TECHNICAL NOTE

QUANTIFYING THE SOCIAL AND TRANSPORTATION IMPACTS OF LAND USE CHANGE

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ABSTRACT

Following local protests and substantial media interest over the impacts of closure of the Redwood Post Shop. Abley Transportation Consultants set out to quantify the impacts of the removal of the Redwood Post Shop and compared this with the benefits of establishing the planned new Post Shop in Northwood.

This analysis showed that 5305 people would now have to walk more than 15 min to their nearest post shop (769 aged 65+), while only 3239 people (and 416 aged 65+) would be within a 15 minute walk of the new store, highlighting a net disadvantage to the Christchurch community.

This resulted in Brendon Burns, the local MP for Christchurch Central requesting a more detailed investigation of transportation effects and the demographics of those affected by the planned removal of the Linwood (Stanmore Road) Post Shop. Removing the Linwood Post Shop shows that 72 % of those currently using the post shop could be expected to change transportation mode in order to reach their next nearest post shop. This has the potential to generate an extra 12,000 vehicle trips and an additional 3 tonnes of CO_2 each year.

INTRODUCTION

Amidst the publicity surrounding the closure of the Redwood post shop, Abley Transportation Consultants analysed the potential impacts of the closure as part of a presentation on accessibility modelling. Following the presentation and substantial media coverage regarding further post shops closures, as part of New Zealand Post's re-investment strategy (consolidating retail operations around suburban centres) Abley Transportation Consultants was approached by Brendon Burns, the local Member of Parliament for Christchurch Central, to investigate the transportation effects and demographics of those affected by the planned removal of the Linwood Post Shop.

The impact on the community of closing the Redwood Post Shop and the detailed investigation into the closure of the Linwood (Stanmore Road) Post Shop are discussed in this technical note.

CLOSURE OF REDWOOD POST SHOP

A model of the walking network around post shops in northern Christchurch was created and used to calculate a series of 5 minute walking catchments (up to total walking time of 30 minutes). This was then repeated with the Redwood post shop excluded from the analysis in order to show the impact of its removal on the time taken to walk to the next nearest post shop (Figure 1).

The data from the latest census (2006) was analysed for the area currently within a 15 minute walk of the Redwood post shop and further than 15 minutes from the next nearest post shop. This enabled the demographics of those affected by the closure to be determined.

The analysis found that 5305 people lived within a 15 minute walk of the Redwood Post Shop and would end up having to walk further than 15 minutes to their next nearest post shop. A large proportion of people would find walking more than 15 minutes to access a post shop to be unreasonable. This will ultimately increase reliance on private car travel. The group most affected may be the 769 (14.5%) senior people (65+) who may not have access to a car and could become opportunity disadvantaged by the proposal to close the post shop.

Re-location to Northwood

Part of New Zealand Post's re-investment strategy involves opening a new post shop in Northwood, effectively re-locating the services that are currently offered by the Redwood Post Shop. In order to calculate the net-benefit of this change in location for the Christchurch community, walking catchments were generated for the proposed Northwood Post Shop so that the demographics could be investigated.

The Northwood post shop would benefit 3239 people (within a 15 min walk). 416 (12.8%) would be elderly (aged 65 +). This results in a net-disadvantage to the Christchurch community as 2066 fewer people will be within a 15 minute walk of their nearest post shop, including 353 fewer elderly members of the community.

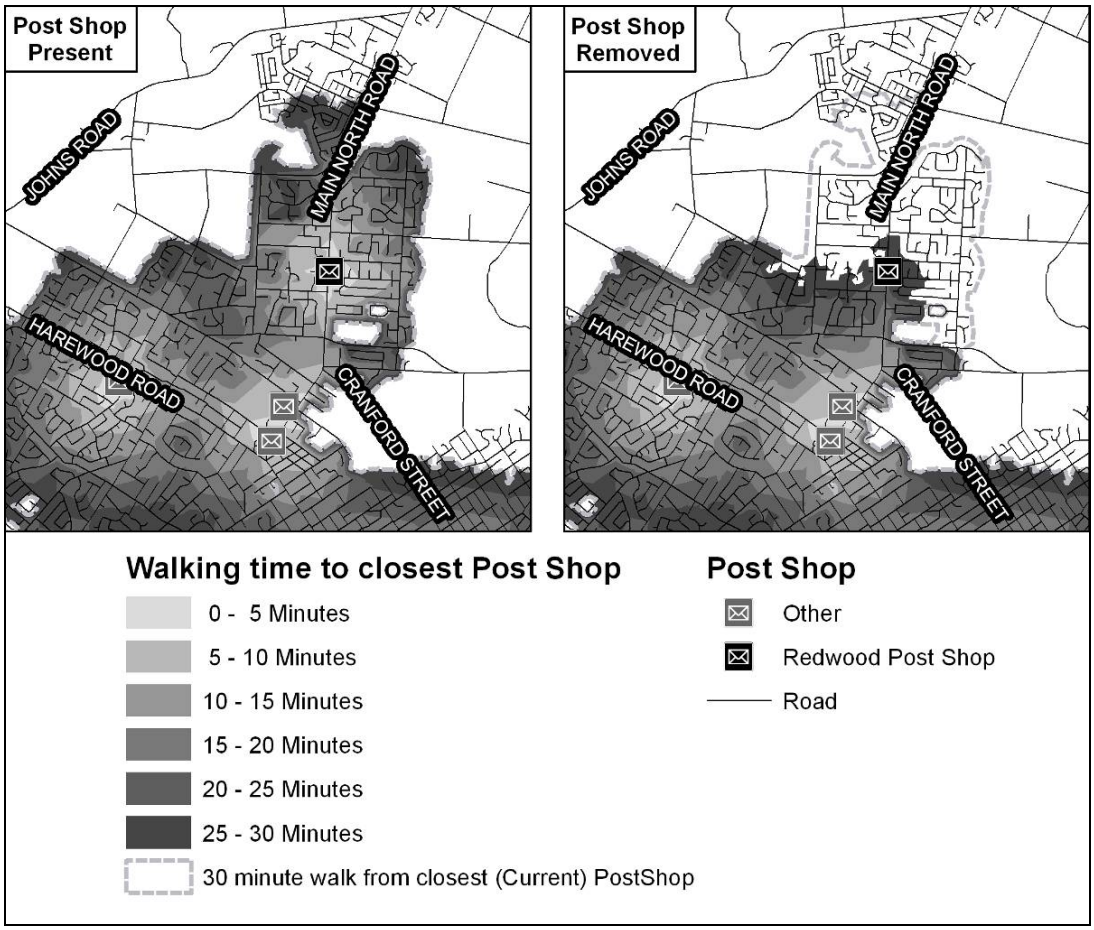

Figure 1 Walking time to the nearest post shop in northern Christchurch showing the impact of the removal of the Redwood post shop. The un-shaded area within the grey dashed line, was within a 30 minute walk of the closest (Redwood) post shop prior to its removal.

DETAILED INVESTIGATION – LINWOOD (STANMORE ROAD) POST SHOP

The analysis of walking catchments used to assess the impact of removing the Redwood Post Shop was refined and then applied to assess the impacts of the planned removal of the Linwood Post Shop. This was complemented by a secondary analysis using the results of a survey of post shop patrons to inform the modelling of the walking trips made by users of the Linwood Post Shop. The modelling results made it possible to investigate how these journeys might change following the removal of the Linwood Post Shop.

Walking Catchment Analysis

Using the mean and 85th percentile walking time from the household to a personal/business service (based on data from a study of the NZ Household Travel Survey, ATCL (in publication), a series of walking catchments to the nearest post shop were calculated for Linwood and the surrounding suburbs (Figure 2).

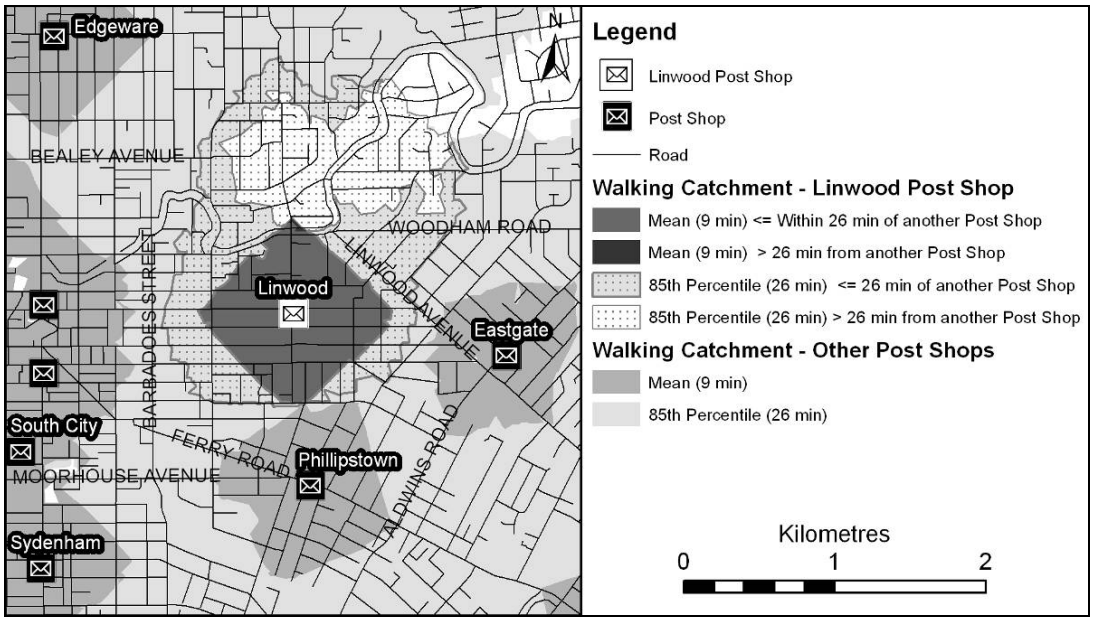

Figure 2 **Walking catchments around post shops east of the Christchurch CBD. The 9 and 26 minute thresholds used relate to the mean and 85th percentile walking time from home to personal/business services. The darkest grey and white dotted areas represent the locations which will experience the greatest disadvantage due to the removal of the Linwood post shop. These catchments were then analysed in conjunction with data from the 2006 census to determine the demographics of those affected by the removal of the Linwood Post Shop:**

- 11,000 people will be required to travel further and hence be disadvantaged by the removal of the Post Shop to some extent. This includes 1,100 elderly and 950 people on a sickness or invalid's benefit.
- 4,890 households will be disadvantaged by the removal of the Post Shop. 900 of these (18%) do not have access to a car, which is double the Christchurch average of 9% and only 47% have access to the internet (Christchurch average 60%).
- The area affected by the removal of the post shop is already amongst the most deprived in Christchurch, with a (weighted average) Deprivation Index score in excess if 8 and has double (9%) the city wide average of sickness and invalid beneficiaries. (The NZDep2006 Index of Deprivation, is published by the Department of Public Health, University of Otago)
- 2,650 people will now have to walk for more than 26 minutes to reach their nearest post shop, of which 340 are aged over 65 and 200 are on a sickness or invalid's benefit. These people form 1,170 households, of which 200 do not have access to a car and more than 500 do not have access to the internet.

Survey and Trip Length Modelling

The 'SAVE THE LINWOOD POST SHOP ACTION GROUP' undertook a survey of users of the Linwood Post Shop for half a day on Thursday 24th September from 9:30am - 1:30pm. The survey showed that in half a trading day, 83 people used the Post Shop and of those, 29 walked to get there.

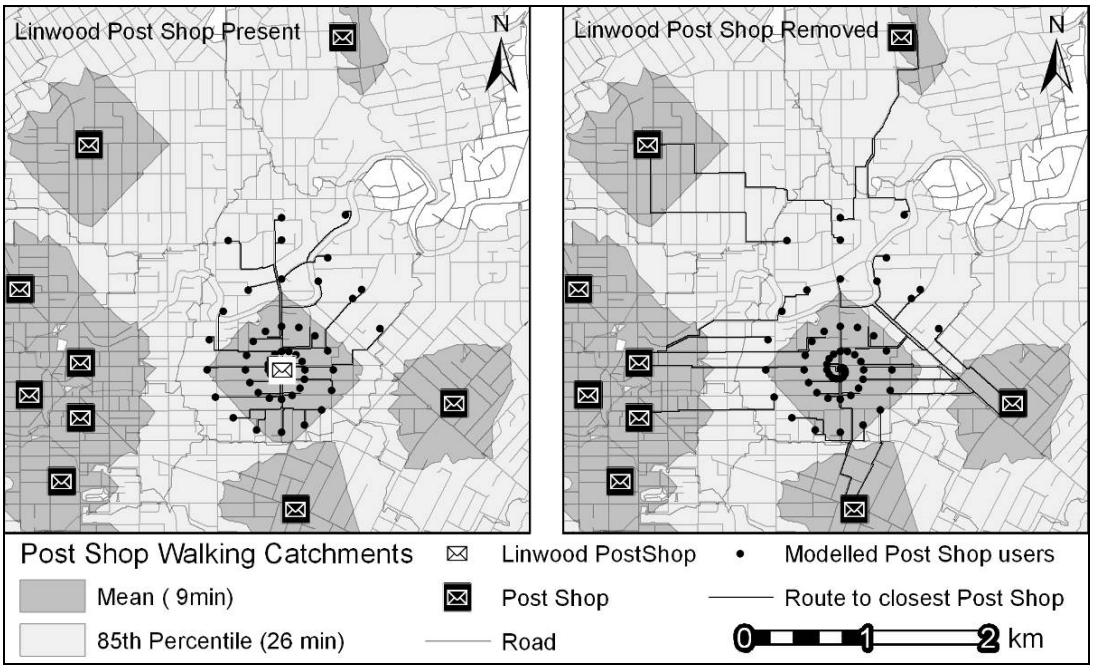

Figure 3 The shortest walking route (by time) to the nearest post shop was modelled for 58 users (in a spiral distribution) of the Linwood Post Shop, both with and without the Linwood Post Shop present.

Using a deterrence curve, 58 users were modelled at regular percentile intervals between 1st and 95th percentile to produce a realistic distance distribution of the post shop customers. Then these distances were spread systematically around the Linwood Post shop every 22.5° in a spiral distribution (the direction of rotation was reversed when the point would otherwise have been placed outside the Linwood Post Shop's catchment). Then the shortest walking trip (time) was calculated to the nearest post shop, both with and without the Linwood Post Shop (Figure 3). From these modelled trips it was possible to calculate the increased time required to reach the closest post shop. Once the travel time exceeded 17.6 minutes (~70th percentile walking time) it was assumed a mode shift from walking to another mode occurred. Then using the results of the survey, the model results were extrapolated to give an indication of the annual effects of the change.

The removal of the Linwood Post Shop could result in 72% of people who currently walk to the post shop switching to another mode of transport. The group that continue to walk the increased distance would spend an additional 640 hours per year walking. It is likely that this mode shift will be spread between cycling, public transport and private vehicle use, but in order to calculate the maximum expected impact, it was assumed that the entire mode shift was to a private vehicle. This would generate 12,000 extra vehicle trips every year. Using the current EU CO_2 emission standards (of 160 g CO_2/km, Source: European Communities, 2009) these extra vehicle trips would generate an additional 3 tonnes of CO_2 per annum.

CONCLUSION

Closing the Redwood Post Shop will have a negative impact on the local community. Even when the planned new post shop in Northwood is taken into account, there is still a net-disadvantage to the Christchurch community as 1796 fewer people will be within 15 minutes walk of their nearest post shop. This includes 353 elderly members of the community.

The detailed study into the effects of removing the Linwood Post Shop shows that 72 % of those currently walking to the post shop could be expected to change transportation mode in order to reach their next nearest post shop. If all those affected switched to using a private vehicle, this has the potential to generate an extra 12,000 vehicle trips and an additional 3 tonnes of CO_2 each year.

This illustrates that decisions primarily formed around economic and retail market efficiency, can have wider reaching social, transportation and environmental consequences that may not be immediately obvious.

REFERENCES

ABLEY TRANSPORTATION CONSULTANTS (unpublished), New Zealand Transport Agency Neighbourhood Accessibility Tool Development. Contract No. 50/07. (due for publication March 2010)

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ACKNOWLEDGEMENTS

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