

**The application of accessibility  
methodologies to land use  
planning  
Final Report**

**May 2001**

**Prepared for:**

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<b>Contents</b>	<b>Page</b>
<b>1. INTRODUCTION.....</b>	<b>1</b>
Outline of the research.....	1
Structure of this report.....	1
<b>2. PROJECT APPROACH .....</b>	<b>3</b>
<b>3. TYPES OF ACCESSIBILITY METHODOLOGIES AVAILABLE.....</b>	<b>6</b>
The 'elements of accessibility' measurement.....	6
Generic types of accessibility measure .....	8
<b>4. THE NEEDS FOR ACCESSIBILITY METHODOLOGIES IN THE LAND USE PLANNING PROCESS.....</b>	<b>11</b>
The Policy Context.....	11
Accessibility in policy, guidance and advice for Wales.....	11
The needs of local authorities.....	13
Summary of perceived needs for methodologies by Local Authorities.....	17
<b>5. THE CURRENT USE OF ACCESSIBILITY METHODOLOGIES IN WALES.....</b>	<b>19</b>
<b>6. GUIDANCE ON USING METHODOLOGIES .....</b>	<b>22</b>
Decision processes for selecting accessibility methodologies.....	22
Practical issues for analysing different types of accessibility .....	22
The usefulness of methodologies for different aspects of the planning process....	25
<b>7. OPERATIONALISING MEASURES OF ACCESSIBILITY.....</b>	<b>30</b>
Types of methodology required.....	30
Accessibility criteria.....	33
<b>8. THE AVAILABILITY AND COST OF OBTAINING SOFTWARE AND DATA .....</b>	<b>38</b>
<b>9. THE USE OF LOCAL KNOWLEDGE AND PROFESSIONAL JUDGEMENT.....</b>	<b>44</b>
Development Plan Locations.....	44
<b>10. GEOGRAPHICAL INFORMATION SYSTEM TECHNIQUES.....</b>	<b>48</b>
<b>11. SPECIALIST METHODOLOGIES.....</b>	<b>52</b>

**Appendix One - The treatment of accessibility issues and methodology in guidance and practice**

## SUMMARY

### ***The study***

The aim of this research study, is to examine the potential for using accessibility methodologies to assist local planning authorities in the delivery of the National Assembly for Wales policy objectives for integrated transport and sustainable development. The work was carried out by Steer Davies Gleave with the Derek Halden Consultancy for the National Assembly for Wales in 2000 and 2001.

### ***Study objectives***

The specific objectives of the research study have been to:

- review policy guidance, technical advice, research and best practice on the use of accessibility methodologies to assist decision making in the development plan and development control systems;
- establish which accessibility methodologies are currently being used by local planning authorities in Wales;
- test accessibility methodologies against the requirements of different land use types and different areas within Wales and specify the most appropriate accessibility methodologies for use in Wales, assessing the data requirements and costs; and
- recommend guidance and advice which should be included in future, and recommend whether new best practice guidance should be produced.

### ***Summary of recommendations relating to study objectives***

The key findings relating to these objectives are as follows:

**Policy guidance on issues relating to accessibility** is in a period of change. Up to two years ago accessibility tended to be mentioned somewhat peripherally, but more recent guidance points to the need for accessibility methodologies to be used in the planning process. There is little guidance or literature from elsewhere in Europe in existence to provide good practice as to how such methodologies should be used.

**The current use of accessibility methodologies in land use planning** in Wales is limited. Most consideration of accessibility is done using largely qualitative local knowledge and professional judgement, which, up till now, has been felt to be sufficient. In many cases it has been considered more useful than quantitative methodologies available, which are sometimes felt to be too crude to allow the detail needed for the planning process. However, it is felt that there is much to be gained from using accessibility tools that will aid in decision making.

**The specification of methodologies that are appropriate for different land use planning issues** forms a large part of the report. The section in this summary on "accessibility methodologies for land use planning" summarises the findings. For most

purposes it was concluded that the clear and transparent display of relatively simple measures of accessibility, that act as tools to decision making, tailored to specific needs under study is the most appropriate approach. Opportunities reachable within predefined travel times, measured and displayed using Geographical Information Systems (GIS), are generally the most applicable.

**Data availability** acts as one of the largest obstacles to the development of practical methodologies for most Local Planning Authorities. The report contains descriptions of the data that is available, and suggests ways in which simple accessibility methodologies can be used, using GIS systems that use readily available data, or datasets built up by Local Authorities. Another barrier is the ease with which GIS can be implemented, with most systems not tailor made for accessibility analysis. Most authorities have GIS and mapping systems but have few staff capable of using them to their full potential.

**Guidance and advice on methodologies** that can be used in future drafts of guidance on planning by the National Assembly arises from the report. The recommendations are that accessibility should be treated more robustly than it is at present at several stages in the planning process. But strict methodologies should not be defined, unless some common national standards are to be met. The methodologies used by Local Planning Authorities will vary, depending on the data and technical facilities available. In many cases professional judgement can be more valuable than accessibility indicators that are used with insufficient data. The important advice is that statements and decisions relating to accessibility should stand up to scrutiny by other professionals.

**New best practice guidance** is not felt to be the highest priority at the current time. It would seem more appropriate to conduct workshops with Local Planning Authorities to help enable the use of GIS methodologies to be disseminated and developed. This is due mainly to the rapidly changing situation regarding GIS system and data availability. Once such systems have developed the scope for written guidance may be greater, drawing on good practice in Wales and elsewhere.

## ***Accessibility Methodologies for Land Use planning***

### *Approaches to measuring accessibility*

Types of accessibility methodology are reviewed in terms of the elements of accessibility measurement which are defined as:

- the category of people or freight under consideration;
- the relevant opportunities available; and
- the transport opportunities and deterrents that exist.

Accessibility measures of different generic methodologies are described, including:

- opportunity measures;
- value measures; and
- proxy measures or indicators.

### *Types of accessibility measure for land use planning requirements*

The needs for accessibility methodologies in the land use planning process are identified in the report as:

- those that aid Unitary Development Plan preparation, and enable sustainability audits for UDPs;
- those that aid assessing individual land use developments;
- those that are useful in transport planning;
- those that are of use in economic development analysis; and
- those that are useful for service provision.

For these needs, different applications are of relevance and can be categorised as:

- accessibility by walking and cycling to local facilities;
- accessibility to and from transport systems;
- access using transport systems to reach opportunities;
- freight accessibility; and
- accessibility ratios (accessibility by car/ accessibility by other modes).

The perceived needs for measures are generally ones that are simple, transparent, and can be displayed and communicated easily. This was felt to be true for all land use planning and social exclusion based needs, though considerations are somewhat different for transport planning.

The following tables show the areas in which accessibility is felt to be valuable, and the type of accessibility measure that is needed (Table 1), with some guidance as to which calculation methods may be most appropriate (Table 2).

For nearly all purposes relating to land use planning, it is concluded that simple measures using GIS systems will provide sufficient detail, such as;

- the number of opportunities available within 20 minutes, or
- the overall frequency of public transport service to service centres,

displayed in simple map form will generally give land use planners the information they need to back up their professional judgement on accessibility.

More rigorous zonal based spreadsheet models have their uses where greater detail is available. They can be adapted for different 'parameters' such as maximum acceptable travel time and suchlike to provide more robust indicators of accessibility.

TABLE 1 - TYPES OF ACCESSIBILITY STUDY NEEDED FOR DIFFERENT PLANNING PROCESS ISSUES

	Walking and Cycling	Access to/of transport systems	Access to/of opportunities	Freight access
UDP guidance for suitable development locations	✓	✓✓	✓✓	✓✓
Transport assessments	✓✓	✓✓	✓✓	✓✓
Negotiation for Section 106 agreements	✓✓	✓✓		✓
Planning for education, health, social exclusion	✓✓		✓✓	
Planning for economic development		✓✓		✓✓
Transport planning	✓✓	✓✓	✓✓	✓✓
Urban areas/ locations	✓✓	✓✓	✓	
Rural areas/ locations	✓	✓	✓✓	
Areas of unemployment	✓✓		✓✓	

TABLE 2 - SUITABILITY OF ACCESSIBILITY CALCULATION TYPES FOR DIFFERENT ISSUES

	Local knowledge/ professional judgement	Spreadsheet or analysis package	GIS simple mapping	GIS analysis
Walking and Cycling	✓		✓ *	✓
Access to/of transport systems	✓		✓	✓ *
Access to/of opportunities	✓	✓	✓	✓ *
Freight access	✓	✓	✓ *	✓

✓ = Calculation technique appropriate

\* = probably the most useful technique where it can be used

## PART ONE - THE STUDY

### 1. INTRODUCTION

#### Outline of the research

1.1 The aim of this research study is to examine the potential for using accessibility methodologies to assist local planning authorities in the delivery of the National Assembly for Wales policy objectives for integrated transport and sustainable development. The study considers the role of accessibility methodologies for private and public transport, walking and cycling as a tool for assessing appropriate locations for the principal types of land use development. It considers the use of accessibility methodologies to assist decision making in both the unitary development plan and development control systems.

1.2 The specific objectives of the research study have been to:

- review current and emerging planning policy guidance, technical advice, research and best practice on the use of accessibility methodologies to assist decision making in the development plan and development control systems, drawing on examples from the UK and, where appropriate, European/International experience;
- establish which accessibility methodologies are currently being used by local planning authorities in Wales to assist decision making in the emerging Unitary Development Plan, development control and Local Transport Plan systems;
- test existing accessibility methodologies against the requirements of different land use types and different areas within Wales i.e. urban areas, valley communities and rural areas;
- specify the most appropriate accessibility methodologies for use in Wales;
- assess the data requirements for accessibility methodologies and the cost of obtaining the required data where it is not currently available;
- recommend guidance and advice which should be included in future revisions of Planning Policy Wales and/or Planning Policy Wales Unitary Development Plans and/or in Technical Advice Note 18 'Transport' on the use of accessibility methodologies; and
- recommend whether new best practice guidance should be produced, or best practice guidance produced elsewhere be promoted in Wales, to facilitate the use of accessibility methodologies.

#### Structure of this report

1.3 This report is in three main parts. This part (Part One) introduces the study, Part Two looks at the need for accessibility methodologies, while Part Three provides advice on methodologies in the contexts under study.

1.4 The diagram below aims to identify how the report is structured following the next chapter that describes the study methodology.

**FIGURE 1.1 - STRUCTURE OF THE REPORT**



## 2. PROJECT APPROACH

2.1 The project used the following tasks as its methodology.

***Task One - Review of planning policy guidance, technical advice, research and best practice***

2.2 Current and emerging planning policy guidance, technical advice, research and best practice on the role, and use of accessibility methodologies to assist decision making in the development plan and development control systems was reviewed drawing on material from:

- Planning and other guidance from the National Assembly of Wales.
- Related guidance and literature from other parts of the UK, and overseas.

***Task Two - Current use of Accessibility Measures by LPAs in Wales***

2.3 A postal survey of all the 22 Local Planning Authorities (LPAs) and the three National Park Authorities was undertaken to ascertain accessibility methodologies which are currently being used by local planning authorities in Wales.

***Task Three - Selection of case study areas***

2.4 The main criteria for selection were:

- Geographical and demographic characteristics of the area.
- A balance of transport and development policy challenges across the areas.
- Data availability for the area.

2.5 Each case study covered a Local Planning Authority area.

***Geographical and demographic characteristics***

2.6 The aim was to develop a broad stratification of areas along the following dimensions:

- Including urban areas, valley communities, and rural areas.
- A good spread of population and population density.
- A geographical spread (including coastal and peninsula areas).
- A mix of areas in terms of economic vitality.
- Locations where the analysis of different types of development scenario can be evaluated for their impacts on accessibility for each sector in society.

2.7 The following areas were chosen, with the table below describing areas that contain sub-areas that are of a different nature to the primary description.

**TABLE 2.1 - CASE STUDY AREAS**

LPA	Primary Description	Sub area types
Swansea	Large Urban Area	Intensive rural tourist area
Bridgend	Higher Population	
Ceredigion	Deep Rural	Higher density rural Moorland rural
Gwynedd	Deep Rural	Coastal towns National Park (mountain) Peninsula (Llyn) Moorland rural
Powys	Deep Rural	Higher density rural Moorland rural National Park (mountain)
Wrexham	English Border	Urban area

\*The terms "higher density rural" and "moorland rural" are used indicatively to describe density and type of rurality.

**Task Four - Test accessibility measures**

2.8 This task involved the testing and development of accessibility measures in the case studies. The approach taken was to interview a group of Local Authority officers in the case study areas to:

- ascertain the needs they had for accessibility methodologies;
- ascertain those methodologies that were currently used;
- investigate the circumstances in which these methodologies were used;
- show examples of the kinds of methodologies that might be useful; and
- discuss and hand over available data that could be used for the testing of methodologies, and test them.

2.9 In the event it proved difficult to follow this approach in full. In particular, data was much less readily available than anticipated. In general, data storage, retrieval and analysis is most easily carried out using GIS methods. This led to a greater emphasis on the use of GIS methods than had been expected, and most of the specific guidance given on calculation of measures for land use planning needs therefore suggests the use of GIS tools. Nevertheless, if data is available in other forms or GIS tools are not available then the same approaches using the specialist methodologies described in chapter 11 can be adopted but the calculation effort will be greater.

**Task Five - Assessment of results from case studies**

2.10 A framework was developed to assess the methodologies. The aim was to answer four key questions:

- What are the relevant aspects of each of the measures tested for the processes in land use and transport development?
- What do the measures tell us?
- What is the likely cost of implementation for various levels of accuracy?
- What is their adaptability to different levels of accuracy, and in different types of area?

***Task Six - Assessment of costs and ease of obtaining data***

- 2.11 The responses to the questionnaire and the assessment of the results of the case studies, combined with research into commercial data availability, enabled an understanding to be made of the costs involved and the ease of obtaining the necessary data.

***Task Seven - Recommendations***

- 2.12 This report incorporates the main conclusions of the research carried out. These cover alternative methodologies for assessing accessibility for different purposes, and for translating the outputs into useful information for Development Plans, Local Transport Plans, and responses to Development Proposals. Whether a further Best Practice Guide will be needed, or whether more detailed advice to Local Authorities in Wales as to the best ways to use current existing guidance will be required was also addressed.

## PART TWO - APPROPRIATE METHODOLOGIES

### 3. TYPES OF ACCESSIBILITY METHODOLOGIES AVAILABLE

3.1 The primary aim of transport is to enable people and businesses to gain access to jobs, shops, friends, family, and many other activities. The ease with which these activities can be accessed depends not just upon transport systems but upon patterns of land use. Qualitative and quantitative accessibility measures seek to define the level of opportunity and choice taking account of both the existence of opportunities, and the transport options available to reach them.

#### The 'elements of accessibility' measurement

3.2 All types of accessibility measure include three key elements:

- The category of people or freight under consideration – each section of the population has specific needs and desires to be involved in defined activities.
- Destination activities - opportunities are defined in terms of the land use supply which would allow any individual to satisfy their desire to participate in the activity under consideration.
- The availability of transportation – this defines how an individual could travel to reach the relevant facility.

3.3 The result of the simplest accessibility analysis would be to state that "Newport is about 15 minutes drive from Cardiff". A category of people in Newport could reach an activity supply point in Cardiff provided a car was available and the road network was not congested. But it would not mean that all people in Newport could access all locations in Cardiff within 15 minutes.

3.4 For land use planning, the challenge is to structure such analysis to ensure that rigorous and comparable measures are obtained that are of relevance to land use planning issues. This is achieved by taking each of the components of accessibility and defining both the level of accuracy and the ways in which they are reduced to something measurable.

3.5 *Qualitative accessibility* measures (i.e. good, average, poor) have been widely used in the past but rarely provide the level of detail needed for practical land use planning, and demanded by current public accountability constraints. A proposed site in the town centre by a railway station and a proposed site in the countryside by a motorway junction would both have good accessibility. However it is only when we quantify who is affected, what opportunities change, and how their mobility affects their accessibility, that we start to understand the impacts.

3.6 This does not mean that qualitative accessibility is bad, in itself. If the aspects that are under study are defined and stated clearly, a qualitative approach backed up by good local knowledge and professional judgement can be of great value.

3.7 *Quantitative accessibility* techniques recognise that transport is a derived demand and that the analysis needs to consider both the supply of opportunities and the supply of transport for each population group. In the past the range of options for measuring accessibility has hindered its application as a planning tool. The techniques were perceived as complex and there was also no policy priority or administrative structure to encourage or enforce joint working to allow transport provision to be considered jointly with decisions about land use. However as noted above there is now a policy framework which provides both incentives for accessibility analysis and a structure within which the analysis can be pursued.

*The importance of defining accessibility before employing accessibility applications*

3.8 Defining accessibility can be complex in itself. Here we present two definitions that show the differences in which it can be viewed.

- Accessibility for a population group for a defined purpose is the sum of the supply of the opportunities factored by the deterrent effect of reaching the opportunity.
- Accessibility is the ease with which a person can carry out activities in which they wish or have a need to participate.

3.9 These two definitions do not show different ideas of what accessibility is, but differ in the assumptions that are made before accessibility measurement is started. The idea of opportunities and deterrence is contained in both, but in one case what is being accessed is pre-defined, while in the second it is not. This difference serves to highlight the need to carefully analyse what is being measured before embarking on accessibility analysis.

***Applications of accessibility measures***

3.10 For practical planning of developments it is helpful to look separately at the following:

- ***Accessibility by walking and cycling to local facilities.*** If people can meet their needs using non-motorised modes then this is generally viewed as the most sustainable option. It is important to check the impacts of development proposals on accessibility to local facilities using safe walking and cycling routes to ensure that these options are being protected and enhanced.
- ***Accessibility to and of transport systems.*** Access to the road network has been routinely considered in land use planning for many years looking closely at how road capacity and congestion affect access. Access to, and of, public transport systems also need to be considered taking account of public transport service patterns, routes and destinations. Public transport systems rarely serve all appropriate locations in an area.
- ***Access using transport systems to or of opportunities.*** These measure how people of different mobility groups can reach a range of destinations and also what population groups are in the catchment of a location. Since they consider people rather than modes, all modes within the transport system are automatically considered in an integrated way.

- **Freight accessibility.** Freight logistics planning is currently underpinned by accessibility analysis. However the planning system needs to protect land for transshipment centres, rail freight interchanges and other facilities through strategic accessibility analysis of freight needs. This is likely to be most appropriate more at a national Welsh level, or for groups of local authorities than for smaller areas.

#### *Explicit or undefined opportunities*

- 3.11 For opportunities that can be defined in spatial terms such as the distribution of jobs, hospitals, schools, retail, etc., accessibility measures can consider access to opportunities explicitly. For land uses that rely on a catchment of people whose locations are undefined (such as access to shops or leisure facilities), opportunities are 'made' explicit by using population as the measure.
- 3.12 For opportunities that cannot be pre-defined in geographical terms, such as access to friends and family, or potential delivery sources that may change over time, then access to transport systems is often treated as a proxy for the overall level of accessibility. Similarly, where the range of opportunities reachable once on a network is fairly uniform, as on a high quality public transport system such as metro in a city, access to the system acts as a proxy.

#### *Origin and destination accessibility*

- 3.13 Origin and destination accessibility are treated separately. *Origin accessibility* measures the ease of reaching an opportunity (access to) and *destination accessibility* measures the ease with which a destination can be reached (access of). A supermarket would be considered for destination accessibility or catchment. An individual would be interested in their origin accessibility from their house.

#### **Generic types of accessibility measure**

- 3.14 As noted above accessibility is calculated from the opportunities available factored by the deterrence of reaching these opportunities. Accessibility measures can therefore be expressed in terms of the opportunities (opportunity measures) or the deterrence (value measures) as follows:
- **Opportunity measures.** These describe accessibility as an equivalent number of people, jobs, retail floorspace etc.
  - **Value measures.** These describe accessibility in terms of the deterrence of reaching the opportunities measured as a value in cost or time.
  - **Proxy measures and indicators.** Many 'measures' of accessibility do not directly measure accessibility as defined above, but measure something that correlates with accessibility.
  - In addition, "**Accessibility ratios**" are often used (though they are not strictly a 'generic' measure as described above. These are usually used to measure the ratio of accessibility by car to that by other modes (usually public transport, but sometimes including walk and cycle). In general central places will have a lower ratio than locations on the outskirts of towns and in rural areas.

- 3.15 The detail and accuracy of the calculation needs to reflect the needs of the particular situation. Most of the simplest origin accessibility calculations use value measures (e.g. 60 minutes from Cardiff). By contrast, for simple destination accessibility calculations opportunity measures will often be used (i.e. 4000 people in the catchment). However in all situations it is possible to adopt either type of measure and the choice will be determined by the needs of the decision maker, and the availability of data.

### ***Opportunity Measures***

- 3.16 Opportunity measures have the benefit of being easy to understand since, like the Simple measures, they are expressed in terms of number of jobs, number of people etc. They have many potential uses including: the comparison of accessibility changes for different population groups, the identification of the catchment for a destination, and the comparison of accessibility for car available and non-car available trips.

### *Opportunities within isochrones*

- 3.17 These measures are fairly easy to understand e.g. the number of a particular type of opportunity within a defined time threshold. They are most useful for local walking and cycling opportunities, including access to public transport services. For these trips there is some basis for the time thresholds in the analysis. For motorised trips by car and public transport, thresholds founded in real travel behaviour are often much harder to define, since the distance people travel are not limited by physical effort. Results, therefore, need to be viewed with caution as they can be more sensitive to the choice of threshold than to changes in accessibility (see the part of Section 7 on accessibility criteria).

### *Weighted opportunity accessibility*

- 3.18 The weighted accessibility for a location is simply the weighted sum of all the opportunities in every other location of relevance, where the opportunities in each zone are weighted by the travel cost to the zone. So the easier an opportunity is to reach from a point, the more *weight* it carries in the sum of accessibilities. These measures require dis-aggregate information about opportunities and transport.

### ***Value Measures***

- 3.19 Value (or utility based) measures attempt to give "value" to each possibility available. Hence each opportunity is scaled according to its usefulness (usually expressed in terms of size), such that a *larger* opportunity some distance away may have a similar 'value' to a *smaller* opportunity close by.
- 3.20 Furthermore, value measures are expressed in generalised time or cost, so findings can be more difficult to interpret. However by providing a direct measure of the value of transport systems they are powerful appraisal tools. They can be used in similar ways to the opportunity measures and can provide a more complete measure of the benefits of a particular scenario, if interpreted with care.

**Accessibility indicators or "proxy" measures**

3.21 All the above can be described as 'measures' of accessibility in that they attempt to measure the important aspects of accessibility. As well as these a wide variety of indicators can give an indication of accessibility but may not be measuring it. For example, before the advent of high levels of car dependency and telephone or internet banking, the number of bank branches might have given a useful indicator of the accessibility of a centre to people.

**Summary of measure types**

3.22 The following table, repeated in Section 7, describes the various types of accessibility measure that are available. Section 7 discusses how to use this framework to help decide which methodologies should be used.

**TABLE 3.1 - FRAMEWORK FOR ACCESSIBILITY ANALYSIS**

<b>Category</b>	<b>Elements</b>	
<b>Type of person</b>	Car available	People by age, socio-economic group, gender, ethnic group etc.
	Non car available	
	Mobility impaired	
<b>Origin or destination</b>	Origin accessibility defines access to work, shops, railway stations etc.	
	Destination accessibility defines catchments for shops, employment locations, bus stops etc.	
<b>Policy issue</b>	Accessibility to/of opportunities by transport system	
	Access to/of the transport system itself	
	Access to/of local facilities by walking and cycling	
	Freight access	
<b>Methodology</b>	Opportunity or Value Measures	

3.23 The next section looks at the usefulness of these types of measure for land use planning tasks. The language used changes from the generic and technical to the practical, but enables the types of methodology required to be better defined.

## 4. THE NEEDS FOR ACCESSIBILITY METHODOLOGIES IN THE LAND USE PLANNING PROCESS

### The Policy Context

4.1 National sustainable development policies, with aims for a strong economy, an inclusive society and a clean environment, provide the context for integrated transport and land use policy planning in Wales. In taking forward this agenda it is important to define the links between land use and transport, and accessibility measures describe these links. Accessibility methodologies have particular strengths when considering:

- *Consistency of transport and land use policy* with other public policy objectives including, health, education, and regional development.
- The effects of changes in the transport system (i.e. covering all modes, interchanges, cost, time, reliability, and quality) on people's *access to opportunities* such as employment, shopping, health services, social support networks, recreation, countryside etc.
- Defining how transport impacts are *distributed* across geographical areas, population groups, trip purposes and modes of travel ensuring compatibility with equity objectives.
- Assessing the *impacts of new developments* and projects on the transport system.
- Examining local access opportunities by walking and cycling including *access to public transport*.
- Quantifying the value of additional *travel options* for each sector within society.

4.2 In developing Unitary Development Plans it is important to demonstrate how proposals contribute to these strategic sustainable development aims. Planning policy in Wales - specifically Planning Guidance (Wales) Planning Policy, Planning Policy (Wales) Consultation Draft, Technical Advice Note 18, and Technical Advice Note 18 Revision Consultation Draft, each identify the need for accessibility to be considered as part of:

- the siting of new developments;
- planning for public transport in new development; and
- development control.

### Accessibility in policy, guidance and advice for Wales

4.3 Appendix One reviews the existing planning and transport policy, guidance and advice that is of relevance to accessibility methodologies in land use planning.

4.4 The review concludes that accessibility is recognised as being key to both land use and transport planning, and the links between them are strongly recognised. But it is apparent that suggestions for methodologies to address these issues is lacking, except for suggestions of what methodologies might take into account in "The Transport Legacy in Wales". Other literature emphasises that accessibility should be an important criteria in many policies, plans, and decisions, but little guidance is given as to how this should be treated or measured.

- 4.5 This message of the importance of accessibility, and guidance towards where it should be considered has been considerably strengthened in recent consultative redrafting of Planning Guidance and TAN 18.
- 4.6 The policy goals for which methodologies are needed (as described in recent guidance) include:
- the promotion of sustainable development;
  - improving access to services for all;
  - reducing social exclusion;
  - the possible widening of the role of sequential testing in development control;
  - in the new approach to appraisal; and
  - increasing the importance of 'plan led' planning.
- 4.7 The particular factors the methodologies will have to take into account include;
- sustainability appraisal of Unitary Development Plans;
  - the differences between urban and rural circumstances;
  - cross boundary accessibility issues (between LPA areas, and the national boundary);
  - freight accessibility to networks;
  - public transport accessibility incorporating concepts of fixity of infrastructure and services; and
  - accessibility by walk and cycle.

### ***Accessibility in land use planning in European Countries***

- 4.8 Appendix One also reviews other UK and European approaches to accessibility as used in land use planning. Most countries adopt a system of land use planning that has broad similarities to that in the UK with some form of strategic planning, and with applications by developers conforming, to a greater or lesser extent, with that plan. There are differing degrees to which the plan, or applications are the predominant force. The incorporation of accessibility, as in the UK, is generally done in a relatively "common sense" manner with relative accessibility taken to accord to broad factors of location such as "town centre", "suburban", or "on a public transport corridor".
- 4.9 In terms of methodologies used, isochrones, or travel times to key locations are the only indicators used widely. Some systems, such as the Dutch ABC policy, use a simple form of multi-criteria approach to answering a series of questions relating to the accessibility of locations and matching these accessibility criteria with the mobility needs of development. Others use simple criteria, such as developing areas close to railway stations and other high quality public transport infrastructure. Some do not appear to consider accessibility at all in the ways which are currently being discussed as important in land use planning in Wales.

### The needs of local authorities

- 4.10 From discussions in the case studies, and from analysis of policy, the needs for accessibility methodologies related to the land use planning process in its strict sense, relate mainly to the following:
- methodologies that aid the production and updating of *Unitary Development Plans*;
  - methodologies that aid decision making on *individual planning applications* (in terms of providing advice to developers for the production of comprehensive Transport Assessments, and for helping Local Planning Authorities in issues concerning developments (such as suitable parking levels, and planning conditions, obligations, and developer contributions);
  - in addition, it was apparent that there were issues not so closely related to the Planning Process where it was felt accessibility methodologies would be of great value. The most often cited of these was *service and facility planning*, related to identifying areas and groups of people suffering social exclusion through lack of access to services. This was felt to be especially important in rural areas.
- 4.11 The following sections describe where it was felt that methodologies were needed, and the characteristics of the methodologies. Discussion in these sections generally revolves around the needs for:
- professional judgement or local knowledge based methods, where the need is for knowledge of the principles that underlie what makes for accessibility of different types;
  - methods that measure accessibility in a way that numerical comparisons can be drawn between areas; and
  - methods that display aspects of accessibility so that a visual comparison of areas can be made, or areas that are of relevance to an issue of concern are highlighted.

### **Methodologies for Unitary Development Plans**

#### *Areas suitable for different development types.*

- 4.12 In the past Local Planning Authorities have relied on local knowledge and professional judgement without defining explicitly what aspects of accessibility were included in the assessment of the suitability of locations for different types of development. However there are benefits from defining the methodology more rigorously regardless of how complex the accessibility analysis method being used. The main need is to incorporate consideration of accessibility in Unitary Development Plans, and to ensure that methodologies are used that allow for consideration of accessibility by all modes of transport.
- 4.13 The main need for methods appears to be for ones that show accessibility levels by the main modes for all areas, or at least for all likely development sites. What should be measured varied in different discussions, but the main areas of interest include simple measures such as:
- numbers of people or opportunities within isochrones by different modes of transport; and

- degree of access to strategic transport networks such as the motorway and trunk road systems, rail, air and water.

4.14 In general it is felt that such simple measures provide a transparent framework in which to discuss potential development locations, but this transparency allows for reasoned argument about individual sites in cases where accessibility measures do not adequately describe the relevant attributes of the site.

4.15 There are many ways in which it is felt that the use of rigorous and transparent accessibility methodologies will lead to improved Development Plan outputs. Examples include the following.

*Location of housing development*

4.16 In the past many authorities have spread preferred locations for housing across their areas, on an 'even shares' basis, affected by political pressures. The use of accessibility methodologies should highlight those areas that will have the accessibility characteristics that will enable wider policy goals to be met.

*Sustainability appraisal of Development Plans*

4.17 An important aspect of Unitary Development Plans is appraisal of them, in terms of sustainability. Presentation of maps showing accessibility, related to preferred sites for developments, is a useful way of showing how the development plan accords with sustainability objectives. This is especially important for public transport accessibility in relation to most land uses requiring access to people such as housing, retail, offices etc.

*Elements of the ABC system applicable in Wales*

4.18 There has been much interest in using some of the ideas from the ABC system (as developed and used in the Netherlands) for Wales, though maintaining the UK approaches to development. This attraction is based upon the idea that methodologies can define areas as being of different accessibility characteristics. The Netherlands ABC system allows for different methodologies to be used, and different criteria to be used to decide those areas that should be A, B, C, or not classified according to local circumstances. If such a system that provides a categorisation that would stand for many years, and that would play a major role in decisions relating to Land Use Planning were to be used, it is very important that it should be robust, and, preferably, transparent.

4.19 While for methodologies that can be tuned to individual cases the first need is that they are transparent, a methodology for mapping areas that is designed to stand up over time, the needs are that they are robust, but capable of review and alteration as local circumstances change.

### ***Methodologies for individual developments***

- 4.20 Transport Assessments are replacing Traffic Impact Assessments, and accessibility by a range of modes is becoming of much greater importance than it did in the past. There is a need for:
- tools that developers or their advisors can use;
  - tools that enable Local Authorities to understand the situation; and
  - tools that help negotiations for assessing planning conditions and obligations, parking standards, and developer contributions etc.
- 4.21 For assessing accessibility to a particular location it is generally agreed that the numbers of opportunities within isochrones are of the greatest value, since they are transparent and reflect the way in which the development may be used. For facilities, population within catchments would be measured, while for housing developments, the opportunities would include jobs, shops, and other facilities. In addition, for housing development, accessibility to the public transport network would be of importance, but *access to opportunities using the public transport network* is of even greater importance.
- 4.22 Accessibility ratios may be especially useful for the last purpose (negotiation), in that they show those areas that are TAN18 compliant and those that are not. Thus, where a development is proposed in an area that is relatively less accessible by public transport, walking or cycling than it is by car, the onus should be on the developer to demonstrate why it should not provide contributions that would help mitigate the less sustainable modal split that is likely to arise from the development.
- 4.23 For accessibility ratios it is important that the same aspect of accessibility is measured for different modes of transport, or else the ratio is not comparable for different areas. Numbers of people or facilities within isochrones are generally thought to be the most useful measure, though the isochrone for public transport may be longer than for car (e.g. 30 minutes for public transport and 20 minutes for car to reflect 'acceptable' journey times).

### ***Other aims for accessibility methodologies***

- 4.24 The flexibility and transparency of accessibility methodologies means that they can offer considerable support to decision makers on land use/ - transport interaction issues. These are particular strengths when looking at the evaluation of transport and land use policy in relation to economic development, social inclusion/equity, and other policies such as health, education and leisure/tourism. Several issues emerged in discussions.

### ***Economic development***

- 4.25 The complexity of the relationships between economic development and transport have resulted in inconclusive national debates on the subject, surrounding issues such as whether better strategic accessibility for peripheral areas draws economic activity to more central locations, or benefits the area. These issues are of great importance for Wales, but a

'science' to relate accessibility to economic development is not sufficiently far advanced to enable solid advice to be given.

- 4.26 Nevertheless it is clear that an important mechanism by which transport and land use policy can enhance economic development prospects and affect the distribution of economic activity is by improving access to labour, suppliers, sub-contractors etc. Therefore the use of accessibility measures allows a qualitative view to be taken of economic development impacts even though the quantitative economic linkages may be too complex to analyse in depth.
- 4.27 Issues for further exploration could include whether more complex measures can be devised that distinguish 'internal' accessibility (that is accessibility to opportunities within Wales) to 'external' accessibility (that is accessibility to opportunities outside Wales).

#### *Social inclusion*

- 4.28 Operational analysis of transport often tends to focus on majority trends within the population to ensure that capacity and demand issues are robustly analysed. Accessibility analysis is not restricted in this way and is equally appropriate for looking at the impacts of transport and land use changes on minority groups. Social inclusion policy can therefore be informed by accessibility measures which look at issues such as access to jobs for unemployed people, access to shops for elderly people, and access to the transport system from social housing developments.
- 4.29 The difference in these requirements for measures is related to the need for tailoring methodologies to people perceived as suffering exclusion, and to opportunities that are of relevance to these people. Transparency and display of methodologies was felt to be especially important here.

#### *Education and health policy*

- 4.30 Integrating land use and transport with other key policy areas such as health and education is a key challenge for public administration. In some cases health and education services spend as much on transport provision as transport departments themselves. Improving access to health and education therefore offers significant cost savings in addition to the service quality benefits. Accessibility measures of access to health and education for each section of the population can therefore help to inform land use planning to ensure that potential sites are protected for new facilities and that the location of new homes protects access needs.
- 4.31 Political decisions about land use and transport policy are often more influenced by public opinion than by technical appraisals, particularly at a local level. Accessibility analysis, however, can have major presentational advantages by describing the impacts of transport investment in terms that people can easily understand such as changes in the numbers of jobs accessible from a given location. If people understand how they can benefit from development and transport investment decisions they may be more prepared to accept the change and to take advantage of the new opportunities.

- 4.32 In all the above, what is felt to be needed are methodologies that show which communities are suffering exclusion through lack of access to services. Here, the emphasis is on access to a broad range of facilities, which may have different criteria in terms of transport provision for accessibility. For example to be accessible to a market town for shopping by public transport requires services that allow two hours to be spent at the market town between journeys, while to be accessible to work opportunities by public transport typically requires services that arrive before 9am and leave after 5:30pm.

*Accessibility in transport planning*

- 4.33 Accessibility is, in many senses, what transport is for - transport can be seen as a derived demand, with the aim being to access places where activities can be carried out. However, it has historically been 'time savings' on existing journeys that have been the major criteria on which transport schemes are appraised, rather than how schemes increase accessibility for all people. This is an important distinction since 'time savings' are concerned with trips currently made, while accessibility is concerned with improving the potential for people to reach, often new, opportunities.
- 4.34 In general, transport planners have adopted zone based measures of accessibility that fit in with existing traffic models. This study has not been expressly concerned with the needs of transport planning for accessibility methodologies. However, it seems that the pressure for accessibility measures in transport planning will increase, and that GIS systems will be increasingly providing for technically complex measures to be adopted on a point to point basis rather than a zone based one. It is likely that transport departments will provide much of the impetus for GIS development of accessibility measures within local authorities. It is also likely that we will start to see a merging of the aims and goals of such measures.

**Summary of perceived needs for methodologies by Local Authorities**

- 4.35 It became apparent during discussions that, especially in rural areas, accessibility for most land uses in development plan issues can be based mainly on local knowledge and professional experience. It was felt that it is readily apparent whether a plot of land will be accessible or not. The danger was expressed that the use of quantitative methodologies could in many cases actually lower the extent to which accessibility was incorporated into planning, especially where 'black box' methodologies could be used obscuring aspects of accessibility that were not included in the measures chosen.
- 4.36 The challenge for land use planning therefore seems to revolve around several possible directions for providing advice or new methodologies:
- Qualitative accessibility methodologies based on local knowledge and professional judgement can be improved by providing checklists of factors to be taken into account in different situations, and providing guidance on how these factors can be taken into account;
  - Quantitative methodologies (accessibility measures) can be improved by ensuring that the methodologies are transparent, and that assumptions made in reducing real world attributes into elements for the measures are transparent; and

- Mapping of accessibility measures has scope for considerable improvement by using GIS methodologies to display simple measures of accessibility at a local level to show relative accessibility at the 'building plot' level, rather than a broader zonal level.

#### *Transparency*

- 4.37 The main need seems to be for information that is transparent. Accessibility questions and answers are not implicit in the analysis so it is of prime importance that all users of the technique understand what they are doing at all stages and do not seek to rely on "black box" techniques. Whatever method is selected it should not obscure the factors that are of importance to the issues under question.

#### *More complex methodologies*

- 4.38 Generally there was little call for more complex methodologies, but some wished for techniques that included some or all of the more detailed aspects of accessibility such as cost of tickets, steep-ness of hills, effort and safety of crossing roads etc, and felt indices should incorporate them. Such methodologies would be incorporating ideas of 'generalised cost' into the deterrence part of accessibility measures, and such complexity could be added into any types of measure.
- 4.39 The conclusion of the consultants is that it is better to use basic transparent displays of accessibility, and then use 'overlays' of such details, combined with local knowledge before final decisions about "what is accessible" are made.

## 5. THE CURRENT USE OF ACCESSIBILITY METHODOLOGIES IN WALES

### *Results from the postal survey*

5.1 Nineteen of the twenty-five LPAs replied to the survey, and their replies are summarised in the table below. No strong geographical or rural/urban patterns were noticed in the replies. The replies to Question 7 (use and availability of data for use in accessibility measures) are discussed in more detail in Section 8 (Availability and cost of obtaining software and data).

<b>Question</b>	<b>Results</b>
<i>How important is accessibility to people or facilities treated in planning the types of development suitable for different areas and locations?</i>	The most important sectors were Hospitals, Education and Housing, with retail also scoring high. The least important by a long way was Agriculture; Distribution and Warehousing, Office Development and Industrial were also felt to be less important.
<i>How much are the following criteria taken into account when looking at areas suitable for different development types (development plans, planning decisions, and in LTP considerations)?</i>	Accessible town centres and public transport were considered the most important criteria. The least important were centrality to 'market', grouping land in clusters, avoiding development in areas affected by significant barriers such as hills, rivers etc, and locating with respect to other major centres.
<i>How often is transport a key factor in refusal for planning permission?</i>	"Occasionally" (13 out of 19 replies).
<i>How often are accessibility issues considered in assessing the transport needs in these situations?</i>	"Often" (10 out of 19 replies), "Occasionally" (7 out of 19 replies).
<i>To what extent is accessibility being used as a criteria in decisions relating to direction of transport facilities and improvements?</i>	Most important for improving transport networks to raise accessibility for all, accessibility by walk and cycle, and accessibility to public transport services. Least important for accessibility for freight.
<i>Do you use quantitative accessibility methodologies in your land use and transport planning related work?</i>	12 out of 19 answered "yes". 9 of those 12 measured isochrones to locations, 4 measured access to the public transport network, and 4 measured the quality or quantity of opportunities weighted by travel times or distance.
<i>What is accessibility measured for? (walk and cycle access; access to public transport network; access to opportunities; comparing accessibility by car against other modes; freight access)</i>	Accessibility is considered for all these, but only measured by two or three authorities, and for walk/cycle and public transport only. ¾ of the authorities did not consider accessibility for walk/cycle, car against other modes, and freight access.

5.2 The results show that most local authorities are aware of the importance of accessibility, either in terms of using local knowledge and professional judgement or by the use of simple

indicators. However, it seems apparent that many lack the tools and expertise to incorporate it in a structured fashion into both their long term and day to day work.

- 5.3 In other related discussions with local authorities other issues emerged. One major issue is that 'lack of resources' often relates more to a lack of skilled staff than actual time or money. GIS methodologies take time to learn, and a two day course will not provide skills in GIS use and what to do with it with regards to accessibility. Some local authorities are starting to use GIS, and are developing significant skills in their use.

## PART THREE - RECOMMENDATIONS

Part Three looks at how to choose methodologies and describes the use of different methodologies in Land Use Planning.

### ***The process of deciding on accessibility methodologies to be used (Sections 6 to 8)***

The main determinants of the methodology that will be chosen for a particular accessibility issue relates to:

- Defining the question that needs to be answered to decide what needs to be measured;
- Considering the availability of information, techniques, and data pertaining to the issue; and
- Considering the audience for the outputs, and what outputs will be effective.

There is no simple step by step procedure that can be followed to define what should be done in any one situation, as these factors can vary greatly, even for issues that seem similar.

In Section 6 two different dimensions of measures are studied.

- Firstly, issues of what is being measured are looked at (e.g. accessibility by walk and cycle).
- Secondly, issues of the purpose of the measure are looked at (e.g. as input into a Development Plan).

In Section 7 practical issues of operationalising the elements used (such as travel times, or zoning data) are looked at.

Section 8 looks at the availability and costs of obtaining accessibility methodology systems, and data.

### ***Calculation/ Estimation Methods available (Sections 9 to 11)***

The final three sections look at different methodologies in more detail. These are:

- Professional judgement and local knowledge
- GIS techniques
- Bespoke accessibility methodologies

## 6. GUIDANCE ON USING METHODOLOGIES

### **Decision processes for selecting accessibility methodologies**

- 6.1 The route to finding the most appropriate method for any one purpose will differ from area to area and from application to application, but the following should be borne in mind when making decisions.

#### *How the issues and geography affect the choice of methodology*

- 6.2 Section 4 of this report (on the needs for accessibility methodologies) has looked at the various reasons why accessibility may be considered. It is apparent that the type of issue under study will affect the effort that will be appropriate to the particular issue, and what kind of display will be required.

- 6.3 The geography of an area affects the kinds of tools that are appropriate. The key factors are:

- degree of rurality, or nature of urban area;
- topography of the transport networks (with less dense networks, barriers, and directional networks (as in Valley communities) all having an effect).

#### *Data and cost factors in selecting the calculation method*

- 6.4 Where data pertaining to the issue under study is plentiful and in a form that can be applied on a zonal or GIS basis then methods that utilise zonal or GIS methods will almost certainly be appropriate.

- 6.5 Section 8 of this report looks at data cost issues. For some tasks the costs of obtaining data will be worthwhile, while for some, especially 'isolated' issues, they will not, and a less data intensive approach will be more effective.

### **Practical issues for analysing different types of accessibility**

- 6.6 In Section 3, four main types of accessibility analysis were identified. This Section describes some practical issues for undertaking each type of analysis.

#### ***Local access by walking and cycling***

- 6.7 For Unitary Development Plans, requirements for walking and cycling to local facilities and to public transport need only be defined in generic terms. However detailed access requirements should always be part of detailed development control assessments.

- 6.8 Analysis needs to map walking and cycling routes and the distances between houses and local facilities. Capacity is rarely an issue for these routes but the quality of the routes, particularly where crossings of busy roads are involved, is an important factor. Accessibility measures based upon simple thresholds give a good indication of the opportunities available.

- 6.9 Where more refined analysis is needed, effort is best directed at working with local people, including existing and potential pedestrians and cyclists. to identify how problems or perceived problems can be overcome. Such approaches are becoming increasingly common within modern community planning agendas, such as safer routes to school initiatives, healthy living centres, and social inclusion partnerships.
- 6.10 Census output areas provide population data for very small zones. This data is widely available geo-coded for use in GIS analysis. GIS systems can automatically calculate walking distances on roadside footpaths from local facilities to each small zone so by assuming average walking speeds accessibility indices can easily be calculated. A similar approach applies for cycling but the speeds are faster.
- 6.11 Where local data are available on off-road walking and cycling routes then these will usually need to be incorporated into the analysis manually since current GIS do not normally incorporate the automatic calculation of distances using these modes. Other factors can be included such as time penalties for road crossings based on the road traffic flow and reductions in this where pedestrian crossing facilities are installed.

#### ***Access to or of transport systems***

- 6.12 The continuity of the road network to new development is likely to be an implicit part of a development, so the analysis can focus on access to public transport systems, and to the major road network under the following groups:
- **Walking and cycling access to bus stops and rail stations.** This uses the same approaches as for walking and cycling above. These procedures can also be refined with weightings for different types of services (such as in "PTALS" - see Section 11).
  - **Local bus and car access to public transport hubs.** The local zones used will usually be much larger than for walking and cycling analysis or isochrones can be shown from the hubs. The public transport timetable data can be obtained from timetables either manually or electronically.
  - **Car access to park and ride facilities.** Similar procedures are required as for the public transport hubs but the road travel times can be calculated using GIS and OSCAR road network data. In general park and ride sites will be located away from congested areas so there will be no need to use a traffic or transport demand model to calculate travel times in busier periods. However if congestion is considered to be relevant (for example on the access routes into a town) then the appropriate adjustments will need to be made.

- **Access to the trunk road network.** Using an approach similar to that for walking and cycling access to the public transport network access to nodes on the motorway and trunk road system can be measured in terms of travel time. These measures are generally of use for freight considerations. Complications do exist with such measures in terms of what forms a major road for the purposes of study. In many cases access to an "A" class road may be of as much relevance as a "Trunk" road in terms of location, if the road is of good quality.

***Access to / of opportunities using the transport system***

- 6.13 A suitable zoning system is required which is appropriate for the population groups being considered and under which the transport options for each group can be accurately represented.
- 6.14 Procedures will involve:
- Estimating the travel times between the zone being assessed (origin or destination) and the zones in which the opportunities lie for each time period of interest. Separate travel times are required for each group being considered based upon their mobility status. The estimation of travel time will include all legs of the trip e.g. walking to the car, car travel to the car park, bus travel from the car park to the town centre and walking from the town centre to the destination. Appropriate interchange penalties need to be included as required.
  - Assembly of the relevant land use data will depend on the trip purposes being examined. Employment data is widely available from Companies House or from the employment census (noting any confidentiality problems with the latter). Geo-coded health and education data are available from national statistics for each establishment. Other data varies dependent on the local authority area but increasingly a wide range of land uses are held on GIS.
  - There are many options for the analysis of this data. Simple travel time thresholds can be defined to allow isochrone lines to be mapped. Alternatively the opportunities in each zone can be weighted according to the separation between the zones. These calculations are relatively straightforward using spreadsheets, databases or GIS.
- 6.15 In determining the weighting of opportunities in more complex analysis it should be noted that the deterrence effect of travel varies according to the trip purpose. It is clearly desirable that the accessibility measures reflect the perceptions and behaviour of local people for each trip purpose as closely as possible. Where a local transport model is available the calibration of the trip distribution provides the necessary data on observed travel behaviour and the deterrent effect of travel time and cost. Where no local model exists then useful analysis is still possible but the results should be treated with greater caution.
- 6.16 Considerable caution is also required when isochrones are used with zone based data. A minor change can skew the overall results if a major development happens to cross an isochrone line. Therefore despite the concerns about the weighting of opportunities, mentioned above, the accuracy of the weighted measures are always greater than those from isochrones.

### ***Freight Accessibility***

- 6.17 There are some general principles relevant to land use planning:
- Regional and national distribution centres are not particularly sensitive to location within a radius of 30 to 40 miles. This means that decisions about such centres need to be made at a strategic level. In most cases qualitative accessibility considerations will be sufficient to ensure the availability of locations near motorways, and with rail access, port and airport access as appropriate.
  - Local distribution centres will usually be more captive to road transport and be served by smaller vehicles. Therefore the zoning and analysis for these can follow the same principles as for car available access with particular attention needed concerning the time of day when deliveries to town centres are required and how accessibility will be affected by peak period road congestion.
- 6.18 The measurement of accessibility for distribution purposes can often be satisfactorily achieved using iso-chrones and iso-cost maps. Development control for warehousing and other transport sensitive development should therefore seek this sort of accessibility analysis from developers. Where possible, more sophisticated analysis using commercial logistics software will be preferred but this sort of analysis requires extensive data which will not always be readily available.
- 6.19 The prime concern of policy in this area relates to local impacts, and to access to strategic networks, with the aim being to ensure distribution centres are readily accessible to the strategic road and rail networks without causing congestion at junctions or joining points.

### ***Ensuring equitable solutions***

- 6.20 To ensure that equitable decisions are made, ratios of accessibility measures for different mobility groups can be very helpful. Public policy seeks to minimise the ratios of car available accessibility to non-car available accessibility or of fully mobile people to mobility impaired people. Within Unitary Development Plans it may be appropriate to set target ratios for different types of development. However these must be practical and based upon sound transparent analysis. As an indication, it will seldom be possible to reduce the ratio of car available to non-car available point accessibility below about 4.0 outside major urban centres - city centres often achieve a ratio of as low as 1:1.5 while rural areas will nearly always be greater than 1:5.

### **The usefulness of methodologies for different aspects of the planning process**

- 6.21 The following tables summarise guidance as to what techniques may be most useful for different aspects of the planning process, and in different types of areas. Further aspects of each type of measure are described below. The tables can only provide guidance based on current experience, and will not be applicable in all areas. Users of these tables should apply their own critical judgement as to whether the advice suggested is relevant for a particular issue in a particular area, with particular data availability characteristics.

**TABLE 6.1 - ACCESSIBILITY METHODOLOGIES FOR DIFFERENT PLANNING PROCESS ISSUES**

	Walking and Cycling	Access to/of transport systems	Access to/of opportunities	Freight access
UDP guidance for suitable development locations	✓	✓✓	✓✓	✓✓
Transport assessments	✓✓	✓✓	✓✓	✓✓
Negotiation for Section 106 agreements	✓✓	✓✓		✓
Planning for education, health, social exclusion	✓✓		✓✓	
Planning for economic development		✓✓		✓✓
Transport planning	✓✓	✓✓	✓✓	✓✓
Urban areas/ locations	✓✓	✓✓	✓	
Rural areas/ locations	✓	✓	✓✓	
Areas of unemployment	✓✓		✓✓	

6.22 There is no simple advice as to which is most appropriate for any single situation, but the following table shows techniques which are generally suitable, and techniques which would seem the most useful if good data and skills exist.

**TABLE 6.2 - SUITABILITY OF ACCESSIBILITY CALCULATION TYPES FOR DIFFERENT ISSUES**

	Local knowledge/ professional judgement	Spreadsheet or analysis package	GIS simple mapping	GIS analysis
Walking and Cycling	✓		✓ *	✓
Access to/of transport systems	✓		✓	✓ *
Access to/of opportunities	✓	✓	✓	✓ *
Freight access	✓	✓	✓ *	✓

✓ = Calculation technique appropriate

\* = probably the most useful technique where it can be used

*UDP guidance for suitable development locations*

6.23 For the production of a development plan there is no substitute for a complex analysis of the advantages and disadvantages of different locations for development of different types. However, accessibility methodologies must be viewed as tools which may assist in this process, and help display decisions that have been made to the wider public and potential developers. Accessibility will not be the only criteria in decisions concerning suitability of land for development.

- 6.24 Most of the methodologies discussed will be of use for development plan design and production, though time geographic measures will probably be of too high a degree of complexity for these purposes.

*Transport Assessments for Development Proposals*

- 6.25 For individual transport assessments, manual methods of isochrone calculation are generally of the greatest value. GIS systems can automate this to a certain degree, but quite detailed levels of data are needed to produce results that are more useful than those produced by local knowledge and manual checking of travel times. Data on facilities and populations in areas will, however, be of great use in calculating numbers in areas within isochrones.
- 6.26 Written guidance exists on methodologies for accessibility assessment in Transport Assessments for Development Proposals (DETR, 2001 forthcoming).

*Negotiation for Section 106 agreements*

- 6.27 The prime information to LPAs for negotiation over Section 106 agreements are concerned with information that shows what would be needed to allow a potential development to operate in a sustainable manner - i.e. to have a modal split that will not result in excessive private car or freight use. To these ends the same methodologies as for the transport assessment will be of prime use, but with greater emphasis on the accessibility afforded by alternative public transport and walking and cycling network scenarios.
- 6.28 In addition, it is likely that the LPA will wish to have information pertaining to a number of potential sites to show what the situation would be, were the development to be planned in more sustainable locations. While the Local Authority should possess good local knowledge with which to judge the accessibility assessments made by developers, the production of similar assessments for a number of location weighs against intensive manual methodologies, and GIS methods may be favoured, even though they may sometimes oversimplify walking and cycling networks.

*Planning for education, health, social exclusion*

- 6.29 This issue is of particular importance for residential urban areas, as well as for rural areas. The characteristics of the population are of greater importance here than they are in many other accessibility applications. While for most purposes we may be interested in accessibility by different modes, we are here concerned with the proportion of the population who fall into different mobility and income categories, combined with such group's relative accessibility.
- 6.30 The issue is more related to travel need than to accessibility by different modes. But it is important to separate accessibility by different modes from the proportions that have access to different modes. Such accessibility assessment needs to be simple and transparent, and GIS based mapping of simple accessibility concepts can be of great help - for example showing the areas that are within 30 minutes (or some other 'acceptable') travel time of particular services or facilities.

- 6.31 In addition, and especially in rural areas, time sensitive approaches will be of use, in that these approaches can incorporate time availability of people and time dependent aspects of facilities and transport services. For example, such approaches will show that a bus service that travels to a town before 9am and returns at 12 noon is useful for market town shopping, but of little use for those in full time work, or those with a hospital appointment at 2pm.

*Planning for economic development*

- 6.32 For economic development a more strategic level of accessibility assessment is required. Accessibility for freight will also be of more importance. Here, where zone based data exists zonal based accessibility measures will be of use. There is less call for transparency of outputs (except when showing such outputs to potential developers), and the degree of locational accuracy is not as great as for some of the previously discussed applications.

*Transport planning*

- 6.33 As with economic development there will be a need for a strategic view of accessibility, and models showing how new or changed links will affect accessibility across a wide area will be necessary. Here, zonal methods may be of great value, but GIS can also display many of these aspects.
- 6.34 For walking and cycling link planning, however, a much more detailed approach is needed, and isochrones using detailed networks can be of great value.

*Urban and rural situations, and areas of unemployment*

- 6.35 Accessibility itself, as a concept, does not alter between urban and rural situations, but some aspects of relevance alter significantly. For many aspects of accessibility we are measuring different 'conceptions of accessibility' in urban and rural areas:
- in rural areas we are often measuring the absolute possibility of reaching places where activities can be carried out; while
  - for urban areas we are usually measuring the relative ease with which they can be carried out.
- 6.36 Thus, to produce assessments of accessibility that do not distinguish between rural and urban areas may not be of great use. Certain issues need to be borne in mind, especially for rural areas:
- Zones in rural areas may be of little value. Historic zoning of data has often placed zone boundaries along roads, thus splitting settlements, and placing two distant settlements with no access in the same zone.
  - People living outside clustered settlements may be in the same zone but could be several kilometres from others within the same zone.
  - Times of transport services and opening times of facilities will be of prime importance.

- Society operates in a different fashion in urban and rural areas. In most rural areas there is a much greater degree of community and co-operation, though, especially in areas close to cities where commuting is commonplace, such social support is breaking down and assumptions that rural people will help others out may be false. This has implications for criteria applied to accessibility in rural areas.

6.37 Accessibility assessment for areas of high unemployment will often be carried out with social exclusion or economic development in mind. In terms of methodologies these have different needs. For issues surrounding social exclusion it will be important to recognise differences such as those between urban and rural areas.

## 7. OPERATIONALISING MEASURES OF ACCESSIBILITY

### Types of methodology required

- 7.1 In deciding the required approach to accessibility analysis the first step must always be to decide what results are required for the decisions under consideration. Accessibility analysis is very flexible and questions are not implicit. Some people find this challenging since with transport demand analysis the questions are usually implicit relating to the demand/capacity relationship.
- 7.2 In some cases the analysis may be trivially simple once the questions are defined but in others more complex data collection and analysis will be required. In all cases it is essential to define the category of people or freight of interest and the travel need.
- 7.3 The methodology is determined by the following (though professionals' thought processes need not always follow the questions within the strictures of the points described below):
- the definition of the questions;
  - the assembly and simplification of the land use data to an appropriate level;
  - the assembly and simplification of the transport data to an appropriate level; and
  - the selection of an appropriate analysis tool - spreadsheet, database, GIS, accessibility analysis software package.
- 7.4 In practice, all of these need to be considered together at the same time to formulate the method which will combine clarity, practicality, and accuracy of the outputs.

### *Defining the questions*

- 7.5 For the needs of land use planning in Wales we have therefore identified a structure of types of accessibility measure. All measures must define (explicitly or implicitly):
- the category of person or freight involved;
  - whether origin or destination accessibility is being considered;
  - what policy issue is being considered; and
  - the calculation methodology.
- 7.6 The various types of accessibility measure are summarised in Table 7.1 below.

**TABLE 7.1 - FRAMEWORK FOR ACCESSIBILITY ANALYSIS**

Category	Elements	
<b>Type of person</b>	Car available	People by age, socio-economic group, gender, ethnic group etc.
	Non car available	
	Mobility impaired	
<b>Origin or destination</b>	Origin accessibility defines access to work, shops, railway stations etc. Destination accessibility defines catchments for shops, employment locations, bus stops etc.	
<b>Policy issues</b>	UDP guidance for suitable development locations Transport assessments Negotiation for Section 106 agreements Planning for education, health, social exclusion Planning for economic development Transport planning	
<b>Methodology</b>	Accessibility to/of opportunities by transport system Access to/of the transport system itself Access to/of local facilities by walking and cycling Freight access Opportunity or Value Measures	

7.7 Some example questions below illustrate the structure of practical measures:

- Will a town centre or out of town location offer better non-car access for the population? This question suggests a measure based on:  
people - fully mobile car available and non-car available population;  
destination accessibility;  
access of population; using  
opportunity index - population:
- How is car access to employment for unemployed people in Newport affected by growing congestion on the M4? This question suggests a measure based on:  
people - unemployed car available people in Newport;  
origin accessibility;  
access to employment; using  
opportunity index - employment:
- How does the Trans-European road Network reduce peripherality in terms of travel time for the people of Wales? This question suggests a measure based on:  
people - total Welsh population;  
origin accessibility;

access to population in Europe; using  
value index - travel time.

*Simplification to enable measurement*

7.8 Some of the common types of simplification are:

- Where a particular population group is defined in terms of its geographical location by defining a zone.
- If a population group is defined in terms of its travel time from some origin or destination then the limits of the zones in which they are located are defined by isochrones.
- Data are often only available on opportunities over a defined size so minimum thresholds for numbers of jobs at employment locations or minimum floorspace of a retail facility are usually necessary.
- Even though transport service availability changes throughout the day, travel times are generally expressed as averages for the peak and average off peak periods for each mobility group.

***Assembly of the Land Use/Opportunity Data***

7.9 Sources of data are discussed in Section 8. For any analysis it is essential to define which population groups are of interest (e.g. young people, unemployed people, elderly people) and what trip purposes need to be considered (e.g. shopping). Although this data can be extracted flexibly from GIS it will often be appropriate to simplify it by grouping types of facility by floorspace, activity levels.

7.10 For example, access to health facilities might define various categories of health facility (GP surgery, community hospital, general hospital) and define the size of each facility by the activity in terms of patient contact. Data on all health facilities in the UK and the activity at each is available from National Health Statistics and can easily be geocoded within GIS using the postcodes.

***Assembly of the Transport data***

7.11 The level of detail needs to be appropriate to reflect the factors which affect the separation of land uses. Travel for each mobility groups needs to be treated separately. For some journeys rough estimates will provide a sufficient degree of accuracy, and for other travel detailed data collection will be required perhaps including site inspection to allow the quality of options to be assessed.

7.12 This is perhaps best illustrated with an example:

A developer is proposing a major shopping and leisure centre in South Wales. The developer hopes to attract custom from a catchment of up to 100 miles. In the vicinity of the centre it will be necessary to look at the layout of footpaths, cycle routes, road crossings, street lighting etc to ensure that walking and cycling access for the local community, from public transport, and from car parks is safe and minimises travel time for these trips. For distances beyond the walking and cycling catchment of about 2 miles travel time and cost by road and public transport needs to be examined in some detail with the level of detail declining with increasing distance from the proposed centre. For more distant locations it will probably only be necessary to look at major road (for car, bus and coach) and rail travel times.

Long distance travel times and costs can be assessed using road trip planning software from strategic locations and average costs per mile. The national rail timetable and tariff will provide similar data for rail. For more local trips the travel times in the peak and off peak periods can be estimated from a local traffic model and the bus times from the bus timetable. In the immediate vicinity of the centre on site surveys may be required, investigating walking routes and allocating the main barriers an appropriate time or cost penalty, preferably based on the views of local people about when they walk or drive.

At each level the number of zones will be the single most important factor in affecting the effort required for the analysis.

Much of this analysis will probably already have been undertaken by the developer to assess the commercial viability of the site. However it is also relevant in policy terms to examine the distribution of impacts both socially and geographically.

### ***The use of proxy measures***

7.13 Proxy measures can be useful, but have to be used with care. For example, before the advent of high levels of car dependency and telephone or internet banking, the number of bank branches might have given a useful indicator of the accessibility of a centre to people. This example demonstrates how the relevance of an indicator or proxy measure can change over time and emphasises that opportunities are best expressed in the most direct way (i.e. availability of banking services rather than number of bank branches).

### **Accessibility criteria**

7.14 The questions that determine the criteria that are of relevance to the measurement and display of accessibility have been identified as questions such as:

- What is an "acceptable" walking distance?
- When does a bus fare become a deterrent to travel?
- How steep a hill, or how much of a climb will act as a real deterrent to a pedestrian or cyclist?

- How many facilities of what type constitutes a 'reasonable' degree of accessibility, relating to social exclusion?

7.15 These criteria become of special importance when simple measures such as isochrones are used. However, these questions have no simple answer, as thresholds differ for different people. But by mapping quantitative accessibility indicators for walking, bus travel, cycling etc the accessibility analysis informs judgements by planners on the changes being considered.

7.16 This emphasises that care is required to use travel thresholds only when they reflect some real aspect of travel behaviour. To attempt to codify travel behaviour unnecessarily could lead to inaccuracies in the analysis. The strength of accessibility analysis is that the results are sufficiently transparent to help with the understanding of travel behaviour rather than an understanding of travel behaviour being necessary to produce meaningful results.

#### THE USE OF THRESHOLD VALUES AS CRITERIA

The following thresholds and criteria quoted here are given as broad guidelines only. They should not be used unless there is good reason to believe that they are applicable in the area and journey types under study.

Examples of where criteria may be different exist for all those mentioned. One example would be for acceptable driving times for journeys to work:

- In the South East of England 90 minutes might be used as a threshold for driving time to work.
- For a city in an area surrounded by a rural area, 20 minutes might be used.

The values in the following tables are from a variety of sources, and readers are referred to the bibliography for other sources of guidance on thresholds

#### *Acceptable walking distances*

7.17 For most purposes an acceptable walking distance is thought to be about 20 minutes walk, which equates to about 1.5 kms for an average person, but for people with disabilities can be significantly less. The following table provides suggested thresholds for different types of journey.

**TABLE 7.2 - INDICATIVE CRITERIA FOR ACCEPTABLE WALKING DISTANCE**

<i>Aspect of travel</i>	<i>Time and (Distance)</i>
Walking to facilities (urban)	20 mins (1 - 1.5kms)
Walking to facilities (rural)	30 mins (2 - 3 kms)
Walking to bus stop (urban)	5 mins (300-500 metres)
Walking to bus stop (rural)	10 mins (600-1000 metres)
Walking to railway station	10 mins (600-1000 metres)

*Acceptable times will be lower where there is no dedicated footway. Walking distances will also be highly dependent on topography and other factors. Careful consideration is needed for acceptable times for different qualities of facility.*

Readers are referred to caveats mentioned in text box above, and refer to guides mentioned in bibliography

- 7.18 It can be seen that different distances are assumed for urban and rural areas. This is based on analysis of data of travel behaviour. For distances over 1600 metres very few trips are made by walking (except for leisure purposes). 800 metres is about a 10 minute walk and 400 metres a 5 minute walk. These thresholds are widely used for identifying general maximum, normal and short walking distances respectively. 5, 2, and 1 kilometres can be adopted as similar cycling thresholds.

*Acceptable travel times by public transport and car*

- 7.19 What is an acceptable travel time for public transport and car journeys is more complex to define than for walk and cycle journeys. While walking and cycling are usually limited by personal ideas of physical fitness and effort involved, those for public transport and car journeys depend on the journey purpose. Many will find a 30 minute bus journey too long for a trip to the shops, but will happily endure a 6 hour coach journey to go on holiday. However, the following guidelines may be of use.

**TABLE 7.3 - INDICATIVE ACCEPTABLE TRAVEL TIMES FOR USE IN ISOCHRONES**

	In vehicle time	Door to door journey time
<i>Bus or train journeys</i>		
Day to day activities other than work (urban areas)	10-25 mins	30-45 mins
Day to day activities other than work (rural areas)	15-30 mins	45-75 mins
Work journeys	15-45 mins	45-75 mins
Journeys for day long leisure activities	1-2 hours	1.5 - 2.5 hrs
<i>Car journeys</i>		
Day to day activities other than work	15-30 mins	-
Work journeys	20-45 mins	-
Journeys for day long leisure activities	1-3.5 hrs	-

Readers are referred to caveats mentioned in text box above, and refer to guides mentioned in bibliography

*Acceptable travel costs*

- 7.20 Putting thresholds on acceptable travel costs is very difficult. In general, travel cost has to be treated as part of generalised cost (or generalised time) in accessibility assessment. It is, however, equally difficult to give advice on how to relate time with cost when determining such concepts as generalised cost. Transport economics has the concept of "the value of time" which is based on observations of how people trade time and money when making travel decisions.
- 7.21 Studies of tolled bridges, and rail vs air travel) give information on how much people are willing to pay in order to save time). But these are generally based on long distance and infrequent travel with correspondingly large time savings. Studies of bus fare and service level elasticities suggests also provides some information. Taking information from such research the following suggestions can be made, which will be of use in some situations where such judgements have to be made.
- 7.22 Most assessment of acceptable costs is based on relative criteria. People budget according to expectation of costs, and absolute levels may not be useful, where relative costs change over time. The 'acceptable' cost of a mobile telephone has fallen rapidly over recent years, while bus fares have increased by about 50% over the level of inflation over the last 15 years. In most cases it is best to assess maximum acceptable fare levels as being roughly the highest costs paid, or a percentage of this for those on low incomes.

*Physical deterrents to walking and cycling*

- 7.23 The main barriers to walking and cycling include:
- crossing major roads;
  - hills; or
  - passing through areas perceived to be dangerous.
- 7.24 Few attempts have been made to quantify the deterrent effects of such barriers, but the following are suggested as criteria that could be incorporated into accessibility measures.

**TABLE 7.4 - INDICATIVE INFORMATION FOR ASSESSING THRESHOLDS FOR BARRIERS TO WALKING AND CYCLING**

Type of barrier	Value for significant barrier
<i>Walking</i>	
Significant traffic barrier (traffic flow)	Above 9000 - 12,000 vehicles per day
Quiet road (above this level the road may form a less significant barrier)	Below 2,000 vehicles per day
Significant traffic barrier (junction)	Over 30 seconds wait needed
Hill climb for reasonably fit person	60 metre climb
Hill climb for elderly person	15 metre climb
<i>Cycling</i>	
Hill climb for reasonably fit cyclist	40 metres
Road considered unsafe (2 lane <3m width)	10,000 vehicles per day
Road considered unsafe (wider road)	20,000 vehicles per day
Road speed considered too fast (2 lane <3m width)	40 mph limit
Road speed considered too fast (wider road)	50 mph limit

Readers are referred to caveats mentioned in text box above, and refer to guides mentioned in bibliography

*Criteria for facility provision*

- 7.25 The criteria that are applied for the provision of services is one that falls outside the scope of this study, being very complex and specific to particular circumstances and purposes. Each application will require analysis of what criteria should be used.

## 8. THE AVAILABILITY AND COST OF OBTAINING SOFTWARE AND DATA

### *Geographic Information Systems*

- 8.1 The surveys suggested that GIS in one form or another is available to most LPAs – only two of the eighteen authorities who replied did not hold any kind of geocoded data (Blaenau Gwent and Neath). Around a quarter of LPAs have skilled specialist GIS staff who may have experience of accessibility methodologies; the majority of staff are not skilled in the use of GIS, other than for basic mapping. Typically the number of GIS users in LPAs is one or two (at least one LPA that has installed GIS on all its computers – but very few staff make use of it).
- 8.2 The cost of a GIS system can vary enormously depending on whether it is custom-built, desktop (MapInfo, ArcView), or server-based (ArcInfo). The typical cost of a one user licence for desktop GIS is roughly £1,000, with cost per user decreasing as more licences are bought (so for example three licences can cost twice as much as one, eight licences cost three times as much as one, and so on). Server-based systems tend to cost much more – roughly £20,000 – but will include licences for a number of users to access the server from their desktops, and offer much more functionality.
- 8.3 The disadvantage of such ‘out of the box’ systems is that to the uninitiated they can seem complex and offer functionality that the user doesn’t immediately require. In terms of measuring accessibility, the processes required can initially be complex and long-winded.
- 8.4 An alternative option to the above is to invest in a custom GIS. Companies such as MapInfo now offer customisable versions of their main product, where the user interface can be developed to meet the specific needs of the user – for example, inclusion of a simplified tool for measuring accessibility.
- 8.5 Such systems can also be intranet-based. The cost per user is much lower, therefore giving more people GIS capability. There are however high development costs associated with the initial and subsequent development of such systems, and it is likely that they could only be justified as part of a local authority-wide corporate GIS system. Examples of such software are MapX (custom GIS development environment) and MapXtreme (Intranet), which are both MapInfo products. The cost of such systems can vary from £20,000 - £100,000.
- 8.6 Initial software costs can increase with the addition of various ‘add-ons’, one obvious candidate being travel time isochrone generation software such as Drivetime (for MapInfo), or Network Analyst (ESRI). The cost of this software, including the network data required to make it run, can far outweigh the cost of a single desktop GIS licence.
- 8.7 It should be stressed that as costs can vary significantly according to the specific product, the costs quoted above should be regarded as indicative estimates. In addition, customers can often achieve significant discounts through negotiation with vendors.

### *Costs of bespoke accessibility tools*

- 8.8 Section 11 describes four tools that are available for accessibility analysis. Of these one, ACCALC is available freely (on purchase of the accompanying report to the Scottish Executive) and PTALs is a generic technique, that is available through ACCMAP. ACCMAP is available from MVA (consultants) in Woking, and SONATA is available from Steer Davies Gleave (consultants) in London. Both are normally sold as a service including data collection for an area, rather than just as the software.

*Census data*

- 8.9 Nearly all the LPAs possess 1991 Census data at ED and Ward level; about a third of them have this in a format suitable for GIS use. The census data is believed to be supplied to them as part of the Service Level Agreement with the Ordnance Survey. About half the authorities have access to updated census data which is not as out of date. Many authorities (typically, the Economic Development department) provide updated population and unemployment estimates on a monthly or annual basis. More recent data from the 2001 census will be forthcoming.

*Network data*

- 8.10 Network data is available to local authorities as part of the Service Level Agreement with the Ordnance Survey. Oscar-derived data ('Oscar' being the name given to detailed vector network data originally derived by the OS from 1:1250 map data) is available at several different levels of detail, reflected in the price. The surveys suggest that around two thirds of authorities hold such data, and have it at a sufficient level of detail for use in measuring accessibility.
- 8.11 The Service Level Agreement between local authorities and the Ordnance Survey involves local authorities paying an annual fee to the OS, and in return receiving a certain amount of mapping data. It has proved difficult to find any detailed information on the agreement as it is deemed to be commercially sensitive, but from the surveys we can suppose that the data usually consists of network data (typically Oscar) and census data. The data can be used by anyone in the authority and by any outside consultancies who are in specific partnership with the authority. The fee payable is believed to be a small nominal charge.

*PTI Cymru data*

- 8.12 PTI Cymru data on public transport is not yet available in data form, but when it is, it should be of great value for public transport system coding. ("Aim", working on behalf of PTI Cymru, are developing the system using an industry standard file format). It should be possible to link this data to a GIS to use in accessibility analysis.
- 8.13 Typically, such systems are composed of a database of records broken down into bus stop locations, service network, service details, and route details, which can be queried in order to answer individual enquiries from passengers. GIS can be used to display bus stop locations and route networks, and accessibility analysis can be carried out on the underlying public transport service level data. The process of reformatting data can be simplified by developing an interface between the two systems.

*Categorisation of centres and data on facilities*

8.14 Data on service centres and facilities (community, health, education, shopping etc) can be collected at various levels. Even the most basic of data can be useful for accessibility purposes; it can be added to as needed and available. Useful sources include local knowledge, local/unitary development plans, publicly available directories such as Yellow Pages, and commercial databases of facilities.

**TABLE 8.1 - DATA SETS AVAILABLE FROM MAPINFO**

	Number in UK database	Cost for UK (£)
Food retailers (including floorspace)	13000	950
Off licences, CTN and convenience	21000	950
Clothing and footwear	23000	950
Household goods (drapery, carpet, furniture, radio and TV, music, electric, hardware, china, decorating, DIY)	21000	950
Other non food goods (chemist, cards, books, photo, jewellers, toys, sports, garden centres, dept stores, pet, mobile phone)	24000	950
Services (photo process, TV rent, video hire, cleaning, optician, copies, travel)	17000	950
Estate agents	13000	950
Post Offices	19000	950
Finance	23000	1250
Leisure (hotel, restaurant, snack bar, café, fast food, take away, cinemas, bingo, bowling)	9000	950
Public houses	10000	950
Motoring	16000	950
Petrol stations	13000	950
Number of facilities in each postcode sector		950

8.15 Geo-coded retail and service datasets are available from a variety of companies. They may use existing databases of such information and ‘add value’ to them by undertaking further research, cleaning and checking data, classifying and summarising records, and geo-coding. The costs quoted here are for one user – typically, the rate ‘per user’ drops significantly as the number of users grows. For example, 10 users may pay 3 times the single-user rate; 100 users may pay 6 times the single-user rate.

*National Assembly held data*

8.16 The National Assembly Cartographics department currently hold some limited data on services and facilities, including:

- All schools;

- Further & Higher Education Establishments; and
- Hospitals.

In addition, the department have also digitized a number of networks (Bus Routes, Passenger Trains, Traffic Volumes and the Sustrans cycle network) which could be of use.

*Building up local databases*

8.17 Many local/unitary development plans already include maps/lists of local facilities such as service centres. Such lists can be added to by using available data collected locally on the ground, or by use of directories such as Yellow Pages (which is available on the internet). Gwynedd County Council are developing a database of a range of community facilities such as shops, post offices, churches, sports facilities, hospitals, libraries and police stations, a sample of which is reproduced below. The full database contains 70 types of facility and 176 settlements.

**TABLE 8.2 - EXTRACT FROM THE GWYNEDD FACILITY DATABASE**

SETTLEMENT	Slop/Shop	Swyddfa Post/Post Office	Meddygia/Surgery	Capell/Chape	Ysgol Gynradd/Primary School	Ysgol Feithrin/Nursery School	Ysgol Uwchradd/Secondary School	Coleg/College	Prifysgol/University	Ysbyty/Hospital	Clinig/Clinic	Llyfrgell/Library	Heddlu/Police	Neuadd/Hal	Swyddfeydd/Offices	Maes Parcio/Car Park	Cae Chwarae/Playing Field	Cae Peldroed-Rygbi/Football-Rugby Field	Canolfan Chwaraeon/Sports Centre	Lloches Bws/Bus Shelter	Deintydd/Dentist	Bws/Bus	Tren/Trair	Tafam/Public House	Gwesty/Hotel
ABERERCH	1			1	1									1	1						0	0			
ABERSOCH		1	1	1	1									1	1	1				1	0	0	1	1	
BORTHYGEST	1			1	1									1	1						0	0		1	
BOTWNNOG		1	1	1	1		1											1			0	0			
BRYNCIR	1			1																	0	0	1		
CHWILOG	1			1	1									1		1					0	0	1		
CLYNNOG FAWR	1			1										1							0	0	1	1	
CRICCIETH		1	1	1	1						1			1	1	1				1	0	0	1	1	
EDERN	1			1	1									1		1					0	0	1	1	
EFAILNEWYDD	1			1												1	1	1			0	0	1	1	
GARDOLBENMAEN	1			1	1									1		1	1				0	0	1		
LLANAELHAEARN	1		1	1	1															1	0	0	1		

**General Issues for software and data availability**

8.18 There remains a tendency for GIS technology to be developed at grass-roots level within individual departments such as planning and highways, rather than being thought of as a corporate resource which can be useful for a much wider variety of purposes. Some reasons for this can be lack of support at higher levels, the perceived high costs and complexity of such systems, previous bad experiences with corporate IT programmes, "short-termism", and failure to appreciate the more wide-ranging benefits that GIS offers. Very few authorities to date have developed corporate GIS.

- 8.19 Another feature which remains is that of the GIS specialist, an individual within the authority who operates as a ‘bureau’ service to all staff, dealing with all GIS-specific requests which are then ‘bolted-on’ to projects. Often, this is the only individual in the authority with a working knowledge of GIS. A Corporate GIS approach aims to solve this problem by making GIS technology more widespread, resulting in simple GIS analysis being carried out by knowledgeable staff within projects, instead of as an external add-on.
- 8.20 From interviews and surveys, it has emerged that manpower skills and availability may be a bigger issue than financial cost in the use of GIS. Although a feature of most LPAs, in many cases GIS is being used for no more than basic mapping. Officers are keen to make better use of these systems, but regard the pressure of time as a major barrier to increasing their knowledge. Some authorities – in particular, Swansea, Powys and Ceredigion – have successfully argued the business case for developing use of GIS for accessibility and other purposes, and are going ahead with using GIS in much of their work.
- 8.21 There are problems regarding the availability of data to everyone in the organisation. Multiple return of some surveys (from, for example, both the planning and the highways departments) highlights the fact that one department may be unaware of the data held by another.
- 8.22 A major issue is the need to establish standards for data collection by local authorities. This is particularly important for dealing with cross-boundary issues and for ensuring that the data can also be used for strategic purposes by strategic authorities, for example the National Assembly for Wales.
- 8.23 Several government-led data infrastructure projects and initiatives are currently underway, all of which have relevance to the process of measuring accessibility. The National Land Information Service (NLIS), which encompasses the National Land and Property Gazetteer (NLPG) and the National Land Use Database (NLUD), is a major initiative which aims to collect and standardise information on land and property and make it available to the public via the internet. The potential for harnessing this information in order to identify different land types, facilities and so on is enormous. It is noted that the NLUD is not currently in operation in Wales, and it is a recommendation of this report that such a database should be set up.
- 8.24 At the National level, *Syniad*, a local government owned and controlled organisation which gives advice and guidance to local authorities in Wales, has recently established a data unit whose purpose is “to meet the data needs of local and central government in Wales by ensuring that they are better informed about the characteristics of the services and activities of local authorities and of the environment in which they operate”. One of its functions will be to collect, process, interpret and disseminate statistical data on local government services and activities, including collation of small area statistics.
- 8.25 Respondents to the consultation process which preceded the formation of the unit agreed that there was substantial scope for improving local authority data management skills, local authorities working together to fill important information gaps, and greater sharing of data and best practice data management within local government. These are all issues that would have a positive effect on data collection and management for use in accessibility methodologies.

- 8.26 The cost of keeping databases up to date can be regarded as prohibitive by LPAs in terms of time spent. The advantage of data infrastructure initiatives like the ones described above is that they put in place a strong structure for data collection and organisation that can be more cost-effective in the longer term in terms of its many applications. We are already witnessing this structured approach to data collection in Wales, as part of initiatives such as PTI Cymru, which collects bus timetable details from local authorities in a standardised way.

***Strategies for software and data for Local Authorities***

- 8.27 There would seem to be a benefit from Local Authorities having strategies for data collection based on guidance from the National Assembly. Much data is collected for various purposes by Local Authorities, but often there is no central record of data collected, nor is it collected in a way that can be used for future purposes. A balance has to be struck between repeating data collection exercises and too much bureaucracy in developing systems to make data collected for one purpose useful for others.
- 8.28 Guidance on these issues could be provided by the National Assembly, and Local Authorities should give strategic thought to developing systems whereby data collected in one department can be made available in a usable form for tasks such as accessibility analysis.
- 8.29 In developing such strategies it is necessary to give thought to the historical flux in facility provision, for instance. While the distribution of schools changes slowly and in a fashion in which databases can be easily updated, the same would not be true for other services.

***Data collection by the National Assembly***

- 8.30 It has become apparent through this research that the National Assembly could play an important role in data collection for accessibility measurement purposes. Much data is held by the National Assembly (especially such as data on schools, hospitals and other public facilities, and thought should be given to how, with relatively simple changes in procedures more could be made available that would be of use to Local Authorities in developing accessibility profiles and methodologies.
- 8.31 It is recommended that the National Assembly should liaise with Syniad's data collection unit and formulate guidelines for GIS data collection for planning authorities (not just for accessibility purposes). Ideally, the data would be held in a generic database format - with accompanying information on its geography i.e. grid reference - so that it could be used for different purposes, such as GIS or analysis in other packages (Excel, SPSS etc). Not having it in a particular GIS format (e.g. MapInfo) would also make it easier to use for those authorities running different GIS software.

## 9. THE USE OF LOCAL KNOWLEDGE AND PROFESSIONAL JUDGEMENT

The following Sections review various methods for calculating or displaying indices and aspects of accessibility. These are grouped into three Sections, including;

- Section 9) The use of local knowledge and professional judgement,
- Section 10) Map based methods for displaying simple attributes of accessibility,
- Section 11) Bespoke methodologies available to measure accessibility

### Development Plan Locations

9.1 National Assembly planning guidance provides much advice on what constitutes accessible locations. Technical Advice Note 18 states that:

It should be a key planning objective to ensure that employment, shopping, services and leisure are highly accessible by public transport, walking and cycling. To help achieve this UDPs and decisions on individual planning applications should seek wherever possible to locate such developments in places which offer genuine and easy access by a range of transport modes. UDP policies and land allocations should therefore:

- locate major generators of travel demand in city, town and district centres and near public transport interchanges, as a means to reduce car dependency and increase social inclusion by ensuring that development is accessible by public transport for those without access to a car;
- focus local facilities for which there is a regular need close to their users in local and rural centres, ensuring easy access for all, especially by walking and cycling. Local facilities include primary schools, doctors surgeries, local convenience shops; and
- consider the potential for changing travel patterns, by for example increasing the sustainability of existing developments through a co-ordinated approach to UDP allocations and transport improvements.

Locations that are highly accessible by walking, cycling and public transport, particularly in the vicinity of public transport interchanges, offer significant opportunities to reduce the need to travel. When preparing or reviewing UDPs planning authorities should reassess development sites which are highly accessible to non car modes and allocate them for travel intensive uses such as offices, shopping, leisure and hospitals. Care should be taken to ensure that such developments are at sufficient densities to fully utilise the accessibility potential of the site. Consideration should also be given to mixed uses including housing where appropriate. Sites which are unlikely to be well served by public transport, walking and cycling should either not be allocated for development in the UDP or be allocated or reallocated for uses which are not travel intensive.

9.2 In general, local knowledge and professional judgement may provide all that is needed to decide the suitability of different locations for different development, although wherever

possible this should be backed up by quantitative and robust methodologies that provide justification for choices. Guidance would be of use in particular aspects of such decision making.

### ***Mapping accessibility characteristics by local knowledge and judgement***

9.3 With good local knowledge and professional judgement it is possible to categorise locations according to generalised accessibility attributes, as described below. In this description we note the suggestions made in TAN 18 and suggest 6 categories of locations, as;

- "central place" locations (city, town and district centres),
- non "central place" locations with good public transport accessibility (including areas close to interchanges),
- locations with high walk and cycle access but not covered by the above (generally areas of high population density suitable for local facilities in urban areas),
- locations with high road and reasonable public transport access, but poor local accessibility,
- locations with high road accessibility but poor public transport accessibility, and
- locations with lower accessibility or with no special characteristics (generally rural areas away from transport networks).

9.4 As the title of this section implies it is important that such mapping is done by people with good local knowledge, and a good knowledge of accessibility issues. Such mapping should also only be thought of as an addition to more 'rigorous' accessibility methodologies. Used with good professional judgement, and backed up by the use of well thought out and justified criteria, they can be a useful addition. Any mapping using such methods should only be used if it is defensible to scrutiny by other professionals.

#### ***a) 'Central place' locations***

9.5 Defining the area that constitutes a city, town, or district centre can create difficulties with different criteria applied to what is 'central'. Local walking accessibility criteria can be of importance here, with, depending on the size of the centre in question, walking times of between 2 and 5 minutes from an agreed very central area usually describing what is central. In existing centres local people will have a ready understanding of what is 'within the centre' and what is not. New development may alter those ideas, though not usually by a large degree, unless the extension of what is to be thought of a central extends towards a major transport interchange, another related central area, or in some instances towards car parking provision.

#### ***b) Non 'central place' location with good public transport accessibility***

9.6 While 'non central places' often have higher car accessibility than central places (hence the attraction of edge of town location to developers for supermarkets and offices), such locations with good public transport accessibility are less common. The existence of a

railway station or frequent bus route does not always confer high levels of accessibility. It will be necessary to map out those places that are served by public transport, and what is within their catchments.

- 9.7 A manual form of accessibility analysis will be necessary. Those locations close to interchanges, and on high frequency public transport services with through routes beyond local centres will generally be in this category.

*c) Locations with high walk and cycle access but not covered by the above*

- 9.8 Locations with high walk and cycle access (outside central areas) will generally be areas of high population density, and village centres. The key to local accessibility by walk and cycle is population density, but this is also altered by local topography, and by barriers such as water, railways, and major roads. Such locations will include locations that have good local access to local networks in an area. Existing smaller district centres, and areas on the periphery of larger centres will generally fall into this category. Large housing estates and lower density housing areas on the periphery of urban areas should not be included. As a rule of thumb reaching 3000 people in urban areas within a 10 minute walk, and villages with a population of over between 500 and 1500 people (depending on the size of surrounding centres and degree of peripherality) will be included.

*d) Locations with high car and reasonable public transport access, but poor local accessibility*

- 9.9 Many locations have high car accessibility and come under pressure from developers for development of facilities such as retailing. While current guidance may suggest that locations for such development should be directed towards those in the (b) category described here, uses such as for industrial and warehousing may be suitable for this category, having public transport access, while recognising that most access will be by private car and freight vehicles.

*e) Locations with high car accessibility but poor public transport accessibility*

- 9.10 As outlined above many locations will have high car accessibility, but will not necessarily have high walk, cycle, or public transport accessibility. But such locations may come under pressure for development by virtue of their high car accessibility alone. For local planning authorities the task in these cases will often be to display how low the accessibility is by other modes, rather than how high it is by car. These locations may be:

- in non urban areas on good road links and close to strategic roads; or
- in urban areas, normally away from congested centres, and also away from high quality public transport services and interchanges.

*f) Locations with lower levels of accessibility*

- 9.11 Between these other areas will be areas that have no particular accessibility attributes, and in development terms, are unlikely to be suitable for any development requiring accessibility.

- 9.12 Most of the area defined as such will be in rural areas, but many lower population density areas of larger urban areas will not have fallen under the characteristics described in the previous sections, and many rural locations will have high accessibility by virtue of being on main corridors.

*Displaying accessibility characteristics*

- 9.13 Figure 9.1 shows how such a map might look for an area. (It should be noted that the mapping shown in this instance is from local knowledge by the researchers, and is not indicative of how such a map might look for the area shown).
- 9.14 As with other accessibility indicators and mapping it should be apparent that the fact that an area has a particular type of accessibility characteristics does not render it suitable for particular types of development. It should always be made clear that an accessibility map is not a map indicating where development of particular types are necessarily desired. Other factors, for example environmental impacts may encourage the suitability of locations.

## 10. GEOGRAPHICAL INFORMATION SYSTEM TECHNIQUES

10.1 Geographical information systems offer the capability to produce high quality mapping a wide variety of accessibility characteristics. However, in order to use GIS the following are essential:

- Access to a GIS system;
- Data that will be useful to the issues under study; and
- Expertise to use the GIS.

10.2 Section 8 of this report discusses these issues in greater detail.

### *Advantages and disadvantages of GIS*

10.3 GIS systems vary in their capabilities and ease of use. However, the following are key factors to be borne in mind:

- The level of initial investment for GIS software and data is high, and data costs may remain high unless in house data collection already exists, or can become part of a wider local authority activity (such as public transport timetable and mapping provision).

GIS should only be considered for in house use if there is a will to use it for a variety of purposes and commitment.

If this commitment does not exist it is more effective to use consultancy for particular applications using GIS.

- GIS is more suited to display of relatively simple accessibility measures rather than more complex measures.
- However, it is capable of detailed computations that zonal systems cannot undertake, such as detailed travel times through networks.
- As GIS is normally used for simple indicators, these will normally require decisions to be made on criteria that will be applied relating to behaviour. For example a map showing opportunities within 20 minutes isochrones and one showing 45 minute isochrones will look very different. It is important to apply criteria that relate to local behaviour. Section 7 gives some advice on the choice of criteria relating to behaviour, but these should be used critically. Local conditions may imply different criteria.

### ***Isochrones***

10.4 Commercially available isochrone generating software uses road network data and associated data on road speeds (generally by road class and whether the road is in an urban or rural area) to calculate the distance a vehicle is able to travel from one point in a specific time. Time can be added on to the beginning or the end of a journey to reflect time taken to walk to and from a vehicle, or to take into account general delay (for example, during peak hours). Networks may be edited if there are certain sections of road that are subject to particularly slow moving traffic, or access restrictions. Different speeds may be set for different times of

the day and week. The users have the choice as to how involved they wish to be in setting up the network.

- 10.5 By editing the network and travel speed matrix, it is possible to produce isochrones for other modes, for example public transport (slower speeds and a limited network of routes), and walk and cycle (slower speeds, networks combining existing roads and cyclepaths/footpaths).
- 10.6 Unlike car, cycle and walk, public transport accessibility is limited to a short walk catchment either side of the public transport corridor (usually 400-800m), and this has to be reflected manually in the isochrones.
- 10.7 On a local scale it is possible to dispense with such software and use GIS to manually draw isochrones using information from timetables and local knowledge of average vehicle speeds in different areas and at different times - providing the networks involved are not too complex.
- 10.8 Figures 10.1, 10.2 and 10.3 show access isochrones for car, public transport and cycle. The car isochrone is generated using isochrone generating software and a detailed road network. In the public transport example, service frequency is not represented, and all journeys are assumed to be direct ones. A walk catchment of 400m (bus) and 800m (rail) is assumed. The cycle isochrones include additions to the road network (cycle paths) and omissions (motorways, very busy roads).

#### *Complexities of displaying isochrones*

- 10.9 It can be seen from the above maps that isochrones can be graphically displayed in different ways, for different modes. As data and calculation methods become more detailed issues arise as how best to display travel times, and how to calculate times.
- 10.10 Figure 10.4 shows how such mapping techniques can be used and shows how different conceptions of 'travel time' can affect the resulting outputs.

#### **Access to transport systems**

##### *Isochrones for freight considerations*

- 10.11 For freight considerations it is access to strategic road, rail, water, or air transport systems that will be of value. Figure 10.5 displays travel times to a rail network showing a currently existing point of access, and a potential one. This type of map can therefore be useful for:
- showing types of location that would be suitable for freight using development in a Unitary Development Plan; and
  - showing the potential for a new rail depot to add new potential locations for such development.

##### *Access to transport systems*

- 10.12 Figure 10.6 (from Juliao, 1999) shows access times to nodes in a highway network. Such an indicator could be of value for accessibility for freight, but also to access to the trunk road network in Wales. While the process used is different it is also relatively similar to measures of access to public transport systems which can be mapped in a similar way. This is an example of an indicator that can be quite simply calculated using GIS techniques from data on the road network.

***Service levels available to one point***

- 10.13 Using a database and network of local public transport services, the routes of all services to and from a location - for example, a hospital - can be thematically mapped in GIS to reflect bus frequencies along different sections (see Figures 10.7 and 10.8). From this, walk catchments to bus services can also be mapped. The isochrones are a reflection of walk catchments and service levels, but not of travel distance/time or the possibility of interchanging to reach a destination (see Figure 10.9).

***Accessibility by Public Transport and Car to multiple points***

- 10.14 Access isochrones like the ones shown in Figure 10.1, 10.2 and 10.3 can be combined to show overall access to all facilities of a certain type within a local authority area – for example, access to all health facilities, access to all Service Centres (examples are shown in Figures 10.10 and 10.11 for public transport, and 10.12 and 10.13 for car access). They are produced in a very similar way to those for individual locations, but can make use of geocoded databases of facilities, services etc.

***Contour maps for access from all points.***

- 10.15 Contour maps can show attributes such as the number of households reachable within 30 minutes travel time by public transport. For most GIS applications it is necessary to calculate the number of opportunities reachable from many points in turn, and then produce contour maps - while such calculations are possible within a GIS system most do not offer this capability. The procedure to be followed would normally be as follows:

- Use a routine to draw an isochrone for (in this case) 30 minutes for a set of points across the area. These should be along the main network routes (eg bus route and railway stations for public transport maps), and areas in between. In general, for an area of 100 square kilometres it would be expected that in urban areas points would be needed at 1 km intervals, and less frequent in rural areas.
- Plot the values of opportunities within the contour on a map, manually, or as a new layer in the GIS map.
- Either use a contouring capability within GIS to produce contours of opportunities available within 30 minutes, or manually interpolate between points to produce such a map.

An example of such a map is shown in Figure 10.14

### ***Indices of remoteness***

- 10.16 For rural areas an index of remoteness can be useful. In general they have been applied to very large areas such as the Australian continent, but are equally applicable in the more remote rural areas of Wales. The Accessibility/Remoteness Index for Australia (ARIA) (Figure 10.15) interpreted remoteness as accessibility to 201 service centres. Remoteness values for 11,340 populated localities were derived from the road distance to service centres in four categories. Values for populated localities were interpolated to a 1 km grid, and averages calculated for larger areas.

### ***Linking Databases and GIS***

- 10.17 Linking databases and GIS can significantly improve the process of measuring accessibility by adding great flexibility, allowing complex querying of data in order to produce GIS mapping of different scenarios. For example, users can retrieve details of all services within half an hour of all hospitals, and even specify the time of day or week they are interested in. The GIS will automatically map the outcome of the query, and the user may then carry out any accessibility analysis on the resulting network data.
- 10.18 The process is made much simpler if public transport information already exists in database format (e.g. PTI Cymru data). Analysis could be further simplified by developing an interface which seamlessly links the database and GIS.

## 11. SPECIALIST METHODOLOGIES

11.1 In this section we review various bespoke techniques for accessibility analysis, reviewing their usefulness of different aspects of the planning system. The techniques reviewed are:

- ACCALC - A zone based relational database system for calculating a wide variety of accessibility measures.
- ACCMAP - A GIS based method for calculating and mapping PTALS and a network index of accessibility.
- PTALS - A methodology for measuring access to public transport networks, suited to high frequency services in urban areas.
- SONATA - A methodology designed for assessing unmet need by public transport for rural areas.

### ACCALC

11.2 ACCALC, developed by Derek Halden Associates, is a relational database system, that uses data on opportunities (for instance facilities or people) and data on deterrence (for instance travel time or distances), to calculate a variety of accessibility indices over an area. Different deterrence functions can be used, such that a wide variety of indices can be calculated. The approach is to simplify the production of simple, opportunity, and value based accessibility indices.

11.3 ACCALC is useful where good data exists, especially zone based data (or where it is considered worthwhile collecting it). It is useful for exploring different measures of accessibility and seeing how the use of different accessibility criteria and parameters affects the results. For people who understand the concepts of accessibility outlined in Section 3 it is a valuable tool for all types of accessibility measure described here.

11.4 Output is in the form of excel spreadsheets. Figure 11.1 shows a small section of tabular output showing how different criteria and parameter choices for indices can be compared, while Figure 17.2 shows output graphed using a simple mapping program.

**FIGURE 11.1 - TABULAR OUTPUT FROM ACCALC**

	Threshold	Opportunity Inde	Value Index	Contour Index	Number of Zones	Include
	▶ None	219444.73	25.85	418748	58	<input checked="" type="checkbox"/>
	45	219444.73	25.85	418748	58	<input checked="" type="checkbox"/>
	30	170267.75	23.43	305839	44	<input checked="" type="checkbox"/>
	22	55522.07	18.46	88076	13	<input checked="" type="checkbox"/>

### ACCMAP

11.5 ACCMAP, developed by MVA, is designed to simplify the process of mapping PTALS levels. It is based on MAPINFO and allows bus networks to be geocoded, which allows PTALS levels to be mapped at a detailed level. It also includes an index of network

accessibility based on the time it would take to travel the entire network input. Like PTALS it does not include information on services offered at locations.

- 11.6 ACCMAP, being based on the PTALS approach, is generally suitable only for larger urban areas, where access to the public transport network is of greater importance than the destinations of routes (on the assumption that in such urban areas, access to the public transport network is synonymous with accessibility to facilities. It is useful for detailed mapping of local accessibility (accurate to the nearest 100 metres or less). For mapping accessibility for Development Plans, in areas that fit the limitations described above, it is a very useful tool.
- 11.7 ACCMAP produces output for a PTALS type measurement, as well as a measure of network accessibility defined as the total network travel time (for which a low value gives high accessibility. Sample outputs are shown in Figures 11.3 and 11.4.

### **PTALS**

- 11.8 PTALS was developed by the London Borough of Hammersmith and Fulham during the 1990s to assess locations in terms of their accessibility to the public transport system. It does this by assessing an 'average door step frequency' to services of different levels. The average doorstep frequency relates to the average time a person would have to spend (rather than only wait) to catch a bus, so it incorporates walking time and waiting time.
- 11.9 PTALS does not assess the usefulness of services. In urban areas such as London it is assumed that facilities are relatively easily available once the network is accessed. Thus, opportunities are not considered. Also, it is assumed that services run at a frequency where a 'turn up and wait' habit will work. For rural areas, where services run half hourly or less, or where not all routes serve useful service centres, it is of limited use.
- 11.10 The PTALS approach is useful in the same situations as ACCMAP, described above. Outputs can be in a variety of forms, with Figure 11.5 showing typical a shaded contour map.

### **SONATA**

- 11.11 SONATA (SOcial Needs And Transport Assessment) was developed by Steer Davies Gleave during the 1990s to assess accessibility in rural areas with a view to planning rural public transport services over a wide area. It uses a 'time-geographic' approach of reviewing the times at which services run from parishes to locations where key activities can be carried out. About 15 different 'journey types' are tested from each parish, including for example whether a bus departs before 9 and returns after 5 to enable a journey to work.
- 11.12 Gaps in suitable services can be identified. These are related to population levels, so it is possible to assess the level of unmet need both in terms of what journey types are not possible, and the numbers of people affected.
- 11.13 The method is only suitable for rural areas, since levels of service in urban areas are seldom of a level where journeys of different types are not possible by public transport. In urban

areas the problem is generally to improve public transport rather to provide a subsistence level. SONATA was developed as a tool for identifying social need, and uses accessibility to identify need. As such it is useful for both public transport and facility location planning in rural areas as well as for measuring accessibility.

- 11.14 The graphic outputs from SONATA are currently shaded maps of indices output by the program (as shown in Figure 11.6).

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## APPENDIX ONE

### THE TREATMENT OF ACCESSIBILITY ISSUES AND METHODOLOGIES IN GUIDANCE AND PRACTICE IN WALES, AND THE REST OF EUROPE.

## 1. ACCESSIBILITY IN WELSH GUIDANCE AND ADVICE

1.1 Wales is in a state of transition of devolvement of some aspects of government from the rest of the United Kingdom. While different guidance and advice have been provided for Wales in some aspects of planning policy in the past, the situation is being reviewed. Here we review current guidance, drawing mainly on Planning Guidance (Wales) Planning Policy (in its 1999 and revised consultation draft forms), the Welsh Transport Policy Statement "Transporting Wales into the Future", and Technical Advice Note 18 Transport (in its 1998 form and revised consultation draft form). Other planning guidance on Unitary Development Plans and the Technical Advice note on retailing and town centres are also considered, along with other relevant literature.

### **Planning Guidance (Wales): Planning policy**

1.2 In terms of general principles Planning Guidance (Wales): Planning Policy stresses the key factors that should be reconciled by the planning system:

*"The planning system regulates the development and use of land in the public interest. It should reconcile the needs of development and conservation, and secure economy, efficiency and amenity in the use of land, and protect natural resources thereby contributing to sustainable development." (8.1)*

1.3 Accessibility is not mentioned in this list, but is implicit in terms of many of the factors mentioned. Similarly, in later sections of the guidance there are no sections relating specifically to accessibility, but its importance is made clear in many parts of the sections dealing with transport.

*"Policies to support sustainable development include:*

- *reducing the level of road traffic, or reducing the rate of growth;*
- *encouraging alternative means of travel and transport which have less environmental impact, eg public transport, cycling and walking;*
- *reducing reliance on the motor car;*
- *seeking to ensure the more effective use of the transport network and targeting resources to best effect." (8.1)*

1.4 Encouraging and discouraging different modes of travel implies altering the accessibility of land uses by these modes, as does making more effective use of transport networks.

1.5 Similarly, guidance on Development Plans makes clear reference to land use/ transport interactions:

*"Development plans should contain an explanation of the overall aims of the authority's transport policies and the way in which those transport policies support the other policy aims of the plan. Plans should provide the means for:*

- *examining the relationship between transport and land use planning;*
- *promoting the integration and co-ordination of transport and land use planning;*
- *promoting strategies to reduce the need to travel."* (8.1)

1.6 *From the transport side there is recognition that provision for transport and improvements to interchanges are important in affecting accessibility to land uses.*

*"Plans should also include policies and proposals relating to the development of transport infrastructure and related services (eg public transport interchange facilities, rail facilities, harbours and airports including safeguarding zones)." (8.1)*

1.7 The importance of walking and cycling is also stressed:

*"The impact of policies and development on pedestrians and cyclists should be considered. Development plans should encourage the implementation of specific measures to assist pedestrians and cyclists, including the provision of safe and convenient routes between facilities, and parking facilities for cyclists."* (8.1)

1.8 Transport provision differences between urban and rural areas are also recognised:

Plan policies need to reflect the differences between the characteristics of urban and rural areas including the scale of development and the availability of public transport. (8.1)

### **Public Transport**

1.9 It is where public transport is discussed that accessibility is most explicitly referred to, with accessibility profiles put forward:

The likely availability and use of public transport is an important ingredient in determining locational policies designed to reduce the need to travel by car. **Preparing accessibility profiles for public transport** may assist local authorities in assessing possible development sites. (8.2)

1.10 Rail is mentioned for the greater certainty it offers due to its fixed infrastructure, while the advantages of infrastructure for buses such as bus lanes are also stressed. This implies a need for accessibility methodologies to take account of the fixity of associated infrastructure.

1.11 The link between transport provision and improved accessibility that can be offered is recognised, as is the scope for planning conditions and obligations to ;

Local authority support for bus services, passenger rail services or proposals for associated facilities should be consistent with locational policies in development plans. Where development can only take place with improvements to public transport services, local authorities should consider the use of planning conditions and/or planning obligations.

## **Location of development**

- 1.12 Guidance on locations for different types of development is closely related to factors which relate closely to accessibility.

*"Local authorities should aim, as far as practical, to balance employment and population in order to enable people to live near work.*

*... should adopt policies to locate major generators of travel demand in existing centres or other locations which are highly accessible by public transport, cycling and walking.*

*Proposed development sites for housing, employment, retailing, leisure and recreation, and community facilities such as libraries, schools and hospitals should be within existing urban areas or in other locations which are or can be well served by public transport, or can be reached by walking or cycling.*

*Through their development plans authorities should encourage higher density residential development near public transport centres, or near corridors well served by public transport (or with the potential to be so served)."*

- 1.13 It is apparent from these statements that accessibility by walking, cycling and public transport is of key importance, especially where development is not in locations which, by definition, are likely to have good accessibility, such as town centres.

### *Location with respect to freight needs*

- 1.14 Where freight is concerned it is accessibility to freight networks that consistently comes over as a key factor.

*"Where possible, employment and distribution sites should be conveniently located for access to rail sidings, wharves or harbours to encourage freight movement by rail or water rather than road. ... Local authorities should consider which routes are most suitable for use by road freight and encourage the location or relocation of distribution and operating centres and other developments generating frequent road freight movements on sites with access to those routes.*

- 1.15 *However while such accessibility should be good, there are also other factors to be taken into account which will sometimes weigh against the most accessible locations.*

*"However, direct access onto primary routes from new development should be avoided where possible. Where feasible, access should be on to a secondary route."*

## **Development Control**

- 1.16 Four factors are stressed when determining planning applications for local planning authorities to consider for developments which have transport implications:

- the impacts on travel demand of the proposed development;

- the level and nature of public transport provision;
- accessibility by a choice of means of travel;
- the willingness of a developer to provide infrastructure or measures to manage traffic or promote travel by public transport, walking or cycling, to overcome objections to a proposed development.

1.17 Thus accessibility by all modes is only one of four primary considerations, but it is implied in the other three.

### **Summary**

1.18 Planning Guidance (Wales): Planning Policy guides developers and Local Authorities towards solutions that will incorporate accessibility in a variety of ways, but stops short of suggesting methodologies that should be adopted, or might be useful. "Accessibility profiles" for public transport is the most specific mention.

### **Planning Policy (Wales) Consultation Draft**

1.19 Planning Policy (Wales) Consultation Draft, published in 2001 is more prescriptive than the earlier Planning Guidance (Wales) Planning Policy in many areas relating to accessibility. It is much more explicit about the need to consider accessibility related issues in forward planning and in development control, and in specifying that accessibility methodologies should be used to aid this process.

### **Sustainable Development**

1.20 Sustainable Development has come to the forefront in terms of aims of planning policy:

*"The Assembly will promote developments that meets the needs of the present without compromising the ability of future generations to meet their own needs, i.e. 'sustainable' development. This involves supporting the Assembly's Sustainable Development Scheme, and the UK vision of sustainable development, which is based on four 'objectives' which need to be integrated and pursued simultaneously.*

- *Social progress which recognises the needs of everyone;*
- *Effective protection of the environment;*
- *Prudent use of nature resources; and*
- *Maintenance of high and stable levels of economic growth." (para 3.1.1)*

1.21 Sustainability is seen within the wider context of goals of planning policy, with the emphasis (for accessibility considerations in land use planning) on reducing the need for travel:

*"The following objectives should be taken into account in the preparation of development plans and the control of development throughout Wales:*

- *Maximise opportunities for community development and social welfare;*

- *Promote development patterns which minimise the need to travel and support an integrated transport system." (para 3.1.5)*

### **Spatial Planning**

1.22 Spatial planning has become of importance in Wales, and the forthcoming National Spatial Development Plan is reflected in this guidance. Planning should aim to ....

- *"Secure an appropriate settlement pattern to meet the needs of the economy, the environment and health and well being, including maintaining and improving the vitality, attractiveness and viability of town, district, local and village centres. This includes a preference for retail, leisure, office and other key uses in centres, and support for mixed development;*
- *Locate developments where they can maximise accessibility between them and existing facilities and areas of development by walking, cycling and public transport and where reliance on the use of the private car can be minimised. Development in centres along existing transport corridors and approaches such as clustering economic development could contribute to reducing travel growth;*
- *Secure improvements to transport facilities and service which concentrate on maintaining or improving accessibility to communities, services, facilities, to secure economic growth, and/or to improve safety and amenity." (para 3.4.2)*

### **Sustainability Principles in Development Plans**

1.23 The guidance sets out how sustainability appraisal will be used for Development Plans to ensure that policy goals are met.

*"A systematic sustainability appraisal is the most effective way of ensuring that the implications of an emerging development plan are considered as an integral part of its preparation. It ensures that the objectives of a policy are clearly laid out and that the trade-offs between options can be identified and assessed." (para 4.6.1)*

### **Accessibility and the Location of Development**

1.24 A specific section on accessibility and the location of development spells out some of the ways in which accessibility should be integrated into policy thinking and practice.

*"Improving accessibility is a key objective for the planning system that can be achieved by ensuring that housing, jobs, shopping, leisure and services are highly accessible by public transport, walking and cycling. Planning can also play a significant role in achieving the Assembly's objectives for social inclusion by ensuring that development is accessible to all by means other than private car." (para 12.2.1)*

- Planning authorities should assess the extent to which their UDP settlement strategy and new development is consistent with **minimising the need to travel and increasing accessibility by modes other than the private car.**
- A broad balance between housing and employment opportunities should be promoted to **minimise the need for long distance commuting.**

- Local authorities should adopt policies to **locate major generators of travel demand ...** within existing urban areas or in other **locations which are, or can be, well served by public transport, or can be reached by walking or cycling.**
- **Preparing accessibility profiles for public transport, walking or cycling** may assist local authorities in plan preparation and assessing possible development sites.
- Wherever possible **travel intensive developments should be located at major public transport nodes or interchanges.**
- Higher density development, including **residential development should be encouraged, near public transport nodes, or near corridors well served by public transport** (or with the potential to be so served). (*para 12.2.2*)

1.25 It goes on to say that current sites should be re-assessed in terms of their potential use.

*Planning authorities should reassess development sites which are highly accessible to non-car modes and allocate them for travel intensive uses such as offices, shopping, leisure, hospitals and housing of sufficient density to fully utilise the accessibility potential of the site. Sites which are unlikely to be well served by public transport, walking and cycling should either no be allocated for development or be allocated or reallocated for uses which are not travel intensive. (para 12.2.3)*

*In rural areas the majority of new development should be located in those settlements which have a good accessibility by non-car modes which compared to the rural area as a whole. Local service centres should be designated by local authorities and be identified as the preferred locations for most new development including housing and employment provision. The approach should be supported by the LTP strategy and where appropriate the service delivery plans of the local service providers. (para 12.2.4)*

## **Transporting Wales into the Future**

1.26 The Welsh Transport Policy Statement "Transporting Wales into the Future" follows the same principles as the Planning Policy Guidance (Wales) in terms of accessibility, though some other important points are made. Land use transport interaction is stressed:

*"In order to achieve the Government's policies for a sustainable pattern of development it is necessary to appreciate these (land use and transport) interactions and to devise integrated policies and strategies which relate to transport, land use planning and the environment." (9.1)*

1.27 The need to build on existing patterns of development is also made clear. While ...

*"a large new project or development area ... could provide the means for a substantial and rapid reorganisation of land use and transport arrangements .. in most areas progress to more integrated and sustainable patterns must recognise and build on the established situation.*

1.28 *Locational and development challenges are described as:*

- *town centres which pre-date and are ill adapted to high levels of car usage,*
- *extensive housing areas which lack local amenities and have poor public transport to local and town centres,*
- *recent out of town businesses and retail parks almost entirely dependent on the car, and*
- *the poor quality environments in some urban areas which encourage a car based move of population to the urban fringe and to commuter villages. (9.2)*

1.29 *All of the above have accessibility implications, in terms of development which made sense at the time, but with changing access to transport modes, and relationship to other land uses (along with other factors) renders their current characteristics unsatisfactory. Increasing accessibility is implied as one means of improvement.*

#### *Mobility and accessibility*

1.30 *Accessibility is specifically referred to as being of high value to people, and maintaining accessibility by all modes is put forward as a major plank of policy. The message can be taken to be that while people may confuse mobility and accessibility the policy will be to consider accessibility by all modes.*

*"Accessibility to a wide choice of locations for work, shopping or leisure and the opportunity to live in pleasant environments are features which will be defended by those who enjoy them. We will seek to maintain accessibility and extend its benefits to those not currently enjoying them, while seeking to reduce the need to travel and reliance on the car." (9.3)*

#### *Accessibility considerations in Development Plans*

1.31 *It is made clear that accessibility should take a stronger role than in the past, and the need for methodologies to facilitate this is stressed:*

*The development of new methods for relating the location of land uses to different site characteristics, including accessibility, may in the future assist the preparation of development plans. The need to provide planning guidance on such methods will be considered. (9.19)*

#### *Planning conditions and accessibility*

1.32 *It is stressed that planning conditions and obligations will often be associated with accessibility related provision. It will be necessary for methodologies to account for more detailed assessments of accessibility relating to individual developments.*

*In determining planning applications the impacts on travel demand, public transport provision, accessibility and the willingness of a developer to provide infrastructure to overcome objections should all be taken into account. (9.23)*

*In appropriate situations a range of improvements to transport facilities and services may be secured by means of conditions and obligations.*

*... where they are justified, improvements should be sought to benefit walkers and cyclists and to encourage public transport links to the development concerned. (9.24)*

### **Cross boundary issues**

- 1.33 It is apparent that boundaries of local planning authorities should not be ignored in using accessibility in planning. It will be necessary for methodologies to extend beyond boundaries to ensure that the development plan of one area is not undermined by its neighbour.

### **Location in rural areas**

- 1.34 Accessibility is considered of importance in the location of developments in rural areas as well as in urban areas:

The distinctive needs of rural areas will need sensitive solutions which recognise the benefits of a mix of measures at an appropriate scale - for example upgrading public transport links and encouraging development in accessible locations. (9.4)

### **Planning Guidance (Wales): Unitary Development Plans**

- 1.35 Planning Guidance (Wales): Unitary Development Plans provides guidance to Local Planning Authorities on the preparation of Unitary Development Plans. Most of the text is concerned with the procedures and level of content of the plans rather than guidance on the thinking that should go into the Development Plan.
- 1.36 However Paragraph 3.9 states that in the Overall Strategy (in Part 1 of the UDP) "*Land use/ transportation strategy addressing accessibility and the provision of strategic and integrated transport facilities including highways, railways, and other infrastructure*" should be addressed along with housing, conservation and environmental, economic, mineral, waste treatment, tourism, and energy considerations. Urban and rural dimensions of these are stressed (para 3.10).
- 1.37 As with other guidance accessibility is of importance, but methodologies are not suggested.

### **Technical Advice Note (Wales) (No 18): Transport**

- 1.38 Technical Advice Note (Wales) (No. 18): Transport is designed to be read in conjunction with Planning Guidance (Wales) Planning Policy and is concerned with planning matters directly relating to transport changes.
- 1.39 Its main concern relating to accessibility is concerned with "*the location of a wide range of facilities at the local level so that they are accessible by foot and cycle*" (para 12) and using transport changes to meet the needs of pedestrians and cyclists. Similarly, public transport (para 22) is linked to land use policies promoting "*development in areas accessible by means other than the private car*". Local authorities are given guidance on

practical measures to make these modes more attractive and advice on how to cater for them in development plans.

### Technical Advice Note 18 Revision Consultation Draft

1.40 The revised draft of Technical Advice Note 18 is very much more explicit about the role of accessibility in transport related land use planning. It states National Assembly for Wales policy of *"wishing to extend choice in transport and secure accessibility and mobility in ways which support sustainable development by encouraging the development of an integrated transport system which is safe, efficient, clean and fair"*. It specifies the four aspects of integration by which this will be achieved:

- *"integration within and between different types of transport;*
- *integration with land use planning;*
- *integration with the environment; and,*
- *integration with policies for education, health and wealth creation". (para 4)*

1.41 The relationship between land use planning and transport is clearly stated:

*"Land use planning can help to achieve the Assembly's objectives for integrated land use and transport planning through:*

- *reducing the need to travel by influencing the location of development and its relationship to transport infrastructure;*
- *ensuring that new development includes appropriate pedestrian, cycling and public transport provision;*
- *promoting cycling and walking;*
- *supporting the provision of high quality public transport;*
- *supporting traffic management measures; and*
- *supporting necessary infrastructure improvements". (para 5)*

1.42 Methodologies relating to accessibility are clearly of relevance to the first four of these policies.

#### *Accessibility*

1.43 Paragraph 23 sets out in clear terms how accessibility should be incorporated into thinking and practice. The following quotation is the whole paragraph, but is split into bullet points to stress the various components.

- *"Accessibility is a measure of the ease of reaching a destination from a given origin, (origin accessibility), or the ease with which a given destination can be reached by potential visitors, (destination accessibility)".*

- *When identifying sites in UDPs and in determining major planning applications planning authorities should consider the use of accessibility measuring techniques to assist decision making.*
- *Different accessibility measuring techniques may be appropriate depending upon local circumstances and the nature of the plan proposal or planning application.*
- *Techniques include*
  - *simple measures of travel time,*
  - *Geographic Information System (GIS) based tools and*
  - *complex calculations of accessibility based on transport models.*
- *Accessibility profiles may be prepared for people and freight for all modes to determine whether a location has the potential to minimise travel particularly by private car.*
- *The profiles should relate to both access from housing and access to employment and other destinations. The profiles should reflect the catchment area served and the quality of service resulting in relative indicators of accessibility for different sites." (para 23)*

1.44 It can be seen in this guidance that accessibility is treated with a seriousness and with thought that was lacking in the past in planning related guidance.

#### *Location of Development*

1.45 Accessibility is also considered explicitly in guidance on locations for developments of different types.

*"The location of major travel generating uses ... can also significantly influence the number and length of journeys. It should be a key planning objective to ensure that employment, shopping, services and leisure are highly accessible by public transport, walking and cycling. To help achieve this UDPs and decisions on individual planning applications should seek wherever possible to locate such developments in places which offer genuine and easy access by a range of transport modes.*

*UDP policies and land allocations should therefore:*

- *locate major generators of travel demand in city, town and district centres and near public transport interchanges, as a means to reduce car dependency and increase social inclusion by ensuring that development is accessible by public transport for those without access to a car;*
- *focus local facilities for which there is a regular need close to their users in local and rural centres, ensuring easy access for all, especially by walking and cycling. Local facilities include primary schools, doctors surgeries, local convenience shops; and*
- *consider the potential for changing travel patterns, by for example increasing the sustainability of existing developments through a co-ordinated approach to UDP allocations and transport improvements. (para 19)*

*Locations that are highly accessible by walking, cycling and public transport, particularly in the vicinity of public transport interchanges, offer significant opportunities to reduce the need to travel. When preparing or reviewing UDPs planning authorities should reassess development sites which are highly accessible to non car modes and allocate them for travel intensive uses such as offices, shopping, leisure and hospitals. Care should be taken to ensure that such developments are at sufficient densities to fully utilise the accessibility potential of the site. Consideration should also be given to mixed uses including housing where appropriate. Sites which are unlikely to be well served by public transport, walking and cycling should either not be allocated for development in the UDP or be allocated or reallocated for uses which are not travel intensive. (para 20)*

### **Rural areas**

- 1.46 Accessibility and preferred locations for planning are related to accessibility for rural areas. The emphasis is on drawing a compromise between an acknowledgement of the importance of the car, with the need to cater for the needs of those without cars.

*"The car is important for accessibility in rural areas and is likely to remain so for the foreseeable future. However significant population groups including women, the young and those with low incomes, who do not own a car or have limited access to a car can experience severe problems of social exclusion. Improving accessibility for these groups will help to promote social inclusion and reduce rural isolation." (para 21)*

- 1.47 Further details of the ways in which developments should be located in rural areas are suggested:

- *"... the majority of new development should be located ... where access by non car modes is comparatively good.*
- *... planning authorities should consider identifying local service centres when preparing their UDPs.*
  - *These centres may comprise a market town, large village or closely associated group of villages.*
  - *Local service centres should be the preferred locations for most new development including housing and employment provision.*
- *This overall approach should be supported by the LTP strategy and ... service delivery plans of local service providers ...*
- *The adoption of local service centres will help to promote the use of public transport, walking and cycling and minimise the need for journeys to larger centres." (para 22)*

### **The Transport Framework for Wales (a consultation paper)**

- 1.48 The transport framework for Wales consultation published in March 2001 aims to help create a future framework for transport development in Wales. It states it aims as to ...

*Develop a better co-ordinated and sustainable transport system to support local communities and the creation of a prosperous economy' by measures including:*

- *to reduce the pressure on the environment by improving public transport and offering alternatives to travelling by car;*
- *to enable about a quarter of commuting to work to take place by means other than by car compared to about a fifth in the late 1990s;*
- *to facilitate a higher proportion of freight being carried by rail;*
- *to improve road safety. (para 3.1)*

1.49 Accessibility is placed in the objectives in terms of both accessibility and mobility.

*"We have to reverse years of decline in public transport. We need to reduce dependence on the car and at the same time improve accessibility and mobility for everybody particularly those without access to a car. We need to establish the basis for everyone to make integrated and co-ordinated decisions whether they are investing in transport or just planning a journey."*

1.50 In general, accessibility does not feature highly in terms of discussion in the document though it is mentioned in the importance of *"a public transport system that "links to all major settlements in Wales including from rural areas"* (para 5.2), and in the vision section *"to facilitate a transport system that ... changes travel patterns and transport usage and where appropriate reduces the need to travel by integrating with land use planning"* (6.1). Also *"What we want in five years"* includes *"greater access particularly for those who do not have a car"*, and *"less dependence on the car"* (6.2)

1.51 These all point to needs to analyse accessibility, especially for those without access to cars.

### **Guidance on Local Transport Plans in Wales (September 1999)**

1.52 Local Transport Plans are required by all Unitary Authorities to set out plans and provision for transport in the area for the next 5 years. They are new in conception, and the current plans are provisional, and may be ratified, or re-submitted.

1.53 The concept of accessibility is specifically referred to in the guidance, in relation to ensuring integration between land-use and transport planning and to encourage partnership working

1.54 However, the importance given to accessibility does not compare with the weight given to other factors as much as it might. For example, it is not specifically mentioned in the Annex B section on LTP Elements in Development Plans. The document is focussed upon the provision of transport infrastructure and services. It does, however, relate the modal issues to the need to promote improved accessibility (see below for comments from the document).

1.55 The emphasis on accessibility is seen as being to improve access to key services and reduce social exclusion, although no specific measures or indicators are proposed. Examples of cases where accessibility is stated as being of importance are given below.

*"In rural areas the key issue is to promote accessibility" (para 9) "Measures to improve accessibility and widen choice of transport mode will need to be tailored to local circumstances and will depend on the level of existing transport services and the location of amenities".*

*"Links should also be built with social services to address accessibility....and there should be close co-operation with planning departments to ensure that future land allocations and assessments for major planning applications take full account of the need to create sustainable integrated transport networks for the whole area." (para 11)*

*"Cross-boundary movements between urban centres and across Wales, whether for employment, shopping or leisure purposes, are substantial. Those living in rural areas often require access to key services which are, in some cases, located in another local authority area." (para 12)*

- 1.56 It is stressed that appraisal of the LTP must be set against the NATA criteria including: *"accessibility - improving access to everyday facilities for those without a car and reducing community severance"* (para 25). The reader is referred to later comments on NATA, and it will be noted that the Welsh LTP guidance goes further in accessibility consideration than the English "GOMMMS".

### **The Transport Legacy in Wales (Transport Advisory Group March 1999)**

- 1.57 This document consists of a Final Report to the National Assembly, backed up by a collection of Key Advisory Group Papers covering topics including accessibility, gender issues, land use planning, safe routes to school, freight, sustainability, and integrated transport policy. This report represents advice to government rather than guidance or policy from government.

- 1.58 None of the key summary points in the final report relate directly to accessibility but under "A New Policy Direction" the integration of land use and transport is stressed, including:

*" ... there is a need to make it easier for people to make more sustainable travel choices ... "*

*"... there is a strong need to integrate transport and land use planning policies, and that greater emphasis should be given to transport in developing land allocation policies."*

*"On land use planning the group was conscious of the need for further analysis to be undertaken to support criteria based accessibility policies relating to urban areas (such as the Dutch ABC approach) and rural areas (accessibility profiles)." (all quotes from p23)*

- 1.59 Thus there is a strong indication that accessibility is important and suggestions are made concerning the ways in which it could be incorporated into methodology.

*Key Advisory Group Papers*

- 1.60 Accessibility is mainly dealt with in the land use planning chapter but is considered to be a key issue in other papers.
- 1.61 Accessibility is seen as very important especially for rural Wales to improve access to jobs etc. Planning Guidance (Wales) is seen to set the context for advice on the use of accessibility in planning.
- It is important to radically " change planning and transport guidance to deliver a more sustainable settlement and land use distribution which would improve accessibility." (Gender Issues p4)*
- "Strategic and local planning has a vital effect on all aspects of accessibility" (Accessibility Issues p4) Access to developments "has become almost wholly car dependent"*
- 1.62 Accessibility methodologies are suggested as being useful especially;
- *application of geographically based sequential testing for a wider range of developments including large office developments, major leisure facilities and sports stadia.*
  - *an approach similar the Dutch ABC policy for planning in urban areas, and*
  - *accessibility profiling for rural areas.*
- "In looking at rural Wales, the key issue would seem to be the promotion of accessibility rather than mobility and, therefore, it is important to be able to develop a methodology (eg accessibility profiling) which would provide guidance on identifying potential development locations from a public transport perspective" (Land use p9)*
- "The needs of rural areas should be given particular attention, and accessibility needs recognised and responded to " (Gender Issues p10)*
- 1.63 It is implied that accessibility needs to be improved to reduce social exclusion, especially for women and to promote access to opportunities.
- "The distribution of land uses and developments have for many years been based on the premise of personal mobility, largely through car availability This premise does not automatically mean increased personal accessibility and this past emphasis on mobility over accessibility has meant that many individuals are currently discriminated against in terms of accessing locations and activities. Lack of accessibility can be a major factor in social exclusion and for many women social exclusion means that they cannot be economically active or have adequate access to key facilities." (Gender Issues p3)*
- 1.64 The development of methodologies are suggested for using accessibility in planning in annexes.
- 1.65 Land use paper annex I describes *"an approach suitable for some urban areas - the ABC system developed in the Netherlands"* including a review of its implementation in Holland. The description in the Annex does not, however, describe the methodologies that would be used or the criteria that might define A, B, or C locations in a Welsh context.

1.66 Land use paper annex II describes *"an approach that could be developed for rural areas based on identifying those factors which inhibit accessibility in rural areas and ranking rural settlements by accessibility"*. What it says is:

*"Methodologies and techniques need to be developed which allow for 'accessibility profiles' to be developed for settlements in rural areas.*

*"Accessibility profiles will need to recognise (a) the opportunities to access developments in rural settlements by means other than the private car and (b) be based on models which are sufficiently sophisticated to take into account temporal changes in movement and demand for access.*

*"Accessibility profiles will need to be sufficiently robust to allow for:*

- *"ranking of rural settlements into 'accessibility hierarchies' for incorporation in development plans;*
- *"locational choices to be made and defended on the basis of the type of mobility patterns (i.e. travel patterns) generated by different types of development, and*
- *"negotiation of enhanced accessibility to a given level of provision where developments are proposed in locations which would not generally be acceptable on accessibility grounds.*

1.67 This suggested approach is similar to that suggested for Transport Assessments, arising out of the English PPG13 Transport, although the suggestion is for a stronger plan led system with rural settlements pre-defined in terms of their accessibility, and therefore suitability for different development types.

### **Accessibility in guidance and advice for Wales - Summary**

1.68 Accessibility is recognised as being key to both land use and transport planning, and the links between them are strongly recognised. But it is apparent that suggestions for methodologies to address these issues is lacking, except for suggestions of what methodologies might take into account in "The Transport Legacy in Wales". The message comes over strongly in most other literature that accessibility should be an important criteria in many policies, plans, and decision, but the implication must be in general that a qualitative understanding of locations that are accessible and those that are not will suffice.

1.69 While qualitative understanding is important (and a good understanding may provide more useful analysis than many accessibility indicators) it is apparent that there is need for more guidance to Local Authorities as to what kind of methodologies are useful, and where, if accessibility is to be treated at all uniformly.

## 2. ACCESSIBILITY IN OTHER UK GUIDANCE AND ADVICE

2.1 Guidance for Wales has been based very strongly on guidance from other parts of the United Kingdom, having in general, been very recently inherited from guidance from DETR (and its predecessors). It is from the other devolving regions that a more local interest is encouraging the development of new thinking.

### UK and England

#### **PPG13 Transport**

2.2 Planning Policy Guidance 13 Transport, is in the process of being redrafted, with the new version expected during November 2000. Like earlier versions accessibility is seen as one of many important factors.

*"The objectives of this guidance are to integrate planning and transport at the national, regional, strategic and local level to:*

- *promote more sustainable transport choices for both people and for moving freight;*
- *promote accessibility to jobs, shopping, leisure facilities and services by public transport, walking and cycling, and*
- *reduce the need to travel, especially by car." (Para 4)*

2.3 A new element is the idea of Transport Assessments for major new developments which replaces the Traffic Impact Assessment. The assessment of accessibility by all modes is a major part of a Transport Assessment, and implies that methodologies are needed to illustrate anticipated levels of accessibility.

*"For major proposals, the assessment should illustrate accessibility to the site by all modes and the likely modal split of journeys to and from the site." (Para 23)*

2.4 Accessibility also becomes more important in Development Plans, and in Regional Planning, and here again, there is an implied need for methodologies to illustrate levels of accessibility. For Development Plans accessibility should be used to assess land for different uses, and at the regional level, public transport accessibility *criteria* is of importance.

*"A key planning objective is to ensure that jobs, shopping, leisure facilities and services are accessible by public transport, walking, and cycling. This is important for all, but especially for those who do not have regular use of a car and to promote social inclusion. In preparing their development plans, local authorities should give particular emphasis to accessibility in identifying the preferred areas and sites where such land uses should be located, to ensure they will offer realistic, safe and easy access by a range of transport modes, and not exclusively by car. Regional planning guidance should set a strategic framework for this exercise through the use of public*

*transport accessibility criteria for regionally or sub-regionally significant levels or types of development" (Para 19)*

- 2.5 It is likely that guidance on conducting Transport Assessments (due to be published in early 2001) will emphasise the need for simple indicators of accessibility in accessibility profiles for new developments, concentrating on populations (or other opportunities) within isochrones for each main mode of travel. For development plans a similar approach will be suggested, using area wide measures rather than measuring access to one proposed development location.

### ***The 1998 Transport White Paper - A new deal for transport***

- 2.6 "A New Deal for Transport" was the UK government's White Paper, published in July 1998. Relative to previous documents it stressed the role of accessibility in transport policy, and throughout the document, used five criteria by which to judge many aspects of transport policy. These were Environment, Economy, Safety, Accessibility, and Integration.
- 2.7 The key message of the White Paper was that all decisions should consciously consider these five criteria, in an interrelated way.
- 2.8 Related to the White Paper is the "New Approach To Appraisal" (NATA for short) which changed assessment for the cost-benefit approach previously used to a multi-criteria approach based on the five key aspects described above. In this multi-criteria approach the aim is to provide politicians and other decision makers with the key information they need to make a balanced judgement. While some formulations of NATA provide guidelines for assessing criteria, others don't. One that does is Guidance on Methodologies for Multi Modal Studies (GOMMMS for short) which is described in more detail below.

### ***Other Planning Policy Guidance***

- 2.9 PPG3 (Housing) requires local planning authorities to build in ways which  
*"exploit and deliver accessibility by public transport to jobs, education and health facilities, shopping, leisure and local services"*
- 2.10 PPG6 (Retail and town centre development) requires that  
*"At the regional and strategic level, local authorities should establish a hierarchy of town centres, taking account of accessibility by public transport, to identify preferred locations for major retail and leisure investment. At the local level, preference should be given to town centre sites, followed by edge of centre and, only then, out of centre sites in locations which are (or will be) well served by public transport."*

### ***Guidance on Methodologies for Multi Modal Studies***

- 2.11 Guidance on Methodologies for Multi Modal Studies (GOMMMS for short) published in 2000, provides guidance on the use of multi-criteria appraisal for multi modal studies (concerning transport infrastructure). It used the five main criteria set out in the Transport White Paper, and subdivides Accessibility into;

- *option values (the extent to which new transport options are offered, whether or not it improves their access - e.g. a new bus route may be slower than using a car but has a 'value' if the car breaks down unexpectedly),*
- *severance (as new infrastructure may build barriers between local communities, or links may reduce barriers), and*
- *access to the transport system (meaning the public transport system).*

2.12 All these three relate fairly specifically to the effects of transport infrastructure rather than land use development, though the concept of option values is of use in determining suitable locations, and new developments may have positive or negative 'severance' effects. Of more general interest is the access to the transport system where an indicator is to be used which compares accessibility before and after the new proposed changes. The indicator measures:

the percentage of the population of who have access to a car or live within 250 m of a daytime hourly public transport service.

2.13 This indicator is relatively simple, but uses normative criteria as to what is acceptable. Its usefulness to land use planning, in this form, does seem rather limited.

#### *The role of accessibility in the New Approach To Appraisal (in Transport)*

2.14 Care should be taken in adapting these approaches to the needs for accessibility methodologies in land use planning. Somewhat curiously the GOMMMS guidance does not appear to assess the effect that the proposals will have on access to services, concentrating, apparently equally on severance, option values, and access to the public transport system, with new roads apparently likely to add to public transport access more than new public transport in many cases. Accessibility by different modes, to opportunities, or for freight, which are key concerns in land use planning are not specifically addressed.

2.15 The new approach to appraisal leaves decisions on how to weight the various criteria involved up to decision makers, and this is one of its strengths. By doing so it offers decision makers the choice to make their own judgements as to what is important, and what is not, but by placing around 25 different criteria alongside each other it may, in practice, imply that each should be given a comparable weighting. The approach has been criticised by some who argue that aspects such as integration with other policies are key to the decision made concerning a proposal - if it is not 'policy compliant' discussion about it should end there. Similarly, others argue that for transport infrastructure the effect on accessibility is of such importance that analysis of it should be more detailed, higher profile, and proposed infrastructure that does not bring accessibility benefits should not be considered (e.g. Cohen, 2000). These points raise issues that the National Assembly may wish to consider in its treatment of the role of accessibility.

#### *Scottish Transport Appraisal Guidance (STAG)*

2.16 Emerging guidance currently being prepared for the Scottish Executive by Steer Davies Gleave points to some of the above concerns about GOMMMS (in relation to transport projects), and suggests the concept of "base accessibility" relating to the effect that a scheme

would have on the base level of accessibility (defined in terms of those socially excluded by virtue of accessibility levels). Such an approach could be of use in terms both of determining where transport investment is needed, and in terms of land uses that should be encouraged in areas of low accessibility.

## **Scotland**

- 2.17 The principle of accessibility as the focus of transport policy was first established in Scotland in 1992 in the Government policy document Roads Traffic and Safety. This stated that: *"It is not the Government's policy to cater for all demand for transport but rather to ensure good accessibility for people and goods to all parts of Scotland."* The document included journey time isochrones showing how travel opportunities across the country had been changing and were anticipated to change further.

### ***"Travel Choices for Scotland"***

- 2.18 The concepts described above were built upon with the publication of the Scottish Integrated Transport White Paper "Travel Choices for Scotland". This was published at the same time as "The New Deal for Transport" and "Transporting Wales into the Future" but is more prescriptive than its English counterpart, and suggests policies for different types of area, based on, in part, their accessibility characteristics. These are;

- *Cities,*
- *Larger towns,*
- *Smaller towns and settlements,*
- *Remote communities, and*
- *Island communities.*

- 2.19 Accessibility is treated with similar importance to English and Welsh guidance, though more special reference is made to mobility and accessibility difficulties in remote areas.

### ***National Planning Policy Guidance 17 and Planning Advice Note 57 - Transport and Planning***

- 2.20 In Scotland, the main statutory requirements for integrating land use and transport planning are set out in NPPG17 and PAN57 (Scottish Office 1999). These documents specifically identify the need for accessibility analysis as follows:

*"When selecting appropriate sites for development, "accessibility profiles" are required for public transport, walking, and cycling."*

*"Within transport assessments proposed developments should be assessed in terms of both the potential and likely accessibility for people and freight by all modes. "*

*"New developments should be accessible to bus services, with indicative guidance that 50% of new housing should be within 400 metres, and 80% within 800 metres, of a 15*

*minute frequency bus service, with other developments generating over 250 return trips per day being similarly accessible."*

*"Programmes of traffic management should be developed which boost the "relative accessibility" of locations by discriminating between classes of road user."*

*"The approach to parking standards should be based upon securing adequate accessibility to sites by all modes."*

- 2.21 This is far more prescriptive than current guidance for either England or Wales, setting out some criteria by which accessibility should be measured. To support the practical application of these requirements guidance has been developed as set out below.

### ***Guidance on Accessibility Measuring Techniques and their Application***

- 2.22 The Scottish Executive commissioned a review of accessibility measuring techniques and their application, which was published in Autumn 2000. This represents one of the few government attempts in the last twenty years to review accessibility measuring techniques for transport and land use planning. Guidance was produced for those needing to measure or indicate levels of accessibility for different purposes. The guidance suggests "Key Steps" for practical techniques to measure accessibility for:

- *Accessibility by Walking and cycling,*
- *Public Transport Accessibility,*
- *Transport System Accessibility to Opportunities,*
- *Ratios of accessibility for different mobility groups e.g. comparisons of accessibility with and without a car, and*
- *Freight accessibility.*

- 2.23 The emphasis is on simple to use methodologies that can be applied to differing levels of data availability. This report is therefore taken as a major building block for the research that this study will carry out.

### 3. THE USE OF ACCESSIBILITY AND ACCESSIBILITY METHODOLOGES IN OTHER EUROPEAN COUNTRIES

#### ***Netherlands***

- 3.1 The Netherlands has developed its 'ABC' location policy during the 1990s which specifically uses accessibility and transport characteristics of different land uses to specify what types of development are appropriate where. This method is described in more detail in Section 5, and has become very well known in land use planning circles for its innovative approach. The approach is best known for the development of high density offices and other transport intensive uses in the localities in transport interchanges in locations such as central Den Haag.
- 3.2 It is, however, also used for residential development since 1990 for which it is known as VINEX (Martens and Griethuysen, 1999). In its early formulation land for housing was allocated either because it is an 'infilling' location in the existing urban fabric, or as 'expansion' locations where accessibility criteria such as proximity to a city centre, quality public transport connections, and commuter traffic characteristics were the prime determinants. This was criticised because of its focus on proximity rather than accessibility, and has been adapted somewhat.
- 3.3 While the outside world looks to the ABC policy as a goal, many in the Netherlands have been critical of it, and it has been reviewed over the last two years or so. The result of the review has been that the overall policy is sound. However, there have been concerns that while good results have been achieved for "A" locations, there has been less success in the B and C locations, and travel patterns to these types of development have not changed towards sustainable modes sufficiently.

#### ***Germany***

- 3.4 Germany has a greater degree of federalism than most European areas with greater autonomy in its regions. Accessibility has taken a specific role in much spatial planning, especially in the designation of 81 "development centres" (Hall, 1992). This is a joint "Lander" federal project, which aims to provide the whole country with a system of service centres following the principles of Central Place Theory, explicitly based on relating service function to accessibility across a wide area (Christaller, 1929).
- 3.5 At the more local level the *Gemeinden* are responsible for control of land use, and have wide ranging powers to plan and control the implementation of development, by which they can control the supply of building land. Practically all *Gemeinden* have an "F-Plan", which is the development plan for their whole administrative area and is binding on local authorities. (Brown et al, 1999)

## **Italy**

- 3.6 At the regional level, Italy suffers from a centre-periphery problem of rapid development around the North and relative stagnation in the South more than any other European country. Hall (1992) observes that most effort has been put into this problem and that *"As even the most casual visitor to the large Italian cities must notice, the planning machinery does not seem to have been equal to the problems it had to face"* at the more local level.

## **Spain**

- 3.7 At the national and regional level there is no guidance on the use of accessibility in land use planning. However, some regional and local authorities make accessibility studies that are used in planning, generally for new transport networks or for altering existing networks.
- 3.8 Periodically, public transport and private car accessibility analyses are made for all the areas of the Madrid region. Studies are also made to assess accessibility to major trip generators. The Consorcio Regional de Transportes de Madrid (the equivalent of the PTE) and the Health Authority of the Madrid Region are working on a project related to public transport accessibility to Health Centres and hospitals of the Region. Absolute accessibility indexes are used where possible but in some cases relative accessibility has to be used (with respect to the "ideal" accessibility that would have existed with a straight network design and under perfect conditions of accessibility and circulation).
- 3.9 Accessibility studies usually contain;
- *Analysis of population catchments for trip generators (hospitals, shopping centres, etc.) and/or bus stops and rail stations, etc.,*
  - *Analysis of journey times to trip generators and transport nodes using isochrone maps,*
  - *Analysis of the number of stages needed to reach locations.*

## **Ireland**

- 3.10 The republic of Ireland has adopted a planning system which is very similar to that in the United Kingdom, with local authorities having Development Plans (updated every 5 years), and planning decisions being decided by the development control system. Ireland has policies of urban and rural development, which take accessibility into account, but, as in many other countries, without supporting methodologies.
- 3.11 The Local Government (Planning and Sustainable Development) Bill 2000, is currently working its way through Parliament. The Bill provides for concepts such as Integrated Area Plans and regional strategic planning. The final text may also include references to national spatial planning. If the Bill is passed, it will have a large influence on future planning and natural resource management in Ireland. The Irish Government also gave a commitment in the 2000-2006 National Development Plan to prepare a National Spatial Strategy within the context of a more balanced regional development strategy. (Department of Environment (Ireland), 2000, and Brown et al, 1999)

## **France**

- 3.12 France has adopted a more centralised approach to planning than the UK, and with an assumption of a higher proportion of public sector development than has been the case in the UK in recent years. Forward planning involves regional plans that link major developments to transport systems, with, for instance new settlements planned around new transport infrastructure. Accessibility is considered in strategic terms at this level (though not always using specific methodologies to assess accessibility).
- 3.13 Development control relies on the implementation of the PLU (*Plan Locaux d'Urbanisme*) which regulates physical land use. The equivalent of a planning permission has to be presented to the local authority in order to build or extend constructions. If a commune does not have a PLU, development rights are restricted, in such cases development is usually only permitted in already built up areas. The planning system in France has changed from being predominantly a function of the State into a process where competence is shared between the State and local authorities. The system has become more complex in recent years, and the Structure Plan and the PLU must now make provision for the participation of Chambers of Commerce and Industry, Agriculture and other Trade Association during the plan formulation process. (Brown et al, 1999)

## **Greece**

- 3.14 Land use planning in Greece is a responsibility of YPEHODE (Hellenic Ministry for the Environment, Physical Planning and Public Works). The Ministry defines and controls land use, mainly approving the development plans suggested by the local authorities. Local authorities act according to their own judgement, the only constraint being laws that are relevant to their decision-making (e.g.: laws banning the construction of indoor parking areas in the historic centres of certain cities). Licences for developments are then only given for the uses already stated in the development plan.
- 3.15 Most of the planning process is concerned with facilitating car use. Accessibility comes in only in terms of requiring that the land to be used faces onto a fully constructed public road (i.e. including proper surfacing, though even this is often violated in practice). There are no concerns about the existence of public transport services. If there is no public transport serving the area, there are usually discussions between the local authorities, the community involved and the bus operator to press for their introduction. Operators, however, principally act in their own interest, since there are no regulations controlling routes, areas of service etc.

## **Denmark**

- 3.16 Due to a number of reasons, not least the relatively late urbanisation and industrialisation of their centres (Hall, 1992), Scandanavian countries have well developed city-region planning systems. There is a higher degree of public control over where development takes place than in the United Kingdom.
- 3.17 The 1948 'Finger' plan for Copenhagen based future development around transport corridors out of the centre, which would provide good accessibility to the centre for new development. Between these fingers a form of Green Belt would operate in the less accessible areas.

Following a faster than expected urban growth thinking in the 1960s suggested the idea of 'city sections'. These were self contained settlements along the corridors already developed, with high speed access public transport to the city centre for those would not both live and work in the new 'city sections', although debate about these proposals slowed their development. In the 1970s the idea of Transportation corridors involving both radial and orbital public transport corridors emerged - again with a strong emphasis on accessibility for the location of new development. The policy is described in Hall (1992) and in Hermansson (1999).

- 3.18 A goal of locating development near to stations is the main accessibility criteria used in land use planning in Denmark. This goal had been established regional policy for a number of years, but new location of business development seemed to counteract its effect. A study of location patterns for the Copenhagen region has found that regional authorities were lacking in "concentration" efforts, around existing urban zones, and specifically in locations near to stations.
- 3.19 Less than half of new development in years 1990-94, and correspondingly in a projection period up to 2000, happened or was expected to happen according to the goal set. This was clear for business developments and also - but less so - for housing. Efforts are being made to regulate shopping centres in edge of town locations.
- 3.20 The general planning framework quite closely resembles that of the UK. Every Commune (municipality) has to have a Commune plan showing where development should take place. A criticism of these is that they do not take account of neighbouring areas and thus suggest more land available than is needed, and, as a result, the 'steering' capability of the plan is reduced. Developers are able to choose from a very wide range of locations, so much development can, and does, take place in unsuitable locations.
- 3.21 The Danes often tend to be very self critical, possibly arising from the common sense and thought that they apply to their actions, and the level of open public debate in public affairs. These comments should be read in that light, having been provided by personal communication.

## **Sweden**

- 3.22 Like Denmark, Sweden formulated an early post war strategic city region plan for its capital, Stockholm. The 1952 plan was based around development at stations on an underground railway system radiating from several interchange stations in the city centre. Additionally, to avoid the urban sprawl that London had experienced in the 1920s following London Underground development, the new suburbs were planned on the principle of local pyramids of density. This allowed for higher housing densities around the stations, which would also become centres for shopping and other activities, according to a hierarchical principle. Thus walking and public transport accessibility were formulated as a conscious part of the plans. Centres were planned as "C" centres to serve populations of 10-15,000 people within walking distance, and "B" centres serving 15-30,000 people within walking distance and more by the underground system. Hall (1998) later commented that this plan was not wholly successful because of higher than expected car acquisition, showing that accessibility cannot determine travel behaviour.

## **Finland**

- 3.23 With the population density that Finland has, accessibility seems less of a concern than in many other countries, though it is apparent that thoughts on accessibility pervade land use planning exactly because of the large distances that would be involved with a 'badly sited' development. But like other northern European countries the role of a plan led system has been strong, with proactive land use planning and major public building the norm for urban expansion. Coupled with this, the traditional right of landowners to build on their land has led to much unplanned low density suburban expansion.
- 3.24 Finland has recently changed its land use planning system with its Land Use and Building Act of 1999. This gives local authorities more extensive powers, with land use plans no longer needing approval by the central government Ministry of the Environment. Local Authorities can define special 'areas of planning need', which are mostly on the periphery of more densely built up areas where "building under isolated individual decisions would prejudice planned expansion of the community".
- 3.25 Accessibility does not take a major role in written aims of policy, though it is implicit in many aspects of policy such as in-filling in urban areas rather than expansion, and concern for the closures of local facilities.

## **Accessibility in land use planning in European Countries - Summary**

- 3.26 Most countries adopt a system of land use planning that has broad similarities to that in the UK with some form of strategic planning, and with applications by developers fitting in to a greater or lesser extent with that plan. There are differing degrees to which the plan, or applications are the predominant force. The incorporation of accessibility, as in the UK, is generally done in a relatively "common sense" manner with relative accessibility taken to accord to broad factors of location such as "town centre", "suburban", or "on a public transport corridor".

3.27 In terms of methodologies used, isochrones, or travel times to key locations are the only indicators generally used. Where accessibility is quantified it is nearly always accessibility to or of transport networks that is considered. Some systems, such as the Dutch ABC policy use a simple form of multi-criteria approach to answering a series of questions relating to the accessibility of locations and matching these accessibility criteria with the mobility needs of development. Others use simple criteria such as developing in areas close to railway stations and other high quality public transport infrastructure. Some do not appear to consider accessibility at all in the ways which are currently being discussed as important in land use planning in Wales.