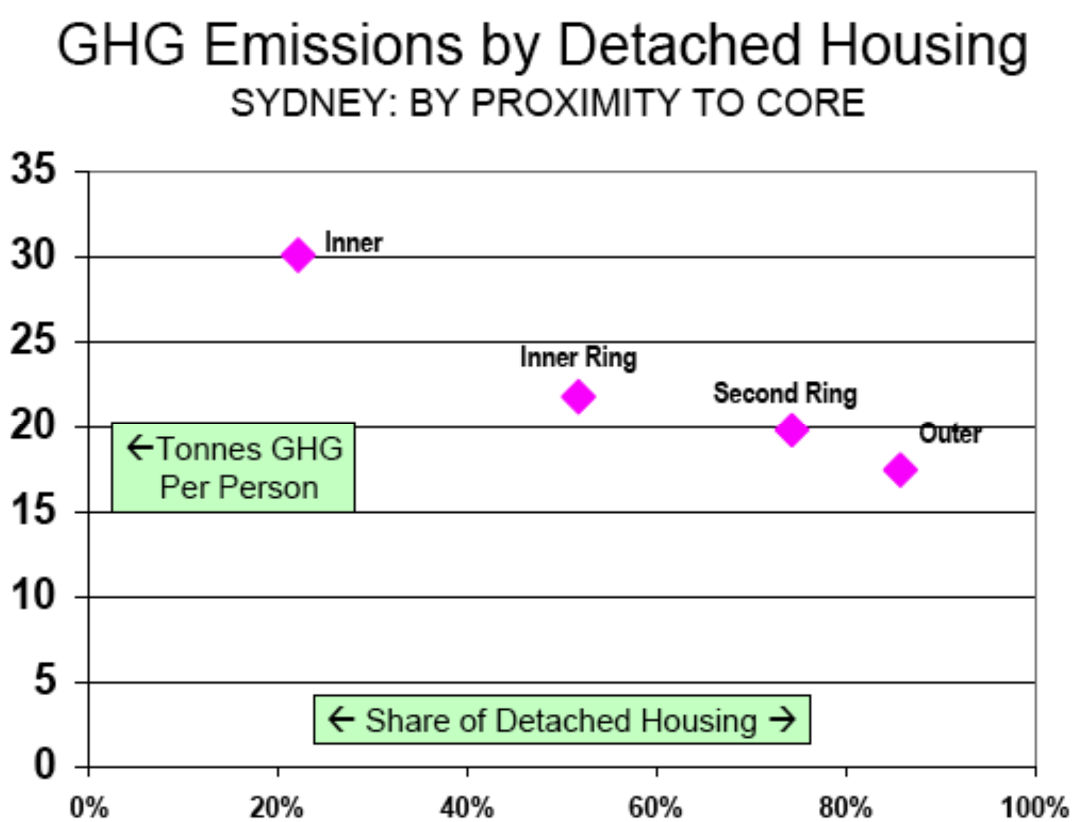
The assertion by the authors of Australian Conservation Foundation Consumption Atlas of an association between higher household incomes and higher GHG emissions per capita is generally supported. Caution, however, is appropriate with respect to the income conclusion. As noted above, a comparison by the authors of households with similar incomes in inner and outer Sydney found that per capita energy use was more in inner areas than outer areas (which suggests that location may be an important factor in consumption, independent of income).

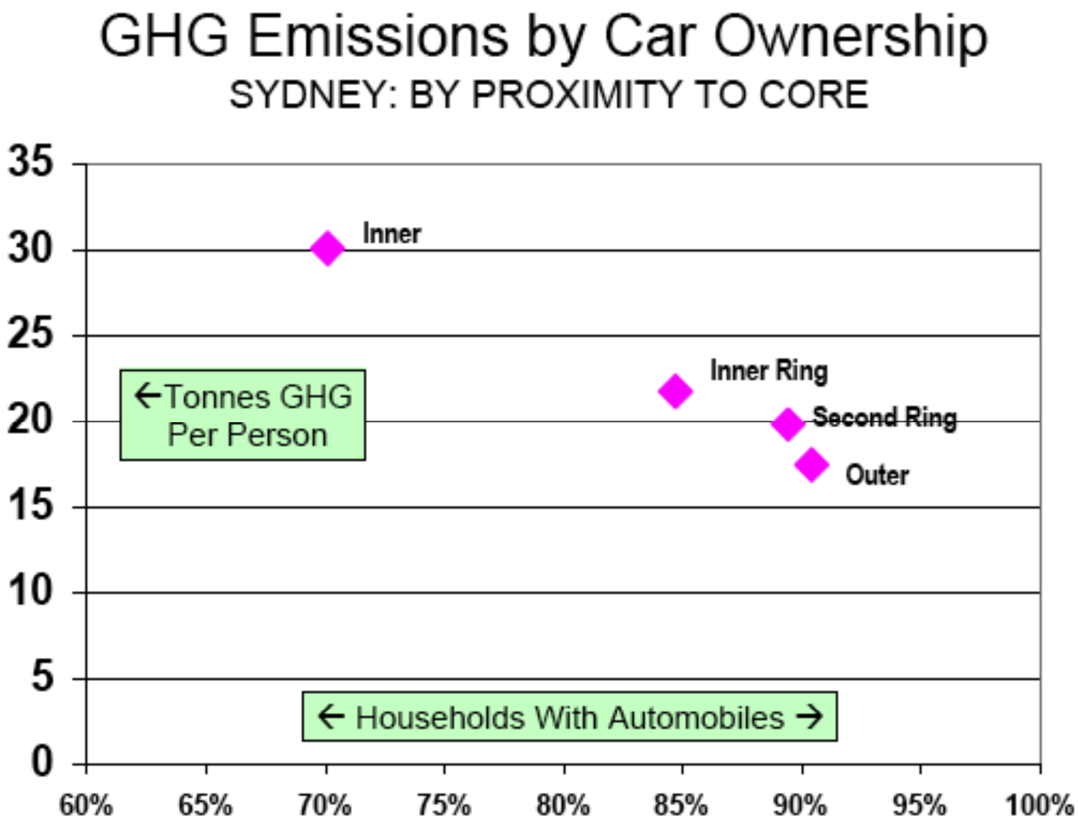
Table 5
Consistency with Urban Consolidation Planning Assumptions
Sydney

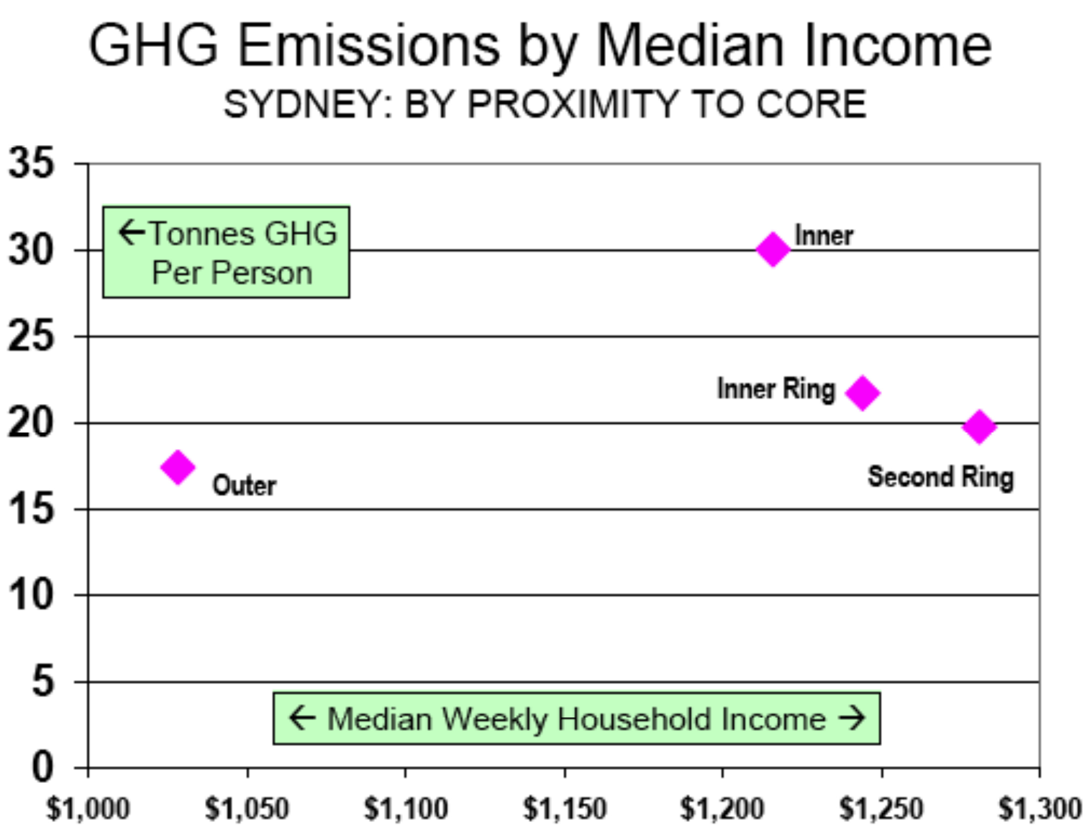
Planning Assumption	Strong Consistency	General Consistency	No Relationship	General Inconsistency	Strong Inconsistency
Higher GHG Emissions Associated with Longer Distance from Core					●
Higher GHG Emissions Associated with Detached Housing				●	
Higher GHG Emissions Associated with More Auto Use				●	
Higher GHG Emissions Associated with Lower Population Density				●	
INSTANCES: Overall	0	0	0	3	1

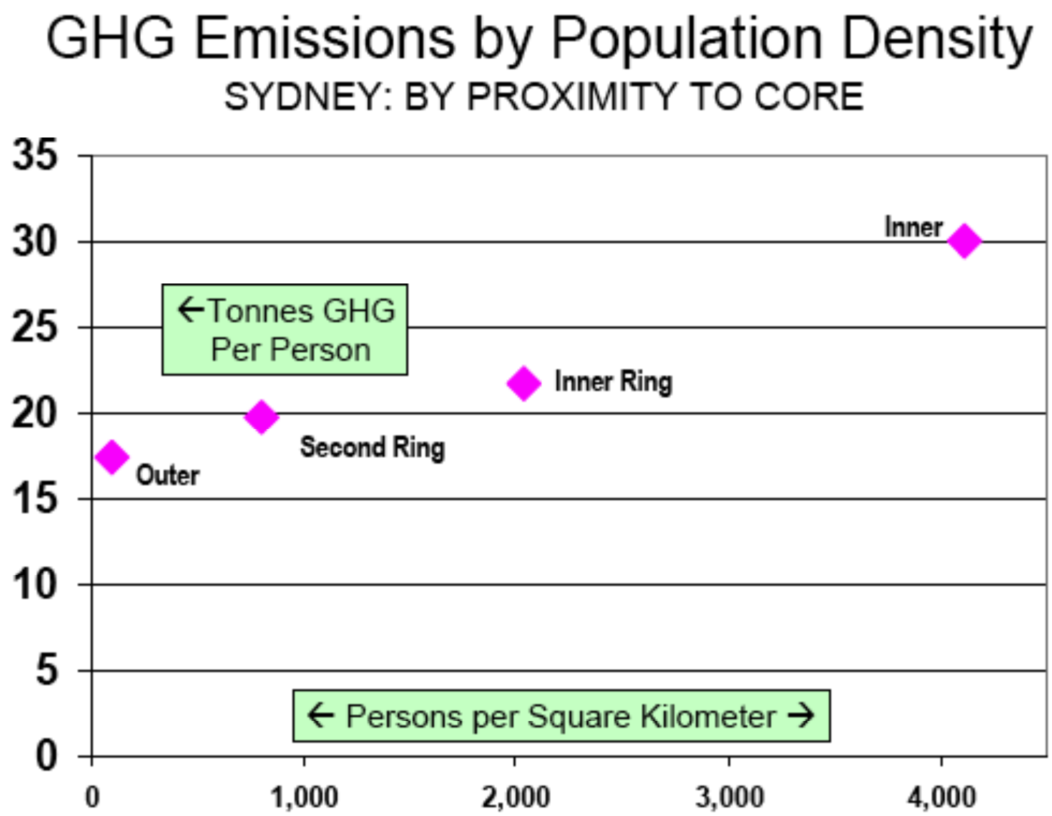
[23] Caution, however, is appropriate with respect to the income conclusion. A comparison by the authors of households with similar incomes in inner and outer Sydney found that per capita energy use was more in inner areas than outer areas (which suggests that location may be an important factor in consumption, independent of income). Per capita direct and indirect energy use in the inner areas was estimated at more than 75 percent higher than in the outer areas. See Manfred Lenzena, Christopher Deya, Barney Foran, "Analysis: Energy requirements of Sydney households," *Ecological Economics 49* (2004), 375-399, Table 6.

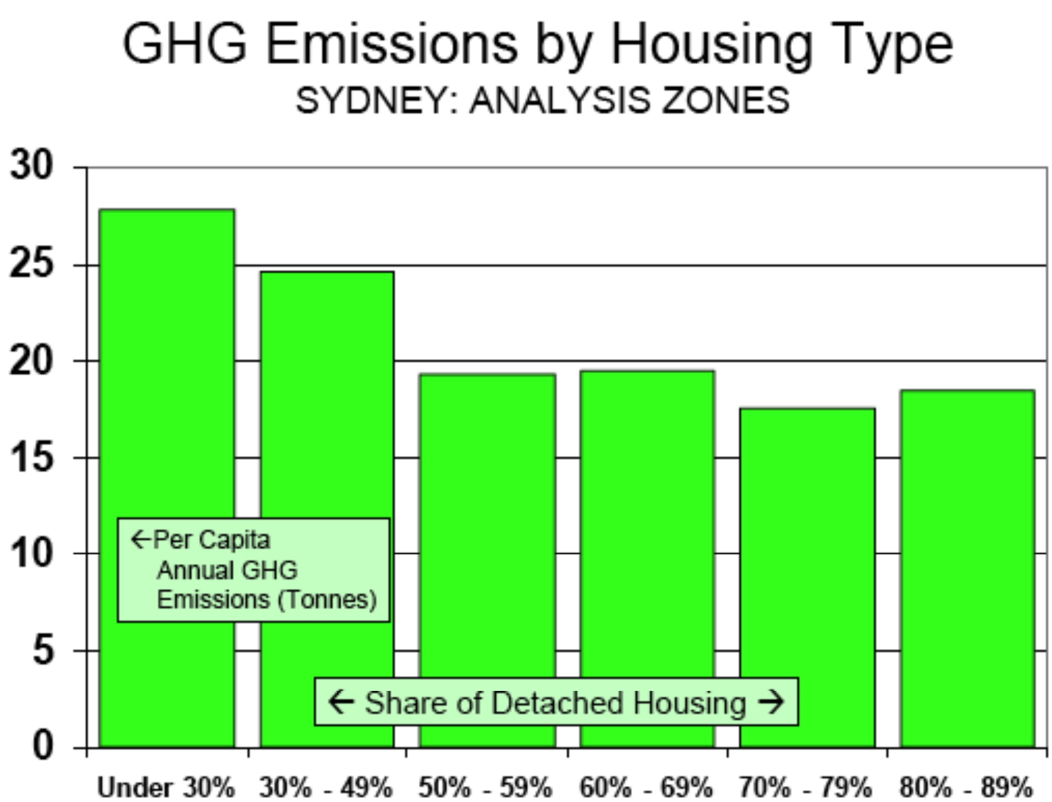

GHG Emissions by Proximity to Core
SYDNEY
←Per Capita Annual GHG Emissions (Tonnes)
35
30
25
20
15
10
5
0
Inner
Inner Ring
Second Ring
Outer

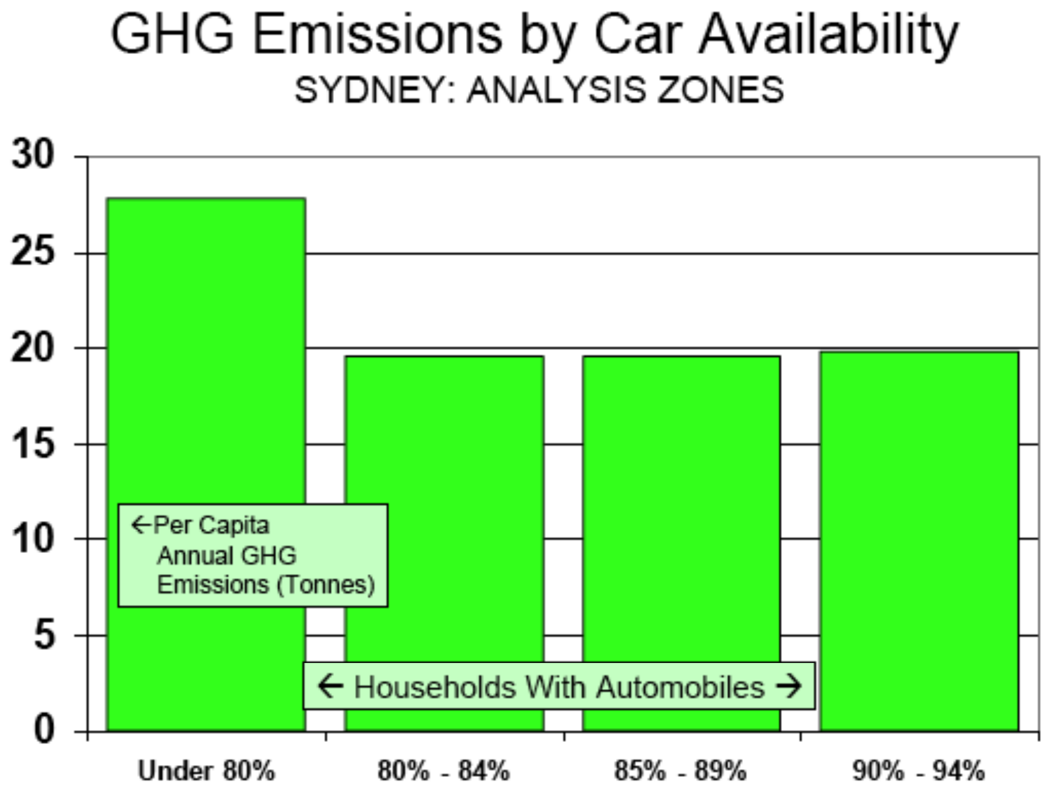

GHG Emissions by Detached Housing
SYDNEY: BY PROXIMITY TO CORE
35
30
25
20
15
10
5
0
Inner
Inner Ring
Second Ring
Outer
←Tonnes GHG Per Person
← Share of Detached Housing →
0%
20%
40%
60%
80%
100%


GHG Emissions by Car Ownership
SYDNEY: BY PROXIMITY TO CORE
35
30
25
20
15
10
5
0
60%
65%
70%
75%
80%
85%
90%
95%
100%
Inner
Inner Ring
Second Ring
Outer
←Tonnes GHG Per Person
← Households With Automobiles →

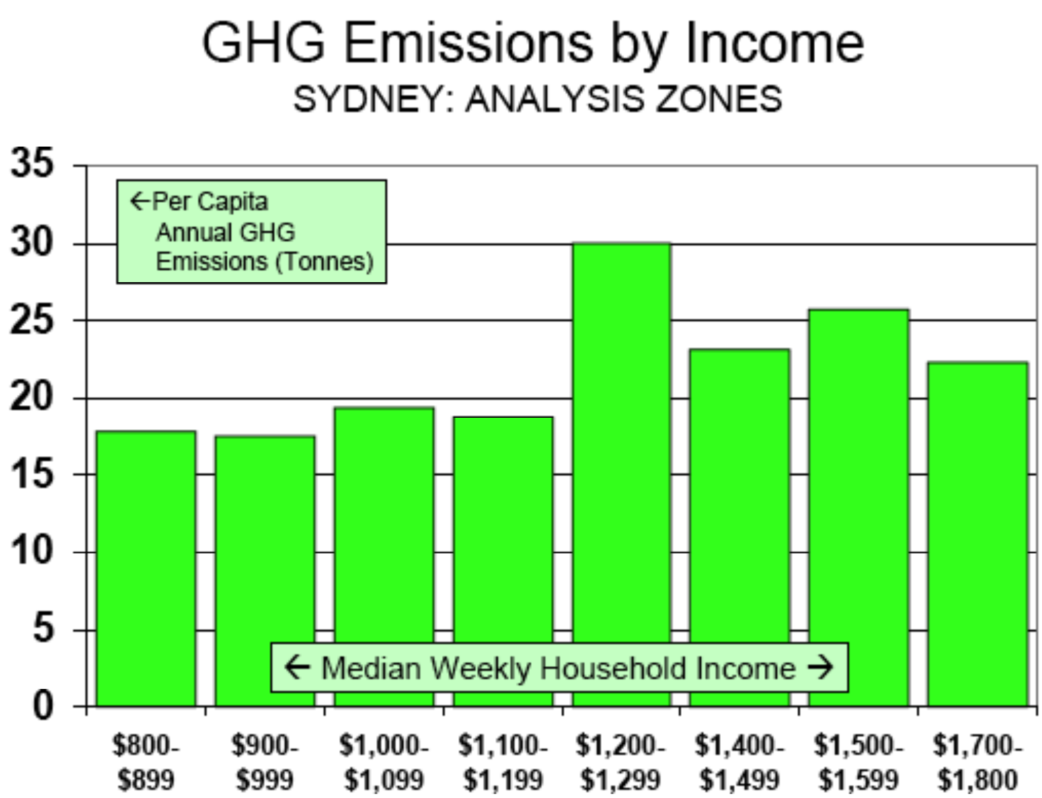

GHG Emissions by Median Income
SYDNEY: BY PROXIMITY TO CORE
35
30
25
20
15
10
5
0
$1,000
$1,050
$1,100
$1,150
$1,200
$1,250
$1,300
Inner
Inner Ring
Second Ring
Outer
←Tonnes GHG Per Person
← Median Weekly Household Income →


GHG Emissions by Population Density
SYDNEY: BY PROXIMITY TO CORE
35
30
25
20
15
10
5
0
←Tonnes GHG Per Person
Inner
Inner Ring
Second Ring
Outer
← Persons per Square Kilometer →
0
1,000
2,000
3,000
4,000

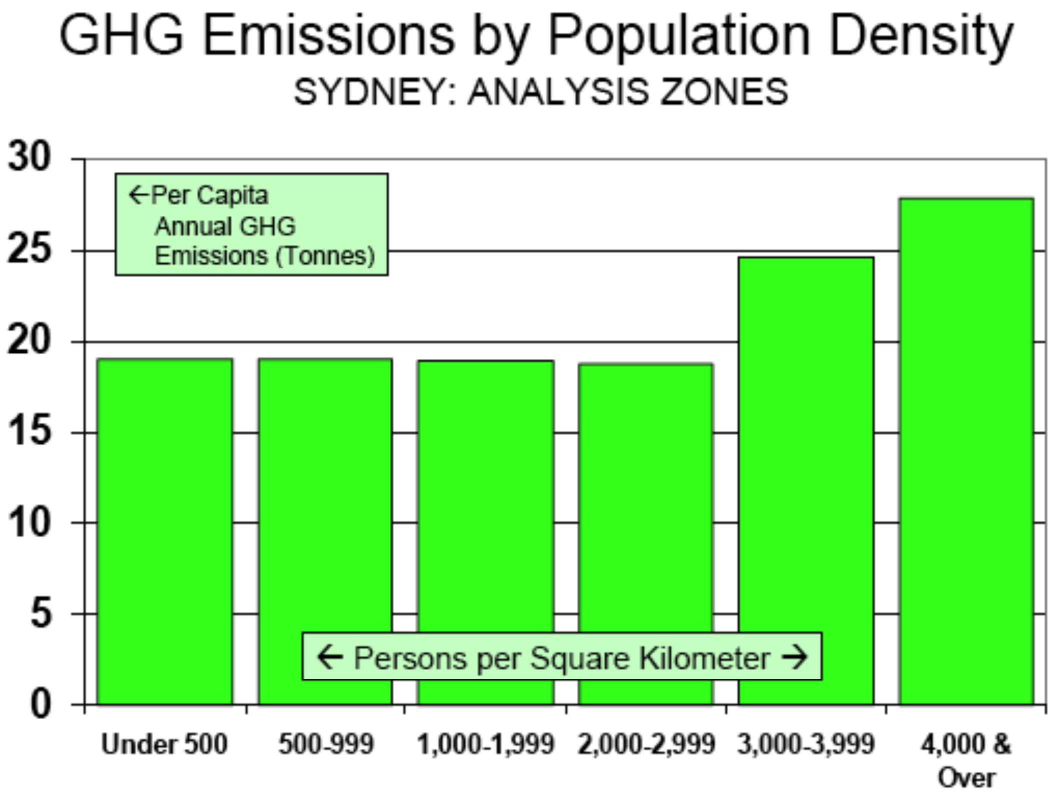

GHG Emissions by Housing Type
SYDNEY: ANALYSIS ZONES
30
25
20
15
10
5
0
←Per Capita Annual GHG Emissions (Tonnes)
← Share of Detached Housing →
Under 30%
30% - 49%
50% - 59%
60% - 69%
70% - 79%
80% - 89%



GHG Emissions by Car Availability
SYDNEY: ANALYSIS ZONES
30
25
20
15
10
5
0
←Per Capita Annual GHG Emissions (Tonnes)
← Households With Automobiles →
Under 80%
80% - 84%
85% - 89%
90% - 94%



GHG Emissions by Income
SYDNEY: ANALYSIS ZONES
35
30
25
20
15
10
5
0
←Per Capita Annual GHG Emissions (Tonnes)
← Median Weekly Household Income →
$800-$899
$900-$999
$1,000-$1,099
$1,100-$1,199
$1,200-$1,299
$1,400-$1,499
$1,500-$1,599
$1,700-$1,800


GHG Emissions by Population Density
SYDNEY: ANALYSIS ZONES
←Per Capita Annual GHG Emissions (Tonnes)
← Persons per Square Kilometer →
30
25
20
15
10
5
0
Under 500
500-999
1,000-1,999
2,000-2,999
3,000-3,999
4,000 & Over

Greenhouse gas emissions for Melbourne are analyzed in two formats:

> Geographical sectors: Data is summarized by analysis zones into four geographical categories: core, [24] inner ring, second ring and outer, based upon proximity to the core.
>
> Demographic Factors: Data is summarized by analysis zone based upon the prevalence of detached housing, prevalence of household car ownership median household income and population density.

Analysis by Proximity to Core

Greenhouse gas emissions per capita area higher toward the core and are lower farther from the core. This is consistent with the national pattern and contrary to the assumption that GHG emissions are lowest in the core. The highest greenhouse gas emissions are produced in the core area of Melbourne, at 28.03 annual tonnes per capita. By comparison, inner ring areas produce 21.18 annual GHG tonnes per capita 24 percent less than Melbourne's core. Annual GHG tones per capita in the second ring is 19.37 tonnes, 31 percent less than Melbourne's core. The outer areas average 17.82 annual GHG tones per capita, 36 percent less than Melbourne's core (Figure 22).

Housing: Melbourne GHG emissions are lower where there are more detached houses (Figure 23). This reflects the national pattern, which is contrary to the generally held belief that lower density living produces higher GHG emissions.

> Melbourne's core, with the highest GHG emissions per capita, has the lowest share of detached housing, at 15 percent. The inner ring, with the second highest GHG emissions per capita, has the second lowest share of detached housing, at 70 percent. The second ring, with the second lowest GHG emissions per capita, has the second highest share of detached housing, at 78 percent. The outer areas, with the lowest GHG emissions per capita, has the highest share of detached housing, at 81 percent.

Cars: Melbourne GHG emissions are lower where there are more cars (Figure 25). This also reflects the national pattern, which is contrary to the generally held belief that automobile based mobility produces higher GHG emissions.

> Melbourne's core, with the highest GHG emissions per capita, has the lowest share of households with cars, at 75 percent. The inner ring, with the second highest GHG emissions per capita, has the second lowest share of households with cars, at 88 percent. The second ring, with the second lowest GHG emissions per capita, has the second highest share of households with cars, at 92 percent. The outer areas, with the lowest GHG emissions per capita, has the highest share of households with cars, at 95 percent.

[24] The core is the Inner Melbourne statistical subdivision.

Income: Generally, the predicted relationship is evident between higher median household incomes and greater GHG emissions per capita (Figure 25). The core area, with the highest GHG emissions per capita, has the highest median household income. The lowest median incomes are in the second ring and outer area.

Population Density: There is a strong association between lower population density and higher GHG emissions per capita (Figure 26). This reflects the national pattern, which is contrary to the generally held belief that lower densities produces higher GHG emissions.

Water and Ecological Footprint: Virtually the same relationship exists with water usage and the ecological footprint as with GHG emissions in Melbourne. Water usage and the ecological footprint are the highest in the core area and decline toward the outer area (Table 9).

Table 9
Consumption Factors by Proximity to Core
Melbourne: Analysis Zones Annual Per Capita

	GHG Emissions (Tonnes)	Water Use (Litres)	Eco-Footprint (Hectares)
Core	28.03	930,000	7.59
Inner Ring	21.18	820,000	6.50
Second Ring	19.37	770,000	6.18
Outer	17.82	680,000	5.86
Total	20.37	780,000	6.34

Analysis by Demographic Characteristics

Similar relationships are evident from an analysis of GHG emissions based upon the demographic characteristics of detached housing, car availability and median household income.

Housing: There is an association between a greater share of detached housing and lower GHG emissions per capita (Figure 27). The highest GHG emissions per capita (28.03 tonnes annually) are in statistical subdivisions with the lowest share of detached housing (less than 30 percent). The lowest GHG emissions per capita (17.75 tonnes annually) are in the statistical subdivisions with the highest share of detached housing (90 to 100 percent).

Cars: There is an association between greater automobile availability share and lower GHG emissions per capita (Figure 28). The highest GHG emissions per capita (28.03 tonnes annually) are in statistical subdivisions with the lowest share of households with cars (less than 80 percent). The lowest GHG emissions per capita (17.94 tonnes annually) are in the statistical subdivisions with the highest household car availability (95 to 100 percent). In something of an inconsistency, the second highest automobile availability category (90 to 94 percent of households) has the second highest GHG emissions per capita.

Income: Generally, the predicted relationship is evident between higher median household incomes and greater GHG emissions per capita (Figure 29). The lowest GHG emissions per capita are in lower income categories (below $1,100 weekly). The highest GHG emissions per capita in the highest income category ($1,500 to $1,599).

Population Density: There is a strong association between higher GHG emissions per capita and higher population density in Melbourne (Figure 30). This reflects the national pattern, which is contrary to the generally held belief that lower densities produces higher GHG emissions.

Water and Ecological Footprint: Again, generally the same relationship is evident in water use and eco-footprint. Water use and the eco-footprint tend generally to decrease where there is more detached housing, more car usage and lower median household incomes (Table 10).

Table 10
Consumption by Demographic Characteristics
Melbourne: Analysis Zones Annual Per Capita

	GHG Emissions (Tonnes)	Water Use (Litres)	Eco-Footprint (Hectares)
Detached Share of Housing			
Under 30%	28.03	930,000	7.59
30% - 49%			
50% - 59%			
60% - 69%	22.43	860,000	6.74
70% - 79%	19.80	790,000	6.22
80% - 89%	19.51	760,000	6.21
90%-100%	17.75	690,000	5.87
Households with Autos			
70% - 74%	28.03	930,000	7.59
75% - 79%			
80% - 84%	20.59	800,000	6.34
85% - 89%	19.80	790,000	6.22
90% - 94%	21.04	810,000	6.49
95%-100%	17.94	700,000	5.91
Weekly Median Household Income			
$700-$799	19.28	810,000	6.07
$800-$899			
$900-$999	19.32	760,000	6.13
$1,000-$1,099	18.36	710,000	5.96
$1,100-$1,199	21.45	820,000	6.56
$1,200-$1,299			
$1,300-$1,399			
$1,400-$1,499			
$1,500-$1,599	25.22	930,000	7.25
Population Density (Persons per Square Kilometer)			
Under 500	17.76	690,000	5.86
500-999	18.56	740,000	5.96
1,000-1,999	20.17	800,000	6.34
2,000-2,999	21.91	840,000	6.63
3,000-3,999	28.03	930,000	7.59
4,000 & Over			
By Analysis Zone			

Conclusions

The analysis of the data provided in the Australian Conservation Foundation Consumption Atlas indicates that the patterns of GHG emissions per capita are strongly or generally inconsistent with the prevailing assumptions of urban consolidation policy in Melbourne (Table 11). To the contrary of the urban consolidation assumptions:

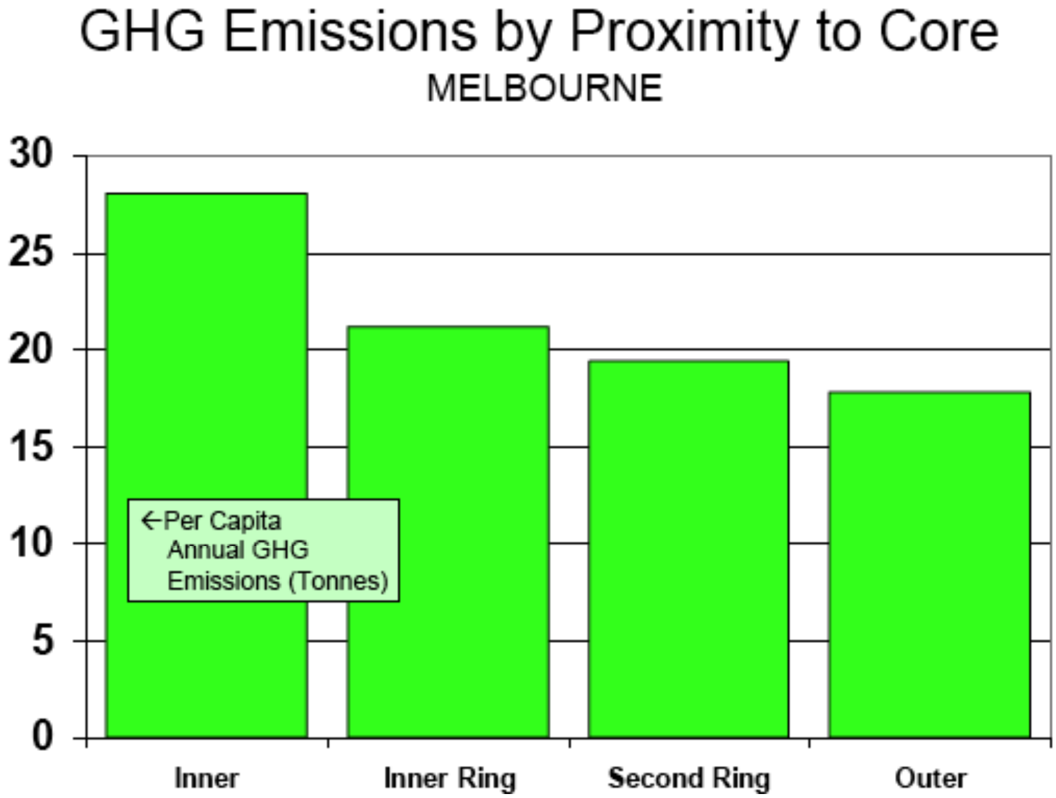
- Lower GHG emissions are associated with locations farther from the core.
- Lower GHG emissions are associated with more detached housing.
- Lower GHG emissions are associated with greater auto use.
- Lower GHG emissions are associated with lower population density.

The assertion by the authors of Australian Conservation Foundation Consumption Atlas of an association between higher household incomes and higher GHG emissions per capita is generally supported.[25]

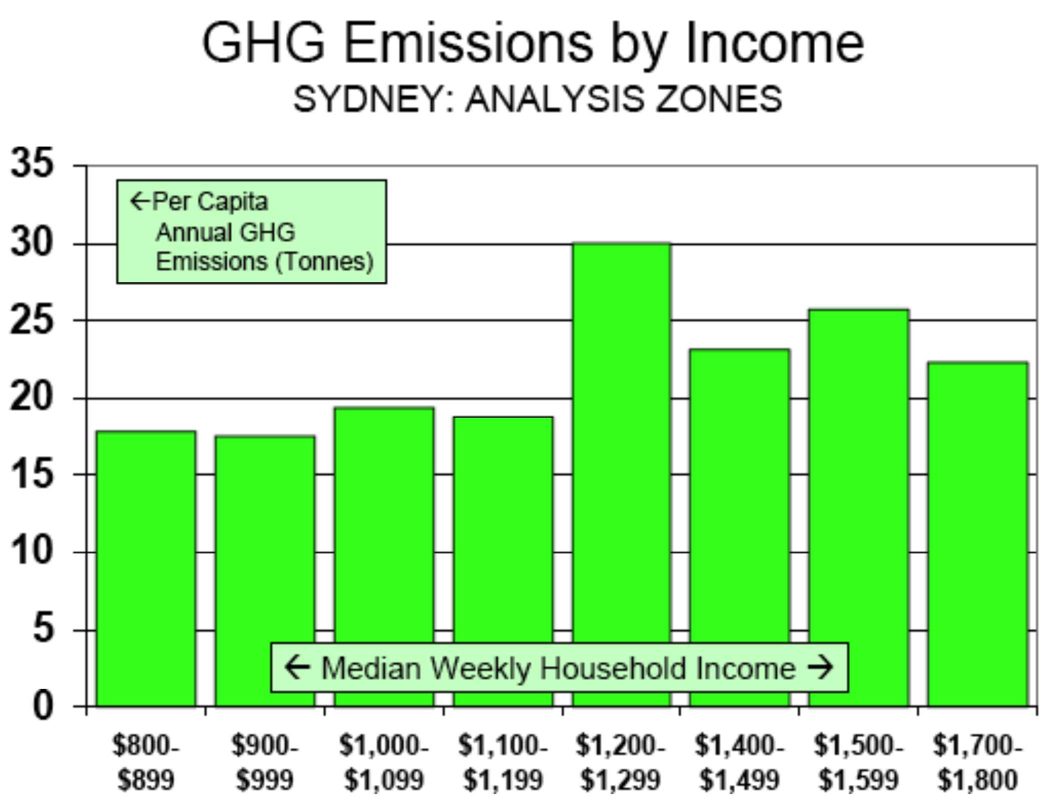
Table 11
Consistency with Urban Consolidation Planning Assumptions
Melbourne

Planning Assumption	Strong Consistency	General Consistency	No Relationship	General Inconsistency	Strong Inconsistency
Higher GHG Emissions Associated with Longer Distance from Core					●
Higher GHG Emissions Associated with Detached Housing					●
Higher GHG Emissions Associated with More Auto Use				●	
Higher GHG Emissions Associated with Lower Population Density					●
INSTANCES: Overall	0	0	0	1	3

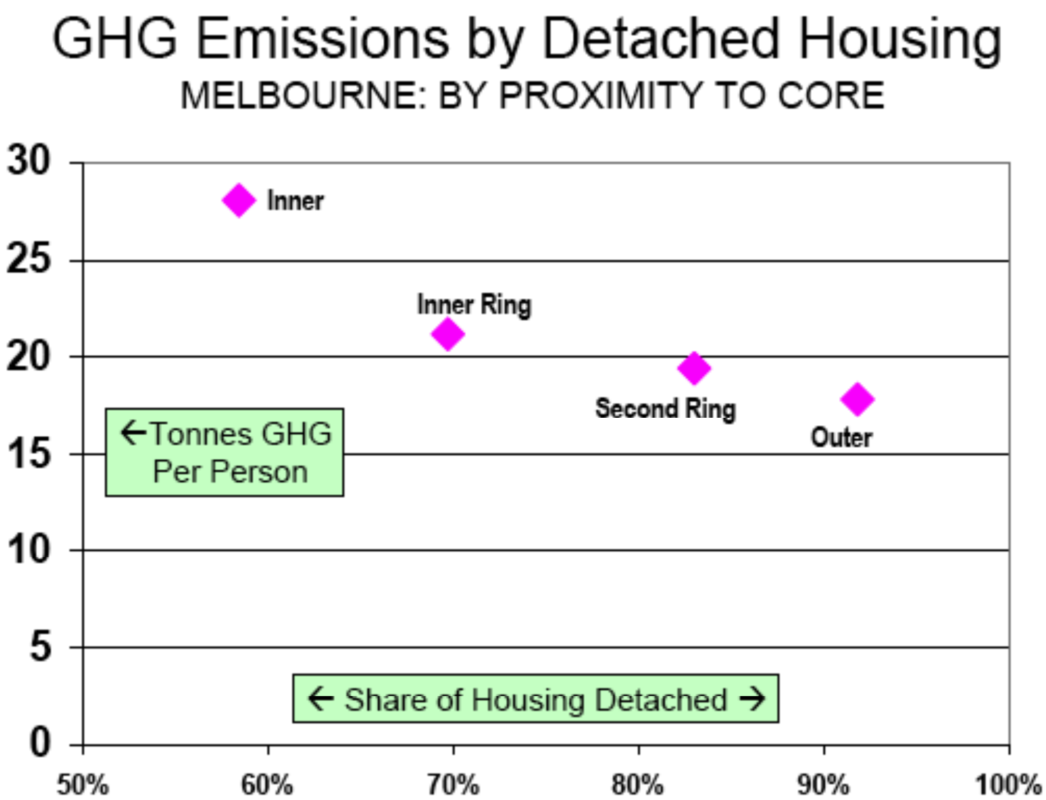
[25] Caution, however, is appropriate with respect to the income conclusion. A comparison by the authors of households with similar incomes in inner and outer Sydney found that per capita energy use was more in inner areas than outer areas (which suggests that location may be an important factor in consumption, independent of income). Per capita direct and indirect energy use in the inner areas was estimated at more than 75 percent higher than in the outer areas. See Manfred Lenzena, Christopher Deya, Barney Foran, "ANALYSIS: Energy requirements of Sydney households," Ecological Economics 49 (2004), 375-399, Table 6.

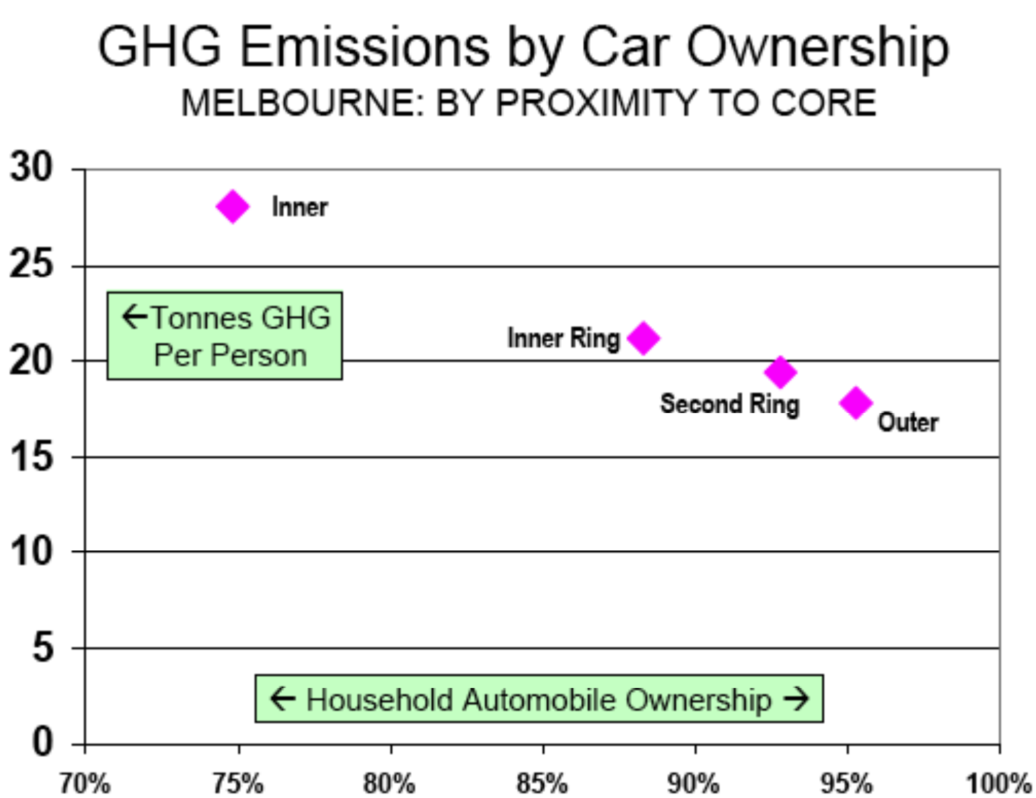


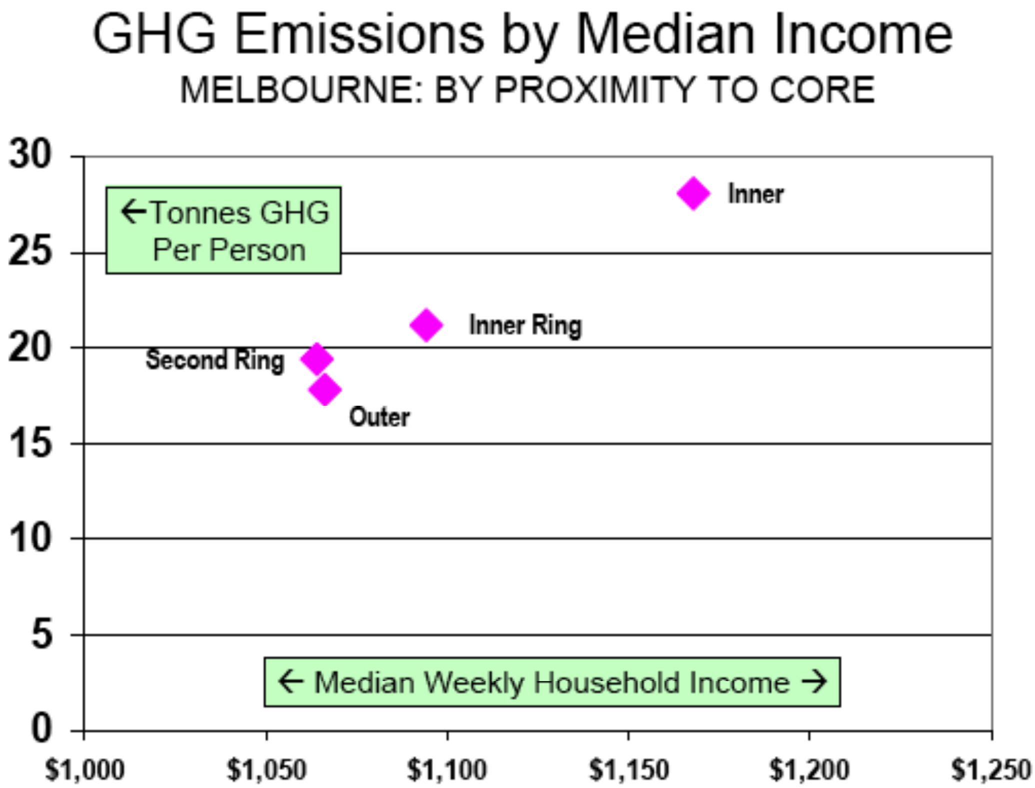
GHG Emissions by Proximity to Core
MELBOURNE
30
25
20
15
10
5
0
←Per Capita Annual GHG Emissions (Tonnes)
Inner
Inner Ring
Second Ring
Outer

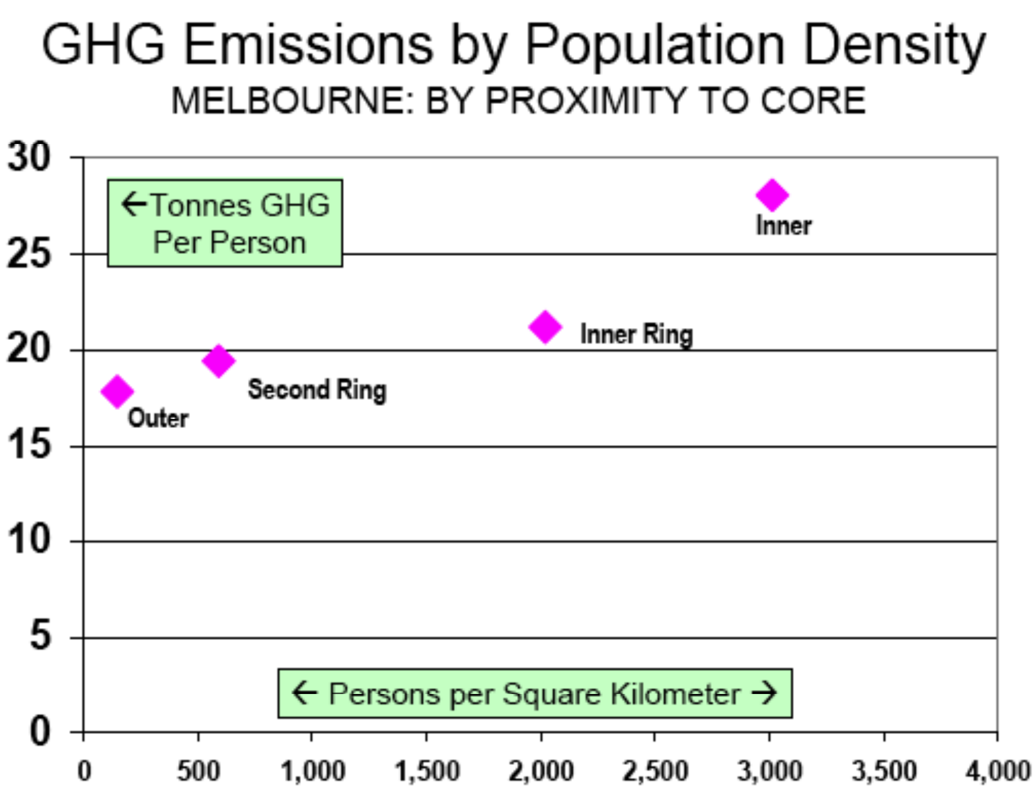


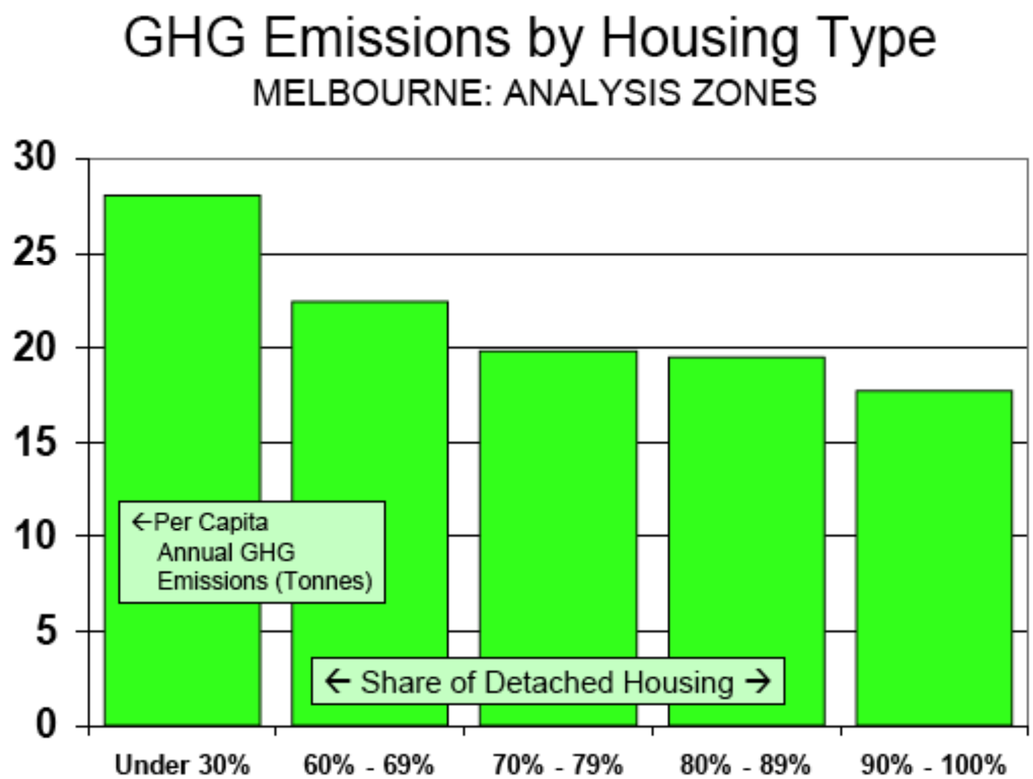
GHG Emissions by Income
SYDNEY: ANALYSIS ZONES
35
30
25
20
15
10
5
0
←Per Capita Annual GHG Emissions (Tonnes)
← Median Weekly Household Income →
$800-$899
$900-$999
$1,000-$1,099
$1,100-$1,199
$1,200-$1,299
$1,400-$1,499
$1,500-$1,599
$1,700-$1,800

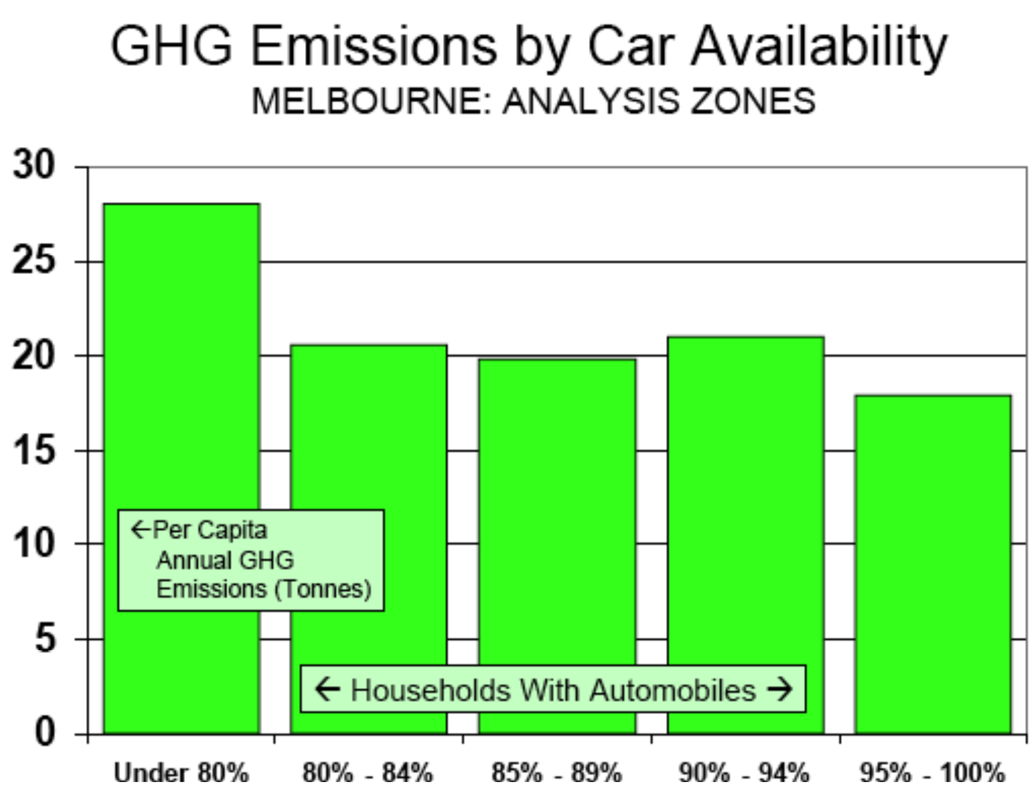

GHG Emissions by Detached Housing
MELBOURNE: BY PROXIMITY TO CORE
30
25
20
15
10
5
0
Inner
Inner Ring
Second Ring
Outer
←Tonnes GHG Per Person
← Share of Housing Detached →
50%
60%
70%
80%
90%
100%

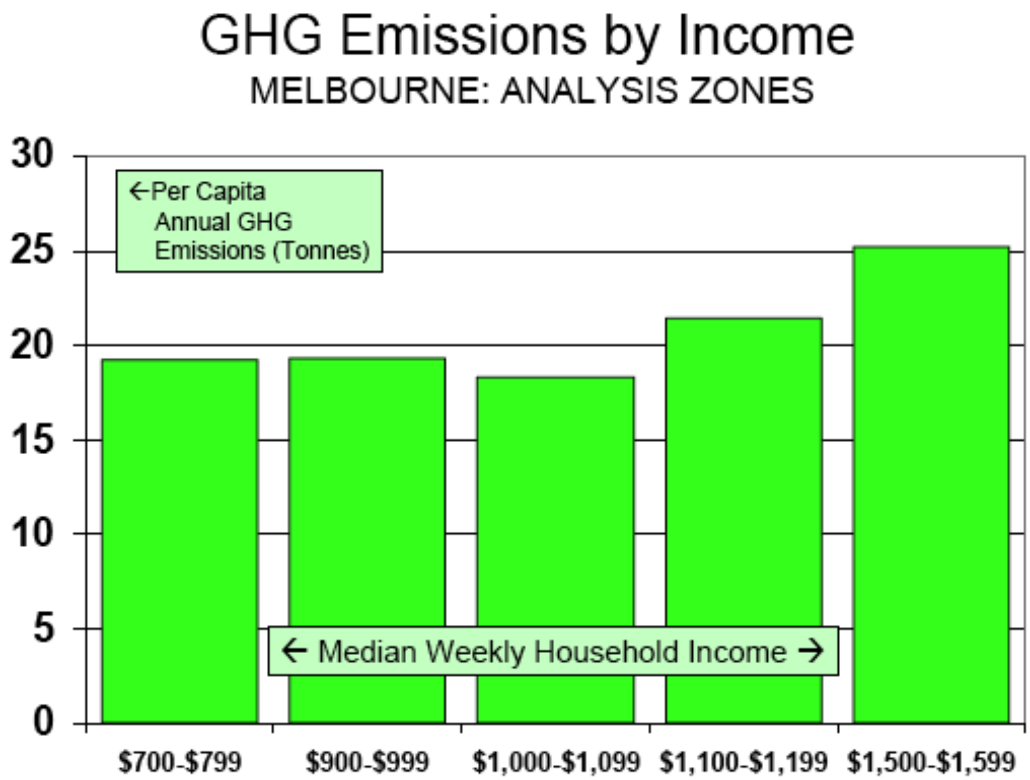

GHG Emissions by Car Ownership
MELBOURNE: BY PROXIMITY TO CORE
30
25
20
15
10
5
0
Inner
Inner Ring
Second Ring
Outer
←Tonnes GHG Per Person
← Household Automobile Ownership →
70%
75%
80%
85%
90%
95%
100%

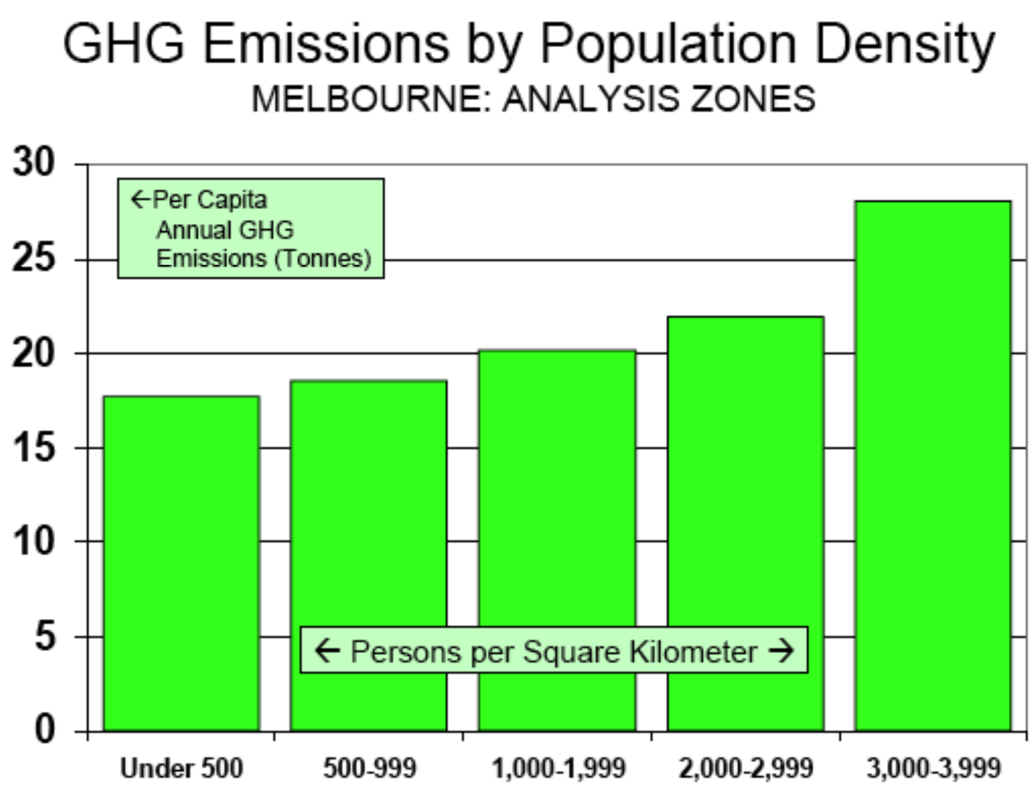

GHG Emissions by Median Income
MELBOURNE: BY PROXIMITY TO CORE
←Tonnes GHG Per Person
Inner
Inner Ring
Second Ring
Outer
← Median Weekly Household Income →
30
25
20
15
10
5
0
$1,000
$1,050
$1,100
$1,150
$1,200
$1,250


GHG Emissions by Population Density
MELBOURNE: BY PROXIMITY TO CORE
←Tonnes GHG Per Person
Inner
Inner Ring
Second Ring
Outer
← Persons per Square Kilometer →
30
25
20
15
10
5
0
0
500
1,000
1,500
2,000
2,500
3,000
3,500
4,000


GHG Emissions by Housing Type
MELBOURNE: ANALYSIS ZONES
30
25
20
15
10
5
0
←Per Capita Annual GHG Emissions (Tonnes)
← Share of Detached Housing →
Under 30%
60% - 69%
70% - 79%
80% - 89%
90% - 100%


GHG Emissions by Car Availability
MELBOURNE: ANALYSIS ZONES
30
25
20
15
10
5
0
←Per Capita Annual GHG Emissions (Tonnes)
← Households With Automobiles →
Under 80%
80% - 84%
85% - 89%
90% - 94%
95% - 100%


GHG Emissions by Income
MELBOURNE: ANALYSIS ZONES
←Per Capita Annual GHG Emissions (Tonnes)
← Median Weekly Household Income →
30
25
20
15
10
5
0
$700-$799
$900-$999
$1,000-$1,099
$1,100-$1,199
$1,500-$1,599


GHG Emissions by Population Density
MELBOURNE: ANALYSIS ZONES
←Per Capita Annual GHG Emissions (Tonnes)
← Persons per Square Kilometer →
30
25
20
15
10
5
0
Under 500
500-999
1,000-1,999
2,000-2,999
3,000-3,999

Greenhouse gas emissions for Brisbane are analyzed in two formats:

> Geographical sectors: Data is summarized by analysis zone into four geographical categories: core,[26] inner ring, second ring and outer, based upon proximity to the core.
>
> Demographic Factors: Data is summarized by analysis zone based upon the prevalence of detached housing, prevalence of household car ownership median household income and population density.

Analysis by Proximity to Core

Greenhouse gas emissions per capita area higher toward the core and are lower farther from the core. This is consistent with the national pattern and contrary to the assumption that GHG emissions are lowest in the core. The highest greenhouse gas emissions are produced in the core area of Brisbane, at 26.51 annual tonnes per capita. By comparison, inner ring areas produce 22.81 annual GHG tonnes per capita 14 percent less than Brisbane's core. Annual GHG tones per capita in the second ring is 19.11 tonnes, 28 percent less than Brisbane's core. The outer areas average 16.95 annual GHG tones per capita, 36 percent less than Brisbane's core (Figure 31).

Housing: Brisbane GHG emissions are lower where there are more detached houses (Figure 32). This reflects the national pattern, which is contrary to the generally held belief that lower density living produces higher GHG emissions.

> Brisbane's core, with the highest GHG emissions per capita, has the lowest share of detached housing, at 34 percent. The inner ring, with the second highest GHG emissions per capita, has the second lowest share of detached housing, at 65 percent. The second ring and the outer area have the lowest GHG emissions per capita and the highest share of detached housing, at 89 percent.

Cars: Brisbane GHG emissions are lower where there are more cars (Figure 33). This also reflects the national pattern, which is contrary to the generally held belief that automobile based mobility produces higher GHG emissions.

> Brisbane's core, with the highest GHG emissions per capita, has the lowest share of households with cars, at 79 percent. The inner ring, with the second highest GHG emissions per capita, has the second lowest share of households with cars, at 88 percent. The second ring and outer area have the lowest GHG emissions per capita, and the highest share of households with cars, at 93 percent.

Income: Generally, the predicted relationship is evident between higher median household incomes and greater GHG emissions per capita (Figure 34). The core area, with the highest GHG emissions per capita, has the highest median household income. Median incomes then decline toward the lowest in the outer area.

[26] The core is the Inner Brisbane statistical subdivision.

Population Density: There is a strong association between lower population density and higher GHG emissions per capita (Figure 35). This reflects the national pattern, which is contrary to the generally held belief that lower densities produces higher GHG emissions.

Water and Ecological Footprint: Virtually the same relationship exists with water usage and the ecological footprint as with GHG emissions in Brisbane. Water usage and the ecological footprint are the highest in the core area and decline toward the outer area (Table 12).

Table 6
Consumption Factors by Proximity to Core
Brisbane: Analysis Zones Annual Per Capita

	GHG Emissions (Tonnes)	Water Use (Litres)	Eco-Footprint (Hectares)
Core	26.51	870,000	7.76
Inner Ring	22.81	810,000	7.33
Second Ring	19.11	720,000	6.67
Outer	16.95	650,000	6.29
Total	19.54	730,000	6.74

Analysis by Demographic Characteristics

Similar relationships are evident from an analysis of GHG emissions based upon the demographic characteristics of detached housing, car availability and median household income.

Housing: There is an association between a greater share of detached housing and lower GHG emissions per capita (Figure 36). The highest GHG emissions per capita (26.51 tonnes annually) are in statistical subdivisions with the lowest share of detached housing (between 30 and 49 percent). The lowest GHG emissions per capita (17.14 tonnes annually) are in the statistical subdivisions with the highest share of detached housing (90 to 100 percent).

Cars: There is an association between greater automobile availability share and lower GHG emissions per capita (Figure 37). The highest GHG emissions per capita (26.51 tonnes annually) are in statistical subdivisions with the lowest share of households with cars (less than 80 percent). The lowest GHG emissions per capita (17.45 tonnes annually) are in the statistical subdivisions with the highest household car availability (95 to 100 percent).

Income: the predicted relationship between higher median household incomes and greater GHG emissions per capita is generally not as evident in Brisbane (Figure 38). The second lowest GHG emissions per capita are in highest income category (between $1,200 and $1,299 weekly). The lowest GHG emissions per capita are in the middle income category ($1,000 to $1,099). The highest GHG emissions per capita are in the second highest income category ($1,100 to $1,199).

Population Density: The highest Brisbane GHG emissions per capita are where population density is the highest. This is generally consistent with the national pattern and contrary to the belief that higher densities are associated with lower GHG emissions. GHG emissions decline in the middle density categories are higher in the lowest density category (Figure 39).

Water and Ecological Footprint: Again, generally the same relationship is evident in water use and eco-footprint. Water use and the eco-footprint tend generally to decrease where there is more detached housing, more car usage and lower median household incomes (Table 13).

Table 13
Consumption by Demographic Characteristics
Brisbane: Analysis Zones Annual Per Capita

	GHG Emissions (Tonnes)	Water Use (Litres)	Eco-Footprint (Hectares)
Detached Share of Housing			
30% - 49%	26.51	870,000	7.76
50% - 59%			
60% - 69%	22.81	810,000	7.33
70% - 79%	17.39	660,000	6.36
80% - 89%	18.49	710,000	6.61
90%-100%	17.14	650,000	6.35
Households with Autos			
75% - 79%	26.51	870,000	7.76
80% - 84%			
85% - 89%	22.06	790,000	7.20
90% - 94%	18.53	700,000	6.55
95%-100%	17.45	680,000	6.44
Weekly Median Household Income			
$700-$799	19.41	720,000	6.72
$800-$899			
$900-$999	19.28	720,000	6.69
$1,000-$1,099	16.55	640,000	6.20
$1,100-$1,199	21.20	770,000	7.02
$1,200-$1,299	17.45	680,000	6.44
Population Density (Persons per Square Kilometer)			
Under 500	18.68	700,000	6.60
500-999	16.40	650,000	6.18
1,000-1,999	17.39	660,000	6.36
2,000-2,999	23.52	820,000	7.41
3,000-3,999			
4000 & Over			
By Analysis Zone			

Conclusions

The analysis of the data provided in the Australian Conservation Foundation Consumption Atlas indicates that the patterns of GHG emissions per capita are strongly or generally inconsistent with the prevailing assumptions of urban consolidation policy in Brisbane (Table 14). To the contrary of the urban consolidation assumptions:

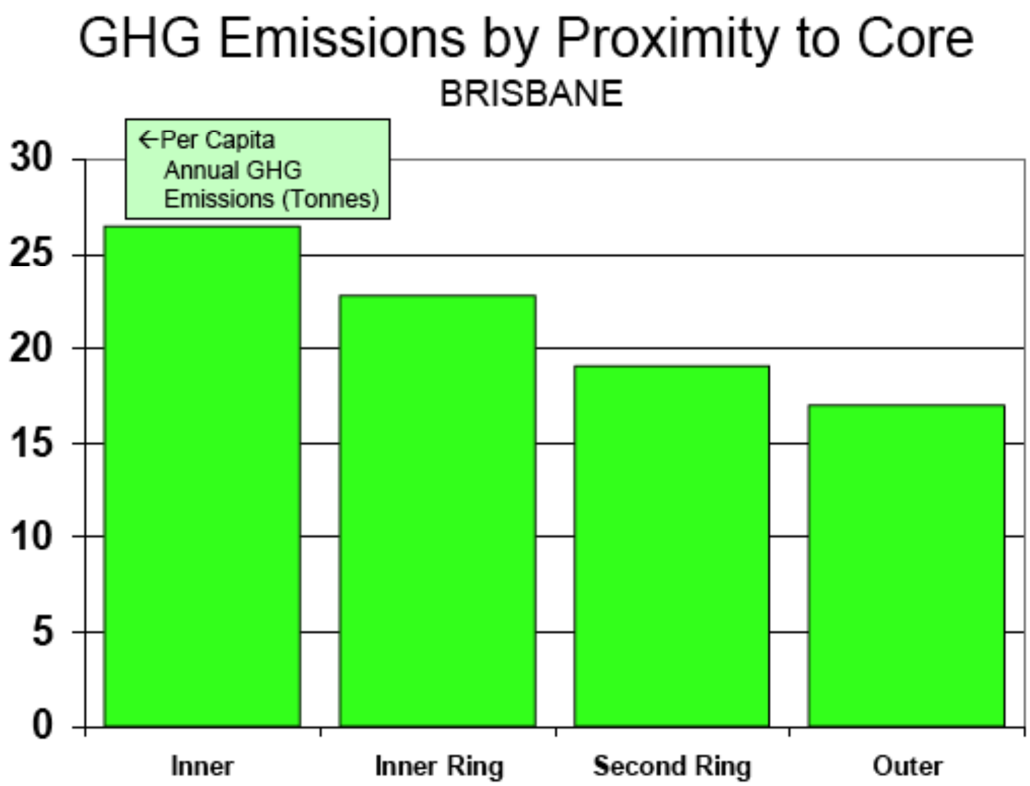
* Lower GHG emissions are associated with locations farther from the core.
* Lower GHG emissions are associated with more detached housing.
* Lower GHG emissions are associated with greater auto use.
* Lower GHG emissions are associated with lower population density.

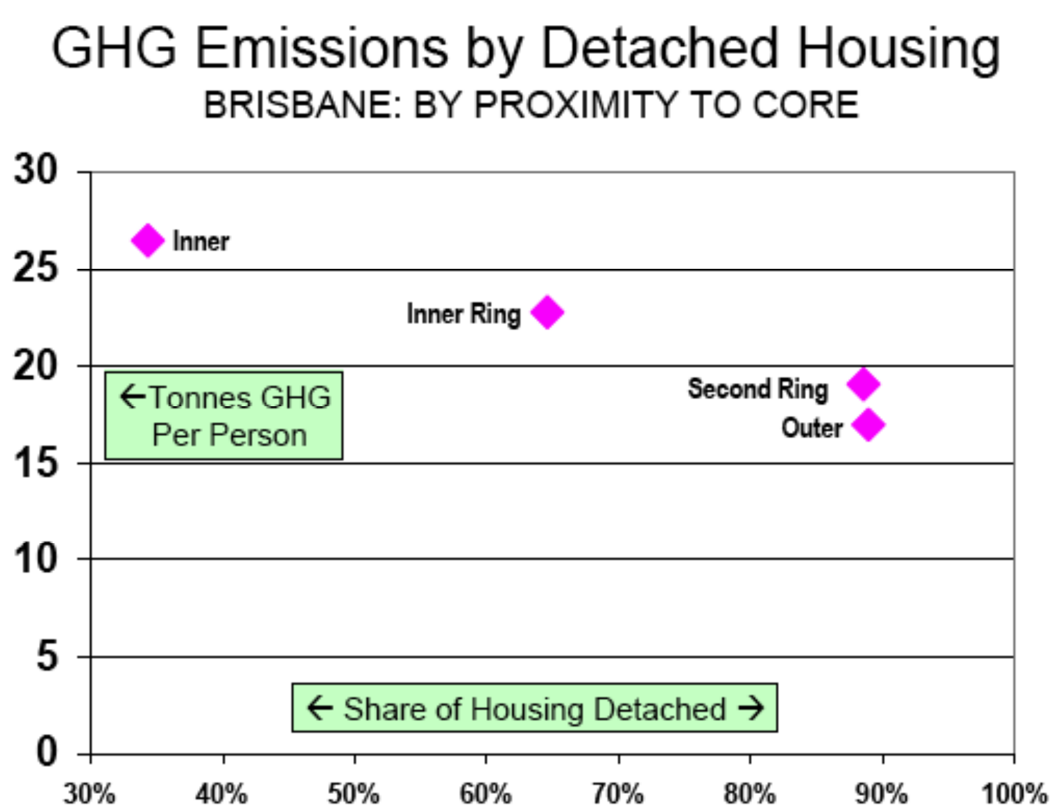
The assertion by the authors of Australian Conservation Foundation Consumption Atlas of an association between higher household incomes and higher GHG emissions per capita is generally supported.[27]

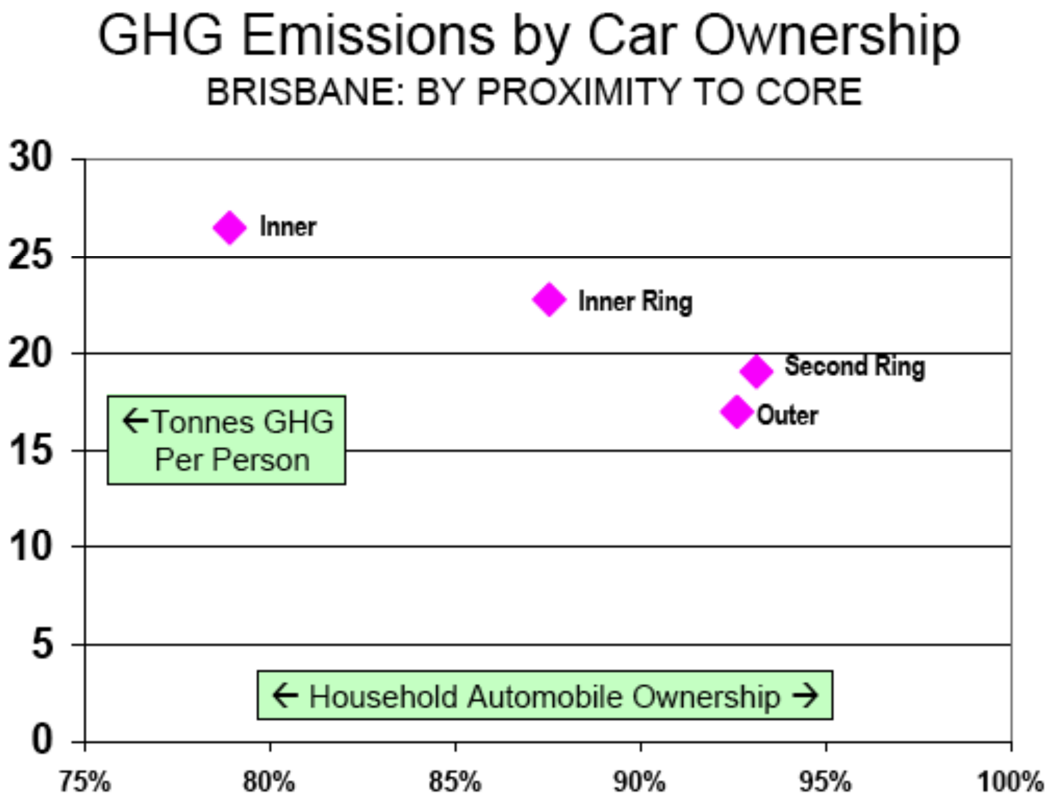
Table 14
Consistency with Urban Consolidation Planning Assumptions
Brisbane

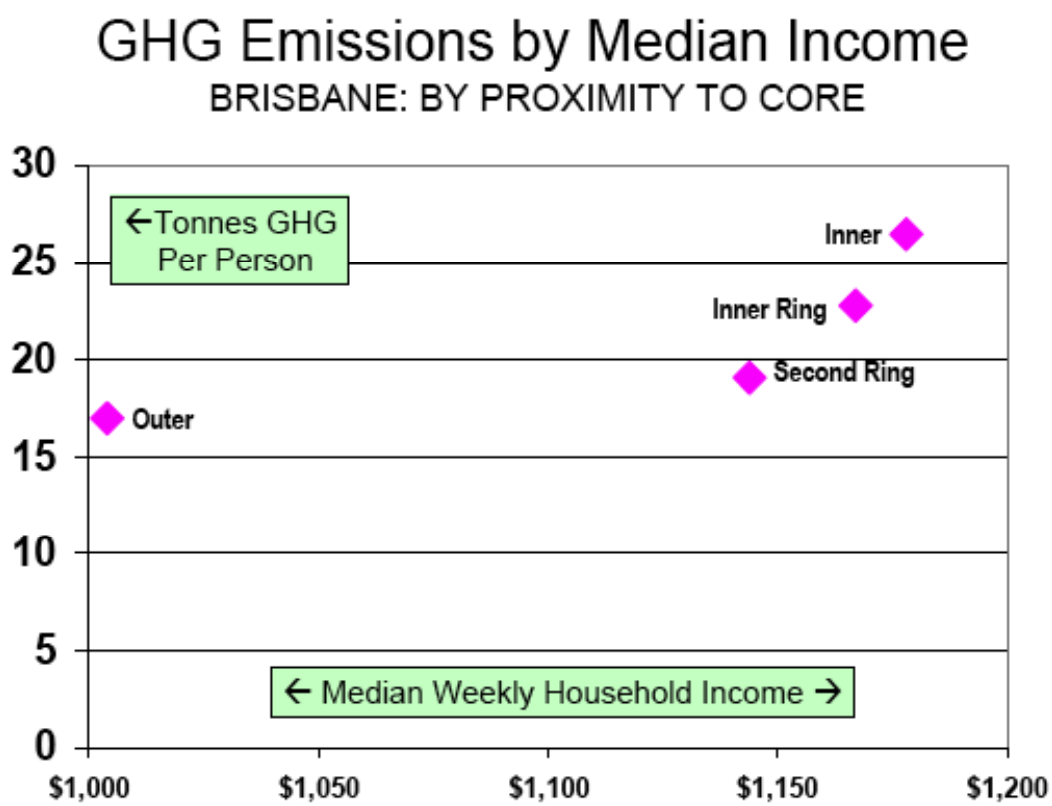
Planning Assumption	Strong Consistency	General Consistency	No Relationship	General Inconsistency	Strong Inconsistency
Higher GHG Emissions Associated with Longer Distance from Core					●
Higher GHG Emissions Associated with Detached Housing				●	
Higher GHG Emissions Associated with More Auto Use					●
Higher GHG Emissions Associated with Lower Population Density				●	
INSTANCES: Overall	0	0	0	2	2

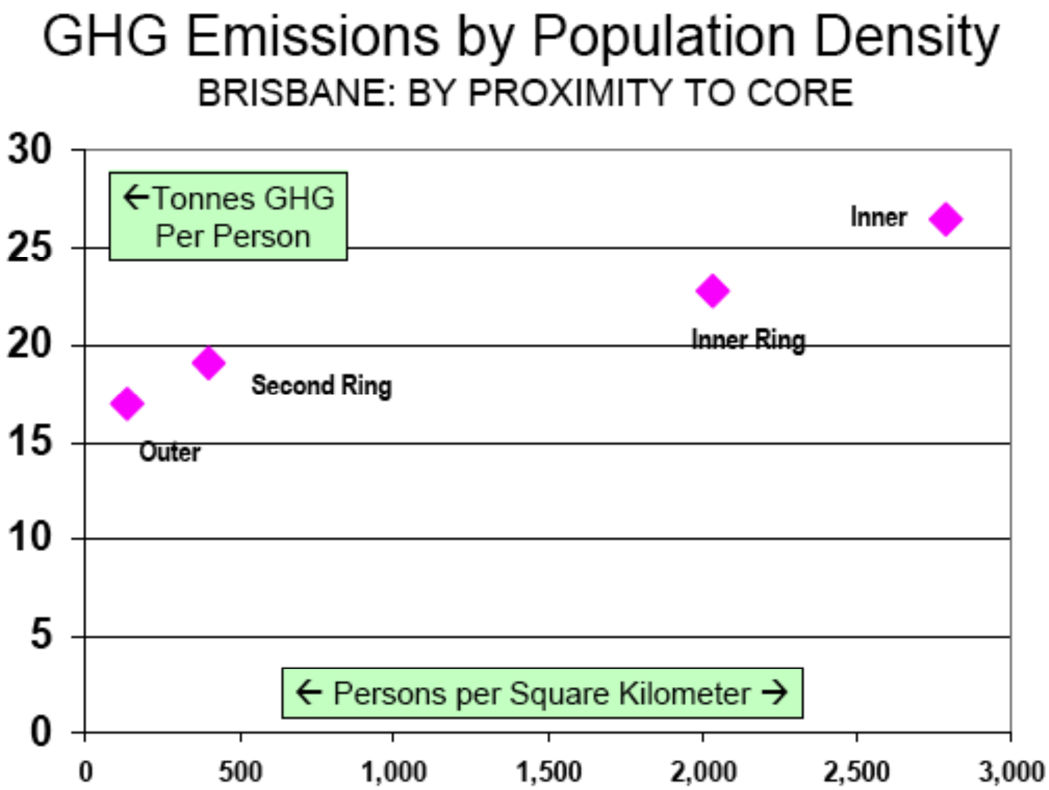
[27] Caution, however, is appropriate with respect to the income conclusion. A comparison by the authors of households with similar incomes in inner and outer Sydney found that per capita energy use was more in inner areas than outer areas (which suggests that location may be an important factor in consumption, independent of income). Per capita direct and indirect energy use in the inner areas was estimated at more than 75 percent higher than in the outer areas. See Manfred Lenzena, Christopher Deya, Barney Foran, "Analysis: Energy requirements of Sydney households," *Ecological Economics 49* (2004), 375-399, Table 6.

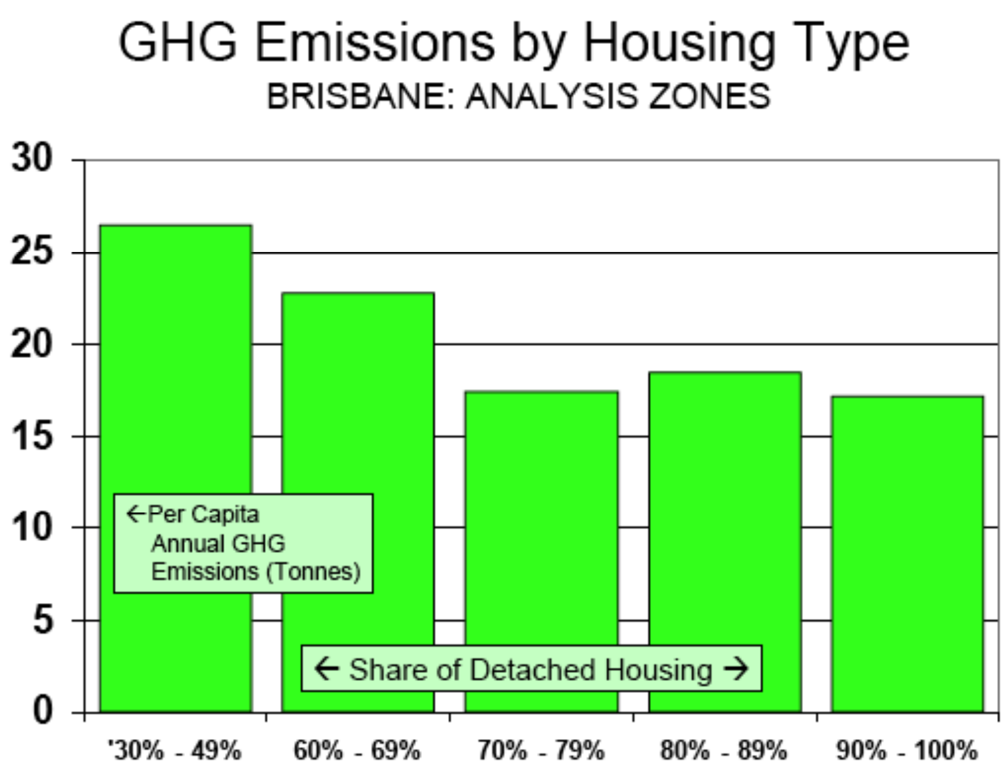

GHG Emissions by Proximity to Core
BRISBANE
←Per Capita Annual GHG Emissions (Tonnes)
30
25
20
15
10
5
0
Inner
Inner Ring
Second Ring
Outer

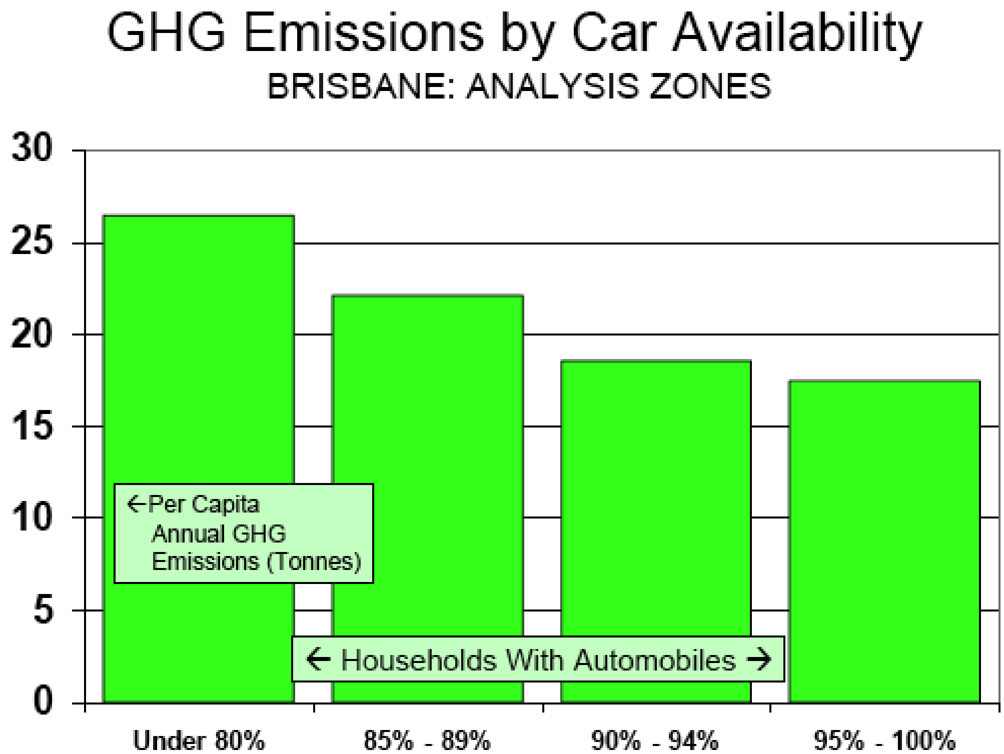

GHG Emissions by Detached Housing
BRISBANE: BY PROXIMITY TO CORE
←Tonnes GHG Per Person
← Share of Housing Detached →
Inner
Inner Ring
Second Ring
Outer
30
25
20
15
10
5
0
30%
40%
50%
60%
70%
80%
90%
100%

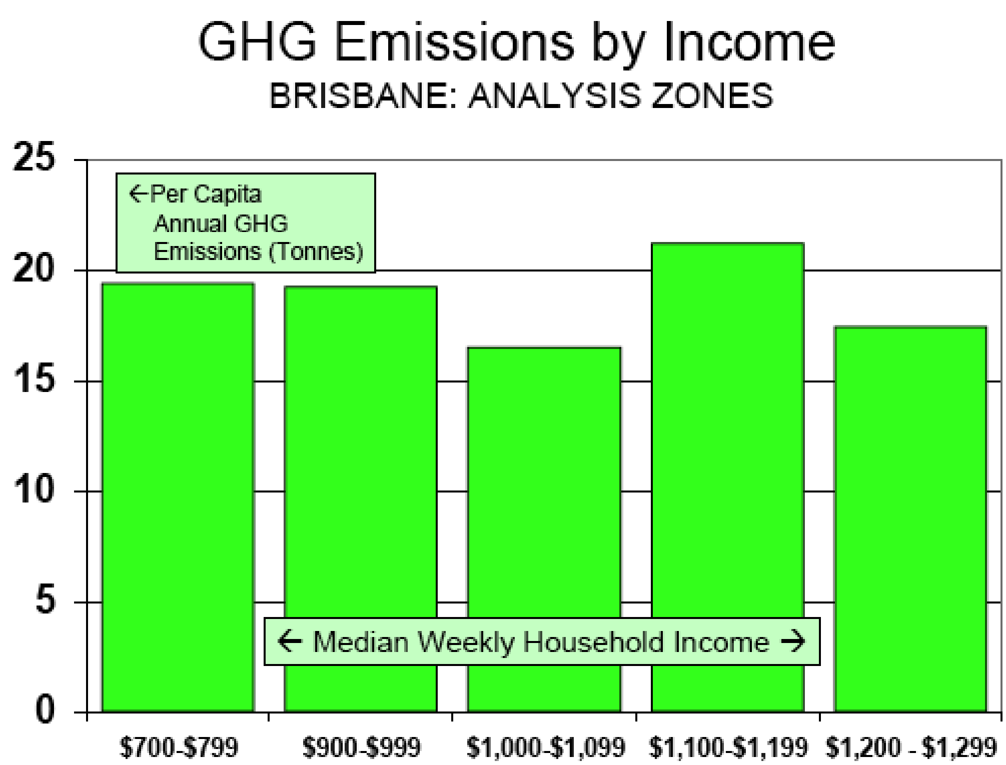

GHG Emissions by Car Ownership
BRISBANE: BY PROXIMITY TO CORE
Inner
Inner Ring
Second Ring
Outer
←Tonnes GHG Per Person
← Household Automobile Ownership →
30
25
20
15
10
5
0
75%
80%
85%
90%
95%
100%

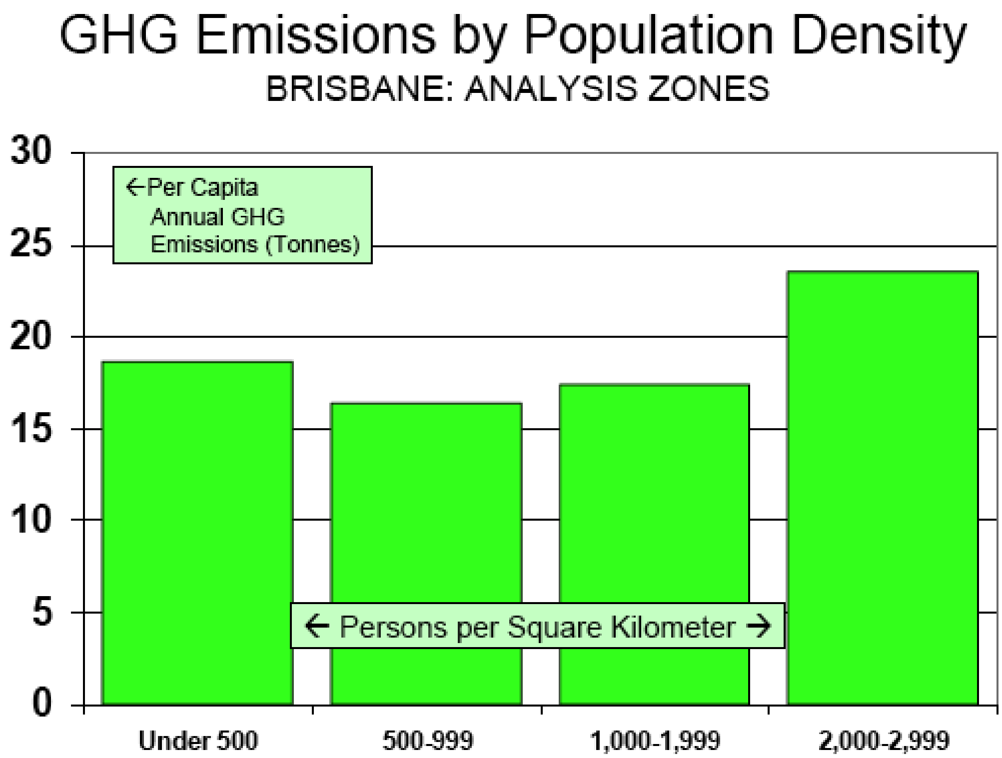

GHG Emissions by Median Income
BRISBANE: BY PROXIMITY TO CORE
←Tonnes GHG Per Person
Inner
Inner Ring
Second Ring
Outer
← Median Weekly Household Income →
30
25
20
15
10
5
0
$1,000
$1,050
$1,100
$1,150
$1,200


GHG Emissions by Population Density
BRISBANE: BY PROXIMITY TO CORE
←Tonnes GHG Per Person
Inner
Inner Ring
Second Ring
Outer
← Persons per Square Kilometer →
30
25
20
15
10
5
0
0
500
1,000
1,500
2,000
2,500
3,000


GHG Emissions by Housing Type
BRISBANE: ANALYSIS ZONES
←Per Capita Annual GHG Emissions (Tonnes)
← Share of Detached Housing →
30
25
20
15
10
5
0
'30% - 49%
60% - 69%
70% - 79%
80% - 89%
90% - 100%


GHG Emissions by Car Availability
BRISBANE: ANALYSIS ZONES
30
25
20
15
10
5
0
←Per Capita Annual GHG Emissions (Tonnes)
← Households With Automobiles →
Under 80%
85% - 89%
90% - 94%
95% - 100%


GHG Emissions by Income
BRISBANE: ANALYSIS ZONES
25
20
15
10
5
0
←Per Capita Annual GHG Emissions (Tonnes)
← Median Weekly Household Income →
$700-$799
$900-$999
$1,000-$1,099
$1,100-$1,199
$1,200 - $1,299


GHG Emissions by Population Density
BRISBANE: ANALYSIS ZONES
30
25
20
15
10
5
0
←Per Capita Annual GHG Emissions (Tonnes)
← Persons per Square Kilometer →
Under 500
500-999
1,000-1,999
2,000-2,999

Greenhouse gas emissions for Adelaide are analyzed in two formats:

> Geographical sectors: Data is summarized by analysis zone into four geographical categories: core,[28] inner ring, second ring and outer, based upon proximity to the core.
>
> Demographic Factors: Data is summarized by analysis zone based upon the prevalence of detached housing, prevalence of household car ownership median household income and population density.

Analysis by Proximity to Core

Generally, greenhouse gas emissions per capita area higher toward the core and are lower farther from the core. This is consistent with the national pattern and contrary to the assumption that GHG emissions are lowest in the core. The highest greenhouse gas emissions are produced in the core area of Adelaide, at 22.48 annual tonnes per capita. By comparison, inner ring areas produce 18.12 annual GHG tonnes per capita 19 percent less than Adelaide's core. Annual GHG tones per capita in the second ring is 16.68 tonnes, 26 percent less than Adelaide's core. The outer areas average 18.35 annual GHG tones per capita, 18 percent less than Adelaide's core (Figure 40).

Housing: Adelaide GHG emissions are lower where there are more detached houses (Figure 41). This reflects the national pattern, which is contrary to the generally held belief that lower density living produces higher GHG emissions.

> Adelaide's core, with the highest GHG emissions per capita, has the lowest share of detached housing, at just below 50 percent. The inner ring, with the second highest GHG emissions per capita, has the second lowest share of detached housing, at 71 percent. The second ring, with the third highest GHG emissions per capita, has the second highest share of detached housing, at 83 percent. The outer area, with the lowest rate of GHG emissions, has the highest share of detached housing, at 91 percent.

Cars: Adelaide GHG emissions are lower where there are more cars (Figure 42). This also reflects the national pattern, which is contrary to the generally held belief that automobile based mobility produces higher GHG emissions.

> Adelaide's core, with the highest GHG emissions per capita, has the lowest share of households with cars, at 84 percent. The inner ring, with the second highest GHG emissions per capita, has the second lowest share of households with cars, at 86 percent. The second ring, with the second lowest GHG emissions per capita, has the second lowest share of households with cars, at 91 percent. The outer ring, with the second lowest GHG emissions per capita, has the second lowest share of households with cars, at 94 percent.

Income: Generally, the predicted relationship is evident between higher median household incomes and greater GHG emissions per capita (Figure 43). However, the outer core area, with the lowest GHG emissions per capita, has the highest median household income.

[28] The core includes the Adelaide, Norwood/Payneham and St. Peters, Unley-East, Unley-West and Walkerville statistical subdivisions..

Population Density: There is a strong association between lower population density and higher GHG emissions per capita (Figure 44). This reflects the national pattern, which is contrary to the generally held belief that lower densities produces higher GHG emissions.

Water and Ecological Footprint: Virtually the same relationship exists with water usage and the ecological footprint as with GHG emissions in Adelaide. Water usage and the ecological footprint are the highest in the core area and decline toward the outer area, except that the second highest values are in the outer area (Table 15).

Table 15
Consumption Factors by Proximity to Core
Adelaide: Analysis Zones Annual Per Capita

	GHG Emissions (Tonnes)	Water Use (Litres)	Eco-Footprint (Hectares)
Core	22.48	840,000	7.63
Inner Ring	18.12	720,000	6.85
Second Ring	16.68	680,000	6.62
Outer	18.35	730,000	6.93
Total	17.59	710,000	6.77

Analysis by Demographic Characteristics

Similar relationships are evident from an analysis of GHG emissions based upon the demographic characteristics of detached housing, car availability and median household income.

Housing: There is an association between a greater share of detached housing and lower GHG emissions per capita (Figure 45). The highest GHG emissions per capita (22.48 tonnes annually) are in analysis zones with the lowest share of detached housing (between 30 and 49 percent). The lowest GHG emissions per capita (16.87 tonnes annually) are in the analysis zones with the second highest share of detached housing (80 to 89 percent). In an anomaly, the second highest GHG emissions per capita are in the category with the highest detached housing share.

Cars: There is an association between greater automobile availability share and lower GHG emissions per capita (Figure 46). The highest GHG emissions per capita (20.25 tonnes annually) are in analysis zones with the lowest share of households with cars (80 to 85 percent). The lowest GHG emissions per capita (16.68 tonnes annually) are in the analysis zones with the second highest household car availability (90 to 95 percent). In an anomaly, the second highest GHG emissions per capita are in the category with the highest automobile availability share.

Income: the predicted relationship between higher median household incomes and greater GHG emissions per capita is somewhat evident in Adelaide (Figure 47). The highest GHG emissions per capita are in highest income category (between $1,400 and $1,499 weekly). The lowest GHG emissions per capita are in the second lowest income category ($1,000 to $1,099).

Population Density: There is a strong association between higher GHG emissions per capita and higher population density in Adelaide (Figure 48). This reflects the national pattern, which is contrary to the generally held belief that lower densities produces higher GHG emissions.

Water and Ecological Footprint: Again, generally the same relationship is evident in water use and eco-footprint. Water use and the eco-footprint tend generally to decrease where there is more detached housing, more car usage and lower median household incomes (Table 16).

Table 16
Consumption by Demographic Characteristics
Adelaide: Analysis Zones Annual Per Capita

	GHG Emissions (Tonnes)	Water Use (Litres)	Eco-Footprint (Hectares)
Detached Share of Housing			
30% 49%	22.48	840,000	7.63
50% - 59%			
60% - 69%			
70% - 79%	18.12	720,000	6.85
80% - 89%	16.68	680,000	6.62
90%-100%	19.87	800,000	7.27
Households with Autos			
80% - 84%	20.25	770,000	7.20
85% - 89%	18.33	730,000	6.90
90% - 94%	16.68	680,000	6.62
95%-100%	19.87	800,000	7.27
Weekly Median Household Income			
$700-$799	17.22	690,000	6.66
$800-$899	16.49	650,000	6.52
$900-$999	16.64	680,000	6.61
$1,000-$1,099	20.85	820,000	7.38
$1,100-$1,199			
$1,200-$1,299			
$1,300-$1,399	19.87	800,000	7.27
Population Density (Persons per Square Kilometer)			
Under 500	16.75	679.29	6.63
500-999			
1,000-1,999	18.35	723.46	6.88
2,000-2,999			
3,000-3,999			
4000 & Over			
By Analysis Zone			

Conclusions

The analysis of the data provided in the Australian Conservation Foundation Consumption Atlas indicates that the patterns of GHG emissions per capita are strongly or generally inconsistent with the prevailing assumptions of urban consolidation policy in Adelaide (Table 17). To the contrary of the urban consolidation assumptions:

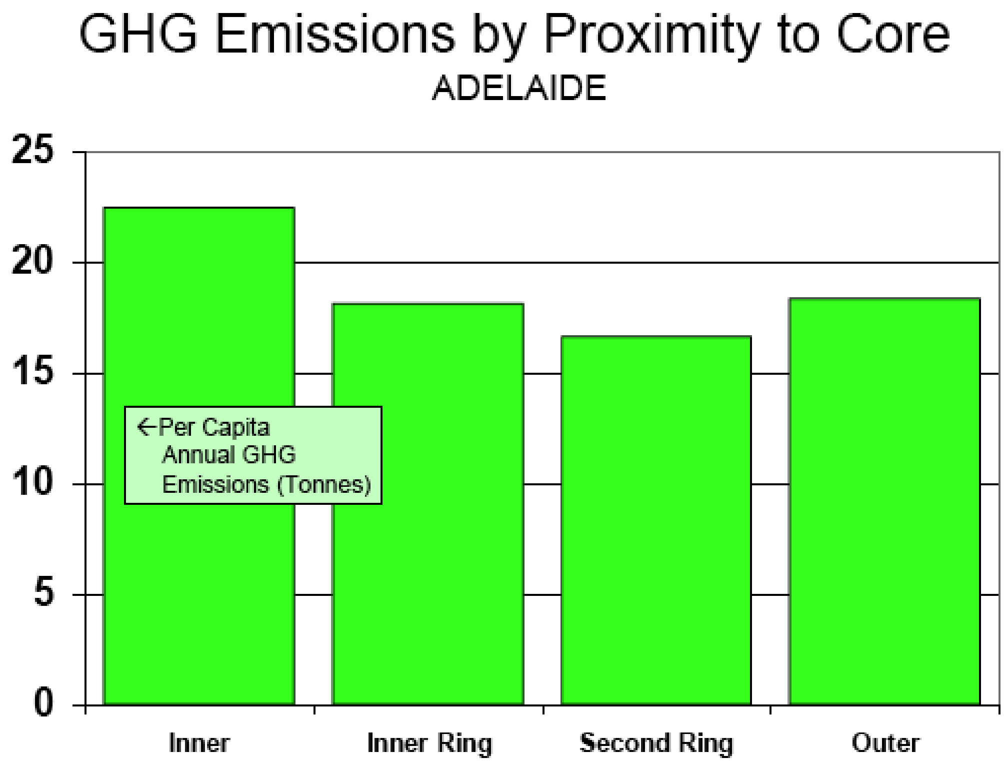
* Lower GHG emissions are associated with locations farther from the core.
* Lower GHG emissions are associated with more detached housing.
* Lower GHG emissions are associated with greater auto use.
* Lower GHG emissions are associated with lower population density.

The assertion by the authors of Australian Conservation Foundation Consumption Atlas of an association between higher household incomes and higher GHG emissions per capita is generally supported.[29]

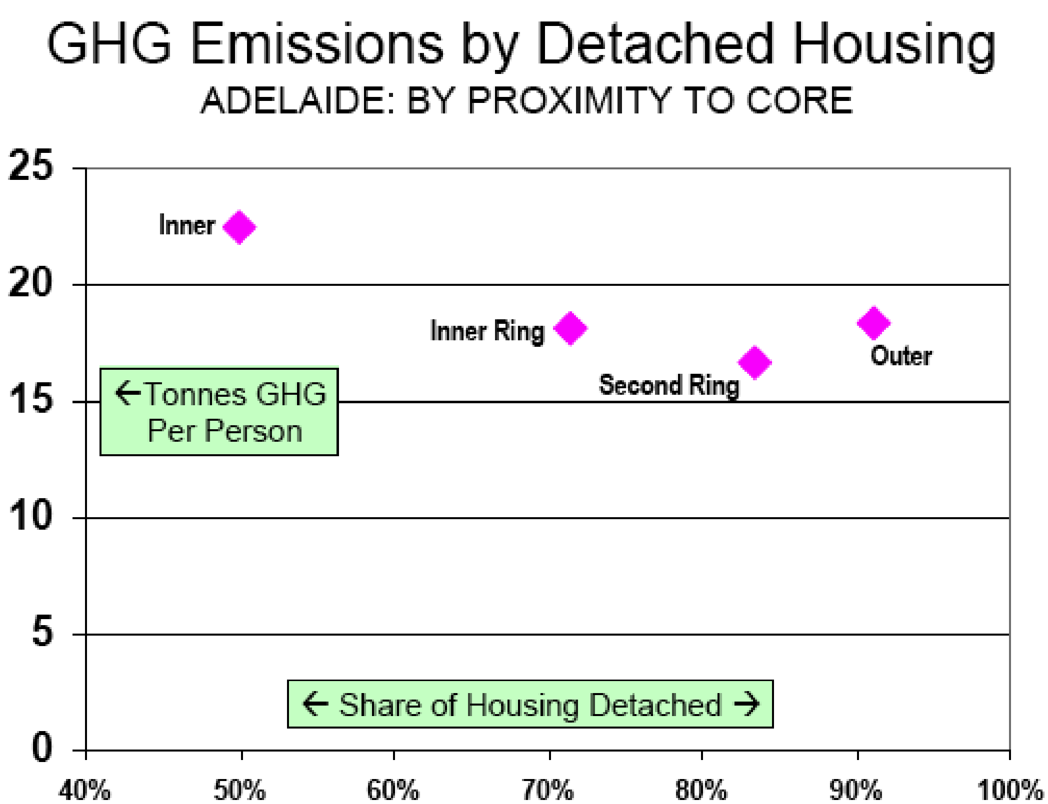
Table 17
Consistency with Urban Consolidation Planning Assumptions
Adelaide

Planning Assumption	Strong Consistency	General Consistency	No Relationship	General Inconsistency	Strong Inconsistency
Higher GHG Emissions Associated with Longer Distance from Core				●	
Higher GHG Emissions Associated with Detached Housing				●	
Higher GHG Emissions Associated with More Auto Use				●	
Higher GHG Emissions Associated with Lower Population Density					●
INSTANCES: Overall	0	0	0	3	1

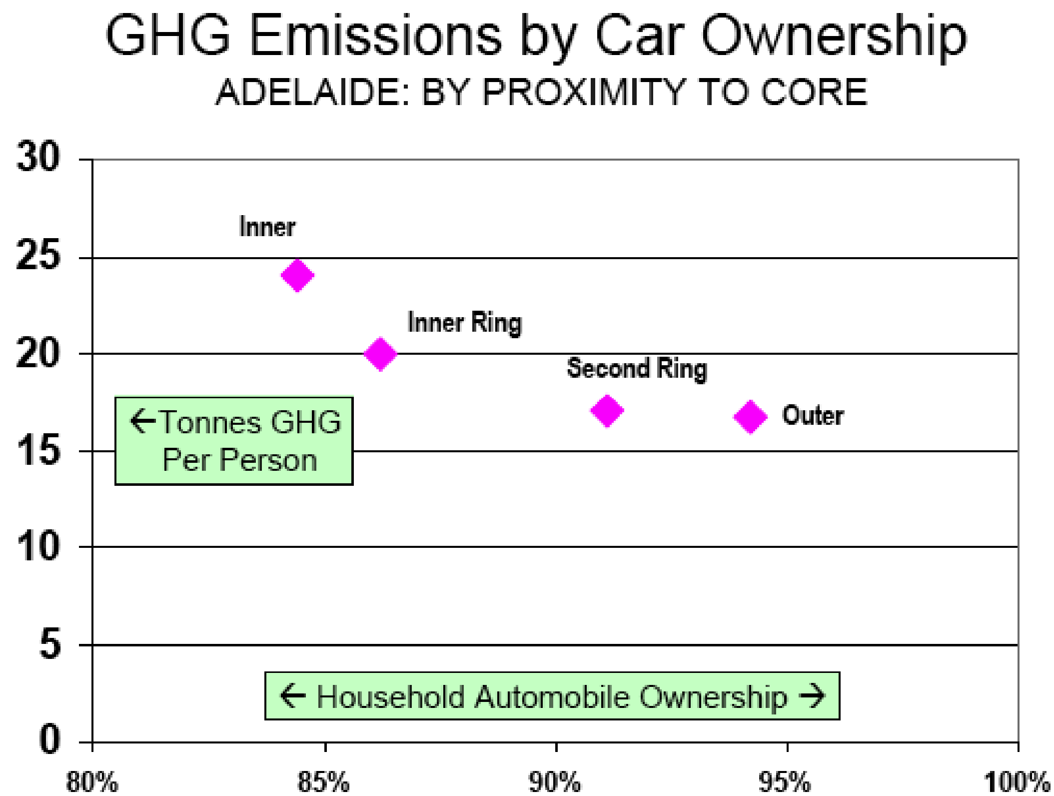
[29] Caution, however, is appropriate with respect to the income conclusion. A comparison by the authors of households with similar incomes in inner and outer Sydney found that per capita energy use was more in inner areas than outer areas (which suggests that location may be an important factor in consumption, independent of income). Per capita direct and indirect energy use in the inner areas was estimated at more than 75 percent higher than in the outer areas. See Manfred Lenzena, Christopher Deya, Barney Foran, "Analysis: Energy requirements of Sydney households," *Ecological Economics 49* (2004), 375-399, Table 6.

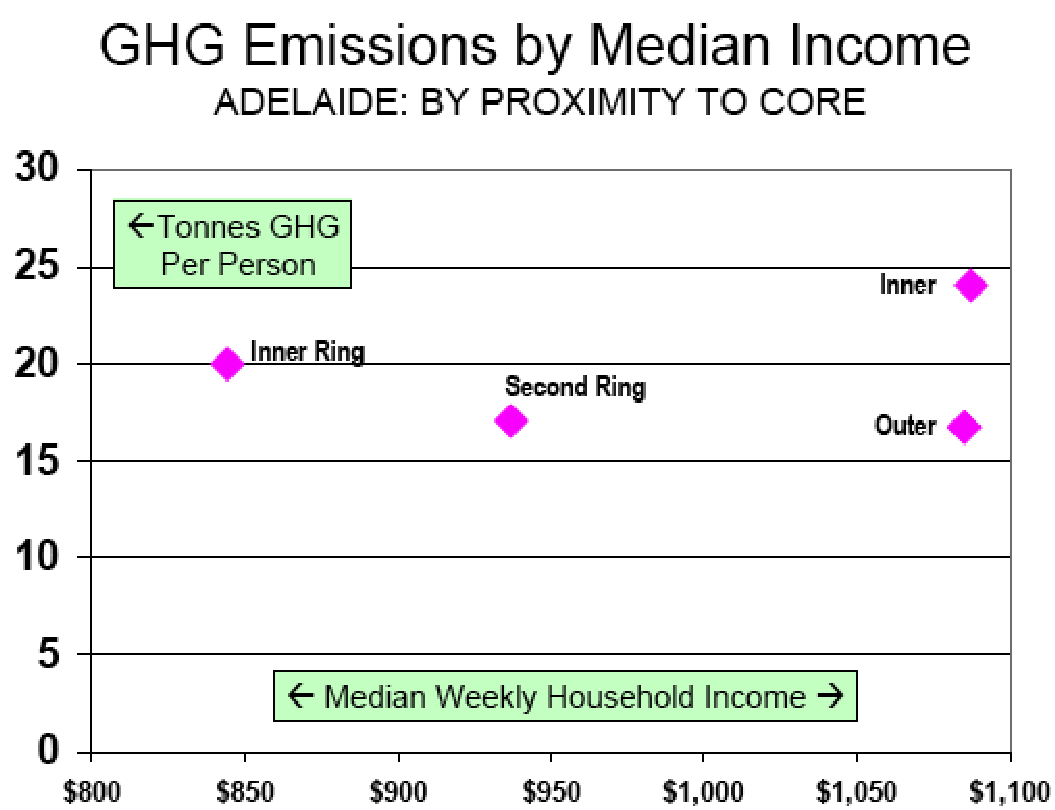


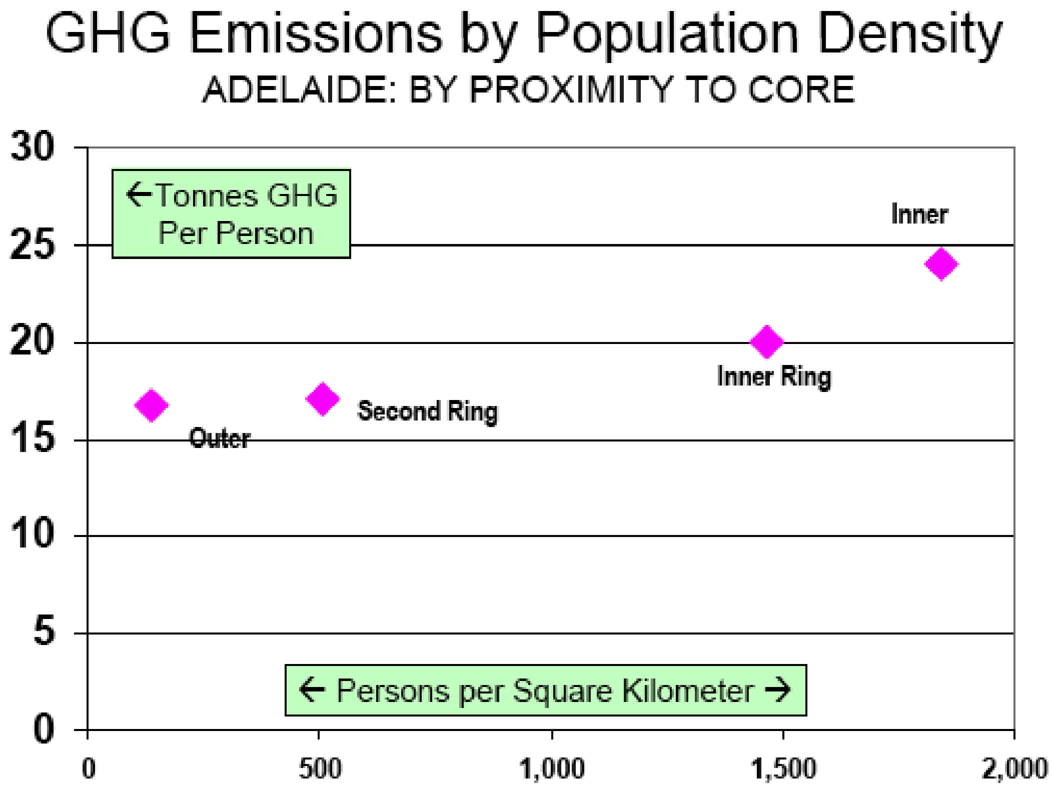
GHG Emissions by Proximity to Core
ADELAIDE
25
20
15
10
5
0
←Per Capita Annual GHG Emissions (Tonnes)
Inner
Inner Ring
Second Ring
Outer

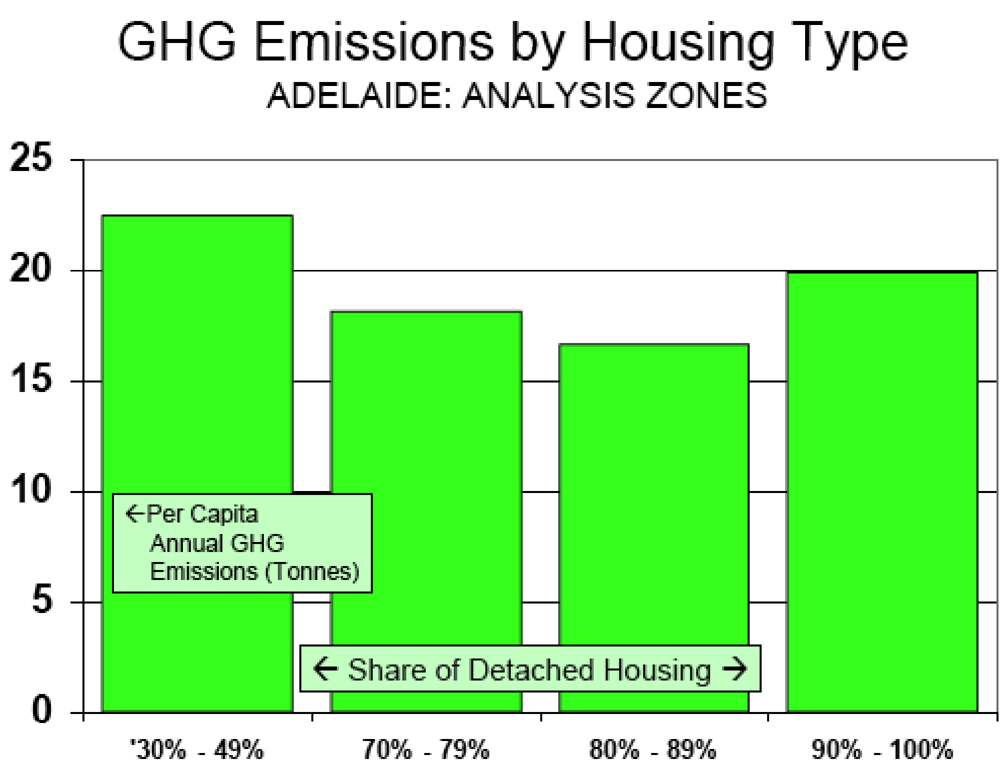


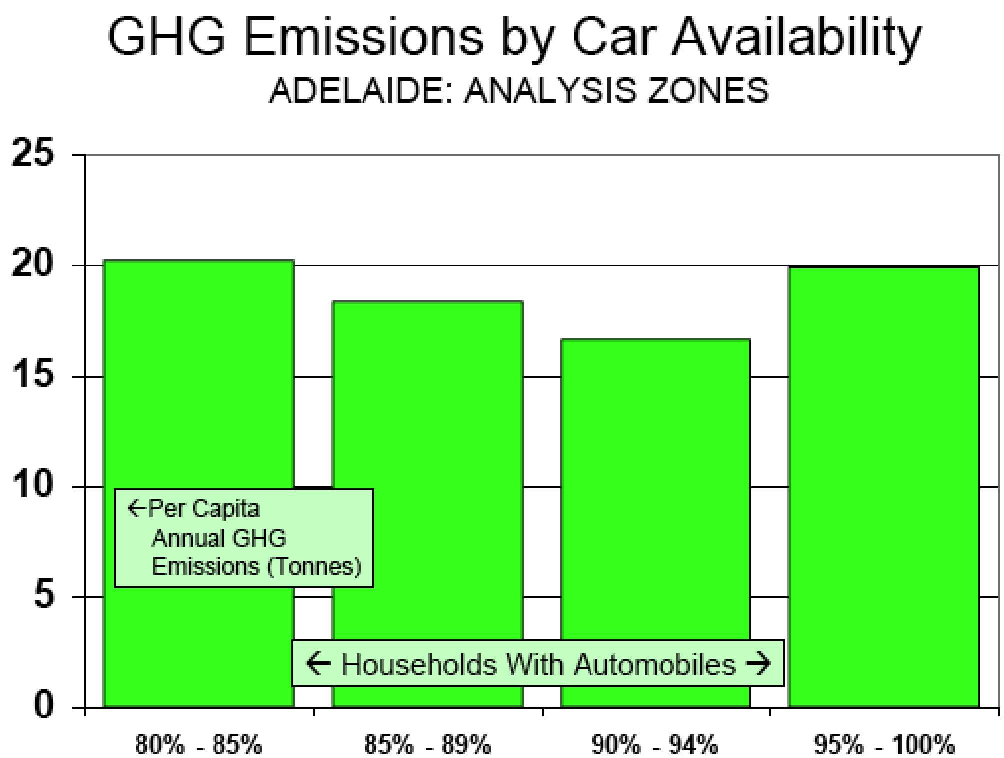
GHG Emissions by Detached Housing
ADELAIDE: BY PROXIMITY TO CORE
25
20
15
10
5
0
Inner
Inner Ring
Second Ring
Outer
←Tonnes GHG Per Person
← Share of Housing Detached →
40%
50%
60%
70%
80%
90%
100%

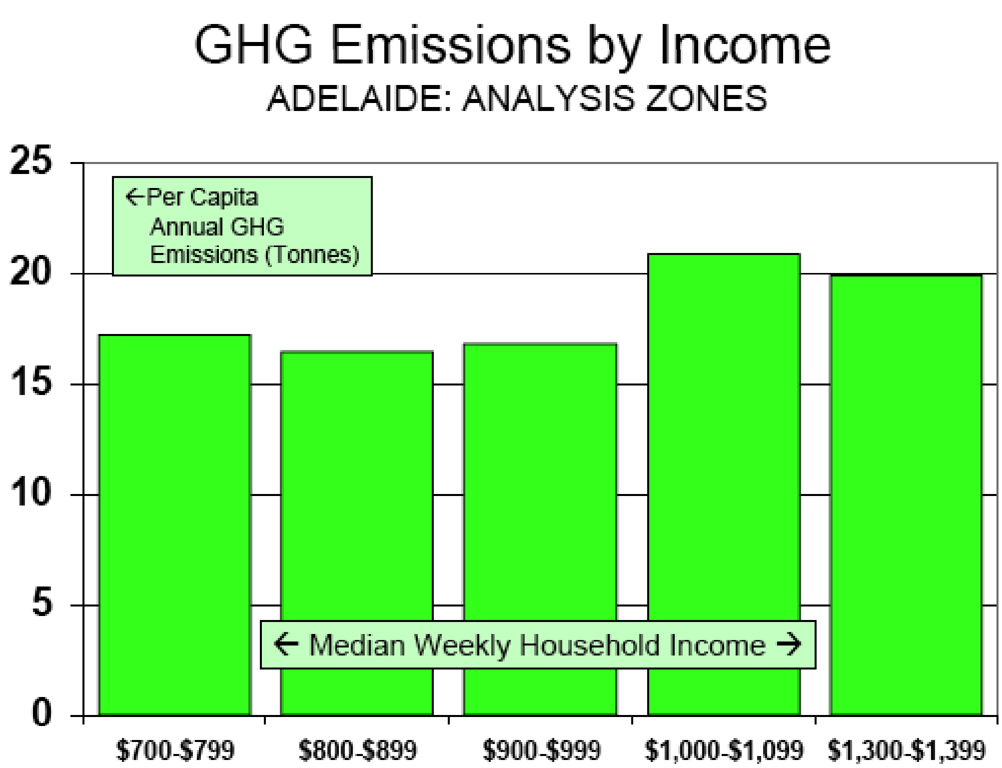

GHG Emissions by Car Ownership
ADELAIDE: BY PROXIMITY TO CORE
30
25
20
15
10
5
0
Inner
Inner Ring
Second Ring
Outer
←Tonnes GHG Per Person
← Household Automobile Ownership →
80%
85%
90%
95%
100%

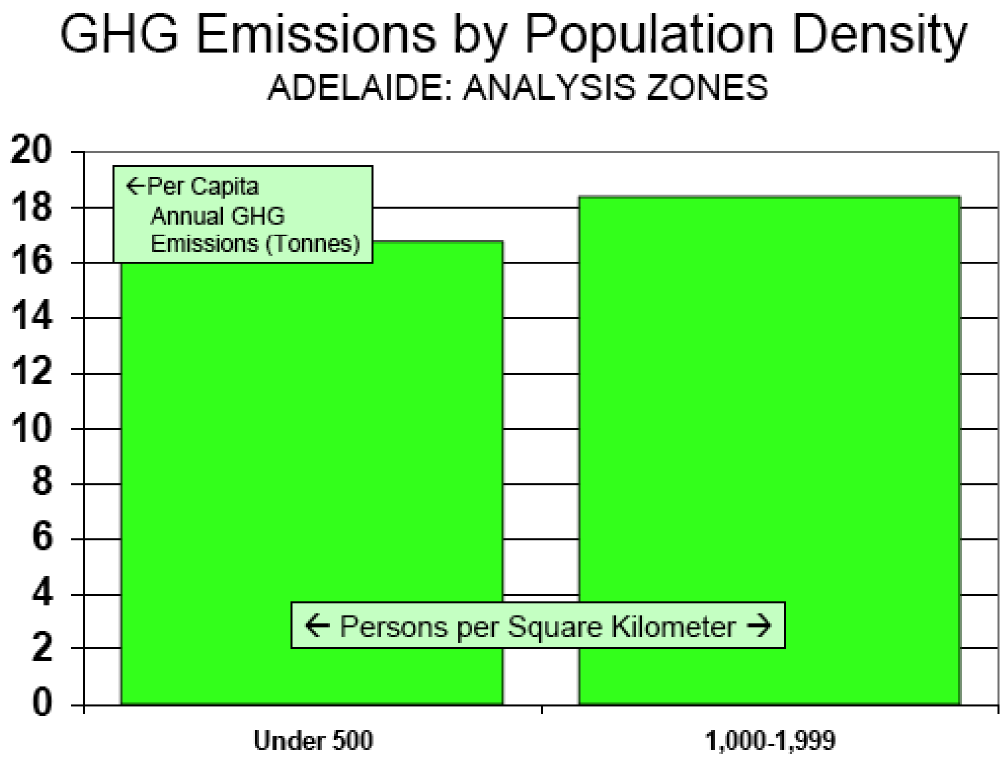

GHG Emissions by Median Income
ADELAIDE: BY PROXIMITY TO CORE
30
25
20
15
10
5
0
←Tonnes GHG Per Person
Inner
Inner Ring
Second Ring
Outer
← Median Weekly Household Income →
$800
$850
$900
$950
$1,000
$1,050
$1,100


GHG Emissions by Population Density
ADELAIDE: BY PROXIMITY TO CORE
←Tonnes GHG Per Person
Inner
Inner Ring
Second Ring
Outer
← Persons per Square Kilometer →
30
25
20
15
10
5
0
0
500
1,000
1,500
2,000


GHG Emissions by Housing Type
ADELAIDE: ANALYSIS ZONES
←Per Capita Annual GHG Emissions (Tonnes)
← Share of Detached Housing →
25
20
15
10
5
0
'30% - 49%
70% - 79%
80% - 89%
90% - 100%


GHG Emissions by Car Availability
ADELAIDE: ANALYSIS ZONES
25
20
15
10
5
0
←Per Capita Annual GHG Emissions (Tonnes)
← Households With Automobiles →
80% - 85%
85% - 89%
90% - 94%
95% - 100%


GHG Emissions by Income
ADELAIDE: ANALYSIS ZONES
25
20
15
10
5
0
←Per Capita Annual GHG Emissions (Tonnes)
← Median Weekly Household Income →
$700-$799
$800-$899
$900-$999
$1,000-$1,099
$1,300-$1,399


GHG Emissions by Population Density
ADELAIDE: ANALYSIS ZONES
←Per Capita Annual GHG Emissions (Tonnes)
← Persons per Square Kilometer →
20
18
16
14
12
10
8
6
4
2
0
Under 500
1,000-1,999

Greenhouse gas emissions for Perth are analyzed in two formats:

> Geographical sectors: Data is summarized by analysis zone into four geographical categories: core,[30] inner ring, second ring and outer, based upon proximity to the core.
>
> Demographic Factors: Data is summarized by analysis zone based upon the prevalence of detached housing, prevalence of household car ownership median household income and population density.

Analysis by Proximity to Core

Greenhouse gas emissions per capita area higher toward the core and are lower farther from the core. This is consistent with the national pattern and contrary to the assumption that GHG emissions are lowest in the core. The highest greenhouse gas emissions are produced in the core area of Perth, at 24.07 annual tonnes per capita. By comparison, inner ring areas produce 20.04 annual GHG tonnes per capita 17 percent less than Perth's core. Annual GHG tones per capita in the second ring is 17.08 tonnes, 29 percent less than Perth's core. The outer areas average 16.74 annual GHG tones per capita, 30 percent less than Perth's core (Figure 49).

Housing: Perth GHG emissions are lower where there are more detached houses (Figure 50). This reflects the national pattern, which is contrary to the generally held belief that lower density living produces higher GHG emissions.

> Perth's core, with the highest GHG emissions per capita, has the lowest share of detached housing, at 46 percent. The inner ring, with the second highest GHG emissions per capita, has the second lowest share of detached housing, at 68 percent. The second ring, with the third highest GHG emissions per capita, has the second highest share of detached housing, at 90 percent. The outer area, with the lowest rate of GHG emissions, has the highest share of detached housing, at 92 percent.

Cars: Perth GHG emissions are lower where there are more cars (Figure 51). This also reflects the national pattern, which is contrary to the generally held belief that automobile based mobility produces higher GHG emissions.

> Perth's core, with the highest GHG emissions per capita, has the lowest share of households with cars, at 84 percent. The inner ring, with the second highest GHG emissions per capita, has the second lowest share of households with cars, at 90 percent. The second ring and outer area have the lowest GHG emissions per capita, and the highest share of households with cars, at 95 percent.

Income: The relationship between higher incomes and higher GHG emissions suggested by the Consumption Atlas authors is evident at the Proximity to Core level in Perth. The core area, with the highest GHG emissions per capita, has the highest median household income. Median incomes then decline toward the lowest in the outer area (Figure 52).

[30] The core area includes the Perth-Inner, Perth-Remainder, Subiaco and Vincent statistical local areas.

Population Density: There is a strong association between lower population density and higher GHG emissions per capita (Figure 53). This reflects the national pattern, which is contrary to the generally held belief that lower densities produces higher GHG emissions.

Water and Ecological Footprint: Virtually the same relationship exists with water usage and the ecological footprint as with GHG emissions in Perth. Water usage and the ecological footprint are the highest in the core area and decline toward the outer area (Table 18).

Table 18
Consumption Factors by Proximity to Core
Perth: Analysis Zones Annual Per Capita

	GHG Emissions (Tonnes)	Water Use (Litres)	Eco-Footprint (Hectares)
Core	24.07	880,000	8.24
Inner Ring	20.04	800,000	7.72
Second Ring	17.08	730,000	7.22
Outer	16.74	680,000	7.13
Total	18.38	750,000	7.42

Analysis by Demographic Characteristics

Similar relationships are evident from an analysis of GHG emissions based upon the demographic characteristics of detached housing, car availability and median household income.

Housing: There is an association between a greater share of detached housing and lower GHG emissions per capita (Figure 54). The highest GHG emissions per capita (24.07 tonnes annually) are in statistical subdivisions with the lowest share of detached housing (between 30 and 49 percent). The lowest GHG emissions per capita (16.83 tonnes annually) are in the statistical subdivisions with the second highest share of detached housing (80 to 89 percent).

Cars: There is an association between greater automobile availability share and lower GHG emissions per capita (Figure 55). The highest GHG emissions per capita (26.51 tonnes annually) are in statistical subdivisions with the lowest share of households with cars (less than 80 percent). The lowest GHG emissions per capita (17.45 tonnes annually) are in the statistical subdivisions with the highest household car availability (95 to 100 percent).

Income: the predicted relationship between higher median household incomes and greater GHG emissions per capita is somewhat evident in Perth (Figure 56). The highest GHG emissions per capita are in highest income category (between $1,400 and $1,499 weekly). The lowest GHG emissions per capita are in the second lowest income category ($1,000 to $1,099).

Population Density: There is a strong association between higher GHG emissions per capita and higher population density in Perth (Figure 57). This reflects the national pattern, which is contrary to the generally held belief that lower densities produces higher GHG emissions.

Water and Ecological Footprint: Again, generally the same relationship is evident in water use and eco-footprint. Water use and the eco-footprint tend generally to decrease where there is more detached housing, more car usage and lower median household incomes (Table 19).

Table 19
Consumption by Demographic Characteristics
Perth: Analysis Zones Annual Per Capita

	GHG Emissions (Tonnes)	Water Use (Litres)	Eco-Footprint (Hectares)
Detached Share of Housing			
30% - 49%	24.07	880,000	8.24
50% - 59%			
60% - 69%	19.31	770,000	7.52
70% - 79%	20.82	830,000	7.93
80% - 89%	16.83	710,000	7.13
90%-100%	17.08	720,000	7.23
Households with Autos			
80% - 84%	24.07	880,000	8.24
85% - 89%	19.36	770,000	7.52
90% - 94%	18.03	750,000	7.38
95%-100%	17.71	730,000	7.36
Weekly Median Household Income			
$900-$999	19.36	770,000	7.52
$1,000-$1,099	16.91	710,000	7.17
$1,100-$1,199	19.28	780,000	7.59
$1,400-$1,499	23.87	900,000	8.48
Population Density (Persons per Square Kilometer)			
Under 500	16.91	710,000	7.18
500-999	17.28	720,000	7.22
1,000-1,999	20.41	810,000	7.77
2,000-2,999			
3,000-3,999			
4000 & Over			
By Analysis Zone			

Conclusions

The analysis of the data provided in the Australian Conservation Foundation Consumption Atlas indicates that the patterns of GHG emissions per capita are strongly or generally inconsistent with the prevailing assumptions of urban consolidation policy in Perth (Table 20). To the contrary of the urban consolidation assumptions:

* Lower GHG emissions are associated with locations farther from the core.

* Lower GHG emissions are associated with more detached housing.

* Lower GHG emissions are associated with greater auto use.

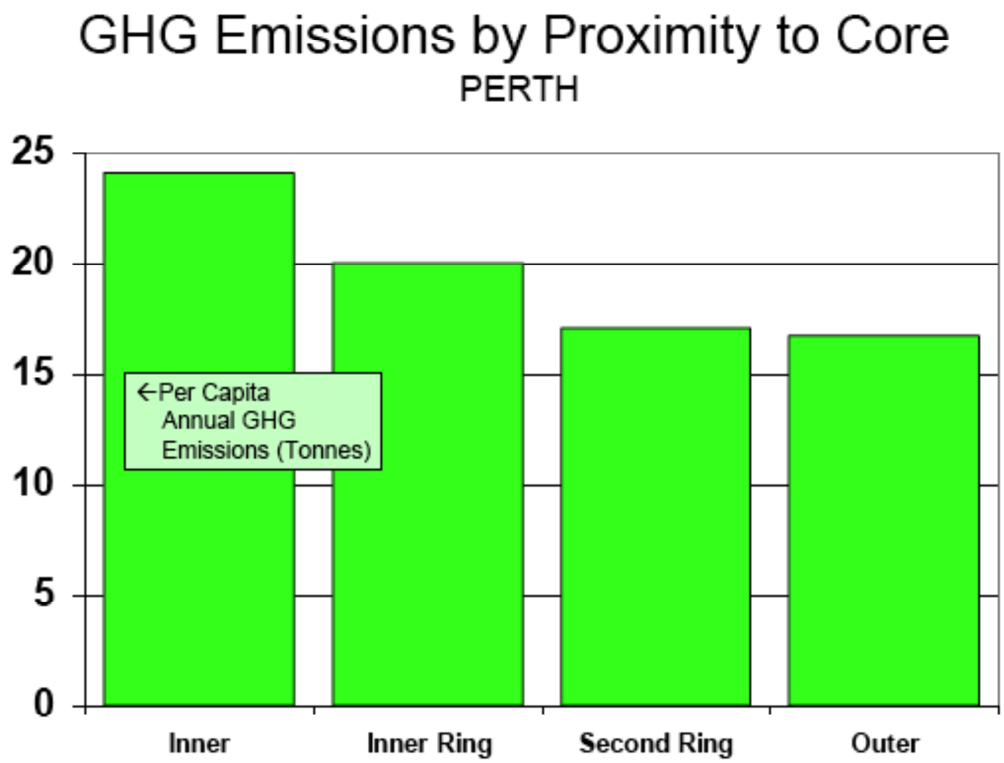
* Lower GHG emissions are associated with lower population density.

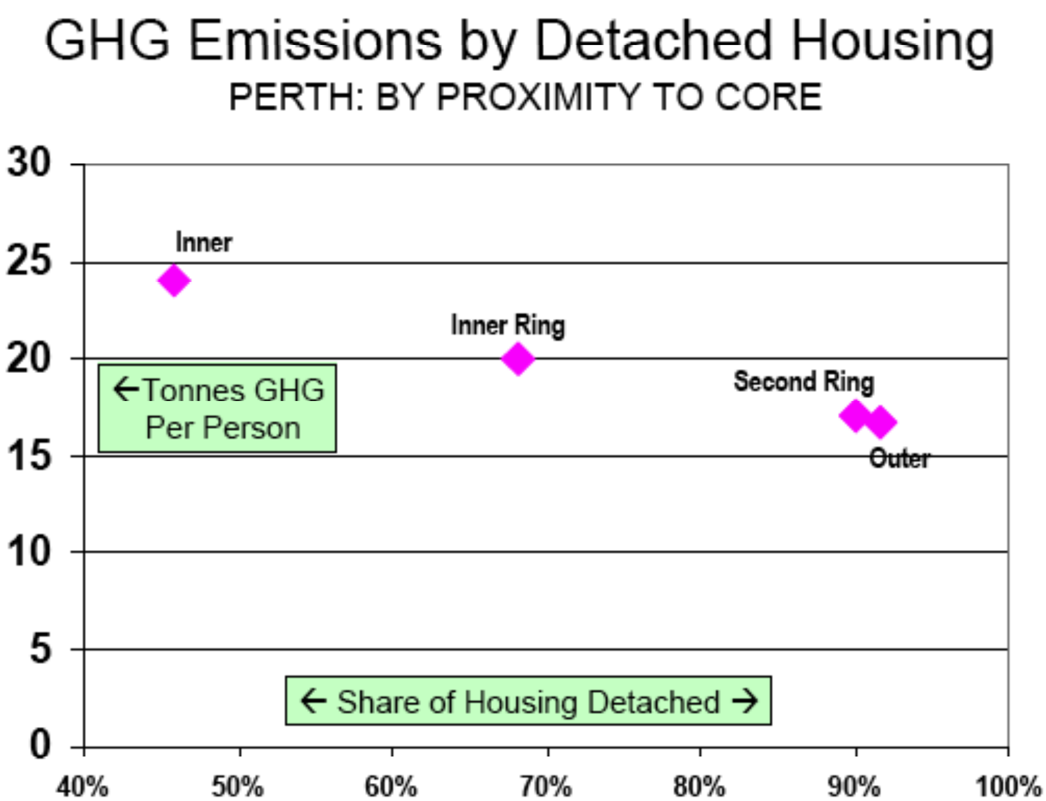
The assertion by the authors of Australian Conservation Foundation Consumption Atlas of an association between higher household incomes and higher GHG emissions per capita is generally supported.[31]

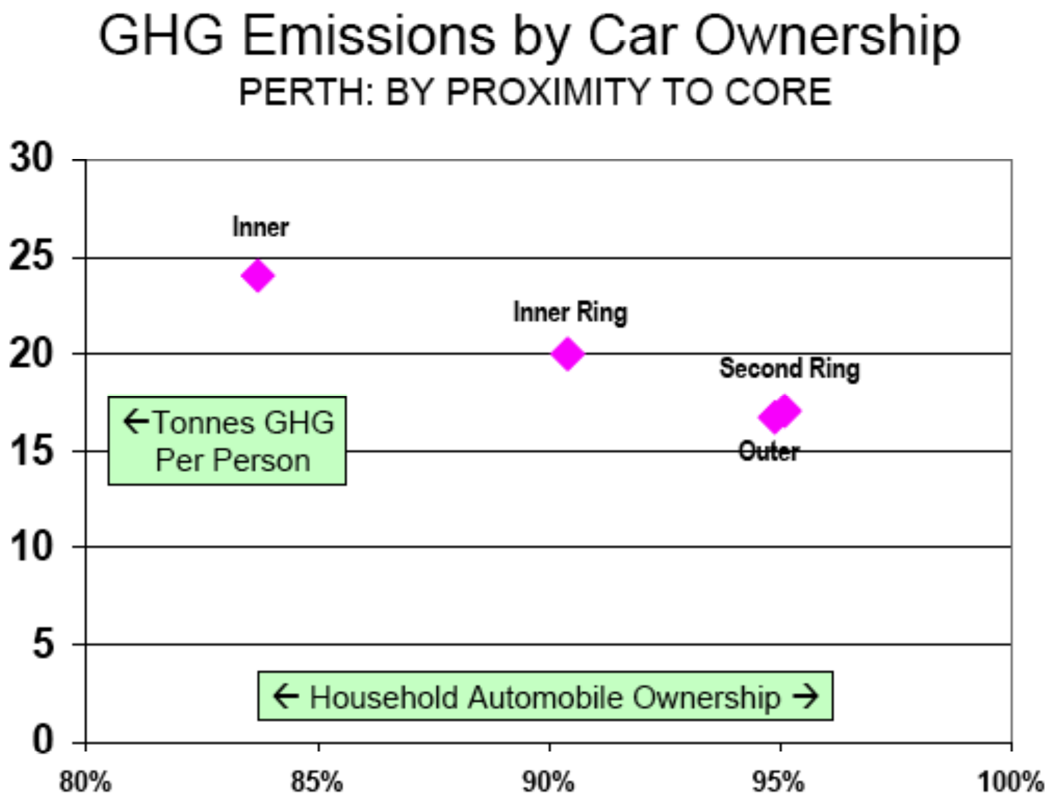
Table 20
Consistency with Urban Consolidation Planning Assumptions
Perth

Planning Assumption	Strong Consistency	General Consistency	No Relationship	General Inconsistency	Strong Inconsistency
Higher GHG Emissions Associated with Longer Distance from Core					●
Higher GHG Emissions Associated with Detached Housing				●	
Higher GHG Emissions Associated with More Auto Use					●
Higher GHG Emissions Associated with Lower Population Density					●
INSTANCES: Overall	0	0	0	1	3

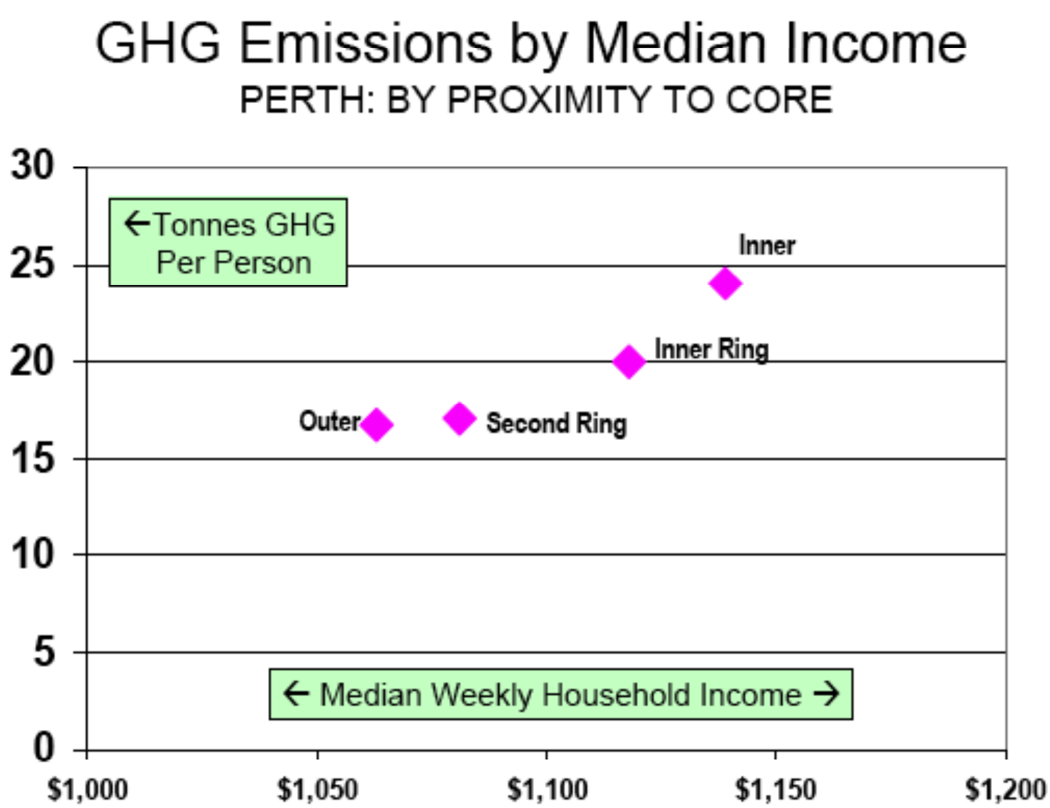
[31] Caution, however, is appropriate with respect to the income conclusion. A comparison by the authors of households with similar incomes in inner and outer Sydney found that per capita energy use was more in inner areas than outer areas (which suggests that location may be an important factor in consumption, independent of income). Per capita direct and indirect energy use in the inner areas was estimated at more than 75 percent higher than in the outer areas. See Manfred Lenzena, Christopher Deya, Barney Foran, "Analysis: Energy requirements of Sydney households," *Ecological Economics 49* (2004), 375-399, Table 6.


GHG Emissions by Proximity to Core
PERTH
25
20
15
10
5
0
←Per Capita Annual GHG Emissions (Tonnes)
Inner
Inner Ring
Second Ring
Outer

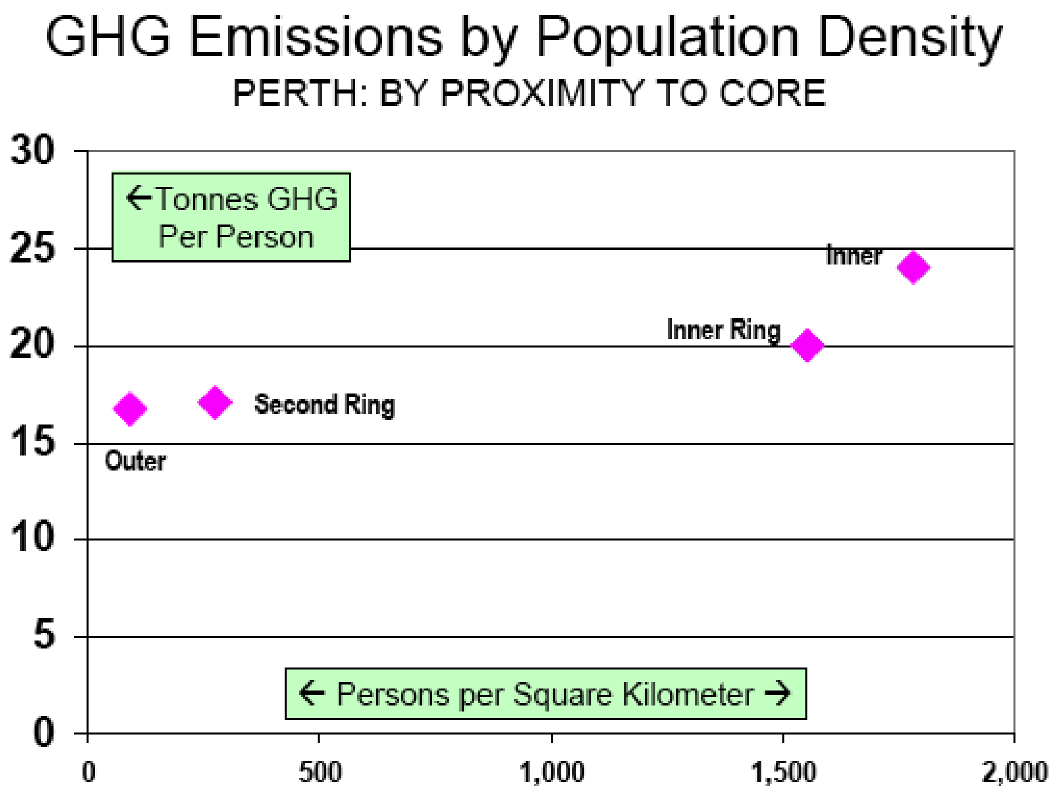

GHG Emissions by Detached Housing
PERTH: BY PROXIMITY TO CORE
30
25
20
15
10
5
0
Inner
Inner Ring
Second Ring
Outer
←Tonnes GHG Per Person
← Share of Housing Detached →
40%
50%
60%
70%
80%
90%
100%

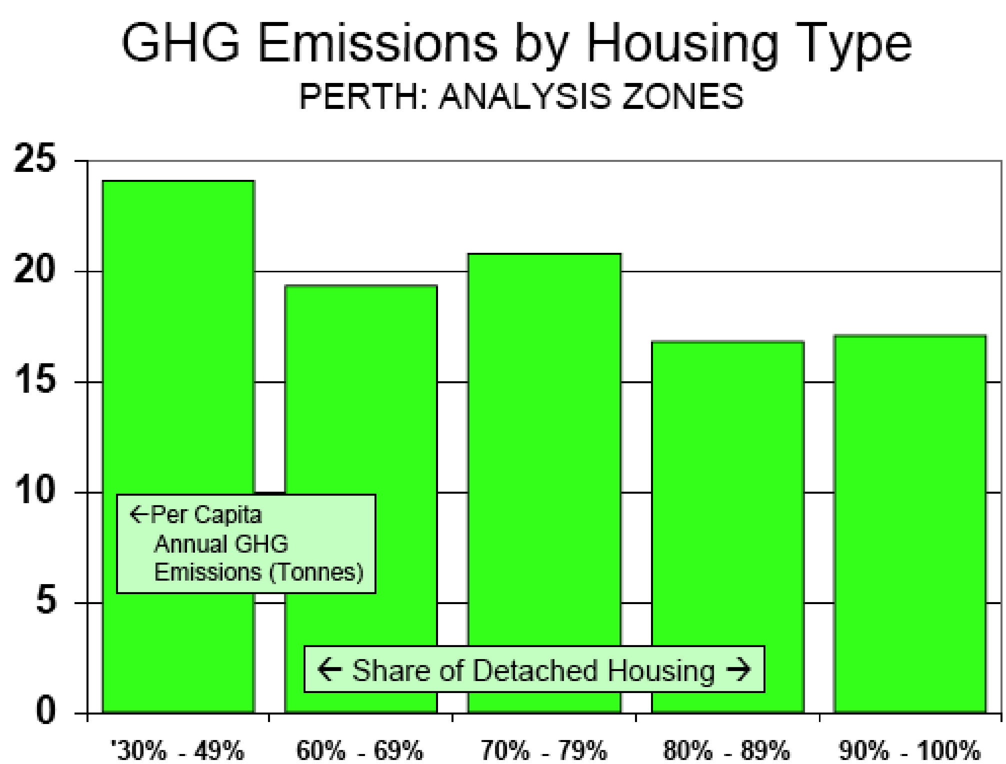


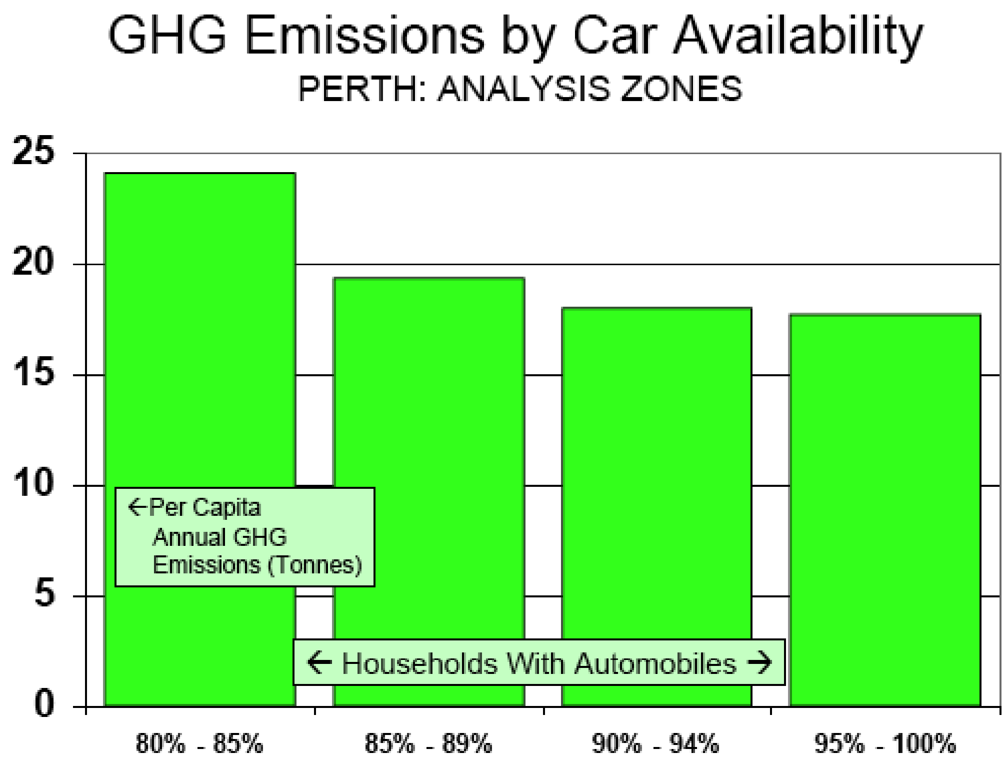
GHG Emissions by Car Ownership
PERTH: BY PROXIMITY TO CORE
30
25
20
15
10
5
0
Inner
Inner Ring
Second Ring
Outer
←Tonnes GHG Per Person
← Household Automobile Ownership →
80%
85%
90%
95%
100%

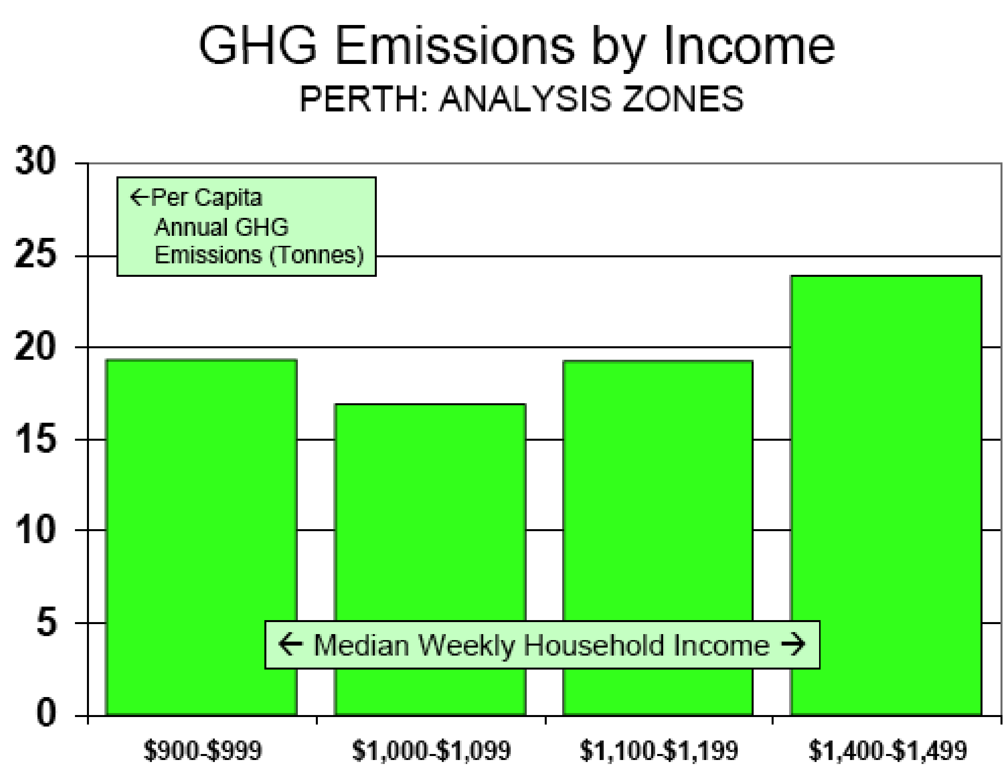


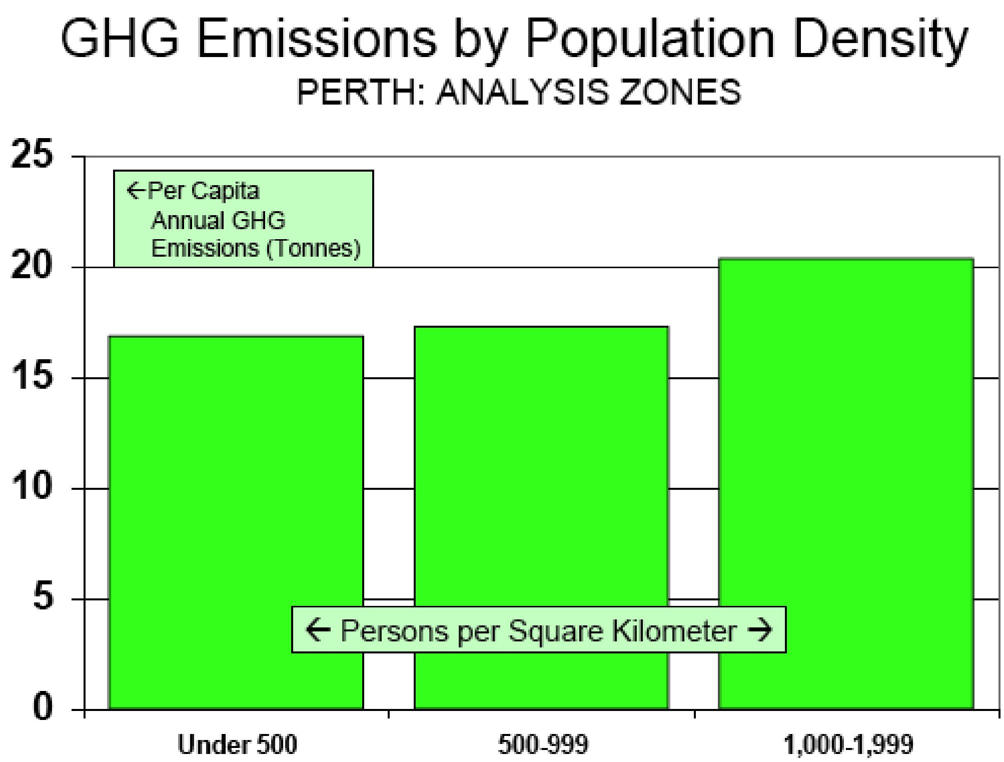
GHG Emissions by Median Income
PERTH: BY PROXIMITY TO CORE
30
25
20
15
10
5
0
←Tonnes GHG Per Person
Inner
Inner Ring
Outer
Second Ring
← Median Weekly Household Income →
$1,000
$1,050
$1,100
$1,150
$1,200


GHG Emissions by Population Density
PERTH: BY PROXIMITY TO CORE
←Tonnes GHG Per Person
← Persons per Square Kilometer →
Inner
Inner Ring
Second Ring
Outer
30
25
20
15
10
5
0
0
500
1,000
1,500
2,000


GHG Emissions by Housing Type
PERTH: ANALYSIS ZONES
←Per Capita Annual GHG Emissions (Tonnes)
← Share of Detached Housing →
25
20
15
10
5
0
'30% - 49%
60% - 69%
70% - 79%
80% - 89%
90% - 100%


GHG Emissions by Car Availability
PERTH: ANALYSIS ZONES
25
20
15
10
5
0
←Per Capita Annual GHG Emissions (Tonnes)
← Households With Automobiles →
80% - 85%
85% - 89%
90% - 94%
95% - 100%


GHG Emissions by Income
PERTH: ANALYSIS ZONES
30
25
20
15
10
5
0
←Per Capita Annual GHG Emissions (Tonnes)
← Median Weekly Household Income →
$900-$999
$1,000-$1,099
$1,100-$1,199
$1,400-$1,499


GHG Emissions by Population Density
PERTH: ANALYSIS ZONES
25
20
15
10
5
0
←Per Capita Annual GHG Emissions (Tonnes)
← Persons per Square Kilometer →
Under 500
500-999
1,000-1,999

HOBART

Greenhouse gas emissions for Hobart are by analysis zone based upon two geographical categories: core,[32] and ring.

Analysis by Proximity to Core

Greenhouse gas emissions per capita area higher toward the core and are lower away from the core (Figure 58). This is consistent with the national pattern and contrary to the assumption that GHG emissions are lowest in the core. The highest greenhouse gas emissions are produced in the core area of Hobart, at 18.53 annual tonnes per capita. By comparison, ring areas produce 14.03 annual GHG tonnes per capita 24 percent less than Hobart's core.

Housing: Hobart GHG emissions are lower where there are more detached houses (Figure 59). This reflects the national pattern, which is contrary to the generally held belief that lower density living produces higher GHG emissions.

> Hobart's core, with higher GHG emissions per capita, has a lower share of detached housing, at 71 percent. The ring, lower GHG emissions per capita, has a higher share of detached housing, at 88 percent.

Cars: Hobart GHG emissions are lower where there are more cars (Figure 60). This also reflects the national pattern, which is contrary to the generally held belief that automobile based mobility produces higher GHG emissions.

> Hobart's core, with higher GHG emissions per capita, as a lower share of households with cars, at 87 percent. The ring, with lower GHG emissions per capita, has a share of households with cars, at 91 percent.

Income: The relationship between higher incomes and higher GHG emissions suggested by the Consumption Atlas authors is evident in Hobart. The core area, with higher GHG emissions per capita, has higher median household income (Figure 61). The ring, with lower GHG emissions per capita, has lower median household income.

Population Density: There is a strong association between lower population density and higher GHG emissions per capita (Figure 62). This reflects the national pattern, which is contrary to the generally held belief that lower densities produces higher GHG emissions.

Water and Ecological Footprint: Virtually the same relationship exists with water usage and the ecological footprint as with GHG emissions in Hobart. Water usage and the ecological footprint are the highest in the core area and decline toward the outer area (Table 21).

[32]The core includes the Hobart-Inner and Hobart-Remainder statistical local areas.

Table 21
Consumption Factors by Proximity to Core
Hobart: Analysis Zones Annual Per Capita

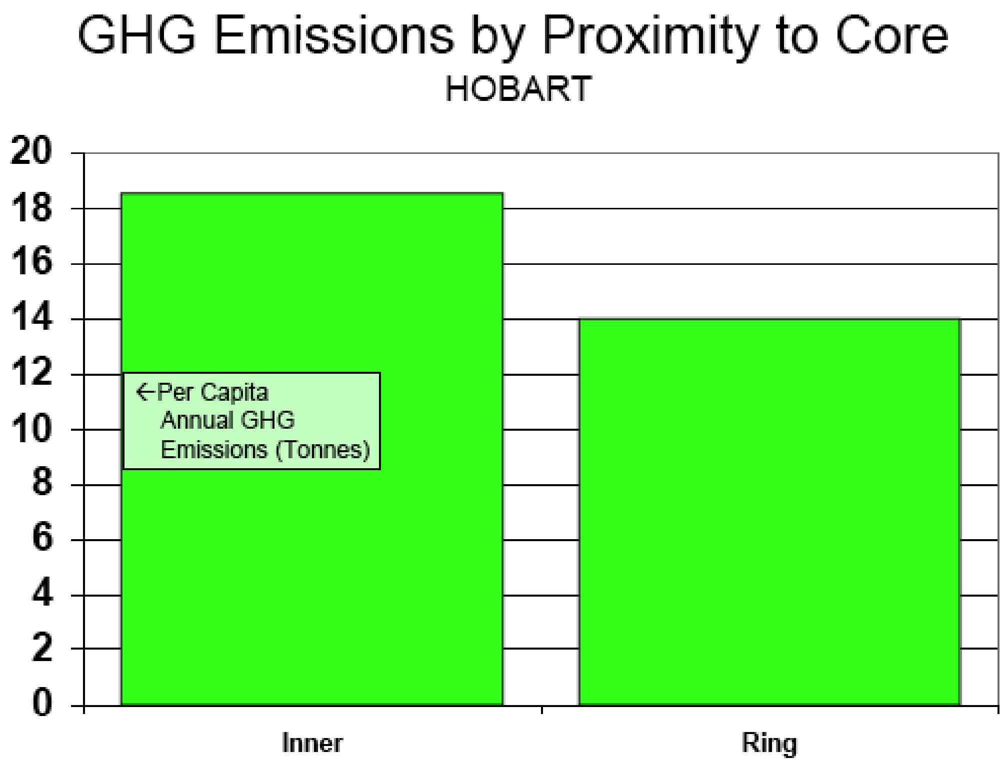
	GHG Emissions (Tonnes)	Water Use (Litres)	Eco-Footprint (Hectares)
Core	18.53	790,000	6.30
Ring	14.03	600,000	5.47

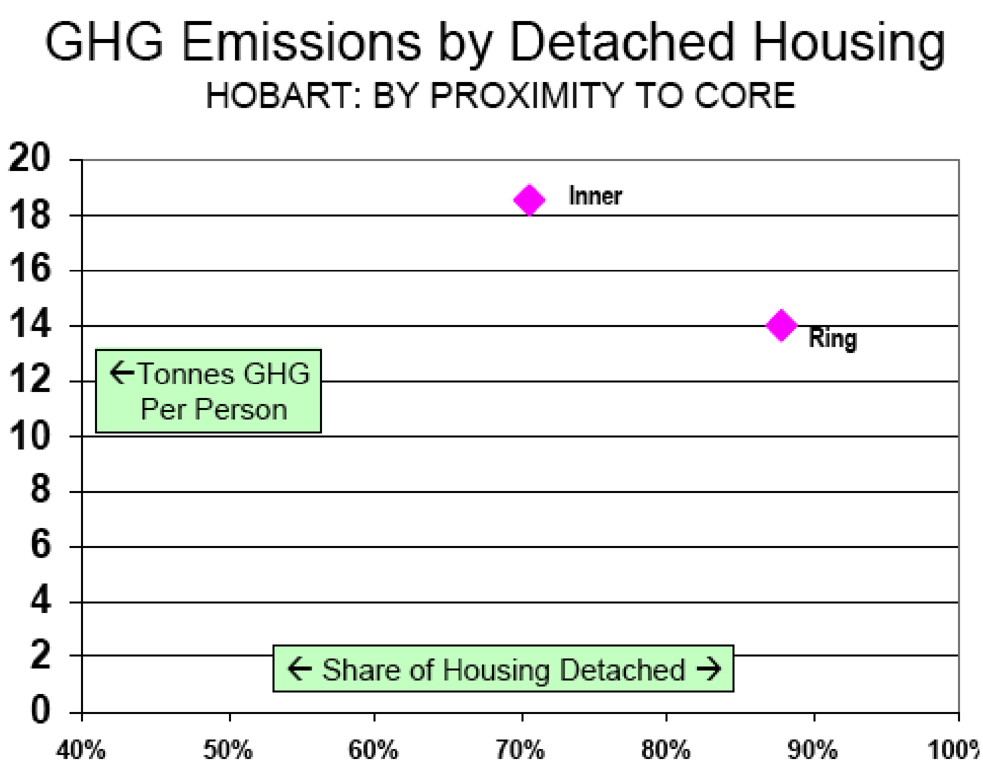
Conclusions

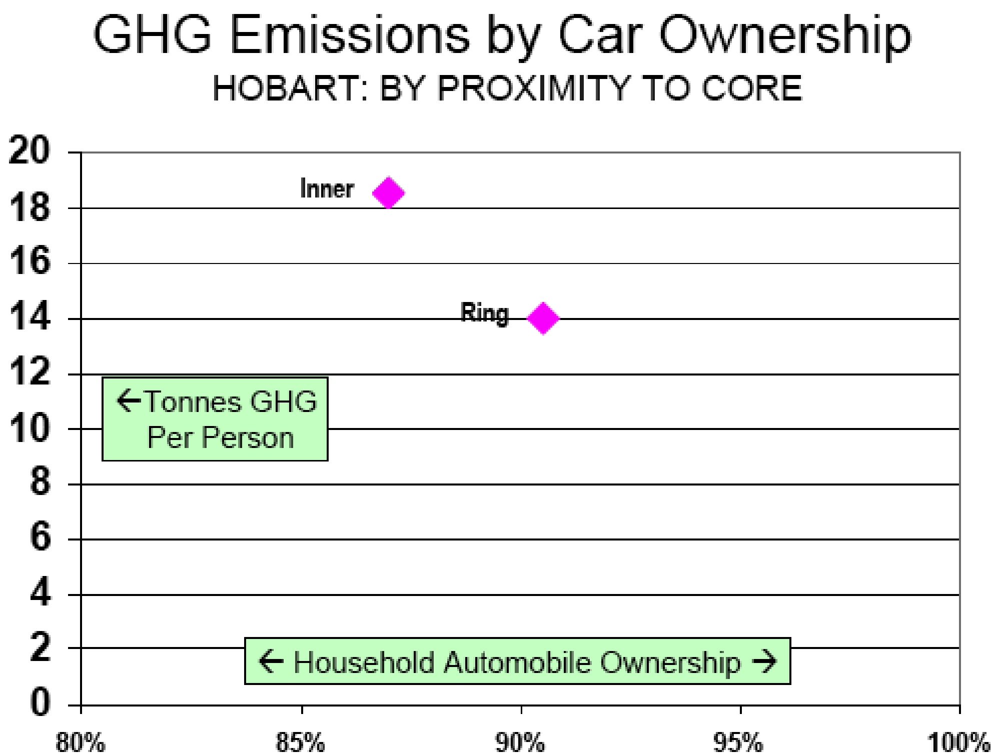
The analysis of the data provided in the Australian Conservation Foundation Consumption Atlas indicates that the patterns of GHG emissions per capita are strongly or generally inconsistent with the prevailing assumptions of urban consolidation policy in Hobart (Table $$$). Lower GHG emissions are associated with locations outside the core, which also have more detached housing, more automobile use and lower population densities.

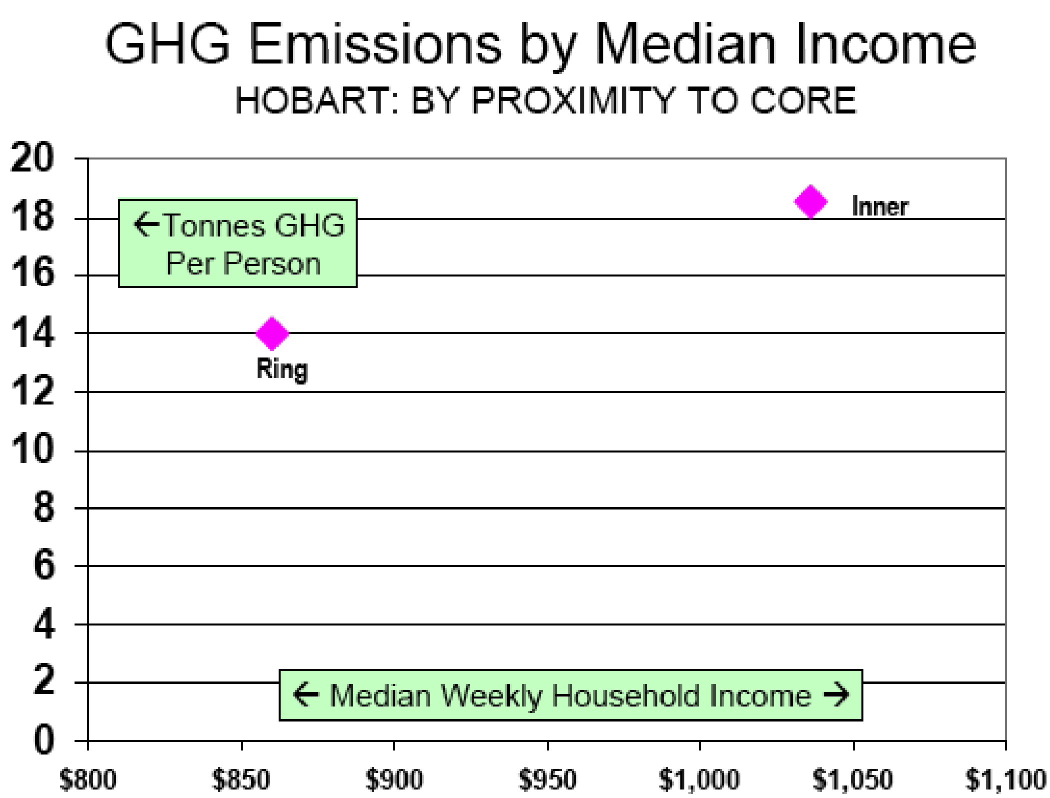
The assertion by the authors of Australian Conservation Foundation Consumption Atlas of an association between higher household incomes and higher GHG emissions per capita is generally supported. [33]

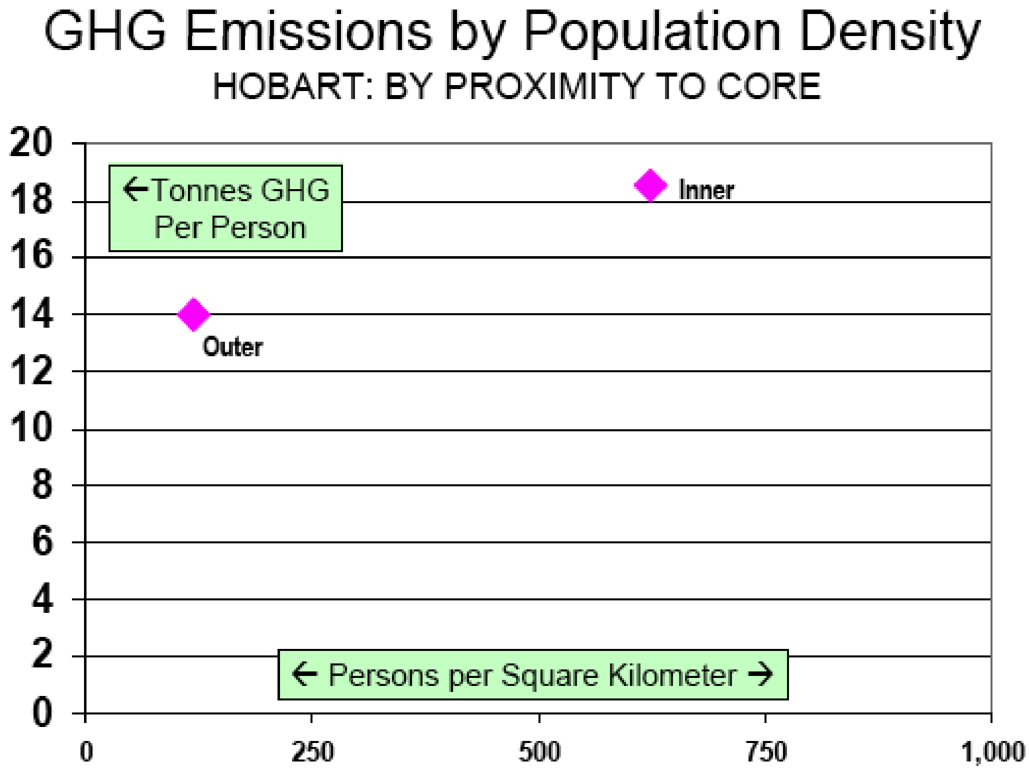
[33] Caution, however, is appropriate with respect to the income conclusion. A comparison by the authors of households with similar incomes in inner and outer Sydney found that per capita energy use was more in inner areas than outer areas (which suggests that location may be an important factor in consumption, independent of income). Per capita direct and indirect energy use in the inner areas was estimated at more than 75 percent higher than in the outer areas. See Manfred Lenzena, Christopher Deya, Barney Foran, "Analysis: Energy requirements of Sydney households," *Ecological Economics 49* (2004), 375-399, Table 6.


GHG Emissions by Proximity to Core
HOBART
20
18
16
14
12
10
8
6
4
2
0
←Per Capita Annual GHG Emissions (Tonnes)
Inner
Ring


GHG Emissions by Detached Housing
HOBART: BY PROXIMITY TO CORE
20
18
16
14
12
10
8
6
4
2
0
Inner
Ring
←Tonnes GHG Per Person
← Share of Housing Detached →
40%
50%
60%
70%
80%
90%
100%


GHG Emissions by Car Ownership
HOBART: BY PROXIMITY TO CORE
20
18
16
14
12
10
8
6
4
2
0
Inner
Ring
←Tonnes GHG Per Person
← Household Automobile Ownership →
80%
85%
90%
95%
100%


GHG Emissions by Median Income
HOBART: BY PROXIMITY TO CORE
20
18
16
14
12
10
8
6
4
2
0
Inner
Ring
←Tonnes GHG Per Person
← Median Weekly Household Income →
$800
$850
$900
$950
$1,000
$1,050
$1,100


GHG Emissions by Population Density
HOBART: BY PROXIMITY TO CORE
←Tonnes GHG Per Person
← Persons per Square Kilometer →
Inner
Outer
20
18
16
14
12
10
8
6
4
2
0
0
250
500
750
1,000

Greenhouse gas emissions for Darwin are by analysis zone based upon two geographical categories: core,[34] and ring.

Analysis by Proximity to Core

Greenhouse gas emissions per capita area higher toward the core and are lower away from the core (Figure 63). This is consistent with the national pattern and contrary to the assumption that GHG emissions are lowest in the core. The highest greenhouse gas emissions are produced in the core area of Darwin, at 25.31 annual tonnes per capita. By comparison, ring areas produce 19.32 annual GHG tonnes per capita 24 percent less than Darwin's core.

Housing: Darwin GHG emissions are lower where there are more detached houses (Figure 64). This reflects the national pattern, which is contrary to the generally held belief that lower density living produces higher GHG emissions.

> Darwin's core, with higher GHG emissions per capita, has a lower share of detached housing, at 28 percent. The ring, lower GHG emissions per capita, has a higher share of detached housing, at 76 percent.

Cars: Darwin GHG emissions are lower where there are more cars (Figure 65). This also reflects the national pattern, which is contrary to the generally held belief that automobile based mobility produces higher GHG emissions.

> Darwin's core, with higher GHG emissions per capita, as a lower share of households with cars, at 88 percent. The ring, with lower GHG emissions per capita, has a share of households with cars, at 92 percent.

Income: The relationship between higher incomes and higher GHG emissions suggested by the Consumption Atlas authors is evident at the geographical level in Darwin. The core area, with higher GHG emissions per capita, has higher median household income (Figure 66). The ring, with lower GHG emissions per capita, has lower median household income.

Population Density: There is a strong association between lower population density and higher GHG emissions per capita (Figure 67). This reflects the national pattern, which is contrary to the generally held belief that lower densities produces higher GHG emissions.

Water and Ecological Footprint: Virtually the same relationship exists with water usage and the ecological footprint as with GHG emissions in Darwin. Water usage and the ecological footprint are the highest in the core area and decline toward the outer area (Table 22).

[34] The core includes the City-Inner, Fannie Bay, Larrakeyah, Parap, Stuart Park and The Gardens statistical local areas.

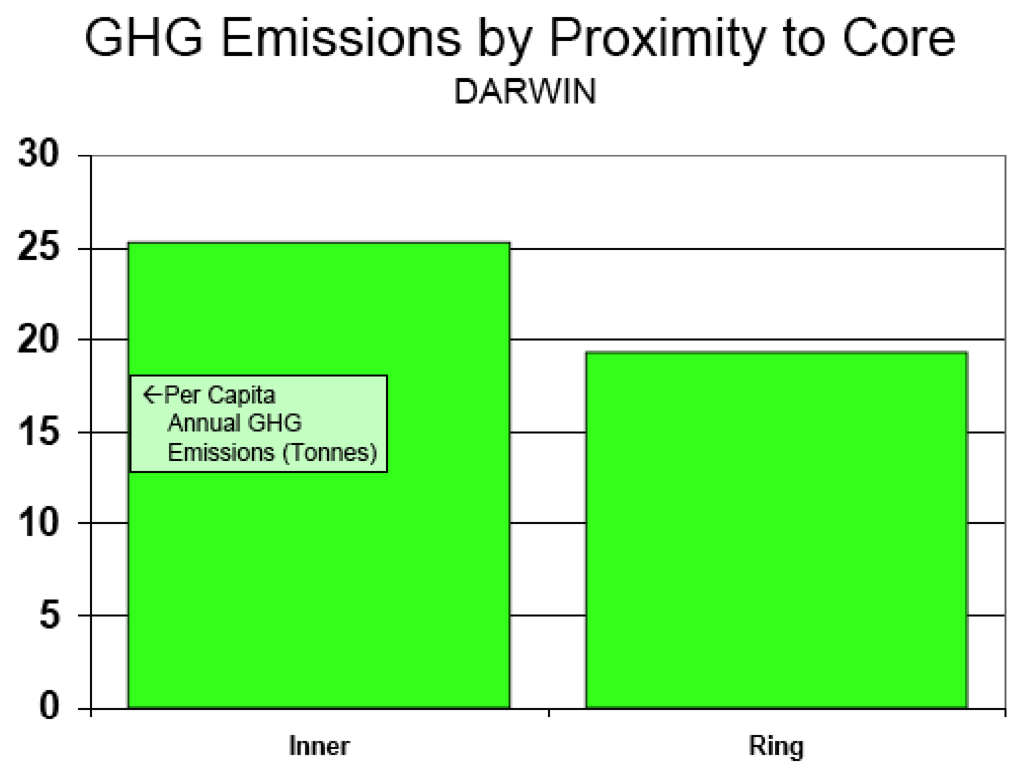
Table 22 Consumption Factors by Proximity to Core Darwin: Analysis Zones Annual Per Capita			
	GHG Emissions (Tonnes)	Water Use (Litres)	Eco-Footprint (Hectares)
Core	25.31	820,000	7.74
Ring	19.32	710,000	6.90

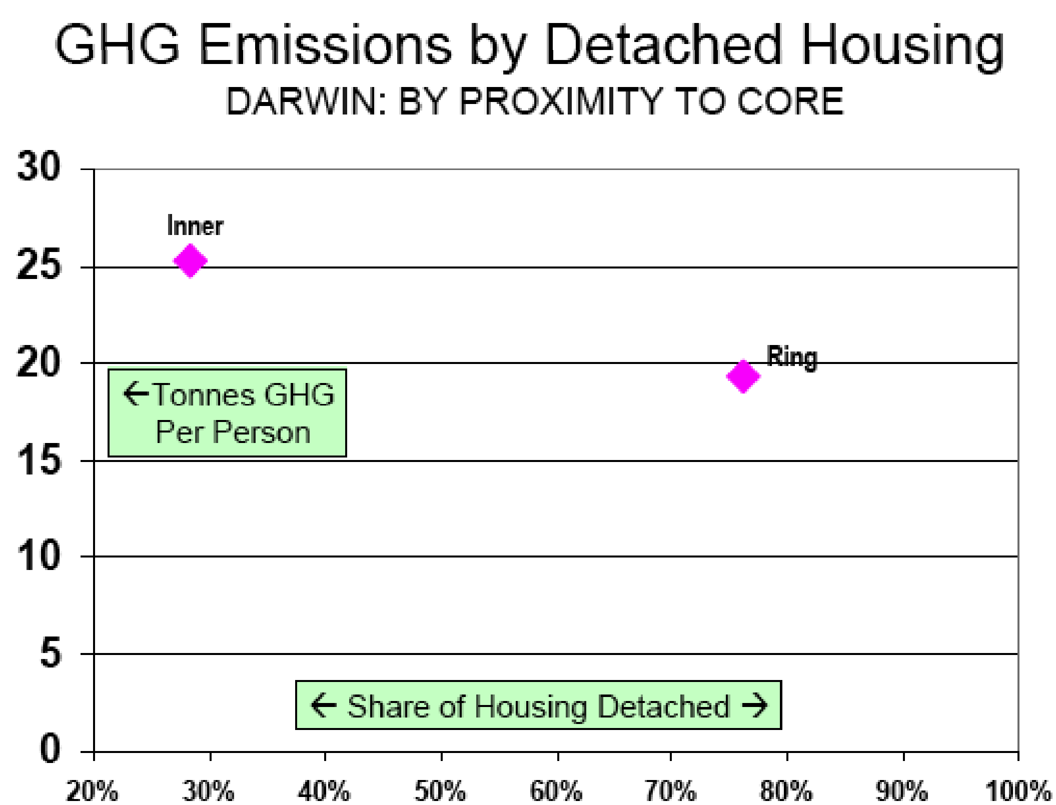
Conclusions

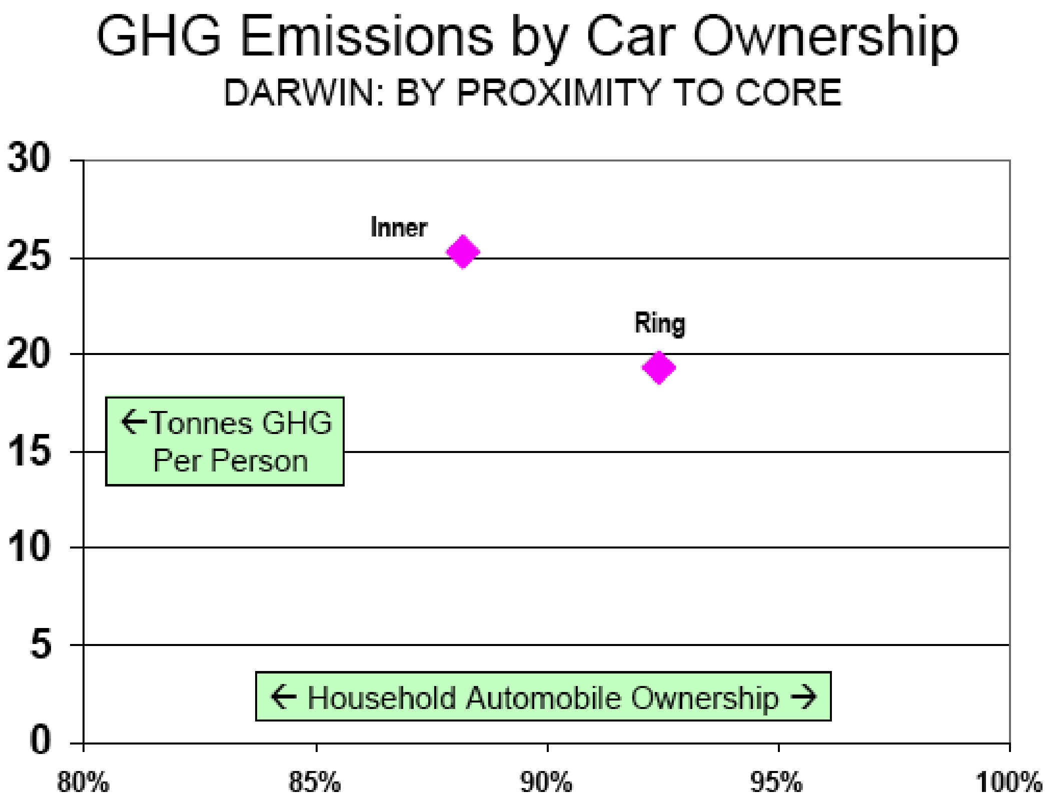
The analysis of the data provided in the Australian Conservation Foundation Consumption Atlas indicates that the patterns of GHG emissions per capita are strongly or generally inconsistent with the prevailing assumptions of urban consolidation policy in Darwin (Table $$$). Lower GHG emissions are associated with locations outside the core, which also have more detached housing, more automobile use and lower population densities.

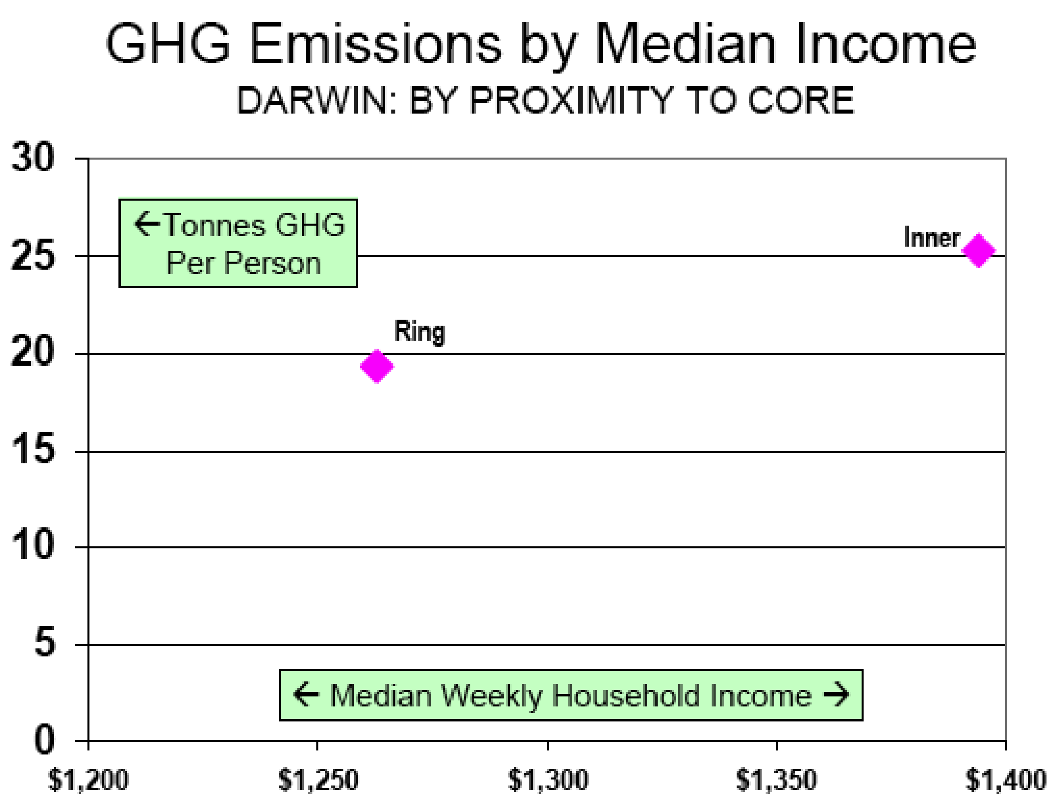
The assertion by the authors of Australian Conservation Foundation Consumption Atlas of an association between higher household incomes and higher GHG emissions per capita is generally supported.[35]

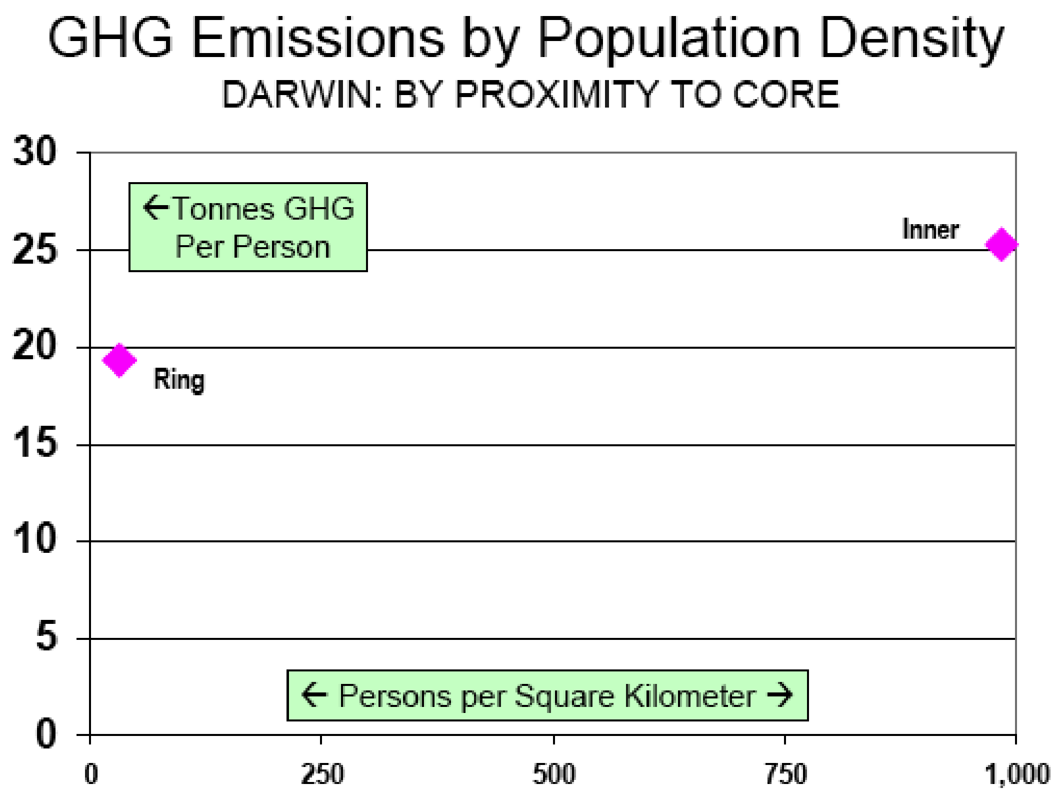
[35]Caution, however, is appropriate with respect to the income conclusion. A comparison by the authors of households with similar incomes in inner and outer Sydney found that per capita energy use was more in inner areas than outer areas (which suggests that location may be an important factor in consumption, independent of income). Per capita direct and indirect energy use in the inner areas was estimated at more than 75 percent higher than in the outer areas. See Manfred Lenzena, Christopher Deya, Barney Foran, "Analysis: Energy requirements of Sydney households," *Ecological Economics 49* (2004), 375-399, Table 6.


GHG Emissions by Proximity to Core
DARWIN
30
25
20
15
10
5
0
←Per Capita Annual GHG Emissions (Tonnes)
Inner
Ring


GHG Emissions by Detached Housing
DARWIN: BY PROXIMITY TO CORE
30
25
20
15
10
5
0
Inner
Ring
←Tonnes GHG Per Person
← Share of Housing Detached →
20%
30%
40%
50%
60%
70%
80%
90%
100%


GHG Emissions by Car Ownership
DARWIN: BY PROXIMITY TO CORE
30
25
20
15
10
5
0
80%
85%
90%
95%
100%
Inner
Ring
←Tonnes GHG Per Person
← Household Automobile Ownership →


GHG Emissions by Median Income
DARWIN: BY PROXIMITY TO CORE
30
25
20
15
10
5
0
$1,200
$1,250
$1,300
$1,350
$1,400
Inner
Ring
←Tonnes GHG Per Person
← Median Weekly Household Income →


GHG Emissions by Population Density
DARWIN: BY PROXIMITY TO CORE
←Tonnes GHG Per Person
Inner
Ring
← Persons per Square Kilometer →
30
25
20
15
10
5
0
0
250
500
750
1,000

CANBERRA

Greenhouse gas emissions for Canberra are by analysis zone based upon two geographical categories: core,[36] and ring

Analysis by Proximity to Core

Greenhouse gas emissions per capita area higher toward the core and are lower away from the core (Figure 68). This is consistent with the national pattern and contrary to the assumption that GHG emissions are lowest in the core. The highest greenhouse gas emissions are produced in the core area of Canberra, at 26.62 annual tonnes per capita. By comparison, ring areas produce 20.80 annual GHG tonnes per capita 22 percent less than Canberra's core.

Housing: Canberra GHG emissions are lower where there are more detached houses (Figure 69). This reflects the national pattern, which is contrary to the generally held belief that lower density living produces higher GHG emissions.

> Canberra's core, with higher GHG emissions per capita, has a lower share of detached housing, at 58 percent. The ring, lower GHG emissions per capita, has a higher share of detached housing, at 82 percent.

Cars: Canberra GHG emissions are lower where there are more cars (Figure 70). This also reflects the national pattern, which is contrary to the generally held belief that automobile based mobility produces higher GHG emissions.

> Canberra's core, with higher GHG emissions per capita, as a lower share of households with cars, at 87 percent. The ring, with lower GHG emissions per capita, has a share of households with cars, at 95 percent.

Income: The relationship between higher incomes and higher GHG emissions suggested by the Consumption Atlas authors is not evident at the Proximity to Core level in Canberra (Figure 71). The core area, with higher GHG emissions per capita, has lower median household income. The ring, with lower GHG emissions per capita, has higher median household income.

Population Density: There is a strong association between lower population density and higher GHG emissions per capita (Figure 72). This reflects the national pattern, which is contrary to the generally held belief that lower densities produces higher GHG emissions.

Water and Ecological Footprint: Virtually the same relationship exists with water usage and the ecological footprint as with GHG emissions in Canberra. Water usage and the ecological footprint are the highest in the core area and decline toward the outer area (Table 23).

[36]The core includes the North Canberra (excluding the Kowen and Majura statistical local areas) and South Canberra statistical subdivisions (excluding the Balconnen-Balance statistical subdivision).

Table 23
Consumption Factors by Proximity to Core
Canberra: Analysis Zones Annual Per Capita

	GHG Emissions (Tonnes)	Water Use (Litres)	Eco-Footprint (Hectares)
Core	26.80	920,000	7.63
Ring	20.80	810,000	6.61

Conclusions

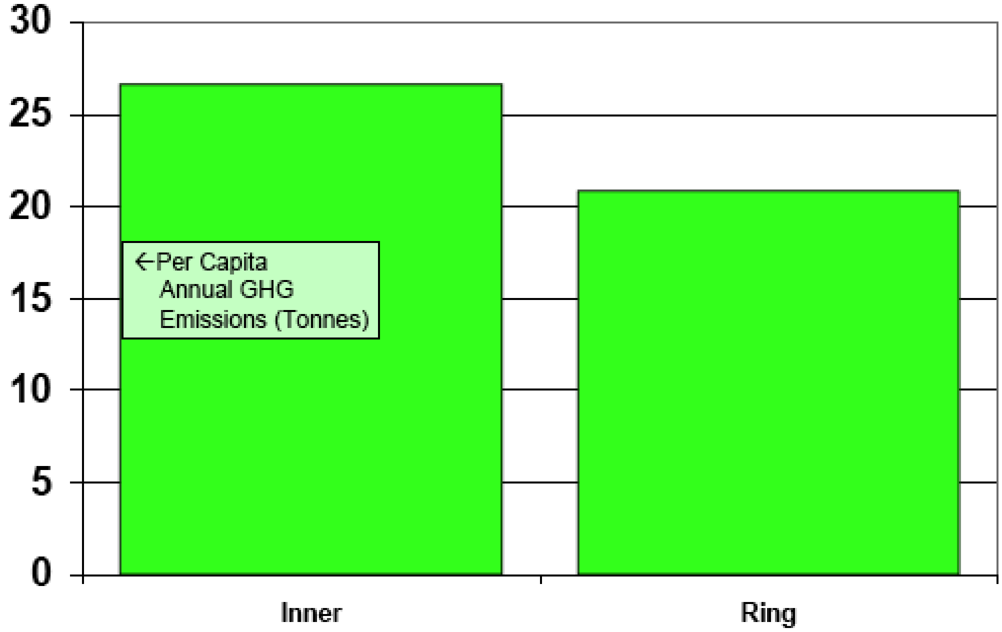
The analysis of the data provided in the Australian Conservation Foundation Consumption Atlas indicates that the patterns of GHG emissions per capita are strongly or generally inconsistent with the prevailing assumptions of urban consolidation policy in Canberra (Table $$$). Lower GHG emissions are associated with locations outside the core, which also have more detached housing and more automobile use. There is an anomaly in the population density data in Canberra, which is explained by the unique situation of the core area including substantial rural territory..

The assertion by the authors of Australian Conservation Foundation Consumption Atlas of an association between higher household incomes and higher GHG emissions per capita is generally supported.[37]

[37]Caution, however, is appropriate with respect to the income conclusion. A comparison by the authors of households with similar incomes in inner and outer Sydney found that per capita energy use was more in inner areas than outer areas (which suggests that location may be an important factor in consumption, independent of income). Per capita direct and indirect energy use in the inner areas was estimated at more than 75 percent higher than in the outer areas. See Manfred Lenzena, Christopher Deya, Barney Foran, "Analysis: Energy requirements of Sydney households," *Ecological Economics 49* (2004), 375-399, Table 6.

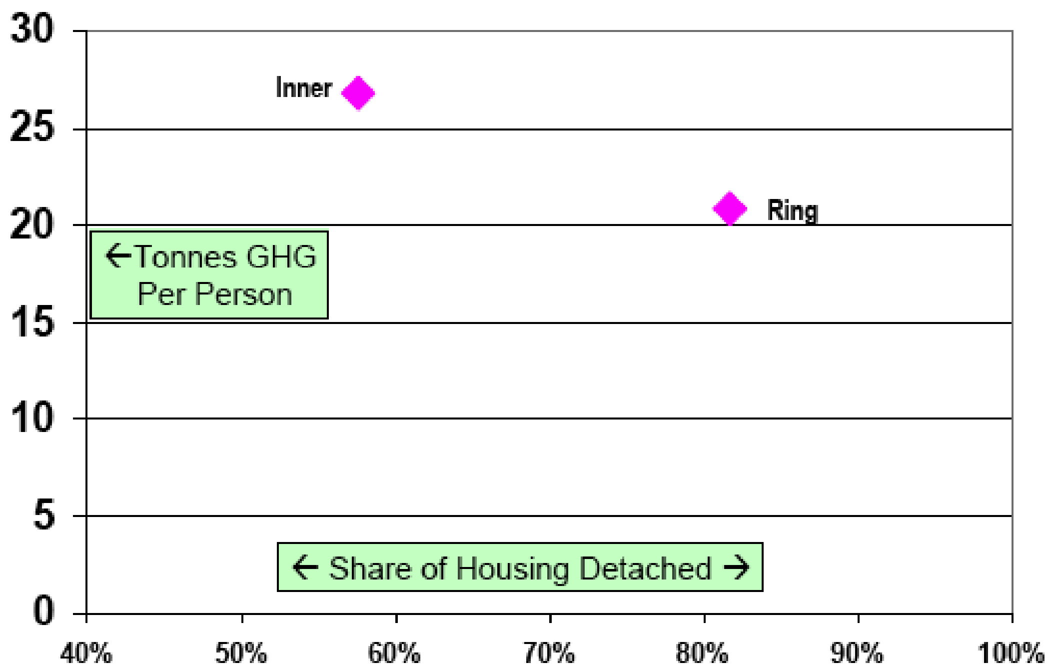
GHG Emissions by Proximity to Core

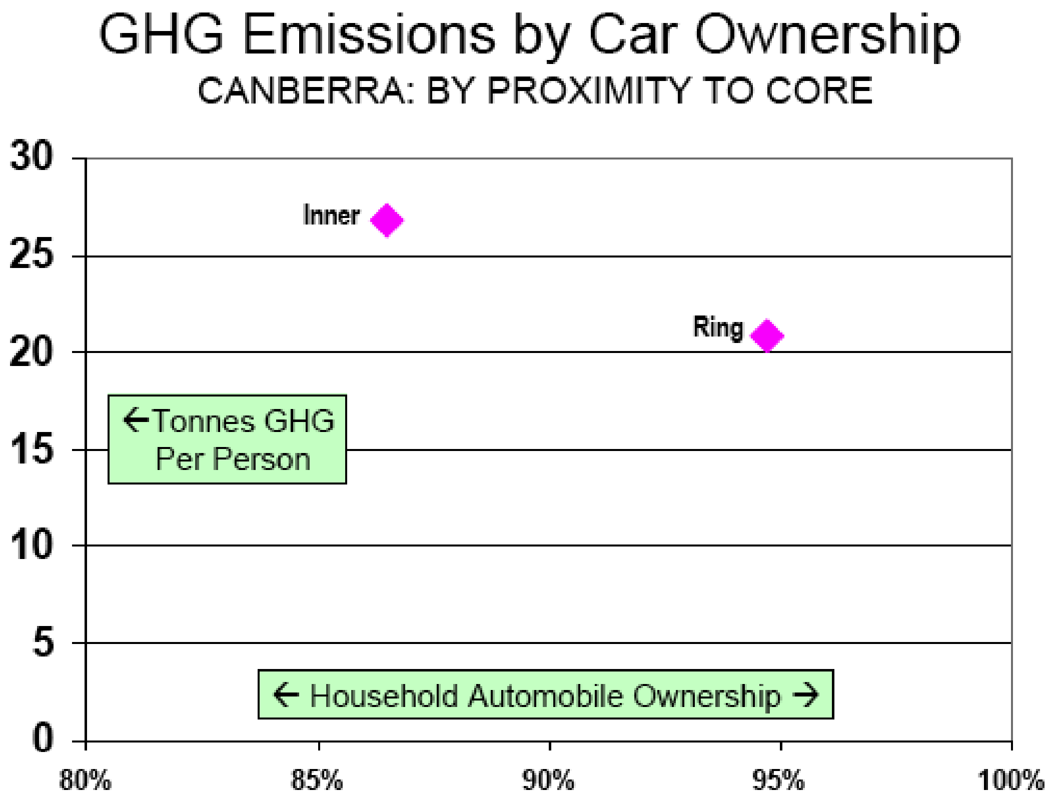
CANBERRA

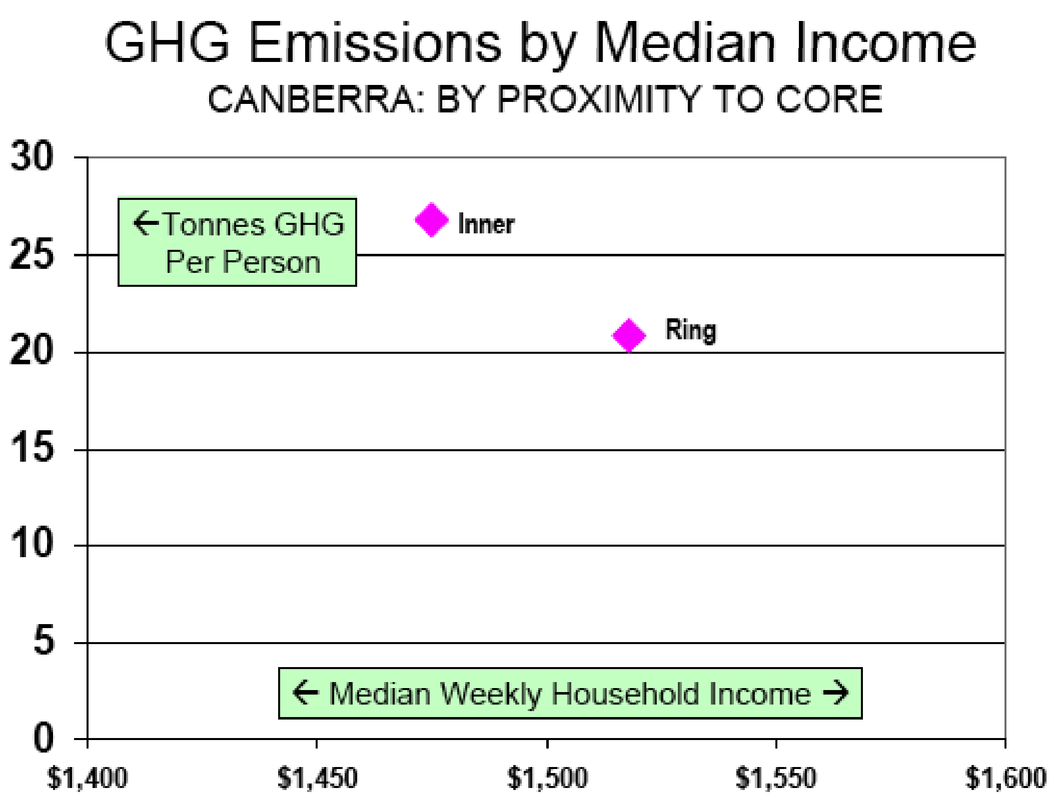


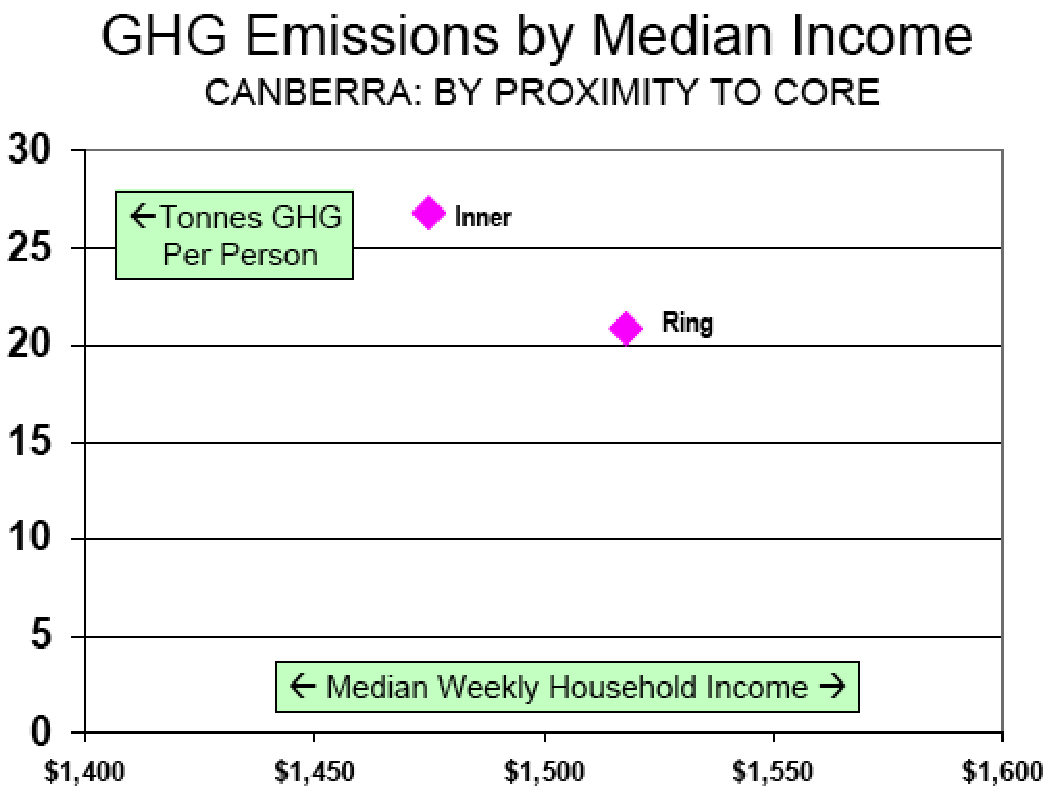
GHG Emissions by Detached Housing

CANBERRA: BY PROXIMITY TO CORE




GHG Emissions by Car Ownership
CANBERRA: BY PROXIMITY TO CORE
30
25
20
15
10
5
0
Inner
Ring
←Tonnes GHG Per Person
← Household Automobile Ownership →
80%
85%
90%
95%
100%


GHG Emissions by Median Income
CANBERRA: BY PROXIMITY TO CORE
30
25
20
15
10
5
0
←Tonnes GHG Per Person
Inner
Ring
← Median Weekly Household Income →
$1,400
$1,450
$1,500
$1,550
$1,600



GHG Emissions by Median Income
CANBERRA: BY PROXIMITY TO CORE
30
25
20
15
10
5
0
←Tonnes GHG Per Person
Inner
Ring
← Median Weekly Household Income →
$1,400
$1,450
$1,500
$1,550
$1,600

Appendix A - METHODS

The *Australian Conservation Foundation Consumption Atlas* provides estimates for GHG emissions, water use and eco-footprint per capita for the nation's statistical local areas. This report accumulates the data in "analysis zones" and develops larger area per capita estimates, using 2004 population estimates from the Australian Bureau of Statistics (ABS).

The analysis is produced for the eight capital cities, which are the corresponding statistical divisions as defined by ABS. Within each capital city, geographical analysis zones are defined based upon their proximity to the urban core. In Sydney, Melbourne and Brisbane, the analysis zones are defined by ABS statistical subdivisions. The inner statistical subdivision corresponds to "Inner," while the statistical subdivisions bordering on the inner statistical subdivision are designated as "inner ring." The "second ring" includes areas that are principally within the urban footprint, but outside the inner ring. The "outer" areas are principally outside the urban footprint.

In Adelaide, Perth, Hobart, Darwin and Canberra, where there are fewer statistical subdivisions, the analysis zones are defined by ABS statistical local areas. An index is provided for all statistical local areas in the capital cities (Appendix B), which indicates their corresponding statistical subdivision and analysis zone.

Data from the 2006 census is used in developing a detached housing share and a household automobile availability share in each analysis zone. Median household income is also taken from the 2006 census and estimated by a population weighted averaging of the statistical subdivision or statistical local area data. Population and population density is based upon 2004 ABS estimates.

Appendix B - INDEX OF STATISTICAL LOCAL AREAS

Capital City	Statistical Local Area	Proximity to Core (Note)	Statistical Subdivision
Adelaide	Adelaide	1	Eastern Adelaide
Adelaide	Adelaide Hills - Central	4	Eastern Adelaide
Adelaide	Adelaide Hills - Ranges	4	Eastern Adelaide
Adelaide	Burnside - North-East	2	Eastern Adelaide
Adelaide	Burnside - South-West	2	Eastern Adelaide
Adelaide	Campbelltown - East	3	Eastern Adelaide
Adelaide	Campbelltown - West	2	Eastern Adelaide
Adelaide	Charles Sturt - Coastal	2	Western Adelaide
Adelaide	Charles Sturt - Inner East	2	Western Adelaide
Adelaide	Charles Sturt - Inner West	2	Western Adelaide
Adelaide	Charles Sturt - North-East	2	Western Adelaide
Adelaide	Gawler	4	Northern Adelaide
Adelaide	Holdfast Bay - North	3	Southern Adelaide
Adelaide	Holdfast Bay - South	3	Southern Adelaide
Adelaide	Marion - Central	3	Southern Adelaide
Adelaide	Marion - North	3	Southern Adelaide
Adelaide	Marion - South	3	Southern Adelaide
Adelaide	Mitcham - Hills	3	Southern Adelaide
Adelaide	Mitcham - North-East	3	Southern Adelaide
Adelaide	Mitcham - West	3	Southern Adelaide
Adelaide	Norw. P'ham St Ptrs - East	2	Eastern Adelaide
Adelaide	Norw. P'ham St Ptrs - West	1	Eastern Adelaide
Adelaide	Onkaparinga - Hackham	3	Southern Adelaide
Adelaide	Onkaparinga - Hills	3	Southern Adelaide
Adelaide	Onkaparinga - Morphett	3	Southern Adelaide
Adelaide	Onkaparinga - North Coast	3	Southern Adelaide
Adelaide	Onkaparinga - Reservoir	3	Southern Adelaide
Adelaide	Onkaparinga - South Coast	3	Southern Adelaide
Adelaide	Onkaparinga - Woodcroft	3	Southern Adelaide
Adelaide	Playford - East Central	3	Northern Adelaide
Adelaide	Playford - Elizabeth	3	Northern Adelaide
Adelaide	Playford - Hills	3	Northern Adelaide
Adelaide	Playford - West	3	Northern Adelaide
Adelaide	Playford - West Central	3	Northern Adelaide
Adelaide	Port Adelaide. Enfield - Coast	2	Western Adelaide
Adelaide	Port Adelaide. Enfield - East	2	Northern Adelaide
Adelaide	Port Adelaide. Enfield - Inner	2	Northern Adelaide
Adelaide	Port Adelaide. Enfield - Park	2	Western Adelaide
Adelaide	Port Adelaide. Enfield - Port	2	Western Adelaide
Adelaide	Prospect	2	Eastern Adelaide
Adelaide	Salisbury - Central	3	Northern Adelaide
Adelaide	Salisbury - Inner North	3	Northern Adelaide
Adelaide	Salisbury - North-East	3	Northern Adelaide
Adelaide	Salisbury - South-East	3	Northern Adelaide
Adelaide	Salisbury Bal	3	Northern Adelaide
Adelaide	Tea Tree Gully - Central	3	Northern Adelaide
Adelaide	Tea Tree Gully - Hills	3	Northern Adelaide
Adelaide	Tea Tree Gully - North	3	Northern Adelaide
Adelaide	Tea Tree Gully - South	3	Northern Adelaide

Appendix B - INDEX OF STATISTICAL LOCAL AREAS

Capital City	Statistical Local Area	Proximity to Core (Note)	Statistical Subdivision
Adelaide	Unincorporated Western	2	Western Adelaide
Adelaide	Unley - East	1	Eastern Adelaide
Adelaide	Unley - West	1	Eastern Adelaide
Adelaide	Walkerville	1	Eastern Adelaide
Adelaide	West Torrens - East	2	Western Adelaide
Adelaide	West Torrens - West	2	Western Adelaide
Brisbane	Acacia Ridge	3	Southeast Outer Brisbane
Brisbane	Albany Creek	3	Pine Rivers Shire
Brisbane	Albion	2	Northwest Inner Brisbane
Brisbane	Alderley	2	Northwest Inner Brisbane
Brisbane	Alexandra Hills	4	Redland Shire
Brisbane	Algester	3	Southeast Outer Brisbane
Brisbane	Annerley	2	Southeast Inner Brisbane
Brisbane	Anstead	3	Northwest Outer Brisbane
Brisbane	Archerfield	3	Southeast Outer Brisbane
Brisbane	Ascot	2	Northwest Inner Brisbane
Brisbane	Ashgrove	2	Northwest Inner Brisbane
Brisbane	Aspley	3	Northwest Outer Brisbane
Brisbane	Bald Hills	3	Northwest Outer Brisbane
Brisbane	Balmoral	2	Southeast Inner Brisbane
Brisbane	Banyo	3	Northwest Outer Brisbane
Brisbane	Bardon	2	Northwest Inner Brisbane
Brisbane	Beaudesert - Pt A	4	Beaudesert Shire Part A
Brisbane	Bellbowrie	3	Northwest Outer Brisbane
Brisbane	Belmont-Mackenzie	3	Southeast Outer Brisbane
Brisbane	Birkdale	4	Redland Shire
Brisbane	Boondall	3	Northwest Outer Brisbane
Brisbane	Bowen Hills	1	Inner Brisbane
Brisbane	Bracken Ridge	3	Northwest Outer Brisbane
Brisbane	Bray Park	3	Pine Rivers Shire
Brisbane	Bribie Island	4	Caboolture Shire
Brisbane	Bridgeman Downs	3	Northwest Outer Brisbane
Brisbane	Brighton	3	Northwest Outer Brisbane
Brisbane	Brookfield (incl. Brisbane Forest Park)	3	Northwest Outer Brisbane
Brisbane	Browns Plains	3	Logan City
Brisbane	Bulimba	2	Southeast Inner Brisbane
Brisbane	Burbank	3	Southeast Outer Brisbane
Brisbane	Burpengary-Narangba	4	Caboolture Shire
Brisbane	Caboolture - Central	4	Caboolture Shire
Brisbane	Caboolture - East	4	Caboolture Shire
Brisbane	Caboolture - Hinterland	4	Caboolture Shire
Brisbane	Caboolture - Midwest	4	Caboolture Shire
Brisbane	Calamvale	3	Southeast Outer Brisbane
Brisbane	Camp Hill	2	Southeast Inner Brisbane
Brisbane	Cannon Hill	2	Southeast Inner Brisbane
Brisbane	Capalaba	4	Redland Shire
Brisbane	Carbrook-Cornubia	3	Logan City
Brisbane	Carina	2	Southeast Inner Brisbane
Brisbane	Carina Heights	2	Southeast Inner Brisbane
Brisbane	Carindale	2	Southeast Inner Brisbane
Brisbane	Carseldine	3	Northwest Outer Brisbane

Capital City	Statistical Local Area	Proximity to Core (Note)	Statistical Subdivision
Brisbane	Central Pine West	3	Pine Rivers Shire
Brisbane	Chandler-Capalaba West	3	Southeast Outer Brisbane
Brisbane	Chapel Hill	3	Northwest Outer Brisbane
Brisbane	Chelmer	2	Northwest Inner Brisbane
Brisbane	Chermside	3	Northwest Outer Brisbane
Brisbane	Chermside West	3	Northwest Outer Brisbane
Brisbane	City - Inner	1	Inner Brisbane
Brisbane	City - Remainder	1	Inner Brisbane
Brisbane	Clayfield	2	Northwest Inner Brisbane
Brisbane	Cleveland	4	Redland Shire
Brisbane	Clontarf	4	Redcliffe City
Brisbane	Coopers Plains	3	Southeast Outer Brisbane
Brisbane	Coorparoo	2	Southeast Inner Brisbane
Brisbane	Corinda	2	Northwest Inner Brisbane
Brisbane	Daisy Hill-Priestdale	3	Logan City
Brisbane	Dakabin-Kallangur-M. Downs	3	Pine Rivers Shire
Brisbane	Darra-Sumner	3	Northwest Outer Brisbane
Brisbane	Deagon	3	Northwest Outer Brisbane
Brisbane	Deception Bay	4	Caboolture Shire
Brisbane	Doolandella-Forest Lake	3	Northwest Outer Brisbane
Brisbane	Durack	3	Northwest Outer Brisbane
Brisbane	Dutton Park	1	Inner Brisbane
Brisbane	East Brisbane	2	Southeast Inner Brisbane
Brisbane	Eight Mile Plains	3	Southeast Outer Brisbane
Brisbane	Ellen Grove	3	Northwest Outer Brisbane
Brisbane	Enoggera	2	Northwest Inner Brisbane
Brisbane	Everton Park	3	Northwest Outer Brisbane
Brisbane	Fairfield	2	Southeast Inner Brisbane
Brisbane	Ferny Grove	3	Northwest Outer Brisbane
Brisbane	Fig Tree Pocket	3	Northwest Outer Brisbane
Brisbane	Fortitude Valley	1	Inner Brisbane
Brisbane	Geebung	3	Northwest Outer Brisbane
Brisbane	Graceville	2	Northwest Inner Brisbane
Brisbane	Grange	2	Northwest Inner Brisbane
Brisbane	Greenbank-Boronia Heights	3	Logan City
Brisbane	Greenslopes	2	Southeast Inner Brisbane
Brisbane	Griffin-Mango Hill	3	Pine Rivers Shire
Brisbane	Gumdale-Ransome	3	Southeast Outer Brisbane
Brisbane	Hamilton	2	Northwest Inner Brisbane
Brisbane	Hawthorne	2	Southeast Inner Brisbane
Brisbane	Hemmant-Lytton	3	Southeast Outer Brisbane
Brisbane	Hendra	2	Northwest Inner Brisbane
Brisbane	Herston	1	Inner Brisbane
Brisbane	Highgate Hill	1	Inner Brisbane
Brisbane	Hills District	3	Pine Rivers Shire
Brisbane	Holland Park	2	Southeast Inner Brisbane
Brisbane	Holland Park West	2	Southeast Inner Brisbane
Brisbane	Inala	3	Northwest Outer Brisbane
Brisbane	Indooroopilly	2	Northwest Inner Brisbane
Brisbane	Ipswich - Central	4	Ipswich City
Brisbane	Ipswich - East	4	Ipswich City
Brisbane	Ipswich - North	4	Ipswich City

Appendix B - INDEX OF STATISTICAL LOCAL AREAS

Capital City	Statistical Local Area	Proximity to Core (Note)	Statistical Subdivision
Brisbane	Ipswich - South-West	4	Ipswich City
Brisbane	Ipswich - West	4	Ipswich City
Brisbane	Jamboree Heights	3	Northwest Outer Brisbane
Brisbane	Jindalee	3	Northwest Outer Brisbane
Brisbane	Kangaroo Point	1	Inner Brisbane
Brisbane	Karana Downs-Lake Manchester	3	Northwest Outer Brisbane
Brisbane	Kedron	2	Northwest Inner Brisbane
Brisbane	Kelvin Grove	1	Inner Brisbane
Brisbane	Kenmore	3	Northwest Outer Brisbane
Brisbane	Kenmore Hills	3	Northwest Outer Brisbane
Brisbane	Keperra	3	Northwest Outer Brisbane
Brisbane	Kingston	3	Logan City
Brisbane	Kuraby	3	Southeast Outer Brisbane
Brisbane	Lawnton	3	Pine Rivers Shire
Brisbane	Logan Bal	3	Logan City
Brisbane	Loganholme	3	Logan City
Brisbane	Loganlea	3	Logan City
Brisbane	Lota	3	Southeast Outer Brisbane
Brisbane	Lutwyche	2	Northwest Inner Brisbane
Brisbane	MacGregor	3	Southeast Outer Brisbane
Brisbane	Manly	3	Southeast Outer Brisbane
Brisbane	Manly West	3	Southeast Outer Brisbane
Brisbane	Mansfield	3	Southeast Outer Brisbane
Brisbane	Margate-Woody Point	4	Redcliffe City
Brisbane	Marsden	3	Logan City
Brisbane	McDowall	3	Northwest Outer Brisbane
Brisbane	Middle Park	3	Northwest Outer Brisbane
Brisbane	Milton	1	Inner Brisbane
Brisbane	Mitchelton	3	Northwest Outer Brisbane
Brisbane	Moggill	3	Northwest Outer Brisbane
Brisbane	Moorooka	2	Southeast Inner Brisbane
Brisbane	Morayfield	4	Caboolture Shire
Brisbane	Moreton Island	3	Southeast Outer Brisbane
Brisbane	Morningside	2	Southeast Inner Brisbane
Brisbane	Mount Gravatt	3	Southeast Outer Brisbane
Brisbane	Mount Gravatt East	3	Southeast Outer Brisbane
Brisbane	Mount Ommaney	3	Northwest Outer Brisbane
Brisbane	Murarrie	3	Southeast Outer Brisbane
Brisbane	Nathan	3	Southeast Outer Brisbane
Brisbane	New Farm	1	Inner Brisbane
Brisbane	Newmarket	2	Northwest Inner Brisbane
Brisbane	Newstead	1	Inner Brisbane
Brisbane	Norman Park	2	Southeast Inner Brisbane
Brisbane	Northgate	3	Northwest Outer Brisbane
Brisbane	Nudgee	3	Northwest Outer Brisbane
Brisbane	Nundah	2	Northwest Inner Brisbane
Brisbane	Ormiston	4	Redland Shire
Brisbane	Oxley	3	Northwest Outer Brisbane
Brisbane	Paddington	1	Inner Brisbane
Brisbane	Pallara-Heathwood-Larapinta	3	Southeast Outer Brisbane
Brisbane	Parkinson-Drewvale	3	Southeast Outer Brisbane
Brisbane	Petrie	3	Pine Rivers Shire

Capital City	Statistical Local Area	Proximity to Core (Note)	Statistical Subdivision
Brisbane	Pine Rivers Bal	3	Pine Rivers Shire
Brisbane	Pinjarra Hills	3	Northwest Outer Brisbane
Brisbane	Pinkenba-Eagle Farm	3	Northwest Outer Brisbane
Brisbane	Pullenvale	3	Northwest Outer Brisbane
Brisbane	Red Hill	1	Inner Brisbane
Brisbane	Redcliffe-Scarborough	4	Redcliffe City
Brisbane	Redland Bal	4	Redland Shire
Brisbane	Redland Bay	4	Redland Shire
Brisbane	Richlands	3	Northwest Outer Brisbane
Brisbane	Riverhills	3	Northwest Outer Brisbane
Brisbane	Robertson	3	Southeast Outer Brisbane
Brisbane	Rochedale	3	Southeast Outer Brisbane
Brisbane	Rochedale South	3	Logan City
Brisbane	Rocklea	3	Southeast Outer Brisbane
Brisbane	Rothwell-Kippa-Ring	4	Redcliffe City
Brisbane	Runcorn	3	Southeast Outer Brisbane
Brisbane	Salisbury	3	Southeast Outer Brisbane
Brisbane	Sandgate	3	Northwest Outer Brisbane
Brisbane	Seventeen Mile Rocks	3	Northwest Outer Brisbane
Brisbane	Shailer Park	3	Logan City
Brisbane	Sheldon-Mt Cotton	4	Redland Shire
Brisbane	Sherwood	2	Northwest Inner Brisbane
Brisbane	Slacks Creek	3	Logan City
Brisbane	South Brisbane	1	Inner Brisbane
Brisbane	Spring Hill	1	Inner Brisbane
Brisbane	Springwood	3	Logan City
Brisbane	St Lucia	2	Northwest Inner Brisbane
Brisbane	Stafford	2	Northwest Inner Brisbane
Brisbane	Stafford Heights	2	Northwest Inner Brisbane
Brisbane	Strathpine-Brendale	3	Pine Rivers Shire
Brisbane	Stretton-Karawatha	3	Southeast Outer Brisbane
Brisbane	Sunnybank	3	Southeast Outer Brisbane
Brisbane	Sunnybank Hills	3	Southeast Outer Brisbane
Brisbane	Taigum-Fitzgibbon	3	Northwest Outer Brisbane
Brisbane	Tanah Merah	3	Logan City
Brisbane	Taringa	2	Northwest Inner Brisbane
Brisbane	Tarragindi	2	Southeast Inner Brisbane
Brisbane	The Gap	3	Northwest Outer Brisbane
Brisbane	Thorneside	4	Redland Shire
Brisbane	Thornlands	4	Redland Shire
Brisbane	Tingalpa	3	Southeast Outer Brisbane
Brisbane	Toowong	2	Northwest Inner Brisbane
Brisbane	Underwood	3	Logan City
Brisbane	Upper Kedron	3	Northwest Outer Brisbane
Brisbane	Upper Mount Gravatt	3	Southeast Outer Brisbane
Brisbane	Victoria Point	4	Redland Shire
Brisbane	Virginia	3	Northwest Outer Brisbane
Brisbane	Wacol	3	Northwest Outer Brisbane
Brisbane	Wakerley	3	Southeast Outer Brisbane
Brisbane	Waterford West	3	Logan City
Brisbane	Wavell Heights	3	Northwest Outer Brisbane
Brisbane	Wellington Point	4	Redland Shire

Appendix B - INDEX OF STATISTICAL LOCAL AREAS

Capital City	Statistical Local Area	Proximity to Core (Note)	Statistical Subdivision
Brisbane	Pine Rivers Bal	3	Pine Rivers Shire
Brisbane	Pinjarra Hills	3	Northwest Outer Brisbane
Brisbane	Pinkenba-Eagle Farm	3	Northwest Outer Brisbane
Brisbane	Pullenvale	3	Northwest Outer Brisbane
Brisbane	Red Hill	1	Inner Brisbane
Brisbane	Redcliffe-Scarborough	4	Redcliffe City
Brisbane	Redland Bal	4	Redland Shire
Brisbane	Redland Bay	4	Redland Shire
Brisbane	Richlands	3	Northwest Outer Brisbane
Brisbane	Riverhills	3	Northwest Outer Brisbane
Brisbane	Robertson	3	Southeast Outer Brisbane
Brisbane	Rochedale	3	Southeast Outer Brisbane
Brisbane	Rochedale South	3	Logan City
Brisbane	Rocklea	3	Southeast Outer Brisbane
Brisbane	Rothwell-Kippa-Ring	4	Redcliffe City
Brisbane	Runcorn	3	Southeast Outer Brisbane
Brisbane	Salisbury	3	Southeast Outer Brisbane
Brisbane	Sandgate	3	Northwest Outer Brisbane
Brisbane	Seventeen Mile Rocks	3	Northwest Outer Brisbane
Brisbane	Shailer Park	3	Logan City
Brisbane	Sheldon-Mt Cotton	4	Redland Shire
Brisbane	Sherwood	2	Northwest Inner Brisbane
Brisbane	Slacks Creek	3	Logan City
Brisbane	South Brisbane	1	Inner Brisbane
Brisbane	Spring Hill	1	Inner Brisbane
Brisbane	Springwood	3	Logan City
Brisbane	St Lucia	2	Northwest Inner Brisbane
Brisbane	Stafford	2	Northwest Inner Brisbane
Brisbane	Stafford Heights	2	Northwest Inner Brisbane
Brisbane	Strathpine-Brendale	3	Pine Rivers Shire
Brisbane	Stretton-Karawatha	3	Southeast Outer Brisbane
Brisbane	Sunnybank	3	Southeast Outer Brisbane
Brisbane	Sunnybank Hills	3	Southeast Outer Brisbane
Brisbane	Taigum-Fitzgibbon	3	Northwest Outer Brisbane
Brisbane	Tanah Merah	3	Logan City
Brisbane	Taringa	2	Northwest Inner Brisbane
Brisbane	Tarragindi	2	Southeast Inner Brisbane
Brisbane	The Gap	3	Northwest Outer Brisbane
Brisbane	Thorneside	4	Redland Shire
Brisbane	Thornlands	4	Redland Shire
Brisbane	Tingalpa	3	Southeast Outer Brisbane
Brisbane	Toowong	2	Northwest Inner Brisbane
Brisbane	Underwood	3	Logan City
Brisbane	Upper Kedron	3	Northwest Outer Brisbane
Brisbane	Upper Mount Gravatt	3	Southeast Outer Brisbane
Brisbane	Victoria Point	4	Redland Shire
Brisbane	Virginia	3	Northwest Outer Brisbane
Brisbane	Wacol	3	Northwest Outer Brisbane
Brisbane	Wakerley	3	Southeast Outer Brisbane
Brisbane	Waterford West	3	Logan City
Brisbane	Wavell Heights	3	Northwest Outer Brisbane
Brisbane	Wellington Point	4	Redland Shire

Capital City	Statistical Local Area	Proximity to Core (Note)	Statistical Subdivision
Brisbane	West End	1	Inner Brisbane
Brisbane	Westlake	3	Northwest Outer Brisbane
Brisbane	Willawong	3	Southeast Outer Brisbane
Brisbane	Wilston	2	Northwest Inner Brisbane
Brisbane	Windsor	2	Northwest Inner Brisbane
Brisbane	Wishart	3	Southeast Outer Brisbane
Brisbane	Woodridge	3	Logan City
Brisbane	Woolloongabba	1	Inner Brisbane
Brisbane	Wooloowin	2	Northwest Inner Brisbane
Brisbane	Wynnum	3	Southeast Outer Brisbane
Brisbane	Wynnum West	3	Southeast Outer Brisbane
Brisbane	Yeerongpilly	2	Southeast Inner Brisbane
Brisbane	Yeronga	2	Southeast Inner Brisbane
Brisbane	Zillmere	3	Northwest Outer Brisbane
Canberra	Acton	1	North Canberra
Canberra	Ainslie	1	North Canberra
Canberra	Amaroo	5	Gungahlin-Hall
Canberra	Aranda	5	Belconnen
Canberra	Banks	5	Tuggeranong
Canberra	Barton	1	South Canberra
Canberra	Belconnen - SSD Bal	5	Belconnen
Canberra	Belconnen Town Centre	5	Belconnen
Canberra	Bonython	5	Tuggeranong
Canberra	Braddon	1	North Canberra
Canberra	Bruce	5	Belconnen
Canberra	Calwell	5	Tuggeranong
Canberra	Campbell	1	North Canberra
Canberra	Chapman	5	Weston Creek-Stromlo
Canberra	Charnwood	5	Belconnen
Canberra	Chifley	5	Woden Valley
Canberra	Chisholm	5	Tuggeranong
Canberra	City	1	North Canberra
Canberra	Conder	5	Tuggeranong
Canberra	Cook	5	Belconnen
Canberra	Curtin	5	Woden Valley
Canberra	Deakin	1	South Canberra
Canberra	Dickson	1	North Canberra
Canberra	Downer	1	North Canberra
Canberra	Duffy	5	Weston Creek-Stromlo
Canberra	Dunlop	5	Belconnen
Canberra	Duntroon	1	North Canberra
Canberra	Evatt	5	Belconnen
Canberra	Fadden	5	Tuggeranong
Canberra	Farrer	5	Woden Valley
Canberra	Fisher	5	Weston Creek-Stromlo
Canberra	Florey	5	Belconnen
Canberra	Flynn	5	Belconnen
Canberra	Forrest	1	South Canberra
Canberra	Fraser	5	Belconnen
Canberra	Fyshwick	1	South Canberra
Canberra	Garran	5	Woden Valley
Canberra	Gilmore	5	Tuggeranong

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Capital City	Statistical Local Area	Proximity to Core (Note)	Statistical Subdivision
Canberra	Giralang	5	Belconnen
Canberra	Gordon	5	Tuggeranong
Canberra	Gowrie	5	Tuggeranong
Canberra	Greenway	5	Tuggeranong
Canberra	Griffith	1	South Canberra
Canberra	Gungahlin	5	Gungahlin-Hall
Canberra	Gungahlin-Hall - SSD Bal	5	Gungahlin-Hall
Canberra	Hackett	1	North Canberra
Canberra	Hall	5	Gungahlin-Hall
Canberra	Harman	1	South Canberra
Canberra	Harrison	5	Gungahlin-Hall
Canberra	Hawker	5	Belconnen
Canberra	Higgins	5	Belconnen
Canberra	Holder	5	Weston Creek-Stromlo
Canberra	Holt	5	Belconnen
Canberra	Hughes	5	Woden Valley
Canberra	Hume	1	South Canberra
Canberra	Isaacs	5	Woden Valley
Canberra	Isabella Plains	5	Tuggeranong
Canberra	Jerrabomberra	1	South Canberra
Canberra	Kaleen	5	Belconnen
Canberra	Kambah	5	Tuggeranong
Canberra	Kingston	1	South Canberra
Canberra	Kowen	5	North Canberra
Canberra	Latham	5	Belconnen
Canberra	Lyneham	1	North Canberra
Canberra	Lyons	5	Woden Valley
Canberra	Macarthur	5	Tuggeranong
Canberra	Macgregor	5	Belconnen
Canberra	Macquarie	5	Belconnen
Canberra	Majura	5	North Canberra
Canberra	Mawson	5	Woden Valley
Canberra	McKellar	5	Belconnen
Canberra	Melba	5	Belconnen
Canberra	Mitchell	5	Gungahlin-Hall
Canberra	Monash	5	Tuggeranong
Canberra	Narrabundah	1	South Canberra
Canberra	Ngunnawal	5	Gungahlin-Hall
Canberra	Nicholls	5	Gungahlin-Hall
Canberra	O'Connor	1	North Canberra
Canberra	O'Malley	5	Woden Valley
Canberra	Oaks Estate	1	South Canberra
Canberra	Oxley	5	Tuggeranong
Canberra	Page	5	Belconnen
Canberra	Palmerston	5	Gungahlin-Hall
Canberra	Parkes	1	South Canberra
Canberra	Pearce	5	Woden Valley
Canberra	Phillip	5	Woden Valley
Canberra	Pialligo	1	South Canberra
Canberra	Red Hill	1	South Canberra
Canberra	Reid	1	North Canberra
Canberra	Richardson	5	Tuggeranong

Capital City	Statistical Local Area	Proximity to Core (Note)	Statistical Subdivision
Canberra	Rivett	5	Weston Creek-Stromlo
Canberra	Russell	1	North Canberra
Canberra	Scullin	5	Belconnen
Canberra	Spence	5	Belconnen
Canberra	Stirling	5	Weston Creek-Stromlo
Canberra	Stromlo	5	Weston Creek-Stromlo
Canberra	Symonston	1	South Canberra
Canberra	Theodore	5	Tuggeranong
Canberra	Torrens	5	Woden Valley
Canberra	Tuggeranong - SSD Bal	5	Tuggeranong
Canberra	Turner	1	North Canberra
Canberra	Wanniassa	5	Tuggeranong
Canberra	Waramanga	5	Weston Creek-Stromlo
Canberra	Watson	1	North Canberra
Canberra	Weetangera	5	Belconnen
Canberra	Weston	5	Weston Creek-Stromlo
Canberra	Weston Creek-Stromlo - SSD Bal	5	Weston Creek-Stromlo
Canberra	Yarralumla	1	South Canberra
Darwin	Alawa	5	Darwin City
Darwin	Anula	5	Darwin City
Darwin	Bakewell	5	Palmerston-East Arm
Darwin	Bayview-Woolner	5	Darwin City
Darwin	Brinkin	5	Darwin City
Darwin	City - Inner	1	Darwin City
Darwin	City - Remainder	5	Darwin City
Darwin	Coconut Grove	5	Darwin City
Darwin	Driver	5	Palmerston-East Arm
Darwin	Durack	5	Palmerston-East Arm
Darwin	East Arm	5	Palmerston-East Arm
Darwin	Fannie Bay	1	Darwin City
Darwin	Gray	5	Palmerston-East Arm
Darwin	Gunn-Palmerston City	5	Palmerston-East Arm
Darwin	Jingili	5	Darwin City
Darwin	Karama	5	Darwin City
Darwin	Larrakeyah	1	Darwin City
Darwin	Leanyer	5	Darwin City
Darwin	Lee Point-Leanyer Swamp	5	Darwin City
Darwin	Litchfield - Pt A	5	Litchfield Shire
Darwin	Litchfield - Pt B	5	Litchfield Shire
Darwin	Ludmilla	5	Darwin City
Darwin	Malak	5	Darwin City
Darwin	Marrara	5	Darwin City
Darwin	Millner	5	Darwin City
Darwin	Moil	5	Darwin City
Darwin	Moulden	5	Palmerston-East Arm
Darwin	Nakara	5	Darwin City
Darwin	Narrows	5	Darwin City
Darwin	Nightcliff	5	Darwin City
Darwin	Palmerston Bal	5	Palmerston-East Arm
Darwin	Parap	1	Darwin City
Darwin	Rapid Creek	5	Darwin City
Darwin	Stuart Park	1	Darwin City

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Capital City	Statistical Local Area	Proximity to Core (Note)	Statistical Subdivision
Darwin	The Gardens	1	Darwin City
Darwin	Tiwi	5	Darwin City
Darwin	Wagaman	5	Darwin City
Darwin	Wanguri	5	Darwin City
Darwin	Winnellie	5	Darwin City
Darwin	Woodroffe	5	Palmerston-East Arm
Darwin	Wulagi	5	Darwin City
Hobart	Brighton	5	No statistical subdisivions
Hobart	Clarence	5	No statistical subdisivions
Hobart	Derwent Valley - Pt A	5	No statistical subdisivions
Hobart	Glenorchy	5	No statistical subdisivions
Hobart	Hobart - Inner	1	No statistical subdisivions
Hobart	Hobart - Remainder	1	No statistical subdisivions
Hobart	Kingborough - Pt A	5	No statistical subdisivions
Hobart	Sorell - Pt A	5	No statistical subdisivions
Melbourne	Banyule - Heidelberg	2	Northern Middle Melbourne
Melbourne	Banyule - North	2	Northern Middle Melbourne
Melbourne	Bayside - Brighton	2	Southern Melbourne
Melbourne	Bayside - South	2	Southern Melbourne
Melbourne	Boroondara - Camberwell N.	2	Boroondara City
Melbourne	Boroondara - Camberwell S.	2	Boroondara City
Melbourne	Boroondara - Hawthorn	2	Boroondara City
Melbourne	Boroondara - Kew	2	Boroondara City
Melbourne	Brimbank - Keilor	2	Western Melbourne
Melbourne	Brimbank - Sunshine	2	Western Melbourne
Melbourne	Cardinia - North	4	South Eastern Outer Melbourne
Melbourne	Cardinia - Pakenham	4	South Eastern Outer Melbourne
Melbourne	Cardinia - South	4	South Eastern Outer Melbourne
Melbourne	Casey - Berwick	4	South Eastern Outer Melbourne
Melbourne	Casey - Cranbourne	4	South Eastern Outer Melbourne
Melbourne	Casey - Hallam	4	South Eastern Outer Melbourne
Melbourne	Casey - South	4	South Eastern Outer Melbourne
Melbourne	Darebin - Northcote	2	Northern Middle Melbourne
Melbourne	Darebin - Preston	2	Northern Middle Melbourne
Melbourne	Frankston - East	3	Frankston City
Melbourne	Frankston - West	3	Frankston City
Melbourne	Glen Eira - Caulfield	2	Southern Melbourne
Melbourne	Glen Eira - South	2	Southern Melbourne
Melbourne	Gr. Dandenong - Dandenong	3	Greater Dandenong City
Melbourne	Gr. Dandenong Bal	3	Greater Dandenong City
Melbourne	Hobsons Bay - Altona	2	Western Melbourne
Melbourne	Hobsons Bay - Williamstown	2	Western Melbourne
Melbourne	Hume - Broadmeadows	3	Hume City
Melbourne	Hume - Craigieburn	3	Hume City
Melbourne	Hume - Sunbury	3	Hume City
Melbourne	Kingston - North	2	Southern Melbourne
Melbourne	Kingston - South	2	Southern Melbourne
Melbourne	Knox - North-East	3	Eastern Outer Melbourne
Melbourne	Knox - North-West	3	Eastern Outer Melbourne
Melbourne	Knox - South	3	Eastern Outer Melbourne
Melbourne	Manningham - East	3	Eastern Middle Melbourne
Melbourne	Manningham - West	3	Eastern Middle Melbourne

Capital City	Statistical Local Area	Proximity to Core (Note)	Statistical Subdivision
Melbourne	Maribyrnong	2	Western Melbourne
Melbourne	Maroondah - Croydon	3	Eastern Outer Melbourne
Melbourne	Maroondah - Ringwood	3	Eastern Outer Melbourne
Melbourne	Melbourne - Inner	1	Inner Melbourne
Melbourne	Melbourne - Remainder	1	Inner Melbourne
Melbourne	Melbourne - S'bank-D'lands	1	Inner Melbourne
Melbourne	Melton - East	4	Melton-Wyndham
Melbourne	Melton Bal	4	Melton-Wyndham
Melbourne	Monash - South-West	3	Eastern Middle Melbourne
Melbourne	Monash - Waverley East	3	Eastern Middle Melbourne
Melbourne	Monash - Waverley West	3	Eastern Middle Melbourne
Melbourne	Moonee Valley - Essendon	2	Western Melbourne
Melbourne	Moonee Valley - West	2	Western Melbourne
Melbourne	Moreland - Brunswick	2	Moreland City
Melbourne	Moreland - Coburg	2	Moreland City
Melbourne	Moreland - North	2	Moreland City
Melbourne	Mornington P'sula - East	4	Mornington Peninsula Shire
Melbourne	Mornington P'sula - South	4	Mornington Peninsula Shire
Melbourne	Mornington P'sula - West	4	Mornington Peninsula Shire
Melbourne	Nillumbik - South	3	Northern Outer Melbourne
Melbourne	Nillumbik - South-West	3	Northern Outer Melbourne
Melbourne	Nillumbik Bal	3	Northern Outer Melbourne
Melbourne	Port Phillip - St Kilda	1	Inner Melbourne
Melbourne	Port Phillip - West	1	Inner Melbourne
Melbourne	Stonnington - Malvern	2	Southern Melbourne
Melbourne	Stonnington - Prahran	1	Inner Melbourne
Melbourne	Whitehorse - Box Hill	3	Eastern Middle Melbourne
Melbourne	Whitehorse - Nunawading E.	3	Eastern Middle Melbourne
Melbourne	Whitehorse - Nunawading W.	3	Eastern Middle Melbourne
Melbourne	Whittlesea - North	3	Northern Outer Melbourne
Melbourne	Whittlesea - South-East	3	Northern Outer Melbourne
Melbourne	Whittlesea - South-West	3	Northern Outer Melbourne
Melbourne	Wyndham - North	4	Melton-Wyndham
Melbourne	Wyndham - South	4	Melton-Wyndham
Melbourne	Wyndham - West	4	Melton-Wyndham
Melbourne	Yarra - North	1	Inner Melbourne
Melbourne	Yarra - Richmond	1	Inner Melbourne
Melbourne	Yarra Ranges - Central	4	Yarra Ranges Shire Part A
Melbourne	Yarra Ranges - Dandenongs	4	Yarra Ranges Shire Part A
Melbourne	Yarra Ranges - Lilydale	4	Yarra Ranges Shire Part A
Melbourne	Yarra Ranges - North	4	Yarra Ranges Shire Part A
Melbourne	Yarra Ranges - Seville	4	Yarra Ranges Shire Part A
Perth	Armadale	4	South East Metropolitan
Perth	Bassendean	3	East Metropolitan
Perth	Bayswater	2	East Metropolitan
Perth	Belmont	2	South East Metropolitan
Perth	Cambridge	2	Central Metropolitan
Perth	Canning	3	South East Metropolitan
Perth	Claremont	2	Central Metropolitan
Perth	Cockburn	3	South West Metropolitan
Perth	Cottesloe	2	Central Metropolitan
Perth	East Fremantle	2	South West Metropolitan

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Capital City	Statistical Local Area	Proximity to Core (Note)	Statistical Subdivision
Perth	Fremantle - Inner	2	South West Metropolitan
Perth	Fremantle - Remainder	2	South West Metropolitan
Perth	Gosnells	3	South East Metropolitan
Perth	Joondalup - North	3	North Metropolitan
Perth	Joondalup - South	3	North Metropolitan
Perth	Kalamunda	4	East Metropolitan
Perth	Kwinana	3	South West Metropolitan
Perth	Melville	2	South West Metropolitan
Perth	Mosman Park	2	Central Metropolitan
Perth	Mundaring	4	East Metropolitan
Perth	Nedlands	2	Central Metropolitan
Perth	Peppermint Grove	2	Central Metropolitan
Perth	Perth - Inner	1	Central Metropolitan
Perth	Perth - Remainder	1	Central Metropolitan
Perth	Rockingham	4	South West Metropolitan
Perth	Serpentine-Jarrahdale	4	South East Metropolitan
Perth	South Perth	2	South East Metropolitan
Perth	Stirling - Central	2	North Metropolitan
Perth	Stirling - Coastal	2	North Metropolitan
Perth	Stirling - South-Eastern	2	North Metropolitan
Perth	Subiaco	1	Central Metropolitan
Perth	Swan	3	East Metropolitan
Perth	Victoria Park	2	South East Metropolitan
Perth	Vincent	1	Central Metropolitan
Perth	Wanneroo - North-East	3	North Metropolitan
Perth	Wanneroo - North-West	3	North Metropolitan
Perth	Wanneroo - South	3	North Metropolitan
Sydney	Ashfield	2	Inner Western Sydney
Sydney	Auburn	3	Central Western Sydney
Sydney	Bankstown - North-East	2	Canterbury-Bankstown
Sydney	Bankstown - North-West	2	Canterbury-Bankstown
Sydney	Bankstown - South	2	Canterbury-Bankstown
Sydney	Baulkham Hills - Central	3	Central Northern Sydney
Sydney	Baulkham Hills - North	3	Central Northern Sydney
Sydney	Baulkham Hills - South	3	Central Northern Sydney
Sydney	Blacktown - North	3	Blacktown
Sydney	Blacktown - South-East	3	Blacktown
Sydney	Blacktown - South-West	3	Blacktown
Sydney	Blue Mountains	4	Outer Western Sydney
Sydney	Botany Bay	1	Inner Sydney
Sydney	Burwood	2	Inner Western Sydney
Sydney	Camden	4	Outer South Western Sydney
Sydney	Campbelltown - North	4	Outer South Western Sydney
Sydney	Campbelltown - South	4	Outer South Western Sydney
Sydney	Canada Bay - Concord	2	Inner Western Sydney
Sydney	Canada Bay - Drummoyne	2	Inner Western Sydney
Sydney	Canterbury	2	Canterbury-Bankstown
Sydney	Fairfield - East	3	Fairfield-Liverpool
Sydney	Fairfield - West	3	Fairfield-Liverpool
Sydney	Gosford - East	4	Gosford-Wyong
Sydney	Gosford - West	4	Gosford-Wyong
Sydney	Hawkesbury	4	Outer Western Sydney

Capital City	Statistical Local Area	Proximity to Core (Note)	Statistical Subdivision
Sydney	Holroyd	3	Central Western Sydney
Sydney	Hornsby - North	3	Central Northern Sydney
Sydney	Hornsby - South	3	Central Northern Sydney
Sydney	Hunter's Hill	2	Lower Northern Sydney
Sydney	Hurstville	2	St George-Sutherland
Sydney	Kogarah	2	St George-Sutherland
Sydney	Ku-ring-gai	3	Central Northern Sydney
Sydney	Lane Cove	2	Lower Northern Sydney
Sydney	Leichhardt	1	Inner Sydney
Sydney	Liverpool - East	3	Fairfield-Liverpool
Sydney	Liverpool - West	3	Fairfield-Liverpool
Sydney	Manly	3	Northern Beaches
Sydney	Marrickville	1	Inner Sydney
Sydney	Mosman	2	Lower Northern Sydney
Sydney	North Sydney	2	Lower Northern Sydney
Sydney	Parramatta - Inner	3	Central Western Sydney
Sydney	Parramatta - North-East	3	Central Western Sydney
Sydney	Parramatta - North-West	3	Central Western Sydney
Sydney	Parramatta - South	3	Central Western Sydney
Sydney	Penrith - East	4	Outer Western Sydney
Sydney	Penrith - West	4	Outer Western Sydney
Sydney	Pittwater	3	Northern Beaches
Sydney	Randwick	2	Eastern Suburbs
Sydney	Rockdale	2	St George-Sutherland
Sydney	Ryde	2	Lower Northern Sydney
Sydney	Strathfield	2	Inner Western Sydney
Sydney	Sutherland Shire - East	2	St George-Sutherland
Sydney	Sutherland Shire - West	2	St George-Sutherland
Sydney	Sydney - East	1	Inner Sydney
Sydney	Sydney - Inner	1	Inner Sydney
Sydney	Sydney - South	1	Inner Sydney
Sydney	Sydney - West	1	Inner Sydney
Sydney	Warringah	3	Northern Beaches
Sydney	Waverley	2	Eastern Suburbs
Sydney	Willoughby	2	Lower Northern Sydney
Sydney	Wollondilly	4	Outer South Western
Sydney			
Sydney	Woollahra	2	Eastern Suburbs
Sydney	Wyong - North-East	4	Gosford-Wyong
Sydney	Wyong - South and West	4	Gosford-Wyong

Note:
Proximity to Core
1-Inner (All capital cities)
2-Inner Ring (Sydney, Melbourne, Brisbane, Adelaide, Perth)
3-Second Ring (Sydney, Melbourne, Brisbane, Adelaide, Perth)
4-Outer (Sydney, Melbourne, Brisbane, Adelaide, Perth)
5-Ring (Hobart, Darwin, Canberra)

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