Native Plants in Lincoln Township: Ecological Baseline Survey of Residential Properties

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Introduction

This project seeks to identify and enumerate native plants in residential properties in the Lincoln Township. The objective of this study is to establish baseline ecological data so that future changes and enhancement of indigenous biodiversity can be monitored.

Given New Zealand's colonial past, there is an appalling record of the appreciation and preservation of native plants and animals. Early European colonists were quick to replace indigenous plants with familiar plants from home, and as a result New Zealand's native plant species were seldom seen in predominantly exotic gardens. Due to this, people have not connected with the indigenous flora and fauna of New Zealand, as it is unfamiliar to them. Recently there have been increased initiatives to create landscapes that reflect our indigenous history and culture. Fundamental to creating indigenous landscape is that it will create a landscape identity that celebrates nature and culture, thus making the indigenous more familiar and in time the expected norm. Hence culture becomes the driver for nature conservation not as a separate activity (Meurk and Swaffield 2000).

Despite the now fashionable trend towards using native plants in parks and gardens there is still sadly the perception that they are inferior to exotic species (Edwards and Given 2004).

Part of the motivation for this project is to create an awareness of native species present in private gardens, often homeowners did not realise that they have native species present. It is hoped that this awareness in turn will encourage more widespread planting and appreciation of New Zealand's unique flora. There are many reasons why people may plant a garden. For some it may be a purely aesthetic want, to create a pleasing environment. For others, reasons may be more practical, such as creating shelter. Many people are unaware of the benefits that planting natives brings. The flowers and fruits of many New Zealand plants are attractive to native birds, and so are significant in terms of encouraging wildlife back into urban spaces. Planting bird-attracting plants is also important to encourage natural regeneration through seed dispersal which is a service naturally carried out by birds (Edwards and Given 2004).

Urban centres are often built in areas of high biodiversity so therefore the importance of this diversity should be taken into consideration when planning and managing land use options. With the creation of adequate green space that has been ecologically restored it would provide for propagule saturation across the landscape (Spellerberg and Given 2004). In other words, by creating a source of native plants they would be naturally dispersed into the surrounding area. This would be of benefit in terms of increasing biodiversity. This has clear implications for this research, which is to establish baseline data of native vegetation present within the private gardens of Lincoln homeowners.

Significant to this study would be the identification of any naturally regenerating native species. This also has a social dimension in the weeding of gardens. Part of the interest for this project is to see if these spontaneous propagules are recognised by the public and protected and encouraged to become features in people's private gardens.

Methods

This research of native biodiversity was based on the sampling of 120 residential properties within the Lincoln Township. Random points were generated and from each of these the closest residential property was sampled. The size of the property was estimated, as was the percentage of land covered by the house. Each property was divided into front and back yards.

The following parameters were recorded:

In each section the proportion of cover was estimated for seven different biotopes being, lawns, shrubbery, herbaceous borders, woodland, hedge, vegetable garden and the amount of paved surface.

A regeneration index ('tidiness' index) of 1-5 was also recorded for both the front and back of the property. 1 being unkempt, often with the presence of spontaneous regeneration and 5 being totally covered in concrete, bark chips or plastic. The number of each native species and the height of the tallest of each species were recorded for front and back yards and the cover class for common invasive species ivy, male fern and tradescantia was also estimated. The number of non-native woody species was recorded and classed as 'many' if >5 individuals were present.

Simple summary statistics were carried out to show any significant patterns in indigenous species abundance.

Results

Native species composition and richness

The total native biodiversity was high, with fifty-nine species recorded for the front of the properties and forty-nine species recorded for the back (Table 1., Appendix 1). The total number of species found in front and backyards was 72.

The most common native species in front and backyards were *Hebe* species, *Pittosporum tenuifolium, Carex* species*, Phormium tenax*, *Pittosporum eugenioides, Coprosma* species*, Dodonea viscose* and *Cordyline australis. Griselinia littoralis,* and *Hoheria populnea* occurred only in front yards while *Dicksonia squarrosa, Pseudopanax crassifolius* and *Cordyline australis* were more common in backyards. *Sophora microphylla* occurred in backyards only.

It is noteworthy that several species that naturally occur only on the North Island (e.g., *Hoheria populnea* and *Sophora tetraptera*) were reasonably common (see Appendix 1 for other North Island species).

Table 1. The total numbers of native species and the mean number per property for front and backyards, Lincoln Township. Only species with > 10 individuals in either front or backyard are shown.

Front yard	Total number of native plants	Mean number per property	**Backyard**	Total number of native plants	Mean number per property

Hebe hybrid/cultivar	160	1.4	*Hebe* hybrid/cultivar	102	0.9
Pittosporum tenuifolium	137	1.2	*Pittosporum tenuifolium*	132	1.1
Carex spp.	97	0.8	*Carex* spp.	19	0.2
Phormium tenax	65	0.6	*Phormium tenax*	64	0.6
Pittosporum eugenioides	60	0.5	*Pittosporum eugenioides*	79	0.7
Coprosma spp./hybrid	40	0.3	*Coprosma* spp./hybrid	73	0.6
Dodonaea viscosa	39	0.3	*Dodonaea viscosa*	31	0.3
Cordyline australis	36	0.3	*Cordyline australis*	85	0.7
Libertia ixioides	33	0.3	*Libertia ixioides*	41	0.4
Pseudopanax lessonii	31	0.3	*Pseudopanax lessonii*	27	0.2
Coprosma robusta	23	0.2	*Coprosma robusta*	22	0.2
Myrsine australis	23	0.2	*Mrysine australis*	11	0.1
Dicksonia squarrosa	20	0.2	*Dicksonia squarrosa*	52	0.4
Solanum laciniatum	16	0.1	*Solanum laciniatum*	12	0.1
Hebe speciosa	13	0.1	*Hebe speciosa*	8	0.1
Coprosma repens	12	0.1	*Coprosma repens*	13	0.2
Hebe stricta/salicifolia	13	0.1	*Hebe stricta/salicifolia*	7	0.1
Hebe odora	9	0.1	*Hebe odora*	11	0.1
Sophora tetraptera	9	0.1	*Sophora tetraptera*	28	0.2
Plagianthus regius	7	0.05	*Plagianthus regius*	10	0.1
Pseudopanax crassifolius	3	0.05	*Pseudopanax crassifolius*	37	0.3
Griselinia littoralis	21	0.2			
Hoheria populnea	12	0.1			
			Sophora microphylla	21	0.2
Other*	109	0.9	Other	90	0.8

* Other significant species recorded but < 10 individuals encountered in either front or backyard. See Appendix 1. for a full species list.

To examine differences in species richness as a function of property age the data was separated into new subdivisions and older residential properties (Table 2.). There were no

significant differences in species richness between different subdivisions, neither in front nor backyards.

Table 2. Mean native species richness in new and older subdivisions by front and back yards, Lincoln Township.

Property	Number of properties	Mean species richness per property	SE mean	Standard deviation
New Front	28	3.621	0.560	3.017
New Back	29	3.500	0.403	2.134
Old Front	87	3.586	0.319	2.979
Old Back	87	3.356	0.362	3.436

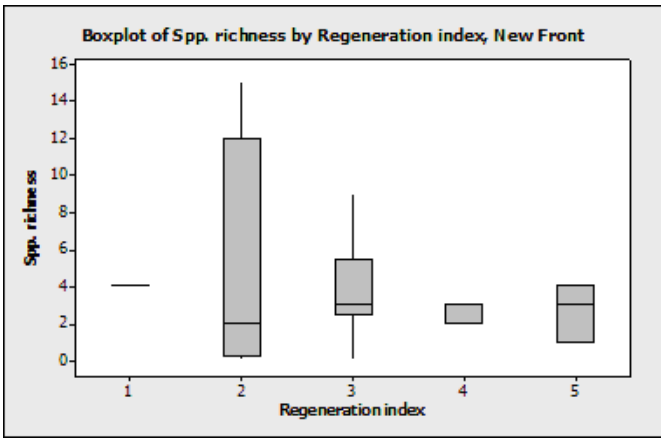
Species richness and the regeneration ('tidiness') index

For each property a regeneration score was given on a scale of one to five, as mentioned in the Methods section: one being the presence of spontaneous growth of native plants, two was untidy or unkempt garden, three was clean and tidy, four being obsessively manicured and five was the total cover of concrete or plastic. This regeneration index is also an indication of how much maintenance a garden receives. Spontaneous growth is more likely to occur in gardens that are not constantly being weeded.

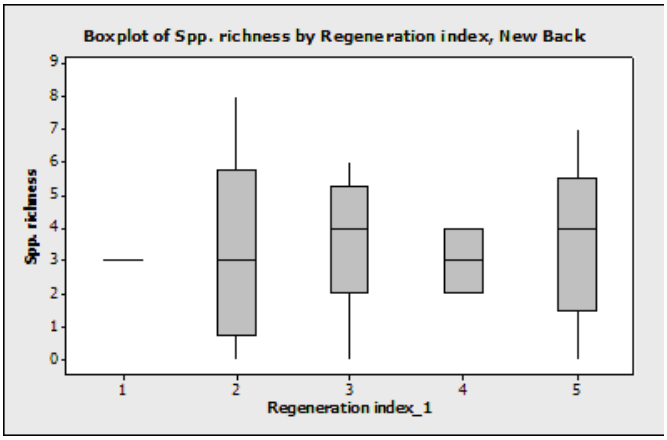
In the new subdivisions, species richness was unrelated to the regeneration index (Figure 1.) There was a tendency (although non significant) for species richness to be higher in back yards. In the older subdivisions, species richness in both front and back yards tended to be higher in the more unkempt properties (regeneration index = 1) and considerably higher than in all other situations in older properties and all new subdivisions.

Figure 1. Relationship of species richness to the regeneration index in new and older subdivisions, Lincoln Township.

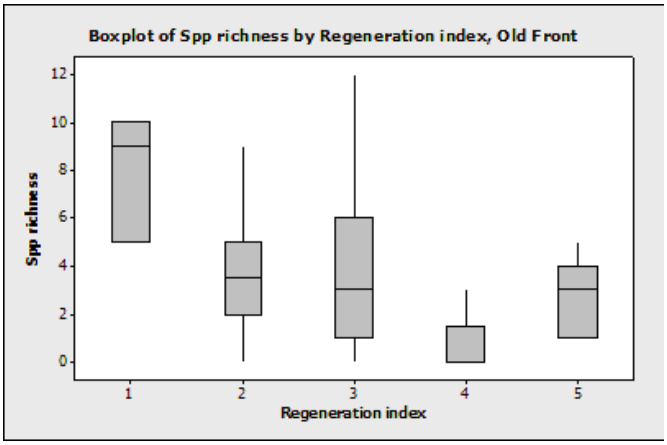
1. New Front



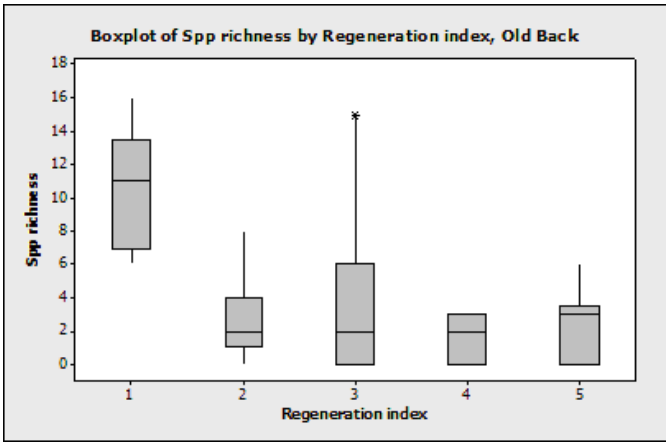
2. New Back



3. Old Front



4. Old back



Proportion of biotopes in residential properties

For each property % cover for different biotopes was estimated for both the front and backyards (Table 3). The most common biotope is lawn at around 40%, followed by paved surfaces at 20-30%. Woodland was rare, shrubberies were common and it is interesting to note the greater prevalence of herbaceous borders in front yards than in backyards. Vegetable gardens were not well represented and when present generally occurred in backyards.

Table 3. Percentage cover of common biotopes in residential front and backyards, Lincoln Township.

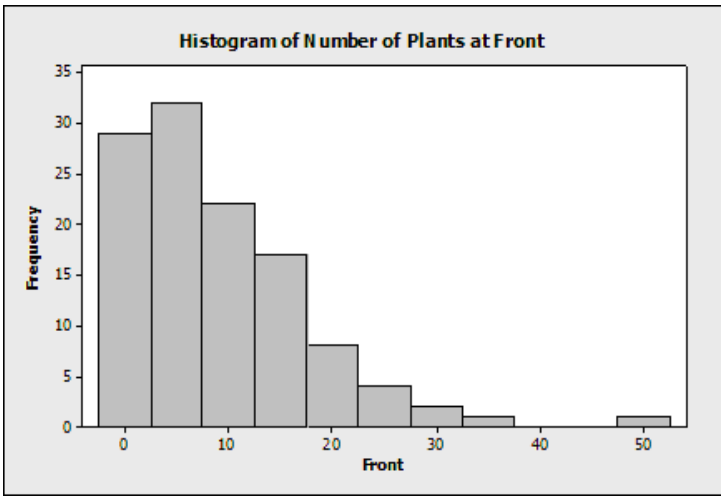
Biotope	Lawn	Shrubbery	Herbaceous border	Woodland	Hedge	Vegetable garden	Paved
Front	38	15	14	1	2	1	29
Back	42	18	7	2	1	9	20

Frequency of plants per property

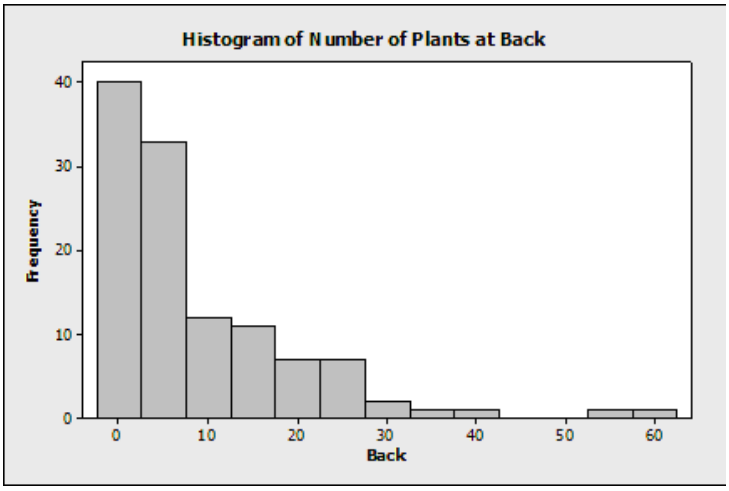
The results for both front and backyards are highly skewed indicating that many properties had few native plants (generally <10) and that few properties had > 40 plants (Figure2).

Figure 2. Frequency of native species per property in (a) front and (b) backyards, Lincoln Township

(a) Front



(b) Back



Discussion

Gardening is a major leisure activity through which a number of social and cultural themes can be explored (Bahatti and Church 2000). The Lincoln project, demonstrated that the social component was of major significance as it up to the individual's values and preferences what they choose to have in their garden. Many placed a higher aesthetic value on the exotic species than natives so therefore the majority of gardens sampled contained predominantly exotic species. The real value of this project will lie with the monitoring of changes in species composition exhibited in resident's private gardens. When these sites are revisited changes can then be part of a wider understanding of whether people's values pertaining to native plants are changing.

Urban vegetation, of which domestic gardens comprise a large proportion, has influence on the aesthetic character of the area. Considering the increasing amount of land covered by domestic gardens due to increasing urbanization, it would seem appropriate for urban planners to develop a greater understanding of the characteristics of domestic gardens in terms of composition and management (Jim 1993), as well as the motivations of those that create them (Head & Muir 2004, Zagorski et al 2004). The rapid conversion of agricultural land into urban development is especially evident in Lincoln. Currently there are a number of subdivision development projects happening in Lincoln, which are drastically altering the character of a once small rural service town. This project whilst focusing on the presence of native plants in domestic gardens gives a indication of the general character of existing gardens in terms of species composition, as well as including what people consider comprises a domestic garden.

The majority of residents were happy for the researcher to look through their garden once the project was explained. Most expressed surprise that the focus of the study was on native plants and many were sure that they had none in their garden. Often three or four species were found. Concern over the state and appearance of their private space was often expressed. Most interestingly, however, was the initial reaction of residents living in the newer subdivisions when asked if the researcher could look through their garden (which are predominantly planted with native species), residents replied that it was not 'their garden the developer just planted it', which indicates a lack of connection to and ownership of their own personal space.

Given the choice, most people prefer to have an exotic garden judging by conversations with homeowners. On more than a couple of occasions residents whose properties backed onto native reserve areas complained profusely about spontaneous native plants popping up in their gardens! However this study was of an ecological nature and not a social one so these social dynamics and preferences whilst of huge importance and of great interest, were not explored in any quantifiable manner.

Most urban dwellers live on a property with both a front yard facing the street and a back yard, which is hidden from casual observers by a house or fence . Historically back yards have been used primarily to produce food for domestic use and other useful tasks (Seddon 1997 in Simberloff 2003). In contrast the front yard was a place for display (Malor 2002). Recent research in the United Kingdom suggests that 'privacy and scalability and sensual connections to nature', are the main functions of a domestic garden today (Bhatti & Church 2004. p. 37). This shift in values may have lessened the contrast between front and back gardens as was evident on this study, with there being no significant differences in the maintenance of front or back yards nor in the cover classes which is some indication of use.

Garden surveys can suffer bias in that it depends on who is home at the time of sampling. Often older retired residents were encountered in this study which may have some influence on the results due to personal preferences as to what is planted in their garden, perhaps with tendency to plant more of the 'traditional' exotic species.

There has been some research carried out in Christchurch that explores the potential social issues likely to be faced by those wishing to transform urban landscape to enhance biodiversity. The issue of cultural identity seems to be the centre of the contention between the appropriateness of native plantings vs. exotics. Exotics were deemed to have clear link to colonial history but knowing what was originally there is also important for many people as being able to establish their own collective identity .

Conclusions

Most New Zealanders are unfamiliar with the language of ecology, biodiversity, ecosystems, species and habitats. This is not to say they don't care for the native species. As a nation we value our native forests but it may take another generation to learn how to value native biodiversity. The term "biodiversity" commonly refers to the diversity of plants and animals and the places they live in and the processes needed to sustain them.

The reasons why biodiversity should be valued are hugely important as biodiversity provides the ecosystem processes on which we all depend as well as it defining our sense of place. However, many people have grown up surrounded by exotic species that were introduced before they were born, and for them whatever aesthetic is associated with sense of place may well attach to those species as well (Simberloff 2003). This is indeed the case as it is apparent in the choices people make in what species they like to have in their garden. To convince people to plant natives one would have to push strongly for why natives provide something that exotics lack.Thus, more awareness of the benefits natives provide is needed if the township of Lincoln is going to increase its native biodiversity.

Whilst this study exhibited no results of any real significance, the recording of these analyses will be valuable for understanding the nature of domestic gardens as a resource within the township of Lincoln as well as providing a baseline for determining future changes in the composition of residential gardens with particular reference to the amount of native biodiversity.

Acknowledgements

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Appendices

Appendix 1. Number of 'other' native species present in residential front and backyards (see Table 1), Lincoln Township.

Species	Front yard	Back yard
Agathis australis	0	1
Alectryon excelsa	5	0
Anemanthele lessonii	2	0
Aristotelia serrata	1	0
Brachyglottis monroi	0	1
Brachyglottis spp.	5	2
Chionchloa conspicua	3	0
Clianthus puniceus	2	1
Coprosma crassifolia	0	1
Coprosma rotundifolia	5	0
Corynocarpus laevigatus	0	2
Cyathea smithii	0	3
Dacrycarpus dacrydioides	2	2
Dacrydium cupressinum	1	0
Elaeocarpus dentatus	0	1
Hoheria angustifolia	1	7
Hoheria sexstylosa	2	0
Knightia excelsa	4	1
Kunzea ericoides	0	9
Leptospermum hybrid	3	0
Leptospermum scoparium	5	3
Lophomyrtus hybrid	1	0
Melicytus ramiflorus	2	2
Metrosideros excelsa	1	3
Metrosideros robusta	1	1
Myoporum laetum	1	6

Myrsine divaricata	1	0
Myosotidium hortensia	0	2
Neopanax laetum	3	0
Nothofagus fusca	7	3
Nothofagus menziesii	3	0
Nothofagus solandri	6	6
Olearia arborescens	2	0
Olearia spp.	5	2
Olearia paniculata	0	3
Pittosporum hybrid	3	5
Pittosporum ralphii	0	3
Podocarpus totara	6	1
Polystichum vestitum	4	0
Prumnopitys ferruginea	1	0
Pseudopanax arboreus	6	9
Pseudopanax ferox	7	1
Pseudopanax hybrid	4	8
Pteridium esculentum	1	0
Uncinia rubra	2	0
Vitex lucens	0	1
Weinmannia racemosa	1	0

Appendix 2. Street addresses for all properties sampled

7 Tod Pl
4 Tod Pl
11b Robert St
20 Tod Pl
9 Milbrath Dr
28 Milbrath Dr
36 Kildare
17 James St
30 James St
12 Morris St
6 Habgood Pl
90 Moffat Dr
13 Ryelands Dr
50 Heathridge Pl
60 Heathridge Pl
67 Heathridge Pl
16 Heathridge Pl
6a Williams St
3 Murray Pl
61 Gerald St
1 Murray Pl
16 William St
6a Edward St
18 Ashgrove Pl
94a Moffat Drive
51 Edward St
138 North Belt
5 Lindum Pl
112 East Belt
63 Gerald St
47 Gerald St
5 Glebe Pl
7 Glebe Pl
8 Glebe Pl
25 West Belt
233 Southfield Dr
224 Southfield Dr
9 Murray Pl
13 Murray Pl
6b Williams St
11a Williams St
6 Murray Pl
5 Williams St
11 Armil Pl
18 Williams St
51 Gerald St
31 Alandale Drive
1 Murray Pl
3 Armil Pl
14 Edward St
8 Ashgrove Pl
19a Ryelands Dr

21 Ryelands Dr
6 James St
17 Heathridge Pl
57 Heathridge Pl
1 The Mews
1a Williams St
8 Kildare Tce
9 Douglas St
10 Hagbam St
29 West Belt
76 Moffat Dr
90 Moffat Dr
23 Leinster Tce
82a Moffat Dr
98 West Belt
6 Weston Way
86a Moffat Dr
30 Edward St
29a Edward St
40 Edward St
7 Barker St
6 Barker St
1 Glebe Close
20 Maurice St
11 Barker St
22 Robert St
48 South Belt
40 James St
42 Kildare St
2 Boundary Rd
31 Edward St
19a South Belt
13a Roblyn Pl
11 Roblyn Pl
28 Roblyn Pl
4 Linbum Pl
38 Edward St
2 Lindum St
64a Kildare St
20b Robert St
7 James St
30 Kildare St
30 James St
2 Roblyn Pl
25 James St
97 North Belt
9 Heathridge Pl
19 Edward St
111b North Belt
105a North Belt
111 North Belt
8 Lyttelton St
3 Lyttelton St
7 Lyttelton St

113 North Belt
4a Lyttelton St
119a North Belt
7b West Belt
20 West Belt
24 West Belt
45 Gerald St
39 Gerald St
15 West Belt
8 West Belt
13a West Belt

Appendix 3. Street addresses and GPS locations for all properties photographed.

Site	E	N
31 Allendale Drive	2467913	5729138
3 Armil Pl	2467827	5729375
19 Edward St Front	2468905	5729425
19 Edward St Back	2468928	5729459
61 Gerald St Front	2467740	5729452
61 Gerald St Back	2467765	5729423
1 Glebe Pl	2468162	5729402
7 Glebe Pl	2468104	5729386
9 Heathridge Pl	2468820	5729603
50 Heathridge Pl	2468907	5729605
57 Heathridge Pl	2468946	5729753
3 Lyttelton St Front	2468238	5729753
3 Lyttleton St Back	2468257	5729776
4 Lyttelton St	2468244	5729756
7 Lyttelton St Front	2468246	5729723
7 Lyttelton St Back photo 1	2468286	5729720
7 Lyttelton St Back photo 2	2468290	5729710
8 Lyttelton St	2468252	5729723
9 Millstream Drive	2468906	5729281
28 Millstream Drive	2468915	5729172
10 Murray Pl	2467920	5729394
13 Murray Pl	2467992	5729389
11A Robert St	2468415	5729441
22 Robert St	2468445	5729329
64A Ryelands Dr	2468575	5729348
1 The Mews	2468474	5729321
20 Tod Pl	2469085	5729250
5 West Belt	2468132	5729685
7B West Belt	2468131	5729673
25 West Belt	2468175	5729449
29 West Belt Front	2468174	5729395
29 West Belt Back	2468216	5729411
5 Williams St	2468363	5729733
6A Williams St Front	2468326	5729713
6A Williams St Back	2468320	5729751

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