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chapter 1 Traffic Management and Sustainability

1.1 Introduction

Purpose

The purpose of this manual is to provide a source of information and guidance on traffic management issues. The manual has been prepared in line with current national and regional transport strategy guidelines that promote sustainability and accessibility through improvement to and better management of the transport system. The strategies will set the objectives for transportation and traffic management schemes (see 1.2) and this manual outlines the techniques and tools available to assist in the delivery of these objectives. For any given transportation/traffic management proposal it is important that the objectives are achieved using appropriate techniques

It is intended that this manual will provide assistance to a wide range of people including local authority officials, developers and Government Departments and agencies. It covers general best practice principles in the areas of traffic management and sustainability, road safety and traffic calming and land use planning and development. It provides guidance for engineers, planners, architects and policy makers working on behalf of local authorities, developers, government departments and also for An Garda Siochana. Chapters should not be read in isolation but in the context of the overall document.

Sustainability

The achievement of a sustainable environment and transport system is one of the greatest challenges facing us in the 21st century. This challenge has major implications for transport professionals.

At its simplest level, sustainability is about the consumption and management of limited natural resources in a way that meets the needs of today's world without compromising the needs of future generations. A principal challenge is to strike a more sustainable balance between protecting/ enhancing the environment and maintaining economic vitality.

Good and efficient transport links are vital for the economy of the country. However, the transport sector places huge demands on limited natural resources such as oil and is a major contributor to environmental pollution. In Ireland transport accounts for over 17% of national CO_2 emissions with three-quarters of this coming from road traffic. Levels of these emissions are rising[1].

The main challenges for the transport sector are to reduce the need to travel and to achieve more sustainable modes of transport that do not have such adverse environmental impacts, whilst maintaining economic vitality.

Economic growth and its impact on traffic

Since the early 1990s there has been much higher economic growth in Ireland than was previously encountered. Table 1.1 on the following page illustrates some of the effects of this.

The demand for travel has increased substantially since 1990. Most of the trips that have been generated have been taken up through the increased use of private cars. This has increased pressure on the road network and congestion has increased markedly.

Congestion costs business and industry millions of Euro every year. The increased pollution damages health and the environment. Congestion in the Greater Dublin Area has already led to a significant increase in peak hour journey times for private cars in 2000 compared with the mid-1990s.

Increasing congestion brings with it increases in concern about road safety. Public transport reliability and journey times suffer and the service can

deteriorate. This is known as the "Transport Vicious Circle" and is illustrated in Diagram 1.1.

Transport Planning Context

National transport policy since the mid-1990s has reflected concerns over sustainability.

The Dublin Transport Initiative[2] (DTI) Strategy was introduced in the early 1990s and is an integrated approach to transportation planning in the Greater Dublin Area. It is based around a broader vision of the area as a safe, thriving and attractive place in which to live, work, visit and socialise.

The DTI involved the production of a long-term transportation strategy (to 2011) and a mechanism for continuous review and revision linked to funding programmes. The DTI dealt with all forms of surface transport (road, rail, LRT, cycling and walking) as well as issues such as traffic management and enforcement. It also took account of related policy areas such as land use, economic development, urban renewal, employment and the environment.

In 1997, the Irish Government issued a document entitled Sustainable Development – A Strategy for Ireland[1]. This Strategy set out an agenda to "green" Irish transport, centring on:

- Making transport more efficient;
- Reducing the environmental impact and the intensity of transport; and
- Support for moves at EU and international levels towards examination and implementation of the internalisation of external costs in transport

Specific actions and initiatives which would be taken in support of these objectives to establish a basis for more sustainable transport included the following:
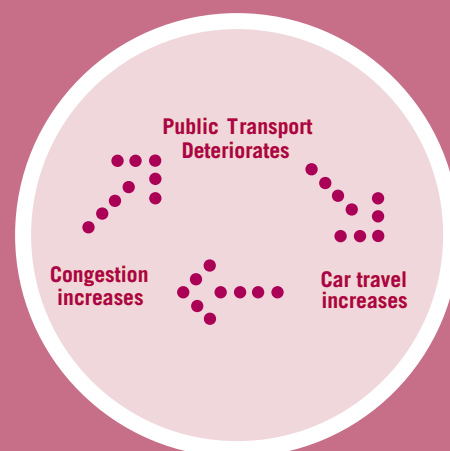
- Minimisation of potential growth in transport demand to be incorporated as a leading consideration in land use planning.
- Government policy and investment for road transport to support necessary economic growth. To this end, the roads programme to continue to target bottlenecks which represent inefficiencies in the infrastructural system.

Table 1.1 Effects of economic growth in the Greater Dublin Area

	1991	1997	2002*
Population (millions of persons)	1.35	1.43	1.5
Employment ('000's)	452	565	720
Cars ('000's)	334	440	615
Household Size	3.36	3.14	3
Motorised Trips ('000's)	172	250	396
Trips per Job	0.38	0.44	0.55

*Preliminary Estimates for 2002

Diagram 1.1 Transport Vicious Circle

Public Transport Deteriorates

Car travel increases

Congestion increases

■ Increased efforts to be made to manage the existing road network more efficiently.

■ Government policy to continue to support and improve public transport systems and infrastructure with a view to increasing their market share. Efficient, cost effective and customer focused development of the rail network to be supported for its economic, social, environmental and regional development benefits.

■ The agencies concerned, led by the Department of the Environment and Local Government and the Department of Transport to work together to provide more sustainable and environmentally-acceptable alternatives to private car transport, including better facilities for non-motorised transport and where feasible, improved public mass transport modes.

■ Implementation of the Dublin Transportation Initiative to be intensified.

■ Noise controls to be developed under the roads (or other) legislation to limit permissible noise form roads transport.

■ Opportunities for non-motorised transport to be improved. This will include increased provision of cycle lanes and safer facilities for pedestrians.

■ The Department of the Environment and Local Government and appropriate agencies, such as Dublin Transportation Office, to actively encourage greater public awareness of the unsustainable aspects of increasing use of vehicle transport.

There were many other actions and initiatives set out in the 1997 Strategy in respect of transport.

Against this background, there has been a major change in the emphasis in transport schemes in urban areas. Such schemes now seek to promote the more sustainable modes of transport such as walking, cycling and public transport. Considerable investment has taken place in recent years to combat the decline in these modes of transport.

In September 2000, the Dublin Transportation Office (DTO) published the outline of its integrated transport strategy in "A Platform for Change[3]". This document takes account of the Strategic Planning Guidelines for the Greater Dublin Area which were published in February 1999. The DTO's "Platform for Change" (the DTO Strategy) provides an overall planning framework for the development of the transport system in the Greater Dublin Area.

The National Spatial Strategy [4] (NSS) was launched in November 2002. It outlines in detail the approach to meeting the Governments objective for more balanced regional development over the next 20 years. It also sets out indicative policies in relation to the location of various types of development. The NSS will, in turn, provide a national level spatial policy structure to inform the making of Regional Planning Guidelines and Development Plans under the Planning and Development Act 2000. The development plan process in turn establishes the policy context for the assessment of individual development proposals under the planning code.

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1.2 Balancing conflicting priorities and making the right choices

There is a strong relationship between the 3 main attributes of a road network which are shown in Diagram 1.2:

- Function – the position in the road hierarchy or purpose of the road in relation to carrying through traffic or local traffic and in relation to adjacent land uses (see 1.3)
- Shape – the cross section of the road in relation to how space is allocated for different modes of transport such as pedestrians, cycles, buses and general traffic, as well as planting, loading/parking, lighting etc.
- Use – the actual behaviour of road users on a road rather than the design intention

It is important to achieve the correct balance between these factors in any design.
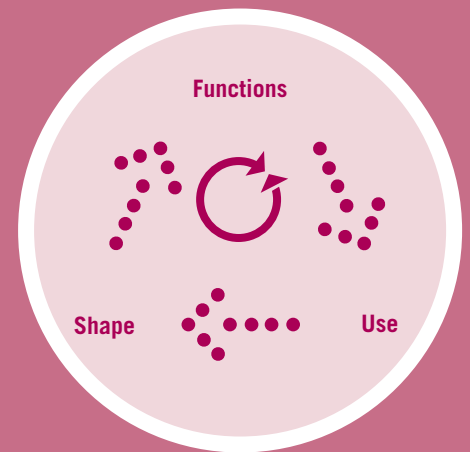
Objectives

Managing the transport network involves dealing with many different objectives. Some of the common ones are listed below:

- environment improvement
- congestion relief
- capacity improvement
- safety
- accessibility
- economic vitality
- politics

Inevitably there will be times when the priorities for each of these objectives within individual schemes could be in conflict with each other. For example the provision of a pedestrian stage at a set of traffic signals may help to improve safety and accessibility but could reduce the throughput of general traffic.

Diagram 1.2 Functions, Shape and Use Triangle

Functions

Shape   **Use**

Where choices are available, the public should be consulted over the options. The benefits and potential dis-benefits of options should be explained clearly in order that an informed decision can be reached.

1.3 Managing travel, promoting public transport and the movement of goods

The principal objective of those involved in transportation planning and traffic management is to organise the safe and efficient movement of people and goods. In the past this has been sought primarily through planning for and providing for vehicle movements on the road network. This resulted in the development of a philosophy of predicting future traffic levels and providing road space accordingly.

In countries such as Holland and Germany significant emphasis has been placed on providing high quality public transport and cycle facilities since the 1970's. In Ireland, by comparison, the development of cycle facilities and public transport services has only commenced in earnest, in recent years.

Managing the movement of people and the role of public transport

The private motor car has brought benefits to many people including greater personal freedom and mobility. It is likely to continue to be the most popular means of travel for many journeys for the foreseeable future. However there are questions about its sustainability in the longer term.

Increasing demand for travel by car in large urban areas cannot be accommodated. A more sustainable alternative for these situations is now required.

This has resulted in the need to manage travel options by planning for the travel needs of individual people rather that the needs of their individual vehicles.

A modern bus can carry around 80 passengers in no more road space than two or three private cars so it is considerably more efficient in terms of moving people. Cyclists occupy very little road space and do not use fuel. Cycling provides healthy exercise and does not damage the environment and is an attractive

Bus priority measures

On-road cycle tracks

transport option for short trips. There are strong economic and environmental arguments for giving priority to these more sustainable modes of transport in our network management strategies.

New development should promote accessibility by public transport, cycle and on foot.

Travel management has a role to play in providing the infrastructure to ensure that viable alternatives to the private car are put in place. It should also highlight the alternative modes of travel that are available to the population as they prepare to make their trips.

Managing the movement of goods

As well as managing the movement of people, it is necessary to manage the movement of goods. In the Greater Dublin Area moving goods presents huge logistical problems to the industries and commercial activities that rely upon them for their trade and prosperity. The efficiency of that movement is ultimately reflected in the cost of goods and services to the whole community. However, the intrusion and damage caused by the presence of large commercial vehicles in those areas of the city where the road network is totally unsuited to their presence also adds costs and dis-benefits to the community.

The provision of new or improved road links to essential areas of commercial activity that cannot easily be relocated is a first step to managing goods movement. It allows steps to be taken to introduce legal restrictions designed to remove large vehicles from inappropriate streets and to balance the use of streets between loading and other functions.

Emergency service requirements

All traffic management techniques must take into account the legitimate requirements of the emergency services. Unnecessary delays in their response times can have serious consequences for users of their services. The emergency services' views on all traffic schemes should be sought and taken into account wherever possible (See also Chapter 6.3).

Diagram 1.3 Weight Restrictions

Weight Restriction

Weight restriction signs

Area weight restricted

A modern bus can carry around 80 passengers in no more road space than two or three private cars so it is considerably more efficient in terms of moving people. Cyclists occupy very little road space and do not use fuel. Cycling provides healthy exercise and does not damage the environment.

Streets as living space[5]

Streets in urban areas serve many different needs:

■ access to property

■ areas to socialise

■ leisure and play for children

■ shopping

■ through traffic

■ servicing (loading & parking)

Street Functions

It is only in the last few decades that the car has come to dominate every street. Streets are (or ought to be) living spaces, an integral part of the community and the focus of many activities that link together people's lives. The way in which streets are managed and used promotes or discourages a sense of community and makes them an attractive or unattractive place to live.

While certain levels of traffic for access and serviceability can often be accommodated, increasing pressure for parking and movement capacity for vehicles at the expense of other considerations has diminished the vitality and attractiveness of many areas.

This imbalance must be reversed if urban communities are to revive and prosper. Planners and engineers must take the lead in this process.

The introduction of a road hierarchy and the management of traffic onto appropriate roads is a fundamental step in this process.

Closing residential roads to through traffic may be a difficult process but it is a necessary one if future generations are to regain the freedom to consider the roads outside their homes as an integral part of their living space rather than barriers to movement for residents.

1.4 Enforcement

An Garda Siochana has an essential role and responsibility with regard to managing traffic and road safety. The objective of

Streets as a living space

> The way in which streets are managed and used promotes or discourages a sense of community and makes them an attractive or unattractive place to live.

traffic policing is to assist in the safe movement of all road users. An Garda Siochana take control of traffic in emergency situations or when traffic congestion occurs and requires their intervention to resolve the problems. They are responsible for enforcing the traffic legislation, including infringements which relate to:

■ speeding

■ parking

■ driving under the influence of drink or drugs

■ vehicle safety

■ general road user rules and regulations.

They must be consulted over the positioning and use of regulatory signs prior to their installation. They should also be consulted over scheme proposals that are likely to effect their enforcement role e.g. traffic calming schemes.

An Garda Siochana attend the scene of road accidents and manage any temporary traffic arrangements required. They record the details of road traffic accidents which are kept on a national database for statistical and accident investigation purposes. In 1997, the Garda Commissioner established a dedicated National Traffic Policy Bureau within An Garda Siochana to prioritise and co-ordinate Garda action for road safety. An Garda Siochana are also represented on a High Level Group on Road Safety which promotes co-ordination between a number of national agencies involved in road safety. This High Level Group is chaired by a representative from the Department of Transport and also has representatives from the Department of Health and Children, Department of Justice, Equality and Law Reform, Irish Insurance Federation, Medical Bureau of Road Safety, National Roads Authority, National Safety Council and County and City Managers Association. Recent experience of (local authority led) clamping, and the introduction of penalty points, would indicate that penalties directed at mobility are providing the most successful methods of enforcing traffic management restrictions and regulations

1.5 Demand management

Managing the demand for travel is a key element in reducing congestion and the adverse impacts of vehicular traffic on safety and the environment. It involves providing and encouraging alternatives to car use for those who have a real choice in how they travel. Travel managers can help to develop demand management policies as part of their involvement in providing better road facilities for public transport, cyclists and pedestrians. If the demand for travel by private car is left unchecked then congestion will continue to increase. Journey times will increase and the peak hours for traffic will get longer and longer. Safety and the environment will suffer. The economic prosperity of town and city centres will suffer.

Demand management involves implementing strategies and measures aimed at influencing the choice of mode and time of travel for people's journeys. It also involves strategies to reduce the distance that people travel and their need to travel (See Diagram 1.4, next page).

The benefits of managing travel demand are summarised in Table 1.2 (next page).

A wide variety of techniques is available to assist in managing the demand for travel. The main techniques can be split into five broad categories and are shown in Diagram 1.5 and Table 1.3:

■ planning and development

■ financial

■ technology

■ traffic management

■ travel management plans

Many of the demand management techniques shown in Table 1.3 are dealt with in subsequent chapters of this manual.

The others are discussed briefly below:

- **Planning and development** – Planning policies affect the development of land and the traffic it generates. Policies should aim to reduce the length of journeys and the need to travel. Policies should promote sustainable modes of travel (public transport, cycling and walking). Policies can reduce the number of existing parking spaces, control standards for new developments where appropriate and encourage Green Travel Plans

- **Financial** – Congestion charging and road pricing are mechanisms to charge motorists for the use of particular roads at specific times of day or days of the week to encourage more sustainable modes of travel. Fuel pricing is a more general tool for achieving a reduction in car usage. Levies on workplace and private non-residential parking spaces are also forms of road pricing but they would require new legislation. Subject to certain conditions, it is now possible to obtain tax relief on the purchase of annual bus or rail tickets. This is based on a provision of the Finance Act, 1999.

- **Technology** – Home-working involves working from home or a satellite office closer to home, often with electronic links via computers. This reduces the need to travel to work. Camera enforcement can be used to minimise infringements of traffic laws such as bus lane mis-use, red light running and speeding

- **Travel and mobility management plan** – Examples of this type of plan are Company and School Travel Plans[6]. Such plans encourage employers or organisations such as schools to prepare and implement travel plans. The purpose of these is to encourage their employees (and pupils) to travel in a more sustainable way. They require substantial encouragement and support from road and planning authorities in order to implement them effectively. They may be conditioned as part of a planning application for development of appropriate sites.

Travel Plans should seek to encourage:

- home-working (where appropriate)
- car sharing
- public transport use
- cycling and walking
- cycle parking facilities and links to major bus stops and interchanges
- good access for road users with a mobility impairment.

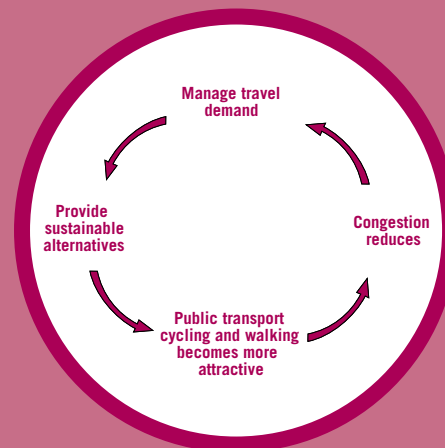Diagram 1.4 Reversing the transport vicous circle
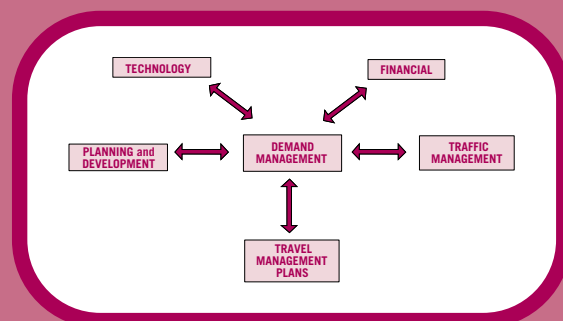

Diagram 1.5 Demand management

Table 1.2 Benefits of Demand Management

- Reduces the dominance of the car in sensitive areas
- Reduces reliance on the car for all journeys
- Reduces congestion
- Improves economic efficiency
- Improves peoples quality of life by improving the local environment
- Improves the attractiveness and vitality of our towns and cities
- Improves safety for all modes of travel
- Increases the use of public transport

The DTO will be providing guidance on Safer Routes to School following assessment of pilot projects in the Greater Dublin area.

It may be appropriate to set targets for each mode of travel in order to demonstrate a reduction in car usage.

Consideration should also be given to:

■ the introduction of a car park management plan which gives priority to essential users and car sharers

■ providing incentives and subsidies such as interest free loans, to encourage walking, cycling and public transport

■ provision of showers, lockers, secure cycle stands and shelters

■ curtailing incentives that encourage car use

Such travel plans can be made attractive to schools and businesses because they can;

■ ease pressure on parking facilities

■ save time and money on car-based travel expenses and provision of workplace parking spaces

■ encourage a fitter, healthier staff

■ encourage children into more sustainable travel habits that they can take with them through their life

TABLE 1.3 DEMAND MANAGEMENT TECHNIQUES

Category	Type of measure	Comments/Reference
Planning and Development	Reducing the need to travel through land use planning Sustainable development policy Mixed use developments	This Chapter This Chapter This Chapter
Financial	Fuel pricing Congestion charging or road pricing Workplace parking charges Private Non-Residential (PNR) parking charges Tax relief on annual travel passes	This chapter This chapter Section G, Chapter 16 Section G, Chapter 16 This chapter
Technology	Home-working (Teleworking) Telematics Urban Traffic Control (UTC) and network protection Camera enforcement	This chapter Section H, Chapter 19 Section D, Chapter 10 This chapter
Traffic Management	Infrastructure for sustainable modes of travel – Public transport (including Park and Ride) – Promoting walking – Cycle facilities Traffic restraint measures – Road closures – Traffic calming – Reallocation of road space (for walking, cycling and public transport) Control of parking Truck Routes	 Section F, Chapter 15 Section E, Chapter 12 Section E, Chapters 12 and 14, Provision of cycle facilities, National manual for urban areas Section C, Chapter 6 Section C, Chapter 6 Section C, Chapter 6 Section G, Chapter 16 Section H, Chapter 17
Travel Management Plans	Mobility Management (Green Travel Plans) School Travel Plans	This chapter This chapter

1.6 Road hierarchy

As identified earlier, roads and streets are often multi-functional. The traffic function of each road and street in the network needs to be identified and agreed. In planning travel and movement management strategies for the future, the definition of a road hierarchy is vitally important. It is not appropriate to assume that all roads should be available for all classes of vehicles and traffic. Traffic should be managed onto appropriate roads. The historical failure to do this has resulted in through traffic using residential streets unsuitable for this purpose. This in turn has led to safety and environmental problems.

The classification of the existing road network into a hierarchy helps traffic managers to decide the principal role of each road in the network in relation to general traffic. It assists in strategies for determining measures to manage traffic onto more appropriate roads.

The Roads Act, 1993[7] designates three classifications for roads:
- national
- regional
- local

The power to designate National and Regional roads now rests with the Minister for Transport. Road Authorities can divide local roads into sub-classes and rural local roads are normally divided into local primary, local secondary and local tertiary roads.

In an **Urban context** Primary Distributor roads can be considered to fulfil the role of **National routes.** For the purposes of this document it is convenient to divide **Urban non-national roads** into the categories of District Distributor, Local Collector and Access Roads.

Urban road classification

Descriptions for different Urban road classifications (in terms of function) are set out below:

■ Primary Distributor Roads

The predominant role for primary distributor roads is to serve long distance traffic. In new designs, such roads cater for fast moving long distance through traffic with segregation between vehicles and cyclists/pedestrians and no frontage access. In many cases these new roads are designed as Urban Motorways. However most existing primary distributor roads have to cater for mixed use traffic in many cities and it is only with the completion of Ring Routes about the cities that these roads can be re-designated in terms of classification and function.

■ District Distributor Roads

These roads provide links between local districts within urban areas. Whilst they are important traffic routes they can have significant movements of buses and cyclists along them (segregated or on-road) and pedestrians crossing them where there are schools, shops, offices and businesses. Positive measures for pedestrian safety may be required and assistance for cyclists by way of cycle tracks and junction facilities for cyclists may be required where alternative cycle routes are not available.

■ Local Collector Roads

These roads provide for local journeys and provide links to major routes. Many such roads will have residential and commercial access/frontage and there will be significant movements of pedestrians and cyclists. Designs should not provide unnecessarily wide roads since these encourage higher speeds which can cause problems for the movement of pedestrians and cyclists and lead to accidents.

■ Access Roads

Designs should aim to keep vehicle speeds low (20mph or less) and allow vehicular access to

property and also allow for delivery of goods and servicing of premises. Segregated cycle tracks should not generally be required and pedestrians should have considerable freedom for crossing such roads. In some circumstances shared pedestrian/vehicular areas may be appropriate.

1.7 Land use planning and development

The impact of land use policy on travel

The way in which land is used and developed has a major influence on travel demands and patterns. For example, if the places that people live are not close to where they work, shop etc. then the length of journeys will increase and there is likely to be less choice in terms of their mode of travel.

The development of retail and business parks on the edge of urban areas creates attractive places to shop and to work. Although these developments increase the general economic vitality of the area, they also place heavy travel demands on the transport network. In many cases there has been little alternative for the majority of people but to use their car as the primary means of access. These people-intensive developments may not be well served by convenient public transport links and their comparatively distant location from where people live discourages walking and cycling.

The cumulative effect of this development location policy has been to increase the demand for travel and the length of journeys undertaken. It has also led to the overloading of the road network. Options to reverse this process include (1) promoting more compact and less car dependent urban forms and avoiding a dependence on out of town destinations for employment, retailing and other activities. (2) investing in better public transport links to these development locations or plan for new communities around them. (3) providing cycling and walking networks linkages to the catchment.

Sustainable land use policy

A more sustainable development and land use policy would seek to:
- reduce the growth in the length and number of motorised journeys
- encourage alternative means of travel which have less environmental impact
- reduce the need to travel

In order to achieve a more sustainable land use policy, consideration needs to be given to locating developments that generate significant amounts of travel where there are viable alternatives to car use.

For example, the Netherlands operates a policy with these aims: the ABC location policy[8].

A – Match people intensive land uses (such as residential, retail and office) to areas with good public transport links (bus and rail), easy access by cycle or on foot. Limit parking, support by Park and Ride facilities on feeder routes.

B – Commercial services, sport and recreation should be located at transport interchanges in a district centre, at a bus interchange or near a main road. Discourage parking.

C – Goods intensive uses should be located on main roads at the edges of urban areas and near motorway intersections.

By regulating land use more in line with these principles and improving public transport, walking and cycling links, it is possible to reduce the number and length of trips that need to be made by private car in favour of more sustainable modes. Together with the promotion and adoption of Green Travel Plans for new developments, this could help to reduce the adverse impacts of car usage that are becoming apparent.

Planning authorities should consider this type of sustainable development location policy and promote the implementation of Travel Management Plans when considering planning applications.

Integrated Framework Plans.

Integrated Framework Plans are used to make recommendations for future development type, use mix, density and optimum layout. Higher density development is focused along public transport corridors and employment intensive sites at public transport nodes. Better use of open space and implementation of green corridors to accommodate cycling and pedestrian routes are also identified. These studies are carried out within local Area Action Plan framework and are therefore local area based.

The inextricable link between land use and transportation is identified throughout the Dublin Transportation Office's "A Platform for Change", and most particularly in its "Guidance on Complementary Land Use Policies". The Dublin Transportation Office (DTO) Strategy is complementary to the Strategic Planning Guidelines, and provides the transportation detail for the Guidelines. Each of the Development Plans in the Greater Dublin Area (GDA) has taken into consideration the objectives of the Strategic Planning Guidelines, in accordance with the Planning & Development Act, 2000.

In the Greater Dublin area, the DTO works with the individual local authorities on the integration of the strategic transportation network with land use needs at a local level. In this regard, a number of land use and transportation consultants have been commissioned jointly by the DTO and Local Authorities to carry out "Integrated Framework Plans (IFP's)".

The Integrated Framework Plans aim to encourage the development of land use transportation plans for major development centres in the Metropolitan and Hinterland areas. The plans aim to identify both current and future trip demands generated within these centres and provide a land use and transportation solution consistent with the policies and objectives of the DTO Strategy.

The IFP will look at existing and future zoned land uses and development within the town or district centre and examine traffic movement patterns. Based on the results of this study, the Framework Plan makes recommendations to provide better access for pedestrians, cyclists, local buses and cars. It also makes recommendations for land use development to enhance job opportunities and create better living environments for existing and future residents. The intention of the IFPs is to plan for land use development which will maximise the potential for walking, cycling and public transport.

The IFP will be incorporated into the review of the development plan and will guide future land use development and transportation investment. The Framework Plan and will also identify the following:

- a local bus network to cater for existing and future trip demand.
- significant pedestrian and cycle networks and priority in residential areas and in the town centre.
- identify land uses at appropriate locations and densities to complement the proposed walk and cycle network.

1.8 Layout and design of residential areas

Historically, residential development has tended to centre itself on transport links and centres for trade and commerce.

In recent decades the growth in residential development has been centred primarily on access by road. Housing layouts have been dictated by road hierarchy considerations based around the movement and parking requirements of motor vehicles.

Design consideration for motor vehicles has come to dominate the shape and layout of developments. This has often been to the detriment of other road users and there are many examples where the road design and speed of traffic has discouraged pedestrian and cycle movement because of concerns over safety. It has also led to the creation of areas that are too similar and lack their own sense of local identity.

New developments should seek to create high quality areas with a sense of local identity and community. The design and layout of roads needs to be integrated into the development in a way that is sensitive to the local development rather than to dominate it.

Both the development plan and development control processes should also ensure that new developments are highly permeable in terms of the ability of public transport modes such as buses, and pedestrians and cyclists being able to move through and between adjacent housing developments. Mechanisms such as dedicated bus routes and car restraint measures can place sustainable transport modes at an advantage over the car in accessibility and travel times if their needs are integrated at the design stage. In particular, examples here would include ensuring that local bus services can access the entire development without entering circuitous and time consuming cul-de-sacs. Connections between housing developments by bus only routes could offer faster ways for buses to

access residential areas thereby contributing to offering a real alternative to car based transport.

Developments should encourage walking, cycling and easy access to good existing or improved public transport links (through developer contribution where appropriate). Within new residential developments most roads fall into the "access" category of the hierarchy. The main roads into and out of these areas are generally local distributor roads. Within the access category there can be a number of different road types depending on the size and nature of the development. The road type varies with the number of dwellings that each road serves.

Some common types are:
- **Pedestrian and cycle only links** – These are routes (free of motor traffic) that are provided for pedestrians and cyclists, to link various parts of a development. They should provide convenient and direct routes and offer more convenient movement around an area than by motor vehicle.
- **Bus only links** – These can be created to allow public transport better access into an area, whilst restricting use by through traffic.
- **Major access roads (or link and feeder roads)** – These are the main links within the housing areas serving between 100 and 300 residential dwellings. However some UK design guides allow up to 700 residential dwellings off this type of road. Speeds should be physically constrained by the road layout to 30 mph (and 20 mph where possible). Bus lanes should be considered for these roads in the absence of any dedicated bus facility to the main road.
- **Minor access roads (or, mews, courts and squares)** – These generally serve small groups of houses, up to 50 dwellings. Speeds should be physically constrained by road layout to 20 mph. Some of these will have a shared surface for vehicles and other road users.

Design guidelines

Local authorities can publish guidance on how new housing developments are to be designed. This should contain guidance on general layout and design of residential roads and footways/cycleways. This will help developers, planners, architects and engineers to create high quality, safe, sustainable developments.

A number of design guides have been published by local authorities in the UK and are included as references at the end of this chapter. These could form the basis for such guidance but they would need some modification to reflect local and national differences in layout and design of housing, use of materials, local parking and garage use etc. to achieve a sense of local identity.

Developers should provide a conceptual or preliminary design for larger residential developments (100 dwellings or more). This will allow planning and roads authorities to check (at an early stage) that the development is well integrated into the surrounding area and that the road layout is safe for pedestrians and cyclists as well as vehicles.

The preliminary design should include:

- consideration of the main points of access for pedestrians, cyclists, emergency vehicles, public transport, service vehicles and private motorists.
- walking and cycling routes to local facilities such as shops, health centres etc.
- consideration of provision for low design speed (including 20mph) and facilities for pedestrians and cyclists
- any off-site road improvement works, public transport, cycling and walking infrastructure that will be required
- impact on the existing road network in terms of environmental and travel issues (see Assessment of Traffic and Environmental Impacts, Chapter 1.11)
- lighting and landscaping for walking and cycling routes
- the location, amount and impact of car parking
- cycle parking (private safe cycle parking is essential)
- visitor parking for cars and for bicycles

Housing layout dominated by road layout

High quality development with a sense of local identity

Housing development and density

New housing should, where possible, be located:

- in central locations within existing urban areas on vacant, derelict land or through the improvement or redevelopment of existing sites (brownfield sites)
- close (within walking and cycling distance) to employment, leisure, education and shopping facilities
- where there are good public transport links
- as part of high quality mixed use developments

This policy will help to reduce the impact of the development on travel demand.

Guidelines for planning authorities on Residential Density[9] was issued by the Department of the Environment and Local Government in September 1999. This document indicates that in areas well served by local facilities residential densities can be increased (35–50 or more dwellings per hectare) providing that they have good public transport, walking and cycling links.

1.9 Commercial developments

Commercial developments can be made up of a mixture of industrial, retail, business, warehouse and office uses. Many of the design principles for residential roads are applicable to commercial developments. However they differ in that commercial developments will have to cope with larger numbers of long and heavy vehicles.

Pedestrians and cyclists will still wish to get to and from work in these areas so the developments need to be designed in a way that does not create conflict between vehicles and more vulnerable road users. It is appropriate to design for low speeds and incorporate appropriate traffic calming measures but corner radii and road widths will need to be suitable for commercial vehicles (see Section D, Chapter 8).

On-street parking should be discouraged and off-street parking facilities should be provided within developments limited to the intended level of car use.

Good public transport access and facilities should be provided.

Design guidelines

As with housing developments, local authorities can publish guidance on how new commercial developments are to be designed.

Again, a number of design guides have been published by local authorities in the UK and are included as references at the end of this chapter. Some modifications to reflect local and national differences in layout and design of commercial estates would be required.

Conceptual or preliminary designs should be provided to the local authority by developers for developments on parcels of land in excess of 1.2 hectares. These will allow planning and roads authorities to check at an early stage that the development is well integrated into the surrounding area and that the road layout is safe for pedestrians and cyclists as well as vehicles.

The preliminary design should include:

- consideration of the main points of access to the development for vehicles, pedestrians and cyclists
- consideration of provision for a low design speed and facilities for pedestrians and cyclists
- any off-site road improvement works, public transport, cycling and walking infrastructure that will be required
- impact on the existing road network in terms of environmental and travel issues (see Assessment of Traffic and Environmental Impacts, Chapter 1.11)

1.1O Mixed use developments

In order to reduce the need to travel it is important to provide as many facilities as possible locally. Mixed use development can help to achieve this by promoting developments that encompass living, working, education, shopping and leisure facilities in the same locality. Some attempts at such developments have failed in the past because of poor delivery and has led to unattractive and unsafe surroundings. High quality provision and the right mix of facilities are required to make this approach successful.

In providing mixed use developments it is important to segregate access for vehicles to commercial areas from residential areas. It would be inappropriate for significant numbers of commercial and other motor vehicles to drive through residential areas to access commercial areas.

The degree to which mixed uses can be incorporated into a development will depend very much on the scale of the development and its location in relation to other local facilities. Larger scale developments are more viable for mixed use.

1.11 Assessment of traffic and environmental impacts

Traffic Impact Assessments (TIAs)[10] and Transport Assessments

Traffic Impact Assessments were used to assess the impacts of developments on the surrounding road network. In the UK there is increased emphasis on accessibility by walking, cycling and public transport, and TIAs are being replaced by a new more inclusive process called Transport Assessments (TAs).

Even modest size developments can have a significant effect on travel demand and capacity of the surrounding transport links. (Invariably, new developments will always impact on the pedestrian route at the front of the development, for instance). In such cases it is considered appropriate that developers should provide a full detailed assessment of how the trips to and from a development might affect the road network and public transport links (including rail and LRT if appropriate).
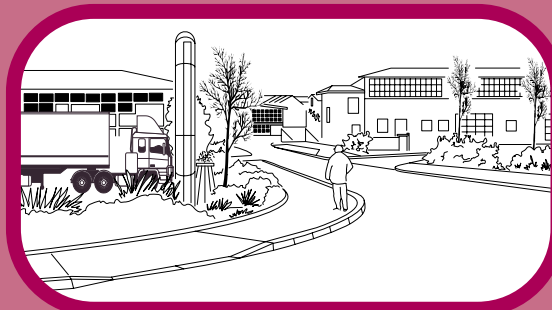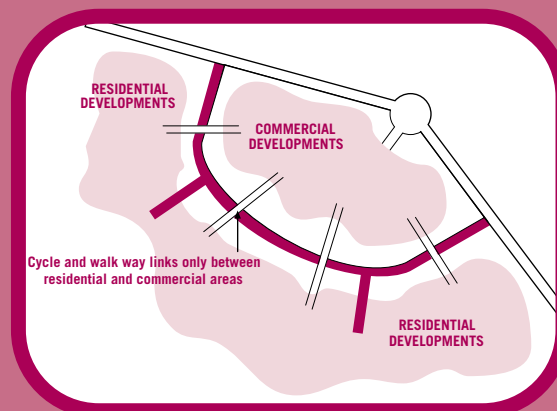
Diagram 1.6 Commercial Developments

Diagram 1.7 Mixed use Development

RESIDENTIAL
DEVELOPMENTS

COMMERCIAL
DEVELOPMENTS

Cycle and walk way links only between
residential and commercial areas

RESIDENTIAL
DEVELOPMENTS

With the changing emphasis on promoting the more sustainable modes of transport it is important that this considers all possible modes of travel, not just vehicular transport.

Transport Assessments provide a framework for such studies and should be an impartial assessment and description of both the positive and negative impacts of the proposed development.

There are three key steps in the process:
1. Determination of the need for a TA
2. The scope of the TA
3. The preparation of the TA report

It is necessary to decide which developments should be subject to a TA. One of the simplest ways in which to do this is to set thresholds above which a TA is automatically required. This does not mean that occasional sensitive developments that do not meet these thresholds should not be subject to a TA if considered appropriate.

The scope of the assessment should be agreed between the developer and the planning and roads authorities. This is normally achieved by carrying out a scoping study. This study normally sets out the following information:
■ details of data to be collected
■ extent of the area to be considered
■ key junctions to be considered
■ methodology of the study
■ year of assessment

The scoping study helps to set out the basis for the full study and pinpoint any potential areas of difficulty, at an early stage.

Table 1.4 Thresholds for Transport Assessments

– Traffic to and from the development exceeds 10% of the traffic flow on the adjoining road
– Traffic to and from the development exceeds 5% of the traffic flow on the adjoining road where congestion exists or the location is sensitive
– Residential development in excess of 200 dwellings
– Retail and leisure development in excess of 1000m^2
– Office, Education and Hospital development in excess of 2,500m^2
– Industrial development in excess of 5,000m^2
– Distribution and warehousing in excess of 10,000m^2

It is necessary to decide which developments should be subject to a TA. One of the simplest ways in which to do this is to set thresholds above which a TA is automatically required. (see table 1.4)

The full TA study is then carried out in accordance with any relevant local guidelines that have been agreed. It should consider the items below in an integrated manner:

■ a description of the existing conditions at the site
■ a description of the proposed development
■ details of the modal choice and trip attraction
■ trip distribution and assignment
■ assessment timescale
■ road impacts including access points
■ road safety
■ internal layout
■ parking provision
■ public transport
■ pedestrians/cyclists/people with disabilities
■ junction design
■ alternative forms of junction layout

Environmental Impact of road traffic for new developments

Developments can have significant impacts on the environment. There is a need to balance the environmental consequences of a development with the economic benefits that the development brings.

Assessments of environmental impact provide a framework for the analysis of a wide range of local environmental impacts arising from new developments. They should be carried out at an early stage to allow alternative arrangements to be considered. It is important that they are carried out in a comprehensive and consistent way.

Environmental Impact Statements (EIS) are mandatory for developments such as housing developments with more than 500 dwellings, motorways, busways, new or widened 4 lane roads which are more than 500 metres in length in an urban area and for many other major developments.

Even where an EIS is not mandatory it can be useful to use the EIS requirements as a framework for examining proposals.

EIS requirements for road schemes are set out in the European Communities (Environmental Impact Assessment) (Amendment) Regulations, 1999 (S.I. No. 93 of 1999)[19]. While similar in content, EIS requirements for other developments are covered by different legislation and the requirements are set out in Schedules 5,6 and 7 of the Planning and Development Regulations, 2001[20].

The Environmental Impact Assessment methodology can be used to assess developments if considered appropriate irrespective of whether or not an Environmental Impact Statement is legally required.

It is beyond the scope of this manual to consider in detail this procedure but some of the commonly used procedures are listed in the references at the end of this chapter.

Some of the common impacts to be considered are:

■ noise
■ vibration
■ visual impact
■ severance
■ road user delay and amenity
■ safety and accidents
■ air pollution
■ dust and dirt
■ ecology
■ heritage and conservation
■ flora and fauna

A Traffic Plan should form part of the transportation planning process.

1.12 Traffic Planning

The planning and management of traffic in cities and provincial towns is becoming an increasingly urgent and necessary job. Many towns and urban areas have in the past developed without sufficient attention being given to planning for traffic and managing its effects.

Conflicting objectives of commercial vitality, ease of access/movement, safe environment for all users, residential/environmental amenity can make this process difficult to manage. However with the population set to increase to 4.5m by 2015, and the direct link between economic growth and transport demand it is essential to plan and manage traffic demands in our towns and urban areas if they are to thrive.

There are also very clear road safety reasons for managing and controlling traffic in urban areas. Recent Dublin data suggests that approximately 75% of all fatalities and approximately 43% of all injuries in urban areas are vulnerable road users (Pedestrians, motorcyclists, or pedal cyclists).

It is useful to define what is meant by the following traffic terms:

Traffic Management:

Involves the daily management of the traffic network and the development of programmes and projects which are compatible with the longer term Traffic Plan. Traffic networks should be designed and managed in accordance with the Functions, Shape and Use approach. See section 1.2. Management techniques should include the following:

- Network control (in terms of use of traffic lanes, junctions, traffic signals and roundabouts and possible use of UTC systems)
- Provision of facilities for pedestrians, cyclists, mobility/sensory impaired, public transport, HGV's and taxis as appropriate

- Enforcement of regulations
- Restraint measures - physical, parking, charging, area controls
- Traffic calming / speed management
- Use of pedestrianisation / pedestrian priority streets
- Parking provision for cars (including disabled), bikes, motorbikes, bus and trucks)
- Loading/Servicing /emergency vehicle facilities
- Camera – enforcement/remote monitoring
- Prioritisation of Objectives – not everything can or will fit
- Monitoring and measuring against objectives

Traffic Plan:

A Traffic Plan should form part of the transportation planning process. It should be focused on best use of existing assets (rather than building new alignments). It should be a plan with the following:

- 3-5 year horizon
- Compatible with the County Development Plan
- Multi-modal
- Objective-led

It is often necessary to undertake certain studies to assist in the task of planning for the future. The two main types of study are Traffic Studies and Land Use / Transportation Studies:

Traffic Studies

Traffic Studies should be carried out with the objective of finding short-term solutions and setting medium term goals to improve traffic circulation, pedestrian, cycle, and public transport facilities in an urban area. They should also focus on improving the town centre environment for business, retail and living purposes. They should examine current traffic management policy and recommend implementation of new policy where appropriate.

Depending on the size of the area under study it may be useful to develop traffic simulation and prediction models, however this is often not necessary for

smaller towns and conurbations (for a population of less than 30,000). A Traffic Study should however as a minimum include the following:

■ Traffic and junction counts
■ Pedestrian counts
■ Parking Survey (no, location, duration, level of enforcement)
■ Loading/Servicing surveys
■ Traffic signal assessment
■ Survey of public transport facilities and needs
■ Maps indicating networks for each model

Outputs from a Traffic Study should include:

■ A Traffic Plan with phased implementation
■ Costings for all proposals
■ Population/traffic growth predications
■ Assessment/comments on current Development Plan
■ Identification of future transport needs

Regional Land Use / Transportation Studies:

These studies are strategic in nature and, usually require the development of a simulation model of the area under study. Their objective is to establish the longer-term land use and transportation needs of the area under study. They review the current Development Plans and identify proposals and needs for the study area over a 20-30 horizon. They should examine current Land Use/Transportation Policy and recommend the adoption of new policy where appropriate.

It can be useful to carry out a Traffic Study after the Land Use/Transportation Study as one can feed into the other and will result in a short-term implementation strategy with a view to the longer term objectives.

IFPLUTS (Integrated Framework Plan for Land Use and Transportation) is concerned with sustainable growth in development centres within the context of a regional LUTS strategy. Information on Integrated Frameworks Plans can be found in Chapter 1.7

1.13 References

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12. Highways in Residential and Commercial Estates: Design Guide – Devon County Council – UK. (Available from Devon County Council, Environment Department, Lucombe House, County Hall, Topsham house, Exeter, Devon, EX2 4QW)

13. The Essex Design Guide for Residential and Mixed Use Areas – Essex Planning Officers Association – UK. (Available from Essex County Council, Environment Services Directorate, County Hall, Chelmsford, CM1 1QH, Tel +44 1245 437027 Fax +44 1245 492781)

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15. Lincolnshire Design Guide for Residential Areas – Lincolnshire County Council – UK. (Environment Services Directorate, 4th floor, City Hall, Beaumont Fee, Lincoln, LN1 1DN, Tel +44 1522 552222)

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