(Sub)urban Directions

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Abstract

A 2003 thesis by Sumita Ghosh concluded that, in relation to the scope of her study, the low density (18 households/hectare) block at a distance from the CPD offered the most sustainable urban form in Auckland when using indicators for transport, carbon sequestration, energy, food and waste. This study considers and extends this hypothesis by using a single stand-alone house in an Auckland suburb to examine, from practical evidence, the potential offered by low density suburbia for reduction in household energy use, harvesting of water and food, recycling of waste and change to transport habits.

For this study, an existing suburban house on a plot that matched the density claimed by Ghosh to be ideal was first studied unconverted. It was then changed to improve its use of energy, the site was redesigned so food could be grown, and the transport habits of the occupants changed. The whole process was monitored over two periods, each of one year. Total energy, excluding that for travel, was reduced by 70 percent between the two study periods. The electricity component was reduced by only 12.7 percent although substantial improvements were made in amenity and comfort. These included a $2^{o}C$ rise in indoor temperature over the heating season. Water purchased from the utility supplier was reduced by 78 percent and on a $31m^2$ garden, 23.5 percent of the household's vegetables were grown. Given a $555m^2$ plot size that matches Ghosh's calculated ideal, CO_2 emissions from work related travel in the study house would have been sequestered within its own plot.

There is evidence that the house on an individual plot at Ghosh's proposed density of 18 households per hectare may be the optimum size for a degree of self sufficiency for the average family within the Auckland urban environment. This research revealed that an average family could be autonomous in water, electrical energy and could sequester its work travel CO_2 emissions. Substantial reductions could also be made in bought vegetables and organic waste disposal.

This research shows that the existing suburban layout can be used in a much more sustainable manner, suggesting the current concerns with densification may be moving suburban Auckland in a non-sustainable direction. This research also demonstrates the need for any changes to suburbia to ensure people can still use their houses and gardens in a sustainable manner. This will provide Auckland with a robust built environment that can cope with future changes in resource availability.

Dedication

This thesis is dedicated to my family

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