Guidance

Design Guidance
Active Travel (Wales) Act 2013

May 2014
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0 How to Use This Document

This document has been approved by the Welsh Ministers under the Active Travel (Wales) Act 2013. It is for everyone involved in the planning, design, approval, construction and maintenance of active travel routes in Wales. It will be of benefit to professional staff working for national government, local authorities and consultants as well as non-government organisations who help to create, modify and manage the built environment. These include private developers and other property owners, including health and education organisations.

It is also intended to be of use to the general public, who will need to be consulted on the maps and schemes that result from the application of the Act. There is an important role for user groups in assessing whether the proposals made by local authorities meet the standards set out in this document.

The Guidance provides advice on the planning, design, construction and maintenance of active travel networks and infrastructure, and is to be used at all stages of the process. As noted in the Introduction, the Welsh Government intends to keep the document under review, so feedback on its application in all these stages, and how it can be improved, is welcomed.

This Design Guidance should be read in conjunction with the Delivery Guidance, also made by the Welsh Ministers, which sets out the processes relating to the preparation of the existing route maps and integrated network maps which are required by the Active Travel (Wales) Act.

There are three sections to this Design Guidance document, and a total of 11 Chapters and three Appendices.

Part A – General Principles

This part gives general principles for the development of Active Travel Networks

- Chapter 1 introduces the document
- Chapter 2 summarise the legal and policy frameworks in which it operates
- Chapter 3 provides guidance on the how to involve, engage and consult the public

Part B – User Needs, Planning and Design

This part provides the main technical basis for the planning and design of active travel networks and schemes

- Chapter 4 sets out the needs of people using the active travel network
- Chapter 5 gives guidance on how active travel networks should be planned
Chapter 6 goes into detail on the design of the elements making up the networks themselves

Part C – Related Matters

This part provides technical guidance on other important issues

- Chapter 7* discusses how active travel networks should integrate with other modes of travel
- Chapter 8 gives guidance on related facilities such as seating and cycle parking
- Chapter 9* explains how authorities should discharge their duties when creating and improving highways to benefit active travel
- Chapter 10* provides guidance on the construction, maintenance and management of active travel networks
- Chapter 11* advises how authorities should monitor and evaluate their networks

There are three Appendices:

- Appendix A, Design Elements (DEs) – this provides a set of typical design details, with summary advice on their application. The DEs are given different levels of force, as explained in Chapter 1 below.
- Appendix B Cycling Route Audit Tool – provides a useful numerical tool for assessing the quality of cycling routes
- Appendix C Legal Procedures – provides more detail on the common legal processes associated with the creation of active travel networks, including the carrying out of Equality Impact Assessments (EqIAs) under the Equality Act 2010.

It should be noted that although there is more technical content in this document relating to cycling, this simply reflects the fact that there is less cycling infrastructure of a suitable quality already in existence, compared to walking. There is no implication that walking is to be given less priority than cycling – both are equally important active travel modes.

* Note – Chapters 7, 9, 10 and 11 provide non-statutory government guidance for local authorities, as there is no specific provision in the Active Travel Act for the issuing of guidance on these topics. Nevertheless, the content of these chapters is considered to represent good practice which will assist local authorities in their general duty to promote active travel under Section 10 of the Active Travel (Wales) Act.
PART A – GENERAL PRINCIPLES
1 Introduction

This Chapter explains:

- why the Welsh Government is promoting active travel
- how the Active Travel (Wales) Act 2013 will operate
- the purpose of this document in relation to the Act,
- its status and application; and
- how it will be kept up to date.

1.1 Active Travel in Wales

The Welsh Government seeks to enable more people to walk, cycle and generally travel by more active methods, so that:

- more people can experience the health benefits of active travel;
- we reduce our greenhouse gas emissions;
- we help address poverty and disadvantage, and;
- we help our economy to grow by unlocking sustainable economic growth.

One of the major steps in achieving these goals was the Active Travel (Wales) Act 2013 (hereafter referred to as the Active Travel Act) which gained Royal Assent on 4th November 2013. This created new duties for local authorities in Wales and the Welsh Ministers. It also gave the Welsh Ministers the power to issue guidance on the location, nature and condition of active travel routes and facilities to ensure they are suitable for use.

Research indicates that for many people, the biggest barrier to walking and cycling is concern for their safety. These concerns relate mainly to the existing infrastructure, such as difficult road junctions. The design of active travel infrastructure is critical in addressing safety concerns, both real and perceived, and is therefore key to achieving the aim of increasing active travel.

Where infrastructure already exists, gaps and varying standards affect people’s ability to make use of it. The purpose of this document is to provide a consistent standard to work to when planning, designing and implementing networks and routes for walking and cycling in Wales, and therefore achieve the step change that is needed.

1.2 Status of the Design Guidance

The Guidance is issued using the powers of the Welsh Ministers to give guidance under Sections 2(6), 2(9) and 7(2) of the Active Travel (Wales) Act 2013.

The document is published by the Welsh Government for use throughout Wales when designing and maintaining active travel routes and facilities. It is intended to ensure that the
requirements of the Active Travel Act are applied consistently and appropriately throughout Wales.

Additionally, the Welsh Government requires that all works on projects on the trunk road network must consider the advice contained within this guidance document.

Currently all highway design on the trunk road network is undertaken in accordance with the Design Manual for Roads and Bridges (DMRB). The intention of this document is not to supersede any mandatory clauses within the DMRB, which remains as the prime guidance document. Manual for Streets (MfS) and Manual for Streets 2 (MfS2) (see below) are not appropriate for trunk roads.

Where designers consider that compliance with the advice contained in this design guidance will conflict with a mandatory clause in the DMRB, then this should be addressed through the Welsh Government’s departures from standards process.

If, after consideration of the advice within this guidance, the trunk road designer elects to follow alternative guidance then they should retain documentation for this design decision.

For all non-trunk road networks the advice in this guidance must be considered by local authorities when designing active travel schemes, even where the advice in this document conflicts with current local authority design standards. Local authorities may also consider guidance contained in MfS and MfS2, but advice contained in this document will take precedence if there is any conflict. If, after consideration of the advice within this guidance, the local authority elects to follow alternative guidance, then the local authority should retain documentation for this design decision.

This documentation will form the basis of the “explanation” required by section 3(6) of the Active Travel Act, which states:

When submitting an existing routes map to the Welsh Ministers under this section a local authority must also submit to them –

a) a statement of the extent (if any) to which any of the active travel routes shown on it do not conform to standards specified in guidance given under section 2(6), and

b) an explanation of why the local authority has nevertheless decided that it is appropriate for them to be regarded as active travel routes.

1.3 Innovation and Experimentation

The Active Travel Act opens up opportunities for the development and trial of more innovative infrastructure for walking and cycling, which will be essential if Wales is to achieve a step change in the amount of active travel. This guidance aims to support and encourage this by bringing together examples of well-established techniques, as well as more innovative designs being trialled in the UK, through the use of Design Elements with different statuses, as described below.

Moving forward, a number of ongoing developments will continue to drive new techniques, notably:
• Implementation of the Mayor’s Vision for London and investment in the English cities and towns receiving Cycle City Ambition Grant and other funding, which will involve rolling out a range of innovative measure to encourage cycling. These have been the subject of recent off-highway trials at the Transport Research Laboratory, including small and low level signals for cyclists, options for light segregation, bus stop bypasses and alternative roundabout designs, as well as signal junctions with two-stage right turns.

• The forthcoming major revision to the Traffic Sign Regulations and General Directions, due out in early 2015, that is expected to include a range of new design options for walking and cycling signs, road markings and associated infrastructure

The Welsh Government is committed to updating these guidelines in the light of these ongoing developments.

1.4 Design Elements

Appendix A to this Document consists of a set of ‘Design Elements’, which provide concise guidance, including dimensioned drawings where appropriate, on the layout and use of particular types of design solution.

In order to enable authorities to gain experience in the use more innovative techniques, as well as being able to apply more well-established solutions with confidence, each Design Element has been given one of three statuses, defined as.

**Standard Details** [●] Details that are well understood and should generally be applied as shown unless there are particular reasons for local variation.

**Suggested Details** [●] Details that have not been widely applied in Wales but may be considered appropriate for use in the circumstances as advised.

**Possible Details** [●] Details that are largely untested in Wales but have been used successful in other places and may be considered for use in pilot schemes to gain further experience.

Within this document those elements denoted as **Standard Details** [●] will be regarded as “standards” for the purposes of section 3(6)(a) of the Active Travel Act.

The use of advice categorised as **Suggested Details** [●] or **Possible Details** [●] will require careful monitoring by the local authorities who implement them. More details of monitoring processes can be found in Chapter 11.
1.5 Other applications for the Design Guidance

The Active Travel Act requires the creation of an integrated network map, which will set out the local authority’s plans for active travel infrastructure for the next 15 years. Local authorities will have to have regard to the plans set out in the maps when developing their local transport plans. Chapter 5 will be of great use to local authorities in adequately planning their networks, in conjunction with Chapter 6 on the design of the routes themselves.

Local authorities are required to have regard to this guidance when creating or improving active travel routes. However, this guidance will also be useful for planning active travel more widely. We encourage local authorities to use it for all their active travel and highway needs. Using the principles of the guidance will help provide safe and suitable infrastructure that is appropriate, thus avoiding over-engineering or wasting resources on facilities of little value.

1.6 Keeping Standards Up to Date

As noted above, the field of walking and cycling design guidance is evolving quickly. The intention is that this design guidance will be regularly updated to take account of changes to design standards, new legislation or experience learnt from those implementing the design solutions contained within this document. This is expected to result in changes to the main guidance document and the status of some Design Elements, as experience is gained, together with the addition and/or deletion of others.

User views are essential for the successful evolution of this document and so all who use this guidance are encouraged to submit comments. These comments should be sent to the following address: activetravel@wales.gsi.gov.uk
This chapter summarises the principal legislation and Welsh Government policy relating to the planning, design and implementation of active travel networks and routes.

Appendix C provides more detail on the common legal processes associated with the creation of walking and cycling measures, while Chapter 9 explains how authorities should discharge their duties under the Active Travel Act when creating, improving and managing highways.

### 2.1 Principal Legislation

**Active Travel (Wales) Act 2013**

The Active Travel Act makes provision -

a) for approved maps of existing active travel routes and related facilities in a local authority’s area,

b) for approved integrated network maps of the new and improved active travel routes and related facilities needed to create integrated networks of active travel routes and related facilities in a local authority’s area,

c) requiring local authorities to have regard to integrated network maps in preparing transport policies and to ensure that there are new and improved active travel routes and related facilities,

d) requiring the Welsh Ministers to report on active travel in Wales,

e) requiring the Welsh Ministers and local authorities, in the performance of certain functions under the Highways Act 1980, to take reasonable steps to enhance the provision made for walkers and cyclists and to have regard to the needs of walkers and cyclists in the exercise of certain other functions, and

f) requiring the Welsh Ministers and local authorities to exercise their functions under the Act so as to promote active travel journeys and secure new and improved active travel routes and related facilities.

For the purposes of this Act, a route in a local authority’s area is an active travel route if it is situated in a designated locality, and the local authority considers that it is appropriate for it to be regarded as an active travel route.

The designated localities within which active travel routes are to be planned and implemented are set out in the Designated Localities Direction of the Welsh Ministers which
details the areas to be mapped. [This is due to be made during the consultation period, the Direction will be linked to the final version of the guidance].

A “route” means a highway, or any other route to which the public has access, (including a crossing) and which may lawfully be used by walkers and cyclists.

Under the Active Travel Act “walkers and cyclists” means people who walk; people who use pedal cycles, other than pedal cycles which are motor vehicles for the purposes of the Road Traffic Act 1988; and disabled people not within the last two groups who use motorised wheelchairs, mobility scooters or other aids to mobility.

When this document refers to routes for walkers and cyclists, or for active travel, this refers to routes that can be used by people who fit one or more of the descriptions above.

In considering whether it is appropriate for a route to be regarded as an active travel route, a local authority must take into account whether the route facilitates the making by walkers and cyclists of active travel journeys, and whether the location, nature and condition of the route make it suitable for reasonably safe use by walkers and cyclists for the making of such journeys.

In this Act “active travel journey” means a journey made to or from a workplace or educational establishment or in order to access health, leisure or other services or facilities.

Local authorities must have regard to this guidance, which has been given by the Welsh Ministers under sections 2(6), 2(9) and 7(2) of the Active Travel Act, as to whether the location, nature and condition of the route make it suitable to be an active travel route.

Under the Active Travel Act, the Welsh Ministers and each local authority must take reasonable steps to enhance the provision made for walkers and cyclists when they are exercising their functions under Parts III, IV, V, VI, 1X and X11 of the Highways Act 1980 (creation, maintenance and improvement of highways, interference with highways and acquisition etc. of land), as far as it is practicable to do so.

The Highways Act 1980 includes provisions on the creation, maintenance and improvement of highways. Active travel routes will almost certainly be highways in law (a highway being essentially a route over which the public has the right to pass and re-pass). This definition does exclude permissive routes, where the landowners’ consent to the use of the route would be required.

Table 2.1 summarises the provisions of the Highways Act 1980 that are affected by the Active Travel Act.
### Table 2.1 - Powers and duties under the Highways Act 1980, as affected by the Active Travel Act

<table>
<thead>
<tr>
<th>Act</th>
<th>Part</th>
<th>Sections</th>
<th>Key powers and duties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highways Act 1980</td>
<td>III – Creation of Highways</td>
<td>24 to 35</td>
<td>Power to create new highways, footpaths and bridleways</td>
</tr>
<tr>
<td></td>
<td>IV – Maintenance of Highways</td>
<td>36 to 61</td>
<td>Duty to maintain highways</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Power to adopt new public highways</td>
</tr>
<tr>
<td></td>
<td>V – Improvement of Highways</td>
<td>62 to 105</td>
<td>Powers to generally improve highways, including constructing cycle tracks, traffic calming, refuges, bridges, subways etc.; duty to construct footways where necessary or desirable.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Power to prescribe improvement line for widening</td>
</tr>
<tr>
<td></td>
<td>IX – Interference with Highways</td>
<td>130 to 185</td>
<td>Duty to protect the public’s right to use a highway, removal of obstructions, prevention of damage etc.</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Duty to remove snow and soil etc.</td>
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<td></td>
<td></td>
<td></td>
<td>Construction of vehicle crossovers</td>
</tr>
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<td></td>
<td>XII – Land Acquisition</td>
<td>238 to 271</td>
<td>Powers to acquire land to construct public highways.</td>
</tr>
</tbody>
</table>

Under the Active Travel Act, the Welsh Ministers and each local authority must have regard to the needs of walkers and cyclists when they are exercising their functions under—

(a) Parts 1, II, IV and VII of the **Road Traffic Regulation Act 1984** (general and special traffic regulation, parking places and obstructions),
(b) Part 3 of the **New Roads and Street Works Act 1991** (street works), and 
(c) Part 2 of the **Traffic Management Act 2004** (network management by local 
traffic authorities).

Table 2.2 summarises the provisions of the above Acts that are affected by the Active Travel 
Act

**Table 2.2 – Powers and Duties under the:**
Road Traffic Regulation Act 1984,
New Roads and Street Works Act 1991 and 
Traffic Management 2004,
_as affected by the Active Travel Act_

<table>
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<th>Part</th>
<th>Sections</th>
<th>Key powers and duties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road Traffic Regulation Act 1984</td>
<td>I – General Provisions for Traffic Regulation</td>
<td>1 to 5 and 9 to 11</td>
<td>Powers to make orders to regulate traffic – prohibition, restriction or regulation use by any type of traffic. Powers to make experimental traffic orders.</td>
</tr>
<tr>
<td></td>
<td>II – Traffic Regulation in Special Cases</td>
<td>14 to 22D</td>
<td>Powers to make traffic regulation orders during construction works or for other special reasons. Powers to regulate traffic on byways in National Parks.</td>
</tr>
<tr>
<td></td>
<td>IV – Parking Places</td>
<td>32 to 41, 45 to 49, 51 to 53 and 55 to 63A</td>
<td>Power to provide parking places for vehicles (of any class), both on and off street. Power to acquire land to create parking places.</td>
</tr>
<tr>
<td></td>
<td>VII – Bollards and other Obstructions</td>
<td>92 to 93</td>
<td>Power to erect bollards etc. to prevent unlawful vehicular access.</td>
</tr>
<tr>
<td>Traffic Management Act 2004</td>
<td>2 – Network Management by Local Authorities</td>
<td>16 to 31</td>
<td>Duties in relation to network management by local authorities (which includes the road network used by pedestrians and cyclists).</td>
</tr>
</tbody>
</table>
Chapter 9 provides further guidance to local authorities on the discharge of these duties when creating, improving and managing highways, whether or not they are active travel routes.

Under the Active Travel Act, local authorities will be required to have regard to their integrated network map when forming local transport policies under section 108(1)(a) or (2A) of the Transport Act 2000, which requires local authorities to have local transport plans.

This duty was also modified by the Transport Act 2006, which requires local authorities to have regard to the Wales Transport Strategy when preparing their local transport plans. These plans must be approved by the Welsh Ministers, as do the integrated network maps.

**Equality Act 2010**

Chapter 149 of the Equality Act 2010 introduced a general equality duty on the public sector. This is a duty to have due regard to three specified matters when exercising their functions. The three matters are:

- eliminating conduct that is prohibited by the Act
- advancing equality of opportunity between people who share a protected characteristic and people who do not share it; and
- fostering good relations between people who share a protected characteristic and people who do not share it.

In developing this guidance every effort has been made to consider the needs of people with protected characteristics throughout (see below for definition).

In applying this guidance, local authorities need to be satisfied that their activities comply with Equalities legislation. Equality Impact Assessments are valuable tools for demonstrating and monitoring the impact on those with protected characteristics.

**Equality Impact Assessment (EqIA) Process**

The purpose of an (EqIA) is to identify any potential risks of unlawful discrimination and opportunities to promote equality and removing barriers to inclusion. They also support the outcome of delivering excellent customer service that meet the needs of, and are able to be accessed by all.

An (EqIA) is essentially a way of assessing outcomes to ensure that Initiatives do not discriminate against people on the basis of what are known as a protected characteristic:

- Age
- Disability
- Gender Re-assignment
- Marriage & Civil Partnership
Further guidance on the carrying out of EqIAs is given in Appendix C.

2.2 Principal National Policies

Sustainable Development

Under the Government of Wales Act 2006 the Welsh Ministers must make a sustainable development scheme setting out how they propose, in the exercise of their functions, to promote sustainable development. This scheme is set out in One Wales: One Planet. The Welsh Government’s approach to tackling climate change is set out in the Climate Change Strategy for Wales, which includes a target to reduce greenhouse gas emissions by 3% a year. A greater use of active travel infrastructure can assist in meeting these objectives.

Transport

The Welsh Government’s transport policies are set out in The Wales Transport Strategy. This strategy document, required under the Transport Act 2006, sets out the full range of transport policies, including walking and cycling.

A more detailed summary of the Welsh Government’s policies on active travel can be found within the Active Travel White Paper, published as part of the development of the Active Travel Bill.

The White Paper contains detailed information about the benefits of active travel. The Active Travel Action Plan sets out a range of activities that are being carried out to implement the Welsh Government’s active travel policies. This is not just in the field of transport, but also health, leisure and education.

Planning

Planning Policy Wales (currently on Edition 5, November 2012), provides the policy framework for the effective preparation of local planning authorities’ development plans. Chapter 8 relates to transport.

This is supplemented by 21 topic based Technical Advice Notes (TANs). TAN 18 relates to transport and TAN12 relates to design, including adopting inclusive design principles that deliver adequate provision for all people.

Procedural guidance is given in Welsh Office / National Assembly for Wales / Welsh Government circulars. Planning Policy Wales, the TANs and the circulars may be material to decisions on individual planning applications. They will be considered by the Welsh Ministers and Planning Inspectors in the determination of called-in planning applications and appeals.
Equalities

The Strategic Equality Plan is based on eight key Equality Objectives. This document sets out the Welsh Government’s strategy for addressing inequalities in Wales, and draws on other areas such as the Tackling Poverty Action Plan, the Framework for Independent Living and the implementation of the Rights of the Child Measure 2011. Well designed active travel infrastructure can support these aims, by enabling better access for those with protected characteristics. The Disability Wales Guidance Toolkit Planning for Inclusive Access provides a practical resource to aid planning.

Health

Physical inactivity is a recognised public health problem. Promoting active travel and providing suitable infrastructure can help meet local and national polices on promoting public health and reduce inequalities of health outcomes. The national strategy is set out in Our Healthy Future, supported by the Reducing Inequities in Health Strategic Action Plan, Fairer Health Outcomes for All.

Education

Local Authorities have statutory duties relating to school transport. The Learner Travel Measure 2008 sets out that local authorities have a duty to risk assess routes to school, including walked routes.

In relation to carrying out risk assessments, local authorities in Wales currently refer to the Road Safety GB guidance entitled Assessment of Walked Routes to School. This guidance is under review, and revised guidance is due to be published in May 2014.

The draft guidance covers such issues as the need to consider the age and specific needs of learners; route conditions; traffic; footpaths; crossing points; canals; rivers; ditches; embankments; lighting; bridges and any other dangers, including social dangers. The guidance has been drafted in line with the Rights of the Child Measure 2011.
3 Involvement, Engagement and Consultation

This Chapter provides general advice to local authorities on the principles of involving, engaging and consulting with the public and external organisations on the development of active travel networks and individual schemes.

3.1 Introduction

The Active Travel Act requires local authorities to consult on their existing route maps and integrated network maps, and makes the consultation one of the factors that the Welsh Ministers consider in deciding whether to approve the maps. Further guidance on the processes for consultation on the maps themselves can be found in the Delivery Guidance.

Consultation on the maps, however thorough, does not mean that the schemes or networks shown can be delivered without any further engagement with those affected. Particularly, it does not negate any statutory requirements for consultation and engagement that may be required as part of an individual scheme (for example, as part of a Compulsory Purchase Order or Traffic Regulation Order).

Consultation should result in better design and better schemes. As such, it is best carried out at several stages: from the development of the network to individual schemes. Good consultation at early stages can help to avoid poor decisions based on inaccurate or outdated information and gain greater community support for any new scheme. The more opportunity people have to influence and shape walking and cycling schemes for their local area, the more likely they will be to use them.

Broad consultation is also an opportunity to demonstrate more widely the local authority’s investment in active travel provision and thereby their commitment to making active travel an attractive choice – which in itself can help increase the uptake.

3.2 Principles of Good Practice

The key to ensuring successful engagement on network planning and scheme design is that it meets the ABC requirements:

- Accessible – with regard to location, format, style, language, timing
- Broad – opportunity to get involved for everybody who is directly or indirectly affected, including potential users
- Clear parameters – clarity of scope and limitations of what is being discussed

There are numerous resources available which provide more detailed advice on successful strategies and techniques for involving, engaging, and consulting with the public, in particular:

http://www.goodpracticewales.com/Resources/Citizen-Engagement

http://www.involve.org.uk/
The following guidance focuses on aspects of particular relevance to consulting on active travel networks and schemes.

**Accessible**

Consultations on active travel networks and schemes must be accessible to all people regardless of their abilities and the extent of their knowledge or expertise.

This will often require a range of media to be used - printed notices and online activity are not accessible for all groups and targeted engagement may well be necessary – for example using local radio, sessions with community groups such as access and disability groups, and culture groups where the main language is not English or Welsh.

Authorities should avoid using unnecessary technical details and jargon when presenting information. Engineering-style drawings and scheme illustrations should be prepared in a way that does not assume any kind of engineering knowledge on behalf of those being consulted.

This can be achieved through the inclusion of maps which put the scheme into context, the avoidance of unnecessary technical information, the use of photos, sketches, and examples of similar schemes wherever possible. Where technical terms are necessary, an explanation must be included to ensure it is understood. Acronyms and abbreviations should be avoided if possible, or explained.

**Broad**

Effective consultation at network and scheme level needs to target both current and potential users of walking and cycling infrastructure.

Possible ways of reaching large numbers of people may be through major trip generators such as employers, schools, higher and further education institutions, hospitals, and also include local businesses, community and special interest groups.

Early engagement within the authority itself, in particular those authorities where network planning and scheme delivery are separated, is also essential, as is engagement with elected members. Further guidance on the range of local authority departments and individual officers who can contribute to the successful development of active travel strategies, networks and routes is given in Chapter 5.

**Clear Parameters**

It is important to set clear parameters for any contact with the public and other stakeholders, so that they understand clearly what can and cannot be changed as a result of their involvement, so that expectations are managed.

The nature and scope of the process should be clearly defined and this should include both its mechanisms, including time scale, and the expected output of the activity, including any decision processes that follow.
**Suitable Tools**

There is a vast and constantly evolving range of consultation and engagement tools and methods, many of which would be suitable for consulting on active travel networks and schemes. These include:

- Community Street Audits,
- Cycle Route Inspections
- Posters and site notices along routes
- Social media led events and online fora discussions, targeted at current or potential active travellers
- Events on radio and other local media

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**Case Study – Cardiff Council consultation on the Enfys Network**

As a sustainable travel city Cardiff is developing a number of schemes to bring sustainable transport options to Cardiff over the next decade or so. Local Transport Projects Limited (LTP) and Cardiff Council worked with ArkLab to consult with the public on the development of a draft strategy plan for cycling in Cardiff. They approached the project with two core goals:

- Get as wide a response as possible to the plan that LTP would produce, and
- Raise general awareness of cycling within Cardiff.

ArkLab took over an empty shop on one of Cardiff’s busiest streets. They opened for two weekends with a late night Thursday, asking people what they thought of the plan and taking them through an interactive survey which allowed the public to engage with the strategy and give key insights on the plans.

As well as the shop the team designed an online survey which was a recreation of the interactive elements in the city centre consultation. They ran a mini marketing campaign both on and offline, involving local cyclist groups and offering free bicycle maintenance workshops for the public.

**The consultation achieved:**

- Local media coverage
- Over 1,000 people visiting the online survey
- 50 vox-pop interviews
- Thousands of flyers handed out
- Theatre performance piece

[http://www.ark-lab.co.uk/project/cardiffcycling-cardiff-council-cycle-network-consultation](http://www.ark-lab.co.uk/project/cardiffcycling-cardiff-council-cycle-network-consultation)
PART B –
USER NEEDS, PLANNING AND DESIGN
4 User Needs

Pedestrians and Cyclists – Similarities and Differences

This chapter sets out the basic needs of people when they make journeys on foot and by bicycle.

4.1 Introduction

Walking and cycling as modes of transport have many similarities. They deliver significant physical and mental health benefits, reduce congestion, create no air pollution or noise, and are low cost forms of travel. The barriers to people taking up both modes share similarities such as fast traffic speeds and poor or lack of infrastructure. Reducing speeds, through measures such as the wider adoption of 20mph limits (see box out) and other techniques (see Chapter 6) benefit both Active Travel Modes.

The needs of people walking and cycling can be summarised under the following headings, which are also reflected throughout the guidance: people wish to use routes that are:

- Coherent
- Direct
- Safe
- Comfortable
- Attractive

However, it is also important to note that they are distinct modes of transport with important differences. People on cycles and people on foot travel at different speeds and have different needs, which require different approaches to planning networks and designing infrastructure. In some circumstances pedestrians and cyclists can share the same space safely and effectively, and the design of such areas is discussed further in Chapter 6. However, most pedestrians and cyclists would prefer to have their own spaces so that both groups can travel at their own speed and without concerns over conflict.

Walking as a mode of travel predominates for journeys of less than two miles whilst cycling is more convenient for longer journeys, typically of up to five miles for regular journeys. Furthermore the current levels of utilisation of each mode are significantly different. Walking rates are relatively high, particularly for journeys of less than two miles, although there has been a long term decline in walking rates across most of Wales. Cycle use is coming from a very low base but take up is growing, and the challenge is to increase and extend that rate of growth.

A key principle to be followed at all times is that improving conditions for cycling should not be bought at the expense of creating unacceptable conditions for pedestrians. Both Active Travel modes are important and local authorities should always aim to improve both of them.
20mph limits and zones

Reducing vehicle speeds is one of the most effective measures to reduce physical risk and intimidation from speeding motor traffic which can make pedestrians and cyclists unsafe – and feel unsafe. 20 mph limits are one of the most effective measures that will reduce road danger and improve the walking and cycling environment on our streets. Physical measures such as traffic calming, traffic management, and the reallocation of road space from motor vehicles to pedestrians and cyclists all contribute to reducing speeding traffic. Effective enforcement of speed limits by the Police is also important in reducing the risk of speeding vehicles.

In recent years, a number of local authorities in England have implemented area wide 20mph limits as a method to reduce vehicle speeds in predominantly residential areas, and also as a mechanism to try and change drivers attitudes to speed in urban areas. Cardiff Council is also developing a pilot 20mph speed limit for an area on the edge of the City Centre. The purpose of this type of area-wide scheme is to create conditions in which drivers naturally drive at around 20 mph because of the general nature of the location, or as a result of traffic calming measures and / or signing being put in place.

Reducing the speed limit improves road safety by reducing the severity and frequency of collisions. The Royal Society for the Prevention of Accidents calculates that there is a 20% chance of a fatal injury in a collision at 30mph, but this reduces to a 2.5% chance at 20mph [1]. In terms of collision frequency, research shows that there is a 2-7% reduction in all collisions for every 1mph reduction in average road speed. [2]

Most importantly, recent research suggests that primary-age children cannot accurately judge the speed of moving traffic travelling over 25mph [3] The inability of young people to accurately assess the speed of approaching vehicles impacts on their ability to cross the road safely. Therefore, the lower the speed limit the safer it is for young people.

Some concerns have been raised over 20mph zones in relation to increased journey times (including bus journey times) and increased emissions. However, during Bristol's 20mph pilot in 2009, monitoring showed the new limits had negligible effect on bus journey time. [4] They concluded that this was because the time lost waiting at junctions, pedestrian crossings, or in traffic is just as important as speed in an urban environment. As such, urban journey times should not be significantly increased by 20mph limits.

The use of 20mph limits is encouraged and supported by the Welsh Government, particularly in residential areas and further guidance regarding 20mph limits and zones is contained in Circular 24/2009 ‘Setting Local Speed Limits in Wales’. At present, 20mph zones require physical traffic calming measures at regular intervals, although 20mph limits can be provided with signs alone.

4.2 Inclusive Design

With around 18% of the population of Wales aged over 65, and around 23% of the working-age population considered as disabled people[i], and with both figures increasing, it makes strategic long term sense to ensure our environments are accessible to the full range of types of people. Furthermore, a route that is accessible for disabled people will be more comfortable and convenient for all, such as older people and those accompanied by young children.

In the past the requirement for inclusive design has most commonly been applied to pedestrians, but similar considerations should also be applied to people using cycles, many of whom will have some form of disability. Cyclists may require all-ability cycles, such as tricycles, quadricycles or hand cycles, which require the careful design of facilities.

Photo 4.1 – All-Ability Cycling

All public authorities have a duty under the Equality Act 2010 to ensure they meet the needs of disabled people, and actively involve disabled people in the design and delivery of their services such as the provision or improvement of pedestrian routes and cycle routes. An effective and timely Equality Impact Assessment can help ensure this, (see Chapter 2 for the legal framework for EQIAs). The requirement is to promote improvements rather than just guard against problems so as to enable inclusion and independence.

It is important to recognise that disabled people are not a homogenous group and will have a range of requirements, and it is important that the full range of diversity is considered and accounted for when considering user needs - even two wheelchair users or two blind people may have different requirements.

However, facilities which benefit one group of disabled people can also benefit another. For instance, logical and clearly defined pedestrian routes which follow accepted guidance for
signing and wayfinding benefit a range of groups: Blind and partially sighted people will use recognised cues in the environment, such as tactile paving, buildings, kerb edges and controlled crossings for orientation and navigation; people with learning difficulties and autism benefit if routes are clear and not confusing, as would people who have mental health issues; Deaf people and those with hearing impairments benefit through improved independence if they can follow a clear logical route without needing to ask for directions. It should also be noted that one of the causes of vision impairment, diabetes, also causes reduced sensitivity.
Chapter 4 Section 1 - Pedestrians’ Needs

The principal needs of pedestrians have been summarised under the 5 key principles for Active Travel Routes, as introduced in Section 4.1.

Research carried out by Living Streets (see box out) also reveals pedestrians’ day to day concerns.

4.3 Coherence

Pedestrian routes must allow people to reach their day to day destinations easily and logically. Important places to be served by walking networks include homes, shops, schools, transport interchanges and bus stops and other community facilities. Better accessibility to public transport is likely to encourage its use decrease and reliance on the private car for longer journeys.

Manual for Streets advises that walkable neighbourhoods, as illustrated in Figure 4.1 below, are characterised by having a range of facilities within 10 minutes’ walking distance (about 800m) which people may access comfortably on foot, although it is important to note that this depends on walking speed and will be less for older and disabled people. Therefore, the creation of mixed-use neighbourhoods with interconnected street patterns, where daily needs are within walking distance of most residents will tend to lead to more walking.

Figure 4.1 – Walkable neighbourhoods, Report of the Urban Task Force, 1999
Routes should connect with one another seamlessly to form a comprehensive, permeable and logical network. Routes must be clearly defined and identifiable by all. High quality, well placed and, where appropriate, tactile embossed/Braille signs is vital to ensure pedestrians are sufficiently aware of the most direct route to local facilities (See Chapter 10). Layouts of walking routes should be simple, logical and consistent. This will enable people to memorise environments that they use regularly and predict and interpret environments that they are encountering for the first time.

Any severance of key routes by busy roads or other obstacles such as railways, waterways and sharp changes in level must be reduced or overcome through appropriate and sympathetic schemes. Surface level crossings of roads coupled with other design measures such as reducing traffic speeds can help. Diverting pedestrians through subways and across footbridges should be avoided where possible due to the potential accessibility problems for older people and those with disabilities. Subways can also deter walking through perceptions.
(real or perceived) of crime and personal safety and add to the time and distance of a journey.

4.4 Directness

Pedestrians are moving under their own efforts and therefore require routes and networks which are direct and follow natural desire lines.

Many new housing developments have convoluted and impermeable layouts, often driven by a desire to control motor traffic speeds. That is understandable, but a balance needs to be struck between calming traffic and creating a layout that gives direct routes to people on foot. Pedestrian-only routes between cul-de-sacs are essential to provide permeability but careful design is needed to ensure that these do not become places where anti-social behaviour and crime can flourish.

At a detailed level, as noted in Manual for Streets, pedestrian routes should be as straight as possible through road junctions. Tight corner radii are preferred which minimise the need for pedestrians to deviate from their desire lines when crossing minor roads. Crossing on a radius is hazardous for blind and partially sighted pedestrians as it is very difficult to orientate in a straight line from a radius and the person can inadvertently wander into the open road.

4.5 Safety

Safety – both actual and perceived - is an essential user need for pedestrians, both in the form of preventing physical harm through collisions with vehicles and minimising threats to personal safety.

Good road safety is achieved by separating pedestrian routes from fast vehicle routes in space and/or time; and/or by reducing vehicle speeds and flows to a level such that risks are brought to an acceptable level.

Fears over personal safety can be a major barrier to walking. Street lighting is an important influence on the public’s perception of what constitutes a safe street and local authorities should ensure streets and paths are well lit at times they are likely to be well-used, with an even and continuous distribution of lighting, avoiding glare and pools of light and shadows. Street lighting should provide an attractive street environment which provides reassurance for pedestrians and any faults should be repaired quickly.

Walking routes should be overlooked by buildings which are inhabited and well used by pedestrians and environmental anti-social activity such as graffiti, litter or vandalism should be reduced to a minimum or removed or repaired quickly. Walking routes should have clear exit and entrance points where people cannot be trapped, such as subway networks and blind corners. Overhanging shrubbery should be reduced to improve sight lines and to prevent it becoming an obstruction for blind and partially sighted people. It is also important that councils work with other partners such as the Police to ensure pedestrians feel safe using walking routes through initiatives such as regular community policing.
4.6 Attractive

Attractive walking routes not only encourage more people to walk but also contribute to the overall quality of an area and can help to create a sense of place through the creation of more accessible public spaces.

As Manual for Streets usefully remarks ‘The propensity to walk is influenced not only by distance, but also by the quality of the walking experience. A 20-minute walk alongside a busy highway can seem endless, yet in a rich and stimulating street, such as in a town centre, it can pass without noticing. Residential areas can offer a pleasant walking experience if good quality landscaping, gardens or interesting architecture are present’ (MfS, Para 6.3.1).

Walking routes can deliver both a place and movement function although the balance between such functions may depend on external influences such as the time of day or day of the week. A pedestrian route may deliver a movement function during the working week and revert to more of a place function during the weekend, for example by being used for a street market.

Manual for Streets considers the role of place in detail but in essence place function is about how people gain from an area, even when they are not moving. The availability of spaces to rest and reflect, and paths for relaxing walks, are important for mental health and wellbeing. Some quiet spaces and walks, such as areas of local parks, should therefore be included within the network of pedestrian routes.

As well as encouraging Active Travel, attractive streets and public realm deliver increased economic activity through increases in footfall and rateable values of high streets (Living Streets, 2013). Creating attractive pedestrian routes requires targeted reduction of street clutter, use of community led design techniques, regular street cleansing and the regular maintenance of street furniture and footway surfaces.

4.7 Comfortable

Pedestrian comfort is influenced by a range of factors including the basic design of the route – its width as related to the number of users and the gradient and quality of the surface – as well as other elements such as tactile paving, street furniture, drainage, cleanliness and lighting.

Basic width requirements for different types of people walking or using mobility aids are given in Inclusive Mobility and Manual for Streets which is the source for Figure 4.2 below.
Where possible, paths should have a clear unobstructed width of 2m, which allows two wheelchair users to pass one other. Where physical constraints make this impossible a clear width of 1.5m should be maintained as this allows a wheelchair user and walking companion to travel side by side. If there is an obstacle that cannot be moved a restricted width around this of 1.2m provides space for a blind or partially sighted person to walk using a long cane, or with a guide dog, or alongside a person providing guidance.

Some routes will require greater width than the minimum given above due to the number of pedestrian that habitually use the route and/or the main category of user. A suitable footway width is important to allow pedestrians to travel comfortably at their chosen speed and in groups, such as when walking with younger children. For example, the areas around schools will be used by large numbers of children and young people at the start and end of the school day. Hospitals will generate large numbers of movements of people with a range of physical, sensory or cognitive impairments and a range of mobility needs.

Further detail on the assessment of pedestrian capacity is given in Transport for London’s Pedestrian Comfort Guidance for London (2010) see Figure 4.3. It defines Levels of Service for pedestrian capacity in terms of pedestrians per minute per metre width (ppmm) and defines area types with peak pedestrian times including high street, office and retail, residential, tourist attractions and transport interchanges. Generally a minimum Level of Service B should be achieved on all active travel routes.

Street clutter, such as pole-mounted signs, utility boxes, phone boxes, litter bins, bollards and guard railing, reduces the available width of footways and is a particular hazard for visually impaired people. The amount of clutter should be minimised with remaining items
located in a street furniture zone out of the pedestrian flow.

Authorities and their partners should take action to prevent the obstruction of pedestrian routes by thoughtless behaviour. In particular, the use by retailers of A-boards should be prevented or at least controlled. These unregulated advertisements can add significantly to street clutter and pose a risk to older people and those with visual impairments.

Footway (also called pavement) parking causes hazards and inconvenience to pedestrians. It can block routes for wheelchair users, older people and parents with children and can be hazardous for blind and partially sighted people who risk bumping into wing mirrors or even open car boots. It also poses a road safety risk by blocking the view of oncoming traffic and requiring people to walk into the carriageway.
Figure 4.3 - Extract from Pedestrian Comfort Guidance for London
Steep gradients can have particular impact on older people, those with physical disabilities and parents with pushchairs.

- 1% (1 in 100) - is never an obstacle.
- 2% (1 in 50) - can be managed by most people (and also provides good drainage).
- 2.5% (1 in 40) - can be managed by many people.
- Steeper than 2.5% - impossible for many manual wheelchair users.

These gradients may be difficult to achieve in many areas. A gradient of 5% (1 in 20) should be regarded as a desirable maximum in most situations.

Steep gradients than these can be managed by some wheelchair users, but only over very short distances (1m or less), for example on a ramp between a bus entrance and the pavement. Even over these short distances the maximum gradient used should be no more than 10% (1 in 10). As a general rule, however, 8% (1 in 12) should be used as the absolute maximum.

Steep cambers and crossfalls are a problem for many people, including wheelchair users. Crossfalls should not exceed 2.5% (1 in 40) with a desirable maximum of 2% (1 in 50).

The choice of surface materials on walking routes is important to pedestrian comfort, and can also contribute to the character of a street environment. In general, surfaces should be even, firm and slip resistant in wet and dry conditions. The maximum deviation under a 1m straight edge should not exceed 3mm.

Contrast is important to many visually impaired people, many of whom are able to distinguish changes in colour and tone. Pavement materials should therefore be consistent, avoiding the use of random patterns which have no meaning. Good contrast between pedestrian routes, cycle tracks and carriageways will help visually impaired people to make sense of their environment.

When paving flags and paviours are used, care should be taken to ensure that they are evenly laid; any unevenness can cause problems for some wheelchair users and some visually impaired cane users. Cobblestones should not be used.

The provision of areas and benches for pedestrians to rest and sit is a particularly important user need for older pedestrians and those with physical disabilities (see Chapter 8). The provision of clean and accessible public toilets is also an important user needs particularly for older people or those with children.

**KEY REFERENCES**

Department for Transport (2007) *Guidance on the use of Tactile Paving Surfaces*

Department for Transport (2006) *Inclusive Mobility: BS8300, London*

Chartered Institution of Highways and Transportation (2000) *Guidelines for providing for journeys on foot, London*

Living Streets (2013) *The pedestrian pound - the business case for better streets and places, London*

National Federation of the Blind of the UK (2013) ACCESS FOR BLIND PEOPLE IN TOWNS. SS1401

Chapter 4 Section 2 - Cyclists’ Needs

4.8 Introduction

In the Active Travel Act, a cyclist is simply defined as someone who uses a bicycle, and so in this document, ‘cyclist’ is used a shorthand for anyone who happens to use a bicycle, whatever the distance, speed or purpose of the journey, or the characteristics of the person. Cyclists are only cyclists when they cycle – when they dismount, they become pedestrians.

Designs should therefore meet the needs of everyone who cycles for any reason and at any age or physical condition; as well as those who are considering taking up cycling for the first time. Routes need to cater for a wide spectrum of people with different levels of confidence and experience; including people riding bicycles adapted to meet particular physical needs (see Section 4.2 above)

4.9 Why do people cycle?

The principal reasons given for cycling are that it is convenient and fast. In addition, many users are motivated by the health benefits they get from cycling (Cycling Embassy of Denmark, 2012). However, reasons can differ depending on age of user or trip types, or even time of day.

The most significant barrier to achieving more cycling is the perceived lack of safety, particularly for women and older people, who are under-represented amongst regular cyclists in the UK.1

While main roads are often the most direct, coherent network available to cyclists, they are the places where fear of and intimidation by motor traffic is at its greatest. Consequently, in many areas the provision of adequately safe, attractive and comfortable facilities along these roads is crucial to encouraging active travel. These routes can be supplemented by more indirect routes along minor roads or paths.

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1 Understanding Walking and Cycling – Lancaster University, 2011; Attitudes towards cycling, Annual Report 2012 – Transport for London
Cycling Safety

Although the health benefits of cycling greatly outweigh the risks of injury encountered while cycling, the risks of injury while cycling are typically higher than when travelling by car. Per mile travelled, the fatality risk of cycling is comparable to walking, with around 31 pedestrians killed per billion kms walked and 27 cyclists killed per billion kms cycled (DfT, 2013d).

There are approximately 80,000 cycle casualties per year in Great Britain of which proportionately around 1,250 occur in Wales (DIT, 2013c). Of these casualties just over a third are reported to the Police, nearly all of which involved another vehicle or pedestrian.

Most of the large number of non-reported crashes are cycle-only incidents, many of which involve ice, wet or oily surfaces, gravel, debris or mud. This shows that attention must be paid to maintaining smooth, textured surfaces that are swept and receive good winter maintenance.

Collisions involving motor vehicles tend to be serious, representing over 90% of fatalities. Most of these collisions are considered by Police to be the fault of the driver, (see graphic below).

Over two thirds of collisions with vehicles occur at junctions (DIT 2013b). A quarter of all serious injuries or deaths to cyclists involve motor vehicles turning either left or right, with the remainder either involving overtaking, or where the vehicle is moving ahead (TRL, 2009). Heavy goods vehicles are disproportionately involved in cycle fatalities: 18% of deaths involve these vehicles, despite them making up just 5% of road traffic.

It is therefore vital to provide safe, coherent, direct and comfortable routes for cyclists through major junctions - otherwise even high quality links will be underused by cyclists who are unable to interact with fast moving traffic; particularly those who are nervous, inexperienced, elderly or who have disabilities.
4.10 The Effort Required to Cycle

The amount of effort required to cycle depends on physical conditions and the local environment: on surface quality, surface material, ability to maintain constant speed, gradients, deflections and undulations, and so on.

The conservation of cyclist effort should be a key consideration in the design of any cycling facility. Designers can take positive steps to enable people to cycle with the minimum of effort:

Table 4.1 – Factors Affecting Cycling Effort

<table>
<thead>
<tr>
<th>Factors affecting cycling effort required</th>
<th>Meaning</th>
<th>Design implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Bicycle and Rider</td>
<td>Speed travelled</td>
<td>A cyclist's ability to maintain their own speed matters a great deal.</td>
</tr>
<tr>
<td></td>
<td>Efficiency of bicycle</td>
<td>All these factors, taken together, means that stopping and starting require a lot of effort; much more than maintaining a constant speed</td>
</tr>
<tr>
<td></td>
<td>Mass of rider and bicycle</td>
<td>It also means that lighter bicycles require less effort to ride and that it is a good idea to maintain a bicycle in optimum working order.</td>
</tr>
<tr>
<td></td>
<td>Routes that are direct and allow cyclists to maintain their speed are the most appealing to users – designers should avoid making cyclists stop slow down, or deviate unnecessarily from their route. The effective width available for cycling and the choice of junction type are important factors in allowing for maintenance of speed</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Surface quality</th>
<th>Resistance of the road surface</th>
<th>The greater the surface resistance, the harder it is to cycle. This is particularly true for small-wheeled bicycles.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Routes that are direct and allow cyclists to maintain their speed are the most appealing to users – designers should avoid making cyclists stop slow down, or deviate unnecessarily from their route. The effective width available for cycling and the choice of junction type are important factors in allowing for maintenance of speed</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gradient</th>
<th>Gradient</th>
<th>The steeper the gradient, the more energy is required to overcome it.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Directness of route may need to be balanced with avoiding steep gradients.</td>
<td></td>
</tr>
</tbody>
</table>
Air Resistance
Frontal area and drag coefficient

The frontal area of the cyclist matters: upright cyclists using ‘city bikes’ have to generate more power. Importantly, environmental conditions also matter. Cycling into a prevailing headwind requires much more effort. Local conditions, such as microclimate around tall buildings, can exacerbate this.

Designing to reduce headwind effects has not been commonplace in Wales but can make a big difference. Windbreaks using planting, trees or fences, can help mitigate the effects of strong winds.

**Electrically Assisted Pedal Cycles**

Electrically-assisted pedal cycles are in widespread use in continental Europe and are becoming increasingly popular in the UK. They provide power to drive the wheels in addition to the effort of the cyclist, up to a speed of 15mph, and make it much easier to tackle hills. They therefore have great potential for use in Wales. In design terms, they are little different to conventional cycles, and can use cycle lanes, tracks and parking spaces in the same way.

### 4.11 The Dimensions of Bicycles and Cyclists

Typical conventional bicycles for adults are around 1.8m in length and 0.65m in width. For an adult cyclist, 0.8m is the typical static width but extra width is needed for moving cyclists (see below). A reasonable assumption is that this amounts to a total width of 1m (as stated in LTN 2/08: ) – this is referred to as the ‘dynamic envelope’

People using non-standard types of bicycles should not be excluded from using cycle infrastructure through lack of consideration for their needs at the design stage. There are many types of non-standard bicycles, including:

- Bicycles with trailers for children or deliveries
- Tricycles, including those used by some disabled people
- Tandems with two or more seats
- Purpose built cycles for disabled people e.g. quadricycles and hand cycles
- Recumbent bicycles
- Cargo bikes (for carrying goods or children)
- Small-wheeled foldable bicycles

It is unusual for the actual width of any of the non-standard bicycles to exceed 0.9m, and for the dynamic envelope to be any greater than 1.4m. Consequently, any cycle lane or track should be at least 1.5m wide, or it will risk excluding some types of user. The use of
chicanes or gates aimed at restricting unauthorised access to paths (e.g. by motorcycles) may also obstruct these users, and therefore must not be used unless in exceptional circumstances. Further advice on access controls is given in Chapter 6.

Turning circles are an important consideration, both in terms of the space required to execute a full turn, which LTN2/08 calls the ‘outer radius’, and the space required to turn around a fixed object, or ‘inner radius’. For conventional bicycles, the inner radius should be at least 0.85m and outer radius 1.65m, although these will require the cyclist to be travelling very slowly, and larger radii are appropriate at higher design speeds. The turning radii of non-standard bicycles may be considerably larger than that of standard ones.

Table 4.2 (adapted from LTN 2/08) summarises the key dimensions and minimum turning circles of different types of bicycle.

### Table 4.2 – Bicycle Dimensions and Turning Circles

<table>
<thead>
<tr>
<th>Type of bicycle</th>
<th>Typical length (mm)</th>
<th>Typical width (mm)</th>
<th>Minimum turning circle (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Outer radius</td>
</tr>
<tr>
<td>Conventional bicycle</td>
<td>1,800</td>
<td>650</td>
<td>1,650</td>
</tr>
<tr>
<td>Bicycle with 850 wide trailer</td>
<td>2,700</td>
<td>850</td>
<td>2,650</td>
</tr>
<tr>
<td>Tandem</td>
<td>2,400</td>
<td>650</td>
<td>3,150</td>
</tr>
</tbody>
</table>

Note – based on LTN 2/08

### 4.12 Headroom

Cyclists require a minimum of 2.7m of headroom. This may be reduced to 2.4m where the obstruction is for less than 23m (such as where a traffic sign spans the carriageway) (Highways Agency, 2005b).

Every effort should be made to provide this headroom; where this cannot be achieved (i.e. at a low railway bridge), ‘limited headroom’ signing should be provided in a similar fashion as for a low bridge over a carriageway (see Traffic Signs Manual, Chapter 4, Section 7 (Department for Transport, 2004), in preference to ‘Cyclists Dismount’ signs, the use of which should be avoided on Active Travel Routes.

### 4.13 Cycling Speeds

The speed of different people on cycles can vary widely – ranging from walking pace (for children or people using cycles adapted for users with disabilities), up to 25 mph or more on steep, downhill gradients. This presents a challenge for those trying to plan to accommodate
the variety of cyclists' needs.

Table 4.3 – Typical desired speeds and proportion of trips, by cycle user type

<table>
<thead>
<tr>
<th>User type</th>
<th>Typical desired speeds</th>
<th>Current approximate share of cycling trips</th>
</tr>
</thead>
<tbody>
<tr>
<td>School travel</td>
<td>5-15 mph</td>
<td>10%</td>
</tr>
<tr>
<td>Leisure</td>
<td>5-15 mph</td>
<td>36%</td>
</tr>
<tr>
<td>Adult shopping or other</td>
<td>10-15 mph</td>
<td>15%</td>
</tr>
<tr>
<td>Adult commuting</td>
<td>10-20 mph</td>
<td>39%</td>
</tr>
</tbody>
</table>

Note: Based on “Design speeds and acceleration characteristics of bicycle traffic for use in planning, design and appraisal”, by Prof John Parkin and Jonathon Rotheram, and the National Travel Survey.

Although speeds do vary, the aim should always be to create facilities that suit as wide a range of people as possible, rather than setting out to provide ‘dual networks’ for novice and experienced cyclists. This can be done by creating facilities that enable people to travel at the speed they wish to, with sufficient space to overtake.

Most cyclists will wish to travel between around 12mph (20km/h) and 18mph (30km/h). Based on these speeds, plus a lower design speed of 6mph (10km/h), the key geometric criteria shown in Table 4.4 are recommended.
Table 4.4 – Minimum Forward Visibility, Horizontal and Vertical Curvature

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Design Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>18 mph / 30km/h</td>
</tr>
<tr>
<td>Minimum Forward visibility</td>
<td>Desirable</td>
</tr>
<tr>
<td></td>
<td>Preferred</td>
</tr>
<tr>
<td></td>
<td>Absolute</td>
</tr>
<tr>
<td>Minimum Horizontal Curvature, Inner Radius</td>
<td>Absolute</td>
</tr>
<tr>
<td>Vertical Curvature, Crest K Value</td>
<td>Desirable</td>
</tr>
<tr>
<td></td>
<td>Preferred</td>
</tr>
</tbody>
</table>

Note – based on Cardiff Cycle Design Guide

4.14 Gradients

Sections of rising or falling route create specific challenges for cyclists. Ascending even short uphill gradients considerably increases the discomfort for cyclists. It is particularly difficult for less able cyclists, such as older people, those with impairments or people using adapted cycles, which tend to be heavier and offer limited ability for short-term increases in power. Downhill gradients can lead to rapid increase in speed, which increases the risk of collision.

Where possible, routes should avoid the steepest gradients. The priority for improvement to routes should be focused on routes with least ascent or descent.

The maximum desirable gradient depends on length. People are better able to tackle short steep gradients, but even relatively gentle gradients can become difficult if they are sustained.

Figure 4.4, adapted from Dutch guidance, shows the relationship between desirable maximum gradient and the length of the incline. For example, with a length of incline of 10m, a maximum gradient of 7% is acceptable, but with an incline 150m long, the gradient should be no more than 2%. Hills over 200m long should be no more than around 1 in 60 (1.7%).

The graph can also be used to look at options when the height difference is known. For example, when the height difference is 2m, either a 100m incline at 2% or a 60m incline at 3.3% is acceptable.
Figure 4.4 – Relationship between height difference and desirable gradient

On uphill gradients cyclists’ speeds will decline significantly below the 10-15 mph that could be expected from most cyclists on a level gradient. At even relatively modest uphill gradients of 3% or so, the speed achieved by an average cyclist will fall over to the level - typically around 7mph - at which the stability of the bicycle is substantially reduced. The additional space needed by slow moving cycling should be considered.

On downhill gradients cyclists speeds will rapidly increase, with a speed of 20-25 mph easily achieved. Care should be taken to allow cyclists to maintain this momentum as much as possible, by increasing design speeds at the foot of inclines. Where space is limited it may be preferable to provide wide lanes or tracks for uphill cyclists, as downhill cyclists will be able to maintain a speed similar to general traffic and thereby offer them the opportunity to use the whole carriageway.

4.15 Space for Cycling

Movements from side to side are necessary to stabilise a bicycle when in motion: these lateral movements increase as speeds diminish. At a reasonable speed (7 mph or above) the dynamic envelope required by a cyclist is approximately 1m in width, i.e. around 200m more than the width of the cyclist when stationary, thus making the typical dynamic envelope of 1m. At slower speeds, for example when cyclists are travelling up a steep gradient, it is greater.
The space required to cycle is normally more than this. It also needs to take into account:

- wobble room, so that cyclists of all abilities feel they have the space to move comfortably.
- the position, height, width and profile of any continuous or intermittent physical barriers around pedal height, such as full-height kerb segregation or light segregation – objects with a vertical profile need a wider clearance than rounded or sloping objects, and the risk of clipping a pedal is greater for a higher kerb
- any physical barriers at handle-bar height or above, typically walls, guardrail, sign or signal poles and lamp-posts
- the width of adjacent traffic lane(s) or, how close vehicles will come to encroaching on the cycling facility
- the speed and width/type of vehicles moving alongside the cyclists
- volume of pedestrians on adjacent footways
- bus infrastructure
- the geometry of the lane or track – cyclists require greater widths on curves, such as where the lane or track deviates around parked cars, loading bays, bus stops, etc.

![Diagram of basic space requirements for cycling](image)

**Figure 4.5 – Basic Space Requirements for Cycling**
Based on guidance contained in LTN2/08, the additional space required to accommodate the fear of encountering any upstand or vertical structure parallel to the route is:

- 250mm for kerbs under 50mm high
- 500mm for kerbs over 50mm high
- 750mm to sign posts and lamp columns
- 1000mm to continuous features such as walls, railings or bridge parapets

In addition, cyclists may need to deviate from their path by around 500mm to avoid gullies or potholes.

As with any form of transport, people cycling will often be travelling with someone else. Cycling is a social activity and many people will wish to be able to cycle in comfort side by side, particularly in the case of parents accompanying children, or when they wish to safely overtake another cyclist. It is important that cyclists are able to choose their own speed so that they can make progress commensurate with the amount of effort they wish or can put in.

At clearance of 0.5m between dynamic envelopes is required for cyclists to pass or ride abreast comfortably and safely. Based on the typical dynamic envelope of 1.0m, this would mean that an effective width of 2.5m is required to permit safe overtaking or social cycling. A width of 2m allows these activities to take place with care, and should therefore be regarded as a desirable minimum on routes designed for one-way cycling. It should be noted that, with a lane or track width of 2.5m, many non-standard cycles cannot overtake or cannot be overtaken without difficulty.

Narrow (below 1.5m) cycle lanes should not be used on roads as they can place cyclists in greater danger, as there is evidence that the presence of the cycle lanes leads to closer overtaking by drivers (Parkin J & Meyers C, 2009).

When moving in opposing directions, there is a risk of head-on collisions, which can be severe if cyclists are moving at high speeds. At least 1.0m clearance between cyclists is therefore recommended. This gives rise to a minimum width requirement of 3.0m for two-way tracks. This minimum width would allow overtaking or social cycling where there is a light flow in the opposing direction.

### 4.16 Cyclists and Motor Vehicles

The minimum clearance between a moving motor vehicle and the outside of the dynamic envelope of a cyclist should be 1.0m where the motor vehicle is travelling at 20mph or less, and 1.4m at 30mph or more. Where motor vehicles are more likely to include buses and other large vehicles, more clearance may be needed, and any measurement should be taken to the furthest side extremity of the vehicle. This has implications for the design of pinch points and for the width of general traffic lanes when cyclists are sharing carriageways, which are discussed below.
Road positioning of cyclists

Figure 4.6 - Primary and Secondary Road Positioning

Bikeability cycle training is taught in schools in Wales, and has replaced the ‘cycling proficiency test’. Bikeability teaches pupils three levels of skills, from basic bike handling to riding on busy roads and junctions.

Bikeability training teaches cyclists to adopt two main riding positions when riding on carriageways – the Primary and Secondary positions.

Designers need to be aware of these riding positions and design on-carriageway cycle routes with them in mind.

Cyclists are taught to ride in the Secondary Position, between 0.5-1m from the kerb or other fixed object, whenever it is safe and reasonable for them to do so, and in particular it is safe for motor vehicles to pass them. This position ensures that they are far enough out to be able to avoid drains or debris near the gutter, but can also move in either direction to avoid potholes or utility access covers.

When the available width means that it is not safe for the cyclist to be passed, for example when approaching hazards such as side-roads, pinch points or junctions, the advice to cyclists is to take the Primary Position in the centre of the traffic lane. Using the centre of the lane increases the cyclists’ visibility to other road users and reduces the risk of inappropriate or risky overtaking manoeuvres.

While this style of riding can be safe, it is unlikely to be attractive to more nervous, less experience cyclists or those considering taking up cycling. It is therefore not appropriate to design Active Travel routes that depend on cyclists taking the primary position except in situations when motor traffic volumes and speeds are low.
4.17 Pinch Points

It is important to ensure that chicanes and pinch-points are designed in such a way that cyclists are neither squeezed nor intimidated by motor vehicles. The preferred option is to provide sufficient width so that the cyclist can remain in the Secondary Position and be passed safely. Alternatively, when speeds are low, the alternative is for cyclists to be placed in the primary position by keeping the space tight. This will not be desirable over long lengths, as cyclists will feel intimidated, unless motor traffic volumes are low. The appropriate widths are given in Table 4.5 below.

Table 4.5 Lane widths at pinch points where no cycle track or bypass is provided

<table>
<thead>
<tr>
<th>85th percentile traffic speed</th>
<th>Lane width (m)</th>
<th>No buses or HGVs</th>
<th>With buses, HGVs</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 20 mph</td>
<td>2.5 or less</td>
<td>3.0 maximum</td>
<td></td>
</tr>
<tr>
<td>21 – 30 mph*</td>
<td>4.0†</td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td>&gt; 30 mph*</td>
<td>4.0</td>
<td>4.5</td>
<td></td>
</tr>
</tbody>
</table>

- additional measures (e.g. speed humps or cushions) should be considered to reduce speed in these instances
  † 3.0m may only be used if frequent traffic calming measures are present along the length of road.

Table 4.5 shows that pinch points in the critical width range of between 3m and 4m should not be used under any circumstances. At this width drivers will be tempted to pass cyclists with insufficient clearance.

4.18 Road profiles and their effect on cyclists

In places where cyclists can be expected to share the road with other users, the width of the road profile has a profound effect on cyclists’ comfort. Cyclists will feel uncomfortable if they sense that they are impeding motor traffic, while drivers may become impatient if they cannot easily overtake. This may in turn lead to closer overtaking manoeuvres, which are uncomfortable and potentially dangerous.

Designers should always be aware of the effect of their lane and carriageway width choices on cyclists, even if they are designing a route that has not been identified as an Active Travel route. The obligation for highway authorities to consider cyclists when discharging their general functions is discussed further in Chapter 9.

Critical Lane Widths

Unless motor traffic flows are light, and drivers can cross easily into the opposing carriageway to pass cyclists, traffic lane widths of less than 3m or more than 4m should be used. Lane widths in the critical range of 3.2m to 3.9m should be avoided.

The effect on typical carriageway profiles (with no on-street parking) is as follows.
Wide streets – 9m minimum two-way carriageway

These widths give adequate space for drivers to overtake cyclists comfortably, however, speeds can be high. Within the overall carriageway width available consideration should be given to provision of cycle lanes or tracks, which should be wider where speed limits are higher.

Critical width streets – 7.3m two-way carriageway

The 7.3m carriageway has been the default standard in the UK for many years, but it is important that designers recognise that this width often creates unsuitable conditions for cycling, and not of a standard that is now recommended under the Active Travel Act for Active Travel Routes.

Where traffic volumes are low and sightlines are good, such roads can provide reasonable space for drivers to overtake safely by crossing into the other carriageway. Where volumes are higher, and drivers have to wait for gaps in oncoming traffic to pass cyclists, such roads create very uncomfortable conditions for cyclists, with drivers tempted into close overtaking.

Designers should therefore not use 7.3m wide carriageways unless cyclists are accommodated outside the carriageway, or traffic volumes are low for Active Travel Routes.

Where an existing 7.3m carriageway is being considered as an active travel route, it may be possible to make conditions suitable for cycling by reducing the speed and volume of motor traffic to recommended levels. Another alternative would be to make the route one way for motor vehicles, which would allow (for example) two 2m cycle lanes or tracks and a single 3.3m general traffic lane.

Simply providing narrow (<1.5m) advisory cycle lanes within a 7.3m carriageway is not a recommended approach.

Narrow width streets – 6m maximum two-way carriageway

Narrow roads are objectively safer for cyclists as drivers are less likely to be able to overtake, and cyclists are able to be more assertive in their use of the space. However, such streets should be short, traffic calmed, and designed to make it clear that cyclists have priority.

4.19 Road and path surfaces

Cyclists are particularly susceptible to uneven or hazardous road surfaces, such as potholes, ruts or slippery surfaces. Most cycle crashes involve no other vehicle and many are due to poor surface conditions.

Rough surfaces also greatly increase the resistance and energy required to cycle the route, reducing comfort. Routes for cyclists must be constructed to be smooth, with bituminous surfaces laid by machine, rather than by hand. Care must be taken to ensure that routes
near vegetation are constructed with a properly drained base course and designed to prevent root damage. As with any infrastructure, routine maintenance such as path sweeping, vegetation clearance and winter maintenance must also be provided on Active Travel routes, whether on or off-carriageway (see Chapter 10).

4.20 Summary of Cyclists' Needs

As with pedestrians, the design of the active travel network should ensure that cyclists are able to reach their destinations on routes that are Coherent, Direct, Safe, Comfortable and Attractive. These needs are expressed in more detail as Network Requirements in Chapter 5.

**Coherent**
The network must be coherent; it must link all the places cyclists want to start and finish their journeys with a route quality that is consistent and easy to navigate. Abrupt changes in the level of provision for cyclists – such as a busy high speed roundabout - will mean that an otherwise serviceable route becomes disjointed and unusable by the majority of potential users.

**Direct**
Routes for cyclists must provide the most direct and fastest route from origin to destination. In order to make cycling preferable to driving, routes for cyclists must be at least as direct – and preferably more direct - than that available for private motor vehicles. An indirect designated route for cyclists may result in some of them choosing the more direct, faster route, even if it is not properly planned for cycling and therefore unsafe.

**Safe**
Cycle networks must not only improve cyclists’ – and other road users – safety, but also their feeling of how safe the environment is. Consideration must be given to reducing the speeds of motor vehicles to acceptable levels, particularly when cyclists are expected to share the carriageway. The need for cyclists to come into close proximity and conflict with motor traffic must be removed, particularly at junctions, where the majority of crashes occur. Good quality surfaces are needed, not least to prevent cycle-only casualties.

**Comfortable**
Smooth surfaces, with minimal stopping and starting, without the need to ascend or descend steep gradients and which present few conflicts with other users create comfortable conditions that are more conducive to cycling. The presence of high speed, high volume traffic affects both safety (as above) but also the comfort to the user.

**Attractive**
People cycling are more aware of the environment they are moving through than those in cars or other motor vehicles. Cycling is a pleasurable activity, in part because it involves such close contact with the surroundings. The attractiveness of the route itself will therefore affect whether users choose cycling.

How these principles are applied when in planning networks and the routes themselves are dealt with in Chapters 5 and 6 of these Guidelines.
Key References

CROW. 2006. *Design Manual for Bicycle Traffic*

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5 Network Planning

5.1 Introduction

This chapter sets out the value of producing an integrated network plan to create the integrated network map required by the Active Travel Act. The requirements of networks which will cater for a broad range of journeys and types of users and a recommended process for both cycle and pedestrian network planning. It focuses on the identification of improved active travel routes and facilities, of relevance to Section 1(b) of the Active Travel Act:

(b) for approved integrated network maps of the new and improved active travel routes and related facilities needed to create an integrated network of active travel routes and related facilities in a local authority’s area.

This guidance is to support local authorities in delivering their new duties, including audit tools that will help local authorities to decide whether a route is appropriate for active travel, and what steps should be taken to deliver improvements.

This chapter also advises on the range of evidence that should be used in developing such networks. As noted in Chapter 4, there are substantial differences between walking and cycling, and so there are key differences in the approaches to the planning of pedestrian and cycle networks.

It should be noted that although separate methodologies are given below for planning walking and cycling networks, there are some overlaps, particularly around data gathering and public consultation. Authorities should therefore consider whether it is appropriate to carry out these steps separately for walking and cycling; or whether it is better and more cost effective to deal with both active travel modes together.

The strategic planning of cycling infrastructure is typically based around the development of suitable routes and integrated networks, with existing provision being poor in many places. Walking routes within Welsh settlements have developed over a long period of time, with pedestrian facilities provided adjacent to almost all roads, ensuring that there is already a comprehensive network in most places to accommodate the vast majority of pedestrian trips. However, the walking network will often need to be improved to properly accommodate the needs of most pedestrians.

Network planning therefore needs to be specific to the mode of active travel the network should cater for. The network planning process also needs to be adaptable to settlements of different sizes and demographics, which will in turn impact on the breadth of data required. Local user knowledge is a key source of information and views from relevant stakeholders should be sought at all stages of the process.

5.2 Existing Routes Map

The initial map to be produced will show the existing routes within the designated areas that are suitable and appropriate for making active travel journeys. Its purpose is to communicate
to the public where routes are already suitable for active travel and to give them the information that they require in order to make decisions about how to travel.

In terms of network planning, the Existing Routes Maps also provide a basis for establishing a clear understanding of the existing infrastructure, the gaps in existing provision and those routes or sections of route which do not currently conform to minimum standards of provision.

The process for producing these maps is set out in detail in Chapter 3.4 of the Delivery Guidance. It is an iterative process involving auditing, assessment, consultation and approval.

The first step will be to undertake an audit of existing routes. This should cover the conditions of the route, the levels of usage, its availability to different types of users and the nature and scale of any problems and potential improvements (Delivery Guidance 3.4.2).

These routes will generally be different for pedestrians and cyclists but some may be suitable for both – e.g. off-road, shared, and segregated or traffic free routes. The Existing Routes Maps should also show crossing points and any facilities that exist to support active travel, including cycle shelters/parking/storage and public toilets.

Paragraphs 3.2.4, 3.2.6 and 3.2.8 of the Delivery Guidance show the types of facility and key features of a settlement that should be shown on the Existing Routes Map, and also on the Integrated Network Map.

5.3 Integrated Network Map

The second stage of the Act requires local authorities to develop Integrated Network Maps which identify the proposed new and improved routes and the works required to create networks of the required standard. The steps involved in these processes are set out in the following chapters.

These Integrated Network Maps must be prepared and submitted to the Welsh Ministers within three years of the commencement of Section 3 of the Active Travel Act and the maps should set out the proposed route developments for each local authority over a 15 year period (Delivery Guidance 3.5.1 and 3.5.2). The Integrated Network Maps will serve a number of roles - forming part of strategic plans, providing evidence for bidding documents for resources and for developing work programmes (Delivery Guidance 4.3.1).

Integration

Integration is key to the successful development and delivery of active travel networks. The networks need to be integrated with existing functions of the urban network, with other strategic plans and with a wider programme of measures to improve facilities for pedestrians and cyclists.

Integration with other strategic plans and programmes

Experience from the Netherlands, Germany and Denmark shows that the key to achieving
high levels of cycling is the provision of good quality infrastructure ‘complemented by other measures such as ample bike parking, integration with public transport, the education and training of cyclists and motorists, and a wide range of promotional events intended to generate enthusiasm and wide public support for cycling. (Pucher & Buehler, 2008, pp 495)

Closer to home, the Cycling Demonstration towns in England have shown that for improvements to infrastructure to be successful they should be delivered within a wider programme which includes political commitment, skilled delivery teams, engagement, encouragement and promotion (Cycling England, 2010).

A similar integrated approach needs to be taken for promoting walking as a valid mode of travel for shorter everyday trips.

The network plans and their associated programmes of works therefore need to be integrated with wider strategic plans of the authority and external organisations. These plans might include:

Transport and Land Use Plans:

- existing walking, cycling or active travel plans
- plans or proposals for the development of non-vehicular routes, quiet lanes, home zones or traffic calming
- strategic bus plans or schemes,
- Rights of Way Improvement plans,
- traffic management plans,
- city centre management plans
- any Network Rail plans such as new stations, station improvements or changes to bridges or level crossings as part of the proposed electrification of the lines
- Road Safety strategies and schemes
- Safe Routes in Communities schemes
- Plans and strategies by third parties that include infrastructure provision for active travel
- Local Development Plans
- Local Transport Plans
- Wales Transport Strategy
- National Transport Plans
- Highway Maintenance Plans
- Any plans for new highways (e.g. linking to new development sites)

Other Plans

- Community strategies
- Crime reduction strategies
- Children and young people’s plans
- Tourism, economic regeneration and community development proposals
- Workplace strategies, including healthy living initiatives
- Public health and physical activity plans and strategies
- Social care and well-being strategies
• Proposals for land use, including housing, commercial and industrial developments
• Play sufficiency assessments
• Plans for public spaces such as parks
• Public realm improvement plans
• Retail strategies;
• Alley gating plans

Direct contact with other local authority officers maybe the best way of identifying synergies with these other plans - not all information is necessarily available in a report or other data source. Workshops may be useful which would allow for discussions on the constraints and opportunities resulting from overlaps with other policies and implementation plans. Through discussions about the traffic and transport ‘system’ as a whole, such workshops also have the potential to help build lasting, perhaps even binding, agreements among the involved parties.

Key local authority officers include members from the following teams (this list is not exhaustive):

• Transport policy
• Public transport
• Strategic Planning
• Development Control
• City Centre Management
• Housing
• Schools
• Tourism
• Countryside
• Public Rights of Way
• Highway Maintenance
• Access officers
• Rehabilitation officers

When measures have been discussed for one transport mode, the consequences for other transport modes then become clearer. This integration will be of particular relevance at points within the networks where the different transport modes interact with one another such as junctions and interchanges (Dutch Ministry of Water, Energy and Transport, 2009).

*Non-Infrastructure Measures*

The plans also need to be integrated within a wider programme of measures to improve facilities for active travel. The following non-infrastructure measures should be considered in conjunction with any walking and cycling improvement schemes:

• Ensure that planning policy guides new development towards sustainable locations that maximise the potential for walking and cycling trips.

• Ensure that transport policy and highway development control processes result in new development site layouts that are designed to maximise access on foot and cycle.

• Ensure that the needs of pedestrians and cyclists are considered when implementing
any changes to highway infrastructure.

- Encourage Travel Plans, which provide a strategy and action plan for facilitating and encouraging travel by sustainable modes, from all significant developments through the planning process.

- Explore the potential for new larger-scale developments to fund walking and cycling audits within adjacent neighbourhoods, potentially secured through Section 106 Agreements.

- Promotion of active travel through measures such as:
  - Production and dissemination of public walking and cycling maps, which should also provide information on public transport;
  - Organised activities for specific user groups, such as ‘Walk/Bike to School Month’; and;
  - Dissemination of publicity regarding the potential health and financial benefits of regular active travel.

- Work with partners in the health sector to develop walking and cycling-based initiatives to help meet shared objectives for active travel.

Value of the integrated network maps

Integrated Network Maps are vital tools for developing and delivering the best possible active travel networks.

The existence of a map enables engagement with all of those people needed to make the networks a reality - politicians, engineers, funding bodies and the public, as well as the development of partnerships with health, education, commercial and voluntary bodies. Such engagement allows for the development of a sense of ownership of the planned networks both within the local authority and with the wider public.

- The maps are critical to designing each section of route within the networks. An effective design for any individual section is only possible if the designer understands its function with respect to adjacent links and within the overall network.

- Integrated network maps are invaluable tools to enable future improvement programmes to be developed, prioritised and managed. This represents a shift from the ad hoc provision for cycling and walking, that has so often happened in the UK helping to ensure that all infrastructure will contribute to the development of a comprehensive network for active travel.

- The integrated network map enables authorities to gain access to a broader use of funds to develop networks, allowing other departments within the local authority, and outside organisations, to identify overlaps with their programmes. As discussed further in Chapter 9, the Highway Maintenance department resurfacing programme
could be used to alter road markings to create cycle infrastructure, zebra crossings could be installed as part of a Road Safety junction improvement scheme or speed reduction measures and new footways could be included from the outset as part of a new development.

- The delivery of active travel schemes could also be achieved through non-highway functions and organisations, such as public realm and environmental management projects and new developments, including developer contributions (S106 Agreements and Community Infrastructure Levy funding).

The evidence based, strategic nature of the network plan allows for the preparation of stronger funding bids (Delivery Guidance 4.3.1).
Chapter 5 Section 1 - Network Planning For Walking

5.4 Introduction
The Act covers a wide range of settlement types and pedestrian environments, with different datasets and resources available to each local authority.

This section of the guidance provides a number of suggested approaches to producing the walking element of the Integrated Network Maps, with the flexibility for local authorities to adapt the approach to their situation.

5.5 Methodology and Principles
As noted in the introduction to this chapter there is generally already a comprehensive network in place to accommodate most of pedestrian trips. The role of pedestrian network planning for utility trips in built-up areas is generally not to provide new walking routes per se, but to improve the existing network in order to encourage people to make more short trips on foot.

The question of where to focus investment is critical, and so this guidance outlines processes for identifying which parts of the pedestrian network should be prioritised for improvement and included on the Integrated Network Map, based around three possible approaches to the critical Stage 2 of the process.

A) Walking trip attractors;
B) Funnel routes associated with land-form barriers; and
C) Footway maintenance classification.

These processes can be utilised in isolation to determine where to focus pedestrian infrastructure improvements. It is recommended, however, that authorities utilise a combination of the three approaches, tailored to local circumstances.

5.6 Process Stages
A process map for the recommended methodology, including the three approaches, is shown in Figure 5.1 below:
Stage 1: Understanding Walking Patterns & Barriers to Walking

The first stage is to assess barriers to walking and existing walking patterns using available local travel survey information. As noted above, there are overlaps with the Information Gathering stage of the cycle network planning process, and authorities may wish to combine these steps.

Existing Walking Patterns

Key walking journeys for analysis include commuting trips and the journey to school. The 2011 National Census provides publicly-available information on the ‘Method of Travel to Work’, which includes Local Authority, ward and detailed local (Output Area) data, and this can be used to assess existing walking patterns by geographical area.

The resources required to undertake pedestrian flow surveys over a wide area, to establish where the levels of pedestrian movements are highest, can be prohibitive.
However, it would be beneficial to utilise data on pedestrian movements from existing data sources, and to undertake a limited number of pedestrian flow surveys on specific routes, to confirm whether the level of pedestrian movements is as high as expected (applicable to Stages 2A and 2B), and also to help understand the relative level of pedestrian movements associated with the different footway maintenance categories (applicable to Stage 2C).

**Barriers**

Consultation with the public and stakeholders should be used to identify barriers to walking, preferably through a range of methods, to supplement the local knowledge of authority officers. Examples of barriers are discussed further in Stage 2B below.

Consultation with different user groups can also help ensure that local authorities exercise their duties under the Equalities Act 2010, (see Chapter 3). It is particularly beneficial to engage with children and young people, given the importance of walking as a mode of travel for the journey to school, and the potential for walking to have lasting positive impacts on the lifestyles of young people.

Possible forms of consultation include:

- Workshops with representatives from relevant groups/organisations, such as Disability Wales, Living Streets and Sustrans Wales, as well as local access focus groups and disabled people’s organisations;
- Online surveying of all residents in the settlement;
- Public engagement events;
- Community Street Audit; and
- Discussions with local elected Members.

Public consultations should ensure that residents’ views on specific pedestrian issues are established. Feedback from local residents on specific walking issues forms a key part of the scheme identification outlined as part of Stage 4.

To help prioritise pedestrian infrastructure improvements, the consultation responses should be used to identify the local perceptions of the main barriers to walking, and to assess the relative influence of each barrier on overall walking levels. For consistency, the barriers should be categorised based on the criteria utilised for on-site auditing (see Stage 3).

**Stage 2A: Key Walking Trip Attractors**

Utility walking trips within a settlement do not generally have the same journey *origin*, as most walking trips start at homes spread across a settlement. However, utility trips typically have common journey *destinations* such as educational establishments, workplaces, health, leisure and other facilities. This guidance therefore outlines a methodology that focuses pedestrian network planning and improvements around these *key walking trip attractors*.

The Delivery Guidance provides examples of destination points that may be considered key walking trip attractors. These have been included in the list below to provide a guide to the
types of local amenities that could be expected to attract a significant number of pedestrian trips:

- Employment areas or large individual employers
- Educational establishments (primary schools, secondary schools, colleges, university campuses);
- Healthcare establishments (hospitals, health centres, doctors’ surgeries);
- Retail facilities (local retail centres, district retail centres, shopping parades/malls, supermarkets, retail parks);
- Community facilities (libraries, leisure centres, religious buildings, cultural institutions);
- Venues (sports stadia, performance arenas, visitor attractions); and
- Transport interchange facilities (bus stops on core routes, rail stations).

The key walking trip attractors in each settlement should be located and mapped, including any proposed new facilities, initially in the process of producing the existing routes map, as required by the Act.

The relative size and likely level of pedestrian activity associated with each facility should be considered when deciding whether to classify it as a key walking trip attractor. For example, a large employment site may only attract a small number of pedestrian trips due to its location distant from the nearest residential areas, but a small employment site may attract a large number of pedestrian trips due to its central location within a settlement. Future changes, such as the planned opening or closure of facilities, should be considered. Latent demand for walking should also be considered, if improved pedestrian infrastructure has the potential to increase walking levels sufficiently to justify classifying a facility as a key walking trip attractor.

Research shows that preferred walking distances are short relative to cycling and travel by other modes. It is therefore recommended that the focus of pedestrian infrastructure is within the walking zones around key walking trip attractors, referred to as ‘attractor zones’. In built-up areas, the number of pedestrian routes that are utilised by people in travelling to/from an attractor increases as the distance from entry points increases. Therefore, the attractor zones can be defined using an approximate 5 minute walking distance of 400m (average walking speed) as a guide to the extents of the pedestrian infrastructure that should be assessed, with smaller areas used for small attractors and larger areas used for larger attractors.

Geographic Information System (GIS) applications can automatically draw walking isochrones of a set time/distance around defined points, which may be a useful tool in defining the zones around attractors, but this should be combined with an assessment of which routes are likely to accommodate high pedestrian flows. For example, a residential cul-de-sac may be a short walking distance from a key walking trip attractor such as a primary school, however, the cul-de-sac is unlikely to see a high level of pedestrian movement, and as such it may not be appropriate for it to be prioritised and assessed for pedestrian improvements.
The process for defining attractor zones should utilise all available information, including local knowledge, to identify a zone within the vicinity of the key walking trip attractor that is likely to accommodate the majority of the pedestrian activity associated with the attractor. It is noted that the zones for different attractors are likely to overlap with each other, which will allow some zones to be merged.

The attractor zones then provide distinct boundaries of areas within which all pedestrian infrastructure is deemed to be important. It is then recommended that the pedestrian routes within these zones are audited on-site, as discussed in Stage 3 below.

Stage 2B: Funnel Routes

Existing pedestrian networks within urban areas are fairly comprehensive and therefore generally provide a number of possible route options. However, barriers associated with the land-form or layout of a settlement can cause severance. This often creates routes with high pedestrian flows, as users are funnelled along the limited number of paths available, if they want to make particular journeys on foot.

Examples of barriers include steep changes in level, rivers, railway lines and heavily-trafficked roads with a limited number of crossing points. Railway and river bridges in densely populated urban areas, as well as their connecting junctions, often accommodate high pedestrian flows due to the lack of alternatives.

Other examples include residential and industrial estates with poor permeability for pedestrians, and with a limited number of access points to the wider network. This results in high pedestrian flows along the primary pedestrian access route(s). Parks and green spaces which are locked at night, or are not attractive walking routes outside of daylight hours, can also create funnel routes on the paths around them.

Funnel routes should be established from a desktop exercise using aerial imagery and other mapping, identifying barriers that sever the pedestrian network, and considering the structure and type of nearby land-uses and adjacent pedestrian routes. As noted in Stage 1, consultation with the public can also help identify barriers and hence funnel routes. Pedestrian ‘spot counts’ and on-site observations can be utilised to confirm whether the pedestrian flows appear to be high enough to justify assessing, auditing and potentially improving the route.

The identified funnel routes then represent pedestrian routes that are deemed to be important and which should be audited on-site, as discussed in Stage 3.

Stage 2C: Footway Maintenance Classification

The guidance document ‘Well-Maintained Highways: Code of Practice for Highway Maintenance Management’ (RLG, 2005 Edition (2013 update)) provides recommendations to authorities that allow for the production of “positive and lasting maintenance policy”. As part of the recommendations, a suggested footway hierarchy is defined (separate from the carriageway hierarchy that is used to categorise roads), with five broad categories for classifying the functionality and scale of use for routes, as reproduced in Table 5.1:
Table 5.1: Recommended Footway Hierarchy

<table>
<thead>
<tr>
<th>Category</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1(a)</td>
<td>Prestige Walking Zones</td>
<td>Very busy areas of towns and cities with high public space and streetscene contribution.</td>
</tr>
<tr>
<td>1</td>
<td>Primary Walking Routes</td>
<td>Busy urban shopping and business areas and main pedestrian routes.</td>
</tr>
<tr>
<td>2</td>
<td>Secondary Walking Routes</td>
<td>Medium usage routes through local areas feeding into primary routes, local shopping centres etc.</td>
</tr>
<tr>
<td>3</td>
<td>Link Footways</td>
<td>Linking local access footways through urban areas and busy rural footways.</td>
</tr>
<tr>
<td>4</td>
<td>Local Access Footways</td>
<td>Footways associated with low usage, short estate roads to the main routes and cul-de-sacs.</td>
</tr>
</tbody>
</table>

The Code of Practice recommends that the above hierarchy is utilised to classify all footways maintained by local authorities; there is no separate recommended hierarchy for Public Rights of Way (PRoW). The guidance indicates that this classification of footways “is a matter for local discretion”, but should consider factors such as current/future pedestrian usage and contribution to the streetscene, as well as the “proximity to schools and other establishments attracting higher than normal numbers of pedestrians”.

Although it is not a statutory requirement to follow the recommendations, maintenance teams in many Welsh authorities have classified their footways based on this approach, tailored to local circumstances, and some authorities have developed local maintenance policies based on the Code of Practice. It is therefore recommended that this defined classification of footways is used as a basis for establishing where to focus improvements to walking infrastructure under the Active Travel Act.

It will be useful to map the footway maintenance classifications, which may already be available from maintenance teams, using appropriate GIS applications.

Using the existing footway classifications, it is recommended that authorities prioritise auditing (see Stage 3), and the subsequent identification of pedestrian improvements (see Stage 4), starting with the higher category footways in each settlement.

It is recognised that there may not be any category 1(a) or 1 footways in some settlements, and in these cases it would be more appropriate to focus on category 2 and/or category 3 footways, and considering the length of footway that would need to be assessed. The high category footways then represent pedestrian routes that are deemed to be important. It is recommended that these routes are audited on-site, as discussed in Stage 3.

It is recognised that the above process may not be possible for some local authorities, due to the lack of footway classification information. If this is the case, then the approaches detailed in Stage 2A and Stage 2B can be utilised instead. However in this case, input from the authority’s Highway Maintenance Team should still be sought to ensure that the integrated network map reflects their requirements.
**Stage 3: Auditing the Key Walking Routes**

Stage 2 has enabled authorities to identify the most important pedestrian routes within each settlement. The next stage of the process is to audit the existing infrastructure along the routes and in areas that have been identified.

The aim of the audit process is to identify where pedestrian infrastructure improvements are needed, with sufficient detail obtained on-site to enable the scope and indicative cost of schemes to be estimated, and to assemble packages of potential improvement works.

There are a number of potential methodologies for auditing walking infrastructure, ranging from detailed street audits, to surveys that only consider specific aspects of the infrastructure (such as footway condition surveys). It is recommended that the auditing methodology should target the following five considerations for pedestrian infrastructure.

- Comfort
- Attractiveness
- Accessibility
- Directness
- Safety

Based on these 5 key considerations, a recommended audit checklist has been developed, which defines the pedestrian environment in terms of 16 individual categories to be assessed on-site, as given in Table 5.2:

**Table 5.2: Walking Audit Checklist**

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>GREEN</th>
<th>AMBER</th>
<th>RED</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMFORT - Condition</td>
<td>Footways level and in good condition, with no trip hazards.</td>
<td>Some defects noted, typically isolated (such as trenching or patching) or minor (such as cracked, but level pavers). Defects unlikely to result in trips or difficulty for wheelchairs, prams etc. Some footway crossovers resulting in uneven surface.</td>
<td>Trip hazards or hazards which could impede wheelchair or pram passage, such as: - rocking pavers, - potholes in pavements, - subsided or fretted pavement, - significant uneven patching or trenching. Large number of footway crossovers resulting in uneven surface.</td>
</tr>
</tbody>
</table>

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| COMFORT - Other | Examples of ‘other’ comfort issues include:  
- Poorly drained footways resulting in ponding issues/slippery surfaces; and  
- Steep gradients. |
|-----------------|-------------------------------------------------------------|
| COMFORT - Other | Examples of ‘other’ comfort issues include:  
- Poorly drained footways resulting in ponding issues/slippery surfaces; and  
- Steep gradients. |
| COMFORT - Other | Examples of ‘other’ comfort issues include:  
- Poorly drained footways resulting in ponding issues/slippery surfaces; and  
- Steep gradients. |
| ATTRACTIVENESS - Maintenance | Footways well maintained, with no significant issues noted. |
| ATTRACTIVENESS - Maintenance | Minor littering. |
| ATTRACTIVENESS - Maintenance | Overgrown vegetation. |
| ATTRACTIVENESS - Maintenance | Street furniture falling into minor disrepair (for example, peeling paint). |
| ATTRACTIVENESS - Maintenance | Littering and/or dog fouling prevalent. |
| ATTRACTIVENESS - Maintenance | Fly-tipping and/or graffiti prevalent. |
| ATTRACTIVENESS - Maintenance | Seriously overgrown vegetation, including low branches. |
| ATTRACTIVENESS - Maintenance | Street furniture falling into major disrepair. |
| ATTRACTIVENESS - Fear of Crime | No evidence of vandalism with appropriate natural surveillance. |
| ATTRACTIVENESS - Fear of Crime | Minor vandalism. |
| ATTRACTIVENESS - Fear of Crime | Lack of active frontage and natural surveillance (e.g. houses set back or back onto street). |
| ATTRACTIVENESS - Fear of Crime | Major or prevalent vandalism. |
| ATTRACTIVENESS - Fear of Crime | Evidence of criminal/antisocial activity. |
| ATTRACTIVENESS - Fear of Crime | Route is isolated, not subject to natural surveillance (including where sight lines are inadequate). |
| ATTRACTIVENESS - Other | Examples of ‘other’ attractiveness issues include:  
- Evidence that lighting is not present, or is deficient;  
- Routes with poor visibility for pedestrians (e.g. blind corners); and  
- Temporary features affecting the attractiveness of routes (e.g. refuse sacks). |
| ATTRACTIVENESS - Other | Minor vandalism. |
| ATTRACTIVENESS - Other | Lack of active frontage and natural surveillance (e.g. houses set back or back onto street). |
| ATTRACTIVENESS - Other | Major or prevalent vandalism. |
| ATTRACTIVENESS - Other | Evidence of criminal/antisocial activity. |
| ATTRACTIVENESS - Other | Route is isolated, not subject to natural surveillance (including where sight lines are inadequate). |
| ACCESSIBILITY - Footway width | Footways able to accommodate all users without ‘give and take’ between users or walking on roads. Footway/clearance widths generally in excess of 1.5m. | Occasional need for ‘give and take’ between users and walking on roads due to restricted width, street clutter or footway parking. Footway/clearance widths of between approximately 1.5m and 1.2m. Permanent obstructions cause some deviation from desire lines. | Users ‘give and take’ frequently, walk on roads and/or results in crowding/delay due to restricted width, street clutter or footway parking. Footway/clearance widths of less than 1.2m (i.e. standard wheelchair width). Permanent obstructions cause significant deviation from desire lines. |
| ACCESSIBILITY - Street clutter | | |
| ACCESSIBILITY - Footway parking | Examples of ‘other’ accessibility issues include:  - Temporary obstructions restricting clearance width for pedestrians (e.g. driveway gates opened into footway, or poorly managed streetworks);  - Barriers/gates restricting access; and  - Bus shelters restricting clearance width. | |
| ACCESSIBILITY - Other | Crossing of road easy, direct, and comfortable and without delay (< 5s average). Crossing of road direct, but associated with some delay (up to 15s average) Crossing of road associated indirect, or associated with significant delay (>15s average) | Adequate dropped kerb provision. Dropped kerbs provided, albeit not to current standards. Dropped kerbs absent.  | Adequate tactile paving provision. Tactile paving provided, albeit not to current standards. Tactile paving absent. |
The auditing should cover the different types of pedestrian routes, including footways adjacent to roads, off-road Public Rights of Way (PRoW), and other non-highway footpaths that the public have access to, as appropriate.

If a large number of pedestrian links/routes are to be audited, then it is suggested that a simple scoring system is utilised, to highlight where there are existing deficiencies/issues. Pedestrian links can be scored as green, amber or red against the 16 infrastructure categories outlined in Table 5.2.

Authorities can tailor the audit process to their local situation, considering the nature and scale of improvement schemes that they would be looking to propose, and the resources they have available to carry out the work. It may be appropriate to undertake detailed street audits if the extents of the pedestrian environment to be assessed are manageable.

In order to ensure that the methodology for auditing existing infrastructure accounts for the views of different user groups, it may be useful to undertake a pilot street audit with representatives from the various user groups, including people with different types of disabilities.
This information can form the basis of the Statement and Explanation, required to accompany any routes on the existing route map that are not up to standard, but suitable for mapping none the less. The delivery guidance contains more information about the statement and explanation.

Stage 4: Scheme Identification

Potential schemes that can be implemented to improve pedestrian provision and address existing deficiencies include:

- Replace broken/uneven/rocking paviors;
- Resurface footways;
- Improved street lighting;
- Provision of CCTV security cameras;
- Improved pedestrian crossing facilities;
- Removal of street clutter;
- Provision of traffic calming features;
- Reduced road speeds;
- Provision of dropped kerbs and tactile paving; and
- Public realm improvement schemes encompassing some or all of the above.

As part of the public engagement events (see Stage 1), local residents should be asked to highlight specific infrastructure issues, to help identify possible improvement schemes. Further analysis should be undertaken to critically assess the scale and nature of the issues raised by the public, with a focus on issues that have been raised by multiple residents.

Other key stakeholders – such as Disability Wales, Living Streets and Sustrans Wales, local access focus groups and disabled people's organisations - should also be involved in site visits to discuss the walking infrastructure and potential improvements on key pedestrian routes. It may also be beneficial to consult with internal departments/colleagues, particularly Access and Rehabilitation Officers.

Where a number of schemes have been identified within the same zone, or on the same route, it may be appropriate to merge the schemes into a package of works, to help ensure that individual measures are implemented together and to achieve complementary benefits and synergies.

It may be necessary to prioritise improvement schemes (and packages of schemes) for funding and implementation – this is a matter for local discretion. However, relevant factors to consider in prioritising pedestrian improvements include:

- The current and potential levels of pedestrian movements;
- The importance of the route for specific user groups;
- The degree of deficiency of the existing infrastructure;
- Previous, current and planned levels of investment in the public realm;
• Integration with facilities for other transport modes, particularly cycling and public transport;
• Performance against local transport policy objectives;
• Scheme feasibility / deliverability;
• Potential to attract funding, particularly private sector funding; and
• Implementation costs.

Stage 5: New Pedestrian Links

In addition to improvements to the existing pedestrian network, there may still be a requirement to provide new links in order to ensure that pedestrian routes are as direct and safe as possible. Pedestrian desire lines that are not facilitated by a suitable pedestrian facility can be identified from a number of sources, including:

• Requests from the public, local elected members and key stakeholders;
• Evidence of worn pathways across grassed areas, which may be noted from the on-site auditing of existing pedestrian routes (see Stage 3); and
• Analysis of barriers can highlight where facilities such as new crossing points and bridges could potentially accommodate a high number of pedestrian trips, with demand currently suppressed by the limited number of route options.

In assessing potential new links, the requirement of the Act to focus on utility trips should be considered - routes that are only likely to provide for leisure/recreational walking trips are not suitable for inclusion on the integrated network map.

Stage 6: Phasing & Monitoring

The settlements covered by the Act range in size from small villages to large cities, and as such the number of pedestrian routes to be assessed will vary substantially. It is acknowledged that local authorities may not have the resources to audit, assess and identify improvements across the whole of a larger settlement in one phase, therefore some authorities may need to phase the assessment work by dividing settlements into sub-areas. There are a number of potential ways to undertake this.

A recommended approach to phasing is to utilise local-level data from the 2011 National Census to identify areas with statistically lower levels of accessibility, using the census dataset for ‘proportion of households without access to a car/van’ and higher levels of poor health. This will help to address key objectives through enhancing walking infrastructure that improves access to key amenities. The boundaries used by the census geography are built for the purposes of statistical analysis, therefore it may be necessary to refine the boundaries to provide more intuitive area boundaries for the public and other stakeholders.

To establish the impact of any implemented walking improvements, monitoring of walking levels and travel patterns should be undertaken before and after implementation. The surveys and consultations undertaken to inform the development of the programme of works (see Stage 1) should provide a representation of existing ‘before’ walking patterns. Once the schemes that are to be implemented as part of the network planning assessment have been
determined, and the geographic extents of implementation have been defined, the obtained information on views and perceptions regarding walking can be supplemented by pedestrian flow counts at key locations.

In order to monitor the impact of implemented measures, ‘after’ surveys should be undertaken a suitable period after implementation. It is important that the brief for the ‘after’ surveys is consistent (through consideration of factors such as time, day of the week and weather conditions) with the ‘before’ surveys, to ensure that the results provide a direct comparison.
Chapter 5 Section 2 - Network Planning For Cycling

5.7 Introduction

This section of the guidance provides a recommended approach to preparing the cycling element of the Integrated Network Maps. It is based on European best practice, amended as necessary to suit the legislative framework applying in Wales.

This process can be adapted to suit local circumstances and the degree of sophistication of the cycling network plan will depend on the size of the area under consideration.

5.8 Process Stages

Figure 5.2 sets out the stages to be undertaken when developing a cycling network plan:
The stages are:

- **Network aims** – the journey types it should cater for, its density (the distance between routes within the network) and the key network requirements.

- **Information gathering** from a broad range of sources including local and officer knowledge, strategic plans, and national and local data.

- **Mapping**, which involves plotting the trip departure and destination points, identifying desire lines and designating route types.

- **Route assessment** involves translating desire lines into actual routes, using existing routes and streets wherever possible. The suitability of routes is assessed against the key network requirements.

- The **Draft network plan** indicates the routes to be developed and the improvements required to bring those routes up to standard.

- **Validation** is required through effective consultation and engagement.
The Final Integrated Network Map can be sent to Welsh Government for approval once any necessary amendments have been made.

A further additional stage is the prioritisation of the works required to create the routes based on local and national policy, any overlaps with other programmes of works and the availability of funding.

Stage 1: Network Aims and Requirements

Establishing network aims is crucial to understanding the focus of the network development and informs all of the proceeding stages of planning.

Journey Type

Cycling generally has two main purposes - utility and leisure.

Utility cycling involves making a journey for the main purpose of doing an activity at the journey’s end, such as work, education or shopping whereas leisure cycling is done for the journey itself. Leisure cyclists include sports training cyclists, recreational riders and cycle tourists (LTSA 2004).

The Active Travel Act, is aimed at promoting and enabling utility journeys.

The definition of ‘active travel’ under the Act means walking and cycling as an alternative means to motorised transport for the purpose of making everyday journeys. An “active travel journey” means a journey made to or from a workplace or educational establishment or in order to access health, leisure or other services or facilities (Delivery Guidance 2.3.1).

This Delivery Guidance also explains (2.3.2) that: Where routes could not be used to access a workplace or educational establishment, health, leisure or other services or facilities, then they are not suitable to be considered as active travel routes (Delivery Guidance 2.3.2)

When developing their active travel networks, local authorities should be clear what the aims of the network are, the journeys they are planning to cater for and the people they are hoping will use the network.

Network Density

If a cycle network is viewed as a grid or mesh that is laid across an area, and the designated routes are the lines of the mesh, then the density can be measured by the distance between the designated routes. This distance between routes is referred to as the “mesh width”.

The networks developed under the Active Travel Act should aim to have a mesh width of around 250m to create as dense a network of cycle routes as possible. However it is acknowledged that it will take time to develop a network of such density and wider mesh widths of 500-1000m would be expected within the initial years of the network development. The Act acknowledges that these cycle networks will not be delivered overnight and the ‘integrated network maps should set out the plans of the local authority for the next 15 years’ (Delivery Guidance 3.5.2).

The density of the network will also be in part defined by the size and layout of each settlement. In smaller towns (less than around 2000 residents) the network could potentially include every possible route from the outset. In larger towns and cities this would have to be simplified by clustering certain destination or departure points - for example by only including
larger employment sites (e.g. where more than 100 people are employed) or only the larger shopping areas.

Whatever the density of the designated routes, the key to delivering a truly comprehensive network is the principle of the basic network. This means that most roads within a settlement, i.e. the residential and lightly trafficked parts of the network, should be designed to allow for the safe movements of cyclists, since every home, employment location and amenity should be accessible by cycle. The power of the bicycle is in its flexibility, speed and convenience. These advantages can only be exploited if as many routes as possible are suitable for cycling. The basic network is therefore not only the designated cycle routes but the majority of the road network (with a few exceptions such as most trunk roads, other high speed roads and motorways).

Different levels of provision would be expected on the designated routes as compared to the local routes which typically make up the basic network but the principle means that authorities should consider the safety of cyclists on most streets. This is a shift from previous practice in the UK which typically focused heavily on providing a limited number of designated cycle routes.

Network Requirements

A number of factors have been identified as being key requirements to creating a usable cycle network – see Chapter 4, User Needs. Routes should be:

- Coherent
- Direct
- Safe
- Comfortable
- Attractive

The first three of these key factors (i.e. coherence, directness and safety) are of greater importance in the design of the overall cycle network, whereas comfort and attractiveness play more of a role in the design of the routes themselves.

The relevance of each of these factors in network planning is set out in Table 5.3
<table>
<thead>
<tr>
<th>Key requirement</th>
<th>Principle</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coherence</strong></td>
<td>Continuity of routes</td>
<td>Cyclists should be able to easily and safely join and navigate along different sections of the same route and between different routes in the network. Routes should be complete with no gaps in provision. ‘End of route’ signs should not be installed but rather cyclists should be shown how the route continues. Cyclists should not be ‘abandoned’ by the infrastructure, particularly at junctions where provision will often be required to ensure safe crossing movements.</td>
</tr>
<tr>
<td>density of network</td>
<td>Cycle networks should provide a mesh or grid of routes across the town or city. The density of the network is the distance between the routes which make up the grid pattern. The aim, possibly in the longer term, should be a network with a mesh width of 250m.</td>
<td></td>
</tr>
<tr>
<td><strong>Directness</strong></td>
<td>Distance</td>
<td>Routes should follow the shortest option available or as near to the ‘as-the-crow-flies’ distance as possible. It is recommended that routes be no longer than 1.4 x ‘as-the-crow-flies’ distance.</td>
</tr>
<tr>
<td>time: frequency of required stops</td>
<td>The number of times a cyclist has to stop on a route should be minimised. This includes stopping at junctions, access (motorcycle) barriers, give way points, pedestrian only zones etc.</td>
<td></td>
</tr>
<tr>
<td>time: delay at junctions</td>
<td>The delay caused by junctions should be minimised. This includes assessing the impact of multiple or single stage crossings; signal timings, toucan crossings etc.</td>
<td></td>
</tr>
<tr>
<td>time: delay on links</td>
<td>The delay caused by not being able to bypass slow moving traffic.</td>
<td></td>
</tr>
<tr>
<td><strong>Gradients</strong></td>
<td>Routes should avoid steep gradients. Uphill sections increase time, effort and discomfort. Where these are encountered, routes should be planned to minimise climbing gradient and allow users to retain momentum gained on the descent. However in some circumstances short steeper sections may be better than long slower gradients. The routes should be cycled to assess the relative impact of gradient on time, effort and discomfort.</td>
<td></td>
</tr>
<tr>
<td><strong>Reduce/remove speed differences</strong></td>
<td>Key to reducing severity of collisions is reducing motor traffic speeds, particularly at points where the risk of collision is greater, typically at junctions. Where cyclists and other vehicles are sharing the carriageway speeds should be reduced to more closely match that of the cyclist. Where speed differences cannot be reduced cyclists should be separated from traffic. This separation can be achieved at varying degrees through on-road cycle lanes, light segregation, hybrid tracks, and full segregation. Segregation will reduce the risk of collision from beside or behind the cyclist and improve subjective safety.</td>
<td></td>
</tr>
</tbody>
</table>
| **Safety** | **Risk of collision** | A high proportion of collisions involving cyclists occur at junctions, which need particular attention to reduce the risk of collision. Junction treatments include:  
- Minor/side roads - cyclist priority and/or speed reduction across side roads  
- Major roads - separation of cyclists from motor traffic through junctions. Routes should be identified which reduce the number of crossing points or junctions that a cyclist needs to negotiate (see Stopping Frequency above). Where junctions cannot be avoided they should be designed to be low speed or with segregated provision. |
<p>| <strong>Reduced conflict with crossing traffic</strong> |  |  |</p>
<table>
<thead>
<tr>
<th>Comfort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avoid complex design</td>
</tr>
<tr>
<td>Consider all user demands</td>
</tr>
<tr>
<td>Reduce severity of collisions where they do occur</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td>Separation from traffic fumes and noise</td>
</tr>
<tr>
<td>Surface quality</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Attractive-ness</td>
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<tr>
<td>----------------</td>
</tr>
<tr>
<td>Effective width without conflict</td>
</tr>
<tr>
<td>Wayfinding</td>
</tr>
<tr>
<td>Social safety and perceived vulnerability of user</td>
</tr>
<tr>
<td>Minimise street clutter</td>
</tr>
<tr>
<td>Secure cycle parking</td>
</tr>
</tbody>
</table>
Importance of cycling the route

The recommended method for assessing routes against these requirements is to cycle them, as it is only when they are experienced first-hand that the issues can be more fully understood. This understanding will result in better design and more usable routes. Local and user knowledge is also a crucial input and views should be sought throughout the process to ensure the best possible routes and solutions are identified.

Application of principles to all highway schemes

Following these principles in the design of all highway schemes will allow as many all-purpose roads within the network as possible to provide properly for active travel. This is discussed in greater detail in Chapter 9.

Stage 2: Information Gathering

A broad range of information should be gathered when developing the cycling elements on the integrated network map. The need for this will depend to some extent on the size of the settlement, but collecting more information is likely to increase the quality of the final network and therefore the take-up active travel.

As noted above, there are overlaps with the Understanding Walking Patterns and Barriers to Walking stage of the pedestrian network planning process, and authorities may wish to combine these steps.

Information should be obtained on

- the journeys that people currently make (by all modes of transport),
- their trip departure and destination points
- the barriers they perceive to cycling or cycling more often,
- their views on existing routes and
- their requests for improvements and potential new routes.

This information can be gathered through a variety of means including surveys, workshops, social media and exhibitions, both on-street and in nearby buildings. Local authorities could undertake surveys of the public’s expectations and requirements for walking and cycling routes and facilities. This may include assessing the needs locally of specific user groups, such as disabled people. Surveys might also help to assess the extent to which people are making short car journeys due to a lack of knowledge of alternative methods, poor or missing infrastructure provision or because their journey was unsuitable for active travel. (Delivery Guidance 3.5.10)

National Data

There is a broad range of publically available data which can usefully input into the development of an integrated network map, including:

- Ward boundary map
- Census – ward-to-ward travel to work data by mode
- NOMIS ward-to-ward travel to work patterns
- Demographic profile maps
- Residential and workplace population data
- Cycling to work data
- Cycle collision data (e.g. www.crashmap.co.uk)
- Road network hierarchy
Local Data

Local authorities already collect a range of data which can usefully input into the cycle network plan including:

- Locally collected traffic and cycle count location plan
- Locally collected traffic and cycle flow data including off road cycle counters
- Locally collected traffic speed data
- Data collected as part of Travel Plans for specific organisations within the settlement
- Existing traffic calmed streets
- Housing monitoring maps

Where necessary local authorities may need to carry out additional cycle and traffic counts or speed surveys on specific streets or routes where no data already exists. This needs to be used in the context of the existing and envisaged use by motor vehicles and cyclists.

In particular, care needs to be taken to ensure that seemingly ‘safe’ routes with low casualty levels are not actually heavily trafficked routes that no one would wish to cycle on (and hence show very low casualty levels).

Stage 3: Mapping

Once the relevant information has been gathered the mapping stage can be undertaken. The mapping stage should be developed through a process of layering all of the relevant information from the various sources discussed above.

The mapping stage involves the following steps:

1. Map trip departure and destination points
2. Plot links between them
3. Designate route type

Plot Trip Departure and Destination Points

Trip departure points are usually the main residential areas of the settlement. Depending on its size and the required density of the network, the departure points can be clustered – see below.

Trip destination points generally cover all of the buildings and amenities that might attract existing and potential cyclists.

For the Active Travel Act the mapping of the following departure and destination points will be completed as part of the production of the Existing Routes map.
• main office locations and business parks
• public transport nodes
• libraries
• post offices
• sports stadiums
• leisure centres
• parks
• religious buildings
• hospitals
• shopping centres
• educational establishments
• cultural institutions
• tourist advice centres
• tourist and leisure attractions
• recreational walking and cycling routes
• cycle maintenance and repair shops

However based on the information gathered during the previous stage additional points may need to be added which are planned within the period of the network plan, such as residential areas, railway or light rail stations, business parks, schools etc.

Local authorities should also consider destination and departure points in neighbouring local authorities where the distance is not too great (less than 10 miles) to prevent active travel being a viable transport option. It is recommended that wherever possible settlements in different local authorities are connected through the Active Travel networks, which should be developed through collaborative working. (Delivery Guidance 3.5.9)

Clustering of departure/destination points

Once all of the new and proposed departure and destination points have been mapped they will need to be clustered to reduce the complexity of identifying desire lines.

The clustering will depend on the size of the settlement and the density of the network being developed. For larger towns and cities this clustering might be done by only including larger employment sites (e.g. where more than 100 people are employed) or only the larger shopping areas.

For example when developing the Cardiff strategic cycle network plan

- homes within a neighbourhood were clustered and identified by one key point (e.g. the main hub or row of shops within the neighbourhood)
- employment centres such as Cardiff Bay were identified as one key destination point

Clustering on this scale would not produce a network plan of a density of 250m mesh width. However the initial Integrated Network Map is the first phase in a long term plan for developing a network. Once the first phase of routes are developed, networks with routes that have a closer mesh width can be identified and created and so on until eventually the network will have the desired density.

Identify Desire Lines

Once trip destination and departure points have been mapped (and clustered where required) the next step involves plotting the desire lines between them. These desire lines should be direct and should not follow existing roads or cycle routes – all that is needed at
this stage is to identify the lines along which people want to travel. This can be carried out independently of the Existing Routes Maps. The Existing Routes Map will be an invaluable tool when converting desire lines to actual routes, but the identification of desire lines should not be constrained by existing routes.

The plotting of desire lines requires an understanding of who wants to go where, as not all destination points need to be linked to all departure points. The identification of the desire lines should be based on the data, research and local knowledge collected in the information gathering stage.

For example, not every residential area needs to be linked to every school as generally schools have catchment areas (although this may not be applicable to Welsh language medium or religious schools) so the links need only be identified within those catchment areas. Census data can provide extensive information on residential and workplace populations which can be used to identify potentially useful links.

This methodology is scalable - a considerable amount of analysis may be appropriate to identify the required cycle route network in a city but within smaller towns and villages the desire lines may be more self-evident.

Identify Cycle Route Type

Prior to converting the desire lines into actual routes the importance of the route needs to be understood, in terms of the numbers and types of cyclists it will need to cater for (e.g. links to schools will naturally need to cater for younger people’s needs).

This process informs the designation of route type. These route types are similar to the hierarchies used to identify different levels of service for motor traffic that would be expected on trunk roads, distributor roads and residential streets.

The following hierarchy of cycle routes is recommended:

- **Primary routes**: key corridors between neighbourhoods/residential areas and a town or city centre; key routes between districts and neighbourhoods within a town or city; cycle routes which are (or will be) used by a great many cyclists

- **Secondary routes**: links between the primary routes; links to trip attractors such as schools, colleges, employment sites; cycle routes which are an attractor for a more limited range of users; routes which will cater for fewer cycle journeys than the primary routes but are still of strategic importance within the network

- **Local routes**: all other all-purpose roads which are not necessarily part of a designated route (e.g. many residential streets). This basic network of local routes, although lower in the hierarchy, form an important part of the cycle network.

Showing the demand lines at this stage can be done by using varying thickness of line to show the different levels of route - see example Figure 5.3. This shows a stronger relation between a large residential area and a large city market in comparison to that between a large residential area and a small residential area.
Stage 4: Assessment

Convert Desire Lines to Routes

This stage is the most critical and involves translating the desire lines into actual routes. Authorities should aim to make as much use as possible of existing infrastructure and any new infrastructure that is already planned – for example any new roads and streets being provided by new housing development sites.

This identification of routes should be based on a clear understanding of the key requirements of the cycle network set out in Table 5.3 and the design standards set out in Chapter 6.

The conversion of desire lines to routes involves the following steps, which are illustrated in Figure 5.4.

1. Identify the most direct route available (based on directness requirements of time, distance and gradient)
2. Check the route is suitable for the intended use (based on the coherence, safety, comfort and attractiveness of the route);
3. If not, confirm that the route can be brought up to minimum standards;
4. If it cannot, identify the next best route and start again from Stage 2.
1. **Identify Most Direct Route**

Where there are a number of potential routes between points, they will all need to be assessed to determine which is the most direct in terms of the factors given in Table 5.3 namely distance, time (stopping frequency and delay) and gradient. Reference should also be made to the basic user needs given in Chapter 4.

2. **Check suitability of route**

The most direct route should then be assessed for its suitability. This assessment involves the appraisal of the route in terms of the other key requirements of coherence, safety, comfort and attractiveness given in Table 5.3 and the design guidance and standards set out in Chapter 6.

An Audit Tool has been developed to assist in this task, which is included in Appendix B. It is intended to be used on-site and provide a means of ensuring that all of the factors which make up the key requirements are considered.

Any route which scores less than 35 (out of a potential 50 points), or has any element that is marked as ‘Critical’ will require further development before it is included in the Existing or Integrated Network Maps.

3. **If Not Suitable, Identify Improvements Required**

If the route is not suitable in its current condition, an assessment should be undertaken to identify the works or measures that would enable it to fulfil the network requirements and the design standards, based on the following considerations:

- **There is often more than one solution** – street design is not an exact science and there is no one solution for any given situation. A range of options should be considered (and consulted on where required) to identify the best possible solution. Designing for the bicycle is a creative challenge which requires designers to think through the consequences of their choices in the design rather than simply applying standard templates.

- **The aim is to find the best solution possible for cyclists** – the aim when designing active travel routes is to make cycling on those routes more attractive than using motor vehicles. People must choose to cycle and will only do so if they gain...
from it personally.

- **The existing motor traffic situation must be considered** – This should be based on actual surveys and observations rather than just the speed limit or assumptions about street type. For example it should not be assumed that traffic speeds and volumes are low in all residential streets. Similarly a low speed does not automatically infer that bicycle and motor traffic can be combined and in some situations segregation may be required despite low speeds. An approach which includes observations of actual use in addition to the considerations of intended use is necessary.

- **Speeds and volumes of motor traffic on any route are not fixed** – Where necessary, consideration should be given to measures which could change the function of a street, including motor traffic volumes and/or speed in order to bring a route within acceptable standards. A major deterrent to cycling expressed by non-cyclists is fear of motor traffic (Carnall, 2000), and vehicle speed is a major factor in perceptions of the road environment as hostile by both cyclists and pedestrians.
  - In relation to traffic volume, filtered permeability or the creation of vehicle restricted areas could be used to create a more attractive and safer cycling route.
  - Influencing the speed of traffic can be achieved through traffic calming and/or the introduction of 20mph limits and zones – see Chapter 4.

- **Junctions are a key area of concern** – As noted in Chapter 4, a high proportion of collisions involving cyclists occur at junctions. Despite this, less consideration has often been given to the movements of cyclists through junctions than on links, which can leave cyclists feeling abandoned when they most need cycle-specific infrastructure. Active travel networks should in future ensure that there are no gaps in provision along any part of a route and that junctions are given particular attention. The following should be considered:
  - Speed reduction and legibility are crucial factors in improving safety for all users. Lower speeds allow for ‘forgivingness’.
  - Junctions should be designed such that all users are aware of the potential positioning and movements of other users.
  - Visibility and eye contact are key as the ability to communicate between different road users improves safety.
  - Greater priority should be given to cyclists wherever possible through raised tracks with priority at side roads, cycle specific signals, increased green time on cycle routes (particularly on uphill gradients), toucan crossings, and raised table junctions which reduce the speeds of all users to that similar to cyclists.
  - Conventional roundabouts often pose the highest risk to cyclists

- **Designs should not be developed in a vacuum** – the best designs, particularly for complex problems are often identified through brainstorming sessions involving user groups and designers.
4. If The Route Cannot Be Improved to Required Standard - Reconsider Options

If, following steps 2 and 3, it is considered that no motor traffic management changes or physical measures are feasible which would bring the route up to the required standard, then the next most direct route should be assessed for suitability.

Another possibility may be that if the route could not feasibly be made suitable to be a primary cycle route, consideration could be given to downgrading it to a secondary or local route, if the appropriate standards could then be met. For example, cycle lanes that cater for single file cycling may be appropriate on a secondary route but a primary route would need lanes that allow for cycling side-by-side.

Stage 5: Validation

Once the draft Integrated Network Maps have been produced, there should be broad engagement and consultation with both internal and external stakeholders in order to validate the proposals.

This consultation should be as extensive as possible to help ensure all those who may be affected by the proposals have a chance to input. For the integrated network maps developed as part of the Act it is recommended that there should be a 12 week public consultation.

General advice on consultation is included in Chapter 3 - a brief summary of the key points is provided below.

- Local authorities should consult with all of the people who will be affected by the proposals including those who live in the vicinity of the routes and those who are likely to use them.
- It will be important to be clear in the public consultation that the Integrated Network Maps show longer term aims.
- Consultation on the maps will not replace the need for consultation and negotiation on individual schemes as and when specific proposals for delivery / implementation are taken forward.
- It will be important to engage with diverse groups including those who are not currently active travellers and those who are members of groups with protected characteristics under the Equalities Act 2010. An Equality Impact Assessment may be required (see Chapter 2).
- Engagement should be carried out through a variety of means such as social media, online surveys, and exhibitions in public buildings and on-street consultation in town centre locations.
- Local authorities need to consider the appropriate level of detail to be provided when consulting with the public and avoid engineering style drawings or technical jargon if possible.
- Consultation should be seen as an opportunity to promote active travel and a means of engaging people in reconsidering their travel options.

Stage 6: Final Integrated Network Map

Following consultation sufficient time and resources should be allocated to ensure any necessary amendments are made to the Integrated Network Maps prior to submission to the Welsh Ministers for approval.
The Delivery Guidance gives detail guidance on the submission, approval and review process.

**Stage 7: Prioritisation**

Local authorities should decide for themselves how best to plan for the delivery of their integrated network. However it is recommended that they focus on those parts of the network that are most likely to have the greatest impact on increasing rates of active travel and the number of people who choose to travel actively (Delivery Guidance 5.1.3).)

One of the key benefits of the identification of schemes within an integrated network map is the ability to deliver the network through a broader range of funding sources and not just through those budgets specific to active travel.

As well costs and the availability of funding, prioritisation of schemes should also be informed to some extent by the deliverability of the schemes. It is likely that schemes identified in the Integrated Network Maps will fall into one of the following categories:

- ‘Shovel Ready’ – schemes which are ready for immediate delivery or are under active development
- Medium term – schemes where there is a clear intention but delivery is dependant on funding availability or other issues
- Longer term – more aspirational schemes or those awaiting defined solution

When considering funding submissions the Welsh Ministers expect to see key schemes being prioritised, and evidence that the integrated network maps have been considered (Delivery Guidance 2.6.3).

**REFERENCES**

Aldred, R. 2012. Cycling cultures: summary of key findings and recommendations. ESRC, UEL.


Bristol City Council (2012b) 20mph Speed Limit Pilot Areas - Monitoring Report (March 2012)


Warrington BC (2010) Executive Board 18 October 2010 (20mph Speed Limit Trial Assessment)
6 – DESIGNING FOR WALKING AND CYCLING

This Chapter provides guidance on the design of active travel routes for walking and cycling. It provides guidance in relation to Section 2(6) of the Active Travel Act. In determining whether anything a route is suitable to be designated as an active travel route, a local authority must have regard to this guidance.

6.1 Introduction

This chapter provides advice on the design of active travel routes – links, junctions and crossings which meet the needs of pedestrians and cyclists, in urban and rural situations.

It builds on guidance on the User Needs (Chapter 4) and on the Network Planning for walking and cycling (Chapter 5). It should also be read in conjunction with Chapter 8 on Related Facilities, which covers direction signing, cycle parking and features of value to pedestrians, such as benches, as well as Chapter 10 on Construction, Maintenance and Management, which includes details on drainage, fencing, tactile paving, lighting and access controls.

Appendix A provides more detailed design guidance on specific measures combining advice on key design features with other considerations, alongside a drawing for each of a series of Design Elements. Where the text refers to a Design Element in Appendix A it is marked with this symbol “DE6”.

Each Design Element has been given one of three statuses, defined as.

**Standard Details**
Details that are well understood and should generally be applied as shown unless there are particular reasons for local variation.

**Suggested Details**
Details that have not been widely applied in Wales but may be considered appropriate for use in the circumstances as advised.

**Possible Details**
Details that are largely untested in Wales but have been used successful in other places and may be considered for use in pilot schemes to gain further experience.
Within this document those elements denoted as **Standard Details** will be regarded as “standards” for the purposes of chapter 3(6)(a) of the Active Travel Act.

The use of advice categorised as **Suggested Details** or **Possible Details** will require careful monitoring by the local authorities who implement them. More details of the monitoring process can be found in Chapter 11.

### 6.2 General Considerations when Designing Routes

When designing active travel routes it is essential to recognise that:

- Active travel routes need to connect with one another to form a coherent network (see Chapter 5).
- The needs of all users need to be fully considered, including older and disabled people, including people with vision, hearing, cognitive and mobility impairments (see Chapter 4).
- The potential to reduce motor traffic speeds and volumes and the maximum size of vehicles along active travel routes should always be considered whenever such routes are being designed.
- When upgrading a street to provide facilities for other road users this should not be to the detriment of existing pedestrians or cyclists.
- Opportunities should be taken to reallocate road space away from motor traffic to make conditions better for pedestrians and/or cyclists.
- Allowing for the anticipated increase in use is important - the choice of design solution should take account of the ability of that solution to accommodate substantial increases in usage, and the cost of providing greater capacity should additional works prove necessary.

In order for active travel routes to be well designed and fit for purpose, a number of important factors must be taken into account:

- Route characteristics and functions, both in terms of movement and place (see Manual for Streets)
- Expected level of use by pedestrians and cyclists
- The type of cycle route (Primary, Secondary or Local – See Chapter 5)
- Motor traffic speeds, volumes and composition
- The space available
- The need for kerbside activity, such as parking and loading
- Construction, maintenance and enforcement requirements; and
- cost / funding.

**Coloured surfaces**

Coloured surfaces are not prescribed by TSRGD and have no legal meaning. There is no obligation to use them and the value of doing so should be balanced with cost and
requirement for maintenance.

For best effect coloured surfaces should be used sparingly, but it can be useful for emphasising cycle lane markings, helping cyclists to follow a route and to remind motorists that the surface is either primarily or exclusively for the use of cyclists. They can also help cyclists to follow a route or position themselves in the appropriate part of a carriageway.

Locations where coloured surfacing may be appropriate for safety reasons are:

- Advanced stop line reservoirs and their feeder lanes
- Across the mouth of junctions
- Through complex junctions
- On cycle lanes alongside on-street car parking (in addition to the buffer strip)
- Any other areas of potential conflict

Selection of the appropriate colour is a matter for the relevant highway authority. Where local authorities do not have a standard policy it is recommended that red is used, which will over time become recognised as a consistent standard across Wales.

**Tactile paving**

Tactile paving is provided on both links and at junctions and crossings to assist visually impaired people in moving around an area. The use of tactile paving should be considered at the design stage to ensure it is fully integrated. Adding tactile paving at a later stage could compromise the design, which can cause a reluctance to install tactile paving.

The types of tactile paving and their typical uses are described in detail in chapter 10 Construction, Maintenance and Management, as well as being shown in context on the Design Element diagrams.
6.3 General Design Approaches

The following design approaches have benefit to both pedestrians and cyclists and apply to both links and junctions.

- Reallocation of Road Space
- Reducing the Speed and Volume of Motor Vehicles
- Filtered Permeability
- Vehicle Restricted Areas
- Home Zones
- DIY Streets
- Shared Space

6.4 Reallocation of road space

The reallocation of road space from motor to active travel modes makes an important statement about the relative priority of different transport users. It not only creates better conditions for walking and cycling but also makes a statement that active travel is considered to be at least as important as motorised travel. Typically this will involve one or more of the following:

- Filtered permeability, e.g. road closures (with exemptions for pedestrians and cyclists)
- Removal of one or more general traffic lanes
- Reduced width of general traffic lanes
- Removal of centre line
- Removal or relocation of car parking
- Shared space

Significant kerb line changes can have an impact upon existing drainage and utilities which may be costly, and early engagement with statutory undertakers is necessary. However, changes to kerb alignments will sometimes be necessary in order properly reallocate road space so that the needs of pedestrians and cyclists are met.
6.5 Reducing the Speed and Volume of Motor Vehicles

As noted in the introduction to Chapter 4, both pedestrians and cyclists will benefit from reducing the speed and volume of motor traffic along active travel routes, at both links and junctions. This will provide benefit in terms of safety, comfort and attractiveness, and will also reduce the difference in travel time between driving and active travel. There is a range of measures that can be used to achieve this, as shown in Table 6.1 below.
Table 6.1: Techniques for Reducing Motor Vehicle Volumes and Speeds

<table>
<thead>
<tr>
<th>Measure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filtered Permeability</td>
<td>This technique involves the 'filtering out' of motor vehicles (sometimes of only private traffic, with bus access being retained) from parts of a network. Cycling and walking permeability, i.e. providing a choice of routes through a network, is retained. If access for motor vehicles in one direction only is removed, cycling should be permitted in both directions (contraflow cycling).</td>
</tr>
<tr>
<td>20 mph limits and zones</td>
<td>Vehicle speeds are reduced, ideally with physical measures, to create a lower speed environment (see Box Out, Chapter 4)</td>
</tr>
<tr>
<td>Physical traffic calming</td>
<td>A range of options exist for reducing traffic speeds through physical measures, such as road humps and carriageway narrowing. Any traffic calming devices should be designed to be safe and comfortable for cyclists.</td>
</tr>
<tr>
<td>Changes in road geometry and layout</td>
<td>Manual for Streets provides guidance on how road geometry and layout can be used to reduce motor traffic speeds – such as reducing carriageway width, reducing forward visibility and using sharp changes in direction. Reallocation of carriageway width to widen footways and/or to enable dedicated space for cycling will tend to reduce speeds and provide additional safety and comfort for active travel. Quiet Streets and Cycle Streets involve the introduction of features to the carriageway layout which show that the route is intended to be used as an important cycle route.</td>
</tr>
<tr>
<td>Home zones and DIY Streets</td>
<td>Home zones comprise residential streets in which the whole of the road space is shared between all road users, although it will often include a pedestrian-only space for vulnerable users. Design speed is set very low, at less than 20mph. Home zones enhance streets so that they are not just traffic routes but spaces for community activity. DIY Streets use a similar approach but in a low-cost way, with the design and implementation of the scheme being led by the local community.</td>
</tr>
<tr>
<td>Quiet lanes</td>
<td>Quiet lanes are the rural equivalent of home zones. These are aimed at making country lanes more attractive for walking, cycling and horse riding.</td>
</tr>
<tr>
<td>Shared spaces</td>
<td>Shared Space schemes minimise the use of traffic signs/ markings and other traffic management features. The lack of a clear indication of priority encourages motorists to see the space as different from a typical road and to react by driving more slowly. In some cases there is no or low height kerbing or demarcation between the pedestrian-only space and the vehicle track, though a lack of delineation between the footway and the carriageway will impact on blind and partially sighted people. Shared spaces tend to be suited to central urban streets with high pedestrian usage.</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Vehicle restricted areas</td>
<td>Vehicles restricted areas involve prohibiting vehicles from streets by type of vehicle and/or at certain periods during the day. For example service vehicles may be prohibited from a shopping street between the hours of 10:00 and 16:00. Even when vehicles are allowed to use the area, speeds are normally kept low through the use of appropriate techniques such as 20mph limits, traffic calming and shared space techniques.</td>
</tr>
</tbody>
</table>

6.6 **Filtered Permeability DE8**

Filtered permeability provides an advantage to cycling and walking by exempting it from access restrictions applied to motor traffic; or through the creation of short connections only available to cyclists and pedestrians. Filtered permeability is often created by imposing Traffic Regulation Orders, typically:

- Road closures
- Point closures
- Banned turns
- One way streets

There should be a presumption to exempt cyclists from any such TROs unless there are overriding safety reasons for not doing, which could include an unacceptable impact on pedestrians.
6.7 Vehicle Restricted Areas

Vehicle restricted areas (VRAs) are generally found in city/town centres where vehicles are restricted from using certain streets with these areas often referred to as ‘pedestrianised’. VRAs main purpose is to provide an environment where pedestrians can move around freely without fear and intimidation from vehicles.

VRAs can form barriers to cycling unless they are exempted from the vehicular restrictions or alternative routes of equivalent coherence, directness, safety, comfort and attractiveness are provided. This may be possible when VRAs are small but finding alternative routes around large VRAs is often difficult. Larger VRAs may also present access problems for pedestrians, particularly older and disabled people, who may need to walk some distance from public transport stops or car parking.

Restricted areas are primarily key shopping destinations; therefore the need for cycle access and parking will also usually be important. Consideration should be given to disabled cyclists who have walking difficulties to park closest to the shops / facilities.

Research by TRL (see TAL 9/93) supports permitting cyclists to use VRAs. This may involve a change to the TROs and signing, it may also be necessary to alter physical aspects of the VRA to ensure cyclists can access and use the space safely. Where new pedestrian areas are being designed, cyclist exemption should be included within the design taking account of the safety concerns of all intended users.
6.8 Home Zones and DIY Streets

Home Zones

Home zones comprise residential streets in which the whole of the road space is shared between all road users, although it will often include a pedestrian-only space for vulnerable users. Design speed is set very low, at less than 20mph and maximum motor traffic flows of 100 vehicles per hour are the norm.

Home zones enhance streets so that they are not just traffic routes but spaces for community activity. This helps restore the balance between traffic and people. This in turn can help make streets safer, more sociable, and better places to live in.

The concept originated in the Netherlands as the Woonerf. Home Zones often involve design techniques such level surfaces, changes in material, trees and planting to change the whole environment, and can be legally designated under the Transport Act 2000. Further guidance on the design of Home Zones is given in the IHE Home Zone Design Guidelines.

DIY Streets

DIY Streets is a Sustrans community-led initiative that works with residents and other partners to create high quality urban improvements that promote and facilitate sustainable travel. These projects help to facilitate residents to make their neighbourhoods safer and more pleasant places to live. They are an affordable, community-led alternative to the Home Zones design concept.

6.9 Shared space

Shared space aims to reduce the dominance of motor vehicles by reducing traffic management features that tend to encourage motor vehicles to assume priority. It helps to create ambiguity and thus reduce traffic speeds. In the UK it has been primarily focused in town centres where there is likely to be a high proportion of pedestrians.

The effect of shared space can greatly improve the public realm by reducing traffic speeds while encouraging drivers to be more accommodating towards pedestrians and cyclists. Well designed shared space can be attractive to cyclists however this can often increase interaction with pedestrians and reduce speeds. Guidance for England is published in LTN 1/11, the principles of which may be useful in Wales, and the National Federation of the Blind (2013) Access for Blind People in Towns.

A level surface is a particular form of shared space, where the street surface is not physically divided by kerb or level difference into areas for particular users, but these need careful design if they are to work for all users. Disabled people with physical, sensory and cognitive impairments all find such streets difficult to use and many avoid such areas. There needs to be a distinct, detectable route for vulnerable pedestrians, though this does not prevent other pedestrians who wish to from sharing the central part of the space. Currently the only confirmed demarcation is a footway raised above the carriageway with a kerb upstand.
6.10 Link Design

Requirements for links

The basic function of a link, which is defined as a section of route between junctions, is to provide a connection between places. Of the five basic requirements set out in Chapters 4 and 5 the most important ones for links are:

- Directness,
- Safety and
- Comfort

Attractiveness also has a role.

Directness

Pedestrians and cyclists require routes that follow natural desire lines and which avoid deviations. Where pedestrian routes are indirect many users will choose a shorter route if available, away from the formal footway or footpath. Routes for cyclists should be as least as direct as those for motor traffic.

Directness in terms of time is also important, and this is particularly an issue for cyclists as any delay due to having to slow down or stop imposes a substantial time penalty as well as wasted effort. Cycle tracks should be of adequate width for the expected flows to avoid undue delay resulting from speed variance amongst cyclists.

Safety

The design of walking and cycling infrastructure must ensure through design that the risk of injury to pedestrians and cyclists is minimised. On links, attention should be given to the following:

- Providing sufficient width for both pedestrians so that they are not required to step into the paths of motor vehicles or cyclists due to crowding
- Ensure adequate geometry, visibility and surfacing to avoid cyclists running into the path of motor traffic or pedestrians, allowing for errors and evasive manoeuvres;
- Minimising conflict between cyclists and pedestrians by either providing effective separation between them or by allowing sharing to take place where there is sufficient width and cycle speeds are not high.
- Separating cyclists from other motorised traffic which has considerably higher speed or mass;
- Avoiding conflicts between cyclists and oncoming traffic (including other cyclists)
- Ensure that the design of any infrastructure for cyclists reflects how cyclists are trained through National Standards cycle training.
Comfort

Walking and cycling infrastructure should facilitate people’s travelling experience through minimising their exposure to nuisances such as:

- Minimising the gradients along links and keeping any slopes as short as possible (see Chapter 4)
- Providing smooth surface texture which is well maintained (see Chapter 10);
- Avoiding placing any obstructions along a route and remove existing ones
- Providing adequate width for the level and type of pedestrian and cycle flows expected;
- Minimising lost time for cyclists having to slow down or stop - for example at bus stops, crossings or bends;
- Minimising nuisance from motor traffic, through reduced speeds and greater separation;
- Minimising any conflict between pedestrians and cyclists

Attractiveness

Pedestrians and cyclists are much more exposed to their environment than people in motor vehicles, so a key element of link design is improving the quality of the experience when using a particular section of route. Routes should:

- Look attractive and be interesting
- Integrate with and complement their surroundings
- Contribute to good urban design
- Have good public security, be well overlooked and lit
- Be well maintained

6.11 Segregation between Cyclists and Pedestrians

Where cyclists are routed onto off-carriageway tracks, through green spaces and on highways at both links and junctions, there will usually be a need to consider how they interact with pedestrians. There are two possible approaches:

- Segregated provision, where cyclists and pedestrians each have their own defined space; and
- Unsegregated provision, where cyclists and pedestrians share the space (also called Shared Use)

Early consultation with relevant interested parties, such as those representing disabled people, walkers and cyclists, should be part of developing the design of a cycle track which interacts with pedestrians, including decisions on segregation. Designers are encouraged to think through their decisions rather than start from a default position of implementing any particular feature.

In general, separate provision for cycling will tend to provide a route where people are able to maintain their desired speed. This will be important on key active travel routes which are
designed to provide for utility trips and to provide a realistic alternative to the car over short distances.

For a segregated path to operate effectively adequate width should be provided for each user group (see Design Elements 33 and 34) and segregation should be effective, as discussed below. Non-compliance with segregation, where and when it occurs, may lead to increased potential for conflict amongst all users. Where levels of non-compliance are likely to be high due to there being inadequate space for effective segregation, options will include:

- Increasing the path width
- Providing an unseggregated track
- Providing an alternative route for cycling

Factors that will need to be taken into account when deciding whether a route should be segregated will include:

- Pedestrian and cycle flow
- Cycle speed
- Cycle journey purpose
- Visibility
- Whether significant numbers of vulnerable users are expected – elderly, disabled, children
- Available width/presence of pinch points e.g. bridges
- ‘Exchange’ activity – shopping, playing etc.

The key pros and cons of each type of provision are given below.

**Advantages of effective segregation include:**
- Cyclists can maintain a higher speed
- Helps cyclists to pass pedestrians engaged on ‘exchange’ activities – e.g. playing, shopping
- More comfortable for pedestrians who may not expect cyclists
- Less intimidation for vulnerable pedestrians, particularly the visually impaired
- Reduced perception of conflict by both groups
- Keeps cyclists away from driveways if cycle track is located next to carriageway

**Disadvantages of segregation include:**
- Segregated routes can encourage territorial behaviour which can raise conflict if the segregation is ineffective.
- Where pedestrians walk in groups (especially at weekends and school journeys) they are more likely to ignore segregation unless widths are adequate
- Can be more costly to provide, and require more land availability

**Advantages of unsegregated routes include**
- Unsegregated routes are more flexible – for example, cyclists may be the majority group during the weekday peak, and pedestrians in groups during weekends.
● Unsegregated routes with a single surface are better able to accommodate larger cycles, such as those used by disabled people, and people in wheelchairs
● Unsegregated routes may be cheaper to construct and maintain due to less complex engineering and a narrower width. (Construction costs can be up to three times higher if segregation by kerb is used).
● In many cases unsegregated routes require fewer signs and markings, thereby offering a less urban and intrusive solution.
● Can be a useful way of accommodating many different movement types especially at crossings, bus stops and complex junctions

Disadvantages of unsegregated routes include

● Potentially intimidating for pedestrians, especially with high volumes of cyclists.
● Can be frustrating for cyclists who have to limit their speed to accommodate pedestrians

Type of segregation

Good compliance with segregation will not be achieved at all times unless adequate width is provided for each user group and the means of segregation is effective. Segregation should normally be achieved using design features such as contrasting materials, a change in levels or a grass verge. Material choices that give a good tonal contrast will help all users to understand the separation between types of user, and particularly valuable for visually impaired pedestrians. Typically this might involve using asphalt for cyclists and light coloured pavours for pedestrians. Segregation using only simple white lines (Diag 1049) (which are not detectable by blind users) or a raised white line delineator (Diag 1049.1) is an option, but it is rarely respected by pedestrians, unless cycle flows are high or there is generous width, and should not be the norm.
Photo 6.3 – Segregated footway and cycle track at Southend, using contrasting colour and a flush kerb to separate pedestrians and cyclists

**Monitoring and Management**

Following the introduction of any facility where cyclists are routed alongside or with pedestrians, it is advisable to monitor its performance including, where practicable, engagement with potential users who may not use the path because of its design. This will enable any concerns to be identified early on and suitable mitigating measures implemented if required (see also Chapter 11).

On unsegregated tracks consideration should be given to the erection of courtesy signs.
6.12 Pedestrians on Links – DE1 DE2 DE3 DE4

Provision for pedestrians will vary depending on the characteristics of the surrounding environment and the nature of the route. Most routes will be on footways adjacent to carriageways. Other walking routes will generally be along footpaths away from roads, such as paths through housing estates, parks and alongside waterways (DE2). Where footways or footpaths are being designed as a shared use path for pedestrians and cyclists (segregated or unsegregated) refer to Section 6.11 and DEs 023, 024, 033 and 034.

In order to be attractive to pedestrians walking routes should follow desire lines as closely as possible. Walking routes should be designed with sufficient widths and to minimise the need for changes of grade, whilst remaining close to the desire lines. All changes of grade should be designed to be accessible to all users.

In rural areas where it is not possible to install a full footway, for example when there is insufficient width, it may be appropriate to provide a ‘virtual’ footway at the edge of the carriageway. This can be marked with a continuous white line, such as an edge of carriageway marking, or a contrasting coloured or textured surface. To be useful to blind pedestrians the contrast texture needs to be sufficiently distinct to be felt underfoot, noting that one of the causes of vision impairment, diabetes, also causes reduced sensitivity. However, a full width kerbed footway is always to be preferred as it caters for all types of user.

*Widths*

The width of a footway or footpath will need to be assessed taking account of the pedestrian
flow, local land use and activity and the composition and the adjacent vehicle speeds and flows.

Basic minimum widths are given in Chapter 4 and are summarised on DE1 and DE2, but where pedestrian flows are high, for example at significant trip generators such as schools and retail centres, a detailed assessment of pedestrian capacity and comfort should be made (see TfL Pedestrian Comfort Guidelines, summarised in Chapter 4). Where there are high numbers of static pedestrian activities such as photography near tourist attractions, additional space for moving pedestrians will be needed.

Where a footway is adjacent to a road with high vehicle speeds or a high proportion of large vehicles consideration should be given to providing a margin to separate the footway from the road, or to providing additional footway width. Footway widths may be increased by reallocating road space away from motor vehicles to pedestrians or increasing the usable footway width by removing or rationalising street clutter pavement and parking.

Well designed, functional street furniture is a vital part of the daily operations of the street environment. However, poorly designed and poorly placed street furniture can quickly develop into street clutter which can be hazardous (particularly for the visually impaired) and ruins the aesthetics of the street environment. Footways should be free of obstructions, with unnecessary street furniture being removed and the remainder located in a street furniture zone out of the main pedestrian flow. Items such as litter bins and other potential obstructions should have a minimum height of 1m and be continuous to the ground avoiding projecting bins sited on posts. DE1 provides guidance on the need for hazard protection to isolated objects.

Photo 6.5 - Street clutter obstructing and narrowing the cycle track

In Wales footway parking is not generally prohibited, but local authorities can prohibit footway parking through a Traffic Regulation Order.
Alternative, it is possible to deter footway parking through physical measures, such as by installing bollards, raised planters or other street furniture, and by clearly indicating where people should park. These features will need to be well designed and located so that they themselves do not pose a problem.

**Build-outs**

Build-outs can be used to locally widen a footway into the carriageway to provide additional footway width at particular features such as bus stops. They can also be used to restrict the carriageway width in order to calm traffic. Build-outs may be provided at pedestrian crossing points to reduce the crossing width and to enable pedestrians to wait to cross in a more visible position. In such cases tactile paving to indicate the crossing to blind and partially sighted people should extend back to the building line.

The angle of taper for a build-out needs to take account of the likely approach speeds of traffic. Where there is a likelihood of cyclists using the road the effect of a build-out on cyclists needs to be considered so that it does not force a cyclist out into the path of other vehicles, and should be no greater than 1 in 10.

It is also essential that a build-out is conspicuous in both daylight and darkness. This may be achieved by positioning a reflective or illuminated bollard or other feature on the facing corner of a build-out.

**Gradients, Ramps and Steps**

The longitudinal profile of a footway adjacent to a carriageway should generally follow its vertical alignment, although there may be situations where a footway can usefully be maintained on a steady vertical profile while the carriageway goes through a sharp dip or crest. In these situations a retaining wall or slope between the carriageway and the footway will be necessary.

The gradients of footways and footpaths should accord where with the guidance given in Chapter 4 and summarised on DE1 and DE2.

Ramps and steps are provided to facilitate a change in level or grade on a walking route but should only be used where a sharp change in level or grade cannot be avoided. Guidance on the design of ramps and steps are given on DE3 and DE4.

Steps should usually only be provided in conjunction with a ramp in order to retain accessibility for mobility impaired pedestrians. Steps can provide a useful shortcut to maintain desire lines where it is necessary to also provide a ramp to accommodate a change in level or grade. Steps should be well designed with highlighted nosings/edges and handrails to both sides, incorporating corduroy warning paving to the top and bottom, and visual contrast between elements should be used to highlight features such as steps edges.
and handrails.

The suitability of any existing steps on active travel routes should be assessed against DE4, with improvements made where necessary. The provision of wheeling ramps for cycles on steps is discussed in Section 6.51.

6.13 Cycling on Links - Introduction

The starting point for the designing of links for cycling on Active Travel Routes is given in Table 6.2, which relates minimum provision to cycle route type, motor traffic volume and speed.

This shows how these factors influence the decision on the need to segregate cyclists from motorised traffic, and demonstrates how restraint of traffic speeds and volumes can be used to create satisfactory conditions, capable of encouraging new and novice cyclists to use the route.
Table 6.2 - Preferred Minimum Provision - Cycle Links

<table>
<thead>
<tr>
<th>Speed Limit</th>
<th>Number of motor traffic lanes</th>
<th>Motor traffic flow (pcu/day)</th>
<th>Preferred Minimum Provision by Cycle Route Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Secondary cycle route</td>
</tr>
<tr>
<td>20 mph</td>
<td>Irrelevant</td>
<td>1-2500</td>
<td>Quiet Streets: combined traffic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2000-5000</td>
<td>Cycle Lanes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt; 4000</td>
<td>Cycle Lanes</td>
</tr>
<tr>
<td>30mph</td>
<td>2 lanes in total</td>
<td>0-5000</td>
<td>Cycle tracks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt; 4000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>More than two lanes</td>
<td>Irrelevant</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Irrelevant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40mph and over</td>
<td>Irrelevant</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes on Table 6.2:

- This table does not include the Basic Network or cycle tracks away from highways.
- Designers should always consider the potential to reduce motor traffic speed and volume to create acceptable conditions.
- There is some overlap between motor traffic flow ranges to allow for flexibility.
- Speed means speed limit, but if actual speeds are significantly higher, consider next highest category of speed.
- “Cycle tracks” includes light segregation and hybrid tracks unless noted.
- In rural areas achieving speeds of 20mph may be difficult, and so shared routes with speeds of up to 30mph will be acceptable, with motor vehicle flows of up to 1000 vehicles per day.

In practice, a cycle route from one place to another will often involve sections of different types of provision: shared roads, cycle lanes, cycle tracks alongside the carriageway and cycle tracks away from the road. A safe and convenient transition between these different forms of provision is critical to ensure route coherence.
Cycle routes away from roads generally offer important *additional* links in the cycle network and can provide very high quality routes. The decision to provide these should be based on wider network considerations, looking for opportunities to create links through green spaces, along waterways and other types of environment.

Most cycle links will be provided along highways, and in deciding the appropriate form of provision consideration must be given to the following requirements, constraints and issues:

- Physical dimensions of the highway, including available widths and gradients
- Cycle demand (including the type(s) of cycle users, the type of cycle route and the current and forecast volumes of cyclists)
- Adaptability of the design to accommodate future growth
- Pedestrian demands and provision
- Motor traffic speeds
- Motor traffic volumes, including the volume of HGVs
- Interface with adjoining sections of route
- The type and arrangement of junctions, including the frequency of minor arm junctions, intervisibility with conflicting traffic, and the potential to provide cycle priority;
- Conflicting uses, such as bus stops, loading and parking
- Place functions and visual character

Full consideration should be given to options for the suitable provision for cyclists on the carriageway or in a separate space for cycling – either through motor traffic speed / volume reduction, junction treatment and reallocation of carriageway space – before considering taking space away from pedestrians to create cycle tracks or shared use paths.

Where it is necessary to create separate provision for cyclists within highways, segregation from motor traffic can take a number of forms:

- Separation by time – using traffic signals to separate cycle movements from motor traffic streams
- Light segregation - Intermittent physical separation from motor vehicles (e.g. use of refuges, planters, bollards, or other features)
- Continuous physical separation that can be crossed by cyclists (e.g. low kerb)
- Continuous physical separation that can only be crossed at designated locations (e.g. full height kerb, verge)

### 6.13 General Traffic Lane Widths and Car Parking

Designers will often need to consider the widths of general traffic lanes and parking spaces when designing active travel routes. In order to make separate provision for cycling, the reallocation of road space may be necessary (see Section 6.4 above). Designers will therefore need to assess the minimum width requirements of moving and stationary vehicles. When cyclists are sharing the carriageway, designers will need to consider how lane widths relate to the recommended positioning of cyclists (see Section 4.16).
Lane Widths

Figure 6.1, taken from Manual for Streets provides an indication of what various carriageway widths can accommodate and Figure 6.2, taken from the Cardiff Cycling Design Guide provides guidance on the size of vehicles that various traffic lane widths can accommodate; widths pertaining to trunk roads are given in TD27, although it should be noted that TD50 permits lane widths as narrow as 2.25m in certain circumstances on the approaches to traffic signal stop lines. Further guidance on traffic lane widths is given in Manual for Streets 2.

![Figure 6.1 - Illustration of what various carriageway widths can accommodate (from Manual for Streets)](image)

![Figure 6.2 - Vehicles and Lane Widths (from Cardiff Cycling Design Guide)](image)

Whilst traffic lane widths of 3.65m (metrication of 12 feet) have often been provided as standard in the United Kingdom, lane widths of 3.0 metres have been used in many parts of the country on urban roads for some time, and can accommodate most typical vehicles (including HGVs) at speeds up to 40mph (Transport and the Urban Environment, IHT 1997).

Where flows of large vehicles are low, and speeds are modest (less than 35mph), lane widths as narrow as 2.75m can accommodate car traffic comfortably. Larger vehicles can
pass each other at this width at lower speed with care, although some drivers may choose to encroach slightly outside of lanes to pass (i.e. into an advisory cycle lane).

Where general lane widths exceed these values, designers should take the opportunity to reallocate space to walking and/or cycling. Where lane widths are in the critical range of 3.2m to 3.9m given in Chapter 4, conditions will be unsuitable for cycling on the carriageway unless traffic speeds and volumes are low so that drivers can cross easily into the opposing lane to pass a cyclist comfortably.

*Car parking*

Parked vehicles also require physical width. Whilst the standard width of 2.4m for a car parking space is considered to be ideal, in practice it is recognised that this will often be difficult to accommodate within many existing streets. A width of 2.0m is the preferred minimum – this provides a margin of error to allow for poorly parked vehicles. Widths between 1.8m and 2.0m are only recommended if providing parking is essential and space constraints require such narrow widths.

Cyclists who have received training are taught to ride well clear of parked cars to avoid collisions with opening car doors, and cycle lanes should be separated from car parking by a buffer zone for that reason – see DE015 below.

### 6.14 Cycling on Links: Cycling in combined traffic

There will be many streets where motor traffic volumes and speeds are sufficiently low to enable cyclists to share the road space with other traffic without the need for cycle-specific infrastructure. Table 6.2 gives the basic criteria for assessing whether conditions are suitable for different types of cycle route.

In designing such routes it is important not to assume that cyclists can simply ride with traffic, but to ensure that the layout of the street genuinely meets cyclists' requirements – in particular that the width of the carriageway meets the guidance given in Section 6.2 above.

### 6.15 Reducing Traffic Volumes and Speeds DE005, DE006, DE007

Where traffic volumes and speeds exceed the values given in Table 6.2 consideration should be given to the potential to reduce traffic flows and speeds to appropriate levels so that cycling can be accommodated on the carriageway. Table 6.1 provides a list of suitable techniques - guidance on Filtered Permeability has been given in Section 6.6 above.
6.16 Contraflow Cycling DE009, DE010

One-way systems are very commonplace, having been installed for various reasons – to increase the overall capacity of a network, to ease motor traffic movements in narrow streets, increase residential parking capacity and to prevent through traffic for environmental and safety reasons. One-way streets significantly reduce the quality of the cycling network, which becomes less cohesive, less direct, less comfortable, less safe and less attractive. They may also risk inciting cyclists to travel illegally against the flow of traffic.

The permeability of the road network for cyclists can be greatly enhanced by exempting them from one-way restrictions, thus providing connections only available to cyclists. Two-way cycling should be the default option wherever it is proposed to introduce one-way working for general traffic. The operation of existing one-way streets should be reviewed with a view to permitting two-way cycling wherever practicable. Scheme design should include consideration of the possible impact on pedestrians of all abilities and the ease with which they can understand that cyclists will be travelling in both directions.

Photo 6.6 - Contraflow cycling in a narrow street with no marked lane – Brighton

6.17 Traffic Calming DE006 DE007

Physical traffic calming measures are used to reduce motor vehicle speeds thereby improving safety for pedestrians and cyclists as well as improving living conditions for residents living along traffic calmed routes. Decisions on whether and how to implement traffic calming must take account of the requirements of the emergency services and of bus operators.

Traffic calming can significantly improve cycling conditions by reducing motor traffic speeds, but poorly designed vertical features can be uncomfortable for cyclists and horizontal
deflections and pinch points can be intimidating.

Sinusoidal Humps are much more comfortable for cyclists – see DE006 for details. Where pinch points are used, cycle bypasses should be provided – see DE007.

Speeds can also be reduced without overt traffic by changes in basic road geometry, such as using narrower carriageways, reducing forward visibility and using sharp changes in direction or vehicular priority.

Figure 6.3 - The relationship between carriageway widths, forward visibility and speed, from Manual for Streets

6.18 Quiet Streets DE011

Quiet Streets is a term given to urban cycling routes on low traffic speed and volume back streets, which are particularly suitable for new and less confident cyclists. Routes should maintain continuity for cycling and tackle physical barriers such as hostile junctions, narrow paths, and should minimise diversions away from desire lines.

Cycle symbols to Diagram 1057 can be used to sign the continuity of cycle routes and indicate the correct positioning for cycling within the carriageway; in doing so they also raise motorist’s awareness of cyclists, encouraging them to give cyclists space.

Other techniques can be used to improve conditions for cycling which
6.19 Cycle Streets DE012

A Cycle Street is a Quiet Street which also serves as a Primary Cycle Route. It should carry low levels of motor traffic, high levels of cycling, and provide cyclists with a level of service comparable to that provided by a high quality traffic free route.

The objectives of a Cycle Street are to:

- Present a legible design recognisable to all types of user as a main cycle route
- Influence behaviour so that cyclists assume priority with drivers of motor vehicles behaving as ‘guests’
- Maintain priority for cyclists
- Attract experienced cyclists as well as less confident cyclists

Photo 6.7 – Cycle Street on Jack Straws Lane, Oxford

6.20 Cycle lanes DE009, DE013, DE014, DE015, DE016, DE017

Cycle lanes are lanes on the carriageway that are reserved either exclusively or primarily for the passage of cyclists. Table 6.2 gives guidance on the conditions when cycle lanes are suitable on Active Travel Routes.

Cycle lanes are normally located on the left or kerb side of the road and benefit from being included within the normal road maintenance programme. Because they are part of the main carriageway;

- the design of cycle lanes requires careful attention to turning movements of both cyclists and other traffic
- cyclists are not physically protected, and it is important that the traffic regime is appropriate to the presence of cyclists on the road
- they are only useful when clear of car parking and loading activity – cycle lanes should not be provided that are regularly used for parking and loading. Careful attention to this design issue is required especially in town centres and around schools.

There are two types of cycle lane: Mandatory lanes are marked with a continuous white line supported by a Traffic Regulation Order (see Chapter 9), which prohibits motor vehicles from driving or parking in them during the hours of operation. There can be exceptions, such as for emergency service vehicles and access to private driveways. Advisory lanes are marked with a broken white line which indicates that other vehicles should not enter unless it is safe to do so.

Where there are particular problems of overrun of cycle lanes by motor vehicles, raised thermoplastic markings can be used to help deter this. Mandatory lanes provide greater protection for cyclists and should be used where possible. Mandatory lanes should operate at all times unless there are clearly justified reasons not to do so.

6.21 Car parking / loading and Cycle Lanes DE015
Kerbside vehicle parking or loading can often be dangerous for cyclists especially in a street with high vehicle turnover rates as there is a high risk of vehicle doors being opened into the path of cyclists within the cycle lane. It is therefore necessary that any cycle lane must pass parking areas with a sufficient dividing strip (buffer zone) or else be of sufficient width to enable cyclists to travel in the cycle lane away from the parking.

6.22 Cycle Lanes at Side Roads DE016
Cycle lanes should be continued across side road junctions to ensure continuity and help improve cycle safety. This can be achieved using a stretch of advisory lane, where the white line is broken as continuous mandatory cycle lanes across side road junctions are not permitted. It is recommended that cycle lane width be increased at side roads to encourage cyclists to position themselves further out from the kerb so that they can avoid vehicles nosing into the main road, and be more visible to drivers. A side road entry treatment should also be considered as this will reduce the speed of vehicles turning into and out of the junction.

6.23 Removal of centre lines DE017
The removal of centrelines is a useful option where carriageway widths do not otherwise permit the introduction of cycle lanes of adequate width whilst retaining two marked general traffic lanes.

In addition to increasing the width available for cyclists, the technique also has a speed reducing effect as motor traffic no longer has defined lanes in each direction. Where the need arises for on-coming motor vehicles to pass each other, this is achieved by both
vehicles momentarily pulling over into their respective near-side cycle lanes, having first checked to see they are clear of cyclists.

![Photo 6.8 Gilbert Road, Cambridge – Centre line removed to allow advisory cycle lanes to be introduced](image)

**6.24 Cycle tracks with light segregation DE018, DE019, DE020**

The segregation provided by a cycle lane along the side of a road may be reinforced by light segregation from the main carriageway, by using intermittent low level physical features such as planters, wands (retroreflective collapsible bollards), ‘Armadillos’ (properly called ‘Zicla Zebras’ - proprietary raised features constructed from PVC with reflective strips). The fact that the obstacles are intermittent allows cyclists to manoeuvre between the cycle track and the carriageway as necessary, avoids any impact on drainage and means that the design is cost effective and flexible.

Transport for London (TfL) and several other local authorities are starting to incorporate this style of facility into parts of their cycle networks and a scheme has already been successfully introduced in Royal College Street, in Camden. Light segregation is commonly used in various cities including Barcelona, Seville and, New York, Montreal and Melbourne.
Photo 6.9 – Light Segregated Cycle Track using Armadillos, Royal College Street, Camden

Photo 6.10 – Light segregated cycle track, with Armadillos and wand at start, Manchester
6.25 Hybrid Cycle Tracks  DE021, DE022

Hybrid cycle tracks have a cycle facility raised slightly above the carriageway surface but sitting below the level of the footway. This type of solution is common in Copenhagen and elsewhere on the Continent, and it has been used at a small number of locations in the UK, most notably on Old Shoreham Road in Brighton. Hybrid Cycle Tracks are referenced in Local Transport Note 1/12 Shared Use Routes for Pedestrians and Cyclists.

The positioning of the track immediately next to the main carriageway means that transitions between a cycle lane and a hybrid cycle track (and vice versa) are very simple and comfortable for the user.

Photo 6.11 Hybrid Cycle Track – Old Shoreham Road, Brighton

6.26 Cycle Tracks Alongside The Carriageway DE023, DE024

Where traffic volumes and / or speeds are above the thresholds indicated in Table 6.2 physical separation from motor traffic will be appropriate to provide cyclists with safe and comfortable space, through the provision of segregated cycle tracks.

Cycle tracks should be of adequate width, comfortable, continuous and link into surrounding cycling infrastructure. Preferably they will be provided through reallocation of road space from the carriageway; in most urban locations the conversion of footways to shared use should be the last resort.

Cycle tracks away from roads are dealt with in Section 6.30 below.

Cycle tracks alongside the carriageway can be either be two-way or one-way. Two-way tracks are usually provided only on one side of the road, but provision on both sides is useful when it is difficult for cyclists to cross major highways. One-way tracks are usually provided
on both sides of the road, with cyclists travelling in the same direction as other traffic.

Historically most cycle tracks in the UK have been built as two-way, but this can create a number of difficulties for users:

- Retaining priority over side roads / busy accesses is more difficult
- Greater conflict with vehicles at private accesses
- Complexity of design of crossings at traffic signal junctions and roundabouts
- Difficulty of linking with adjoining cycle network at each end of the scheme
- Poor accessibility to development along the route on the opposite side
- Conflict with pedestrians crossing the carriageway

One-way cycle tracks on each side of the road address most of the above issues.

Cycle tracks may either be segregated from pedestrians, or may be shared with them with no differentiation of space. Issues to be considered in deciding whether segregation is appropriate are covered in the section on Deciding Between Segregated and Unsegregated Provision.

The recommended widths for two-way cycle tracks, whether segregated from pedestrians or shared, are the same as those included in the section on cycle tracks away from the road, including the extra width required where there are edge constraints.

6.27 Cycle track crossing of side roads DE025, DE026

Uncontrolled cycle track crossings at side roads should, wherever safe and practicable, give priority to cyclists crossing the side road. Crossings that give cyclists priority over vehicles on the side road will allow cyclists to continue without loss of momentum and present a strong promotional message about how non-motorised users are valued along a corridor.

Priority crossings may not be appropriate in all locations, and where the cyclist is expected to give way clear road markings may be necessary.

Factors to be considered when determining who has priority include: location, vehicle speed, visibility, number of pedestrian and cycle movements, vehicle movements and accident statistics and the viability of providing similar priority at adjacent side road crossings.
6.28 Cycle tracks in centre of carriageway DE027

An option which has been little used in the UK at present is to place two-way cycle tracks in the centre of single carriageway streets, or one way tracks alongside central reservations. This can provide a very good facility for cycling along busy highways, which is clear of obstructions such as bus stops and side roads. Providing good access to and from the central track is critical, which is typically achieved via crossings or suitably designed junctions, and dealing with any conflicts at major junctions along the route. It may be necessary to ban turns across the central track at side roads, if it is not possible to create a suitable junction arrangement. Providing regular pedestrian crossing facilities that are accessible to all people will also be necessary.
6.29 Cycle Lanes / Tracks at Bus Stops DE028, DE029, DE030, DE031, DE032

Bus stops can pose a difficulty for people using cycle lanes and cycle tracks adjacent to the carriageway – moving past a stationary bus will either involve passing the bus on the off-side, with potential conflict with buses entering / leaving the bus stop or passing traffic, or on the footway side, with potential obstructions by street furniture and conflict with waiting /
alighting pedestrians associated with the bus stop.

There is no standard layout for cycle lanes / tracks at bus stops that can address all considerations and there are a wide range of possible layouts. Each site will need considering on its own merits, and the following points require particular consideration:

- Available space for cyclists to pass a stationary bus should be provided wherever possible so that momentum is maintained
- The bus stop should be apparent to cyclists, who will need to be able to adjust their behaviour and speed to reflect the additional risk of conflict with buses or pedestrians
- There will need to be somewhere for pedestrians to wait where they do not pose an obstruction to any cycle bypass
- There should be good intervisibility between pedestrians (those waiting for a bus as well as those passing) and cyclists, to minimise potential for conflict

Five possible options are covered on the Design Elements sheets for minimising conflict with pedestrians and buses, which are:

- Cycle lane terminates at bus cage, with alternative route past stop highlighted
- Cycle lane continues around bus stop, possibly in conjunction with a bus bay
- Cycle track bypass to rear of bus stop
- Cycle lane / track runs across bus boarder
- A shared use area at the bus stop, with cyclists giving informal priority to pedestrians

Photo 6.15 – Bus Stop Bypass, Brighton
6.30 Cycle Tracks away from Roads DE033, DE034

Introduction

Routes free from motorised traffic often referred to as traffic-free routes or Greenways, can be developed in urban, urban fringe and rural areas, utilising a wide range of linear corridors. Developing routes that provide direct connections between journey attractors, and which maximise connectivity to other parts of the networks, are key to achieving high usage.

Generally these will be cycle tracks either with an adjacent pedestrian route or else designed for unsegregated shared use where pedestrians and cyclists share the same path; guidance on the segregation of cyclists and pedestrians is given in Section 6.11 above.

Walking and cycling infrastructure must be fit for purpose and must be maintained to remain so. The attention to detail in the design process and the quality of materials and construction will have a direct impact upon the levels of use and the future maintenance costs incurred. Investment in infrastructure (design, construction and marketing) represents poor value for money if it does not conveniently serve desire lines, or if design details or deficient maintenance deters usage, even if other elements of the facility are exemplary. Common examples of features which undermine otherwise good off-carriageway routes include restrictive access controls, vegetation growth that encroaches on the track width, poor or inadequate lighting or failure of the track surface after winter conditions.

Where routes have existing equestrians use their needs should also be considered. They should not be disadvantaged by the provision of active travel routes. Equestrians should not be denied access to routes that they currently have the right to use by changing the classification of the rights of way. There needs to be clear signing of which routes are intended for use by equestrians.

Successful cycle tracks away from the road require proper consideration of each element of the design and construction process. These are:

**Design**
- Understanding the role of the route within the wider network
- Understanding the types and future volumes of users
- Track width
- Track alignment
- Gradients

**Construction**
- Formation and sub-base
- Surfaces
- Edges and verges
- Drainage
- Lighting
- Ancillary works
Adequate time and money are required to develop high quality routes. No problem is unsolvable, but application of realistic timeframes and funding requirements are essential. Experience from developing the National Cycle Network has shown that when faced with challenges the easy option does not always provide the best solution.

**Corridors for traffic free routes**

Traffic free routes come in a wide variety of forms, and a popular route may comprise one or several types that link to create a coherent corridor. The most common types of corridors used as traffic free routes are:

- Urban parks
- Urban corridors
- Disused railway alignments
- Seaside promenades
- Canal and riverside tracks
- River and coastal flood banks
- Footpaths and bridleways
- Amenity spaces such as golf course, racecourses, stately homes
- Abandoned road alignments
- Through open space provided by new developments

Each corridor will present its own, sometimes unique, set of challenges that will need to be overcome.

**Geometric design**

Geometric design requirements are summarised on the Design Elements sheets.

Designing for walking and cycling allows engineers greater flexibility than highways. Creative alignments and ingenious solutions to common problems can create memorable and attractive routes that are popular with the public.

Key features of successful traffic-free routes include:

- Routes should be direct and follow desire lines wherever possible, while avoiding steep gradients;
- Route capacity and widths should be designed for peak forecast demand conditions;
- Minimum visibility and corner radii should be maintained, based on the appropriate design speed.

**Track Widths**
Selection of an appropriate track width should accommodate forecast and target increases in users, including from planned land-use development which may create large local increases in cycling and walking. Providing a width greater than the minimum will increase the level of service for all users and accommodate future growth in active travel.

Walking and cycling are a social activities and this should be recognised in design if we are to encourage people to travel actively. Routes should be wide enough to enable pedestrians to walk side by side and cyclists to ride two abreast wherever possible.

Available width will depend upon the nature of the route corridor. Re-using an old railway corridor is likely to permit a much wider track than a flood bank or canal towpath.

Cycle tracks should include additional width where they are bounded by vertical features. Only where there is open space on both sides is it is practical to use the whole track width to cycle.

Junctions between traffic free routes

Cycles cannot turn right angles, and pedestrians will often cut a corner and so providing right-angled junctions between tracks will result in adjacent areas becoming a rough desire line. However, blind pedestrians use right angle turns to aid navigation so additional guidance for them may be needed.

Junctions between tracks should therefore have a minimum 2m curve radius or 45° chamfer.

Speed Control Measures

Excessive speeds by cyclists can be an issue, for example where land or other constraints prevent minimum stopping distances or bends being provided; and on unsegregated shared use cycle tracks where approach speeds are high. Education of users may have some effect, but in many instances this will need to be complemented by physical measures. Generally the control of cycling speed is to be avoided, as it reduces the attractiveness of the mode as an alternative to short journeys by car.

This section summarises typical measures used to control cycling speeds on traffic free routes. Whilst some of these are similar to those that can be used for access controls, these are discussed in Chapter 10.

Care should be taken to ensure that there is adequate visibility to any speed control measures.

Speed control options include:

- Physical barriers
- Speed humps
- Bollards, including staggered layouts
- Deviations in the horizontal alignment
- Gravel / unsealed surfacing on the track
- Rumble strips
- Public art
- Signs/markings
Design issues to consider are as follows:

**Accessibility**
- Accessibility to the track must be maintained for all legitimate users, including all types of cycle, pedestrians and wheelchair/mobility scooter users.
- Any restriction in track width should slow down users as they negotiate it however a narrowing would also introduce a conflict point between users where different users have to give way to one another.
- Width restrictions should generally be introduced as a last resort.

**Siting of speed control measures**
- Careful consideration should be given to the location of any speed control measures and the distance between measures.

**Visibility**
- Any feature that may present a hazard to users if encountered at speed should be clearly highlighted such that it is visible in daylight and darkness.

**Maintenance vehicle access**
- On many tracks it is necessary to facilitate access for maintenance, and other vehicles.
- This introduces additional complexity and any locking mechanisms could be subject to either the keys being lost or vandalism and would require additional maintenance.

**Prevention of bypassing**
- The design of any measure should ensure that any option for bypassing the measure provides at least the same level of speed reduction as the measure itself.

**Speed humps**
- If speed humps are specified in bituminous material consideration needs to be given to the ability of the contractor to construct the hump profile to acceptable tolerance. DE6 provides details of the preferred sinusoidal hump profile.
- Precast concrete products are available which could be installed. However the cost of these units means that in most situations this option is likely to be prohibitively expensive. They also require a flat path profile otherwise they can rock and create a trip hazard.
- Care should be taken not to locate speed humps on slopes such that the effect of the slope would be to increase the gradient of the hump beyond the maximum desirable slope of 1 in 20 (absolute maximum 1 in 12).

### 6.31 Cyclists on Links: Rural Roads

Whilst most cycling takes place in urban areas, some roads outside built-up areas provide key links for cyclists who live in rural areas when making active travel journeys to local facilities, including in nearby urban areas. Some designated areas consist of larger settlements surrounded by smaller settlements; the connecting routes between these settlements may be rural roads. Rural roads hey will also be used for leisure purposes by people accessing the countryside.
Cycling on rural roads can often be difficult due to high traffic speeds. They often have poor visibility due to narrow carriageways with hedges and overgrown verges. It is therefore important that motor traffic speeds and volumes are reduced and suitable measures implemented to ensure cycling is safe and perceived to be safe.

Designated on-carriageway active travel cycle routes in rural areas should generally follow roads with low traffic flows, preferably below 1,000 vehicles per day and with traffic speeds no greater than 30mph. In rural areas the design of cycle routes should be sympathetic to the local environment with careful use of signing and road markings.

Improving the rural cycle experience can be achieved by adopting and incorporating the various design features which aim to make rural roads safer and more pleasant places to travel by foot and cycle.

**Gated Closures/Restrictions**

Closing or restricting access to minor roads is an effective way of improving rural conditions for walkers and cyclists. This can be achieved using a road closure with cycle gap, or restrictions such as signing traffic away from minor roads and designated cycle routes. These measures will require local engagement and consultation with TROs before implementation. It is important that any restrictions are signed in advance particularly at junctions to avoid unnecessary turning movements.

**Changed Priorities - Junction redesign:**

Where two roads intersect, each with two-way traffic flows less than 1,000 vpd, the road with the major cycle flow should be given priority. This can be achieved by relocating give-way markings and signs. Junctions can often be hidden in rural roads by bends and vegetation therefore it is important to consider improving and maintaining visibility splay at junctions.

**Reduced speed limits**

The majority of the rural road network is subject to the national speed limit of 60mph. The geometry of many rural roads does not allow such speeds and where cycling is being encouraged, reduced speed limits should be considered. Speed limit changes on their own are unlikely to substantially reduce average speeds, therefore appropriate traffic calming measures should be considered especially at approaches to isolated hazards, junctions and bends.

**Quiet Lanes**

Minor rural roads that are appropriate for shared use by walkers, cyclists, horse riders and motorised users may be designated as Quiet Lanes. They should have low traffic flows travelling at low speeds. This is achieved by community engagement and a combination of gateways, traffic signing strategies and restrictions. This concept identifies networks of rural roads rather than individual roads, which means it facilitates in widening transport choices and also helps to protect character and tranquillity in rural areas.

Quiet Lanes should be essentially self-enforcing however maintaining public awareness about Quiet Lanes is important and this can be done through local advertising. The
Transport Act 2000 contains provisions which give local highway authorities the power to designate certain roads, for which they are responsible as Quiet Lanes, and has given the term ‘Quiet Lane’ legal status.

Centre line removal

Centre lines can have a negative effect on traffic speeds and space requirements for cyclists, this is because they help guide motorists, allowing them negotiate oncoming traffic at higher speeds.

Weight / width restrictions

Where traffic volume is high or where larger vehicles frequently use a road, the introduction of motor traffic restrictions (e.g. signed reroutes, weight & width restrictions) can reduce traffic volume, therefore providing suitable conditions for centre line removal.

Parallel Roads

Consideration should be given to designation of suitable parallel roads carrying lower traffic volumes as cycle routes where the main road may not be suitable for cycling. If speeds are a concern on the parallel route, speed reduction measures may need to be considered. In developing such a route, opportunities should be taken to link it in to additional settlements and attractions.

In assessing the options, consideration should be given to the higher use of such roads by large slow moving agricultural vehicles and the discomfort that these create for cyclists.
**Traffic in Villages**

It is important that access in and around villages is suitable for active travel modes. *Traffic in Villages* is a publication produced by Dorset AONB Partnership and written by Hamilton-Baillie Associates which provides a toolkit that can be used for successful village design.

The mechanisms in the above publication for creating successful villages will also coincide in helping achieve better cycling conditions and facilities. These include reducing speed limits, creating gateways, improving cross points, way finding, public spaces/meeting points, de-cluttering, etc. It is important that these principles do not inadvertently make worse cycle conditions by taking into consideration:

- Designing out existing and avoid creating pinch points (e.g. at gateways)
- Cycle access maintained at closures or restrictions
- Uncomfortable surface materials (e.g. cobbles)
- Retaining and improving upon cycle signing
- Car parking (ensuring echelon and other forms of parking do not create dangerous conditions for cyclists)
- Cycle parking

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**Gateways**

Gateways are used at village boundaries to raise driver awareness of an approaching settlement, where traffic speeds are intended to be reduced. These are points where it is necessary to reduce speed limits and physical traffic calming is often used to help enforce this measure. This can sometimes lead to pinch points for cyclists in areas where traffic speeds are still above 30mph.

Where pinch points are intended or have already been created, cycle bypasses should be provided and this is covered in the traffic calming chapter.

Gateways do not have to take the form of a pinch point as they can be subtly created by using planting, different road colours/materials and other visual changes that mark the
contrast between high speed roads and low speed villages. It should be a place where centre line markings end as this helps highlight a change in road character.

6.32 Interfaces Between Cycle Tracks and Carriageways

Transition between on and off road DE035

The transition for cyclists between a cycle track (including a shared use path) and the carriageway needs to be a safe and comfortable to use. Cyclists should be able to continue on their path, crossing a flush kerb at right angles, without having to turn sideways and give way to vehicles on the carriageway. The design of the transition point must ensure that cyclists are clearly visible so that motorists are aware that cyclists are likely to be re-joining the carriageway ahead of them.

Photo 6.16 – Transition between Cycle Track and Cycle Lane, Liverpool

Transitions in the opposite direction – between a cycle lane and a cycle track – usually present fewer safety problems for cyclists, but should still allow cyclists to continue in a direct line, crossing a flush kerb at right angles.

Flush Kerbs DE036

The ability to move between cycle track and the carriageway, whether as part of a crossing manoeuvre or for cyclists joining or leaving the carriageway, is greatly helped by the type and quality of construction of the kerbs. This is particularly important if the kerb is to be crossed at a shallow angle, although designs should aim to modify kerb lines so that cyclists cross them at 90 degrees.
Chapter 7 Integration with Public Transport focuses on the opportunities and benefits of integrating active travel modes with public transport operations. However, there are some design considerations to address where cycle routes interface with public transport routes, and these are discussed below.

**Combined traffic on bus routes**

Where traffic speeds and volumes are sufficiently low to permit cyclists to share the carriageway with general traffic (see Table 6.2), sharing space with buses will not normally be a problem, subject to appropriate lane widths. However, where bus flows are high and form a large proportion of the traffic volume, consideration should be given to separating cyclists from buses, especially on primary cycle routes.

Frequent stopping and pulling out by buses will disrupt cycle flows and create a hazard, unless cyclists are able to bypass stationary buses (see DE028, DE029, DE030, DE031, DE032)

**Bus lanes and bus-only streets** DE037

Generally cyclists are permitted to use with flow bus lanes. Whilst not specifically a cycle facility per se, bus lanes can provide a certain degree of segregation for cyclists in so far as they minimise the amount of motorised traffic in the affected lane. Some bus lanes also allow taxis and this can significantly increase traffic flows.

In order to be considered suitable to be an designated Active Travel Route, the bus lane should still meet the criteria given in Table 6.2 – i.e. a separate cycle lane (and potentially a
light segregated track) will be needed in some circumstances for the route to be considered suitable for inclusion on the existing route map.

Where bus lanes are provided, care should be taken to ensure that provision for cyclists in the opposite direction is not compromised.

There should be a presumption in favour of designing contraflow bus lanes to be of sufficient width to accommodate cyclists. Where this is the case the widths referred to in DE37 for with-flow bus lanes will apply. However, for short stretches, or where flows are low, narrow lanes may be acceptable, which will mean that buses will not be able to pass cyclists.

Where bus-only links are provided, for example between two residential neighbourhoods, the design should normally include provision for cyclists as well.

Cycling and trams

Although only one mile of operational tramway currently operates in Wales, it is important to ensure that any potential future tramway schemes do not compromise the needs of cyclists.

In principle, cyclists and trams can share the same carriageway provided the tram travels very slowly. However, this requires extra care during the design phase as tram rails make it considerably harder to cycle and cyclists have to make sure they do not cross the rails at too shallow an angle; typically the approach angle should be at least 45 degrees, preferably 60 degrees. Tram rails also contribute indirectly to hazardous situations:

- Cyclists may be concentrating on avoiding the rails that they fail to notice other hazards
- Cyclists are not always able to choose a safe path
- Rails restrict the scope for evasive manoeuvres

Generally a mixed profile of tram, car and cycle on main cycle routes should be avoided.
6.34 Crossing and Junction Design – General Principles

Function, form and use

The design of junctions and crossings must be comprehensible to all users, and it is essential that this is applied to pedestrians and cyclists as well as motorised road users.

User requirements for junctions and crossings

The user requirements of directness, safety and comfort are significant at junctions and crossings.

Directness

Directness is important for both pedestrians and cyclists and the design of junctions and crossings should consider directness in both distance and time.

The delay experienced in negotiating a junction or crossing can considerably increase journey time for pedestrians and cyclists, both real and perceived. This has implications on the timings of traffic controlled junctions and crossings as well as the frequency of an acceptable gap when crossing a carriageway without assistance. Where possible pedestrian and cycle routes should have priority over motorised traffic and designs should avoid arrangements that require frequent stopping and starting by cyclists.

Both pedestrians and cyclists require routes through junctions to follow natural desire lines. Where pedestrian routes are indirect many users will choose a shorter route if available, away from the formal crossing points.

At side road junctions deviations from the desire line can be minimised through the use of small corner radii. This has an additional benefit in reducing vehicle speeds.

Figure 6.4 The effect of corner radii on pedestrians – from Manual for Streets
Safety

Safety is a key consideration for pedestrians and cyclists at junctions and crossings, especially given that most collisions take place at them. Safe, well designed crossings can help overcome community severance created by busy roads.

Attention must be given to the need to minimise the risk of injury by

- Avoiding conflicts as far as possible, and ensuring junction design minimise the number of conflict points
- Minimising the number of traffic lanes through the junction
- Reducing speeds at conflict points – to reduce both the number and severity of casualties
- Ensuring good intervisibility between pedestrians, cyclists and other road users
- Ensuring junction layouts are clear and unambiguous to all road users
- Allowing sufficient time for pedestrians to cross the road and for cyclists to negotiation the junction.

Comfort

Junction layouts need to ease the passage of pedestrians and cyclists by:

- Ensuring a smooth surface with flush dropped kerbs with associated tactile paving
- Careful location of street furniture so as not to obstruct desire lines
- Allowing adequate space for pedestrians and cyclists waiting to cross.
- Minimising hindrance due to stationary cars obstructing the crossing
- Minimising the need for cyclists to stop and start
- Geometry and visibility that enable cyclists to proceed through the junction or crossing unhindered.

6.35 Crossing Types

There are two overall types of crossing – grade-separated, such as bridges and subways and at-grade crossings such as zebra crossings.

At-grade crossings are much more commonplace and relatively low cost. They are preferable to grade separated crossings which would cause significant deviation away from desire lines and/or raise personal safety concerns. However, in some situations a grade separated crossing is the only possible solution, such as a crossing of a railway or motorway, and can be more desirable solution if well designed, such as when a high quality route is created over or under a road. Grade separated crossings are discussed later in this chapter.

There are two overall types of at-grade pedestrian crossing:

- Uncontrolled crossing – pedestrian / cyclist has to give-way to road traffic, but in
some cases these can be designed as a courtesy crossing where drivers are encouraged to give way to pedestrians / cyclists through the overall design; and

- Controlled crossings – road traffic has to give-way to or stop for pedestrians and / or cyclists

The assessment of the need for and the type of pedestrian / cycle crossing to be provided in a particular location should be undertaken in accordance with Department for Transport and Welsh Government publication LTN 1/95 ‘The Assessment of Pedestrian Crossings’.

The design of pedestrian / cycle crossings should be undertaken in accordance with Department for Transport and Welsh Government publication LTN 2/95 ‘The Design of Pedestrian Crossings’.

Where there was no previous provision, suppressed demand may mean that crossing flows are higher than anticipated, especially in residential areas.

Various types of controlled crossings exist, either solely for pedestrians or shared with other non-motorised users. Signalised crossings may be standalone or incorporated into traffic signal controlled junctions.

- Zebra crossing
- Puffin crossing
- Pelican crossing
- Toucan crossing (shared with cyclists)
- Pegasus crossing (shared with equestrians)
- Crossings at traffic signal controlled junctions.

This guidance does not cover Pegasus crossings.

In order to implement a new standalone (i.e. not part of a junction) controlled crossing it is necessary to consult with the police and give public notice of the proposal.

The layout of standalone controlled crossings is prescribed in The Zebra, Pelican and Puffin Pedestrian Crossings Regulations and General Directions 1997. These require particular markings, including the installation of a minimum of two zig-zag markings on the approach to and exit from the crossing, which prohibit vehicles waiting or overtaking on the immediate approach to the crossing.

Crossings of all types may be highlighted with the provision of kerb build-outs, which reduce the width of a crossing, and/or by placing the crossing on a raised table. Both of these measures are likely to be successful in reducing vehicle speeds in the vicinity of the crossing, though care should be taken to ensure build-outs do not result in a pinch point for cyclists using the road.

Consideration should be given to providing high friction surfacing on the approaches to a controlled crossing to ensure adequate skid resistance for braking vehicles. The length of high friction surfacing should be determined based on the vehicle approach speeds. The surfacing should continue past the stop or give-way line for at least one metre to cater for a vehicle overrunning the stop or give-way line.
Crossings need to be wide enough to cater for expected demand, and increased use. Once a new crossing is installed it will frequently be busier than originally expected. Catering for higher numbers at the design stage will avoid a route becoming compromised because dimensions on key crossings were set at the minimum required. Once installed it is difficult to justify further expense if a crossing needs widening.

**6.36 Pedestrian crossings - General**

An inability to cross the road safely can have a major impact on people’s ability to safely and conveniently complete their active travel journeys on foot.

Pedestrian crossings should be provided at locations where a walking route crosses a major road or other barrier, and located as close to the pedestrian desire line as possible. Pedestrian crossings may be located at junctions, or they may be standalone. At signalised junctions pedestrian crossings should be incorporated into the traffic signals for the junction.

The principal types of crossings have been listed above and their main advantages and disadvantages are described in the following sections.

Where controlled crossings are provided some distance apart, consideration should be given to accommodating demand for informal crossings at more regular intervals. This might be desirable along a shopping street where pedestrians may want to cross at any point along a length of road, where there is no clear desire line.

At all signalised crossings, delays to pedestrians and cyclists should be minimised, by keeping cycle times as short as possible, providing maximum green times and setting standalone signals to respond immediately when the push button is pressed.

**6.37 Uncontrolled crossings DE038, DE040, DE041, DE042, DE043**

The simplest form of uncontrolled or informal crossing involves the provision of dropped or flush kerbs so that mobility-impaired people can cross to and from the carriageway. They are less suitable for visually impaired people, who generally prefer signal-controlled crossings.

At uncontrolled crossings pedestrians do not have formal priority over road traffic. There are the following types of uncontrolled crossing:

- Mid link crossing
- Crossing of side road junctions
- Informal crossing with a central median

Care should be taken over the siting of informal pedestrian crossing points in relation to vehicle crossovers so as not to cause confusion for visually impaired people. The effect of parked vehicles in the vicinity of an uncontrolled crossing should be considered and if necessary parking restrictions imposed.

Uncontrolled crossings can be highlighted in a number of ways if appropriate. These
measures include demarcating the crossing with a different coloured surface

Uncontrolled crossings Informal crossings can also indicate clearly to drivers where pedestrians are encouraged - and are therefore likely - to be crossing. Designs can make use of contrasting paving materials, street furniture and changes in carriageway width and level to emphasise pedestrian movement. When done well, in a slow speed traffic environment, they will often encourage drivers to give informal priority to pedestrians.

A refuge in the centre of the carriageway enables pedestrians to negotiate one stream of traffic at a time, which can be of considerable help when flows are high. Refuges tend to be kerbed in order to provide a degree of protection to pedestrians. Flush kerbs and tactile paving should be provided in line with the dropped kerbs at the edge of the road. The refuge is usually marked with bollards facing approaching traffic, although their over provision can have an impact on the streetscape – guidance on the provision of traffic bollards is given in Traffic Advisory Leaflet 3/13.

Pedestrian crossings will usually be provided at side road junctions. Flush kerbs on the junction radii can create difficulties for visually impaired people. Therefore, where possible, crossings at side roads should be inset into the side road approximately one metre beyond the end of the radii. Tighter radii will enable this set-back to be reduced so that pedestrians are not diverted from their desire line. Alternatively a 'side road entry treatment' may be appropriate to enable the crossing to be located closer to the pedestrian desire line – see below.

6.38 Side Road Entry Treatments and Blended Junctions DE041, DE042

Side road entry treatments involve raising the mouth of the side road junction to footway level. They make it considerably easier and safer for pedestrians to cross – particularly the mobility impaired – by enabling the cross on the level, reducing the speeds of turning vehicles and shortening the length of the crossing. Side road entry treatments are also beneficial to cyclists, whether on the carriageway or on cycle tracks routes crossing the side road.

A variant on this is the ‘blended’ junction, where there is no change in the footway material, no flush kerbs and no tactile paving, where vehicles are effectively crossing a widened footway. Choice of locations for this design should take account of the difficulties for older pedestrians and disabled people.
Photo 6.18 – Typical Side Road Entry Treatment, Hammersmith and Fulham

6.39 Central median strips to facilitate informal crossing points DE043

Central median strips are an area of different coloured or textured surfacing in the centre of a road which provides space for pedestrians to wait in while crossing a road in two stages. This type of facility should be in addition to crossings suitable for less mobile or visually impaired pedestrians.
6.40 Zebra crossings DE044

Zebra crossings offer the greatest advantage to pedestrians as they give them priority over all other traffic. In some authorities there has been a move away from providing zebra crossings towards signalised crossings, on the basis that they represent an 'upgrade' but this is not necessarily the case.

Zebra crossings are un-signalised crossings with transverse white bars painted onto the road surface and yellow flashing belisha beacons on black and white striped poles at each side of the crossing. A driver is required to stop at a zebra crossing when a pedestrian starts to cross. A blind person however would not start to cross until sure that vehicles have stopped and would seek a pedestrian controlled signal crossing. Other vulnerable groups such as people with learning impairments and older people are likely to prefer signalised crossings where they may feel safer and more comfortable.
6.41 Signalised crossings DE045 DE046 DE047

**Standalone signalised crossings**

There are a number of variant types of standalone signalised crossings.

Puffin crossings are standalone crossings with nearside pedestrian red and green symbols located as part of or above the push button unit located so that they can be seen at the same time as approaching traffic. Puffin crossings are gradually replacing Pelican crossings in many authorities, although some users prefer the far side pedestrian aspect of Pelicans.

Puffin crossings incorporate detection technology (usually microwave detection) which allows cancellation of the pedestrian demand if a pedestrian crosses after pressing the button, but before the green man has activated. Additionally, the detectors are used to measure the speed at which pedestrians are crossing and automatically adjust the time allowed to cross the road. A Puffin crossing does not feature a flashing amber road traffic signal in conjunction with a flashing green man.

A Pelican crossing is an older form of signalised pedestrian crossing with far-side pedestrian signal heads and a flashing amber/flashing green man crossing period. Unlike a Puffin crossing there is no pedestrian demand dependent variability in the signal timings within a set of signal timings and the pedestrian crossing is activated by a push button.

Ped-X crossing is laid out as a Pelican, with far side signal heads, but the traffic light sequence is as a signalled junction.

Toucan crossings are shared pedestrian and cycle crossings, and are similar to Puffin crossings, but with additional red and green cycle symbols.

6.42 Crossings at signal controlled junctions DE047

Crossing facilities for pedestrians can be incorporated into signal controlled junctions by providing pedestrian signals. Crossings within traffic signals may have nearside (Puffin style) or far side (Pelican style) pedestrian aspects, as well as being combined pedestrian and cycle crossings (Toucan style).

Pedestrian crossing facilities should normally be provided on all arms of a junction, and the number of separate crossing stages that a pedestrian has to use to cross at a junction should be minimised.

Signal controlled crossings should include crossing times of suitably long duration to allow all pedestrians (particularly older people) to cross the road in an efficient unhurried manner. Research by University College London has revealed that that the assumed walking speed 1.2m/s, which is often used, is too fast for 85% of women and 76% of men aged 65 and over.

Signalised crossings may be divided into discrete sections using refuges, with each part of the crossing operating on different stages of the signals for traffic capacity reasons. Such crossings are normally staggered so that pedestrians recognise each part of the crossing as
separate, although there are examples of straight ahead signalised crossings with wide central refuges that operate under separate stages. Staggered crossings involve additional delay and deviation from the desire line, particularly where the stagger is large. Straight ahead crossings are much more convenient for pedestrians and should be used wherever possible.

Audible and tactile signals should be provided for sensory impaired pedestrians at signal controlled crossings.

The volume of an audible signal can be manually adjusted to suit the environment. Where there are a number of crossings in close proximity standard audible signals may cause confusion. In this case bleep and sweep audible signals can be provided. These use a directional speaker and an adjustable volume to assist pedestrians in the vicinity of the crossing.

Tactile signals are rotating cones located on the underside of the push button unit. Care should be taken to ensure that pedestrians can reach the rotating cone and access the crossing without being obstructed by any guard railing. Rotating cones should be located on the right hand side of a crossing.

Pedestrian countdown timers can be installed at pedestrian crossings at traffic signals. These give crossing pedestrians a display which informs them how many seconds are left for them to cross after the green man light has gone out, during the ‘black-out’ period and before the red man light comes on.

The countdown timers remove uncertainty for pedestrians as to how long they have to safely cross and can therefore improve pedestrian comfort and the efficiency of traffic signal timings. Pedestrian countdown timers are currently only suitable for use at crossings with far side pedestrian signals with fixed ‘black-out’ times. This means that they cannot currently be installed at sites which use Puffin technology.

6.43 Cyclists at Crossings - General Principles

As with pedestrians, cyclists will need crossings to enable them to continue their journey across a busy road or other barrier which crosses a designated cycle route. Although reference in this section is made to cycle crossings, they can in fact be thought of as junctions, but where one or more arms of the junction are only used by cycle traffic.

Table 6.3 is indicative of the appropriate treatments for a standalone cycle crossing of a two-way carriageway. It is a guide only, and individual locations should be assessed on a case by case basis. In many situations reducing the speed of traffic using the carriageway will open up additional options for the crossing design.
Table 6.3: Choice of cycle crossing type

<table>
<thead>
<tr>
<th>85th percentile speed of road traffic</th>
<th>Road traffic flow (two way daily)</th>
<th>Type of cycle crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Side Road Crossing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 mph and below (main road)</td>
<td>≤2,000 on side road</td>
<td>Cycle priority crossing on raised table</td>
</tr>
<tr>
<td>30 mph and below (main road)</td>
<td>&gt;2,000 on side road</td>
<td>Cycle crossing on raised table, cyclists give way</td>
</tr>
<tr>
<td>Above 30 mph (main road)</td>
<td>Any</td>
<td>Cyclists give way, crossing not raised</td>
</tr>
<tr>
<td>Main Road Crossing (Standalone)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 mph and below</td>
<td>≤ 4,000</td>
<td>Cycle priority crossing on raised table</td>
</tr>
<tr>
<td>Above 30mph, up to 50 mph</td>
<td>≤6,000</td>
<td>Cyclists give way to road traffic</td>
</tr>
<tr>
<td>35 mph and below</td>
<td>≤ 8,000</td>
<td>Zebra crossing used by cyclists</td>
</tr>
<tr>
<td>Above 30mph, up to 50 mph</td>
<td>≤ 8,000</td>
<td>Cyclists give way to road traffic plus central refuge – urban</td>
</tr>
<tr>
<td>Above 30mph, up to 60 mph</td>
<td>≤ 10,000</td>
<td>Cyclists give way to road traffic plus central stage refuge – rural</td>
</tr>
<tr>
<td>Up to 50 mph</td>
<td>&gt; 8,000</td>
<td>Toucan Crossing</td>
</tr>
<tr>
<td>&gt; 50 mph</td>
<td>&gt; 8,000</td>
<td>Grade separated crossing – urban</td>
</tr>
<tr>
<td>&gt; 60 mph</td>
<td>&gt; 10,000</td>
<td>Grade separated crossing - rural</td>
</tr>
</tbody>
</table>

Source: Based on LTN2/08 & Cycling England

Uncontrolled crossings should be at least the width of the approach paths, and never less than 2.7m wide (3m dropped kerb width). Therefore if the approach path is a cycle track, or
shared use path 3.5m wide then the crossing should not narrow down and create pinch points but provide a facility 3.5m wide.

6.44 Cycle priority crossings DE039

Where an active travel cycle route crosses a relatively lightly trafficked street, it should preferably be given priority over the road. Care needs to be taken to ensure it is clear to motorists that they must give way, and that there is sufficient visibility along the cycle track. At present the crossing needs to be located on a speed hump in order to comply with TSRGD.

Photo 6.20a and b – Cycle Priority Crossing, Bristol
6.45 Simple uncontrolled crossings DE038

On busier roads cyclists crossing will need to give way to motor traffic unless a controlled crossing is provided. However, cyclists will generally be able to cross conveniently in a single movement with traffic volumes up to around 6000 vpd.

6.46 Uncontrolled crossing with refuge DE040

Where cycle routes cross roads with speed limits above 30mph or where vehicle flows are high, it can be difficult to find an adequate gap in the traffic to cross the carriageway in one movement. A central refuge allows crossing to be undertaken in two easier movements, but the arrangement needs to be carefully designed to avoid the refuge creating pinch points that can disadvantage cyclists using the carriageway.

6.47 Zebra Crossings DE044 (see also 6.40)

Zebra crossings can provide a more demand responsive and lower cost solution to accommodate cycle crossing movements, compared to signalised facilities.

The regulation of traffic at zebra crossings is detailed in the Zebra, Pelican and Puffin Pedestrian Crossings Regulations and General Directions 1997 (HMSO, 1997). Under the regulations, cyclists are vehicles and are permitted to ride on the part of a Zebra crossing that is carriageway, providing they give way to pedestrians crossing or waiting to cross. Thus, whilst it is not illegal for cyclists to use a Zebra crossing provided there is a cycle track each side, they do not have priority over other vehicles. More detail is given in Sustrans Technical Information Note 17 Cyclists’ Use of Zebra Crossings.

Designs which encourage cyclists to believe they have priority over road vehicles may result in unacceptable risk, particularly if cyclists are able to approach the crossing at speed in a straight line. The risk of cyclists entering the crossing unexpectedly can be mitigated with speed reducing measures on the approaches to the crossing. The risk of injury to cyclists while on the crossing can be reduced with speed reducing measures on the carriageway - for instance, the crossing could be placed on a flat top road hump).

Bristol City Council has implemented a number of zebra crossings on cycle routes, which have worked well in terms of safety and comfort.
6.47 Signalised Cycle and Pedestrian Crossings (Toucan) DE046

Signalised crossings in urban areas are preferred to enable pedestrian and cycle movements across busier roads and this is normally takes the form of a Toucan Crossing.

At a Toucan crossing cyclists and pedestrians share the same crossing space. In some situations parallel crossings for pedestrians and cyclists may be preferable. The separate cycle crossing will be marked by ‘Elephant’s Feet’ markings, which will require authorisation.

6.48 Pedestrian / Cycle Bridges DE048

Well-designed bridges can provide very useful connections for footpath and/or cycle tracks, enabling crossing of major roads or other barriers to take place without conflict or delay. Where the topography is favourable the need for approach ramps can be minimised and good natural surveillance improves personal security. New bridges can be designed as features along a route and may become attractors in their own right, and are generally considerably cheaper than new subways. Where segregation of the crossing between pedestrians and cyclists is not practicable, consideration will need to be given to whether unsegregated use is appropriate.
6.49 Existing road bridges

Existing road bridges often have very high cycle flows and can be adapted to accommodate cycle tracks. Existing structures with narrow footways, restraining barriers or lower parapets should not be discounted, as it may be feasible to reduce the carriageway width.

Photo 6.22 – Covered segregated pedestrian/cycle bridge, Cambridge

Photo 6.23– segregated cycle track on Kingston Bridge, London
6.50 Subways / underpasses DE049

Subways / underpasses can provide very useful connections along footpaths or cycle tracks away from the road, avoiding conflicts at major roads. Where the topography is favourable the need for approach ramps can be minimised and good natural surveillance is essential for personal security. Sometimes this option will involve the conversion of an existing pedestrian subway or an underpass provided for private access where safe and appropriate taking account of the needs of all users. Where segregation is not practicable consideration will need to be given to whether unsegregated use is appropriate.

Photo 6.24 – Segregated pedestrian/cycle route beneath busy intersection with good natural light – Lund, Sweden

6.51 Wheeling Ramps DE050

In some situations, flights of steps are sometimes unavoidable on a cycle route. To assist cyclists, wheeling ramps should be added to one or both sides of the flights using steel sections or by forming them in concrete.

6.52 Cyclists at Priority Junctions

At major/minor arm priority junctions, opposing turning flows give way according to defined priority rules, which are indicated through traffic signs and markings. Priority is normally given to the dominant traffic flow.

Four overriding principles underpin the design of priority junctions that are safe and suitable for cyclists:

- Low speeds – on approaches and through the junction;
- Good intervisibility;
• Single lane approaches;
• Designs that facilitate correct positioning and offer protection for right turns from the major arm.

The following design details are recommended:

• Change of priority to assist the major cycle flow and reduce traffic speeds. This is typically used on low-traffic streets (up to 3000vpd) where there is not a dominant traffic flow, and may need kerb deflection to support compliance. Changes in priority can signal a change in movement and place function and can support environmental enhancements;

• Minimise kerb radii particularly in residential areas with low flows of medium sized delivery vehicles (e.g. business / industrial parks). Vehicle tracking will be necessary to design appropriate radii where regular use by HGVs is intended. It will acceptable in many 30mph situations for large vehicles to cross centre lines – for further guidance on corner radii refer to Manual for Streets 2 Section 9.4. There may need to be some local strengthening of the footway to allow for larger vehicles occasionally overrunning the corner, or the placing of a bollard or other obstruction to ensure that this does not occur.

• Narrow traffic lanes on junction approaches to reduce traffic speeds and reduce crossing distance for pedestrians. This can release space to accommodate cycle lanes or tracks, where needed;

• The provision of long tapers and left-turn lanes, and in particular free-flowing entry and exit slip lanes, can cause safety and comfort problems for cyclists who are not turning. They should be removed wherever possible from existing junctions and avoided on new layouts.

• Provision of right turn lanes / ghost islands where cyclists are likely to have to wait for a gap in oncoming traffic to turn right;

• Provision of nearside cycle lanes of appropriate width across the minor arms at junctions. This can help to emphasise route continuity for cycle users and can increase awareness of cyclists to motorists turning across the cycle lane

• Where a cycle track alongside the carriageway crosses side roads, the aim should be for the cycle track to retain priority and follow the desire line wherever possible

**6.53 Unmarked Informal Junctions DE051**

Junctions in urban areas, even on relatively busy routes, can be designed without defined priority, requiring road users to slow down and engage / negotiate with and other road users. The application of these ‘shared space’ principles (see Section 6.9 for further guidance) is becoming increasingly common and has been demonstrated to be effective in terms of traffic
capacity and safety on four-arm junctions with peak period flows in excess of 2500 vehicles/hour. Examples include junctions in the centre of Coventry, in Poynton in Cheshire and in Bexleyheath in outer London.

Informal junctions can also use circular paving patterns to indicated roundabout-type priority without the use of road markings and signs. These informal roundabouts are discussed in Section 6.70 below.

In terms of cycling, this type of junction can work well as long as care is taken to ensure that the paths of motor vehicles through the junction are limited to one lane, so that cyclists can adopt a primary position throughout.

Photo 6.25 – Informal Junction, Bexleyheath

6.54 Cyclists at Signalised junctions - General considerations

Safety
Signal-controlled junctions can provide safety benefits for pedestrians and cyclists by separating opposing traffic movements in time and reducing the need for weaving manoeuvres.

Accidents which occur at signalised junctions are often related to conflict between left turning vehicles and straight ahead cycle movements and designers need to consider how to minimise this.

Delays
Signalised junctions can reduce delays for cyclists and pedestrians during peak traffic periods and can manage and facilitate specific turning/crossing movements which may be difficult under priority control. This can give cyclists a time advantage over other traffic.

However, signal controlled junctions commonly result in increased delays during off-peak
conditions, compared to a priority junction.

Cyclists do not like stopping because they lose momentum. Uninterrupted left turns or ahead movements at T junctions can be created by including cycle bypasses where space exists. In other situations, priority control may be preferable on cycle routes to minimise the need to stop and start.

As a minimum, consideration should be given to the provision of advanced stop lines (ASLs) and lead in lanes at all signalised junctions to enable cyclists to bypass queues and to help cyclists position themselves correctly for their turning movement. ASLs are not the only way of providing for cycling, however, and can have some disadvantages which are discussed below.

**Designing for cyclists’ needs**

The design of signalised junctions should consider all movements by all types of user; and how different user groups interact with each other. Many issues can be designed out, if cycle movements are considered early in the design process.

 Minor timing changes to existing signal junction operation can provide significant advantages to cyclists at some junctions, without the need for complex re-signalling works. Some signalised junctions do not require significant changes to the existing timings in order to provide good quality solutions for cyclists. Traffic modelling can help determine whether minor timing changes will have a negative impact on network capacity.

For example, the Connect2 scheme at Finsbury Park adjusted the timings at a signalled junction on Seven Sisters Road such that the minor road approach could be reduced from three to two lanes, thus enabling provision of a cycle track and Toucan crossing at that junction without adversely affecting other traffic movements.

Where cyclists share space with pedestrians, rationalisation of street furniture and single phase crossings will help reduce conflict. Parallel provision for cycles and pedestrians to cross junctions can further reduce conflict between these user groups. Puffin & toucan crossing technology can be used to detect slow moving cyclists and pedestrians through a junction to delay the next signal phase until they are clear.

**6.55 Advanced stop lines DE052**

An Advanced Stop Line (ASL) enables cyclists to take up the appropriate position in the ‘reservoir’, or waiting area between the two stop lines, for their intended manoeuvre ahead of general traffic, before the signals change to green. A cycle feeder lane should normally be provided which will enable cyclists to easily pass queuing motor traffic on the approach to the stop line. They are established practice in most highway authorities and some local highways authorities now have a presumption to install ASLs at all signalled junctions.

ASLs may not resolve all problems for cyclists at traffic signals however. ASLs provide benefit to cyclists on an approach when the traffic signals are on red. They have little value on approaches that are free-flowing for most of the cycle, and/or approaches with multiple lanes, as cyclists will find it difficult to manoeuvre themselves into an offside lane to make a right turn. In these situations alternative solutions should be considered.
ASLs have little or no effect on capacity if the number of general traffic lanes remains unaltered.

Feeder lanes may be provided on the nearside, but where there are high numbers of left turning vehicles crossing cyclists going ahead or right, central or offside feeder lanes between general traffic lanes should be considered.

‘Gate’ entries to ASLs are an option which allows legal entry to the reservoir where a lead-in lane cannot be achieved. However, in all cases, a lead-in lane is preferable; gates represent a lower level of service for cyclists and should not normally be used on active travel routes.

Under TSRGD ASLs are not permitted at non-signalised junctions, or toucan / puffin crossings, but several authorities have installed them immediately adjacent to a standalone signalised crossing point.

An ‘early start’ signal phase for cyclists in conjunction with an ASL enables cyclists to start ahead of other traffic and to clear locations of potential conflict with traffic on the same arm (e.g. overtaking and turning left) or opposing traffic streams. Trials have recently been authorised in Cambridge, York and Brighton and authorities in Wales may wish to seek approval for similar designs. Again this type of arrangement does not confer any advantage while the approach signals are on green.

In due course it is expected that low level cycle signals, currently on trial in London, will be permitted to replace the high level cycle advance signals shown in Photo 6.25 below.

Photo 6.26 - Early Start Cycle Signals at ASL, Cambridge
6.56 Cycle signal phases

A separate signal phase for cyclists at signalised junctions can be an appropriate solution where a cycle track, or cycle-only on-road provision (including contraflow facilities or cycle routes through road closures) enter a signalised junction. Cycle-only phases can be useful, for example:

- Where cyclists can undertake a manoeuvre not permitted for general traffic, and which cannot be shared with pedestrians, such as crossing between the carriageway and a cycle track on the other side of the junction.
- Where cyclists are separated from other traffic for safety reasons

The use of early start / late cut-off and providing designated space to wait can help cyclists making opposed right turns. An on-demand cycle phase using a loop or push buttons within the existing traffic light sequence is the most common way of achieving this. On busier cycle routes, fixed staging may be preferable.

In many other countries cyclists can be controlled separately by the use of smaller sized low level signals. These are currently under trial in London and it is hoped that these will be permitted across the UK in the near future.

6.57 Exemption for cyclists from banned turns

There are many examples of cyclists being successfully exempted from banned turns at signals, and this should always be included in the layout and staging arrangements in order to give cyclists an advantage over motor traffic, unless there are overriding safety problems.

For example, where there is a bus-only movement it should normally be feasible and desirable also to include cyclists. There will also be situations where a cycle-only exemption is appropriate.

6.57 Intergreens for cyclists

Cyclists coming through a signal junction at the end of the green phase may be travelling significantly slower than motor traffic, due to an uphill gradient or the route through the junction being longer for cyclists. This has the potential to place cyclists in conflict with traffic moving off at the start of the next stage.

This safety problem should be addressed by increasing the intergreens, normally by increasing the intergreen to a suitable value, or by including an all red extension when a cyclist is detected who has not cleared the junction. The latter solution will require a reliable system of detection, however.

6.58 Permanent green cycle signal on bus gate

Increasingly traffic signals are being used at bus gates to provide queue relocation on the approach to a signalised junction. Several cities, including Cambridge, have incorporated a permanent green cycle aspect on the bus gate signal as there is no need to stop cyclists
when other traffic has a green.

Photo 6.27 – Permanent Green Signal at Bus Gate - Cambridge

6.59 Diagonal cycle crossing stage during all red

Where there is a demand for cyclists to cross a four-arm signalised junction diagonally, providing a direct diagonal crossing may be preferable to directing them across one arm at a time. Diagonal crossings will increase the overall crossing distance that a pedestrian or cyclist is required to make in one movement – therefore increasing the length of the red stage for other traffic – but it allows users to replace a “two stage” crossing movement with a “single stage”, reducing their journey times.

At junctions where pedestrians cross on an all red stage, it may be feasible for a diagonal cycle crossing to be installed without increasing the duration of the vehicle all–red stage. Omagh and Birmingham both have signalled junctions which incorporate diagonal crossings for cyclists.
Photo 6.28 – Signalised Diagonal Cycle Crossing, Omagh

6.60 Cycle bypasses at traffic signals DE053

Where space and the level of pedestrian use allow, it is often possible to provide a slip off in advance of a signalised junction, leading to a short section of cycle track that enables the cyclist to bypass the red signal.

This is commonly used in two situations:

- To turn left;
- To continue straight ahead at the head of a T junction
6.61 Uncontrolled cycle crossing at signalled junction

At some signalled junctions operational considerations may make it very difficult to justify a separately controlled crossing for cyclists. In such cases it may be appropriate to consider an uncontrolled cycle crossing of an arm of the junction, with the cycle track approaches marked as give way. This also has the advantage that cyclists are not faced with a full red signal at a time when it is quite safe for them to cross.

6.62 Guiding cyclists through signalised junctions DE054

A cycle lane marked through a signalised junction provides a visible indication of route continuity and can increasing the drivers’ awareness of key cycle movements. They are commonly used in two situations:

- To indicate route continuity and protect space for cyclist desire lines on important cycle routes
- To mark out cyclist turning manoeuvres which are different to or not permitted for general traffic movements.

Route markings through junctions will be subject to high levels of wear and will require maintenance.

Where a dedicated phase is provided for cyclists it may be marked using Elephants
Footprints, subject to WG authorisation.

Photo 6.31 – Cycle lane through signalised junction, Oxford Road, Manchester

6.63 Two stage right turn at traffic signals DE055

Based on a standard feature at junctions in the Netherlands and Denmark, this arrangement provides a right turn facility for cyclists at a signalised crossroads as an alternative to an ASL.

It can be of particular benefit on a multi-lane approach where speed and volume of motor traffic makes the execution of a conventional right turn manoeuvre hazardous and unpleasant for cyclists, even with an ASL.

Provision is made for cyclists to pull in to the road on their left and wait there in advance of the stop line and any pedestrian crossing until that road has a green signal, at which point cyclists can make a straight across movement to complete their right turn. It is relatively untried in the UK, with a scheme having recently been installed in Southampton.
6.64 Trixie Mirrors (Blind spot mirrors)

Blind spot road side mirrors are large convex mirrors installed at left turns on signalised junctions to enable drivers of large vehicles (buses and HGVs) to see down the nearside of their vehicles. These are intended to address the significant number of serious casualties caused by large vehicles turning left across cyclists on their nearside.

DfT has authorised their use on the Cycle Super Highways in London at key junctions, and Trixie mirrors are now widely used on other cycle routes in London. Manchester is the latest UK city to start to install these at key junctions across the city.

There is some debate as to whether Trixie mirrors are effective once a vehicle is moving, and whether improvements to junctions needs to include removal or reduction of guard railing as well as Trixie mirrors to deliver maximum benefit.
6.65 Cycle provision at signalised roundabouts

Large roundabouts are a serious problem for most cyclists. However, signalising them can assist cyclists by introducing control of the main traffic movements. Many of the measures described above can be applied at the individual nodes around signalised roundabout, but each situation will require a bespoke design.

To accommodate cyclists using them, ASLs should normally be considered for each entry arm and if stacking space permits ASLs may also benefit cyclists on the circulatory carriageway. In addition providing an early start for cyclists may be beneficial.

Less experienced cyclists are likely to prefer an off carriageway route around the roundabout or across the central island, with signal control across the busier entries and exits. Temple Quay in Bristol provides both options.

6.66 Cyclists at Roundabouts – General Principles

Roundabouts offer capacity advantages over other forms of junction, but they can be hazardous for cyclists when designed in accordance with typical UK practice. Standard roundabouts have entries and exits that are flared, with two or more lanes to increase vehicle capacity and wide circulatory carriageways which are often unmarked. Deflection may be less than desirable because of the constraints on the room available. The relatively smooth path for motor vehicles can result in high traffic speeds through the junction.

Finding a safe position to occupy in a wide circulatory carriageway may be difficult, and
cyclists are at risk of not being noticed by drivers entering or leaving the junction at relatively high speeds.

Roundabouts with a dedicated left turn slip lane to increase capacity pose an additional hazard for cyclists, both at where the lane diverges and on the exit, where a cyclist travelling straight ahead will exit the roundabout between two fast moving traffic lanes. They are not generally recommended wherever cycling can be expected.

There are two possible ways of dealing with cyclists at roundabouts, either make them slow and tight so that cyclists can safely share a single lane circulatory carriageway in the primary position, or provide separate tracks around the outside, preferably with priority over the entries and exits, or signalised crossings.

New roundabouts, or those that can be adapted, offer opportunities to address some of the issues listed above through a change in design thinking. The design approaches listed below will aid implementation of good quality cycling infrastructure, and make roundabouts feel less dominated by motor traffic

- Controlling vehicle speeds
- Reduce the amount of space
- Raise driver awareness
- Unobstructed passage for cyclists

These are design features of ‘compact’ roundabouts, which are discussed further below.

Cycle lanes on the outside of the circulatory carriageway are not normally recommended, even on compact roundabouts.

6.67 Mini Roundabout DE056

Mini roundabouts, where the external diameter is not greater than 15m, can be good alternatives to retaining priority junctions. By using tighter radii they contribute to slower vehicle speeds, and can be included in traffic calming schemes. Single lane approaches mean that cyclists and motor traffic pass through the roundabout in a single stream. They can be a compact and low cost solution to improving junction capacity and an alternative to traffic signals.

Three arm, and some of the quieter four arm, roundabouts are relatively safe, but busier four arm, and combinations of double roundabouts can be uncomfortable from a cyclists perspective.

6.68 Compact (or “Continental”) roundabouts DE057

Compact (or Continental style) roundabouts, which are included in TD16 of DMRB, have tighter geometry that is more cycle friendly than typical UK roundabouts. As the geometry encourages lower speeds, cyclists generally pass through the roundabout with other traffic, in the primary position. Motorists are unlikely to attempt to overtake cyclist on the circulatory
carriageway because of its limited width.

These roundabouts have arms that are aligned in a radial pattern, with unflared, single lane, entries and exits, and a single lane circulatory carriageway. Deflection is therefore greater and the design is widely used as a speed reducing feature.

This design of roundabout is more common in mainland Europe than in the UK, but the principles applied in the geometric design of them improve conditions for cyclists and can be applied to solutions in the UK.

Photo 6.34 – Compact Roundabout, Weymouth

6.69 Conventional UK style roundabouts

As noted above, conventional UK roundabouts with multi-lane flared approaches and wide circulatory carriageways are generally unsuitable for cycling and so no Design Element has been provided. Conventional roundabouts of this type should not feature on an active travel route unless suitable modifications are made.

Where a cycle route runs through a conventional roundabout options to consider are:

- Redesign to compact layout (see above), with reduced traffic capacity
- Provide segregated cycle tracks with Toucan, Zebra or raised table cycle priority crossings on each arm
- Signal control of the roundabout, with cycle facilities
- Replace roundabout with traffic signals

Where such facilities or redesign is not feasible and a peripheral cycle track does not afford adequate priority to cyclists, an alternative active travel route should be explored.
6.70 Informal roundabouts

Some authorities have installed junctions that are designed to encourage drivers to adopt circulatory priority, but they are in fact uncontrolled junctions, with no formal road markings or signs, similar to the Informal junctions described in Section 6.53 above.

These have been found to work well in capacity and road safety terms at relatively high flows, of up to around 2500 vehicles per hour.

The use of circulatory patterns is appropriate where there is a high proportion of turning traffic, which would otherwise tend to give way oncoming traffic in the centre of the unmarked space.

In terms of cycling, this type of junction can work well as long as care is taken to ensure that vehicles only circulate in one traffic stream, so that cyclists can adopt a primary position when passing through the junction, in a similar way to the compact roundabout.

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PART C – RELATED MATTERS
7 Integration with Other Modes

This Chapter provides guidance on how active travel should be integrated with other modes of transport – primarily public transport.

Advice contained in this chapter is non-statutory government guidance, as there is no specific provision in the Active Travel Act for the issuing of guidance on this topic. Nevertheless, the content is considered to represent good practice which will assist local authorities in their general duty to promote active travel under Section 10 of the Active Travel Act.

7.1 Introduction

Although most journeys are relatively short, and many could be entirely made by walking and cycling, longer journeys can also include an element of active travel by including a stage of public transport. Integration between walking, cycling and public transport can help to reduce dependence on private car use for longer journeys and maintain access to distant services, friends or relations, for those without access to cars.

The better integrated public transport stops or interchanges – whether rail or bus, taxi or ferry – are with walking and cycling, the more efficient access to and from the interchange will be, improving the competitive advantage of both modes of transport. This will help to boost passenger numbers, while reducing motor traffic levels near the interchange, where pedestrian and cycling flows are likely to be high. Integration therefore represents a beneficial way of sustaining walking and cycling levels while reducing levels of both local and long distance car traffic.

Active travel already accounts for a significant proportion of journeys to public transport stops, although there is scope to increase cycling substantially. Compared with walking, cycling increases the 20 minute travel time catchment area to a stop by a factor of around 16, thereby greatly extending the reach of public transport. Improving cycle access to interchanges therefore a major opportunity to generate new trips or shift trips from car to sustainable modes.

Presently some 45% of passenger journeys by rail in Wales access the station on foot, whereas just 2.7% arrive by cycle. Driving, either parked or dropped off, accounts for about 20% of journeys to rail stations[i].

7.2 Improving walking to public transport stops and interchanges

Access to stations on foot requires well signposted, high quality walking routes that are well lit, feel secure, are maintained properly and offer direct access from all directions in the surrounding area. Public transport interchanges should be considered a very high priority in the planning of the pedestrian network, following the guidance contained in Chapter 5. It
may also be necessary to change the location of bus stops, or to introduce new ones, to reduce walk distances and improve accessibility, particularly where new development is planned.

Bus stops should be safe and comfortable to use and their siting and related pedestrian desire lines should be considered carefully, so that they can be easily accessed on foot by people of all abilities. Their precise location will depend on a range of issues, such as the need to avoid noise nuisance, visibility and other road safety requirements, and the convenience of pedestrians and cyclists. Footways at bus stops should be wide enough for waiting passengers while still allowing for pedestrian movement along the footway. This may require local widening of the footway at the stop.

Within the interchange itself facilities should be accessible to all users, with navigation to facilities clearly signed. Facilities, such as seats, shelters, left luggage, toilets and shops will make walking a more comfortable, attractive and therefore viable mode.

7.3 Improving cycling to public transport interchanges

To increase cycling to public transport, interchanges must be well connected to the cycle network, with well-signed, high quality routes linking to major other destinations and residential areas.

Access within the interchanges themselves need to be accessible for people with bikes, with step-free access, well signed. Where lifts are required these should be capable of accommodating full size cycles, including those adapted for use by disabled people.

7.4 Carriage of cycles on public transport vehicles

Although it is not a requirement of the Active Travel Act, there are significant benefits to enabling public transport vehicles to accept cycles, and local authorities should encourage operators to do so where feasible.

This is the case even if peak flows mean that restrictions on cycle carriage would be difficult at all times - public transport vehicles will be used at peak loading for less than a quarter of the time. Outside those hours more efficient use of the vehicles can be obtained by admitting a wider range of users, including those who wish to carry cycles with them.

For many years the Snowdon Sherpa bus route included provision to carry bikes on board, and similar schemes operate on bus routes in remote areas elsewhere in the UK.
Current regulations ensure that dedicated space is made available for wheelchair users on all public transport vehicles. However, many people with disabilities use cycles as mobility aids, and often need to carry cycles with them. Spaces made available for wheelchair users should be used flexibly when not required by wheelchair users, with clear instructions for priority usage for wheelchair users. While not commonly applied in Britain, such an approach can be used under international regulations which govern provision of wheelchair spaces on trains.[ii]

Taxis are part of the public transport system and providing mountable racks for cycle carriage will provide a useful facility for some longer trips – for example where the trip to a station is too long or busy to be cycled, and the passenger plans to make a cycle trip at the destination.

Photo 7.2 – Cycle rack on taxi in Copenhagen

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Photo 7.1 – Loading cycles onto a bus
Although dwell times of public transport vehicles are usually little affected by cycle carriage, clear direction and signs both at interchanges and on vehicles will help show users where they should be expected to stand in order to board with their cycles, reducing inconvenience to other passengers and operators.

### 7.5 Cycle hubs and facilities at interchanges

As well as being part of many inter-modal journeys, interchanges between multiple forms of public transport are often transport destinations in their own right. Provision of facilities to store cycles securely at stations (see Chapter 8) must therefore meet the needs of a range of different users, including those employed at the interchange, short term visitors, as well as longer term users who are using the interchange for daily journeys involving a cycling stage to or from the station.

At busier stations, secure cycle parking facilities with hire, repair and retail facilities are encouraged, with local authorities working in partnership with relevant organisations and operating companies. They may require subsidy, however, at least during the early stages of operation.

At major stations, and in locations where tourism potentials are greatest, provision of cycles for hire can help to reduce onward private motor travel and support local accessibility.

Cycle hire can take the form of part of a wider cycle hire network, as part of a ‘Cycle Hub’, or provided as part of a standalone, or seasonal business. Some of these systems, such as the Brompton Dock, can offer cycles for hire on an automated basis, which eliminates the need for staff overheads.

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**Case study – Leeds cyclepoint**

Leeds railway station is the third busiest station outside London, accommodating over 25m passengers a year. In 2010 a cycle hub was opened at Leeds station, based on Dutch experiences. The facilities provide secure storage for 300 bikes, hire and repair facilities. It is accessible to users with swipe cards for 18 hours a day, and staffed for 12.

Photo 7.3 – Leeds Cycle Point
7.6 Park and Cycle

Park and Cycle works in the same way as a Park and Ride but with cycles taking the place of the bus or rail journey stage. Users can travel to the Park and Cycle area by car and park their vehicle, take out their bike from an individual locker and cycle the rest of the way to their destination. Equipment such as clothing and helmets can be stored in the lockers. In order to maximise viability the pricing strategy has to allow for payment for parking, in addition to a fare on any associated bus or train service.

A Park and Cycle site has been operating at the University of Cambridge since 2001 – see http://www.admin.cam.ac.uk/offices/em/travel/cycle/park.html

References

[i] Figures for journeys commencing at stations operated by Arriva Trains Wales from Waves 16-22 of the National Passenger Survey (Passenger Focus).
[ii] European Commission decision of 21/12/2007 “concerning the technical specification of interoperability relating to ‘persons with reduced mobility’ in the trans-European conventional and high-speed rail system”
8 Related Facilities

This Chapter provides guidance on the design of important related facilities for walking and cycling, including seating, cycle parking and direction signing. It provides guidance in relation to Section 2(9) of the Active Travel Act. In determining whether anything constitutes related facilities for the purposes of this Act a local authority must have regard to this guidance.

8.1 Introduction

Section 2 (8) of the Active Travel Act defines a range of features as related facilities for the purposes of the Act including:

(a) facilities for shelter, resting or storage,

(b) toilets or washing facilities,

(c) signing, or

(d) other facilities, which are available for use by, or by any description of, walkers and cyclists using the active travel route.

As noted in Chapter 4 walking and cycling have many similarities and yet they have different user needs. This also applies for related facilities; cyclists will require facilities for showering and secure locations to leave their bicycle whilst pedestrians will require seating and shelter to rest. Both pedestrians and cyclists will require clear direction signing, whilst well maintained planting and public art can contribute to visual amenity.
Chapter 8 Section 1 - Related Facilities for Walking

8.2 Introduction

Related facilities are key to making streets more attractive and tools such as Community Street Audits can be used to assess the needs of local communities for specific related facilities.

They can be divided into six broad categories:

- Seating;
- Public toilets;
- Signing;
- Shelter;
- Transport facilities such as bus stops;
- Other facilities including bins.

8.3 Seating

Seating points for pedestrians, particularly those with mobility or visual impairments, should be provided at intervals along active travel routes. Seating is also important for the activity and vibrancy of public spaces.

The requirement will be dictated by local need. In busy pedestrian areas and key routes where older and disabled people are more likely to use them, resting places should be provided at intervals of around 50m as recommended in Inclusive Mobility although elsewhere a figure of 100m is appropriate as recommended in Manual for Streets.

Extra seating should be considered where people congregate, such as at squares, local shops and schools. The provision of seating encourages a range of ‘place’ activities to take place in public space including eating, reading and watching and meeting people.

Guidance on the design and layout of inclusive seating is given in Inclusive Mobility and BS 8300. In addition to standard height seating, lower seats are useful for people of small stature and children; and higher perches (700mm) against which people half lean and half sit are useful for some disabled people.

Seating such as benches should include space for wheelchair users to sit alongside companions and be located so that when people are seated their feet are not in the pedestrian route, and designed so that people can easily sit and rise from them. BS 8300 recommends the clear space for access to seating designated for disabled people should be 1.05 metres by 2.3 metres deep to allow for manoeuvring a wheelchair into a designated space from a circulation route at right angles.

Seating should ideally be located where there is good natural surveillance and lighting to deter anti-social activity. Seating should allow for street activities to be viewed and can be
used to demarcate areas although its location should not hinder circulation of pedestrians or form an obstruction to movement. Seating can be laid out in various ways:

- inward looking, to encourage conversation;
- outward looking, to see the views;
- in the centre of activities, for rest and chance meetings;
- at bus stops, for waiting (ideally covered);
- in secluded corners, integral with planting.

Materials should use visual contrasts and reflect the theme for other street furniture, but should allow for comfort (including backs and armrests) stability, maintenance, and should consider potential for vandalism and the effects of adverse weather. In addition to seating such as benches consideration should be given for supplementary secondary seating such as stairways, pedestals, low walls, and boxes to meet times of peak demand such as lunch times. Steps built within public spaces are particularly popular because they can serve as a good lookout point as well.

8.4 Public toilets

A lack of clean, accessible and safe toilets impacts on all pedestrians but can disproportionately affect the most vulnerable pedestrians. Older people, parents and carers with young children, disabled people and people with chronic health problems all need easy access to suitably equipped public toilet facilities. Some people may feel unable or reluctant to leave their homes and visit areas where they fear they will not be able to find a public toilet.

A lack of toilet facilities at the right time in the right place contributes to dirty streets that are unsanitary, unpleasant and can spread infection. Public toilets in places like parks and promenades help to encourage people who may need regular toilet access to take exercise and stay physically active. However, public toilets that are badly designed, badly maintained, and poorly located generate a sense of neglect.

Toilets should be no less available for disabled people than for non-disabled people. It is recommended that disabled toilets should be designated as unisex, not integrated with male and female toilets. The provision of unisex toilets allows use by disabled people accompanied by a carer or partner of the opposite sex.

Further guidance regarding toilet design and minimum specifications can be found in Inclusive Mobility and BS8300. Changing places in toilet facilities which are larger than accessible facilities and are equipped with benches and hoists to enable carers to assist severely disabled people should be provided at key locations such as transport hubs, with the co-operation of partner organisations. Further information is available at http://www.changing-places.org

8.5 Pedestrian Signing

Signing is an important related facility for pedestrians to help people find their way around. High quality, well placed and clear signing is vital to ensure pedestrians are sufficiently
aware of the most direct route to local facilities. Signing should complement the surrounding environment and be considered at the route or network scale to ensure consistency.

Signing with, where appropriate, tactile embossed signs and Braille should be clear and give pedestrian users who may not be familiar with the local area some indication of distance and/or time (although will vary according to the walking speed of the individual) to local facilities. Typical destinations for pedestrian signing include:

- public transport nodes
- libraries
- post offices
- sports stadiums
- leisure centres
- parks
- main office locations and business parks
- religious buildings
- hospitals
- shopping centres
- educational establishments
- cultural institutions
- tourist advice centres
- tourist and leisure attractions
- recreational walking and cycling routes
- cycle maintenance and repair shops

It is important to prevent excessive signing contributing to the accumulation of street clutter. Most people will be aware of facilities close to their home but pedestrian signing can be particularly useful where:

- people may not be aware of a walking route to local facilities within walking distance leading them to use the car instead;
- if they are new to the area;
- there are likely to be tourists and visitors unfamiliar with a location (such as town and city centres)

Way finding signing such as the on-street maps used in Cardiff or Newport are good examples of signing which fit well within the existing street environment, and are provided at places where significant numbers of travellers unfamiliar with the area arrive, such as outside train stations. Tactile versions of these maps combined with audible information can be useful in some situations. Consideration should also be given to supplying tactile maps and/or audio trails.
Signing should be frequent and continuous along the entirety of a walking route and integrate within wider walking networks. It is normally provided via finger posts, which can be in a variety of styles. Signing for pedestrians normally provides information on walking distances. Whilst walking times can be useful it is important to consider that walking times can vary significantly from person to person.

An alternative to above ground signing is to incorporate directional indications into the footway itself, using special paving slabs or plaques to identify particular walking routes, including the use of shared use signs to TSRGD Diagram 956, although these contain no directional information. This may also provide useful guidance for some vision impaired people. However, this will only be useful to those with sufficient residual vision as generally they do not have sufficient distinctive texture to be identified underfoot or by cane and
meaning recognised. Tactile guidance paths are useful for blind pedestrians, as specified in the UK Department for Transport Guidance on the use of tactile paving surfaces. Further guidance regarding accessible signing can be found in Sign Design Guide – a guide to inclusive signing, published by the Sign Design Society, http://www.signdesignsociety.co.uk

Street name plates in a consistent style in each local authority area are also valuable navigational aids. They should generally be located at or below 2.5m height, although this may not always be practical. They should be provided at both ends of every street (except cul-de-sacs). On long streets (where pedestrians are likely to join the street mid-block) they should also be provided at junctions with side roads; and building numbers should be included on name plates. Where practical on wide streets, name plates on both sides would be desirable.

It is important that signed walking routes are as direct as possible as pedestrians will not accept long detours. However, people should not be directed via inappropriate, unsafe or poor quality routes just because they are the most direct – this will do little to encourage walking activity and will reflect poorly on an area particularly for first time visitors.

8.6 Planting

Planting delivers a number of benefits for pedestrians and other street users and brings to life any streetscape. Trees and planting can provide a valuable barrier between pedestrians and vehicles, enhancing pedestrian safety and comfort. Planting can provide shade, shelter, privacy, spatial containment and separation. It can also be used to create buffer or security zones, visual barriers, or landmarks or gateway features. Vegetation can be used to limit forward visibility to help reduce vehicle speeds.

It can help to soften the urban street-scene, create visual and sensory interest, and improves the air quality and microclimate. It can also provide habitats for wildlife. The aromatic qualities or contrasting colours and textures of foliage are of value to all, and can assist the navigation of those with visual impairment. Flowers and fruit trees add seasonal variety.

However, vegetation needs to be planted in appropriate locations and in the right manner. Trees and shrubs sited within or close to footways should be carefully selected so that their spread does not reduce pedestrian space below minimum dimensions for width and headroom and do not obstruct pedestrian sight lines. Low overhanging trees and overgrown shrubs can be particularly hazardous for blind or partially-sighted people and it is recommended that projections and overhanging trees must leave a minimum headroom of 2.1 metres.
To ensure its long term viability of any planting will require the provision of:

- healthy growing conditions;
- space to allow growth to maturity with minimal intervention or management;
- species appropriate to a local sense of place and its intended function, and site conditions; (for example avoid plants where dropped leaves can become a slip hazard);
- Suitable arrangements for long-term maintenance. In new developments these proposals should be agreed with the adopting local or highway authority, trust, residents’ or community association or management company.

Space for planting can be integrated into layout and building designs, located on private land or buildings (in generous balconies, roof gardens, and walls) or public land intended for adoption, including the highway.

Careful consideration needs to be given how vegetation is planted. Trench planting, irrigation pipes and urban tree soils will increase the chance of trees establishing themselves successfully, thereby minimising maintenance and replacement costs. Consideration should also be given to the potential impact of planting on adjacent buildings, footway construction and buried services. Planting should be capable of regeneration or easy renewal if vandalised and should be designed for minimal maintenance.

Where trees and other shrubs cannot be planted directly into the ground, containers can be used. Larger containers will be more appropriate in pedestrian areas. The positioning of planters should be an integral part of the design of the open space. Their size, position and colour must also take into account the needs of the visually impaired and in all cases a safe width for the through passage of pedestrians should be maintained. It is important that on-
going maintenance is considered to prevent the potential accumulation of litter in planters.

8.7 Litter Bins

Litter bins are important to ensure walking routes remain comfortable and attractive. Research undertaken by Living Streets in 2012 revealed that 76% of Welsh adults when asked about the area they live in had seen litter or dog fouling on their local street.

Litter bins should be clearly identifiable and located where they are likely to be used. For example, a litter bin placed outside the entrance to a fast food shop may be less effective than one placed 200 metres away where the food and packaging litter tend to be deposited.

Litter bins should have sufficient capacity for their expected use and local authorities and private owners responsible for their maintenance should ensure they are emptied on a frequent basis. The design of litter bins should be carefully considered. Plastic bins can suffer damage in some locations while metal bins corrode quickly in saline environments. Open topped bins are prone to having litter escape from them whilst closed top bins should be regularly cleaned to encourage usage.

Inclusive Mobility and BS8300 provide useful guidance regarding the need to ensure bins do not become an obstruction by considering their location, design, height, use of visual contrast strips and ensuring they do not project from posts.

KEY REFERENCES


Chapter 8 Section 2 - Related Facilities for Cycling

8.8 Introduction

The provision of good related facilities will encourage cycling and typically delivers excellent value for money. Many facilities, such as cycle parking and signing, can be provided without significant change to other infrastructure or the requirement for a lengthy approvals process.

8.9 Cycle parking

Overview

The availability of appropriate cycle parking facilities at either end of a trip has a significant influence on the decision to travel by bicycle. The absence of such facilities, and the consequent risk of vandalism and theft, has been shown to undermine investment in the overall network infrastructure.

Cycle parking is therefore integral to any cycle network, but it can also precede other dedicated cycle infrastructure, in order to address the cycle parking needs from the outset. Cycle parking is also a key part of providing integration with public transport allowing cycling to act as a feeder service to public transport routes, as discussed below.

The quantity and type of cycle parking that is appropriate differs between locations. Consideration of the different needs of each setting is therefore important. Five broad location categories for types of cycle parking can be defined:

- Retail;
- Employment;
- Leisure and public institutions; and
- Residential;
- Public Transport Interchanges.

Cyclists generally want to park as close to their destination as possible, for this reason and to reinforce the transport hierarchy, cycle parking should be sited as close as possible to the final destination or main access of buildings. Experience suggests that where this is not the case cyclists are likely to ‘fly park’ (park informally) in more convenient locations. Figure 8.1 gives guidance on the relationship between proximity of cycle parking to the final destination and the duration as well as service level features, chiefly related to weather protection and security that might be appropriate for each setting.
Quantity of Cycle Parking

The required quantity of cycle parking should be carefully assessed. There should be adequate parking to meet demand including some spare capacity to allow for growth in cycling whilst avoiding cluttering the streetscape and affect the space available for walking and cycling routes.

The quantity of cycle parking will be dependent on the location and nature of provision. Table 8.1 proposes appropriate minimum cycle parking levels. In addition to Table 8.1 a number of local authorities provide specific guidance on cycle parking requirements. Where the land use under consideration does not correspond to those detailed in Table 8.1 a decision should be made based on the setting and evidence of current demand for cycle parking locally.

Table 8.1: Minimum cycle parking standards

<table>
<thead>
<tr>
<th>Land use type</th>
<th>Sub-category</th>
<th>Short Stay requirement (obvious, easily accessed and close to destination)</th>
<th>Long stay requirement (secure and ideally covered)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retail</td>
<td>Small (&lt;200m²)</td>
<td>1 per 100m²</td>
<td>1 per 100m²</td>
</tr>
<tr>
<td></td>
<td>Medium (200-1,000m²)</td>
<td>1 per 200m²</td>
<td>1 per 200m²</td>
</tr>
<tr>
<td></td>
<td>&gt;1,000m²</td>
<td>1 per 250m²</td>
<td>1 per 500m²</td>
</tr>
<tr>
<td>Employment</td>
<td>Office/Finance (A2/B1)</td>
<td>1 per 1000m²</td>
<td>1 per 200m²</td>
</tr>
<tr>
<td></td>
<td>Industrial/Warehousing</td>
<td>1 per 1,000m²</td>
<td>1 per 500m²</td>
</tr>
<tr>
<td>(B2/B8)</td>
<td>Leisure and Institutions</td>
<td>Leisure centres, assembly halls, hospitals and healthcare</td>
<td>Greatest of: 1 per 50m² or 1 per 30 seats/capacity</td>
</tr>
<tr>
<td>--------</td>
<td>---------------------------</td>
<td>----------------------------------------------------------</td>
<td>---------------------------------------------------</td>
</tr>
<tr>
<td>Residential</td>
<td>All except sheltered/elderly housing or nursing homes</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sheltered/elderly housing/ nursing homes</td>
<td>-</td>
<td>0.05 per residential unit</td>
<td>0.05 per bedroom</td>
</tr>
<tr>
<td>Public Transport Interchange</td>
<td>Standard stop</td>
<td>Upon own merit (see below)</td>
<td></td>
</tr>
<tr>
<td>Major interchange</td>
<td>-</td>
<td>1 per 200 daily users</td>
<td></td>
</tr>
</tbody>
</table>

Where cycle parking is already provided, or there is evidence of demand for cycle parking evidenced by bicycles secured to street signs or other street furniture, monitoring by periodic survey can be a valuable tool in establishing demand and where cycle parking should be provided or added to.

**Types of Cycle Parking**

Just as the location, layout and quantity of cycle parking should be considered in the context of its use so should the nature of the cycle parking equipment itself. Different types of cycle parking offer different characteristics in terms of their ease of use, weather protection, security and space requirements. Table 8.2 sets out a range of cycle parking types and gives guidance on where these might be appropriate. Where there is more than one tick, the parking type is particularly suitable.

Details of the most common type of cycle parking, the Sheffield Stand, are shown on DE61 and DE62,
<table>
<thead>
<tr>
<th>Type</th>
<th>Location Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Retail On-street</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Retail Off-street</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Employment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leisure, Schools etc</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Residential</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Public Transport Stop/Station</td>
<td></td>
</tr>
<tr>
<td>Sheffield Stand</td>
<td>✔✔ ✓ ✓ ✓</td>
<td></td>
</tr>
<tr>
<td>Street Stands</td>
<td>✔✔ ✓ ✗ ✗ ✗ ✗ ✗</td>
<td></td>
</tr>
<tr>
<td>Vertical Stand</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>----------------</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>Compact space requirement but often requires user to lift bicycle. May be incompatible with certain bicycle types. Requires secure locking point.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Two-tier stand</th>
<th>✓</th>
<th>✗</th>
<th>✓</th>
<th>✓</th>
<th>✓</th>
<th>✓</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suitable for locations where very high levels of cycle parking are required in confined spaces. Some users may find lifting bicycle to upper tier difficult.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lockers/Cages</th>
<th>✓</th>
<th>✗</th>
<th>✓</th>
<th>✓</th>
<th>✓</th>
<th>✓</th>
</tr>
</thead>
<tbody>
<tr>
<td>High security but time-consuming to use and with high-space requirement. Best suited to long-stay parking. Likely to require maintenance.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>🔄</td>
<td>✔</td>
<td>✗</td>
<td>✔</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>----------------</td>
<td>----</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Wheel stands</td>
<td>✓</td>
<td>✓</td>
<td>✗</td>
<td>✓</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Compact footprint but should include facility to stabilise and lock the cycle frame to the stand. Can be incompatible with some bicycles/wheels. Stands that support bicycles only by the wheel can cause damage to bicycles and are subsequently often not used.

| Wall Fittings  | ✓  | ✓ | ✗ | ✓ | ✗ | ✗ |
|                |    |   |   |   |   |   |
|                |    |   |   |   |   |   |
|                |    |   |   |   |   |   |
| Minimal street footprint when not in use. Needs permission of building or property owners.

| Street furniture retrofit | ✔✔ | ✓ | ✗ | ✗ | ✗ | ✗ |
|                          |    |   |   |   |   |   |
|                          |    |   |   |   |   |   |
|                          |    |   |   |   |   |   |
| Added to street signing poles. Cost effective and space efficient, do not add to street clutter. |
Cycle parking at interchanges

Providing adequate space for cycle parking at bus, rail or ferry terminals is vital and should be given a high priority by authorities, working in partnership with the relevant operators and organisations managing the facilities.

A careful assessment of demand will be necessary. Where cycle parking already exists, regular counts of parked cycles will give an indication of any excess demand or current spare capacity. Counts should be undertaken in good weather at a range of times during the day. Where ‘fly parked’ cycles (bicycles parked in locations that are not within the designated parking areas) can be found, this will give an indication that the existing parking provision is:

- insufficient to meet demand
- not secure enough to provide confidence to users
- too far from the entrance to the interchange or station

Wherever demand is close to supply of available spaces, it is likely that there is suppressed demand. If cycle provision is already high (over 50 spaces provided), capacity should be increased by at least 20%.

When evaluating demand, the nature of public transport trips and the direction of travel should be taken into account. Outlying stops and station that serve daily commuters travelling by bus or train to town or city centres are likely to have a demand which is greater than termini or interchanges. For commuter stations in particular, demand for cycle parking should be provided based on the future anticipated cycle mode share. It is recommended that a starting point of 5% of passengers entering the station should be assumed, based on Better Rail Stations report, prepared for the Department for Transport[iii].

Secure cycle parking can also be provided in small quantities at suburban and rural bus stops, which will greatly increase their catchment area.
Security of cycle parking at interchanges can be improved with better lighting, CCTV, and the provision of specific equipment such as lockers, or secure cycle storage compounds. In some locations local authorities, in partnership with rail operators, are introducing ‘Cycle Hubs’ which combine secure cycle storage with retail and hire facilities, as discussed in Chapter 7.

Cycle Parking Layout and Other Requirements

Cycle parking should, as a minimum, be large enough to accommodate the dimensions of a typical adult size bicycle, as given in Chapter 4. Increased space provision may be required in locations where large bicycles or bicycles with goods baskets or child seats are expected to park frequently. In all cases the location of cycle parking should ensure that parked bicycles will not obstruct nearby walking and cycling routes.

Table 8.3 sets out the appropriate space allowances for the layout of cycle parking. Providing insufficient space is likely to result in the cycling parking being frustrating to use with subsequent lower use.

Table 8.3: Space allowances for cycle parking

<table>
<thead>
<tr>
<th>Situation</th>
<th>Dimensions</th>
<th>Area per cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stands on street</td>
<td>1.8m x 0.5m</td>
<td>1m²</td>
</tr>
<tr>
<td>Within building minimum</td>
<td>1.8m x 0.5m spaces plus 1.8m aisle</td>
<td>1.35m²</td>
</tr>
<tr>
<td>Within building generous</td>
<td>2.0m x 0.75m spaces plus 3 - 4m aisle</td>
<td>2–3m²</td>
</tr>
</tbody>
</table>
There are many ways of arranging cycle parking but in all cases the following should be considered:

- **Security** – Cycle parking must allow users to secure their bicycle with a variety of lock types;
- **Lighting** – essential for personal security and for parking after dark;
- **Weather protection** – can the cycle parking be covered? This is important for commuters and overnight parking;
- **Obstruction** – The needs and space requirements of other users, particularly blind and partially sighted pedestrians must be considered and parked bicycles should not obstruct these routes. Visual aids such as high visibility markings on the first and last stand in a row or contrasting colour/texture paving may be used to delineate cycle parking areas;
- **Potential to integrate with existing street furniture, signing or planting**;
- **Located on level ground or, if this cannot be achieved, perpendicular to the slope to avoid bicycles rolling down the slope**; and
- **Located in obvious, clean, maintained and overlooked areas to deter vandalism/theft, and to make users feel safe and welcome.**

Cycle parking must be installed appropriately. In addition to the correct layout detailed above the physical installation must be correct to minimise the chance of damage through regular use or the risk of vandalism and theft. Construction details will vary for different options

In on-street locations where space for cycle parking is limited, for instance constrained or busy footways, consideration should be given to the placing of cycle parking stands on the carriageway. This may require the reallocation of existing kerbside car parking.

Around eight bicycles can be accommodated in the same space as one car parking space. The provision of multiple cycle stands in place of one or two car parking spaces demonstrates the space efficiency of cycling over car use and allows a greater number of people to park in busy areas. Care should be taken with such designs to minimise the risk of vehicles striking cycle stands or parked cycles - the stands will usually need to be protected through the construction of build-out extensions into existing carriageway space.

![Photo 8.5: Cycle parking in kerbside parking area](image-url)
Paid-for cycle parking

In key urban locations such as transport interchanges and city centres it may be appropriate to provide paid cycle parking facilities (the cycling equivalent to a car park with charges). Such facilities in the UK (Leeds, London and Brighton) and on the Continent typically offer high numbers of cycle parking spaces.

The success of such facilities is likely to be related to the availability of unpaid nearby cycle parking and the range of additional related facilities offered such as:

- cycle hire;
- bicycle shop;
- on-site workshop; or
- showers and lockers.

Further information on these Cycle Hubs is given in Chapter 7.

8.10 Signing for Cycling

Road signs and markings fall into three categories:

- Regulatory – enforceable traffic management signing;
- Warning and advisory – traffic management signing and markings that are to warn of hazards and to guide positioning;
- Route guidance – location and direction signing.

Signing for cycling may combine more than one of these functions.

In addition to general traffic signing and road markings there are cycling-specific signs and marking in each of the three above categories. Cycle specific signing is useful to

- Warn drivers to keep out of cyclists’ space and assist enforcement;
- encourage lane discipline and safe positioning by drivers and cyclists;
- warn other road users of the likely presence of cyclists;
- publicise recommended cycle routes; and
- promote cycling and raise its status.

The design of all prescribed road signs (and road markings which are technically signs) should be undertaken in accordance with the requirements of the Traffic Signs Regulations and General Directions 2002 (TSRGD) and Chapters 3, 5, and 7 of the Traffic Signs Manual (DfT, 2008 and 2003a and 2003b). The advice here complements that guidance by expanding on some signing issues particular to the design of cycle infrastructure.

For non-prescribed signs (i.e. signs not included in TSRGD), authorisation is required before they can be used. In Wales this authorisation is given by the Welsh Government.

The current edition of TSRGD, published in 2002 and amended in 2011, made some
important changes over the previous version. These included:

- Allowing an ‘Except Cyclists’ sign to be placed under the No-Entry sign
- A new sign for contraflow cycling without a cycle lane
- Introduction of ‘Cyclists Rejoin Carriageway’ sign

A revised version of TSRGD is currently under preparation, the revision is likely to include further additional cycle specific signing.

The design of cycle signing and wayfinding should consider the following key principles:

- **Minimising signing.** The potential to improve the clarity and safety of a route through improved design rather than extra signs;
- **Minimising clutter.** The use of signing which minimises street clutter through appropriate scale, good location and integration with existing street furniture;
- **Signing coherence.** The importance of coherent and consistent signing over a whole network and along a particular route;
- **Maintenance.** Minimise the need and cost of future maintenance to ensure that safety and wayfinding remain of a high quality in the long term; and
- **Value of signing.** Good signing should enable cyclists to locate themselves and the intended destination through use of strategic and local destination signing to include key facilities

Many signs are optional rather than mandatory. On the majority of on-street routes cyclists can be adequately catered for within the general traffic signing regime and by exemption to restrictions. It is useful to bear this in mind, as cycle infrastructure can be quite sign intensive and, if not carefully designed, can create unnecessary visual intrusion. Overuse of coloured surfacing adds to this. Where appropriate, signs should be mounted on walls, existing posts or other street furniture to minimise the number of sign posts on the footway.

The following provides guidance on signs that are currently frequently used (but in some cases should not be).

**The Cycle Symbol**

*Diagram 1057*

The cycle symbol as a road marking, diagram 1057, is probably the most commonly used
marking in cycle infrastructure. TSRGD requires it to be used in conjunction with vertical signs, although the spacing is not specified and authorities can use vertical signs sparingly to avoid excessive clutter. It is particularly useful to mark route continuity and cycle positioning, as well as at junctions.

The cycle symbol is also one of the most poorly replicated diagrams in practice. Poorly implemented diagrams and variations are unlawful and should not be used.

**END marking and the END OF ROUTE sign**

![END](https://via.placeholder.com/150)

*Diagram 1058*

The END marking to diagram 1058 and the END OF ROUTE sign to diagram 965 can be used where a cycle lane, track or route terminates. However these signs are not mandatory and are often provided unnecessarily, which does little to encourage cycling. In most cases, cycle lanes can simply stop. For short breaks, such as where a cycle lane is interrupted by a controlled crossing or a bus stop, indicating that the lane has ended is never appropriate.

END markings might occasionally be useful where a route terminates at a hazardous location, but, if the end of the lane/track/route is obvious, these diagrams should not be used. If the cycle lane/track/route has to concede priority on ending, GIVE WAY signing is used instead.
GIVE WAY signing

Diagram 1003

TSRGD lays down a hierarchy for GIVE WAY signing. The hierarchy in order of increasing signing is:

1 a double broken line, diagram 1003;
2 diagram 1003 with a triangle marking, diagram 1023;
3 diagrams 1003 and 1023 with a vertical sign, diagram 602.

In many cases simply the double broken line will be necessary to indicate priority, for example where a cycle track crosses a busy road, or when cyclists are expected to give way to pedestrians at the approach to a shared area.
The CYCLISTS DISMOUNT sign

Diagram 966 (alternative)

The CYCLISTS DISMOUNT sign, diagram 966 (alternative), is another heavily overused sign. On a well-designed cycle facility, it is very rarely appropriate. The sign is possibly the least favoured (and adhered to) among cyclists. Each time it is used, it represents a discontinuity and lack of appropriate provision.

The 2011 Amendment to TSRGD changed the default wording of the sign to ‘Cyclists Rejoin Carriageway’, as this is often a situation where the dismount sign has been used.

Diagram 966 (Default)

The CYCLISTS DISMOUNT sign now should only be used in relatively rare situations where it would be unsafe or impracticable for a cyclist to continue riding. Where the use of the sign is considered, designers should firstly check to see whether the scheme design could be modified to make it unnecessary. If the result is that the sign is still to be used, designers should be able to defend this decision and why it cannot be avoided by improved design.

Route guidance, location, and direction signing

Route, location and direction signing creates a usable network effect for cycling. It communicates to people where it is possible to travel and in many cases how much more direct these options can be than the alternative car or public transport journey. They are also essential to direct and reassure people who are not familiar with the area. Not all signing used for cycling needs to be specific - well implemented standard signing such as street names and road signs provide a foundation on which to make specific additions.

Cycle routes are usually distinguished by white on blue vertical signing with a cycle symbol. Cycle route signing and route confirmation should only be used where routes are direct and convenient and journey experience, under normal conditions, is reasonably good.

Along off-highway routes and along back streets, general direction signing is unlikely to be present, and so cycle signs should address the requirements of direction signing as well as route confirmation. This can be done with signs or with road markings. On main road routes
vertical signs should be used for direction signing, with a route symbol either on the sign or combined with lane markings to provide route confirmation.

In addition to marking the route itself, signs may be required to direct cyclists onto the route at intermediate locations. Signs may also be required to direct cyclists to destinations along the route or at the end. A specific locality e.g. Abercynon train station should be used even if the cycle route itself does not go all the way there.

Within each area a consistent set of destinations should be used, these will typically be divided into primary, local and supplementary destinations. Examples of these categories are given in Table 8.4.

Table 8.4: Example signing categories

<table>
<thead>
<tr>
<th>Primary</th>
<th>Local</th>
<th>Supplementary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiff</td>
<td>Roath</td>
<td>Public Toilets</td>
</tr>
<tr>
<td></td>
<td>Butetown</td>
<td>Shopping centres</td>
</tr>
<tr>
<td></td>
<td>Cathays</td>
<td>Sports centre</td>
</tr>
<tr>
<td></td>
<td>Splott</td>
<td>Railway stations</td>
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<td></td>
<td>Ely</td>
<td>Tourist attractions</td>
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<td>Named cycle routes e.g. Taff Trail, Celtic Trail</td>
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<td>Trecenydd</td>
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Care should be taken with the design of sign assemblies to reduce the risk of vandalism and sign rotation. Where fingerpost arrangements are proposed, purpose built products are available which can provide aesthetically pleasing and prevent the rotation of signs. Alternatively, rectangular posts should be used for cycle direction signs as these will help prevent rotation.

It is also important to ensure signs are located where they will be visible and not obscured by other signs or vegetation growth.

Types of direction signs

There are a variety of types of direction sign, with factors depending on location and purpose. The main types are listed below. However, detailed sign design requires specialist traffic engineer input, reference to the Road Signs Manual and normally the use of appropriate computer software.

- **Finger posts** are used at the actual junction. The sign itself points in the appropriate direction and includes a chevron type arrow.
- **Advance signs** are used prior to junctions to give warning of the junction and enable
initial manoeuvring to take place.

- **Stack signs** are where the different destinations are listed above each other in tabular form. They can be used as advance direction or prior to a junction.
- **Map** type signs are where a pictorial representation (map) is used on the sign to help clarify the direction of the destinations. Signs of this type are of value at complex junctions or where the route taken may be unclear.

![Finger Posts](image1.png) ![Finger Post and Stack Sign](image2.png) ![Map sign](image3.png)

**Route confirmation signs**

On long chapters of cycle route between nodes, there may be the need to erect route confirmation signs to let the users know that they have not left the route without being aware. The cycle route sign Diagram 967 on its own is not recommended for this as the cyclist could be on a different route from that desired.

Route confirmation signs should be provided at least every 1/2 mile, as well as after each decision point (normally at the far side of every junction).

![Diagram 967](image4.png)

**Off highway signs**

Although TSRGD only applies to public highways, in other locations consistency with these standards is recommended so that the meaning of signs is clear to all users. However, on such traffic-free routes there is greater flexibility to add character to routes through branding, integration with public art and use of symbols on bollards and posts.
8.11 Cycle hire and public bike systems

Cycle hire and public bike systems have been implemented in a number of locations over the past decade; notable examples are London, Paris and New York. Such systems can encourage more people to cycle without the need to bring one into the centre of the town or city, or even to own a bicycle at all, and can raise the profile of cycling generally. Successful schemes typically cover a broad network of hiring stations enabling users to travel between a variety of destinations.

Caution should however be exercised as such systems have significant capital and maintenance costs and funds may be better utilised in other cycling projects.

A successful hiring scheme will require the following:

- Significant capital and operating cost funding or sponsorship for the medium to long term;
- hire stations at major destinations: transport hubs, retail centres and major workplaces;
- careful planning of the number and size of hiring stations based on user survey or a demand assessment;
- sufficiently comprehensive coverage to offer an option for point-to-point journeys;
- a dedicated team to look after cycle availability/roadworthiness and station tidiness; and
- Appropriate technology and/or staffing to include means of securing and releasing bicycles that can be understood by a range of users and which is reliable.

In addition to the larger well-known public schemes a number of private operators such as train companies are expressing an interest in providing cycle hire in a variety of locations. These may offer an alternative to public schemes, or may be 'closed' schemes with memberships limited to a known set of users for instance a company workforce. Such private operators may also offer a wider variety of bicycle types for instance folding or electric bicycles.

Photo 8.6 - Bike&Go at Rochdale Station, operated by Merseyrail
8.12 On-street maintenance facilities

Many cyclists will not have the space, knowledge, equipment or inclination to maintain their bicycle. In order to encourage cycling and particularly the roadworthiness of bicycles there may be the opportunity to offer facilities or assistance to encourage cycling. Examples of such facilities, illustrated in Photos 8.7a-c might include:

- Pumps
- Tools
- Electric bike charging points
- On-Street cycle services
- Mobile bicycle shops

Photos 8.7 a-c: On-street cycle facilities

8.13 Cycle Counters

Cycle counters are equipment that is able to monitor the level of cycle use over time. The data gathered can aid the understanding of travel habits and aid in the planning and justification of providing for cycling. Further guidance on the potential role for cycle counters in monitoring and evaluation programmes is given in Chapter 11, including costs.

Cycle counters are often not visible by the public (Photo 8.8a) but a variation on this is to attach a public display to a counter in order to display the information in real-time (Photo 8.8b). Installation of counters such as this have been well received and have a valuable function in the promotion of cycling by indicating to the general public the importance placed on levels of cycling in an area.
Photo 8.8a: Typical cycle counter for monitoring b: Public cycle counter
9 Creating, Improving and Managing Highways

This Chapter provides guidance to local authorities when carrying out their general duties and powers in connection with creating, improving, maintaining and managing public highways, whether or not they are defined as an Active Travel Route.

Advice contained in this chapter is non-statutory government guidance, as there is no specific provision in the Active Travel Act for the issuing of guidance on this topic. Nevertheless, the content is considered to represent good practice which will assist local authorities in their general duty to promote active travel under Section 10 of the Active Travel Act.

The weight to be given to the Guidance is greater for defined Active Travel Routes, however, since under Section 7 of the Act authorities must in every year secure new and make improvements to existing active travel routes and related facilities. This will have implications for how authorities go about their general highway duties.

Common legal processes associated with the provision of active travel facilities are given in Appendix C.

9.1 Introduction

Section 9(1) of the Active Travel Act states that the Welsh Ministers and local authorities must take reasonable steps, as far as it is practicable to do so, to enhance the provision made for walkers and cyclists when exercising a number of key functions under various Acts related to highways, These have been summarised in Tables 2.1 and 2.2 in Chapter 2.

Unfortunately in the past, highway authorities have not always carried out these functions in a way that is compatible with the Aims of the Act. Some newly-built highways and “improvement” schemes have failed to improve conditions for pedestrians and cyclists – and in some cases have made things worse.

As noted in Chapter 6, most roundabouts in the UK have multi-lane flared entries and wide circulatory carriageways, and many make no separate provision for cyclists who are expected to share the space with heavy traffic. On active travel routes, alternative designs should be used where appropriate, such as compact roundabouts (which are included in TD16) or traffic signals with cycle facilities.

General highway schemes provide excellent opportunities for the creation and improvement of active travel routes. Authorities should therefore in future place as much importance on walking and cycling as on other types of traffic when creating, improving, maintaining and managing highways. It should be noted that the duties of authorities under Traffic Management Act 2004 to maintain the free flow of ‘traffic’ includes both cycle and pedestrian traffic.
9.2 Process - General

Manual for Streets (2007) set out a generic process for all highway schemes, as shown in Figure 9.1 below:

Figure 9.1 - Generic Process for Highway Schemes

Further details on this process is given in Chapter 3 of Manual for Streets, but In terms of providing for active travel, the key steps are

- Objective Setting;
- Design; and
- Auditing.

Objective Setting

Although many schemes to build new or improved highways will have a prime objective – for example to reduce congestion or to provide access to a new area of development – it is important that authorities give careful consideration to all of the possible objectives of a scheme before beginning the planning and design process.

With the Active Travel Act now in force, authorities should always expressly include the objective of enhancing provision for walking and cycling; and translate this into specific and measurable outcomes; for example making a suitable link from this residential area to that school. This will enable the emerging design options to be assessed against these stated objectives.

Similar objectives should be set when external agencies, such as developers or other public sector bodies – for example health and education authorities – are responsible for delivering new highways as part of new developments. This will require close collaboration between highway and planning authorities.
Design

Designs of new and improved highways will need to strike an appropriate balance in order to best meet the various objectives that have been set. Further details on the design of networks and elements to meet the needs of active travel are given in Chapters 5 and 6.

Although there may sometimes be a tension between objectives – for example between increasing motor traffic capacity and providing for pedestrians and cyclists – the statutory obligation to enhance provision for active travel means that this should be given a higher priority throughout the design process than has been the case in the past.

Auditing

Although it is common for highway schemes of all types to be subject to a Road Safety Audit, authorities should give consideration to more broadly-based audit techniques. These should be used to check how well a design meets the objectives that were set for it at the outset.

Where a Road Safety Audit identifies that a scheme departs from safety related design standard, all options to mitigate for the issues raised should be explored. The actual level of risk posed by issues highlighted should also be considered and a risk assessment of these may be useful in considering an appropriate proportionate response; it is important that the usefulness of an active travel route is not compromised by an over-cautious approach to road safety – for example by installing unnecessary guardrailing which reduces directness and attractiveness. It is important to remember that designs do not ‘pass’ or ‘fail’ a road safety audit; see Manual for Streets 2 for further guidance.

Given that objectives should in future include enhancing active travel, the audit process should normally include assessments of the quality of provision for walking and cycling. This could be by undertaking a Non-Motorised User Audit to HD 42/05 of the Design Manual of Roads and Bridges, although this is fairly general in nature.

A more detailed tool for assessing cycling routes is included in Appendix B, and Table 5.2 in Chapter 5 gives a checklist for walking.

In situations where there are many competing types of objective (for example in sensitive locations in historic centres), a Quality Audit (QA) may be helpful. Further details of the QA process is given in Traffic Advisory Leaflet 5/11. Cardiff Council uses a Combined User Audit, which is a simplified version of the QA and which considers other aspects of a scheme than simply road safety.
9.3 Creating New Highways

New roads and streets are created either by authorities themselves using powers under Part 3 of the Highways Act 1980, or by the private sector by an Agreement under Section 38 of the same Act.

Public authority-promoted schemes

When public authorities are promoting new highways, it is important that active travel modes are properly planned and designed for from the outset, rather than being seen as an ‘add-on’ once the needs of motor traffic have been considered. Designers of new highways should consider the five attributes of good walking and cycling routes given in earlier chapters - Coherent, Direct, Safe, Comfortable and Attractive – and find ways to meet them as part of the scheme.

This means that whenever a new link is first being planned, its place within the existing and future network of walking and cycling routes is considered. In rural areas there may be only low numbers of journeys by foot and cycle, but nevertheless the designers of rural road schemes should always identify where walking and cycling routes could be severed by the scheme, and appropriate mitigation measures included so that pedestrians and cyclists also benefit, or as a minimum are left no worse off.

New highways in urban areas will almost always affect large numbers of actual and potential active travel journeys and so designers take great care to identify how the scheme can make them better.

For example, a town bypass scheme or urban relief road will usually intercept a number of major and minor roads leading to the town centre. New and enlarged junctions on these roads can present real difficulties for pedestrians and cyclists travelling into the town from the surrounding areas if they are not well designed. In future, Authorities must make enhanced provision for people on foot and cycle at all junctions along a scheme, so that the use of these modes of travel is encouraged.

The route of a new highway itself provides a major opportunity for enhancing provision for active travel, simply on the basis that it provides the opportunities for journeys that are not presently being made. As a general rule, all highways, even in rural areas, should provide paved footways and cycle facilities that are appropriate to the volume and speed of motor traffic that will be using it and the number of users that can be anticipated.

The appropriate design solution for the junctions and links making up a new highway should be determined from the advice given earlier. Chapter 5 advises on the assessment of the importance of the active travel routes that are intercepted by a new highway, or are formed along the new route itself. This will enable designers to establish the importance of the route in the overall network and help to establish the likely level and type of demand. Chapter 6 then provides detailed advice on how to design network elements that meet active travel needs, and these should be incorporated into the overall design of the scheme as appropriate.
Planning and designing for active travel at the earliest opportunity is particularly important when land is to be acquired to enable a new highway to be built. Establishing sufficient land to include footways and cycle facilities of suitable width and type, together with any verges and planted strips, is vital. If compulsory purchase is required, it will be necessary to justify the amount of land that is needed, and reference may need to be made to the standards and guidelines given in this document as part of the case for acquiring land.

Photo 9.1 – Cycle track provided with new road scheme, Swansea

Highways resulting from new development

Many new highways are promoted, funded, designed and built by the private sector (and by other bodies such as health and education authorities) as part of new development schemes. Even though the local authority may not be directly responsible for the scheme, it must use its powers to control development and approve technical designs to fulfil its obligations under the Active Travel Act to bring benefits to pedestrians and cyclists.

In some cases new developments can provide entirely new routes away from the site itself – for example a large housing scheme may fund a bypass or other type of new link under an agreement to S278 of the Highways Act. In this case the guidance given in the preceding section will again apply – an entirely new link is being created which will intersect existing walking and cycling routes and will itself provide a new opportunity for active travel.

In most cases, however, the new highways will be built as part of the development itself, and
will be offered for adoption under Section 38 of the Highways Act.

Most new highways of the second type are designed in accordance with local authority design guides. These normally lay out minimum geometric parameters for roads and streets serving residential and commercial developments and should generally be in conformity with the advice contained in Manual for Streets 1 and 2, which place greater emphasis on the needs of pedestrians and cyclists.

The passing of the Active Travel Act and the publication of this guidance means that authorities should again review their design guidelines to ensure that proper provision is made for active travel by developers’ design teams. This will require a consideration of the basic elements making up new highways – motor traffic lane widths, cycle lanes/tracks, footways, verges and so on – to ensure that highways on new developments provide appropriate facilities for walking and cycling as a matter of course.

In new developments, the planning and design of new and improved infrastructure will be led by the Transport Assessment, which is used to provide forecast of the all-mode travel demands of new developments, assess their impact on the surrounding network and design appropriate mitigation measures.

In general, it is important not to err on the side of high motor traffic forecasts on the assumption that it is always best to use ‘worst case’ figures for trip generation. Using high motor traffic flows will tend to lead to the over-design of links and junctions, which may make it more difficult to provide good facilities for pedestrians and cyclists. The requirements of the Active Travel Act mean that the designers should start by making good provision for active travel; and then to consider what is needed to cater for motor traffic.

Active travel routes and networks should be a fundamental consideration when the layout of new developments is being planned and designed, and again the processes set out in Chapters 5 and 6 should be followed. Larger developments will have important destinations within them – schools and retail centres for example – and suitable links to them from new and existing residential areas should be planned.

Although some new active travel routes may be along motor traffic-free links, for example through parks and open spaces, it is likely that they will mostly be along streets that are also used by motor vehicles. Designers should therefore carefully assess the speed and volume of motor traffic that can be expected along new internal links. If necessary these will need to be limited through traffic calming and traffic management techniques, as set out in Chapter 6, to ensure that cyclists (and in some cases pedestrians) are able to share the carriageway with motor vehicles.

Where speeds and volumes are higher, separate cycle lanes/tracks (and in most cases footways) will be needed. Guidance on the appropriate thresholds for cycling is contained in Table 6.2 in Chapter 6.

In almost all cases there will also be the need for connections to places beyond the development itself – for example to a nearby town centre or major employment zone – and it
will be necessary for good connections to be made by foot and cycle to these places from all parts of the site.

Active Travel connections should not be seen as optional; they are as important as points of general access and off-site improvements to cater for motor traffic increases, and developments that do not adequately make provision for walking and cycling should not be approved. In many cases this will mean that off-site improvements along existing highways that are specifically for active travel – for example the introduction of cycle lanes or tracks, or reductions in speed so that sharing the carriageway is made acceptable – will be necessary in order for the development to be made acceptable.

**Figure 9.1 – Planning for walking and cycling at the Master planning Stage. The Mill, Cardiff**

### 9.4 Improving Highways

In the past, highway ‘improvement’ schemes have tended to focus on increasing capacity for motor traffic, and have ignored the fact that such schemes have often made the situation worse for pedestrians and cyclists, by widening carriageways and enlarging junctions. The duty to enhance provision for walking and cycling placed on authorities by the Active Travel Act means that this is no longer acceptable.

Improvement schemes that are specifically designed to make conditions better for walking
and cycling have also taken place and will continue, such as the provision of new zebra or signal-controlled crossings. Where cycling schemes have been carried out they have tended to be of a standard below that which is now required – for example the conversion of footways to shared use facilities.

With the passing of the Active Travel Act it is expected that authorities will increasingly be promoting schemes that specifically improve conditions for walking and cycling, particularly along designated Active Travel Routes, but also on all other all-purpose roads where cycling and walking are permitted.

As noted in Section 9.2 above, even where improvement schemes are mainly justified by a requirement to relieve congestion, their objectives should also expressly include making conditions better for pedestrians and cyclists.

There can sometimes be tension between the need to provide additional capacity for motor traffic and creating better conditions for walking and cycling. In considering options, it should be recognised that providing better active travel facilities will encourage more people to use these modes; which in turn will reduce the need to travel by motor vehicle. Authorities should also consider trends in motor traffic volumes – in many urban areas motor traffic flows have been steady or declining over a considerable period, and the provision of better active travel facilities will help this further.

In general the planning and design considerations for improved highways are similar to those for new schemes – the importance of the active travel links through the scheme should be considered in accordance with chapter 5 and the advice contained in chapter 6 should be followed when the scheme is designed.

Where improved highways required additional land to be acquired, again care should be taken to ensure that the area is of sufficient size to enable proper provision to be made for pedestrians and cyclists.

*Improvements through maintenance*

Highway maintenance issues are covered in general in Chapter 10, but it is important to note here that improvements for active travel – particularly cycling - can be achieved at minimal cost during maintenance operations.

During resurfacing, road markings are often removed, and this creates an ideal opportunity to reallocate the amount of carriageway given to motor traffic and cyclists. General traffic lanes can be narrowed, wide central hatching can be removed and the resulting space given over to cycle lanes, which can also be protected with light segregation, all at minimal or low cost.
An even lower cost technique, mainly suitable for routes with lower motor traffic volumes and speeds, is to simply not replace centre line markings which has been shown to reduce speeds (see Manual for Streets para 9.3.3). As discussed in Chapter 6, removing centrelines can also enable the provision of advisory cycle lanes with a single all-purpose lane for motor traffic – see DE017.

Resurfacing provides an opportunity to improve the riding quality of carriageways. As noted in Chapter 10, Stone Mastic Asphalt provides a much smoother surface than Hot Rolled Asphalt, and is the preferred surface for all highways used by cyclists and particularly active travel routes.

During maintenance, authorities need to carefully consider which signs are actually necessary – for example ‘End of Route’ signs should be removed and replaced with signing indicating how the route will continue. All redundant or unnecessary repeater signing should be removed. Any signing which reduces the available width or poses a hazard should be relocated as part of ongoing de-cluttering programmes.
9.5 Managing Highways

Authorities have a wide range of powers at their disposal and under the Active Travel Act they must now have regard to the needs of walkers and cyclists when using the powers listed in Table 2.2 in Chapter 2. Chapter 4 of these guidelines provide information on user needs.

Under the Road Traffic Regulation Act 1984, authorities are empowered to make Traffic Regulation Orders to regulate the speed, movement and parking of vehicles and to regulate pedestrian movement. Authorities also have powers to make Orders, similar to Traffic Regulation Orders, which require the same or similar procedure to be followed for management of parking and loading.

Examples of TROs which may be relevant to schemes intended to create good conditions for walking and cycling are:

- Prohibitions of specific classes of vehicle – by weight, width, length or specific description e.g. goods vehicles above 7.5 tonnes
- Prohibition with exemption for certain classes of vehicle – commonly used for providing priority or improving access for cycle traffic and buses
- All motor vehicles prohibited – allows pedal cycles (and horse-drawn vehicles) to continue to use the road, and is normally used to create pedestrianised areas where cycling is permitted.
- Prevention of footway (pavement) parking

A TRO may also be made to prohibit vehicles entirely, which would make cycling along a road illegal. Unless there are particular local circumstances, however, authorities should normally allow cycling in pedestrianised areas. The issue of allowing cycling in vehicle restricted areas is discussed in detail in Chapter 6.

At junctions, TROs may be used to restrict vehicle movements. These may be shown either by restrictive signs – which prevent certain manoeuvres being undertaken and are indicated by a sign within a red roundel – or by positive signs which make certain manoeuvres mandatory and are indicated by a round sign with a blue background.

Authorities should always start with the presumption that cycle traffic should be exempt from these restrictions. Banning movements for cycling will mean that cyclists are required to travel further and exert more energy in order to complete their journeys, and this is contrary to the overall requirements of the Active Travel Act. In any event, experience shows that some cyclists will ignore turning restrictions, placing themselves and others in danger.

As noted in Chapter 6, a TRO is currently needed to establish mandatory cycle lanes and although this involves additional time and expense, mandatory lanes do give greater protection to cyclists than advisory lanes. Mandatory lanes can be part time only, but this is not the preferred approach – mandatory lanes should be made full time unless there are exceptional circumstances, so that all types and times of cycle journey are facilitated.
TROs or Parking Orders may be introduced to prohibit waiting and/or loading of vehicles at any time or to restrict loading and waiting to certain times and duration. This is normally shown by yellow line markings on the carriageway and the kerb, although these markings can be omitted within Restricted Parking Zones.

Authorities should always seek to use Orders to prevent parking and loading in all cycle lanes (both mandatory and advisory) at all times. A cycle lane which is blocked by a vehicle is of no value and will simply place the cyclist in danger when moving out into the traffic stream. Chapter 6 gives details of how car parking and loading can achieved while still providing safe space for cycling.

TROs are also used to set local speed limits and guidance on this is contained in Circular 24/2009 ‘Setting Local Speed Limits in Wales’. Amongst other factors, this guidance states that the needs of vulnerable road users must be fully taken into account in order to further encourage their mobility and improve their safety. Setting appropriate speed limits has significant benefits for pedestrians and cyclists, and the use of 20mph limits is encouraged and supported by the Welsh Assembly Government, particularly in residential areas. The contribution that 20mph limits and zones make to achieving Active Travel Routes is discussed in Chapter 4.

Where there is uncertainty as to the effects or public response to any traffic management proposals, an Experimental Order under chapters 9-13 of the Road Traffic Regulation Act 1984 may be used, or in any other circumstances where a trial measure is considered appropriate. Trial measures can be particularly useful where there is concern over the effects reallocating road space on motor traffic capacity – see Leicester example below.

Photo 9.2 – One lane of Newarke Street, Leicester, was coned off for 6 months and is now a generous contraflow cycle facility
10 Construction, Maintenance and Management

This chapter deals with the construction, maintenance and management of any pedestrian or cycle facility, and associated matters.

Advice contained in this chapter is non-statutory government guidance, as there is no specific provision in the Active Travel Act for the issuing of guidance on this topic. Nevertheless, the content is considered to represent good practice which will assist local authorities in their general duty to promote active travel under Section 10 of the Active Travel Act.

It should be noted that for all trunk roads pavements should be constructed as per the requirements of the Design Manual for Roads and Bridges.

10.1 Introduction

It is essential that close attention be paid to construction and maintenance standards and details to ensure that routes used by pedestrians and cyclists are comfortable for all users, including those with mobility, sensory or cognitive impairments, as well as being legal, aesthetically acceptable, easy to maintain and durable.

It is important to consider the full life costs and benefits of a scheme. Certain options may require increased capital expenditure at the outset but may result in lower maintenance and management costs. It is only by considering street planning, street design and street management as a whole that pedestrian user needs can best be met. For example, construction costs for a sealed surface path may outweigh those of an unsealed path, but this is false economy once maintenance requirements are included.

10.2 On-carriageway cycle routes

The typical choice for the carriageway is an asphalt surface. Asphalt used for roads and paths contain bitumens and aggregates which give a durable, joint-free surface that is relatively straightforward to construct and maintain. Different products are available, each with their own properties. The main variables are the aggregate size, aggregate content, binder content and binder grade, which have an effect on stiffness, resistance to cracking and other physical properties of the asphalt. The smoothness of the riding surface tends to be dictated by the texture depth of the asphalt – the higher the texture depth, the rougher the surface and vice-versa.

Asphalt surface treatments for carriageways generally come in one of two forms:

- HRA, hot-rolled asphalt, with or without precoated chippings, was the UK surface
material of choice before the 2000s. Its use has been in decline especially in urban areas due to the positive textured nature of this material, which means it generates more noise than some other treatments. For HRA with pre-coated chippings, hardstone (often granite) chippings are rolled into the asphalt surface course while it is still hot. They add texture to the surface and therefore increase its skid-resistance properties. The chippings are pre-coated with a binder, which can contain coloured pigment if necessary. They must be hard-wearing but with a high polished stone value (PSV), so that they are durable and do not polish over time. A typical choice for carriageway surfaces would be HRA 35/14 but other carriageway and footway grades exist.

- **TSCS**, a thin surface coarse system, is often applied to carriageway rather than footway surfaces. It typically uses a 10mm or 14mm aggregate. The advantage of using TSCS is that these materials come in a variety of texture depths and also colours. The use of clear bitumens and coloured aggregates allows these materials to be used as decorative asphalts. Use of such decorative asphalts is not recommended in areas of load unless assurances are sought from material suppliers. Note that proprietary types of TSCS have replaced generic SMA (stone mastic asphalt).

The use of all these materials is described in the European Standard Specification EN13108 and thicknesses should be specified using the British Standard BS594987: 2010, Asphalts for roads and other paved areas – specification for transport, laying compaction and type testing protocols, in conjunction with the local highway authority’s design and construction standards. Full guidance on using the British Standards is provided in PD 6691 Guidance on the use of BS EN 13108 Bituminous Mixtures - material specifications (BSI, 2010).

All routes for cyclists should be machine-laid rather than hand-laid, which is less regular. As noted in Chapter 4, a smooth surface texture significantly reduces the effort needed to cycle, adding to comfort.

![NEGATIVE TEXTURE](image1)

**Thin Surface Coarse System**

![POSITIVE TEXTURE](image2)

**Hot Rolled Asphalt**

Modifications to the surface may be required to incorporate cycle lanes, advanced stop lines, or traffic speed control measures (traffic calming). Dimensional tolerances should follow normal highway standards, and when a new on-road cycle route is installed a check should be carried out to confirm that this is the case.

Where kerb re-alignment is needed any new carriageway construction should be to normal highway standards unless there is kerb segregation of the cycle lane, when a lighter construction should be used, although surface quality should still be to highway standards. In the case of carriageway widening this can entail the relaying and/or protection of utilities.
plant (electricity, gas, water, foul and surface water drainage, telephone, cable TV etc.)

10.3 Coloured surfacing

In most situations, as noted in Chapter 6, black bituminous surfacing in conjunction with cycle logos and appropriate lane markings is satisfactory in most circumstances and colour should be used sparingly. Extensive use of coloured surfacing is not recommended for maintenance reasons, and poorly maintained coloured surfacing can pose an additional hazard for cyclists.

10.4 Footway construction

Footway construction should be of sufficient depth to withstand the loads likely to be imposed on it.

Consideration should be given to the likelihood of accidental or intentional overrun of a footway by heavy vehicles and the thickness increased accordingly. The construction at vehicle crossovers may need to be thicker than the adjacent lengths of footway depending on the nature of the crossover. Cracking or rutting of surfaces due to overloading can be unsightly, create trip hazards and/or drainage problems. The construction specification for footways, footpaths and cycle tracks is contained in HD39, Tables 3.1 to 3.4.

10.5 Footpath construction

Where a footpath is constructed away from the highway consideration should be given at the design stage to the practicalities of constructing the path and in particular access arrangements for construction vehicles. Access points to some paths can be several hundred metres away and may require material to be moved by dumper truck. This might be satisfactory for moving sub base materials, but keeping tarmac hot enough to lay properly may be a concern. Additional access points may need to be constructed, and the path may need to be able to carry plant associated with the works.

Where a footpath also serve as access routes for maintenance vehicles e.g. adjacent to waterways, the surfacing and construction of the path needs to reflect this.

It may also be appropriate to thicken sub base layers, or use geotextile materials if necessary where ground conditions are poor. Where paths use land that is contaminated avoid excavating in these circumstances and lift path levels if areas are unavoidable.

10.6 Cycle Track Construction

It should be borne in mind that one of the most common reasons why some cyclists use the main carriageway in preference to a cycle track alongside the road is that the riding quality of the main road carriageway is better. The riding quality of the cycle track should be at least as good as that of the adjacent road and should be machine laid.
Among the most important considerations in choosing an appropriate surface material are cost (and variation by colour), durability and skid resistance. Polished stone value (PSV) gives a measure of skid resistance. A PSV of 55 is normally acceptable for road skid resistance. Table 10.2 below shows, indicatively, a comparison of different surface materials and treatments according to these criteria.

Only materials costs are included here. Laying costs can vary considerably depending on the area (m²) and the required traffic management arrangements – difficult and restricted access, in particular, are likely to increase costs. The cost per square metre will also be higher for smaller areas. In each case, more accurate figures should be obtained from suppliers.

### Table 10.2 Surface treatments for cycle routes

<table>
<thead>
<tr>
<th>Surface Material</th>
<th>Life (years)</th>
<th>Skid resistance (PSV)</th>
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<tbody>
<tr>
<td>6mm asphalt concrete</td>
<td>20</td>
<td>60+</td>
</tr>
<tr>
<td>Coloured TSCS, 30-50mm thick</td>
<td>20</td>
<td>55+</td>
</tr>
<tr>
<td>Block paving</td>
<td>20</td>
<td>55</td>
</tr>
<tr>
<td>Brick paving</td>
<td>20</td>
<td>-</td>
</tr>
<tr>
<td>Concrete paving flags</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>Tactile paving</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>York stone flags</td>
<td>20</td>
<td>-</td>
</tr>
<tr>
<td>Granite paving flags</td>
<td>20</td>
<td>-</td>
</tr>
<tr>
<td>Thermoplastic High-Friction Surfacing</td>
<td>4-6</td>
<td>70+</td>
</tr>
<tr>
<td>Resin High-Friction Surfacing</td>
<td>8-10</td>
<td>70+</td>
</tr>
<tr>
<td>Cycle Track Veneer (thermoplastic slurry)</td>
<td>5</td>
<td>55+</td>
</tr>
<tr>
<td>Cycle Lane Veneer (polymer binder)</td>
<td>10</td>
<td>55+</td>
</tr>
<tr>
<td>Slurry Seal (poor colour and life)</td>
<td>5</td>
<td>55</td>
</tr>
<tr>
<td>Surface Dressing – Granite Stone (bituminous binder)</td>
<td>20</td>
<td>60+</td>
</tr>
<tr>
<td>Surface Dressing – Granite Stone (clear binder colour enhance)</td>
<td>20</td>
<td>60+</td>
</tr>
<tr>
<td>Surface Material¹</td>
<td>Life (years)</td>
<td>Skid resistance (PSV)</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>Surface Dressing – Pea Shingle Stone</td>
<td>20</td>
<td>50</td>
</tr>
</tbody>
</table>

The preferred surfacing is machine laid bituminous material, although bound or unbound aggregate, concrete or stone flags or paving blocks are sometimes used. Unbound aggregate surfaces are generally unsuitable in an urban / urban fringe environment as they cause excessive dust in dry weather and can be susceptible to ponding and become muddy and in wet weather, leading to rapid deterioration; for these reasons they are not generally recommended.

Generally paving blocks and concrete or stone flags will provide a more aesthetically attractive finish and are more suited to high quality public realm areas, but will be less comfortable to cycle on and can be more problematic to maintain.

There may be local sensitivities around surfacing of paths with black bituminous material in areas of high heritage value or green spaces and these should be considered and addressed as part of the consultation. If necessary, paths can be surface dressed with appropriate materials.

### 10.7 Tactile paving

Tactile paving is provided on walking routes to assist visually impaired people in moving around an area and on segregated shared-use routes to enable them to navigate safely, preventing them from walking into the cycle track inadvertently. Types of tactile paving used and their typical uses are listed below in Table 10.3. The most common form of tactile paving provided in association with walking routes is blister type tactile paving at road crossings.
Table 10.3 – Common Tactile Paving Types for Pedestrian and Cycle Areas

<table>
<thead>
<tr>
<th>Type of tactile paving</th>
<th>Typical usage</th>
<th>Typical example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blister (red coloured)</td>
<td>Signalised pedestrian crossing facilities, including zebra and toucan crossings</td>
<td>![Example Image]</td>
</tr>
<tr>
<td>Blister (buff coloured)</td>
<td>Uncontrolled pedestrian crossing facilities</td>
<td>![Example Image]</td>
</tr>
<tr>
<td>Corduroy</td>
<td>Where a footway joins a shared use path, top and bottom of steps or other hazard</td>
<td>![Example Image]</td>
</tr>
<tr>
<td>Ladder/tramline</td>
<td>Start, end and repeater indication of segregated footway/cycleway (ladder on footway side and tramline on cycleway side)</td>
<td>![Example Image]</td>
</tr>
</tbody>
</table>

Guidance on the provision of tactile paving is set out in the Department of Transport publication ‘Guidance on the Use of Tactile Paving Surfaces’ and reference should be made to that document when specifying tactile paving.

Current national guidance covers simple layouts but does not give detail for the wide variety of layouts that are encountered in reality. For non-standard layouts engineers need to apply the principles contained in the guidance and consult with local groups representing the...
visually impaired during the design process.

10.8 Kerbs, edgings and verges

Footways may require some form of edge restraint in order to maintain their structural integrity. Where a footway is not adjacent to a wall or building this can be provided by an edging strip. Edgings are generally formed from precast concrete units. Any edge treatment will increase the overall cost - pre-cast concrete kerbing roughly doubles the cost of a path.

Where a footway is provided adjacent to a road the footway will normally be delineated from the adjacent carriageway with a kerb. This offers a degree of protection to pedestrians and can assist blind or partially-sighted pedestrians identify the edge of the footway.

In low vehicle speed environments where a ‘shared space’ is being created it may be appropriate to omit the kerb. In these cases the impact of not providing a kerb on blind or partially-sighted users should be considered with appropriate use of tactile paving, or a low kerb upstand be retained. Further guidance on the design of shared space areas is given in Chapter 6.

Kerb heights should be as set out in Table 10.4:
### Table 10.4 – Kerb Heights

<table>
<thead>
<tr>
<th>Location</th>
<th>Upstand</th>
<th>Typical example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General</strong></td>
<td>75mm to 125mm</td>
<td><img src="image" alt="Image" /></td>
</tr>
<tr>
<td></td>
<td>Half battered profile adjacent to footway</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Splayed (45°) where no adjacent footway and on high speed roads</td>
<td></td>
</tr>
<tr>
<td><strong>Pedestrian or cyclist crossing</strong></td>
<td>Flush with tactile paving&lt;br&gt;Any upstand makes it more difficult for wheelchair users</td>
<td><img src="image" alt="Image" /></td>
</tr>
<tr>
<td><strong>Vehicle crossover</strong></td>
<td>25mm&lt;br&gt;To maintain continuity of edge of carriageway drainage and provide a continuation of the kerb line for blind or partially-sighted pedestrians.</td>
<td><img src="image" alt="Image" /></td>
</tr>
</tbody>
</table>

Away from the carriageway edgings are generally formed from precast concrete units but in rural or more lightly used situations timber edges can be used. However, in many locations away from the highway an alternative to kerb edgings is to construct the sub-base and binder course 300mm wider than the path, providing a 150mm shoulder on either side to support the path.

Where a footway or cycle track is provided adjacent to a higher speed, or more heavily trafficked road the footway should be separated from the adjacent carriageway by a verge, typically at least 1m in width, in order to provide a margin between the active travel path and vehicular traffic. In most cases this margin is likely to be grassed.

On off-carriageway routes, a verge of between 0.5m and 1m should be maintained each side.
of the path, as mown edges prevent the vegetation encroaching and making a footpath of cycle track unusable, or reducing the extent of usable width. The remainder of the verge may be left and can be of value to wildlife.

10.9 Drainage

Standing water and poorly-designed surface water run-off can cause problems for pedestrians and cyclists users and seriously damage pavement construction. Keeping water off and moving it away from a carriageway or path will increase the longevity of the pavement structure and increase its use. Any drainage system needs to be efficient and reliable and may need to extend beyond the immediate edges of a new path to be effective.

Where water comes from and how it is disposed of needs proper consideration. It is important to include proper drainage within a design. Poor drainage can give an impression of a forgotten route and lead to a host of other problems.

On carriageway drainage

When cyclists are on carriageways, attention will need to be paid to gully location and levels, which are critical for cyclists as well as ensuring good route drainage. This is particularly important where full or light segregation for cycling has been introduced, since cyclists will find it difficult to avoid gullies. Acceptable gully characteristics are as follows:

- In any location where there is a possibility that cycle wheels will cross gullies, the grate slots should be at right angles to the direction of travel. Alternatively, non-slot ‘pedestrian style’ gratings should be provided.
- no gaps between the frame and cover wider than 15 mm
- recessed gully frames raised to be flush (tolerance +/- 5mm) with the surface
- suitable for their location to take public highway loadings
- open in a manner suitable to be cleansed by a normal gulley cleansing or jetting machine under the relevant highway authority contract

Dished and other gratings unsuitable for cycling across should be replaced. Side-entry gullies or perforated kerb type gullies (e.g. Beany Blocks) may be suitable in some circumstances, particularly where there is restricted width and where cyclists will be close to the kerb.

Fully segregated cycle tracks and hybrid tracks will need additional gullies as well as appropriate falls to facilitate run-off. A minimum grating size of 300 x 300mm is recommended, as the smaller size gully gratings that are sometimes used in off-carriageway situations tend to get blocked.

A gully should be provided in the carriageway at the upper side of any pedestrian / cycle crossing in order to prevent surface water running across the point at which people step into the carriageway.
**Off-Carriageway Routes**

Where new routes are being provided, or widened into soft verges consideration should be given to the effects of any increase in the volume of surface water run-off contributing to the existing drainage system. Once taken off the path surface it is essential that water is returned back into the system at a suitable location. This requires careful thought and understanding. Simply diverting over land run off, or removal of flood water into the nearest ditch or culvert may create problems further downstream.

To prevent ponding of surface water, or the formation of ice, a crossfall or camber should be provided on the carriageway or path surface within the limits stated in Table 10.5 below. Excessive crossfall is uncomfortable to walk on and can cause difficulties for wheelchairs, pushchairs and cyclists.

**Table 10.5 – Crossfalls**

<table>
<thead>
<tr>
<th>Crossfall (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
</tr>
<tr>
<td>Preferred</td>
</tr>
<tr>
<td>Maximum (at crossings)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Crossfall (%)</th>
<th>Minimum</th>
<th>1.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preferred</td>
<td>2 – 3.3</td>
<td></td>
</tr>
<tr>
<td>Maximum (at crossings)</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

The direction of the crossfall should be set so that surface water does not run-off onto adjacent property where there is no highway drainage along the boundary. Typically footways will fall towards the adjacent carriageway. On cycle tracks the crossfall should generally fall towards the inside of a bend.

Where it is not possible to provide a continuous crossfall across a path, either due to the relative levels between the kerb and the back of the path or the width of the path, it will be necessary to provide drainage channels within the path. Table 10.5 sets out four options.
Table 10.5 – Drainage Channels on Paths

<table>
<thead>
<tr>
<th>Measure</th>
<th>Advantages</th>
<th>Disadvantages</th>
<th>Typical example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dished channel blocks</td>
<td>Easy to maintain</td>
<td>Trip hazard</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Requires gullies</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Can result in ponding water</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not suitable on cycle routes</td>
<td></td>
</tr>
<tr>
<td>Flat channel blocks</td>
<td>No trip hazard</td>
<td>Less capacity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Easy to maintain</td>
<td>Requires gullies</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Can result in ponding water</td>
<td></td>
</tr>
<tr>
<td>Linear channel with gratings</td>
<td>Can avoid having to create a low spot in a surface</td>
<td>Prone to blocking and silting up Gratings can work loose and cause trip hazards</td>
<td></td>
</tr>
<tr>
<td>Linear slot drain</td>
<td>Visually un-intrusive</td>
<td>Prone to blocking and silting up</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Can have high capacity (in pipe below ground)</td>
<td>Have to be jetted or rodded to be cleaned</td>
<td></td>
</tr>
</tbody>
</table>

If gullies or gratings are used as part of a path drainage system a heel proof grating should be specified.

10.10 Access Controls

Access Controls are sometimes placed on off-carriageway routes to prevent access being gained by unauthorised vehicles, particularly motorcycles.
It is recommended that designers should start with a presumption against the use of any form of access control, as these cause difficulties to many legitimate users and are often ineffective in addressing the issues they are intended to address. In particular, restrictive access controls:

- are inconvenient, can be unsightly and can actively discriminate against some user groups who have legitimate rights to use a path.
- extend the journey time for cyclists and so reduce the utility of a cycle route
- add another level of cost, and maintenance concern, to a path.
- are frequently ineffective because fencing along a traffic free corridor is missing, broken or subsequently vandalised so that the access control can be bypassed.

There is also a tendency to install access barriers to stop, or slow, cyclists at the end of a path for safety reasons – whether actual, or perceived. This is often inappropriate, and designers fail to consider other solutions, such as clear signing and (if necessary) other means of slowing cyclists such as changing path geometry.

A single bollard, and clear sight lines will be effective in many locations. Double rows of bollards, with a spacing of between 1.20 – 1.50m can reduce cycle speeds and prevent motor cycle / car access, whilst retaining better permeability for users than chicane barriers.

Photo 10.1 – Access Control using bollards, Weymouth

Sustrans’ document “A guide to controlling access on paths” provides detailed information on assessing whether an access control is needed, and if so the most appropriate design solutions. It covers:

- Legal issues, including the Equalities Act
- Whether an access control is required
• Alternative measures to control access
• Risk assessment
• Deciding on type of access control required
• Design parameters
• Layout and design solutions

10.11 Fencing and Hedgerows

Fencing may be required along off-highway paths for the safety of users, the security of neighbours and livestock control. Where needed fencing should remain visually unobtrusive.

The installation of fencing has an impact upon all route users, but greater impact upon cyclists as a fence immediately adjacent to the path edge reduces the effective path width by 500mm.

Fencelines set 1m away from a path edge will generate a better visual aspect, and where required on both sides of a path reduce the "tunnel effect". Verges will allow space for drainage, and if necessary ducting for lighting.

Security fencing can be harsh and oppressive, creating environments that are visually off putting to pedestrians and cyclists alike.

Under most circumstances 1.5m high fencing is, or should be, adequate in all but exceptional circumstances. To a pedestrian they still provide views over, and the visual and aesthetic impact upon a traffic free route is considerably less.

Hedgerows form part of the immediate environment for many paths away from or alongside the road. Developing routes that include at least one hedgerow as a boundary feature can re-invigorate them as dead wood, brambles and unwanted species are removed and new growth encouraged. Thorny species such as Hawthorn or Dog Rose should be avoided where necessary, but if used will require planting further back from the path edge to prevent hedge clippings causing punctures.

Refer to Sustrans Technical Information Notes E 01 “Hedgerow Management” for further guidance.

10.12 Lighting

If walking and cycling are to play an important role as an alternative to the car for short journeys they must be promoted as around-the-clock means of transport, rather than just a daylight activity. Many walk and cycle journeys will be made after dark, especially during the winter months, and routes should normally be lit to provide an adequate level of safety, both real and perceived. The benefits of lighting a walking or cycling route include enabling users to:

• Orientate themselves and navigate the route ahead
• Identify other users ahead
• Detect potential hazards
Discourage crime and increase a sense of personal security

It is important that the provision of lighting is considered at an early stage in the design process, so that the issues can be properly considered and the needs of users taken fully into account in the choice of equipment and the design of the scheme.

Routes along urban and many rural highways will be lit by the existing highway lighting but specific lighting will be needed for off-highway routes. However, in lighting such routes consideration also needs to be given to wider factors, including:

- Limiting levels of light pollution
- Level of ambient brightness in the surrounding area
- The visual impact of the lighting equipment
- Intrusion on nearby properties
- The needs of visually impaired users for uniform illumination at surface level
- Vandalism issues
- Proximity of electricity supply
- Energy usage and cost
- Costs of installation, operation and maintenance

Further information is available in Sustrans Technical Information Note 12 Lighting of Cycle Paths, 2012.

10.13 Maintenance and Management - Introduction

Maintenance of the path or carriageway surface is of great importance to pedestrians and cyclists, including proper reinstatement following works by statutory undertakers. For routes away from the highway it is essential to establish responsibility for maintenance of the path, and put into place a regular regime for visits and minor works.

A route that is kept in good condition will be more useful, attractive and popular than one allowed to deteriorate. Maintenance needs to be well planned as, having invested time and money by building the route, it is important that it remains attractive to users.

Programmed maintenance of the wider highway network can offer opportunities to enhance the network of walking/cycling routes if properly planned – see Chapter 9. Walking and riding quality should be maintained, particularly keeping routes clean and ice free in autumn and winter.

10.14 Designing with maintenance in mind

Maintenance should be considered as part of the route development process long before construction starts. A thoughtful design will mean less maintenance in the future. For example an off-highway path surfaced with bituminous material will have a long life needing little maintenance.

The future maintenance burden, both financial and operational, on local highway authorities for any new cycling and walking infrastructure should be a major consideration for designers and it is recommended that both a Value Engineering and Future Maintenance Audit are carried out on all proposed designs before implementation.
It is particularly important to think about maintenance at the start of the design process if the project has capital funding available but maintenance will have to come from existing budgets. Sometimes money can be put aside from the capital source into a separate fund for future maintenance. Irrespective of what the ultimate arrangement will be, it is essential that the design team has agreed the future maintenance arrangements early in the scheme’s development.

10.15 Maintenance Responsibilities

As noted in Chapter 2, most active travel routes will almost certainly be highways under the definition of the Act (a highway being a route that the public has the right to pass and re-pass), but this does not mean that the highway authority is responsible for their maintenance. Where the route is on the road it will usually be the responsibility of the highways authority but some routes may well be the responsibility of another part(s) of the council – for example the education authority if the route is through school playing fields.

Every department with future responsibility for the maintenance of the route needs to accept those responsibilities at the outset of the project and allow for them in future budgeting.

Many local parks and former railway greenways have local volunteer groups supplementing the staff carrying out the bigger maintenance tasks. They provide a hugely valuable role, ensuring the local community is involved in its local path and promoting its use, while carrying out smaller maintenance tasks.

10.16 General Maintenance Tasks

Each Local Highway Authority will have its own defect intervention criteria as part of the ‘well maintained highways’ process and established safety inspection regimes based on the hierarchical status and functionality of each asset.

The following list, though not exhaustive, gives some indication on the type of defects that affect walking and cycling network safety and serviceability.

- Carriageway, Footway and Cycleway surface defects.
  - Broken/uneven riding or walking surface with defects meeting or exceeding applied intervention criteria.
  - Worn riding or walking surface with suspect skid resistance - where appropriate, testing of the surface should be carried out to ensure adequate skid resistance for traffic expected to use it
  - Defective kerbs, edging and channels
  - Consider prioritising the section of the road where people usually cycle i.e. the first 2m or so from the kerb needs to be in good condition.

On the parts of the cycle network that run within the carriageway any maintenance inspection regime of road surfaces should ensure that the area of the road which cyclists will most probably use (up to 2m from the kerb) receives a closer examination, with hazards in those locations receiving priority attention.
Ironworks, such as drainage gullies and utility covers, are particularly hazardous for cyclists, being both slippery in wet conditions, and often associated with potholes which form around their edges. Where cycle routes are located on roads shared with traffic, such surface defects can lead to greater conflict, with people on bikes often having to make often risky manoeuvres.

- Drainage and utility covers maintenance
  - Missing or damaged inspection or drainage covers and frames
  - Surface water flooding or severe standing water
  - Blocked surface water gullies and drainage systems
  - Ironwork surface texture

- Guardrail, fencing and restraint systems
  - Missing or damaged posts, rails or barrier likely to cause a potential danger or render system ineffective

- Signing, Road Studs and Markings
  - Missing, damaged or illegible sign faces.
  - Damaged post or fixings
  - Insufficient headroom from underside of sign
  - Insufficient offset from trafficked areas
  - Post/ sign obstruction to passage or visibility
  - Loose sign brackets resulting in turned sign face
  - Missing or damaged road studs
  - Missing, faded, worn or incomplete markings

- Streetlighting, Traffic Systems, pedestrian and cycle crossings
  - Daytime lamp burn
  - Lamp out
  - Damage, corrosion to columns or posts
  - Damaged/turned heads or lanterns
  - Missing/loose access doors to columns or cabinet
  - Missing / damaged tactile paving at crossing
  - Missing / damaged tactile rotating cone on crossing

- Verge, Trees and Hedges – on both rural and urban routes
  - Obstructed visibility or physical obstruction to free passage by vegetation, particularly at junctions and crossing points; cuttings to be kept clear of path surface.
  - Root heave to surrounding walking or cycling surface
  - Obvious damage, disease or poor condition of any tree within falling distance of the route
  - Need for periodic cutting back of adjacent grass verges or banks to maintain full width of asset

- Cleanliness and Weed Growth
  - Unacceptable levels of leaf litter likely to cause drainage or safety issues for
users
  o Unacceptable levels of litter, detritus or dog fouling
  o Sign face cleansing
  o Unacceptable levels of weed growth
  o Presence of Noxious weed growth
  o Programmed cleansing of litter/dog fouling bins

A poorly cleansed surface, apart from discouraging users, can present real dangers to the user. Bypasses and gaps for cyclists do not benefit from the movement of motor traffic to push debris out of the way, so these need to be of sufficient width for street sweepers and be regularly swept if they are to be usable.

Broken glass is one of the more obvious dangers to both cyclists and walkers. Excessive leaf litter or detritus build up can cause potential slip hazards and impact on the efficiency of surface water drainage infrastructure.

Often more of an issue for off road infrastructure, failure to control weed growth can have a detrimental effect of the safety and serviceability of an asset as well as its attractiveness to users.

If litter bins are provided within the design, they must be cleaned regularly.

10.17 Maintaining Active Travel Routes Through Roadworks

Section 9 of the Active Travel Act requires that roadworks should provide suitable provision for pedestrians, including disabled people, and cyclists – and preferably without cyclists needing to dismount. Equipment located on the footway should be fenced off and the accessibility of the route maintained for all types of user, with signed diversion routes where necessary.

TROs may be used to place temporary traffic restrictions on roads during construction in order to enable the works to proceed safely, such as making a route one way.
Photo 10.2 – Temporary contraflow cycle lane during roadworks, London

UK Department for Transport guidance concerning street works and road works, Safety at Street Works and Road Works - A Code of Practice, states that:

“If your work is going to obstruct a footway or part of a footway, you must provide a safe route for pedestrians that should include access to adjacent buildings, properties and public areas where necessary. This route must consider the needs of those with small children, pushchairs and those with reduced mobility, including visually impaired people and people using wheelchairs or mobility scooters. You should always try to enable pedestrians to remain safely on the footway if at all possible.” (p28 DfT, 2013)

Chapter 8 of the Traffic Signs Manual states that:

O3.14.6 Where there is cycle provision, such as cycle lanes or tracks, efforts should be made to keep these open or to provide an acceptable alternative during the road works. They should not be blocked by signs, debris, plant etc.

Road works and any unavoidable consequential route changes must be clearly signed and promoted. Where route changes are planned the Local Authority must raise awareness in the local community and at key facilities or destinations served by the route. This must include using local radio, talking newspapers, and informing disability groups.

10.18 Bridges and other structures

Bridges usually have a separate inspection and management system from the rest of the highway and traffic free networks. Bridge owners such as local councils and Network Rail have sophisticated bridge management systems. These tend to focus on the structural condition of the bridge and can pay less attention to the environment of the bridge. Thus graffiti can remain indefinitely unless reported to the council, making the whole environment feel uncared for and potentially threatening for walkers and cyclists. Underpasses provided for pedestrians and cyclists to avoid busy roads are particularly vulnerable to this type of abuse making their use at best an off-putting and sometimes frightening experience.

Smaller bridges in parks and similar traffic-free environments sometimes have wooden decks. Unless these are treated with a good antiskid surfacing material at the time of construction they can become very slippery when wet. Once again, by considering the maintenance problems at the design stage, potential problems can be avoided before they become significant.

It is important to keep trees and bushes cut back close to bridges to allow inspectors a clear view of the structure and to avoid damage to by those trees and bushes which can cause
masonry to crack and painted surfaces to corrode.

10.19 Winter Maintenance

Local highway authorities in Wales are under a duty to ensure, so far as reasonably practicable, that safe passage along a highway is not endangered by snow or ice.

Whilst this is not an absolute duty due to the qualification of ‘reasonable practicality’, the Active Travel Act raises the priority of walking and cycling routes and this should be reflected in local authorities’ winter maintenance programmes.

It is not reasonable, due to the scale and cost to expect local highway authorities to apply this service to the entire highway network or ensure that treated sections of the network remain ice or snow free. However, well used walking and cycling routes should merit a high priority.

It is therefore recommended that local highway authorities:

● Undertake risk assessments of which parts of the cycling and walking network should be identified for treatment in Winter Service Plans
● Engage cycling and walking stakeholders and users in the development of policies, winter service and operational Plans
● Advise and inform walking and cycling network users and stakeholders on the extent of the service and safe use during these periods

10.20 Highway Enforcement and Custodianship

Although not strictly a maintenance function, local highway authorities also have a duty to assert and protect the rights of the public to the use and enjoyment of any highway, including active travel routes.

The following list, though not exhaustive, shows typical enforcement or controlling actions that may need to be taken to meet the needs of users and ensure compliance with statutory duties in relation to walking and cycling. All the following have potential to cause unnecessary obstruction or potentially unsafe conditions for both cyclists and walkers, and should be addressed by the local authority or police, as appropriate.

● Placing of builders skips within the highway
● Placing of building materials within the highway
● Scaffolding within the highway
● A boards placed within the highway
● Displaying of goods for sale within the highway
● Parking on the footway and across dropped kerbs
● Parking of trailers or caravans so as to cause obstruction
● Illegal signing within the highway
● Cutting back of privately owned vegetation encroaching on the highway
● Mud and soil deposited on the highway
● Control of statutory undertakers and maintenance works
Key References

- Cycling England Design Guidance: C.06 Maintenance (pdf)
- Trees, Technical Information Note 11, Sustrans 2012 (pdf)
- Cyclists at Road Works, TAL 15/99, DfT 1999 (pdf)
- Sustrans document “A guide to controlling access on paths”, April 2011
- Sustrans Technical Information Notes E 01 “Hedgerow Management” for further guidance.
- Department of Transport publication ‘Guidance on the use of tactile paving surfaces’
- London Cycling Design Standards, TfL
- Safety at Street Works and Road Works - A Code of Practice. Department for Transport, October 2013
11 Monitoring and Evaluation

This chapter sets out the reasons why local authorities should carry out monitoring and evaluation of active travel routes and schemes, and provides advice on how this should be carried out.

Advice contained in this chapter is non-statutory government guidance, as there is no specific provision in the Active Travel Act for the issuing of guidance on this topic. Nevertheless, the content is considered to represent good practice which will assist local authorities in their general duty to promote active travel under Section 10 of the Active Travel Act.

11.1 Introduction

It is vital that authorities establish a programme of active travel monitoring, which will establish a baseline for measuring future improvement and progress towards targets and policy goals.

As part of the development of individual improvement schemes, monitoring should be considered from the outset and should be built into all projects. How the success of any improvements will be monitored will need to be considered prior to commencing any work on these schemes.

The type of monitoring that is undertaken will depend upon a number of factors relevant to the specific scheme itself. This chapter explores some of the reasons for monitoring and evaluation and details how it can be approached.

11.2. Why Monitor and Evaluate?

Gathering data around the usage and impact of routes provides the justification for existing plans and schemes, and makes the case for new proposals and helps with exploring future options. Typically monitoring will be used to:

- compare and prioritise scheme design options
- compare active travel schemes with other local transport schemes
- demonstrate that schemes represent value for money
- review operation of experimental scheme that may disadvantage some stakeholders, prior to deciding on whether to make it permanent
- assess the operation of innovative schemes to learn lessons on how the design might be developed / improved in future

When planning a new route or network, or improvements to existing infrastructure, data from other similar routes and networks can be used as the basis for forecasting what usage and impact might look like following the intervention, and for making the case to support the proposition.
The Welsh Government and other funders generally expect to see evidence of the impact of the scheme post implementation. The case for future funding or providing support at public consultation can be enhanced by a quantified (and qualitative) examination of usage.

11.3. How to approach data gathering

At the outset a Monitoring and Evaluation Plan should be developed for any intervention and the costs of this should be factored in when evaluating costs. The plan would typically be some variant on a logic map or logic framework – a systematic and visual presentation of the key steps forming a monitoring programme based on the scheme objectives. This requires the identification of

- objectives,
- inputs,
- outputs,
- outcomes and
- impacts.

A simple example is given in Table 11.1.

**Figure 11.1: Example of a simple Logic Map**

<table>
<thead>
<tr>
<th>Objective</th>
<th>Input</th>
<th>Output</th>
<th>Outcome</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve cycling safety</td>
<td>Infrastructure improvement resources</td>
<td>Physical route, signing,</td>
<td>Increased usage, improved perceptions of safety,</td>
<td>Reduction in incidence of accidents,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>congestion reduction,</td>
</tr>
</tbody>
</table>

In the context of a route or network intervention the parameters can range widely:

- What is the route for? (objectives: increasing commuting, making journeys to school safer);
- What might the route achieve? (outcomes: increased tourism activity, increased commuting, improved perceptions of safety);
- What results from the intervention? (impacts: increased tourism revenue, reduced absenteeism, reduction in accidents).

The Monitoring and Evaluation Plan, must consider the characteristics of the route or network in question. There are no quick fix ‘counts required per kilometre’ or ‘survey this many users’. Rather the data to be collected should directly address the intended outcomes and impacts, and should relate to what is on the ground. Is there a suitable location for an
automatic counter on the route/ network? Are there schools/ workplaces that are served by the route/ network where data can be gathered?

Consideration should also be given to unintended consequences, such as the possibility that certain types of users may avoid a route following an intervention. This will not always be easy but good baseline data that identifies the existing level of use by type of user will enable this to be done if it is considered necessary.

The other key constraint is cost. The investment in data gathering needs to be proportionate and to address the outcomes and impacts cost effectively. Scaling of costs is not a simple formulaic matter. If a more detailed data set is required, costs are inevitably higher. A low cost scheme may not necessarily correspond to a scheme with a minimal data requirement. Examples in Sustrans’ portfolio include circumstances where 1% of a multi-million pound investment has been spent on monitoring, and where monitoring has amounted to around a quarter of total project cost.

11.4. Data gathering tools available

Currently very few local authorities collect data on walking unless specific to a particular scheme, and approaches to the collection of data on cycling varies enormously both in approach and robustness. Most monitoring of walking and cycling relate to levels of use.

A very wide range of tools for data collection is available. These should be selected according to the information outputs to be generated for the Monitoring and Evaluation Plan. It is absolutely crucial to consider what might already be available from existing national or local datasets that might meet the project’s needs before embarking on tool selection.

There is a range of tried-and-tested tools available, which makes any data collection, analysis and comparison to other projects more robust, easy to implement and more cost effective.

Table 11.2 lists the most common tools, along with a basic indication of costs, and considers their scale of application.

<table>
<thead>
<tr>
<th>Tool</th>
<th>Indicative cost</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantitative Tools:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automatic bicycle/pedestrian counts</td>
<td>£££</td>
<td>Initial investment costs are high due to hardware costs, and there is an ongoing maintenance liability; extent of costs depends on number of counters required, and intensity of coverage required; costs can range from £1,500 to £5,000 per counter unit, depending on specification, but greater for complex locations. Ongoing maintenance costs are also a consideration.</td>
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<tr>
<td>Method</td>
<td>Cost</td>
<td>Description</td>
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<tr>
<td>Manual bicycle/pedestrian counts</td>
<td>££</td>
<td>No hardware costs, but an ongoing cost in commissioning repeat counts; frequency and the number of points to be covered are the primary determinants of cost; expect to pay a standard day rate per count day per site per iteration</td>
</tr>
<tr>
<td>Video counts</td>
<td>££</td>
<td>Modest hardware cost and installation costs, but data is not continuous unless repeat periods of operation are scheduled</td>
</tr>
<tr>
<td>Cycle parking counts</td>
<td>£</td>
<td>Cost depends on area to be covered; expect to pay a standard day rate per person required per iteration</td>
</tr>
<tr>
<td>Beneficiary and participant count record and surveys</td>
<td>£</td>
<td>Main cost is the time of the project delivery team in administering the tools</td>
</tr>
<tr>
<td>Route user intercept surveys</td>
<td>££</td>
<td>Based on four days coverage per survey event, usually using two people per site; cost is standard day rate times eight for data collection.</td>
</tr>
<tr>
<td>Household travel behaviour survey</td>
<td>£££££</td>
<td>Usually very expensive for very strong data; survey design and sampling are part of the process, but the bulk of the cost is surveyor time; key cost determinants are level of coverage with respect to sample size and statistical surety; expect to pay £40,000-90,000 per iteration; typical sample size required would be around 1000 households.</td>
</tr>
<tr>
<td>Workplace travel surveys</td>
<td>£</td>
<td>Main cost is the time for administering the survey (may be done in house)</td>
</tr>
<tr>
<td>School travel surveys</td>
<td>£</td>
<td>Main cost is the time for administering the survey; some data may be available through school travel plans where available</td>
</tr>
<tr>
<td>Qualitative Tools:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community impact evaluation²</td>
<td>£</td>
<td>Tools can be supplied at modest cost; main cost is the time of the project delivery team in administering the tools</td>
</tr>
</tbody>
</table>

² Surveying participants at events organised by the council or other organisations provides a focused look into the behaviour of individuals who are somehow engaged in active travel initiatives.
<table>
<thead>
<tr>
<th>Process evaluation(^3)</th>
<th>£</th>
<th>Modest costs, requiring a series of interviews with a defined range of stakeholders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluative exploitation of social networking sites, etc.</td>
<td>£</td>
<td>Modest costs, but needs a clear plan of operation</td>
</tr>
<tr>
<td>'Context' Tools:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention diary(^4)</td>
<td>£</td>
<td>Tools can be supplied at modest cost; main cost is the time for entering data, which is best done by the project delivery team</td>
</tr>
<tr>
<td>Ancillary data</td>
<td>£</td>
<td>Limited cost for collating existing data; main bulk of costs are for analysis and reporting</td>
</tr>
</tbody>
</table>

11.5. Analysing the data

The analysis should be planned at the stage of designing the data collection approach and should respond directly to the requirements of the Monitoring and Evaluation Plan. For example, there would be no requirement to report on trips to school if the primary outcome measure is tourism-derived revenue.

The complexity of assembling an expression of impact depends on the reporting needs and the data sources used. It is relatively easy to report on the usage of a short stretch of route if counter and user intercept survey data is available.

However, this approach can risk significantly underestimating usage on a more complex network due to the failure to account for sections of the route not covered by data collection activity.

In response to this, methods are being developed that go beyond traditional approaches to analysing route usage by using a variety of data types to describe the volume and characteristics of journeys at specific points. This data can then be used as a proxy for the usage on the surrounding area. It allows geographically distinct sources of data, collected on a network of routes, to be combined to estimate use across that network. This approach can generate a single annual usage estimate (broken down by user type) for a walking or cycling infrastructure scheme for both pre and post (where data permits) scheme construction.

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\(^3\) Process evaluation involves engaging with stakeholders, partners, volunteers and others involved in project delivery to gauge their impressions of how the programme is being carried out.

\(^4\) The online intervention diary provides a diary of infrastructure, softer measures (cycle training, events etc) and other factors that can affect cycling levels.
11.6. Output

The output from the analysis will need to be expressed clearly to communicate the findings to a range of stakeholders and its content and format should be set at the outset in the Monitoring and Evaluation Plan.

Options might reasonably be expected to include:

- Measures of levels of walking and cycling
- Measures of / change in
  - levels of walking and cycling
  - levels of walking and cycling among particular user groups
  - levels of walking and cycling by particular trip type category
  - perceptions of safety
  - perceptions of facets of a route
  - revenue-generation performance of a route
  - health benefits associated with a route
  - economic benefits associated with a route
- Benefit to cost ratio of a route

Presentation of these results must have regard to the target audiences and be accessible to them. Whilst a detailed analysis may be appropriate for a more technically minded audience, a more visual representation of key results will be more suited to others, including decision makers and the general public.

Key References

Guidance on Monitoring Local Cycle Use, TRL Report 395, 1999

Research on Monitoring Local Cycle Use, TRL Report 396, 1999

Appendix A – Design Elements
Appendix B – Cycling Route Audit Tool
Cycle Route Audit Tool – Guidance notes

This tool has been developed to assist local authorities in the auditing of routes.

The tool can be used for both existing and proposed routes.

- On existing routes the current conditions should be audited.
- On proposed routes the proposed schemes should be audited.

Scoring
The tool requires the auditor to score the route against each of the factors using the following scale:

  0 for poor provision,
  1 for provision which is adequate but should be improved if possible
  2 for good quality provision

*Any route which scores less than 35 (out of a potential 50 points) would require further development before it is included in the Existing or Integrated Network Maps.*

Critical factors
Some of the criteria have been given a ‘critical’ rating.

*Routes which fail to pass any of the critical factors require further development and should not be included on the Existing or Integrated Network Maps.*

Comments
As the scoring is sometimes qualitative the tool also allows the auditor to add comments explaining their score allocation.

For example where a route has scored 1 for Gradient, it may be useful to explain that although there is a steep uphill chapter there is a path which climbs the side of the valley in gentle steps, thereby allowing the cyclist to comfortably use the route.

The addition of text allows the audit scoring to be better understood when reviewed by other stakeholders.

Actions
There is an additional column for Actions. This allows auditors to record any solutions to any of the issues identified on the route e.g. narrowing a junction mouth to reduce speeds or removing redundant street clutter along a chapter of the route to improve its attractiveness.

The assessment relies on an understanding of the route type (ie primary route, secondary route or local route) to be provided for as well as a full understanding of the existing traffic conditions (i.e. urban or rural, distributor or residential street).

If the route is assessed as suitable in its current condition according to the network requirements and design standards it can be included in the Existing Routes Map.
<table>
<thead>
<tr>
<th>Key requirement</th>
<th>Factor</th>
<th>Design Principle</th>
<th>Indicators</th>
<th>Critical</th>
<th>0 (Red)</th>
<th>1 (Amber)</th>
<th>2 (Green)</th>
<th>Score</th>
<th>Comments</th>
<th>Actions</th>
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<tbody>
<tr>
<td></td>
<td>Connections</td>
<td>Cyclists should be able to easily and safely join and navigate along different sections of the same route and between different routes in the network.</td>
<td>Ability to join/leave route safely and easily: consider left and right turns</td>
<td></td>
<td>Cyclists cannot connect to other routes without dismounting</td>
<td>Cyclists can connect to other routes with minimal disruption to their journey</td>
<td>Cyclists have dedicated connections to other routes provided, with no interruption to their journey</td>
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<td></td>
<td>Continuity and Wayfinding</td>
<td>Routes should be complete with no gaps in provision. 'End of route' signs should not be installed - cyclists should be shown how the route continues. Cyclists should not be 'abandoned', particularly at junctions where provision may be required to ensure safe crossing movements.</td>
<td>Provision for cyclists throughout the whole length of the route</td>
<td></td>
<td>Cyclists are 'abandoned' at points along the route with no clear indication of how to continue their journey.</td>
<td>The route is made up of discrete sections, but cyclists can clearly understand how to navigate between them, including through junctions.</td>
<td>Cyclists are provided with a continuous route, including through junctions</td>
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<td></td>
<td>Density of network</td>
<td>Cycle networks should provide a mesh (or grid) of routes across the town or city. The density of the network is the distance between the routes which make up the grid pattern. The ultimate aim should be a network with a mesh width of 250m.</td>
<td>Density of routes based on mesh width ie distances between primary and secondary routes within the network</td>
<td></td>
<td>Route contributes to a network density mesh width &gt;400m</td>
<td>Route contributes to a network density mesh width 250 - 400m</td>
<td>Route contributes to a network density mesh width &lt;250m</td>
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<td>Key requirement</td>
<td>Factor</td>
<td>Design Principle</td>
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<td>Routes should follow the shortest option available and be as near to the ‘as-the-crow-flies’ distance as possible.</td>
<td>Deviation of route</td>
<td>Deviation factor against straight line or shortest road alternative &lt;20%</td>
<td>Deviation factor against straight line or shortest road alternative 20 - 40%</td>
<td>Deviation factor against straight line or shortest road alternative &gt;40%</td>
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<td>The number of times a cyclist has to stop or loses right of way on a route should be minimised. This includes stopping and give ways at junctions or crossings, motorcycle barriers, pedestrian-only zones etc.</td>
<td>Stopping and give way frequency</td>
<td>The number of stops or give ways on the route is more than 4 per km</td>
<td>The number of stops or give ways on the route is between 2 and 4 per km</td>
<td>The number of stops or give ways on the route is less than 2 per km</td>
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<td>The length of delay caused by junctions should be minimised. This includes assessing impact of multiple or single stage crossings, signal timings, toucan crossings etc.</td>
<td>Delay at junctions</td>
<td>Delay for cyclists at junctions is greater than for motor vehicles</td>
<td>Delay for cyclists at junctions is similar to delay for motor vehicles</td>
<td>Cyclists are not required to stop at junctions (eg bypass at signals)</td>
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<td></td>
<td></td>
<td>The length of delay caused by not being able to bypass slow moving traffic.</td>
<td>Ability to maintain own speed on links</td>
<td>Cyclists travel at speed of slowest vehicle (including a cycle) ahead</td>
<td>Cyclists can usually pass slow traffic and other cyclists</td>
<td>Cyclists can always choose their own speed (within reason)</td>
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<tr>
<td>Gradients</td>
<td>Routes should avoid steep gradients where possible. Uphill sections increase time, effort and discomfort. Where these are encountered, routes should be planned to minimise climbing gradient and allow users to retain momentum gained on the descent.</td>
<td>Gradient</td>
<td>Route includes sections steeper than the gradients recommended in Figure 4.4</td>
<td>There are no sections of route steeper than the gradients recommended in Figure 4.4</td>
<td>There are no sections of route which steeper than 2%</td>
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<tr>
<td>Safety</td>
<td>Reduce/ remove speed differences where cyclists are sharing the carriageway. Where cyclists and motor vehicles are sharing the carriageway, the key to reducing severity of collisions is reducing the speeds of motor vehicles so that they more closely match that of cyclists. This is particularly important at points where risk of collision is greater, such as at junctions.</td>
<td>Motor traffic speed on approach and through junctions where cyclists are sharing the carriageway through the junction</td>
<td>85th percentile &gt; 37mph (60kph) 85th percentile &gt;30mph 85th percentile 20mph-30mph 85th percentile &lt;20mph</td>
<td>85th percentile &gt; 37mph (60kph) 85th percentile &gt;30mph 85th percentile 20mph-30mph 85th percentile &lt;20mph</td>
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<tr>
<td>Avoid high motor traffic volumes where cyclists are sharing the carriageway</td>
<td>Cyclists should not be required to share the carriageway with high volumes of motor vehicles. This is particularly important at points where risk of collision is greater, such as at junctions.</td>
<td>Motor traffic volume on sections of shared carriageway, expressed as vehicles per peak hour</td>
<td>&gt;1000vph, or &gt;5% HGV</td>
<td>500-1000vph and 2-5%HGV</td>
<td>100-500vph and &lt;2% HGV</td>
<td>0-100vph</td>
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<tr>
<td>Risk of collision</td>
<td>Where speed differences and high motor vehicle flows cannot be reduced cyclists should be separated from traffic. This separation can be achieved at varying degrees through on-road cycle lanes, hybrid tracks and off-road provision. Such segregation should reduce the risk of collision from beside or behind the cyclist.</td>
<td>Segregation to reduce risk of collision alongside or from behind</td>
<td>Cyclists sharing carriageway - nearside lane in critical range between 3.2m and 3.9m wide and traffic volumes prevent motor vehicles moving easily into opposite lane to pass cyclists.</td>
<td>Cyclists in un-restricted traffic lanes outside critical range (3.2m to 3.9m) or in cycle lanes less than 1.8m wide.</td>
<td>Cyclists in cycle lanes at least 1.8m wide on carriageway; 85th percentile motor traffic speed max 30mph.</td>
<td>Cyclists on route away from motor traffic (off road provision) or in off-carriageway cycle track. Cyclists in hybrid/light segregated track; 85th percentile motor traffic speed max 30mph.</td>
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<td>Key requirement</td>
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<td>A high proportion of collisions involving cyclists occur at junctions. Junctions therefore need particular attention to reduce the risk of collision. Junction treatments include: Minor/side roads - cyclist priority and/or speed reduction across side roads. Major roads - separation of cyclists from motor traffic through junctions.</td>
<td>Conflicting movements at junctions</td>
<td>Side road junctions frequent and/or untreated. Major junctions, conflicting cycle/motor traffic movements not separated</td>
<td>Side road junctions infrequent and with effective entry treatments. Major junctions, principal conflicting cycle/motor traffic movements separated.</td>
<td>Side roads closed or treated to blend in with footway. Major junctions, all conflicting cycle/motor traffic streams separated.</td>
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<td></td>
<td>Avoid complex design</td>
<td>Avoid complex designs which require users to process large amounts of information. Good network design should be self-explanatory and self-evident to all road users. All users should understand where they and other road users should be and what movements they might make.</td>
<td>Legible road markings and road layout</td>
<td>Faded, old, unclear, complex road markings/unclear or unfamiliar road layout</td>
<td>Generally legible road markings and road layout but some elements could be improved</td>
<td>Clear, understandable, simple road markings and road layout</td>
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<td>Key requirement</td>
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<tr>
<td>Consider and reduce risk from kerbside activity</td>
<td>Routes should be assessed in terms of all multi-functional uses of a street including car parking, bus stops, parking, including collision with opened door.</td>
<td>Conflict with kerbside activity</td>
<td>Narrow cycle lanes &lt;1.5m alongside parking/loading</td>
<td>Significant conflict with kerbside activity (eg nearside cycle lane &lt; 2m wide alongside kerbside parking)</td>
<td>Some conflict with kerbside activity - eg less frequent activity on nearside of cyclists, min 2m cycle lanes or buffer.</td>
<td>No/very limited conflict with kerbside activity</td>
<td></td>
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<tr>
<td>Reduce severity of collisions where they do occur</td>
<td>Wherever possible routes should include “evasion room” (such as grass verges) and avoid any unnecessary physical hazards such as guardrail, build outs, etc. to reduce the severity of a collision should it occur.</td>
<td>Evasion room and unnecessary hazards</td>
<td>Cyclists at risk of being trapped by physical hazards along more than half of the route.</td>
<td>The number of physical hazards could be further reduced</td>
<td>The route includes evasion room and avoids any physical hazards.</td>
<td></td>
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</tr>
<tr>
<td>Comfort</td>
<td>Density of defects including non cycle friendly ironworks, raised/sunken covers/gullies, potholes, poor quality carriageway paint (eg from previous cycle lane)</td>
<td>Major and minor defects</td>
<td>Numerous minor defects or any number of major defects</td>
<td>Minor and occasional defects</td>
<td>Smooth high grip surface</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface quality</td>
<td>Pavement or carriageway construction providing smooth and level surface</td>
<td>Surface type</td>
<td>Hand-laid materials, or any other bumpy, unbound, slippery, and potentially hazardous surface.</td>
<td>Machine-laid Hot Rolled Asphalt, concrete pavours with frequent joints.</td>
<td>Machine laid smooth and non-slip surface - eg Thin Surfacing, or firm and closely-jointed blocks undis-</td>
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<tr>
<td>Key requirement</td>
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<td>Indicators</td>
<td>Critical</td>
<td>0 (Red)</td>
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<td>Effective width without conflict</td>
<td>Cyclists should be able to comfortably cycle without risk of conflict with other users both on and off road.</td>
<td>Desirable minimum widths according to volume of cyclists and route type (where cyclists are separated from motor vehicles).</td>
<td>More than 25% of the route includes cycle provision with widths which are no more than 25% below recommended values; or widths are narrower than this at any point.</td>
<td>No more than 25% of the route includes cycle provision with widths which are no more than 25% below recommended values.</td>
<td>Recommended widths are maintained throughout whole route</td>
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<tr>
<td>Wayfinding</td>
<td>Non-local cyclists should be able to navigate the routes without the need to refer to maps.</td>
<td>Signing</td>
<td>Route signing is poor with signs missing at key decision points.</td>
<td>Gaps identified in route signing which could be improved</td>
<td>Route is well signed with signs located at all decision points and junctions</td>
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<td>Key requirement</td>
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<td>Social safety and perceived vulnerability of user</td>
<td>Attractiveness</td>
<td>Routes should be appealing and be perceived as safe and usable. Well used, well maintained, lit, overlooked routes are more attractive and therefore more likely to be used.</td>
<td>Lighting</td>
<td>Most or all of route is unlit</td>
<td>Short and infrequent unlit/poorly lit sections</td>
<td>Route is lit to highway standards throughout</td>
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<td></td>
<td>Isolation</td>
<td>Route is generally away from activity</td>
<td>Route is mainly overlooked and is not far from activity throughout its length</td>
<td>Route is overlooked throughout its length</td>
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<td>Impact on pedestrians, including people with disabilities</td>
<td>Introduction of dedicated on-road cycle provision can enable people to cycle on-road rather than using footways which are not suitable for shared use. Introducing cycling onto well-used footpaths may reduce the quality of provision for both users, particularly if the shared use path does not meet recommended widths.</td>
<td>Impact on pedestrians, Pedestrian Comfort Level</td>
<td>Route impact negatively on pedestrian provision, Pedestrian Comfort Level C or below.</td>
<td>No impact on pedestrian provision or Pedestrian Comfort Level remains at B or above.</td>
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<td>Pedestrian provision enhanced by cycling provision, or Pedestrian Comfort Level = A</td>
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<td>Key requirement</td>
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<tr>
<td>Minimise street clutter</td>
<td>Signing required to support scheme layout</td>
<td>Signs informative and consistent but not over-bearing or of inappropriate size</td>
<td>Large number of signs needed, difficult to follow and/or leading to clutter</td>
<td>Moderate amount of signing particularly around junctions.</td>
<td>Signing for wayfinding purposes only and not causing additional obstruction.</td>
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<td>Secure cycle parking</td>
<td>Ease of access to secure cycle parking within businesses and on street</td>
<td>Evidence of bicycles parked to street furniture or cycle stands</td>
<td>No additional cycle parking provided or inadequate provision in insecure non-overlooked areas</td>
<td>Some secure cycle parking provided but not enough to meet demand</td>
<td>Secure cycle parking provided, sufficient to meet demand</td>
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Audit Score Total
Appendix C – Legal Procedures

Introduction

The diagram below sets out the main legal frameworks for the construction and maintenance of active travel routes and facilities. This appendix sets these out in more detail.

Highways Act 1980

Section 65 (Construction of cycle tracks adjacent to carriageways) empowers highway authorities to provide cycle tracks within or next to highways including a carriageway (i.e. a street). This is not suitable for footpaths (i.e. where the only right of way across the entire width of the highway is by foot). There are no statutory requirements regarding the exercise of this power, although there needs to be evidence that the Highway Authority has exercised this power, particularly given such schemes may be contentious. The erection of the appropriate traffic signing will perform this role to an extent, though it is recommended that any conversion is formally made by a resolution of the relevant council committee, following consultation and engagement with stakeholders (Section 2.3).

Where a cycle track is proposed adjacent to a highway, but outside its adopted limits, this can be achieved by constructing a cycle track under section 65(1) of the Highways Act as a permitted development under Part 13 of Schedule 2 of the Town and Country Planning (General Permitted Development) Order 1995 (HMSO, 1995).
Sections 90A-90F (Road humps) allows Highway Authorities to construct road humps. Their design and installation is regulated by the Highways (Road Humps) Regulations 1999 (HMSO, 1999b). Advice relating to good practice and legal requirements with respect to design can be found in Section 4 of LTN 1/07 Traffic Calming (Department for Transport, 2007a).

Section 90C (1) of the Highways Act 1980 requires that the Chief Officer of Police is consulted before road humps are installed. Sections 90C (2)&(5) of the same Act require authorities to carry out the following procedure before installing road humps –

• Notices should be placed in local press and on-street, detailing each individual road hump proposed and inviting objections before a stated deadline not less than 21 days after the publication of proposals;

• Any objections received should be considered by the Highway Authority. Typically objections will be considered by the relevant committee of the Council.

Regulation 3 of the Highways (Road Humps) Regulations 1999 requires that the following bodies are consulted in addition to those above –

• The Chief Officer of the fire brigade;
• The Chief Officer of any body providing ambulance services; and,
• Any organisations appearing to the authority to represent persons who use the highway to which the proposal relates, or to represent persons who are otherwise likely to be affected by the road hump.

Sections 90G-90I (Other traffic calming) allows highway authorities to construct other traffic calming measures. These measures are regulated by the Highways (Traffic Calming) Regulations 1999 (HMSO, 1999a), which permit the following measures:

• Build-outs
• Chicanes
• Gateways
• Islands
• Over-run areas
• Pinch points
• Rumble devices
• Combinations of the above

The regulations impose limits on the design of over-run areas and rumble devices. Section 5 of LTN 1/07 Traffic Calming (Department for Transport, 2007a) offers design advice – additional care should be taken to ensure such features do not pose a hazard to cyclists.

Sections 97 (Lighting) empowers highway authorities to provide lighting on highways, including cycle tracks. There is no prescribed procedure for providing such lighting.

Road Traffic Regulation Act 1984

Sections 1-5 (Traffic regulation orders) empower highway authorities to make Traffic Regulation Orders (TROs) to regulate road traffic. TROs are usually required where any road traffic activity in any part of the highway is to be prohibited or restricted for any user, over and above what is prohibited by other legislation.
In terms of cycling infrastructure, the following will require the implementation or amendment of TROs:

- Pedestrianised streets
- Bus lanes (with-flow and contraflow)
- One way streets (including with contra-flow cycling)
- Mandatory cycle lanes
- Prohibited & prescribed manoeuvres
- Exemptions from existing restrictions

TROs will also be required for other traffic restrictions introduced to facilitate cycling, including road closures and prohibitions of waiting and/or loading.

TROs can be made for a variety of reasons, prescribed under Section 1 of the 1984 Act. With regard to cycling infrastructure, it will typically be appropriate to state that the order is made for the purposes of facilitating the passage of pedal cycles along the affected street(s).

Where the cycling infrastructure is simply an exemption from a TRO applying to other traffic, the exemption for cycles must be written into the TRO. This means a new TRO will be required where it is proposed to exempt cycles from an existing restriction. Section 2 of the Act allows for such exemptions.

Care needs to be taken in the drafting of TROs to ensure the provisions match the definitions and signing and lining used. For example, the provisions for a contra-flow cycle lane will need to be more detailed than for where cycles are simply exempted from a one way street as, for instance, motor vehicles need prohibiting from entering a mandatory contra-flow cycle lane.

There are restrictions on TROs, although these will not generally be relevant to cycling infrastructure. One exception concerns pedestrianised streets. Where it is required to deny access to adjacent streets for any class of vehicle (cycles included) to adjacent premises for greater than 8 hours in any 24, it will be necessary to either seek the consent of the Welsh Government (this is only possible in certain circumstances), or make an order under the Town and Country Planning Act.

Speed limits, parking places and cycle tracks should not be made by Traffic Regulation Order (i.e. Orders made under Section 1 of the Road Traffic Regulation Act). These are made using different mechanisms –

- Speed limit orders are made under sections 81- 91 of the Road Traffic Regulation Act
- Parking places are designated under sections 32- 63A of the Road Traffic Regulation Act
- Cycle tracks in highways incorporating a carriageway are constructed under section 65 of the Highways Act 1980
- Conversion of footpaths away from highways incorporating a carriageway is made under Section 3 of the Cycle Tracks Act 1984; and,
- New cycle tracks outside of the highway are made under the Highways Act and planning legislation – advice of a planning officer should be sought in this instance.

Procedure for TROs is governed by the Local Authorities (Traffic Orders) (England and Wales) (Procedure) Regulations 1996 (HMSO, 1996). This is summarised in the document Traffic Regulation Orders – Your Questions Answered (Department for Transport, 2007c),
and described in greater detail in Annex F of Operational Guidance to Local Authorities: Parking Policy and Enforcement (Department for Transport, 2008e).

Sections 23-25 (Pedestrian crossings) empower highway authorities to provide pedestrian crossings. These are prescribed by the Zebra, Pelican and Puffin Pedestrian Crossings Regulations 1997 (HMSO, 1997). Where it is proposed to install, alter or remove a pedestrian crossing, the traffic authority is required to

- Consult the Chief Officer of Police;
- Give notice to the public of the proposals; and
- Inform the Secretary of State in writing.

There is no requirement in legislation for the Council to consider objections to pedestrian crossings.

Toucan crossings and signal-controlled crossings at junctions are not prescribed under this Section of the Act, but under Sections 64 to 80 (traffic signs).

Sections 32-63A (Parking places) empower traffic authorities to designate parking places. Orders are made under Sections 32 (off-street parking) or 45 (on-street parking) of the Act where a parking place is to be designated, including cycle parking places. Section 63 allows for the provision of stands or other devices to be provided for the safe keeping of cycles at designated parking places.

Parking place orders are made for the relief or prevention of traffic congestion – in the case of cycling parking places, this will be by encouraging modal shift onto pedal cycles. Cycle parking places can also relieve congestion on footways where cycles may be left haphazardly in the absence of proper facilities.

These powers are also used to provide limited waiting, permit parking and pay and display parking. The procedure is as for traffic regulation orders.

Sections 64-80 (Traffic signs) empower traffic authorities to provide traffic signs and road markings. Traffic signals are also prescribed under this mechanism. No specific procedure is prescribed for the erection of signs generally.

All traffic signs must conform to regulations or special authorisations issued by the Secretary of State or the Welsh Ministers – usually these will be the Traffic Signs Regulations and General Directions (HMSO). The requirement for signs to be prescribed in this way applies to ‘any length of highway or any other road to which the public has access, including bridges over which a road passes’ (HMSO, 1984a). It should be noted that ‘highway’ includes footpaths, bridleways and cycle tracks.

In Wales, the Traffic Signs (Welsh and English Language Provisions) Regulations and General Directions 1985 also apply (HMSO, 1985). These give requirements and provide the necessary diagrams regarding bilingual English and Welsh traffic signs.

The Regulations require TROs or other enactments to be in place where certain signs or markings are provided.

Sections 81-91 (Speed limits) concern speed limits. Guidance can be found in Setting Local Speed Limits in Wales (Welsh Government, 2009) - Section 4 deals with the legislative framework. Procedure is as for traffic regulation orders.
Sections 92 & 93 (Bollards) authorise highway authorities to provide bollards or other obstructions to enforce a traffic regulation order. No additional process is required above and beyond that necessary for a traffic regulation order.

**Cycle Tracks Act 1984**

Section 3 *(conversion of footpaths to cycle tracks)* allows highway authorities to convert footpaths (i.e. highways with right of way by foot only) to cycle tracks. The powers under this Act are rarely used, however, because when objections are made the process can become very extended.

Where the footpath crosses agricultural land, Section 3(2) requires the written consent of anyone with a legal interest in the land is obtained before the cycle track order can be made.

The procedure for making a cycle track order is governed by the Cycle Tracks Regulations 1984 *(HMSO, 1984c)*. Before making a cycle track order, the authority must consult:

- One or more organisations representing persons using the footpath, or are likely to be affected by the proposed order, unless it appears to the authority that no such organisations exist;
- Any community council within whose area the footpath lies;
- Those statutory undertakers whose operational land is crossed by the footpath; and,
- The Chief Officer of Police.

Upon making the Order, notices should be placed in local press, at each end of the affected footpath and on any public notice boards in their locality, detailing the proposals and inviting objections before a stated deadline not less than 28 days after the publication of proposals, and send this notice to all consultees.

If no objections are received, the authority can confirm the Order itself. If objections are received, application must be made to the Welsh Ministers to confirm the Order. A public inquiry will be conducted, and following that the Welsh Ministers will decide whether to confirm the Order (as made or amended), or to reject the application.

Legal and physical works to accommodate the cycle track are a permitted development under section 10 of the Act, so planning consent is not required. This also applies when providing a metalled way for cyclists where none exists presently.

Conversion of a footpath to restricted by-way can be a less onerous means of permitting cycling than that provided by the Cycle Tracks Act

Section 4 *(provision of barriers in cycle tracks etc.)* allows the highway authority to provide barriers or other features to safeguard users of the cycle track (whether adjacent to a carriageway of otherwise), and to segregate foot and cycle traffic. There are no procedural requirements for the installation of such features.

**Town and Country Planning Act 1990**

Provisions within the Town and Country Planning Act 1990 *(HMSO, 1990)* and the Highways Act 1980 *(HMSO, 1980)* will apply where it is proposed to provide a cycle route where no right-of-way or physical path exists at present. In these instances, legal and planning advice should be sought.
Section 249 of the Town and Country Planning Act provides a means of providing pedestrianised streets by extinguishing vehicular rights over highways. This can be a useful mechanism where the provisions of the Road Traffic Regulation Act are not robust enough for the desired level of restriction. Such Orders can only be made, altered or revoked by the Secretary of State – this includes any amendments to existing Orders that may be necessary to permit cycling at any time of the day.

Where S.249 Orders are proposed, or are existing, and are proposed to be amended to accommodate cycling, planning and legal advice should be sought.

**Bridleways and Restricted Byways**

The legislative measures outlined above do not allow for the use of horses on cycle routes away from roads, or for the use of cycles on existing bridleways.

Section 30 of the Countryside Act 1968 (HMSO, 1968) permits cyclists to use bridleways, so it is not necessary to change the status of a bridleway to allow cycling. However, there are a number of issues where cycle routes are to follow bridleways –

- Section 30(3) of the Countryside Act 1968 specifically does not obligate the highway authority or any other responsible party to maintain bridleways to a standard able to accommodate cycling, or to do anything to facilitate cycling along the route. This risks bridleway sections of cycle route not being maintained sufficiently for cycling; and,

- Cycle route signs are unlikely to be appropriate on bridleways and regulatory signs indicating a cycle track cannot be lawfully erected on bridleways. Providing route continuity along a bridleway section may therefore be difficult.

On key cycle routes, it may be appropriate to give cyclists a greater claim to the facility than can be provided with bridleway status, in which case the bridleway can be converted to a restricted byway under section 26 of the Highways Act 1980 (HMSO, 1980).

The procedure for the conversion of a footpath or bridleway to restricted byway under Section 26 of the Highways Act 1980 is governed by the Public Path Orders Regulations 1993 (HMSO, 1993) and is described in *A Guide to Definitive Maps and Changes to Public Rights of Way* (Countryside Council for Wales, 2008).

Where the use of bridleways or restricted byways is proposed, care should be taken to ensure that facilities for equestrians are maintained and where possible extended into the countryside.

**Experimental Schemes**

Where traffic regulation orders, speed limit orders or parking place orders are proposed, but prove to be controversial, it is possible to install the scheme experimentally before considering objections, so as to evaluate it.

This power is provided by Sections 9-11 of the Road Traffic Regulation Act 1984 (HMSO, 1984a). The procedure is described in Annex F of *Operational Guidance to Local Authorities: Parking Policy and Enforcement* (Department for Transport, 2008e), and can be summarised as follows:
- Notices should be placed in local press and on-street, detailing the proposals, as for an ordinary TRO, at least 7 days before the Order is made;
- The experimental order can be left in place for up to 18 months, during which people may lodge objections;
- After a maximum of 18 months, any objections received should be considered by the Highway Authority, after which the Council may (subject to consideration of those objections) make the Order permanent, or let the Order lapse.

This procedure can be used to alleviate public concerns by demonstrating the actual impact of the scheme, rather than simply relying upon expectation and speculation. However, it may also be interpreted as forcing proposals through without regard for public concerns, so this procedure should be used carefully. Experimental schemes should be carefully monitored so that their real impact can be reported on and amendments can be considered to mitigate for any issues observed.

**Equality Act 2010 - Equality Impact Assessments**

All public bodies under Section 149 of the Equalities Act 2010 have a duty to promote and advance equality with specific reference in this case to highways functions; and record their actions within an Equality Impact Assessment (EqIA) to illustrate due considerations and mitigations.

An Equality Impact Assessment (EqIA) provides a key part of the process required when developing, reviewing or changing any initiative (i.e. service, policy, strategy, function, procedure, project etc). The resulting assessment is part of the work required on any initiative and provides some of the evidence base for what is being undertaken and the outcomes to be achieved.

They are a legal requirement under equalities legislation, and have been in place since 2000; reinforcing all public bodies' legislative duty to:-

- Eliminate discrimination, harassment and victimisation
- Advance equality of opportunity between different groups
- Foster good relations between different groups

As well as being a legal requirement, Equality Impact Assessment (EqIA) are an effective way of identifying the needs of the community.

The potential impact on all groups and individuals covered by the Equality Act 2010 must be considered when authorities are planning, revising or considering reducing / terminating service, policy, function, strategy or project.

The trigger points for screening for an EIA are:

- planning a new initiative (i.e. service, policy, strategy, function, procedure, project)
• making any moderate or significant changes to an initiative (including relocation)

Carrying out and EqIA: The Equality Impact Assessment should be taken into account in the early planning stages in order to ensure that any potential risks or issues relating to equality are identified as soon as possible.

Failing to pay due regard to equality and diversity when planning, amending or terminating an initiative can lead to a great deal of wasted time, effort and resources, not to mention prosecution if the outcome is proven to be unlawful.

When implementing an Equality Impact Assessment, some of the following questions should be considered. This list is not exhaustive but is intended to assist authorities when considering how the policy, strategy, project or function could impact on any particular group.

• What are you trying to achieve through the policy, strategy, project, procedure, service or function, and why?
• Who is intended to benefit from the policy, strategy, project, procedure, service or function, and how?
• Who will have responsibility for implementing the policy, strategy, project, procedure, service or function and how will this be done?
• Have you considered the appropriate terminology of the policy, strategy, project, procedure, service or function? Is reference to equalities explicitly?
• Does the policy, strategy, project, procedure, service or function comply with the Welsh Language Act 1993 and local authorities' Welsh Language Schemes?
• Will the policy, strategy, project, procedure, service or function be applicable to people of all ages, including younger and older people?
• Have you considered the diverse needs of disabled people with physical, sensory and mental impairments?
• Have you considered the diverse needs of those with other protected characteristics?