



Deposited via The University of Leeds.

White Rose Research Online URL for this paper:

<https://eprints.whiterose.ac.uk/id/eprint/2208/>

Monograph:

Hopkinson, P.G. (1994) The Social Valuation of Road Schemes. Working Paper. Institute of Transport Studies, University of Leeds , Leeds, UK.

Working Paper 363

Reuse

Items deposited in White Rose Research Online are protected by copyright, with all rights reserved unless indicated otherwise. They may be downloaded and/or printed for private study, or other acts as permitted by national copyright laws. The publisher or other rights holders may allow further reproduction and re-use of the full text version. This is indicated by the licence information on the White Rose Research Online record for the item.

Takedown

If you consider content in White Rose Research Online to be in breach of UK law, please notify us by emailing eprints@whiterose.ac.uk including the URL of the record and the reason for the withdrawal request.



White Rose Research Online

<http://eprints.whiterose.ac.uk/>



[Institute of Transport Studies](#)

University of Leeds

This is an ITS Working Paper produced and published by the University of Leeds. ITS Working Papers are intended to provide information and encourage discussion on a topic in advance of formal publication. They represent only the views of the authors, and do not necessarily reflect the views or approval of the sponsors.

White Rose Repository URL for this paper:

<http://eprints.whiterose.ac.uk/2208/>

Published paper

Hopkinson, P.G. (1994) *The Social Valuation of Road Schemes*. Institute of Transport Studies, University of Leeds. Working Paper 363

UNIVERSITY OF LEEDS
Institute for Transport Studies

ITS Working Paper 363

ISSN 0142-8942

June 1994

THE SOCIAL VALUATION OF ROAD SCHEMES

P G Hopkinson

This work was sponsored by the Economic and Social Research Council.

ITS Working Papers are intended to provide information and encourage discussion on a topic in advance of formal publication. They represent only the views of the authors, and do not necessarily reflect the views or approval of the sponsors.

CONTENTS

Page

ABSTRACT	
1. INTRODUCTION	1
2. BACKGROUND	1
2.1 Framework Appraisal in Trunk Road Planning	2
2.2 Social Cost-Benefit Analysis	3
2.3 Environmental Impact Assessment	3
3. ISSUES AND PROBLEMS	4
3.1 Theoretical Issues	
3.1.1 The relationship between the economic and environmental appraisal	4
3.1.2 The relative importance of attributes affecting the same individual	4
3.1.3 Private and social interests	5
3.2 Methodological Issues	10
3.2.1 Elicitation	10
3.2.2 Elicitation method	11
3.2.3 Valuation	12
3.2.4 Survey methods	13
3.2.5 Measurement difficulties	14
3.2.6 Conclusion	17
4. SURVEY DEVELOPMENT	17
4.1 Introduction	17
4.2 Effect of Information	18
4.3 Trade-offs	18
4.4 Private and Social Preferences	19
4.5 Payment Mechanism	20
4.6 Second Pilot Study	20
4.7 Elicitation of Attributes: Perception of the Scheme	21
4.8 Ranking of Schemes	23
4.9 Valuation of Scheme Benefits	24
4.10 Conclusions	26
5. FINAL METHOD	27
5.1 Survey Areas and Sample Population	28
5.2 Findings	29
6. INTERPRETATION OF FINDINGS	35
REFERENCES	36
ANNEX 1: PUBLIC CONSULTATION SURVEY FORMS	
ANNEX 2: MAIN SURVEY FORMS	

ABSTRACT

HOPKINSON, PG (1994). The social valuation of road schemes. ITS Working Paper 363, Institute for Transport Studies, University of Leeds.

Road project appraisal in the UK is based upon the estimation of costs and benefits which in turn are predicted upon a series of techniques, assumptions and approaches. This paper examines a number of critical issues in road project appraisal, in particular the relation between 'economic' and 'environmental' costs and benefits. A social survey methodology is described which allows people to express their preferences between alternative road schemes in a much fuller way than is normally allowed in conventional studies of, for instance, value of time or environmental impact surveys. The findings of these surveys are discussed and their implications for road project appraisal outlined.

THE SOCIAL VALUATION OF ROAD SCHEMES

1. INTRODUCTION

This paper reports on the development of a survey method as part of a two year ESRC funded project entitled 'The Social Valuation of Road Schemes'. The aim of the project was to examine the way in which new road schemes in the UK are appraised, the assumptions upon which this appraisal process is based and how these assumptions or alternative assumptions affect the apparent value attached to a given proposal.

The specific objectives of the project are:

- (i) to identify how people conceptualise the impacts of road schemes
- (ii) to measure the relative importance of different project attributes
- (iii) to examine the extent to which private and social valuations differ.

A further objective was added to the project at an early stage in view of the recommendation of the 'Pearce Report', for a greater role for monetary valuation of environmental goods and impacts within project appraisal (Pearce et al 1989). Thus we set out to determine the extent to which it was feasible or meaningful to include monetary valuations of the environmental impacts of new road schemes.

From the outset it was recognised that this work would be exploratory and it would be necessary to identify and test approaches with which to obtain peoples' preferences. This required an understanding of the theoretical basis and assumptions underlying the measurement of preference and attitude; the cornerstone of neoclassical economics. Given the project objectives, it was necessary to look further afield than the mainstream transport or environmental economics literature. On the basis of various ideas developed during the course of the project, a series of pilot surveys, varying in their degree of complexity and scale, were undertaken which led to a final method which was used in the main survey. The findings from this survey are reported in this paper.

Section 2 of the paper sets out the background of the project objectives within transport planning and appraisal. Section 3 deals with a number of key theoretical and methodological considerations affecting the development of an approach. Section 4 describes, the findings from the developmental stages of the project. Section 5 describes the method adopted, its application and the findings.

2. BACKGROUND

This project is concerned primarily with the appraisal of new trunk road schemes in the UK and in particular the way in which the environmental costs and benefits of those schemes are valued, and how these values influence decisions. This topic has also been recently investigated and reported on by SACTRA (1992). SACTRA recommended changes to the environmental appraisal of new road schemes including the need to specify strategic environmental objectives for the road as a whole; earlier identification of constraints in scheme selection and route identification as well as a limited role for valuing environmental costs and benefits in monetary terms at the local level to assist in decisions between competing alternative road schemes. Aside from trunk road

appraisal, the issue of valuation is of fundamental importance in transport planning generally. For example, decisions on public transport investment increasingly involve consideration of a wide range of indirect benefits, as does the justification for traffic demand management.

The findings from this project will be of interest and relevance across a broad set of proposal types. The remainder of this report however is concerned with the current trunk road appraisal process and issues arising from this.

2.1 FRAMEWORK APPRAISAL IN TRUNK ROAD PLANNING

The method used to appraise new trunk road schemes in the UK is the Leitch Framework (Department of Transport, 1979). The objectives of the framework appraisal are to ensure that all the relevant impacts of a scheme on people and the environment are considered; to provide the DOT with a balanced presentation of a set of comparative data; to show that the DOT has considered the effects of the available options prior to reaching a decision and to enable the public to give their views in the knowledge of the implications of the various alternatives. The various alternative scheme options put forward are assessed against a do-nothing situation which is assumed to be a deteriorating situation or a do - minimum situation which is taken to account for proposed small scale improvements to the network.

The main stages in the planning for specific major trunk road schemes are as follows:

Stage 1: Requires the identification of a problem. This problem is normally cast in the form of travel delays or environmental problems as a result of traffic congestion, although the precise way in which a problem location is defined or prioritised is not clear. The identification of a problem location leads to a scheme identification study involving preliminary traffic, economic and environmental assessment. If these schemes pass initial criteria they pass their way into the roads programme.

Stage 2: In the scheme stage, more detailed assessment of the traffic, economic and environmental effects of alternative scheme designs are carried out, informal confidential discussions are pursued with local authority and statutory organisations, and the views of the Landscape Advisory Committee are obtained. A number of scheme-options are then presented in a public consultation exercise via a local exhibition. A decision on a preferred route is then made on the basis of analytical results and the views expressed at public consultation.

Stage 3: The third stage involves more detailed surveys and traffic, economic and environmental appraisals are undertaken as a basis for detailed design of the preferred option. At this stage draft statutory orders are published under the 1980 Highways Act. If objections to these orders are received from affected parties which cannot be resolved a public enquiry may be held into these orders. The findings from a public inquiry and a recommendation by the Inspector are provided for the Secretary of State for Transport in England, (or the secretary of state for Scotland or Wales in these countries). The final decision lies with the Secretary of State.

Stage 4: The fourth and final phase of the process involves acquisition of the necessary land and the letting of contracts, the construction of the road and its subsequent opening to traffic.

The appraisal of new road schemes using the Leitch framework is based upon a social cost benefit analysis and an environmental impact assessment. The effects included under these separate

evaluations are assessed in relation to the following appraisal groups: travellers, occupiers of property, user of facilities, policies for conserving and enhancing the area, policies for development and transport and financial effects.

2.2 SOCIAL COST-BENEFIT ANALYSIS

The basic comparison involved in the economic appraisal of transport is the trade-off of capital expenditure against time-savings, accident savings and changes in vehicle operating costs each valued in monetary terms. On average around 90% of the benefits of a scheme evaluated by COBA (the DOT's programme for calculating the user-benefits of a project option) take the form of time saving. The current values of time used by the DOT are based mainly upon studies which ask people for their stated preference between alternative routes with different cost and journey time characteristics. From this motorists apparent willingness to pay for time-savings are computed. These values can then translate into big benefits to support new road schemes. For example a new road likely to save 20,000 motorists five minutes each per day valued at 3p/minute would add up to a benefit of around one million pounds per year for the duration of the scheme.

Accident cost savings are imputed to reflect the loss of output of those injured which is valued at the wage rate. In addition a value is placed upon the pain, grief and suffering associated with the loss of life. These values have recently been revised so that now a life is valued at £500,000 in 1991 prices. COBA uses the monetary value for time-savings and accident cost and discounts them for a 30-year time period. The net present value of a scheme is the costs and benefits of a scheme expressed in monetary terms discounted over 30 years at a discount rate, currently set by Treasury at 8%.

2.3 ENVIRONMENTAL IMPACT ASSESSMENT

The environmental impact assessment of new road transport schemes has been based, for a number of years, upon the DOT Manual of Environmental Appraisal (MEA Department of Transport 1983). A revised version has been recently issued in draft form. This covers both the environmental effects resulting from traffic as well as land-loss and damage to sites as a result of new construction. The MEA includes the impact of a project upon a list of attributes as well as policies for enhancing and conserving the area. The attributes are traffic noise, visual impact, air pollution, severance, effects on agriculture, heritage and conservation areas (including demolition of property). Ecology, construction disruption and pedestrians and cyclists. No consideration is given to the cumulative effects of individual projects upon environmental systems, for example global warming. Each impact category is measured in different ways and valued in non-monetary terms, although by including such effects in the Leitch framework alongside time-savings, accident savings and changes in vehicle operating costs, they receive an implicit monetary valuation (see above).

The quantification of some of the environmental effects of road transport schemes are based upon studies in which peoples attitudes or behaviour response have been measured and related to a level of the environmental factor under consideration. The purpose of this "dose-response" approach is to attempt to identify "thresholds" of environmental conditions above which adverse reactions or responses are likely to occur. Where such thresholds are breached it is presumed that these will have an important bearing on decisions affecting route choice or detailed scheme design. In practice such thresholds are difficult to identify and appear to have little bearing upon the decision about the choice of route, but are important at a detailed design stage such as determining

eligibility for noise insulation or mitigation measures. Other impacts, notably upon nature conservation and ecology, are assessed in descriptive terms only.

3. ISSUES AND PROBLEMS

The current approach to trunk road project appraisal raises a number of issues which need closer inspection given their influence on such decisions as the overall size of the roads programme, the choice of routes and scheme design. Those issues considered most important are dealt with in turn.

3.1 THEORETICAL ISSUES

3.1.1 The relationship between the economic and environmental appraisal

The measurement of project attributes within the appraisal process in monetary terms leads one to suspect some variation of Greshams Law - namely that higher weighting is given to the computed NPV, relative to the other quantitative and qualitative information from the environmental appraisal.

Since the environmental effects of road transport projects are not valued in monetary terms it is generally unclear what weight is given to such matters. It is noticeable that this observation is reinforced by the findings from the National Audit office (1988) which show that individual schemes are usually approved where they show a positive economic return but not where they show negative economic returns but have positive environmental benefits. There are few reported cases where any scheme has been rejected because of the negative environmental effects.

3.1.2 The relative importance of attributes affecting the same individual

Time savings typically comprise around 80 - 90% of the benefits of new schemes. The current measure used to value time-savings are based upon studies where people have been asked to make simple choices regarding route or mode of travel.

The consequence of this work is that motorists' choices and preferences are being posed in contexts in which the effects of journey time savings and road transport schemes are isolated from the wider consequences of the choices being made. In other words, a motorist who expresses a preference for a shorter, faster route in one setting may in another setting, for example, where a route affects a site of nature conservation interest, place more value on that site than his own travel benefits and prefer the longer route. The current approach to obtain value of time savings does not indicate the relative worth of private time-savings to other private costs and benefits. The net result is that time saving benefits expressed in money terms may be used to support proposals which do not reflect motorists or other groups real preferences. Examples of how such valuations can affect appraisal outcomes have been described by Bowers, Hopkinson and Palmer (1992). One example involved a decision in favour of a scheme which avoided an ancient woodland on the basis of an NPV some £5M higher than the scheme through the wood. This NPV however was based on the aggregation of hundreds of thousands of individual journeys on the new stretch of road over a 30 year period which could be made approximately 12 seconds quicker than by the slightly longer route through the wood !

The defence to this approach are firstly that the current method is easier and simpler and secondly that if the appraisal is comprehensive and measures all costs and benefits accurately then the decision outcome would be the same as if individuals had been asked to value all the project attributes. The former has some merit, the latter - as anyone who has ever looked at a detailed Leitch Framework, is both highly unlikely and probably impossible.

Surprisingly, given the enormous amount of research into public perception and evaluation of the effects of new road schemes, we know virtually nothing about the relative weighting that people give to the travel benefits and various environmental benefits and disbenefits which are brought about by a new road scheme. For example do road users value factors other than time savings when a new road is under consideration and if so how might these be measured? Moreover, because we know little about the relative weightings which people assign to the different components of a new road scheme, it is uncertain what their preferences are in the presence of conflicting personal interests or how they think decisions regarding new road schemes should be made. Thus the current approach to appraisal measures individual attributes in isolation, leaving decision makers to impose their weightings which being implicit are difficult to discern from actual decisions made. The way around this is to seek information on the relative weighting of attributes from those affected by road schemes and/or else value the attributes in commensurate units.

3.1.3 Private and social interests

Measurement of individuals private preferences and attitudes, such as willingness to pay for individuals private time savings, is the building block of both cost-benefit analysis and EIA in road transport planning and appraisal. These private values then provide the basis for determining the need for a new road, the type of road and its location. It has been argued that where an issue has widespread social and environmental consequences, that there may be a case for considering individuals' social or citizen's valuations. The justification and classification of what this means requires considerable explanation.

In the context of new road schemes the distinction between private (selfish) and public (non-selfish) concerns is reflected most readily in the popular acronyms NIMBY (not in my backyard) and NAMBY (not in anyone's backyard). The former attitude is one where an individual rejects a development proposal, regardless of its benefits to anyone else, because of the impacts on his/her private interests. That person would not, however, oppose or reject the development taking place in someone else's area or backyard. A NAMBY on the other hand would oppose or reject a development on the basis that they believe it to be socially undesirable, whether it impacts on their private interests or not. The reasons for rejecting the development or project may be complex but is likely to contain a strong ethical rationale. This position has been termed "considered preferences" by Pearce and Turner (1990) i.e. preferences, expressed after careful deliberation.

The approach to the measurement of 'preference' as a basis for valuation within road transport planning and appraisal reflects mainly private interests and concerns (personal time-savings, noise levels in house) rather than public or social preference. The issue here is whether such an approach is defensible, and linked to this, whether changing it would make any difference to the valuations achieved. These issues are now examined in detail.

The particular version of human behaviour and preference that underlies most measurement of individual's valuations of road project costs and benefits are based upon assumptions that have three features. These are;

- (a) a person's well-being (value) is dependent upon his/her own consumption
- (b) a person's goal is to maximise his/her own well-being and given uncertainty the expected value of that well being
- (c) each act of choice is guided immediately by the pursuit of one's own goals and is not restrained by mutual interdependencies.

These three features are normally compounded together in a monist framework usually referred to as an individual's utility function (Sen 1987). This model depicts individual's behaviour in terms of self-interest utility maximisation; the classical 'homo economicus'. Looking at each assumption in turn.

(a) A person's well-being is dependent upon his own consumption

This assumption argues that individual well-being is unaffected by any considerations other than personal consumption of goods and services. From this it would follow that an individual's valuation of the costs and benefits of a road project would be only considered in relation to his own private consumption (direct benefit) or conversely his own private impact (direct cost). In the case of a new road scheme proposal, for example, we would expect from this assumption, the ranked preference of alternative road schemes for example, to correspond to the balance of private benefits and costs experienced or anticipated by an individual. In this instance an individual who stood to gain private benefits (e.g. time-savings) from a scheme and no disbenefits would be assumed to have a positive preference for the option which maximised his private benefit. In this situation any concern the individual might have about the effect of his private gain on someone else's interests are ignored. This approach fails to take account of external costs imposed on others or the possibility that the individual will suffer in the same way from the actions of others in another situation or location.

Under such conditions even if individuals wish to maximise their own personal consumption it may not be desirable for them to adopt such strategies. By acting in a rational self-interested way to maximise the net benefit to himself each individual contributes to a less than maximum social net benefit perhaps to the point of extinguishing the resource altogether (the well known concept of the Tragedy of the Commons).

The important point to note here is that in the case of environmental resources and amenity that a person's well-being is not unaffected by the behaviour of others and that in isolation (the isolation paradox) a person may hold preferences or behave in such a way that diverge from his social preference. On the one hand therefore people might wish to travel freely have the mode of their choice but also regret the impact of such a policy, when others act in the same way, when this leads to new road building through their local area or an area they might prefer to see left undisturbed.

If this is true, it may reasonably be argued the measurement of preferences and choices should allow individuals to identify as far as possible with their possible wider interest and with future generations.

(b) *A person's goal is to maximise his/her own well being*

Whilst self-interest and utility maximisation is a feature of human behaviour in a variety of settings this does not deny that people can or do act in ways that reflect non-selfish goals. The limitations of this particular assumption has a number of features. The first of these is tautology. The idea of self-interested utility maximisation makes it possible to define a persons interests and behaviour in such a way that no matter what a person does or states he prefers it can be said to be furthering his own self-interested utility maximising behaviour. Thus if observed to choose x and reject y one is declared to have revealed a preference for x over y, maximising one's utility (Sen 1987).

Simple minded welfarists, raving altruists or class conscious militants will be said to be maximising their own welfare (Sen 1987). Whilst this point may be of little to concern for studies which attempt to forecast peoples travel behaviour, by contrast the translation of a preference or choice act to measure of value or well-being is problematic. What defines the selfishness or non-selfishness of a preference or a choice are features external to those preferences and choices. This is the nature of our aims, values and motivation. How these are defined and measured then determines what is to count as the source of an individual's valuations.

The second problem is whether in reality self-interest utility maximisation is an accurate characterisation of how people actually behave. Whilst it is undoubtedly true that some individuals most probably pursue their own personal interests most of the time and most individuals pursue self-interests some of the time this does not deny that individuals can or do behave according to other motivations. Indeed there is very little in the way of empirical testing of the common assertion. A more pressing problem associated with the self-interest view of rationality is that the promotion of non-self interested goals leads us to conclude that such behaviour is irrational. Accordingly we do not set out to explore any forms of motivation that may contradict the version of human behaviour which guides our expectations.

Thirdly the denial that individuals may hold a number of different motives and values which relate to a particular preference or choice points to a particular conception of individual decision-making. Here the individual is supposed to have reconciled all potential, conflicting partial values and synthesised them into a single utility function. The function then orders his preferences not only in the present but in all future states of the world. Under this model an individual's social concerns (if any) are assumed to have been synthesised in an individual's preferences and choices.

Such a model might hold up where decisions are of a regular nature involving highly specific forms of activity (e.g. I travel to work by car or by train?). As decisions become more complex, possibly affecting many aspects of a persons life (as a road scheme might) then this neat view of decision-making becomes less satisfactory or realistic. Under situations of complexity and unfamiliarity individuals often experience difficulty making decisions. Classically individuals are presumed to reach decisions based upon some rational computational assessment of the options before them.

Other models of decision making suggest that individual decisions are often based upon the emotional appeal of alternatives (Harre, Clarke and De Carlo 1987) or constructing images and fantasies about oneself and ones lifestyle (Earl 1983). If this is the case then the way in which we construct experimental investigations and interpret and explain choices may require rethinking. In situations where the problems and options are not clear then it may be that at best individual

decision-making displays at best bounded rationality based upon looking for good-enough or satisfying courses of action rather than maximising or optimal courses of action (Simon 1983).

Whilst the efficient, rational processing of information and alternatives may be an ideal to aim for, in practice most of us invest considerable effort in "fudging" decisions and would not be able to maximise utility even if it were our goal.

Taken together the above problems, if unchallenged can lead us to adopt experimental investigations based on methods which lead to self-fulfilling prophesies and which produce measures of valuations the meanings of which are unclear.

For example, two individuals may hold similar values of time but hold entirely different views and values about the action which should be taken to improve journey times. Individual A for example may have values relating to the wider effects of a road scheme such as the demolition of homes or the effect on the landscape. In a broader context this person might consider sacrificing time savings or even use of the motor car to achieve other objectives. Individual B on the other hand may support the development of new roads regardless of any costs to others. The conclusion that the individual supports the construction of new roads or necessarily prefers a route which maximises journey time savings is not, de facto, warranted by this measure.

The point of these examples is that when people are asked to state preferences in a context where the wider implications of the options under consideration, or the preference schedule are not included it is likely that the assumption of self-interested utility maximising behaviour will lead to a self-fulfilling prophesy. Accommodating a wider set of concerns into an experimental design will allow for the expression of possible non selfish preferences or at least the relative weighting given to different sources of value.

(c) Self goal choice

The assumption of self-goal choice requires us to treat individual behaviour and attitude in isolation from the effects of factors such as class; community or occupation. To deny that other people affect and influence our behaviour is to reject our daily interaction with people as incidental features of an otherwise autonomous and isolated existence. Actions based on group loyalty may involve sacrifices of personal interests just as they can facilitate a greater fulfilment of personal interests. The relative balance of the two may vary depending upon the type of action in which the group is engaged. In some relationships e.g. in family obligations the element of sacrifice may be large. The mixture of selfish and selfless behaviour is in fact one of the characteristics of a group and which can be seen in a variety of group associations. The implications of group membership or identity can affect and individual's behaviour and valuation in a number of ways. Three effects can be considered here.

Firstly what an individual chooses or prefers may be a reflection not only of his own interests but the interests of other people as well. If these interests are legitimate (i.e. genuine concern) this should be allowed to enter into an individual's valuations. Society, social and peer pressures influencing and shaping our values need to be treated as an explanatory variable, rather than taking preferences as given.

Secondly if an individual is a member of or identifies with a group he or she may be prepared to make personal sacrifices to help achieve group goals. This may take the form of an individual

being willing to affect his valuation to benefit the group as a whole. Setting an individual's preferences and behaviour in relation to appropriate groups is not only necessary to achieve accurate representation of the context in which individual behaviour and decision-making takes place but also to show up the willingness to make personal sacrifices for the benefit of the wider group.

Thirdly the perception of group or social pressure or identity can manifest itself in terms of the roles which people adopt or perceive themselves to adopt in a given situation. Individual's behaviour takes place in a specific situational context. Each situation in which a person finds himself has rules (Harre 1980). The rules of the situation direct behaviour in certain ways rather than others. The situation also provides the actor with a role. These roles carry with them expectations, responsibilities and duties. In this sense roles can be conceived as clusters of rules about how to act in given situations (Warr, 1980). Thus if in situation X, in a position (role) Y then do Z. An individual playing out or presenting a particular role to others may not place very high value on the behaviour he is engaged in other than for appearances sake or because that is what is expected. A 'businessman' may travel by a particular form of transport, claim to hold certain views or develop a certain lifestyle because that is what that individual perceives a businessman to do, say or live. In a family situation parents may wish to present their family in an interview as a loving, caring group because this is what a family is supposed to be like. Decoding the presentation and roles an individual imagines himself to hold will likely result in alterations to the values and valuations initially provided by any individual. Alternatively the way in which an individual presents or achieves things (control of presentation) may be a more important source of value than the actually activity itself. In the context of time-savings and cost-benefit analysis it has been speculated -though not tested- that what drivers may value is the act of saving time rather than the time-saved (Bowers and Hopkinson 1993). This has major implications for economic appraisal and the treatment of small time savings which underpin the case for many road improvements in congested areas. This model of behaviour depicts urban driving in the form of a game where the actual journey time involved is less relevant than 'winning the game' i.e. beating other motorists between any two points. In social psychology it is widely reported that in many situations the achievement of respect, honour, pride or friendship may be a greater source of value (expressive values) than the activity itself (practical values).

(d) Conclusion

From the preceding discussion a number of criticisms have been aimed at the narrowly defined view of human behaviour and experimental investigation underlying the measurement of costs and benefits in road transport planning and appraisal. These criticisms do not deny that people's valuations may spring from private or selfish interests but do suggest that the context in which behaviour is observed or questions posed can be highly significant in terms of the behavioural interpretation or responses given. At a practical level it may be the case that new road schemes which are being defended on the basis of various preference studies may be biased towards certain outcomes i.e. those which support private benefits at the expense of wider interests.

These observations point to the need for a more open-ended or different approach to the measurement of preference than hitherto. Having said this no method, or empirical evidence, has been found to show the differences between private and social preferences at the individual level. From the discussion above it is implied that the distinction can only be derived from an understanding of the motivations of an individual rather than through externally observed criterion.

In other words the motivation or underlying preference (private or social) cannot be inferred from observed behaviour. This does not mean that we cannot set up experimental situations which prompt or act as an incentive to display or reveal different preferences and values. Currently the experimental situations which are used to derive values for transport planning and appraisal are constrained and geared towards the elicitation of private values and preferences. Alternative experimental constructs are needed. One to be explored is to ask people to consider road schemes in their entirety.

3.2 METHODOLOGICAL ISSUES

Asking people to consider road proposals in their entirety can be seen as a choice amongst alternatives where the preference criteria is the worth placed on a number of different attributes distributed unevenly amongst those alternatives. For this project the key issues are how to elicit the attributes relevant to the evaluation of a situation and then how to measure the value placed upon them.

3.2.1 Elicitation

In this study elicitation refers to the unearthing of an individual's attitudes and preferences towards road schemes and environmental change and why they hold a particular attitude or preference. Two approaches to elicitation are commonly used in transport research. The first is to use a questionnaire in which information and instructions are pre-structured, the second is through an interview.

(a) Questionnaires

Highly structured surveys using questionnaires follow a predictable sequence and impose a consistency across sessions, across interviewers, and across respondents. They are most useful when the nature and range of the material being collected is well-known, even though the exact content is not (Diaper, 1989). However, in this case we wish to obtain people's preferences between alternative road schemes, and to understand the basis for those preferences. The use of a highly structured questionnaire required the following assumptions. First, that the researcher can determine the necessary information for another person's choice decisions. Secondly, that the questions are relevant to the individual, and are phrased in such a way that (if read without variation), they will be understood as intended and will simulate a valid response (Suchman 1987)

In practice, for respondents to give a preferred option, they need both instructions and the relevant knowledge (Humphreys and McFadden 1980). The identification and measurement of peoples' choice and preferences does not mean writing better instructions or providing more information, but understanding and aiding the structuring process. Moreover, how a question is interpreted in the absence of the person who designed it is unknown.

(b) Interviews

An interview can be regarded both as a specific technique and as a process within which various other techniques are used to elicit knowledge. As a specific technique, the interviewer asks questions to which the interviewee responds with answers. These sessions may be based upon structured, semi-structured or unstructured formats. As a process, the interviewer and the interviewee collaborate using a range of tools and techniques in order to elicit and negotiate material which is relevant and meaningful to the topic.

Some of the doubts about the veracity of interview data arise from a misconception of the interview as a survey method, and from a failure to distinguish between the forms of interaction which induce bias, and those which are the natural and legitimate tools for achieving the goals of reliable and valid data (Suchman 1987).

The development of computerised interactive stated preference methodologies, which provides a link between questionnaire-based and interview-based techniques, has gone some way to recognising the importance of allowing subjects to tailor the content of an experiment (options, attributes, levels) and to make it relevant and meaningful and, thereby, yield more reliable measures (Jones et al. 1986). These experiments have, to date, been concerned with choice decisions characterised by a small number of familiar options and limited options. Asking people to make choices between up to six road scheme alternatives, each with a range of attributes, is likely to be more complex than this, and to generate information which stands outside the current set of prescribed attributes or prevailing theory or model of choice.

In this project there is a need for a method which can deal with the complexity of the data which respondents need to use, is capable of eliciting the concept which people employ in making choices and ultimately provides the basis for exploring private versus social preference distinctions.

3.2.2 Elicitation method

The method initially considered for eliciting attributes is the repertory grid (Kelly, 1955). Repertory grid is an operational tool developed within Personal Construct Theory (PCT). PCT states that the way in which individuals make sense of the world and their lives is through a process of contrast and similarity. By this it means that we construe situations by seeking to differentiate them from other situations and seeing them as similar to others. It is through such a process that we are able to generate and give meaning to events and decide whether they are significant.

Repertory grid is used in a wide variety of areas such as developments of automated knowledge acquisition systems and decision analysis (see Diaper 1989). These applications are highly intensive and focus on individual differences rather than as a structured tool for assessment purposes. The reasons for deciding to experiment with the repertory grid technique to elicit people's conceptualisation of a road scheme are as follows:

- the technique gives an explicit theory of how individuals form and structure conceptualisations of events and situations
- the repertory grid allows the subject to operate at his/her own level of complexity
- the method can be used to obtain a person's thinking about unfamiliar, new or different types of situations.

The two key features of a repertory grid are elements and personal constructs. Elements are used to elicit constructs. The elements usually form the object of the investigation. In this study the elements are the alternative road projects. The elements are used to elicit attributes (constructs) relevant to the choice alternatives under consideration by presenting pairs or triads of alternatives. The subject is asked to specify differences and similarities between pairs of elements (dyads). These differences and similarities are used to form the poles of the constructs (Table 3.1). A fuller account of the technique and its employment in the pilot work can be found in Hopkinson, Nash and Sheehy (1991).

An additional technique, known as laddering, developed within PCT and frequently used in repertory grid technique will be used in order to understand any ambiguous constructs or to elicit core constructs. If we can identify a small number of core constructs which are consistent across groups, we then have the basis for designing more structured experiments in the later stages of the method. The aim of the method then is to elicit a list of attributes in the form of constructs which can be used as the basis for more structured questions in a subsequent stage.

3.2.3 Valuation

Section 2 of this report indicated a number of issues relating to the measurement of costs and benefits of new road schemes. In this section we consider some theoretical and methodological issues relating to valuation of the costs and benefits of new road schemes.

When a new road scheme is proposed it will frequently involve disruption and damage to the environment, as well as bringing about environmental benefits. These environmental impacts will relate both to the construction of new infrastructure as well as the relocation of traffic. Numerous studies have catalogued and listed the environmental impacts of new road schemes (e.g. Bowers et al, 1992; Nash et al, 1990). Various ways of estimating the value of different types of environmental impact have been proposed including survey based techniques, revealed preference methods and shadow projects (SACTRA, 1992). In this study we consider the use of survey based techniques as a means of measuring the value people place on changes in local environmental amenity.

One popular economic analysis of environmental goods and services (Pearce et al 1989) suggests that the total value of any environmental asset has 3 components.

(i) *Use value*

Refers to all the ways a person derives benefit from the use of an environment. In the context of transport projects, this can be interpreted to include the benefits of peace and quiet; of clean air; or living in a pleasant or traffic-free environment. It can also include benefits of visiting historic areas, nature conservation sites or various outdoor activities, such as walking, shopping, sports, etc. A person may gain directly from the use of an environment or indirectly as a result of other people in the household using an environment.

(ii) *Option value*

In addition to people who currently use an environment there may be people who, although not currently using an environment, may wish to use it at some time in the future or else be unsure about whether they will want to use it. In this respect people are uncertain about their future use but are concerned about damage to or irreversible changes which would prohibit their future use. Option value is the term used to refer to the amount that people would be willing to pay to guarantee their future use or else to delay an activity until such time as more information is available which will permit a better decision. It is difficult task to identify people who might hold an option-value for a site but even more difficult to measure their option-value. Even so the evidence of surveys in the USA indicates that option-values might be significant for nature conservation, in some cases exceeding use-values (Mitchell and Carson, 1989).

(iii) *Non-use value*

Non-use benefits refer to the utility people obtain from an amenity for various reasons other than their expected personal use. A frequently quoted example is the pleasure or satisfaction which people obtain from seeing, via television or pictures, rare species such as Blue Whale, even though they may never witness these species directly. It is argued that people are willing to pay in the absence of a use or option-value to ensure the preservation of rare species or important sites. The pleasure or satisfaction which people derive from charitable donations to organisations concerned with nature conservation could be cited as evidence for the existence of non-use benefits. Such actions on the part of individuals might spring from a satisfaction or desire to know other people are benefiting from the provision of the good (altruistic value) or else to secure the good for future generations (bequest value) or else for the intrinsic value or right of individual plants and animals to exist (existence value). The measurement of non-use values raises a number of methodological and sampling problems. Nonetheless researchers particularly in the USA claim that the non-use valuation for nature conservation sites can be higher than use values and a similar order of magnitude to option-values (Mitchell and Carson, 1989).

This final category of benefit offers a point of convergence with this study insofar as social preferences and values equate with non-use values. The exploration of non-use values within the environmental economics literature has tended to be based upon questionnaire surveys. Some doubts exist about the veracity of this data given the somewhat simple methods used to obtain such measures.

3.2.4 Survey methods

The most popular approach to derive valuation of environmental costs and benefits are survey based methods often referred to as hypothetical questioning techniques. We can distinguish two methods of approaching the question; contingent valuation and stated preferences.

Contingent valuation involves asking direct questions about an individual's maximum willingness to pay (WTP) to maintain a resource or minimum acceptable compensation (MAC) for its removal of the service. This technique is widely used in the USA for obtaining both use and non-use valuations of environmental resources. A survey question in a contingent valuation study might take the following form.

"What is the most you would be willing to pay to preserve a local environment asset if it was threatened with damage?"

In comparison Stated Preferences (SP) are deduced by presenting the respondent with a series of scenarios, each characterised by different trade-offs between money (in some form) and resource provision. A survey question in a stated preference experiment might take the following form.

"Suppose a local environmental asset was under-used and was to be redeveloped unless people in your area paid something towards maintaining it (for example, in higher taxes). Which of the following options would you favour?"

- (a) keep the environmental asset at a cost to you of £1 a year more (4p/week)
- (b) redevelop the asset".

A large range of choice options are presented to a respondent, with varying monetary amounts to yield the maximum willingness to pay for environmental conservation. The range of comparisons is only limited by the inventiveness of the researcher and the capacity or willingness of the respondent to respond. The art is in finding a form of question and comparison that is realistic and yields meaningful data.

3.2.5 Measurement difficulties

The main criticism levelled at all methods based on hypothetical questions is that what individuals say they will do or pay does not necessarily correspond with what they would actually do or pay if the hypothetical circumstances under consideration were to occur in practice (Freeman, 1979). Whilst random error in responses is not a serious problem since it will tend to offset in the process of averaging across individuals, systematic measurement problems could be very serious.

The literature identifies a number of measurement problems. The following were considered to be potentially significant for our work; strategic bias; starting point bias; information bias and social norm bias.

(i) Strategic bias

For the stated response to be classified as containing strategic bias (rather than other types of bias or inaccuracies), the individual must be motivated to state a strategic payment in the hope of influencing policy to his/her advantage and must know that they are deliberately distorting their valuations to this end. This is distinct from the motivation to pay a sum of money in the hope of affecting policy.

A number of studies have examined the issue of strategic bias. The findings from these surveys show varied evidence. Some studies suggest that strategic bias is not a serious problem (Bohm, 1972; Brookshire et al, 1976; Rowe et al, 1980) although others, particularly those in transport, suggest that it is (Chatterjee et al, 1983; Couture and Dooley, 1981). One way of detecting strategic bias has been to compare the values obtained from direct questioning with those obtained from either hedonic pricing or the alternative cost approach (see Cummings et al, 1986 for a review). However, discrepancies may be due to the fact that the different methods are measuring different benefits - "selfish" versus "altruistic" benefits, for instance.

(ii) Starting point bias

There is some evidence (e.g. Rowe et al, 1980; Willis and Benson, 1988) that the values obtained from the iterative bidding process which is usually used in the contingent valuation methods, as opposed to asking for a direct willingness to pay, are influenced by the starting point. Here an individual might fix on the initial payment introduced and interpret it as a reasonable value. Alternatively it could also stem from boredom, fatigue or irritation. Although other studies have failed to find any significant effect (Brookshire et al, 1980; Brookshire et al, 1982; Thayer, 1981), it is a problem to be aware of and to try to avoid.

(iii) *Information bias*

There has been some discussion as to whether this category of bias is a bias at all (Cummings et al, 1986). The argument runs that the type and form of information presented to people will "bias" their responses. We feel that there is an important distinction to be made between information that biases a response and information that is required to produce reliable and valid data. Where information is presented during the course of an interview then there is a possibility of interviewer bias whereby the interviewer leads the respondent towards particular responses or uses information in such a way as to hint at the appropriate types of response. This has often been used as an argument in favour of questionnaires over interviews, where the questionnaire permits a standardised presentation of information. Work by Laflin and Hopkinson (1993) discusses the issue of information bias. They conclude that the literature is extremely confused and confusing on this subject and no consensus on good practise exists. Indeed this issue lies at the heart of the problems underlying valuation and preference measurement. If preferences and values are influenced by information what then is the 'correct' or 'optimal' level of information to bring into the discussion. Where does information provision start and education and changing preference/values begins. This concern becomes particularly important where the topic under discussion is complex, wide-ranging or unfamiliar. In such situations values and preferences are likely to be contextual rather than transferable. Moreover all information and questions are likely to generate thought and focus attention where none previously existed. In such situations the questionnaire or interview process are generating or creating the survey responses. In one famous example involving a survey of working conditions amongst factory workers, a 'respondent' reported that the survey had affected her work adversely. Asked what she thought about whilst operating a conveyor belt system she was unable to articulate any clear response. Further questions asked her if she thought about holidays whilst she was working. Since that survey she had not been able to get the idea of holidays out of her mind. In presenting people with information or prompts in the form of concepts or structured questions there is the inherent danger that the responses given are as much an artefact of the survey process as a genuine expression of value or preference.

(iv) *Social norm bias*

Social norm bias is a general term to describe the possible pressures exerted knowingly or unknowingly by other people on a respondent in such a way as to affect his/her values and valuations. Such pressure may arise from people who are important to him/her (e.g. friends or family) or, in an interview, from the interviewer. The interviewer or the questionnaire may suggest acceptable views and affirmation bias represents the case where the respondent answers to affirm these views. Such pressure may cause an individual to pretend to certain values and thereby raise or lower their valuations. The nature of any bias will depend upon the nature of the survey (questionnaire or interview), the number of persons involved (face to face or group discussions) and the way in which the survey is carried out.

It is important that we distinguish between the effects of other people on an individual's valuation processes that are unwanted and those that are a legitimate cause of concern to an individual (altruism). It is the former that we must consider as bias although in practise it may be difficult to separate social norm biases from altruism. In practise social norm bias will be detected where a respondent alters his or her valuations in line with comments or perceived pressure from other group members or an interviewer. This issue is closely aligned to the above comments on information bias. Interviews are by necessity a form of interaction. Within this interaction the

possibility of influencing responses is real. This is a well known problem. The skill of the interviewer however is to maintain a non-affirmative position during an interview. This can be achieved by only asking questions rather than providing opinion or supportive reactions to the respondent- a process similar to 'free-attention' in psychotherapy. Whilst one can never be certain about the influence on another person careful attention to the process of questioning can avoid many obvious biasing actions.

(v) *Choice of payment mechanism*

A key consideration in the valuation experiment is the choice of payment mechanism by which the respondent can express their valuation of a good or service. Empirical evidence suggests that the values obtained can be influenced by the payment-mechanism used (Brookshire et al, 1980; Daubert and Young, 1981; Greenley et al, 1981; Rowe et al, 1980).

The chosen mechanism needs to be meaningful and acceptable to the respondent whilst it would be desirable if the mechanism could be universally applied to all respondents. A number of possible payment mechanisms suggest themselves.

(a) *Local property taxes*

Until recently the UK property tax system (known as "the rates") was a main source of funds for UK local authorities and was identified with local authority support for local public transport. This system is no longer in operation.

(b) *Community charge*

Although a potentially attractive mechanism, since it was levied on almost everyone and should thereby reduce concerns about "free riding" by non payers, it has been a highly contentious issue. There was too much controversy surrounding its introduction for use in this study.

(c) *Income or sales taxes*

Although widely used in surveys in the United States, neither of these taxes are levied locally within the UK and are therefore not readily associated with support for local facilities.

(d) *A subscription scheme*

Whereby only those people who pay to join it are permitted to use the facility. This approach suffers from two disadvantages. Firstly, it is unfamiliar and may be regarded as unrealistic. Secondly, such a mechanism would only be relevant for use-related benefits.

(e) *An "abstract" instrument*

That is one without reference to any particular mechanism, has the attraction of avoiding the problems of other mechanisms and being appropriate to obtain non-use values.

(f) *Property value*

Whereby the existing market value of the household is taken as a capitalisation of the benefits

derived from the property and the surrounding neighbourhood and amenities. Problems arise where people do not know the market value of their home (particularly in a fluctuating market).

(vi) *Estimating disaggregate values*

We have outlined the distinction between various benefit categories. We have argued that use-values are typically included in evaluation measures; whilst option and non-use values are not. Where people value an environment for a variety of reasons, which may include a combination of use, option and non-use benefits, it is desirable that these can be distinguished. Whether this can be achieved or how it might be achieved is not straightforward.

Two possible approaches are termed "compositional" and "decompositional". The former requires the respondent to give a separate value to each category of interest whereupon the overall value is the sum of the constituent parts (Greenley et al, 1981). The latter elicits a response denoting an overall value and then the respondent is required to apportion this between its various components (Walsh et al, 1984, 1985; Willis and Benson, 1988).

Even if it is not possible in practice to obtain values disaggregated into all the components of interest, the most important distinction is between use and non-use values. People who do not currently use, benefit from, or expect to use an environment will by definition only provide non-use valuations. Those who currently use or expect to use an environment may be able to separate use and non-use valuations.

In the current approach to road transport planning and appraisal attributes are valued in isolation to each other and in a variety of units. An alternative approach is to ask people to consider alternative projects made up of different attributes and levels of attributes. The merit of this approach is that it resembles the way in which the DoT carries out public consultation. In the DoT approach affected members of the public are asked to rank schemes in order of preference and then to prioritise attributes in order of importance (see Annex 1 for example). There is no attempt however to determine how much people might value environmental gains or losses. It is a simple logical extension.

3.2.6 Conclusion

The above discussion highlights the many considerations in the choice and design of method for a survey of the type proposed in this project. The strategic choice in the first instance lies between interviews and questionnaires. There are advantages and disadvantages in the use of interviews or questionnaires. It was proposed to explore issues with participants using an interview based approach in the first instance.

4. SURVEY DEVELOPMENT

4.1 INTRODUCTION

The first stage of the detailed survey development involved a set of open-ended interviews. These were carried out at households in North Yorkshire in a village where a decision on a new by-pass scheme was imminent. There were two purposes behind this first stage survey:

- to define the level of complexity which people use in describing new road schemes
- to identify which issues appear most salient.

One hundred households, drawn at random from the electoral register in each village, were contacted by letter. A total of 60 forms were returned. Interviews were arranged with 18 households. Eleven of the households involved two or more people. The coverage of topics in the interviews varied across interviews. In each case, however, a topic guide was used to focus the interview. This included:

- a discussion of whether they were in support of a by-pass and, if so, which of the alternative schemes they preferred
- a comparison of alternative schemes with each other and against the do-nothing situation
- information about their experience and evaluation of other local by-pass schemes
- attitudes to a proposed general scenario where the by-pass would be funded in part by a local tax.

The information from the interview and reactions to the questions raised a number of issues. These are discussed in turn below.

4.2 EFFECT OF INFORMATION

The interviews were carried out 12 months after a public consultation exercise carried out by the Department of Transport. Interviewees were given a copy of the Department of Transport's consultation document, which they had previously seen, as a reminder of the three alternative routes.

Few respondents had precise knowledge of the alternative routes or of the exact alignment of their preferred route and had to refer to the Department of Transport's document for information. Even then they were not always clear where the route alignment was or its likely effect on the immediate environment. Despite this nearly all those interviewed had very clear views on which scheme they supported or preferred. Some referred to 'official information' as supporting evidence for their preference e.g. because of the number of properties demolished etc. The lack of detailed knowledge of the area or the effects of a specific scheme suggest that people make relatively strategic or intuitive choices based on some composite view of the merits or disadvantages of a scheme rather than on specific details or 'accurate' knowledge.

4.3 TRADE-OFFS

A number of difficulties arose with the repertory grid. Accordingly the elicitation of attributes proved more difficult than had been anticipated. The difficulty arose from the fact that only one scheme, the southern route, was perceived as a by-pass. This scheme was perceived to have few environmental disadvantages compared to the other two routes. As far as the alternative schemes were concerned, all household members interviewed were in favour of the removal of traffic, especially heavy goods vehicles (HGV's) from their village. Most interviewees imagined that a by-pass was the only feasible short term solution to the removal of traffic. They voted by 19:4 in favour of the route to the south of the village. The most important factors assigned to the southern route were its distance from both villages and the minimal environmental disruption in terms of land-take and land quality affected.

The imbalance of perceived advantages and disadvantages made the detection of trade-offs between attributes and valuations difficult. To counter this two hypothetical schemes with potential conflicting advantages and disadvantages were created and presented to people. They were asked to accept the technical feasibility of the routes. By chance the Northern route outlined was not dissimilar to proposals for a new road made 30 years previously! No costing information or impact details were provided. These additions helped the interview in a number of respects.

First, it enabled options to be developed with varying levels of travel and environmental costs and benefits. Secondly, the hypothetical options could be introduced within the context of those factors which people had previously claimed to be important, e.g. distance from the village. Thirdly, it provided a way of cross referencing interviewees' earlier statements or preferences by making them consider routes and information which had not been included in the public consultation. Here they would either have to defend their previous value-claims or to produce new arguments. Several people altered their preferences in favour of the new routes, indicating a higher importance attached to residential amenity than to loss of countryside, whilst several others rejected the hypothetical routes on the grounds of threat to various environmental assets. In the next stage of the study, therefore, it is proposed to choose a survey site where the range of road schemes have clear trade-offs between attributes.

4.4 PRIVATE AND SOCIAL PREFERENCES

As noted earlier, people are capable of viewing an issue from both a selfish and a social perspective. If we want to know how people balance their selfish and social preferences, it is necessary to do it without producing an information-bias or leading people towards a particular outcome, supportive of one conclusion rather than another. The approach adopted here involved asking interviewees about the road scheme proposal affecting their village, which would affect their interests as residents, and about a number of other schemes in the region which had been built recently and would potentially affect their interests in other capacities. This comparison revealed some interesting conflicts.

First, by-pass schemes were generally viewed as desirable for motorists and for getting traffic out of towns and villages. It was also recognised that by-pass schemes tend to attract traffic. In response to this, some participants then argued that by-passes should be designed to accommodate future traffic growth (i.e. dual-carriageway) even though more road capacity involves greater environmental impact and is likely to encourage more traffic to the area. To examine the way in which people resolve the conflict between by-pass provision, traffic restraint and environmental impact, we think that the alternative schemes which people are asked to consider should include variant of each route (e.g. single and dual carriageways) and traffic management policies (e.g. to restrict the build up of traffic in the by-passed town).

When talking about schemes in other areas many respondents claimed that factors other than distance would be important in their choices between schemes. For many people the important point was to have a route which enabled them to travel in congestion-free conditions, not to minimise the distance between two points. Indeed a number of people volunteered that they were perfectly happy to travel further if it meant that a new road scheme would avoid certain harmful effects on other communities and the environment.

In order to resolve the conflict between the selfish preference of wanting a by-pass for their village and the social preference of reducing the volume of traffic on the roads, many people volunteered support for vigorous public transport policies. This support included more subsidy

for bus travel in the area and an enhanced role for rail transport. Such options are typically not included in the planning and appraisal of new trunk road schemes, despite frequent protests from the public and support from the original SACTRA committee report (Leitch, 1987). From this pilot study it may be that social preferences may only emerge if the alternatives under consideration are extended to include schemes and public transport alternatives which have desirable properties.

4.5 PAYMENT MECHANISM

A number of general observations arising from the interviews can be made regarding the choice of payment mechanism. Some found the idea of a local tax to secure their preferred route and its associated benefits difficult to comprehend. This may have been for several reasons. People may have had a genuine difficulty in connecting the idea of a local tax to the payment for a preferred road scheme. Secondly, a moral indignation that they should have to pay to secure the provision of a trunk road scheme when schemes in other areas were not funded in this way a decision on the scheme was imminent and, therefore, asking people to support the scheme by some form of payment was tantamount to blackmail; and people already contributed to the payment for road schemes via vehicle licence payments and fuel tax and a belief that motorists already pay enough for road scheme provision.

In addition, there was a strong undercurrent of feeling that questions about payment to secure environmental benefits presumed a level of satisfaction with existing conditions. Rather, many respondents felt that they had put up with traffic and traffic increases year after year without ever being offered compensation. Many interviewees were supportive of compensation being paid to people (from existing revenues) who experienced negative impacts as a result of new road schemes. It was felt that people should be compensated for any devaluation of their property plus an amount to cover additional disturbance.

The use of household rates (the property tax currently used to finance local government in Britain) was not considered due to the imminent replacement by a poll tax (now the Council tax). The use of the poll tax, although realistic, is likely to engender both hostility and uncertainty until people know how much they will pay as a household when the tax is introduced. The use of some form of neutral environmental tax would have considerable advantages although specifying its administration and realism is likely to create problems. Further testing of alternative payment mechanisms is therefore needed.

This first pilot survey highlighted some of the difficulties in developing a method to attend to some of the issues in the second section of this report. There was sufficient encouragement from the first survey however to replicate an interview survey in a different area with a different set of road schemes.

4.6 SECOND PILOT STUDY

The second pilot survey took place during November 1989 in the towns of Bingley/Shipley and Baildon, 4 miles to the North-West of Bradford. This area was chosen because of the proposal to build a road scheme to relieve the existing A650 provides a summary of the costs and benefits attributed to each route. In-depth interviews lasting up to 2 hours each took place with 12 households over a three week period. An example of the survey form is attached in Annex 2. The findings from the surveys are described below.

All but one of the respondents interviewed belonged to 2 or more person-households. Seven of the respondents had lived at their current address for less than 3 years. All but one of the respondents was a regular car driver, all but one of the respondents regularly drove along the A650 either towards Bradford or Bingley. Only three of the respondents made frequent use of Shipley Glen (one of the areas affected by the valley route). Similarly only one or two of the respondents made use either of Northcliffe Woods or the sports grounds adjacent to the nearby canal. All these sites are locally important recreation areas and generally well known.

As previously the interviews were conducted with three outcomes in mind:

- (i) Elicitation of project attributes
- (ii) Ranking of alternative schemes and attributes
- (iii) Valuation of alternate schemes.

4.7 ELICITATION OF ATTRIBUTES: PERCEPTION OF THE SCHEME

The first part of the interviews dealt with the way in which people perceived the different effects which would result from the individual road schemes. The repertory grid approach was used again. Each respondent was asked to compare pairs or sets of schemes and to discuss ways in which they considered the schemes to be similar or different from each other. As in the first survey the use of the 'grid' proved less rich data than had been expected or is reported in the literature from applications in other areas. In general people found it "odd" to be asked to compare two road schemes which were different in terms of geographical location, and type that many respondents only offered differences/similarities that were patently obvious (e.g. tunnel is underground, valley route is not). Despite this some useful data was elicited. Table 4.1 below indicates the constraints (attributes) elicited from the interviews.

As can be seen the constructs offer no surprises in terms of what appear to be some underlying concerns. What this information does illustrate though is the specific language and terminology that people use and the relatively coarse attributes that are used e.g. affect houses badly, will spoil park, will improve traffic. What this suggests, if the method is valid, is that people conceive of road schemes and their impacts in very broad terms. Of course people may have views on the specifics of schemes, especially where they are directly affected in an adverse way. These tend to be a small minority of a local population - not that this diminishes the importance of that population in decisions - but may suggest a role for a simpler rather than more complex methodology at least in assisting choice decisions.

Table 4.1:

		Options compared
<u>Interview 1</u> Reduce quality of life close to route Cost less to build Increased pollution (noise, air pollution, visual)	Remove traffic with minimum disruption to people Cost more to build Little noise, pollution	RW/S RW/S V/T
<u>Interview 2</u> Low cost Affect houses badly Affect park/sports grounds Best for me as a motorist High impact on woods	High cost Little effect on houses Will not affect parks/sports grounds Worst for me as a motorist Low impact on woods	DN/T RW/T VT V/DN S v RW
<u>Interview 3</u> Kill off shops Disturb/demolish houses Alter way of life Traffic near people Upset environmental aspects	Will not hit shops Will not disturb/demolish houses Little effect on way of life Traffic away from people Will not upset environmental aspects	T/DN RW/T S/V T/S V/T
<u>Interview 4</u> Pleasant area affected (canal/wildlife) Involves demolition Take traffic away from valley floor Take up green land Deals with small problem Benefits me greatly	Does not affect pleasant area Does not involve demolition Keeps traffic in valley Does not take up green land Deals with larger problem Does not benefit me much	V/T RW/V M/V T/M RW/T V/S
<u>Interview 5</u> Refusal to acknowledge problem Economically unviable Environmentally best option No real effect on traffic Affects residential areas Affects countryside Affects recreational areas	Acceptance of problem Economically viable Environmentally worst option Ease congestion Does not affect residential areas Does not affect countryside Does not affect recreational areas	DN/T T/V T/V RW/V RW/V V/T V/T
<u>Interview 6</u> Knocks down property Expensive Goes through classy area Will spoil park Too big and disruptive Mess up shopping area Upset local people Will not bother houses Slow traffic down	Does not affect property Not really expensive Goes through cheap area Does not affect park Quick and not disruptive Helps shops Will not upset local people Will bother houses Helps traffic	RW v V T v V S v V V v T RW v V RW v T V v T S v V G v RW
<u>Interview 8</u> Economically viable Damage residential area Damage woods/open spaces Improves traffic considerably	Economically expensive Will not damage residential area Will not damage woods/open spaces Does not affect traffic much	V v T RW v V RV v T RW v T
<u>Interview 9</u> Cost little Improve traffic Long time to build Conventional option Uses existing routes	Cost a lot Will not improve traffic Short time to build Non-conventional option Totally new route	T v V V v RW T v V V v T RW v T

4.8 RANKING OF SCHEMES

Table 4.2 presents the ranking of the alternative schemes presented during the interview. Two respondents presented a public transport option as a preferred alternative to new road building. This option was allowed to enter the discussion. A dash in the Table indicates that the respondent did not consider the scheme to be desirable in any way or refused to rank of scheme. The valley route was the most preferred option for six of the respondents. The do-nothing option, the Gyratory system and the road widening were ranked low by nearly all the respondents, although the latter proposal was ranked 2nd or 3rd by 3 of the respondents. The tunnel options were ranked first by two respondents. Two of the respondents ranked the tunnel their sixth choice. The southern route was ranked first or second by six of the respondents and was generally ranked more highly than the tunnel options. Whilst there are clear differences between individuals, it is possible to make some general statement about the 'overall' ranking of schemes. This we can represent as follows; on the basis of majority voting (which in this case yields a transitive preference ordering):

$$V > S > T > W > M > G > DN$$

Behind this ranking however lies some interesting points which reflect the perceived practicability and feasibility of the alternative schemes. In other words the rankings disguise what amounts to 'tactical' voting by certain respondents. In three cases respondents did not place the tunnel as their top option because they felt that a tunnel was perceived as unlikely to be given serious consideration on the basis of cost, and therefore promoted the valley route as the preferred option.

Table 4.2: Ranking of Alternative Schemes by Respondent

	1	2	3	4	5	6	7	8	9	10	11
A650 widening (W)	2	3	3	6	5	—	5	7	—	6	4
Gyratory (G)	7	7	5	8	—	—	3	6	—	5	5
Tunnel A (T)	6	4	6	2	4	—	1	1	—	3	2
Tunnel B (T)	6	4	6	4	4	—	1	1	—	3	2
Valley Route (V)	3	2	4	1	1	1	7	4	1	1	1
Do-Nothing (DN)	8	9	8	7	6	—	6	8	—	7	7
Southern Route (S)	4	1	2	3	2	2	4	3	2	2	6
Moor Route (M)	5	6	1	5	3	—	8	5	—	—	—
Public Transport (PT)	1	8	—	—	—	—	—	—	—	—	—
Location	Bi	Bi	Ba	Sh	Sh	Ba	Sh	Sh	Sh	Sh	Sh

Bi = Bingley; Ba = Baildon; Sh = Shipley

A second point to note is that the interviews that took place in Shipley were in households "above" the proposed routing of the tunnel options. In all but one of the six cases these Shipley residents stated that they preferred the valley route as the first choice and the southern route as the second choice in three instances. These interviews then should not be taken as being representative of the views of the Shipley residents away from the argument of the tunnel.

Two of the Shipley respondents who use Shipley Glen regularly, placed the tunnel scheme as their

preferred route. Given the general low level of use of the recreational facilities and open-spaces in the area it is difficult to discern whether use of facilities affects the ranking of schemes.

Those who supported the valley route claimed that the area affected by the proposed scheme was either not especially attractive or that the road would not particularly affect the area. Few of the respondents actually walked or visited the area affected on a regular basis (because it was perceived as unattractive or "unedifying") but did "know" the area from past visits.

As in the first pilot it was apparent that people had little difficulty ranking of the schemes. To what extent the ranking was based upon a clear understanding of the possible effects was difficult to determine. Two groups of respondents referred to the Stage II Airedale section as examples of how a new road scheme can fit into the local environment and "improve" the environment (at least from the drivers perspective).

4.9 VALUATION OF SCHEME BENEFITS

The final stage of the interviews asks people if it was necessary to make a choice between one of their preferred schemes and some lower-ranked scheme, whether they would be willing to pay some amount to secure their preferred scheme. Four respondents said they would not be willing to pay anything to secure their preferred scheme. Three of these respondents refused to pay anything on the grounds that they pay enough already in taxes etc. and that the principle was wrong.

These three respondents all supported the valley route as their preferred scheme. Of interest three of the seven respondents who said they would pay something, stated that they had not thought of this previously but considered it to be a good way of securing a scheme they wanted.

The main difficulty with the question arises from the fact that different people rank schemes in different orders thus making it impossible to ask standardised pair-wise comparisons. Moreover since many people ranked the valley route as the preferred scheme, which is much cheaper than the tunnel, asking people how much they are willing to pay to secure a cheaper option invites ridicule. The question works best when, in the case where the tunnel is ranked highest or higher than the other scheme under consideration, or where the higher ranked scheme has "obvious" travel or environmental benefits relative to the other scheme in the comparison.

Ideally one would also want to ask the respondent to compare a number of pairs of schemes in order to establish the relative valuation assigned to the different benefits attributed to the schemes, identified from the first stages of the interview. Thus one pair-wise comparison might identify the value placed on the benefits of one scheme relative to another. To find out more specifically the value placed upon travel versus environmental benefits or different types of environmental benefits requires other comparisons involving schemes with other attributes. The list below illustrates the costs and benefits of the different schemes as presented by the DOT. At the end of a lengthy interview this is an additional onerous task and one which can quickly exhaust the patience of the respondent. The highest number of comparisons asked was four.

	Benefits on A650		Travel benefits on new route	Impact on other environment
	Travel	Environment		
Valley scheme	√√√	√√√	√√√	XXX
Tunnel	√√√	√√√	√√√	√√√
Southern	√√	√	√√	X
Do-nothing	XXX	XX	—	X
Road widening	√	XXX	—	—

√ = positive benefits attributed to scheme; X = negative impact attributed to scheme.

To compare each scheme with every other scheme would require 10 pairwise comparisons.

The range of values offered by respondents varied between £2/year to £250/year. Two of the valuations offered were in support of public transport. I have not included these in the analysis below. For illustration purposes I have shown the original rank-order for each respondent and the amount they have expressed they would be willing to pay to secure particular schemes relative to other schemes.

Respondent 1 V>T>S>M>W>DN>RW TvDN 250
 VvS 250
 VvDN 0
 VvW 150
 TvV 100

Respondent 2 V>S>M>T>RW>DN TvDN 50
 VvDN 100

Respondent 3 V>S VvT 50
 VvDN 50

Respondent 4 T>S>V>M>G>RW>DN TvV 150
 SvG 250

Respondent 5 T>S>V>M>G>RW>DN TvRW 0
 TvV 250
 TvS 250

Respondent 6 V>S TvDN 100
 VvDN 100

The first point to note from these results is that if people did not consider a scheme to be worthy of ranking (e.g. respondents 4 and 6) it was still possible to extract a sensible monetary value for non-ranked schemes by asking them to consider the possibility of doing nothing. So even if people did not wish to commit a statement of preference towards a scheme they might still be prepared to offer an amount for something to be done, via a non-ranked scheme, rather than nothing to be done.

In the case of respondent one, the rankings and money values require some explanation. Although the valley route is ranked higher than the tunnel option, the respondent would be willing to pay £250/year for the tunnel rather than have nothing done, but nothing for the valley route versus doing nothing. Logic would suggest that the valley route would be valued more highly in money terms than the tunnel. However, the respondent indicated that he had placed the tunnel route below the valley because he thought it was too costly and likely to be impracticable, although he would actually like to see it built.

He would also be willing to pay £100/year to secure the tunnel option rather than the valley scheme. At the same time the respondent would be willing to pay an amount to secure the valley route above either the road widening option or the southern route, but nothing when compared to the do-nothing option. This latter value was based on the view that something had to be done, that doing nothing was unrealistic and that this choice was not realistic or fair. On the other hand the tunnel was valued at £250/year against the do-nothing option on the grounds that the tunnel is an expensive option and contributions to its construction are seen as acceptable. From the other figures shown however it would have been imputed that the valley versus do-nothing option would have been valued at £150/year from this we could argue that the travel/environmental benefits derived from the reduction of traffic on the A650 and the environmental benefits of the tunnel option are valued at £100/year.

Respondent number 2 values the valley route at £50/year more than the tunnel route which in turn is valued at £50/year when compared to do-nothing. Given that only 2 comparisons were made it cannot be imputed what the £50 difference between the valley route and tunnel option is for. Since both schemes have similar benefits to the A650 it could be inferred that the respondent is placing a £50 premium on the loss of local amenity (which he does not use) or the perceived risk associated with the tunnel).

Respondent 3 ranked only 2 schemes. Here again a premium of £50/year is placed on the valley route relative to the tunnel option. In this case the respondent was very anxious about the effects of the tunnel on his property - hence the £50 is to avoid the tunnel effects rather than to secure the loss of local amenity.

Respondent 4 ranked the tunnel option first and expressed a willing to pay of £150/year relative to the valley schemes. This £150/year is attributable to the environmental benefits of the tunnel, since both schemes have similar travel and traffic reduction benefits. We do not have sufficiently detailed information to assign the £150/year to different environmental benefit categories.

The rank order of respondent 5 is inconsistent demonstrating that the choices that people make do not necessarily follow the theory of rationality.

The sixth respondent did not rank the tunnel scheme in the original ranking but again when confronted with the prospect of nothing being done, stated that he would be willing to pay an amount towards a tunnel rather than nothing being done.

4.10 CONCLUSIONS

The second pilot survey offered encouragement to the position that people make clear choices between road schemes and are able to articulate the basis for those choices. Notwithstanding the proneness to tactical voting (strategic bias ?) it would appear that a scheme which promotes

private benefits and has few local disbenefits (tunnel) is, not surprisingly, well supported. This is not a universal support particularly where it is perceived to have potential adverse effects on property. Those who supported the surface route along the valley bottom appeared to be expressing purely private interests, albeit from a position of incomplete knowledge about the valley area affected.

The valuation questions work surprisingly well in terms of ability to comprehend the question and providing intuitively plausible results. The intransitivity of values between pairs is interesting suggesting the contextual nature of schemes and the difficulty of transferring values.

The merit of asking people to value a scheme in monetary terms is that it forces people to think through why they have ranked the schemes in the order they have and by attaching money values, which have a scalar property, can show up inconsistencies in the rankings and require people to defend or modify their views or their valuation. Frequently after people have given an expression of money value they will sit back and wonder why they have arrived at the particular amount, or recognise contradictions in their own rank-orders and values or figure out that if they have given X to comparison 1, that comparison 2 should be valued at Y. In this sense we can see the approach adopted as one of turning "conflicts of value" into substantive issues (money values) which have a better opportunity of being understood and resolved than when kept in non monetary units.

The apparent ease with which people appeared to be able to understand the valuation questions led to the view that it might be possible to obtain valuation's using a questionnaire. In the next stage of the study it was therefore proposed to run a parallel surveys using interviews and questionnaires.

5. FINAL METHOD

The final survey method involved:

- (a) An interview and questionnaire
- (b) Interviews were enlisted through a postal request. A follow-up telephone call after a form has been returned set up the interview. Questionnaires were postal return. Reminder letters were sent when a questionnaire was not returned
- (c) Based on the two pilot surveys the interview and questionnaire distributed to the households in the local area covered similar areas and issues. These were as follows:
 - (i) familiarity with traffic conditions on existing road
 - (ii) assessment of benefits/costs of scheme to individual as a motorist and resident, to the local area and to people from outside the area
 - (iii) ranking of schemes in order of preference in relation to personal gains/losses, impact on area outside of own, benefit to visitors, travellers or future residents, overall assessment.
 - (iv) assessment of the importance of thirteen attributes to the choice between schemes
 - (v) ranking exercise in which respondent is asked to prioritise the following: benefit to motorists, benefit to public transport users, avoidance of new damage to local

- (vi) environment, reduction of traffic from residential areas and cost of scheme the willingness to pay in terms of increased local taxes for the perceived environmental benefits of the tunnel option where the choice rests between the tunnel or the other 4 schemes. This question was only asked of people who ranked the tunnel as their overall first choice.

The questionnaire sent out to non-local households was similar in structure but only asked people to rank the alternative schemes in terms of overall preference and presented a shorter list of five attributes under (iv). A fuller explanation of the survey methodology development is given in Hopkinson et al (1992). Copies of the survey forms are given in Annex 2.

5.1 SURVEY AREAS AND SAMPLE POPULATION

The same study area was chosen for the main survey as the second pilot study, with the same set of road scheme options. The existing A650, which is heavily trafficked and highly congested at peak times, passes through a dense residential area. The samples were randomly drawn from household lists derived from the electoral register. The letters and local questionnaires were distributed between eight residential areas segregated or bounded by major roads. These zones and the schemes they are primarily affected by are shown below.

Area	Mainly affected by
(a) Shipley town	Do Nothing/Road Widening
(b) Saltaire village	Valley Route/Do Nothing
(c) Saltaire estate	Valley Route
(d) Branksome	Tunnel/Southern Route

It was speculated that residents in each area would have different reactions to the alternative schemes. In addition the areas have distinctly different socio-economic characteristics. These include:

- housing stock and size
- car ownership levels
- proximity to alternative scheme proposals
- access to rail travel facilities.

A second shorter questionnaire (sample II in the tables) was sent out to households in three villages North-West of Shipley, which had each recently benefited from the provision of road improvements in their location and contained people who were likely to travel to/from the Leeds/Bradford conurbation. This was an attempt to include people less directly affected by the schemes but whose private interests were likely to be concentrated on the traffic benefits.

	Interview sample	Questionnaire sample (1)	Questionnaire sample (2)
Letters/questionnaires	200	175	50
Returns	60	56	15
Interviews set up	48		
Interviews completed	(28)*		
Number of respondents	(36)*	56	15
Response rate:			
— contact	30%	32%	30%
— total	30%	32%	30%

Note: Unfortunately the interim process had to be curtailed due to serious illness in the latter stages of the project.

The response rates for each of the three surveys was pleasing, especially for the interview surveys. However we are not in a position to assess whether the views or values of non respondents correspond to those who actually responded. This represents a major issue which requires further urgent research.

5.2 FINDINGS

The three samples show little difference in the reported level of travel by car or bus along the A650. The interview sample reported a slightly higher use of bus transport than the questionnaire sample. Virtually all respondents were aware of road proposals for the area and were supportive of the need for improvement to existing conditions. The bulk of the respondents to both the interview and questionnaire surveys came from the area to the south of the existing A650, furthest away from the valley route, and generally comprising higher quality housing and higher socio-economic groupings.

Table 5.1 shows the ranking of the individual schemes in order of preference for the three survey samples. Not all respondents ranked the five schemes, often because they considered the option a 'non-choice' for tactical reasons, explaining that they would not vote for a scheme which they did not want at any price. Within the interview surveys two observations were made. Firstly that in nine cases individuals ranked the tunnel scheme in second or third position because they felt it was not a feasible proposition, either on cost or engineering grounds, and whilst they would ideally prefer that scheme, did not rank it first in case it was later dismissed and another scheme put in its place. What people really preferred and what they considered rightly or wrongly to be practical or feasible, were not necessarily the same.

Secondly a small number of people were very unclear about the areas through which different schemes would pass - even though they may have lived in the area for many years, or about the details of the schemes. Thus many people were making choices or preferences based upon incomplete information or an inability to visualise the areas affected.

Table 5.1: Ranking of alternative proposal (% of sample)

Sample	Rank	Road widening	Tunnel	Southern	Valley	Do-nothing
Interview (N=33)	1	3	57	0	39	0
	2	6	24	33	33	0
	3	6	9	45	6	0
	4	39	3	0	9	9
	5	3	6	6	0	42
Questionnaire I (N=55)	1	9	33	2	55	2
	2	18	24	33	16	5
	3	33	18	31	7	7
	4	33	18	27	13	5
	5	4	4	4	8	73
Questionnaire II (N=16)	1	12	19	6	44	0
	2	31	19	25	12	0
	3	31	25	31	6	6
	4	19	19	25	31	6
	5	0	6	6	6	63

Table 5.2: Number of respondents ranking tunnel and valley schemes as first choice

	Tunnel		Valley	
	I	Q(I)	I	Q(I)
Best for me personally	16	15	13	29
Best overall	19	18	13	30

Overall the do-nothing and road widening options are the least preferred options for the majority. The valley route was the most preferred scheme amongst the questionnaire sample (55%), the tunnel the most preferred by the interview sample (57%). The southern scheme was not a popular first choice in any of the samples but was strongly supported as a second or third choice. In the two questionnaire samples the tunnel option was the first choice for 33% of local residents and 19% of non-local residents. The differences in the proportion of the sample in each survey voting for the tunnel as first choice were significantly different at the 95% level. The differences in first choice votes for the valley scheme between surveys was not however found to be significantly different. In the case of the interview sample, the majority of those voting for the tunnel option did so because of its environmental and wider area benefits relative to the other schemes on offer. The questionnaire sample contained a higher proportion of male respondents and people below retirement age than the interview sample which may in part account for the different rating pattern. The interview sample however also contains a higher proportion of people who live nearer to the area affected by the valley route, which will affect people's perception of the impact of the scheme.

The large number of residents voting for the valley scheme was somewhat surprising given the loss of recreational amenity this would result in along the valley bottom, and given the choice of

an option, albeit an expensive option, with few environmental disbenefits. The issue of tactical voting has previously been mentioned. Two other factors were found to favour the scheme. Firstly many of those voting for the valley scheme live to the South of the A650, and tend to make use of the area affected by the Southern bypass, for recreational purposes. Many of these people do not use the valley area for formal or informal recreational purposes.

Table 5.3: Rating of attributes by importance (% of respondents)

		very imp	imp	minor	not v. imp	D/K	N
Noise reduction	I	22	56	3	8	—	23
	Q(I)	11	52	31	4	2	56
Faster travel	I	37	42	8	12	—	24
	Q(I)	34	40	21	4	—	56
Local access	I	40	20	20	20	—	24
	Q(I)	34	57	6	4	—	56
Cost	I	16	18	16	50	4	15
	Q(I)	19	31	36	14	—	56
Reduce rat-runs	I	40	13	33	13	—	24
	Q(I)	52	32	9	4	2	56
Safer crossing	I	60	38	—	4	—	18
	Q(I)	54	35	8	2	2	56
Protect Roberts Park	I	20	25	12	36	8	21
	Q(I)	19	17	39	23	2	56
Benefit businesses	I	5	22	44	27	—	21
	Q(I)	13	59	13	1	—	56
Views for motorists	I	14	5	19	57	5	25
	Q(I)	2	6	33	57	2	56
Avoid Hirst Wood	I	24	38	14	14	9	25
	Q(I)	16	26	28	28	2	56
Protect Saltaire village	I	62	28	16	4	—	24
	Q(I)	31	48	13	6	2	56
Protect Northcliffe	I	20	50	12	17	—	25
	Q(I)	29	38	21	7	4	56
Reduce traffic on A650	I	76	12	—	12	—	—
	Q(I)	70	21	9	—	—	—

Table 5.4: Ranking of alternative benefit-cost issues (% of respondents)

		1	2	3	4	5
Benefits to public transport users	I*	4	15	8	8	23
	Q(I*)	4	20	22	24	16
	Q(II*)	0	6	25	25	37
Benefits to motorists	I	4	15	39	19	4
	Q(I)	30	24	20	13	4
	Q(II)	37	18	18	13	0
Cost	I	0	12	8	27	19
	Q(II)	9	13	13	18	40
	Q(II)	12	12	12	12	52
Avoid damage to the environment	I	50	4	8	11	6
	Q(II)	22	15	11	24	20
	Q(II)	6	37	18	12	6
Remove traffic	I	38	39	8	0	0
	Q(I)	35	29	20	4	4
	Q(II)	52	12	12	12	18

* N=16, N=26, N=55

Table 5.5: Valuation of tunnel scheme versus alternative option

		Range	Mean sample	
			£pa	n=
Tunnel v Valley	I	2-500	106	10
	Q(I)	5-250	72	14
	Q(II)	10-50	33	3
Tunnel v Do-Nothing	I	2-100	47	6
	Q(I)	10-215	74	18
	Q(II)	10-50	33	3
Tunnel v Southern	I	20-50	35	2
	Q(I)	10-250	91	16
	Q(II)	10-50	33	3

Secondly many of those voting for the valley option as a first choice live above the alignment proposed for the tunnel option. Whilst it was not possible to question further those consulted by questionnaire it was evident that many residents of the Nab Wood and Moorhead areas were worried, consciously or subconsciously, about the possible impacts of the tunnel excavations on their properties. This is a legitimate concern and not an issue on which it was possible or ethical

to offer reassurances. In about a third of the interview surveys, and one might suppose an equivalent proportion in the questionnaire survey, there were concerns about the impact of the tunnel on structural foundations. In a number of cases people argued that the tunnel was the best choice for the area as a whole but still voted for the valley option. In other cases however people would not even consider the tunnel option as a possible option, discounting any possible merits and steadfastly supporting the valley scheme. A third group expressed concern about the possible impact of construction on their property yet still voted for the tunnel.

Table 5.5 shows for the valley, tunnel and southern scheme options the difference in the number of respondents placing each scheme as first choice when asked to rank the schemes in terms of benefits to themselves as residents and motorists and overall, taking account of the area generally and non-local residents, travellers and visitors. As can be seen there is relatively little difference in the number of votes cast in relation to personal benefits compared with overall benefits.

Three more people considered the tunnel to be the best option overall than for themselves personally, the same result as for the questionnaire sample. In the case of the valley scheme there was little or no difference in the numbers of votes. Overall it would appear that private and social preferences don't differ, or differ in only a small number of cases. From the interviews however it is apparent that given the opportunity to consider schemes as a whole, most people cannot, and do not separate their private and social concerns into individual assessments but form an overall judgement in the light of all the effects of the alternatives under consideration. This implies that it is important to make available to people information about the choices under offer and the possible consequences of the options. Without this people will tend to act in a 'private' capacity even though they may at the same time have social concerns which are relevant to the choices being made.

Table 5.3 shows the rating of attributes by importance. Each person was asked to state how important they considered each attribute to be in terms of their ranking of the individual schemes. The differences between the surveys were not found to be statistically significant, other than for the attribute 'protection of Saltaire village'.

The most frequently rated attributes in terms of importance were 'reduction in traffic', 'safety for pedestrians, and 'protection of Saltaire village'. Surprisingly 'cost of the scheme' was rated as generally of minor importance in choosing between schemes. This may reflect a disbelief that they would actually have to bear this cost through local taxation. Also the protection of Roberts Park and Hirstwood, areas both adversely affected by the valley route, was not rated as important by as many people as might have been expected. This is likely to be a reflection of the under-representation of respondents from the north of the A650, closest to the valley area but also a misperception of the impact of the valley scheme on Saltaire village (small) and on the woods/parks along the valley bottom.

Table 5.4 shows the ranking of the importance of five different cost and benefit categories when deciding the choice between road schemes. The rank order of costs/benefits differed sharply between the interview and questionnaire samples. Avoidance of damage to the local environment was ranked as the most important factor by half of the interview sample, removal of traffic from residential areas being the next most important factor; only 4% of the sample considered benefits to motorists as being the most important factor. This is consistent with the majority support for the tunnel scheme by this sample. In contrast the questionnaire samples placed removal of traffic from residential areas as the most important factor, followed by benefits to motorists. 22% and

6% of the questionnaire samples placed avoidance of damage to the local environment as the most important consideration. These rankings are again consistent with the majority support for the valley route above the tunnel option. Benefits to public transport users and cost were generally viewed as less important considerations, although it should be noted that the samples were each dominated by respondents who were mainly car users. These results indicate that amongst local residents, who are predominantly car users, a sizeable minority put environmental protection as their primary concern. Whether people would hold to these priorities had they required to have made sacrifices in terms of reduced traffic reduction or travel benefits is debatable.

Unfortunately whilst the choice of scheme options was advantageous in terms of their relative costs/benefits it did allow people to vote/buy a scheme which was beneficial on both traffic and environmental grounds.

Having asked people to rank the alternative schemes in order of preference, those who ranked the tunnel as their most favoured option were asked how much they would be willing to pay in terms of increased local taxes to secure that scheme rather than each of the other four cheaper options, each with environmental disbenefits. Although the sample sizes are relatively small, the results do provide evidence that a sizeable minority of people are willing to pay to secure a scheme option which avoids adverse environmental effects or put another way, to preserve a set of local environmental assets. All those who voted for the tunnel as their first choice scheme stated that they would be willing to pay something towards the additional cost of the tunnel relative to the other schemes. The expressed values have a wide range and were found to be closely related to both income and actual use of the areas affected by a scheme.

The values expressed relate to the entire environment affected by a road scheme, not to specific features or attributes. In the interviews people found the question relatively straightforward and meaningful to answer. No person who chose the tunnel as a first choice said they would not pay anything to secure that option.

It was found that more people were willing to answer repeat willingness to pay questions in the questionnaire survey than in the interviews, i.e. the sample sizes from the questionnaire surveys were greater than those in the interviews. This was due to a number of reasons. Firstly, the respondent becoming tired after a long and thought provoking interview. Secondly, the need of the respondent to finish the interview to get on with other activities. Thirdly, fatigue or irritation, or difficulty following repetitive questions. In conclusion it is felt that if valuation questions are to be used in an interview then the interview should be much shorter or else people given a written set of questions to complete at leisure or in their own time during the interview. The values from the questionnaire survey of local people and the interview surveys are to within $\pm 50\%$ of each other except in the tunnel v road widening choice where the interview sample is extremely small. The mean values from the non-local questionnaire returns are lower in each case than the other two samples, fulfilling an expectation that on average we might expect local people to value the local environment more highly than non-local people.

More speculatively but potentially more important is the average value derived from motorists travelling through the area but who live beyond the area affected by the road schemes. The findings show a small though potentially significant percentage of motorists who, given a choice of scheme options, vote for the one with environmental benefits and express a willingness to pay for those "benefits". Such benefits should then enter the formal appraisal.

Can these values be taken as a true reflection of the value which people place upon their local environmental resources. Much has been written about the potential sources of measurement bias in hypothetical questioning techniques such as these. From the interviews conducted it was evident that people gave serious thought and consideration about whether they would pay and how much to secure the tunnel scheme versus another scheme. In our opinion there are as yet no reliable tests which can be used to detect whether people are biasing their answers, other than asking them to pay the amount they stated they would pay. In the absence of this 'test' we rely upon the judgements of those who carried out the surveys, which was that there was no evidence to support the view that people were deliberately distorting their values to 'free-ride' or affect policy by means of strategic bias.

6. INTERPRETATION OF FINDINGS

During the period of this project and subsequent, the procedures and techniques for road project appraisal and the entire direction of road policy have come under increasing scrutiny. Considerable attention has been given to the potential for placing monetary values on the environmental effects of new road schemes. The work carried out during this project has a number of implications for road project appraisal.

Firstly road scheme appraisal involves assessing a long list of attributes in many different units across many different groups. People are seldom given the opportunity to comment upon or value schemes or alternative combinations of schemes as a whole. Moreover they are rarely asked to compare and value alternative modal options. The consequence of this is that it is difficult for people to express certain forms or types of preferences. If people are asked to consider specific project attributes or schemes then they are likely to respond in a certain way. The idea that people give values depending upon the questions they are asked is well known but seems to have received little serious review in the area of road project appraisal.

We conclude that it is both sensible and appropriate to ask people to consider road schemes in their entirety and include alternative modal options. Without this people are conditioned to formulate views and preferences within a particularly narrow perspective.

The qualitative evidence from this study is that people tend to think and experience environments in a broad way and are not conditioned or used to making fine distinctions or segmentation about 'parts' of environment. In certain respects the approach by the Department of Transport to public consultation which involves presenting broad descriptions of the environmental and economic costs and benefits of alternative scheme options has much to commend it. The limitations on the alternatives considered is a serious drawback but the level of information presented and the ranking of schemes would seem to operate at a level of detail which most people can operate at.

We feel that such an approach to the comparison and valuation of schemes and their broad attributes allows the most important trade-offs between local issues to be identified and considered. We do not believe that complex environmental issues are capable of resolution or valuation through survey methods. People readily understand local level, directly experienced or perceived impacts. The more remote or detached the issue from everyday experience the less likely is it that meaningful responses to survey questions can be achieved. Currently the long list of attributes tends to obscure the fundamental trade-offs between travel benefits, safety, cost and environment. A broader approach for choosing between schemes, followed by a finer analysis

for the detailed design and mitigation stages of the assessment would help to avoid/create an overly cumbersome assessment process.

When operating at a scheme level then it was found that people can make trade-offs between schemes where monetary values are included. Broad indications of the value placed upon the protection of one environment against another appears to be achievable and can be used as additional support for and against different schemes. This does not mean that people are able to place money values on specific attributes or even levels of attributes e.g less severance versus more severance. This level of detail is difficult enough to rank without the introduction of money values. This finding suggest that survey based monetisation could be used as a useful aid to judgement. This depends upon the question posed. In the case of major new infrastructure the sensible question for many people is whether the additional expenditure on a specific schemes is warranted for the specific benefits achieved. Thus in the case-study used the essential question which can be posed to respondent is whether the conservation of the valley area is worth the £45m (or whatever the predicted figure) extra cost of the tunnel. Survey based information can shed light on the likelihood that consumer preferences for local environmental protection are sufficiently high or widespread to warrant this additional expenditure or the average WTP levels required amongst the local population to make this expenditure worthwhile.

The methodology proposed to obtain valuations is both simple and understandable by ordinary people. We do not think it is possible to obtain a set of "national" environmental values but rather envisage surveys being carried out on a project by project basis where necessary, and a set of representative 'ball-park' values being built up over time. It would be possible once a number of surveys had been carried out to regress the measures of WTP against various attributes or combinations of attributes. From this it would be possible to deduce those attributes which appeared to be weighted more highly than others. The search for a set of values similar to the standardised 'values of time' we believe to be an elusive holy grail and likely to consume vast amounts of research time for little substantive or reliable reward.

REFERENCES

- Bohm, P. (1972). Estimating demand for public goods: an experiment. *European economic review* 3, pp. 111-130.
- Boose, J.H. (1985). Personal construct theory and the transfer of human expertise. In O'Shea, T. (Ed) *Advances in artificial intelligence*, Amsterdam: Elsevier/North Holland.
- Bowers, J., Hopkinson, P. and Palmer, A. (1992). Roads 2. Implementing sustainability into the roads programme. Final Report to English Nature.
- Bowers, J. and Hopkinson, P.G. (1993). *Roads Nature Conservation and Sustainability* (forthcoming).
- Brookshire, D.S., Schulze, W.D., Thayer, M.A. and d'Arge, R.C. (1982). Valuing public goods: a comparison of survey and hedonic approaches. *American Economic Review* 72, pp. 165-77.
- Brookshire, D.S., Randall, A. and Stoll, J.R. (1980). Valuing increments and decrements in natural resource service flows. *American Journal of Agricultural Economics* 62, pp. 478-98.

- Brookshire, D.S., Ives, B. and Schulze, W.D. (1976). The valuation of aesthetic preferences. *Journal of Environmental Economics and Management* 3, pp. 325-436.
- Chatterjee, A., Wegmann, F.J., and McAdams, M.A. (1983). Non-commitment bias in public opinion on transport usage. *Transportation* 11, pp. 347-60.
- Couture, M.R., and Dooley, T. (1981). Analysing traveller attitudes to resolve intended and actual use of a new transit service. *Transportation Research Record* 794, pp. 27-33.
- Cummings, R.G., Brookshire, D.S. and Schulze, W.D. (1986). Valuing environmental goods: an assessment of the contingent valuation method. Rowan and Allanheld, Totowa, New Jersey.
- Cummings, R.G., Brookshire, D.S. and Schulze, W.D. (1986) (Eds). Valuing environmental goods: a state of the art assessment of the contingent valuation method. Totowa, N.J, Rowman and Allanheld.
- Daubert, J., and Young, R. (1981). Recreational demands for maintaining instream flows: a contingent valuation approach. *American Journal of Agricultural Economics* 63, pp. 66-676.
- Department of Transport (1983). Manual of environmental appraisal.
- Department of Transport (1979). Trunk road proposals: a comprehensive framework for appraisal. Standing Advisory Committee on Trunk Road Appraisal, HMSO.
- Diaper, D. (1989). Knowledge elicitation: principles, techniques and applications. Ellis Horwood, Chichester.
- Earl, P. (1983). The Economic Imagination. Houseman.
- Freeman, A., Myrick, I. (1979). The benefits of environmental improvement. The John Hopkins University Press, Baltimore.
- Greenley, D.A., Walsh, R.G. and Young, R.A. (1981). Option value: empirical evidence from a case study of recreation and water quality. *Quarterly Journal of Economics* 96, pp. 657-72.
- Harre, R., Martin, D. and De Carlo (1987). Motives and mechanisms. Methuen.
- Harre, R. (1980). Man and the actor in Models of Man (eds A.J. Chapman and D.M. Jones). BPS.
- Hopkinson, P.G. and Pearman, A.D. (1988). Measuring residents attitudes to environmental disturbances under multiple dimensions of impact and uncertainty. Eleventh Research Conference on subjective probability, utility and decision making, Cambridge.
- Hopkinson P.G., Nash C.A. and Sheehy N. (1992). How much do people value the Environment. *Transportation*. 19: 97-115.
- Humphreys, P. and Mcfadden, W. (1980). Experiences with MAUD: aiding decision structuring versus bootstrapping the decision maker. *Acta Psychologica* 45, pp. 51-69.

Jones, P.M., Ampt, E., Ferguson, D. and Bradley, M.A.(1986). Development of an interactive computer-assisted stated preference technique to study bus passenger preferences. TSU ref 340, Transport Studies Unit, Oxford University.

Kelly, G. (1955). The psychology of personal constructs. Norton.

Laflin, P. and Hopkinson, P.G. (1993). Critical observation on the use of contingent valuation method. Department of Environmental Science, Working Paper 6, University of Bradford.

Mitchell, R.C. and Carson, R.T. (1989). Using surveys to value public goods: the contingent valuation method. Resources for the future, Washington D.C.

Nash, C.A. (Ed.) (1990). Appraising the environmental effects of road schemes. Response to the SACTRA Committee. Working Paper 293, Institute for Transport Studies, University of Leeds.

National Audit Office (1988). Department of Transport, Scottish Department and Welsh Office: Road Planning. Report by the Comptroller and Auditor General. HMSO 688.

Pearce, D. and Turner, K. (1990). Economics of Natural Resources and the Environment. Wheatsheaf.

Pearce, D., Markandya, A. and Barber, E. (1989). Blueprint for a Green Economy. Earthscan.

Rowe, R., d'Arge, R. and Brookshire, D.S. (1980). An experiment on the value of visibility. Journal of Environmental Economics and Management 7, pp. 1-19.

Sen, A. (1987). On ethics and economics. Blackwell.

Standing Advisory Committee on Trunk Road Assessment (1992). Assessing the environmental effects of new road schemes.

Suchman, L. (1987). Plans and situated actions: the problems of human machine interaction. Cambridge, Cambridge University Press.

Thayer, M.A. (1981). Contingent valuation techniques for assessing environment impacts: further evidence. Journal of Environmental Economics and Management 8, pp. 27-44.

Walsh, R.G., Loomis, J.B. and Gillman, R.A. (1984). Valuing option existence and bequest demands for wilderness. Land Economics 60, pp. 14-29.

Walsh, R.G., Bjorback, D., Rosenthal, D. and Aitken, R. (1984). Public benefits of programmes to protect endangered wildlife on Colorado. Paper presented at the symposium on issues and technology in the management of impacted western wildlife, Thorne Ecological Institute.

Warr, P. (1980). Springs of action: Models of Man, Ed A.J. Chapman and D.M. Jpnas BPS.

Willis, K.G. and Benson, J.F. (1988). Valuation of wildlife: a case study of the Upper Teesdale site of special scientific interest and comparison of methods in environmental economics. In Turner, R.K., (Ed) Sustainable Environmental Management, Belhaven Press, London.

ANNEX 1: PUBLIC CONSULTATION SURVEY FORMS

INTRODUCTION

The proposals exhibited in 1986 were:-

- (i) Shipley Eastern Bypass.
- (ii) Improving the existing A650 between Cottingley Bar and the Branch Public House including either a) Widening the road through Gordon Terrace
or b) Providing a one way system using Saltaire Road, Gordon Terrace and a new link between the two.

OPTIONS ARISING FROM PUBLIC CONSULTATION IN 1986

The Department has examined several options. These are shown on the plan. The summary framework compares the options on the grounds of their effect on the environment, traffic movement, safety, property, cost and value for money.

With **Option A** the traffic would remain on the existing road. It is different from the proposals of the 1986 consultation as it would not affect the gardens of properties adjacent to the A650. A variation has also been looked at which would take the road into a short tunnel under Saltaire roundabout and Gordon Terrace. Another possibility has been examined in which the link from the A650 at the Branch Public House to Valley Road/Canal Road would be relocated near to Bradford Grammar School.

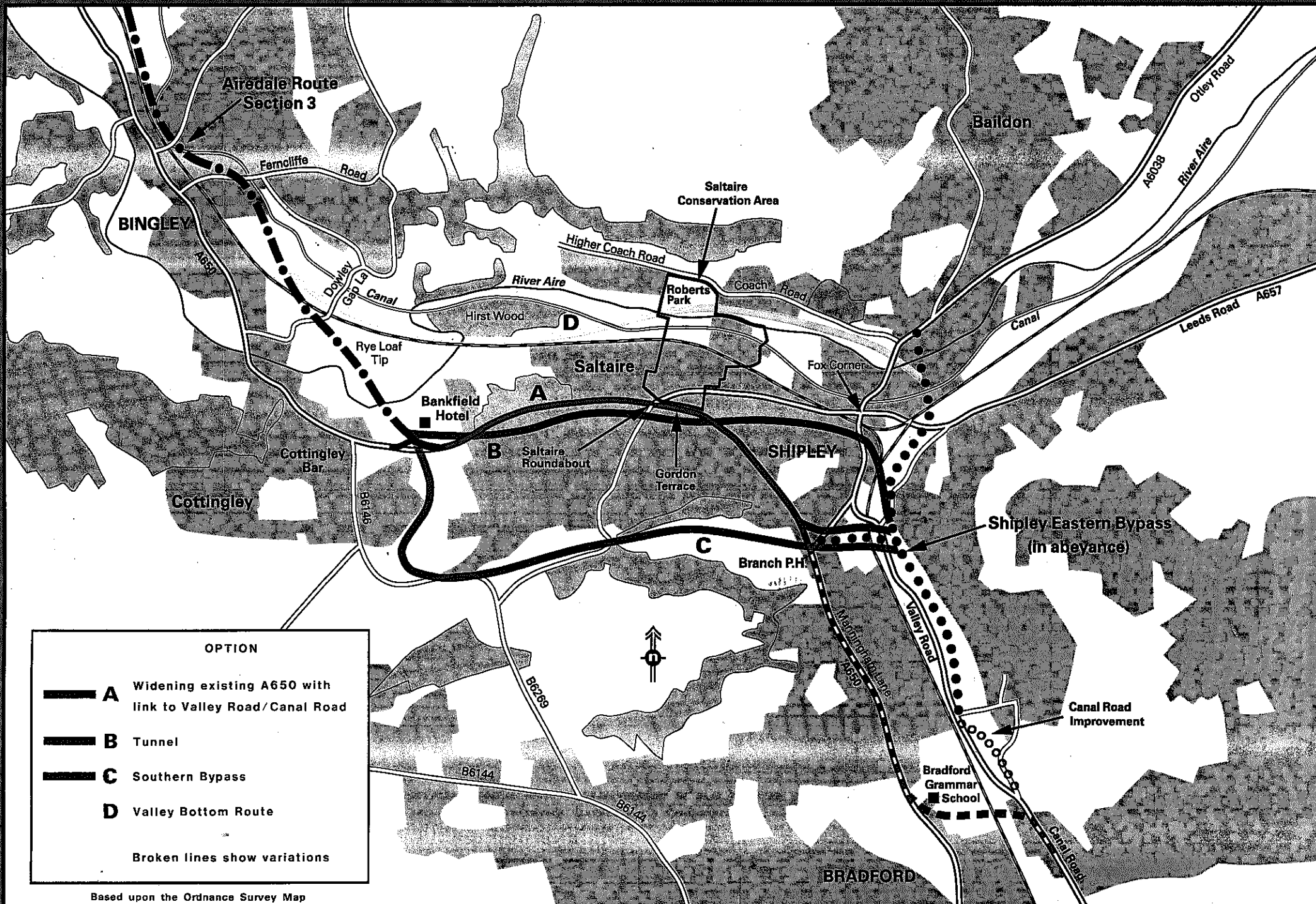
Option B is for a long tunnel between Cottingley Bar and the Shipley Eastern Bypass. The possibility of it being a single or a dual carriageway has been investigated.

Option C is a bypass of Shipley on the southern side. There would be steep gradients at each end. This option would require a link from the A650 at the Branch Public House to Valley Road/Canal Road.

Option D is a bypass along the bottom of the River Aire Valley to the north of Saltaire Village. A more northerly valley bottom route passing close to Higher Coach Road was rejected after the 1980 Public Inquiry because of its severe impact on the environment of the valley and on the Saltaire Conservation area. The information contained in the framework is for the scheme suggested by the City of Bradford Metropolitan Council and West Yorkshire Metropolitan County Council in 1984 which passed under Roberts Park in a short tunnel.

THE FUTURE

The Department considers that its proposals for Section 3 of the Airedale Route (Bingley Relief Road) would be a significant improvement for those who work, live and shop alongside the A650 between Crossflatts and Cottingley Bar. The Department is pressing ahead with the statutory procedures to enable that section to be built.



SUMMARY FRAMEWORK FOR A650 COTTINGLEY BAR TO EAST OF SHIPLEY

OPTIONS	EFFECTS				
	1. Environment	2. Traffic	3. Road Safety	4. Property Number Demolished Number from which land acquired	5. Finance NOTE: Value for money compares traffic benefits with construction cost.
OPTION A WIDENING EXISTING A650	No traffic relief means problems remain. Link to Valley Road/Canal Road would have substantial disadvantages.	Some improvement at Saltaire Roundabout. Congestion problems reduced. Some side roads closed.	Design standards modified to keep improved road predominantly within existing boundary. Some reduction in accidents.	23 47	Low construction cost (£9m). High value for money.
OPTION B TUNNEL	Single tunnel (40% traffic relief) brings moderate improvement. dual tunnel (60% traffic relief) brings substantial relief to A650. New intrusion at portals and ventilation stations.	Uninterrupted route for through traffic although capacity problems likely with single tunnel. Improved access for side roads, parking and unloading.	Designed to normal trunk road standards. Significant reduction in number of accidents.	5 17	Very high construction cost (£51m (single) — £94m (dual)). Single tunnel low value for money, dual not value for money.
OPTION C SHIPLEY SOUTHERN BYPASS	20% traffic relief to A650 brings some improvement. New intrusion introduces new area of high landscape value.	Lorries likely to be deterred by steep hills. Some side road parking and loading difficulties. Some congestion remains in Saltaire.	Minimum design standards employed. Moderate reduction in number of accidents.	8 28	Medium construction cost (£26m). Not value for money.
OPTION D VALLEY BOTTOM ROUTE	60% traffic relief to A650 brings substantial improvement. New intrusion into area of high environmental value.	Uninterrupted route for through traffic. Improved access for side roads, parking and loading.	Designed to normal trunk road standards. Significant reduction in number of accidents.	15 6	High construction cost (£35m). High value for money.



THE DEPARTMENT
OF TRANSPORT

A650 COTTINGLEY BAR TO EAST OF SHIPLEY

The public were consulted in 1986 about proposals to widen the A650 between Cottingley Bar and the Shipley Eastern Bypass. The Department put forward two alternatives for on-line improvement. Neither scheme found favour at the Public Consultation, and some alternative routes were suggested. The Department has investigated these proposals.

After analysing the various proposals, the Department has not identified a scheme which has gained wide public support, and is therefore unable to propose a preferred route. Proposals for the Shipley Eastern Bypass will also be held in abeyance until an acceptable scheme for the A650 can be promoted.

YORKSHIRE AND HUMBERSIDE REGIONAL OFFICE
CITY HOUSE
LEEDS
LS1 4JD

ANNEX 2: MAIN SURVEY FORMS

49

QUESTIONNAIRE 1
COTTINGLEY BAR - SHIPLEY BY-PASS

Name:

Address:

.....

.....

1. How long have you lived at this address? 65 years

2. How many people live in your household? 1

3. Do you drive a motor vehicle? NO Yes [] ... No [✓]

4. Approximately how often do you travel along the Bradford Road (A650) as a car driver or passenger either towards Bradford or Bingley in a typical week?

Every day	[]	Almost every day	[]
Two/three days week	[]	One day week	[✓]
Less one day week	[]	Rarely	[]

5. Approximately how often do you travel along the Bradford Road (A650) in a public bus either towards Bradford or Bingley in a typical week?

Every day	[]	Almost every day	[]
Two/three days week	[]	One day week	[✓]
Less one day week	[]	Rarely	[]

6. Are you aware of any proposals for improving traffic conditions along the Bradford Bingley Road (A650) between Cottingley Bar - Shipley?

Yes [] ... No [✓]

7. Do you think there is a need to improve traffic conditions along the Bradford-Bingley Road (A650) between Cottingley Bar - Shipley? Yes [✓] ... No []

In making this selection, I have always included the variation of a short tunnel when referring to option A.

9. (i) Having outlined each of the schemes, could you indicate below how much you think each option would benefit you personally, as a resident and as a road user, if they were built.

Benefit me personally as a resident

	Considerable benefits	Some benefits	No Change	Some worsening	Considerable worsening	Don't know
A Road Widening	☐	☒	☐	☐	☒	☐
B Tunnel	☒	☐	☐	☐	☐	☐
C Southern Bypass	☐	☒	☐	☐	☐	☐
D Valley Route	☐	☐	☐	☐	☒	☐
E Do-nothing	☐	☐	☐	☒	☐	☐

Benefit me personally as a road user (car driver, passenger or public transport user).

	Considerable benefits	Some benefits	No Change	Some worsening	Considerable worsening	Don't know
A Road Widening	☐	☒	☐	☒	☐	☐
B Tunnel	☒	☐	☐	☐	☐	☐
C Southern Bypass	☐	☒	☐	☐	☐	☐
D Valley Route	☐	☐	☐	☐	☒	☐
E Do-nothing	☐	☐	☐	☒	☐	☐

- (ii) Which schemes do you think will be most beneficial to you personally overall (please rank the schemes by their letter below, first rank is most benefits).

1st B.
 2nd C.
 3rd A.
 4th D.
 5th E.

10. (i) Besides having benefits to you personally and to others in your household each of the proposed schemes will have some benefit and some negative effects on other residents and road users who live in the area. Thinking about all the different effects, good and bad, on the area, could you indicate below how much you think the each option would benefit the local area overall.

Benefits to residents as a whole

	Considerable benefits	Some benefits	No Change	Some worsening	Considerable worsening	Don't know
A Road Widening	☐	☒	☐	☐	☐	☐
B Tunnel	☒	☐	☐	☐	☐	☐
C Southern Bypass	☐	☒	☐	☐	☐	☐
D Valley Route	☐	☐	☐	☐	☒	☐
E Do-nothing	☐	☐	☐	☒	☐	☐

Benefits to road users as a whole

	Considerable benefits	Some benefits	No Change	Some worsening	Considerable worsening	Don't know
A Road Widening	☐	☒	☐	☐	☐	☐
B Tunnel	☒	☐	☐	☐	☐	☐
C Southern Bypass	☐	☒	☐	☐	☐	☐
D Valley Route	☐	☒	☐	☐	☐	☐
E Do-nothing	☐	☐	☐	☒	☐	☐

- (ii) If you were responsible for making a decision for the benefit of other people in the area as a whole (regardless of the effects on you personally) how would you rank the schemes in overall order of benefit (1st = most beneficial)?

1st B
 2nd C
 3rd A
 4th D
 5th E

11. In addition to the effects on you personally and to other people in the area each of the four road schemes may affect other people who live outside the area also. These include road-users who travel through the area, people who visit friends and relatives in the area or visit sites and attractions in the area, and people who may come to live in the area in the future or who may wish to visit the areas' attractions in the future. The different options may improve conditions for these groups of people or worsen conditions. For each of the groups below could you assess whether you think each scheme will have a beneficial or negative effect overall.

Road users travelling through the area

	Considerable benefits	Some benefits	No Change	Some worsening	Considerable worsening	Don't know
A Road Widening	☐	☒	☐	☐	☐	☐
B Tunnel	☒	☐	☐	☐	☐	☐
C Southern Bypass	☐	☒	☐	☐	☐	☐
D Valley Route	☐	☒	☐	☐	☐	☐
E Do-nothing	☐	☐	☐	☒	☐	☐

Visitors to the area

	Considerable benefits	Some benefits	No Change	Some worsening	Considerable worsening	Don't know
A Road Widening	☒	☐	☐	☐	☐	☐
B Tunnel	☐	☒	☐	☐	☐	☐
C Southern Bypass	☐	☒	☐	☐	☐	☐
D Valley Route	☐	☒	☐	☐	☐	☐
E Do-nothing	☐	☐	☐	☒	☐	☐

Future potential visitors/residents

	Considerable benefits	Some benefits	No Change	Some worsening	Considerable worsening	Don't know
A Road Widening	[]	[✓]	[]	[]	[]	[]
B Tunnel	[✓]	[]	[]	[]	[]	[]
C Southern Bypass	[]	[✓]	[]	[]	[]	[]
D Valley Route	[]	[✓]	[]	[]	[]	[]
E Do-nothing	[]	[]	[]	[✓]	[]	[]

- (ii) If you had the responsibility for choosing a road scheme which would be most beneficial to groups of people outside the area, how would you rank the schemes under consideration? (1st - most beneficial).

1st .B..
 2nd .C..
 3rd .D..
 4th .A..
 5th .E..

12. Taking into account the effects to you personally; the other people in the area and to people from outside the area, which of the five options under consideration would be your most preferred scheme. Which would be the second most preferred scheme, and the third and fourth.

1st .B..
 2nd .C..
 3rd .A..
 4th .D..
 5th .E..

13. We would like to know a little more about your reasons for ranking the different road schemes in the way that you have in question 12. Listed below are a number of possible factors which you might have considered to be important when making your choice. Could you indicate below how important the following factors were in your overall ranking of schemes in question 12.

	Very important	Important	Minor importance	Not very important	Don't know
• Reduction in noise for residents along Bradford/Bingley Road	[]	[]	[]	[]	[]
• Faster travel times through the area	[]	[]	[]	[]	[]
• Easier access for local residents onto main roads	[]	[]	[]	[]	[]
• Cost of scheme	[]	[]	[]	[]	[]
• Reduction in cars cutting through residential areas	[✓]	[]	[]	[]	[]
• Easier for pedestrians to cross A650	[]	[]	[]	[]	[]
• Protection of Roberts Park	[]	[]	[]	[]	[]
• Benefits to businesses in the area	[]	[]	[]	[]	[]
• Goods views for motorists	[]	[]	[]	[]	[]
• Avoidance of traffic intrusion in Hirstwood/Canalside area.	[]	[]	[]	[]	[]
• Protection of Saltaire Village	[]	[]	[]	[]	[]
• Protection of Northcliffe Woods & Playing fields	[]	[]	[]	[]	[]
• Reduction in traffic along A650	[✓]	[]	[]	[]	[]
• Improving safety along A650	[✓]	[]	[]	[]	[]

Others (please list):

The use of a roundabout... [] [] [] [] []
 will transfer build up of traffic on the A650 to the junction of Green Lane with the A6038 Otley Rd. which is already congested. This will make this a 'high accident' corner.
 There is also some flooding in this area

14. Could you indicate below in order of importance the three factors from Q.13 most influencing your overall choice of schemes.

- 1 Improving Safety on A 650
- 2 Reduction in Cars through residential areas.
- 3 Reduction in Traffic along A 650

15. In making your choice of schemes which of the considerations were most important in your overall decision (1 = most important, 2 = next most important, etc.

- Benefit to public transport users 3
- Benefit to motorists 4
- Cost of scheme 5
- Avoiding new damage to local environment 2
- Removing traffic from residential areas 1

16. Finally could you indicate below which of the following classification groups you fit into.

Male () Female (☒) under 18 () 18-60 () >60 (☒)

Personal Income

- <5000 Annum ()
- 5-10,000 Annum (☒)
- 10-20,000 Annum ()
- >20,000 Annum ()

Thank you for your co-operation. Would you return this questionnaire by the FREEPOST envelope enclosed. We would be grateful if you could assist us a little further. If you ranked the tunnel scheme as your most preferred option would you help us further by filling in the enclosed blue questionnaire.

SUMMARY FRAMEWORK FOR A650 COTTINGLEY BAR TO EAST OF SHIPLEY

EFFECTS

OPTIONS	1.Environment	2. Traffic	3. Road Safety	4. Property		5. Finance NOTE: Value for money compares traffic benefits with construction cost.
				No. Demo- lished.	No. from which land acquired	
OPTION A WIDENING EXISTING A650	No traffic relief means problems remain. Link to Valley Road/ Canal Road would have substantial disadvantages.	S o m e improvements at Saltaire Roundabout. Congestion problems reduced. Some side roads closed.	D e s i g n standards modified to keep improved road predominantly within existing boundary. Some reduction in accidents.	23	47	Low construction cost (£9m). High value for money.
OPTION B TUNNEL	(60% traffic relief) brings substantial relief to A650. New intrusion at portals and ventilation stations.	Uninterrupted route for through traffic although capacity problems likely with single tunnel. Improved access for side roads, parking and unloading.	Designed to normal trunk road standards. Significant reduction in number of accidents.	5	17	Very high construction cost £94m. Not considered value for money.
OPTION C SHIPLEY SOUTHERN BYPASS	20% traffic relief to A650 brings s o m e improvement. New intrusion introduced into an area of high landscape value.	Lorries likely to be deterred by steep hills. Some side road parking and loading difficulties. Some congestion remains in Saltaire.	M i n i m u m design standards employed. Moderate reduction in number of accidents.	8	28	M e d i u m construction cost (£26m). Not value for money.
OPTION D VALLEY BOTTOM ROUTE	60% traffic relief to A650 brings substantial improvement. New intrusion into area of high environmental value. Loss of two sports grounds.	Uninterrupted route for through traffic. Improved access for side roads, parking and loading.	Designed to normal trunk road standards. Significant reduction in number of accidents.	15	6	H i g h construction cost (£35m). High value for money.
OPTION E	Conditions as they are now. Worse over time.	Traffic likely to become worse over time.	Little change expected.	—	—	—

9. (i) Having outlined each of the schemes, could you indicate below how much you think each option would benefit you personally, as a resident and as a road user, if they were built.

Benefit me personally as a resident

	Considerable benefits	Some benefits	No Change	Some worsening	Considerable worsening	Don't know
A Road Widening	[]	[]	[]	[]	[]	[]
B Tunnel	[]	[]	[]	[]	[]	[]
C Southern Bypass	[]	[]	[]	[]	[]	[]
D Valley Route	[]	[✓]	[]	[]	[]	[]
E Do-nothing	[]	[]	[]	[]	[]	[]

Benefit me personally as a road user (car driver, passenger or public transport user).

	Considerable benefits	Some benefits	No Change	Some worsening	Considerable worsening	Don't know
A Road Widening	[]	[]	[]	[]	[]	[]
B Tunnel	[]	[]	[]	[]	[]	[]
C Southern Bypass	[]	[]	[]	[]	[]	[]
D Valley Route	[]	[✓]	[]	[]	[]	[]
E Do-nothing	[]	[]	[]	[]	[]	[]

- (ii) Which schemes do you think will be most beneficial to you personally overall (please rank the schemes by their letter below, first rank is most benefits).

1st
 2nd
 3rd
 4th D.....
 5th

10. (i) Besides having benefits to you personally and to others in your household each of the proposed schemes will have some benefit and some negative effects on other residents and road users who live in the area. Thinking about all the different effects, good and bad, on the area, could you indicate below how much you think the each option would benefit the local area overall.

Benefits to residents as a whole

	Considerable benefits	Some benefits	No Change	Some worsening	Considerable worsening	Don't know
A Road Widening	[]	[✓]	[]	[]	[]	[]
B Tunnel	[]	[]	[]	[]	[]	[✓]
C Southern Bypass	[]	[]	[]	[]	[✓]	[]
D Valley Route	[✓]	[]	[]	[]	[]	[]
E Do-nothing	[]	[]	[]	[]	[✓]	[]

Benefits to road users as a whole

	Considerable benefits	Some benefits	No Change	Some worsening	Considerable worsening	Don't know
A Road Widening						
B Tunnel						
C Southern Bypass						
D Valley Route	✓					
E Do-nothing						

- (ii) If you were responsible for making a decision for the benefit of other people in the area as a whole (regardless of the effects on you personally) how would you rank the schemes in overall order of benefit (1st = most beneficial)?

1st D
 2nd A
 3rd B
 4th C
 5th E

11. In addition to the effects on you personally and to other people in the area each of the four road schemes may affect other people who live outside the area also. These include road-users who travel through the area, people who visit friends and relatives in the area or visit sites and attractions in the area, and people who may come to live in the area in the future or who may wish to visit the areas' attractions in the future. The different options may improve conditions for these groups of people or worsen conditions. For each of the groups below could you assess whether you think each scheme will have a beneficial or negative effect overall.

Road users travelling through the area

	Considerable benefits	Some benefits	No Change	Some worsening	Considerable worsening	Don't know
A Road Widening						
B Tunnel						
C Southern Bypass						
D Valley Route	✓					
E Do-nothing						

Visitors to the area

	Considerable benefits	Some benefits	No Change	Some worsening	Considerable worsening	Don't know
A Road Widening						
B Tunnel						
C Southern Bypass						
D Valley Route	✓					
E Do-nothing						

Future potential visitors/residents

	Considerable benefits	Some benefits	No Change	Some worsening	Considerable worsening	Don't know
A Road Widening	[]	[]	[]	[]	[]	[]
B Tunnel	[]	[]	[]	[]	[]	[]
C Southern Bypass	[]	[]	[]	[]	[]	[]
D Valley Route	[✓]	[]	[]	[]	[]	[]
E Do-nothing	[]	[]	[]	[]	[]	[]

- (ii) If you had the responsibility for choosing a road scheme which would be most beneficial to groups of people outside the area, how would you rank the schemes under consideration? (1st - most beneficial).

1st	D
2nd	E
3rd	A
4th	B
5th	C

12. Taking into account the effects to you personally; the other people in the area and to people from outside the area, which of the five options under consideration would be your most preferred scheme. Which would be the second most preferred scheme, and the third and fourth.

1st	D
2nd	E
3rd	A
4th	B
5th	C

13. We would like to know a little more about your reasons for ranking the different road schemes in the way that you have in question 12. Listed below are a number of possible factors which you might have considered to be important when making your choice. Could you indicate below how important the following factors were in your overall ranking of schemes in question 12.

	Very important	Important	Minor importance	Not very important	Don't know
• Reduction in noise for residents along Bradford/Bingley Road	[]	[]	[]	[]	[]
• Faster travel times through the area	[]	[]	[]	[]	[]
• Easier access for local residents onto main roads	[]	[✓]	[]	[]	[]
• Cost of scheme	[✓]	[]	[]	[]	[]
• Reduction in cars cutting through residential areas	[✓]	[]	[]	[]	[]
• Easier for pedestrians to cross A650	[]	[✓]	[]	[]	[]
• Protection of Roberts Park	[]	[]	[✓]	[]	[]
• Benefits to businesses in the area	[✓]	[]	[]	[]	[]
• Goods views for motorists	[]	[✓]	[]	[]	[]
• Avoidance of traffic intrusion in Hirstwood/Canalside area.	[]	[]	[]	[✓]	[]
• Protection of Saltaire Village	[]	[]	[✓]	[]	[]
• Protection of Northcliffe Woods & Playing fields	[]	[✓]	[]	[]	[]
• Reduction in traffic along A650	[✓]	[]	[]	[]	[]
• Improving safety along A650	[✓]	[]	[]	[]	[]
Others (please list):					
.....	[]	[]	[]	[]	[]
.....	[]	[]	[]	[]	[]
.....	[]	[]	[]	[]	[]

14. Could you indicate below in order of importance the three factors from Q.13 most influencing your overall choice of schemes.

1 *Cost*
2 *Reduction of cars.*
3 *Improving safety*

15. In making your choice of schemes which of the considerations were most important in your overall decision (1 = most important, 2 = next most important, etc.

- Benefit to public transport users _____
- Benefit to motorists _____
- Cost of scheme ☒
- Avoiding new damage to local environment ☒
- Removing traffic from residential areas ☒

16. Finally could you indicate below which of the following classification groups you fit into.

Male ☒ Female () under 18 () 18-60 () >60 ☒

Personal Income

<5000 Annum ☒
5-10,000 Annum ()
10-20,000 Annum ()
>20,000 Annum ()

Thank you for your co-operation. Would you return this questionnaire by the FREEPOST envelope enclosed. We would be grateful if you could assist us a little further. If you ranked the tunnel scheme as your most preferred option would you help us further by filling in the enclosed blue questionnaire.

*The Tunnel Scheme is far too costly &
the disruption would be enormous
for everyone!*

QUESTIONNAIRE
COTTINGLEY BAR - SHIPLEY BY-PASS

Name:

Address:

.....

.....

1. How long have you lived at this address? 8 years

2. How many people live in your household? 4

3. Do you drive a motor vehicle? Yes ☒ ... No ☐

4. Approximately how often do you travel along the Bradford Road (A650) as a car driver or passenger either towards Bradford or Bingley in a typical week?

Every day	☐	Almost every day	☒
Two/three days week	☐	One day week	☐
Less one day week	☐	Rarely	☐

5. Approximately how often do you travel along the Bradford Road (A650) in a public bus either towards Bradford or Bingley in a typical week?

Every day	☐	Almost every day	☐
Two/three days week	☐	One day week	☐
Less one day week	☐	Rarely	☒

6. Are you aware of any proposals for improving traffic conditions along the Bradford Bingley Road (A650) between Cottingley Bar - Shipley?

Yes ☒ ... No ☐

7. Do you think there is a need to improve traffic conditions along the Bradford-Bingley Road (A650) between Cottingley Bar - Shipley? Yes ☒ ... No ☐

8. Below is a description of four road options which have been considered as possible ways of improving road traffic conditions between Cottingley Bar and Shipley. These options are shown on an accompanying map that was used as part of a Department of Transport consultation exercise in 1989. It may help to remove this map from the questionnaire to refer to when answering the questions. Each option has been coloured to make them stand out on the map. Would you read the description of each scheme. Some of the details might not mean much to you. We would still be interested in your answers to the questions following these descriptions. There is also a fifth option to consider which is to do-nothing.

PROPOSALS WE WOULD LIKE YOU TO CONSIDER

- Option A** The traffic would remain on the existing road. It would not affect the
ROAD gardens of properties adjacent to the A650. A variation has also been
WIDENING looked at which would take the road into a short tunnel under Saltaire
 roundabout and Gordon Terrace.
- Option B** A long tunnel between Cottingley Bar and the Shipley Eastern Bypass.
TUNNEL
- Option C** A bypass of Shipley on the southern side. There would be steep
SOUTHERN gradients at each end. This option would require a link from the A650
BYPASS at the Branch Public House to Valley Road/Canal Road.
ROUTE
- Option D** A bypass along the bottom of the River Aire Valley to the north of Saltaire
VALLEY Village.
ROUTE
- Option E** Leave conditions as they are now. Traffic will increase over time.
DO-NOTHING

Each scheme will have its good points and bad points. On the next page we have reproduced the main good points and bad points of each scheme as outlined in the Department of Transport Consultation document 1989. You may think there are other good and bad points. Please take any additional points you consider to be important into account when answering question 9 onwards.

9. If there was a referendum tomorrow to find out which of the five schemes you most prefer which would it be, which would be the second most preferred scheme, and the third and the fourth.

1st D
 2nd B
 3rd C
 4th A
 5th E

10. We would like to know a little more about your reasons for ranking the different road schemes in the way that you have in question 9. Listed below are a number of possible factors which you might have considered to be important when making your choice. Could you indicate below how important the following factors were in your overall ranking of schemes in question 9.

	Very important	Important	Minor importance	Not very important	Don't know
• Protection of residential environments	☒	☐	☐	☐	☐
• Faster travel times through the area	☒	☐	☐	☐	☐
• Protection of open spaces onto main roads	☐	☐	☒	☐	☐
• Cost of scheme	☐	☒	☐	☐	☐
• Benefits to businesses in the area	☒	☐	☐	☐	☐
• Goods views for motorists	☐	☐	☐	☒	☐
• Reduction in traffic along A650	☒	☐	☐	☐	☐
Others (please list):					
.....	☐	☐	☐	☐	☐
.....	☐	☐	☐	☐	☐
.....	☐	☐	☐	☐	☐

11. In making your choice of schemes which of the following considerations were most important in your overall decision (1 = most important, 2 = next most important, etc.

- Benefit to motorists 1
- Benefit to public transport users
- Cost of scheme
- Avoiding new damage to local environment
- Removing traffic from residential areas 2

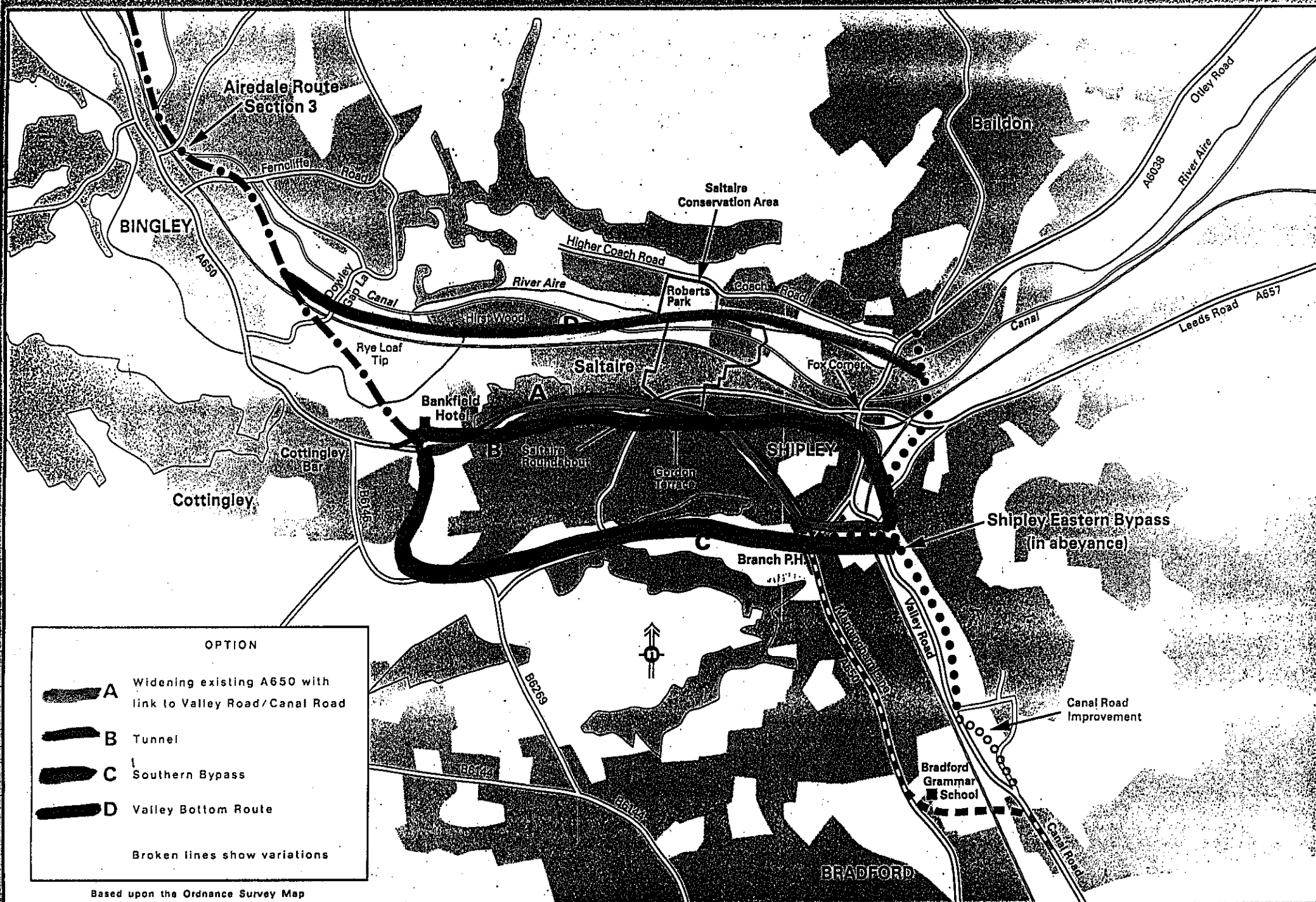
12. Finally could you indicate below which of the following classification groups you fit into.

Male ☒ Female () under 18 () 18-60 () >60 ()

Personal Income

<5000 Annum ()
5-10,000 Annum ()
10-20,000 Annum ()
>20,000 Annum ☒

Thank you for your co-operation. Would you return this questionnaire by the FREEPOST envelope enclosed. We would be grateful if you could assist us a little further. If you ranked the tunnel scheme as your most preferred option would you help us further by filling in the enclosed blue questionnaire.



QUESTIONNAIRE
COTTINGLEY BAR - SHIPLEY BY-PASS

If you placed the tunnel scheme as your preferred option we would like to ask you a few more questions about this choice. As you will be aware this particular scheme is much more expensive than the other options under consideration. Would you want a tunnel scheme if it meant paying an additional amount per year to the local authority to cover the extra costs of the tunnel. This might depend on what the alternative was.

For each pair of options could you indicate which you prefer.

1. A. *Build the tunnel scheme and personally pay £5/year each year.*
 B. *Build the valley scheme*

Prefer A [] Prefer B []

2. C. *Build the tunnel scheme and personally pay £25/year each year.*
 D. *Build the valley scheme*

Prefer C [] Prefer D []

3. E. *Build the tunnel scheme and personally pay £50/year each year*
 F. *Build the valley scheme*

Prefer E [] Prefer F []

4. G. *Build the tunnel scheme and personally pay £100/year each year*
 H. *Build the valley scheme*

Prefer G [] Prefer H []

What is the most you would be willing to pay each year to secure the tunnel scheme rather than the valley scheme (please write in below).

_____ year

5. I. Build the tunnel scheme and personally pay £5/year each year
J. Do nothing

Prefer I []

Prefer J []

6. K. Build the tunnel scheme and personally pay £25/year each year
L. Do Nothing

Prefer K []

Prefer L []

7. M. Build the tunnel scheme and personally pay £50/year each year
N. Do nothing

Prefer M []

Prefer N []

8. O. Build the tunnel scheme and personally pay £100/year each year
P. Do nothing

Prefer O []

Prefer P []

What is the most you would be willing to pay each year to secure the tunnel route rather than do nothing.

_____ year

9. Q. Build the tunnel scheme and personally pay £5/year each year
R. Build the southern route

Prefer Q []

Prefer R []

10. S. Build the tunnel scheme and personally pay £25/year each year
T. Build the southern route

Prefer S []

Prefer T []

11. U. Build the tunnel scheme and personally pay £50/year each year
V. Build the southern route

Prefer U []

Prefer V []

12. W. *Build the tunnel scheme and personally pay £1000/year each*
X. *Build the southern route*

Prefer W [] Prefer X []

What is the most you would be willing to pay each year to secure the tunnel scheme rather than the Southern Route (please write in below).

_____ year

For each pair of options could you indicate which you prefer.

13. A. *Build the tunnel scheme and personally pay £5/year each year*
B. *Widen the existing road*

Prefer A [] Prefer B []

14. C. *Build the tunnel scheme and personally pay £25/year each year*
D. *Widen the existing road*

Prefer C [] Prefer D []

15. E. *Build the tunnel scheme and personally pay £50/year each year*
F. *Widen the existing road*

Prefer E [] Prefer F []

16. G. *Build the tunnel scheme and personally pay £100/year each year*
H. *Widen the existing road*

Prefer G [] Prefer H []

17. I. *Build the tunnel scheme and personally pay £5/year each year*
J. *Widen the existing road*

Prefer I [] Prefer J []

18. K. *Build the tunnel scheme and personally pay £100/year each year*
L. *Widen the existing route*

Prefer K [] Prefer L []

-
19. What is the most you would be willing to pay each year to secure the construction of the tunnel scheme rather than wideening the existing route.

Tunnel vs road widening year
