

Light/Medium Commercial Vehicle Use in Four Urban Centres

C. O'Fallon, Pinnacle Research and Policy Ltd, Wellington
C. Sullivan, Capital Research Ltd, Wellington

ISBN 0-478-28728-3
ISSN 1177-0600

© 2007, Land Transport New Zealand
PO Box 2840, Waterloo Quay, Wellington, New Zealand
Telephone 64-4 931 8700; Facsimile 64-4 931 8701
Email: research@landtransport.govt.nz
Website: www.landtransport.govt.nz

O'Fallon, C.¹, Sullivan, C.² 2007. Light/medium commercial vehicle use in four urban centres. *Land Transport NZ Research Report 316*. 134 pp.

- 1 Pinnacle Research and Policy Ltd, Wellington
- 2 Capital Research Ltd, Wellington

Keywords: Auckland, CBD, commercial vehicles, couriers, light/medium commercial vehicles, Lower Hutt, movement, New Zealand, Takapuna, transport corridor, transport modelling, trip, urban areas, visit, Wellington

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Acknowledgments

First of all, we would like to thank Land Transport New Zealand for the funding to carry out this research project.

The support of Peter Clark (formerly of Auckland Regional Council) and Tony Brennan (formerly of Greater Wellington Regional Council) was important at the outset, in terms of initially obtaining funding, identifying the case study corridors and scoping out the information to be collected. Jay Sankaran, Auckland University, provided invaluable advice on our methodology and case analysis. Our external peer reviewer, Jason Vallint of TRL, also provided insightful comments and helpful references to improve the overall quality of our reporting.

Thank you to the key respondents from the 50+ organisations in our four corridors – Queen Street, Auckland; Central Takapuna; Lambton Quay, Wellington and Central Lower Hutt – who kindly gave us their time, facts and opinions about commercial vehicle use within their organisations. Without their co-operation, we would have nothing to report.

Abbreviations and acronyms

ARC:	Auckland Regional Council
ANZSIC:	Australia and New Zealand Standard Industrial Classification
CBD:	Central Business District
FTE:	Full-time Equivalent
GWRC:	Greater Wellington Regional Council
HCV:	Heavy Commercial Vehicles
LMCV:	Light/Medium Commercial Vehicles
MED:	Ministry of Economic Development
SIC:	Standard Industrial Classification

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Executive summary

Our study, which was undertaken during 2004 and 2005, is exploratory in nature, primarily because very little information is available regarding light/medium commercial vehicle (LMCV) trip patterns in urban areas. At the outset, we identified four main objectives to the project:

- to qualitatively clarify the nature, as well as the driving factors (e.g. consumer preference, inventory requirements), of urban-based LMCV movements;
- to categorise the types of movements and usage of transport services by organisational purpose (i.e. goods v. services, perishable v. non-perishable products/goods, etc) to the extent feasible within a case study approach;
- to comment on the impact different policy tools might have on such movements, based on key informant interviews; and
- to discuss the implications for modelling such movements (e.g. for forecasting).

Method

We adopted a well-recognised explanatory method for case studies. This required us to formulate our hypothesis as a precursor to defining the case study protocol. Our hypothesis for this research project was:

The demand for (or use of) and the provision of transport services within an urban corridor varies depending on:

- the physical characteristics of the corridor (e.g. level of traffic volume (as it relates to congestion), location within the urban area);
- the density, composition and nature of the organisations located within the corridor (e.g. organisational type/structure, level of transport service required, available floor space/storage);
- the effect of the relationship between the organisation and its customers (e.g. customer service standards, customer expectations), between the transport user and its clients, and between the transport provider and the transport user; and
- the regulatory environment (e.g. local policies such as curfews through to vehicle licensing and operation regulation characteristics).

From this hypothesis, we derived three propositions, which are essentially a series of specific statements based on the hypothesis that we hoped to prove (or disprove) in the course of our case studies.

Selecting case studies

Deciding on a multiple case study approach, we established two contexts for our case studies, namely Auckland Region and Wellington Region, and selected four case study corridors: two in the heart of the Central Business District (CBD) of a major city (Queen Street, Auckland, and Lambton Quay, Wellington) and two in the main business area of a secondary city (Central Takapuna, North Shore City, and Central Lower Hutt).

We conducted face-to-face interviews with 'key informants' from organisations located within each corridor. Approximately 50 such organisations were interviewed about their demand for all types of commercial transport services, thus including heavy commercial vehicles (HCVs) and cycle couriers, as well as commercial trips involving private vehicles, although we intended to focus our analysis on LMCV movements. Given the extensive use of couriers in all four corridors, we also interviewed one non-urgent and one urgent courier company, both operating in the Wellington Region.

Reporting

We prepared a separate report for each corridor, providing contextual information about the corridor and our specific 'target area', including the mix of business types and sizes located within the corridor, as well as a general description of each organisation interviewed. We then discussed their use of/demand for commercial transport services, specifically considering physical and other characteristics of the corridor (such as density, congestion levels, effect of special types of goods) and their effect on demand. We explored their reaction to possible transport-related policies, including pedestrianisation and restricting commercial vehicle access, and their reaction to increasing transport costs.

We conducted four types of cross-case analysis, comparing commercial vehicle movements between similar contexts, i.e. between the two 'heart' corridors of Lambton Quay and Queen Street, and between the two secondary city central areas of Central Takapuna and Central Lower Hutt; and within contexts, comparing Queen Street to Central Takapuna, and Lambton Quay with Central Lower Hutt.

We also considered the characteristics of the businesses and how these might affect the demand for/use of commercial transport services. We found that some characteristics had a distinctive impact on commercial vehicle movements associated with a business, namely whether:

- the business provided goods (e.g. retail shop) or services,
- the business operated independently or as part of a chain or franchise, and
- the goods or services provided are time-sensitive (perishable or not perishable) or vary by season.

We also found that service standards, either set by the organisation or expected by the customer, have an effect on commercial vehicle movements.

Our research does not support the theoretical argument that either the number of staff employed or the floor space occupied by an organisation are good indicators of the extent of commercial transport services required by that organisation. Rather, the characteristics of the organisation, as indicated above, and the density and mix of organisations in the corridor appear to be stronger determinants of overall demand.

Implications for quantitative questionnaire and modelling

In terms of the systematic data collection required to express or model the LMCV movements in an urban corridor more quantitatively, we have the following observations:

- It is necessary to distinguish between commercial vehicle trips to the corridor, stops within the corridor (to service one or more clients), and visits to each client.
- The characteristics of organisations in the corridor will have a distinctive influence on the volume of commercial vehicle trips and visits within the corridor. With further quantitative research, it may be possible to generate a classification of different businesses and their 'commercial vehicle attraction rate'.
- Distinguishing between 'goods' and 'services' visits is likely to be difficult: courier visits may be either as a supplier (e.g. to deliver stock or to transfer stock between locations) or as a service (e.g. to pick up outgoing packages for clients of the business).
- Similarly, distinguishing between 'incoming' and 'outgoing' goods trips or visits may be difficult for some businesses, as one such visit, e.g. by a regularly scheduled courier, may result in the delivery of incoming items and the pick-up of outgoing items.
- Distinguishing vehicle types involved in visits or trips to an organisation appears to be quite readily achieved.
- It may be too easy to under-estimate service-related visits, particularly for maintenance and repairs. Generally, we found that a smaller number of these happened on a weekly basis, unless a business was significantly reliant on technology.
- In areas of intense land development (e.g. a lot of high-rise buildings), some vehicle movements will not be counted by the tenants, as they are the responsibility of the building manager. In quantifying LMCV movements, it will be important to include building managers in any surveying.
- Many respondents did not know the floor area and could not even approximate it. Collecting this information via a quantitative survey form may be misleading.
- 'Private' vehicles were not widely used among the 49 organisations we interviewed for either delivery of goods or services: 35 of these could not recall any private vehicle use when asked, while seven others indicated that such use was limited to five or fewer trips per week.
- HCV visits were even less common than private vehicle movements: 45 out of 49 respondents did not identify any HCV trips or visits to their organisation.
- Exploratory/qualitative research may be useful in developing some understanding about shopping malls, as they may have very different delivery patterns, given that greater centralised control and timetabling is possible.

Abstract

This study, undertaken in 2004–2005, explores light to medium commercial vehicle trip patterns in urban areas. We selected four case study corridors: two in the heart of the Central Business District of a major city (Queen Street, Auckland, and Lambton Quay, Wellington) and two in the main business area of a secondary city (Central Takapuna, North Shore City, and Central Lower Hutt).

We conducted face-to-face interviews with key informants from organisations located within each corridor. Approximately 50 such organisations were interviewed. Given the extensive use of couriers in all four corridors, we also interviewed one non-urgent and one urgent courier company operating in Wellington Region.

The project had four main purposes:

- to qualitatively clarify the nature, as well as the driving factors (e.g. consumer preference, inventory requirements), of urban-based light and medium commercial vehicle movements;
- ,to categorise the types of movements and usage of transport services by organisational purpose (i.e. goods v. services, perishables v. non-perishables, etc) to the extent feasible within a case study approach;
- to comment on the impact different policy tools might have on such movements, based on key informant interviews; and
- to discuss the implications for modelling such movements (e.g., for forecasting).

1. Introduction

1.1 Context

The focus of this project, which was undertaken in 2004–2005, is primarily on light to medium commercial vehicles (LMCVs) operating within urban areas, rather than long haul (inter-regional) heavy freight vehicles. Long haul freight movements have been the subject of another project funded through the Land Transport New Zealand research programme (Booz Allen Hamilton Ltd 2005). LMCVs may be delivering or collecting goods or carrying out a servicing activity (e.g. installing equipment, maintenance, cleaning) to the organisation¹ they are visiting. Both types of trips are considered of 'fundamental importance to the functioning of the urban area' (Wigan et al, 2002).

Our study is exploratory in nature, primarily because very little information is available in published reports and papers regarding LMCV trip patterns in urban areas. Initially, we found only one example of related research, based in Sydney.

Wigan et al (2002) and Peachman & Mu (2000) describe an attempt, made in 1999, in Sydney to come to some understanding of the movements of 'light commercial or goods vehicles' using more quantitative survey methods, which found it very difficult to gather data by such means. Wigan et al (2002) report that only 10% of businesses approached would agree to participate, and less than half of these actually completed the required survey. Hence, they were able to make only quite general conclusions, including providing a typology of trips and an indication of the trip activity rates (number of service visits per employee per week) for 41 businesses of different types and sizes, along with some comments on potential modelling approaches. In particular, both papers highlight the large number of service trips as opposed to freight trips and argued that no single modelling framework (e.g. to estimate trip generation and 'attraction') can be expected to work across all segments identified. The survey was not able to explore or report on the driving factors behind the trip activity rates or what policy tools might impact on them.

One Australian study (SKM 2006), of a more general nature, modelled the urban freight task and the segmentation of the freight vehicle fleet. This work projected that more of the urban freight task will be conducted by light and medium commercial vehicles, rising from 72% to 83% by 2020. The greatest growth in the freight vehicle fleet has been in the smaller vehicle sizes (1–2 tonne courier vans and small trucks on short haul urban tasks) and in the largest of freight vehicles.

¹ An 'organisation' in the context of this project includes any retail or service business (e.g. counselling service, shop, bank, marketing company, architect, etc), local or central government agency/department, or service organisation (e.g. library, information service) that has a shop front or office at or above street level in the identified urban corridor.

Sankaran et al (2004) and Sankaran et al (2005) have reported in detail on an exploratory study in Auckland of the micro-level impact of traffic congestion from a supply-chain perspective. This study adopted a case study methodology with reference to a total of eight organisations (manufacturers, distributors and logistics/transport service providers). Interviews were conducted with 'knowledgeable informants.' Other data were collected from secondary sources and a literature review. The research was inductive in nature, with the effect that the issues being probed in interviews were not too clearly defined prior to entering the field; rather, they were shaped in the course of the data gathering itself, as new issues came to light. In this way, the researchers could capture information on issues that they had not previously identified (owing to the lack of previous research in this area).

The analysis of their qualitative data enabled Sankaran et al (2004) to report on:

- how customer behaviours aggravate the impact of congestion (e.g. tighter specification of delivery times or uneven purchasing through the credit cycle thereby increasing loads early in the month);
- the adverse impacts of congestion on:
 - distribution costs and efficiency,
 - inbound logistics, and
 - the strategies employed by the organisations to mitigate them (e.g. more zones plied by smaller vehicles, secondary hubs allowing more diverse routes);
- the strategic importance attached to congestion management.

This was done from the perspectives of the manufacturers and distributors as well as the logistics/transport service providers.

1.2 Objectives

We have identified four main purposes of this project:

- to qualitatively clarify the nature, as well as the driving factors (e.g. consumer preference, inventory requirements), of urban-based LMCV movements;
- to categorise the types of movements and usage of transport services by organisational purpose (i.e. goods v. services, perishable v. non-perishable products/goods) to the extent feasible within a case study approach;
- to comment on the impact different policy tools might have on such movements based on key informant interviews; and
- to provide the foundation for modelling of such movements (e.g., for forecasting).

This project is very much about the evolving transport environment and has been aimed towards future users. It was a response to what was perceived to be relatively recent developments (the growth of courier use and more frequent deliveries to businesses) in transport.

Regional Council planners wanted to make improvements related to LMCV movements in their major transport models. Preliminary qualitative research like this is required before more structured approaches (e.g. quantitative surveys) can be soundly designed and efficiently targeted through appropriate sampling. Such quantitative approaches will provide the results needed for subsequent transport modelling.

2. Method

2.1 Overview

Given that we were seeking to break new ground and that the relatively complex issues involved were not sharply defined, rather than jumping into interviews using a loose semi-structured approach, we structured the method relatively formally following a well-recognised text on case-studies (Yin 2003).

Yin (2003) defines three basic types of case studies:

- **Exploratory:** aimed at defining the questions and hypotheses of a subsequent study (not necessarily a case study) or at determining the feasibility of desired research procedures,
- **Descriptive:** presents a complete description of the phenomenon in context, and
- **Explanatory:** presents data bearing on cause-effect relationships – explaining how events happened.

We decided to undertake explanatory case studies, although the project has a definite element of exploration, insofar as we may define future research questions or requirements. This is mainly because very little information is available in published reports and papers regarding LMCV trip patterns in urban areas.

Our approach is confirmed by the study questions which we identified in our original research proposal and which we clarified further with the potential users of our research output:

- How and why does the nature and mix of organisations located within a specific corridor affect (or not affect) the use of transport services in the corridor?
- How does the use of transport services vary (or not vary) in different types of 'corridor' (i.e. effect of physical location characteristics)?
- How might different policy tools/mechanisms affect the demand for transport services within a corridor?
- How could this information contribute to improving the modelling of LMCV movements?

This section outlines the main components of our theory development, case study selection, commercial vehicle definitions, and approaches to fieldwork and data collection. More detailed information is available from our case study protocol, which is found in Appendix A.

2.2 Theory development

2.2.1 Formulating the hypothesis

Having established the type of case studies we wanted to undertake, we then formulated our hypothesis. Yin (2003) regards the development of theory as an integral part of the case study design work, as it helps to illuminate all aspects of the research design, such as the choice or creation of propositions, case studies, units of analysis, the logic for data collection and the criteria for interpreting the findings. Our hypothesis for this research project is:

The demand for (or use of) and the provision of transport services within an urban corridor varies, depending on:

- **the physical characteristics of the corridor** (e.g. level of traffic volume (as it relates to congestion), location within the urban area);
- **the density, composition and nature of the organisations** located within the corridor (e.g. organisational type/structure, level of transport service required, available floor space/storage)²;
- **the effect of the relationship** between the organisation and its customers (e.g. customer service standards, customer expectations), between the transport user and its clients, and between the transport provider and the transport user (who may be in the same organisation), and within each organisational type; and
- **the regulatory environment** (e.g. local policies such as curfews etc., through to vehicle licensing and operation regulation characteristics).

We conjectured that these factors determine things such as the timing, efficiency, and modal mix of transport services within the corridor under scrutiny. They also influence the potential impact of different policy tools/mechanisms on the demand for and provision of transport services within the corridor. Gaining an understanding of these factors will provide insight for transport modelling efforts and other research programmes.

We did not intend to explore the latter point of the hypothesis – regarding the regulatory environment – in this project, other than to investigate, to a limited degree, the potential impact of policy changes on the demand for transport services. Internationally, this area has been studied under the terminology of ‘city logistics.’

² New building construction or major building refurbishment will also generate its own demand for transport services. However, this was considered beyond the purview of the current research topic.

2.2.2 Deriving the propositions

From this hypothesis, we derived a series of propositions, which are essentially a series of specific statements based on the hypothesis that we hoped to prove (or disprove) in the course of our case studies.

Proposition 1

The demand for/management of transport services in a corridor, with reference to an individual business/organisation in the corridor (our 'embedded units of analysis'), is affected by:

- the characteristics (type, size, etc.) and mix of other organisations within the corridor;
- the service standards and customer expectations of the business or organisation; and
- the relative cost of transport service vis-à-vis other operating costs, such as land use cost where, for example, high rental space may be converted from stock storage to sales space in order to increase turnover. The effect of this may be to increase the frequency of transport visits to the site.

Proposition 2

The demand for/management of transport services in a corridor as a whole (our 'case study'), is affected by:

- the relative density of organisations within a corridor;
- the distribution of trip type (goods or services), trip purpose (commercial or private) and vehicle type (light commercial vehicle or private vehicle), as per the Wigan et al. (2002) typology;³
- the distribution of goods by value/nature, where value/nature may be defined monetarily, or in terms of time sensitivity, the hazardous nature or security characteristics of the good in question;
- the physical characteristics of a corridor;
- congestion/traffic volumes (this includes exploring whether or not it is feasible to reduce traffic on the roads and still maintain good transport service within a corridor);
- difficulties with transport services (such as timeliness and cost), causing some organisations to consider relocating; and
- transport-related policies of councils (initial reactions to such policies may indicate how they will affect traffic movements in a corridor).

³ For the purposes of structuring our initial data collection, we assumed this proposition to be true, but remained open to learning about weaknesses of this typology and modifying it through the course of the case studies.

Proposition 3

Transport supply (by transport service operators) within a corridor is affected by:

- the mix and density of organisations,
- customer service (transport users') expectations,
- transport service operators' service standards,
- supplier competition,
- congestion/traffic volumes, and
- transport-related policies of councils. Initial reactions to such policies may indicate if they will have a negative impact on the supply of transport services to a corridor. Potential examples include:

- the council charging for using the waiting/loading zone during certain time periods,
- the introduction of pedestrianised areas, with delivery hours restricted between the hours of 11 a.m.–3 p.m., or
- the introduction of a cordon charge.

In interviewing transport operators, we also sought to confirm (or not) the conclusions arising from the analysis of the information gathered from transport users within a corridor.

2.3 Selecting case studies

Rather than having a single case study of one corridor, we adopted a multiple case-study design incorporating two 'contexts' or settings, namely Wellington and Auckland urban centres. Both Wellington and Auckland are located in the North Island of New Zealand (refer to Figure 2.1) and both comprise four cities. Using more than one context is important for developing understanding of the phenomena under study. Both similarities and differences will be found between Auckland and Wellington (for example, we expected a strong influence from congestion in Auckland compared to Wellington). Exploring the reasons for such similarities and differences and the possible impact on future behaviour (e.g. likely reaction to changes in transport policy) typically proves very useful to policy and planning decision-makers.

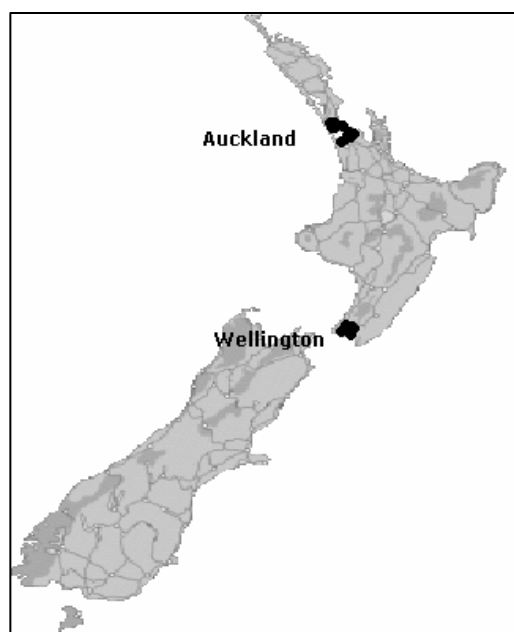


Figure 2.1 Map of New Zealand showing the location of Auckland and Wellington.

The strength of having more than one case study in each context lies in the fact that if two or more cases are shown to support the same theory, replication may be claimed. The evidence is considered more compelling and robust than that of a single case study and analytical generalisations can be made. Yin (2003) suggests that multiple case studies should be selected so that they replicate each other: either predicting similar results (literal replication) or generating contrasting results for predictable reasons (theoretical replication).

Within each context, we have selected two case studies:

- The 'heart' of the central business district (CBD) for the main urban centre. These corridors are characterised by high road traffic volumes (often operating at >80% of corridor capacity) and high-rise complexes, generally with retail and other services at ground and first floor level, and offices in higher storeys. A wide mixture of activities is present.
- The main street of a city within a secondary urban centre. These are characterised by lower overall volumes of road traffic, low level buildings (generally single or two storey), a wide mixture of activities and some kind of direct street access for each organisation.

Each case study contains many 'embedded units of analysis' (Yin 2003), namely the organisations located within the corridor under examination. Analysing a range of these units will allow us to make (analytical) generalisations about the corridor as a whole.

Figure 2.2 illustrates our case study design.

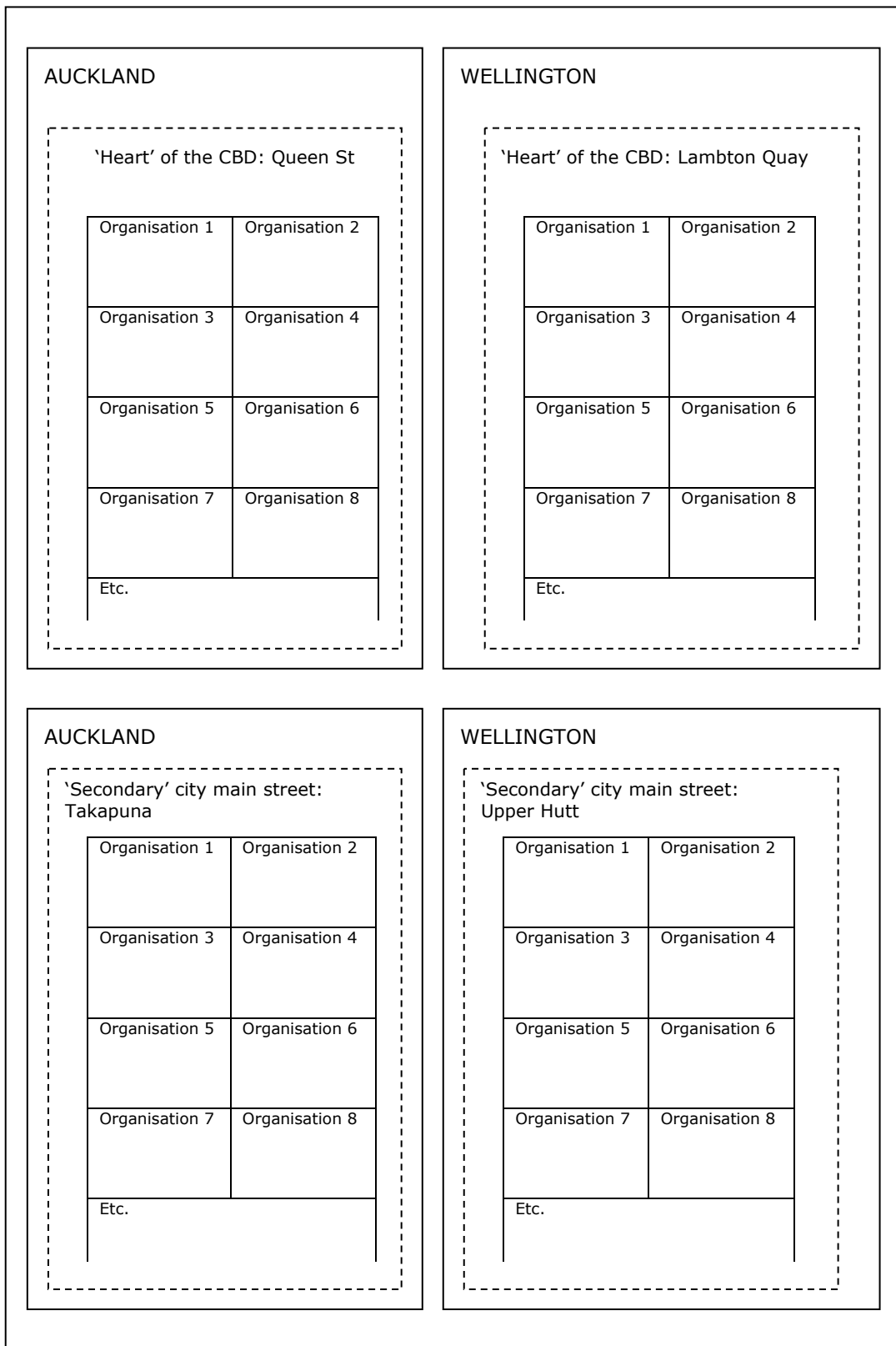


Figure 2.2 Multiple case study design: context of this project, showing cases and embedded units.

Because we were constrained by time and budget in how much information we could gather in each corridor, the strength in our analysis lies in the cross-context and cross-case analysis, rather than the analysis of individual cases. Our findings are presented in Chapter 7.1, where we first compare the two case study corridors within the Wellington Region (Lambton Quay and Central Lower Hutt) and then the two corridors within the Auckland Region (Queen Street and Takapuna); and in Chapter 7.2, where we first compare the two 'heart' corridors (central CBD of Auckland City and Wellington City) and then examine the similarities and differences between the two main street corridors in Lower Hutt and Takapuna.

2.4 Defining commercial vehicle movements

2.4.1 Initial focus and definitions

In broad terms, our research proposal stipulated that we were going to study LMCV movements in urban corridors. In the absence of any other model, we chose to adapt the classification framework for such movements developed by Wigan et al (2002), which involves three components: trip type, trip purpose and vehicle type. One of our purposes, therefore, is to establish the utility of the Wigan et al framework for classifying LMCV movements.

For the purposes of this project, we have defined LMCVs as follows:

- vehicles – whether car, van or trucks – which are liveried with commercial insignia (usually indicating who owns and/or operates the vehicle),
- vans, utility vehicles and light trucks up to 3.5 times gross laden weight, and
- two-axle heavy trucks without a trailer, over 3.5 tonnes gross laden weight. Most light commercial vehicles have single rear tyres, but small trucks with dual rear tyres are included, which tends to extend the weight category up to 5–7.5 tonnes.

Because our focus was on movements generated by organisations in the corridor, we excluded vehicles providing services for corridor-based infrastructure, such as telecommunications cables and wiring, electricity, gas and water. We did not make a distinction between leased, hired or company-owned vehicles, except insofar as whether the vehicle was liveried with a commercial logo.

Although initially we had indicated that our focus was to be on LMCV movements, our project steering group expressed an interest in identifying and understanding all vehicle movements which have a commercial function within the corridor. Wigan et al (2002) divide function into two categories: 'trip purpose' (commercial versus private) and 'trip type' (goods versus services). We made the additional distinction as to whether or not the vehicle movements were incoming or outgoing. Wigan et al (2002) did not make this distinction. This led us to devise a matrix (see Table 2.1) to illustrate the possible complexity of the analysis, which involved:

- **trip type:** commercial (including employer’s business, such as deliveries, attending meetings or picking up items from other organisations) or private movements (for personal purposes) or both;
- **trip purpose:** the movement of goods or services or both;
- **vehicle:** movements by all modes, including: non-motorised (foot, bike), LMCVs (motorised, generally <3.5 tonnes), HCVs (freight movement) and other vehicles (private car, train, bus, taxi);
- **incoming or outgoing** vehicle movements or both. We defined ‘incoming’ as someone coming from another site to the organisation/business under observation. Thus, ‘outgoing’ refers to someone from the observed business or organisation going to another site.

Incoming and outgoing vehicle movements are not presented as separate cells in Table 2.1 – adding these would double the number of cells in the matrix.

Table 2.1 Matrix illustrating possible range of commercial movements in a corridor

	Incoming and outgoing	Incoming and outgoing	Incoming and outgoing	Incoming and outgoing
HCV	Goods Commercial	Goods Private	Services Commercial	Services Private
LMCV	Goods Commercial	Goods Private	Services Commercial	Services Private
Other vehicle	Goods Commercial	Goods Private	Services Commercial	Services Private
Non-motorised	Goods Commercial	Goods Private	Services Commercial	Services Private

Note: incoming and outgoing movements apply to each cell.

We decided, given the level of complexity, to focus this project on incoming and outgoing LMCV movements for commercial purposes within urban corridors, highlighted in grey in Row 2 of the matrix.

Courier vehicles are included in the LMCV category. New Zealand has two types of couriers:

- non-urgent (providing scheduled pick-up and delivery each day, generally with overnight or 3–4 hour delivery windows), and
- urgent (generally providing pick-up and delivery in one hour or less).

A significant proportion of courier vehicles are vans, presumably because of the volumes this permits them to carry. Courier personnel also have health and safety restrictions that limit size of package that they can individually handle (maximum length, weight and volume, e.g. not exceeding 1.5 m or 25 kg or 0.125 cubic metres).

'Private' movements were noted when mentioned by key informants, as they contributed to traffic within the corridor, and also because they may use commercial vehicles that would be counted in street-side traffic counts.

As noted earlier, describing and modelling long haul (non-urban) heavy freight vehicle movements was part of another project funded through the Land Transport New Zealand research programme, so we generally ignored heavy freight movements in this project.

2.4.2 Trips, visits and stops

After our pilot interviews in the field, when we began to realise how extensively courier vehicles are used for commercial transport operations, we saw a need to distinguish between their different types of movements. Hence, we adopted the following typology:

- **Trips** are made to and from the corridor.
- **Stops** refer to the number of times the vehicle actually stops in the corridor.
- **Visits** are to individual businesses within the corridor.

The number of stops cannot exceed the number of visits. For example, on one trip to a corridor (after which the vehicle returns to its depot), a courier vehicle may be stopped outside one high-rise building and visit several clients within the building; then the vehicle may be moved and stopped again outside a different building while the driver visits several other clients within that building.

We were told that not only courier vehicles have these distinctive types of movements. Beverage and water delivery company vehicles often exhibit similar behaviour.

2.5 Fieldwork

2.5.1 Preparation

Prior to selecting the organisations for inclusion within the case studies, we gathered information on each case study corridor in order to be able to identify how similar and different they are from each other. We wanted to confirm that they are either as similar as possible (e.g. both 'heart' corridors having the same characteristics) or provide a distinctive contrast (i.e. that 'heart' corridors and 'secondary' city main streets are sufficiently different).

Our information gathering took several forms, including preliminary observations in each of the corridors, noting factors such as commercial vehicle movements, loading bays or zones, parking regulations and the nature of businesses. We also obtained information from a New Zealand business directory, the UBD business-to-business database, as provided to us by APN Data (APN Data pers. comm.⁴), which compiles contact details, staffing, trade category codes (Australia and New Zealand Standard Industrial Classification (ANZSIC) and Standard Industrial Classification (SIC)), physical location,

⁴ The database we took the business details, etc from has to be purchased through a contracted arrangement from APN Data. We obtained the information in 2004.

contact details of key personnel and so on, for a huge range of businesses/organisations into searchable spreadsheets. Regional and city councils provided us with further details about things such as traffic volumes, street layout, and possible policy or regulatory changes, as well as planning and other reports.

2.5.2 Sample selection

Selecting the organisations to interview was difficult, given that the project only allowed time to interview a small number in each corridor (given the flexibility in the detail required), yet differences on several dimensions were of interest:

- business type (goods/retail versus services, public versus private sector, perishable versus non-perishable);
- size (we over-sampled larger businesses overall, assuming that these were more likely to be 'information rich'. For example, larger organisations may have corporate, social responsibility, or safety, health and environment reports that would consider transport use and issues); and
- physical location (street front versus leg-in or high-rise, spread around the corridors, not forgetting potentially large differences between the two sides of a street such as Lambton Quay or Queen Street).

Exploring different business types was particularly important so as to lead towards quantitative surveys or models of the potential for different mixes of business to generate different levels of demand in a corridor. On the other hand, we were obliged to reduce the diversity of businesses sampled so that we could expose differences between corridors (by interviewing the same type of business in different corridors).

Bearing all of this in mind, we adopted a 'maximum variation sampling' approach within the four case studies, attempting to have a wide range of organisational types included in each corridor – a challenging task, given that we were only able to undertake about a dozen interviews in each one. Across the case studies, we engaged in some 'stratified purposeful sampling' ensuring that, for the purposes of replication, each case study included at least one:

- independently-owned café or restaurant,
- clothing/footwear retail shop that is part of a national chain,
- government agency (either local or central),
- personal service (e.g. doctor, dentist, hairdresser, bank),
- business/support service (e.g. lawyer, building manager, human resources firm),
and
- other (non-food) retail shop.

We identified approximately twice as many organisations as we wanted to interview. The Auckland and Greater Wellington Regional Councils (ARC and GWRC, respectively) sent out introductory letters to the selected organisations advising them of the study, its purpose and our proposed visit to them. We wanted the interviews to be open-ended and assumed a conversational manner, following a set of questions derived from our case

study protocol. Hand-written notes during the interviews were supplemented with additional notes made on review immediately afterwards, as well as voice recordings where the interviewee permitted them. This ensured that as much information as possible provided by the interviewee was retained.

Table 2.2 shows the final mix of organisations interviewed in each corridor.

Table 2.2 Number and type of organisations interviewed in each case study corridor.

Organisation type	Lambton Quay	Queen Street	Takapuna	Lower Hutt
Chain café/food place ^a		2		
Independent food place	1	1	2	2
Chain clothing/footwear	1	2	1	1
Independent clothing/footwear		1	2	1
Department store	1	1		
Personal services				
Doctor/optometrist/dental		2	1	1
Hairdresser			1	
Bank/financial/insurance	1	1	1	
Business/support services				
Lawyers	1			1
Building manager	1			
Communication/technology/printing	1		1	2
Recruitment/management/consulting		1	1	1
Retail – miscellaneous				
Office supplies	1			
Books			1	
Gift	1	1		
Travel	1			
Florist	1			1
Pharmacy	1			
Household goods/furnishing/appliances			1	1
Central & local government administration	1	1	1	2
Miscellaneous	1 (trial)			
Total number of interviews:	12 + 1 trial	13	12	13 (2 by telephone)

a 'Food places' include cafés, bars and restaurants, as well as organisations retailing food or beverages for customers to take away (e.g. wine merchants or bakeries).

The focus when interviewing organisations within the corridor was on their demand for transport services. We also interviewed two transport operators supplying services to the two case study corridors located in Wellington. Given their predominance in meeting service demands in all four corridors, we chose to interview one 'regular' (non-urgent) courier (providing scheduled pick-up and delivery each day, generally with overnight or 3–4 hour delivery windows) and one 'urgent' courier (generally providing pick-up and delivery in 1 hour or less).

3. Case Study 1: Lambton Quay – Wellington CBD

3.1 Context

Wellington City CBD is very compact; as it is only 2 kilometres in diameter, it is possible to walk across the entire central city in less than 20 minutes. Other key background facts about the Wellington CBD are given in Table 3.1 below:

Table 3.1 Demographic details of the Wellington CBD (from Wellington City Council 2006)

Workforce	As the 'seat of government', Wellington is home for a wide range of national institutions and associations, as well as government agencies. Wellington contains the highest proportion of people working in communications services (including ICT engineering, sciences, telecommunications and high technology), finance and insurance, and property and business services industries in New Zealand.
Businesses	The largest occupational group in terms of employment is professional services (the largest occupational group in NZ as a whole is service and sales).
Transport	About 26 000 people commute into the city every working day. Of these, about 28% use public transport (compared to 18% usage in Auckland, 9% in Christchurch and an average of 10% in Australian and North American cities). Walking to work is very high by international standards at about 11%.

Street-level retail space on Lambton Quay is the most expensive in New Zealand, with rents having increased by 35% in the past five years according a recent report in The Dominion Post newspaper (Johnson 2005). The average rent for prime retail space was expected to increase to \$2,500 per square metre by the end of 2006. Examples cited showed a range from \$1,661 to \$3,031 per square metre. Traditionally, Lambton Quay has been a mixed retail area, but the higher rents and increasing demand has seen a change towards greater numbers of fashion retailers.⁵

Pedestrian traffic counts taken during the two-hour lunch period (12 noon to 2 p.m.) provide the reason for this: between Brandon and Panama Streets, the peak hour total was 7700 pedestrians in both directions; the average hour total was about 6200 (GWRC counts taken in March, 2005 and provided to us as a personal communication). Between Waring Taylor and Johnston Streets, and between Grey and Hunter Streets, the peak hour totals were about 6000 pedestrians, while the 'fringe', between Whitmore and Balance Streets, still had around 3000.

⁵ It is highly likely that there will be an accompanying trend of converting stock holding facilities to retail floor/selling space for the shop.

3.2 Our target area

Our case study corridor included the whole length of Lambton Quay and incorporated all those organisations with a Lambton Quay address, although a limited number may have their main entrance on a side street. This area is shown in Figure 3.1.



Figure 3.1 Location map of Lambton Quay.

The categories and sizes of the businesses we interviewed and the vehicle movements they generate are shown in Tables 3.2, 3.3 and 3.4. The ANZSIC numbers and the details on size and type of businesses were provided by APN Data.

Table 3.2 Size of organisations in Lambton Quay.

Number of staff	Number of organisations	Percent
1-2	103	28.9
3-5	99	27.7
6-19	105	29.4
20-99	35	9.8
100+	11	3.1
Unknown	4	1.1
Total	357	100.0

Table 3.3 Business categories in Lambton Quay target area.

Business category (ANZSIC)	Number of organisations	Percent
Retail trade	105	34.7
Property and business services	82	23.0
Personal and other services	41	11.5
Finance and insurance	33	9.2
Accommodation, cafés and restaurants	28	7.8
Health and community services	19	5.3
Local and central government administration	17	4.8
Manufacturing	15	4.2
Communications services	7	2.0
Wholesale trade	4	1.1
Cultural and recreational services	4	1.1
Transport and storage	2	0.6
Total	357	100.0

Table 3.4 Lambton Quay respondents and the number of commercial vehicle movements they generated weekly.

Business	Couriers (not cycles)	LMCV	HCV	Private vehicle
Café	0	15		6
Government organisation	35-40	4		Taxis (meetings; to airport)
Bank – main Wellington branch	110	140 + own fleet (for client visits)	29 (2/3 cash, 1/3 rubbish/recycling)	≈1
Lawyer ^a	15	10 (drycleaner) + 1 service vehicle		0
Communication services	22	102 (own fleet)		75
Travel agent	14	negligible		
Building manager	0	13		
Gift shop	19	1		
Florist	50	7		10-12 (unmarked van)
Pharmacy	50	6		
Office supplies	≈50		1	
Department store	200	75 movements. One van does 80000 km/yr		

^a The building that the lawyers occupied also had a staff cafeteria and caterer as a separate business to the law firm. The caterers were not interviewed in this study.

We found that many organisations we spoke to on Lambton Quay incorporated a reasonable number of business-related trips on foot into their weekly business. One respondent stated that they had a policy: during quiet periods on the street (e.g. not peak pedestrian traffic times) and if an item is portable, they encourage walking to deliver it. Walking to client meetings is also encouraged. This and other businesses picked up and dropped off their post themselves on foot (6 of the 12 organisations interviewed), the florist and the lawyers' office regularly delivered flowers/documents to clients within the Lambton Quay area on foot, and various organisations visited clients on foot. Similarly, some services visited these organisations on foot: for example, the dry cleaners, the plant care people and the florist serviced the bank on foot; the lawyer received hand-delivered documents and flowers.

In addition to this walking activity within and between organisations located on Lambton Quay, cycle couriers are widely used among some of the service-oriented organisations, particularly where the walking distance may be more than 5 minutes each way. While this is similar to what we found in Queen Street, Auckland, the two smaller urban corridors of Lower Hutt and Takapuna had no cycle couriers operating at all.

3.3 General comments about commercial vehicles

At the beginning of each interview, we asked respondents for their 'top of the mind' comments about commercial vehicles (e.g. 'What do you think of when we say we'd like to speak with you about commercial vehicles?'). In closing, we also asked if they had thought of anything that we had not spoken about. This section records their responses.

The lack of loading zones or commercial vehicle parking on Lambton Quay was identified by a number of respondents. One retailer noted that repairs and technical people had to arrive in the early morning in order to gain parking reasonably close by so that they could get their gear in and out of the shop. Others spoke of the fines gathered by delivery vehicles and couriers for stopping in the bus lane and no parking zones – one noted that some commercial vehicles 'do get ticketed on our own dock way' for stopping on the yellow lines at the entrance to the dock. 'One leg up on the footpath,' was a common phrase used in discussing goods delivery vehicle parking, while others described couriers as 'parking where they can.' Mention was made of vehicles having to circle the area while waiting for a place to stop.

In New Zealand, all courier vehicles and many delivery vehicles are 'owner-operated' or leased by the operator, who is thus responsible for paying any fines incurred while stopped on yellow lines, in bus lanes or on the footpath.

Different parts of Lambton Quay were identified as having better loading zone facilities: at Lambton Square, the loading zone is large enough to accommodate about five vehicles, while near the Capital on the Quay, the zone only accommodates about two vehicles, although it serves a fairly long section of the Quay (as far down as the AA Centre). It was observed that taxis are 'always on top of' the loading zone, forcing couriers and other

delivery vehicles to park in the bus lanes and run a high risk of fines. This is despite the fact that a large taxi stand for about 7–8 vehicles is located a bit further down Lambton Quay from the loading zone. The taxi stand has apparently grown from five years ago, when space was provided for 4–5 taxis and more loading zone room. Neither the loading zones nor the public parking spaces are policed well, so taxis tend to use the loading zones and people overstay in the parking spaces.

The use of loading zones by unmarked vehicles that were clearly being unloaded/loaded outside shops was raised a few times. Those who commented on it felt that this behaviour should be allowed, but noted that the parking wardens were inclined to ticket such vehicles, even if they knew the owners. One respondent noted that customers parking in loading zones on Saturdays or after 5 p.m. on weekdays often get tickets; the respondent thought that this was unfair and that the public should be able to use the loading zone for at least short-term parking during these times.

Even where businesses have their own loading bays, the narrow Wellington streets caused problems, as apparently the size of HCVs such as double trailers has increased over time. These vehicles may not be able to access the loading bay properly and are forced to park or double-park on the street and this 'becomes a problem to other people.' One solution considered was to have the trucks 'de-van' on the outskirts of the CBD into smaller trucks, but double-handling of goods could significantly increase operating costs. However, if local authorities determined that the external costs (social, economic and environmental) outweighed the additional operating costs, it may be an initiative they contemplate putting in place.

For businesses with access from Gilmer Terrace up behind Lambton Quay, the fact that five parking buildings emptied out between 5 p.m. and 6 p.m. was problematic. One respondent commented that either you left before 4:55 p.m. or waited until 5:45 p.m. because otherwise it could take half an hour to leave their building. This also caused problems for couriers and other commercial vehicles seeking to make pick-ups or deliveries at the end of the day.

One street-front business commented that 'the noise level' from commercial vehicles which leave their motors running while servicing nearby clients is 'horrendous'. The business has an 'open door policy' for their operation. On wet days, they sometimes close the door, but rain seems to increase the volume of traffic noise intrusion near the premises.

Another street level business showed us what looked like dirt or soot from diesel smoke that had come through the air conditioning (and open shop entrances). They thought that larger commercial vehicles 'scattered along the Quay [made it] appear littered.' The larger commercial vehicles and buses using Lambton Quay mean that, for customers, it is a 'waste of time looking for a park.' They supported the use of LMCVs for deliveries, stating that 'courier vans do all our work.'

The bus lane had various supporters and detractors, the view apparently depending on whether or not the business relied on commercial vehicle access from Lambton Quay.

3.4 Effect of density

3.4.1 General effects

The density of organisations on Lambton Quay has a noticeable effect on commercial vehicle use, insofar as we found that people were considerably reliant on walking documents or other small items across or down the road rather than using a courier. Where distances were longer, cycle couriers could be used, although in some cases (particularly where the organisation was located above street level), it was difficult for the business to say whether or not specific items were cycled or driven to their destination.

The density also permits couriers to make efficient, routine 'rounds' of the businesses using their services each day. Some businesses were visited five times a day, either to drop off or pick up items. Couriers could park their vehicles in one location, check in with a range of clients, and then go to the depot to sort out the deliveries before the next round. This system of regular visits means that businesses know, with some confidence, that their packages and documents will be picked up or delivered in a certain timeframe, without having to take any action to ensure that it occurs. In an area of lesser density, the number of visits by the courier is likely to be less.

The density of businesses makes it feasible not only for couriers, but also for some service and retail organisations (such as computer technicians, communication support, dry cleaners, florists, and plant care people among others) to visit their clients on foot.

3.4.2 A density-related phenomenon: the on-site building manager

The size of buildings and the variety of tenants within each one means that many of them have a building or property manager who operates from within the building. In lower density corridors such as Takapuna and Lower Hutt, the building manager is usually located off-site and may manage several, generally smaller, buildings.

The building manager is generally responsible for maintenance and repair of the physical premises leased by occupants, such as air conditioning, lighting in common areas (corridors, entranceways), security and fire alarms, lifts and escalators, and other trades such as plumbers, builders and painters. In some cases, cleaning, rubbish and recycling pick-ups were the responsibility of the building management, too. Irrespective of their location in Wellington or Auckland, businesses leasing space in such buildings often did not have a strong sense of how frequently services might be provided.

We interviewed a building manager on Lambton Quay about one of the buildings they managed to assess the impact of their activities on commercial vehicle movements in corridors. On the whole, they generated very little traffic in their maintenance and repair role – only about 13 HCV movements a week, the bulk of which (ten) were the daily rubbish and recycling truck visits. The other visits were split among a variety of

service/tradespeople, who generally might be called in once or twice a month (air conditioning, plumbers, electricians, plant care, security). Cleaning supplies were delivered only every couple of months.

The building manager felt that commercial vehicle access on Lambton Quay was 'good' overall compared with other sites they managed. As an example, they described Featherston Street as 'more difficult' because it is a thoroughfare, while Brandon Street was considered a 'disaster' for commercial vehicle access. It should be noted that the Lambton Quay building had both loading zone access and a loading lane running alongside the building.

3.5 Effect of physical characteristics of the corridor

Some organisations had no direct building access for commercial vehicles on Lambton Quay, relying instead on the side streets leading to Lambton Quay or back entrances off The Terrace. Others were completely dependent on gaining access from Lambton Quay.

One organisation, with street access from both The Terrace and Lambton Quay, noted that they have no loading zones near them either on The Terrace or Lambton Quay, forcing commercial vehicles to park in the bus lane (with a high risk of attracting a parking fine). Another respondent observed that they were 'blessed' with quite a few access points, as their building had a shared service area/loading bay for all the tenants, as well as a car park with access to a nearby trolley and lift, as well as a loading zone on Lambton Quay.

3.6 Congestion

No businesses specifically mentioned congestion on Lambton Quay itself, though two did refer to the congestion experienced in the afternoon on Gilmer Terrace, which provides the back entrance for a number of Lambton Quay businesses. Issues were related much more to parking availability, namely loading zones, on Lambton Quay, rather than the speed of delivery. For example, the florist complained that plant sellers (sales representatives) wanting to display the wares they have available often bypass their shop because the sellers cannot park. This means that the florist misses out on opportunities to bring in new products for their shop. However, if the sales representatives are bringing in orders, they will stop, even if they have to park on the bus lane.

Where a business is dependent on Lambton Quay for commercial vehicle access, congestion is a real issue. One business noted that they were at the mercy of the couriers/freight companies for the timing of their deliveries⁶, as the couriers refused to bring in large or heavy items in the morning, preferring to deliver in the early afternoon.

⁶ At the present time, courier vehicles operate approximately from 6 a.m. to 6 p.m. and do not offer a 24-hour door-to-door service, apart from transferring packages between cities overnight.

This meant that the shop staff could not unpack the new stock until the next day, thereby losing a day's trading on that stock.

3.7 Location and transport

One business stated that they 'wouldn't be interested in being anywhere else' and that 'location is everything,' despite their complaints about the high cost of retail space on Lambton Quay – and the lack of services provided by the City Council.⁷ Others observed that their location on Lambton Quay is 'very important' for their clients, particularly for those where most people came by foot (e.g. the travel agent and the café). One respondent stated that their operation is 'business-to-business' and that this required them to be located near to the businesses they serve.

The florist said that Lambton Quay is a 'prime location', although they thought that perhaps they could now safely relocate, as they are well-known and have a solid client base. However, they noted that this would increase their transport costs (the respondent assumed they would maintain their large Lambton Quay clientele), although their overheads might be lower.

Some difficulties with access, particularly for trade and service people, were mentioned – in some parts of Lambton Quay, no provision has been made either for vehicle parking (where the service person may be required to carry tools, ladders or other equipment) or for entrance to the premises other than through the front door. Another business noted that one of their 'regular' service people (who came about once every three months) was based in the Hutt Valley and this person was a 'bit nervous about parking here [on Lambton Quay].'

One of the large businesses we spoke to had relocated from The Terrace to Lambton Quay about two years earlier. The new location is considered far superior to the old: because they are in the heart of the CBD, it is possible to convey more items on foot, banks and other important organisations are close at hand, the existence of a loading bay makes deliveries much easier, and customers have better access. The move also provided the opportunity to consolidate their courier use. Another respondent noted that one 'perk' of being on Lambton Quay was that they were 'surrounded by like businesses' as well as complementary ones.

One respondent noted that transport costs would be similar regardless of whether their shop was located in Lambton Quay or the suburbs – this was not an issue they had to consider. Rather, the difference in rental costs is the main focus: Lambton Quay is regarded as having 'huge foot traffic but huge rent expense' compared to the suburbs. The respondent suggested that the costs on Lambton Quay were as much as 10 times higher.

⁷ Another business made a similar comment about the level of services, stating that they 'pay a lot of rates already' and need more service in return for what they contribute.

3.8 Efficiency of existing mix of transport service modes

The law firm had structured its courier use very efficiently. Despite sending and receiving over 300 items per month, they had reviewed their courier use and, as a result, were able to reduce from using two courier companies to one, who could handle both domestic and international pick-ups and deliveries. This reduced the number of courier visits to their organisation by ten per week. A combination of delivery 'by hand' (their staff, or those from another organisation, walking) and cycle couriers were used for any urgent delivery requirements. Their central location also meant that fresh flowers for the reception area were delivered once a week on foot by the florist.

Sankaran et al (2005) related a similar experience arising in their research on the impact of road traffic congestion on supply chains. A transport service provider reported that a client (commercial transport user) 'might facilitate shipment consolidation by employing third-party distribution and/or rationalising their bases of freight carriers'. The result is that 'one less truck' goes to that retail outlet.

The florist felt that they were also quite efficient with their transport use, as they deliver anything within about a five minute radius of their shop on foot, and use a combination of specialist courier vans and their own vehicles to manage other pick-ups and deliveries. A regular courier service visits three times a day, picking up multiple orders (generally around 20 at a time), while urgent couriers are used in between as necessary. To minimise costs, the florist tries to have urgent couriers pick up multiple orders. Freshness is critical and as flowers are perishable goods, stock has to be brought in virtually every day. The use of cycle couriers was not considered as feasible.

Another respondent of a shop with high turnover particularly noted that while courier vans delivered over 90% of their stock, cycle couriers would not be appropriate because of the 'sheer volume' of stock required.

The café owner noted that the truck which delivers their beverages once a week services the whole end of Lambton Quay by parking in one spot and its operators using a trolley to distribute their wares. This kind of efficiency by transport operators cannot be properly documented by asking transport users about commercial vehicle movements generated by their organisations.

Despite what appears to be a huge number of commercial vehicle movements (250+ per week, involving seven different courier companies and other transport operators, as well as their own small vehicle fleet), the respondent for the bank felt that 'what is being done is efficient' because the head office acts as a distribution centre for branches, meaning that a lot of material is going in and out. Cycle couriers are used as appropriate to the size of items to be picked up/dropped off. Most of the deliveries and pick-ups were regarded as 'urgent', requiring a high frequency transport operation.

One respondent observed that it is human nature to take as much time as one has and to push hard against deadlines for delivering important documents and packages, so that if only 15 minutes are required for pick-up/delivery, the package will be ready for that. If the situation changed – say, by pedestrianising Lambton Quay – so that 15-minute deliveries were no longer feasible, then the people within an organisation which uses transport would probably adapt their habits to the new ‘minimum’ delivery timeframe.

We interviewed one business in Lambton Quay and another in Lower Hutt who were members of the DX Mail Exchange (DX Mail), a private specialist business mail delivery company which offers overnight and priority services for both internal (between branches of an organisation) and external mail. In one instance, the business walks its mail to or picks up incoming mail from a central location; in the other, a courier van picks up and delivers incoming and outgoing mail twice a day. The centralised ‘depot’ makes for a very efficient operation, as only one vehicle would be required, twice a day, to service a large number of businesses, with transfers to other vehicles for out-of town deliveries as appropriate.

Three businesses we spoke to had reduced their on-site inventories, two of them because they found that technology was changing too rapidly, with the result that some stock would become obsolete and have to be written off. One of the respondents estimated that they had 25% more deliveries relative to turnover than they used to because of the change in stock composition (more variety) and/or having smaller on-site inventories. They suggested that it was ‘easier to hold things in stock before because [we had] less variety.’ The third business observed that they had tried to maintain more stock but found they were limited for space, and so have opted for ‘more frequent, less volume’ of deliveries while still maintaining their discount on transport services (e.g. ‘free’ delivery).

Another service-oriented business had found that the use of email had increased greatly over the past 2–3 years, particularly amongst its younger clientele. The ‘older generation still prefers personal contact.’ The increased use of email has reduced both the number of couriers used by the business as well as faxes sent. They are also able to update the products they offer much quicker by using the Internet.

3.9 Reaction to possible transport-related policies

3.9.1 Pedestrianisation

Generally, allowing only foot/bus access between the hours of 10 a.m. and 2 p.m. was considered more ‘realistic’ than closing off Lambton Quay to service vehicles, particularly courier vans, from 8:30 a.m. to 5 p.m. every day.

Three businesses we spoke to felt they would not be directly affected by any pedestrianisation of Lambton Quay, as their primary (in some cases, only) commercial vehicle access, including loading bays, was located either on a side street or behind Lambton Quay (off Gilmer Terrace). One business thought pedestrianisation could be

beneficial to them, as the side street would have less traffic on it for commercial delivery vehicles to contend with.

Despite having access from both The Terrace and Lambton Quay, three respondents thought that pedestrianising Lambton Quay would cause significant access difficulties for them. One regularly holds half or whole-day meetings that require catering which has to be delivered close to lunch time (in order to be fresh). In addition, they regularly use urgent couriers (for 15 or 30-minute pick-up and delivery) for documents, some of which may not be moved by cyclists because the documents are being delivered outside of the core CBD.

A second business, the florist, considered the notion of pedestrianisation as a 'major problem' which would require the development of better access along the length of the Terrace, both in terms of delivery areas (within the building itself) and to create new loading zones. The respondent stated that they 'wouldn't survive without access all day' as flowers and plants are perishable and require timely delivery, both out to the shop's clients and into the shop as stock. If pedestrianisation resulted in higher transport costs or the need to restructure their accommodation, they stated that they would probably 'get out of business' rather than relocate.

A third business receives goods during regular shop opening hours (8:30 a.m. to 5 p.m.) when staff are present to help unload and put away stock and service customers. While some smaller deliveries and pick-ups could use the access on The Terrace, the business owner stated that the bulky deliveries have to come through the Lambton Quay entrance because no loading or parking facilities (for either business) are available for commercial vehicles on The Terrace (also, no room is available for double-parking vehicles at the lower end of The Terrace). They suggested that staff would have to be paid to be available earlier or stay later to receive stock. Another business already had arranged for its courier company to have a key so that the morning's mail could be left in the office regardless of whether or not any staff had arrived for work. This arrangement avoids the costs of making staff available prior to business hours and mitigates the impact of traffic congestion.

One retailer noted that Lambton Quay is a 'shopping street' and as such, customer cars are very important, along with the need for shops to be well-served with good access. They felt that rather than pedestrianise, some thought should be given to getting the buses off Lambton Quay. Another respondent felt that Lambton Quay did not need two traffic lanes and that some thought should be given to creating a 'Christchurch strip [Oxford Terrace] look,' as expanding the footpaths would do a lot to improve street appeal. Commercial vehicles require some access, perhaps at regulated times, because 'anything affecting couriers will affect us', but the respondent did not see the need for other cars to have access. This sentiment was echoed by another respondent, who thought private vehicles could be banned, but this could not apply to commercial vehicles as too few streets provide access, and some businesses are completely reliant on Lambton Quay for commercial vehicle access.

In contrast, another respondent thought that having a pedestrian zone would 'kill it [Lambton Quay]' as 'people like to park.' This person did not object to traffic calming to make Lambton Quay more pedestrian-friendly and suggested that having buses along the Quay detracted from that.

A travel agency we interviewed stated that most of their traffic came to the office on foot from nearby buildings, with much of the remainder of their business conducted via telephone and email. Thus, they were not overly concerned about the notion of pedestrianisation, as long as they could have their early morning (prior to 8:30 a.m.) and late afternoon (5 p.m.) mail pick-up/delivery. A similar view was expressed by the independent café owner, who thought that pedestrianisation could be quite hard on service people (who might have to re-structure their working hours in order to gain access to Lambton Quay), but that it was good for the café's business, as the roads would be less crowded without service people on them.

One respondent noted that both Wanganui and New Plymouth had experimented with having pedestrian-only shopping streets, and in both cases, the pedestrianisation had been reversed. We later confirmed that Wanganui and New Plymouth had a 'pedestrian space/shopping precinct that has reverted back to having a road through the precinct,' (CCC 2003) – and that Manukau City (Onehunga Mall), Hastings, Hawera, Tauranga and Rotorua had the same experience. More recently, in May 2006, a Christchurch City Council press release reported on plans to 'allow traffic to return to High Street and providing limited thoroughfare to Cashel Street'. Together, these streets form part of an extensive pedestrian shopping precinct in Christchurch. The area has been a pedestrian-only shopping street for over 20 years. It appears that the concerns of organisations about potential pedestrianisation may be supported by these other experiences.

3.9.2 Increased transport costs

When asked about the potential impact of doubling transport costs, one business noted that their transport use is 'driven by client needs' and that they would have to continue to send (physical) documents irrespective of cost. Many of their clients do not have regular access to 'electronic communications' so they require 'hard copy' documentation to be delivered to them. Having said this, the respondent stated that they try to reduce their transport costs by having documents ready the night before, particularly if they have a large mail-out, so that overnight couriers can be used (rather than requiring urgent or same day deliveries). Currently, they select their couriers on the reliability of service rather than the price.

El Sawy (2001) describes this particular principle, where a business modifies its 'upstream practice to relieve downstream bottlenecks', as 'Lose Wait'. Sankaran et al (2005) found a similar example of this behaviour in their Auckland-based research where, although BuildCom was restricted to daylight hours for the delivery of its products to customers, it had had to change its distribution centre's operation to a 24-hour shift pattern in order to maximise vehicle use. As a result, orders can be pre-packed overnight for dispatch the

next day and vehicles are turned around more quickly. This required the employment of additional staff and working hours.

For one smaller retailer, rising courier costs meant that they had already passed some on to their customers, raising the lower limit for 'free' deliveries from \$30 to \$50. If these costs were to increase further, they would be prepared to raise the lower limit again, as well as encouraging orders to be sufficient to justify the costs. They observed (along with many other retailers we spoke to in Wellington and Auckland) that most of the transport costs associated with stock deliveries, particularly foodstuffs, is included in the cost of the incoming goods, i.e. it cannot be disaggregated.

As one business noted, transport costs are 'just another business expense': twice daily service is still required even if the costs were 'doubled (or halved)'. This sentiment was echoed by others, most of whom would try to pass the costs on to their customers, either directly or through price increases. By contrast, the florist stated that if the costs doubled, they would be forced to close down, as the respondent felt that they could not pass all transport costs on to clients; nor could they afford to absorb a dramatic increase.

3.10 Miscellaneous issues outside propositions

3.10.1 Loading zones and docks

At least three of the businesses we interviewed had no direct building access for commercial vehicles from Lambton Quay. Loading bays were located on side streets either accessed off The Terrace (e.g. Gilmer Terrace), or from Featherston Street or Lambton Quay (e.g. Johnston and Brandon Streets). In one case, cycle couriers were also meant to use the loading bay rather than the Lambton Quay pedestrian entrance; however, as the offices were located several floors up, this was impossible for the organisation to police.

Those having access off Gilmer Terrace noted that the late afternoon was a very difficult time for pick-ups and deliveries as several car parking buildings tend to empty around that time.

3.10.2 Changes affecting the transport corridor

One respondent, who had been in business on Lambton Quay for 20 years, noted that 20 years ago, one could park cars all along Lambton Quay, and the street had more offices than retail space. The respondent had noted that nowadays:

- fewer private vehicles use the street,
- 'heaps more taxis' are in evidence,
- Lambton Quay has 30% more retail space (as a result of in-building green space and converting offices), and
- 'just-in-time' delivery of goods and services is much more common: people are impatient and want 'instant delivery'.

On The Terrace, much office space has been converted into apartments so that more people are in the CBD area overall.

More than one business observed that couriers had been in operation for over 15 years, although the florist noted that in the past, growers used to deliver their own flowers but now they use couriers instead. They speculated that this was probably a cheaper and more convenient option for the growers in question. A similar observation about the use of couriers for delivering stock was made by other shopkeepers. In contrast to the replacement of supplier-owned or leased vehicles by courier vehicles, one respondent noted that the regular delivery of water by HCVs to various businesses and organisations along Lambton Quay is a recent phenomenon.

The building manager we interviewed observed that while 'nothing's changed' in 19 years, the use of courier vans for delivering stock, as opposed to large trucks, has increased. Several respondents noted that courier vans had often replaced suppliers' or distributors' own vehicles for delivering goods. However, another respondent observed that they had more large trucks, as well as small courier-type vans, delivering items than had been the case five years earlier. This was credited to increased demand for re-stocking, both as a result of growing business and greater turnover, and because the business had relinquished one of its nearby storage locations during this time. They were currently investigating having another warehouse outside the inner city area, which may reduce the current level of commercial vehicle trips. Similarly, two of the manufacturing/trading organisations interviewed by Sankaran et al (2005) were considering the establishment of satellite or additional distribution centres in the Auckland region in order to control the effect of congestion on their businesses.

4. Case Study 2: Central Lower Hutt

4.1 Context

Some key background facts about central Lower Hutt are shown in Table 4.1 below.

Table 4.1 Demographic data of central Lower Hutt (from Hutt City 2001 and Hutt City 2003).

Workforce	Approximately 7800 people worked in Hutt Central in 2001. Less than one half (45%) of these worked full-time.
Businesses	In 2002, 1227 businesses were located in the Lower Hutt CBD area, compared with 7369 businesses in Lower Hutt as a whole. Of these, 77% had 5 or fewer employees in 2002; less than 2% (1.8%) had more than 50 employees. Property and business services form the bulk of the businesses operating in the CBD (40%), followed by retail trade (20%). The next largest categories of businesses (including financial and insurance, personal and other services, wholesale trade) each form around 5–7% of the CBD businesses.
Transport	Information on how people travelled to and from work is not readily available for Central Lower Hutt. In the whole of Hutt City, 45% drove their own car, 13.5% used passenger transport and 5% went to work on foot on Census Day in 2001.

4.2 Our target area

The central business area of Lower Hutt is located on a flat river plain, with the result that streets are reasonably wide (allowing at least two lanes of traffic, and parking on both sides) as are the footpaths. Despite foot traffic being less dense than in Lambton Quay, we found that a reasonably large number of trips were made on foot if they were within 'walking distance.' Eight of the organisations interviewed either had their mail delivered by a postie on foot, or walked themselves to pick up the mail from their post box. In all instances, someone in their business walked to the post office to drop off any mail at the end of the business day. Both of the government organisations had their mail dropped off in the morning and picked up in the afternoon by a courier van. The area we investigated is shown in Figure 6.1.

One of the government administrative organisations we interviewed had its own cafeteria which provided catering services and had its own transport-related requirements. These were not addressed in the course of our interviews.

The categories and sizes of these businesses and the vehicle movements they generate are shown in Tables 4.2, 4.3 and 4.4. Details on the size, type and classification of the businesses were provided by APN Data.

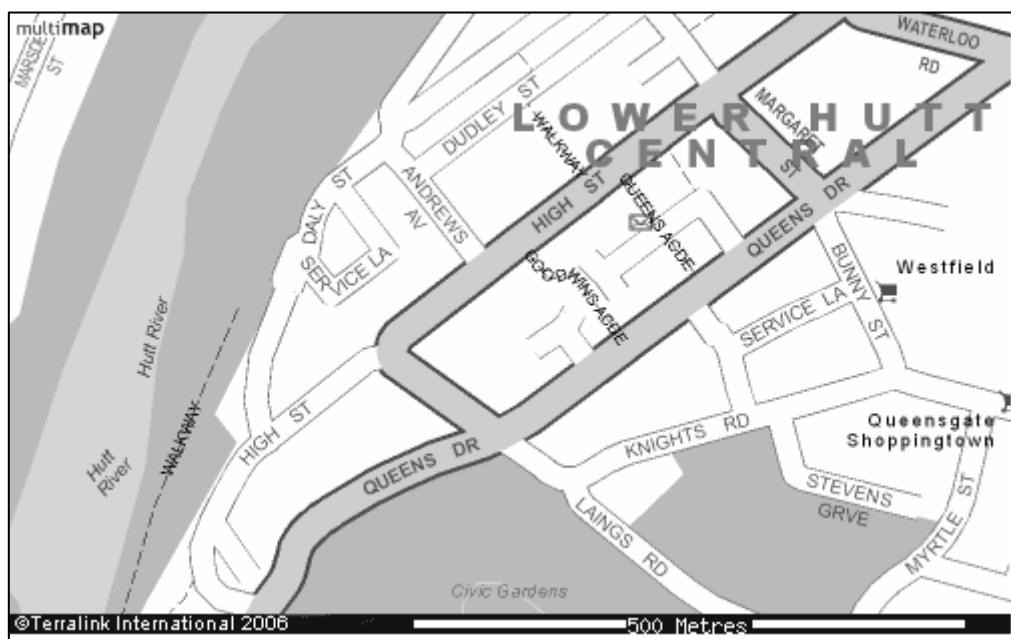


Figure 4.1 Street map of the Lower Hutt central business area.

Table 4.2 Size of organisations in Central Lower Hutt target area.

Number of staff	Number of organisations	Percent
1-2	94	32.1
3-5	95	32.4
6-19	76	25.9
20-99	25	8.5
100+	1	0.3
Unknown	2	0.7
Total	293	100.0

Table 4.3 Business categories in the Central Lower Hutt target area.

Business category (ANZSIC)	Number of organisations	Percent
Retail trade	80	27.3
Property and business services	61	20.8
Personal and other services	35	11.9
Health and community services	33	11.3
Finance and insurance	24	8.2
Accommodation, cafés and restaurants	19	6.5
Cultural and recreational services	11	3.8
Manufacturing	8	2.7
Local and central government administration	8	2.7
Communications services	6	2.0
Wholesale trade	5	1.7
Transport and storage	3	1.0
Total	293	100.0

Table 4.4 Central Lower Hutt respondents and the number of deliveries they generate weekly.

Business type	Couriers (not cycles)	LMCV (including company vehicles)	Private vehicle
Fashion retailer (independent)	30–50 (depending on time of year)	2	0
Sporting goods retailer	18	12	Some local deliveries
Food outlet	1	14	0
Bakery	0	10	0
Florist	≈31	Incoming: 3 In/out: 11–12 (company van)	0
Dentist	7–9	1 (recycling)	0
Copy/printing/other service	25–27*	1	0
Copy/printing service	<1	<1	0
Computer retail/servicing	20	Incoming: 2 In/out: 5 (company van)	0
Legal services	2	≈1	1 (cleaners)
Consultant	≈1	≈1	4–5 (own vehicle)
Local/central government administration	10	Incoming: seldom Outgoing: 4 fleet vehicles to visit clients/meetings	0
Local/central government administration	10–30 (depends on reporting demands)	Incoming: ≈20 + 5 HCV (recycling) Outgoing: 50+ fleet vehicles – average 12 000–15 000 km/year	0

* Frequency is greatly affected by other services being offered.

4.3 General comments about commercial vehicles

Hutt City Council staff considered that couriers have been used more in the Lower Hutt area in the past five years, at least partly caused by building owners making less on-site provision for deliveries from bigger vehicles. Through the planning process, the council strives to have building owners consider what vehicle movements the potential occupants of their building will generate, but owners do not necessarily want to invest in 'service space' (servicing access and loading bays/docks) because it is expensive and limits the amount of 'selling space'. According to the council, the District Plan is not prescriptive. Rather, it is 'effects based', so that most activities will be compliant and minimum amounts of service space are not established.

One respondent observed that High Street used to be the main street, but Queens Drive had taken over that role, largely because the council has installed traffic lights, a roundabout and parking restrictions in order to make traffic movement 'difficult.' The development of Queensgate shopping mall had also had an impact. The respondent regarded this treatment of the roads as a 'bit of a fiasco.' However, little direct effect on commercial vehicle access was noted, as a loading zone was still available nearby – and the back lane rear entrance to the shop remained unused.

One respondent noted that they use couriers partly because of time constraints and also because the packaging is convenient: some items sent by post require boxing whereas if sent by courier, the same item can be inserted into an envelope.

4.4 Density

Lower Hutt is much less densely developed and populated than Wellington's CBD, although it is more built up than the main business area of Takapuna (North Shore City CBD). Several buildings are higher than six storeys. However, like Takapuna, the density is too low to support foot or cycle couriers.

The demand for urgent couriers (for 30 or 60-minute pick-ups and deliveries) is generally quite low: a transport operator covering the Hutt Valley and Wellington estimated that probably around 15–20% of their business was Hutt-based, while around 70% was Wellington City based. This is more likely to be a reflection of the mix of businesses (one respondent observed that Lower Hutt had far more retail and far fewer major corporations than Lambton Quay) rather than the actual density of the corridor.

4.5 Effect of physical characteristics of the corridor

The central city area of Lower Hutt is located on a flat river plain, permitting relatively easy access and egress. The nearby Hutt River means that the streets have not been laid out in perfect grid formation.

Many businesses operating in this Lower Hutt corridor have off-street access available for shipping and receiving goods, in addition to fairly conveniently located loading zones on the main road in front of their premises.

4.6 Congestion

None of the respondents referred to congestion of the roadway as a cause for concern. Their comments reflected parking related issues, often caused by (relatively) new large shops, such as a large homeware department store, a large sporting goods shop that is part of a chain, and a butchery located in their vicinity. These shops had higher volumes of large commercial vehicles servicing them compared with the businesses that had been located there previously, causing difficulties for clients trying to find nearby parking.

4.7 Location and transport

One business, though it had changed owners over the years, had been in the same location for over twenty years. They considered their location to be a 'landmark', stating that 'people know where it is.' Hence, re-location was simply not on the agenda. Another business had recently relocated after their lease had expired and the costs of renewing it were quite high. They decided that proximity to their old location (where they had been for more than 10 years) was important, as their existing client base was nearby. In the

end, they relocated from the street to a mall, and found that significantly higher foot traffic was present in the new location and that the availability of a loading zone out front and a loading dock in the service lane made commercial vehicle access quite easy too.

The computer, fashion and sporting goods retailers all noted that the customer is the most important element of their operation; hence the businesses had to be both visible and have easy access, which they all had in their present location. The sporting goods retailer also suggested that it was helpful to have reasonable parking available nearby or outside the shop, indicating that some other shops were struggling because of a lack of easy parking. The computer shop respondent indicated that it was important to be in a good foot traffic area and that parking should be provided so that the distance is 'not too far to walk.' By contrast, the respondent from the legal services business observed that generally, 'location is not important within limits, as long as it is within the Hutt Valley.' However, they qualified this by noting that the ability of clients to access their offices by car is essential.

While the fashion retailer also said that the delivery of stock had to be relatively easy, the lack of a loading zone on either side of the street outside of their shop (resulting in parking fines for couriers), and the difficulties during weekdays with their rear access (caused by a narrow alleyway and other businesses' customers using the car parking area) were not considered sufficient causes to re-consider their current location. By contrast, the florist observed that the service lane right outside their shop was an 'extremely important consideration' as they have a large volume of deliveries daily. Access for foot traffic was also important, and the business operator had invested some funds in upgrading the walkway passing by their shop.

The copying service respondent noted that in winter, they warned their clients of the possibility of weather-related delays caused by fog or snow on the Desert Road in the central North Island, noting that '98% of the year, [the item] will come in on time.'

4.8 Efficiency of existing mix of transport service modes

We found examples of transport operators improving the efficiency of their service (although it is not clear if the benefits of this are passed on to their customers) by making multiple deliveries to the same building. For example, a beverage company was observed delivering its wares to three cafés in one mall in one stop, parking in the loading zone outside the mall.

One business (legal services) is a member of the DX Mail document exchange service, which provides guaranteed, secure overnight delivery between 8000 New Zealand businesses. DX Mail has document exchange boxes within walking distance of the legal service's offices. Hence, most of their documents are sent via the DX Mail overnight service, by-passing the need for couriers and the postal service⁸. Urgent documents will

⁸ New Zealand Post offers a similar service called 'Boxlink' which permits businesses to send less than 500 letters or documents to Post Office box or bag holders via a 'next working day' service.

be sent via email or fax more often than via urgent courier. The advantage of email is that it is fast communication and it provides an audit trail.

Non-urgent couriers, of course, do a similar type of thing by having set times that they visit buildings in order to drop off and/or pick up any packages from their customers. This type of behaviour makes it quite difficult to assess how many commercial vehicle trips or visits are actually generated by different businesses.

In one particular case, the organisation admitted that they use urgent couriers much more now than they did even two years ago. In some cases, it may be that the item being delivered is more 'time critical' than in the past, but mostly, people leave a lot of things to the last minute, knowing that a service will ensure that the item is delivered on time.

4.9 Reaction to possible transport-related policies

4.9.1 Pedestrianisation

The creation of a pedestrian zone in the Central Lower Hutt area was regarded by two respondents as a 'problem', given the way the courier services are structured. Both respondents observed that couriers could not manage all of their Lower Hutt deliveries and pick-ups in the morning before 8:30 a.m. or even 10 a.m. By contrast, creating a one-way system might have 'not much impact on couriers', depending on how well traffic flow is thought out.

Another respondent thought that implementing a pedestrian zone 'would be pretty negative as far as we are concerned. [It would have a] detrimental effect on our ability to serve customers in the manner they expect.' Apart from not permitting customers to park right outside the shop door, a pedestrian zone could prevent the 24-hour turnaround for special orders that they currently provide.

One café noted that the vast majority of their deliveries occurred early in the morning, so the pedestrian zone would not affect that. They were concerned about the potential impact on customers, some of whom arrived off the public bus service. Their preference for deliveries was to have them outside the period between 11 a.m. and 2 p.m., as this is the café's busiest time.

A service provider expressed concern that their loading area would not be accessible during the hours a pedestrian zone was in effect, which 'would become a bit of an issue.' Another service provider who did not have a lot of customer visits (and hence was not so concerned about parking) felt that the creation of the pedestrian zone was not an issue really: 'There's a service lane out the back which is almost as useful' as the main road out front.

The florist relies heavily on their back lane access for vans delivering and picking up flowers, which would not be affected by any pedestrianisation. Many of their customers telephone or arrive on foot.

4.9.2 Increased transport costs

For three service-oriented businesses, transport costs were quite insignificant, with the effect that considering cost reduction strategies was 'not relevant.' Two of these providers observed that as the volume of goods ordered increases, the 'overt' cost goes down, suggesting that this is a strategy they themselves might adopt if price rises became an issue. This would mean maintaining higher on-site inventories, which one business felt was risky. By contrast, another service provider (a consultancy) found that transport costs are a significant part of their overhead costs – similar to the office rent – but that such costs were difficult to minimise as time is an important issue when their customer is being charged at an hourly rate.

The fashion retailer noted that transport costs are generally built into the cost of each item ordered, with smaller orders (of less than ten items) generating an additional freight cost, which tends to get passed on to customers. The recent fuel cost rises were viewed as counteracting the currency exchange rate effect (during the period of this study, the New Zealand dollar increased in strength relative to the US dollar). However, some customers had queried why clothing costs were not reducing because of the currency exchange rates – clearly, they were not taking transport costs into account.

Two other retailers observed that the costs were 'not significant in the main' or were 'small' but occasionally, they considered passing costs on to the customer rather than absorbing them. If the costs were significantly increased, they would have to take these costs into account when pricing an item for the shop shelves. Both had already implemented some cost reduction strategies, primarily focused on consolidating their orders by ordering in bulk (particularly for items that turn over quickly) or for more than one item at a time from the same supplier, particularly when requesting a 'special' order for a customer. However, one shop found that sometimes, the supplier chooses to send out the stock separately because 'their warehouses are so big, it is easier to do this.'

The florist noted that transport costs are already a high proportion of their operating costs (apart from stock), but that most of these costs are passed on to their clients. Thus if the 'costs increase, we pass it on.' Cost reduction strategies include trying to have two separate deliveries to the same building delivered in one visit by the same van. If this occurs, they will often do one delivery for free.

4.10 Feasibility of maintaining good transport service while reducing traffic

The computer shop specifically mentioned 'storeroom constraints' as a reason for maintaining a limited on-site inventory. They managed this by trying to maintain between one week's and one month's stock of high demand items, such as printers and monitors, on-site and ordering 'specialist items' in as requested by customers. This also ensured that the shop did not incur any losses from holding stock that does not turn over quickly. Special items were generally ordered for overnight delivery.

The respondent noted that holding larger inventories ties up a lot of money. They do not want to maintain higher stock levels because this could incur losses as products change. Improvements to computer equipment and software are quite common, affecting the value of earlier models/versions.

One service provider (a consultant) observed that over the last two to three years, an increasing proportion of documents is being transmitted electronically, as the introduction of high-speed Internet services (broadband) has made this possible. This has significantly decreased this business's use of couriers and the postal system.

4.11 Effect of special types of goods

One government organisation we spoke to relied heavily on electronic and telephone transactions to conduct their business, and had very little direct interaction with clients. The use of couriers to deliver packages occurred on a very intermittent basis, with the observation that if a delivery is urgent, 'it is important that it is there on time.' This means that they had little concern about the relative cost of transport services, pedestrianisation, cost reduction strategies, etc. Another respondent, operating a consultancy, expressed similar views, although for them, the cost of transport is an issue, given that they undertake four to five trips per week for meetings and consultations.

By contrast, another government organisation we spoke to had a high reliance on both non-urgent and urgent couriers, such that they had no cohesive record of how many couriers were used in any given time, apart from knowing that mail and stationery were delivered each morning by a particular courier company, and post is picked up again at the end of the day. In addition, a number of items are delivered by hand each day by individuals (not couriers).

For them, it was important to ensure that documents were delivered within the required timeframe, given legal requirements to do so; the issues of cost and efficiency were not under consideration. Hence, they could only offer a very general estimate of how many courier deliveries and pick-ups occurred each week.

4.12 Miscellaneous issues outside propositions

4.12.1 Loading zones and docks

Most Lower Hutt central area businesses had lane access to a rear entrance. The usage of such an entrance was varied: one fashion retailer only used the rear entrance at weekends when they were bringing in some supplies, while others, such as the florist and the eating places, used it several times every day.

Hutt City Council staff did not think demand was high for additional loading zones in the case study area, although it is trying to maintain existing ones; the perception is that couriers, as performing the bulk of commercial pick-up and deliveries, would not use loading zones (they 'will park anywhere') and so putting them in was 'not worthwhile'.⁹ Tradespeople or other deliveries making a very short stop would park similarly or could gain access through the service lanes. Instead, the Council's focus appears to be on facilitating pedestrian access, including accommodating bus stops in centralised positions.

None of the people spoken to used forklifts for stock, although on occasions, trolleys were required. One respondent observed that most deliveries consist of things that can be carried by one person or loaded on to a trolley – all deliveries were deemed 'man manageable [sic].'

4.12.2 Changes affecting the transport corridor

One retailer who had been located in Lower Hutt for 20 years reckoned that the greatest change occurred 10–15 years ago, when road transport replaced rail as the main mode for shipping goods from Auckland to Wellington region. Stock would arrive on rail and then trucks would deliver it to the shops.

The same retailer and a service provider noted an additional change affecting how stock is ordered, which occurred around the same time. Earlier, orders were sent by mail and the turnaround time (until stock was received in the shop) was one week. Now, the orders are faxed or emailed, dispatched and delivered in 24 hours. One respondent thought that this created a 'self-feeding' system because the ordering/stocking service has improved; the retailers and, in turn, customers expect orders to have 'instant delivery.'

The fashion retailer noted that over the past five years, they have had more frequent stock delivery. Previously, they had to order most of their seasonal stock in advance, so deliveries were less frequent and larger in package size. However, couriers have been the ones making the deliveries for more than ten years. Now, the shop does not have to carry so much stock, which is viewed as 'good for the cash flow.' The respondent believed that this change had occurred because of demand from retailers, so that suppliers may be carrying more stock, and retailers are ordering it on an 'as needs' basis.

⁹ While not providing adequate parking and/or loading zones could be a means of generating revenue for the Council (through fines from ticketing), it is worth noting the larger city-based councils in New Zealand tend to contract out ticketing to private service providers and hence do not receive the direct benefit of such ticketing.

5. Case Study 3: Queen Street – Auckland CBD

5.1 Context

Auckland City CBD is at the heart of a rapidly growing region. Current population projections from Statistics New Zealand (medium series) (Statistics New Zealand 2007) suggest that the population of Auckland Region might grow by around 36% (435 000) over 20 years. This is much higher than the 16% growth rate projected for New Zealand as a whole (indeed, the growth projected for Auckland is around 2/3 of the increase in population projected for the whole country). Auckland City itself is projected to grow from 389 000 in 2001 to 531 000 in 2021, an increase of 142 000 (36%).

Such growth naturally leads to different challenges for urban design and transport planning from most other New Zealand cities. Substantial changes are being planned for transport in the Auckland CBD and elsewhere in the region, given the greater frustration with congestion than other locations in New Zealand. Queen Street is one specific focus of attention within the Auckland City Council's *Auckland's CBD: into the future* project (Auckland City 2004a). In consulting about this strategy and action plan with key users before public consultation, it is noteworthy that the first two of the 'main challenges' listed both concerned transport (Auckland City 2004a):

- difficulty in accessing the CBD, and
- traffic congestion and domination by vehicles.

Consistent with this, public submissions in 2004 also focused on transport:

Transport was seen by submitters as the most significant challenge for the CBD, with 45 per cent of comments asking for improved public transport options and an end to the city's traffic congestion woes. (Auckland City 2004a)

Other key background facts about the Auckland CBD are shown in Table 5.1.

Table 5.1 Demographic data of Auckland's CBD (from Auckland City 2005).

Workforce	Approximately 65 000 people work in the CBD, making it the largest employment centre in New Zealand. It has 25% of all jobs in Auckland city and nearly 13% of jobs in the Auckland region.
Businesses	Almost 8500 businesses are located in the CBD, representing 18% of businesses in Auckland City. The largest single business is Ports of Auckland Limited, while the largest businesses in terms of employment are financial services, ICT and business services.
Transport	Approximately 73 000 people enter the CBD between 7 a.m. and 9 a.m. each weekday. Of these: <ul style="list-style-type: none"> • approximately 44 000 people (60%) come by car; • approximately 27 000 (37%) come by passenger transport - buses and, to a lesser extent, rail and ferries; • approximately 2000 (3%) walk or cycle.

The nature of activity in the CBD is also changing. Auckland's CBD is changing from a largely commercial centre to a mixed-use centre, in which accommodation, education and entertainment are becoming as important as business. For example, by June 2004, the estimated number of residents of the CBD was around 16 000, nearly double the number at the 2001 Census.

Auckland City plans to spend around \$100 million upgrading the CBD's streets over 10 years, funded by CBD ratepayers through the CBD targeted rate introduced in 2004.

5.2 Our target area

We focused on the core retail and business area of Queen Street from Wellesley Street to Customs Street¹⁰. This area is shown in Figure 5.1. We excluded the final block north (in the direction of the harbour) past Customs Street because of the unusual dominance of bus parking and the Britomart complex there. The area we selected coincides with the section of Queen Street in the 'West Side' and 'Old Town' quarters identified by the Auckland City Council as part of the strategy for revitalising and transforming the CBD. These quarters are seen as focused on 'retail and business', 'nightlife', and 'fashion' respectively. South of Wellesley Street is the 'civic and cultural' quarter.

The categories and sizes of the businesses we interviewed within the target area are shown in Tables 5.2, 5.3 and 5.4. Details regarding the size, type and classification were provided by APN Data.

Although this area is cited as having one of New Zealand's highest concentration of pedestrians (up to 6000 on Queen Street's foot paths during a typical weekday lunch hour (Auckland City Council 2004b), a need for upgrading and revitalising is accepted. Responses from retailers concerning transport were affected, and to some extent overshadowed by, concern that Queen Street (below Wellesley Street) is under-performing and not attracting sufficient customers. A Lambton Quay retailer, who was working on Queen St until recently, described Queen Street as a 'ghost town', with shoppers preferring to go to St Lukes or Botany Downs where they can be assured of getting a park and do not need to cross roads. One Queen Street retailer interviewed called Queen Street a 'slum'.

¹⁰ Because of imprecision in the database used for sampling, one respondent recruited was a few yards outside the area. We have continued to use this person's responses rather than to ignore them.

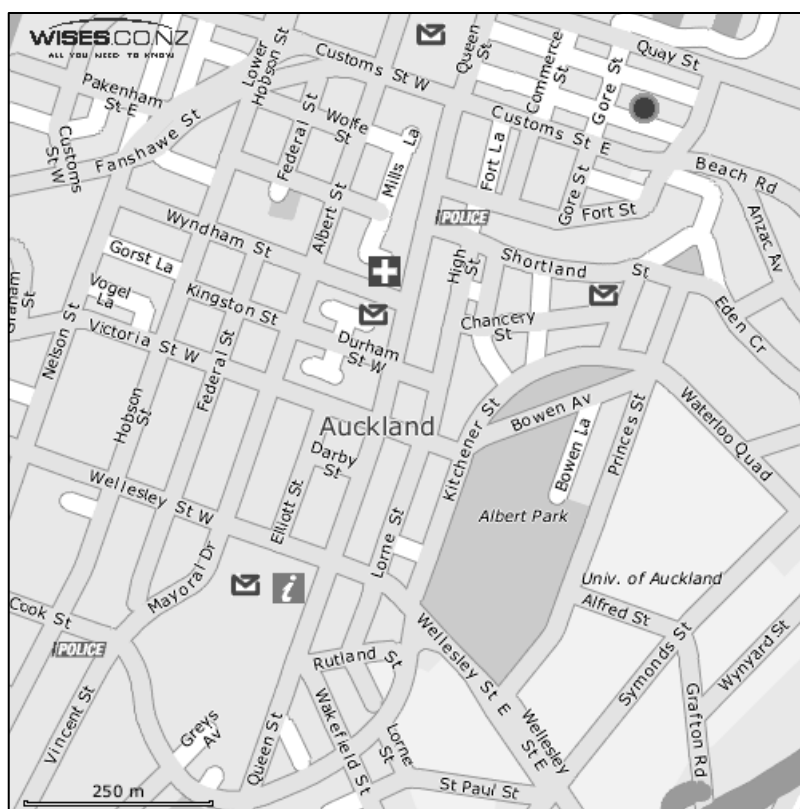


Figure 5.1 Location map of Queen Street, Auckland.

Table 5.2 Size of organisations in Queen Street.

Number of staff	Number of organisations	Percent
1-2	176	33.1
3-5	132	24.8
6-19	142	26.7
20-99	70	13.2
100+	7	1.3
Unknown	5	0.9
Total	532	100.0

Table 5.3 Business categories in the Queen Street target area.

Business category (ANZSIC)	Number of organisations	Percent
Retail trade (including food, clothing, cars and other goods)	147	27.6
Property and business services	121	22.7
Personal and other services (including travel agencies and hair salons)	70	13.2
Finance and insurance	58	10.9
Education, health and community services	43	8.1
Manufacturing	28	5.3
Accommodation, cafés and restaurants	24	4.5
Transport and storage	10	1.9
Cultural and recreational services	9	1.7
Communications services	8	1.5
Local and central government administration	8	1.5
Wholesale trade	4	0.8
Construction and repair of buildings	2	0.4
Total	532	100.0

Table 5.4 Queen Street respondents and the number of commercial vehicle visits they generate weekly.

Business type	Couriers (not cycles)	LMCV	Private vehicle
Fashion retailer (chain)	30–55	0 (or counted as couriers)	0
Fashion retailer (independent)	0	1	3.5
Department store	60	50	0
Gift shop	2	0	0
Fast food chain	2–3	11	1?
Food franchise	0	15	9?
Café (independent)	5	30	–
Medical services	3	18	–
Optometrist	25	< 1	–
Financial services	5	1	0
Recruitment	9	3–4	0
Government organisation	22–23	1	25

Some quantitative support backs such complaints. The number of people coming into the CBD to shop dropped by 22% between 1993 and 1999. However, the CBD's share of retail jobs has remained steady in recent years, suggesting compensating demand from CBD residents and workers (Auckland City Council 2004a).

Currently, Queen Street is undergoing some upgrading as part of the *Auckland's CBD: into the future* project. While many of the planned changes to Queen Street will not affect commercial vehicle traffic, some changes are being made to parking provisions on the street (Auckland City 2004a). In particular, the re-designed Queen Street will have 51 'stopping spaces', compared to 81 prior to the upgrading. These spaces will be 'shared parking', meaning that they are used by different users at different times of the day.

Before 11 a.m. on Monday to Friday, the 51 spaces will be reserved for loading and servicing Queen Street businesses. After 11 a.m., six of the spaces will be available for use by taxis, while the remaining 45 will be used as short-term (15-minute) car parks. This permits their use by couriers and other delivery vehicles, which need to be able to make quick stops during business hours.

Over 80% of the organisations in the target area are small or medium in size (following the Ministry of Economic Development (MED) classifications of 'small' as employing up to 5 full-time equivalents (FTEs) and 'medium' as employing 6–19 FTEs (Ministry of Economic Development, 2003). As expected, the most common categories of business are 'retail trade' and 'property and business services'.

Around half of these were small businesses (5 or fewer staff). In contrast to our Lambton Quay sample, we did not end up with any respondents from the very large organisations with more than 100 staff at a single Queen Street site. Such organisations accounted for only 7 of the 532 businesses listed by the UBD Database provided to us by APN Data in the target area.

5.3 General comments about commercial vehicles

Most Queen St interviews began with an open-ended request to mention the first things that came to mind about commercial vehicles. Couriers, small/medium vans and trucks typically came to mind first, or what they saw as the major characteristics (e.g. '95% deliveries, only 5% pick-ups... for us, we deal with a lot of different suppliers'). Others immediately thought of problems, often related to parking:

- Delivery vehicles often parked on yellow lines.
- Courier vehicles appeared not to get tickets for illegal parking, but an obvious trade vehicle got a ticket.
- Some would like to be able to use a loading zone with a non-marked personal car for loading.
- Lack of room in Queen Street forced delivery vehicles onto the footpath.

The general concern about parking was apparent both for deliveries and customers on Queen Street itself, as well as for themselves and staff nearby.

Final comments from respondents also commonly mentioned parking issues, for example:

- the shortage of drop-off and pick-up places, and
- leniency wanted with respect to business owners using private vehicles for loading in goods vehicle loading zones.

One respondent (a retailer on the east side) was emphatic that extra parking was mainly required for customers (this respondent wanted a return to free weekend parking). Others emphasised the importance of providing space for commercial vehicles to load.

This report does not take any position on such claims. Rather, we see their comments as consistent with the debate noted in an overview report to the Auckland City Council:

Tension/debate: 'Providing affordable parking to facilitate business vs. restricting parking to increase public transport use and decrease dependency on cars.'

Possible resolution: 'Parking yet to be resolved but may be an issue of explaining the current policy so that it is understood' (No Doubt Research 2003).

One business observed that stock had been delivered via couriers for at least the past ten years.

5.4 Density

A couple of respondents explicitly mentioned that delivery times were good in the central city area, presumably because the density of businesses justified a large number of deliveries (relative to distant suburbs).

The Lambton Quay tendency of walking to nearby clients was missing from Queen St interviews. This reflects the more dispersed nature of Auckland.

5.5 Effect of physical characteristics of the corridor

Queen Street runs down a reasonably broad valley with hills on either side. Respondents did not remark on this as having a major effect.

The rising ground on the sides of Queen Street does lead to some ambiguities in recording the level (storey) of businesses. Specifically, a business might be on Level 2 in a Queen Street building, but have ground level access to the rear. Indeed, one of our respondents with a Queen Street address effectively had their main entrance at ground level onto a small street running parallel to Queen Street. This back street was used for their regular deliveries.

For loading and unloading, side and cross-streets (crossroads such as Durham St and the lanes parallel to Queen Street (e.g. Lorne St and Mills Lane) often enable rear access) were important to several respondents. Loading docks and vehicle entrances are common on such streets but rarely on the more valuable Queen St frontage.

5.6 Congestion

Unexpectedly, congestion was almost never mentioned by respondents during these interviews without prompting. When explicitly prompted toward the end of one interview, the respondent simply replied that congestion was not seen as a problem in relation to commercial vehicle use.

Congestion may nevertheless be affecting commercial vehicles servicing these businesses. First, the impact may be largely invisible to the businesses (particularly given that most deliveries/pick-ups were not highly time-sensitive) but highly visible to transport operators delivering to them (because of the delays and extra costs associated with congestion). Second, the early morning delivery times (e.g. 5 a.m.) for some major deliveries were primarily attributed to the use of parking on Queen Street at that time, which is clearly visible to the businesses. The operators may consider congestion an important reason for the timing of the very same delivery. Third, congestion at peak times in Auckland may now be such an accepted part of life in central Auckland that it was simply taken for granted by our respondents and not seen as worthy of mention in such an interview.

Even a medical practice with strict timing requirements associated with some deliveries (e.g. vaccines needing to be delivered within 4 hours into an appropriate fridge. Some even include temperature monitors in each courier pack, which must be returned to confirm appropriate delivery) expressed more concern about parking problems (both for patients and for specialists).

A couple of respondents mentioned that service people 'hate' coming to the CBD. But the reason cited for this again concerned parking difficulties rather than congestion.

5.7 Location and transport

Retailers were quick to attribute the generally accepted lesser vitality in Queen Street retailing (which was assumed to push business owners towards relocation) to transport problems, primarily parking. One firmly favoured a returned to free weekend parking and also wanted plenty of public car parks down Queen Street (with a 1–2 hour time limit).

It is the general public who are desperate more than vans and couriers (a retailer about parking).

Consistent with this view, a recent article in the New Zealand Herald argued strongly against plans to make more space for pedestrians on Queen Street at the expense of parking.

In addition, a medical practice was blunt about the difficulties of getting specialists to work sessions in the CBD caused by the requirements for car parks.

Being located at ground level on Queen Street was clearly critical to some of the retailers because of the foot traffic. Services organisations a few levels above the street were not generally so specific. A recruiting company noted that apart from being located near major employers, having a Queen Street address was a distinct advantage with their many international applicants because the address was commonly recognised and easily found.

In summary, this issue divides the retailers from the others. The retailers are affected more by parking problems and see the need for revitalising Queen Street retailing. Service organisations in offices are less affected by parking and are happier with the CBD environment for business.

The following published comment from a non-retailer in the CBD expresses what may be a common view:

Auckland is a good place to do business,' agrees Geoff Hunt, managing director of Alstom New Zealand, a subsidiary of the French engineering company. 'The support services we buy - lawyers, accountants, engineers - are good and they're generally more customer-focused than Australians. There's nothing fundamentally wrong with Auckland, apart from the time it takes to get to the airport, or the need to get out of bed earlier to get across the harbour bridge (Unlimited 2005).

A report dedicated to CBD business location decisions was recently completed for the Auckland City Council with respondents specially selected because they had recently moved into or out of the CBD (Gravitas 2003). Key business people and decision-makers in the Auckland Region were interviewed to identify the 'key drivers' of decisions to locate in the CBD. Gravitas found that 'image' is a key factor, along with the desire to be at the 'centre of the region', to be close to clients and with good access to services, shopping and cafés/restaurants. Respondents to our research gave similar impressions about business location.

5.8 Reaction to possible transport-related policies

5.8.1 Pedestrianisation

We explored possible restrictions to vehicle access at certain times (e.g. 10 a.m.–2 p.m. or 8:30 a.m.–5 p.m.) by discussing possible pedestrianisation of the stretch of Queen Street outside the organisation.

For most, pedestrianisation (particularly if the restrictions only applied 10 a.m.–2 p.m.) was not a huge problem, assuming that compensatory provision for commercial vehicles would be added to the side streets and cross streets. The bigger issue for retailers was whether or not this would contribute to revitalising Queen Street as a retail destination (on these grounds, one fashion retailer dismissed the notion of pedestrianisation as

'unrealistic'): '[It] wouldn't bother me, as long as we have pedestrians. The traffic out there doesn't benefit me – they can't stop anywhere.'

Such policies were of minimal direct concern to offices as opposed to retailers.

Other policy changes might lead to an increase in commercial vehicle costs. We explored these (without specifying policy tools) by asking how things might change if transport costs doubled. (Note that such a dramatic increase, selected primarily for simplicity of communication, is not entirely unrealistic for transport; for example, one manager noted that parking prices per week for staff had roughly doubled in the last four years.) A first reaction was to reduce the number of deliveries by various methods:

- ordering more at one time (where storage allows),
- telling clients to expect longer lead times for delivery so as to allow greater consolidation and fewer deliveries,
- doing more self-delivery, or
- using the post more often, instead of using couriers.

One large retailer noted that transport costs had already been noted as a significant cost and measures such as centralising deliveries from major suppliers to a distribution centre had already been taken, as well as settling on a single transport provider.

5.9 Feasibility of maintaining good transport service while reducing traffic

Two respondents had reduced multiple deliveries to the CBD by consolidation at a distribution centre. While such options may be feasible and cost-effective, it appears they are not being used by other CBD businesses with many branches in the Auckland region.

Smaller food businesses also mentioned they were able to reduce deliveries by using a supplier with a broad range of goods (such as Toops or Gilmours). Given the other benefits to businesses of reducing the number of suppliers and deliveries (e.g. reduced interruptions from deliveries, reduced paperwork), such strategies may be underused by other businesses. However, it is also possible that some businesses feel that the quality or price of their food supplies is better by being ordered from organisations that specialise in particular food types.

Business motivation for such strategies may not revolve around transport. The first reason cited for a distribution centre by a retailer was to reduce the cost of checking incoming supplies in stores rather than reducing transport costs. Similarly, a small business's major reason for reducing the number of suppliers (and hence reducing deliveries) was to reduce paperwork, not specifically to reduce transport costs. It appears that the concept of 'supply chain management' has yet to penetrate small to medium business enterprise thinking. Transport costs are seen as incidental to operating costs and not one that can be measured or valued so that it can be controlled. The main reason for the lack of supply chain management at this level is probably that small to medium

businesses (where the owner is often the managing director, the financial director, the chief executive, etc.) cannot absorb or afford the cost of employing logistics or transport management specialists.

For non-perishable goods, clearly, a trade-off must be made between CBD storage and frequency of delivery. In response to a possible increase in transport costs, several respondents made the obvious suggestion of having fewer but larger deliveries. This option is not open to some on account of limited storage. Limited storage is likely to be more of an issue in the CBD rather than in secondary urban areas because of high land and rental prices in the CBD.

5.10 Effect of special types of goods

An upmarket clothing retailer considered transport costs only a very small part of the overall costs and therefore was unwilling to consider transport cost reduction strategies because prompt delivery was seen as important part of client service.

Some deliveries to a medical practice were clearly time-sensitive and required special storage. But this did not seem to create special problems or requirements for different infrastructure (beyond having a transport provider who dealt with the special requirements) reliably.

No hazardous goods were mentioned.

5.11 Miscellaneous issues outside propositions

5.11.1 Loading zones and docks

Special loading docks were not common and not often used. Despite having a dedicated off-street loading dock, one business interviewed said that their largest deliveries were being downloaded directly on Queen Street (before business hours) because the truck was too large for the loading dock, which had been constructed many years previously. Allowing parking on side streets opposite loading docks was an irritant to one respondent, as it restricted entry of larger trucks to docks. In particular, this created problems during heavy rain when unloading became impossible because of the risk of damage to stock.

In one case, the major regular delivery was usually made by a van/truck parked on the footpath. From observation, this practice appeared less common in Auckland than in Wellington. The exception in Auckland related to an awkward location near a corner (where the traffic lane extends to the footpath rather than allowing stopping).

Business satisfaction with loading zones is not merely a matter of the number and location of the zones. Enforcement can make a big difference. Firstly, the businesses were frustrated (as in Lambton Quay) by being fined when making use of loading zones for goods vehicles with an unmarked car. 'A little more leniency' for people obviously unloading into businesses was sought, whatever their vehicle. Secondly, one business was

exasperated by the 15-minute parking area near the store of being nearly continually occupied by taxis, and thus being unavailable for deliveries.

5.11.2 Changes affecting the transport corridor

Relatively few changes in the last two years (e.g. in terms of delivery methods or client expectations for speed) were noted, and no respondents could cite major changes to delivery patterns expected soon.

6. Case Study 4: Takapuna – North Shore City CBD

6.1 Context

North Shore City is the fourth largest city in New Zealand, with a population of 184 820 (Statistics New Zealand 2001). Takapuna is generally regarded as North Shore City's central business district, containing the offices of the City Council, several corporate headquarters and the area's main hospital (Enterprise North Shore, 2005). The Takapuna Community Board area had a population of 40 824 (2001), accounting for 22% of the total North Shore City population and representing an 8.8% increase on the 1996 Census figures.

With 4.7% economic growth in the year to March 2002, North Shore City was the fastest growing economy in the greater Auckland region. In 2003, the economy grew 7.1%, but it was expected to ease to about 4–5% in 2004 (North Shore City Council (NSCC) 2004b). At 29.3%, North Shore City had the highest percentage growth in new businesses in 1998–2002 (NSCC 2004a). A major contributor to this economic growth is the Smales Farm Technology Park in Takapuna which includes companies such as Toll NZ, EDS and TelstraClear, and is the first technology park to have a university linkage (NSCC 2004b).

In 2003, communications services and the manufacturing sector each comprised about 11% of economic activity in the City's economy, while wholesale trade represented 14% (NSCC 2004b). Over 76 000 FTE jobs were located in North Shore City at February 2003.

The drivers of the economic growth in North Shore City have been attributed to a 'mix of attractions' (NSCC 2004a), including the availability of 'greenfield' business land, relatively easy transport access, proximity to Auckland's CBD (Takapuna is located an estimated five minutes north of Auckland Harbour Bridge) and a strong workforce, as well as the attractiveness of the natural environment (Takapuna has both a golden sand beach and a volcanic freshwater lake). However, it is noted that increasing traffic congestion is eroding the North Shore City's competitive advantage relative to other parts of Auckland.

6.2 Our target area

We focused on the core retail and business area of central Takapuna, as discussed with Auckland Regional Council. Hence, we included:

- Lake Road between Blomfield Spa and Huron Street,
- Hurstmere Road between its intersection with Lake Road/The Strand and the intersection with Anzac Street (including businesses around the roundabout), and
- The Strand between Lake Road and Gibbon Road.

These areas are shown in Figure 6.1.

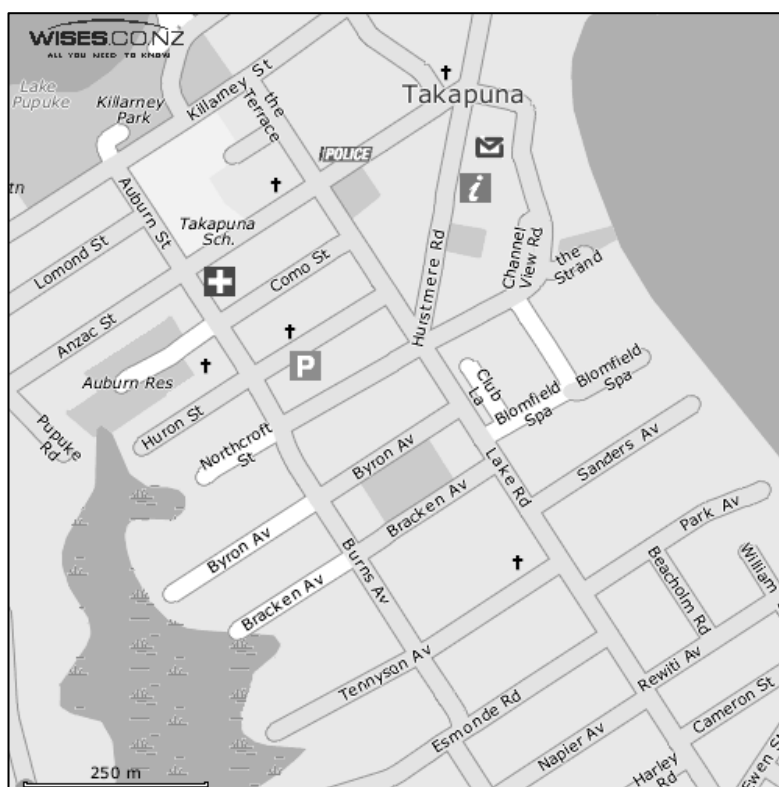


Figure 6.1 Location map of Takapuna’s CBD.

The UBD database provided by APN Data for this part of central Takapuna contained 216 businesses. We discovered, once we were in the field, that the occasional business selected was actually located just outside the immediate study area. We interviewed respondents from three such businesses. Given the exploratory nature of this research, we decided not to worry about this and retained the information we collected from them.

The categories and sizes of these businesses and the vehicle movements they generate are shown in Tables 6.1, 6.2 and 6.3. Details of the size, type and number were provided by APN Data.

Table 6.1 Size of organisations in Central Takapuna.

Number of staff	Number of organisations	Percent
1-2	78	36.1
3-5	57	26.4
6-19	53	24.5
20-99	22	10.2
100+	2	0.9
Unknown	4	1.9
Total	216	100.0

Table 6.2 Business categories in the Central Takapuna target area.

Business category (ANZSIC)	Number of organisations	Percent
Retail trade	61	28.2
Property and business services	53	24.5
Finance and insurance	22	10.2
Health and community services (including government offices)	22	10.2
Personal and other services	19	8.8
Accommodation, caf��s and restaurants	12	5.6
Cultural and recreational services	6	2.8
Wholesale trade	5	2.3
Manufacturing	4	1.9
Construction and repair of buildings	4	1.9
Communications services	3	1.4
Transport and storage	2	0.9
Local and central government administration	2	0.9
Water supply	1	0.5
Total	216	100.0

Except for the large organisation, the businesses we spoke to had someone walk to pick up the post from their post office box in the morning and to drop off their out-going mail at the end of the day. The large administrative organisation had two mail deliveries/pick-ups per day by one courier company, as well as a fleet van which transferred internal mail between different locations.

Most of the businesses interviewed did not have in-house supplies of food and beverages, although a few did have drinking water deliveries. The exception was the government organisation, which has an on-site cafeteria and caterer, and one other business, where the office manager went out in their own vehicle to buy tea and coffee supplies a couple of times a month.

Similarly, most businesses stated that their use of repair and technical services people (e.g. to service or fix photocopiers, telephones, computers or air conditioning) occurred 'very rarely' and 'as required'. Generally, this amounted to less than one visit per month by any repair or technical service personnel, even in the case of the large organisation interviewed. All but two respondents used the council-provided rubbish and recycling services. The bookshop and ladies' fashion retailer both observed that it would be helpful to them if the frequency of the paper recycling pick-up increased from once per week to as much as three times per week.

Table 6.3 Central Takapuna respondents and the number of commercial vehicle movements they generate weekly.

Business type	Couriers (vans or cars)	LMCV ^a	Private vehicle
Fashion retailer – shoes (national chain)	11–21 ^b	0	0
Fashion retailer – shoes (independent)	10	0	0
Fashion retailer – women’s clothing (independent)	3–12 ^b	0	0
Restaurant/bar (independent)	0–5	30 LMCV 21 HCV (including rubbish and recycling)	0
Bank (branch)	10–12	6–7	5 (cleaner)
Dental services	23–30	3	1 vehicle driven ≈20 hours/week making many deliveries
Computer services	4–5	≤1	0
Hair salon (men’s) ^c	1	1	0
Homeware/gifts	0	≤1	3–5 (stock)
Food/beverage manufacturer (head office)	5–11	2–3	0
Bookshop	25	4+	0
Large administrative organisation (>20 employees) ^d	Scheduled: 25 (excludes ad hoc deliveries)	<u>Incoming:</u> scheduled: 17 (minimum 0, including rubbish) <u>Outgoing:</u> vehicle fleet: 80–100 round trips <i>per day</i>	

Notes to Table 6.3:

- a The council-organised rubbish and recycling collection, occurring once a week, is excluded from totals, unless specified otherwise.
- b Fluctuations are seasonal: stock is delivered much more frequently at the beginning of a new ‘season’ and in much larger quantities (up to 5–6 cartons daily, compared to 1–2 cartons per week in the off-season).
- c Our respondent noted that a women’s hair salon would probably have a greater number of commercial vehicle visits per week, as it would have a higher consumption of hair products (colours, shampoos, towels, etc.) than the men’s hair salon.
- d This organisation had its own cafeteria, for which the commercial vehicle movements are not included here. It is likely to be similar to other independent food services.

6.3 General comments about commercial vehicles

Things at the top of respondents’ minds generally focused on timeliness of deliveries, either of goods to the business in question or of materials from their business to other organisations (e.g. documentation from the bank branch to the processing centre at the end of the day). The dental services sometimes found that even ‘overnight’ services, with stated delivery times of 8 a.m. the following day, were not reaching their destination (within Auckland region) until 3 p.m. They tended to do local deliveries (North Shore, the Hibiscus Coast, Waitakere and Auckland City) themselves in a private vehicle to ensure their timeliness.

A major difficulty stems from ‘most stuff being on the other side of the bridge’. The bank manager observed that it could take as long as an hour to get on to the bridge between 5 p.m. and 7 p.m. in the evening. Generally, this does not impact the bank branch in Takapuna, unless the vehicle is late for the afternoon pick-up/delivery of money, as staff have to be present for the handover of cash.

The other major issue identified by respondents had to do with parking. Many people we spoke to perceived that 'there's not a lot of parking in Takapuna.' The actual issue varied for different businesses: the bank branch had a combination of five-minute parking and dashed yellow lines on the road outside its doors, with the nearest loading zone located about 40 metres away, making security for the pick-up and delivery of money a challenge. As the road is only two lanes wide, no room is available for double-parking and often the security vehicle has to wait until a space is available to park. Despite using it themselves for stock deliveries, a retailer complained about having a loading zone immediately opposite their shop front, because the heavy vehicles using it are noisy, block the flow of traffic and make it difficult for people using the car parks opposite the loading zone.

The issue for the dental services and food/beverage manufacturer was that the available parking on the street near their business was short-term (either a 30 minute or 2 hour time limit, or some metering) meaning that staff had to park at least a block away from their workplace if they wanted to park for free. By contrast, another business, located in the same street, felt that the free 30 minute parking zone on the street was very convenient for commercial vehicles and visitors (this organisation had on-site parking for staff). One retailer noted that they had two car parks for staff, so that if three were on duty, one had to pay for parking.

6.4 Density

Takapuna is much less densely developed and populated than Auckland CBD. Many buildings in the study corridor area were single-storey; none are above five storeys tall. The most observable effect this has on the demand for transport services is that, unlike Auckland's and Wellington's CBDs, no foot or cycle couriers are found in the corridor. Nor was overt mention made of urgent courier use (pick-up and delivery in one hour or less) by the dozen businesses interviewed. One respondent observed that 'couriers find it quite good around here [the Takapuna central area]' – road works, not parking or traffic, were considered to be the main issue.

6.5 Timeliness of transport services

The bank branch had immutable time windows for transport service: its documentation for processing and money delivery and pick-up need to occur at the end of the business day. The exchange of money requires a branch staff member to be present, while picking up documentation could be done at any time that suited the processing centre. The branch manager said they had sufficient money supplies that if the daily pick-up was not done, it 'would not be a big drama', although security could be a concern if an excess of cash was on hand. However, the documentation, which includes account deposits, had to be picked up daily no matter what in order to meet client expectations.

The dental service had fairly long lead times between an order being placed and the expected delivery (usually several days), but the actual delivery date is usually critical, as it had to mesh with a patient's appointment at the dentist.

6.6 Congestion

Within central Takapuna, the roads were considered to be busy, but congestion did not appear to be a problem with respect to transport services – access to parking was the primary concern. Rather, the issues to do with congestion arose when the commercial vehicles involved had to access the Auckland Harbour Bridge.

6.7 Location and transport

6.7.1 Within the Takapuna corridor

The restaurant/bar we interviewed is located on the Hurstmere Road strip, just beyond the Anzac Street intersection, one of approximately half a dozen restaurants, cafés and bars. They regard themselves as part of an established 'destination venue' and feel that if they moved away from this area, they would be losing their share of the market. The main shopping part of Hurstmere Road has daytime foot traffic and is quiet at night. Another retailer in the shopping area thought that 'being visible on the main road is important' and would not seriously consider moving from their current location, despite having made a number of negative comments about parking availability.

The bank branch manager considered re-location on either Lake Road or Hurstmere Road and thought that clients would see little difference in terms of ease of access and parking, though Lake Road would be better for commercial vehicle access, as the road is wider, thereby making double-parking a possibility. By contrast, other businesses valued their location on Hurstmere Road to a high degree, commenting that the 'whole of Lake Road is pretty dead' and on the desire for 'a big enough shop in the right spot.' Being on the 'better side' of the street was important for another business, who believed that the side their shop is on had 'a lot more foot traffic than the other side, or the other end of the street.'

By contrast, four service-oriented businesses regarded their location in central Takapuna as being of fairly minimal importance. For three of these, it was possibly because they

primarily interact with their clients remotely (by telephone, fax or email) rather than having frequent on-site visitors. The fourth business observed that even though quite a number of visitors came to its site, it is 'not absolutely necessary to be here – we could be elsewhere', particularly if there was better vehicular access to the new building. Overall, they felt they could relocate to quite a distance away from the central Takapuna area and only nominally affect their business operations.

6.7.2 On the North Shore

Most of the businesses we spoke to mentioned of their North Shore location affecting how they structured their use of transport services.

The restaurant/bar manager observed that alcohol deliveries occur only once a day, in the afternoon/early evening, because the warehousing is 'on the other side [of the Auckland Harbour Bridge]'. The time of delivery varies depending on the traffic, but is always in the afternoon (when the restaurant/bar is already open), rather than the morning when it would be more convenient in terms of staff being able to put the stock away. By contrast, alcohol deliveries occur twice a day south of the Harbour Bridge. In terms of managing supplies, the manager was careful to buy and store enough alcohol for one week of business.

Parking was again mentioned as a concern for staff within the businesses that were forced to pay for parking or to obtain a free park some distance away. One business stated that it was hard to get staff as a consequence of the high parking costs in Takapuna, because no other locations in the North Shore had the same difficulty getting free or long-term parking close by. Another business had made a decision to relocate as their staff of about a dozen people could not park near the workplace. The new location, outside central Takapuna, will have sufficient on-site parking for staff and visitors.

6.8 Efficiency of existing mix of transport service modes

The restaurant/bar manager had reviewed its use of transport services and felt that not much more could be done to reduce the number of weekly deliveries while still maintaining the quality and freshness of food that their clientele has come to expect. This quality and freshness made frequent deliveries a mandatory requirement.

Both the retail shoe shops had established courier delivery and pick-up routines (once in the morning and once in the afternoon) whereby stock was delivered to the shop, customer purchases were picked up for delivery and stock was transferred between shops. One shop observed that not every courier visit resulted in a delivery or a pick-up, and that seasonal variation meant that the size of the delivery carton changed, rather than the frequency of the deliveries. The efficiency of such an arrangement (routine courier stops) is illustrated in a comment by an administrative organisation respondent: 'some days only a couple of items [will be picked up] and other days, 30–40 items.' At the same time, however, this organisation admitted that unrecorded numbers of couriers

were delivering items to individual departments, so they couldn't estimate exactly how many commercial vehicle movements they generated per day.

Another business was making a concerted effort to reduce costs and the number of deliveries it received by placing orders only of a size sufficient to avoid a courier surcharge and by computerising its inventory. Another common practice mentioned by a few respondents was to package goods together to reduce the number of items their regularly scheduled courier is picking up (and hence the charges), or to hold on to an item for a customer and send it out with the regular incoming courier.

The bank branch manager noted that the number of couriers used by the branch had changed significantly since the bank began to transmit documents electronically to branches and/or clients for signing. Now the branch may only order a courier pick-up once a week, whereas before, couriers would have been used 3–4 times a week. Another respondent noted that they used to have couriers scheduled for three regular pick-up/delivery trips per day, but that this had been reduced to two as a result of the travelling times between locations.

Another business was in the process of computerising its inventory, which they expected would result in their being more efficient in ordering additional stock, resulting in fewer deliveries each week.

Both infrequent and frequent transport services users were found to consider how urgent the delivery of an item was to a client (i.e. whether it warranted same hour, same day, next day or postal delivery service) – in one case, the respondent also took how much the item weighs into account when choosing the delivery method.

6.9 Reaction to possible transport-related policies

6.9.1 Pedestrianisation

We discussed the effect that pedestrianisation of the area along Hurstmere Road and Lake Road, bordered at the north end by the intersection with Anzac Street and at the south end by Bracken Street, would have on the businesses and their use of transport services. With pedestrianisation, commercial vehicle traffic would be barred from the area between 10 a.m. and 2 p.m. or perhaps longer. Two respondents noted that the pedestrianisation of Hurstmere Road would make traffic on the surrounding roads, particularly Lake Road and The Strand, much worse.

Most businesses expressed concern that their clients would find it difficult, as they had come to expect to be able to park very near their destination. Older people, especially, were thought to need to park close by. One retailer commented that 'people have forgotten they have feet' while another observed that customers 'like to park, not walk'. However, in terms of their commercial vehicle use, most businesses thought that they could probably adapt to the change in access, the primary difficulty being for the transport operators themselves, who had to take the Auckland Harbour Bridge into

account when sorting out timing of deliveries and pick-ups. Several businesses already had most of their deliveries and pick-ups occurring outside of the proposed time window.

Some respondents thought that pedestrianisation, particularly of Hurstmere Road, was a good or 'fantastic' idea: one suggested establishing cafés in the centre of what is now the street. They felt that delivery vehicles arriving within the restricted access time could make use of the alleyways, even if it meant walking a short distance with the delivery to the shop. Some other businesses felt quite differently, as they either had no alley access or used their back entrance areas for storage, etc.

One business manager observed that Parramatta in Sydney had tried pedestrianising its main shopping area, but had later reverted to allowing all vehicle traffic. This person thought that New Zealand could learn a lesson from this.

6.9.2 Increased transport costs

We asked interviewees how their business would respond to a doubling of transport costs. Interestingly, for many businesses, transport costs are 'hidden' in the cost structure of the goods they are receiving. For example, the restaurant/bar manager observed that they incurred no 'explicit delivery costs', acknowledging that these may be priced into the products, but are invisible to the restaurant/bar itself. They observed that they work 'on the margins', so that if the overall price of inputs was steadily increasing then they would increase their menu prices. However, many products, particularly fruit, vegetables, chicken and meat, regularly fluctuate in cost, often balancing out rises in other costs. The clothing and shoe retailers also commonly mentioned that transport costs were simply part of the overall shipment price.

For others, such as the computer services business, transport service use is a very minor component of the business and this, along with the ability to pass costs on to clients, means that increased costs have very little impact on the business overall.

For the businesses we spoke to which were part of a 'chain' (e.g. the shoe retailer and the bank manager), most of their transport costs were borne by the parent organisation.

Smaller independent businesses, such as the hair salon and the bookshop, found that paying courier fees, while not a huge proportion of the overall operating costs, was significant enough to warrant the effort to minimise them. Ordering in larger quantities – if the delivery cost was the same for one item or for ten – was one tactic adopted to minimise costs, along with waiting to re-order stock until a particular value was reached so that the delivery fee would be waived. In the case of the hair salon, the respondent observed that if a customer wanted something in particular which was out of stock, they would go to another hair salon to buy it rather than wait for it to be ordered in. The loss of a sale is not considered too important, as the \$6 fee for a courier for individual items means that they 'would lose [their] margin anyway.'

The large administrative organisation chose its couriers based primarily on reliability rather than cost. However, they do take steps to reduce the number of items being sent by 'clustering' them together, either physically (e.g. when more than one item is going to those same destination) or temporally (e.g. by having several individual items being picked up at one time by the same courier).

6.10 Feasibility of maintaining good transport service while reducing traffic

The bank branch observed that the increasing amount of transactions being completed electronically or by telephone, including transfers between accounts, payments and printable versions of important documents for signing, means that the need for physical transport of either clients or the papers required to complete the transactions is decreasing. Information and communications technology is seen as an alternative mode of transport.

6.11 Miscellaneous issues outside propositions

6.11.1 Loading zones and docks

Only two businesses interviewed in the Takapuna corridor had their own loading bay – one of these was the North Shore City Council. The other business used their loading bay daily, loading/unloading goods off the back of the trucks with no other special equipment. Only one vehicle making deliveries was known to have a 'tail lift' because of the weight of its freight.

One business had a loading zone across the street from its shop front, but found that this was not highly useful to them, as their customers were the ones who wanted to use it (for loading their purchases) but would be ticketed for doing so.

6.11.2 Changes affecting the transport corridor

One respondent observed that until recently, they could order stock one day and pick it up themselves from the supplier when they were driving by the warehouse on their way to the shop in the next morning. However, most suppliers now have 'logistics management' systems in place and will not let retailers pick up stock, preferring to have it sent by courier so they can keep better track of what is happening.

7. Cross-case analysis

7.1 Within the same context

7.1.1 Lambton Quay versus Central Lower Hutt

Although Lambton Quay, Wellington City, has a much higher density of buildings per square metre of land space than does Central Lower Hutt City, the total number of businesses in the two target areas is not very different (357 in Lambton Quay and 293 in Central Lower Hutt, (unpublished APN Data, 2004). The mix of businesses is remarkably similar: proportionally, Lambton Quay has somewhat more retailing (34.7% compared to 27.3% in Lower Hutt), food services (7.8% compared to 6.5%), and local and central government administration (4.8% compared to 2.7%); the Lower Hutt corridor has more health and community services (11.3% compared to 5.3% in Lambton Quay), and cultural and recreational services (3.8% compared to 1.1%).

As can be seen in Table 7.1, the Central Lower Hutt corridor has a slightly greater proportion of micro-businesses (≤ 5 employees) than does Lambton Quay.

Table 7.1 A comparison of organisation size in Lambton Quay and Lower Hutt.

Number of staff	Lambton Quay (in percent)	Central Lower Hutt (in percent)
1-5	56.6	62.5
6-19	29.4	24.5
20+	12.9	11.1
Total	357 businesses	293 businesses

The corridors are quite different in terms of their structure. In the Lower Hutt, most businesses had some off-street access in the form of a back lane, while in Lambton Quay, many businesses rely on the Quay itself for commercial vehicle access. In both corridors, parking was considered to be a greater issue than congestion, perhaps reflecting that we were speaking with transport users rather than operators who actually have to deal with the traffic. In the Lower Hutt, delays in deliveries were more likely to be attributed to problems with the motorway between Wellington and the Hutt than within the corridor itself.

While parking was considered an issue, the focus was perhaps different, insofar as Lower Hutt respondents were more concerned about whether or not their customers could park near to their premises (thus having easy access). In Lambton Quay, the parking issue was more focused on whether or not commercial vehicles could find a place to stop to make their delivery or pick-up, or to make a maintenance call, as well as whether or not sales representatives could park in order to come in and display new products and take orders for re-stocking. The differences could reflect the fact that many more retail

customers arrive on foot to businesses on Lambton Quay, often via passenger transport, compared with Lower Hutt, where they are more likely to arrive by car.

Concerns about access to and quantities of loading zones were more commonly raised by Lambton Quay respondents than those in Lower Hutt. Perhaps this reflects the fact that Lower Hutt organisations had better off-street access than their Lambton Quay counterparts.

We found that both corridors had a high number of hand-deliveries, made by 'walking' the item across the road to its destination. Lower Hutt businesses used far fewer urgent couriers than did Lambton Quay respondents. Cycle couriers are not used in Lower Hutt.

While the mix of organisations we interviewed, in terms of goods and services orientation was quite similar in both corridors (around 40% goods and 60% services), some differences in terms of the size of operation were notable: 10 out of 13 businesses interviewed in Lower Hutt had 1–5 employees, while in Lambton Quay only 3 out of 12 organisations were this small.

Given this, it is perhaps not surprising to find that the Lower Hutt organisations we interviewed had far fewer commercial vehicle visits (including couriers and LMCVs) than did Lambton Quay respondents: 6 out of 13 Lower Hutt organisations had less than 10 visits per week, while none of the Lambton Quay organisations fell into this category. Rather, 6 out of 12 Lambton Quay organisations had more than 40 commercial vehicle visits per week, compared with only one organisation in the Hutt.

Courier vehicles featured dominantly in the overall number of visits in either corridor: very few respondents had extensive visits from other LMCVs, other than the cafés in both corridors, the florist in Lower Hutt, and the bank, communication services and department store in Lambton Quay. The latter two had their own marked vehicle or fleet that undertook most of the trips, whether incoming or outgoing.

7.1.2 Queen Street versus Takapuna

Queen Street, Auckland City is clearly a more intense environment with a much greater density of pedestrians and correspondingly higher retail lease rates than Takapuna, North Shore City. The sheer busy-ness of Queen Street does not allow for the large number of angle parks that are present on Hurstmere Road.

Greater pressure was also reflected in:

- greater intensity and concern about loading zones,
- the smaller amount of parking available directly on Queen Street other than loading zones/bus stops/taxi stands, and
- the extent to which businesses reported being fined for illegal activities such as improper use of loading zones.

In addition, the greater level of concern over transport issues in general was perhaps reflected in it being easier to recruit respondents from Queen Street.

The density of Queen Street is much higher than central Takapuna, as reflected in the overall number of businesses in each corridor: the UBD database we obtained from APN Data listed 532 for the section of Queen Street we studied, compared with 216 in central Takapuna. This is despite the fact that the Takapuna corridor covers a much greater land area than Queen Street. The mix of organisations was quite similar in both corridors in terms of retail, food services, finance and insurance, property and business services and so on, the exceptions being that Queen Street has a slightly higher proportion of personal and other services (including travel agencies, hair stylists, etc.), and 'manufacturing' businesses, as classified using ANZSIC.

In terms of our interviews, the split between goods and services-related organisations was slightly different in the two corridors, wherein we interviewed 4 goods businesses (retail shops) and 8 service-oriented organisations in Queen Street, and 6 of each in the Takapuna corridor. Surprisingly, perhaps, 8 of the 12 organisations we interviewed in Queen Street had ≤ 5 employees, while only 5 out of 12 in the Takapuna corridor had ≤ 5 employees.

Six of the businesses interviewed in Takapuna had 10 or fewer commercial vehicle visits (including courier and other LMCVs) per week, compared to three in Queen Street, despite the greater presence of smaller businesses in the Queen Street interviews. Two businesses in each corridor had more than 40 commercial vehicle visits per week. Courier vehicle visit rates were very similar in both corridors: in both cases, two had no courier vehicle visits in any given week, and six businesses had 10 or fewer courier visits per week.

It is possible that a shortage of showroom and backroom storage in CBD retail shops would necessitate more visits through 'just-in-time' replenishment. However, this would be difficult to verify, as many of the respondents could not provide either estimates or exact measures of the floor space leased by their business.

Key informants in both corridors mentioned difficulties with access as well as with late deliveries. In the case of Takapuna, access issues and the lateness of deliveries were generally attributed to stock being warehoused in locations south of the Auckland Harbour Bridge, meaning that the bridge had to be traversed in order to obtain it. Similarly, goods or materials that had to be sent across the bridge (e.g. the bank's daily business, which is processed in a regional office in Auckland City) were subject to delays. Difficulties with traffic on the bridge meant that some businesses received stock at the time it suited the transport operator, rather than the time that would be most convenient for the business. Two of the organisations interviewed had begun to make their own deliveries because they could not rely on couriers to make the deliveries in the timeframe required.

Lateness of deliveries in Queen Street had led two businesses to establish their own distribution centres so they could receive all stock there and consolidate it in order to minimise the number of commercial vehicle trips to Queen Street itself.

7.2 Across different contexts

7.2.1 Lambton Quay versus Queen Street

Discussions with Queen Street retailers were coloured by concerns that Queen Street was now a weak retail destination and concerns about parking. Lambton Quay retailers were distinctly positive by comparison, although concerns about parking were still quite common. The positive outlook is reflected in retail lease rates per square metre being slightly higher in Lambton Quay than in Queen Street, despite that the former serves a much smaller population.

One Lambton Quay retailer had only recently moved from managing a shop on Queen Street, giving them a good insight into the two corridors. They described Queen Street as a 'ghost town', stating that people preferred to shop in St Lukes or Botany where they could be assured of a car park and not have to cross any roads. Lambton Quay, by contrast, is a friendlier street to walk down, with much less traffic and no 'boy racers' to 'hurtle down the street.' However, they thought that Queen Street had much better connections with the waterfront, compared with Lambton Quay, which is cut off from the harbour.

Queen Street is geographically quite different, being much broader (four lanes, whereas Lambton Quay is reduced to one lane in parts). Queen Street carries a broader range of traffic, less dominated by buses. In addition, Queen Street has normal cross streets forming a grid pattern whereas Lambton Quay has only one true cross street at the end extending up to The Terrace. However, the use of back lanes and side streets as well as parking on the foot path is probably less marked in Queen St because of the greater number of loading zones and parks on the broad main street itself.

A number of free car park spaces are provided on Queen Street (even though many were limited to 15 minutes). By comparison, the limited amount of parking available on Lambton Quay is currently charged at \$4 per hour.

Both streets had sufficient density to warrant the presence of urgent couriers, including cycle couriers. Neither Lower Hutt nor Takapuna had cycle couriers, and the use of urgent couriers was far less frequent. It was far more common to be told about hand-deliveries being walked by businesses to their customers in Lambton Quay than in Queen Street, perhaps reflecting differences in the physical size and layout of the two streets.

The density of the two corridors allowed transport operators to implement efficiencies, such as making one stop to service several businesses (water delivery trucks and couriers) and to have several regular courier visits per day.

In both corridors, parking issues and loading zones received far more attention/concern than congestion, albeit it with an important difference: parking concerns emanated with regard to patrons rather than couriers in Queen Street, in contrast to Lambton Quay where concern about the ability of commercial vehicles to stop or park was expressed. This could reflect the fact that congestion is somewhat 'invisible' to transport users – transport operators, particularly couriers, are the ones who must cope with the traffic demands. On the other hand, respondents (at street level) could readily see parking spaces and loading zones being occupied. Uneven policing of loading zones (e.g. allowing taxis to use loading zones inappropriately, while ticketing unmarked vehicles when the owner was clearly unloading goods into a shop) was a source of frustration for organisations in both corridors.

In both corridors, we found that organisations located in the higher levels of buildings were not as aware as those at street level of whether the courier they used arrived by bicycle or in a motorised vehicle, or about parking or congestion issues. This could present some difficulty in estimating the number of LMCV visits to such organisations.

In terms of LMCV movements, we noted some substantial differences in the volume of visits between Lambton Quay and Queen Street. Six of the 12 businesses we spoke to on Lambton Quay had more than 40 LMCV visits per week, compared with only two businesses achieving this volume on Queen Street. On Queen Street, three organisations had less than ten LMCV visits per week; on Lambton Quay none were in this position.

These differences are not something that could be put down simply to different types of organisations being interviewed. For example, the Queen Street department store reported 110 courier and LMCV visits per week, while the Lambton Quay department store had 275 plus an unspecified number of company van visits. The government organisation on Lambton Quay had around 40 LMCV and courier visits per week, while the one on Queen Street had less than 25. Staff numbers did not vary greatly between the two. The communications service and the florist on Lambton Quay had far more vehicle movements than did any other private sector operation on Queen Street or Lambton Quay.

While these variations are not representative of the entire corridor, they are enough to suggest that it is difficult to make 'hard and fast' assumptions about the number of visits associated with a particular type of business or corridor.

7.2.2 Central Lower Hutt versus Takapuna

Central Lower Hutt and Central Takapuna are quite similar in their overall appearance: both have predominantly low rise buildings (often single-storey, with most less than five storeys), neither have any foot or cycle couriers, both have angle parking for customers on the 'main' street, and many organisations interviewed walked to pick up and drop off their daily post. Unlike Lower Hutt, where almost everyone did, very few organisations in Takapuna had off-street or back lane access to their site. A reasonably similar mix of organisation types and sizes could be found in the two corridors. However, our interviews

had a disproportionate number of small businesses (≤ 5 employees) represented in Lower Hutt compared with Takapuna – 9 out of 13 organisations in Lower Hutt were this size, but only 5 out of 12 in Takapuna.

Nonetheless, the total number of commercial vehicle visits (including courier vehicles and other LMCVs) in the two areas was very similar. Approximately half of the businesses had 10 or fewer visits per week. Only one or two in each corridor had more than 40 visits, including the government organisations in both locations, and an independent restaurant. Eight organisations in each case had 10 or fewer courier vehicle visits.

Respondents in both corridors complained about the lack of parking, largely with respect to customer access, although in Takapuna, respondents also complained about loading zones (e.g. the bank complained about the lack of these, while others criticised their proximity, which interfered with their business operation). This probably reflects the fact that fewer Takapuna organisations have off-street access to their buildings, unlike those in Lower Hutt. Some businesses in Takapuna complained about the on-street parking restrictions which prevented their staff from parking close to their workplace. One organisation had decided to relocate outside of central Takapuna in order to be able to provide their staff with car parks.

Timeliness of deliveries was a far greater issue for Takapuna than Lower Hutt, although traffic on the motorway near the Hutt does sometimes disrupt commercial vehicle activity. In Takapuna, the delays were so severe that two organisations had decided to manage their own deliveries in private vehicles.

8. Embedded units of analysis: individual organisations

8.1 Proposition 1

Our first proposition concerned demand for transport services in a corridor where the data collection focus is on individual organisations rather than the corridor as a whole.

Proposition 1

The demand for/management of transport services in a corridor, with reference to an individual business/organisation in the corridor (our 'embedded units of analysis'), is affected by:

- the characteristics (type, size, etc.) and mix of other organisations within the corridor,
- the service standards and customer expectations of the business or organisation, and
- the relative cost of transport service vis-à-vis other operating costs such as land use cost where, for example, high rental space may be converted from stock storage to sales space in order to increase turnover. The effect of this may be to increase the frequency of transport visits to the site.

8.2 Effect of business type

8.2.1 General

As expected, the type and size of businesses clearly had an effect on demand for transport services. Hence the mix of organisations within the corridor will affect the overall demand for transport services.

8.2.2 Goods versus services

8.2.2.1 Distinctions

Distinguishing between goods and service organisations is clearly fundamental to understanding (and hence modelling or forecasting) commercial vehicle use. Replenishment of stock is clearly fundamental to busy retailers where customers continually take away clothing, shoes and other goods. Where the stock comes from a number of different suppliers (one Lambton Quay shop had 36 regular suppliers, 30 of whom were located in Auckland, while a Lower Hutt shop estimated it had 100 different suppliers, although only 20 were considered to be 'major'). It is common for each supplier to organise its own deliveries, usually by courier, independently of other suppliers, meaning that a number of visits can be made to a business each day. By contrast, service organisations may just have two courier deliveries/pick-ups each day, generally one in the morning and the other in the late afternoon.

Evidence for this clear distinction was apparent in the mechanics of recruiting and interviewing respondents. First, a service business turned down the request for a face-to-face interview by arguing that everything could be covered in a few minutes on the phone because they only had a couple visits from couriers per week. No organisation focused on goods attempted the same reasoning. Secondly, interviews with service organisations tended to be shorter (as short as 20 minutes for a small recruitment company in a small financial services business) than where delivery of goods was more important (e.g. an hour for a small café).

8.2.2.2 Size of deliveries

Differences in the volumes/sizes of typical deliveries were also clear from goods organisations (but not service organisations), which sometimes mentioned:

- mechanical assistance being necessary for common deliveries (e.g. trolleys, tail lifting), although service organisations might still occasionally see a trolley used for unusually heavy deliveries such as stationery;
- assistance being needed with unloading (e.g. a café was annoyed about one major delivery usually being at the end of the day when most of the staff were gone); and
- volumes such as 10 pallets per day or 50 cartons in a delivery as opposed to small documents in envelopes.

Such differences in volume and weight have implications for practical issues such as how far away delivery vehicles will be prepared to park and the length of time for a delivery. In turn, this affects the appropriate location of loading zones around different types of business, and the extent of illegal parking and parking on the footpath. In addition, the bigger deliveries of goods make alternatives such as cycle delivery impractical. In contrast, several of the respondents in services organisations did not know (or care) whether the courier deliveries were made by van or cycle (although the fact that service organisations are more commonly found on higher levels rather than at street level also contributed to this lack of knowledge).

8.2.2.3 Number of commercial vehicle visits

A difference in the number of commercial vehicle visits to goods rather than service organisations is not clearly apparent from the small number of interviews in this study (remembering that one must try to take account of differences in business size). However, where the service provided is based around the preparation of reports or other documents (e.g. engineering consultants or some government departments), their use of courier services may be significantly less than for other service or goods businesses, particularly since the advent of broadband Internet services. As one respondent noted, broadband Internet allows 'big documents and plans to be transmitted very efficiently.'

8.2.2.4 Size of storage space

Another factor in the number of commercial vehicle visits is the size of the storage space that a business has, irrespective of whether it is a service or goods business. One copy service business was located in a large old building with an enormous amount of storage

space, and so was able to maintain quite high levels of stock. This meant that they had very few commercial vehicle visits (about one per month). Their use of couriers was limited, as they relied on customers to drop off and pick up their printed/copied goods. This is an interesting example of increased floor area being related to fewer trips, which is directly opposite to the assumptions (that increased floor area generates increased commercial vehicle trips) in some transport models.

8.2.2.5 Use of cycle couriers

The use of cycle couriers varied between service and goods organisations. The goods organisations (i.e. retailers) we interviewed in Lambton Quay and Queen Street were much less likely to use cycle couriers for two reasons:

- Generally, the deliveries they required were less urgent than the documents some service organisations were sending – the exception being floral arrangements, which require particular handling and have a special courier service to assist.
- The items involved were bulkier (e.g. reams of copy paper or a pair of shoes) than documents and did not lend themselves to being couriered on a cycle.

For example, the office supplies retailer interviewed on Lambton Quay suggested that urgent (vehicle) couriers might generate 3–4 extra movements per week for their shop, over and above the 45+ that were handled by 'ordinary' courier companies.

8.2.2.6 Number of service-related visits

Many goods organisations only had intermittent visits by technical and repair service people, meaning that the traffic generated by this type of activity is quite minimal. Service organisations, by contrast, might have a much higher visit rate, being more reliant on technology (such as computers, telephones and photocopiers) to conduct their business. Smaller retail shops were most likely not to have any snack or foods on-site, whereas larger organisations may have an in-house caterer/food service that generates its own demand for commercial vehicle trips.

In several cases, maintaining lights, air conditioning, lifts, security and fire alarms was the responsibility of the building owner/manager, and the lessee had little knowledge of any commercial vehicle movements generated for these purposes. We interviewed a building manager on Lambton Quay to try to gain some insight into this phenomenon.

Overall, our interviews gave useful warning of several difficulties that will need to be worked through if differences in business type are to be quantified in a later survey and/or incorporated in forecasting models.

- Commercial vehicle trip or visit numbers will probably not increase linearly with employee numbers or floor area. For example, service trips such as cleaners are unlikely to occur twice as often simply because a business has 40 rather than 20 employees.
- To quantify differences in business type usefully (e.g. goods versus services, or probably some finer distinctions), it is important to control the impact of different business size in the sample data being used. This may be difficult, given the nonlinear relationship with size suggested in the previous point.
- Careful distinction between vehicle types rather than total visits will be required. For example, service organisations may have fewer deliveries from vehicles belonging to other organisations, but they may make more visits using their own vehicles. Such vehicles may be more likely to have car parks provided on-site, and hence not require loading zones in this location.

Others have previously noted related differences between business types and even quantitative rules of thumb. For example:

The trips generated by retail uses are several times greater (typically 10 vehicle trips per employee per hour) compared to offices (3/employee/hr) and industry (1/employee/hr) (Douglass 2003).

8.2.3 Business structure: independent versus chain

Even where businesses may be of a similar size and retail similar goods, delivery patterns may be predictably different because of differences in business structure. Our initial interviews in Lambton Quay suggested that chains may have different delivery patterns from independent operators. The Queen St interviews explore this hypothesis in particular detail by including three different types of café/restaurant. We interviewed the owner of an independent café, a franchise owner and the manager of a major nationwide chain.

The nationwide chain made major use of a centralised distribution centre with consolidation from 20–30 major suppliers occurring at the centre. At the other extreme, one independent café in Queen Street had a remarkably large number of deliveries (about 35 per week) from a large number of suppliers. An independent restaurant/bar in Takapuna had a similarly large number of deliveries. However, the franchise owner and three other independent cafés we interviewed had more moderate amounts of deliveries (10–15 per week) – possibly reflecting the fact they were primarily weekday operations (except for the franchise), open from early morning until about afternoon tea time. Overall, the largest of these businesses (in terms of both staff numbers and possibly floor area) had the fewest deliveries made because they were managed as part of a major chain which used a distribution centre. By contrast, however, a franchised sporting goods retailer still had to deal with a huge volume of suppliers (estimated at 100 different ones, 20 of which are major suppliers) and, as a result, with several deliveries per day.

We found a range of experiences when interviewing businesses operating in different sectors. One large independent retailing store we interviewed had a plethora of

commercial vehicle movements (both courier vans and LMCVs) on a weekly basis, generated by having stock come in from a huge variety of suppliers. This was mirrored by a number of other independent retailers (e.g. bookshop, office supplies, fashion retailer, sporting goods and pharmacy), though on a smaller scale as appropriate to a smaller business. By contrast, another large retailing store that operated as part of a chain had far fewer (about 25%) commercial vehicle movements per week. Two independent gift shops had a minimal number of commercial vehicle visits, caused by low stock turnover and a narrow range of available items.

Independent businesses may find that they have little say in terms of when they receive their deliveries, particularly if the supplier is a 'big company'. We had more than one complaint about supplies/stock being delivered when it suited either the transport operator ('We tend to get things when they drive past, usually between 9 a.m. and 4 p.m.') or the supplier, rather than when it would be suitable for the retailer. In some cases, it meant that stock was left sitting around to be unpacked and put away, either after business hours or the next day. However, another respondent from an independent café noted that only one of their 15 deliveries per week occurred later than 7:30 a.m.

Independent businesses sometimes have a mix of functions, presumably to assist their financial viability. For example, one fashion retailer (for men) operated a suit hire business and an alteration service, a hairstylist was also an outlet for adult party supplies, and a photocopying/desktop publishing business operated both a dry cleaning agency and a photographic development agency. The additional functions can generate a significant number of additional commercial vehicle trips or visits that are not intuitively obvious. In the case of the fashion retailer, the extra commercial vehicle trips or visits amount to nine per week; for the photocopying business, this figure was about 20 per week. In the case of the hairstylist, no extra commercial vehicle trips or visits were generated – supplies were picked up by walking twice a month.

Where a business is the head office or main office for a particular region, it appears that additional commercial vehicle movements may be generated by this role, as the headquarters may be the point of distribution for publications to the branches, the central meeting place or, in the case of a bank, the site of the main cash/securities safekeeping facilities and/or data processing centre.

8.2.4 Perishable versus non-perishable goods

8.2.4.1 Food businesses

Food businesses were clear that daily delivery was important for some of their suppliers because of the need for freshness: 'perishables... that's one reason we need deliveries every day.' One further clarified that the need for daily delivery of some foodstuffs was increased by their lack of storage space and high turnover. Of course, this differs by the type of food required. One respondent quickly made it clear that fresh bread was required daily, but that three times a week was fine for other supplies such as lettuces or tomatoes (a different respondent received their fruit and vegetable order once a week), while another observed that milk and egg deliveries could be reduced to twice a week if they

had more chiller space. Another respondent also noted that baked goods such as muffins and croissants could not be sold the following day. While none of the businesses interviewed discussed them, daily newspapers would clearly fit into the 'perishable' category.

The number of deliveries can also be affected by the actual type of food business being operated. A bakery we spoke to had deliveries from only two main suppliers (dairy products and 'other' supplies), while cafés typically would have deliveries from a wider range of suppliers, such as meat, dairy products, fruit and vegetables, baked goods and so on. The greater variety of goods and number of suppliers tends to increase the number of commercial vehicle visits to a given location, particularly where the business is independent and is therefore not replenished from a central distribution centre as part of a chain.

Commonly, café respondents reported having only one day's worth extra stock in store to be prepared for transport breakdowns, although this depended on the size of the operation and which foodstuff was being considered. Dry goods were generally maintained at slightly higher levels (a few days to a week) while dairy and bakery products would have a daily inventory. As a complete contrast, a small fashion retailer had a major delivery (of imported stock) about once a month while a homeware/gift shop ordered one container load of stock per year. Two other non-food businesses with a high turnover of reasonably small items found it very difficult to maintain high inventories of stock. One of these maintained inventories of stock generally sufficient for 10–20 days, depending on the item as well as on the speed of the distributor in filling orders.

Keeping even one day's extra stock could be a challenge for a food business: a café owner noted that his 'worst' supplier would deliver on Tuesday following an order on Friday. In contrast, his fruit and vegetable supplier would deliver next day (even for orders phoned in as late as 2 a.m.). Retailers of perishables mentioned *ad hoc* solutions to inventory problems; for example, borrowing from related stores nearby was an established practice for both a food franchise and the manager of a nationwide chain. Another independent café owner said that they shopped for most of their supplies and transported these by car, while milk, other beverages and eggs were delivered, largely because of their bulk and weight. This reduced their reliance on external suppliers making timely deliveries. These actions seem to reflect the greater constraints they work under by retailing perishables.

8.2.4.2 Florists

Florists also operate businesses with most of their stock being in the perishable category, although many carry a range of giftware, plants, and/or gourmet foods or chocolates. Both of the florists interviewed stated that 'freshness and quality' are of considerable importance in meeting customer service expectations, requiring flowers to be brought in daily. As different growers produce different types of flowers and not all are available for purchase from the growers' markets, this results in multiple commercial vehicle movements per week.

Deliveries of resulting flower arrangements require particular care, either by their own van(s), specialist courier vans (with arrangement holders and temperature control, with guaranteed delivery in less than three hours), or on foot if the destination is within a five-minute walking distance. The need for quick delivery (in order to maintain flowers in optimum condition), means that many scheduled and unscheduled vehicle visits take place per day, sometimes as many as 9 or 10, either by courier vans or their own vehicles. Communication between the shop and the delivery people is critical, as weather and traffic can affect the promptness of pick-ups and deliveries.

Both florists that we interviewed noted that the situation could vary between florists, as other businesses may rely more on foot traffic or passers-by stopping in and purchasing flowers which the customer then carries away, lessening the number of vehicle movements.

8.2.4.3 Non-perishables

The respondents we spoke to who sell or provide information and communication technology appear to treat their products as 'semi-perishable', because technology changes so rapidly that stock becomes out-of-date or obsolete if held too long. Hence, they have adopted practices to cope with this: two respondents ordered in stock purely 'on demand' – that is, as a customer requested a particular item – while another maintained up to one month's stock of more commonly requested items (such as mice, monitors and printers) and ordered in 'specialist items' on request.

Businesses dealing with non-perishable goods may not require daily deliveries of stock, but may find that they have multiple deliveries each day simply as a result of having to deal with several different suppliers. For example, an independent bookshop had up to 30 courier van deliveries per week, as each publisher and/or supplier relied on a different courier service for its deliveries. New stock was generally ordered once or twice a week from each supplier, the quantity being dependent on the release of new titles (averaging two per month by each of four major publishers), replenishment of stock by the bookshop, and special orders by customers. The bookshop owner/manager estimated that they dealt with 40 suppliers in total. This situation was similar to that described by respondents working in sporting goods, office supplies and chemist shops.

In some cases, sales representatives regularly visited a business (usually monthly) to demonstrate new products and take stock orders – this was true of hair stylists, florists and the dental office. This might generate an additional 1–2 vehicle trips per week for a business, in either a signed or unsigned vehicle. In one instance, the shop owner complained about the difficulty (in Lambton Quay) of sales representatives gaining car parks, which meant that their shop was regularly missing out on new products or product lines, or the delivery of stock was delayed. It appears that many sales representatives do not carry the stock with them, but provide samples and demonstrations of new products and take orders, which are then delivered by courier later. This means that two separate commercial vehicle trips occur for the sole task of keeping that particular stock on the shelves. However, for non-perishable stock, it is possible to minimise these trips by trying

to purchase sufficient stock for one month's supply (or more). One florist observed that an increasing number of representatives provide information via fax, thereby lessening the need for a vehicle trip.

In contrast with the bookshop – where new titles are frequent and important additions to the shop and customers regularly require additional reading material – an independent homeware/gift shop had enough inventory in an off-site warehouse for about 12 months, transferring it as required to the shop using their own vehicle. Much of the shop's stock is from overseas and it is more economical to bring it in by the container load rather than in any smaller quantities. Infrequent deliveries to customers are also made by shop personnel. Their total transport movements, usually in a private vehicle, were generally fewer than eight per week.

8.2.4.4 Seasonal

Retailers dealing with seasonal changes in stock (e.g. clothing and shoes) appear to have periods where their demand for transport services is going to be much higher than other times. When the new season's stock is arriving, the number of deliveries per week, and the volume per delivery, can increase dramatically: one fashion clothing shop estimated that for two months each season, 10–15 deliveries (by courier van) would be necessary per week, while in the 'off-season', they needed as few as one per week, as stock is re-ordered. Another fashion retailer (with a higher turnover) estimated that they would have 25–30 courier van visits in the busy time, with up to 20 packages per day (sometimes up to five different suppliers' goods would be delivered in the same courier visit), dropping back to about 10–15 courier visits per week in the off-season periods. In the lead-up to the arrival of the new season stock, which lasts up to two months, clothing representatives visit the shop to show the new stock and take orders – one fashion retailer estimated that they would have 2–3 representatives visit per day during this period.

A shoe retailer reported that the delivery of new season's stock doubled the number of courier visits for that time. One giftware shop noted that they had a much higher level of deliveries in the six weeks leading up to Christmas, when unique gift items were in high demand.

8.3 Effect of service standards and customer expectations

None of the respondents mentioned formal service standards with financial penalties for late delivery from suppliers or late delivery to clients.

This did not mean that late delivery was not a matter of concern. For example, one respondent made it quite clear that even a small amount of lateness would result in immediate concern and a phone call, because he had two employees waiting to handle a major delivery at 6 a.m. But the contractor concerned was generally reliable and so informal 'give and take' about unusual problems was sufficient to keep late deliveries at a reasonable level. Other businesses reported a similar informal approach with late delivery.

However, where a business was maintaining higher on-site inventories (say for a month), they appeared to be more relaxed about delivery times. For example, one respondent stated that they were 'not usually under time pressure', and that if they ran out of an item in between sales representative visits, they would phone or fax an order in and it would arrive within a couple of days. If it was urgent, then the supplier would try to 'get it to us quicker.'

Trading off speed of delivery against price was familiar to several respondents. One bluntly stated that expectations of delivery speed to the branches from Queen Street were low: the couriers 'never send in the morning and say to expect delivery in the afternoon'. Another noted 'we use a cheap courier; they're not the most reliable.'

Related to this, preventing high expectations of fast delivery was explicit in a couple of cases. One retailer trained staff to prevent customer expectation of next day delivery e.g. 'It'll be here next Saturday – do you need it sooner?' In this way, they could get a low-cost transfer taking up to 3–4 days. Previously, this business had typically transferred such items by courier so as to have next day delivery, but they found that many such items were not picked up by customers for several days. If next day delivery was important to the customer, this business would still courier if the item was of sufficient value. Another business had resorted to completing 'local' deliveries (to an area encompassing North Shore City, Auckland City, the Hibiscus Coast and Waitakere) themselves to ensure that the required high-value items were received on time.

By contrast, one florist we interviewed asks their customers what their expectation regarding delivery timing is when they are taking the order – then they try to meet it. This involves paying for a taxi if required. The other florist did not go so far as paying for a taxi, but would use their own van if necessary to ensure timely delivery. Both florists noted that specialist couriers to deliver fresh produce are lacking. Both felt they offered a premium quality service, with one respondent noting that they are 'fussier than some [florists] in terms of providing quality flowers and good service to customers.' Another business observed that if the supplier couldn't make a next day delivery, then the respondent might pick up the item themselves, if it was available in the same city.

An optometrist noted that some customers expected instant delivery and that some competitors were glazing on-site (i.e. inserting lenses into the frames chosen). They did not seem overly concerned that such instant delivery might be a competitive advantage.

Retailers seem to have varying standards; some tried to maintain next day service, while others set an expectation of 2–3 days to avoid customer disappointment. One such retailer noted that they often manage to get the desired item in overnight (or on the same day if it is ordered in the morning), and thus the customer sees them as exceeding expectations. A fashion clothing retailer noted that customers may have to wait between two days and a month for their request, depending on whether the item is 'coming in from Australia, is getting made up or is ready.' By contrast, another independent fashion retailer generally strived for a 24-hour turnaround because customers had an expectation

that they could use the clothes the next day. The respondent attributed their ability to offer this service to their knowledge about the courier cycles of different suppliers, allowing them to provide a reasonably accurate estimate of when the requested item will arrive. They found it was very rare to miss a given timeline, unless a major accident happened on the motorway accessing their city.

One giftware shop owner noted that despite the unique and hand-made nature of many of the items sold in the shop, some customers still expected 'instant gratification', creating a need to have storage on-site (one month's worth of stock) to try to meet their demands. They stated that it is a 'full-time job keeping the shop stocked', as some items required considerable lead time for delivery.

Three respondents stated that the 'sense of urgency has changed' over time or that 'people are more impatient... [they] want instant delivery' more now than in previous years: in one case, people ring and order, and expect to receive their goods within three hours. However, this is also a service standard that one business strived to provide, noting that other shops do not have the same quick turnaround time and also charge more for transport costs. The respondent suggested that if the turnaround time changed (e.g. was a half-day or next day), it would not affect their business too much because they have 'loyal customers.' However, another respondent had a different view, stating that the customer's expectation of 'instant gratification' meant that the business couldn't go back to a lower level of service (95% of special orders arrive in 24 hours) as the customer would 'go elsewhere' to purchase the item(s) they required.

One respondent observed that the suppliers offered overnight service, rather than them requesting it – although it was pointed out that 'sometimes, we do want it' as the particular customer expects it and may go elsewhere if that expectation is not met. They noted that 'a lot of customers want it yesterday, but not all.'

Another service-related business, with offices in Wellington and Auckland, had very different service level agreements in the two cities: in Wellington, a 30-minute response within a two-kilometre radius of their office was offered because they can walk there. Auckland, by contrast, has a two-hour response time (with a three-hour maximum guarantee) because of the traffic. Apparently, the standards have become increasingly higher (e.g. lower response times) over the past ten years, as all competitors strive to provide a similar level of service.

8.4 Relative cost of transport services

In nearly all cases, the direct cost of transport was minimal, and hence not a focus of attention.

Organisations were typically sensitive to even small direct transport charges. For example, one independent bookshop particularly noted that the courier surcharge for orders less than \$100 could not be recouped from customers as most books have a 'recommended retail price' imprinted on their back cover. It was very common to hear mention of ordering larger amounts so as to get 'free' delivery. One very small retailer stated that they were more likely to get free delivery when known by a supplier.

In general, cost was much less of a concern than reliability issues related to parking availability and time of delivery.

9. Transport operators

9.1 Focus

Because of the predominant use of couriers, particularly vans, we decided to focus our interviews with transport operators on courier service providers. We interviewed two couriers, one 'regular service' (same day or overnight delivery) and the other an 'urgent' courier (deliveries within a specified timeframe, usually 15, 30 or 60 minutes). In New Zealand, urgent courier services are only provided in Wellington, Auckland and Christchurch.

9.2 Regular courier service

9.2.1 Organising courier runs

The company we spoke to has been operating for more than 20 years in New Zealand, providing freight and courier services around the country. We visited their Wellington depot, which services the whole of the Wellington Region.

The depot fleet consists of about 60 owner-operated vehicles, most of which are courier vans. The depot is the 'hub' or 'heart' of the Wellington operation: all vehicles start in the hub every morning and finish there every evening. Each has a set run which is owned by the courier company and the drivers operate it for them. Drivers visit their runs to deliver and pick up packages/envelopes, then return to the depot (6–7 times per day) to exchange items before going out to repeat the process.

For areas that are further away from the hub and may encounter traffic problems if trying to return to base frequently, a 'sub-hub' may be formed, as illustrated in Figure 9.1, where one courier comes out and exchanges items with other couriers.

In general, the company aims to have overnight delivery to main areas (arriving in the morning on the following day or by mid-day if delivering to an outer area), and aims for less than a half day (4-hour) turnaround for 'same day' delivery. At the end of a working day, they have a 'sweeper' courier picking up the late calls for overnight delivery.

If they find that the 'local service standard' is becoming problematic (e.g. they receive several complaints about timeliness), the company firstly considers if the complaints are specific to a particular courier run or runs and assesses how the issue could be addressed. If the problem is general across the fleet, the company might drop an exchange cycle so that drivers have more time to make each tour. The company might decide to establish another sub-hub or transfer point so that vehicles do not have as far to travel before they can exchange their packages. Sankaran et al. (2005) report that the Auckland-based courier company that they interviewed had taken this type of action.

Alternatively, the company might decide to increase the number of couriers operating in that corridor by sub-dividing the route into two or more smaller ones. A decision to increase the number of couriers operating is made with great care, as this can affect the revenue of both the company and the couriers. On Lambton Quay, as would be the case for Queen Street, Auckland, more than one courier route operates along the approximately 750 metres of street included in the study corridor.

The respondent estimated that 8000–10 000 items would be moved in and out each month in some CBD courier runs. In lower density, higher kilometre runs, a stronger emphasis would be placed on dropping off packages. On these runs, around 1500 items may be moved in a week.

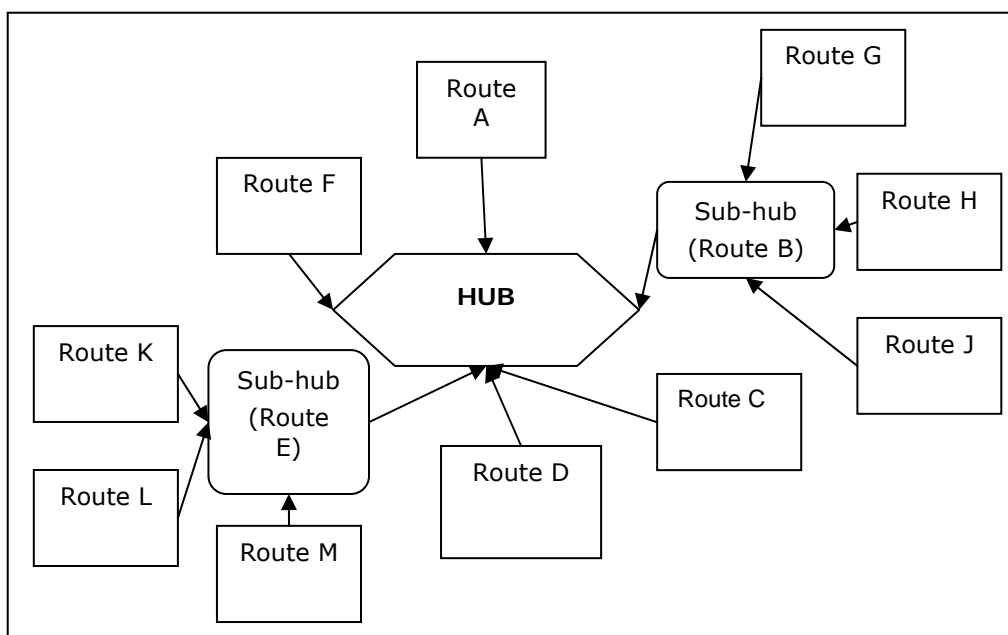


Figure 9.1 Organisation of non-urgent courier routes and hubs.

9.2.2 Customer expectations

Some customers expect that the company's service standard will be consistently met. Hence, the company is continuously assessing its resources and city traffic levels to be able to uphold the standard.

9.2.3 Dealing with congestion and traffic

Because they have standard runs which they make several times a day, courier drivers quickly develop an in-depth understanding of when the roads are likely to be busy, requiring them to allow extra time for a tour, or when they can be more flexible. If an extra pick-up is requested, the driver will immediately be able to assess if they cannot fit it in on a particular run and need to schedule a different time.

Different pick-ups have 'cut-off times'. For example, if a courier is requested during afternoon peak period, the company may tell them it is too late for normal pick-up,

offering the client the option to have the item picked up later by the 'sweeper' or the next day.

The company has made 'little tweaks here and there' as the traffic – and the courier business – has grown. The addition of sub-hubs in areas such as the southern suburbs reflects this, as does the increase in overall courier levels in Wellington.

9.2.4 Parking

According to the company respondent, 'drivers know where they can park and what they can get away with'. The company does not really worry about where or how courier vehicles are parked, so long as their service standard is not affected. Courier vehicles are 'owner-operated' (or leased by the operator), so any fines received are the responsibility of the driver. The respondent observed that loading zones can become 'cluttered' with non-commercial vehicles, particularly in the school holidays. Within the CBD, couriers can park in one spot and serve multiple buildings.

According to the interviewee, traffic tends to flow better in Lambton Quay, probably because the roads are 'geared up better' in terms of traffic management. In Lower Hutt, the couriers tend to rely on the service lanes much more, as stopping is difficult on Queens Drive and other main roads.

9.2.5 Changes in recent years

The respondent noted several changes that had occurred in the past 5–10 years, including:

- The advent of email and the introduction of standardised 'e-packs' (which reduced volume and cost of packaging) affected revenue for courier drivers.
- The introduction of 'Boxlink' (an overnight business-to-post office box or bag holder letter and document service) by New Zealand Post would have affected revenue for couriers.
- Barcoded tickets for tracking packages were introduced. Tracking used to be a manual process.
- The introduction of a pager system for booking items to be picked up (courier drivers are directly paged so that they can plan the pick-up into their schedule).
- Increased demand for signatures on delivered items. This has required service changes because couriers begin their deliveries from 5:30 a.m. – before most businesses are open – so different arrangements have to be made to accommodate the need for signatures, e.g. keys to access, or leaving signature tickets for signing which will be picked up later.
- An increased number of courier vehicles are operating because of economic growth.

In the 1980s, the establishment of the 'hub and spoke' operation was a significant innovation.

The courier business in Wellington and Auckland (as reported by Sankaran et al, 2005) is still growing because of the growing New Zealand economy. Once the economic growth levels off, our respondent indicated that the company will have to 'grow market share', which has not been a concern to date (November 2005). They do not consider themselves to be 'price aggressive', having adopted a strategy of 'saturation' and good service, evidenced by good coverage of the city by courier routes with multiple servicing opportunities per day. The respondent considered that this approach might change when economic growth slows although, in their view, competitive pricing would not ever be at the expense of maintaining service standards, particularly reliability.

9.2.6 Reaction to possible transport-related policies

9.2.6.1 Pedestrianisation

In the view of the respondent, pedestrianisation would have a huge service impact on courier movements, as couriers would have to walk to make their pick-ups and deliveries; this would slow everything down and reduce the number of times each business could be serviced in one day. The volume of deliveries would need to be reduced through the use of such things as e-packs (envelope-bags) rather than boxes.

Closing off roads for major events, such as parades, causes some annoyance for the company, as their clients are faced with a change in service, if even for a short time period (usually for less than one day). Generally, the company has found that good communication with clients is paramount, and will increase their resources to address this when it arises.

9.2.6.2 Implementing a one-way system

Implementing a one-way system in the urban core was considered to also have a major impact on courier delivery times, where even a 30-minute change can affect a business. However, the courier drivers would probably adapt quite easily by changing their routine within their runs to accommodate the one-way system. The respondent thought that some clients would be unreasonable if their delivery/pick-up times were changed.

9.2.6.3 Implementation of a cordon charge

The company interviewed considered that the additional costs incurred from a 'pay per use' or daily cordon charge would be directly passed on to clients and did not expect that the courier level of service would be affected.

In fact, implementing a cordon charge could result in an improvement in the quality of service as some (mainly passenger) vehicles would be priced off the roads, thereby reducing congestion and improving reliability. For example, Transport for London (2006) reports that the London congestion charging scheme has resulted in average reductions in congestion of 26% inside the charging zone in the three years between 2003 and 2005. Typical delay values in the charging zone in 2005 were 1.8 minutes/km, compared to 2.3 minutes/km for representative conditions before the introduction of charging in 2002.

9.2.7 Increased fuel costs

In the face of significant fuel cost increases in the past two years, the company has employed several different strategies. Initially, if fuel costs rise, the company may increase the amount it pays to van drivers (either by increasing the amount per package the driver receives, or by implementing a daily or weekly fuel subsidy payment), without altering the charges to clients. Hence the company bears the increased cost of the fuel. If the price went up further, they would, reluctantly, increase the charges to clients and the payment rate to couriers (dropping any fuel subsidy that may have been in effect).

Specific cost reduction strategies are not in operation; the company always has to have a certain level of resources available and is constantly reviewing its operation to improve service to clients. It is necessary to balance the effect of any change on clients and couriers with the balance of revenue to the company.

9.3 Urgent courier service

9.3.1 Characteristics of urgent courier services

Urgent couriers only operate in three New Zealand centres: Auckland, Wellington and Christchurch. While urgent courier services using vans and cars have been available since the late 1980s, the use of bicycles by urgent couriers was introduced later, and only in the 'heart' of the CBD in Wellington and Auckland (in Wellington, this incorporates Lambton Quay, The Terrace and some linked streets). Now, bicycles make up about a quarter (26%) of the company's fleet in Wellington.

While a few of the urgent courier vehicles begin their day in Lower Hutt, the main focus of the company's service is Wellington City. Lower Hutt is 'a little bit slower' and does not have the 'big corporates' that downtown Wellington has. The respondent (a manager) perceived it to be 'easy to have staff walk across the road' in Lower Hutt because businesses there, being largely retail, were not as pushed for time as those in Wellington.

Urgent courier service differs from the 'regular' courier service in that couriers go to clients 'on demand', or as they are called to pick up packages. Because it is a time-dependent service – delivery in 15, 30, 60 or 90 minutes from the time when the job is called in to the actual delivery – it is not possible to 'bank' jobs. Visiting the same client several times a day (up to 20, according to the interviewee) is not uncommon. Sometimes a courier can combine visits to the same building, for example making a delivery and doing other pick-ups in one stop.

The urgent courier service does not need a hub or depot for couriers to exchange packages: what urgent couriers pick up, they deliver. If they need to pass it on to another courier (say a cyclist receives a package considered too far away to make the delivery deadline), two couriers will arrange to meet somewhere to make the exchange. The manager estimated that only 5% of couriers would swap jobs. Another difference between urgent and regular couriers is that regular or non-urgent couriers deliver much more freight than urgent couriers.

Some types of businesses are more inclined to use urgent couriers than others, including lawyers, government agencies, accountants, advertising agencies, florists, designers and motor part companies/auto repair shops. Retail shops tend to be 'very spasmodic' in their use of urgent couriers, apart from stationery companies that may use urgent couriers to deliver orders.

9.3.2 Customer expectations

As far as the customer is concerned, it is the courier company's problem to meet the service standards. If the company is 'proactive' in notifying clients of potential delivery delays (e.g. sending an email to the client if a traffic accident has caused a delay or providing a traffic page on their website advising of road closures that might affect deliveries), then usually the customer is pretty relaxed about the delivery being late.

9.3.3 Dealing with congestion and traffic

Because of the tight timeframes that urgent couriers operate under, they have to take roadworks and other things that might affect traffic flow into account. 'Juggling traffic' has become worse over the past 5–10 years as streets have become more congested.

Within Wellington, our respondent noted that urgent couriers 'steer clear' of the Basin Reserve area between 2:45 and 3:30 p.m. on school days, and away from Boulcott Street between 4 p.m. and 5 p.m.

One issue discussed in some detail was the temporary closure of streets during big events like parades, street races, international film premieres, etc. In the opinion of our interviewee, better or more dialogue should take place between the Council and key road users, such as taxis and courier companies, to assess how opening and closing the roads, and access during the events should be handled, as these companies are very familiar with traffic patterns and where potential bottlenecks might occur. In their view, this would facilitate acceptance by commercial transport providers of the closures. Commercial entities need to be allowed to function, so their access to commercial vehicles is important.

9.3.4 Parking

Parking is 'not a biggie' according to the respondent, as couriers do not care where they stop; they will double-park, stop in a bus lane, loading zone, bus stop or car park – basically, wherever they can – in order to pick up or make a delivery. The Wellington region has no 'courier parks' – loading zones exist but these tend to be used by other non-business vehicles 'with impunity.'

Angle parking, such as is provided on the main streets in Lower Hutt, is 'atrocious' as it causes a lot more accidents between vehicles in the traffic and those pulling out of car parks. However, they generate a lot more revenue, as the Council would be able to have two car parks where they would only have one if parking was parallel.

Hutt City Council agreed that the 'parking manoeuvre' is made into the thoroughfare, with 'not much room for anything to go wrong.' However, given that pedestrian accessibility is a high priority for the Council, the increased availability of spaces created by angle parking is considered worth the 'narrow thoroughfare' and increased risk created.

9.3.5 Changes in recent years

The respondent noted several changes that had occurred in the past 5–10 years, including:

- The 'growth surge' of email in 1997–98 significantly affected the number of urgent couriers in their company, cutting numbers back by 25% by the end of 1998–99.
- Growth in the number of businesses in the city and densification of businesses (because taller buildings accommodate more businesses per square metre of land) has created a need for more couriers in order to provide services within the required timeframe. For non-urgent couriers, routes have been compressed so that couriers are able to continue to provide a similar level of service.

The respondent thought that the increased visibility of couriers on city streets is more a reflection of the increased numbers of businesses and business growth rather than greater use of couriers by individual companies or owing to traffic or congestion.

9.3.6 Reaction to possible transport-related policies

9.3.6.1 Pedestrianisation

Pedestrianising Lambton Quay was regarded as a 'logistical nightmare' by the respondent, who also thought that Lambton Quay businesses would be compromised in their ability to do business. Couriers (other than cycle couriers) would have to park in Featherston Street and walk in to Lambton Quay to pick up or deliver packages.

In High Street, Lower Hutt, it would also take a lot longer for deliveries to be completed if the couriers had to stop further away, with the potential that the service standard would drop. It is not clear, however, that the respondent was taking the availability of service lanes into account.

9.3.6.2 Implementing a one-way system

Implementing a one-way system would, in the view of the respondent, increase the amount of time required to move around and could affect the company's service standards because increased congestion and bottlenecks could result.

9.3.6.3 Implementing a cordon charge

As most couriers in New Zealand are independent contractors, including the ones employed by the urgent courier company we spoke to, implementing a 'pay per use' or daily cordon charge would 'kill' them, as the courier would bear the cordon charge as part of their operating cost. Some urgent couriers go in and out of the central business district 6–7 times per day.

9.3.6.4 Increased fuel costs/petrol taxes

Because the couriers are contractors, they pay their own costs. Hence, in the face of petrol price or tax increases, courier operating costs would rise initially and their income would be negatively affected.¹¹ Eventually, the courier company would pass on some of the higher costs to the clients, but they face a high risk that the client will 'think twice [about using] urgent couriers.'

The respondent did not consider it feasible to implement cost reduction strategies (which could include encouraging drivers to operate their vehicles in a 'fuel efficient' manner), because of the 'on demand' nature of the urgent courier business. The 'best available' courier (generally the closest to the pick-up location) gets the job.

¹¹ It is possible that if fewer other vehicles were on the road, both non-urgent and urgent couriers could do more pick-ups and deliveries because the roads would be less congested, thus raising their income and negating the effect of the fuel increase.

10. Conclusion: verifying our hypothesis and implications for future research

10.1 HCVs

While the focus of our study was on LMCV use, we structured our data collection table so that we could take services or goods deliveries by HCVs into account. We asked about various types of trips (receiving stock, sending documents, rubbish pick-up, and maintenance), their frequency (daily, weekly, fortnightly, monthly or irregularly) and then sought to record the type of vehicle involved.

Where an organisation was located in a building that had a building manager, the organisation itself was often not responsible for its own rubbish and recycling collection, which will undoubtedly occur on a regular, even daily, basis for the entire building. Hence, we found that 45 of the 49 organisations interviewed in the course of this study could not identify any HCV trips being specifically generated for or by their business, even on an irregular basis. The four businesses that did identify HCV trips were a bank head office, a department store, a restaurant/bar and a government administration.

10.2 Verifying our hypothesis

10.2.1 The hypothesis

Our hypothesis proposes that various factors affect the demand for and provision of transport services within an urban corridor. From it, we derived a series of propositions, which are essentially a series of specific statements based on it that we hoped to prove (or disprove) in the course of our case studies.

Stated in full, our hypothesis for this research project is:

The demand for (or use of) and the provision of transport services within an urban corridor varies, depending on:

- **the physical characteristics of the corridor** (e.g. level of traffic volume (as it relates to congestion), location within the urban area);
- **the density, composition and nature of the organisations** located within the corridor (e.g. organisational type/structure, level of transport service required, available floor space/storage);
- **the effect of the relationship** between the organisation and its customers (e.g. customer service standards, customer expectations), between the transport user and its clients, and between the transport provider and the transport user (who may be in the same organisation), and within each organisational type; and
- **the regulatory environment** (e.g. local policies such as curfews etc., through to vehicle licensing and operation regulation characteristics).

The following sections address each proposition in turn.

10.2.2 Proposition 1: the effect of individual organisations

10.2.2.1 General findings

Many retail organisations operate with a 24-hour, next day service standard and customers generally expect that this will be the case. However, we did find that a few Auckland-based businesses have tried to reduce these expectations, generally because of issues to do with traffic between the distribution centre and the retail outlet.

Given the extensive use of couriers for the delivery of goods generally, and the fact that non-urgent couriers operate on set routes with established pick-up/delivery times, it is difficult to ascertain how many extra trips these service standards would engender. A crude means of estimation is that if the frequency of service were to be increased from twice daily to thrice daily, then the number of trips of non-urgent couriers to a given corridor would increase by 50%.

However, during the course of our interviewing, we developed a strong sense that the service standards were offered simply because it was feasible to do so, given the advances in technology in recent years (e.g. ordering stock used to require sending orders in the post and waiting for shipment; now it may be 'electronic point of sale', with computerised linking of ordering systems and warehouse inventories in the distribution centre, and shipping out occurring almost immediately). Competition ensures that the standards continue to be offered at least in the short to medium-term.

We did not find any evidence of transport being used as a form of 'mobile storage'. A few retailers noted that they no longer maintained large inventories on-site, but the reasons for this varied: in the case of two computer retail/services organisations, they had found that rapidly changing technology meant that some stock would quickly become obsolete, making it too high a risk to maintain high inventory levels. The office supplies business, which includes computer supplies, found that it has a much greater variability in its stock and a tendency to obsolescence, so it maintains smaller volumes of a greater range and re-orders more regularly.

Two fashion retailers specifically noted that they had changed how they hold stock, reducing their holdings and re-ordering as they run out of sizes. The respondents stated that this was better for their shops' cash flow and appeared to be how the suppliers wished to operate.

We found more evidence supporting the statement that particular characteristics of individual organisations have an effect on the demand for transport services, as discussed below.

10.2.2.2 Goods versus services

We interviewed respondents from 20 goods organisations (i.e. retail shops) and 29 service organisations (hair stylists, dentists, lawyers, consultants, government agencies – also including restaurants and cafés which, while providing a ‘good’ in the form of food, are also providing a service/experience). Only 10 of the organisations we interviewed had more than 20 employees – and 8 of these 10 were service-oriented.

With respect to the use of couriers, services-oriented businesses were far more likely to have 10 or fewer courier vehicle visits (excluding cycles) per week – 19 out of 29 services were in this category, compared with 7 out of 20 goods-related businesses. Retail operations were more likely to have more than 30 courier visits per week.

However, when considering the minimum number of commercial vehicle visits (including couriers, LMCVs and HCVs) per week, no notable difference could be seen between goods or service organisations as a group in their demand for transport services. However, when we considered characteristics within these groups, we found some discernable differences.

Independent v. chain/franchise operations

We identified a tendency for food places (restaurants, cafés and bakeries) operating as part of a chain or a franchise to have fewer commercial vehicle visits per week than their independent counterparts. As this was based on a small sample (six businesses in total), it requires further investigation.

Also, comparing the two department stores we visited, it appears that the chain store has far fewer commercial vehicle visits per week than the independent department store. Again, this result cannot be generalised, but could be explored further.

Because of the small samples involved (six businesses in the case of food places and two department stores), we cannot confidently generalise the result across the corridor(s). However, we can make an analytical generalisation¹², stating that chain outlets are likely to benefit by receiving combined shipments from their distribution centres rather than directly from suppliers (at least for some product types such as non-perishables).

Perishable v. non-perishable supplies

Where the supplies required by a business are perishable (e.g. foodstuffs, flowers or electronic parts), they are much more likely to have 10+ commercial vehicle visits per week than are other service-oriented or non-perishable retail organisations (e.g. clothing or shoes). In addition, flowers and some foodstuffs require special care when being transported, e.g. refrigeration and/or special stands. ‘Ordinary’ courier vehicles are not suitable and the florists complained of a lack of specially equipped couriers.

For example, of the 15 organisations interviewed which counted 10 or fewer commercial vehicle visits per week, only one (a bakery) was a business involving perishable supplies.

¹² According to Yin (2003), an analytical generalisation is where research results are generalised from one case study, by means of a suitable theory, to other cases.

By contrast, five of the 11 organisations requiring perishable supplies had 35+ commercial vehicle visits per week. This is comparable to much smaller proportions of service-oriented organisations and non-perishable goods retailers interviewed (only 2 out of 21 and 4 out of 17, respectively).

Seasonal variation of supplies

Clothing and shoe shops, in particular, have a distinctive changeover from autumn/winter stock to spring/summer stock. It appears that during this transition (twice yearly for a period of up to two months), they may receive up to twice as many deliveries weekly compared with other times. The volume of each delivery may be larger as well, with some respondents noting that instead of one carton, they might receive six or more. One shoe shop we spoke with did not have an increase in deliveries but managed by increasing the volume of each delivery.

The two department stores did not report a similar changeability, possibly because load variations could be contained within the LMCVs servicing their businesses.

Some retailers (notably gifts, clothing and booksellers) also reported increased numbers of deliveries occurring in the 6–8 week period leading up to Christmas.

Only one service organisation reported significant variation in its use of couriers, which reflected times when they were preparing to release major public documents.

10.2.2.3 Number of staff employed

The number of staff employed has some relationship with the overall number of commercial vehicle visits per week, if one considers the extremes in the numbers of visits (i.e. 10 or fewer per week or more than 40). For example, 12 out of 26 organisations employing 5 or fewer staff had ≤ 10 visits per week, while only 3 out of 13 employing 6–19 people had as few commercial vehicle visits. None of the 10 businesses employing 20+ staff had ≤ 10 visits per week. Conversely, 6 of the 10 largest organisations had 30+ visits per week, while only three of the smallest 26 organisations had as many visits. Of the medium-sized organisations (6–19 employees), 6 out of 13 had 30+ commercial vehicle visits per week.

Removing the extremes and considering organisations receiving between 11 and 30 visits per week (or even creating different clusters), it is impossible to distinguish any effects of staff size from our sample. It is also difficult to explain how staff size could affect the number of trips for either service businesses or those that retail goods. Among service businesses, staff size may be a proxy for business turnover, but business turnover probably has stronger implications for the sizes of consignments than the number of trips.

10.2.2.4 Floor space

Many of our respondents were unable to provide even an estimate of their available floor space, making it difficult to establish whether or not a correlation can be drawn between floor space and the number of commercial vehicle visits.

At first glance, it appears some relationship may be found between floor space and commercial vehicle visits. Five of the largest businesses (the bank head office, the two department stores and two government administrations), all occupying at least a few thousand square metres, had very high numbers of commercial vehicle visits, including the use of their own vehicle fleet – ranging from more than 100 up to nearly 300 visits per week.

However, we found evidence to suggest that no theoretical basis exists for arguing that the difference in floor space drives the difference in the number of trips. For example, one large service organisation, covering three floors of a high-rise on Lambton Quay and employing around 100 staff, had severely reduced its commercial vehicle visits (to around 25 per week) as a result of re-structuring its operations. Furthermore, six organisations based in relatively small sites (ranging from 100 m² to 350 m²) also had a reasonably large number of visits because of the services/goods they were providing: the two florists, the chemist, an office supplies shop, a restaurant/café and a communications service all had between 45 and 60 commercial vehicle visits per week, although one organisation had well over 100. Even the two department stores had a huge difference in their numbers of commercial vehicle visits per week: one department store had nearly three times the number of the other.

10.2.3 Proposition 2: the effect of the corridor as a whole

We considered several factors in verifying this proposition as discussed below.

10.2.3.1 Density

We found that the overall demand for transport services within a corridor is strongly affected by the density of organisations within the corridor itself: fewer businesses in an area generally mean fewer commercial vehicle visits in total. Eleven out of 25 organisations interviewed in the secondary cities had 10 or fewer commercial vehicle visits compared with only two out of 24 organisations interviewed in the heart corridors. It is not readily apparent to us why this should be so: in terms of our sample, the mix of organisations (goods/services, ANZSIC classification, number of employees) is very similar in the two corridor types.

One possible explanation for the differences could be that in secondary cities, floor-space and/or storage-space is not as constrained, as a result of which, 'just-in-time' replenishment is not strongly mandated. A related explanation is that since retail space is more expensive in Lambton Quay and Queen Street, stores in such corridors need to realise a considerably higher turnover per square metre to break even, which means faster stock turns – and more frequent replenishment in smaller quantities.

As noted earlier, the density of the 'heart' corridors permits the use of foot/cycle couriers.

In addition, both the urgent and non-urgent couriers noted a significant difference between the two 'main street' corridors (Lower Hutt and Takapuna) in terms of their far lesser demand for urgent couriers compared with Queen Street and Lambton Quay.

10.2.3.2 *Trip type, trip purpose and vehicle type*

In addition to the use of cycle/foot couriers in the Wellington and Auckland CBD, organisations in the 'heart' corridors were more likely to be extensive users of couriers compared with Lower Hutt and Takapuna. Seven organisations (out of 24) interviewed in the heart corridors had 40+ courier vehicle visits per week, compared with three out of 25 in the other two corridors. The main street corridor businesses were much more likely to have had 10 or fewer courier vehicle visits (12 businesses, compared with three in the CBD).

The use of private vehicles for commercial trip purposes did not vary between the two corridor types.

The format of our data collection does not permit us to comment on the 'trip type' as proposed by Wigan et al (2002), which refers to whether the trip is to supply goods or services to the organisation under observation. In part, this is because we found non-urgent courier vehicles delivering most, if not all, of the stock to many businesses we interviewed. If the delivery is made by a non-urgent courier, it is likely to be part of a regularly scheduled stop at the premises, and will coincide with the scheduled visit to pick up other items, either for the same or another business nearby. Hence, it is unclear how to count that courier visit: is it a service or goods trip?

10.2.3.3 *Value or nature of goods*

In retrospect, this factor should really be considered as a characteristic of individual organisations within the corridor. Specialised courier and other vehicles are available for flowers as well as for foodstuffs, and secure vehicles are used by banks for their documents and cash. The type of corridor does not affect the demand for these; rather, it is the type of the individual organisation.

10.2.3.4 *Physical characteristics of the corridor*

Off-street or side street access, which occurs far more extensively in the Lower Hutt and Queen Street corridors than the other two corridors, makes access for commercial vehicles much easier. However, it is not clear whether it changes the behaviour of organisations within the corridors in terms of their demand or management of transport services.

10.2.3.5 Congestion

Concern about congestion and its effects was far more pronounced in the two Auckland corridors than in the Wellington ones. In the two 'main street' corridors, most delivery problems were associated with a transport link external to their corridor. In the case of Takapuna, it is the Auckland Harbour Bridge; for Central Lower Hutt, it is the stretch of state highway between Wellington City and Lower Hutt City.

In response to repeated delays in deliveries, two businesses had set up their own distribution centres and three had begun to do their own local deliveries, usually in a private vehicle.

According to the Wellington-based courier companies we spoke to, and the Auckland one profiled by Sankaran et al (2005), courier company responses to increasing delays are to decrease the size of the routes and/or establish new hubs as well as to increase the number of courier vehicles operating, rather than to minimise traffic.

10.2.3.6 Re-location

We found only one business that was re-locating because of transport-related issues, namely a lack of free on-street parking near their worksite, rather than any service issue. While some respondents stated that they could comfortably relocate out of their current corridor location, most felt that their current site was either important to the success of their business or that transport was not an issue significant enough to warrant change.

10.2.3.7 Effect of possible transport-related policies on the corridor

Predictably, we received a hugely varied reaction to the policies investigated (pedestrianisation, restriction of commercial vehicle access, or doubling transport costs through a cordon charge or increased fuel costs). A few businesses felt that they would be forced to close down in the face of significantly increased transport costs; others thought they could pass the costs on while for a third group, transport costs are not transparent (e.g. they are included in the 'free delivery' of stock) so they did not have an immediate issue with the idea of transport cost increases.

A few respondents recommended further study of the pedestrianisation proposal, as they identified examples of where it had been tried, without success, and the streets were later converted back to 'regular' streets. In Takapuna and Lower Hutt, businesses seemed more concerned with how pedestrianisation would affect their clientele, who are used to parking directly outside the place they wish to visit. In Queen Street and Lambton Quay, greater concern was expressed about commercial vehicle access, particularly for couriers.

Retailers' views would naturally vary according to how dependent they are on customers having good parking facilities. Larger retailers may have a higher spend per customer ratio than smaller retailers, irrespective of whether they are food or non-food retailers. The need for a car nearby will depend on the products for sale; for example, jewellery may be transported by foot whereas the weekly grocery shopping requires a car. In the latter instance, the customer's parked car is, in effect, a 'shopping trolley.'

In our study, the focus was on CBD or core urban corridors. While three of the four corridors¹³ observed contained one or more large department or retail stores, in many cases, the goods sold could be transported on foot by the customer. Bulky items, such as furniture, appliances or groceries, are not widely available in the 'heart' corridors of Wellington and Auckland.

10.2.4 Proposition 3: factors affecting transport supply

10.2.4.1 General findings

It is important to note that our discussion about transport operators is limited to couriers, as we did not interview any other transport providers.

We found that a variety of factors affect the supply of transport services within a corridor, including:

- the density and mix of organisations,
- service standards,
- congestion, and
- the effect of possible transport related policies.

10.2.4.2 Density and mix of organisations

Higher densities permit the use of non-motorised transport modes (hand-deliveries by walking and cycle couriers).

While the corridors we studied all had a very similar mix of organisation types, we found that service-oriented organisations generally differed from goods-oriented organisations in terms of overall numbers of visits and in use of couriers. The size of the organisation, in terms of staff numbers, also has an influence on transport use. It appears, too, that another factor affects transport use, which we suggest might be business income or stock turnover rates.

10.2.4.3 Service standards

Transport service operator standards vary according to traffic conditions. Both the urgent and non-urgent courier companies we interviewed identified different delivery timeframes used for Auckland and Wellington, reflecting the greater congestion in Auckland.

Operators also face stiff competition from other companies and will only reluctantly adjust their standards.

10.2.4.4 Congestion

As indicated, different delivery/pick-up timeframes operate between Auckland and Wellington. Some transport users noted that these were regularly not met, resulting in

¹³ In Takapuna, the shopping mall, which had a department store and supermarket, was outside the corridor.

the need for them to begin making their own deliveries to clients. This is true for two Takapuna businesses and one on Queen Street.

In order to continue to meet these timeframes, courier companies will adjust their routes, visitation rates and courier vehicle numbers before even considering changing the service standard.

10.2.4.5 Effect of possible transport-related policies

Given that most New Zealand couriers own their vehicles themselves and are independent contractors to the courier company, increasing transport costs or implementing pedestrianised areas will reduce their income and/or viability.

The courier company would have to consider changing service standards to match the increased travel time required in pedestrianised areas, for example by lengthening the delivery timeframe or by lessening the number of visits to the area each day. Given the predominance of couriers for delivery of stock, the companies may also have to negotiate with the businesses concerned to gain after-hours access to the site in order deliver the stock and to fit in with the street closures. Alternative solutions could include having carts and trolleys to move goods from pedestrianised areas to parking areas.

10.3 Implications for quantitative questionnaire and modelling

In addition to exploring the LMCV trip patterns in urban corridors, in order to test the validity of the hypothesis and propositions discussed above, we also proposed to make some comment on the implications of our findings for the modelling of such patterns.

Because of the lack of pre-existing research in this area, our work has been highly qualitative. We wanted to identify what the driving factors of LMCV movements in urban corridors are, as outlined in the propositions. Having collected our data in face-to-face interviews, we have attempted to categorise the types and numbers of vehicle movements by corridor type, business type and size of operation (in terms of staff numbers) in a very general way.

In terms of the systematic data collection required to express or model the LMCV movements in an urban corridor more quantitatively, we have the following observations:

- It is necessary to distinguish between commercial vehicle 'trips' to the corridor, 'stops' within the corridor (to service one or more clients) and 'visits' to each client. If collecting data from businesses rather than operators, remember that 'visits' not 'trips' are being counted. For example, even while stopped in one place for only a few minutes, a courier, beverage or water van may visit several businesses. In order to gain an accurate picture of commercial vehicle movements, it may be necessary to speak with these types of transport operators as well.
- The characteristics of the organisations in the corridor will have a distinctive influence on the volume of commercial vehicle trips and visits within the corridor. For example, retail shops which are part of a chain appear to have fewer commercial vehicle visits than an independent retailer because of their ability to consolidate shipments through a distribution centre. Likewise, businesses with time-sensitive requirements with regard to either merchandise or services are likely to generate more commercial vehicle visits. With further quantitative research, it may be possible to generate a classification of different businesses and their 'commercial vehicle attraction rate'.
- Distinguishing 'goods' and 'service' visits (such as proposed by Wigan et al 2002) is likely to be difficult. Couriers form a major proportion of LMCV visits in urban corridors and are likely to do so even in the face of increased transport costs. This is because courier services are a more economical transport method and have replaced the need for suppliers/distributors to own or lease their own vehicles.

Courier visits may be either as a supplier (e.g. to deliver stock or to transfer stock between locations) or as a service (e.g. to pick up outgoing packages for clients of the business). In a heart corridor, an urgent courier visit may be a separate trip or it may be one stop of several in the same building. Also, an urgent courier may be on a bicycle or in a motorised vehicle, which has different implications for traffic management.
- Similarly, distinguishing 'incoming' and 'outgoing' goods trips or visits may be difficult for some businesses, as one such visit (say, by a regularly scheduled courier) may result in the delivery of incoming items and the pick-up of outgoing items. We found that department stores, chain stores and the florists we spoke to had similar experiences with their own or contracted commercial vehicles delivering goods as well as picking up goods for transfer elsewhere.
- Distinguishing vehicle types involved in visits or trips to an organisation appears to be quite readily achieved. A common exception was uncertainty about whether courier deliveries made to service businesses away from street level used a motor vehicle rather than a bicycle. Similarly, several businesses were not sure about vehicle types used by cleaners coming after hours. In the rare instance where a

relatively large truck was involved, respondents were sometimes uncertain about the size of the vehicle (e.g. whether it had three axles).

- It is very easy to under-estimate service-related visits, particularly for maintenance and repairs. Because these tended either to be less important to the respondent (particularly in the case of businesses heavily dependent on regular goods deliveries) or irregular (common for diverse repairs and technical services), they are probably more easily forgotten by organisations. Generally, we found that a small number of these happened on a weekly basis; unless a business was significantly reliant on technology (e.g. the organisation used many computers, photocopiers or telephones). In such cases, services-related visits may become significant in number and may require relatively lengthy parking.
- In areas of intense land development (e.g. a lot of high-rise buildings), a certain number of vehicle movements will not be counted by the tenants, as they are the responsibility of the building manager. For instance, we found that in some buildings, it was the manager that arranged rubbish and recycling pick-ups, as well as the general maintenance of the building. In others, the tenants arranged for their own rubbish and/or recycling pick-ups. In quantifying LMCV movements, it will be important to include building managers in any surveying.
- Many respondents did not know the floor area and could not even approximate it. Collecting this information via a quantitative survey form may be misleading.
- 'Private' vehicles were not widely used. Among the 49 organisations we interviewed for either delivery of goods or services, 35 of these could not recall any private vehicle use when asked, while another seven respondents indicated that such use was limited to five or fewer trips per week. However, for the remaining seven organisations, private vehicle use was either substantial – four organisations recorded more than 25 such trips per week – or critical: two organisations relied on their vehicles for stock transfer from warehouse to shop. Those with extensive private vehicle trips included a dental laboratory in Takapuna, a government organisation in Queen Street, and a communications services and a retail store in Lambton Quay.
- HCV vehicle visits were even less common than private vehicle movements. We found that 45 out of 49 respondents did not identify any HCV trips or visits to their organisation. In some cases, rubbish and recycling pick-up is organised by the building manager, and the tenant may have no awareness of either the vehicle being used to do this or the frequency. Putting this aside, it is apparent that HCV visits to locations within urban corridors are likely to be relatively uncommon.
- Respondents had no problems focusing on commercial rather than private trips.

- Exploratory/qualitative research may be useful to develop some understanding about shopping malls, as they may have very different delivery patterns, given that greater centralised control and timetabling is possible.

10.4 Future research

It is quite clear that little information, monitoring or appreciation of delivery transport or shipping transport exists in the study areas. This gives rise to several opportunities for further research:

- Developing a regular survey of commercial vehicle movements could be beneficial to local authorities.
- Encouraging businesses to monitor transport and their costs could be undertaken so that greater transport efficiency, improved customer service and business sustainability can be achieved.
- City logistics could be explored, trialled and implemented in the more congested central business areas.
- The effect of organisations in the corridor in generating client traffic (whether via foot, passenger transport or private vehicle) could be investigated. For example, food shopping, appliances and home furnishings are more likely to require a vehicle for transporting goods home than book or CD stores, cafés and many clothing/shoe retailers.

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Appendix A Case study protocol

A1 Preliminary note

This appendix contains the guidelines drawn up by the researchers prior to undertaking the interviews and data collection, and submitted to their steering group for approval. The protocol outlined here was used as a guide for the researchers, not a rule book, so in the field, some minor aspects were carried out slightly differently from how they are described here.

A2 Case study methodology

This project seeks to break new ground, and the relatively complex issues involved are not sharply defined. Given this starting point, rather than jumping into interviews using a loose semi-structured approach, we judged it prudent to structure the method relatively formally (following a well-recognised text on case studies, Yin 2003).

A2.1 Type of case study

Yin (2003) defines three basic types of case studies:

- **Exploratory:** aimed at defining the questions and hypotheses of a subsequent study (not necessarily a case study) or at determining the feasibility of desired research procedures.
- **Descriptive:** presents a complete description of the phenomenon in context.
- **Explanatory:** presents data bearing on cause-effect relationships – explaining how events happened.

We are conducting explanatory case studies, although the project has an element of exploration, insofar as we may define future research questions or requirements. Primarily, this is because very little information is available in published reports and papers regarding LMCV trip patterns in urban areas.

Our approach is confirmed by the study questions we identified in our original proposal and further clarified with input from end users:

- How and why does the nature and mix of organisations located within a specific corridor affect (or not affect) the use of transport services in the corridor?
- How does the use of transport services vary (or not vary) in different types of 'corridors' (i.e. effect of physical location characteristics)?
- How might different policy tools/mechanisms affect the demand for transport services within a corridor?
- How could this information contribute to refining the modelling of LMCV movements?

A2.2 Theory development

Yin (2003) regards the development of theory as an integral part of the case study design work, as it helps to illuminate all aspects of the research design; namely:

- the choice or creation of propositions,
- case studies,
- units of analysis,
- the logic for data collection, and
- the criteria for interpreting the findings.

More pragmatically, putting such ideas in writing also helps to clarify direction with our steering group.

Based on our study questions, we have derived the following hypothesis: The demand for (or use of) and the provision of transport services within an urban corridor varies depending on:

- the physical characteristics of the corridor (e.g. level of traffic volume (as it relates to congestion), location within the urban area, proximity to distribution centres/ depots, and available floor space and storage);
- the density, composition and nature of the organisations located within the corridor (e.g. organisational type/structure, level of transport service required, cost structure);
- the effect of the relationship between the organisation and its customers (e.g. customer service standards, customer expectations), between the transport user and its clients, between the transport provider and the transport user, and within each organisational type; and/or
- the regulatory environment (e.g. local policies such as curfews through to vehicle licensing and operation regulation characteristics).

These factors determine things such as the timing, efficiency and modal mix of transport services within the corridor under scrutiny. They also influence the potential impact of different policy tools/mechanisms on the demand for and provision of transport services within the corridor. Gaining an understanding of these factors will provide insight for transport modelling efforts and other research programmes.

A2.3 Propositions

Demand for transport services in a corridor (where data collection focus is on individual organisations):

- The characteristics (type, size, etc.) and mix of organisations within the corridor affect the overall demand for transport services.
- The service standards and customer expectations of a business or organisation affect the use of transport services within a corridor.
- The relative cost of transport service regarding other operating costs means that some organisations within a corridor are using transport services as a form of mobile storage (replacing on-site inventory).

Demand for transport services in a corridor (focus on corridor as a whole):

- The level and nature of demand for transport services changes with the relative density of organisations within a corridor.
- The Wigan et al. (2002) typology (based on trip type, trip purpose and vehicle type) is applicable to the New Zealand context (This proposition was assumed to be true for structuring our initial data collection, but we remained open to learning about weaknesses of this typology and modifying it through the course of the case studies).
- The physical characteristics of a corridor affect how organisations use transport services.
- Congestion affects the demand for/management of transport services within a corridor (e.g. choice of mode used, timing, logistics).
- Difficulties with transport services (such as timeliness and cost) within a corridor cause some organisations to consider relocating.
- The existing mix of transport service modes is efficient, given the physical characteristics and the range of organisations in the corridor.
- Initial reactions to possible transport-related policies that Councils may want to introduce suggest whether or not they will have a negative impact on traffic movements in a corridor.
- It is feasible to reduce traffic on the roads and still provide and maintain good transport service within a corridor.
- Value of goods – monetary, time sensitivity, hazardous nature (security) – influences the demands on courier services.

Transport supply within a corridor:

A variety of factors influence how transport services are supplied (e.g. choice of mode used, timing, logistics) within the corridor:

- the mix and density of organisations within a corridor,
- customer service (transport users) expectations,
- transport service operators' service standards,
- supplier competition – this forces the transport/logistics price down and forces service levels up (in theory) but creates a difficult sustainable solution for all those involved, and
- congestion/traffic volumes.

The initial reactions of transport service providers to possible policies which a council may want to introduce will indicate whether or not the proposed changes will have a negative effect on the supply of transport services.

Policies that transport service suppliers will be invited to consider include:

- What if entry to the corridor in question was restricted to commercial vehicles and public transport operators who have purchased permits? What if these restrictions were applied during peak traffic periods? What if they were applied during normal business hours?
- What would be the effect if the closest waiting/loading zone to a specific organisation was removed? What if the access to it was restricted so that vehicles could not stop there during peak hours (and which time of day would concern the transport service supplier most)? What if the council charged for using it during certain times?
- What if the area was pedestrianised so that deliveries are restricted to before 11 a.m. and after 3 p.m.?

Our conclusions can be confirmed (or not) based on the analysis of demand for transport services within a corridor.

A3 Identification of research parameters, case studies and definitions

A3.1 Single v. multiple case studies

Initially, we had a choice of whether we undertook a single case study of one corridor or if we adopted a multiple case study design. Given that we were asked to consider this research project by regional council officers in both Auckland and Wellington (these provide two distinct 'contexts' or settings for our case studies), we made the decision to do multiple case studies within the two contexts. Using more than one context is important for developing understanding. Both similarities and differences will be found between Auckland and Wellington (in particular, we expect a strong influence from congestion in Auckland). Exploring the reasons for such similarities and differences, and the possible impact on future behaviour (e.g. likely reactions

to changes in transport policy) typically proves very useful to policy and planning decision-makers.

The strength of having multiple case studies in each context lies in the fact that if two or more cases are shown to support the same theory, replication may be claimed. The evidence is considered more compelling and robust than that of a single case study, and analytical generalisations can be made. Otherwise, it is deceptively easy for readers of the subsequent report, or even the researchers themselves, to over-generalise the results to the whole of Auckland or some other context. Carefully noting differences between corridors/centres within a single region and developing understanding of the reasons for and effects of the differences reduces the risk of such over-generalisation.

Yin (2003) suggests that multiple case studies should be selected so that they replicate each other, either predicting similar results (literal replication) or generating contrasting results for predictable reasons (theoretical replication).

Our case studies reflect a combination of the literal and theoretical replication approach.

A3.2 Selecting case studies

We have chosen two contexts for our research: the main urban centres of Auckland and Wellington. Each of these centres comprises four cities:

- Auckland: Waitakere, North Shore, Auckland City and Manukau;
- Wellington: Upper Hutt, Lower Hutt, Wellington City and Porirua.

Within each context we have selected two case studies:

- **The heart of the CBD for the main urban centre.** These corridors are characterised by high road traffic volumes (often operating at >80% of corridor capacity) and high-rise complexes, generally with retail and other services at ground and first floor level, and offices in higher storeys. A wide mixture of activities is present.
- **The main street of a city within a secondary urban centre.** These are characterised by lower overall volumes of road traffic, low level buildings (generally single or two storey), a wide mixture of activities, and some kind of direct street access for each organisation.

Each case study contains many 'embedded units of analysis' (Yin 2003), namely the organisations located within the corridor under examination. Analysing a range of these units will allow us to make (analytical) generalisations about the corridor as a whole.

Figure A1 illustrates our case study design.

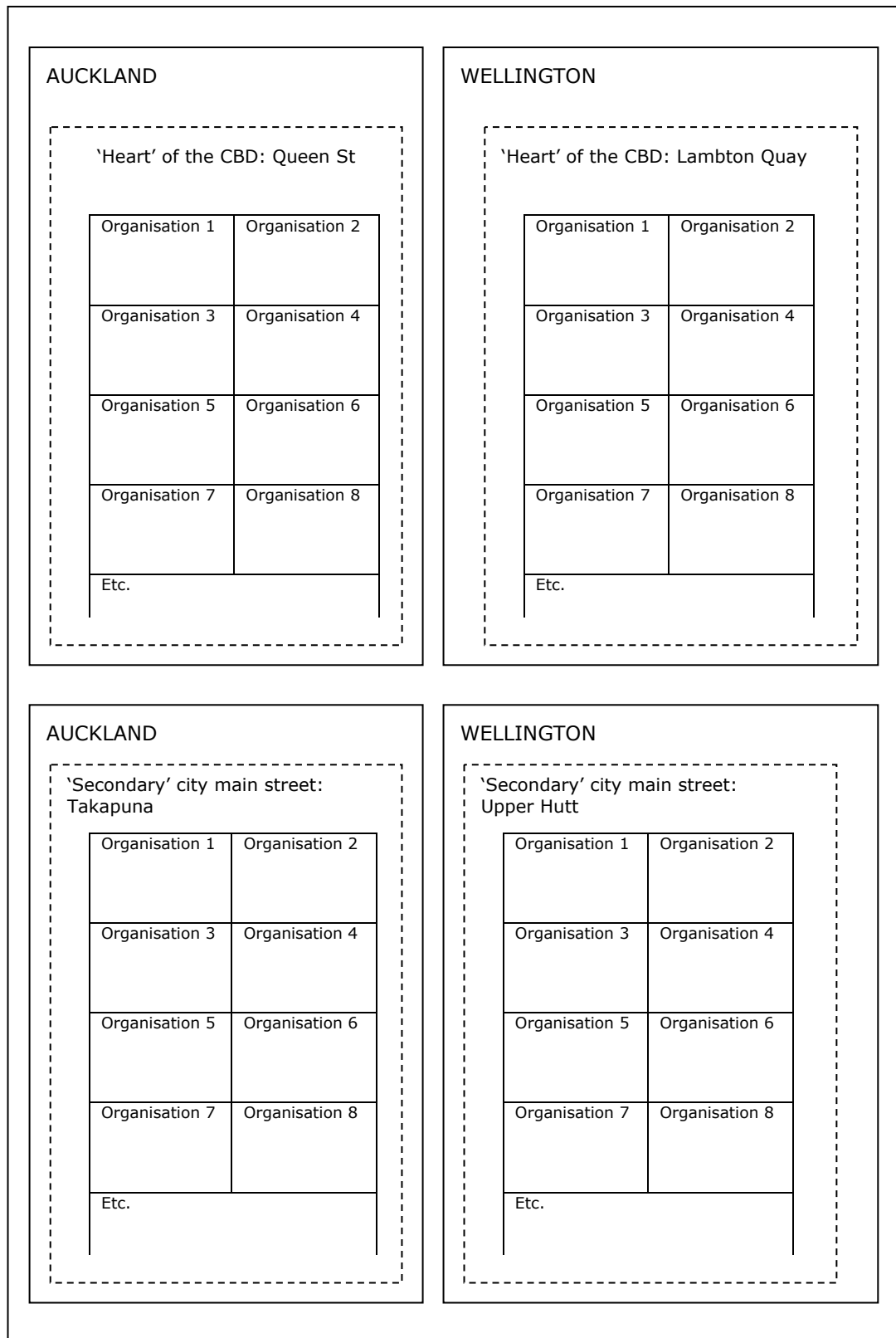


Figure A1 Multiple case study design, showing the structure of the context, cases and embedded units.

With this case study design, we are hoping to undertake literal replication, predicting similar results for two cases, each pair having distinct characteristics:

- the heart of the CBD: Lambton Quay, Wellington, and Queen Street, Auckland;
- the main street of the secondary city: Lake Road, Takapuna, North Shore City, and either Main Street, Upper Hutt or High Street, Lower Hutt.

In addition, we are able to test theoretical replication:

- Transport service use varies depending on the main urban centre the organisation is located in (i.e. Auckland is different from Wellington).
- The demand for/use of and provision of transport services varies according to the physical characteristics of the corridor (particularly high traffic volume and high density v. lower traffic volumes and low density).
- The potential impact of transport-related policies will vary depending on the corridor characteristics.

We are constrained by time and budget in how much information we can gather in each corridor, so the strength of our analysis may be in the cross-context and cross-case analysis, rather than the analysis of individual cases.

A2.3 Units of analysis

Each case study contains many 'embedded units of analysis' (Yin 2003), namely the organisations located within the corridor under examination. Analysing a range of these units will allow us to make (analytical) generalisations about the corridor as a whole.

An 'organisation' in the context of this project includes any retail or service business (i.e. counselling service, shop, bank, marketing company, architect), local or central government agency/department or service organisation (i.e. library, information service) that has a shop front or office at or above street level in the selected urban corridor.

A2.4 Defining 'commercial vehicle' movements

In broad terms, our research proposal stipulated that we were going to study LMCV movements in urban corridors. For the purposes of this project, we defined LMCVs as follows:

- cars with commercial insignia (usually indicating who owns and/or operates the vehicle),
- vans, utilities and light trucks up to 3.5 times gross laden weight (Most light commercial vehicles have single rear tyres, but small trucks with dual rear tyres are included), and
- two-axle heavy trucks over 3.5 tonnes gross laden weight without a trailer.

Although we had indicated that our focus was to be on LMCV movements, our steering group expressed an interest in all vehicle movements having a commercial purpose within the corridor. The group also expressed an interest in whether a movement was goods or service-related and whether a trip was incoming or outgoing. Hence, our first task was to clarify exactly what we were including in our project:

- A 'purpose' could be commercial (including employer's business, such as deliveries, attending meetings, picking up items from other organisations, etc) or private movements (for personal purposes) or both.
- A 'movement' could involve moving goods , providing a service or both.
- The 'vehicle' clarifies how the movement was made, including non-motorised means (foot or bicycle), LMCVs, HCVs and other vehicles (private car, train, bus, taxi).
- We defined 'incoming' as someone coming from another site to the organisation/business under observation. Thus, 'outgoing' refers to someone from the observed business or organisation going to another site.

We devised a matrix (see Table A1) to illustrate the possible complexity of the analysis. Incoming and outgoing vehicle movements are not presented as separate cells – adding this would double the number of cells in the matrix.

Table A2 Matrix illustrating the possible range of commercial movements in a corridor.

	Incoming and outgoing	Incoming and outgoing	Incoming and outgoing	Incoming and outgoing
HCV	Goods Commercial	Goods Private	Services Commercial	Services Private
LMCV	Goods Commercial	Goods Private	Services Commercial	Services Private
Other vehicle	Goods Commercial	Goods Private	Services Commercial	Services Private
Non-motorised	Goods Commercial	Goods Private	Services Commercial	Services Private

Note: incoming and outgoing movements apply to each cell.

We decided, given the level of complexity, to retain the focus of this project on incoming and outgoing LMCV movements for commercial purposes within urban corridors, i.e. the shaded part of Row 2 in the matrix. 'Private' movements will be noted, as they contribute to traffic within the corridor, and also because they may use commercial vehicles that would be counted in street-side traffic counts.

If we find a lot of commercial movements associated with Row 3 (i.e. using other vehicles) then appropriate questioning will be followed, as we believe 'other vehicles' provide a closer economic substitute to commercial vehicles than do non-motorised modes (Row 4). They are also more likely to be problematic in terms of transport network management than are Row 4 movements. With respect to Row 4, we intend to ascertain the proportion of commercial movements using non-motorised modes and their nature (e.g. delivering goods or services) in order to gain some sense of their relative importance within the corridor.

Freight movements in vehicles with more than two axles (and weighing more than 3.5 tonnes) have been the subject of other project(s) funded through the Land Transport New Zealand research programme, and we intend to largely ignore them in this project.

A4 Field and data collection procedures

A4.1 Preparation

Our fieldwork preparation began with the first meeting of the steering group for this project, where we:

- discussed the project goals,
- selected the likely case study corridors (with the detailed choice to be refined by us later),
- identified the issues that end users were interested in having explained or explored,
- set the project timetable, and
- discussed a possible case study report outline.

Following this meeting, we were able to refine our project goals, develop the theoretical framework and propositions for testing, finalise the choice and description of the case study corridors and define the units of analysis and the commercial movements that are to be the focus of this research. These have been discussed in the preceding sections. The following sections establish the fieldwork procedures which the investigators will be guided by in collecting data.

A4.2 Developing an understanding of the case study corridors

We will gather detailed information on each case study corridor to be able to identify how similar to and different from each other case study they are. This information will confirm if the corridors are either as similar as possible (e.g. both heart corridors may have the same characteristics) or provide a distinct contrast (i.e. that 'heart' corridors and 'secondary' city main streets are sufficiently different).

Our information gathering will take several forms. We plan to do some preliminary observations of identifiable LMCVs, firstly in the Lambton Quay corridor (and its side streets if access to an organisation is found there) and subsequently in each of the other corridors to obtain a rough overview of what goods or services are being delivered to what types of organisations. This may include observation of a loading bay area, speaking to employees or such things as following and/or speaking to couriers to identify what kinds of businesses they are going to. Initially, we spent an hour or two doing some general observation and perhaps follow this up in the larger corridors with a more specific, longer timeframe, observation, e.g. post a student at the access to the lifts in a large retail/office tower to monitor the activity of couriers/delivery people. We will do some kind of observation in each case study area to add 'realism' to our case studies and to prevent us reporting something which locals know to be obviously 'off track' for their area and to reduce the effect of natural pre-judgments affecting choice of business types for interviewing.

We will obtain any information collected on traffic volumes in the corridors at different times of day, including breakdown by vehicle type, if available.

We will also contract APN Data to provide us with information about most of the organisations located within the four case study areas from its UBD business-to-business database. The information includes:

- business name,
- contact name and title,
- physical and postal addresses,
- phone and fax number(s),
- SIC trade category code and description, or ANZSIC code and description,
- staff size,
- Internet URL,
- importer/exporter flag,
- geocodes,
- unique UBD number (for updating information in the future),
- Relationship type (i.e. whether the organisation is independent, part of a chain or a franchise), and
- related companies.

In some cases, we will be able to supplement this information with further material found on organisational websites. This background information will allow us to determine the mix of organisations in the corridor and their relative size (in terms of employees), which will be useful in terms of considering appropriate organisations for interviewing purposes.

We also intend to ask property managers or real estate agents about the cost per square metre of floor space (which we believe may vary depending on whether it is located at or above street level and on the general size). The cost of space in different corridors may vary and have an influence on how transport is used. This is particularly possible, given the nature of the corridors selected in this study because they include some of the highest-priced retail streets in New Zealand.

A4.3 Selecting organisations for inclusion in case studies

Once we have completed the observations and analysis of the UBD data, we will be in a position to select the organisations for interviewing within the case study corridor. Several approaches are possible when identifying a 'purposeful sample' targeting 'information-rich' respondents (Patton 2002) for our case studies, including:

- **extreme or deviant case sampling:** organisations likely to have very high transport usage contrasting with those who will probably have very low usage;
- **intensity sampling:** selecting 'information-rich' cases that use transport intensively, but which are not at the extreme end of users;
- **maximum variation (heterogeneity) sampling:** this aims to capture and describe the central transport user themes that cut across a great deal of variation within the organisations themselves;
- **homogeneous samples:** a subgroup of organisations with very similar characteristics (e.g. organisational type, number of staff, etc) for in-depth study;
- **stratified purposeful sampling:** basically, selecting more than one homogeneous subgroup for comparison;
- **typical unit sampling:** after taking guidance from key informants within the corridor and possibly our steering group, selecting organisations that are considered 'typical' (not extreme, deviant or intensely unusual) in their transport use;
- **critical unit sampling:** this identifies the unit of analysis (or case) where one can say 'If it doesn't happen here, it won't happen anywhere' (this is unsuitable in our research context); or
- **criterion sampling:** all units would be selected based on a common criterion, such as 'retail – women's fashion' or 'more than 100 employees'..

At this stage, we think it quite likely that we will adopt the 'maximum variation (heterogeneity) sampling' approach, given that we are faced with considerable variation in organisations and a limited knowledge of their actual transport use. Hence, organisations would be selected to display a wide range of diversity, with the intent of providing two kinds of findings:

- high-quality, detailed descriptions of each organisation and their use of transport, which is useful for documenting unique characteristics; and
- important 'shared patterns' that cut across organisations and demonstrate the nature of transport use in the corridor as a whole.

In a similar fashion, we may choose to use the 'extreme sampling' concept, if we find sufficient justification for so doing. We will be seeking guidance from our peer reviewers (in TRL), our expert advisor in Auckland (Jay Sankaran) and the steering group on the selection of organisations.

Until we know more about the corridors themselves, how easy or difficult it is to make contact with people or how long an interview takes, it is difficult to state unequivocally how many interviews or units of analysis we will include in our case studies.

A4.4 Entering the field

The Auckland and Greater Wellington Regional Councils have agreed to send out letters to the selected organisations advising them of the study, its purpose and our proposed visit to them. Letters will be sent out 7–10 days prior to the planned interviewing time and we will follow them up with a phone call to arrange an appointment. We will look for the person in the organisation who is most knowledgeable about incoming and outgoing transport movements. In larger retail organisations, such as Farmers or Kirkcaldies & Stains, we expect that a 'purchasing manager' might be employed, while in smaller organisations, a personal assistant or a manager will probably have the best information.

We need to ensure that we get the appropriate depth of information from businesses. With transport-intensive organisations, we plan to allow sufficient time and flexibility to speak to two or more respondents within the organisation. In a situation where we find much more of interest than expected, we plan to follow up (e.g. an extra interview with that business or even a 10-minute phone call with a few extra questions a week later) the same respondent after completing other interviews in the area, and may undertake to recruit another organisation of a similar business type (to facilitate literal replication).

We will conduct the first interview in the first case study jointly in order to assess the appropriateness of our protocol and question guide. Given its proximity to our offices, we plan to investigate Lambton Quay in the first instance. As indicated in Figure A2 (which shows the overall case study process), following the first interview we will do a 'quality control' check to evaluate how well the guide worked, the nature of information collected and any need for additional questions. Our second interview will also be conducted jointly using the revised questionnaire guide then we will conduct a quality control check again, including an assessment of validity of the theoretical framework and propositions. Following this, we expect to interview the remainder of the first case study interviewees separately.

A4.5 Data recording

Our interviews will be open-ended and assume a conversational manner, following a set of questions derived from our case study protocol. It is important for us to both satisfy the needs of our inquiry and to be friendly and non-threatening in our questioning. For example, Yin (2003) includes the classic advice about avoiding the word 'why' when asking questions, as this may put the respondent on the defensive; we think it better to ask 'how' or 'what are the reasons for...'. This suggestion is reflected in our question guide below.

Interviews are best regarded as 'verbal reports' – and therefore as subject to the common problems of bias, poor or inaccurate articulation, or poor recall. Hence, we will attempt to corroborate interview data with information from other (written) sources within the organisation or with other interviews in the same or another similar type of organisation.

Where appropriate, we will ask the interviewee to suggest other persons for us to interview, as well as other sources of evidence (e.g. courier log sheet; company report) that may assist us in our research.

We will be taking hand-written notes during the interviews. These will be supplemented in two ways: firstly, by taking 10–15 minutes at the close of the interview to sit down and go over our notes with a view to clarifying what we have written and secondly, by audio-recording the interview (where we are given permission by the interviewee). This provided a backup if our notes are unclear or if we particularly want to quote something the interviewee had said. At this stage, we do not have any plans to transcribe the audiotapes.

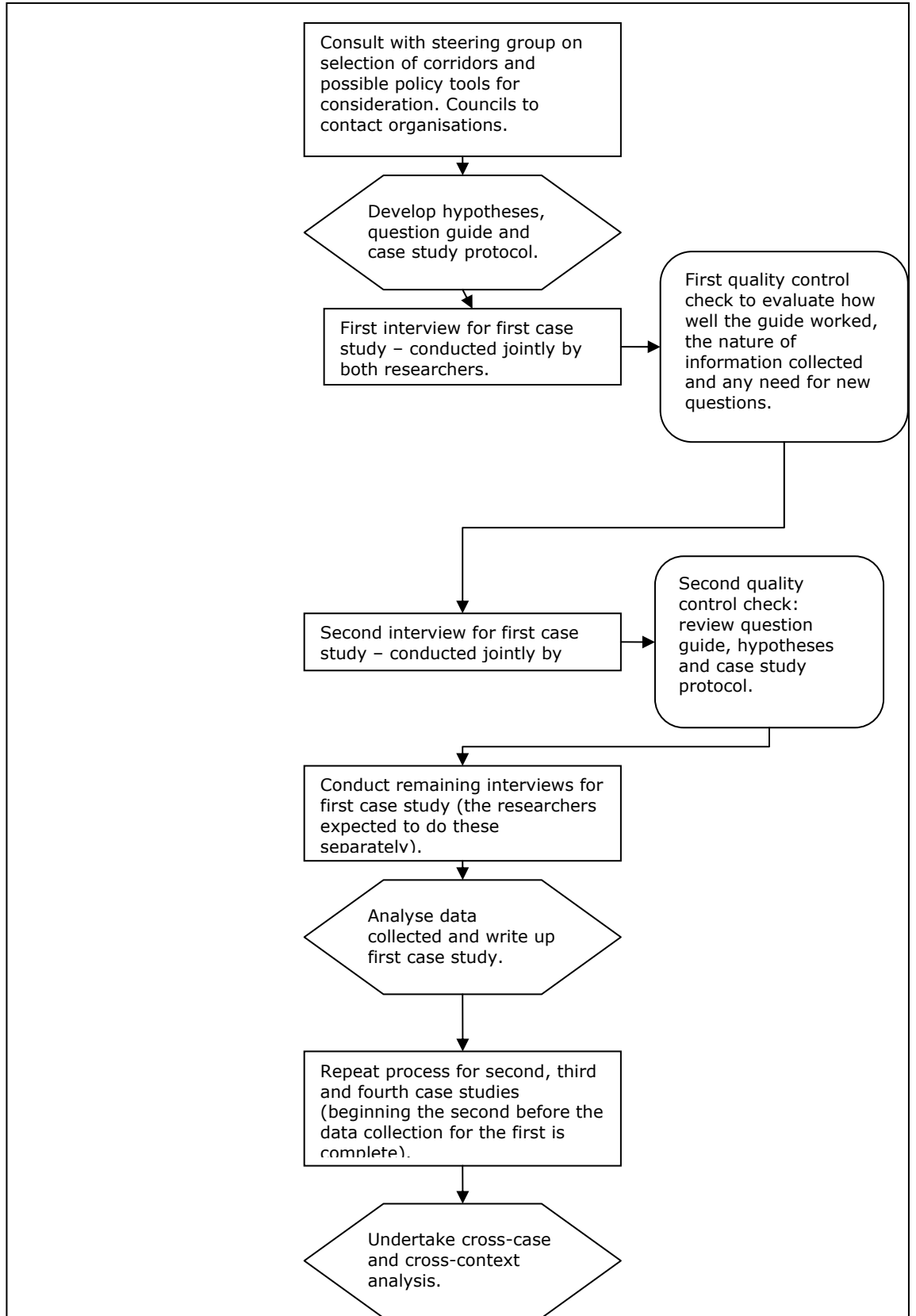


Figure A2 The process that we used for this study.

A4.6 Initial question guide

Our primary focus will be on the demand for transport services arising from the organisations located within the corridor. However, we will seek information about the services that these organisations supply to others. We expect that some organisations may only be able to provide minimal information; others (such as computer service technicians) may have more detailed recall/records.

We want to collect some basic information for each organisation we interview within the corridor. Some of the information we will be able to gather prior to our interview, which will then serve to confirm our understanding. The descriptive information we will look for is summarised in Table A3 below.

Table A3 Background information on organisation.

Information required	Organisation's details	Comment
Approximate length of time in this location	<1yr 1-2 3-5 5-9 10+	
Approximate length of time that business has been established	<1yr 1-2 3-5 5-9 10+	
Number of employees	Full time: Part time: Casual:	
Description of business activity		
Floor space (in m ²)		Exact, their estimate or our visual estimate?
Storage separate?		Exact, their estimate or our visual estimate?
Physical address/location of delivery/ unloading facilities (if relevant)		
Own commercial vehicle(s)? If yes: Description: If no: Name of 'main' transport service provider		
(Only if relevant) Proximity to main distribution centres or depots (how many depots/distribution centres, physical location)		Own depots/suppliers
Other (will be influenced by background material collected)		

Note to Table A2: This table is based on the note-taking form used during interviews and other research. The original form also had space to list the name, physical location and level (storey) of the business.

The questions which guided our interviewing are listed in Appendix B.

A4.7 Confidentiality

Our results are intended to be anonymous. We will inform interviewees that we will not list the names of their organisations. Subject to their approval, we want to list the types of business we interview in each area, stressing that only a few businesses of their type may be located in the corridor and therefore some readers might be able to guess who is likely to be involved.

If we want to present a special box on a topic which might make a contributor more identifiable, then we plan to draft it and get consent later.

A5 Transport operator interviews

We have indicated that we will interview transport operators identified by the organisations as delivering to the selected corridors, probing issues such as:

- What is the nature of their trip-making to the area (timing, single delivery v. trip chaining, service v. goods trips, types of vehicle used)?
Regarding this, we asked interviewees to consider:
 - whether the trip involved consolidated single drops, multi-drop roll cage (retail), parcels, express, time-sensitive products or utility/service;
 - the handling requirements – size/weight of loads, access to ‘shop front’/delivery location;
 - vehicle use, the number of rotations and number of drops; and
 - the software used
- What are the customer expectations with respect to ‘customer service’? How do these affect operations (considering time and other requirements)?
- How do the organisation’s service standards affect its provision of transport services?
- Compared to other centres in the region, what similarities and differences do they see in their particular one?
- How well do they use the capacity of their vehicle fleet? How has competition affected this?
- What key performance indicators, if any, do they have?
- How has their organisation modified its vehicle usage (types of vehicles used, size, timing, etc.) over the last 5–10 years?
- How do road conditions/infrastructure, particularly congestion, affect operational practices?
- Where else do they deliver to?
- Do they have scope to refine their transport logistics to minimise costs?
- What is their cost structure and how does it influence their operations?
At what point will increasing transport costs be passed on to the customer?
- What is the effect of regulations?

The actual questions will be shaped by what we were told by transport service users. Given constrained resources, it may only be possible to interview operators located in the two Wellington case study corridors.

Because transport operators naturally gain an overview from dealing with a large number of clients, discussions with them will be able to demonstrate changes in fleet composition and logistics management that have already occurred in response to congestion or customer demands. But commercial sensitivity will probably limit the extent to which detailed quantitative information could be obtained from operators. As logistics management for commercial efficiency is a relatively mature field of research, our project will focus on driving factors of the demand for services from such firms.

A6 Case study analysis

We will conduct a systematic analysis of the qualitative data gathered to extract findings within each case study as well as across the case studies (similarities and differences between corridors) and cross-context (similarities and differences between Auckland and Wellington).

This analysis will be done in a progressive basis – i.e. we prepared the first case study report while still completing the second case study interviews. After we have prepared the first case study report (refer to Figure A2), we intend to submit it to the steering group and other end users for their comment and feedback as to the usefulness and direction of the research. This will help us to realign our data collection if necessary to take any findings of interest to end-users into account.

Appendix B Question guides

B1 Nature of the questions

The questions are framed towards us as the interviewers to remind us of the various elements we are seeking information on, rather than to give a formal list of questions to ask each person.

B2 Goods (in and out)

Table B1 Form used to collect details of the goods-related LMCV movements generated by an organisation.

Main operator in?: Main operator out?:		Contact person (explain): Contact person:										
Types of goods	Time of day	Frequency					Mode (if known)					
		weekly	monthly	credit cycle	irregular	other	cycle/ foot	courier van	LMCV	HCV*	Private vehicle	Unknown/ other
In												
Out												

*HCVs have three axles and/or a trailer.

Table B2 Questions regarding how goods are moved.

Question	Specifics
Frequency – reasons?	What determines the frequency of visits?
Stock/inventory?	What level of stock is kept on-site – sufficient of everything for a day/week/month? Are samples only held of most/some stock or do you have to order in for each customer? Is it possible to maintain greater inventories? What would be the advantage/disadvantage of this? How would operating costs be affected? (Only if appropriate: In a way, are you using transport as mobile storage rather than holding more stock?)
Changes?	Has the organisation changed its patterns of goods deliveries in the last year? Two years? Longer?
Alternative mode possible?	–
Time window?	Does the organisation have requirements regarding when deliveries of goods can take place – e.g. time window (such outside of peak; evening, etc), mode used, only ordering when you have 'enough' to justify an order? What are the reasons for these requirements? If it doesn't already happen, is it possible for deliveries to occur in the evening or at night?
Pedestrian zone?	How hard would it be to change the timing e.g. if deliveries are not permitted 8:00 a.m.–5:30 p.m because of pedestrian zones being installed? If this is very hard, what if deliveries were not permitted between 10:00 a.m. and 2:00 p.m.?
Speed requirement/expectations (inward goods)?	Does the organisation have a requirement/expectation as to when the delivery will occur relative to when an order is placed? What happens if the expectation is not met? Which is in place: a formal guarantee or a standard?
Standards compared to competitors (inward goods)?	What would happen if the service standard was lessened? Made more stringent? What if a competitor improved their standard – would this organisation change its own in response?
Customer expectations (outward)?	Do they expect 'instant gratification' or are they prepared to wait? Do you have explicit service standards?
Standards compared to competitors (outward)?	How do your standards differ from those of competitors? What if a competitor improved their standard – would this organisation change its own in response?
Costs doubling?	How much would you notice if this kind of transport costs doubled for your organisation? What level of charges would cause the organisation to rethink its current practices? What types of goods deliveries would the organisation notice the most? What might you change?
Money spent on transport?	Roughly, what proportion of your business expenses*? 1%, 5%, 10%+?
Cost reduction strategies already?	Strategies already in place to reduce transport costs or to cope with rising transport costs (e.g. fewer deliveries, greater inventory, increase prices to client)?
Loading bay?	What use is made of loading bay facilities? Rear loading, tail-lifting (this is the mechanical hoist that means loading can be done to ground level) side loading/curtain siders, turning limits, queuing facilities, size limits (90 th percentile trucks)?
Location?	What are the reasons that the organisation is located in this particular corridor? Is it possible to be located elsewhere and still meet customer expectations? How does being located here affect the organisation's transport use? Its costs?

*The review process found that this question was ambiguous and the question was changed so it was clear whether wage costs and cost of sales were included or excluded in the business expenses.

B3 Services (in and out)

Table B3 Form used to collect details of the service-related LMCV movements generated by an organisation.

Main operator in?:		Contact person (explain):										
Main operator out?:		Contact person:										
Building management company:		Contact person:										
Total per week:		Courier van visits:					Other LMCV:					
Service	Time of day	Frequency					Mode (if known)					
		weekly	monthly	credit cycle	irregular	other	cycle/foot	courier van	LMCV	HCV*	Private vehicle	Unknown/other
General												
Couriers in												
Couriers out												
Mail in												
Mail out												
Other documents/packages (inward)												
Other documents/packages (outward)												
Cleaners												
Rubbish and recycling												
Towel services												
Dry cleaners												
Flowers												
Plant care												
Telephones												
Photocopiers												
Computers												
Air conditioning												
Lighting and bulbs												
Security and fire alarms												
Lifts and escalators												
Other equipment/trades												

* HCVs have three axles and/or a trailer.

Table B3 cont. Form used to collect details of the service-related LMCV movements generated by an organisation.

Main operator in?:		Contact person (explain):										
Main operator out?:		Contact person:										
Building management company:		Contact person:										
Total per week:		Courier van visits:					Other LMCV:					
Service	Time of day	Frequency					Mode (if known)					
		weekly	monthly	credit cycle	irregular	other	cycle/foot	courier van	LMCV	HCV*	Private vehicle	Unknown / other
Snack and food replenishment												
Drinking water												
Coffee												
Vending machines												
Honesty boxes												
Alcoholic beverages												
Groceries												
Customer relations												
Client/customer visits (inward)												
Client/customer visits (outward)**												

* HCVs have three axles and/or a trailer.

** Outward customer visits include meetings.

Table B4 Questions regarding service-related movements.

Question	Specifics
Frequency—reasons?	What determines the frequency of visits?
Changes?	Has the organisation changed its patterns of goods deliveries in the last year? The last two years? Longer?
Is an alternative mode possible?	
Time window?	Does the organisation have requirements regarding when deliveries of goods can take place – e.g. time window (such outside of peak, evening, etc), mode used, only ordering when the quantity is 'enough' to justify an order? What are the reasons for these requirements? If it doesn't already happen, is it possible for deliveries to occur in the evening or at night?
Pedestrian zone?	How hard would it be to change timing e.g. if not permitted to deliver 8:00 a.m.–5:30 p.m. because of a pedestrian zone? If this is very hard, what if not permitted between 10:00 a.m. and 2:00 p.m.?
Speed requirement/expectations?	Does the organisation have a requirement/expectation as to when the delivery/service will occur relative to when an order is placed? What happens if the expectation is not met? Which is in place: a formal guarantee or a standard?
Standards compared to competitors (inward)?	What would happen if the service standard was lessened? Made more stringent? What if a competitor improved their standard – would this organisation change its own in response?
Customer expectations (outward)?	Do customers expect 'instant gratification' or are they prepared to wait? Do you have explicit standards?
Standards compared to competitors (outward)?	How do your standards differ from those of competitors? What if a competitor improved their standard – would this organisation change its own in response?
Costs doubling?	How much would you notice if these kinds of transport costs doubled for your organisation? What level of charges would cause the organisation to rethink its current practices? What types of service deliveries would the organisation notice the most? What might you change?
Cost reduction strategies already?	Strategies already in place to reduce transport costs or to cope with rising transport costs (e.g. fewer deliveries, greater inventory, increase prices to client)?
Location?	What are the reasons that the organisation is located in this particular corridor? Is it possible to be located elsewhere and still meet client/customer expectations? How does being located here affect the organisation's transport use? Its costs?

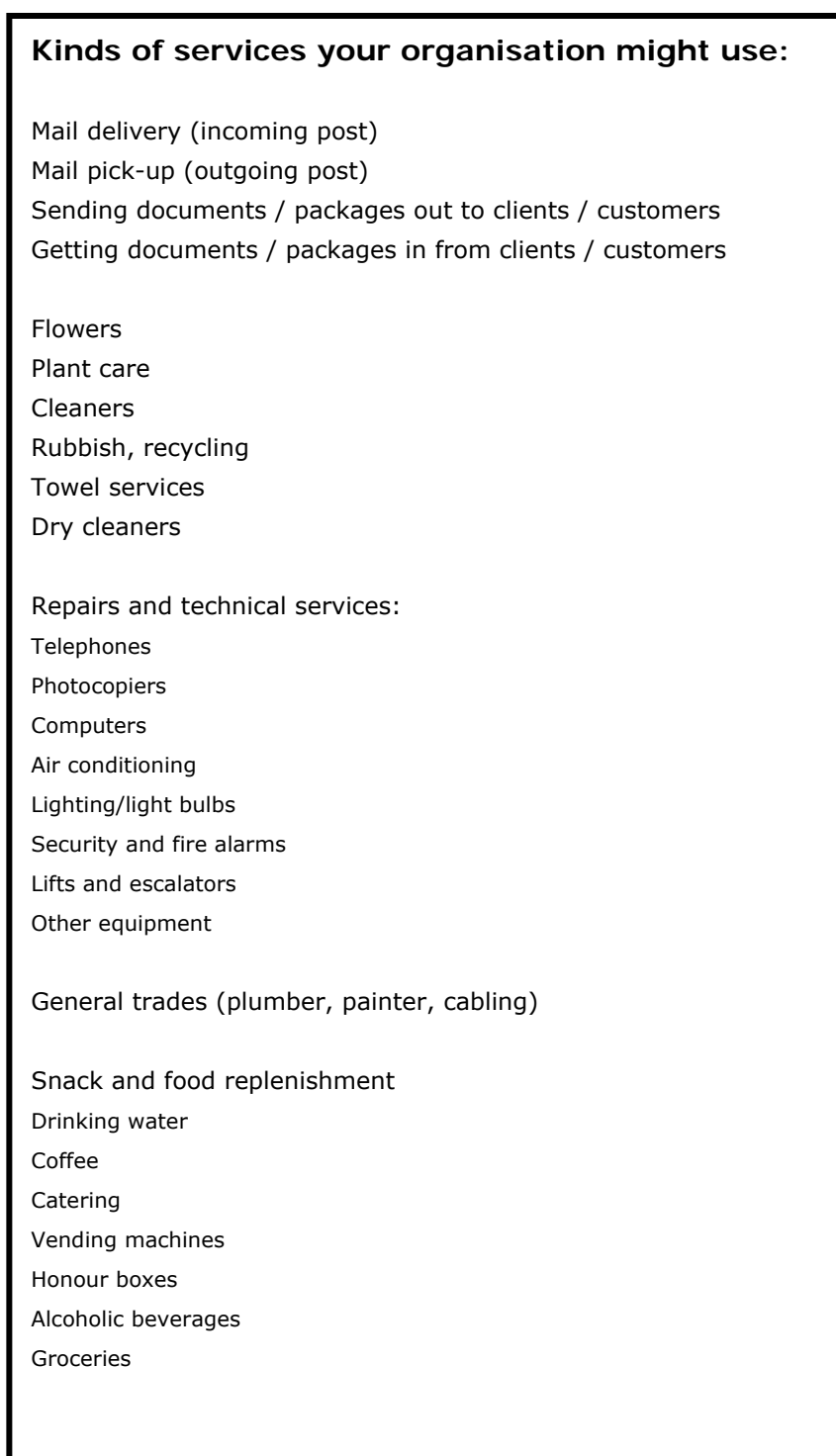


Figure B1 Show card of service types used to prompt respondents.

**Light/Medium Commercial
Vehicle Use in Four Urban
Centres**

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