The benefits of public transport – option values and non-use values
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An important note for the reader

Acknowledgements

Abbreviations and acronyms

CA	conjoint analysis (a method of establishing willingness-to-pay using a stated preference approach)
CV	contingent valuation (a method of establishing willingness-to-pay using a stated preference approach)
EEM	NZTA *Economic evaluation manual* (vols 1 and 2)
GB	Great Britain
MoT	Ministry of Transport (NZ)
NUV	non-use value
NZTA	New Zealand Transport Agency
OV	option value
PT	public transport
RU	regular use
SCBA	social cost-benefit analysis
SP	stated preference (market research approach to establishing willingness-to-pay)
TEV	total economic value (represents the maximum value of a good or service to the individual)
WTA	willingness-to-accept
WTP	willingness-to-pay

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Executive summary

Project overview, objectives and scope

The objective of this research project, which was undertaken in 2010-11, was to investigate the economic concepts of 'option values' and 'non-use values' as applied to public transport (PT) services, and to undertake primary market research in New Zealand to estimate approximate valuations.

The concepts of 'option value' and 'non-use value' are commonly applied in environmental economics, which has a large literature on their measurement and valuation. To date, they have been applied relatively rarely in the transport sector, although it is recognised that they incorporate some additional economic benefits to those 'direct user benefits' assessed in conventional social cost–benefit appraisals. They are defined as follows:

- **Option value** (OV) represents the willingness-to-pay for the option of having a service available for possible use at some time in the future if required, even though the option may never be taken up.

- **Non-use value** (NUV) represents the willingness-to-pay for the continued existence of a good or service that the individual does not directly consume themselves, and never intends to consume.

In the field of public transport, OVs and NUVs are likely to be most significant in situations where substantial changes to the available transport services are being contemplated. This particularly applies to rural and peri-urban areas, where existing low levels of service may be threatened by closure, or where a new service might be introduced where none currently exists. Most of the limited international research on the topic has related to such situations, and these research studies derived OVs/NUVs that were quite substantial relative to 'direct use values'.

Project market research

The project involved primary market research in four peri-urban/semi-rural communities within the outer catchment areas (for commuting, access to major facilities and services, etc) of larger New Zealand centres (Auckland, Wellington, Christchurch, Hamilton).

The research focused on the willingness-to-pay (WTP) of households in the selected communities for enhanced rail and/or bus services to/from the major centre, compared with the existing situation of no (or minimal) services. A contingent valuation approach was used, involving two key questions relating to WTP for the enhanced services and the main factors influencing this:

- How much (per week or per year) would your household be willing to pay (as a maximum) to have each of the specified PT service options?

- In reaching your view as to household WTP (above), what is the relative importance of various factors that the service might contribute to (eg personal use, use by others in the community, reduced traffic congestion or environmental benefits)?

A survey questionnaire was developed and administered to approximately 100 households in each of the four selected communities (as the research was of an exploratory nature, large sample sizes were not required). Following a piloting process that involved both face-to-face (in home) interviews and telephone interviews, the telephone method was selected for the subsequent surveys: given careful interviewer

selection and training, it appeared to give results of similar quality to those from face-to-face interviews, at less than half the cost.

Research findings

From the survey results, two WTP estimates were derived for each respondent household and for the sample overall:

- total household WTP for each service option, covering consumer surplus, OV and NUV (from the first question above)

- the OV and NUV components that represent 'additional economic value' not covered by conventional economic appraisal procedures for transport projects.

The sample average results are summarised in table 1. The results for total economic value (TEV)/household for the service options examined in the four communities varied between $231pa and $44pa. The 'additionality' component accounted, in all cases, for about 55–60% of the TEV total.

Further examination of these WTP results, in the light of knowledge about the communities concerned, provided confidence that the relativities between the various results were plausible, given the following differences:

- Community characteristics: It was found that much of the variation in WTP between individual households was accounted for by household income, household size, distance of residence from the centre of the local community, and expected frequency of PT use.

- PT service characteristics: The characteristics of the PT service options (eg travel time, frequency, fares, convenience of access at both ends) appeared to have a major influence on WTP values, as might be expected. It was notable that rail options were not necessarily seen as preferable to bus options in this regard (refer to the Te Kuiti case in table 1).

- Characteristics of car travel option (eg speed, reliability, road quality).

- The strength and nature of the connection between the local community and the main centre, which affected the potential trip profile (eg commuting v occasional social/personal/business travel).

Table 2 provides some comparisons between the range of TEV results from this research and the findings from the most relevant international research studies available (all figures in NZ$pa, 2010/11 prices). Our main conclusions from these comparisons were as follows:

- There are only a small number of broadly comparable studies on this topic (only two in the case of bus services).

- Comparisons between studies are fraught, given the wide range of base situations, options assessed, research methodologies, scope, etc of the international studies.

- The values (for TEV) derived from this project are sensibly consistent with the weight of evidence from the international studies, and arguably on the conservative (low) side.

- These international comparisons tend to provide some additional confidence as to the validity of our research results.

Application of findings for NZ economic evaluations

One of the required project outputs was recommendations on 'Option values and non-use values (or ranges) that may be adopted as New Zealand default values, applicable to situations of new PT service introduction, service abandonment or major service changes'.

For the economic evaluation of significant PT service proposals outside the urban centres, we suggest that a two-pronged approach to estimating OVs/NUVs be adopted:

*   **Default values** resulting from this research project be applied, either as a component of the 'base case' benefit assessment or as a sensitivity test on the base case. This should be done for all relevant service proposals.

*   For the more major service proposals, or other cases where the OV/NUV benefits may be crucial to the decision as to whether to proceed with the initiative (or which option to choose), then a **situation-specific survey** should be also undertaken.

The default assessment of option/non-use benefit values would have two components:

*   Determination of an appropriate unit value per household in the relevant catchment area.

*   Estimation of the number of households within the catchment area, to which this unit value should be applied.

In terms of the unit OV/NUV 'additionality' value per household, we suggest that one of three default values be applied, as set out in table 3, predominantly dependent on the characteristics of the service option and how attractive it is likely to be from the perspective of potential users. The categorisations and values in this table can be progressively defined as further surveys are undertaken.

In terms of the number of households affected, the report provides guidance on assessment of the effective catchment area of the local community.

Recommendations on future research and application

The report includes recommendations relating to:

*   refinements to the questionnaire developed in this project for any further OV/NUV surveys that may be undertaken relating to potential PT initiatives in New Zealand

*   enhancements to the analysis of any such surveys

*   modifications to the approach to assessing catchment areas for local communities

*   future review and updating of any OV/NUV (additionality) values (eg as table 3) that might be adopted as standards for use in New Zealand economic evaluations.

Table 1   Summary of total economic value (TEV) and 'additionality' component results (all figures in NZ$/household/year, 2010/11 prices)[a]

Locality	Major centre	Rail options		Bus options		Notes
		TEV	Additionality component	TEV	Additionality component	
Featherston	Wellington	$231	$132	$60	$34	Figures relative to no service (rail service currently operates).
Oxford[b]	Christchurch	-	-	$98	$59	Direct bus service
				$66	$40	Indirect bus service
Te Kuiti	Hamilton	$44	$25	$60	$35	Rail service has inconvenient access at both ends of trip.
Tuakau	Auckland	$157	$86	$45	$25	

Notes:

a)   The table gives mean values derived from each survey. The 95% confidence interval for these results is around ±20% to 25% of these mean values.

b)   No rail options examined in the Oxford case (but two bus options assessed).

Table 2   **Comparison of 'total economic value' research findings with international studies**

Study	Survey year	Survey location	Population unit	Mode/situation	Study TEV estimates converted to NZ$2010 (annual)[a]
International studies					
Painter et al (2001)	1999	US – Washington State	Mixture household & individual	Two rural bus services	$98
Bristow et al (1991b)	1990	GB – Leeds, Cheshire	Probably household	Two local bus services; one in an inner city area and one in a rural village	$250
Crockett (1992)	1992	GB – N England	Probably household	Inter-urban rail link connecting small towns to a major urban centre	$142
Geurs et al (2006)	2004	Netherlands	Individual	Regional rail link connecting (urban and rural) towns to major urban centres	$300
Humphrey & Fowkes (2006)	2002	Scotland	Household	Regional rail link connecting small towns to a major urban centre	$456
New Zealand studies					
KiwiRail (2010b,c)	2010	Carterton	Household	Regional rail link	$318
Current study	2010–11	Various	Household	Rail (4 locations)	$44–$231
		Various	Household	Bus (5 locations)	$45–$98

a)   Converted from the original currency, first by escalation of the original study values, by applying GDP/capita growth factors, to July 2010 local prices; then by the application of PPP exchange rates applying in July 2010 (refer to table 3.3 for further details).

Table 3   Proposed default OVs/NUVs (additionality) for economic evaluation

Category	Notes on typical characteristics	Typical catchment area (km radius)	Default value (2010 $pa/household)	Surveyed options within category (and additionality values)
High	- Good level of service (frequency, reliability, travel time, etc) - Car alternative relatively poor (congestion, difficult road conditions, etc) - Service well-matched to desired origins/destinations (stop locations, etc)	20–35km	$130	Featherston – rail ($132)
Medium	Between 'high' and 'low' characteristics[a]	10–25km	$75	- Tuakau – rail ($86) - Oxford – direct bus ($59)
Low	- Poor level of service (frequency, travel time, need to transfer, etc) - Car alternative relatively good - Service poorly matched to desired origins/destination (eg rail station away from town centre)	10–15km	$35	- Oxford – indirect bus ($40) - Te Kuiti – bus ($35) - Featherston – bus ($34) - Tuakau – bus feeder ($25) - Te Kuiti – rail ($25)

a)   It is difficult to be more specific about the typical characteristics of the 'medium' category, beyond saying that they are substantially worse overall than the 'high' characteristics and substantially better overall than the 'low' characteristics.

Abstract

This research was undertaken in New Zealand in 2010–11 to investigate the economic concepts of option values and non-use values as applied to public transport services, and to undertake primary market research in New Zealand to estimate approximate valuations.

The primary market research involved telephone-based surveys of a random sample of households in four peri-urban/semi-rural communities within the outer catchment area of major urban centres. The surveys used contingent valuation methods to establish household willingness-to-pay for the provision of enhanced public transport services to/from the nearest main centre, and to estimate the various components (consumer surplus, option value, non-use value) of the overall willingness-to-pay value.

The survey results were used to derive the average willingness-to-pay per household; the component of this that is not included in conventional transport economic appraisals; and the underlying factors (eg service and household characteristics) influencing the willingness-to-pay values. The results were also compared with the equivalent findings from the small number of research studies undertaken internationally on this topic.

Recommendations were made on an appropriate set of default option/non-use values (per household) for use in the economic appraisal of public transport projects in New Zealand.

1   Introduction

1.1   The project

The overall objective of this research, which was undertaken in 2010–11, was to investigate the economic concepts of '*option values* and *non-use values* as applied to public transport services', and to undertake primary market research in New Zealand to estimate approximate valuations.

The investigation involved the development of market research methods for assessing 'option values' and 'non-use values' in public transport (PT); their application to a number of New Zealand case study situations in order to estimate appropriate valuations; and the provision of advice on the implications of these results in terms of enhancements in economic evaluation procedures for PT projects in New Zealand. The case studies focused on the valuations of residents in the outer commuter catchment areas of main centres, particularly those areas that were, at the time of the research, poorly (or not at all) served by PT services.

Option and non-use values have not hitherto been commonly included in project evaluations (using social cost–benefit analyses) in New Zealand, and procedures for estimating these benefits are not incorporated into the current *Economic evaluation manual* (EEM) (NZTA 2010).

The research was undertaken by consultants Ian Wallis Associates Ltd (Ian Wallis and Don Wignall, with additional inputs from Charles Sullivan).

1.2   Project context

As outlined in the EEM, evaluations of the benefits associated with PT services, or changes to services, generally focus on the changes in the 'generalised costs' of travel for those people who use the service and/or are directly affected by changes in the travel behaviour of others (eg road congestion). But another legitimate category of socio-economic benefits that are not directly associated with the use of the services may arise. Individuals may be willing to pay for:

*   the option of having the service available to them and of consuming the good at some point in the future, even if they may never actually take up that option – ie the *option value* (OV)

*   the continued existence of a good that they themselves do not directly consume, and never intend to consume (with the motivation for their desire for the good to continue to exist varying from one good and circumstance to another) – ie the *non-use values* (NUV).[1]

The concepts of OVs and NUVs are commonly applied in environmental economics, which has a large literature on their measurement and valuation: they are applied less often in the transport sector. However, the transport evaluation procedures in Great Britain recommend that OVs should be assessed for PT schemes, and note that this is particularly important where measures are being considered 'which will substantially change the availability of transport services within the study area' (Department for Transport 2007).

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1 The option value is sometimes regarded as one type of non-use value.

To date, the extent of market research undertaken internationally to quantify OVs and NUVs in the PT context has been very limited. In 2006, a review by Laird et al identified six studies (internationally) that had used stated preference (contingent valuation or conjoint analysis) methods to derive OV/NUV estimates for PT services. These studies indicated OVs/NUVs that were quite substantial relative to direct 'use values'.

No such studies have yet been undertaken in New Zealand (or Australia). The *National guidelines for transport system management in Australia* (Australian Transport Council 2006) commented:

> *Insufficient data exist to support the use of option values for urban public transport initiatives in Australia at present. Given the limited quantitative evidence available, the Guidelines do not include option value as part of the quantified benefits of public transport initiatives. This is an aspect of appraisal for public transport initiatives where further research appears to be worthwhile.*

This research project was designed to fill this knowledge gap, specifically in a New Zealand context but also contributing to the international body of evidence. It is intended to contribute to improving current PT assessment/evaluation procedures in New Zealand: its findings should be especially relevant to the smaller urban centres and semi-rural areas, particularly those that may be contemplating the introduction of PT services where none currently exist.

1.3 Report structure

This report is structured as follows:

- Chapter 1 – Introduction

- Chapter 2 – Discussion of project background, and of option value/non-use value concepts and definitions

- Chapter 3 – Review of the methodologies and findings from international market research studies on the topic (additional details in appendix A)

- Chapter 4 – Review of current international practice relating to incorporation of option values/non-use values in the procedures for evaluating public transport projects

- Chapter 5 – Summary of previous New Zealand market research relating to public transport option values/non-use values

- Chapter 6 – Outline of market research methods developed in this study, the experience with piloting them, and the implications for the project's main surveys

- Chapter 7 – Outline of main surveys undertaken in several communities, including their analyses and findings

- Chapter 8 – Summary of the study's research findings, their comparisons with international research findings, and their implications for the economic evaluation of public transport projects in New Zealand.

Full details of the surveys undertaken, and of various other aspects of the research, are set out in the appendices (as listed on the contents page).

2   Background, concepts and definitions

2.1   Background

This research project arose from recognition of the need to investigate a category of benefit that is commonly excluded from cost–benefit analysis of transport projects in New Zealand – namely, option values and non-use values associated with public transport. As noted by Weisbrod in 1964, OVs have their origins in the field of environmental economics, where there is a large body of literature on their measurement and value. They are defined as 'the value that economic agents are willing to pay, above and beyond their expected value of consuming the good, in order to have the option of consuming that good at some point in the future'.

The application of OVs and NUVs to cost–benefit analysis in transport occurred sometime later, within the development of an overall concept of 'total economic value' (TEV – see, for example, Bristow et al 1990).

2.2   Option values (OVs)[2]

An option value (OV) represents the value (willingness-to-pay – WTP) to preserve the *option* of using a transport service (or facility) for trips that are not yet anticipated, or are currently undertaken by other modes, over and above the expected value (consumer surplus) of any such future use.

GB transport evaluation procedures note (DfT 2007) that:

> *Option values are associated with unexpected use of the transport facility which is not built into the forecasts produced by the modelling stage and would otherwise not appear in the appraisal as a benefit.*

> *Option values are related to the individual's attitude to uncertainty – in practice a range of option values is likely to be found within the population.*

> *There is a real risk of double counting, particularly when trying to separate individuals' willingness to pay to have the option of using the service from their willingness to pay for their actual use of the service.*

The literature also identifies a concept referred to as a quasi-option value: this represents the value of maintaining a facility until better knowledge is available regarding its future demand, which may be particularly relevant to decisions on whether or not to dispose of the trackbed of closed railways.[3] In this report, this concept is not considered as a separate item, as even though such a benefit might exist at the individual level, it may be indistinguishable from option values as defined here.

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2 Much of the material in this chapter is drawn from DfT WebTag 3.6.1 (2007) and Laird et al (2007).

3 'Investment option values' are referred to in the current EEM (Vol 1, App. A10.7) (NZTA 2010): these are based on the concept that 'in certain situations there may be benefits in spending more on a project now, to provide the option ... to (more) easily increase capacity in the future ...'.

2.3   Non-use values (NUVs)

Non-use values (NUVs) differ from 'use values' and 'option values' in that a value may be placed on the continued existence of a good regardless of any possibility of future use by the individual in question. The motivation for the desire for the good to continue to exist may vary: individuals may value a good for altruistic reasons, reasons of indirect use, or because the good has some existence, bequest or intrinsic value. Some examples of situations where NUVs may exist in a transport environment include:

* use by other members of the household

* use by friends or family

* concern for other people in the community/society in general

* concern for particular groups – eg the poor, the elderly, children

* concern for future generations

* desire to reduce congestion

* desire to improve safety

* desire to reduce environmental problems

* social cohesion effects – eg links to larger communities

* local economic or property effects.

2.4   Additionality and double-counting

In the context of project evaluation using social cost–benefit analysis (SCBA) methods, the OV is always additional to the consumer surplus from any actual use, and any environmental and safety externalities. NUVs, on the other hand, may double-count some elements of benefit already included in a comprehensive SCBA evaluation: only NUVs that arise from altruistic motives do not result in double-counting. For example, the NUVs for a new rail line that is part of a plan to reduce road noise would already be included in a comprehensive SCBA evaluation as a noise benefit. However, a NUV that a resident may hold associated with ensuring the elderly can access facilities would be additional.

It is important to note that two substantial contributors to NUVs generally represent a double-counting of benefits:

* changes associated with land or property values, which generally represent a capitalisation of the benefits already evaluated

* changes associated with the profitability of businesses – ie the effect of a new transport service or facility on business profitability may be included in the evaluation as part of wider economic benefits, but typically involves a redistribution of economic benefits, rather than being a net benefit.

Other potential issues involving double-counting become apparent when the components of total economic value are identified. For example, care is needed to differentiate clearly between user benefits

(including consumer surplus) and OVs – the former is the value associated with use of the actual service as it stands, and the latter is having the service available for potential use in the future.

2.5   When do OVs/NUVs need to be considered?

In economic evaluation in the transport sector, OVs/NUVs are, in principle, applicable to road infrastructure and freight facilities as well as PT services (including bus and rail passenger services).

In project/policy evaluation, OVs/NUVs are likely to be particularly significant in situations where the strategies or plans being evaluated include measures that substantially change the availability of transport services within the study area (eg the opening or closure of a rail service, or the introduction or withdrawal of buses serving a particular rural area).

The existence of OVs implies some scarcity or risk, as the presence of ubiquitous abundant services and facilities would naturally lead to a feeling of security and a very low value being placed on any particular marginal change in services.

The concepts of OVs and NUVs (within the transport field) have been developed in the course of studies of outer communities, where bus or rail services provide access for commuting (and other purposes) to a larger urban area. This type of situation is likely to result in relatively high OVs and NUVs being placed on such services. OVs and NUVs may also be significant in other situations; eg for isolated communities connected to larger centres by longer-distance services, or in locations within urban areas with poor PT access or service levels. However, they are unlikely to be significant when assessing incremental changes in PT services in typical urban situations with relatively good service levels.

3 International market research studies – methodologies and findings

3.1 Overview of studies

Our review of the international literature identified a number of previous market research studies that estimated option benefits and non-use benefits associated with public transport services, additional to the direct use benefits. All these studies adopted some form of stated preference (SP) survey approach: they used either contingent valuation (CV) techniques – ie directly asking people about their willingness to pay; or conjoint analysis (CA) – sometimes called stated choice (SC) experiments – where values are derived indirectly from responses to discrete choice situations.

Six SP studies undertaken over the last 20 years were identified – three in the UK and one each in Italy, the Netherlands and the US. Three of these related to rail services, two to bus services, and one to both modes. Summaries of the six studies are given in the following tables:

- Table 3.1 summarises the characteristics of each of the studies, including the areas involved, the PT services under discussion and the market research methodology and scope.

- Table 3.2 presents a summary of the results from each study[4], in particular focusing on estimated OVs and NUVs.

- Table 3.3 presents a comparative summary of the OVs plus NUVs derived from each survey, adjusted to a common year and price basis.

More detailed descriptions and comments on each of the six studies are provided in appendix A.[5]

3.2 Interpretation and inferences from study results

To facilitate the estimation of OV/NUV economic benefits associated with potential PT projects, it would be desirable to develop a set of evaluation guidelines that would involve a methodology and appropriate unit values for a range of different service types, market segments and other situational factors. Ideally, the methodology and values would be based on the experience and evidence gained from the previous market research/SP studies undertaken to date. However, the modest market research base, the small sample sizes in most cases, and the differences in the studies' research methodologies made this difficult.

In table 3.4, we comment on key factors that are likely to account for differences in OVs/NUVs in different circumstances, and summarise how these may have influenced the valuation results from the various studies.

A previous paper that reviewed the international market research (SP) evidence on OV/NUV (principally in the context of rail projects) summarised the conclusions as follows (Laird et al 2007):

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4 One of the six studies was not included here, as it was not possible to derive OVs/NUVs from the results.

5 In addition, a seventh relevant study (Jackson 2010) was made available at a late stage in the project. This is also reviewed in appendix A (section A.8), but not included in the summary tables in this chapter.

The field of measuring transport option and non-use values is far from developed. To date only values from five studies, which in the main have small sample sizes, are available giving a potentially large range between £41 and £190 (2002 prices). Despite this we have shown that it is possible to rationalise, in a mainly qualitative manner, the results from these studies against each other. The upper end of the range reflects a high quality train service linking a community to a large employment and service centre and for which there already exists a strong commuter demand. In the middle of the range we find values associated with high quality bus services (3 or 4 buses an hour with good evening and weekend services). At the lower end of the range we find lower quality bus services and potentially lower quality rail services, neither of which may necessarily serve the community's needs particularly well. The evidence base is too small, however, to indicate how values may vary with: quality of service; the mix of public transport services that may be available in the study area; socio-economic factors such as car ownership; or to communities adjacent to mainline stations or 'hub' stations. We think it reasonable to think that services offering little or no value for commuting will have much lower values than services that do. Additionally there is no evidence on the values that business may attribute to the rail network, either for the carriage of freight or for employees travelling on company business.

The work for the GB Department of Transport by ITS Leeds to review previous market research/SP studies on OV/NUV, which has been summarised in this chapter, was applied more or less directly in formulating the evaluation guidelines on OV/NUV that are promulgated in WebTag (DfT 2011). These guidelines are summarised in chapter 4.

3.3   Other studies

A number of other studies have been undertaken to estimate OVs that are not specifically related to the primary area of this research – namely, OVs and NUVs for PT services from outer areas into a larger urban area.

Other identified studies include:

*   OVs and NUVs for intercity passenger rail services in Korea (Chang 2010)

*   OVs and NUVs for a remote community situated on a long-distance rail route in New Zealand (described in chapter 5 and appendix B) (KiwiRail 2010c)

*   user and non-user willingness to pay for reductions in bus travel times and improvements in other bus attributes (McDonnell at al 2009)

*   the use of motorist OVs for the occasional use of rail, in the evaluation of public transport proposals in the US (TRB 2002).

These are all of some potential interest, but are not directly relevant to the application of OVs and NUVs considered in this research.

3.4   Survey methods

Most previous studies have applied SP methods to obtain OVs and NUVs through identifying and quantifying respondents' willingness to pay for particular service options.

SP methods ask respondents to directly state their values, rather than using 'revealed preference' methods to infer values from actual choices.

SP methods are of two main types (OECD 2005):

• Contingent valuation (CV), which is a direct method of establishing willingness to pay (Humphreys 2004 and others – see appendix A)

• Conjoint analysis (CA), including indirect contingent ranking or rating methods (eg Jackson 2010, McDonnell et al 2009 and others – see appendix A).

This research has used the CV approach, for reasons discussed later in this report (section 6.2).

Other methods are sometimes used; for example, the application of financial and real option approaches to transport appraisal (Oxera 2008). This approach is so far largely untested, but appears to provide substantially higher estimates for OVs than found in previous studies (Laird et al 2009). A recent peer review of the Oxera study (Fowkes 2008) was of the view that this approach had merit, but that further work was needed before it could be used as a means of predicting OVs for use in transport appraisals.

3.5 Interview techniques

A range of interview techniques have been used in previous studies, including face-to-face, postal and internet questionnaire methods.

This research used a telephone-based household interview technique, which is new to the reported research in this field: it was selected after test comparison with face-to-face interview techniques (refer to the discussion in section 6.9).

Table 3.1   Characteristics of stated preference studies on public transport OVs and NUVs

Item	UK case studies			Non-UK case studies		
	Bristow et al (1991b)	Crockett (1992)	Humphreys & Fowkes (2006)	Roson (2001)	Painter et al (2001)	Geurs et al (2006)
Study area	Hawksworth, Leeds; Rainow, Cheshire	Settle	Edinburgh to North Berwick, Scotland	Piove to Padua; Mogliano to Venice (Northern Italy)	Chelan County; Clallam County (Washington State, US)	Arnhem to Winterswijk; Leiden to Gouda (Netherlands)
Public transport type	Two local bus services; one in an inner city area and one in a rural village	Settle-to-Carlisle rail link connecting small towns to a major urban centre	Regional rail link connecting small towns to a major urban centre	Regional bus service and local rail link connecting small towns to a major urban centre	Two rural bus services	Regional rail link connecting (urban and rural) towns to major urban centres
Elements of TEV distinguished	Consumer surplus; NUV (including OV)	NUV (including OV)	Consumer surplus, OV, indirect use value, altruistic value	Not identified	Consumer surplus, NUV	Consumer surplus, OV, NUV
Data collection	Travel diaries and face-to-face interviews	Face-to-face interviews	Face-to-face interviews	Face-to-face interviews	Computerised panel session, follow-up phone survey	Internet survey using a national data panel
Valuation methodology	CV, iterative bidding procedure	CV, iterative bidding procedure	Combination of CV (use value) and SP experiment (NUV)	SP experiment	CV; open ended	Three different SC experiments
Sample size	Very small – 30 household interviews (60 respondents) for both study areas	Very small – 34 respondents	Small – 178 respondents, 78 in SP part	Modest – 199 and 122 respondents in the case study areas	Modest – 170 participants in SP part	Large – 428 to 510 respondents in each SP experiment
Target group	Local residents – total 25 users, 35 non-users in CV part	Local residents	Local residents – 64 users, 14 non-users in SP part	Local residents – number of users and non-users unknown	Local residents – total 80 users, 90 non-users	Local residents – total 413 users, 189 non-users in SP part
User definition	Use the bus service in a normal week	Use the train service	'Likely' or 'very likely' to use the North Berwick-to-Edinburgh train service in the following 6 months (from date of survey)		At least one household member uses the transit system regardless of frequency	Individuals who (a) used the selected train service in the previous year, or (b) are car-owners and might have used the train service in the previous year had the car suddenly become unavailable
Attributes valued	Removal of service; evenings and route (Rainow); route and network (Hawksworth)	Removal of service on Settle–Carlisle line	Variation of train frequency; parallel bus route; traffic increase on parallel roads; train service withdrawn; bus service withdrawn	Increase and decrease of train frequency	Good bus service; present service; fare-free bus; removal of service	Travel time; increase and decrease of train frequency and number of stops; complete removal of service

Table 3.2   OV/NUV survey estimates (average values, converted to yearly WTP values)

Item	UK case studies			Non-UK case studies	
	Bristow et al (1991b)	Crockett (1992)	Humphreys & Fowkes (2006)	Painter et al (2001)	Geurs et al (2006)
Mode	Bus	Rail	Rail	Bus	Rail
Base year	1990	1992	2002	1999	2004
Currency	Sterling	Sterling	Sterling	US dollar	Euro
Unit of analysis	Possibly household WTP, but not specified in CV questions, so could be individual WTP	Possibly household WTP, but not specified in CV questions, so could be individual WTP	Household	Not specified in the survey – a follow-up survey identified it to be a mixture of individual and household values	Individual
Consumer surplus	User: £102 (year)	Not estimated	User: £46 (year)	Not estimated	User: €86 (year)
Option value	Not estimated	Not estimated	User: £150 (year) Non-user: £172 (year) Average[b] £154 (year)	Not estimated	User: €112 (year) Non-user: €96–€132 (year) Average[c]: €94
Non-use value	Not estimated	Not estimated	Total indirect use value: - User: £28 (year) - Non-user: £22 (year) - Average[b]: £27 (year) Altruistic value: - User: £17 (year) - Non-user: -£27 (year) - Average[b]: £9 (year)	Not estimated	User: €196 (year)[d] Non-user: €97 (year)[d] Average: €148[d]
OV + NUV	User: £22–£30 (year) Non-user: £78–£84 (year) Average[a]: £58 (year)	User: £43 (year) Non-user: £24 (year) Average: £36 (year)	User: £195 (year) Non-user: £167 (year) Average[b]: £190 (year)	User: not estimated Non-user: $56 (year)	User: €308 (year)[d] Non-user: €193 - €229 (year)[d] Average: €242[d]
Basis of OV + NUV valuation	No alternative PT service	Existing bus service and alternative rail line/train station	No alternative PT service	No alternative PT service	No alternative PT service

a)   Average values calculated using user/non-user proportions in tables 3.13 of Bristow et al (1991b)

b)   Average values calculated using proportions – 81% users and 19% non-users (Humphreys and Fowkes 2006, p44)

c)   Average OV calculated assuming that those who indicated that they would never catch the train have an OV of zero

d)   Geurs et al (2006): NUVs may reflect household WTP. Furthermore user NUVs may also be biased upwards by use motives. The OV+NUV total is therefore likely to be biased upwards compared to the true total for an individual.

Table 3.3   Summary estimates of OV/NUV on common price and value base (figures are an average of user and non-user values for OV and NUV combined)

Item	Painter et al (2001)	Bristow et al (1991b)	Crockett (1992)	Geurs et al (2006)	Humphreys & Fowkes (2006)
Survey year (study base year)	1999	1990	1992	2004	2002
Population unit	Mixture of household and individual values	Probably household values	Probably household values	Individual values	Household values
Mode	Bus	Bus	Rail	Rail	Rail
Alternative public transport service available	No	No	Existing bus service and alternative rail line/train station	No	Half-hourly bus service
Original study values	US$56	£58	£36	€242	£190
Study values converted to GBP and 2002 price base[a]	£41	£104	£59	£125	£190
Study values converted to NZ$ 2010[b]	$98	$250	$142	$300	$456

a) Converted to GBP using PPP currency exchange rate for the study year, and then to 2002 price base assuming GDP/capita growth elasticity = 1.0.

b) Converted from previous row by applying UK GDP/capita growth 2002 to 2010, and then PPP currency exchange rate to NZ$ in July 2010 (overall factor 2.40).

Table 3.4   Option/non-use valuation influences and review of SP study results[a]

Aspect	Comments
1 Relationship between OVs and NUVs	For economic evaluation, ideally need to separate OV and NUV, in particular to avoid double-counting of NUV component. However, only 2 of the 6 studies attempted to separate OV and NUV (Humphreys & Fowkes, Guers et al), and issues with these 2 studies are such that only a broad range could be estimated for the OV/NUV proportions: OV may be between around two-thirds and four times the size of NUV.
2 User and non-user valuations	All the studies identified significant differences in OV and NUV results for PT users and non-users. However, it was difficult to compare the study results, as each study defined 'users' in a different way (refer to table 3.2). Therefore the preferred approach, given the evidence limitations, is to compare OV/NUV averaged across all respondents. In any event, this approach may be more useful for appraisal purposes, as often market segmentation by user/non-user etc is not available.
3 Study price and value basis	Direct comparison of study results is not possible without adjustment for price differences between centres and years. Laird et al (2006) made adjustments using currency conversions (based on PPP data) and GDP/capita growth, assuming that OV/NUV benefits would increase in this proportion. The resultant adjusted values are given in table 3.3: it is seen that the average OV/NUV results vary between 41 and 190 GBP (2002).

Aspect	Comments
4 PT mode quality and function	The magnitude of OV/NUV would be expected to be affected by the function and quality of the transport link and the availability of alternatives. Higher values would be expected for services with good frequencies and long hours of operation; for services that provide access to major employment and service centres (rather than solely shopping and leisure facilities); and in general for rail rather than bus services. The availability of alternative services will reduce the likely OV/NUV for a particular link. The results from the various studies are generally consistent with these hypotheses.
5 Households and individuals	In some of the studies, OVs/NUVs were sought on a household basis; in some, on an individual basis; and in others, this was not made clear. No simple relationships between household values and individual values would be expected, owing to issues of who controls the household income and what values should be ascribed to children. However, the study results do suggest that the range of results would narrow somewhat if they could all be placed on the same basis (either per household or per individual).
6 Variation with income	The study results provided limited evidence on the manner in which OVs/NUVs vary with income, although the available evidence suggests little sensitivity. This is not inconsistent with some other studies, which indicate low-income elasticities for valuation of travel-time savings (using cross-sectional data).
7 Variation with car ownership and availability	It would be expected that OVs for PT would be lower for people with access to a car than for those without it. However, none of the studies disaggregated OV/NUV results according to car ownership or availability.
8 Variation with distance	The studies did not provide any evidence on how OVs/NUVs vary with distance from the PT service concerned: most of the studies only sampled households reasonably close to the service. Regarding the effect of quality (item 4), it would be expected that values would tend to decrease for situations where the service is further away than a typical walking distance.
9 Absolute or incremental values	The various studies provided a mix of absolute values (ie where the base for comparison is no PT service) and incremental values (ie the difference between two PT 'packages'). In general, incremental values would be lower than absolute values, and this partly explains some of the differences in values between the various studies. Both the Humphrey & Fowkes study and the Crockett study suggested that the incremental value of the bus service in a train + bus package is relatively small – much smaller than the incremental value for the train service. The Bristow et al study examined the values associated with different temporal components of the bus service (eg evening services). Clearly the issue of incremental OV/NUV benefits associated with different PT packages is fundamental to the evaluation of PT projects.
10 Survey methodology	Based on wider experience with the valuation of goods and services that have no observable market price, there is every expectation that the survey methodology will influence the valuation results. The survey methods used by two studies (Bristow et al, Crockett) were almost identical, and similar to those in the Painter et al study. The methods in the other two studies were significantly different from these 3 studies, and from each other. There is as yet no consensus on appropriate survey methodology.
11 Appraisal of double-counting issues	As noted earlier (section 2.3), in the case of NUV, only the component that arises from altruistic incentives does not represent double-counting with 'conventional' economic benefits (eg decongestion and environmental benefits). There is a danger (depending on the survey methodology adopted), that a component of stated NUV relates to people's perceptions of a positive impact on property values associated with the presence of a PT service: this component involves double-counting and should be subtracted.

a)   This table draws heavily on Laird et al (2006).

4   Treatment of OV/NUV in project evaluation procedures

4.1   Introduction

This chapter presents a review of the treatment of OV/NUV in the 'standard' evaluation procedures adopted in transport project evaluation manuals in the UK, US, Canada, Norway, Sweden and Australia.

To the best of our knowledge, the only countries that have included procedures for assessing OV/NUV (albeit as a recommended additional procedure and in consultative form) within their standard transport economic evaluation procedures were England and Wales (DfT 2007): these procedures are outlined in section 4.3 below. We also provide comments in relation to practices in New Zealand and in selected other countries.

4.2   New Zealand

The NZTA maintains a two-volume *Economic evaluation manual* (EEM) that is used for the detailed evaluation of a wide range of transport funding applications. The EEM does not mention OVs (in the sense intended in this research) or NUVs, although these potential benefit categories are not explicitly excluded either.

In recent times the NZ Treasury (in conjunction with the NZ Ministry of Transport) has established procedures for rail appraisal. These are primarily based on financial business case criteria (NZ Treasury 2010), but occasionally also take into account significant anticipated wider economic effects (for example, agglomeration impacts in the case of some Auckland investments).

The current Treasury advice on cost–benefit analysis (NZ Treasury 2005) recommends the inclusion of all potential benefits, and includes a link to a reference that describes OVs and NUVs (DETR 2002). However, such benefits have not yet been applied in New Zealand.

For network assessment and the preliminary appraisal of service proposals, KiwiRail has developed an unpublished internal resource entitled 'Preliminary economic evaluation handbook – passenger rail services' (KiwiRail 2010a), which draws on international literature and includes OVs and NUVs. This handbook currently relies on the WebTag recommended values (DfT 2007) translated into NZ$ terms (making a very broad allowance for different income levels). The reference in the handbook to OVs and NUVs reads as follows:

> *It is suggested for NZ conditions that the number of households within station catchment areas is factored by the following values:*
>
> • *urban services, option value only: $135 per household per annum*
>
> • *regional services, option plus non-use value: $225 per household per annum*
>
> • *long-distance services, option plus non-use value: $112.5 per household per annum*
>
> (*... with reference to DfT WebTag UK TAG Unit 3.6.1, Table 2; urban and regional values*).

4.3   England and Wales

4.3.1   Overview

The standard guidelines/procedures for the economic evaluation of transport projects in England and Wales are set out in the Department for Transport's publication *Transport analysis guidance* (TAG) (DfT 2011). TAG Unit 3.6.1 - 'The option value sub-objective', which is accessible through the WebTag website (www.dft.gov.uk/webtag/), presents the guidelines for the appraisal of benefits associated with OVs/NUVs. At the time of writing, the most recent version of this unit was an 'in-consultation' version (January 2007) which, subject to amendment/ confirmation, was expected to formally replace the previous (June 2004) version. The following summarises the key provisions of the January 2007 version of Unit 3.6.1.

4.3.2   Application

TAG Unit 3.6.1 specifies that:

> *Appraisal of option and non-use values should be undertaken for all types of transport schemes that involve the introduction of a new transport mode or the loss of an existing mode. Appraisal of option and non-use values should also occur when a step-change in the level of service offered within a mode occurs – for example, when new commuting opportunities become available or are lost.*

> *Such an appraisal should include an assessment regarding which transport service or group of transport services within a particular strategy will give rise to the option and non-use value, the nature of the change in service and the sign of the change. Additionally, the number of households affected by the change should be identified.*

TAG Unit 3.6.1 further notes that:

- Given the current limited evidence on appropriate valuations of OV/NUV in the transport field, monetisation of impacts should be restricted to the opening/closing of local rail stations and the introduction/loss of good-quality local bus services (the following subsections focus on such situations).

- Where relevant highway schemes could be assessed in accordance with the OV procedures, but the impacts would not generally be monetised.

- In cases where monetisation is undertaken, the central estimates of project economic indicators should be given excluding OV/NUV impacts; but the effects of including these impacts on economic ranking should also be presented.

The following subsections cover the guidance on qualitative scoring, and where applicable, the additional guidance on assigning monetary values to the impacts.

4.3.3   Estimation of scale of impacts

For situations where OVs/NUVs are relevant, the guidelines involve a qualitative scoring of impacts, based largely on the number of households likely to be affected.

The key elements in the process are as follows:

- Determine the numbers of households (size of community) likely to be affected, based in large measure on the catchment area of actual/potential users of the service:

    – includes guidance on how to define catchment areas (for trip origins)

    – in general, does not consider OV/NUV for services at the destination end of trips (on both theoretical and practical grounds)

- Based on the size of the affected community, give a qualitative score to the likely OV/NUV impacts, as set out in table 4.1.

- This score reflects the impacts of PT changes on households (any impacts on businesses, relating to either person or freight-related movements, are dealt with in TAG Unit 3.5.8).

Table 4.1   DfT WebTag qualitative procedures for assessing OVs and NUVs

• Qualitative scores should relate to the size of the resident community given options to travel by the strategy, according to the following scale:		
Size of community (in opening/closure year)	**Scores**	
	Service withdrawn	**Service added**
>1000 households	Large adverse	Large beneficial
250–999 households	Moderate adverse	Moderate beneficial
1–249 households	Slight adverse	Slight beneficial
0 households	Neutral	Neutral
• Where more than one community is affected, the total number of resident individuals should be added together (with a negative sign attached to communities losing their service).		
• 'Ghost' services not providing reasonable opportunities for return travel on all days of the week should not be treated as services for these purposes. Withdrawal of rail services replaced by bus should be counted as a withdrawal of service, given the lower level of accessibility offered to significant groups of users, unless the bus service is demonstrably of comparable quality to rail.		

4.3.4   Valuation of OV/NUV impacts

The unit values (per household) given for situations in which the OV/NUV should be monetised are given in table 4.2.

Table 4.2   DFT Webtag OVs and NUVs (2002 prices and values)

Mode/package	Value per household per annum[a]		
	OV and NUV	**Sensitivity tests**	
		Excluding NUV	Value of mixed-mode package
Train	£170	£102	-
Bus	£90	£54	-
Train and bus	£170	£102	£260

a) Factors need to be applied if the appraisal is for a later year.

The guidelines provide the following comments on these values and their application:

- The figures are based on Humphreys and Fowkes (2006) research for train services and Bristow et al's (1991b) research for bus services.

- The figures represent an aggregation of OV and NUV, averaged over users and non-users. Given the limited evidence base, it has not been feasible to disaggregate values by type of train service or bus service, community characteristics, or user/non-user proportions in the community.

- However, the values reflect services of a moderate or higher quantity and quality. Services that are not suitable for regular commuting, or that do not connect with a major employment centre, are likely to have much lower values.[6]

- The values given relate to local bus and/or rail services and small communities served by them. They do not relate to communities around main line stations or services that serve a predominantly long-distance market. The values represent household-based valuations for personal travel only, and do not reflect values associated with businesses.

- The differences between the train and bus values (bus values slightly more than half the train values) reflects the generally poorer quality of bus services relative to local train services in Great Britain.

- The values relate to scenarios where there is no PT alternative to the bus or train. For situations where a rail service is replaced by a bus service (both of reasonably good quality), the relevant valuation is the difference in values between the two situations.

- The base values (first column) in table 4.2 attempt to exclude any double-counting component of the NUV. However, given the uncertainties in the evidence base, a sensitivity test is suggested (middle column) to exclude the full NUV estimate.

In addition to these points, the guidance also provides procedures for estimating the change in the OV/NUV benefits over the full evaluation period, allowing for changes in GDP/capita, household growth and discount rate.

4.3.5   Reporting of assessment results

The guidelines specify the information relating to OV/NUV that should be reported through the Appraisal Summary Table (AST). This includes (as relevant):

- a qualitative score on 7-point scale (as outlined in table 4.1)

- the number of households affected

- the specific transport services (within package/group) that are the source of OV/NUV impacts, together with comments on available alternatives if the scheme were not implemented

- the NPV of the difference in OV/NUV benefits between 'Do minimum' and 'Do something' cases

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6 In cases where the services are not suitable for regular commuting, the guidelines specify that no monetary value should be ascribed and the evaluation should be limited to qualitative scoring (as above).

- the overall performance of the scheme excluding OV/NUV benefits (central estimate of economic impacts), with analysis and comments on effects on this estimate of including OV/NUV benefits.

4.4   Other countries

4.4.1   Scotland

A scoping review of potential option values in the Highlands and Islands, much of which might be applicable to other situations with '... sparse networks of limited capacity and frequency ... ' was undertaken by Leeds ITS (Laird et al 2004). This review contains useful background discussion, including:

> *3.2   ... Initially, option values were not included, either in the New Appraisal Methodology (NAM) in Scotland (SEDD, 1999) or in the New Approach to Appraisal (NATA) in England (DETR, 1998). Their introduction into transport appraisal in the UK came instead with the rail industry's adoption of NATA (OPRAF, 1999; SRA, 2003) and the 'multi-modal' version of NATA (DETR, 2000): both of these methods incorporated Option Values as part of the assessment of Accessibility criterion.*

The scoping review made eight recommendations for further research, and at the core of these was a need for additional survey data to be obtained and analysed.

A subsequent report has been published that reviews more recent evidence and recommends the sensitivity testing of OVs and NUVs within Scottish Transport Appraisal Guidance or STAG (Laird et al 2009):

> *3.29   It is recommended, therefore, that STAG is enhanced to include an option values sub-objective. However, the limited evidence on option and non-use values needs to be taken into account in developing any recommendations for option values. However, the following enhancement principles are considered to be appropriate given the evidence:*
>
> - *A qualitative assessment is carried out for all transport interventions (based on the number of households affected by the intervention);*
>
> - *Monetisation of the option and non-use value is only undertaken for bus and rail schemes;*
>
> - *Due to the limited data on option and non-use values, the monetised values should only be included in an economic appraisal as a sensitivity test;*
>
> - *As the main determinant of option and non-use values is access to employment opportunities, option and non-use values should only be applied when commuting opportunities either become available (through the introduction of a new service) or are removed (through the closure of a service);*
>
> - *Option and non-use values are not applied to changes in service frequency or quality (beyond the provision of commuting opportunities); and*
>
> - *The results are sensitivity tested to the possibility that all of the non-use value double count impacts already included in an economic appraisal.*

4.4.2   Australia

In Australia, economic evaluation guidelines for transport projects exist at both the federal level and the individual state/territory level, although over recent years there have been moves to adopt a single set of guidelines/procedures developed by the federal authorities in conjunction with the states' authorities.

Neither the current Federal economic evaluation guidelines nor any of the individual state guidelines include OV/NUV as a separate category of benefits. The Federal guidelines (Australian Transport Council 2006) comment, principally in relation to PT projects, that:

> *Insufficient data exist to support the use of option values for urban public transport initiatives in Australia at present. Moreover, option values are likely to be appropriate only in particular circumstances, such as the withdrawal of public transport services or establishing public transport in a location where none is available in the Base Case. Given the limited quantitative evidence available, the Guidelines do not include option value as part of the quantified benefits of public transport initiatives. However, the potential option value for public transport can be addressed as a non-monetised impact in the AST. This is an aspect of appraisal for public transport initiatives where further research appears to be worthwhile.*

4.4.3   Netherlands

OVs/NUVs are not currently included in the national cost–benefit guidelines in the Netherlands. In 2009, Bakker et al undertook a review of the benefits of public transport (including OVs, but the report does not refer to NUVs) that were being excluded from cost–benefit analysis. They concluded that the absence of certain benefit categories could have a significant impact on the appraisal of some individual proposals, but that in overall terms the impacts were generally less significant.

4.4.4   US

In the US, OVs are included in major economic assessment procedures (TRB 2002), in the form of the estimated benefits based on scenarios where 'the car users are willing to buy the options to use the rail alternative' (Gwee et al 2008).

For smaller PT funding applications, the Federal Transit Administration (FTA) includes evaluation procedures that are not based on a traditional cost–benefit analysis approach.

These procedures may include:

- mobility benefits

- environmental benefits

- cost-effectiveness (the cost per hour of projected user travel-time benefits)

- transit-supportive land use policies and future patterns

- other factors, which can include 'Any other factor which the project sponsor believes articulates the benefits of the proposed major transit capital investment but which is not captured within the other project justification criteria' (FTA 2007). Potentially, this could include the incorporation of OVs and NUVs, although these are not specifically referred to in the published guidance.

4.4.5 Canada

At the federal level, Canada appears to recommend the quantification of safety, efficiency (including user benefits) and productivity gains. Some allowance is made for environmental benefits and the use of WTP evaluation techniques, but there is no specific reference to OVs or NUVs, perhaps unsurprisingly as the Canadian benefit–cost guidelines are dated September 1994 (Transport Canada 1994).

4.4.6 Scandinavia

Norway does not (appear to) include OVs and NUVs:

> *1.17 Our Scandinavian contacts indicated that their 'national' economic appraisal procedures were similar to STAG. That is aside from external costs, such as safety and carbon, economic benefits are calculated as the user benefits accruing through travel time savings, vehicle operating cost savings and/or fare/toll savings. The exception is Norway where 'inconvenience costs' are also included in the appraisal of fixed links. The chapter on scheduling costs, therefore, draws on this Norwegian evidence* (Laird et al 2009).

5 Previous New Zealand market research

5.1 Overview

Market research to investigate OVs and NUVs relating to rail services in New Zealand was carried out by Transport Futures Ltd for KiwiRail in November 2009 (KiwiRail 2010b, 2010c). Telephone-based interviews were undertaken for samples of households in the Carterton and Ohakune areas.

The methodology used differentiated between users and non-users, and between OVs and NUVs. A component approach to OVs and NUVs was taken (which, for example, allowed values relating to delay and environmental effects from rail services to be identified and later excluded for economic appraisal purposes).

5.2 Survey methodology and design

Details of the survey methodology for each of the areas surveyed are given in appendix B.

5.3 Survey results and comments

The mean OVs and NUVs derived from the samples in the two areas are summarised in table 5.1 (Carterton) and table 5.2 (Ohakune).

5.3.1 Summary of Carterton survey

Table 5.1   Carterton survey results (all results represent annual values (NZ$2009) per household)

	User	Non-user	All	Proportion of total
OV only	$58.69	$45.25	$53.86	16.9%
NUV (excl. environment and delay)	$169.25	$149.83	$162.26	51.0%
Sub-total (CBA purposes)	$227.95	$195.08	$216.11	67.9%
Environment and delay only	$110.05	$88.03	$102.13	32.1%
All	$338.00	$283.11	$318.24	100.0%

The following summarises the findings for Carterton (see appendix B for further details):

• The survey sample size was 50 households.

• The average distance of interviewed households from the station was 3.4km.

• The proportion of survey respondents who were rail users (ie had used the service at least once within the past six months) was 64%.

• Stated OVs and NUVs were substantial (at $216/annum average for CBA purposes) and close to the KiwiRail handbook value, which was based on UK evidence ($225). This reflected the quality, speed and frequency of the Wairarapa regional rail service.

5.3.2   Summary of Ohakune survey

Table 5.2   Ohakune survey results (all results represent annual values (NZ$2009) per household)

	User	Non-user	All	Proportion of total
OV only	$22.62	$21.03	$21.52	17.3%
NUV (excl environment and delay)	$73.57	$57.85	$62.66	50.2%
Sub-total (CBA purposes)	$96.19	$78.88	$84.18	67.5%
Environment and delay only	$49.41	$36.59	$40.52	32.5%
All	$145.60	$115.47	$124.69	100.0%

The following summarises the findings for Ohakune (see appendix B for further details):

• The survey sample size was 49 households.

• The average distance of interviewed households from the station was 5.3km.

• The proportion of survey respondents who were rail users was 31%.

• Significant OVs and NUVs were found to existfor a situation such as this (a remote rural area with infrequent long-distance rail services).[7]

• The OVs and NUVs in Ohakune for long-distance services ($84.18/annum average for CBA purposes) were lower than the estimated handbook value ($112.50) and were (as anticipated) substantially lower than those identified for regional services in Carterton.

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7 Prior to this market research, significant OV/NUV values had not been established in the literature for such services.

6 Methodology development and pilot survey

6.1 Objectives

This chapter is concerned with the development and design of an appropriate survey methodology (up to and including the piloting stage) to investigate the scale of OVs and NUVs for bus and rail services in several New Zealand communities.

6.2 Lessons learned from previous research

From our review of previous market research internationally on this topic (see chapter 3), and of recent research experience for KiwiRail in New Zealand (see chapter 5), we drew the following conclusions and lessons relevant to the survey design for this project:

- Using interviewer-based survey methods would be better than using self-completion methods. Interviewer-based methods allow for much more interaction with the respondent, thus helping to ensure that the concepts are well understood. This conclusion was supported by the UK research (eg Bristow et al 1991b) as well as the more recent research for KiwiRail. This approach was particularly appropriate for this project, which had a research emphasis, with limited samples, rather than requiring a large-scale survey.

- The recent KiwiRail research indicated that telephone-based surveys offer an economical and apparently effective means of eliciting the required responses. However, given the research nature of this project and the limited international experience with alternative survey methods, we decided that a comparison of the cost-effectiveness of face-to-face and telephone-based interviews would be useful.

- In this project, the options of interest for testing were of a relatively straightforward nature (eg comparing WTP for a rail service, a bus service, or no PT service between an outlying community and the nearest main centre): the project was not concerned with detailed investigation of trade-offs between different combinations of fares, service levels, travel times, etc (which are more typically the focus of WTP research on PT issues). Because of this, SP methods using CA (involving respondents in making multiple choices between various scenarios of time, cost, etc) were not necessary: a simpler CV approach was considered to be more appropriate.[8]

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8 We note suggestions in some of the literature that CV methods are less reliable and more likely to give biased results than CA methods – although other experts are of the view that well-designed CV methods can provide reasonably reliable results. In particular, CV methods may be subject to strategic behaviour by respondents if they have self-interest motivations for under- or over-stating their valuations. In the context of this research (which was largely theoretical), such behaviour was considered unlikely. CV methods may also be subject to starting-point bias, whereby the respondent's valuation estimate may be influenced by any starting-point estimate suggested by the interviewer. In this research, we took care to minimise the chances of such bias by (a) only suggesting a starting point when the respondent really needed such help; and (b) varying the starting-point figures between high and low values in successive interviews.

It was concluded that:

- the questionnaire survey used in the KiwiRail research was broadly appropriate for this project, although subject to re-examination of a number of aspects in detail (as discussed below)

- the survey could be delivered either through telephone or face-to-face (household-based) means.

6.3   Pilot survey methodology development and issues

For the pilot survey, the following decisions were made:

- Both telephone-based and face-to-face (at house) survey delivery methods would be used, with the objective of comparing their cost-effectiveness and hence reaching a decision on the method(s) to be used in the main surveys.

- The surveys (pilot and main surveys) should focus on 'outer' communities, where bus and rail services (existing or potential) would provide access for commuting, and other purposes, to a larger urban area (see section 2.5).

- The survey 'population' would be those households in the 'catchment area' of such PT services.

- The survey would be designed to obtain WTP values for either retention of an existing PT service, or introduction of a new/improved service, both relative to a 'base case' (which might be no service or an inferior service).

- The questionnaire would be designed to elicit household-based WTP values, rather than individual values.

The area chosen for the pilot survey was Featherston, in the Wairarapa, in the light of the following considerations:

- It was close to the consultants' base location (Wellington) and therefore convenient for face-to-face interviewing.

- It fitted within the concept of an outlying community within the 'commuter-shed' of a major centre, and having a relatively low level of PT services.

- It was relatively straightforward in terms of the WTP OVs that could sensibly be considered (ie no PT service, or a bus service to/from Upper Hutt, relative to the existing rail service).

- Given that the earlier KiwiRail work had surveyed Carterton, which was on the same railway line, useful comparisons could be made between results for Carterton and Featherston.

The survey sampling basis proposed for the pilot survey was as follows:

- For telephone-based interviews, the sample was a random selection of White Pages addresses in the wider catchment area of Featherston. All of the entries were stated to be Featherston addresses. All 'not ins', refusals, incomplete and successful interviews were recorded. The method used was for alternate interviewers to use alphabetical and reverse-alphabetical order for the first sweep through the directory; and then to use the same process with second calls to the 'not ins'.

- For face-to-face interviews, a narrower catchment area (for practical reasons) was selected of houses in Featherston town itself. The urban area was divided into four comparable quadrants, and the interviewers worked through each quadrant, calling at residential (and non-business) properties that were obviously occupied. Again, all 'not ins', refusals, incomplete and successful interviews were recorded.

6.4   Pilot questionnaire design

The pilot questionnaire was designed to be administered to an adult who would act as a representative of their household.

It focused on the following two questions relating to WTP, and the factors influencing this:

1   *How much (per week or per year) would your household be willing to pay (as a maximum) to have each of the PT service options of interest?*

2   *In reaching your view as to household WTP (above), what is the relative importance of various factors that the service might contribute to (eg personal use, use by others in the community, reduced traffic congestion or environmental benefits)?*

The total household WTP for each service option was derived from responses to the first question. The responses to the second question were used to subdivide the total household WTP into its various component factors, thus separating out those factors that represented OV/NUV components not included in current 'conventional' evaluation procedures.

In the design of the questionnaire, the following specific issues arose relating to the best methods for assessing household WTP:

- **Elicitation method:** Respondents were asked to provide a specific $ amount for their WTP for the specified service. Where respondents found this to be problematic, the interviewer was to assist by:

    - putting the amount in context with the scale of existing rate payments

    - using an iterative bidding method (ie asking them iteratively to choose between the service and various amounts of money).[9]

- **Time frame:** The exploratory KiwiRail research (for Carteron and Ohakune) asked for WTP in terms of amounts per week. The resulting amounts for OVs were quite small – typically averaging around $2–4 per week per household for users, 50c–$1 for non-users. While a similar approach was adopted for the pilot survey, the interviewer was also to translate the weekly estimate into an annual amount, in order to check with respondents that they were happy with their estimate in these terms.

- **Payment mechanism:** Public transport is typically subsidised (at least in part) through local government rates. Hence this is a natural payment mechanism to specify in the interests of increasing the realism of hypothetical payments. Respondents were advised that the amount they stated they were willing to pay could be assumed to be charged through local rates.

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9 Refer to section 6.2 for comments on the potential problem of starting-point bias in this process, and the approach used to minimise or overcome this.

6.5   Pilot survey methodology

Telephone interview and household interview surveys were undertaken in Featherston (located in the Wairarapa, Wellington region) during the period 21 June–10 July 2010. The area was served by a regional rail commuter service (to/from the Hutt Valley and Wellington) and by local bus services (see the map below).

Figure 6.1   Featherston location map

The questionnaire that was developed for the Featherston survey is provided in appendix C.[10] This draft was based on the telephone method: some minor modifications were made for use in face-to-face interviews.

A range of questions were asked, the most important being:

*   Question 4: WTP to retain rail services (relative to having no PT service between Featherston and the Hutt Valley/Wellington).

*   Question 5: WTP for a bus substitute service (relative to the same no-PT-service case).

*   Question 6: Importance rating for various categories of potential rail service benefits.

Adjustments were made to the detailed methodology early in the pilot survey; in particular, the order of questions was changed to ask for ratings on different aspects of the rail service (question 6) prior to asking for WTP estimates (questions 4 and 5). The reason for this change was because:

*   the original order of the questions caused difficulties for respondents because of the emphasis in question 3 on 'principal' users of the current rail service

*   questions 4 and 6 both related to rail and therefore need to be asked consecutively.

Sampling was undertaken as described in section 6.3.

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10 Featherston was chosen as the pilot survey site, using the questionnaire given in appendix C. Given the success of the pilot, it was decided to include the Featherston survey results within the main survey results for the other three localities (refer to chapter 7). There were only minor differences between the Featherston (pilot) questionnaire and the questionnaires used for the other three localities.

All interviews were undertaken on weekdays and weekends with adults who were able to respond on behalf of each household.

6.6 Pilot survey analysis

A total of 106 interviews were completed, 58 by phone and 48 face-to-face. Eighty-one of these interviews took place following the change in question order, 49 by phone and 32 face-to-face (details of the response rates are given in appendix C, section C.2).

In order to identify and eliminate potential inconsistencies, uncertainties or other problems, the interviews were graded: 67 'highest-quality A-grade interviews' were selected for analysis/reporting purposes (35 of those were by phone, and 32 were face-to-face).

The total WTP values expressed for retention of the rail services were subdivided into four main categories, as shown in table 6.1. The two categories of prime interest in the project were B – OV and C – NUV – other: these categories represented economic benefit components that were not included in the EEM. The basis used for this subdivision was as follows:

* Each respondent rated the importance of each of the benefit components on a scale of 0–10.

* The total of these rating scores was added up for each respondent, and an average overall rating profile was derived.

* To obtain component values, the rating proportion for each category was then applied to the overall WTP value.

* This unit value was then applied to the rating score on each component to give a WTP value for that component.

* The new WTP value for each component was then derived for relevant subsamples. For analysis purposes, respondents were subdivided into 'rail user' (defined as taking at least one rail trip/year) and 'non-rail user' (someone who declared that they 'never' used rail).

Table 6.1   Categorisation of benefit components

Category	Components[a]	Notes
A Regular use	1 Regular use by household members	Already included in conventional CBA (as EEM)
B OV	2 Occasional/emergency use by household members	Additional economic benefit (not in EEM)
C NUV – other	3 Use by other friends and relatives 4 Use by others in the community 5 Contribution to the local economy	Additional economic benefit (not in EEM)
D NUV – 'externalities'	6 Reduced road traffic delays 7 Environmental and safety effects	Already included in conventional CBA (as EEM)

a)   Refer to appendix C, sections C.2, C.5 (survey question 6).

6.7   Concluding comments on pilot survey results

The following preliminary conclusions were drawn from the pilot survey analyses of the rail WTP question:

• Station catchment areas appeared to be extensive and there seemed to be only a slow decline in WTP values for rail retention with increasing distance within these areas.

• There was a general trend of increasing WTP values with increasing income, increasing frequency of use and increasing household size.

More detailed analysis of the pilot WTP results is provided in appendix C (section C.2), including information on:

• survey response rates

• WTP values by various subsamples (including phone and face-to-face samples)

• some comparisons between the pilot survey WTP results and the equivalent-valuation estimates from international studies.

6.8   Pilot survey issues and lessons

As would be expected in such a pilot, a number of problems and issues were encountered during the course of the survey. The main issues, and the way it was decided to address them in the subsequent surveys, are summarised in table 6.2.

Overall, the pilot survey was successful in meeting its objectives, in terms of:

• providing initial estimates of OVs and NUVs for PT services for the community surveyed (which compared sensibly with values obtained in similar research studies in New Zealand and internationally)

• providing good information and experience on the relative merits of telephone and face-to-face delivery methods for such surveys (refer to the following section)

• identifying issues relating to the questionnaire design and its administration, so that these could be addressed for the main survey stage.

Table 6.2   Pilot survey issues and proposed responses

Item	Issue	Response
Question phrasing	Question 3 – 'Who do you think would be most affected (by loss of rail services) generated a commuter-focused valuation, and interviewees who were not commuters tended give a zero or low valuation.	Remove the word 'most' from this question for future surveys.
Question order	Question 6 was used to identify inconsistencies between the valuation given and the importance of potential rail benefits – and a number of inconsistencies were found.	Shift question 6 to come before the valuation questions (4 and 5). For future surveys, consider removing question 3, which now duplicates question 6.

Item	Issue	Response
Reasons for WTP values	The reasons for WTP values were not always recorded, which made it difficult to identify the thinking behind low, high or potentially inconsistent values.	Instruct surveyors to always ask and record reasons for WTP values. Where inconsistencies not resolved, reject responses.
Value-testing problems	Where unrealistic or inconsistent values were given, the testing of these values by surveyors was not always effective.	More training for surveyors on how to test such values. Consider capping or deleting high values if considered not realistic. Where inconsistencies remain, reject responses.
Interview timing	Interview sometimes appeared to be too quick, indicating not enough time was being spent on obtaining thoughtful responses.	Instruct surveyors on the target length for interviews and adjust incentives for interview completion.
Interview completeness	Emphasising/concentrating on a few main questions meant that many forms were not completed in their entirety.	Incorporate in-advance training of surveyors to encourage better question completion rates.
Interview consistency	A number of responses were potentially inconsistent (eg they had zero or very low values, but scored the importance of rail benefits as high).	Unless reasons were given (eg unable to pay because of very low income), reject responses.
'Not in' visits	Time was wasted on the face-to-face interview days by calling at addresses where no one was at home.	Call at properties where there is a clear 'sign of life' and also conduct interviews in some communal areas (eg near cafes, high-street shops, library and open spaces).
Weekly/annual valuation	Although the survey concentrated on weekly WTP values in all cases, a conversion to annual values was given.	If this is considered to be significant, alternate weekly and annual WTP questions in successive interviews.

6.9 Appraisal of survey delivery methods and implications for main surveys

6.9.1 Feedback from pilot survey

One of the main objectives of the pilot survey was to assess the relative merits of telephone-based and face-to-face survey methods to derive good WTP estimates. While it was clear that telephone-based methods involved lower costs per completed interview, the key concern was that they might be less successful in conveying the WTP concept to the respondents, and might therefore produce lower-quality results.

Feedback was solicited from each of the surveyors about their experiences and judgements on the relative merits of telephone or face-to-face methods (see appendix C), section C.4. Table 6.3 sets out our assessment of the relative advantages/disadvantages of the two methods.

Table 6.3   **Comparison of telephone and face-to-face survey methods**

Technique	Advantages	Disadvantages
Phone	- High speed - Low cost - Large sample - Able to survey wide catchment areas	- Higher proportion of refusals/incomplete interviews - Less confidence in results - Limitations for some aspects of questionnaire design
Face-to-face	- High quality/more confidence in results - Scope for questionnaire design - Fewer refusals	- Higher cost - Practical survey issues (surveyor availability and logistics) - Restricted catchment areas

Because of lower unit costs of the telephone method (35–40% of the costs of the face-to-face method), more interviews could be completed within the project budget. This type of interview was also easier to arrange and faster to complete, especially in areas away from Wellington. However, the lower refusal and non-completion rates of the face-to-face method meant there was less chance of non-response bias, and the surveyor was better able to ascertain that the respondent had understood the questions and concepts, leading to higher-quality results.

Our analysis of the various pilot survey subsamples suggested that the telephone method resulted in marginally lower WTP values than the face-to-face method, with the difference between the two methods in the order of 10–20%. The reasons for such a difference were unclear[11], but one suggestion is that respondents had the option to only partially engage in the telephone call, or to discontinue it, which seemed to encourage lower-value responses: in other words, it is relatively easy to say 'zero' on the telephone, rather than answer the question honestly. Another problem was the difficulty of challenging/ testing the answer via the telephone, as the risk of an incomplete interview appeared to increase if the time and complexity of a telephone interview increased.

Given the lessons learned from the pilot survey (see table 6.2), it was expected that with minor adjustments to the questionnaire and with further interviewer training, the difference in quality between telephone and face-to-face interviews could be further reduced: we anticipated that this would also result in a reduction in the differences in WTP values.

6.9.2   Survey cost structures

Based on the pilot survey experience, we developed estimates of costs for the main surveys (assuming a central North Island survey location), as set out in table 6.4. These estimates included training, interview and supervision costs, travel, accommodation, other expenses, data coding, checking and basic analysis.

The cost structures were:

- telephone method – approximately $500 + $40/interview

- face-to-face method – approximately $1200 + $110/interview.

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11 This difference may not be statistically significant.

Table 6.4   Survey cost structure – telephone and face-to-face interviews

Completed interviews (A-grade)	Total cost ($)		Cost per interview ($)	
	Phone	Face-to-face	Phone	Face-to-face
50	2536	6732	51	135
100	4565	12,278	46	123
150	6658	17,972	44	120
200	8623	23,370	43	117

6.9.3   Desired sample sizes

Based on our examination of the results from the pilot survey and more general experience in sample selection for transport surveys, our judgement on the desirable (minimum) sample sizes for the main survey was as follows:

- For face-to-face interviews, an absolute minimum sample size of c50 completed interviews (A-grade) would be appropriate in any one area to provide average WTP results of reasonable confidence.

- For telephone interviews, given the possibly lower quality of the methods, a somewhat higher minimum number of completed interviews would be appropriate – say around 75 per area.

- For telephone interviews, a sample size of around 100–120 completed interviews per area would allow more disaggregation and investigation of the factors influencing the WTP distribution.

6.10 Conclusions for main surveys

For the main surveys, we concluded that the telephone delivery method would offer better value for money than the face-to-face method. This conclusion reflected the relatively large cost difference between the two methods, as well as the experience from the pilot survey with the telephone method that:

- respondents generally appeared to understand the issues and provided plausible responses

- the differences in WTP values from the face-to-face method were small (and maybe not statistically significant)

- it should be possible to further improve the quality of the survey and hence the results.

Following discussions with the project steering group and regional councils about potential survey locations, it was decided that the main surveys should cover three locations (Oxford, Christchurch area; Te Kuiti, Hamilton area; and Tuakau, Auckland area – see the next chapter). In addition, it was decided to include the pilot survey (Featherston) results in our analyses, along with the main survey results, as it was unlikely that the changes in the questionnaire and survey delivery methodology (between the pilot survey and the main surveys) would have any substantial effects on the WTP values derived.

The research budget was sufficient to allow for 300–400 completed telephone-based interviews in the main surveys.

Hence it was determined that the main surveys should involve:

- telephone-based interview methods

- three locations (supplemented by the Featherston pilot survey results)

- samples of c100 completed (high-quality) interviews in each location.

7 Survey results

7.1 Introduction

This section describes the results from four surveys of households in outer communities to investigate WTP values for public transport services to connect with larger centres, in terms of option values (OVs) and non-use values (NUVs).

The surveys focused on areas/situations where existing PT services might potentially be withdrawn, or a new service might be introduced where there were currently no (or minimal) services. Thus the focus tended to be on smaller communities in predominantly rural areas within the (outer) commuting catchment of one of the larger urban areas.

A number of locations that could provide a variety of current and potential types of PT options were reviewed: the final decisions on survey locations were taken after discussions with the relevant regional and district councils.

7.2 Survey areas and characteristics

7.2.1 Overview

In the light of the pilot survey and its findings, the approach taken in relation to the main surveys for the project was as follows:

1   The survey method was based on telephone surveys – after the Featherston (pilot) survey, no more face-to-face surveys were undertaken.

2   The survey questionnaire was based on the final version of the Featherston questionnaire (see appendix C, section C.3) tailored to the individual circumstances of each of the survey areas and the specific PT options under consideration.

3   The areas selected covered a range of situations, in terms of:

  –   types of existing PT services (none/bus/rail)

  –   existing and potential markets, including regular commuting, occasional business, social and leisure travel

  –   service introduction/expansion versus service cessation/reduction.

4   The three new areas chosen for survey, selected from outer areas within the wider catchments of main centres, were:

  –   Oxford (Christchurch) – the PT options were direct or indirect new bus services, compared with the current lack of any significant PT service

  –   Te Kuiti (Hamilton) – the PT options were a new bus service or new rail service, compared with the current lack of any significant PT service

– Tuakau (Auckland) – the PT options were a new rail service or a new, regular bus shuttle service, compared with the current limited bus service.

In addition, the Featherston pilot survey results (A-grade) were incorporated into the final project dataset.

5   Target sample sizes of around 100 completed (telephone-based) interviews in each of the new selected areas were adopted.

Table 7.1 lists the communities subject to surveys, together with their key demographic characteristics. The individual communities are described in the following subsections.

Table 7.1   Survey areas and characteristics (data based on 2006 Census)

	Featherston	**Oxford**	**Te Kuiti**	**Tuakau**	**Carterton**
Main centre & distance from it	Wellington (62km)	Christchurch (55km)	Hamilton (77km)	Auckland (58km)	Wellington (85km)
Situation type	Outer community with existing rail service	Outer community with no existing bus service	Outer community with existing bus service	Outer community with no existing rail service	Outer community with existing rail service
Population (and households): • Primary catchment area • Wider catchment area	3666 (1560) 4680 (1938)	1716 (663) 3432 (1326)	4419 (1611) 8838 (3222)	3504 (1179) 7008 (2358)	3505 (1398) 7010 (2796)
Average household size	2.35	2.59	2.74	2.97	2.51
Unemployment rate – district (region)	5.7% (5.2%)	3.2% (4.0%)	6.7% (5.2%)	6.2% (5.2%)	3.6% (5.2%)
Median income/ person (15+) district (region)	$20,500 ($28,000)	$18,400 ($23,500)	$21,300 ($24,100)	$24,200 ($24,100)	$22,200 ($28,000)
Consultations[a]	GW[b] and South Wairarapa District Council (DC)	ECan[c] and Waimakiriri DC	EW[d] and Waitomo DC	EW and Waikato DC	

a)   Indicates that consultations were held with these regional/district councils prior to proceeding with the surveys.

b)   GW – Greater Wellington (Regional Council)

c)   ECan – Environment Canterbury (Regional Council)

d)   EW   Environment Waikato (Regional Council)

7.2.2   Featherston

In June/July 2010, telephone interviews and face-to-face interviews were undertaken in Featherston (Wellington region), which is approximately 62km north-east of Wellington City and was served by five direct passenger rail services each way, Monday to Friday. A significant number of commuters, from a wide catchment area, drove to Featherston railway station to catch the train – ie 'park and ride'.

The Featherston (pilot) survey has already been discussed in chapter 6, and detailed survey results are given in appendix C.

7.2.3   Oxford

In December 2010, telephone interview surveys were undertaken in Oxford (Canterbury region), which is approximately 55km north-west of Christchurch (via the Tram Road) and was not being served by public transport. The first Christchurch earthquake had occurred in September of that year, but it was not judged to have had a major impact on the survey in terms of affecting the demand for commuting and other travel between Oxford and Christchurch. Detailed survey results are given in appendix D.

Figure 7.1   Oxford location map
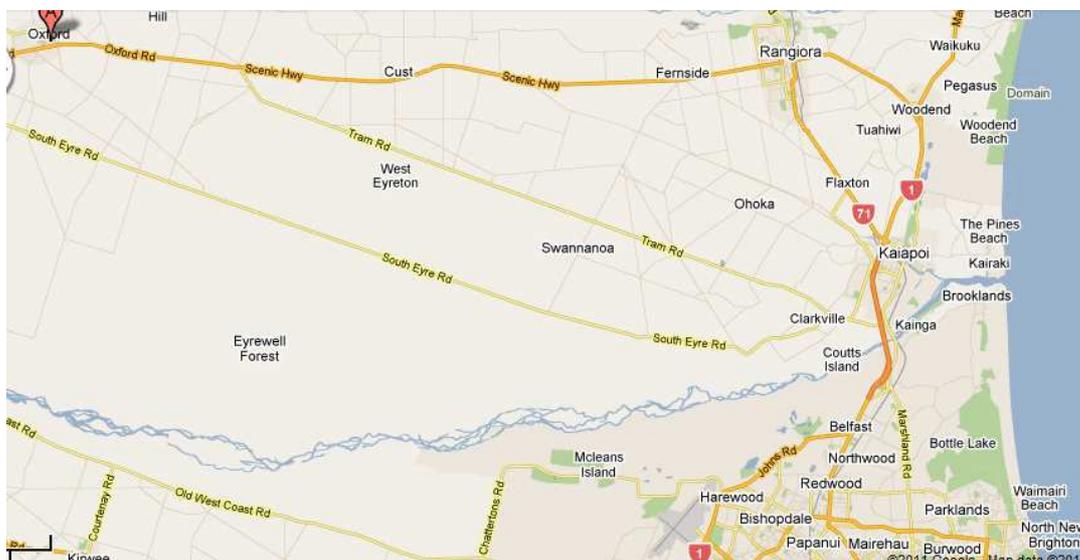
7.2.4   Te Kuiti

In December 2010, telephone interview surveys were undertaken in Te Kuiti in Waitomo District (Waikato region), which is approximately 77km south of Hamilton and was being served only by irregular commercial passenger transport services. Detailed survey results are given in appendix E.

Figure 7.2   Te Kuiti location map

7.2.5   Tuakau

In January 2011, telephone interview surveys were undertaken in Tuakau (Waikato region), which is approximately 10km south of Pukekohe and 58km south of Auckland City centre. Tuakau was being served only by irregular, commercial passenger transport services. Detailed survey results are given in appendix F.

Figure 7.3   Tuakau location map
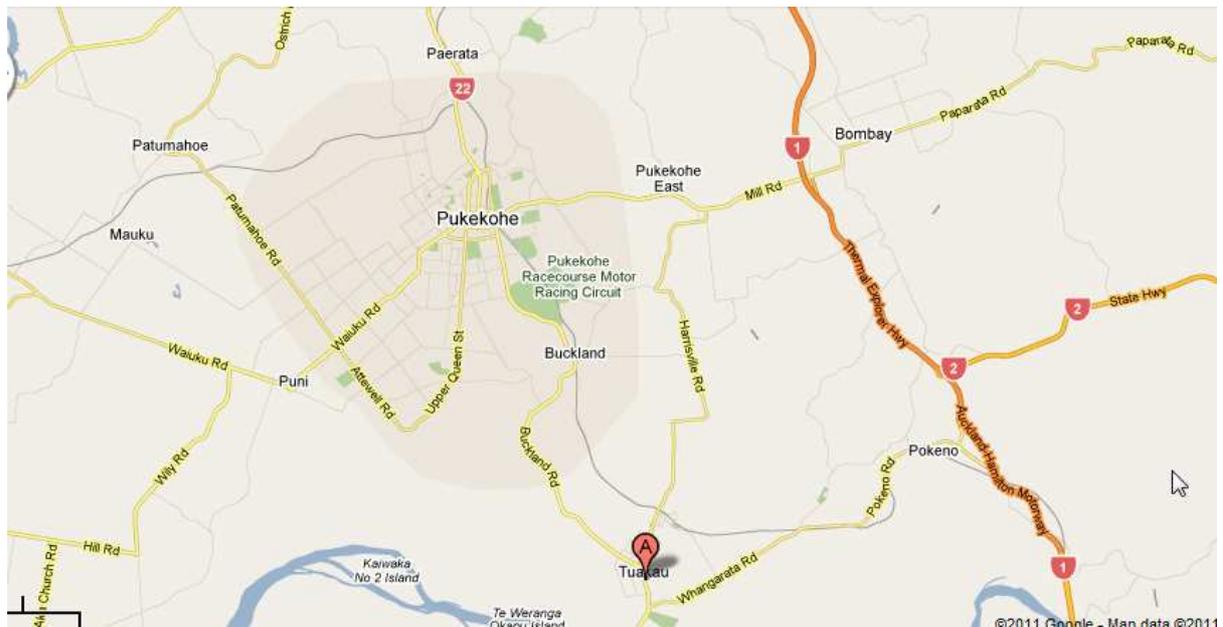
7.3   Options assessed

Table 7.2 provides a summary of the PT options covered in the surveys for the four communities. The following points should be noted:

- In general, the surveys investigated WTP values relative to the existing situation and PT services. In the case of Featherston, the 'base case' was taken as involving withdrawal of the Featherston–Wellington rail services, leaving no PT services between Featherston and Upper Hutt.

- The primary option surveyed in each case was considered to be the one likely to be valued most highly by respondents.

- The secondary option surveyed was included to confirm this survey design assumption, and to obtain further comparison values.

All fares and travel-time assumptions were identified through comparison with other existing services in the relevant region and, in each case, in consultation with the regional council and district councils.

Table 7.2   PT services and options assessed

Area	Featherston	Oxford	Te Kuiti	Tuakau
Existing PT services	• Rail services each way on weekdays • Two services each way on Saturday/ Sunday	• School bus service and weekly commercial bus shuttle	• Commercial non-commuter long-distance bus services	• Irregular, infrequent commercial bus /coach/rail services
PT option 1	• Retention of rail service (relative to base case of no PT service between Featherston and Upper Hutt) • Single fare to Wellington $12	• Direct commuter bus service to Christchurch via Tram Road (plus midday return service) • Assumed single fare to Christchurch $7	• Direct commuter bus service to Hamilton (plus midday return service) • Assumed single fare to Hamilton $10	• Direct commuter rail service to Britomart (plus midday return service) • Assumed single fare to Auckland $12
PT option 2	• Substitute bus shuttle service to Upper Hutt at existing rail frequency, connecting with train services between Upper Hutt and Wellington • Assumed through single fare to Wellington $12	• Indirect bus service to Christchurch via Rangiora (plus midday return service) • Assumed single fare to Christchurch $7	• Direct commuter rail service to Hamilton (plus midday return service) • Assumed single fare to Hamilton $10	• Bus shuttle commuter service to Pukekohe (plus midday return service) • Assumed through single fare to Auckland $12

7.4   Overall average WTP unit values

Table 7.3 shows the total mean WTP values for regular use (RU), OV and NUV derived from the options surveyed for each community. It also shows the 95% confidence intervals on these mean values (derived from the spread of results and the surveyed sample sizes).

The following observations can be made:

- The mean total RU/OV/NUV values were in a range $44–231 per household per year across the four communities and the options surveyed. (By comparison, the earlier KiwiRail survey of Carterton gave a higher value, at $318 per household.)

- The 95% confidence intervals were around 20–25% of mean values (actual range 18–27% in the four cases).

- In two of the three centres where both rail and bus options were examined, the rail WTP values are substantially higher (by a factor of 3–4) than the values for the bus options. However, in the third case (Te Kuiti), the rail value is significantly lower than the bus value. Thus no general conclusions can be drawn on the relative merits of rail v bus options in terms of OVs/NUVs: values appear to be related more to the service characteristics of the options assessed (in terms of travel times, service frequency, access/egress convenience, etc) rather than to any intrinsic modal characteristics.

Table 7.3   Summary table of total annual WTP regular use, OV and NUV per household

Area	Featherston	Oxford	Te Kuiti	Tuakau	Carterton
Sample	67	104	94	107	50
Rail option WTP (±confidence interval[a]	$231 (±$59)	-	$44	$157 (±$28)	$318 (±$43)
Bus option WTP (±confidence interval)[a, b]	$60	$98 (±$19)[b] $66[b]	$60 (±$16)	$45	-

a)   Confidence intervals shown are 95% CI based on the spread of results and sample sizes (and assuming normal distribution of results).

b)   The first value given here is for the primary (direct) bus option; the second is for the secondary (indirect) bus option.

The mean values found in the earlier Carterton survey are very similar to those from the Featherston survey. This finding, while plausible, should be treated with some caution. There were a number of differences between the Carterton surveys and the surveys for this project, especially in terms of the wording of the critical value question – the project surveys were more sophisticated, in term of using random starting points for the value question (when respondents required assistance), and also using iterative bidding techniques to confirm values.

7.5   WTP unit values for economic evaluation purposes

The WTP values summarised in the previous section essentially represent the 'total economic value' (TEV) that respondents associate with the various service options examined. Some of these TEV components are already incorporated in the current NZTA EEM economic evaluation procedures, whereas others represent additional economic benefits. Therefore, in interpreting the survey results, an important aspect is distinguishing between these existing EEM benefit categories and the additional economic benefit categories not currently included in EEM.

Table 7.4 examines each of the benefit categories covered in the survey, comments on the extent to which they are covered in the current EEM, and draws conclusions on whether or not they should be treated as

additional economic benefits. The conclusion is that the following four economic benefit categories should be treated as additional (ie are legitimate economic benefits not captured in the current EEM procedures):

- OV – occasional use by respondents or other household members

- NUV – use by family and friends

- NUV – use by others in the community

- NUV – local economic effects.

Table 7.4   Total economic value WTP subcategory status

Subcategory benefit type	Subcategory name	NZTA EEM economic evaluation status	Additional to current NZTA EEM procedures?
Consumer surplus	Regular use by household members	Already included in economic evaluation procedures (NZTA EEM Vol 2)	No
OV	Occasional use by household members	Not currently included within existing NZTA EEM procedures. It may be necessary to make a (probably small) allowance for the revenue and user consumer surplus resulting from the actual travel of this group.	Yes
NUV	Use by friends and family	Not currently included within existing NZTA EEM procedures. It may be necessary to make a (probably small) allowance for the revenue and user consumer surplus resulting from the actual travel of this group.	Yes
NUV	Use by others in the community	Not currently included within existing NZTA EEM procedures. It may be necessary to make a (probably small) allowance for the revenue and user consumer surplus resulting from the actual travel of this group.	Yes
NUV	Local economic effects	This is discussed in the literature in terms of the potential for additional benefits to the economy due to market imperfections (Laird et al 2004) and securing access to economic opportunities (Laird et al 2006). Such benefits can be allowable if they represent effects not included in other benefit categories.[a]	Yes
NUV	Property impacts	Although this is often of high interest to respondents, it is not included in current NZTA EEM procedures and is not allowable in economic evaluation terms.	No
NUV	Delay	This is included within decongestion benefits in existing procedures (NZTA EEM Vols 1 & 2)	No
NUV	Safety and environment	These are largely included within existing procedures (NZTA EEM Vols 1 & 2)	No

a)   However, the extent to which this category represents 'legitimate economic benefits not captured in the current EEM procedures' is arguable, and hence its treatment as an additional benefit may involve some component of double-counting.

For each of the four surveys (primary options), table 7.5 shows the proportions of the total WTP values (TEV) that are accounted for by each benefit category. In all four surveys, between 55% and 60% of TEV represents economic benefits that are additional to those currently accounted for in the EEM. The split of

benefits between the four categories of additional benefits and the other benefit categories is shown pictorially for each survey in figure 7.4.[12]

Table 7.5   WTP regular use, OV and NUV proportions

Benefit category	Featherston	Oxford	Te Kuiti	Tuakau
	% of total benefits from survey			
1 Regular use	9%	12%	10%	11%
2 Option – occasional use	10%	14%	13%	13%
3 Non-use – friends and family	13%	15%	14%	12%
4 Non-use – community	18%	22%	20%	16%
5 Non-use – local economy	16%	10%	10%	15%
6 Non-use – property impacts	[a]	10%	8%	12%
7 Reduced delay	17%	9%	12%	11%
8 Improved safety and environment	17%	10%	13%	11%
Total 'additional' (items 2, 3, 4, 5)	57%	60%	57%	55%
Total other	43%	40%	43%	45%

a)   This benefit category was not included in the Featherston survey.

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12 The estimates in both table 7.5 and figure 7.4 represent the consumer surplus associated with the existence and use of the services in question. Note that these estimates are net of any time and monetary costs (including fare payments) associated with use of the services.

Figure 7.4   Summary of 'additional' and 'other' benefit proportions

Oxford	Tuakau
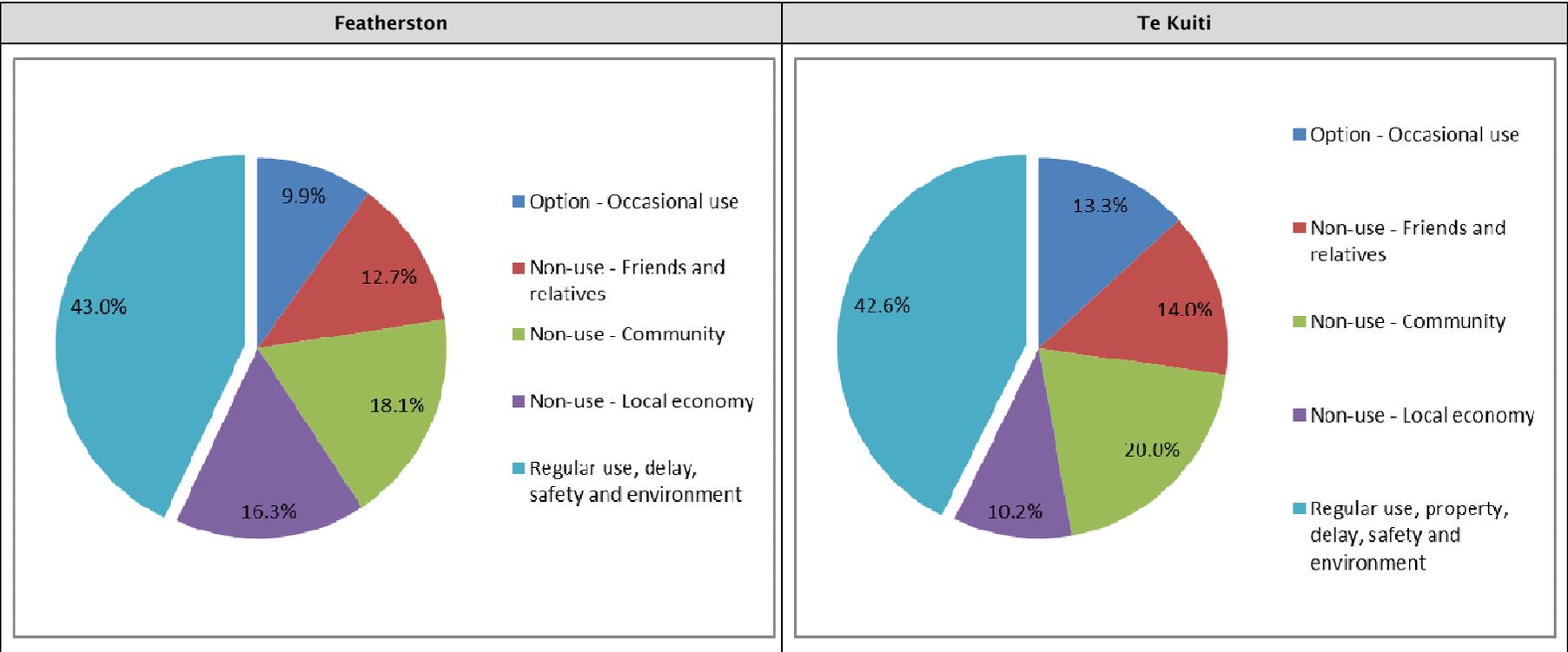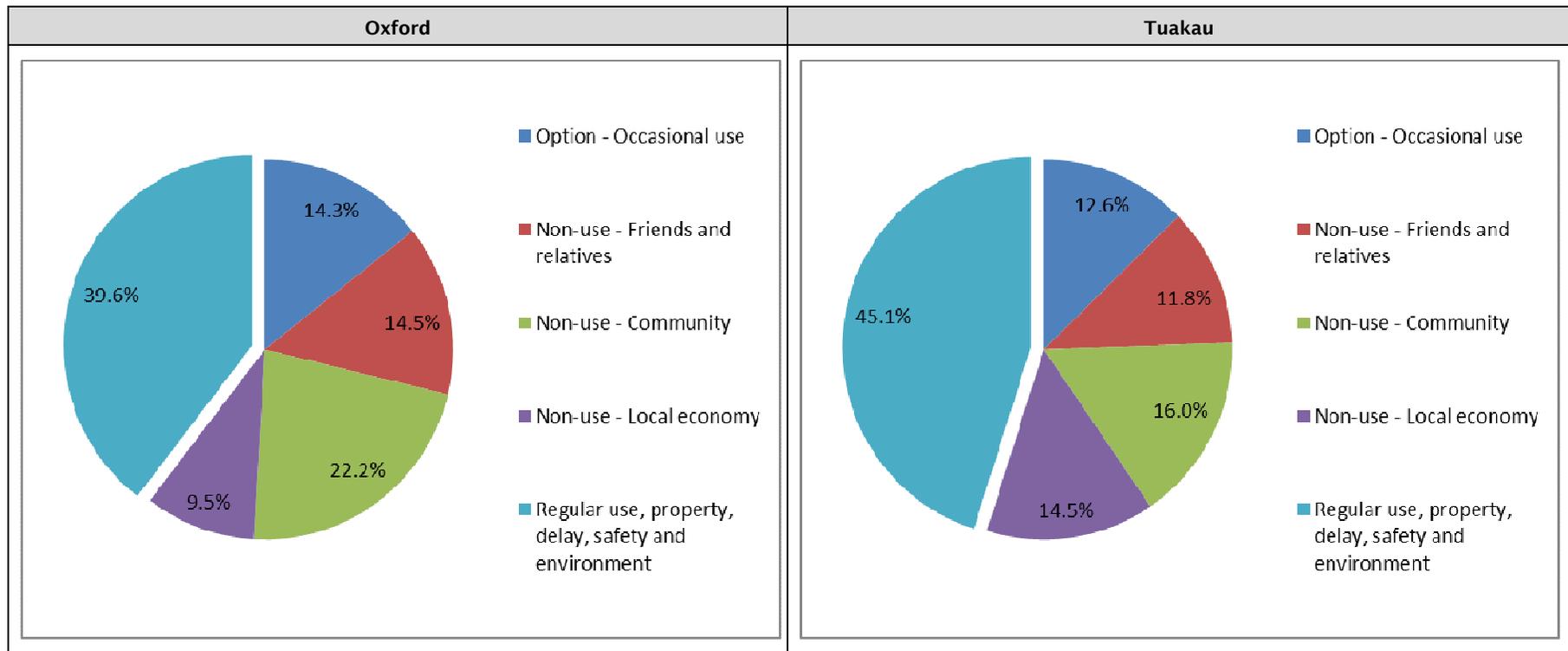
Table 7.6 shows the total 'additional' option/non-use benefits (per household per year) for each of the communities and the options surveyed: the results for the earlier Carterton (KiwiRail) survey are also shown, for comparative purposes. The mean values for the four communities surveyed range between $25pa and $132pa per household.

Table 7.6   Summary of 'additional' annual WTP values per household for economic evaluation purposes

Option mode	Featherston	Oxford[a]	Te Kuiti	Tuakau	Carterton
Rail option	$132	-	$25	$86	$216
Bus option	$34	$59 $40	$35	$25	-

a)   The two Oxford bus values refer to the 'direct' and 'indirect' bus options (see table 7.2).

7.6   Indicative total community WTP values (for economic evaluation purposes)

The above 'additional' values have been applied to derive indicative estimates of the additional economic option benefits/non-use benefits to the local community overall that are associated with each option.

These estimates were derived as follows:

- Estimate the number of households in the immediate community (table 7.1).

- Multiply this by the unit 'additional' values per household given in table 7.6, to derive a lower bound estimate of likely community total benefits.

- As an upper bound, use double the lower bound value, to reflect the potential wider catchment areas of the PT service options examined.[13]

The results are summarised in table 7.7. The total lower bound figures for the different communities/options vary between $27,000pa (Oxford, secondary bus option) and $128,000pa (Featherston rail option), with the upper bound figures being double these.

While these figures are significant, in all cases they would be sufficient to justify only a modest proportion of the total (gross) costs of providing the services specified.

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13 The assumption that the upper bound is twice the lower bound (based on the aggregate WTP for households in the survey area) is considered likely to be conservative (ie a maximum), and in practice it is more likely to be significantly lower than this figure. More detailed estimates of total valuations for the outer catchment area of each scheme could be derived by assessing the total number of households within this outer area, and then multiplying this by an assumed average WTP per outer area household (based on examination and extrapolation of the values found for the surveyed area).

Table 7.7   Summary of total annual community WTP benefit for evaluation purposes

Option	Featherston	Oxford	Te Kuiti	Tuakau	Carterton
Rail	$128,000–$255,000	-	$41,000–$82,000	$101,000–$203,000	$302,000–$604,000
Bus (1)	$33,000–$66,000	$39,000–$79,000	$56,000–$111,000	$29,000–$59,000	
Bus (2)	-	$27,000–$53,000	-	-	

7.7   Factors influencing WTP values

7.7.1   Household characteristics

The survey included a number of questions relating to household characteristics, including:

* distance from the centre of the local community (derived from address given by respondent)

* expected frequency of use of the PT services under consideration

* household income (pre-tax)

* household size (total people normally living in household, by age group).

For each of the four surveys, analyses were undertaken of the variation in WTP (total) values against each of these four household characteristics (separately). Full results are given in appendices C–F, and the statistical significance of the relationships between WTP and each household characteristic is presented in table 7.8. Table 7.9 then provides a summary of the findings.

Table 7.8   Statistical analyses of relationships between WTP and household characteristics – summary of 'P' values[a, b]

Factor	Featherston	Oxford	Te Kuiti	Tuakau
Distance	0.13	**0.03**	**0.01**	0.40
Expected PT use	0.46	**0.000004**	0.35	0.30
Household income	**0.004**	**0.001**	0.07	**0.001**
Household size	**0.04**	**0.02**	**0.04**	**0.01**

a)   'P' value results derived from the regression analyses detailed in appendices C–F inclusive.

b)   'P' values of <0.05 (shown in bold in the table) indicate that the slope of the regression line (for WTP v household characteristics) is likely to be significantly different from zero (at the 95% confidence level). 'P' values of >0.05 indicate that the slope is unlikely to be significantly different from zero (at the 95% confidence level).

Table 7.9   Household characteristics influencing WTP – overview

Characteristics	Relationship with WTP OVs and NUVs	Comments
Distance from local centre	WTP values tend to reduce with distance. Typically the values at 10–15km from the local centre are around half those close to the centre, with a reasonably consistent pattern across the 4 areas.	The relationships are statistically significant in 2 of the 4 cases. For Tuakau, the WTP declines very slowly with distance (up to at least 30km) and the relationship is not significant.
Expected frequency of PT use	WTP values tend to increase with increases in expected frequency of PT use. The relationships are consistent in all 4 cases, with WTP among frequent users around 3 times that of very occasional users or non-users.	The relationships are statistically significant in only one (Oxford) of the 4 cases, despite the regression line slopes being quite similar in all the cases.
Household income	WTP values tend to increase with increases in household income. The relationships are consistent in all 4 cases, with WTP among the highest-income category approximately twice that among the lowest-income category.	The relationships are statistically significant in 3 of the 4 cases.
Household size	WTP values tend to increase with increasing household size. The relationships are consistent in all 4 cases, with WTP among the largest households being approximately twice that among the smallest (single person) households.	The relationships are statistically significant in all 4 of the cases.

The following provides comments on these analyses and results:

- **Best-fit regression line** – In all 16 cases, the slope of the best-fit regression line relating WTP values to each household characteristic is of the expected sign; ie WTP increases with closeness to the local centre, expected PT use, household income and household size.

- **Statistically significant relationships** – The 'P' value statistical analyses (table 7.8) indicate that in 10 of the 16 cases, these relationships are statistically significant (ie there is a <5% probability they could have arisen by chance), including in at least one case for each of the four household characteristics (the relationships are not significant in the other six cases).[14]

- **Distance from local centre**[15] – For three of the four surveys, the WTP values at 10–15km from the local centre are broadly half those close to the centre, with very low values beyond about 15km. In the Tuakau case, the values appear to still be significant for distances up to at least 30km (but note that the number of households surveyed at such distances is small). This indicates that it is not realistic to try to define a specific catchment area (radius from the centre of the community) applying to all communities, but that each community needs to be examined in terms of the particular characteristics of its area: eg the transport network in the area; alternative public transport services serving other communities in the area; the patterns of movements from the community to alternative major cities, etc. However, it should be noted

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14 The use of larger sample sizes would be expected to result in more of these relationships becoming significant.

15 Distance from local centre was estimated relative to the local railway station, for communities with a railway line; for other communities it was estimated relative to the main bus stop, which was generally in the local town/community centre.

that the estimates of total community WTP for OV/NUV will generally be rather insensitive to the precise catchment area definition – WTP values are generally low towards the outer fringes of any catchment area, and typically the numbers of households involved are also relatively few.

- **Expected frequency of PT use** – All four surveys show consistent results, with WTP values among the 'most frequent user' category being around three times those among 'very occasional users/non-users'. However, the relationship is statistically significant in only one of the four cases.

- **Household income** – Again the relationships are consistent in all four cases, with WTP among the highest income category being around twice that among the lowest income category: this implies that WTP increases with household income, but less than proportionally.

- **Household size** – Again, the relationships are consistent in all four cases, with WTP among the largest household categories (6+ persons) being around twice that among the smallest household category (1–2 persons).

- **Further analyses on larger samples** – Given the modest sample sizes, no further statistical analyses of the impacts of household characteristics on WTP have been attempted. With larger samples, further analyses could be undertaken, including multi-variate analyses which would examine the correlations between the various household characteristics (which are likely to be strong).[16]

7.7.2   Service characteristics

Given that the surveys covered only eight service options in four communities, it was not possible to draw any statistically based conclusions as to how the characteristics of the services influenced the WTP values. However drawing on the survey experience, we have provided the following indicative comments on how service characteristics seem likely to influence WTP values:

- Values are expected to be influenced by the perceived utility and attractiveness of the specified service options in terms of meeting respondents' needs and priorities.

- Valuations would therefore be expected to be highest when the services are of reasonably high quality, frequency, speed, at reasonable cost and well matched to desired origin–destination patterns.

- The highest WTP values found in the research applied to rail services (Featherston and Tuakau). In both of these cases, it seems likely that respondents valued the rail service substantially more highly than bus options because of their perceived advantages in terms of travel speed, reliability (protection from congestion) and comfort (particularly in the Featherston case).

- However, in the Te Kuiti case, the rail option offered was valued less highly than the bus option. It is likely that this reflected that the Te Kuiti rail option involved relatively poor access to residential locations at the Te Kuiti end of the trip, and relatively poor access to desired locations at the Hamilton end.

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16 A multi-variate analysis could examine household WTP as a function of all four of the household characteristic variables, including a dummy variable for each of the areas surveyed. This would provide additional information on the separate influences on WTP of each of the household characteristics.

- This evidence supports the view that the WTP values are more dependent on the characteristics of the service (relative to people's travel desires) than the specific characteristics of particular 'modes'.

- The average WTP values (tables 7.3 and 7.6) vary by a factor of around five between the highest and lowest values found within each community/option. Disaggregated WTP values vary typically by factors of 2–3 (table 7.9) within each of the household characteristics examined (and presumably by a greater factor if combinations of household factors were examined).

- In very broad terms, this suggests that the impacts of different household characteristics on WTP values are of similar magnitude to impacts of different service options. But at a community-wide level, the effects of averaging will tend to mean that the primary factor affecting valuations will be the characteristics of the services offered to the community, rather than its specific average household profile.

7.8 Commentary on survey aspects

The survey methodology, and in particular the detailed questionnaire design, was piloted through the Featherston survey and then adapted (in the light of that experience) and applied to the other three areas. Particular care was taken in the selection, training and supervision of the interview team, to ensure a high-quality survey: in addition, some completed questionnaires were reviewed, and where there were doubts about their quality or consistency, eliminated from the final survey set. Thus we are confident that the findings provided in this report reflect the high quality of the market research undertaken.

In this context, the following comments relate to possible further improvements in survey methodology/questionnaire design if further market research on this topic is to be undertaken.

7.8.1 Expression of WTP values – weekly or annual terms

The questionnaire was designed to elicit answers in terms of weekly WTP values, as this was found to work best when residents were considering the impact on their household budgets. In all cases the annual implications of weekly WTP values were relayed back to respondents by the surveyor, before the respondents confirmed their valuations.

For presentation and reporting purposes (as in this report), annual WTP figures have been used. This is consistent with the reporting practice of most of the international studies on the topic.

7.8.2 Specification of valuation subcategories

The survey asked respondents to give relative importance ratings (on a scale of 0–10) for eight different WTP subcategories (table 7.4). This is a quite demanding task for a telephone-based interview, and there would be advantages if the question could be simplified. For any future surveys, we would suggest consideration be given to:

- combining the non-use categories of 'friends and family' and 'others in the community'

- deleting the category of 'contribution to property attractiveness and value': this category is perhaps of questionable merit, as it really represents an alternative measure of estimating the

overall impact of transport investments (which are largely encompassed in the current EEM procedures).[17]

7.8.3   Method for establishing subcategory valuations

We consider the survey/analyses method used to derive WTP values for subcategories suffers from two deficiencies:

- As noted above, it is a difficult task for respondents to consistently rate as many as eight subcategories in a telephone-based survey.

- More importantly, our analysis assumption that values are directly proportional to ratings (on the 0–10 scale) is open to doubt.

This latter deficiency could be overcome in future surveys by the adoption of a 'bag of points' method, with respondents being asked to allocate (say) 100 points across the various subcategories to reflect their relative WTP values. While this method seems likely to provide improved results, it is unclear whether it could be administered successfully through a telephone-based survey: further investigation/piloting would be desirable.

7.8.4   Sample selection biases

The population from which the survey samples were drawn was the households listed in the 'White Pages' telephone directory covering the community in question. This approach may give rise to potential sample biases relating to:

- exclusion of households who are either ex-directory or do not have a fixed phone line

- telephone directory boundaries not always coinciding with the community catchment areas appropriate for the project's purposes.

In addition, sampling biases may arise through non-responses – in particular the sample is likely to be over-weighted towards the less mobile members of the community and those not in regular employment, as they are more likely to be at home at any time. It is not clear whether these biases would result in the average WTP value obtained being likely to under- or over-estimate the 'true' average valuation per household in the community in question. However, given the relatively high response rates obtained from the survey, we consider that any sampling biases will be of secondary importance to potential response biases resulting from (user) interpretation of the survey questions.

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17 This category was not included in the Featherston survey. The counterargument, in favour of its retention in the survey questionnaire, is that it was found to account for a significant proportion (around 10%) of total WTP values of respondents (table 7.5). Retaining it would allow respondents to nominate it as important to them, whereas otherwise they may increase their stated importance of another benefit category as a proxy for property impacts.

8 Conclusions and implications

8.1 Introduction

This chapter summarises the findings and conclusions from this research project, in two main sections. Section 8.2 sets out the findings and conclusions relating to the market research methodology, the resulting willingness-to-pay (WTP) valuations (per household) and the effects of household and service characteristics on these valuations. Section 8.3 compares the project's valuations with corresponding findings from international research studies.

8.2 Summary of research findings

8.2.1 Research methodology

The market research methodology applied in this project was developed through a piloting process, and built on the experience of various international research studies and recent KiwiRail research.

The project has shown that telephone-based surveys can be used successfully and cost-effectively for this application: if applied with care, they give values similar to those from face-to-face survey methods, but at around 35–40% of the unit cost.

The research endeavoured to develop survey techniques that minimise bias, especially in the main WTP value question, through the use of different starting points for the WTP value question and the use of bidding techniques when offering assistance to respondents who required further explanation of the question before completing their answer.

We have identified several aspects in which further improvements might be made in survey methods if further market research is to be undertaken on this topic. In particular, we suggest that the survey approach to valuing the various benefit subcategories could be improved by adopting a 'bag of points' method in place of the rating method used here.

8.2.2 Overall WTP valuations

Table 8.1 provides a summary of the mean WTP values derived from each of the project surveys. All values represent average annual WTP values per household in the local community, in NZ$2010/11. The following two values are provided for each survey:

- the total economic value (TEV) covering consumer surplus, OV and NUV (refer to tables 7.3 and 7.4)

- the 'additionality' component of this TEV that represents economic benefits not currently included in the NZTA EEM (refer to table 7.6).

Table 8.1   Summary of total economic value (TEV) and 'additionality' component results[a]

	Featherston	Oxford[b]	Te Kuiti	Tuakau
Rail OVs	$231/$132	-	$44/$25	$157/$86
Bus OVs	$60/$34	$98/$59 $66/$40	$60/$35	$45/$25

a)   In each case, the first figure given represents TEV, the second figure its 'additionality' component. Typical 95% confidence intervals on these results are around (±) 20–25% of the mean values given here (refer to table 7.3).

b)   The two Oxford bus values refer to the 'direct' and 'indirect' bus options (refer table 7.2).

8.2.3   Impacts of household characteristics

The research found that for any one community and PT option considered, there was a considerable spread of household WTP values. This was not unexpected. Our analyses showed that much of this variation may be accounted for by four household-related characteristics:

- distance from local centre

- expected frequency of PT use

- household income

- household size.

All four surveys showed very similar results regarding the variation in WTP with each of these characteristics, although the rate of fall-off in value with distance from the local centre differed between the communities (some communities had wider effective catchment areas than others). Further details were given in section 7.8.

8.2.4   Impacts of service characteristics

For an individual community (and transport option), the strongest factors influencing WTP variations between households appear to be those noted above. But when comparing across communities (and their transport options), the strongest factors influencing the overall WTP results related to the transport service itself – including its frequency, travel time, reliability, accessibility (to desired trip origins and destinations) and fares. The research was not designed to isolate the separate effects on WTP of these individual service characteristics.

In our view, the range of results found in the different surveys (communities/service options) is likely to reflect primarily the attractiveness of the specified PT service for providing access to the nearest main centre. The results are also likely to reflect the relative attractiveness of alternative (car) access to the main centre, and the range of facilities etc available in the main centre as compared with closer centres.

The *highest mean values* found in the surveys related to train services between Featherston and Wellington ($231/$132pa per household – table 8.1). The earlier Carterton survey (KiwiRail) gave a considerably higher value (TEV of $318pa per household). These two cases clearly had many similarities, in terms of the characteristics of the local communities, the service levels offered (travel time, reliability, comfort, etc), the attractiveness of these services relative to the car-based alternative (owing to the

Rimutaka Hill in particular), and the relatively good access to facilities, etc at both trip ends. These features are likely to have accounted for the relatively high WTP values found in both cases.

It is unclear why the Carterton TEV was considerably (c40%) higher than the Featherston value. However, we believe that the largest contribution to the difference in value was probably the difference in survey methodology, principally the wording of the key questions, in the two cases: the Carterton survey was rather less rigorous in terms of its efforts to minimise any bias in respondents' valuation estimates.[18]

The options with the *next highest mean values* were for the Tuakau rail service to Auckland ($157/$86pa per household) and the Oxford direct bus service to Christchurch ($98/$59pa per household). In both of these cases, the service suggested would be reasonably attractive (direct, moderately fast), but operating at a lower frequency than the services for the two Wairarapa townships. Also in both cases, the alternative of access to the main centre by car was more attractive than in the Wairarapa cases. These factors are likely to have largely accounted for the lower values in these two cases.

The remaining five communities/options had the *lowest set of values*, within a relatively narrow range – between $66/$40pa per household (Oxford, indirect bus) and $44/$25pa per household (Te Kuiti rail). In all five cases, the relatively low values may have been attributable (in large measure) to them offering relatively unattractive services with probably limited market demand:

- In the cases of Featherston (bus over the Rimutaka Hill), Oxford (indirect bus) and Tuakau (bus feeder to rail), these service options were unattractive relative to the primary options considered for these centres.

- In the Te Kuiti cases, the bus option was relatively unattractive on account of the longish journey time and the apparent modest demand for travel to Hamilton; while the rail option was unattractive in particular because the stations at both the Te Kuiti and the Hamilton ends were not well-located relative to most desired origins and destinations.

8.3   Comparison of findings with international research

Table 8.2 presents a summary of the main international research studies from which OVs/NUVs have been derived and which could usefully be compared with the results of the current research. However, there were substantial difficulties in attempting any comparisons of values, given:

- the relatively few relevant studies that have been undertaken/reported internationally

- the wide range of situations and types of services these studies have covered

- the differences in coverage, in terms of TEV components, of the various studies

- the different population bases used in the different studies (eg users v non-users, persons v households)

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18 The Carterton survey did not attempt to minimise starting-point bias by offering alternating high and low values as suggested starting points for estimating WTP values. In addition, it provided all interviewees with figures for the current average public transport household rates in the region, which (in retrospect) tended to bias respondents' valuations.

- the different price bases on which the results have been derived.[19]

The following comments should be interpreted in the light of these difficulties.

This research project (and the earlier Carterton research for KiwiRail) was primarily concerned with the valuation of services between small outer communities that were considerable travel distances (55–85km) and associated travel times (typically 1.0–1.5 hours) from a larger centre.

In general, car ownership in these New Zealand areas is very high. However, New Zealand incomes are significantly lower than those in most of the other countries (Great Britain, Netherlands, Italy, US) in which the international studies were conducted.

In regard to the studies covering *rail options*, the New Zealand study results could reasonably be compared with the results from the three international rail-based studies (Crockett 1992, Guers et al 2006, Humphrey & Fowkes 2006) as well as the earlier New Zealand (Carterton) study. For those comparisons:

- the three international results for TEV were $142, $300 and $456

- the Carterton study gave a value of $318

- the current study gave two values of $157 (Tuakau) and $231 (Featherston), with a third value (Te Kuiti) of $44.

Discounting the highest international value ($456), and setting aside the Te Kuiti result, then the remaining two study values ($157, $231) were broadly consistent with the two remaining international values ($142, $300) and somewhat lower than the earlier Carterton value ($318). This was an encouraging finding and would suggest that the study values were reasonably conservative (low).

The relatively low value obtained for the Te Kuiti rail option (lower than the Te Kuiti bus option assessed) was entirely consistent with the characteristics of the rail service in this case, which had poorly located stations at both ends of the service assessed.

In regard to the studies covering *bus options*, only two relevant international studies were available, by Bristow et al (1991b) in Great Britain and by Painter et al (2001) in the US. For those comparisons:

- the Bristow study found a TEV of $250pa, although it was unclear whether this was on a household or individual basis

- the Painter study found a lower average value, of $98pa for rural bus services, and this apparently related to a mixture of household and individual values

- the current study estimated five values, all in the range $45–$98, with three of these being in the range $60 –$66.

Our study results are thus reasonably comparable with, but generally lower than, the Painter study results (assuming these are on a household basis), but substantially lower than the Bristow result. It is not clear why the Bristow result is so relatively high, but we note that the study was the first of its kind and involved very small samples.

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19 The notes to table 8.2 describe the basis used to convert the original results for each study to NZ$ at July 2010 prices.

The finding from this research of five values for bus options within a reasonable range gives some confidence that our research methodology is providing valid and consistent results.

In summary, our main conclusions from these comparisons of the project results with other international research study findings are:

- There are only a small number of broadly comparable studies on this topic (only two in the case of bus services).

- Comparisons between studies are fraught given the wide range of base situations, options assessed, research methodologies, scope, etc of the international studies.

- The values (for TEV) derived from this project are sensibly consistent with the weight of evidence from the international studies, and arguably on the conservative (low) side.

- These international comparisons tend to provide some additional confidence as to the validity of our research results.

Table 8.2   Comparison of TEV research findings with international studies

Study	Survey year	Survey location	Population unit	Mode/situation	Study TEV estimates converted to NZ$2010 (annual)[a]	Comments
International studies						
Painter et al (2001)	1999	US – Washington State	Mixture of household and individual	Two rural bus services	$98	Mainly phone survey CV methodology, open ended
Bristow et al (1991b)	1990	GB – Leeds, Cheshire	Probably household	Two local bus services; one in an inner city area and one in a rural village	$250	Face-to-face interviews, very small samples CV methodology, iterative bidding procedure
Crockett (1992)	1992	GB – North England	Probably household	Interurban rail link connecting small towns to a major urban centre	$142	
Geurs et al (2006)	2004	Netherlands	Individual	Regional rail link connecting (urban and rural) towns to major urban centres	$300	
Humphrey & Fowkes (2006)	2001	Scotland	Household	Regional rail link connecting small towns to a major urban centre	$456	
Previous NZ studies						
KiwiRail (2010b, c)	2010	NZ – Carterton	Household	Regional rail link	$318	
Current study						
Wallis et al (2012)	2010-11	NZ – various	Household	Rail (4 locations)	$44–$231	
		NZ – various	Household	Bus (5 locations)	$45–$98	

a)   Converted from the original currency, first by escalation of the original study values, by applying GDP/capita growth factors, to July 2010 local prices; then by application of PPP exchange rates applying in July 2010 (refer to table 3.3 for further details).

9 Recommendations

9.1 Application of findings for economic evaluation

9.1.1 Overview

One of the intended project outputs was recommendations on 'Option values and non-use values (or ranges) that may be adopted as New Zealand default values, applicable to situations of new PT service introduction, service abandonment or major service changes'. This section addresses this aspect.

For the economic evaluation of significant PT service proposals (service introduction, abandonment or major changes) outside the urban centres, we suggest a two-pronged approach to estimating OV/NUVs be adopted:

- Default values resulting from this study, as outlined below, be applied, either as a component of the 'base case' benefit assessment or as a sensitivity test on the base case. This should be done for all relevant service proposals.

- For the more major service proposals or other cases where the OV/NUV benefits may be crucial to the decision as to whether to proceed with the initiative (or which option to choose), then a situation-specific survey should be also undertaken.

It is suggested that discussions be held between scheme proponents/evaluators and NZTA prior to undertaking any OV/NUV benefit assessments, to confirm the most appropriate approach.[20]

The default assessment of OV/NUV benefits would have two components:

- determination of an appropriate unit value per household in the relevant catchment area

- estimation of the number of households within the catchment area.

9.1.2 Unit option and non-use ('additionality') values

As noted earlier (section 8.2.4), the survey results suggest that unit benefit values may be categorised into one of three groups, based predominantly on the characteristics of the service option and how attractive it is likely to be from the perspective of potential users.

Table 9.1 summarises our proposed categorisation, providing a default value for each category and listing typical service and related characteristics that differentiate the categories. The unit values given for each category have been selected as typical of the 'additionality' values given in table 8.1 for the three groups of schemes as described in the text (and also shown in table 9.1).

As further surveys are undertaken, they may be added to this table and the categories and their associated default values refined as appropriate.

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20 One of the problems associated with local (situation-specific) surveys in situations where significant PT service changes are being contemplated (and are known about through the media, etc) is the likelihood of people's responses being affected by strategic bias (refer section 6.2). This may be difficult, if not impossible, to avoid entirely.

Table 9.1   Proposed default OV/NUVs for economic evaluation

Category	Notes on typical characteristics	Typical catchment area (km radius)	Default value (2010 $pa/ household)	Surveyed OVs within category (and additionality values)
High	• Good level of service (frequency, reliability, travel time, etc) • Car alternative relatively poor (congestion, difficult road conditions, etc) • Service well-matched to desired origins/destinations (stop locations, etc)	20–35km	$130	• Featherston – rail ($132) • Carterton – rail ($216)
Medium	• Between 'high' and 'low' characteristics[a]	10–25km	$75	• Tuakau – rail ($86) • Oxford – direct bus ($59)
Low	• Poor level of service (frequency, travel time, need to transfer, etc) • Car alternative relatively good • Service poorly matched to desired origins/destination (eg rail station away from town centre)	10–15km	$35	• Oxford – indirect bus ($40) • Te Kuiti – bus ($35) • Featherston – bus ($34) • Tuakau – bus feeder ($25) • Te Kuiti – rail ($25)

a)   It is difficult to be more specific about the typical characteristics of the 'medium' category, beyond saying that they are substantially worse overall than the 'high' characteristics and substantially better overall than the 'low' characteristics.

9.1.3   Catchment area households

The surveys undertaken for this (and previous) research have indicated that relevant catchment areas (within which households express significant OVs/NUVs) vary according to the characteristics of the service option, the associated WTP values, and also the following characteristics of the community in relation to its wider area:

• Catchment areas are most appropriately related to distance from the rail station or main bus stops within communities.

• While they may superficially be expressed in terms of a radius from this point, in practice they are likely to be irregularly shaped, reflecting natural barriers and the presence of nearby (competing) communities and the services they offer.

• In general, the greater the size of the catchment area, the higher the quality of the service offered.

As a very broad guide, typical catchment areas (radius from the main stop/station) are shown in table 9.1 for the three default categories. In the absence of better information, the number of households within these areas may be used as the basis of the default assessment of OVs/NUVs for economic evaluation purposes. However, we suggest that better estimates could be made in each specific case through a quick

examination of the local geographic and transport situation and discussions with a few people knowledgeable about the community.

9.2 Recommendations for future research and application

9.2.1 Future market research

Based on the experience to date, for future applications we recommend the following changes to the survey questionnaire used in this project:

- Reduce the number of subcategories for which valuations are estimated, by combining the categories 'friends and family' and 'others in the community', and eliminating the property subcategory.

- Adopt (or, at least, trial) the 'bag of points' approach to assessing subcategory values in preference to the rating approach.

Future research might usefully further investigate:

- the range of factors (singly or in combination) that influence household WTP values

- enhanced approaches to defining the effective catchment area of any service proposals.

9.2.2 Future economic evaluation applications

Our recommendations for how option/non-use benefit estimates might be incorporated within the NZTA's EEM, if desired by NZTA, are set out in section 9.1.

We also suggest that scheme evaluators should hold discussions with the NZTA to confirm the most appropriate approach to be applied, prior to undertaking any estimation of option/non-use benefits.

We recommend that the appropriate unit values and evaluation methodology (to be incorporated into the EEM, if required) be reviewed and updated periodically, in the light of further market research experience and the values obtained from this.

10   Bibliography

Australian Transport Council (2006) *National guidelines for transport system management in Australia 4: urban transport*. Canberra: Commonwealth of Australia.

Bakker P and P Zwaneveld (2009) *The importance of public transport. An inventory of impacts on society.* Ministry of Infrastructure and the Environment (VenW).

Bristow AL, PG Hopkinson, CA Nash and M Wardman (1990) Evaluation of the use and non-use benefits of public transport. Pp1–18 in *Proceedings of the Planning and Transportation Research and Computation Summer Annual Meeting*, 1 September 1990, Sussex University, UK.

Bristow AL, PG Hopkinson, CA Nash and M Wardman (1991a) Evaluation of the use and non-use benefits of public transport: report number 1 – development of a survey methodology. *Institute of Transport Studies (ITS) working paper 309*. Leeds: ITS Leeds. 44pp.

Bristow AL, PG Hopkinson, CA Nash and M Wardman (1991b) Evaluation of the use and non-use benefits of public transport: report number 2 – application of the method. *Institute of Transport Studies (ITS) Working Paper 310*. Leeds: ITS Leeds.

Bristow AL, PG Hopkinson, CA Nash and M Wardman (1991c) Use and non-use benefits of public transport systems – what is their relevance, can they be valued? *2nd International Conference on Privatisation and Deregulation in Passenger Transportation*, Tampere, Finland.

Cartea A, A Meaney, C Riley, T Worsley and H Zamani (2008) Using real option techniques in appraisal to value the options provided by transport networks. *European Transport Conference 2008,* 6–8 October 2008, The Netherlands.

Chang J S (2010) Estimation of option and non-use values for intercity passenger rail services. *Journal of Transport Geography 18*: 259–265.

Crockett D (1992) Should non-use benefits be included in social cost benefit analysis (MA dissertation). Leeds: ITS Leeds.

Department for Transport (DfT) (2007) The option values sub-objective. TAG Unit 3.6.1 (consultation draft January 2007 and Guidance June 2003). Accessed 12 September 2011. *www.dft.gov.uk/webtag/documents/expert/unit3.6.1c.php*

Department for Transport (DfT) (2011) Transport analysis guidance: WebTAG. Accessed 12 September 2011. *www.dft.gov.uk/webtag/*

ECONorthwest and Parsons Brinckerhoff Quade & Douglas Inc (PBQD) (2002) Estimating the benefits and costs of public transit projects: a guidebook for practitioners. *Transportation Research Board TRCP Report 78*. 148pp.

Federal Transit Administration (FTA) (2007) *FY 2009* New starts and small starts evaluation and rating process. Accessed 30 September 2011. *www.fta.dot.gov/planning/newstarts/planning_environment_9063.html*

Fowkes AS (2008) Comments (unpublished) prepared by Tony Fowkes, ITS Leeds, on *How should real transport options be measured?* Department of Transport, Scotland.

Geurs KT, R Haaijer and B van Wee (2006) The option value of public transport: methodology for measurement and case study for regional rail links in the Netherlands. *Transport Reviews 26*, no.5: 613–643.

Gwee E, G Currie and J Stanley (2008) Evaluating urban railway development projects – an international comparison. *31st Australian Transport Research Forum (ATRF),* Gold Coast, October 2008. 15pp.

Humphreys RM and AS Fowkes (2006) The significance of indirect use and non-use values in transport appraisal*. International Journal of Transport Economics, XXXIII,* no.1: 17–35.

Humphreys RM (2004) *Assessing indirect use and non-use values for rail transport using expressed stated preference techniques.* PhD thesis (unpublished), ITS Leeds.

Jackson JA (2010) *Appraising rural railways: are they a special case?* PhD thesis, University of Leeds.

KiwiRail (2010a) Preliminary economic evaluation handbook – passenger rail services. Wellington: KiwiRail Group.

KiwiRail (2010b). Survey notes S2: Carterton option and non-use survey (unpublished). Wellington: KiwiRail Group.

KiwiRail (2010c), Survey notes S3: Ohakune option and non-use survey (unpublished). Wellington: KiwiRail Group.

Laird JJ, RP Batley, CA Nash and K Geurs (2006) *Option values, non-use values and transport appraisal.* Final report to Department for Transport. Leeds: ITS Leeds. 52pp.

Laird JJ, K Guers and C Nash (2009) Option and non-use values and rail project appraisal. *Transport Policy 16*: 173–182.

Laird J, P Mackie (2009) *Review of economic assessment in rural transport appraisal.* Report to Transport Scotland (Transport Research Series, Scottish Government Social Research).

Laird JJ, K Geurs and CA Nash (2007) *Option and non-use values and rail project appraisal.* Paper to European Transport Conference, Strasbourg.

Laird JJ, J Nellthorp and PJ Mackie (2004) *Option values, business and population impacts in transport assessment – scoping study.* Report to Highlands & Islands Enterprise. Leeds: ITS Leeds.

Litman T (2011) *Evaluating public transit benefits and costs: best practices guidebook.* Victoria: Victoria Transport Policy Institute.124pp.

McDonnell S, S Ferreira and F Convery (2009) Bus priority provision and willingness to pay differentials resulting from modal choice and residential location: evidence from a stated preference survey. *Journal of Transport Economics and Policy 43*, part 2: 213–234.

NZ Transport Agency (NZTA) (2010) *Economic evaluation manual* (vol 1), 1st ed, (amendment 0). Wellington: NZ Transport Agency.

NZ Treasury (2005) *Cost benefit analysis primer*. Wellington: NZ Treasury.

NZ Treasury (2010) *Better business cases for capital proposals toolkit*. Wellington: NZ Treasury.

Organisation for Economic Co-operation and Development (OECD) (2011) Improving the practice of transport project appraisal. *Round Table Report 149*. 112pp.

Organisation for Economic Co-operation and Development (OECD) and World Bank (2005) *Handbook of national accounting: integrated environmental and economic accounting – studies in methods,* series F, no.61, rev.1, glossary. OECD.

Oxera Consulting (2008) *How should real transport options be measured?* Report for Department for Transport, UK. Oxford: Oxera Consulting.

Painter KM, RD Scott II, PR Wandschneider and KL Casavant (2001) Using contingent valuation to measure user and non-user benefits: an application to public transit. *Review of Agricultural Economics 24*, no.2: 394–409.

Roson R (2001*)* Assessing the option value of a publicly provided service: the case of local transport. *Urban Studies 38*, no.8: 1319–1327.

Transport Canada (1994) Guide to benefit–cost analysis in Transport Canada*.* Accessed 30 September 2011. *www.tc.gc.ca/eng/corporate-services/finance-bca-101.htm*

Transportation Research Board (TRB) (2002) Estimating the benefits and costs of public transit projects: guidebook for practitioners. *Transit Cooperative Research Program (TCRP) report 78*.

Weisbrod, BA (1964) Collective-consumption services of individual-consumption goods. *Quarterly Journal of Economics 78*, no.3: 471–477.

Appendix A   International stated preference studies – individual study descriptions

A.1   Introduction

As outlined in section 3.1, our review of the international literature identified six previous studies that used stated preference (SP) methods to estimate option values (OVs) and non-use values (NUVs) associated with local public transport (bus and rail) services. This appendix presents a description of the scope and results for each of these studies: it draws heavily on a previous report by ITS Leeds for the UK Department for Transport (Laird et al 2006). Further summary and interpretation of the results was given in tables 3.1–3.3 and section 3.2.

In addition, a seventh study of relevance (Jackson 2010), which was made available at a later stage in the project, was also reviewed; a summary of this is provided in the last section of this appendix.

A.2   Use and non-use values of bus services in Leeds and Cheshire (UK)

The first empirical study on non-use benefits was conducted by Bristow et al (1991a, 1991b) at ITS Leeds. The authors developed a methodology using travel diaries and an iterative bidding CV technique (in face-to-face interviews) to examine the willingness to pay (WTP) for local bus services in two contrasting areas in the UK. The first was Hawksworth, a 'deprived' urban area 18km and half an hour's drive time from Leeds, with low levels of car and home ownership. The second was the 'affluent' rural village of Rainow in Cheshire (the nearest centre and access to the rail system was at Macclesfield, 5km away).

WTP for non-use was asked in the context of a threat of service withdrawal, and distinguished between five non-use categories:

a)   Option value (bus is standby in case of unexpected trips)

b)   use by others in the household

c)   use by others in the community

d)   congestion and environmental effects

e)   accessibility effects (providing a means of contact and social cohesion).

The WTP was derived for use and non-use as a group of benefits. WTPs were not derived for each non-use category, but respondents were given 100 points to allocate between the specified non-use categories. The sample sizes were relatively small – fewer than 50 respondents in each area. Bus users placed a higher value on 'own use' value than option and non-use values; about 80% of their total value (about £2.5 per week) consisted of consumer surplus (ie the difference between maximum WTP for trips and fare paid). Surprisingly, non-users gave a relatively high value to retain the bus service (about £1.5 per week) compared with the OV and NUV of bus users (about £0.5 per week).

Bristow et al gave two explanations for this effect. Firstly, users had already expressed their WTP in terms of fares for their own use and could have been financially constrained when asked to give an OV and NUV. Secondly, the results were not corrected for socio-economic differences; non-users in the sample, for example, had higher incomes than bus users and had a greater ability to pay.

Another explanation is that OV was probably included in the use value of bus users (ie maximum WTP before use is ceased), whereas OV was included in the OV and NUV of non-users. Further, the prioritisation of OV and NUVs between users and non-users differed strongly. Users placed the greatest priorities on use by relatives and friends and accessibility effects, whereas non-users found OV, environment and congestion effects the most important.

A.3   Non-use value of Settle–Carlisle rail service (UK)

Follow-on research to the above study was conducted in a Master's dissertation (Crockett 1992, also at ITS Leeds) to examine values placed on the retention of the Settle–Carlisle rail service: this rail link runs a distance of approximately 120km through predominantly rural areas of NW England, with very little commuter use. The study involved an assessment of individual WTP for an aggregate bundle of non-use benefits, defined to include standby value, use by friends and relatives, benefits for the community, and benefits to road users and local industry.

The approach adopted was similar to the above study, employing an iterative bidding (IB) CV question, through 'face-to-face' interviews. Crockett interviewed 34 residents in one community, the town of Settle in the Yorkshire Dales. He obtained an average NUV of 68.5p per week, or £36 per year (in 1992 prices): this comprised 82 pence per week (£43 per year) for users and 46 pence per week (£24 per year) for non-users. These results differed from the previous study, where non-users had the higher NUVs.

A.4   Indirect and non-use values of the Edinburgh-to-North Berwick railway link in Scotland (UK)

Humphreys (2004) and Humphreys and Fowkes (2006) presented the first empirical study in the academic literature that broke down the different components of the total economic value. The study area was the Edinburgh-to-North Berwick railway line (approximately 60km and used by commuters) in Scotland. Humphreys combined different SP techniques. First, contingent valuation (CV) was used to quantify train-users' consumer surplus. Respondents were asked to indicate, using a payment ladder, the maximum amount they would be willing to pay to ensure the continued availability of the rail service for their current level of use, at the current level of fares. Second, a choice experiment was conducted to quantify OV and 'indirect use' categories. In the experiment, NUVs were broken down into different categories:

- functional indirect use of rail – operationalised as road traffic changes on parallel roads

- vicarious indirect use of rail – operationalised in terms of an unspecified discount rail card for individual council taxpayers and their immediate family members

- altruistic value – operationalised in terms of an unspecified discount rail card for other specific population groups, eg disabled travellers, pensioners and/or school children.

Option values were not included as a separate attribute in the choice experiment, but were estimated as a 'residual' category, representing the portion of the total economic value that a household was willing to

pay over and above their consumer surplus and not captured by one of the other elements of total economic value included in the experiment.

Humphreys estimated total WTP for options involving different rail and (parallel) bus service frequencies.[21] Total OVs and NUVs were estimated between £167 and £195 per person per year for respondents in the sample. The major component was OV, estimated at between £150 and £172.

A.5 Option value of local bus and rail services in northern Italy

Roson (2001) conducted a choice-modelling experiment to analyse the WTP for changes in public transport service levels in two areas in Northern Italy connecting a small town to a major urban centre, ie the Piove–Padua bus link (a distance of 20km) and Mogliano–Venice railway link (a distance of 15km with a frequent urban commuter service).

The survey included regular users, occasional users and non-users, reflecting the fact that most people usually used both private and public transport services, although in varying proportions. Respondents were asked in face-to-face interviews to choose between a menu of alternatives, including the existing situation. The sample sizes were about 200 and 120 respondents respectively in the two study areas. The choice options varied in terms of the daily service frequency and monetary amounts of local taxation; an increase in the service frequency was associated with higher local taxes on real estate property, while taxation was diminished when a lower service frequency was accepted. The variation in local taxation was estimated considering the current total cost of the service and the share of it covered by public subsidies, assuming that each variation in the frequency level implied a proportional variation in subsidies. The author estimated a discrete choice model to estimate WTP, including socio-economic variables (such as age, sex, education and income levels) as independent explanatory variables.

The author found that respondents were willing to pay a little more in taxes in order to increase the service level; about two-third of the respondents preferred the current situation to alternative service frequency and taxation levels. The difference in WTP for service improvements between users and non-users was significant, but the amounts were relatively small in both cases. Respondents who regularly commuted by public transport to other destinations than the destination in the research question (ie non-users of the routes considered) had a higher willingness to pay than daily users of the routes. Roson stated that about two-thirds of the responses in the experiment were 'conservative' – that is, the preferred option was the status quo. Roson stated that this result probably did not stem from a real preference for the current situation, but from the fact that some people preferred things to remain unchanged. Other reasons might have been because the issue was too complex for respondents to select a better alternative, or they were not sufficiently familiar with the transport system to make an informed choice.

Unfortunately, the paper did not present the full results of the author's analysis – it presented the impact of socio-economic variables on stated willingness to contribute to subsidisation of the public transport services, but WTP values were not reported. Another weakness of the study is that the author did not distinguish between different motives for WTP for service level changes: the term 'option value' was used for what was probably a mixture of consumer surplus, OVs and NUVs. Moreover, WTP to prevent a

21 The parallel bus service took more than twice as long as the train service (72–86 mins versus 33 mins), but operated more frequently.

complete service withdrawal was not examined, and thus probably strongly under-estimated individuals' total WTP values. Hence no useful OVs or NUVs could be derived from the study.

A.6 Use and non-use values of rural bus services in Washington State (US)

Painter et al (2001) examined the WTP and willingness-to-accept (WTA) of users and non-users for two local bus (transit) services in two rural areas in Washington State in the US. The study involved a short telephone survey and an elaborate CV questionnaire administered to a panel of (80–90) randomly selected local residents. CV participants were about equally divided into users and non-users of the transit service. CV participants were asked:

a) how much they would be willing to pay monthly, over and above any amount currently being paid, for:

    – an 'imaginative' local transit system that would reflect their idea of an efficient transit system

    – the transit system if they became unable to use it (ie NUV)

    – the current transit system

    – a fare-free bus system

b) how much they would need to be compensated (WTA) for giving up access to the transit system.

Consistent with prior expectations, users of the transit system were willing to pay more towards maintaining the existing transit system than non-users (US$12.50 and US$6.40 per month, respectively). Clearly these user WTP values also included some use benefits. This study also identified an asymmetry between WTP values and WTA values, as has also been found in other CV studies. For example, the corresponding WTA values (ie the compensation required to accept service withdrawal) were US$62.40 and US$30.40 monthly, respectively. Furthermore, the study showed significant NUVs (US$4.50 per month for transit non-users) relative to total WTP for the transit system.

Painter et al conducted additional statistical analysis to test the influence of socio-demographic variables and altruistic motives (to provide transit to others outside the family and friends who could not afford their own transport) on each of the economic valuation questions. Income was found not to be a significant factor in explaining WTP/WTA values, whereas altruistic motives were found to be a strongly statistically significant predictor.

A.7 Option values and non-use values of regional rail services in the Netherlands

Geurs et al (2006) examined the option value of regional rail links in the Netherlands. An internet-based survey instrument was constructed to include SP experiments to elicit WTP values for specific rail links at different levels of service quality. The methodology was applied in two case studies to derive reliable WTP estimates of residents in the service area of rail links for option use, additional use and non-use.

Two railway links with a typical regional transport function were selected: both had relatively low use and cost-coverage levels below 50%. The first one, the Arnhem–Winterswijk light-rail link (a distance of around 70km) was located in a low-density rural area situated in the eastern part of the Netherlands and

connecting 10 small- to medium-sized rural towns (5000–40,000 inhabitants) to the larger town of Arnhem (about 130,000 inhabitants). The second one, the Leiden–Gouda railway link (a distance of approximately 40km) was situated in the highly urbanised western part of the Netherlands and connected three medium-sized towns to the larger towns of Leiden (about 120,000 inhabitants) and Gouda (about 70,000 inhabitants). Respondents were recruited from a large internet panel in the Netherlands that provided a relatively high spatial coverage of the country (more than 200,000 panel members, about 2% of the households in each municipality). Internet panel members living in the case study areas were recruited for the study.

The survey included three different SP experiments, linked to actual or hypothetical trips made by the respondents:

- A 'consumer surplus' choice experiment was constructed to elicit the maximum number of train users willing to pay for a trip using the selected railway link. Combined with information on trip costs from the second part of the survey, consumer surplus could be estimated. Respondents had to choose from three alternatives (two train alternatives plus a no-service case), whereas the other choice experiments had two alternatives. The no-service option was included to elicit the maximum amount respondents were willing to pay for a train service. Train travel times were included as a variable to allow a consistency check with values of time found in other studies, and train ticket price was included as payment mechanism.

- An 'option price' choice experiment was constructed to elicit the total WTP for improvement or deterioration of train service levels. Option prices were elicited as the total WTP to prevent closure of the railway service. Option values for train users were estimated by subtracting expected consumer surplus from the option price. The choice experiments included increases and decreases in train frequency, number of railway stations, and used monthly local property taxes as a payment vehicle.

- A 'non-use value' choice experiment was constructed to elicit WTP for improvement or deterioration of train service levels when the respondent (and other household members) no longer used the railway link. This experiment had the same design as the previous experiment, but here, respondents were asked about a situation in which the respondent and other household members would no longer use the railway link – eg the respondent would henceforth travel by car, or their current trip destination had changed (eg relocation of work, school), etc.

After cleaning the data, 779 valid questionnaires remained, of which 395 were in the case study area of Arnhem–Winterswijk and 384 in Leiden–Gouda. On average, the consumer surplus for train users was about €5 per month. OV estimates were derived as the average option price minus the average monthly consumer surplus for each respondent group. It was found that train users were willing to pay a significant amount over and above their consumer surplus for the continued availability of the railway link: an average of about €9 per month in each case study area. The OV estimates for 'possible option users' (car drivers who would consider using the train in future unexpected situations if the car was not available) were significant (at €11 and €14 per month for the Leiden–Gouda and Arnhem–Winterswijk areas, respectively): this indicated the importance of the railway links as a back-up transport mode for car-owners for their occasional use.

Respondents seemed to be willing to pay significant amounts to maintain the railway link in a non-use context. However, the values obtained in the study were subject to doubts. High NUVs for users were hypothesised to be biased by the difficulty of the mental task train users were presented with in the choice experiment, ie having to imagine a situation in which they and other household members would no longer use the railway link. The mental task was obviously much easier for non-users: non-train-using household

members gave WTP estimates of €6–7 per month, which were much lower than those for train users (€16 per month). Total economic values were not computed because of the risk of double-counting benefits.

Geurs also found that the WTP for rail service improvements was less than for the continued availability of existing rail links. That is, WTP for rail service improvements was valued less than preventing rail service deteriorations. He attributed this asymmetry to the concept of loss aversion in, for example, prospect theory. This result is consistent with the differences between WTP and WTA values found in the Painter et al study (above) and in other CV studies.

A.8 Option and non-use values of North-west England rural rail services

This work (Jackson 2010) investigated the value of services held by local residents in terms of OVs and NUVs.

The work looked at three rail lines in northern England, namely:

- Skipton to Lancaster (SL)

- Skipton to Carlisle (SC)

- Carlisle to Hexham (CH).

The research aims were as follows:

- Estimate service-related user benefits held by users of services in their current form.

- Estimate, for appraisal purposes, the likely effect of replacing existing rail services with road (bus/coach) services on a permanent basis.

- Assess the effects of varying the quality of service on feeder revenue to the rest of the rail network, particularly by looking at the importance of reliability.

- Obtain a large sample of non-use valuations and compare them across a range of circumstances.

- Complete an appraisal of a route based on the results presented.

The method used was self-completion post-back SP questionnaires, from which 326 adequately completed forms were obtained (10% of the distributed forms).

Results for seven value subcategories were obtained – the current use of the service, unanticipated future use, insurance mode, use by future generations, benefit to friends/family, benefit to the elderly, environment and congestion:

- OVs were derived as the sum of unanticipated future use and insurance[22] mode values

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22 This relates to the use of the lines as feeder routes and the need to minimise impacts potentially affecting connections with other services. Frequent and reliable feeder services mitigate these potential impacts and are perceived to act as 'insurance'.

- NUVs (for appraisal purposes) were derived as the sum of use by future generations, benefit to friends/family, and benefit to the elderly.

The current use, environment and congestion values were reported in terms of aggregate values but not included for option and non-use valuations that were intended to be applied for economic appraisal purposes.

The OVs and NUVs found for residents served by these lines were lower than found in previous studies (eg Humphreys and Fowkes 2006), partly because the rail services included in the research were primarily used for social and leisure purposes and had very little commuter use.

The results presented in the report (for the SL and SC lines) were disaggregated by the following subcategories:

- PT user or non-user

- station catchment or settlement catchment

- good or poor PT alternative

- current service frequency or lower service frequency.

Interpreting these results, it appears that the OVs and NUVs that were of most relevance to current New Zealand research were on the basis of catchment areas, current frequencies, and situations where alternative public transport services were poor. On this basis, values could be derived of approximately £70pa for users and £30pa for non-users.

It should be noted that the OVs were derived in the context of a bus replacement option being provided, rather than being compared with the alternative of no public transport being available at all.

When incorporated into an appraisal, the resultant OVs and NUVs were found to be similar in scale to calculated externalities, and on average, around a fifth of the calculated consumer surplus.

Given the nature of the services considered, the results from Jackson's research may be more comparable with earlier OV and NUV research undertaken in Ohakune (Kiwirail 2010c) than with this research report's focus on peripheral areas with higher commuter potential.

Appendix B   Previous New Zealand (KiwiRail) surveys – Carterton and Ohakune

B.1   Introduction

Initial OVs and NUVs for New Zealand were derived from international experience (DfT 2007) and have been included in the KiwiRail *Preliminary economic evaluation handbook* (2010a) as follows:

Table B.1   Kiwirail Handbook OV / NU values for economic evaluation

Service type	Annual handbook value (per household)
Regional services (eg Carterton)	$225.00
OVs + NUVs	*$135.00 + $90.00*
Long-distance services (eg Ohakune)	$112.50
OVs + NUVs	*$67.50 + $45.00*
Urban services *OV only*	*$135.00*

Values relating to delay and environmental effects from rail services were excluded from the above values, as these were allowed for in other economic evaluation procedures in the Handbook.

B.2   Survey methodology

Surveys were undertaken as described below, to obtain some New Zealand-specific estimates of OVs and NUVs. The surveys were intended for preliminary assessment only, rather than to provide detailed valuation estimates, and thus involved relatively small samples. The survey methodology drew on previous market research on OVs and NUVs (eg Bristow et al 1991a, b). The methodology that was developed (and subjected to peer review) involved telephone-based interviews.

The surveys were undertaken in November 2009, in two locations served by passenger rail:

* Carterton (50 households) – a rural town c85km from Wellington, having substantial commuter flows and served by a regional rail passenger service

* Ohakune (49 households) – a remote tourism-based community 290km from Wellington and 360km from Auckland, served by a daily long-distance passenger service.

In addition to establishing OVs and NUVs, the survey methodology differentiated between rail users and non-users.

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B.3   Carterton results – summary

Results from the Carterton survey, in terms of annual WTP values per household, are summarised in the table below (KiwiRail 2010b).

Table B.2   Carterton OV/NU survey results

Carterton	User	Non-user	All	Proportion
OV only	$58.69	$45.25	$53.86	16.9%
NUV (excluding environment and delay)	$169.25	$149.83	$162.26	75.1%
Subtotal (CBA purposes)	$227.95	$195.08	$216.11	67.9%
Environment and delay only	$110.05	$88.03	$102.13	32.1%
All	$338.00	$283.11	$318.24	100.0%

The following points can be made:

• Stated OVs and NUVs in Carterton were substantial (at $216 per annum) and close to the estimated Handbook value ($225). This reflected the quality, speed and frequency of the Wairarapa regional rail service.

• The average distance of interviewed households from the station in Carterton was 3.4km.

• The proportion of survey respondents who were also (at least occasional) rail users was high, at 64%.

B.4   Ohakune results – summary

Results from the Ohakune survey, in terms of annual WTP values per household, are summarised in the following table (KiwiRail 2010c).

Table B.3   Ohakune OV/NU survey results

Ohakune	User	Non-user	All	Proportion
OV only	$22.62	$21.03	$21.52	17.3%
NUV (excluding environment and delay)	$73.57	$57.85	$62.66	74.4%
Subtotal (for cost–benefit analysis purposes)	*$96.19*	*$78.88*	*$84.18*	*67.5%*
Environment and delay only	$49.41	$36.59	$40.52	32.5%
All	$145.60	$115.47	$124.69	100.0%

The following points can be made:

• Significant OVs and NUVs were found to exist in Ohakune – this had not been evident in the literature prior to this survey, as this community lies within a remote rural area, served by an infrequent and long-distance rail service.

• The OVs and NUVs in Ohakune for long-distance services ($84.18pa) were lower than the estimated Handbook value ($112.50) and were (as anticipated) substantially lower than those identified for regional services in Carterton.

- The average distance of interviewed households from the station in Ohakune was 5.3km.

- The proportion of survey respondents who were also rail users was 31%.

B.5 Discussion of results and conclusions

A number of issues were encountered during the course of the surveys – as summarised in the table below.

Table B.4   Carterton and Ohakune survey issues and responses

Item	Issue	Response
Overall value	Need to provide guidance in some cases without introducing bias	Interviewers were told how to deal with this and notes were provided as a guide – however, further emphasis on this issue during training is recommended
OV	Difficulty resolving user $ OV value with overall $ values for rail	Potentially resolved by revisiting the overall and option $ values given and explaining the implications
OV and NUV ratings	The rating system introduces divisions between categories that the respondent may not be aware of	Potentially resolved by revisiting the ratings given and explaining the implications (or by using a 'distribution of points' type system if personal interviews will be undertaken)
NUV	Difference between the non-use values of users and non-users	Likely to be corrected if the above changes are made
Consumer surplus	Difficulty in obtaining a reliable response within context of this survey	Remove from the questionnaire
Income question	Difficulty in obtaining a response over the telephone	Treat as an optional question
Fare	A number of respondents do not pay for rail travel	Examine responses to see if this introduces any significant distortion in valuations given
Sample	Difficult to estimate how representative the sample is – eg if there is no independent data on what proportion of households are rail users	Data from the census and national household travel survey could be reviewed to provide some indication of mode use

Despite the issues (described above) that were involved with undertaking telephone surveys for this type of questionnaire, the results of the survey provided a useful indication of the nature and scale of OVs and NUVs held by peripheral and remote communities.

In addition to the WTP valuations derived, a number of conclusions can be drawn from the research in relation to research methods, findings and potential further applications, as follows:

- The New Zealand survey information obtained in this preliminary study provides a useful resource for the evaluation of regional and long-distance services.

- The surveys identified willingness to pay OV/NU values that are similar in scale to those included in the KiwiRail Handbook.

- There is a case for adjusting the Handbook values to be consistent with New Zealand surveys.

- Further surveys could usefully be undertaken to confirm OVs and NUVs in other communities along the Overlander route and along the Coastal Pacific and TranzAlpine routes, and in other communities served by regional rail services (in the Wairarapa and elsewhere).

Appendix C   Featherston survey report

C.1   Featherston survey methodology

This appendix describes the study survey of households in the Featherston area (South Wairarapa district of Wellington region). Featherston is a community of 3504 people.

The Featherston area is served by regular rail services operating between Wellington and Masterton, and also by local buses within the Wairarapa. The area is subject to a transport rate.

The following two PT options were addressed in the survey:

- **'Primary' option** – retention of existing rail services, as compared with a 'base case' of no PT services operating between Featherston and Upper Hutt.

- **'Secondary' option** – providing a bus service between Featherston and Upper Hutt to connect with the Upper Hutt–Wellington rail service, compared with the base case as above.

The Featherston survey was undertaken as a pilot survey for the subsequent main market research. Given its pilot nature, two survey delivery methods were applied – face-to-face interviews (households in the Featherston town area) and telephone interviews (only Featherston entries that were in the Wairarapa White Pages directory). Because of the success of the pilot survey, the Featherston results were included with the main survey results (three centres) in presenting the overall study results.

A range of questions were asked, with the most important being:

- Question 4: WTP for the introduction of direct rail services.

- Question 5: WTP for the introduction of a shuttle-bus service to Upper Hutt.

- Question 6: Importance rating for PT service benefits (direct rail option).

All interviews were undertaken with adults who were able speak on behalf of each household. Interviews took place on weekdays and Saturdays: no Sunday surveys were undertaken.

In addition to investigating OVs and NUVs, the survey methodology differentiated between PT users and non-users.

The interview form was systematically worked through by the interviewer, recording any additional comments made by the respondent as they were made.

The survey team was made up of university undergraduates, each of whom was trained prior to being asked to conduct interviews. The training consisted of:

- an overview of the nature and purpose of the survey

- an explanation of key terms, such as willingness-to-pay

- a detailed exploration of the survey form, and clarification of any points arising

- a practice face-to-face interview

- a practice telephone interview.

C.2 Featherston results and commentary

C.2.1 Interviews and grading

A total of 175 households were approached and 106 interviews were completed (the response rate was 61% of those approached), as shown in table C.1.

Subsequent grading of interviews reduced the number of selected 'highest-quality A-grade interviews' to 67. All the results presented in this appendix (and elsewhere in this report) relate to the A-grade interviews only, unless specifically noted. The reason that interviews were graded was to eliminate responses involving inconsistencies, uncertainties or other problems. A summary of the response rates is given in table C1.

C.2.2 Segmentation of responses

For analysis purposes, responses were split into 'PT user' (defined as expecting to take at least one public transport trip a year) and 'non-PT user'.

The WTP values expressed were divided into components (regular use, option availability and non-use effects). Regular use and externality effects (a subset of the non-use effects) were separately identified to allow WTP values to be derived for economic evaluation purposes.

C.2.3 Overall results

Results from the survey, in terms of WTP weekly values per household, for the sample of 67 highest quality (A-grade) interviews, are summarised in the following:

- Table C.2 – detailed results by PT-use category

- Table C.3 – summary results by PT-use category

- Table C.4 – WTP mean values and confidence intervals

- Figure C.1 – summary of values by benefit category

- Figure C.2 – distribution of total WTP values.

Table C.1   Summary of Featherston survey response rates

Interview type	Successful interviews		% of total requests	Not completed	% of total requests	No. of refusals	% of total requests	Total requests	Not in	Visits made
	A grade	All								
Face-to-face	25	48	77%	5	8%	11	18%	62	47	109
Phone	42	58	51%	5	4%	50	44%	113	166	279
All	67	106	61%	10	6%	61	35%	175	213	388

Table C.2   Featherston detailed results

Category	Sample size	Average distance (km) home to rail station	Regular use	Option – occasional use	Non-use friends & relatives	Non-use – community	Non-use – local economy	Reduced delay	Improved safety & environment	Regular use, delay, safety & environment	Option and non-use (excluding regular use, delay, safety & environment)	Overall WTP value per year – rail	Option and non-use WTP value per year – rail	Overall WTP value per year – bus	Option and non-use WTP value per year – bus
	No.	km	%	%	%	%	%	%	%	%	%	$	$	$	$
PT user	49	2.88	11.4%	10.4%	12.4%	17.3%	15.4%	16.6%	16.5%	44.5%	55.5%	$244.73	$135.88	$66.90	$37.14
PT non-user	18	1.23	1.4%	8.3%	13.5%	20.9%	19.5%	17.5%	18.8%	37.8%	62.2%	$193.56	$120.48	$40.44	$25.17
Total	67	2.44	9.1%	9.9%	12.7%	18.1%	16.3%	16.8%	17.0%	43.0%	57.0%	$230.99	$131.74	$59.79	$34.10

Table C.3   Featherston summary results

Category	Sample size	Distance (km) to centre	Regular use, property, delay, safety & environment	Option and non-use (excluding regular use, property, delay, safety & environment)	Overall WTP value per year – direct rail	Option and non-use WTP value per year – direct rail	Overall WTP value per year – bus	Annual WTP – option and non-use only – bus
	No.	km	%	%	$	$	$	$
PT user	49	2.88	44.5%	55.5%	$244.73	$135.88	$66.90	$37.14
PT non-user	18	1.23	37.8%	62.2%	$193.56	$120.48	$40.44	$25.17
Total	67	2.44	43.0%	57.0%	$230.99	$131.78	$59.79	$34.10

Table C.4   Featherston WTP mean value and confidence interval – rail option (values per week)

Sample size	67
Mean value (sample)	$4.44
Standard derivation	$4.72
Confidence interval (95%)	±$1.13
Mean value (population) – range (95%)	$3.31 to $5.57

Figure C.1   Featherston WTP value percentages, by benefit category (rail option)
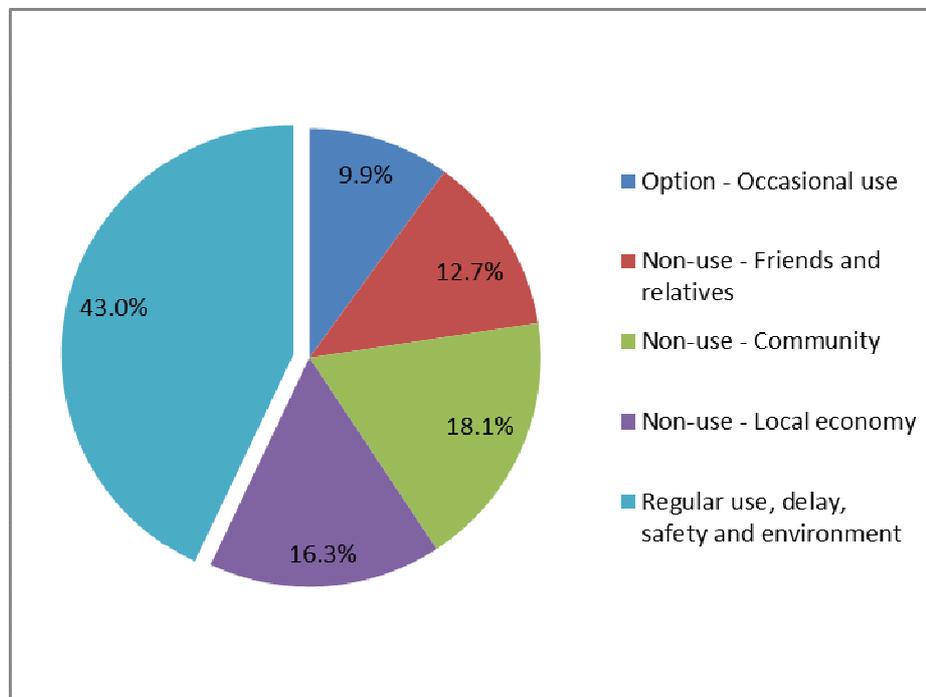
C.2.3.1   Rail option

At the aggregate level, the results indicate that the average total OV/NUV WTP value to retain the existing rail service between Featherston and Wellington was $231pa ($4.44 per week) per household. The distribution of weekly values is shown in figure C2.

The following points can be made:

- The 95% confidence interval on this mean value was ±$59pa (ie $172–$290)

- The median value was $156pa ($3.00 per week)

- The mode value was $260pa ($5.00 per week).

C.2.3.2   Bus/rail option

The average total OV/NUV WTP value for the bus/rail option (involving buses between Featherston and Upper Hutt, integrated with the Upper Hutt–Wellington trains) was $60pa ($1.15 per week) per household.

Figure C.2   Featherston distribution of total WTP values (rail option) – $/week
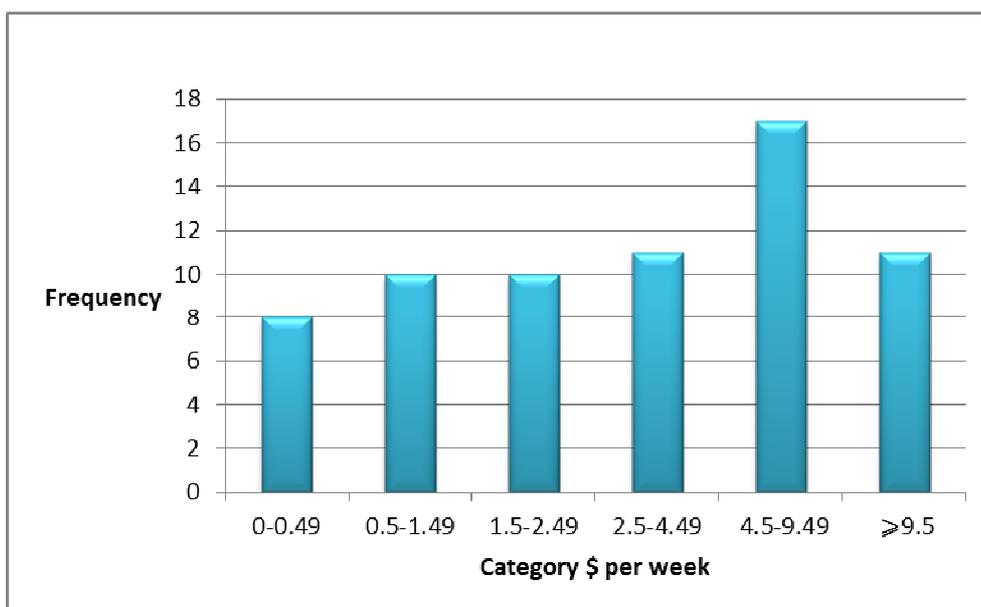
C.2.4   Factors influencing WTP values

The following summarises the survey findings on demographic, geographic, etc factors influencing WTP values (for the rail option).

C.2.4.1   Distance from centre

The variation of WTP values with distance from the local centre is as shown in figure C3.

WTP values tended to decrease with increasing distances from the centre: the average value, at 10–15km from the centre, was around half that close to the centre. This pattern of results was as expected, but the slope of the regression line is not significant (at the 95% level).

Figure C.3   Featherston WTP, by distance
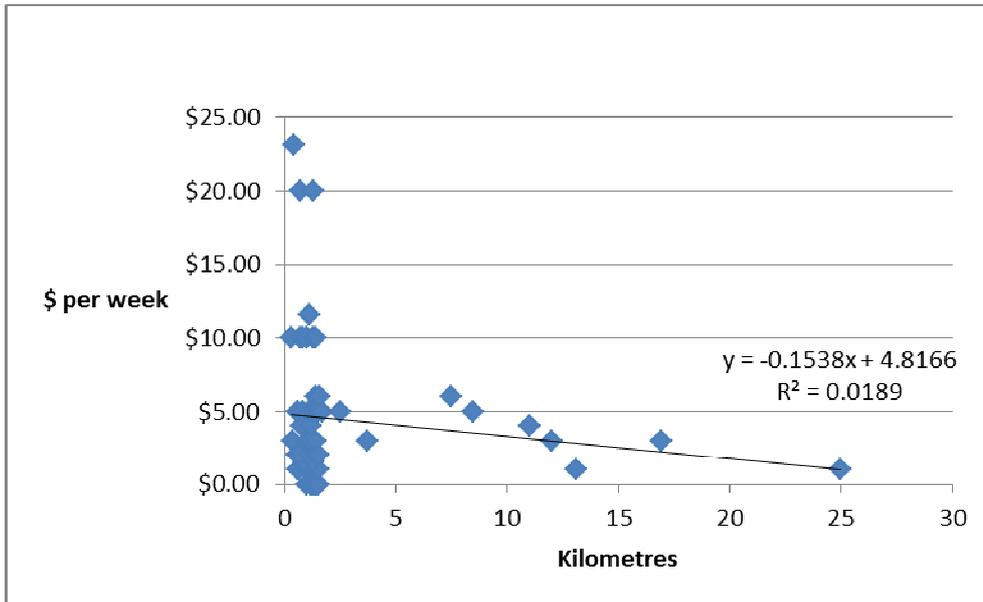
C.2.4.2   Level of PT use

The variation of WTP values with expected PT use is shown in figure C4.

WTP values tended to increase with increasing levels of PT use: the average value for the '1–3 days/week' category was around three times that for the 'never' category. This result was as expected, but the slope of the regression line is not significant (at the 95% level).

Figure C.4   Featherston WTP, by PT use

Key: 1) Never   2) A few times/year   3) 1–3 days/month   4) 1–3 days/week   5) Most days

C.2.4.3   Income category

The variation of WTP values with overall household income category is shown in figure C5.

The WTP values tended to increase with increasing income. The average value for the highest income category was around two to three times that for the lowest category. This result was as expected and the slope of the regression line is significant (at the 95% level).

Figure C.5   Featherston WTP, by household income

Key: 1) <$30,000   2) $30k–50k   3) $50k–70k   4) $70k–100   5) >$100,000

C.2.4.4   Household size

The variation of WTP values with household size is given in figure C6.

WTP values tended to increase with increasing household size: the values for the largest households (6+ members) were around double those for the smallest households (1 member). This result was as expected and the slope of the regression line is significant (at the 95% level).

Figure C.6   Featherston WTP, by household size

The chart shows a scatter plot with "$ per week" on the vertical axis (ranging from $0.00 to $25.00) and "Household size" on the horizontal axis (ranging from 0 to 7). The trend line equation is shown as:

$$y = 0.7553x + 2.4383$$
$$R^2 = 0.0484$$
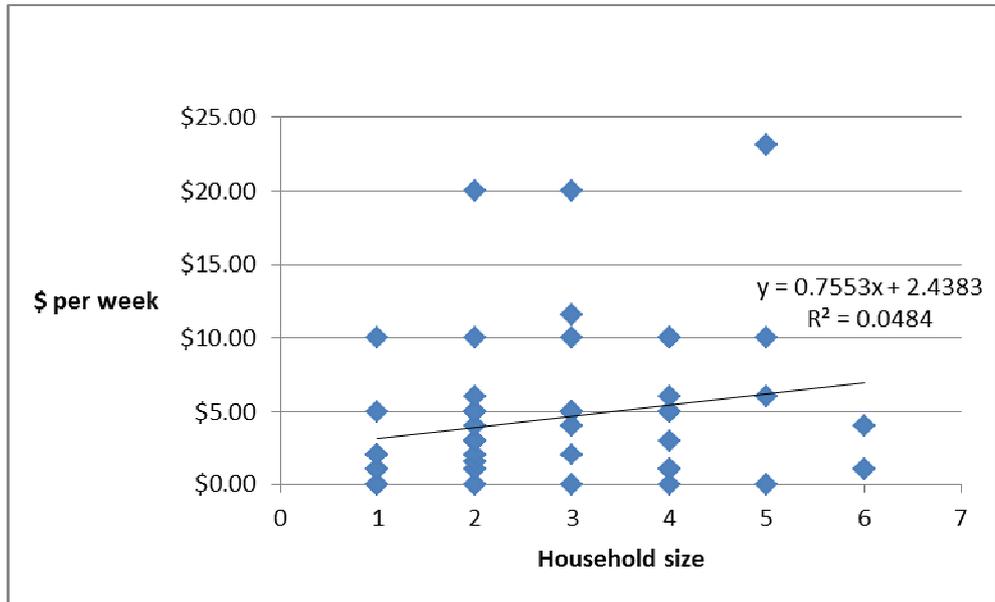
C.2.5   Summary of Featherston findings

The survey found relatively high WTP values to retain the existing rail service and much lower values to substitute an alternative bus service (Featherston–Upper Hutt) if the rail service were to be withdrawn.

The average (per household) WTP valuations were as follows (relative to a no-service base case):

- total usage, option and non-usage values:

    - existing rail – $231pa

    - bus/rail – $60pa

- option and non-usage values only[23]:

    - existing rail – $132pa

    - bus/rail – $34pa.

The average distance from the local centre for those surveyed was 2.44km, although the effective catchment area for OVs appears to be extensive (up to 25km), with decreasing values with increasing distance from the centre.

The survey found relationships between increasing WTP values and increasing income, higher expected frequency of use, and increasing household size.

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23 These values **exclude** components for regular use, traffic delays, safety and environmental effects.

C.2.6 Conclusions

The following conclusions could be drawn from the Featherston survey:

- As detailed above, WTP values to retain the existing rail services were substantial, while the value placed on a bus/rail option (involving a bus service between Featherston and Upper Hutt, linking with the Wellington train service) was very much lower. This result was not unexpected.

- Catchment areas for the rail service to/from Featherston appeared to be extensive, and WTP for this service reduced only slowly with increasing distance from Featherston centre.

- There was a general trend of increasing WTP values for retention of the rail service with increasing income, increasing frequency of use, and increasing household size.

These results were consistent with the following wider views relating to the merits of the Featherston/Wairarapa rail services and their role in the market:

- The existing rail service was well established, of high quality, reasonably frequent, and was very competitive with alternative modes in terms of its speed and cost.

- The Rimutaka Hill made commuting by road vehicle difficult under normal conditions, and less reliable than rail when weather conditions deteriorated.

- Rail had the dominant mode share of Wairarapa work travel to Wellington CBD, and substantial proportions of work travel to other Wellington area destinations.

- The rail service was well used and generally popular. Even those who did not use the rail services were highly aware of the value of its service to the local community.

- It was understood that the rail service was heavily subsidised (relative to the subsidy proportion for the Wellington rail services overall). Featherston ratepayers were paying a transport rate, although the service was primarily supported by rate contributions from elsewhere in the region.

C.3   Featherston questionnaire

Household option and non-use survey: Featherston   Reference number _____

Introduction	Write here	Notes
Interviewer (DO NOT ASK)		*Name*
Type of interview (DO NOT ASK)		*Phone or face-to-face*
Time of interview (DO NOT ASK)		*Date, day and time (am or pm)*
Hi, I'm calling/phoning to do a short survey about public transport. Could I have a few minutes of your time to ask you some questions?		*If the person sounds young, ask if they are 18 or over – if a young person answers, call another time.* *If it is not a convenient time, explain what the survey is about (briefly) and make an appointment to call again.* *If necessary, explain that you are working for a Wellington-based consultancy (Transport Futures Ltd) and provide phone contact number of the project manager – Don Wignall 02 11 39 44 38)* *Keep a record of these instances, and all refusals, on separate sheet.*
Name of respondent *(CHECK)*		*The main aim of this is to check name and initials to allow us to verify the interview and to follow up if necessary.*
Gender of respondent (DO NOT ASK)		
Address (DO NOT ASK)		
Phone (DO NOT ASK)		

Question	Answer	Notes
1 Do you know what rail services are available between Featherston and Wellington, and how frequently they operate?		*The purpose of the interview is to find out what local people from Featherston think about public transport to and from Hutt Valley and Wellington.* *Existing services* *Train: Commuter services – inbound and outbound plus 2 other trains), weekday times depart 6.27, 7.07, 7.32, 11.01am, 4.20 pm; arrive 9.22am, 1.52, 5.34, 6.34, 7.15pm). Late train on Friday, basic two-train service (morning and afternoon) on Sat and Sun.* *Travel time approx 1hr.* *Fare $12 adult single; day rover $15.* *Bus: None over the Rimutakas – but existing bus links to Martinborough, Carterton, Greytown and Masterton.*
2 Could you say how often you use the Featherston to Wellington rail service?	Most days _____ 1–3 days/week _____ 1–3 days/month _____ A few times/year _____ Never _____	
3 Can I ask you who you think in your community would be most affected if there was no public transport to the Hutt Valley and Wellington?		*Get the respondent to think about the role of public transport (especially rail) in the locality, who uses it, and who benefits from it, especially:* *a) Those who would use the rail service (if any members of the household are regular or occasional users)* *b) Others who might be indirectly affected (eg relatives, friends, others, road users, the environment, local businesses, shops)* *Record the answers, but keep it brief as this is simply setting the scene for later questions.*

Question	Answer	Notes
6 On a scale from 1–10 could you please say how <u>importantly</u> you (and others in your household) rate the following in terms of the (possible) benefits of the existing rail service.		*Score in terms of importance from 0 to 10 (where 10 is very important and 0 is of no importance).* *Note that if one aspect is much more important than others, then the scores should reflect this.*
6.1 Regular use by you (and others in your household)	0–10 ………………	*1) Your regular use – this does not need to be every day, but is a regular occurrence under normal circumstances for one or more household members*
6.2 Occasional use by you (and others in your household) in emergencies	0–10 ………………	*2) Your use occasionally or in emergencies (for example, if no car or other transport were available and there was a need for them to travel)*
6.3 Use by other friends and relatives	0–10 ………………	*3) Use by friends and relatives (but not other household members)*
6.4 Use by others in the community	0–10 ………………	*4) Use by others in the community (eg people such as the elderly, those without a car, etc)*
6.5 Contribution to the local economy	0–10 ………………	*5) Contribution to the local economy (ie providing income to local businesses and shops, and supporting local employment)*
6.6 Reduced road traffic delay	0–10 ………………	*6) Reduced road traffic delay (due to fewer cars being on the road)*
6.7 Environmental and safety effects	0–10 ………………	*7) Environmental and safety effects (eg better air quality, reduced noise, and better safety due to fewer cars being on the road)*

Question	Answer	Notes
4.1 Now, to help us assess the importance and value people put on having public transport services – and there are no plans to do this – but please imagine that the current rail services to the Hutt Valley and Wellington were withdrawn and that no bus replacement services from the Wairarapa were provided. However, the current rail services could be kept if locals contributed enough. Could you say in these circumstances how much (if anything) your household would be willing to contribute, on an ongoing basis, to keep the current rail services? You might like to think of this in terms of a weekly amount, and assume it is paid as part of your local rates. Before you do this, you might like to note that the average rates paid by households in the South Wairarapa (or Featherston) area are around $45 per week, or approximately $2400 per year. Of this total, the public transport element is 'only a small proportion'.	Amount (in $ and state if per week or per year) per household .... *Make clear the yearly implication of the weekly figure suggested and check that they are happy with their response in those terms.*	*Featherston to Wellington: No rail service, no bus service over the Rimutakas.* *If needed, explain that this is simply a way of assessing the importance and value of public transport (if they ask, explain that this is a common technique that is used to assess the economic benefit or value of public services).* *If needed, explain that the nearest rail service would then be at Upper Hutt and the trains from there may call at more stations to Wellington than the current Wairarapa 'express' services.* *Do not give this information out – but as further background for the interviewer only, the PT element of South Wairarapa household rates is around 3% of total household rates, or $1.50 per week/$75 per year. The equivalent figures for Wellington region are $5.30 per week or $275 per year allocated to PT.*
4.2 Could I ask some specific questions which may assist? *(Only if the respondent finds it difficult to set a weekly value.)*	*Where people have difficulty in answering the above question, offer them a starting point in terms of $/week and do 'iterative bidding' from there. At the end, check that they are happy with their final answer when converted to $/year.*	*Would your household be prepared to pay $5 per week? If Yes--> How about $10? If No--> How about $1? If No-->How about 50c, 25c, etc.* *Half the interviews to start from a low base ...ie would your household be prepared to pay $1 per week? If yes--> How about $5? If No--> How about 50c, 25c, etc?* *Starting points to be used in sequence: $1/$5–50c/$10–$2/$8–$1.50/$6–$2.5/$4–20c/70c, and then reverse the above.* $1 a week = $50 per year; $1.50 a week = $75 per year; $2 a week = $100 per year; $2.50 a week = $125 per year; $3 a week = $150 per year; $3.50 a week = $175 per year; $4 a week = $200 per year; $4.50 a week = $225 per year; $5 a week = $250 per year; $5.50 a week = $275 per year; $6 a week = $300 per year; $6.50 a week = $325 per year; $7 a week = $350 per year; $7.50 a week = $375 per year

Question	Answer	Notes
5 Now, if all rail services between Featherston and Wellington were withdrawn, but a replacement bus service was provided to deliver the same frequency, with the same fare but to take half an hour longer, to connect with the train services at Upper Hutt – how much would your household be willing to contribute on an ongoing basis to pay for such a service?	Amount (in $ and state if per week or per year) per household	*Featherston to Wellington: Train – none; Bus – replacement of all current rail services, inbound and outbound, between Featherston and Upper Hutt rail station). Travel time to Wellington 1hr 30mins. Fare $12 adult single, $15 off-peak day rover.* *The substitute bus service could be provided to give access to a rail service at Upper Hutt with a transfer to a train to Wellington. The time to transfer from bus to train has been allowed for. The person could use the earlier figure given for continuation of the rail service as a 'comparator' for what their household is prepared to pay for a replacement bus service.*
7 When travelling by train, which stations do you normally use and for what journey purpose? *(Skip if total non-user of rail)*	From _____ To _____ Journey purpose _____	*Most trips are likely to start from Featherston.* *Journey purpose could include travel to work, education, leisure and shopping.*
8 What is the fare that you normally pay for your rail travel? *(Skip if total non-user of rail)*	Fare type _____ Amount _____ Per 2-way trip _____	*Fare types could include: adult single, day return, 10-trip, monthly season, quarterly season, gold card, day rover (non-commuter times, individual or group). If not known, the cost per (two-way) trip can be calculated later.* *Note: Rail fares are about to rise, but ignore this – use the current/previous fare paid by users.*
9 Can I ask which of these age groups you are in? *(DO NOT ASK IF OBVIOUS)*	18 to 24 _____ 25 to 59 _____ 60 or over _____	
10 Can I ask some details about your travel by private vehicles?	Driver licence _____Yes/No Vehicles in household _____ People in household _____	*Any driver licence for the person being interviewed.* *'Vehicles' means all motor vehicles (eg cars, motorcycles, vans for private use).* *Number of people in household includes children and elderly.*
11 Do you mind indicating your household income category?	<$30,000 _____ $30k to $50k _____ $50k to $70k _____ $70k to $100,000 _____ >$100,000 _____	*Approximate household income in last 12 months (or last financial year), before tax.*

Thank you very much for helping with this survey

C.4   Featherston surveyor briefing and feedback notes

C.4.1   Initial briefing

After the initial training, surveyor briefings were held to emphasise the following key points:

1   Don't rush over the important questions, especially questions 4, 5 and 6. Make sure you go through the questions, as written on the form, very carefully. It is better to lose the interview than to risk getting poor answers.

2   Look for inconsistencies in the answers given (eg rating rail as unimportant in numerous categories in Q6, but then being willing to pay a high amount to retain rail in Q4, or vice versa). In such cases, challenge these answers and suggest a reconsideration of either Q6 or Q4. If the answers are maintained, then record the reasons for this.

3   In all cases make sure a weekly figure is converted to an annual amount, to make sure the respondent is aware of the implications of their answer.

4   Test all low (eg zero or near zero) values and high values (eg $10 and above) by asking for their reasoning, and especially how realistic very high values (eg $20 or more) are – record the answers given.

5   Challenge the reasons given if values seem to be based on a misunderstanding of the survey's purpose – eg:

   –   If a person says 'the government should pay for the trains, not local people' – the survey is not concerned about how the services will be funded; this is a separate issue.

   –   If a person says 'I would not be willing to pay anything because I don't use it' – this is not answering the question – ie we want to know if they are willing to pay because of the overall value of the rail service to them and others.

   However, if such answers are maintained, make sure that all reasons given are recorded.

C.4.2   Post-survey feedback from surveyors

Surveyors were invited to comment on the following:

•   Any differences found between face-to-face and telephone interviews.

•   Suggestions as to how the survey might be improved (eg to make it easier for people to understand or to answer).

Olivia

> *Comparing phone style of interviews and face-to-face [interviews] – the phone interviews are obviously a lot quicker and you don't waste as much time trying to find someone who is [at] home.*

In regards to the quality of the interviews, I do think that people put more thought into their answers with face-to-face [interviews] because they feel that it is much more important, whereas on the phone it is a lot more impersonal.

I also think that when it comes to the phone interviews you are more likely to get responses from people who do value the rail service, as those who don't are more likely to refuse [to be interviewed].

Imogen

Both the face-to-face and the phone interviews had different advantages and disadvantages. In terms of phone interviews, the biggest advantage was the ability to end the interview quickly and at any time, should the respondent become annoyed and/or aggressive. Though this did not occur often, I was less nervous and consequently more confident during phone interviews as opposed to face-to-face [interviews] – and perhaps felt more comfortable going through the questions slowly.

However, an obvious disadvantage is that it is much easier for a potential respondent to refuse an interview. People [are] in general, I felt, less inclined to turn down an interview if you are standing on their doorstep.

Face-to-face interviews were on the whole more successful for me. This is perhaps due to the fact that there is widespread distrust of a call from an unknown person – especially at certain times of the day. However a face-to-face interview instils a greater degree of trust and consequently results in more natural contact/conversation between interviewer and respondent.

I should also note that face-to-face interviews allow the interviewer to pick up on confusion on the respondent's part a lot easier than on the phone, where obviously reading facial expressions and body language is impossible. Thus, perhaps face-to-face interviews were the more reliable, as both questions and answers were explained and tested for certainty (potentially omitted during a phone interview).

The interviews were done pretty much as well as they could have been – so no major suggestions for improvement.

Nick

I found that generally people were nicer face-to-face than they were on the phone, possibly because as a male, people find it harder to talk to me on the phone, and during face-to-face I am capable of giving a friendly smile and [having] relaxed body language that cannot be seen through the phone. I also found that (unless they were elderly people looking for some company) people would just want to get off the phone sometimes, and wouldn't really think about their answers as much as they would in person.

I only met about one or two people who weren't able to give a pretty concise timetable of the entire service. Also, most people gave the same answer for question 3, that it would be work commuters (though three or four also said elderly people or high school kids).

Isla (weekday surveys only)

I didn't think the face-to-face interviews were that much better than the phoning interviews – generally the questions were equally understood (or not) in both situations. In particular, it seems that both [groups] had difficulty estimating a value to save the railway – whether it was a voice on the phone or from me in person, it was a hard concept.

People might have felt more inclined to do the interview [if I was] at their doorstep than on the phone. But on the other hand, often the face-to-face interviews took a lot longer, due to extra formalities – eg I noted one time it took 40 minutes compared to average of 6–9 minutes on the phone. The time taken correlated well with age of the participant and 'loneliness'.

In terms of improving the interview, I think it went relatively well. Obviously people struggled with the concept of putting a value in money terms on the rails, and often (despite repeatedly reminding them) they felt that the whole survey was just a ploy from the government to increase rates. In my opinion, this might have been what led to somewhat overly hostile values of $0 given per week, as a reaction to their 'instincts'.

Matt (weekday surveys only)

It could be hard to capture the phone interviewee into a sense of unison with the questions – I am not sure if that is because of who I got on the phone, or whether there is just a stronger dependence on correct answers being given when you are in a face-to-face interview.

It was easier to get hold of people on the phone, but the 1–10 rating ones seemed difficult for older people, and younger people were sometimes busy (and doing something at the same time) with a risk of phone interviews being cut off half way through.

The opposite occurred in face-to-face interviews, but the majority of people that were home (on Tuesday) seemed to be were 'about to leave for work or to pick up the kids'. This resulted in more old people taking the face-to-face interview, as they could not have these excuses. Old people taking the interview seemed to cause two main problems – 1) they had no money and did not get out of the house and therefore did not seem to value the train 2) they struggled to follow the questions very well, and again it would difficult to get a figure on the 1–10 scales.

One thing that would have made it easier in face-to-face interviews is being able to approach those not in the home. Although the home interviews are important, it just seems like a lot of time was wasted waiting at empty homes after knocking. When asking how much out of rates they would be willing to pay, more personal connection to the interviewee may be required before asking for a money value.

C.5 Featherston detailed results, by survey segments

Table C.5 presents a summary of results for each of the interview 'segments', differentiating between telephone versus face-to-face survey methods, survey days (weekday v Saturday v all days) and question ordering (whether Q6 or Q4 came first). Note that these 'segment' results include all completed interviews (not just the A-grade subsample).

Of note is the difference in overall WTP values between the telephone surveys and the face-to-face surveys. The average WTP value to retain rail from the face-to-face interviews was $4.19/week, while that from the telephone interviews was $3.27 (22% lower). However, for the bus services the average value from face-to-face interviews was $0.95, and that from telephone interviews was $1.07 (13% higher). In both cases these differences may not be significant.[24]

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24 The telephone survey methods were refined from the three subsequent surveys: it is considered likely that this would have reduced any difference in results between the two methods.

Table C.5   Featherston survey results, by survey/questionnaire segment

	Category	Overall WTP value to retain rail	Sample size	Average distance (km) home to rail station	Regular Use by household	Option %	Non use - friends/other family, community and economy only.	Non use - road traffic delay, environment and safety effects only.	Total	Overall WTP value of bus substitute service
	Summary Table									
Q 6	**Highest quality (Q6 A Sample)**	**$4.44**	**67**	**2.5**	**9.1%**	**9.9%**	**47.1%**	**33.8%**	**100.0%**	**$1.15**
	All Q6 1st (all days)	$4.29	81	2.5	8.5%	9.6%	47.6%	34.3%	100.0%	$1.08
	All Q6 1st (sat)	$4.40	65	2.2	7.4%	8.3%	48.9%	35.4%	100.0%	$0.90
	Phone Q6 1st (sat)	$3.48	33	3.3	8.4%	8.5%	48.6%	34.5%	100.0%	$0.74
	Face to Face Q6 1st (sat)	$4.41	32	1.0	6.3%	8.2%	49.2%	36.4%	100.0%	$0.87
	All Q 6 phone	$3.60	49	3.5	9.8%	10.5%	46.7%	33.0%	100.0%	$1.09
	Phone Q6 1st (weekday)	$3.85	16	3.9	12.3%	14.1%	43.4%	30.2%	100.0%	$1.80
	User Values (Q6 A Sample)	$4.71	49	3.0	11.4%	10.4%	45.1%	33.1%	100.0%	$1.29
	Non-user Values (Q6 A Sample)	$3.72	18	1.2	1.4%	8.3%	53.9%	36.3%	100.0%	$0.78
Q 4	All Q4 1st (weekday)	$1.71	25	3.2	9.7%	10.8%	46.8%	32.7%	100.0%	$0.83
	All Phone Q4 1st (weekday)	$1.44	9	6.6	7.9%	7.6%	50.0%	34.6%	100.0%	$1.00
	All Face to Face Q4 1st (weekday)	$1.86	16	1.2	10.8%	12.7%	44.8%	31.6%	100.0%	$0.73
ALL	All phone (all days)	$3.27	58	4.0	9.6%	10.1%	47.2%	33.2%	100.0%	$1.07
	All Face to Face (all days)	$4.19	48	1.1	7.7%	9.6%	47.8%	34.9%	100.0%	$0.95
	All interview types (all days)	$3.68	106	3.2	8.7%	9.9%	47.4%	33.9%	100.0%	$1.02

Appendix D   Oxford survey report

D.1   Oxford survey methodology

This appendix describes the project survey of households undertaken in December 2010 in the Oxford (Canterbury) area. Oxford is a community of 1716 people located in Waimakariri District, Canterbury Region. At the time of this research, the area was not served by public transport.

Telephone interviews were undertaken for residential addresses (Oxford entries only) in the North Canterbury and Kaikoura telephone White Pages.

All interviews were undertaken with adults who were able speak on behalf of the household.

Two options were explored in the interviews:

- direct bus (primary) option – involving direct bus services (commuter periods and middle of the day) to Christchurch via Tram Road

- indirect bus (secondary) option – similar to the primary option, but operating via Rangiora.

A range of questions were asked, with the most important being the following:

- Question 4 – importance rating for PT service benefits

- Question 5.1 – WTP for the introduction of direct bus services

- Question 5.3 – WTP for the introduction of indirect bus services.

The survey questionnaire is given in section D.3.

In addition to investigating OVs and NUVs, the survey methodology differentiated between public transport users and non-users.

Interviews were undertaken on weekday daytimes, weekday evenings and Saturdays to obtain a range of responses from commuters and non-commuters: the target sample was 30 A-grade interviews for each of the three time periods. No Sunday surveys were undertaken.

The interview form was systematically worked through by the interviewer, recording any additional comments made by the respondent as they were made.

The survey team was made up of university undergraduates, with each one undergoing training prior to being asked to conduct the interviews.

The training consisted of the following:

- an overview of the nature and purpose of the survey

- an explanation of key terms, such as willingness-to-pay

- a detailed exploration of the survey form and clarification of any points arising

- a practice telephone interview.

D.2   Oxford results and commentary

D.2.1   Interviews and grading

A total of 188 households were approached and 117 interviews were conducted (response rate 62%), as shown in table D1.

Subsequent grading of interviews reduced the number of selected 'highest-quality A-grade' interviews to 104. All the results presented in this appendix (and elsewhere in this report) relate to the A-grade interviews only. The reason that interviews were graded was to eliminate responses involving inconsistencies, uncertainties or other problems. A summary of the response rates is given in table D.1.

Table D.1   Summary of Oxford survey response rates

Interviews (A-grade)	% of total requests	Interviews (B-grade)	% of total requests	Interviews (incomplete)	% of total requests	Refused	% of total requests	Total	*Not in*
104	55.3%	11	5.9%	2	1.1%	71	37.8%	188	*230*

D.2.2   Segmentation of responses

For analysis purposes, responses were split into 'PT user' (defined as expecting to take at least one public transport trip a year) and 'non-PT user'.

The WTP values expressed were divided into components (regular use, option availability and non-use effects). Regular use and externality effects (a subset of the non-use effects) were separately identified to allow WTP values to be derived for economic evaluation purposes.

D.2.3   Overall results

Results from the survey, in terms of WTP weekly values per household, for the sample of 104 highest-quality (A-grade) interviews, are summarised in the following:

- Table D.2 – detailed results by PT use category

- Table D.3 – summary results by PT use category

- Table D.4 – WTP mean value and confidence interval

- Figure D.1 – summary of values by benefit category

- Figure D.2 – distribution of total WTP values.

At the aggregate level, the results indicate that the average total OV/NUV WTP value for a direct bus service between Oxford and Christchurch (via Tram Road) was $98pa ($1.89/week) per household.

The following points can be made:

- The 95% confidence interval on this mean value was ±$19pa (ie $79–$117).[25]

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25 Based on the assumption of a normal distribution.

- The median value was $78pa ($1.50 per week).

- The mode value was zero.

- The average total OV/NUV WTP for the bus service was $66pa.

Table D.2   Oxford detailed results

Category	Sample size	Distance (km) to centre	Regular use	Option – occasional use	Non-use – friends & relatives	Non-use – community	Non-use – local economy	Non-use – property	Reduced delay	Improved safety & environment	Regular use, property, delay, safety & environment	Option & non-use (excluding regular use, property, delay, safety & environment)	Overall WTP value per year – direct bus	Option and non-use WTP value per year – direct bus	Overall WTP value per year – bus via Rangiora	Annual WTP – option & non-use only – bus via Rangiora
	No.	km	%	%	%	%	%	%	%	%	%	%	$	$	$	$
Current & future PT user	14	1.03	17.7%	18.3%	16.7%	20.9%	6.4%	6.6%	6.8%	6.8%	37.8%	62.2%	*$82.33*	*$51.23*	*$42.94*	*$26.72*
Current & future PT non-user	27	3.60	5.3%	7.9%	12.9%	24.2%	13.1%	11.7%	11.5%	13.4%	42.0%	58.0%	*$43.33*	*$25.15*	*$51.52*	*$29.91*
Current PT non-user, but future user	63	2.15	13.0%	15.6%	14.6%	21.7%	8.9%	9.4%	7.8%	8.9%	39.2%	60.8%	*$120.34*	*$73.21*	*$42.94*	*$26.12*
Total	104	2.42	12.0%	14.3%	14.5%	22.2%	9.5%	9.5%	8.5%	9.6%	39.6%	60.4%	*$98.40*	*$59.45*	*$66.32*	*$40.07*

Table D.3   Oxford summary results

Category	Sample size	Distance (km) to centre	Regular use, property, delay, safety & environment	Option and non-use (excluding regular use, property, delay, safety & environment)	Overall WTP value per year – direct bus	Option and non-use WTP value per year – direct bus	Overall WTP value per year – bus via Rangiora	Annual WTP – option and non-use only – bus via Rangiora
	No.	km	%	%	$	$	$	$
Current and future PT user	14	1.03	37.8%	62.2%	$82.33	$51.23	$42.94	$26.72
Current and future PT non-user	27	3.60	42.0%	58.0%	$43.33	$25.15	$51.52	$29.91
Current PT non-user - future user	63	2.15	39.2%	60.8%	$120.34	$73.21	$42.94	$26.12
Total	104	2.42	39.6%	60.4%	$98.40	$59.45	$66.32	$40.07

Table D.4   Oxford WTP mean value and confidence interval (values per week)

Sample size	104
Mean value (sample)	$1.89
Standard derivation	$1.94
Confidence interval (95%)	±$0.37
Mean value (population) – range (95%)	$1.52–$2.26

Figure D.1   Oxford WTP value percentages, by benefit category
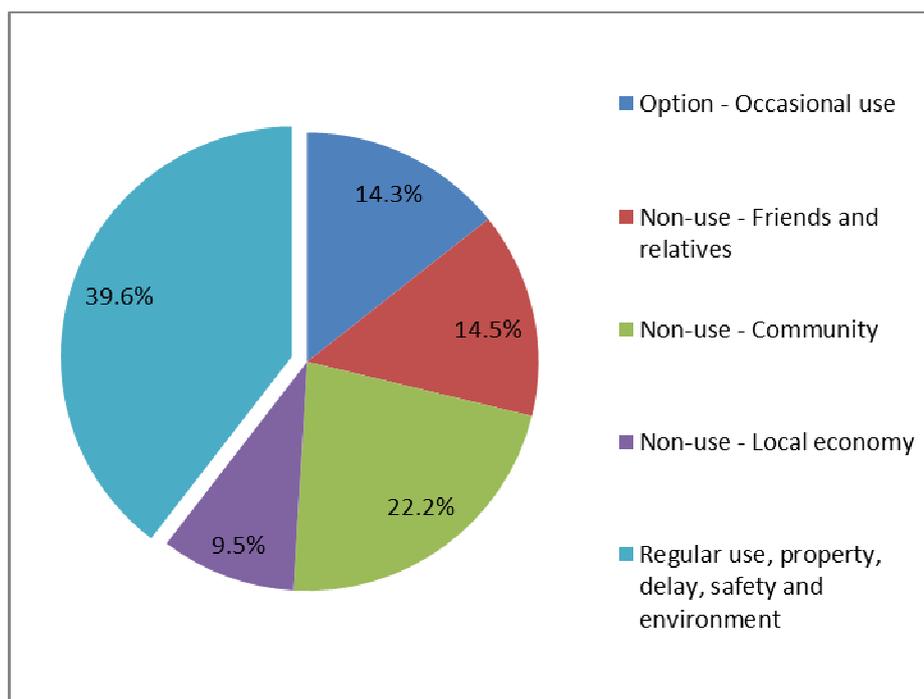
Figure D.2   Oxford distribution of total WTP values – h $/week
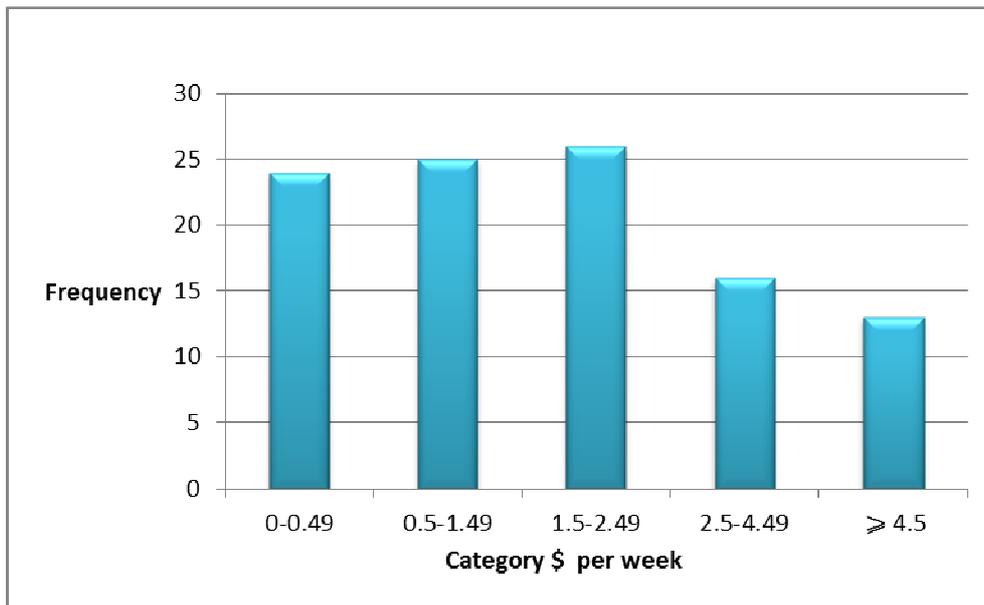
D.2.4   Factors influencing WTP values

The following summarises the survey findings on demographic, geographic, etc factors influencing WTP values (for the 'direct bus' option).

D.2.4.1   Distance from centre

The variation of WTP values with distance from the centre is as shown in figure D.3. WTP values tended to decrease with increasing distances from the centre: the average value at 10km from the centre was around half that close to the centre. This pattern of results is as expected and the slope of the regression line is significant (at the 95% level).

Figure D.3   Oxford WTP, by distance

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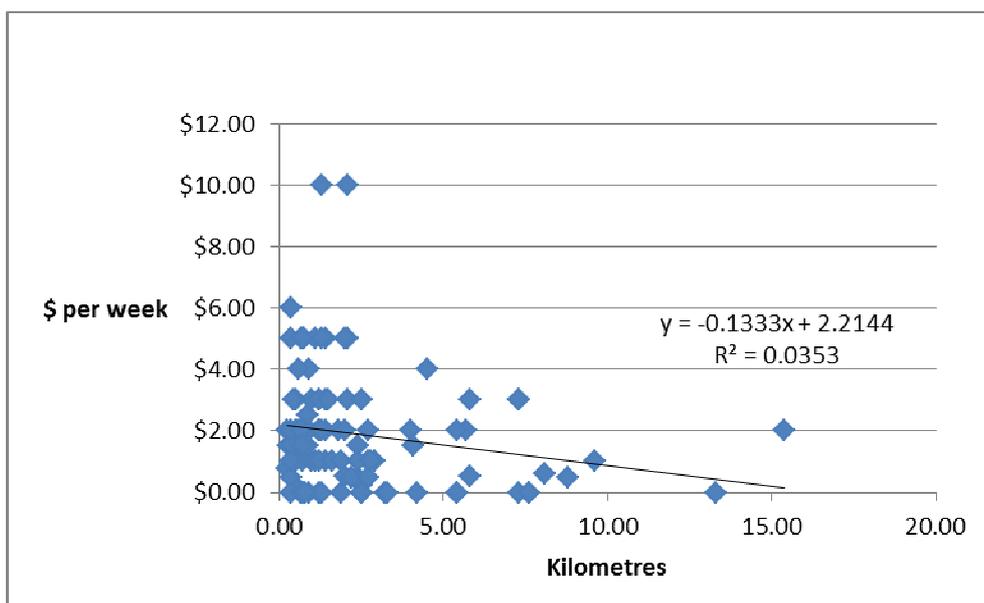
D.2.4.2   Level of PT use

The variation of WTP values with expected PT use is shown in figure D.4. WTP values tended to increase with increasing levels of PT use: the average value for the '1–3 days/week' category was around three times that for the 'never' category. This result is as expected and the slope of the regression line is significant (at the 95% level).

Figure D.4   Oxford WTP, by PT use
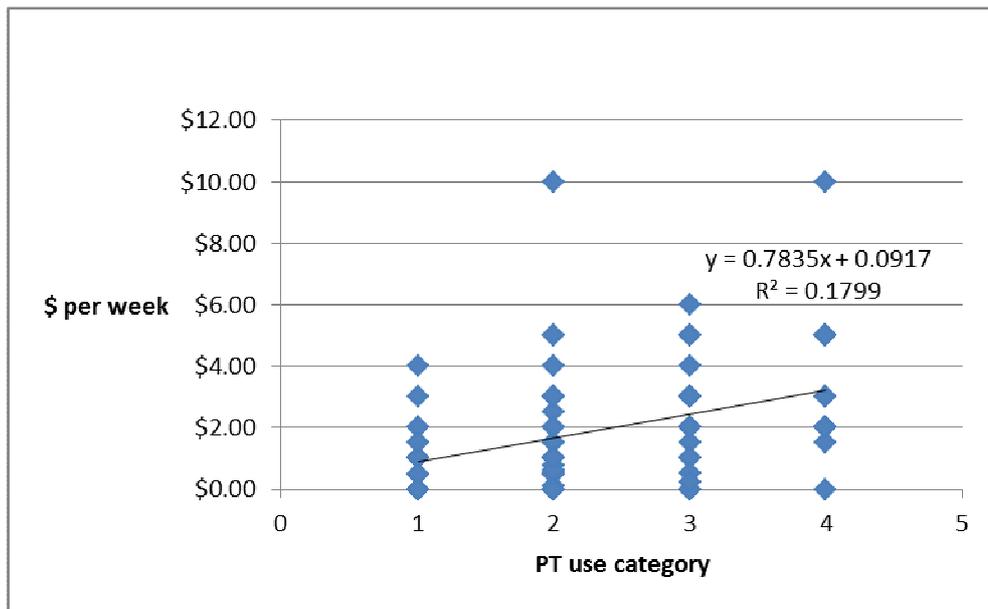
Key: 1) Never   2) A few times/year   3) 1–3 days/month   4) 1–3 days/week   5) Most days

D.2.4.3   Income category

The variation of WTP values with overall household income category is shown in figure D.5.

The WTP values tended to increase with increasing income. The average value for the highest income category was around twice that for the lowest category. This result is as expected and the slope of the regression line is significant (at the 95% level).

Figure D.5   Oxford WTP, by household income

The chart shows data points with trend line:

$$y = 0.5034x + 0.9277$$
$$R^2 = 0.1038$$

X-axis: Income category (0 to 6)
Y-axis: $ per week ($0.00 to $12.00)
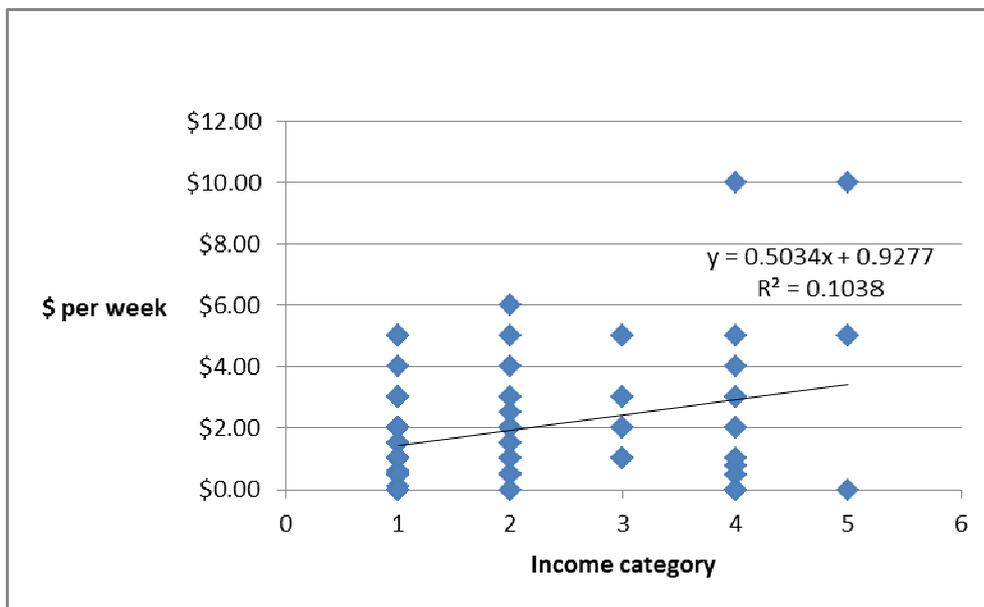
Key: 1) <$30,000   2) $30k–$50k   3) $50k–$70k   4) $70k–$100,000   5) >$100,000

D.2.4.4   Household size

The variation of WTP direct bus values with household size is given in figure D.6.

WTP values tended to increase with increasing household size: the values for the largest households (6+ members) were around double those for the smallest households (1 member). This result is as expected and the slope of the regression line is significant (at the 95% level).

Figure D.6   Oxford WTP, by household size

The chart shows data points with trend line:

$$y = 0.243x + 1.3222$$
$$R^2 = 0.041$$

X-axis: Household size (0 to 12)
Y-axis: $ per week ($0.00 to $12.00)
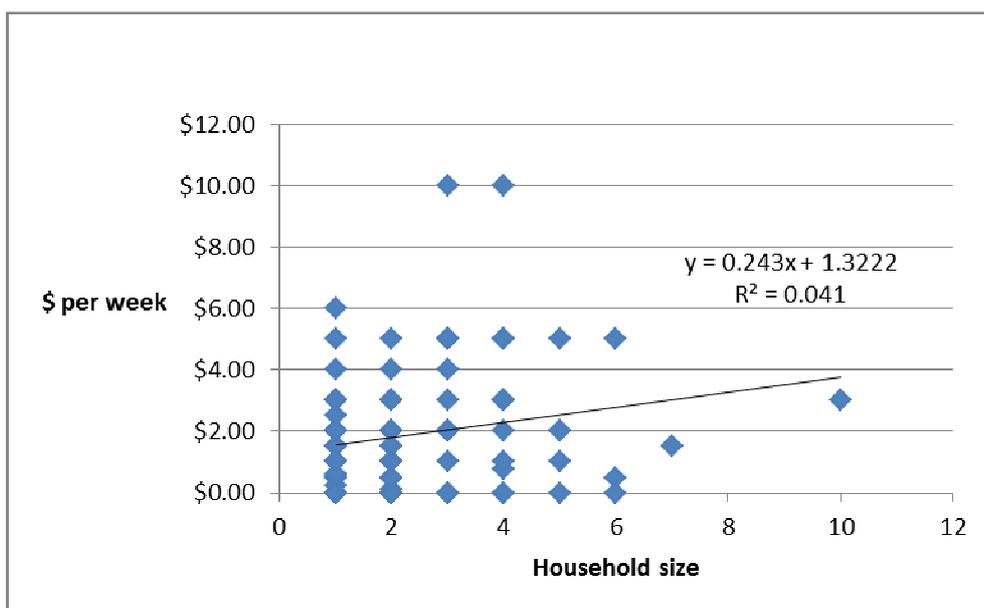
D.2.5   Summary of Oxford findings

The survey found moderate WTP values for a direct commuter bus service to Christchurch and somewhat lower WTP values for an alternative and less direct bus service to Christchurch via Rangiora.

The survey results indicate the average (per household) WTP valuations were as follows (relative to a no-service base case):

- total usage, OVs and NUVs:

    – direct bus – $98pa

    – bus via Rangiora – $66pa

- OVs and NUVs only[26]:

    – direct bus – $59pa

    – bus via Rangiora – $40pa.

The average distance from the centre of Oxford of those surveyed was 2.4km: the effective catchment area for significant WTP values appears to have been extensive (up to 15km), with decreasing values with increasing distance from the centre.

The survey found the expected relationships between increasing WTP values and increasing income, higher expected frequency of use, and increasing household size.

D.2.6   Conclusions

There appeared to be limited demand for a regular commuter bus service that would take approximately an hour to reach Christchurch.

Some residents had a closer relationship with Rangiora, which is a closer, larger 'service centre' that provides retail and education options.

Many of those who wished to travel to Rangiora for these purposes were without a car, or were on low incomes, and made some use of the school bus service and occasional commercial bus shuttle service.

Oxford ratepayers paid a small transport rate, although at the time of this research, the area was not served by public transport.

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26 These values excluded components for regular use, traffic delays, safety and environmental effects.

D.3   Oxford questionnaire

Reference No............... TELEPHONE SURVEY QUESTIONNAIRE: Oxford/Canterbury

Questions	Answer	Notes
1.1 Hi, I'm calling/phoning to do a short survey about transport (especially from Oxford to Christchurch). Could I have a few minutes of your time to ask you some questions?	*Record all refusals, incomplete interviews and all 'not ins' on a separate sheet.*	*If it is not a convenient time, explain what the survey is about (briefly) and make an appointment to call again. If necessary, explain that you are working for Transport Futures Ltd, phone number 02 11 39 44 38).*
2.1 Could you say how often you (personally) travel to Christchurch or places en route?	1) Most days 2) 1–3 days/week 3) 1–3 days/month 4) A few times/year 5) Never	*CIRCLE AS APPROPRIATE* *Name destinations other than central Christchurch*
2.2 What is the main journey purpose for these journeys & what mode do you mainly use?	Journey purpose _____ Car driver/car passenger/ bus/other(state)_____	*eg work/education/social/shopping/other (STATE)* *CIRCLE AS APPROPRIATE*
3.1 Can I just check you are familiar with the current bus service that operates between Rangiora and Christchurch, how often they operate, and what the current fares are?	Aware/explained? *Delete as necessary*	*The purpose of the interview is to find out what local people from the area think about the potential for public transport services to and from Christchurch.* *Existing services:* *Bus – Hourly service through the day.* *Adult single fare Rangiora– Christchurch $5.60 (cash), 20c less for Metrocard holders, concessions $2.10.* *Travel time 50mins.*
3.2 Do you ever use this service, and if so, how frequently?	1) Most days 2) 1–3 days/week 3) 1–3 days/month 4) A few times/year 5) Never	*State frequency of use*

Questions	Answer	Notes
3.3 What do you think (in general) of the idea of a new bus service from Oxford, operating via the Tram Road, to Christchurch?	....	*Record any <u>brief</u> comments*
3.4 If a twice-a-day bus service was to be introduced – adult fare (one way between Oxford and Christchurch $7, less for concessions; travel time approx 1hr – could you estimate how often would you (personally) be likely to use it?	1) Most days 2) 1–3 days/week 3) 1–3 days/month 4) A few times/year 5) Never	*State frequency of use* *Note: Assume that the service would operate with at least one early-morning departure to arrive in Christchurch before 9am – return to Oxford at midday – an early-afternoon departure from Oxford – and a return to Oxford at the end of the working day (around 5pm).* *Assume fare discounting (for concessions and regular travel) would be available; Gold Card holders free in the off peak and half price in the peaks.* *Travel would be to/from central areas of Oxford and Christchurch.*

Question	Answer	Notes
4.1 On a scale from 1–10, please say how importantly you (and others in your household) rate the following (possible) benefits of new bus service.		*EXPLAIN THAT THERE ARE 8 CATEGORIES* *Score in terms of importance from 0 to 10 (where 10 is very important and 0 is of no importance).* *Note that <u>if one aspect is much more important that others, then the scores should reflect this</u>.*
4.2 Regular use by you (and others in your household) .	0–10	*1) Your regular use – this does not need to be every day, but is a regular occurrence under normal circumstances for one or more household members)*
4.3 Occasional use by you (and others in your household).	0–10	*2) Your use occasionally (for example, if no car or other transport were available and there was a need to travel)*
4.4 Use by other friends and relatives.	0–10	*3) Use by friends and relatives (but not other household members)*
4.5 Use by others in the community.	0–10	*4) Use by others in the community (eg people such as the elderly, those without a car, etc)*
4.6 Contribution to the local economy.	0–10	*5) Contribution to the local economy (ie by providing passing trade income to local businesses and shops and by directly supporting local employment)*
4.7 Contribution to property attractiveness and value.	0–10	*6) The effect of PT accessibility in terms of creating an attractive residential location and supporting associated property values*
4.8 Reduced road traffic delay.	0–10	*7) Reduced road traffic delay (due to fewer cars being on the road)*
4.9 Environmental and safety effects.	0–10	*8) Environmental and safety effects (eg better air quality, reduced noise, and better safety due to fewer cars being on the road)*

Questions	6.25	Notes
5.1 To help us assess the importance and value people put on having public transport services: How much would your household be willing to pay, on an ongoing basis (through additional rates or equivalent increase in rents) to reflect these benefits? *Ask respondent to suggest a weekly or annual amount, and make them aware that the average household in the study area currently pays around $40 per week/$2000 per year in rates, only a very small amount of which is currently used to support public transport.* *Note: Users of supported bus services would still be required to pay fares.*	Ongoing amount (in $ per week) per household $ PER WEEK........................... *Make clear the yearly implication of the weekly figure suggested and check that they are happy with their response in those terms. TEST & RECORD REASONS FOR ANSWERS – ESPECIALLY FOR VERY LOW, VERY HIGH OR INCONSISTENT VALUES.*	*If necessary, explain that there are no plans to provide a bus service at present, but if one was to be introduced, it would most likely be funded by an increase in rates for households in the area served.* *If needed, also explain that In the study area a small public transport levy is currently applied, and transport contributions throughout Canterbury are a small proportion of total rates (in Oxford the transport rate is currently around 54 cents a week/$28 a year per household).* *If needed, explain that this is simply a way of assessing the importance and value of public transport (if they ask, explain that this is a common technique that is used to assess the economic benefit or value of public services).* *Record the main reason for the value given:* ....
5.2 Could I ask some specific questions which may assist? *(Only If the respondent finds it difficult to set a weekly value.)*	*Where people have difficulty in answering the above question, offer them a starting point in terms of $/week and do 'iterative bidding' from there. At the end, check that they are happy with their final answer when converted to $/year.*	*Would your household be prepared to pay $5 per week? If Yes--> How about $10? If No--> How about $1? If No-->How about 50c, 25c, etc* *Half the interviews to start from a low base ...ie would your household be prepared to pay $1 per week? If yes--> How about $5? If No--> How about 50c, 25c, etc?* *Starting points to be used in sequence: $1/$5–50c/$10–$2/$8–$1.50/$6–$2.5/$4–20c/70c, and then reverse the above.* $1 a week = $52 per year; $2.50 a week = $130 per year; 5 a week = $260 per year; $7.50 a week = $390 per year; $10 a week = $520 per year

Questions	Answer	Notes
5.3 Now, if you imagine that a limited-stop bus service was provided to connect the study area with Rangiora and then onto Christchurch (assuming a similar frequency and fare to the bus service described earlier with a travel time of 1hr 20mins) how much would your household be willing to contribute on an ongoing basis (funded through rates) to pay for a this service? *Note: Users of supported bus services would still be required to pay fares.*	Ongoing amount (in $ per week) per household	*The person could use the earlier figure given for bus service via the Tram Road as a 'comparator' to estimate the amount their household is prepared to pay for a 'direct' bus service.* *Explain that this question is for research purposes and comparison purposes only and there are no firm proposals to introduce a bus service.* *Record the main reason for the value given:* ....
6.1 Can I ask which of these age groups you are in? *(DO NOT ASK IF OBVIOUS IN PERSONAL INTERVIEW)*	Under 18 _____ 18 to 64 _____ 65 or over _____	*Only for the respondent – terminate interview if under 18 and arrange a time to ring back*
6.2 Excluding yourself, could you indicate the number of people in your household in the following age groups?	Under 18 _____ 18 to 64 _____ 65 or over _____	*Make sure that this <u>excludes</u> the respondent*
6.3 Do you mind indicating your approximate household income category?	<$30,000 _____ $30k–$50k _____ $50k–$70k _____ $70k–$100,000 _____ >$100,000 _____	*Approximate total household income in last 12 months (or last financial year), before tax*

Checks	Answer	Notes
7.1 Name of respondent *(CHECK)*	....	The main aim of this is to check the last name and initials to allow us to verify the interview and to follow up if necessary.
7.2 Gender of respondent *(DO NOT ASK)*	Male/female *Select as necessary*	
7.3 Address *(DO NOT ASK UNLESS UNCLEAR)*	....	
7.4 Phone number *(ASK ONLY FOR FACE-TO-FACE INTERVIEWS)*	....	
7.5 Interviewer *(DO NOT ASK)*	....	*Your name*
7.6 Type of interview *(DO NOT ASK)*	....	*Telephone or face-to-face*
7.7 Time of interview *(DO NOT ASK)*	....	*Date, day and time (am or pm)*

Thank you very much for helping with this survey

Appendix E   Te Kuiti survey report

E.1   Te Kuiti survey methodology

This appendix describes the project survey of households undertaken in December 2010 in the Te Kuiti area. Te Kuiti is a community of 4419 people located in Waitomo District, Waikato Region. At the time of this research, the only public transport services serving the area were some commercial long-distance bus services.

Telephone interviews were undertaken for residential addresses in the Waikato, King Country and Thames Valley telephone White Pages (Te Kuiti entries only).

All interviews were undertaken with adults who were able speak on behalf of the household.

The following two options were explored in the interviews:

- bus (primary) option – involving direct bus services (commuter periods and middle of the day) between Te Kuiti and Hamilton

- rail (secondary) option – involving direct rail services (commuter periods and middle of the day) between Te Kuiti and Hamilton.

A range of questions were asked, with the most important being:

- Question 4: Importance rating for PT service benefits

- Question 5.1: WTP for the introduction of direct bus services

- Question 5.3: WTP for the introduction of indirect bus services.

The survey questionnaire is given in section E.3.

In addition to investigating OVs and NUVs, the survey methodology differentiated between public transport users and non-users.

Interviews were undertaken on weekday daytimes, weekday evenings and Saturdays to obtain a range of responses from commuters and non-commuters: the target sample was 30 A-grade interviews for each of the three time periods. No Sunday surveys were undertaken.

The interview form was systematically worked through by the interviewer, recording any additional comments made by the respondent as they were made.

The survey team was made up of university undergraduates, with each one undergoing training prior to being asked to conduct the interviews.

The training consisted of the following:
- an overview of the nature and purpose of the survey
- an explanation of key terms, such as 'willingness to pay'
- a detailed exploration of the survey form and clarification of any points arising
- a practice telephone interview.

E.2 Te Kuiti results and commentary

E.2.1 Interviews and grading

A total of 121 interviews were conducted. Subsequent grading of interviews reduced the number of selected 'highest-quality A-grade interviews to 94. All the results presented in this appendix (and elsewhere in this report), relate to the A-grade interviews only. The reason that interviews were graded was to eliminate responses involving inconsistencies, uncertainties or other problems. A summary of the response rates is given in table E.1.

Table E.1   Summary of Te Kuiti survey response rates

Interviews (A-grade)	% of total requests	Interviews (B-grade)	% of total requests	Interviews (incomplete)	% of total requests	Refused	% of total request	Total	*Not in*
94	37.5%	19	7.6%	8	3.2%	130	51.8%	251	*142*

E.2.2 Segmentation of responses

For analysis purposes, responses were split into 'PT user' (defined as expecting to take at least one PT trip a year) and 'non-PT user'.

The WTP values expressed were divided into components (regular use, option availability and non-use effects). Regular use and externality effects (a subset of the non-use effects) were separately identified to allow WTP values to be derived for economic evaluation purposes.

E.2.3 Overall results

Results from the survey in terms of WTP weekly values per household, for the sample of 94 highest-quality (A-grade) interviews, are summarised in the following:

- Table E.2 – detailed results by PT use category

- Table E.3 – summary results by PT use category

- Table E.4 – WTP mean value and confidence interval

- Figure E.1 – summary of values by benefit category

- Figure E.2 – distribution of total WTP values.

At the aggregate level, the results indicate that the average total OV/NUV WTP value for a direct bus service between Te Kuiti and Hamilton was $60pa ($1.16/week) per household.

The following points can be made:

- The 95% confidence interval on this mean value was ±$16pa (ie $44–$76).27

- The mean value was $78pa ($1.50 per week).

- The mode value was zero.

- The average total OV/NUV for the rail service was $44pa.

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27 Based on the assumption of a normal distribution.

Table E.2   Te Kuiti detailed results

Category	Sample size	Average distance (km) – home to centre	Regular use	Option – occasional use	Non-use – friends & relatives	Non-use – community	Non-use – local economy	Non-use – property	Reduced delay	Improved safety & environment	Regular use, property, delay, safety & environment	Option & non-use (excluding regular use, property, delay, safety & environment)	Overall WTP value per year – bus	Option and non-use WTP value per year – bus	Overall WTP value per year – rail	Annual WTP – option and non-use only – rail
	No.	km	%	%	%	%	%	%	%	%	%	%	$	$	$	$
Current & future PT user	18	1.65	10.7%	17.0%	15.8%	20.0%	9.8%	5.9%	10.5%	10.3%	37.4%	62.6%	$54.89	$34.35	$30.33	$18.98
Current & future PT non-user	29	1.30	7.4%	10.6%	13.3%	21.5%	8.8%	8.5%	14.1%	15.8%	45.8%	54.2%	$29.59	$16.03	$26.90	$14.57
Current PT non-user, but future user	47	1.26	10.6%	13.0%	13.6%	19.3%	10.8%	8.5%	11.9%	12.2%	43.2%	56.8%	$81.21	$46.14	$60.19	$34.19
Total	94	1.35	9.9%	13.3%	14.0%	20.0%	10.2%	7.9%	12.2%	12.6%	42.6%	57.4%	$60.24	$34.57	$44.20	$25.36

Table E.3   Te Kuiti summary results

Category	Sample size	Average distance (km) – home to centre	Regular use, property, delay, safety & environment	Option and non-use (excluding regular use, property, delay, safety & environment)	Overall WTP value per year – bus	Option and non-use WTP value per year – bus	Overall WTP value per year – rail	Annual WTP - option and non-use only – rail
	No.	km	%	%	$	$	$	$
PT user – current and future	18	1.65	37.4%	62.6%	$54.89	$34.35	$30.33	$18.98
PT non-user – current and future	29	1.30	45.8%	54.2%	$29.59	$16.03	$26.90	$14.57
Current PT non-user –but future user	47	1.26	43.2%	56.8%	$81.21	$46.14	$60.19	$34.19
Total	94	1.35	42.6%	57.4%	$60.24	$34.57	$44.20	$25.36

Table E.4   Te Kuiti WTP mean value and confidence interval (values per week)

Sample size	94
Mean value (sample)	$1.16
Standard derivation	$1.51
Confidence interval (95%)	±$0.31
Mean value (population) – range (95%)	$0.85–$1.47

Figure E.1   Te Kuiti WTP value percentages, by benefit category
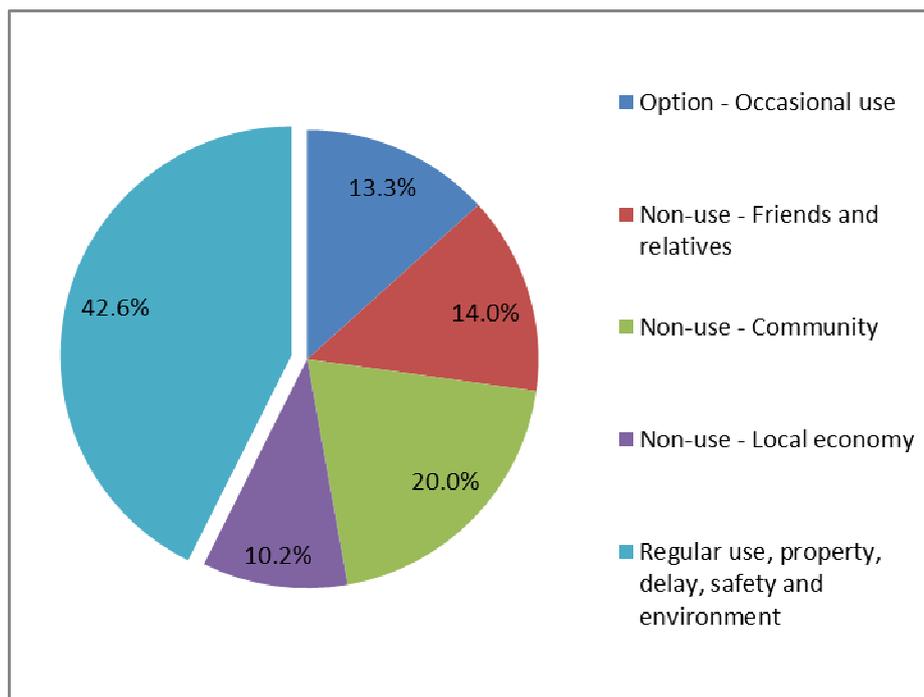
Figure E.2   Te Kuiti distribution of total WTP values – $/week
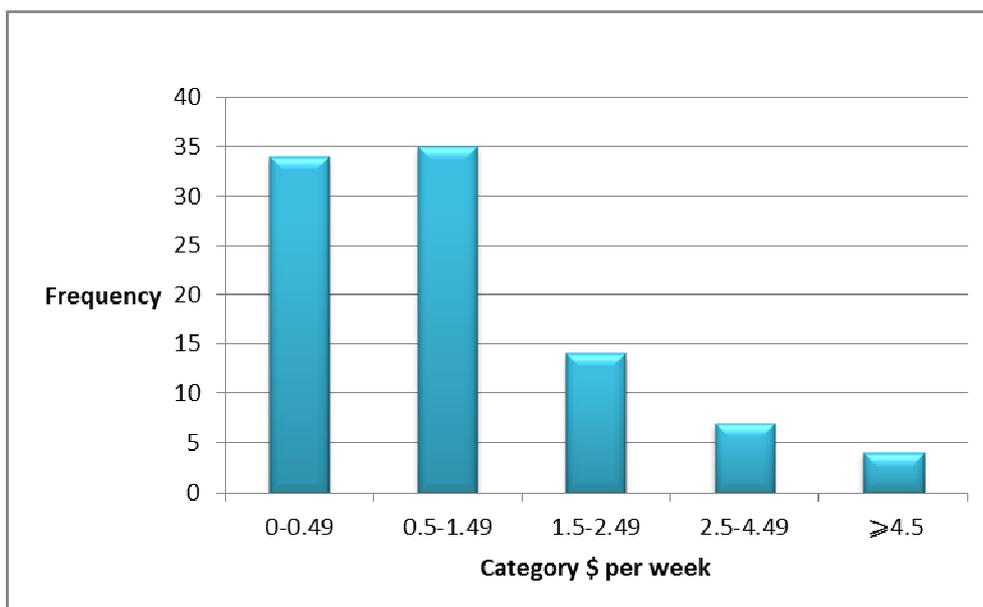
E.2.4   Factors influencing WTP values

The following summarises this survey's findings on demographic, geographic, etc factors influencing WTP values (for the bus option).

E.2.4.1   Distance from centre

The variation of WTP values with distance from the centre is as shown in figure E.3. WTP values tended to decrease with increasing distances from the centre: the average value at 10km from the centre was around half that close to the centre. This result is as expected and the slope of the regression line is significant (at the 95% level).

Figure E.3   Te Kuiti WTP, by distance
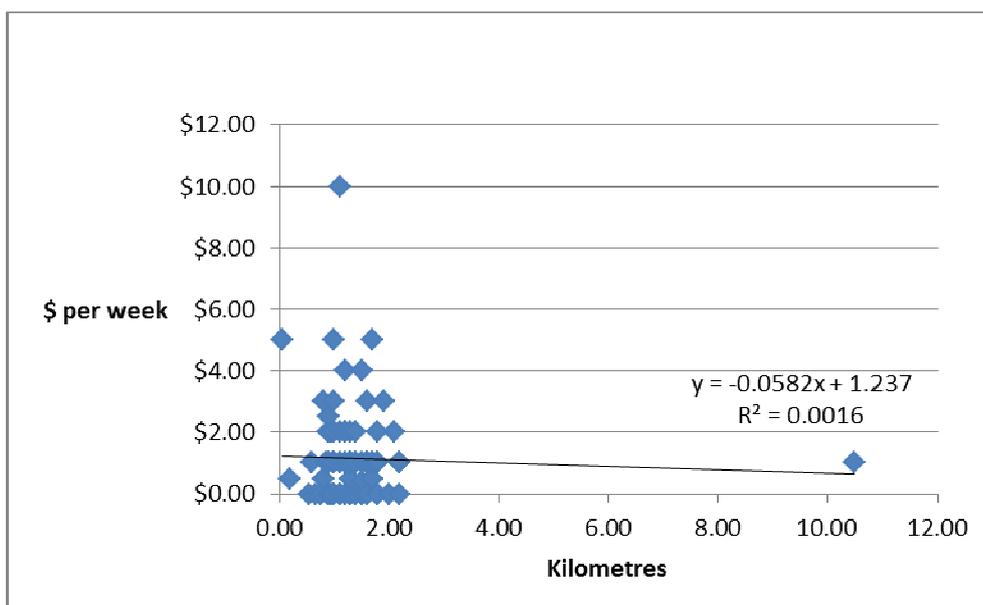
E.2.4.2   Level of PT use

The variation of WTP values with expected PT use is shown in figure E.4.

WTP values tended to increase with increasing levels of PT use: the average value for the '1–3 days/week' category was around twice that for the 'never' category. This result is as expected, but the slope of the regression line is not statistically significant.

Figure E.4   Te Kuiti WTP, by PT use
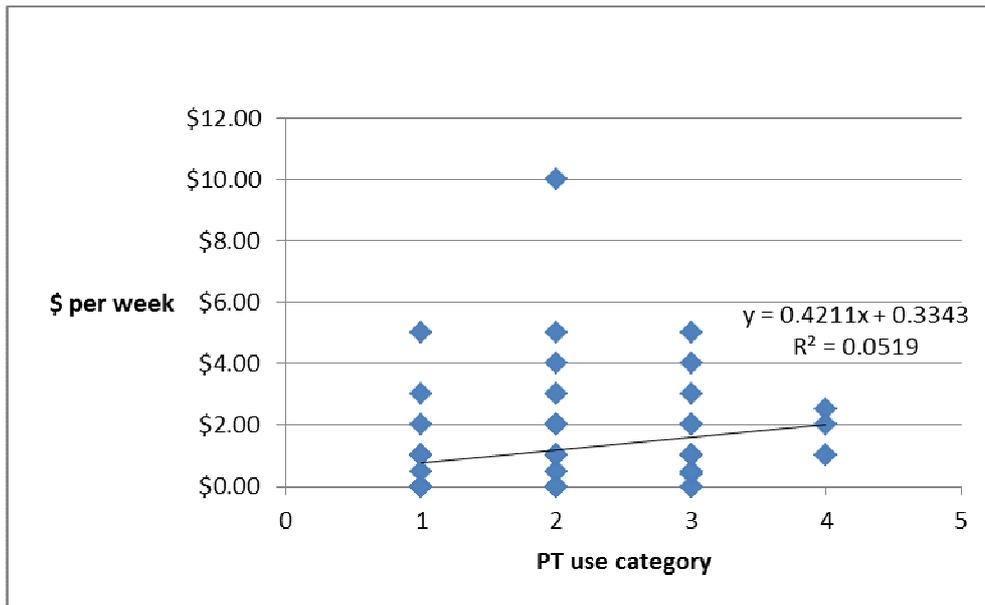
Key: 1) Never   2) A few times/year   3) 1–3 days/month   4) 1–3 days/week   5) Most days

E.2.4.3   Income category

The variation of WTP values with overall household income category is shown in figure E.5.

The WTP values tended to increase with increasing income. The average value for the highest income category was around twice that for the lowest category. This result is as expected, but the slope of the regression line is not significant.

Figure E.5   Te Kuiti WTP, by income

$$y = 0.2165x + 0.8001$$
$$R^2 = 0.0283$$

Key: 1) <$30,000   2) $30k–$50k   3) $50k–$70k   4) $70k–$100,000   5) >$100,000
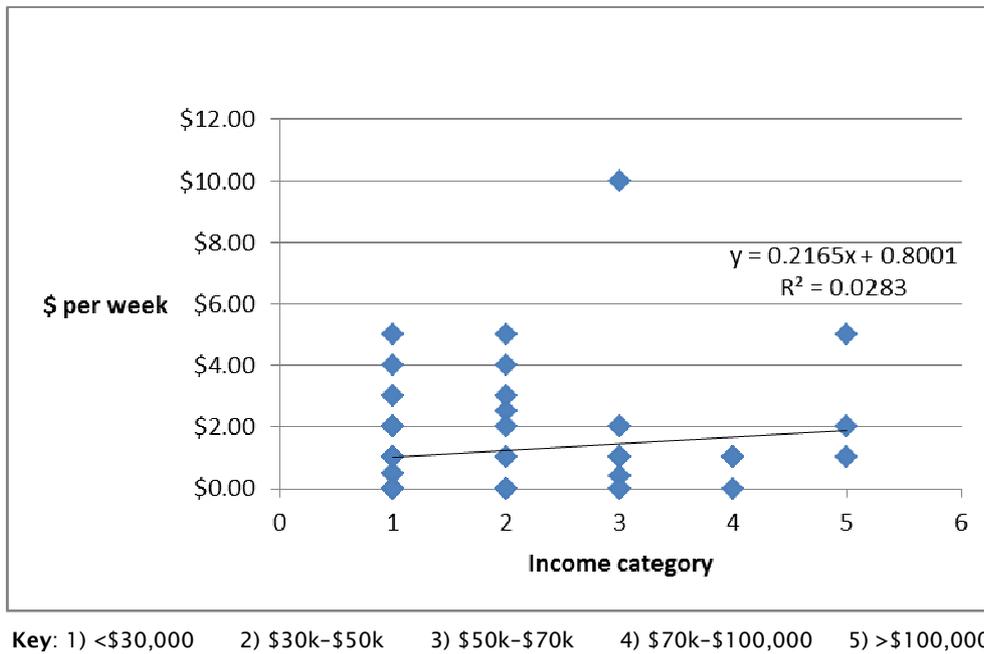
E.2.4.4   Household size

The variation of WTP direct bus values with household size is given in figure E.6.

WTP values tended to increase with increasing household size: the values for the largest households (6+ members) were around double those for the smallest households (1 member). This result is as expected and the slope of the regression line is significant (at the 95% level).

Figure E.6   Te Kuiti WTP, by household size

$$y = 0.1797x + 0.7303$$
$$R^2 = 0.0343$$
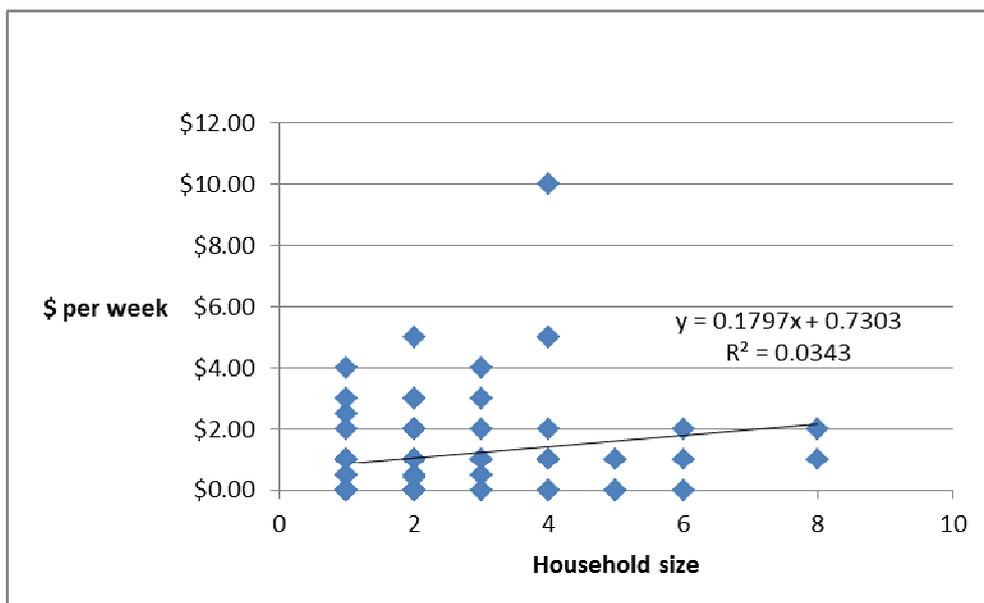
E.2.5   Summary of Te Kuiti findings

The survey found moderate WTP values to introduce a bus service to/from Hamilton, and lower WTP values to introduce an alternative rail service.

The survey results indicate the average (per household) WTP estimates were as follows (relative to a no-service base case):

* total usage, OVs and NUVs

    – bus – $60pa

    – rail – $44pa

* OVs and NUVs only[28]:

    – bus – $35pa

    – rail – $24pa.

The average distance from the centre of Te Kuiti of those surveyed was 1.4km, although the effective catchment area for OVs appears to be extensive (up to 11km), with decreasing values with increasing distance from the centre.

The survey found the expected relationships between increasing WTP values with increasing income, higher expected frequency of use, and increasing household size.

E.2.6   Conclusions

There appeared to be limited demand for a regular commuter bus service that would take an hour and 15 minutes to reach Hamilton.

Rail was not seen as an attractive option, owing to the unfavourable location of the Te Kuiti and Hamilton railway stations with respect to residential areas.

Te Kuiti appeared to be a relatively low-income and reasonably self-contained community. At the time of this research, it was not charged a transport rate.

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28 These values excluded components for regular use, traffic delays, safety and environmental effects.

E.3   Te Kuiti questionnaire

Reference No....................TELEPHONE SURVEY QUESTIONNAIRE: Te Kuiti/Waikato

Questions	Answer	Notes
1.1 Hi, I'm calling/phoning to do a short survey about transport (especially from Te Kuiti to Hamilton). Could I have a few minutes of your time to ask you some questions?	*Record all refusals, incomplete interviews and all 'not ins' on a separate sheet.*	*If it is not a convenient time, explain what survey is about (briefly) and make an appointment to call again. If necessary, explain that you are working for Transport Futures Ltd, phone number 02 11 39 44 38).*
2.1 Could you say how often you (personally) travel to Hamilton or places en route (eg Otorohanga, Te Awamutu)?	1) Most days 2) 1–3 days/week 3) 1–3 days/month 4) A few times/year 5) Never	*CIRCLE AS APPROPRIATE* *Name destinations other than central Hamilton*
2.2 What is the main journey purpose for these journeys & what mode do you mainly use?	Journey purpose _____ Car driver/car passenger/bus/other(state)_____	*eg work/education/social/shopping/other (STATE)* *CIRCLE AS APPROPRIATE*
3.1 Can I just check you are familiar with the current bus and rail services that operate between Te Kuiti and Hamilton, how often they operate, and what the current fares are?	Aware/explained? *Delete as necessary*	*The purpose of the interview is to find out what local people from the area think about the potential for public transport services to and from Hamilton.* *Existing bus services: Although there are several services each day, these are part of longer routes and do not fit commuting travel patterns. The lowest adult fare from Te Kuiti to Hamilton typically varies between $18 and $24.* *Travel time (limited stop) between 1hr 10mins and 1hr 20mins.* *Existing rail services: One service each way, but does not allow same-day travel to/from Hamilton.* *One-way fare $31.* *Travel time (non-stop) 50 mins.* *Note: These are not supported PT services.*

Question	Answer	Notes
3.2 Do you ever use these services, and if so, how frequently?	1) Most days 2) 1–3 days/week 3) 1–3 days/month 4) A few times/year 5) Never	*State frequency of use*
3.3 What do you think (in general) of the idea of a new bus service from Te Kuiti to Hamilton?	....	*Record any <u>brief</u> comments*
3.4 If a twice-a-day bus service was to be introduced – adult fare (one way between Te Kuiti and Hamilton around $10, less for concessions); travel time approx 1hr 15min –could you estimate how often you (personally) would be likely to use it?	1) Most days 2) 1–3 days/week 3) 1–3 days/month 4) A few times/year 5) Never	*State frequency of use* *Note: Assume that the service would operate with at least one early-morning departure to arrive in Hamilton before 9am – return to Te Kuiti at midday – an early-afternoon departure from Oxford – and a return to Oxford at the end of the working day (around 5pm).* *Assume fare discounting (for concessions and regular travel) would be available. Gold Card holders may be free in the off-peak, half-price in the peaks.* *Travel time approx 1 hr 15 mins, limited stop to/from central areas of Te Kuiti and Hamilton.*

Question	Answer	Notes
4.1 On a scale from 1–10, please say how importantly you (and others in your household) rate the following (possible) benefits of new bus service		*EXPLAIN THERE ARE 8 CATEGORIES* *Score in terms of importance from 0 to 10 (where 10 is very important and 0 is of no importance).* *Note that <u>if one aspect is much more important than others, then the scores should reflect this.</u>*
4.2 Regular use by you (and others in your household)	0–10	*1) Your regular use – this does not need to be every day, but is a regular occurrence under normal circumstances for one or more household members)*
4.3 Occasional use by you (and others in your household)	0–10	*2) Your use occasionally (for example, if no car or other transport were available and there was a need to travel)*
4.4 Use by other friends and relatives	0–10	*3) Use by friends and relatives (but not other household members)*
4.5 Use by others in the community	0–10	*4) Use by others in the community (eg people such as the elderly, those without a car, etc)*
4.6 Contribution to the local economy	0–10	*5) Contribution to the local economy (ie by providing passing trade income to local businesses and shops and by directly supporting local employment)*
4.7 Contribution to property attractiveness and value	0–10	*6) The effect of PT accessibility in terms of creating an attractive residential location and supporting associated property values*
4.8 Reduced road traffic delay	0–10	*7) Reduced road traffic delay (due to fewer cars being on the road)*
4.9 Environmental and safety effects	0–10	*8) Environmental and safety effects (eg better air quality, reduced noise, and better safety due to fewer cars being on the road)*

Questions	Answer	Notes
5.1 To help us assess the importance and value people put on having public transport services: How much would your household be willing to pay, on an ongoing basis (through additional rates or equivalent increase in rents) to reflect these benefits? *Ask respondent to suggest a weekly or annual amount, and make them aware that the average household in the study area currently pays around $50 per week/$2600 per year in rates, none of which is currently used to support public transport.* *Note: Users of supported bus services would still be required to pay fares.*	Ongoing amount (in $ per week) per household $ PER WEEK........................... *Make clear the yearly implication of the weekly figure suggested and check that they are happy with their response in those terms. TEST & RECORD REASONS FOR ANSWERS – ESPECIALLY FOR VERY LOW, VERY HIGH OR INCONSISTENT VALUES.*	*If necessary, explain that there are no plans to provide a bus service at present, but if one was to be introduced, it would most likely be funded by an increase in rates for households in the area served.* *If needed, also explain that in the study area, no public transport levy is currently applied, and in other areas of the Waikato, transport contributions are a small proportion of the total rates* *If needed, explain that this is simply a way of assessing the importance and value of public transport (if they ask, explain that this is a common technique that is used to assess the economic benefit or value of public services).* *Record the main reason for the value given:* ....
5.2 Could I ask some specific questions which may assist? *(Only If the respondent finds it difficult to set a weekly value.)*	*Where people have difficulty in answering the above question, offer them a starting point in terms of $/week and do 'iterative bidding' from there. At the end, check that they are happy with their final answer when converted to $/year.*	*Would your household be prepared to pay $5 per week? If Yes--> How about $10? If No--> How about $1? If No-->How about 50c, 25c, etc* *Half the interviews to start from a low base ...ie would your household be prepared to pay $1 per week? If yes--> How about $5? If No--> How about 50c, 25c, etc? Starting points to be used in sequence: $1/$5–50c/$10–$2/$8–$1.50/$6–$2.5/$4–20c/70c, and then reverse the above.* $1 a week = $52 per year; $2.50 a week = $130 per year; $5 a week = $260 per year; $7.50 a week = $390 per year; $10 a week = $520 per year
5.3 Now if you imagine that a rail service was provided (instead of a bus service) to connect the study area with Hamilton – assuming the train was a similar frequency, time and fare as the bus service described earlier – how much would your household be willing to contribute on an ongoing basis (funded through rates) to pay for a rail service? *Note: Users of supported rail services would be required to pay fares.*	Ongoing amount (in $ per week) per household	*The person could use the earlier figure given for the bus service as a 'comparator' to estimate the amount their household is prepared to pay for a rail service.* *Explain that this question is for research purposes and comparison purposes only and there are no firm proposals to introduce a bus or rail service.* *Record main reason for value given below:* ....

Questions	Answer	Notes
6.1 Can I ask which of these age groups you are in? *(DO NOT ASK IF OBVIOUS IN PERSONAL INTERVIEW)*	Under 18 _____ 18 to 64 _____ 65 or over _____	*Terminate interview if respondent is under 18 and arrange a time to ring back*
6.2 Excluding yourself, could you indicate the number of people in your household in the following age groups?	Under 18 _____ 18 to 64 _____ 65 or over _____	*Make sure that this <u>excludes</u> the respondent*
6.3 Do you mind indicating your approximate household income category?	<$30,000 _____ $30k–$50k _____ $50k–$70k _____ $70k–$100,000 _____ >$100,000 _____	*Approximate total household income in last 12 months (or last financial year), before tax*

Checks	Answer	Notes
7.1 Name of respondent *(CHECK)*	....	*The main aim of this is to check the last name and initials to allow us to verify the interview and to follow up if necessary*
7.2 Gender of respondent *(DO NOT ASK)*	Male/female *Select as necessary*	
7.3 Address *(DO NOT ASK UNLESS UNCLEAR)*	....	
7.4 Phone number *(ASK ONLY FOR FACE-TO-FACE INTERVIEWS)*	....	
7.5 Interviewer *(DO NOT ASK)*	....	*Your name*
7.6 Type of interview *(DO NOT ASK)*	....	*Telephone or face-to-face*
7.7 Time of interview (DO NOT ASK)	....	*Date, day and time (am or pm)*

Thank you very much for helping with this survey

Appendix F   Tuakau survey report

F.1   Tuakau survey methodology

This appendix describes the project survey of households undertaken in January 2011 in the Tuakau (Waikato) area. Tuakau is a community of 3504 people in Waikato District, Waikato Region. At the time of this research, the area was only served by irregular passenger transport services and was not subject to a transport rate.

Telephone interviews were undertaken for residential addresses in the Franklin telephone White Pages (Tuakau entries only).

All interviews were undertaken with adults who were able speak on behalf of each household.

Two options were explored in the interviews:

- direct rail (primary) option – a direct rail service to Auckland CBD (Britomart), operating at commuter peak periods, plus a service in the middle of the day

- bus feeder (secondary) option – bus service in peak periods and middle of the day connecting at Pukekohe/Papakura, with rail services to/from Auckland CBD.

A range of questions were asked, with the most important being:

- Question 4: Importance rating for PT service benefits

- Question 5.1: WTP for the introduction of direct bus services

- Question 5.3: WTP for the introduction of indirect bus services.

The survey questionnaire is given in section F.4.

In addition to investigating OVs and NUVs, the survey methodology differentiated between public transport users and non-users.

Interviews were undertaken on weekday daytime, weekday evenings and Saturdays to obtain a range of responses from commuters and non-commuters: the target sample was 30 A-grade interviews for each of the three time periods. No Sunday surveys were undertaken.

The interview form was systematically worked through by the interviewer, recording any additional comments made by the respondent as they were made.

The survey team was made up of university undergraduates, with each one undergoing training prior to being asked to conduct the interviews.

The training consisted of the following:
- an overview of the nature and purpose of the survey
- an explanation of key terms, such as willingness-to-pay
- a detailed exploration of the survey form and clarification of any points arising
- a practice telephone interview.

F.2   Tuakau results and commentary

F.2.1   Interviews and grading

A total of 202 households were approached and 118 interviews were conducted (response rate 58%), as shown in table F.1.

Subsequent grading of interviews reduced the number of selected 'highest-quality A-grade' interviews to 107. All the results presented in this appendix (and elsewhere in this report) relate to these A-grade interviews only. The reason that interviews were graded was to eliminate responses involving inconsistencies, uncertainties or other problems. A summary of the response rates is given in table F.1.

Table F.1   **Summary of Tuakau survey response rates**

Interviews (A-grade)	% of total requests	Interviews (B-grade)	% of total requests	Interviews (incomplete)	% of total requests	Refused	% of total requests	Total	*Not in*
107	53.0%	6	3.0%	5	2.5%	84	41.6%	202	*209*

F.2.2   Segmentation of responses

For analysis purposes, responses were split into 'PT user' (defined as expecting to take at least one public transport trip a year) and 'non-PT user'.

The WTP values expressed were divided into components (regular use, option availability and non-use effects). Regular use and externality effects (a subset of the non-use effects) were separately identified to allow WTP values to be derived for cost–benefit analysis purposes.

F.2.3   Overall results

Results from the survey, in terms of WTP weekly values per household, for the sample of 104 highest-quality (A-grade) interviews, are summarised in the following:

- Table F.2 – detailed results by PT use category
- Table F.3 – summary results by PT use category
- Table F.4 – WTP mean value and confidence interval
- Figure F.1 – summary of values by benefit category
- Figure F.2 – distribution of total WTP values.

At the aggregate level, the results indicate that the average OV/NUV values for a direct rail service to Auckland CBD was $157pa ($3.01/week) per household.

The following points can be made:

- The 95% confidence interval on this mean value was ±$28pa (ie $129–$185).
- The median value was $104pa ($2.00/week).
- The mode value was $52pa ($1.00/week).
- The average OV/NUV WTP for the bus feeder option was $45pa.

Table F.2   Tuakau detailed survey results

Category	Sample size	Av distance (km) – home to rail station	Regular use	Option – occasional use	Non-use – friends & relatives	Non-use – community	Non-use – local economy	Non-use – property	Reduced delay	Improved safety & environment	Regular use, property, delay, safety & environment	Option and non-use (excluding regular use, property, delay, safety & environment)	Overall WTP value per year – rail	Option and non-use WTP value per year – rail	Overall WTP value per year – bus	Option and non-use only - per year – bus
	No.	km	%	%	%	%	%	%	%	%	%	%	$	$	$	$
Weekday	39	6.58	10.7%	13.5%	13.3%	16.8%	12.3%	11.3%	11.0%	11.1%	44.1%	55.9%	$133.28	$74.54	$34.00	$19.02
Current & future PT user	63	2.76	10.2%	12.6%	12.2%	15.6%	15.5%	11.8%	11.1%	10.9%	44.1%	55.9%	$151.94	$84.87	$37.97	$21.21
Current & future PT non-user	3	1.07	6.2%	9.7%	7.1%	19.5%	15.9%	13.3%	11.5%	16.8%	47.8%	52.2%	$52.00	$27.15	$0.00	$0.00
Current PT non-user, but future user	41	6.59	11.1%	12.9%	11.3%	16.6%	12.7%	12.4%	11.5%	11.6%	46.5%	53.5%	$171.80	$91.84	$59.61	$31.87
Total	107	4.18	10.5%	12.6%	11.8%	16.0%	14.5%	12.1%	11.3%	11.3%	45.1%	54.9%	$156.75	$86.04	$45.20	$24.81

Table F.3   Tuakau summary results

Category	Sample size	Av distance (km) – home to rail station	Option and non-use (excluding regular use, property, delay, safety & environment)	Overall WTP value per year – rail	Option and non-use WTP value per year – rail	Overall WTP value per year – bus	Option and non-use only - per year – bus
	No.	km	%	$	$	$	$
Weekday	39	6.58	55.9%	$133.28	$74.54	$34.00	$19.02
Current & future PT user	63	2.76	55.9%	$151.94	$84.87	$37.97	$21.21
Current & future PT non-user	3	1.07	52.2%	$52.00	$27.15	$0.00	$0.00
Current PT non-user, but future user	41	6.59	53.5%	$171.80	$91.84	$59.61	$31.87
Total	107	4.18	54.9%	$156.75	$86.04	$45.20	$24.81

Table F.4   Tuakau WTP mean value and confidence interval (values per week)

|	
Sample size	107
Mean value (sample)	$3.01
Standard derivation	$2.84
Confidence interval (95%)	±$0.54
Mean value (population) – range (95%)	$2.47–$3.56

Figure F.1   Tuakau WTP value percentages, by benefit category
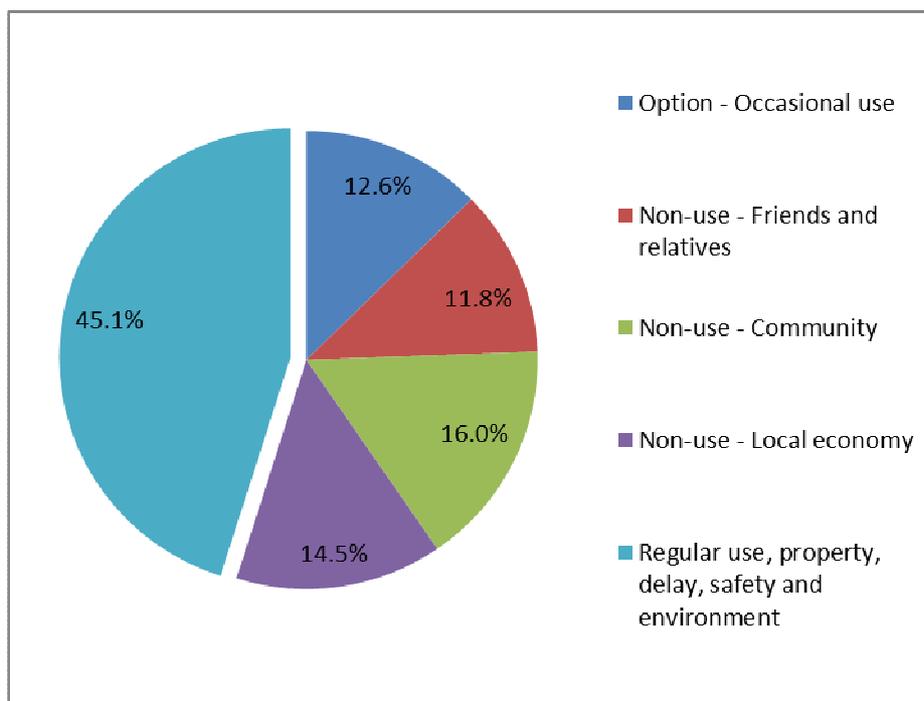
Figure F.2   Tuakau distribution of total WTP values – $/week
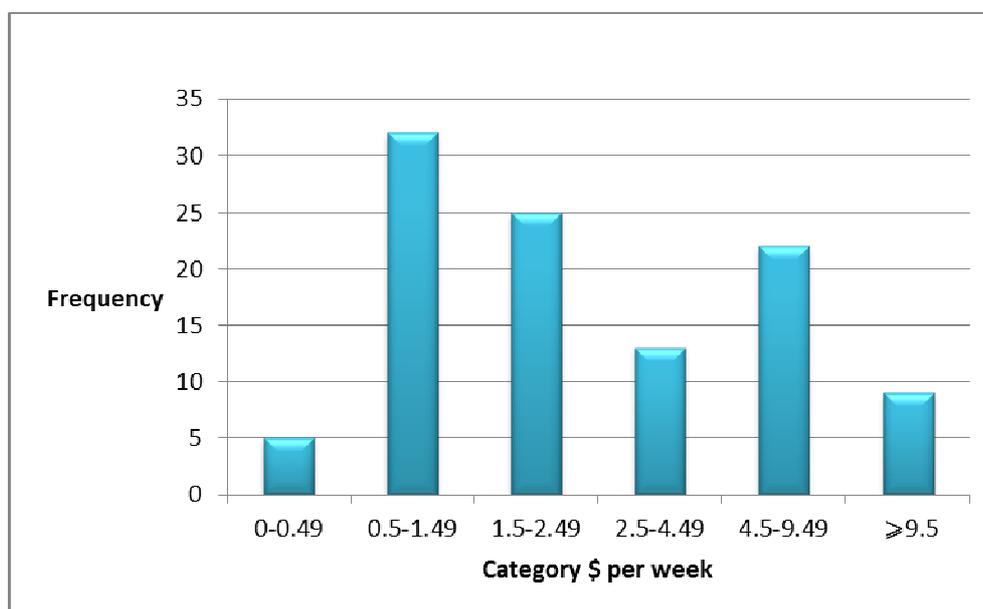
F.2.4   Factors influencing WTP values

The following summarises the survey findings on demographic, geographic, etc factors influencing WTP values (for the rail option).

F.2.4.1   Distance from centre

The variation of WTP values with distance from the centre is as shown in figure F.3. WTP values tended to decrease slowly with increasing distance from the centre: the average value at 30km from the centre was still above half that close to the centre. The slope of the regression line is not statistically significant.

Figure F.3   Tuakau WTP, by distance
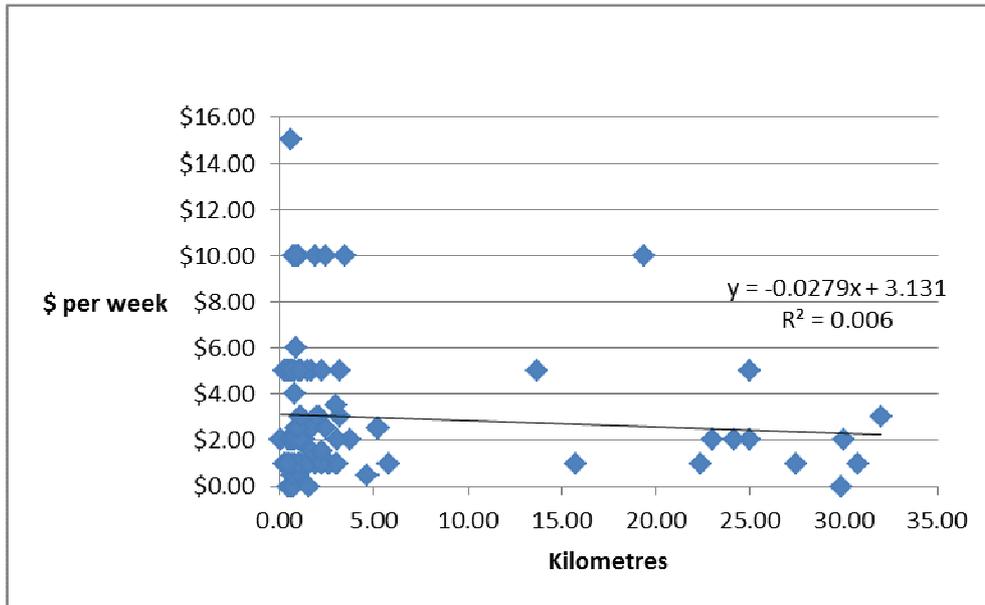
F.2.4.2   Level of PT use

The variation of WTP values with expected PT use is shown in figure F.4. WTP values tended to increase with increasing levels of PT use: the average value for the 'most days' category was around three times that for the 'never' category. This result is as expected, but the slope of the regression line is not significant.

Figure F.4   **Tuakau WTP, by PT use**

$$y = 0.6961x + 1.0042$$
$$R^2 = 0.0504$$
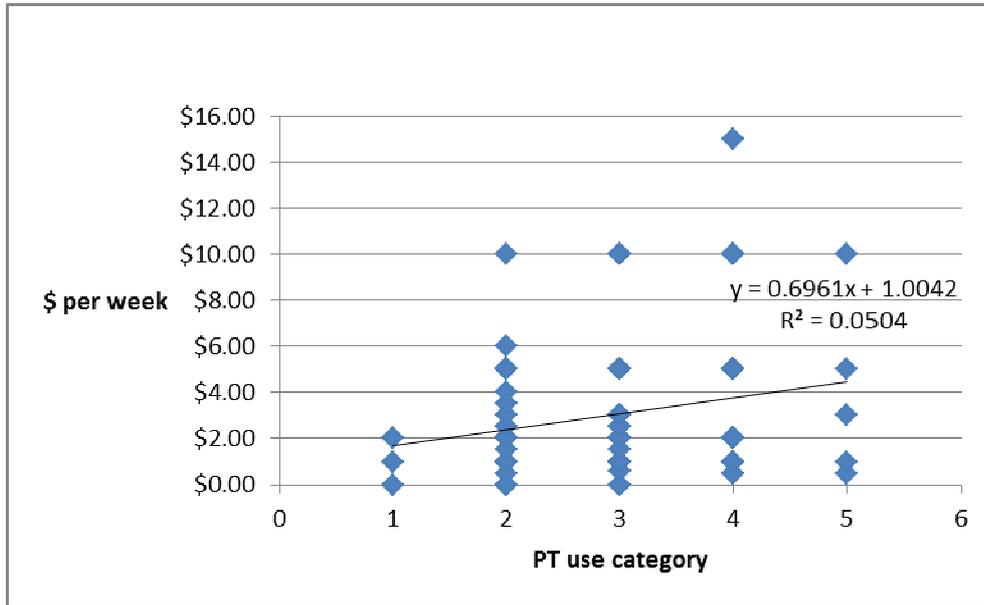
Key: 1) Never   2) A few times/year   3) 1–3 days/month   4) 1–3 days/week   5) Most days

F.2.4.3   Income category

The variation of WTP values with overall household income category is shown in figure F.5.

The WTP values tended to increase with increasing income. The average value for the highest income category was around twice that for the lowest category. This result is as expected, and the slope of the regression line is statistically significant.

Figure F.5   **Tuakau WTP, by income**

$$y = 0.5711x + 1.4516$$
$$R^2 = 0.1038$$
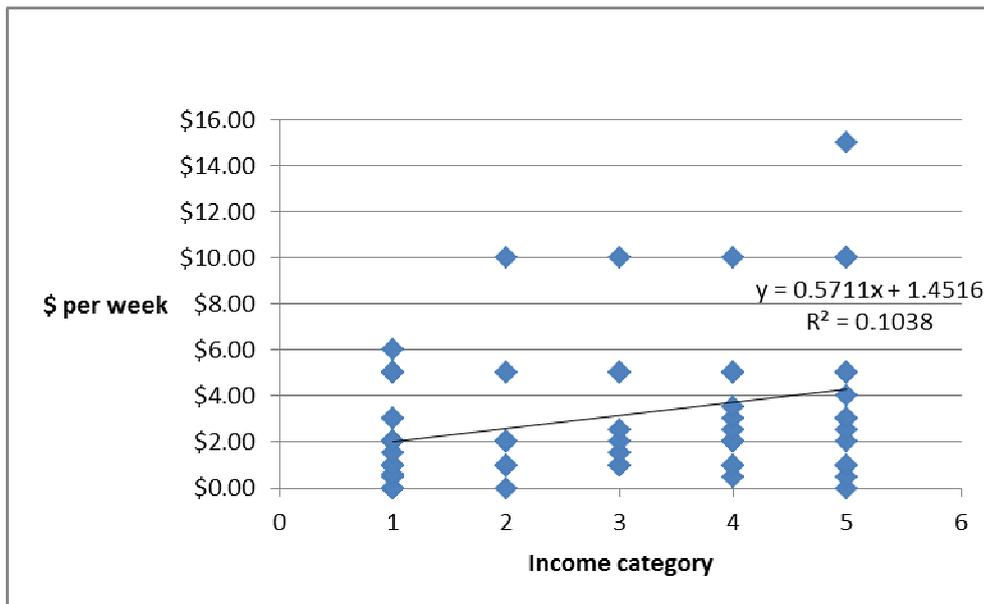
Key: 1) <$30,000   2) $30k–$50k   3) $50k–$70k   4) $70k–$100,000   5) >$100,000

F2.4.4   Household size

The variation of WTP direct bus values with household size is given in figure F.6.

WTP values tended to increase with increasing household size: the values for the largest households (4 or 5 members) were around double those for the smallest households (1 member). This result is as expected, and the slope of the regression line is statistically significant.

Figure F.6   Tuakau WTP, by household size

The chart shows a scatter plot with the regression equation $y = 0.6544x + 1.7789$ and $R^2 = 0.0446$. The y-axis is labelled "$ per week" ranging from $0.00 to $16.00, and the x-axis is labelled "Household size" ranging from 0 to 6.
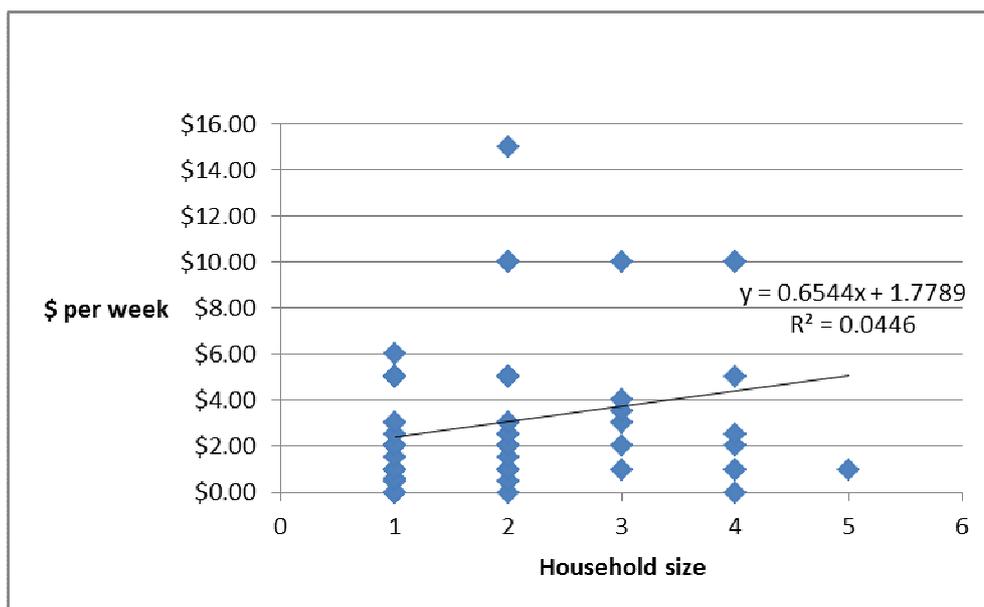
F.2.5   Summary of findings

The survey found relatively high WTP values to introduce a rail service, and much lower WTP values to introduce a feeder bus service to the Auckland rail network.

The survey results indicate the average (per household) WTP valuations were as follows (relative to the existing base case):

- total usage, OVs and NUVs:

    - direct rail service – $157pa

    - feeder bus service – $45pa

- OVs and NUVs only[29]:

    - direct rail service – $86pa

    - feeder bus service – $25pa.

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29 These values exclude components for regular use, traffic delays, safety and environmental effects.

The average distance from the centre of those surveyed was 4.2km, although the effective catchment area for OVs appears to have been extensive (up to at least 30km), with decreasing values with increasing distance from the centre.

The survey found relationships between increasing WTP values and increasing income, higher expected frequency of use, and increasing household size.

F.2.6   Conclusions

There appeared to be strong local demand for a regular direct commuter rail service that would take approximately an hour and a half to reach Auckland.

Although the community is in the Waikato Region, it relates strongly to Auckland, is within the Auckland travel to work catchment area, and is very close to the Auckland rail network. Interchange from bus shuttle to rail was not seen as a particularly attractive option.

At the time of this research, Tuakau ratepayers were not paying a transport rate.

F.3   Notes from Tuakau surveyor debriefing

1   Do you have any problems or observations on the interview technique used?

The arrangement of the survey after four surveys I feel [was] good. It meant that we went straight into the relevant transport questions to which the participants responded well too.

With the first question 'How often do you personally travel to central Auckland or other places en route?', I felt that the respondents' answers were more focused on the Central Auckland destination which they heard first, rather than the 'en route' places, which include Papakura, Pukekohe and Manakau. When people responded that they 'never go to Auckland', I often asked about the en route destinations, which subsequently led to them changing their answers.

Again the question … about 'contributing a weekly amount in order to reap the benefits of this potential bus service' was always a tricky question to ask. In each interview I stressed that this was a purely researched-based question, that there were no plans to do this, and that it was simply to help us access the value and importance that the community would place on this hypothetical public transport. This time [fewer] people went on to discuss the effect of the increased rates – unlike in the previous surveys. I think that this is because I explained that since Tuakau didn't have any PT currently, that it would make sense that if they did get an extended train line, [then] there would be a contribution from each member of the community to help subside the service for the user. Most people responded positively to this logic, although there were still a few who [did not want] to pay anything.

There were still a few people who did not want to indicate their annual income. Also, on two occasions the connection with the person was lost – this happened once [because of] a faulty phone line, and the other time the person lost interest halfway through the interview and hung up.

2   Were there any significant differences you noticed between the responses in Tuakau and the type of responses from the previous survey areas?

The major difference between this survey and the others was that this survey focused on the train option [rather] than the bus.

I found that the general response to Tuakau survey was more positive than previous surveys, and people were more aware of the transport issue. I think that it was a current issue within the community [and] … 'bring public transport back to Tuakau' had been discussed in the local newspaper and [at] meetings held in the community.

The general annual income [in Tuakau] seemed to be low to mid-range. This may be because I interviewed a lot of pensioners. However, there were a few respondents who had an income over $100,000. Once again, the older population … seemed very interested in the potential train service, as each stressed that without public transport and … not being able to drive themselves, they were essentially stuck within Tuakau.

In regards to the alternative transport arrangement of an improved bus shuttle service, most of the respondents were not positive towards this proposal and stated that they would not be willing to fund it and would just take their cars. Of those who were positive about the idea, the majority of the respondents were elderly.

3   Any suggestions as to how the survey might be improved and made easier for people to understand or to answer?

I think the survey layout is well put together. It enables us to get all the relevant information from the participant.

One suggestion could be that a few of the elderly people struggled with rating the eight statements (from 1–10) for the potential benefits of the rail service. They found it confusing, which meant that I had to repeat and explain again the question numerous times. A simpler scale would perhaps be helpful.

F.4   Tuakau questionnaire

Reference no. .... TELEPHONE SURVEY QUESTIONNAIRE: Tuakau/Waikato

Questions	Answer	Notes
1.1 Hi, I'm calling/phoning to do a short survey about transport (especially from Tuakau towards Auckland) – could I have a few minutes of your time to ask you some questions?	*Record all refusals, incomplete interviews and all 'not-ins' on a separate sheet.*	*If it is not a convenient time, explain that survey is about (briefly) and make an appointment to call again.* *If necessary explain that you are working for Transport Futures Ltd, phone number 02 11 39 44 38.*
2.1 Could you say how often you (personally) travel to Auckland centre or to places en route (eg Pukekohe, Papakura or Manukau)?	Most days _____ 1–3 days/week _____ 1–3 days/month _____ A few times/year _____ Never _____	*CIRCLE AS APPROPRIATE* *Name destinations other than central Auckland*
2.2 What is the main journey purpose for these journeys & what mode do you mainly use?	Journey purpose _____ Car driver/car passenger/bus/ other(*state*) _____	*Eg work/education/social/shopping/other (STATE)* *CIRCLE AS APPROPRIATE*
3.1 Can I just check you are familiar with the current buses and trains that operate between Tuakau, Pukekohe and Auckland, how often they operate, and what the current fares are?	Aware/explained? *Delete as necessary*	*The purpose of the interview is to find out what local people from the area think about the potential for public transport services to and from Auckland.* *Bus services: The 7.20am '476' service travels direct to Auckland, taking 2hrs 25 minutes, arriving at 9.45am. Some other '476' and '50' bus services connect with train services at Pukekohe or Papakura.* *Typical travel time for a combined bus/rail journey is around 2hrs.* *Combined bus and rail fare between Tuakau and Auckland centre approx $12.* *Existing rail services: Hourly MAXX train services from Pukekohe, more frequent in the peak.* *Fare $9.80 to Britomart.* *Travel time 1hr 10mins.*

Question	Answer	Notes
3.2 Do you ever use these services, and if so, how frequently?	1) Most days 2) 1–3 days/week 3) 1–3 days/month 4) A few times/year 5) Never	*State which ones and frequency of use*
3.3 What do you think (in general) of the idea of improved public transport services from Tuakau to Pukekohe and on to Auckland?	....	*Record any <u>brief</u> comments*
3.4 If one peak and one inter-peak return MAXX rail service were extended from Pukekohe to start from Tuakau – adult fare (one way between Tuakau and Auckland) around $12.00, potentially less for concessions; travel time approx 1hr 30mins – could you estimate how often you (personally) would be likely to use it?	1) Most days 2) 1–3 days/week 3) 1–3 days/month 4) A few times/year 5) Never	*State frequency of use* *Note: Assume that the service would provide a daily early-morning and late-afternoon return commuter service, with a midday return service each way also provided to allow a half -day (morning or afternoon) trip to Auckland.*

Question	Answer	Notes
4.1 On a scale from 1–10, please say how importantly you (and others in your household) rate the following (possible) benefits of an extended rail service.		*EXPLAIN THERE ARE 8 CATEGORIES* *Score in terms of importance from 0 to 10 (where 10 is very important and 0 is of no importance).* *Note that <u>if one aspect is much more important than others – then the scores should reflect this</u>.*
4.2 Regular use by you (and others in your household)	0–10	*1) Your regular use – this does not need to be every day, but is a regular occurrence under normal circumstances for one or more household members)*
4.3 Occasional use by you (and others in your household)	0–10	*2) Your use occasionally (for example, if no car or other transport were available and there was a need to travel)*
4.4 Use by other friends and relatives	0–10	*3) Use by friends and relatives (but not other household members)*
4.5 Use by others in the community	0–10	*4) Use by others in the community (eg people such as the elderly, those without a car, etc)*
4.6 Contribution to the local economy	0–10	*5) Contribution to the local economy (ie by providing passing trade income to local businesses and shops and by directly supporting local employment)*
4.7 Contribution to property attractiveness and value.	0–10	*6) The effect of PT accessibility in terms of creating an attractive residential location and supporting associated property values.*
4.8 Reduced road traffic delay	0–10	*7) Reduced road traffic delay (due to fewer cars being on the road)*
4.9 Environmental and safety effects	0–10	*8) Environmental and safety effects (eg better air quality, reduced noise, and better safety due to fewer cars being on the road)*

Questions	Answer	Notes
5.1 To help us assess the importance and value people put on having public transport services: How much would your household be willing to pay, on an ongoing basis (through additional rates or equivalent increase in rents) to reflect these benefits? *Ask respondent to suggest a weekly or annual amount, and make them aware that the average household in the study area currently pays around $45 per week/$2250 per year in rates, none of which is currently used to support public transport.* *Note: Users of supported bus services would still be required to pay fares.*	Ongoing amount (in $ per week) per household $ PER WEEK........................... *Make clear the yearly implication of the weekly figure suggested and check that they are happy with their response in those terms. TEST & RECORD REASONS FOR ANSWERS – ESPECIALLY FOR VERY LOW, VERY HIGH OR INCONSISTENT VALUES.*	*If necessary, explain that there are no firm plans to extend the MAXX rail service at present, but if this was to be done, one way that it might be funded is through an increase in rates for households in the area served.* *If needed, also explain that In the study area, no public transport levy is currently applied, and in other areas of the Waikato, transport contributions are a small proportion of the total rates* *If needed, explain that this is simply a way of assessing the importance and value of public transport (if they ask, explain that this is a common technique that is used to assess the economic benefit or value of public services).* *Record the main reason for the value given* ....
5.2 Could I ask some specific questions which may assist? (*Only if the respondent finds it difficult to set a weekly value.*)	*Where people have difficulty in answering the above question, offer them a starting point in terms of $/week and do 'iterative bidding' from there. At the end, check that they are happy with their final answer when converted to $/year.*	*Would your household be prepared to pay $5 per week? If Yes--> How about $10? If No--> How about $1? If No-->How about 50c, 25c, etc.* *Half the interviews to start from a low base …ie would your household be prepared to pay $1 per week? If yes--> How about $5? If No--> How about 50c, 25c, etc?* *Starting points to be used in sequence: $1/$5–50c/$10–$2/$8–$1.50/$6–$2.5/$4–20c/70c, and then reverse the above.* $1 a week = $52 per year; $2.50 a week = $130 per year; $5 a week = $260 per year; $7.50 a week = $390 per year; $10 a week = $520 per year

Questions	Answer	Notes
5.3 Now, if you imagine that an improved bus shuttle service was provided (instead of a rail service) to connect Tuakau area with Pukekohe and Papakura – assuming that the bus was a similar frequency and fare as an extended MAXX rail service described earlier, but with an allowance for extra time of say 15mins associated with interchange between bus and rail – how much would your household be willing to contribute on an ongoing basis (funded through rates) to pay for a bus service? *Note: Users of supported bus services would still be required to pay fares.*	Ongoing amount (in $ per week) per household	*The person could use the earlier figure given for the extension of the MAXX rail service as a 'comparator' to estimate the amount their household is prepared to pay for a 'direct' bus service.* *Explain that this question is for research purposes and comparison purposes only and there are no firm proposals to introduce a bus service.* *Record main reason for value given:* ....
6.1 Can I ask which of these age groups you are in? *(DO NOT ASK IF OBVIOUS IN PERSONAL INTERVIEW)*	Under 18 _____ 18 to 64 _____ 65 or over _____	*Only for the respondent – terminate interview if respondent is under 18 and arrange time to ring back*
6.2 Excluding yourself, could you indicate the number of people in your household in the following age groups?	Under 18 _____ 18 to 64 _____ 65 or over _____	*Make sure that this <u>excludes</u> the respondent*
6.3 Do you mind indicating your approximate household income category?	<$30,000 _____ $30k–$50k _____ $50k–$70k _____ $70k–$100,000 _____	*Approximate total household income in last 12 months (or last financial year), before tax*

Checks	Answer	Notes
7.1 Name of respondent *(CHECK)*	....	*The main aim of this is to check the last name and initials to allow us to verify the interview and to follow up if necessary*
7.2 Gender of respondent *(DO NOT ASK)*	Male/female *Select as necessary*	
7.3 Address *(DO NOT ASK UNLESS UNCLEAR)*	....	
7.4 Phone number *(ASK ONLY FOR FACE-TO-FACE INTERVIEWS)*	....	
7.5 Interviewer *(DO NOT ASK)*	....	*Your name*
7.6 Type of interview *(DO NOT ASK)*	....	*Telephone or face-to-face*
7.7 Time of interview *(DO NOT ASK)*	....	*Date, day and time (am or pm)*

Thank you very much for helping with this survey