

SUBURBAN DEVELOPMENT PATTERNS



TISSUE STUDY SUMMARY

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INTRODUCTION

This study was commissioned by Christchurch City Council as they were developing their medium-density development responses after the 2010—11 earthquakes.

The purpose of the study was to help them understand the differences in infrastructure requirement, efficiency, cost and benefit between the **New Neighbourhood (N)** model of residential suburban development that they were exploring, and a more **Traditional (T1, T2)** approach.

Tissue analyses were made of three more or less contemporary and current developments, all within the same part of Christchurch (NZ) and all entirely residential in nature. To avoid distortions of scale and unintended effects, they all:

- Are roughly the same size (circa 20ha)
- Are Greenfields developments
- Are similar in edge configuration
- Have similar open-space provision/requirements

Each has been designed to a different net density level, from:

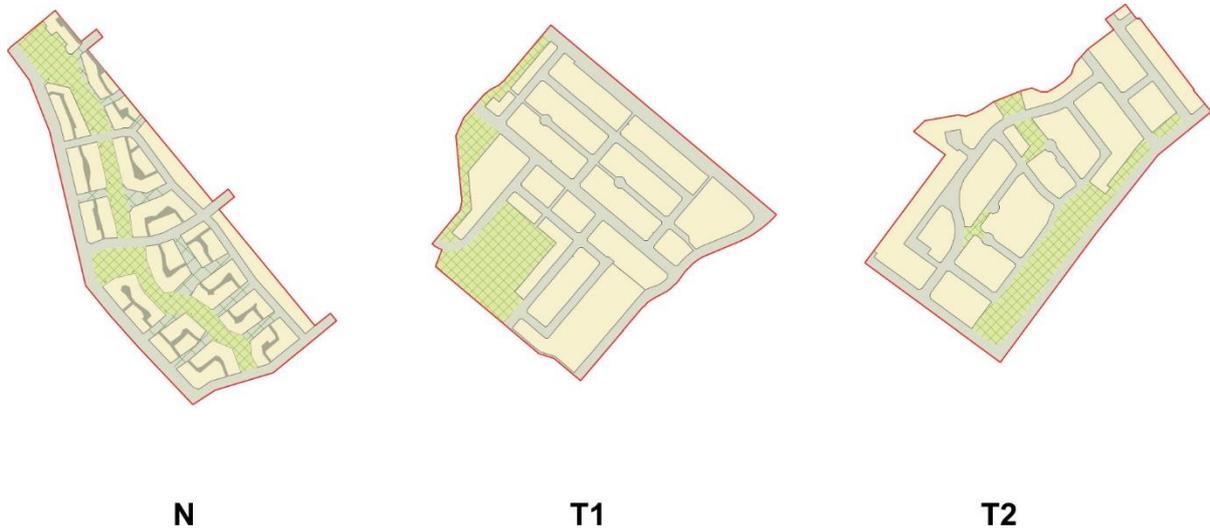
- N = medium (30+ hhu/ha)
- T1 = medium in part (traditional surveyor-led development including some terrace housing – 25 hhu/ha)
- T2 = low ('normal' – 20 hhu/ha).



Measured values are represented as either a percentage, or where comparison is between numbers or lengths, normalised against the largest subdivision (T1).

EFFICIENCY

The first part of the analysis consists of a number of easily calculated measures of area and length.



The summarised results are as follows:

Development Efficiency

Development Area: 5% variance (N = 51%, T1 = 54%, T2 = 55%)

Roads: 1% variance (N = 30%, T1 = 30%, T2 = 29%)

Open-space: 3% variance (N = 19%, T1 = 16%, T2 = 16%)

Yield

N delivers nearly twice the yield

(N = 422, T1 = 277, T2 = 221)

Road Efficiency

N requires less than 1/2 the length of road per lot

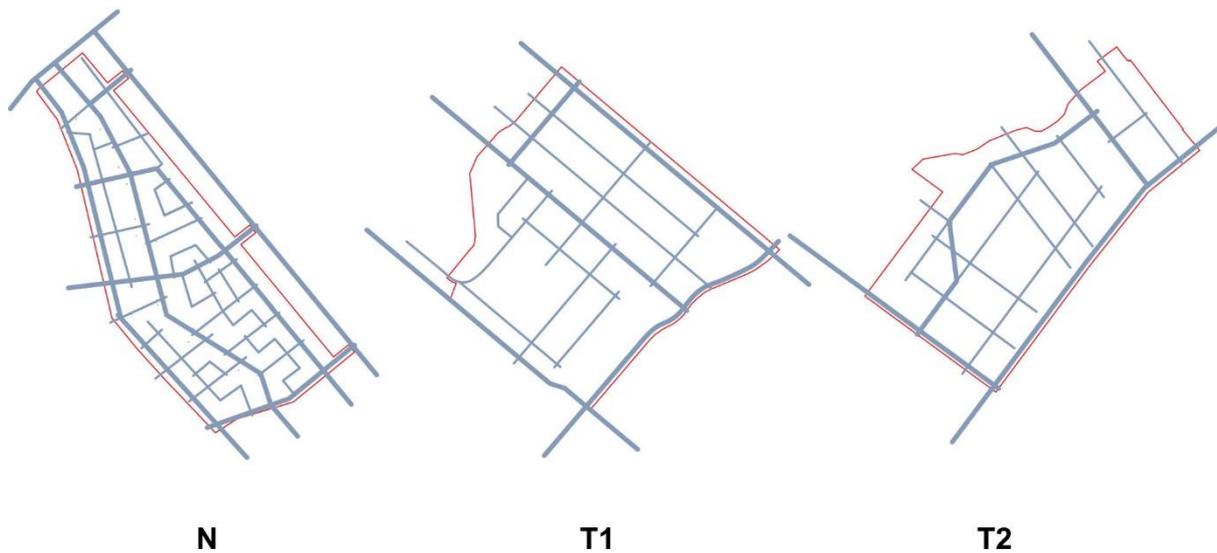
(N = 9.4m, T1 = 14.3m, T2 = 19.8m)

N requires about 2/3 the length of footpath per lot

(N = 19.2m, T1 = 23.0m, T2 = 29.6m)

Pattern

Subdivision grain is clearly visible from both the lot plans (above) and the roading plans. Major connections beyond the sample area are indicated as extensions.



All three subdivisions are designed as connected grids, but because N employs a larger range of road types and considers both the road reserve and open-space to be multi-functional spaces, it creates a much more connected pattern. A great deal of evidence exists concerning the positive effect connectivity has on value, amenity use and safety.

Connectivity summary:

The average segment length for N is about half that of T

(N = 60m, T1 = 117m, T2 = 130m)

The longest segment length for N is about 2/3 that of T

(N = 195m, T1 = 292m, T2 = 318m)

Rate of segment length reduction (3 longest segments):

N – 195m > 127m > 117m

T1 – 330m > 292m > 196m

T2 – 330m > 223m > 182m

Efficiency Summary

N is usually characterised as having too much open-space with too small a block size, leading to much more roading provision – particularly when rear lanes are employed. In short, with less perceived developable area it is criticised as being too expensive to develop.

Unexpectedly, the tissue shows that gross development efficiencies were remarkably similar whatever the design and patterning. However, the performance outcomes were remarkably different.

Development costs tend to be transferred from the developer through to the public and private sectors in a linear fashion ie they don't attract much of a value-add premium. The thing that does vary, and where a developer takes his profit, is in the underlying value of the land. The actual increase will depend on the level of density achieved. Recent research within New Zealand has shown that there will be a 4x increase in value per m² between T2 (low) and N (medium) densities.

This is not particularly an issue for a purchaser because their costs are fixed at purchase, but it does mean that for a territorial authority there will be a large increase in revenue from the rate component calculated from land value. In addition, the total rate take from a given area to support ongoing costs for the same amount of infrastructure will be much higher from a higher density development simply because there are more properties to collect rates from.

Numerically, and somewhat simplistically, if the land value is 4x higher and there are twice as many lots, then the CV component of the rate take will be 8x higher for the council.

Being able to double the yield for the New Neighbourhood development means that infrastructure costs *per lot* are greatly reduced – in the case of roads by over half.

Increased yield results in 2—8x more revenue for established infrastructure maintenance.

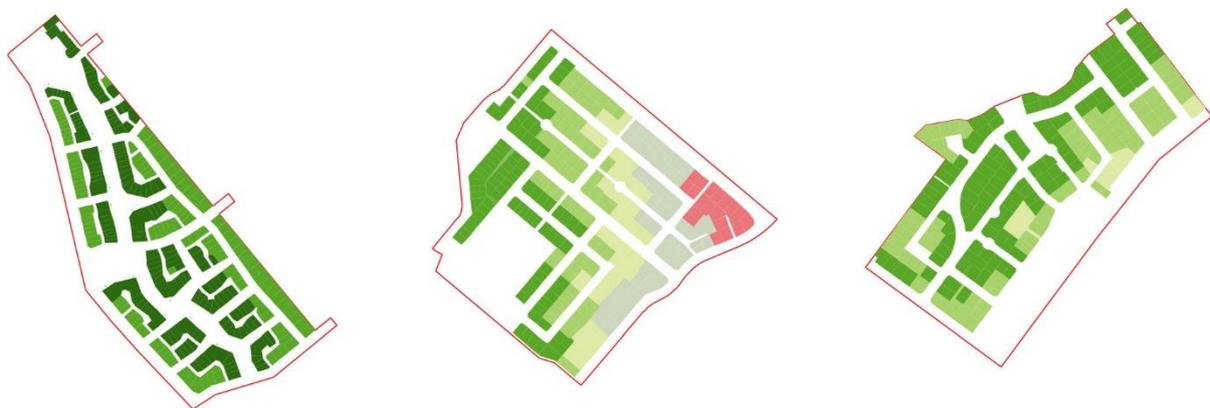
VALUE

If efficiency measures the cost of development, value impacts on the sale price by promoting a range of less quantifiable factors such as desirability, safety, amenity and the perception of amenity that become reflected in the market rate. A range of measurable properties have been shown to be directly related to 'value'

Connectivity (above) is one trigger for value – a more connected environment is more desirable by being more accessible and easier to get around. Many of the other properties that generate value have to do with the configuration of the lot and the relationship of the lot to open-space and the street.

Access to Open-space

The value of public open-space increases as it is used more. Research tells us that residents of lots that front directly onto open-space will use it on average 8x per day, and that use diminishes rapidly with distance, becoming statistically insignificant for lots beyond the 200m mark. Proximity is a measure that transfers directly into lot value.



N

T1

T2

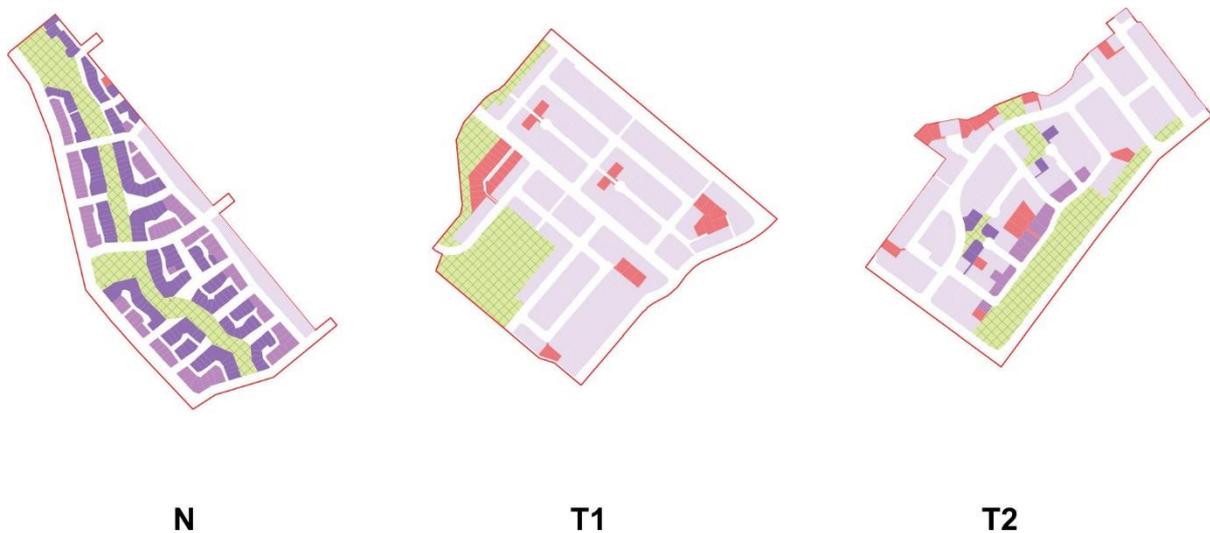
N has 100% of lots within 100m of open-space areas

(T1 = 38%, T2= 66%)

Frontage / Amenity

The ultimate value / amenity enhancement is when the front of the lot spills directly into open-space unmediated by vehicles. As vehicle presence increases, value diminishes.

Rear lots represent a paradox in that in the N scheme they are considered a negative because they don't contribute to or increase the overall open-space and amenity value through their presence and activity. In a typically degraded, car-centric suburban environment, a rear lot – if large enough – is often seen as a haven of peace. That it attracts a higher value than a street-front lot is less an irony than an indication of the extent that vehicle presence devalues the street environment for people.



N has 64% of lots fronting directly onto Open-space

(T1 = 0%, T2 = 4%)

N has 0% of lots without any public frontage

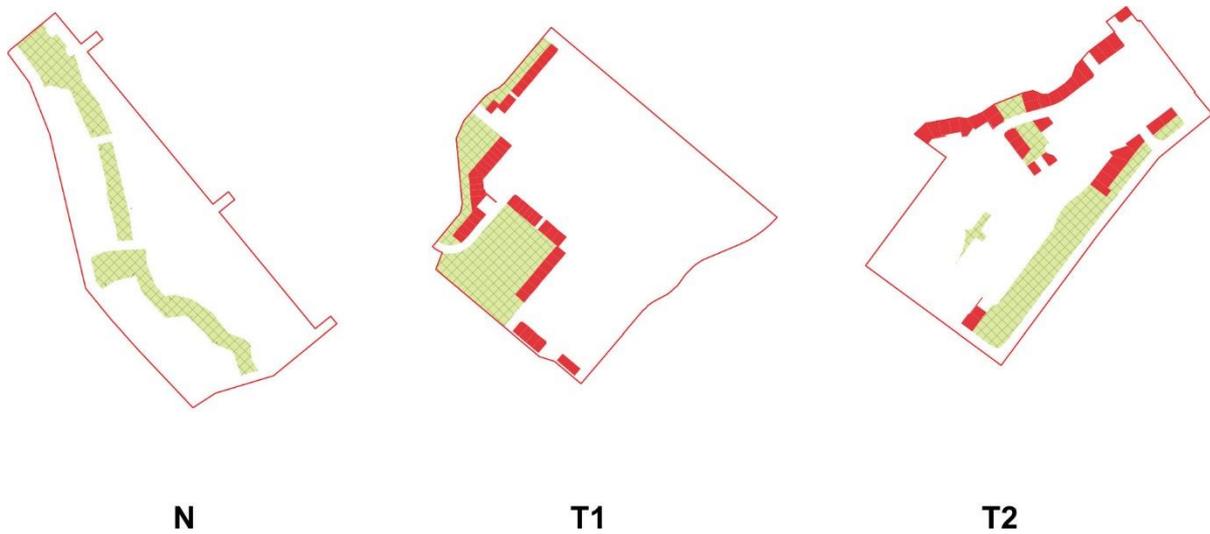
(T1 = 12%, T2 = 7%)

Open-space Dis-benefit

As much as fronting public open-space increases value of both the lot and open-space, when a lot backs onto public open-space it will dramatically reduce the amenity value of the open-space for the public. In almost every case residents chose to separate themselves from the open-space with high fences and vegetation in order to protect their privacy.

Accepting this outcome as an inevitability, most councils include a rule to the effect that public open-space should have at least 50% of its boundary edged by roads for reasons of safety and legibility. If the cost of open-space is borne by the whole community, and we know that lot frontage maximises its use and therefore value, then a better and preferred

rule should be that 100% of the open-space boundary should be fronted by lots, and if not lots, then roads. But never lot rear boundaries.



N has 0% lots backing onto public open-space

(T1 = 18%, T2 = 19%)

Value Summary

The data visualisations identifying lot characteristics consistently illustrate the complete difference between the two approaches to development configuration.

The fundamental distinction in N design is in the understanding of the public realm and the willingness to connect this with the private realm via the front of the house (the public yard). This allows the lot to capitalise on the benefit of public open-space and adds to the amenity of all residents.

The difference in roading pattern seen in the efficiency analysis is a function of realising the principles of this relationship.

CONCLUSION

Being of similar size and having a similar coverage breakdown, development costs for all three development types will be about the same. However, as shown by the efficiency data, the number of lots over which this cost can be spread in the N model is about double. On its own this would seem to be a huge advantage for development feasibility.

But cost is only part of the equation – it is not value. Value will be realised in the desirability, saleability and lot price of the subdivision. It is in this area that the tissue study has revealed the real difference between N and T development patterns.

The heat-map analysis emphasised the dramatic difference in outcome for the N approach in relation to public open-space. As a primary driver of value, the point was made that in the first instance the value created for the developer by open-space amenity attaches to the price of the lot. The research (NZ and international) suggests this premium is in the order of plus 20—80%.

Disregarding the benefit to individual lots, the value of public open-space – a cost to the whole community – is made greater and the spaces more useful in proportion to the amount and variety of activity they attract. By delivering the maximum activity from the fronts of the houses, the community's investment in open-space is optimised without the requirement of extra funding to create necessary activity.

N development aims for higher densities. Small property sizes *may* result in a reduction of amenity value within the lot. This is especially so when higher density subdivisions are designed in the same way as their low-density counterparts with lot sizes above 600m². But the N approach is by nature design-led. It concentrates on the relationship of footprint to site area, and the relationship of activity space to the building and boundary. Larger sites generally have sprawling large-footprint houses built on them with little regard to the left-over space, and so have very low space utilisation efficiency.

Functional amenity within the lot also tends to drop in steps, in a non-linear way, as lot sizes decrease. There's a limit to the size yard that will accommodate a game of cricket – there's no such thing as $\frac{3}{4}$ cricket. But without a full analysis of individual lot layouts there is no way of quantifying the amenity loss in a meaningful way.

An urban design mantra is that as on-site amenity is reduced, off-site amenity should be increased in compensation. This tissue study has certainly shown a massive increase in the usability of amenity available to the lot in the N sample, but beyond the lot boundary. The study also demonstrates that this advantage is gained without having to appreciably increase the total size of the open-space realm.

Given the cost parity, the study points to a reversal of that mantra and to a reversal in policy approach as well. That is, if amenity is present – and by that we mean public transport, shops, open-space, social infrastructure, etc – then development **MUST** achieve minimum density goals to pay for it, based on proximity. Although in theory the cost burden is borne

by the whole community, in practice amenity is not distributed evenly and so costs are largely transferred to poorer areas that receive far less benefit.

N takes a completely different approach to vehicle access and movement in order to increase the value of the public realm. A compound effect of this different way of managing vehicles is that the lot now requires much less land to accommodate cars to reach the same performance standard – about 100m² less. Only considering vehicle amenity alone means that a 300m² N lot for example, equates in usable space to a traditional 400m² lot.

The size / value disparity is increased when other efficiencies resulting from the emphasis N design places on 'fronts and backs' is taken into account. Tissue analysis in Taupo as part of the council's EUL project showed that the difference was about 100% ie the GFA, usable space and real outdoor amenity of existing 700m² sites was matched on N sites of about 300—350m², and usable space and amenity of 450m² sites matched on N sites of about 200m². When functions / activities were mapped on the site it demonstrated that there need not be any reduction of private amenity at higher densities. Higher levels of value and public amenity are an 'extra' achieved at no cost.

By every measure the N approach proved superior to T.

Confining conclusions to the development process, the N approach:

- **Costs the same as T development**
- **Halves the costs *per lot* ie doubles the return**
- **Attracts an extra premium on the price of the lot ie increases gross return**

But suburban development is also a community asset and cost. When real value to residents and the wider community is calculated then:

- **Less land is required for the same population**
- **The same population requires less investment in infrastructure**
- **There is a very large increase in usable amenity**
- **Subdivisions are safer**
- **Higher densities support modal shift and the economics of PT**
- **There are add-on benefits in terms of public health**

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