SUFFOLK DESIGN STREETS GUIDE

2020 edition

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FOREWARD

Suffolk is a fantastic part of the world. A great place to work, play and to bring up children. Rich in history, blessed by beautiful countryside and coastline, stimulated by our vibrant market towns and our globally significant industries. There is so much to be proud of but we must make sure that we are nurturing what is good and encouraging things that are new to be better again. That is why we have invested in the Suffolk Design initiative.

The places we create tell a lot about us and our priorities, they set the framework for our interactions with one another and help to or detract from people's health, happiness, and well-being. Good placemaking is more than many of us appreciate it to be and our streets are essential parts of our environment. Streets are more than just routes to travel or park, they provide places where people meet, areas for trees and other plants grow and support how our energy is conveyed for our homes and businesses. All these different elements need careful consideration as we look forward to a low carbon future and adapt to climate change.

Therefore, and in this context, a street design guide needs to be much more than a prescriptive guidance document. It needs to provide a basis for designers to interpret and deliver streets and places that reflect much broader objectives such as increasing social value, helping to achieve a low carbon future, ensuring better air quality and enhanced biodiversity. These are concepts that have not historically sat at the top of street designers ‘to do list’ but are absolutely an outcome of their endeavours and must be appreciated as part of the process.

Whilst this document spans more than just the network of footways, cycleways and roads; these are necessary building blocks to deliver the vision. They enable and facilitate mobility and affect the way people can live their lives. It has been written to support ‘inclusive growth’ - not just now but also into the future. It puts people in the centre of the design process and strives to appreciate the changing nature of mobility and the future demands of society.

We hope that the users of this document use it for what it was intended to do – keeping Suffolk special for the generations of the future.

CHAPTER ONE

INTRODUCTION

1 Introduction

1.1 Purpose

The purpose of this guide is to assist the delivery of well-designed places in line with the National Design Guide as part of the Suffolk Design initiative, enabling a positive contribution to the spaces and places of Suffolk. This document focuses on providing design guidance for streets, particularly for new residential developments, but is also relevant for works within existing streets and developments. In addition it can also act as a reference for commercial developments and urban regeneration schemes.

In 2019, every Local Authority in Suffolk declared or acknowledged a climate emergency. The design of streets has a pivotal role in reducing carbon emissions by prioritising walking, cycling and access to public transport and mitigating the effects of flooding through effective sustainable drainage systems.

The design guidance will provide details and principles of roads, cycleways and footways alongside other street elements. This document will have elements of a hierarchy, but ultimately promote the designer to think creatively about meeting the needs of users. The document provides guidance on both adoptable and private streets.

This document guides designers to produce unique street corridors and junctions for every location which correctly prioritises users. These corridors and intersections will allow for the required infrastructure within the highway boundary, whilst retaining flexibility for the master-planning process to support place-making and the requirements of specific sites. This guidance includes best practice examples and illustrative layouts for different locations and scales of development.

1.2 Report Context

Suffolk Design Street Guide is a bridging document between national guidance for streets and the Suffolk Highway Specification. Its role is to ensure the ten characteristics in the National Design Guide are considered in a street perspective, reflected in the specification, and ultimately resulting in the delivery of streets in Suffolk. There are elements of overlap between various design guidance documents and Suffolk Design streets guide seeks to incorporate these into a single source so that designers, other professionals, and communities are able to consider how streets can help deliver well-designed places specific for Suffolk.

Design documents, including the emergent Suffolk Design Charter, include an over-arching commitment to good design and key themes and characteristics. As part of the Suffolk Design initiative, a Design Management Process is being formed to assist with the various design stages, particularly before planning applications are submitted. Characteristics of good design, such as those in the National Design Guide, allied to clear stages can act as a check list to help track design decisions and are key throughout all stages of design. Many of these characteristics of good design can be enhanced through good street design.

On the other end of the spectrum sits the Highway Specification and standard construction details. This covers all aspects of specification and construction for streets to be adopted, enabling designs to be delivered in a way that is appropriate for Suffolk.

Suffolk Design Streets Guide sits between these ensuring a strong link remains between the over-arching principles and the ability to deliver good streets and places. Local Planning Authorities might independently incorporate this guidance at various stages of the planning process.

1.3 Structure

This design guide is split into four key chapters:

The opening chapter introduces the challenges that the guide is designed to address, identifies the scope and purpose of the document, and provides reference to key policy and guidance framework within which the guide sits.

Chapter 2 covers the principles of design and how they should be interpreted across Suffolk. This chapter exposes users to the design mentality for designers to adopt and provides the 'building blocks' of good street design. It takes a user's approach to design (bottom up), rather than a prescriptive hierarchical approach. It promotes and encourages the designer to explore and develop concepts whilst providing prescription where required and references wider guidance which might provide additional detail.

Chapter 3 examines movement frameworks and street typologies. Creating movement frameworks is the process in which this guide uniquely priorities users, by ensuring that each users movement are considered first in isolation, before then being considered in the context of the other users. Street typologies take the principles of good street design previously set out in chapter 2 and provide examples of how designers can interpret and integrate different features into streets to respond to the user's needs.

Chapter 4 exists to ensure that the designer's choices, as guided by chapter 3, aligns with the over-arching design principles defined in chapter 2. It allows the designer to be self-critical, whilst also introducing processes that will be required to support the proposal of new streets. It provides spaces to re-examine and critically assess elements such as sustainability, carbon impact and technologies to ensure the design is both flexible and resilient to future demands. This chapter should act as a reinforcing loop, prompting the designer to re-examine the principles, movement framework and street typologies again. It is not considered the final stage of the process but rather a useful tool to utilise and reference during the construction and adoption process, as well as potentially part of long-term monitoring.

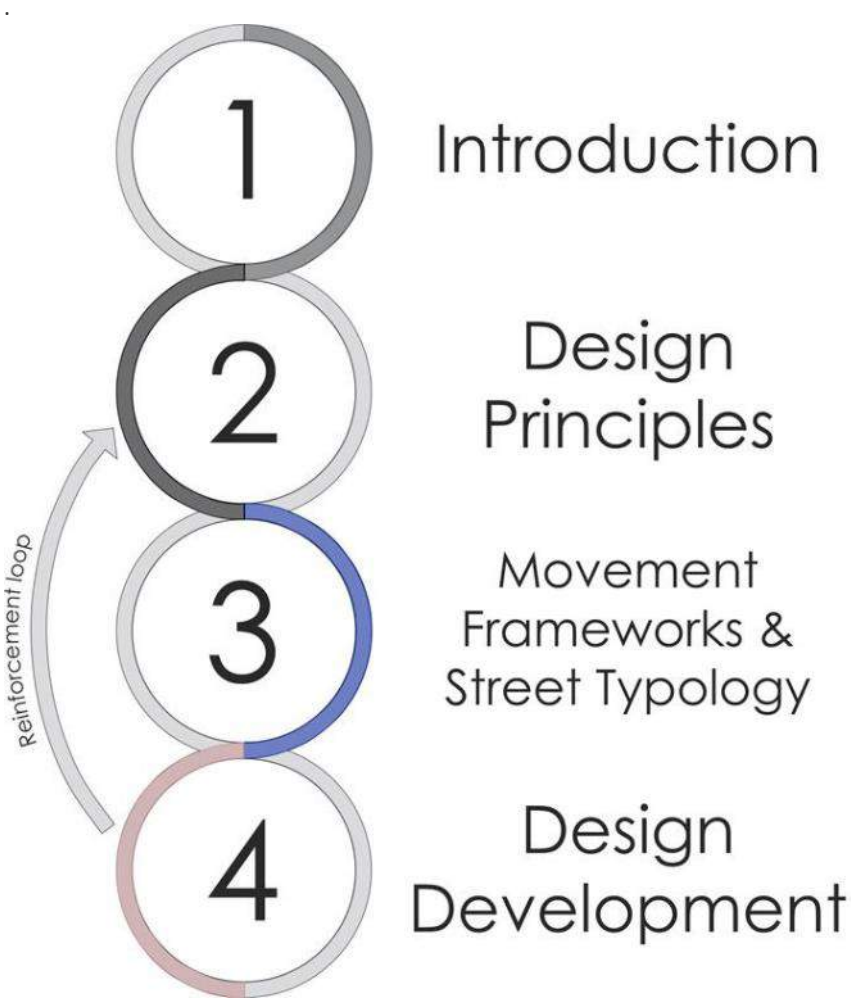

Figure 1 - Chapter Flow

1.4 The Suffolk Design Management Process

Suffolk Design is a long-term initiative to help to embed high quality design in future developments in Suffolk. It exists to support delivery of high-quality, functional places, ensuring Suffolk delivers the communities we want rather than just building homes we need.

The Suffolk Design Management Process (referred to hereafter as the SDMP) has been developed through a series of engagement workshops with local authority planning teams (including Highways and Floods) and housebuilders. This was also in addition to community discussions with parish councils, Suffolk Association of Local Councils and housing and community leads across Suffolk.

The SDMP is an 11-step process and has been incorporated into the street-specific table below. The overarching SDMP is currently being formed and will be appended to the final version of this guide.

Initiated as a local authority piece of work the SDMP will only deliver on the outcomes through working in partnership with our communities and the wider development industry. Details of all background research, topic papers, engagement events and the on-going development of our long-term approach can be found on the Suffolk Design Website.

The SDMP has been developed with and for officers from across Suffolk, utilising a range of specialisms and service areas and describes "how we get there". It sets the processes and behaviours that should be adopted as the norm across all Suffolk local authorities in considering design as part of the wider development process. The aim is for it to be used, as appropriate, on every major application, delivering a consistent design management system for Suffolk.

From the outset of this work, one of the overarching themes was consistency. All stakeholders are looking for consistency in the process: whether it is officers, councillors, members of the public, developers or anyone else involved in or impacted by development.

Consistency helps to set expectations, allocate resources efficiently, and gain an accurate and effective understanding of what needs to be done, when and by whom.

The SDMP aims to reflect the varied nature of development in Suffolk, and to be a document which changes expectations. It aspires to more open communication leading to a collaborative approach to place shaping.

1.5 Suffolk Design Management Process for Streets

Streets are an integral part of delivering high quality, functional places and their development is fundamental to a successful design management process.

Using the SDMP as a tool, Suffolk Design Street Guide aims to bring about:

- An improvement of the design outcomes of new developments, from small-scale extensions to new garden communities.
- An alteration of existing travel patterns to more sustainable modes, such as in and around urban neighbourhoods.
- Reduction in the long-term maintenance and carbon cost of transport networks in Suffolk.

In Figure 2 below, the 11-step process laid out in the SDMP has been brought forward and the key actions associated with delivering streets plotted against them. The Suffolk Design Management Process for Streets should be referred to by designers throughout the project and could be considered as a checklist, where the designer can ensure they have undertaken the expected dialogue with the LPA and community as well as completing their key actions before progressing to the next stage.

DRAFT Suffolk Design Management Process (SDMP): for Streets

Section	First steps *(Local Plan Allocation process may take place between 2 & 3)*		Pre-App Process *(Iterative, non-linear process Timeframes set according to PPA)*				Decision-Making			Post-Decision	
Stage	1 Inception	2 First Formal contact	3 Setting / Agreeing PPA	4 Detailed Site Analysis and Design Principles	5 Design Evolution	6 Informal Opinion	7 Submission and statutory process	8 Decision, Conditions, Obligations	9 Pre-construction design audit	10 Construction	11 Completion / Post Completion
Key Outcomes for Streets	• Setting the Context • Identifying Users • Existing Street Functions (e.g. including PRoW)		• Opportunities for streets beyond the site identified • Draft Movement Framework (addressing inclusivity etc.) • Initial Access Strategy (including PRoW) • Scope of Transport Assessment / Statement agreed • Use of conditions/s.106 for delivery of streets Use of conditions/s.106 for delivery of streets				• Movement Framework developed into detailed street and junction schedule and prepared for submission • Conditions associated with street addressed • Technical approval process complete			• Successful inspections of adoptable highway works • Completion of management period	
Applicant-LPA Dialogue/Actions	❑Wider PRoW reviewed ❑Local context of streets to be identified ❑Consider how streets can impact the sites sustainability ❑Key routes to schools and local services	❑Design Access Draft	❑Infrastructure Contributions Head of Terms ❑Street functions explored ❑Street users identified	❑Draft Movement Framework ❑Draft Highway Drainage Strategy ❑Utility strategy ❑Street Lighting strategy	❑Movement Framework ❑Highway Drainage Strategy ❑Street Typologies Developed ❑Materials identified ❑Construction access considered and detailed in the construction management plan	❑Maintenance / Management Strategy Drafted	❑Consultees formal input	❑Revisit suitability of infrastructure improvements within local area ❑Planning Conditions for streets identified and addressed	❑S38/S278 applications submitted ❑Sewers offered for Adoption ❑Major Road Network Construction Bids ❑ Street and Junction Schedule complete ❑Designers Questionnaire Complete ❑Traffic Regulation Orders and Public Right of Ways submitted	❑Legal agreements signed (i.e. S38, S278 S104)	❑Complete Maintenance Period
Decision Maker Actions			❑Alignment with wider strategies ❑Internal Services (Waste, Leisure, Education, Affordable Housing) ❑Public Transportation Requirements identified	❑Highway Authority involved at Design Workshop		❑Highway Authority input ❑Lead Local Flood Authority input ❑Public Transport input ❑Public Rights of Way input ❑Crime Prevention through Design input			❑Technical approval process complete	❑Site visits from officers to assess construction progress against Design Checklist ❑Highway Inspection Works undertaken	❑Take on formal maintenance of Highways
Community Involvement	❑Local streets input through the emerging Neighbourhood Plans			❑Identify specific and local users around the site ❑ Parish and Town councils to promote local highway wants and needs ❑Contribute to draft movement framework ❑Community-based management options identified ❑Public Transportation Requirements identified ❑Confirmation Neighbourhood Plan objectives and incorporating infrastructure (highway and service)	❑Consultation events ❑Community representative's attendance at key meetings ❑Confirm maintenance commitment		❑Formal statutory public consultation			❑Named officer available for contact	

Figure 2 - Suffolk Design Management Process (SDMP) for Streets

1.6 Context

1.6.1 National Context

Manual for Streets

The publication of Manual for Streets (MfS) in 2005 was a watershed moment in street design. Prior to MfS, there was too much focus on movement with the facilitation of easy car-based access, often to the detriment of all other users and the quality of life within a street setting. MfS was underpinned through research that demonstrated the benefits that came about from prioritising other users and recognising their role in creating places for all members of community.

It challenged many previously well-established working practices that were failing to produce good-quality outcomes, and asked designers to 'think differently'. It emphasised the importance of collaboration on all levels between various stakeholders. Though there are many examples of high-quality street design to have come about since MfS was released, there are just as many streets which continue to be designed predominantly around cars. This is a challenge which Suffolk Design for Streets aims to overcome, by providing clear and specific guidance on how MfS principles can be applied on Suffolk streets.

The creation of this distinct character requires designers to consider buildings, streets and spaces in equal measure. Only when this is done, can places that nurture and contribute towards creating local communities be formed.

MfS provided a framework for use with local systems and procedures and identified tools and processes to ensure that changes and growth are adequately planned for and managed. It did not set out new policy or look to add additional burden to stakeholders; rather it presented a guide/philosophy/strategy to do things differently.

A Housing Design Audit for England

Overall, the intent, contents and evidence supporting Manual for Streets is being used throughout Suffolk. However, as The Housing Design Audit highlighted, there are has been a failure for the principles laid out in MfS to be effectively implemented in many settings including in Suffolk.

The Design Audit identified that too many road layouts are being approved that do not fully account for pedestrians and cyclists. The report concluded that over three quarters of development surveyed should not have received planning permission due to sub-standard design.

The lead author, Professor Matthew Carmona, when interviewed, urged the Government to make mandatory its own advisory Manual for Streets, which says: "Streets are not just there to get people from A to B. In reality, streets form vital components of residential areas and greatly affect the overall quality of life for local people"[1].

The Design Audit was carried out, in order to remove that disconnect and create the change laid out in MfS. It also provided other recommendations such as a desire for national guidance on the adoption of trees and other landscape elements by local highway authorities. Change is more urgent than ever, and Suffolk aims to be at the forefront of enabling this change. In 2019, every local authority in Suffolk declared or acknowledged a climate emergency and are working with partners to be the greenest county in the United Kingdom. This pressure of change is coming from the wider public. A government poll suggested that 76% of people think that, for the sake of the environment, everyone should reduce their driving. This is up 13% from just two years earlier, as the public concern rises following media coverage of climate change and air pollution[2].

[1](Harrabin, 2020)

[2] (DfT, 2020a)

Wider Context

In October 2019, the Government released the National Design Guide. This seeks to support the design objectives within the National Planning Policy Framework, setting out 10 characteristics of well-designed places. The 2020 White Paper, Planning for the Future, clearly expresses the Government's view that more focus needs to be made to design, and advances the use of binding design codes and masterplans to deliver large scale developments as well as locally prepared design guidance. There is also to be an updated Manual for Streets and the establishment of a new expert body on design. Whilst some of the parameters might change, resulting in some future amendments, there is a clear direction that better design needs to be achieved through design guidance such as Suffolk Design Streets Guide.

This guide builds on these characteristics and introduces a wider scope of national policy and guidance to underpin the design principles introduced. These included but are not limited to:

National Planning Policy Framework, specifically;

- **Chapter 8: Promoting healthy and safe communities**
- **Chapter 9: Promoting sustainable transport**
- **Chapter 11: Making effective use of land**
- **Chapter 12: Achieving well-designed places**
- **Chapter 14: Meeting the challenge of climate change and flooding**
- **Chapter 17: Facilitating the sustainable use of minerals**

Manual for Streets

Manual for Streets 2

The SuDS Manual

Secured by Design

Inclusive Mobility

Guidance on the use of Tactile Paving Surfaces

Traffic Signs Regulations and General Directions

Traffic signs manual

Buses in Urban Developments

Government Policy Papers Specifically:

- **Gear Change: a bold vision for cycling and walking**
- **The Inclusive Transport Strategy: achieving equal access for disabled people**
- **Decarbonising Transport: setting the challenge**

Design Manual for Roads and Bridges (DMRB) – *of significance where streets form part of the Major Road Network or are classified*

Specific DMRB guidance will also provide guidance at a local streets level, specifically;

- **CD 143 - Designing for walking, cycling and horse-riding**
- **CD 195 - Designing for cycle traffic**

Local Transport Notes, specifically:

- **LTN 1/20) Cycle Infrastructure Design (LTN 1/20)**

1.6.2 Suffolk Context

Although this document intentionally sits between the National Guidance and Suffolk Highway Specification, it takes guidance and aligns with a much wider pool of Suffolk documentation and policy. These include:

Suffolk Local Transport Plan

Suffolk Travel Plan Guidance

Suffolk Flood Risk Management Strategy

Highway Maintenance Operational Plan

Suffolk Guidance for Parking, Technical Guidance

Suffolk Constabulary Residential Design Guide

1.6.3 Local Planning Context

Suffolk is a two-tier area with the following five district and borough councils and the Broads Authority working with the County Council:

Babergh and Mid Suffolk District Councils;

East Suffolk Council;

Ipswich Borough Council, and

West Suffolk Council

All of the above-mentioned councils have been involved with the formation of this document and their valuable contributions were included in the compilation of this guide. District Local Plans, examples and other documentation that exists within all authorities was also used to understand specific local context.

Each Council is faced with their own unique constraints and specific landscape for development, this guide looks to complement existing literature on the local level both now and going forward. It is designed to be flexible enough to help in all contexts and improve the design outcomes for developments, whether that be small scale rural sites, through to large new 'Garden Communities'.

1.6.4 Neighbourhood Context

Neighbourhood Plans are a significant part of the planning process and give communities control over the nature and location of developments within their area. Neighbourhood Plans across the county include a range of policies covering topics affecting streets including flooding and water management, natural environmental, public right of way networks and transportation.

Suffolk Design for Streets provides a broad set of guidance which Parish Councils and local groups can use to understand how the design of streets can assist them to achieve better outcomes, and what sort of requirements they might wish to apply to realise this. This will be of particular relevance in the development of future Neighbourhood Plans, in order to ensure quality and consistency in neighbourhoods across Suffolk.

1.7 Designing for Suffolk

1.7.1 Development Setting

As you travel through Suffolk, the beauty and variant character of the place is evident. It boasts over 50 miles of coastline, uniquely quaint villages and medieval market towns rich in history and culture. The larger towns, such as Ipswich, Lowestoft, Bury St Edmunds and Sudbury, are economic and cultural centres that need access to their hinterlands and onward to Cambridgeshire, Essex, London and Norfolk.

In building new places, an understanding of how they fit into the existing fabric and the varying, yet quintessential, characteristics of Suffolk is necessary. Most development coming forward will be fairly dense but vary in scale and this will vary greatly depending on the specific context. These can broadly be grouped into three main categories for the context of this guide, and this will indicate where features and typologies may need to be given more emphasis.

Urban – Dense housing with moderate levels of activity

Suburban – Medium to dense housing with low to medium levels of activity

Rural - Low to medium density housing with low levels of activity

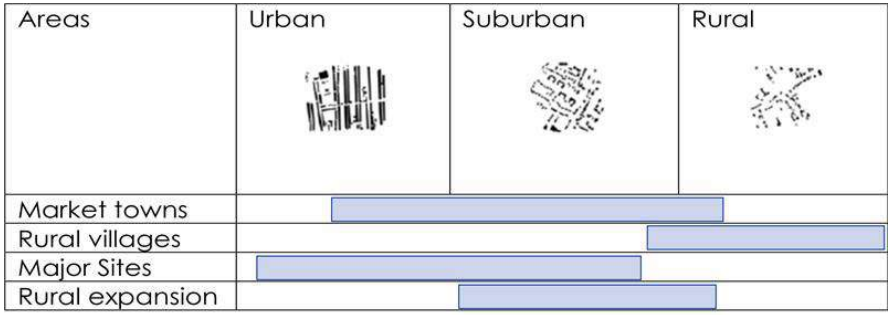

Figure 3 - Development Form

It is important to understand these definitions are only to identify and highlight important characteristics. The grouping could be viewed as a scale and developments do not have to sit solely in one place, but have elements of both urban and rural in them. Figure 3 below explores how places in Suffolk both present and future will likely sit on this scale.

1.7.2 Geography

Development has always centred around key geographical features. From historical perspectives, such as rivers and mineral resources, to more modern features, such as employment hubs or transport corridors. Sites need to understand and relate to these features as well as their setting in the landscape and overall benefit to nature.

1.7.3 Site Integration

Suffolk is steeped in a rich history and the past will often explain how features and street layouts came to be. Designers should spend time understanding this history, the connections and ways in which movement occurred, so they can best understand how to embed a development into the local fabric. Without this consideration, developments become isolated and barriers are created, restricting future movements. Designers must demonstrate how these future routes are not only allowed but encouraged, allowing the development to become part of the community.

This history should also guide the design tools and materials pallet, paying homage to local materials, craftsmanship and reflecting existing local character. However, places always evolve, and developments should be designed for the benefit of its current and future inhabitants. A careful balancing act is required between understanding a place's history and unique character and creating a new sense of place and purpose that can be readily maintained. All developments should have an aspiration to create a sense of unique character; no matter how small it may be.

1.8 Sustainability in Streets

Streets need to be designed in such a way that they can be responsive to their environment and help us to confront future challenges, such as climate change, extreme weather and an ageing population. Sustainability In streets need to be considered at all levels, from helping to contribute towards the UN sustainability goals to providing residents with opportunity to live a healthier, active and sustainable lifestyle.

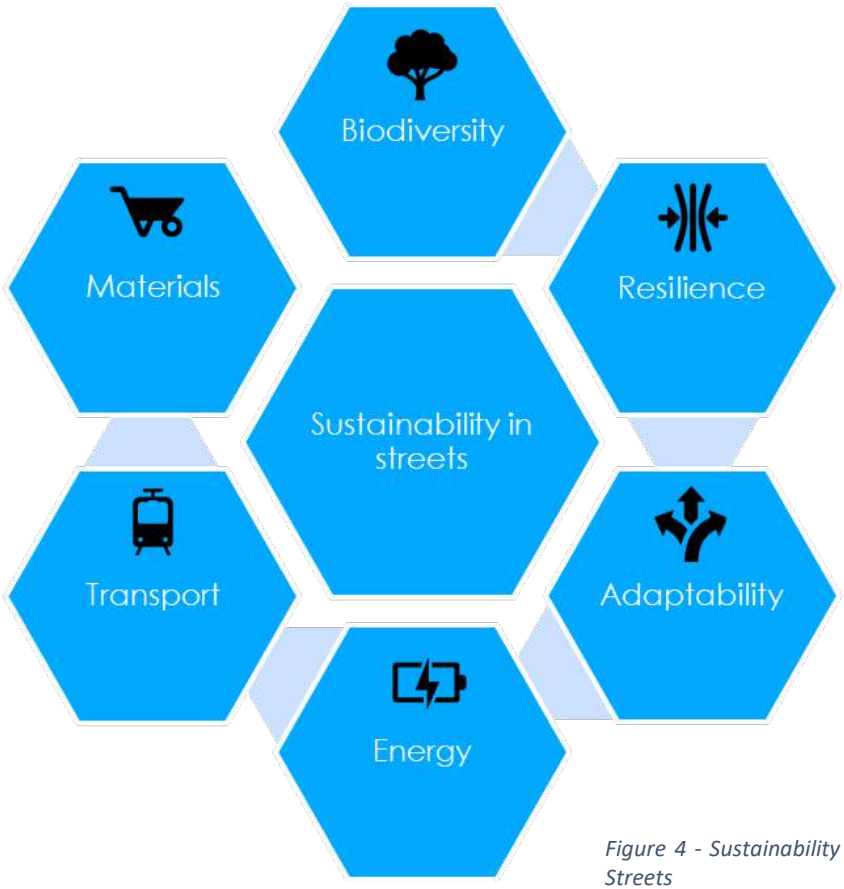

Figure 4 - Sustainability in Streets

Suffolk promotes the environmental benefits of good streets that ultimately provide us with healthier, cleaner, quieter, and safer places. The quality of the street impacts on how people use it and their wellbeing. To do this Suffolk considers the opportunities for increasing sustainability through streets in six key areas: Biodiversity, Resilience, Adaptability, Energy, Transport, and Materials.

Biodiversity - Green corridors, trees and vegetation provide reductions in urban noise, provide shade and reduce temperatures, increased personal well-being, opportunities for pollinators and increase biodiversity. Planting can be proposed both within the highway corridor or adjacent to it. Opportunities also exist to increase biodiversity using sustainable urban drainage.

Resilience – Streets will need greater resilience to deal with the challenges of climate change and the extreme weather associated with it. Increasing urban resilience must always be considered on both a macro and micro level. At the macro level new places and streets add stresses to existing networks, such as highways and drainage. It must be ensured that these systems are resilient enough to cope with any additional demand. On the micro level designers must consider how the physical form, such as street layouts, orientations, and geometry impact urban resilience.

Adaptability - The physical structure of places are long lived and often serve functions that were unconceived at their conception. It is not possible to fully understand the requirements of places in the future, but it is important to consider their adaptability within their current function. The consideration of future technologies and current trends can give insight as to how streets may be used in the future.

Energy – Streets require energy to adequately meet their need. Suffolk County Council has worked in recent years to reduce the requirements of streets by installing LED lighting across the Highway network. Suffolk County Council has engaged with research and trials of smart streetlights which also function as car chargers and Wi-Fi hubs. Designers should look to reduce the energy needs of streets whilst catering for new opportunities and functions.

Transport – Enabling mobility is a key function of a street, but transport currently accounts for an estimated 33 percent of carbon dioxide emissions[3]. Streets will need to be designed in such a way to promote active travel and sustainable transport users. This will ultimately reduce congestion, improve air quality and public health.

Materials - A street needs to be durable and the materials that typically go into making that possible often have high embodied carbon. Therefore, wherever possible Suffolk County Council will look to use recycled materials with low embodied carbon that are highly durable. Developers should refer to the highway specification which is regularly updated to reflect the latest acceptable materials for adoptable highways; however, the County Council will consider other and new materials for such streets on their merits, where appropriate.

[3] (Depart for Business, Energy & Industrial Strategy, 2019)

CHAPTER TWO

DESIGN PRINCIPLES

2

2 Design Principles

The following principles are drawn from a wide pool of evidence and resources. This section provides the principles of the street to the designer, that is to say, the core values that underlie each element of the street. It takes a user's approach to design, rather than a prescriptive hierarchy. It promotes and encourages the designer to explore and develop designs that respond to user needs and circumstances, yet with the specific guidance on matters which need to be adhered to when designing in Suffolk.

This section takes on key principles that were established in Manual for Streets (MfS) but ensures that they are still relevant for the challenges faced today and those specifically faced in Suffolk. It also explores in greater detail street typologies and considers how streets will need to be adaptive for the future.

2.1 The Function of Streets

In the context of this document a street is defined as a public thoroughfare in a built environment which has a public realm function. They can be both adopted by the highway authority or private and can cater for a variety of different users.

Streets are considered to have five principal functions:

- **Place**
- **Movement**
- **Access**
- **Parking**
- **Utilities**

All the functions are interlinked, yet often conflict with each other and compromise the priorities of each other. A street is ultimately defined from the complex interplay between these functions.

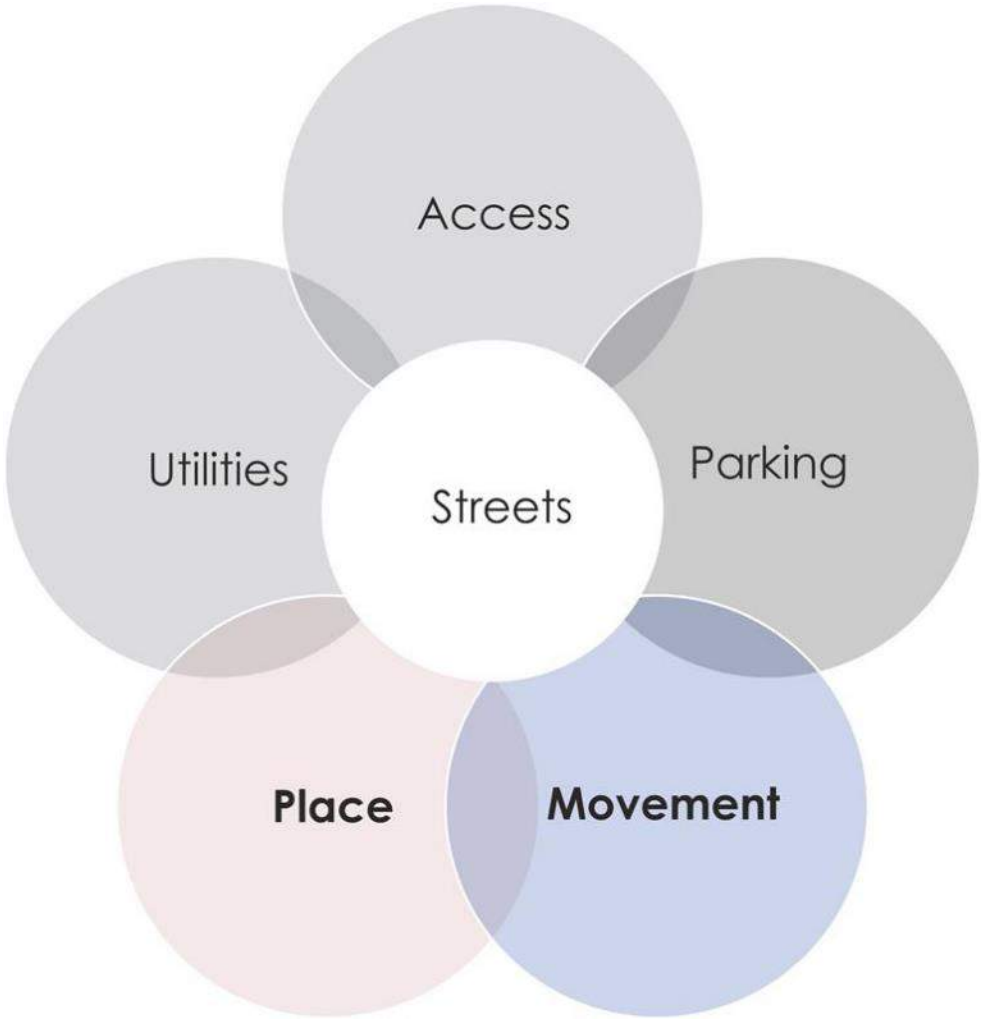

Figure 5 – Street functions

Place and movement are often considered the most important of the principles when determining the character of the street. Very active streets often have a strong sense of 'place', but also perform a key movement function, with the two in constant competition. in this way, they can be considered on a sliding scale between movement and place.

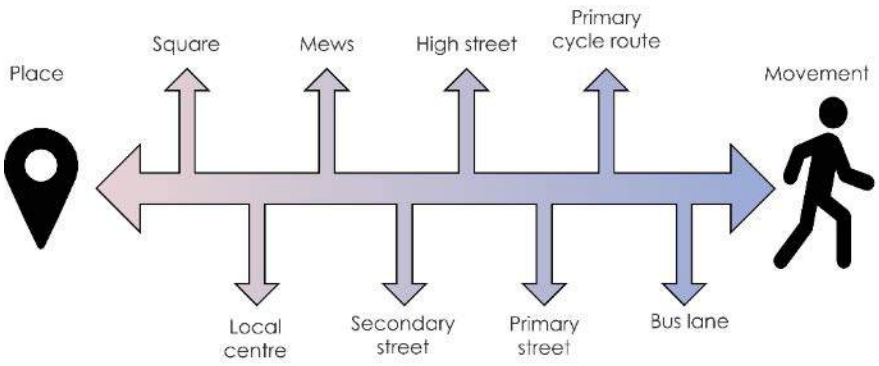

Figure 6 – Movement vs Place

On this scale, 'typical street types' can be positioned to understand how places should be performing on the metrics of movement or placemaking. In the past words such as 'Movement' would too often be viewed from a vehicular perspective and 'Place' from a people's perspective. This has led to the marginalisation of other users when considering mobility, restricting the ability to make better places because of the pressures that occur owing to the prevailing car-centric approach. This design process is about incorporating all users and not about disadvantaging drivers, although compromises are likely to be made so that streets can be used by all safely and efficiently

Designers need to consider not only movement and place but also the variety of users. This requires deeper consideration to the proper functions of the street to consider users' vulnerabilities. This is considered again on a sliding scale where users have a level of vulnerability.

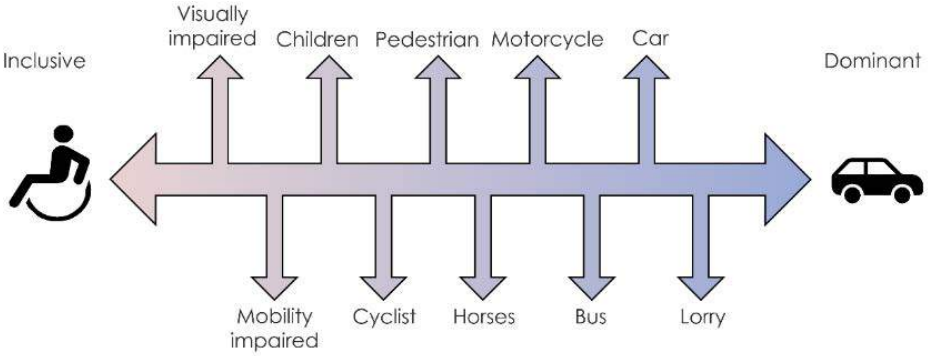

Figure 7 - Inclusive vs Dominant

Acknowledging and designing for dominant users is a necessary consideration of design, as the effective management of these users in the street scene ultimately allows for greater protection for vulnerable users, resulting in more inclusive design.

This simplistic approach allows us to identify and consider the true extent of street users. Streets must be designed in consideration of all these users and designers need to undertake this element of critical thinking.

2.2 Understanding Function

So far this guide has explored the spectrums of **place vs movement** and **inclusive vs dominant**. It is in the interaction between these scales where conflict occurs, and genuinely good design is distinguished from poor design.

Figure 8 illustrates how streets work within both spectrums. At the intersection is where streets with the greatest number of constraints and complexity exist. These streets are not to be avoided but designers need to acknowledge the complexities associated with them and ensure that adequate provision and flexibility are integrated into the design.

Designers may use the principle of the graph to test the street layout against their original intention, questioning whether the proposal aligns with the intention. It could also be used to understand the role of existing streets. Plotting on the current position and identifying how any proposals may change their function and positioning on the graph.

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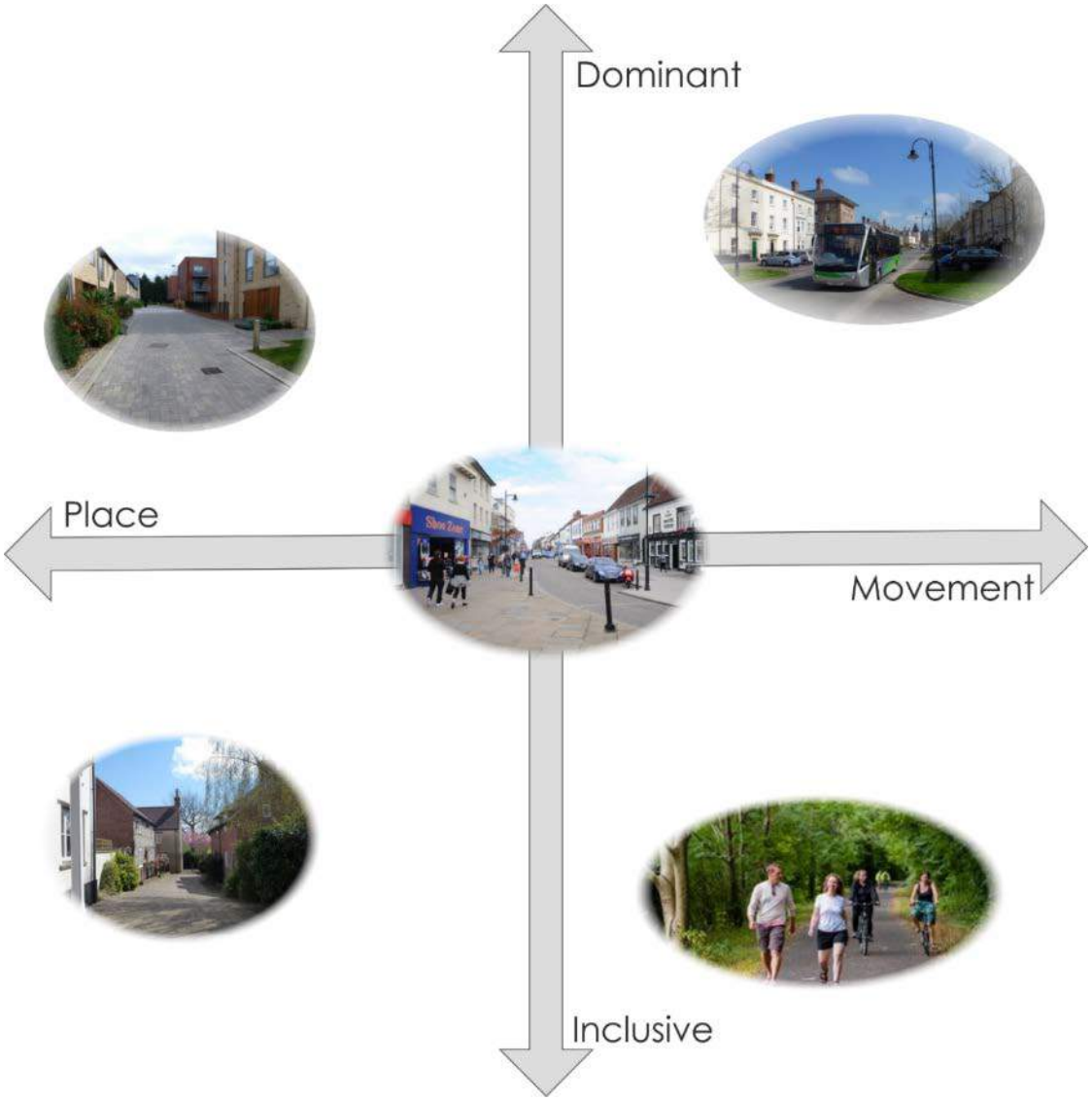


Figure 8 – Understanding Function

2.3 Designing for Users

Street design needs to be inclusive albeit noting that different circumstances require a different design response. This means design providing for all people regardless of age or ability. There is a general duty for public authorities to promote equality under the 2010 Equality Act.

Figure 9 summarises the various types of street users and how they can broadly be grouped. By grouping in this way, it becomes possible to explore the various requirements for different street user and various types of vehicle. The core groups are pedestrians, recreational users, public transport users, cyclists and vehicles. Within each of these groups there is another level of users. Some of the second-tier users appear in multiple user groups, such as children. It is important to note that these users are often the same people who simply make different choices on how to travel, based on the journey being made and the circumstances around that journey. To reduce conflict between users and increase inclusivity, this must be acknowledged.

The list of users within Figure 9 is not exhaustive, but instead chosen when they need specific design consideration within streets. For instance, streets must consider children when designing for pedestrian, cyclists and recreational users, as their inclusion will alter the design, but they are not included within public transport and vehicles because they do not fundamentally change the design principles, even though they may use them as passengers.

Within all categories, the designer will need to design for inclusivity. Where streets cannot avoid preventing certain users accessing them, suitable alternatives must be provided. Suffolk's ageing population will result in more vulnerable users, suffering with conditions such as dementia. Yet the street itself presents the opportunities to assist with this and other conditions by providing familiar features, as well as opportunities to socialise and exercise. Walking and cycling are important physical and mental exercise for people of all ages and help people to live independent lives.

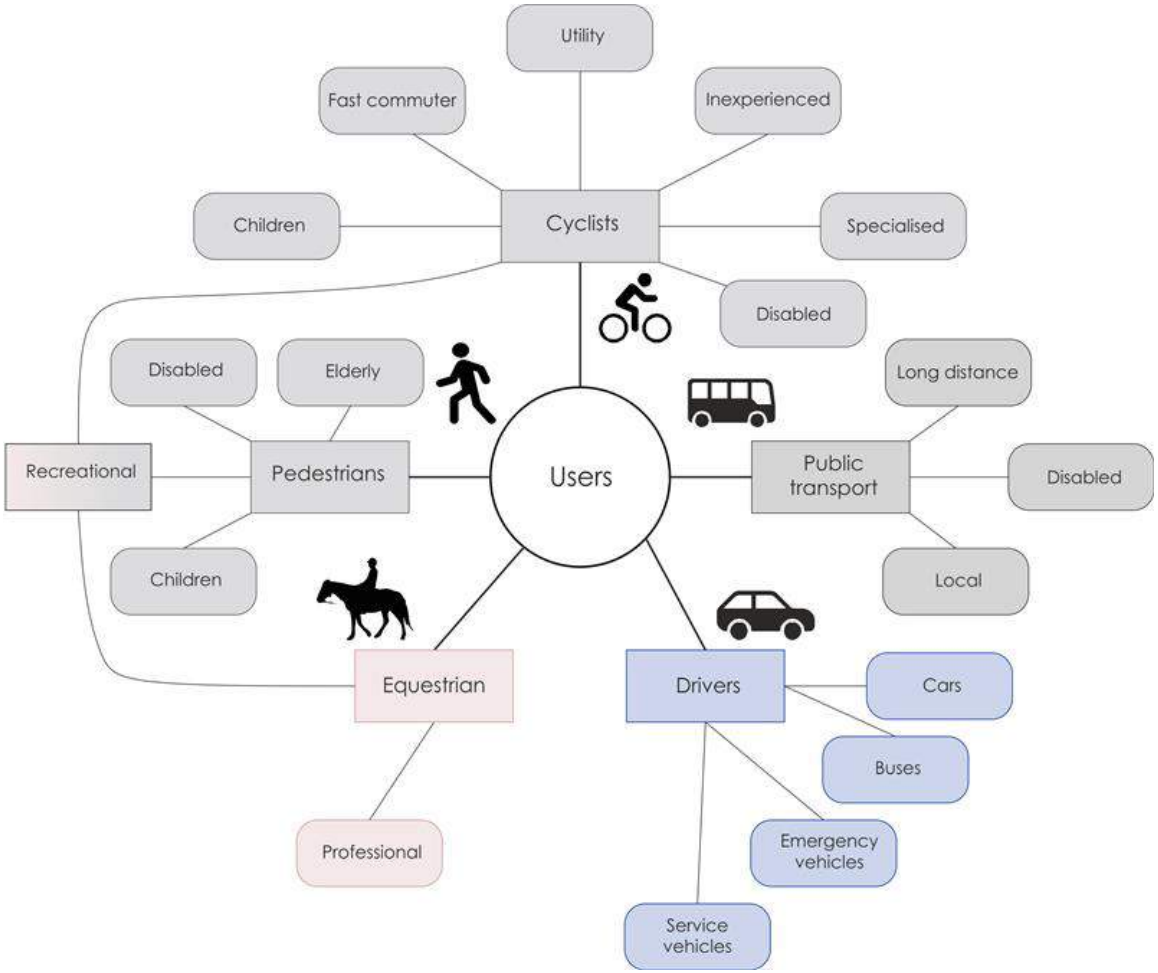


Figure 9 – Street users

2.3.1 Pedestrians

Pedestrians are people of all ages, sizes and abilities. Therefore, the design of streets needs to satisfy a wide range of requirements. The designers will also need to consider vulnerable pedestrians with mobility or cognitive impairments. Wheelchair users and people using prams/pushchairs are also considered pedestrians.

The key objective is to create 'Walkable' places, which in this guide is defined as "suitable or safe for walking. In the UK, in 2017 walking accounted for 81% of all trips under one mile. This dropped significantly to 30% for trips between 1 and 2 miles, with the majority then being undertaken by car[4]. Interestingly, in the British Social Attitudes Survey, 41% of respondents agree when presented with the statement "Many of the journeys of less than 2 miles that I now make by car I could just as easily walk"[5]. Good permeability with infrastructure that provides both a safe and pleasant journey for pedestrians ensures that walking is a viable option and encourages those who could have just as easily walked, to do so.

Pedestrian routes are to be considered first and must be considered both within the site boundary and the surrounding area. The designer should consider in detail how routes to local amenities such as shops, schools and public transport are achieved. Safe pedestrian access to schools are pivotal in reducing vehicular movements around schools, improving air quality, and promoting sustainable forms of transport for children and their escorts. Designers should be looking to link developments into the existing pedestrian networks and public rights of way beyond the site, so that new developments or schemes become fully integrated and connected.

Distance and time spent walking are key in the design of pedestrian routes, with 10 minutes or 800m often cited as 'walkable'[6]. However, this is not the only consideration that pedestrians consider. They must also feel stimulated by their surroundings, whether that be the architecture or landscaping. They need to feel safe from vehicles and have a sense of personal security. A narrow pathway with close boarded fencing is not attractive users and is likely to encourage anti-social behaviour, this will discourage use and not create a sense of place. Designers should identify all key pedestrian routes and assess them from both a distance and user experience point of view. There should also be a focus on providing pedestrians with an unobstructed experience. This means minimising obstructions (from signage, telecommunications equipment, speed cameras etc) and making adequate space allowance for any street furniture. They also need to be smooth and free from any trip hazards.

[4] (DfT, 2018a)

[5] (DfT, 2018b)

[6] (DfT, 2007)

2.3.1.1 Inclusivity

Designing inclusive streets for pedestrians requires the designer to fully understand the users and how different disabilities present various design challenges. These challenges can be broadly grouped into visual impairment, impaired depth perception, colour agnosia hearing loss, strength and stamina and relevant dementia challenges.

All streets need to be inclusive; however, designers should consider the local context and development specifically to understand if the street or pedestrian route has or may have a higher number of vulnerable users than typical and design accordingly.

The traits of inclusive streets and pedestrian are **familiar, legible, distinctive, accessible, safe and comfortable.**

Familiar streets are easy to recognise and understand. New streets could look to incorporate local forms, styles, and materials.

Legible streets allow for easy navigation, reducing confusion and uncertainty. This requires street networks that are well-connected with relatively short streets. This is complimented by use of clear signage which is required by law. The use of discretionary signage should be minimised where possible. street furniture and street objects should not create clutter or hazards along the street corridors.

Distinctive streets are greatly affected by the surrounding urban form. Good place making should look to always include distinctive features which reflects the local character. As well as developing inclusive routes within sites for pedestrians' designers should also look to enhance and improve links to the local public right of ways (PRoW).

Accessible streets should ensure clear widths and gently sloped gradients wherever possible. The gradient should be between 1:60 (1.7%) and a maximum of 1:20 (5%). Any gradient that is proposed to be steeper than this will need to be agreed with stakeholders and comply with the accessibility requirements. Regular opportunity for rests are vital to ensuring users are comfortable and steps shall be avoided unless provided as an additional more direct route for able bodied users.

Steep transverse gradients shall also be avoided particularly in areas where private access is provided across footways or cycleways. Where tactile paving is required it shall be provided at all crossings in accordance with the 'Guidance on the use of Tactile Paving Surfaces'.

Safe streets should have a sense of personal safety, routes should be overlooked where possible from neighbouring properties. Non-primary routes hidden from view should be avoided. Lighting also has a role to play in creating safe environments. Designers should also refer to page 32 Crime prevention through environmental design (CPTED).

Comfortable Streets should provide regular stopping opportunities for users and be enjoyable and stimulating for all.

2.3.1.2 Crossings

Crossings for pedestrians need to be located as close as reasonably possible to desire lines. This results in pedestrian crossings being required in proximity to junctions. Control of vehicle speeds to avoid hazards to pedestrians needs to be considered as a fundamental item early in the design process.

Informal crossings can be provided in a large variety of forms. They indicate, through the geometry and the materials used, that various types of users may be present and encourage awareness and reduce vehicle speeds. These types of junctions require early consideration in the design process to understand the user type and design speeds involved. They promote a greater sense of place and generally provide a higher level of priority to pedestrians. They are suitable for lower speed streets and where there is a greater emphasis on place making.

Formalised crossings either use road markings or signals to allow pedestrians to cross. For instance, zebra and tiger crossings are a formalised crossing that minimises the delay for pedestrians and cyclists. These can be effectively deployed in specific locations such as near schools or major pedestrian routes which interacts with a medium to low flow of vehicles. For older residents they provide a greater level of surety by having the potential to have control over the traffic when using a signalised crossing.

They can be used to good effect within existing streets but should generally be designed out within new developments by correctly managing users, priorities and by promoting the use of informal crossings where appropriate. The developer should engage with Suffolk County Council where any formalised crossing is proposed to ensure its suitability.

2.3.2 Cycling

Cycling is expected to grow significantly as a modal share for many journey purposes in the future, with the government targeting a doubling of the number of trips undertaken by bike[7]. Currently within Suffolk, only 13.8% of the population cycles at least once a week. This is marginally above the average for the UK but significantly below areas such as Cambridgeshire and Oxfordshire. This variation shows us that local attitudes mindset and infrastructure play a huge role in encouraging cycling. Research shows the adage 'build it and they will come' argument holds true for cycling infrastructure[8]. Furthermore, increased electric bike use is replacing journeys that otherwise would have been made by car [9].

Cycling should be promoted due to the well-publicised health benefits. These health benefits have been shown to greatly outweigh any consequences of cycling, such as injury and increased air pollution exposure from cycling close to vehicular traffic[10].

There are five core principles which summarise desirable cycling infrastructure:

Coherent: The network should serve main destinations, be direct and reduce delays. Signage and layout should be clear for users to understand.

Direct: Cycling should link people's journey origin to key destinations such as transport hubs, centres of employment, education, leisure and healthcare.

Safe: Risks should be reduced as much as possible and perceived safety needs to be high.

Comfortable: Smooth surfacing, direct routes, adequate width and continuity.

Attractive: Aesthetics, noise, facilities and secure cycle parking.

There are also different categories of cyclist such as: fast commuter, utility cyclist, inexperienced, child and specialised. All have their own design requirements. Yet, it is possible to cater for all of them within one piece of well-designed infrastructure. Therefore, if any design does not cater for one of these groups the designer should justify why they could not be accommodated.

[7] (DfT, 2020b)
[8] (Cervero, Caldwell, and Cuellar 2013 P102)
[9] (Jones, Harms and Heinen, 2016)
[10] (de Hartog et al., 2010)

2.3.2.1 *Cycling Strategy within Suffolk*

In 2014 Suffolk County Council released the Suffolk Cycling Strategy outlining the vision for cycling in Suffolk which *'looks ahead to a future in which cycling takes its place centre stage as a viable, and even preferable alternative to driving, supporting people's health and improving our environment at the same time.'* The strategy looks holistically at increasing uptake in cycling across Suffolk but furthermore highlights the importance of improving the cycling infrastructure within Suffolk.

Suffolk Spokes is funded by the County Council and provides a host of information regarding cycling in Suffolk and is consistently working with local councils and other organisations to help encourage people to cycle more often. Most importantly, they have mapped out the current cycling infrastructure across all the towns in Suffolk. When considering new streets all designers should refer to these maps, as they provide a snapshot of the current infrastructure provision. Designers must consider the quality of that existing provision (an audit may be required) and use the mapping to highlight where there may be a current lack of provision.

Designers should refer to specific cycling literature within each district where available. Currently, there is the Ipswich Borough Council Cycling Strategy Supplementary Planning Document and the Waveney Cycle Strategy. A Cycling and Walking Strategy is emerging in East Suffolk. In 2017 the Department for Transport released the Local Cycling and Waking Infrastructure Plan (LCWIP) which provides guidance to local authorities in developing specific LCWIPs for their region, designers should also use national route maps available from Sustrans.

2.3.2.2 *National cycling strategy and design guidance*

'Gear change: a bold vision for cycling and walking was released in 2020 by the Department for Transport. The document outlines the case for a step-change in the approach to cycling. Highlighting the various benefits of cycling, from improving air quality, combatting climate change, improving health and wellbeing, addressing inequalities and tackling congestion on our roads. It emphasises that the recent COVID-19 restrictions have presented a 'once in a generation chance to accelerate active travel'. It sets out the actions required at all levels of government into four key themes.

Theme 1 – Better streets for cycling and people

Theme 2 - Putting cycling and walking at the heart of transport, place-making, and health policy.

Theme 3 – Empowering and encouraging local authorities

Theme 4 – We will enable people to cycle and protect them when they cycle.

Alongside this, the Department for Transport has released 'Cycle Infrastructure Design' LTN1/20

. This provides detailed guidance on how to design for cyclists. It also provides 22 summary principles which help practitioners deliver high-quality infrastructure.

These recent changes to policy and guidance have pushed cycling into the forefront. They have provided far greater clarity to designers and lay out the pathway for radical change for walking and cycling. This document contributes towards furthering action on all four themes.

The design guidance published (LTN 1/20) will generally set the minimum expectation for cycling infrastructure being offered for adoption within Suffolk. This document provides further detail on how best to cater for cyclists specifically in Suffolk, for example, cycling in rural areas and consider how cyclists will interact with the various other road users within streets.

2.3.3 Public Transport Users

A good public transport provision requires:

- Accessibility for all users
- Short walks to stops
- High utilisation
- Frequent / reliable service
- Single transfer journeys
- Low capital and operating costs
- Low externalised costs
- High energy efficiency

In most developments public transport is provided in the form of an enhanced bus network. If this service is not properly considered and integrated, bus services have a tendency for a low level of service due to poor ride quality, low speed and restrictions. Therefore, a street design needs to mitigate these risks as much as possible.

The increased use of digital communications is changing how people access and pay for passenger transport. From 31 December 2020, bus operators are legally required to publish their timetable data. This will enable new technologies, applications and services that will help passengers to plan their journeys. Further technological improvements, from Covid-19 experiences, will provide bus capacity information.

The following chapter outlines the basic principles for an inclusive and successful public transport offering. For major and strategic sites which have a greater opportunity to improve the public transport designers should refer to Buses in Urban Developments.

2.3.3.1 Inclusivity

Buses present an opportunity to provide mobility for all, and due to their efficient use of space (when compared to cars) support the development of great places. The bus network therefore needs to provide good reliable connections from one area to another, but also ensure that access to services is optimised for all. The governments vision as set out in 'The Inclusive Transport Strategy' is for disabled people to have the same access to transport as everyone else. They will travel confidently, easily and without extra cost.

Roadside infrastructure for supporting bus services, such as bus stations and stops must be accessible for all. When new bus stops are provided or existing infrastructure upgraded, they shall be designed to SCC specification with disability kerbs. Bus shelters and real time indicators may be considered on high use routes. Pedestrian and cycling routes shall also be examined to and from local bus stops and stations to ensure accessibility, cycle parking may be required alongside bus stops to ensure an integrated transport network.

2.3.3.2 Walking distances to bus stops

A resident's willingness to walk to access public transport is access consideration for users. Therefore, routes to access public transport need to be walkable along suitable safe routes. This walkable distance has historically been cited as 400 metres from a bus stop. However, this neglects several factors which are known to effect bus patronage and does not consider the needs of various user groups[11]. This combination of promoting patronage and the bus as part of a journey is why the 400m walking distance is not suitable without justification.

When considering using public transport, users typically consider the total journey time, including both the travel time to the bus and the journey itself. Therefore, people are willing to accept a longer walk to reach bus services that are fast, direct and more frequent, especially when compared to car trips.

Yet Suffolk's elderly population is set to increase and a walking distance of 400 metres for these users may be restricting. This is also a similar case for people with buggies and shopping. If appropriate, current and future local demographic characteristics should be considered in the design process. This could apply when, for example, extra care housing is proposed in a local plan or within a masterplan for a new community.

Table 1 indicates the maximum walking distances for a variety of different settings and circumstances. These standards cannot be applied uniformly without considering the specific context.

Service and Situation	Maximum walking distances
Key bus corridor with frequent services	500 metres
Single high frequency route	400 metres
Less frequent route	300 metres
Town centres	250 metres

Table 1 - Maximum Walking Distances to Bus Stops

The walking distances indicated in table 1 refer to actual distances encounter by users and not circular catchments on a plan. Therefore, designers need to ensure permeability for pedestrians to increase the physical catchment boundary and justify catchments by plotting out pedestrian routes.

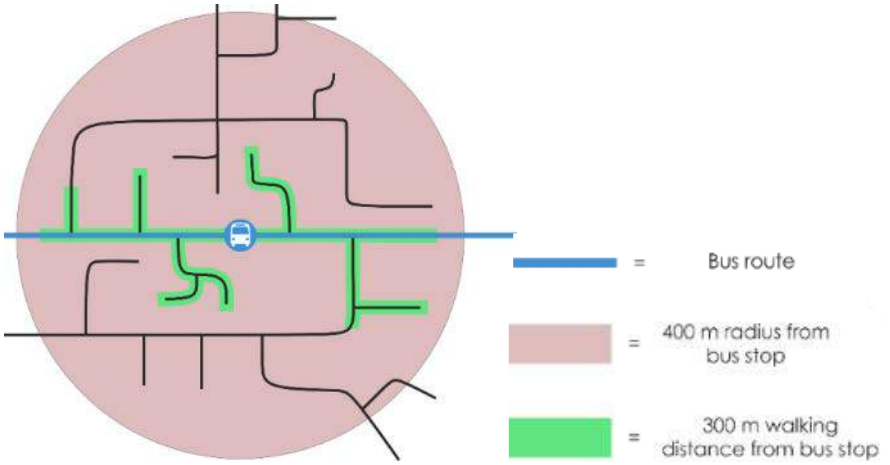


Figure 10 - Distance to bus stop on unconnected streets

[11] (Daniels and Mulleys, 2103)

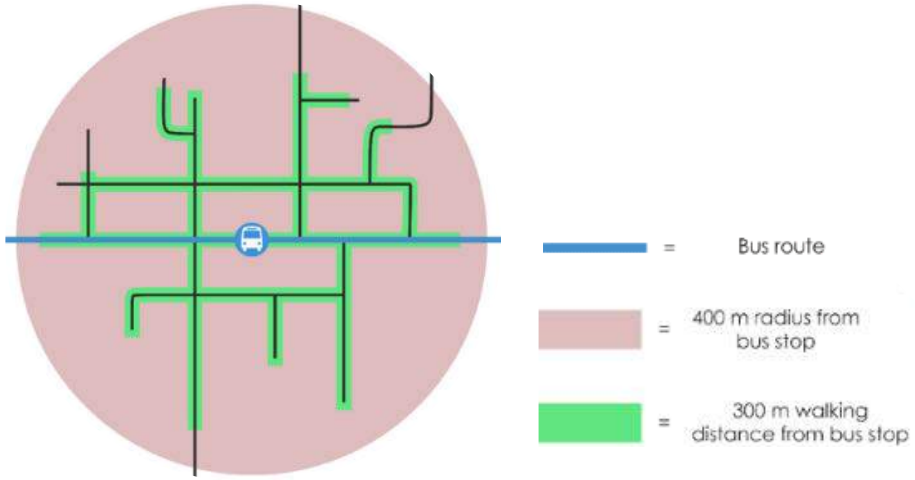


Figure 11 - Distance to bus stop using connected streets

2.3.3.3 Bus Stops & Shelters

All bus stops should have consistent information provision, indicating which routes serve the stop, timetables, and an illustration of the overall route for ease of identifying which destinations are being served. Live information will be provided at key bus stop locations in which there will be high passenger numbers.

The positioning of the shelter should ensure a clear view of oncoming buses and avoid obstructing pedestrians, they should generally look to be sited on street rather than laybys, expect for terminal stops and resting points. where there are bus stops on opposite sides of a road, the stops should be positioned 'tail-to-tail' with a clear distance of at least 36 metres between the backs of the buses at the stops, ideally with a pedestrian crossing between the stops.

There should be a minimum of 1.5m behind the shelter if in the middle of a footway, or 2.1m if at the rear of a footway. All bus stops should be well lit. This can either be met by ensuring small bus stops are positioned near a lamp column, or that more significant stops have separate provision for lighting. The shelter needs to be correctly sized for the maximum number of passengers. Positioning for natural surveillance should also influence the stops location.

Pedestrian crossings and cycling parking should be located nearby to provide an integrated transport network.

2.3.3.4 Multi-Modal Travel and Demand Responsive Transport

Multi modal travel usually consists of different styles of transport e.g. local and then long distance. These often evolve around transportation hubs which allow users to access higher quality transport. Walking or biking to the local bus route will often form the first stage of travel and link into these transportation hubs, whether that be a bus interchange or train station, which should include facilities for cyclists such as secure parking and repair stations.

Focusing on the first stage of travel is where street design can have the greatest influence. Users should have easy access onto the public transport network via their local bus stop. Equally, they should also have access to high quality pedestrian and cycle routes to the transportation hubs, for users who are willing to travel further to these hubs. Larger developments may require or present the opportunity to develop new transportation hubs. If no new hub is required, the development should still consider its ability to improve existing hubs whether that be required through additional capacity, new routes or improved quality of public realm or a combination of these approaches.

Demand responsive transport has the potential to be highly effective in rural areas and for groups within populations who do not need the use of high frequency, high capacity routes. As transport technology continues to develop it is hoped this opportunity becomes more viable at both connecting previously unserved locations and in increasing the quality of the service within networks.

2.3.4 Equestrian and Recreational Users

Recreational users are likely to occupy both urban and rural environments.

In an urban setting, the provision for recreational users is largely covered within other design considerations. However, in more rural parts of Suffolk such as on the margins of market and larger towns, there are frequently opportunities to create or improve links to Public Rights of Way and Quiet Lanes for transport and health benefits. Within developments, linking footways and cycleways to areas of public open space are key design considerations.

Dog Walkers – Dog bins shall be provided where there is likely to be a larger number of dog walkers. Routes which are high in recreational value but also provide a significant through route for cyclists should be increased in width to ensure enough space for both dog walkers and cyclists. It may be appropriate to use dog-on-lead signs in certain locations outside of the adoptable highway.

Children – Local streets can be an excellent way for children to be socially active and to begin to gain independence in a public setting. Where children are likely to gather, designers should consider the provision of local services as well as nearby vehicular speeds.

Cycling – Recreational cyclists look to escape from towns and access the countryside and National cycle routes. Connectivity to these routes and surrounding trails should be considered.

Equestrian – Horses and their riders are among the most vulnerable users within streets. Newmarket is of course the home of British horse racing, in this area developments may be required to consider the specific needs of the horse racing industry within the design process. Liaison with public right of way team within Suffolk Highways should be undertaken and designers should consider the Suffolk Green Access Strategy to understand the Right of Way Improvement Plan in Suffolk. Designers should also refer to CD 143 – Designing for walking, cycling and horse-riding when providing new infrastructure for Equestrian users.

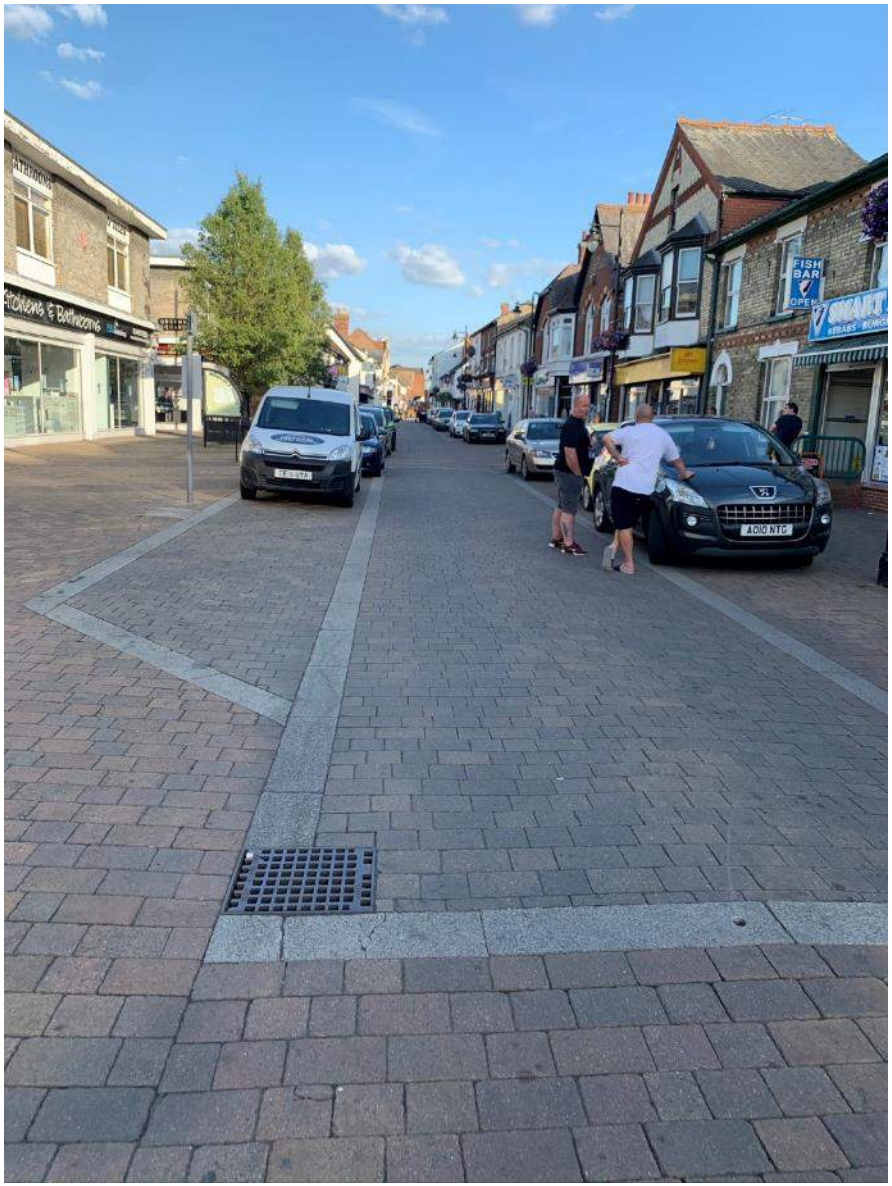
2.3.5 Vehicles

Streets must accommodate and manage a range of vehicles, if only for maintenance or emergency purposes. Private cars will usually comprise most of the flow but other vehicles, such as delivery vans and refuse vehicles, will require regular access. Emergency vehicles may rarely need to access a street, but their capability to do so is of the utmost importance.

The geometric design for streets will be dictated by the larger vehicles, but private cars pose the greatest challenge, principally to ensure that their inclusion is not to the detriment of other users. Designers can consider innovative solutions such as car-free zones and streets with parking provided on the periphery of developments to ensure the heart of a scheme is more pedestrian and cyclist friendly. This zoning approach provides a greater level of flexibility within site design. If levels of car ownership decrease, the flexibility of single plot parking solutions will likely add greater resilience to sites in the future whereas parking designed into the street scene, provides greater challenges for re-purposing.

In recent decades, the sheer number of vehicles on the highway network has put great strain on streets and resulted in poorer experience for other users. Parked vehicles become a nuisance for other users when parked on pavements and a maintenance burden for the highway authority. Suffolk County Council previously undertook a detailed assessment of parking within new developments and produced the 'Suffolk Guidance for Parking' (SGP) document that established recommended parking standards for new developments. While the guidance specifies a minimum requirement for residential areas there is flexibility to reduce this for town centre sites, where there is good provision of sustainable transport.

One of the focuses of the document was to significantly reduce the burden of unplanned on-street parking yet acknowledge it may be beneficial, necessary even, in some circumstances. SGP has subsequently been updated in 2015 and 2019. In this document, how best to incorporate this provision is explored, whilst still accommodating for the other user groups and vehicle movements. In the Designer's Checklist (Section 4.1), sites can be assessed against the criteria laid out in the parking standards to ensure they comply with both the requirements of this document and those of the parking standards.



2.3.5.1 Emergency Services

In most developments, ensuring adequate provision for access for a large fire appliance will enable all other emergency service vehicles to safely operate in the streets. Suffolk fire appliances vary in specification and purpose, but the fire application depicted in appendix F is suitable for initial swept path analysis.

Building regulations state that vehicle access shall be provided within 45m of all houses and all entrances for flats and maisonettes. Further provision is required for taller buildings. This access does not need to be provided in the form of a street, but it is likely to be the case for residential developments. There is also a desire for fire appliances not to have to reverse further than 20m. Therefore, any street over 20m without multiple accesses should provide a turning area to cater for a fire appliance.

2.3.5.2 Refuse Vehicles

The Suffolk Waste Partnership is a strategic partnership of the county, district and borough councils, which work together to continuously improve waste management services throughout Suffolk and provide technical guidance for residential and commercial developments. Suffolk authorities currently operate a three-bin (recycling, garden and residual waste) system but Government policy is expected to change from 2023 to include glass and food waste. Refuse vehicles vary in specification and purpose, but the refuse vehicle depicted in appendix F is suitable for initial swept path analysis.

The refuse vehicle will operate almost exclusively within the public highway for residential developments but may also need to use unadopted streets. The road design and layout of development must take account of the Suffolk Waste Partnership Council's access requirements for refuse and recycling collection vehicles where applicable. A clear working area is required around the vehicle of at least 3.5m wide and 4m long and, wherever possible, routing should always operate forward and reversing avoided. The additional time adds to the cost of providing the service and this manoeuvre causes a disproportionately large number of moving vehicle accidents in the waste industry. Injuries to collection workers or members of the public by moving collection vehicles are invariably severe or fatal.

For bin collection, storage layout, distances and gradients designers should refer to the 'Waste Technical Guidance for Residential and Commercial Developments'

2.3.5.3 Buses

In most cases, developments will rely on bus-based public transport. Therefore, provision for these vehicles needs to be integral to the design. Streets currently or likely to be used by buses should be identified in the design process and engagement should occur with the public transport operators to check the viability of any proposals or seek to develop opportunities.

Ideally a 6.5m wide carriageway should be provided on bus routes, this can be reduced to 6.2m if design speeds are 20mph. Carriageway width can be locally reduced for small sections for speed control etc and may need to be increased on sharp bends. In order to provide a high level of service, the route should be reasonably straight with good level of visibility. Traffic calming may be required but vertical change should be minimised to improve the ride quality for passengers. Routes should have strong connection to the highway network and loops or winding routes should be avoided where possible.

Swept path analysis should be undertaken to determine junction geometry and suitability. On key bus routes and frequent routes swept path analysis should be undertaken for crossing vehicles. the bus vehicle depicted in appendix F is suitable for initial swept path analysis.

2.3.5.4 Private Vehicles

Private vehicles will make the vast majority of motorised vehicle movements on development sites. Residents will need to drive vehicles safely from their homes to their chosen destination. Within urban environments private vehicle speeds need to be maintained at an appropriate speed to minimise conflict with other road users and ensure street users are correctly prioritised. Design speeds for streets will vary across developments and carriageway types, vehicle speeds should be identified at an early stage and designers should look to primarily utilise horizontal design to control speeds.

Parking is a key function of both private and adoptable streets. Designers will need to refer to Suffolk Guidance for Parking to calculate the parking provision for sites and ensure disabled motorists are considered from the outset. Within the parking provision there will likely be an allowance for on-street parking. This will normally form part of the visitor parking allowance. As per the guidance 0.25 space per dwelling allowance should be made for visitor parking. A lower value may be acceptable where a significant proportion of the total parking stock for an area is unallocated; or in locations such as town centres with good accessibility by non-car modes and where on-street parking is controlled. Generally unallocated visitor parking should be provided, where possible, in a clearly separate group to avoid the potential for residents ‘adopting’ spaces near to their properties. Designers will need to justify on plan how parking will be accommodated within the adoptable streets and ensure that parked vehicles will not impede other motorised vehicles or create any safety risks for other street users.

2.4 Sustainable Drainage

2.4.1 Sustainable Drainage Principles

Streets have the potential to contribute significant areas of impermeable surfaces to a development and ultimately, if not designed appropriately, could contribute to flooding and a decline in water quality. They also act as a conduit for the vast majority of drainage infrastructure, whether this is in the conventional form of a piped drainage system or using Sustainable Drainage Systems (SuDS).

All drainage schemes need to be designed in accordance with the principles set out in the Suffolk Flood Risk Management Strategy (SFRMS) and supporting appendices, which provides information on how Suffolk County Council, as the Lead Local Flood Authority (LLFA), aims to reduce the risk from flooding. Appendix A of the SFRMS, "Suffolk Surface Water Drainage (SuDS) Guidance, Standards and Information" also provides more detailed information on the local standards for drainage design. Both these documents align with National Planning Policy and promotes the use of SuDS for water quality treatment and to reduce surface water runoff to mitigate flood risk.

It is necessary for streets to play a role in reducing surface water run-off and provide the necessary water quality treatment, while not becoming a maintenance burden. This balance needs to be considered in the design process. This section explores the role of adopted surface water systems within streets and discusses the design principles that should be followed for highway drainage.

There will be exceptions to this guidance. The highway authority and LLFA may support applications that vary from the preferences listed within this document and other local planning guidance documents. The design of the proposed SuDS, as a minimum, will need to be in accordance with The SuDS Manual (C753) but still meet the requirements of the LLFA and highway authority. This will need to be determined through appropriate pre-application discussions. The drainage design process will still require engagement with all relevant stakeholders.

SuDS should be designed in conjunction with the proposed landscaping and help deliver local distinctiveness and add value to a scheme.

Topography has a significant effect on how water run-off occurs on sites and flows through SuDS features. Where possible flows should be held back at source to create 'miniature catchments', these reduce pressure on the downstream network and reduces overall land-take. Poorly designed SuDS are often inefficient and do not function as effectively as components which are part of a well thought out and comprehensive design.

SuDS need to be embedded in the street scene and can play an important role in delivering biodiversity in developments. They do not have to be a linear feature in the highway and can be used alongside other highway features like on-street parking, trees, cycle parking and bus stops for example. Designers should refer to Chapter 3 to understand how these can be delivered in the street scene.

SuDS can deliver other significant benefits beyond flood risk management. When applying SuDS systems, early consideration of the potential multiple benefits and opportunities will help deliver a more cost-effective SuDS scheme which maximises multiple benefits for all. When greater understanding of these additional benefits are realised, it allows the conversation to become more engaging with a wider range of stakeholders.

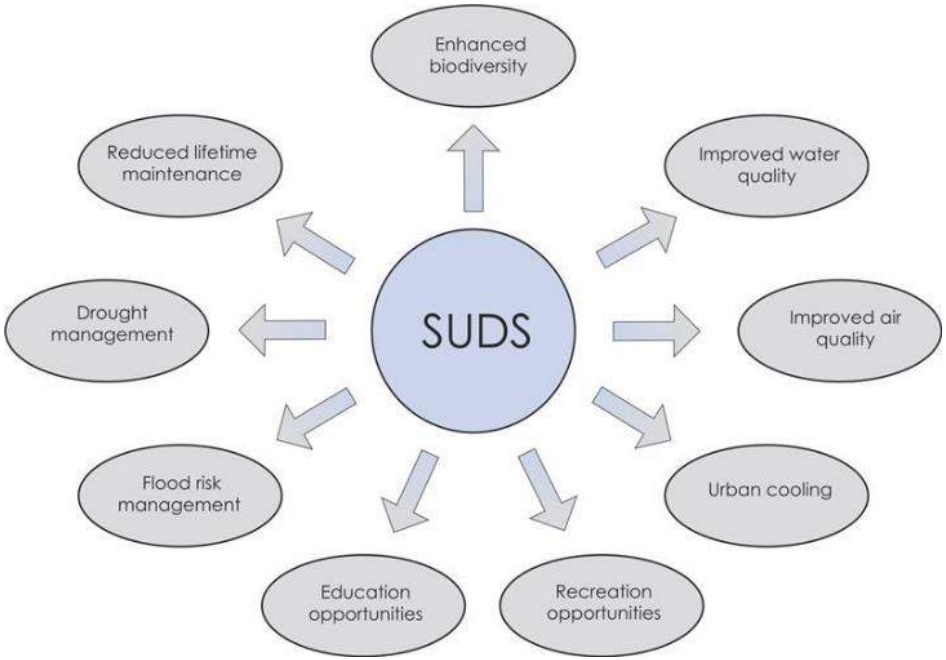


Figure 12 - Additional Benefits of SuDS

2.4.2 Adoptable Sewers

Water and sewerage companies with statutory powers (WaSC) can adopt sewers within the highway. An adoptable system may accept some highway drainage, but it cannot be the main purpose of the system. Adoption of these sewers is dealt with through various applications and historically follow the guidance laid out in the Sewers for Adoption document.

Since the Pitt Review into the floods of Summer 2007, several inquiries identified that a major obstacle to increasing the deployment of SuDS was the uncertainty about their long-term maintenance[12]. To address this the Sewerage Sector Guidance (SSG) was introduced on the 1st of April 2020 and aims to streamline the use of SuDS and the transfer of them into the management of statutory water companies. Anglian Water (AW) are the statutory undertaker for sewers within Suffolk and early engagement is encouraged.

A significant change through the introduction of the SSG is that SuDS components are now recognised as sewers. These components can, therefore, be included within a 'section 104' application. The Design Construction Guidance (DCG) covers the principles of SuDS adoption in more detail. These components can be included within your section 104 application as part of the adoptable design.

In principle, Anglian Water may allow direct discharge of surface water run-off from the highway into an adopted SuDS component but this will require an agreement to be in place. Anglian Water have provided extensive documentation and guidance on the new codes for adoption available on the developer's section of their website. The County Council's position is that it will only adopt highway after sewers are adopted. Although private sewers or drainage can be licensed using the NRSWA s50 license process, this is discouraged for new developments that are proposed for adoption as public highway.

There is likely to be a period of uncertainty following the introduction of the new adoption arrangements as Developers, Water Companies, Planning Authorities and the highway authority work through the initial applications.

[12](Water UK, n.d.)

2.4.3 Highway Drainage

Highway drainage is defined as the components of the drainage system that drain the highway and is managed by the highway authority. Its primary focus is to remove surface water to ensure the purpose of the street is maintained. Highway drainage can take a variety of forms, it typically comprises gullies and pipes but expands to ditches, swales, rills, kerb drains, channel drains and more. Note that at this current time SCC will not consider adoption of permeable paving.

Early site investigation is critical in understanding how best to prepare the drainage design. The highway authority will not be willing to adopt new drainage without a comprehensive study to support any application to discharge Highway Drainage via infiltration or discharging into a watercourse.

Improvements in water quality and biodiversity are encouraged within highway drainage systems where this can be designed without incurring significantly higher maintenance costs.

For highway drainage in Suffolk, designs are separated based on whether or not the site can dispose of surface water through infiltration. A suitable infiltration rate is subject to a detailed ground investigation report and a rate of at least 10mm/hr is required.

If the site **CANNOT** drain via infiltration, designers should refer to section 2.4.3.1

If the site **CAN** drain via infiltration, designers should refer to section 2.4.3.2

2.4.3.1 Impermeable Sites

Where a site cannot infiltrate, drainage provision would likely be provided in the form of a drainage system adopted by water and sewerage companies which would dispose of surface water.

As part of this provision, the water company will accommodate highway surface water run-off in sewers if it is not its main purpose. In these cases, the highway

authority would adopt surface water drainage infrastructure which branches onto the adoptable network.

Drainage kerbs and channel systems may be appropriate where the natural topography of the site limits the carriageway gradients or their inclusion removes the need for piped systems. As Anglian Water adopts the Sewerage Sector Guidance (SSG) there will also be an opportunity for highway drainage to directly discharge into adopted SuDS features.

In these cases, the highway authority would prefer either of the following:

- Dropped kerb to allow direct run-off into an open feature (e.g. swale)
- Gully and headwall
- Kerb outlet

There may be times where an adoptable sewerage system is not in proximity to serve the highway and a section of highway drainage is required. In these cases, any highway drainage systems will have to meet the requirements laid out in Appendix E.

2.4.3.2 Within Permeable sites

On sites with good levels of permeable soils, surface water run-off from development plots will generally be managed through private infiltration systems. Therefore, no adoptable surface water sewers would be present on site. In these cases, a separate highway drainage system will need to be constructed.

Depending on the topography of the site and the localised geology and infiltration potential of soil, surface water run-off from the highway may need to be conveyed to a point in which there is sufficient space and infiltration potential to safely dispose of the runoff.

Highway drainage should, wherever practicable, utilise SuDS principles and maximise source control. The highway authority will adopt the following systems:

- Swales
- Dry swales
- Filter drains
- Piped systems
- Attenuation and infiltration basins managed by local district, parish or highway authority (but only when solely for highway drainage)
- A reasonable and justified feature in accordance with the SuDS manual

Permeable pavements or crate systems are not currently considered for adoption by the highway authority due to the high maintenance costs.

SuDS features should be deployed as much as reasonably possible, but designers must ensure and prove they are fully utilised. That is to say not a token feature which offers little benefit in regard to increasing source control or water quality. To provide a more efficient and utilised solution designers may want to consider the use of crossfall carriageways to remove the requirement for SuDS features on both sides of the street.

There will be times where it may not be appropriate to utilise a SuDS feature and a piped highway drainage system is required. The highway authority will not adopt dual systems, that is to say, if a swale is proposed to capture highway run-off, it will not be acceptable to also have a piped highway system under the road. The designer should perhaps consider utilising a dry swale in these cases.

There will be times that adoptable surface water sewers will exist on sites that drain via infiltration. These will likely be present on the sites with only localised infiltration and where the adoptable sewers act as a conveyance network to the permeable soils. In these cases designers should look to discharge surface water run-off from the highway into these adoptable systems following the principles laid out in 2.4.3.1.

2.4.3.3 Existing Highway Drainage

It is highly likely that the site accesses will interface with existing highway drainage and there is often associated works to improve the site access for users. These works will likely result in additional impermeable area draining to an existing system. The developer will need to prove the system is positively drained, undertake rehabilitation works on any system and add further capacity if required. This will have to be undertaken on a case by case basis in consultation with the highway authority.

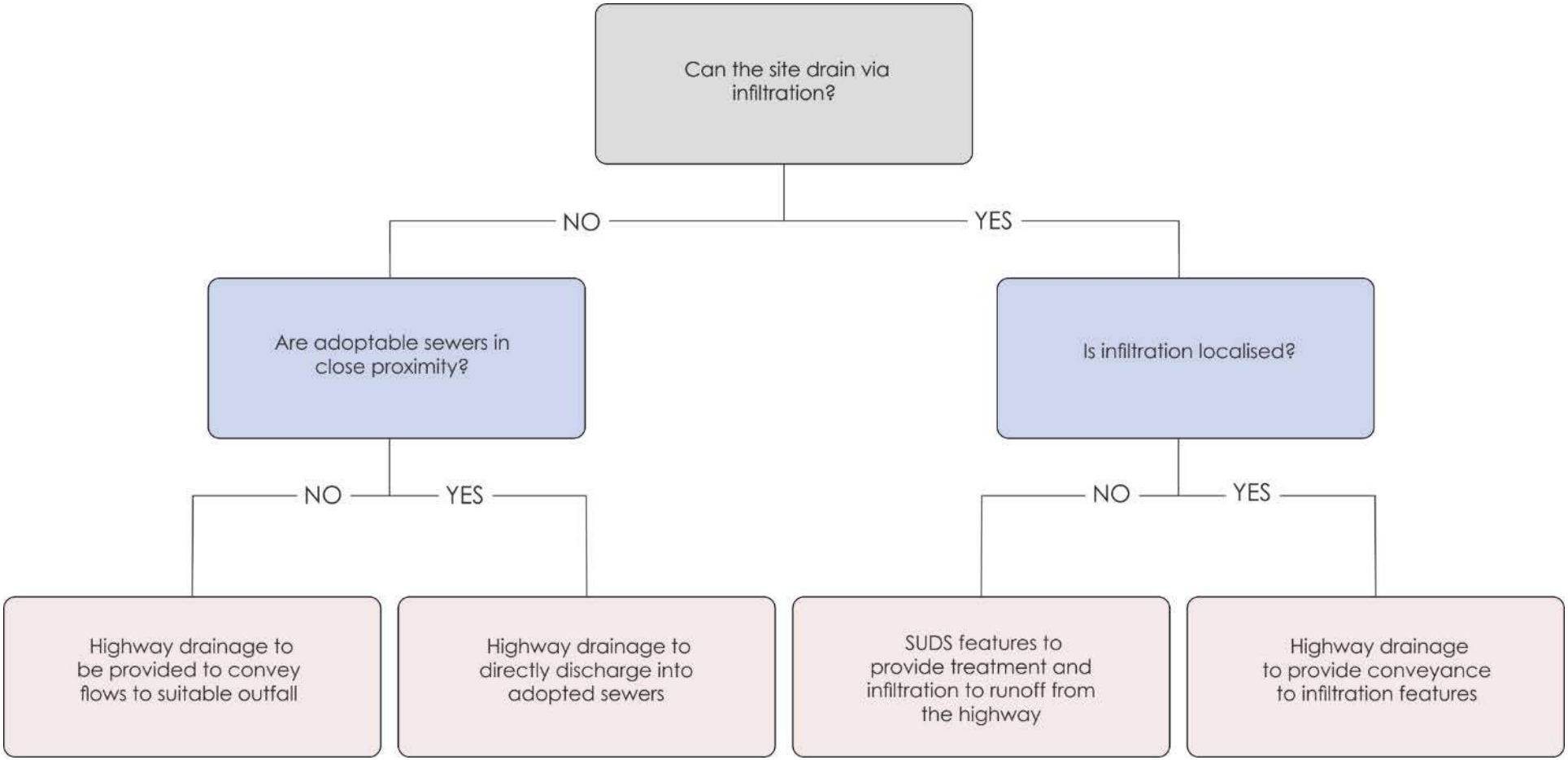


Figure 13 - Highway Drainage Design Options

2.5 Crime prevention through environmental design (CPTED)

Crime, fear of crime and anti-social behaviour all have negative impacts upon community well-being and quality of life. Crime Prevention through Design allows the creation of environments that discourage or impede criminal behaviour, while at the same time promoting the rest of the community to actively use spaces, create a sense of ownership and community and to 'keep a watchful eye',

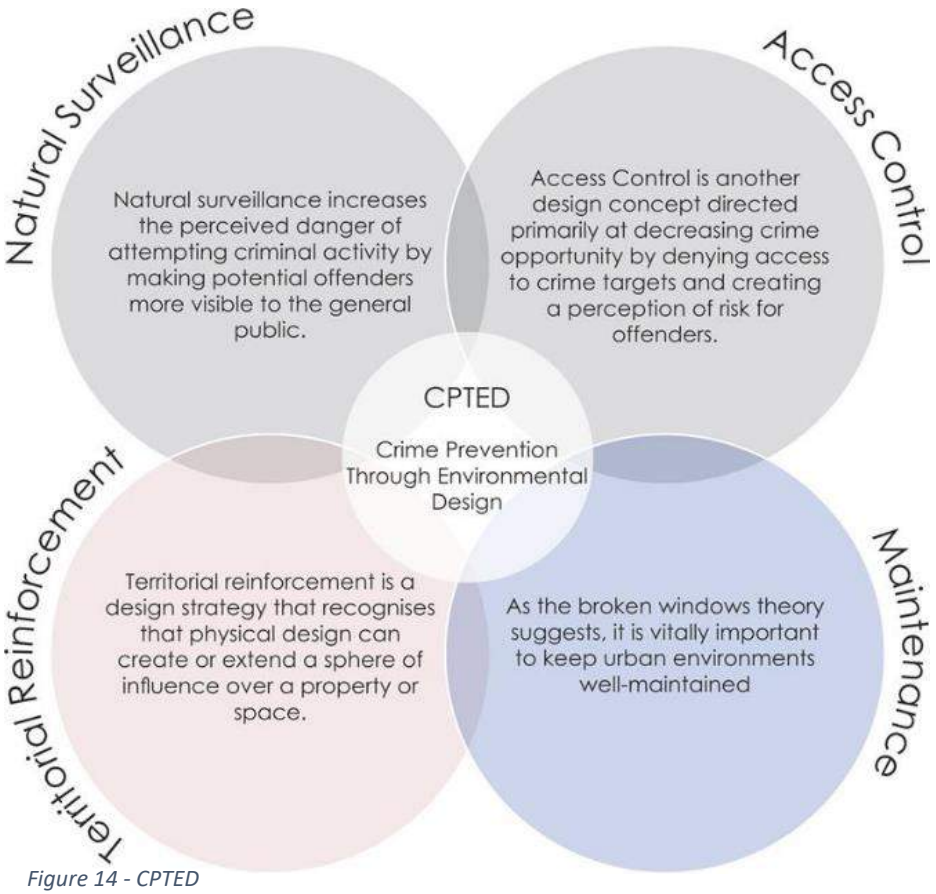


Figure 14 - CPTED

2.5.1.1 Natural surveillance

When aware that they could be watched, potential offenders feel there is an increased risk of being caught, which acts as an effective deterrent. Furthermore, natural surveillance promotes a sense of safety for users and promotes the use of various types of infrastructure.

Natural surveillance can be achieved by designing the placement of physical features, such as buildings, in such a way that maximises visibility of the space. Designers should look to increase the people present in environments, such as increasing pedestrian and bicycle traffic, and increase visibility through sight lines and lighting design to contribute to a greater sense of safety. These principles combined ensure that through design 'problem areas' do not develop. Designers can apply these principles to existing places to increase the quality of the environment.

Well-lit with good natural visibility

Buildings promote a sense of ownership and windows provide a visibility over the space.

Route is of high quality and promotes significant use.

2.5.1.2 Access control

Access control is achieved through the strategic design of streets, building curtilages and landscaping. Routes which promote a sense of movement should use design elements which provide a clear indication of a public route and discourage access to private areas. Where less emphasis exists on movement, designers can provide a greater sense of place through shared surfaces and other design tools. These places need to have a more apparent sense of ownership in order to decrease criminal opportunity by denying access to crime targets.

Street promotes high level of natural surveillance

Pedestrian route provides good visibility and is of high quality

Materials and landscaping clearly indicate public access route

2.5.1.3 Territorial reinforcement

Territorial reinforcement is a design strategy that recognises that physical design can create or extend a sphere of influence over a property or space. When a space is clearly marked as public, semi-public, or private, it creates appropriate ownership of that space.

Owners have a vested interest and are more likely to challenge intruders or report them to the police. This means it is important to try to create public spaces that residents feel they have some ownership of and are therefore more likely to defend.

Public Open Space is interesting in its form

Street and development layout promotes high level of natural surveillance

The open space acts as direct overspill from the dwellings promoting high levels of use

2.5.1.4 Maintenance

Proper care and maintenance enable the continued use of a space for its intended purpose, while any deterioration indicates a greater tolerance of crime and disorder. From a Streets perspective, material should be durable, easy to maintain and where appropriate vandal resistant, whilst still ensuring an adequate variety to created valued places.

Materials are varied and durable

Street promotes a sense of ownership and therefore a sense of maintenance for residents

2.5.1.5 Designing spaces

All the CPTED design principles discussed above are applicable for both new development and regeneration schemes. They can be achieved through the creation of clearly designated, functional public spaces that are well-maintained and enjoyable to use. By ensuring that the design of these spaces fosters positive social interaction, local authorities can successfully decrease the likelihood of anti-social or criminal behaviour.

Pedestrianising certain areas through design creates spaces that are clearly intended for public use, helping to create a sense of ownership of the area among the local community. Pedestrianisation can be used to transform previously uncared for urban areas into bustling multi-functional spaces that are more likely to be consistently occupied throughout the day and can be used to host a variety of community events, which helps to achieve natural surveillance.

Attractive street furniture placement is another way for local authorities to encourage interactivity between visitors, residents and the streetscape. Benches and planters help to create aesthetically pleasing, practical spaces that can be used by residents and visitors. It is, however, essential to think carefully about the siting of these and ensure that they do not contribute to anti-social behaviour and criminal activity, by where it has been placed or its structure, as well as ensuring they are sustainable and vandal resistant.

For densely urbanised areas, designers should consider physical constraints, such as barriers or street furniture, to protect users of the spaces and nearby businesses from possible vehicle ramming attacks.

For local authorities looking to prevent crime through environmental design, carefully selected measures can simultaneously facilitate natural surveillance and access control. The aim is to encourage people to use spaces in positive ways, to create a well-maintained environment that is then looked after by those using it, which should help to decrease crime, keep residents safe and reduce the demand on police and local authorities resources. Further guidance and specifications should be sought from the Suffolk Police Design Out Crime Officers.

2.6 Components of the Public Realm

Streets and the materials used to create them need to endure; these streets will become the fabric of places and the visual aspect will likely remain the same whilst the surroundings change. Choosing the right materials helps to set places but the specification of high-quality materials is not as important as the quality of the design and the appropriateness to the surrounding area. Some of the highest quality street scenes use a palette of materials that consist of a majority of affordable and easily maintainable materials. Often, the smallest details can help create an identity to a place, such as changing of materials and unique geometry, street art, furniture and planting boxes.

This guidance focuses on the role of materials and components within adopted highway. Yet the principles are applicable for private roads and may be referenced by local planning authorities for private areas. Early engagement with the various stakeholders is advised to ensure the material palette and furniture for streets is created to be coherent within and beyond the site, along with the Vision for Suffolk

2.6.1 Surfaces and Kerbs

Materials selected should be durable and easily maintainable. Most adoptable paved surfaces are expected to be of flexible asphalt surfacing with precast concrete kerbs and edgings. The exception to this will be the use of concrete block paving within shared surfaces or for sections of carriageways that have a special function. Other surfacing materials may be appropriate for public right of ways and bridleways, although not if cycling is to be facilitated (See LTN 1/20 chapter 15).

2.6.1.1 Flexible Asphalt Surfacing

Hot Rolled Asphalt (HRA) should be used as the surface finish for all flexible carriageways to be adopted by the highway authority; however, for heavily trafficked major access roads, parking areas and bus lanes the highway authority may consider a thin surface course system.

Asphalt concrete (AC) should be used as the surface finish for all footways and cycleways to be adopted by the highway authority.

Coloured surfacing can be used by designers to clearly delineate features within streets, but the colouring will fade over time and it incurs higher maintenance costs. Designers should look to design out their use where possible, but it is acknowledged coloured surfacing may be useful in the following situations:

- Cycle lanes across the mouth of junctions;
- Routes through complex junctions;
- Cycle lanes alongside on-street car parking (in addition to the buffer strip); and
- Advanced stop line reservoirs and their feeder lanes, particularly central feeders

2.6.1.2 Block paving

Concrete block paving is suitable for use on shared surfaces to be adopted by the highway authority and can be in the following colours: red, charcoal, buff, brindle-type and natural. It is also acceptable to use block paving as an edge restraint for flexible surfaces.

2.6.1.3 Unbound surfacing

Unbound surfaces may be suitable for use on public rights of way, bridleways and independent footways and shared paths. The local context is important for these areas and where possible local materials should be used. Early engagement should

be undertaken to identify the body that will be responsible for the maintenance in the long term and their preferences for the specification.

2.6.1.4 Granite setts and Yorkshire paving

Granite setts and Yorkshire paving should be reserved for locations of significance such as neighbourhood squares and local centres or used sparingly within other contexts. These materials can be used in moderation and still create the desired effect of elevating a space such as a strip or a pattern provided within a flexible carriageway. Granite setts may be used on selected surfaces where a different texture or colour of surface is necessary for managing driver behaviour. However, it shall only be used if other measures have been considered as impractical during the design process. Paving slabs are usually unacceptable for areas used by vehicles.

2.6.1.5 Kerbing

A standard precast concrete kerb and footway edging will be suitable for use in the majority of highways. A kerb upstand of 125mm reducing to 25mm for vehicular accesses, and flush (0-6mm) for pedestrian crossings is recommended. Kerbing heights may be different if used alongside cycle tracks.

Conservation kerbs will need to be considered for any developments occurring near or within a conservation area although generally materials should match those present. They should also be considered for use within important areas of developments where there is a design for place making.

Other bespoke kerbing will also be appropriate within certain private drives and parking courts. Consideration should be given to the local character to ensure that materials are correctly specified.

Bus stop kerbing should be used when creating level entry platforms for bus stops. These will need to match the kerb specification of the local area.

Where pedestrians and cyclists approach crossing points parallel to the carriageway double drop kerbs should be used to reduce the approach gradient.

2.6.2 Street furniture

2.6.2.1 Pedestrian Guardrails

The purpose of pedestrian guard rails is to control and limit certain movements for pedestrians. This can lead to increased safety for pedestrians but do not constitute good design. Pedestrian crossings should be on desire lines and therefore remove the need for pedestrian guard rails in all new developments. The authorities in Suffolk will also kindly look upon developments that seek to remove existing railing subject to addressing safety concerns.

2.6.2.2 Cycle Parking

Well positioned, safe and available cycle parking spaces are a key factor in increasing the attractiveness of cycle ownership and use. Most of the parking will be provided at facilities or homes but some provision in the public realm may also be appropriate, particularly where residents' provision is not easily accessed by visitors. In mixed-use areas, near bus stops or alternative modes of transport and where there are commercial or communal facilities in a residential neighbourhood, well-located and convenient public cycle-parking will normally be necessary. For specific requirements for developments please reference to Suffolk Guide for Parking.

2.6.2.3 Bus Stop and Shelters

Bus stops are people's entrance and exit from the bus network but also potentially a much wider transport network. They are an important feature in the street scene and are part of the user experience. Therefore, high-quality services and shelters that are durable and appropriate should be provided. In rural settings across Suffolk bus stops often reflect the local character and use a wide selection of materials. Discussions should be undertaken with the local parish to discuss potential opportunities. In more urban settings, shelters should be translucent and designed to deter anti-social behaviour and be vandal resistant.

2.6.2.4 Seating

Seating helps with place making and encourages people to mingle and engage. They provide rest for those who are tired such as a mid-point and on top of hills. Seating also provides an opportunity to sit and eat, socialise, or just sit and enjoy the surroundings. Well positioned seating can achieve all the above. The placement and number required should be reviewed and the material choice and specification should be both appropriate to the surrounding and the requirement of users. i.e. a rural bench overlooking a scenic view should be geometrically comfortable and warm and welcoming, whereas seating in highly urbanised areas may need to be slightly more utilitarian in their nature and encourage a higher turnover of users.

2.6.2.5 Litter/Refuse Bins

Public bins should be considered in areas which will likely experience litter build-up. This would be in busy mixed-use areas, outside schools, in parks and on busy walking routes. They will each likely serve a different purpose depending on their location. Most bins should provide both general and recyclable waste opportunity to encourage a greater level of social responsibility. Dog waste bins need to be provided in areas that will experience significant levels of dog walkers.

Bins should be in keeping with the surrounding specification, with expectations being made when areas are looking to create a sense of place. They will need to be simple, sturdy, covered and should be provided at regular intervals without over-provision leading to a sense of clutter.

2.6.2.6 Bollards

Bollards should look to be designed out where possible but when used correctly can benefit the street. They can be used to create and reinforce filtered permeability, reduce sign clutter, provide an emergency access routes and as a speed control measure for cyclists. Positioning must accommodate users requiring sufficient width such as for pushchairs and wheelchairs. Materials need to be in keeping and simple to maintain. When proposed in areas with a place focus, bespoke solution may be suitable but their use should always be justified.

2.6.2.7 Street Name Plates

Street nameplates will need to satisfy the Department for Transport Circular Roads 3/93. The locations of nameplates need to be in the context of the development and other street furniture. They can be mounted on walls and buildings subject to covenant being put in place. Within conservation areas, specific details may be required. Street name plates are the responsibility of the district and borough councils and where a street is to remain private, street name plates shall refer to this fact.

2.6.2.8 Electric Charging Points

Available evidence supports the expectation that most plug-in vehicle owners will carry out the largest proportion of their charging at home and, as chargers are provided at workplaces, these too will become the places of choice to charge electric vehicles. Bike charging points at transport hubs, colleges and other destinations might also be required as demand increases.

Whilst the County Council is supporting charging point installation through Plug in Suffolk, the County Council has not installed any on-street charge points and is awaiting the outcome and evaluation of numerous national trial projects before making any further decisions on the provision of on-street charging.

In the future designers will likely need to consider how to balance the needs of all users, especially pedestrians and those reliant on a safe and accessible network of

footways, this may affect the type of chargers needed and who is going to fund and maintain them once installed.

2.6.2.9 Public art

Public art enriches the environment and places they inhabit. They can help to tell the history of a place and provide a focus for culture. They offer a unique opportunity to engage the community and local artists. It is important to remember that the art should belong to the people and a deep sense of connection can develop between the art and the neighbourhood. Involvement with residents when considering future art provision will create this sense of ownership within the community.

Public art can be provided in various forms, from murals to sculptures, monuments, memorials, and civic statues. The piece can be standalone, integrated (into buildings or objects), applied (refers to work applied to a surface), an installation (art and the site are integral to each other) or ephemeral (non-permanent). The effect of public art can be subtle and integrated into landscaping, lighting, street furniture, signage, walls, SuDS, fencing, gateways and other features. Innovative designs will be encouraged. Whatever form it takes, it is important that the piece is correctly treated to withstand the elements and complies with structural and health and safety standards.

Liaison with the Suffolk Arts Service and local parish councils is advised.

2.6.2.10 Lighting

The Principles for street lighting are covered within the next sub chapter. Its inclusion here is to highlight the role lighting can perform in enhancing both public and private space.

Within Conservation Areas, the lighting equipment will need to be specified by the appropriate authority, which may be the county, district, town or parish council. This is likely to include decorative lanterns. Early consultation with the local planning authority is recommended.

Private lighting in drives and areas should be considered to discourage car crime and a sense of personal safety. Private lighting allows a much greater design flexibility and allows for designers to use distinctive styles.

2.6.3 Trees and planting

Trees, hedges and shrubs enhance new developments and are important in integrating development within the landscape and urban realm. They are benefit users health and wellbeing, reducing pollution, providing shade and encouraging wildlife. however, inadequate planning of trees, hedges and shrubs in developments can have a damaging impact on existing and proposed highway infrastructure. A balanced approach creates attractive, well landscaped and accessible developments, whilst also addressing the need for and cost of future maintenance, necessary to make it 'sustainable'.

Suffolk County Council expects developers and their consultants to work with its Development Management Engineers and Local Planning Authorities to ensure that existing and new trees are considered at an early stage of residential design. This will ensure that new access points are located to avoid trees being removed and the maximum number of the appropriate species are provided, in the right location within the development. Where trees or hedges are proposed adjacent to or in the public highway this guidance must be followed.

The following advice is not exhaustive and reference must be made to appropriate professional expertise. Among other matters, the following should be considered when detailing new planting:

- Trunk flare for mature tree
- Species selection
- Sub-base (adjacent footways, cycleways or carriageways)
- Surfacing and edge detail
- Root deflectors, directors & cellular containment systems
- Location of underground services
- Visibility splays
- Maintenance requirements
- Nearby infrastructure.

It is therefore vital that a suitable ground investigation is undertaken to determine at an early stage if shrinkable clays or other problematic soils are present.

Where trees are proposed within the existing public highway or proposed public highway, this shall be agreed in writing with the Local Planning Authority after consultation with the highway authority before any work commences.

Trees and hedges can also obstruct passage along a highway and, if struck, both the overhanging planting and vehicles or highway user may be damaged or injured. Therefore trees when mature should not create a canopy overhanging the highway within 2.6m above any footway or verge and 5.2m above any carriageway.

2.7 Utilities and Street Lighting

2.7.1.1 Utilities

The highway should not only be considered a conduit for physical users but also utilities. The requirement for public utilities is an essential part of development. The layout, installation, and maintenance of service all need to be considered in the design of streets to minimise obstruction and avoid barrowing of the footway during maintenance works. Developers must engage with public utility providers and the highway authority as soon as possible in the design process. Note that if private utility apparatus is installed within the street, the county council are unlikely to adopt the street (including soft estate) as highway.

Early consultation with planners and highway engineers is necessary to identify the impacts of serving the site with the utility services, in particular any significant impact on the local highway network.

A street layout must balance the sometimes-conflicting requirements of public utilities and the local authorities. All parties must bear in mind that the main object of these standards is to create better places.

Most streets will need to provide a route for statutory undertakers and other services and in the most cases these can be simply managed. The National Joint Utilities Group (NJUG) provide details of service arrangements and typical sections and the 2m section for typical service spacing shall be adhered to wherever possible. In terms of preference utilities should be within highway verges (not swales), then footways and least preferably within the carriageway. The utility corridors should be identified early in the development process and should not be confused with narrow 'maintenance' strips that are provided to allow the highway authority space to maintain the edge of the street and / or to include apparatus such as road signs and street lights.

In shared surfaces the preference is to provide a utility corridor alongside the carriageway. This must be a minimum of 2m wide. One of the problems with service strips is the public's unfamiliarity with their purpose. They offer little opportunity for planting and can often be used for informal parking which is unsightly. Designers should consider ways to ensure where verges are proposed that they add some amenity value. When utility provision in required in shared areas careful consultation between the designer, utility companies and highway authority is required.

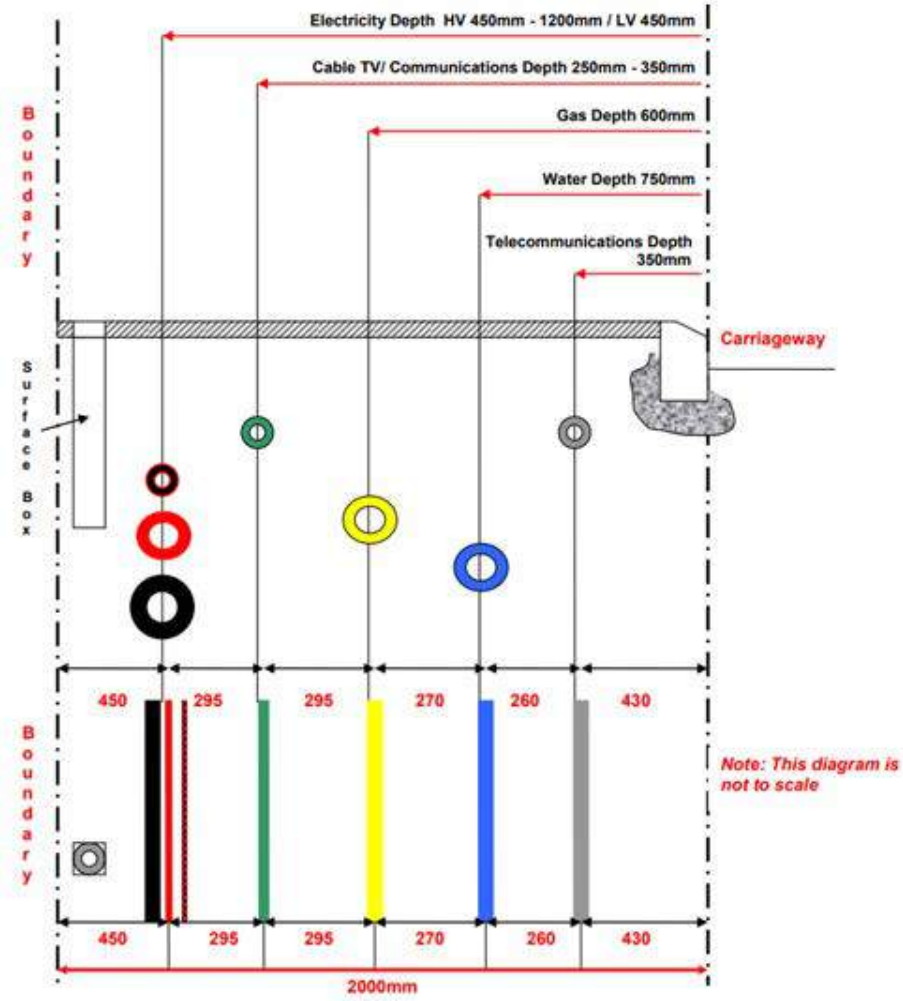


Figure 15 - NJUG (2013)

When utilities are routed in the carriageway the service corridor will need to be maintained to the specified 2m and should be delineated. This can normally be achieved by following a kerb line and applying a constant offset. Where this is not possible, designers should consider delineating the service strip through other physical features on the street. Where the utility corridor crosses the highway alignment it would be preferred to also clearly delineate this on the surface. On key routes a 4m highway corridor always needs to be maintained to allow for utility works to be progressed without requiring road closure. For smaller residential streets this can be reduced to 3.5m.

Utility crossing points on the highway should be grouped and minimised as much as reasonably possible. Joint trenching principles should be adopted and co-ordination to remove clashes is required. Ducting will be provided for lateral connections across streets to avoid trenching after construction. Manhole and inspection covers will not normally be permitted within the carriageway where this forms a discrete element of the street.

The proximity of current and proposed public utilities needs to be considered when planting schemes are proposed and will require liaison with the utility providers.

Placement of cabinets, sub-stations, covers, pumping stations and other features of utilities should be identified at an early stage of the design. The number of covers should be minimised to reduce highway clutter and cabinets shall not be placed in visibility splays.

Suffolk Fire and Rescue Service requires, through a condition of planning permission, the prior agreement of the location and specification of fire hydrants within developments, this normally occurs when the water mains are being agreed.

Building regulations apply varying requirements to different types and uses of buildings, such as commercial and flats. However, to provide resilience, new hydrants are required to be installed when no existing hydrants are available within 90m of a new building.

The location of hydrants should allow the fire service access to install a hose to connect with a fire appliance. Therefore, the locations should not be next to junctions or parking areas and, ideally, within the footpath.

Hard standings for fire appliances may also be required to a higher specification than required in building regulations.

Where foul or surface water pumping stations are required the designer should ensure an appropriate access arrangement is made from the highway and that pumping, or tanker appliances can safely access the compound. The boundary treatment of the pumping station compound needs to be considered in the context of the surrounding streets and materials. The foul rising mains often put pressure on utilities corridors as, due to their size, they are difficult to accommodate. The routing of the rising main should be considered in detail and remain in the footway wherever practically possible.

The same constraints that apply to streets also exist in the private domain. Developers should liaise with utility companies and inform future residents of these constraints and their own right.

2.7.1.2 Street Lighting

In urban areas street lighting can help to aid road safety and acts as a crime prevention measure. However, across Suffolk in more rural settings a greater emphasis exists to protect dark skies. Designers should consider the context and engage with the local parish as to whether lighting will be required. Designers can also make use of publicly available data from NightBlight to understand the current level of light pollution in the surrounding area. This can give a strong indication of where street lighting is in keeping.

Suffolk County Council should be consulted on street lighting at junctions with the existing highway or off-site improvement works.

Where street lighting is required on the public highway the lighting design and installation will require approval from Suffolk County Council through the highway authority. The key objectives are to achieve sufficient illumination to enable safe movement for pedestrians and cyclists whilst reducing opportunities for crime and

enabling drivers to see potential hazards on the streets. Lighting in accordance with the current edition of BS 5489 will, in general, be required on most roads and footways serving new development, and on existing roads and footways which are to be improved and adopted. BS 5489 part 1&2, BS EN 13201-part 2, 3 & 4.

Private lighting may also be required depending on the setting. In these areas lighting predominately acts to discourage crime and increase a sense of personal safety. Designers should refer to BS 12464:2014 when considering parking areas.

On motorised traffic free routes in urban areas, routes should meet the highway standard for street lighting. in rural areas lighting should be considered on a case by case basis where low-level lighting or solar cat's eye lighting may be a more appropriate approach. Sustrans provide further details for lighting traffic-free routes and greenways design and technical guidance for Lighting of Cycle Tracks can be found in TR23 Light of Cycle Tracks (ILE, 1998).

Suffolk County Council has also engaged with research and trails of smart streetlights which also function as car chargers and Wi-Fi hubs. In the future, all lighting should look to incorporate smart technologies where suitable, such as smart LED's and motion detection.

2.8 Management and Maintenance

2.8.1.1 Highway Adoption

The local highway authority, may adopt as highway maintainable at public expense the following areas within the public realm, subject to policy and specification requirements being satisfied:

- Areas available for the movement of people and vehicles, i.e. carriageways, footways and cycle paths. Unallocated parking areas within or adjacent to adoptable streets. This excludes carriageways that are of permeable construction.

- Verges that accommodate forward visibility or junction sightlines. Margins to accommodate statutory undertakers' mains services, maintenance strips or highway swales

- Street lighting within the adoptable highway

- Highway drainage will be adopted by the highway subject to meeting the required design criteria.

The current Suffolk County Council policy is that streets serving six dwellings or more should be constructed to adoptable standards. It is not Council policy to adopt streets serving retail or commercial sites unless integrated with residential estates.

2.8.1.2 Trees

New trees or hedges within the adoptable highway will normally be maintained by the highway authority subject to payment of commuted sums. In some circumstances the highway authority may license public bodies such as district or borough councils to allow planting of trees within the highway. Work on trees in Conservation Areas and trees subject to Tree Preservation Orders require the authorisation of the relevant local planning authority.

2.8.1.3 Adoption of open space community

Amenity areas outside the adoptable highway, such as public open spaces and play areas, will either be adopted by local district councils or Management Companies. These spaces may also include sustainable drainage features if they offer amenity value.

2.8.1.4 Drainage Authority

Anglian Water will normally adopt foul water and surface water sewers that do not predominantly take run off from the highway. This historically would be considered as sewers within the street but is now expanded to SuDS features within the highway corridor and across sites.

2.8.1.5 Management Companies

Where there is no duty for spaces to be adopted by any of the statutory bodies, a management company set up on behalf of residents may offer a suitable way of dealing with future responsibilities for maintenance. This option is more likely to be successful in situations where there is clear connection between the responsibilities of the management company and the immediate expectations of residents, for example, a play area within a home zone. It is less likely to be successful where a management company is responsible for remote and less obvious areas.

2.8.1.6 Neighbourhood & Private Responsibility

The following areas will normally be expected to be the responsibility of private owners: Private driveways, individual commercial premises, footpaths that are predominantly for the benefit of small groups of dwellings but may provide a public route and private or paved strips fronting buildings.

CHAPTER THREE

MOVEMENT FRAMEWORKS & STREET TYPOLOGY

3

3 Movement Frameworks & Street Typology

Successful developments need to be well connected both to the existing local area as well as within the new development itself. The specific context of every site makes it impossible to provide a uniform solution, but designers should strive to ensure users are prioritised correctly, while maximising opportunity for sustainable movement. This will encourage designers to look beyond the boundary of their site to identify opportunities and unlock potential.

To ensure that a variety of journeys are inclusive of users, sites need to promote permeable, well-connected layouts for pedestrians, cyclists and public transport that will allow for easy orientation. Sites need to understand how existing areas function in movement and place terms to best connect with existing infrastructure.

The size of new development also affects the level of opportunity. A smaller site movement framework will sit largely outside of its site boundary and may be constrained by the infrastructure provision in existing streets. Whereas large developments will be able to internalise a significant proportion of their movement needs, given that most day to day needs are catered for within the scheme itself.

In Suffolk, new sites can be broadly broken into three contexts: infill developments, edge of town developments and less connected sites. The Designers requirements in creating good streets for each circumstance will be marginally different.

Infill developments –The typical challenge will be to extend and improve existing routes and to create a permeable layout. A good development can help link together areas that surround it and ensure the development enhances the existing movement framework, for both the new and existing communities, rather than disrupt it.

Edge of town & village development – The typical challenge will be to provide connections to existing areas whilst ensuring future permeability and longer distance routes into the town or village are provided as well as high quality routes to any new local amenities.

Less connected sites – These sites may vary in size but will generally be some distance from existing urban areas and services. Dependant on size and development type, designers should look either to provide high quality internal links and services or seek opportunities to improve links to or facilities at local service centres.

3.1 Movement Frameworks

All movement diagrams are considered in accordance with the design and assessment statements and if required, the transport statement and transport assessment.

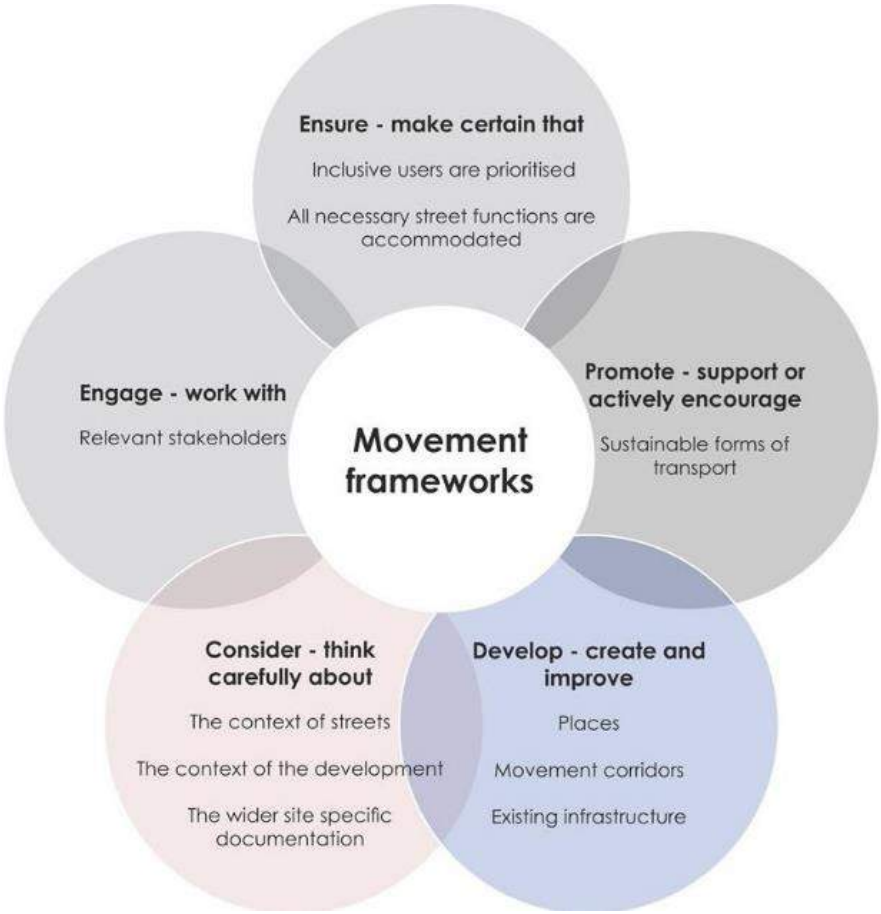


Figure 16 - Movement Frameworks Objectives

3.1.1 Assigning Priority for Users

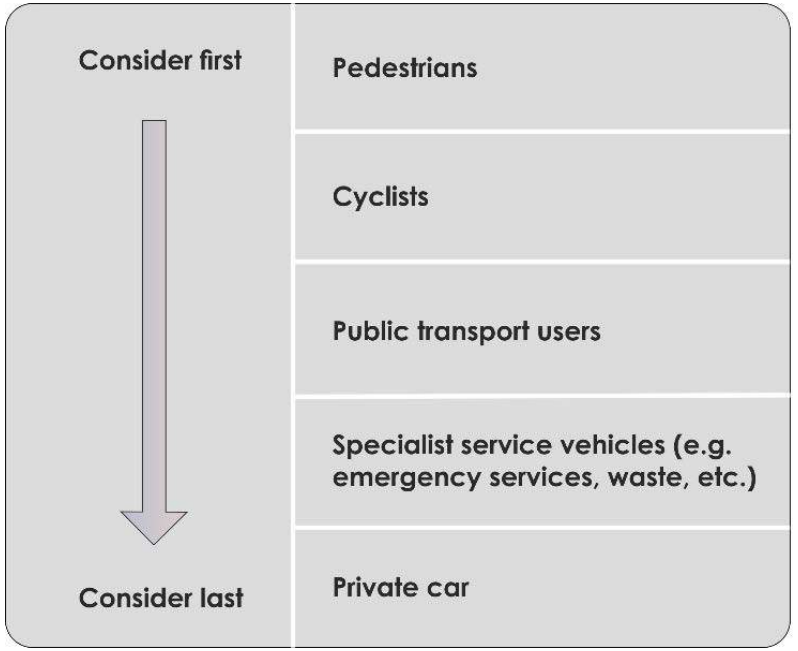
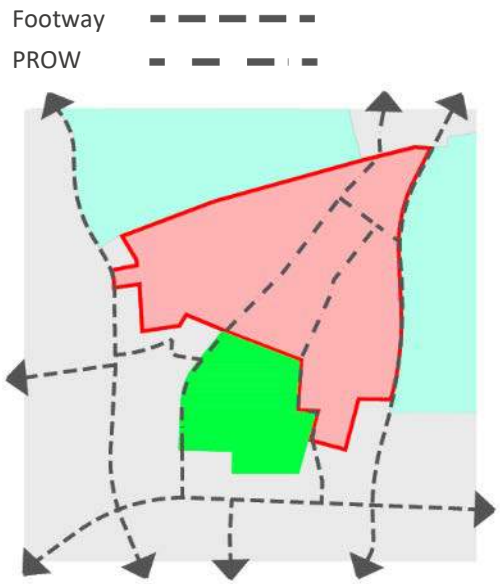
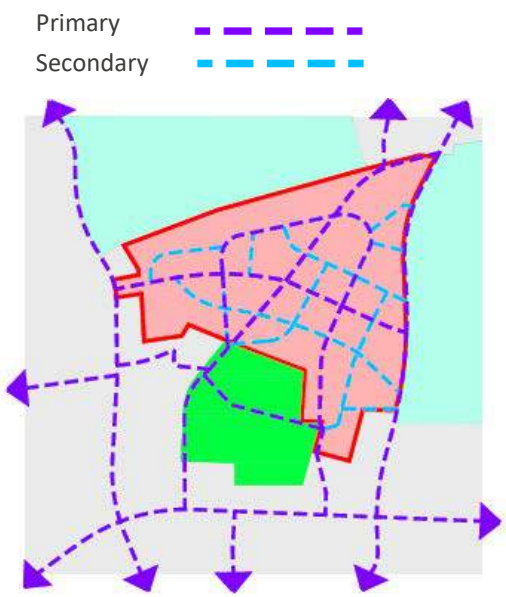


Figure 17 – Assigning Priority

Based on the user's approach designers must first consider (1) Pedestrians, (2) Cyclists, (3) Public Transport Users, (4) Specialist Service Vehicles and (5) Private cars. By assigning a priority to each route, whether for pedestrian, cycle or vehicle, a designer should provide firm justification for the approach taken in the design typology of that route and its intersection with other routes.

Planning routes for each user requires a slightly different approach. Designers will need to be in accordance with the design and access statement as well as the transport strategy if available and must consider how their development aligns with the local plan needs and neighbourhood plans.





3.1.2 Developing Movement Frameworks for Pedestrians

3.1.2.1 Existing Pedestrian Routes

Key existing pedestrian routes will consist of footways, footpaths, Public Rights of Way, Bridleways and restricted byways. These form key pedestrian routes between the site and local services and communities. They may feature in Neighbourhood Plans or strategically in Local Plans as being necessary to make the site sustainable or as providing enhancement for the wider community. A similar approach is taken in terms of design as for new developments although recognising that improving existing infrastructure has more constraints. Developers are encouraged to refer to the definitive map, which is the conclusive legal record of the existence, status and location of all recorded public rights of way, as well as engaging with Parish or Town Councils to explore local perceptions of walking opportunities and constraints.

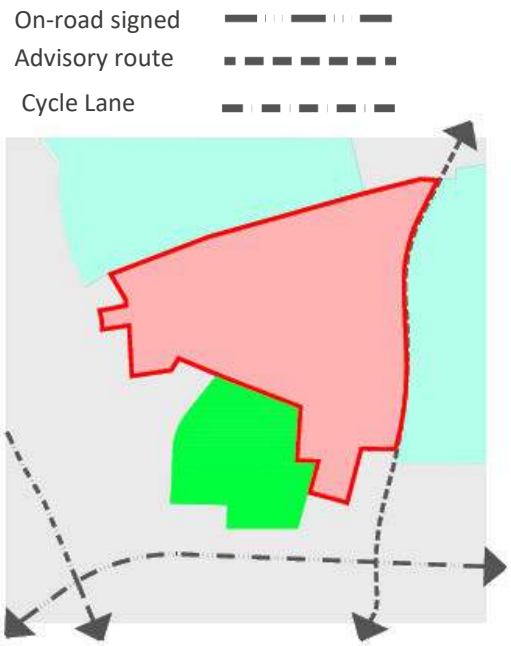
3.1.2.2 Primary Pedestrian Routes

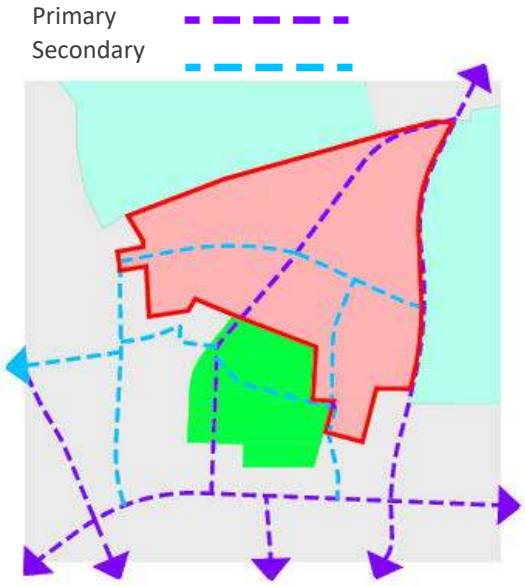
Due to the shorter nature of routes undertaken on foot, typically under 1 kilometre, the number of primary and secondary routes are much higher than any other user group. Primary routes serve the purpose of conveying the majority of pedestrian movements through the site. This would include key routes to bus stops, schools, local centres and transport hubs. These and other infrastructure corridors should be identified in transport as well as design and access statements.

Longer primary pedestrian routes are likely to occur from sites into town centres, employment areas and key transport hubs as well as catering for recreational users. The route could be entirely new or be an upgrade of an existing public right of way.

3.1.2.3 Secondary Pedestrian Routes

The objective of secondary routes are to quickly and conveniently carry pedestrians onto primary walking infrastructure. Apart from a few unique circumstances, all streets are likely to include either a secondary or pedestrian route and designers need to ensure pedestrians can safely access these routes either directly from their property or on appropriately designed private drives and paths.





3.1.3 Developing Movement Frameworks for Cyclists

3.1.3.1 Existing Cycling Routes

Suffolk Cycling Maps are provided across all the town in the region. The maps provide an excellent base level of the current infrastructure provision. In more rural areas designers should also explore the National Cycle Routes which run through the County. Designers should use the existing mapping to understand the local provision. It is advisable to assess the infrastructure against the recent best practice and also to understand the current condition of the infrastructure.

3.1.3.2 Primary Cycling Routes

In urban areas, the distance from any household to a primary cycling route should typically be 250m – 400m, but this will decrease in outer suburbs where the density of development is lower. For major sites designers should assess the transport strategy to classify cycling routes as either primary or secondary. Primary routes are to cater for high flows of cyclists, typically travelling into key destinations such as secondary schools, sustainable transport hubs and town centres. On all primary cycle routes, the cyclist should be segregated from vehicles. When these cycle tracks are alongside the highway they should also be segregated from pedestrians, whereas when the cycle route is away from a highway it may be shared with pedestrians.

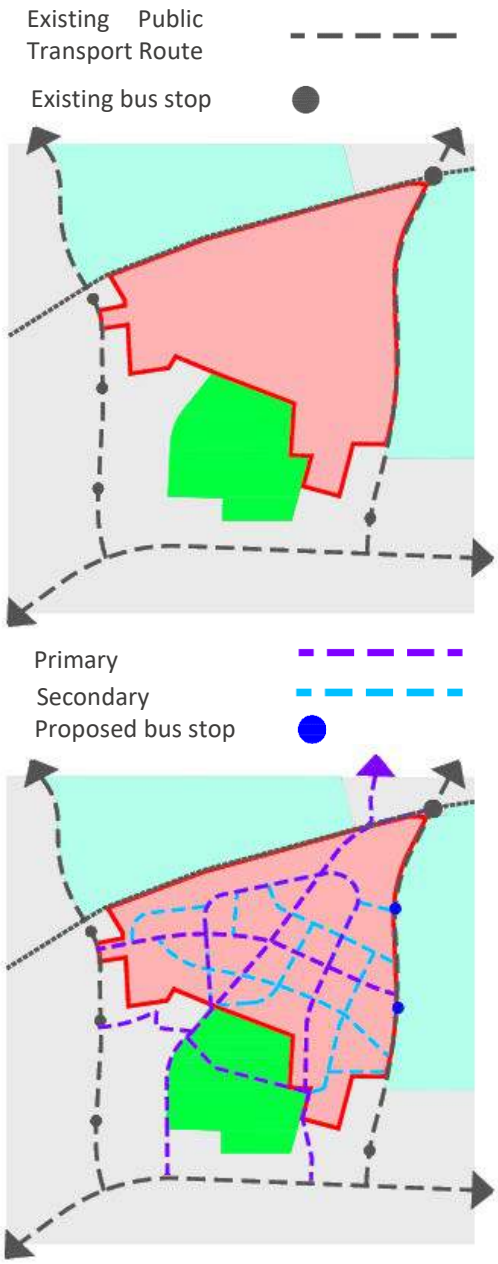
The use of shared paths to form part of a primary route requires further consideration and designers should examine the anticipated flows, key commuter routes may require segregation between pedestrians and cyclists but the design must not create sub standard widths for users by doing this, refer to section 8.2.8 of **LTN1/20 Cycle Infrastructure Design.**

If a cycling track is not possible due to existing highway constraints, or any other justifiable reason, then cycle lanes may be suitable. They should be mandatory cycle lanes where possible. Using an existing footway as a shared footway cycle track is the least preferable option. Even if minimum width can be achieved the likely number of conflict points that would exist on the footway (for example with driveways or more minor streets) would likely make cycling less convenient and safe. **All primary routes shall be designed in accordance with LTN1/20 Cycle Infrastructure Design.**

3.1.3.3 Secondary Cycling Routes

Secondary routes are designed to cater for lower flows such as those associated with primary schools, employment areas, local centres and to connect cyclists to the primary network. When secondary cycle routes run alongside secondary or main carriageways a separate cycling provision should be considered. In these cases, it may be suitable to use a shared footway cycle track due to pressures on the street corridor width. **All secondary routes shall be designed in accordance with LTN1/20 Cycle Infrastructure Design.**

As well as providing high quality primary and secondary cycle routes the designer will need to ensure that access for all users. This will require the designer to ensure that cyclists are able to travel on low speed carriageways and shared surfaces to primary or secondary routes. Where this is not possible the provision of specific cycling infrastructure will be required, even if it does not form part of a primary or secondary route.



3.1.4 Developing Movement Frameworks for Public Transport Users

3.1.4.1 Existing Transit Routes and strategy

The design and access statement as well as the transport strategy if available should examine the existing transport options for local users and assess their suitability and capacity. SuffolkOnBoard provide detailed maps of the existing public transport service and the longer-term strategy for public transport across Suffolk is examined in Suffolk Local Transport Plan. Designers may need to engage with local transport strategies such as those found in Lowestoft and Bury St Edmunds.

3.1.4.2 Proposed transport Infrastructure and Routes

It is unlikely apart from on strategic sites that development will lead to the operation of a new specific service. If however this is the case the proposed transport corridor will need to be identified at the outset in consultation with the highway authority and public transport operators.

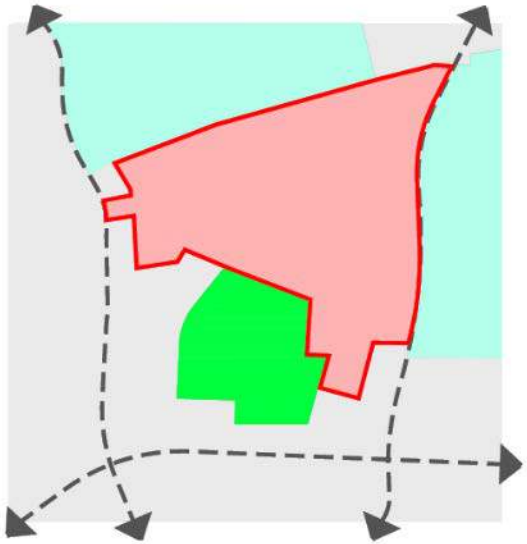
New streets within developments that will have to support either a new service as mentioned above or by an adjusted existing service will also need to be identified at an early stage. Designers should refer to 3.1.5.2- Primary Vehicular Routes when this is the case. The incorporation of selective traffic management measures to facilitate the provision of through services should be given careful consideration in the planning stage. For complex arrangements designers should refer to Buses in Urban Developments.

Designers should refer to Table 1 - Maximum Walking Distances to Bus Stops when considering the siting of existing and proposed bus stops whilst also considering the principles highlighted in Figure 10 - Distance to bus stop on unconnected streets & Figure 11 - Distance to bus stop using connected streets. Designers will need to understand the suitability of existing bus stop infrastructure and identify if and where improvements are required. Proposed shelters will have to be correctly sized and ensure inclusivity through design as well as identifying, following discussion with providers what technology is to be included at stops.

3.1.4.3 Proposed Walking and Cycling Routes to transport stops

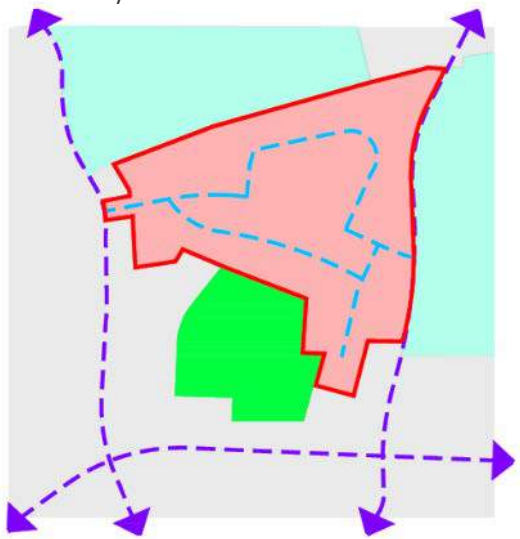
Route planning is an iterative process as street typologies begin to develop. The designer will need to re-explore the proposed walking and cycling routes based on the latest public transport provision to ensure direct and accessible routes to bus stops and sustainable transport hubs are provided. At this time, the designer should also consider the role of multi-modal travel by considering the provision of services such as cycle parking at bus stops.

Existing Vehicular Routes



Primary

Secondary



3.1.5 Developing Movement Frameworks for Vehicles

3.1.5.1 Existing Vehicular Routes and infrastructure

Vehicular routes are easy to identify based on local mapping which will likely be compiled from a variety of sources for a development site. Understanding the current provision relies on designers considering both the surrounding site infrastructure and the more strategic transport connections. At a local level designer should consider key vehicular routes and destinations such as supermarkets etc. When considering strategic transport connections designers should refer to the Suffolk Local Transport Plan to look at both the existing provision and the strategic aspirations for vehicular routes. It may also be important to consider heavy goods vehicles if the site is in close proximity to the lorry route network or is a mixed-use development.

3.1.5.2 Primary Vehicular Routes

Journeys by public transport and private car trips are normally longer than those of pedestrian and cycling journeys. Therefore, within a development the number of primary and secondary routes will be lower than those of pedestrian and cyclists. A primary vehicular route should ultimately be based around the public transport provision and the carriageway should be suitably designed based on this need. Vehicle speeds need to be carefully controlled but also ensure that any public transport provision is fast and reliable. This will involve minimising giveaway points and vertical deflection. The design speed is a maximum of 30mph but in special cases such as outside local centres or schools shall be lowered to 20mph.

3.1.5.3 Secondary Vehicular Routes

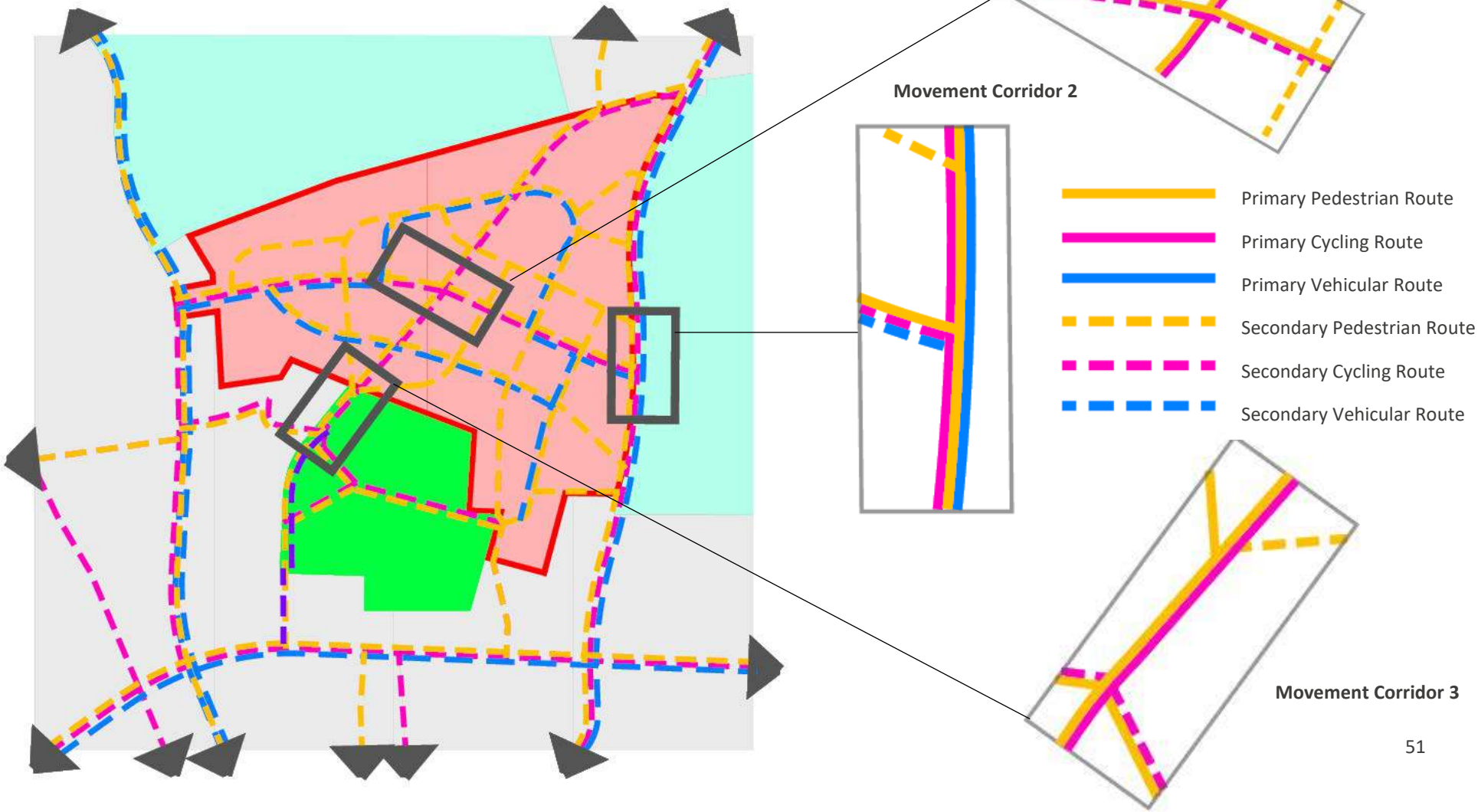
A secondary vehicular route has two key purposes. Firstly, to allow for specialist services vehicles (i.e. refuse, delivery, emergency services) to manoeuvre through the site and secondly, to link private vehicles from residential properties to the wider highway network. Vehicle speeds on secondary streets should be controlled through design using both horizontal and vertical deflections where appropriate. Vehicles should be required to give way to primary pedestrian and cycle movement routes. The design speed should be a maximum of 20kph in the vast majority of cases.

3.1.5.4 Access Vehicular Routes

An access vehicular route allows for specialist vehicles to complete their intended service but in a more constrained fashion and allows private cars to complete the final stages of their travel. By their nature, a vehicular access route has a lower priority than all other user movements and this must be reflected in their design. Design speeds should be between 15-20mph.

3.2 Compiling Movement Corridors

Once Designers have compiled the specific users movement routes as discussed in section 3.1 they must begin to overlay the routes with the various other user groups to compile movement corridors. This will be somewhat of an iterative process, likely requiring designers to adjust movement routes to align users together as required. In the example three movement corridors are explored in detail.



3.3 Street elements for users

Once the movement framework and corridors have been identified, designers can begin to critically examine what infrastructure is required to meet the needs of the movement corridors. Section 3.3 introduces the key principles in the design elements. i.e. geometric design of carriageways. Generally, departures to these elements will not be acceptable within new developments. These principles should be applied to improvements to existing streets, although it is accepted that compromises may be necessary to retrofit design elements to existing layouts or highway boundaries. Table 2 below illustrates how different standards are suitable to certain routes and further details are set out in the diagrams below.

	Footpath	Footway	Shared footway cycle track	Shared path*	Cycle track	Cycle lane	Shared surface	Tertiary carriageway	Secondary carriageway	Main carriageway
Primary pedestrian route	★	★	✓	★	✗	✗	✓	✗	✗	✗
Secondary pedestrian route	★	★	★	★	✗	✗	★	✗	✗	✗
Primary cycling route	✗	✗	✗	★	★	✓	✓	✓	✗	✗
Secondary cycling route	✗	✗	✓	★	★	✓	★	✓	✓	✗
Primary vehicle route	✗	✗	✗	✗	✗	✗	✗	✗	✗	★
Secondary vehicle route	✗	✗	✗	✗	✗	✗	✗	✗	★	✗
Access vehicle route	✗	✗	✗	✗	✗	✗	★	★	✗	✗

★ Best practice
✓ Acceptable
✗ Not permitted

Table 2 – Infrastructure Provision for pedestrian, cycling and vehicular routes

*Refer to section 3.1.3.2 for when a shared path is classed as best practice

3.3.1.1 Footway

These run alongside carriageways and are designed exclusively for pedestrians. They must be:

- Must be at least 2m in width
- Must be provided adjacent to all Primary, Secondary streets
- Must be surfaced with bound material

3.3.1.2 Footpath

These are situated away from carriageways and are exclusively for pedestrians. They:

- Must be at least 2m in width
- Should provide safe and inviting public realm for people to enjoy
- Can be surfaced with a bound material or a suitable all-weather surface

3.3.1.3 shared path

These are situated away from the carriageway and are shared surfaces for both pedestrians and cyclists. They:

- Must be at least 3m in width
- Should provide safe and inviting public realm for people to enjoy
- Should be increased to 4m on primary routes
- Can be surfaced with a bound material or a suitable all-weather surface
- May not be suitable for primary commuting cycling routes

3.3.1.4 Shared footway cycle track

These are situated alongside carriageways and are shared surfaces for both pedestrians and cyclists. They:

- Must be at least 3m in width
- Must be surfaced with a bound material
- Should not be used on primary cycle routes
- Should look to minimise the number of vehicular crossovers

3.3.1.5 cycle track

These run alongside carriageways and footways but are separate areas, exclusively for cyclists. They often abut a footway but are distinguished by a level difference and surfacing colour. They should not be used on streets with large numbers of vehicular crossovers. They:

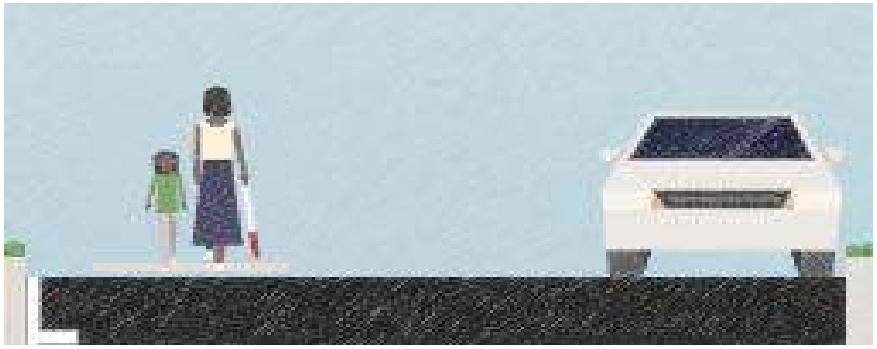
- Must be at least 3m in width for a bidirectional cycle track
- Must be at least 2.2m wide for unidirectional flows unless a narrower width not less than 2m is clearly justified
- Should be separated from footways with 25mm bullnose

3.3.1.6 Cycle Lane

These run alongside carriageways and can either run at level with the carriageway or as a hybrid cycle lane. They are best suited within existing highway corridors where there is existing constraints. They:

- Must be at least 2m unless a narrower width not less than 1.5m is clearly justified.
- Should use differentiating colours or materials at junctions and stop signs.
- Should be separated from carriageway by a 25mm Cambridge kerb.
- Edge of carriageway kerbs must be no more than 100mm in height

3.3.1.7 Shared Surfaces



These surfaces are shared between pedestrians, cyclists and vehicles. They:

- Must have a design speed no greater than 15mph
- Should be a minimum of 5.5m wide with further isolated widening for vehicle movements and parked vehicles out of the highway corridor.
- Maintenance strips of between 0.5m and 1.0m are generally required. Such areas are to allow for maintenance of the carriageway, safe vehicle overhang and location of streetlights and road signs if necessary. They will usually have a grass surface unless included within a private access or connecting footway or cycleway.
- Should encourage a permeable grid structure
- Should give direct driveway access
- Should have a different surface from the remainder of the development
- Can include on street parking where this is not obstructive to cyclists and pedestrians
- Must include speed reducing features at the junction with primary and secondary carriageways

3.3.1.8 Tertiary carriageways

Can be used by both vehicles and cyclists. They will regularly have to be crossed by pedestrians. They:

- Must have a design speed no greater than 20mph achieved by suitable layout design rather than physical measures such as ramps.
- Must be at least 5.5m wide
- Must provide footways on any side that borders dwellings
- Must provide a 0.5-1m maintenance strip when proposed without footway
- Should have planting and parallel parking in order to provide traffic calming, but should not be longer than 3 continuous bays
- Should give direct driveway access
- Should encourage a permeable grid structure

3.3.1.9 Secondary carriageways

Secondary streets function as distributor routes providing access to development plots. Cyclists should be generally directed away from the carriageway, but some cycling on the carriageway is acceptable if suitable alternatives for less confident cyclists are provided. They:

- Must have a design speed no greater than 20mph achieved by suitable layout design rather than physical measures such as ramps.
- Must be at least 5.5m wide
- Must have a maintenance strip of 0.5m (locally 1.0m with streetlights)
- Should incorporates trees and grass verges
- Should limit direct access to shared surfaces and private drives where required to promote pedestrian and cycling priority
- Should accommodate on-street visitor parking within parallel parking bays on the carriageway
- Should include trees and grass verges when appropriate

3.3.1.10 Primary Carriageway

This is the largest street that is covered within this manual and forms the linkage between developments and the wider national road network. These provide access to secondary and tertiary streets and cater for public transport services. They:

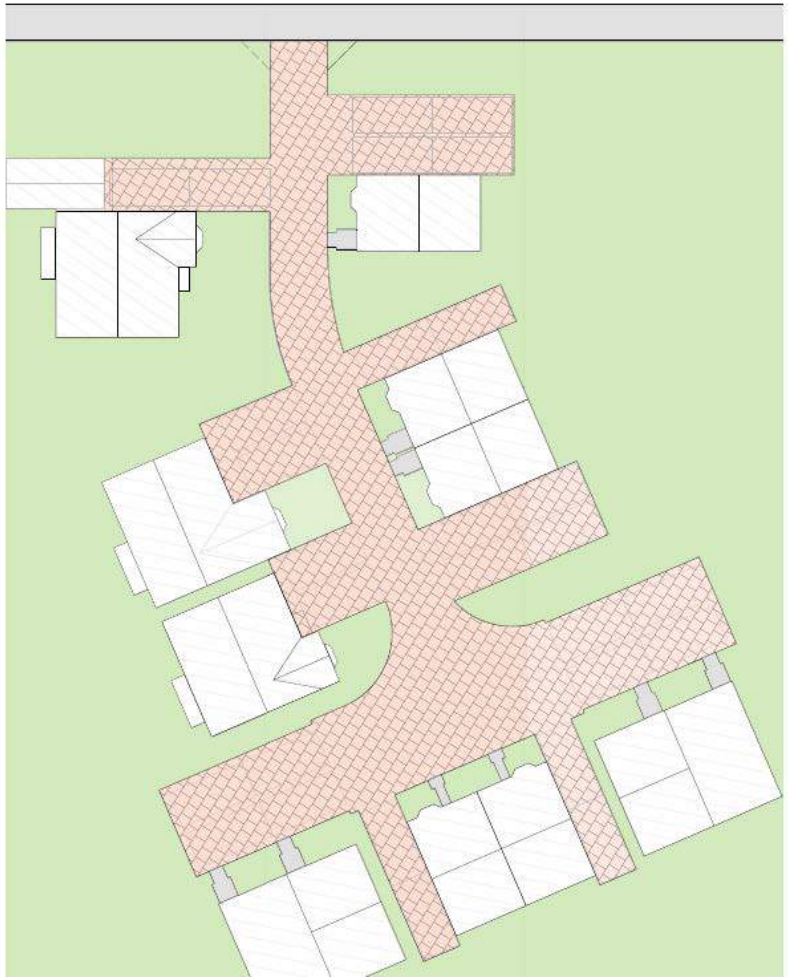
- Must have a design speed of no greater than 30mph
- Must accommodate bus services
- Must be at least 6.2m in width
- Should be 6.5m in width
- Should limit direct access to shared surfaces and private drives where required to promote pedestrian and cycling priority. Generally, accesses to single dwellings will be discouraged
- Should discourage on carriageway parking
- Should have bus stops on carriageways, be accessible and include shelters
- Must provide separation for cyclists if the carriageway is alongside a cycle route
- Should include trees and grass verges when appropriate

3.3.2 Street elements

These street elements are integral to the street but their primary function is not to facilitate movement.

3.3.2.1 Private Drives and Parking Courts

These provide access to dwellings for all user groups.



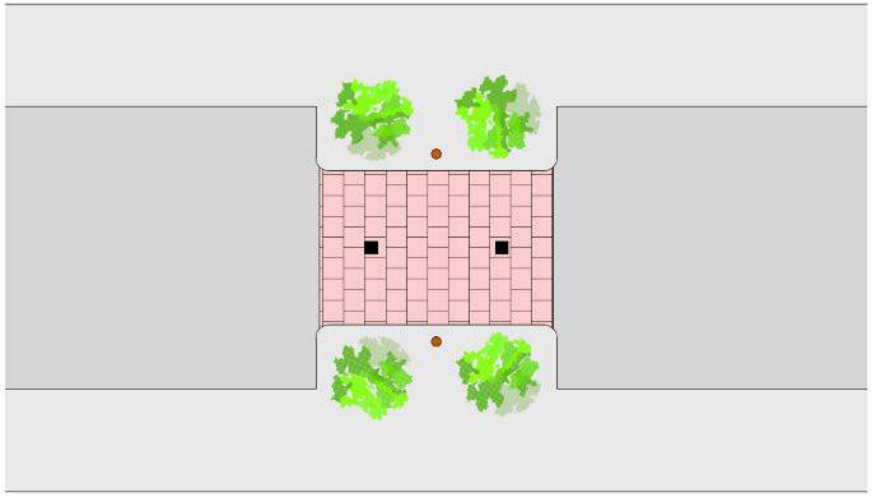
They:

- They must be accessed from either shared surfaces, tertiary carriageways and secondary carriageways, not from main carriageways
- Must be at least 2.6m wide for single driveways
- Must be at least 3.5m wide at the narrowest place for shared driveways but allow for passing opportunities
- Must provide safe access for emergency vehicles when required.
- Must comply with the maximum distances allowed regarding waste movements.
- Must provide 2m x2m visibility splay as they join the highway
- Access should be spaced no closer than 30m on the same side

3.3.2.2 Linkages

Linkages (also known as modal filters) connect various elements of infrastructure together to provide filtered permeability to specific users. They:

- Should allow for pedestrians and cyclists to pass with minimal delay
- Should incorporate planting



3.3.2.3 Highway Margins

Verges allow for the highway to have a greater level of flexibility and can be populated in a variety of ways.

Maintenance strips

- Must be minimum 0.5m wide to allow for maintenance, 1.0m where streetlighting is required.
- Not suitable for planting of trees, shrubs or underground apparatus
- Generally laid with grass except where crossed by private drives or accesses

Service strips

- Must be minimum 2m wide to allow placing of underground apparatus.
- Not suitable for planting of trees, shrubs or for SuDs
- Generally laid with grass except where crossed by private drives or accesses

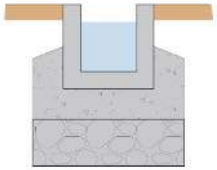
Verges (other than maintenance and service strips)

- Width varies, minimum 0.5m.
- Where forming visibility splays should be clear of obstructions or planting
- Should be 3m where planted with trees or shrubs

3.3.2.4 Rills

Rills can be delivered in a wide variety of forms. They are a hard surface water feature and work well in urban areas. They can be offered for adoption to either the highway authority or Anglian Water but will require prior consultation with the highway authority. They:

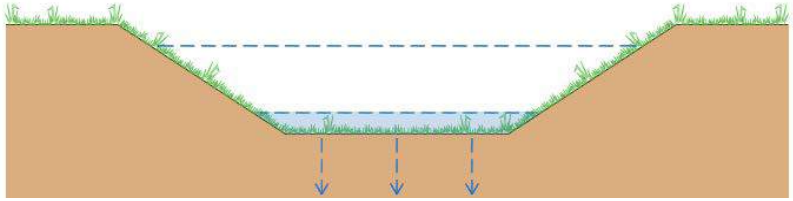
- Must be in accordance with the SuDS Manual and Highway Specification to be adopted by the Highway Authority
- Must be adopted by Anglian Water if within the public highway



3.3.2.5 Swale

Swales can receive, convey, treat and store surface water run-off. They can be adopted by either the highway authority or Anglian Water. They:

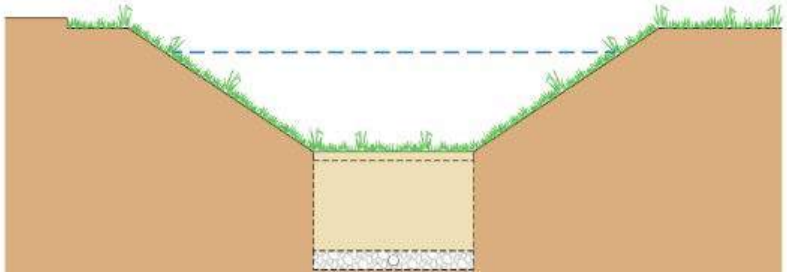
- Must be in accordance with the SuDS manual and Suffolk Highway Specification to be adopted by the highway authority
- Must be no deeper than 600mm
- Should not have side slopes greater than 1 in 3
- Planting of shrubs or trees within SuDs features is not accepted. Areas should be planted with low growing grass or wildflowers



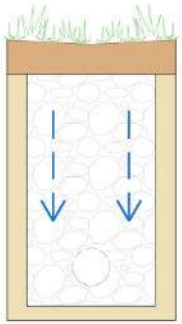
3.3.2.6 Under-drained Swales

Under-drained swales can receive, convey, treat and store surface water run-off. They can be adopted by either the highway authority or Anglian Water. They:

- Must be in accordance with the SuDS manual and Suffolk Highway Specification to be adopted by the highway authority
- Must be no deeper than 600mm
- Should not have side slopes greater than 1 in 3
- Planting of shrubs or trees within SuDs features is not accepted. Areas should be planted with low growing grass or wildflowers



3.3.2.7 Filter Drains



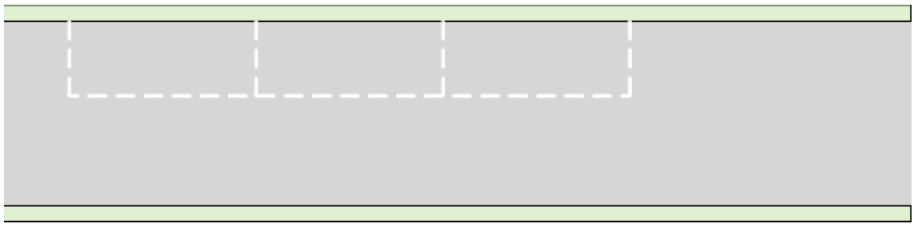
Filter drains can receive, convey, treat and store surface water run-off. They can be adopted by either the highway authority or Anglian Water. They:

- Must be in accordance with the SuDS Manual and Highway Specification to be adopted by the Highway Authority
- Must be adopted by Anglian Water if within the public highway but not adopted by the Highway Authority

3.3.2.8 Parallel Parking Spaces

Streets can accommodate parking on widened carriageway. They:

- Must be marked on the carriageway
- Must be 2m x 6m per vehicle
- Must include sufficient breaks in the parking to allow pedestrian crossing points, tree planting etc
- Must have kerb heights of 125mm and restricted dropped kerbs to discourage footway parking



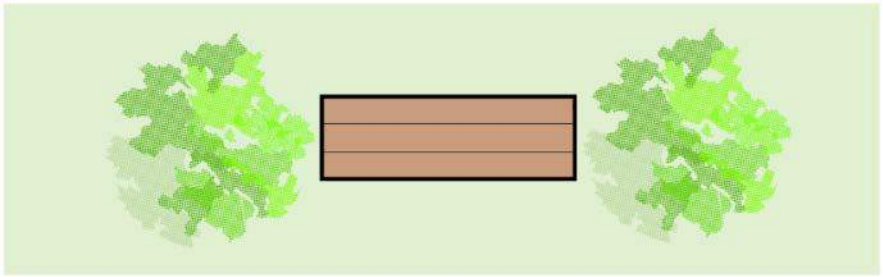
3.3.2.9 Parking Lay-Bys

Parking can be provided within lay-bys where vehicle parking on the carriageway is not preferable. They:

- Must be minimum of 2m wide
- Must allow 6m length per vehicle
- Must with tapered kerbs on entry/ exit.

3.3.2.10 Street furniture

Should be located a minimum of 0.5m from the edge of the carriageway except by agreement in shared use areas. As these features are not critical for the main purpose of streets they should be used sparingly and when located in adoptable highway will require payment of commuted sums for future maintenance. The Highway Authority may consider licensing other public bodies to install street furniture at its discretion.



3.3.2.11 Speed controls

Wherever possible use of street layout such as sinuous carriageways should be used in preference to vertical traffic management features such as ramps with the exception of transition between shared use areas and other streets. Signing should be minimised where possible, for example give and take systems are preferred to formal priority systems where this is acceptable in safety terms.

3.4 Junctions and Intersections

Every junction should be given specific consideration, in relation to the type, number and priority of users that it is designed to accommodate.

- The Primary Route should always be given priority over secondary routes.
- Designers should minimise the number of times primary pedestrian/cycle routes intersect with vehicular routes.
- Where multiple primary routes meet (i.e. Primary cycle route crossing Primary vehicle route), the designer must demonstrate that they have appropriately dealt with this complexity; the design should encourage all road users to be aware of the risk.
- Vulnerable users are at most risk at crossings/intersections and designers should be able to demonstrate how these users are accommodated.

In the following section the requirements of certain crossings and junctions are outlined, and potential typologies explored. The typologies presented are examples only which can be expanded upon or altered with suitable justification. The list below is not exhaustive.

3.4.1.1 Primary Pedestrian, Primary Cycle and Primary Vehicular Intersection

Figure 18 shows a key pedestrian route crossing a primary carriageway and primary cycle route. This example shows:

- Priority is inferred by use of design features.
- Vehicle speeds are reduced using a raised table, materials and tree spacing.
- Cycle speeds are reduced though the use of give- way markings.

- Must be designed in a way to reduce speeds
- Visibility in accordance with vehicle speeds
- Should be uncontrolled, with raised crossing areas when designed on new infrastructure. If a signalised crossing is required, the crossing can be at-grade.
- Must delineate the crossing through use of materials
- Should be lit in accordance with the relevant lighting specification
- Must provide tactile paving in accordance with guidance
- Must minimise the crossing distance for no motorised users; this must not exceed 11m
- Should provide a constant crossing level (no kerbs)
- Should consider planting to increase the presence of the junction to vehicles
- Should be placed away from vehicular junctions where this does not compromise desire lines for pedestrians
- Should provide, where necessary, refuge for pedestrians. Such as between crossing cycle tracks and carriageways
- Should prioritise primary pedestrian over primary cycling routes

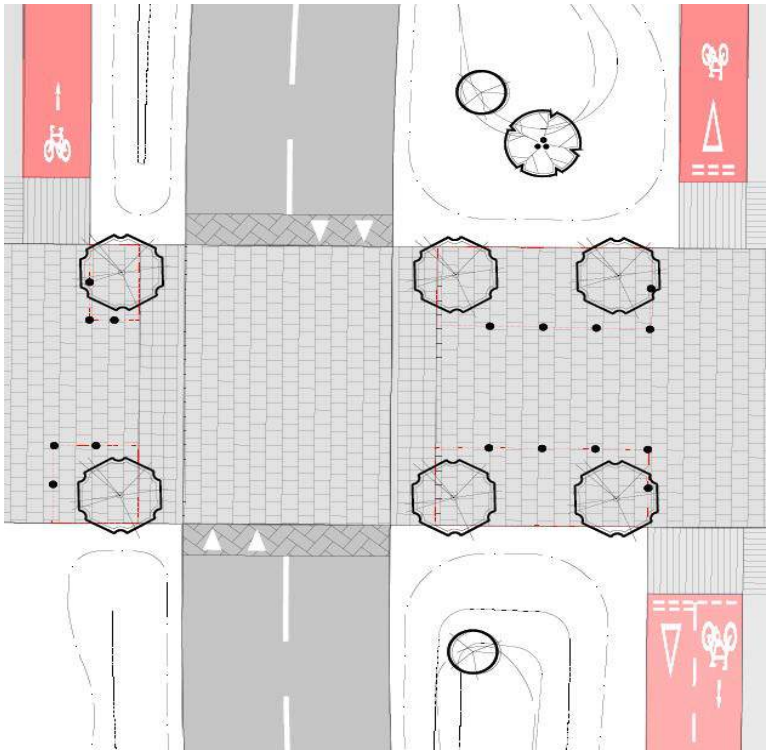


Figure 18 - Primary Pedestrian, Primary Cycle and Primary Vehicular Intersection

3.4.1.2 Primary Pedestrian and Cyclist Crossing with Secondary Vehicular Junction

Junctions with main carriageways are areas which will require designers to deal with complexity as they need to cater for various users, often of high priority. Figure 19 shows a junction from a secondary on to a main carriageway. It reduces vehicle speeds through a raised table, planting and road markings and provides priority to pedestrians and cyclists. Junctions:

- Must be designed in a way to reduce speeds of vehicles
- Must provide road markings
- Must provide tactile paving in accordance with guidance
- Must prioritise primary pedestrian and cyclist routes
- Must provide refuge for vehicles required to give way to pedestrians and cyclists

- Should have a kerb radius of no greater 6m
- Should provide crossings between junctions
- Should include landscaping features
- Should include a raised table

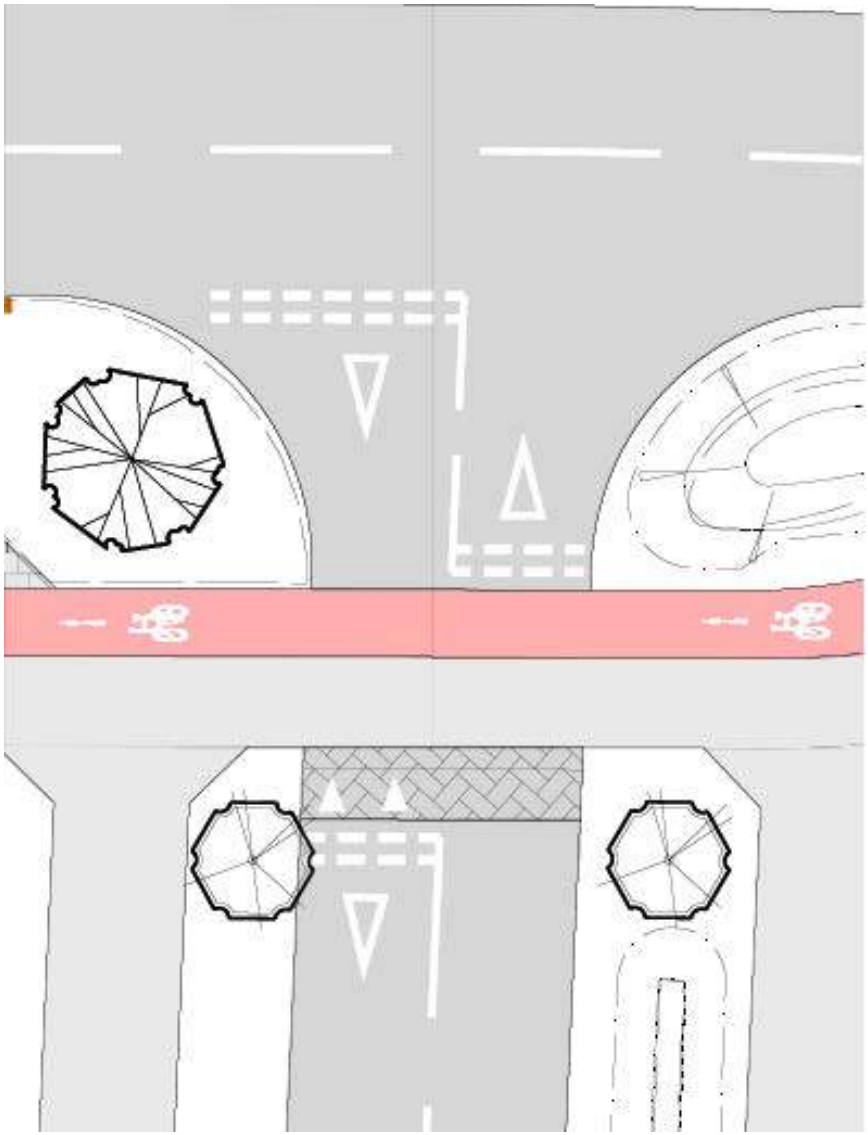


Figure 19 - Primary Pedestrian and Cyclist Crossing with Secondary Vehicular Junction

3.4.1.3 Secondary Pedestrian Route Crossing Secondary Vehicular Route

It is likely that key pedestrian routes will exist along secondary streets. This will require pedestrians to regularly cross both the carriageway and junctions onto primary routes. Figure 20 shows a level carriageway crossing where the design uses narrowing and material change to reduce vehicle speeds.

- Must be designed in a way to reduce speeds of vehicles
- Must provide tactile paving in accordance with guidance
- Must minimise the crossing Distance
- Must provide a 6m kerb radius on junction radius.

- Should delineate the crossing through use of materials
- Should have crossings evenly spaced between junctions
- Should provide a constant crossing level

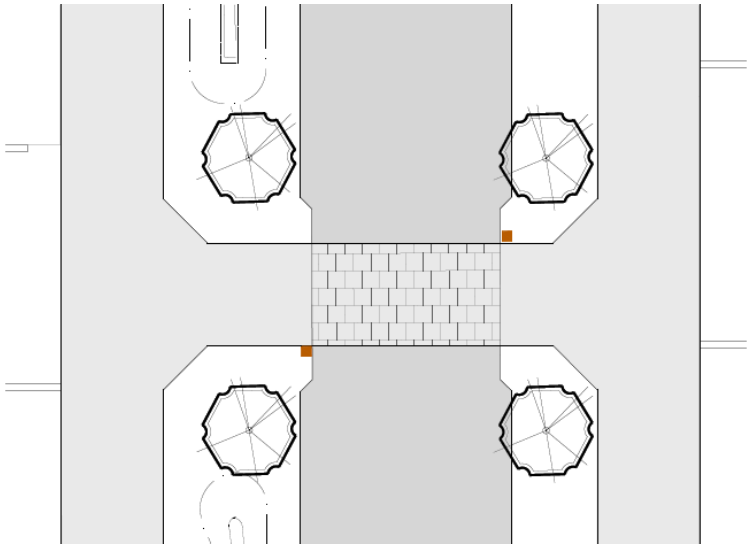


Figure 20 - Secondary Pedestrian Route Crossing Secondary Vehicular Route

3.4.1.4 Primary Pedestrian and Cycling Route Crossing Secondary Vehicular Route

On occasions a cycle route will have to cross vehicular carriageways of equal or lesser priority. Figure 21 shows a shared footway cycle track crossing a secondary carriageway. Vehicle speeds are reduced by using a raised table, materials and strategic tree planting. Cyclist and pedestrians are made aware of the junction through use of materials. Cyclists are kept at grade throughout the crossing.

- Must be designed in a way to reduce speeds of vehicles
- Must provide tactile paving in accordance with guidance
- Must minimise the crossing distance
- Must provide a constant crossing level
- Must delineate the crossing through use of materials

- Should have a raised crossing area

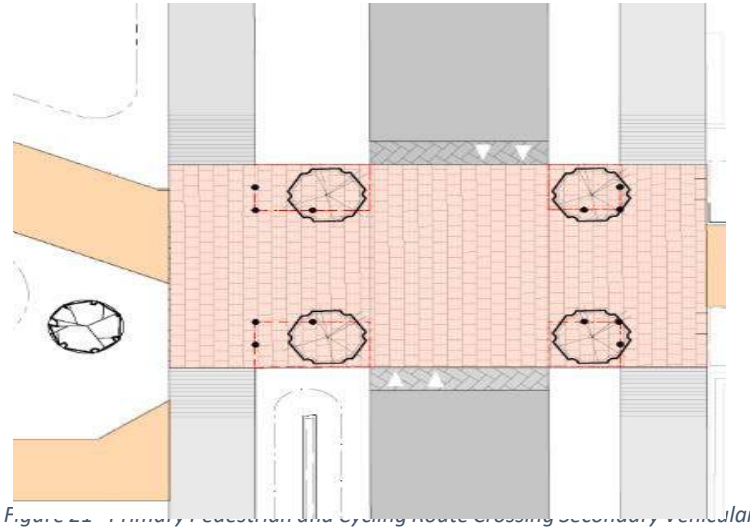


Figure 21 - Primary Pedestrian and Cycling Route Crossing Secondary Vehicular Route

3.4.1.5 Secondary Vehicular Junction with Primary Pedestrian Crossing

Figure 22 shows a secondary street junction on a raised table which makes use of materials, raised tables and planting. Junctions:

- Must be designed in a way to reduce speeds of vehicles
- Must provide tactile paving in accordance with guidance
- Should include landscaping features
- If part of a raised table must provide a 25mm kerb to demarcate the carriageway

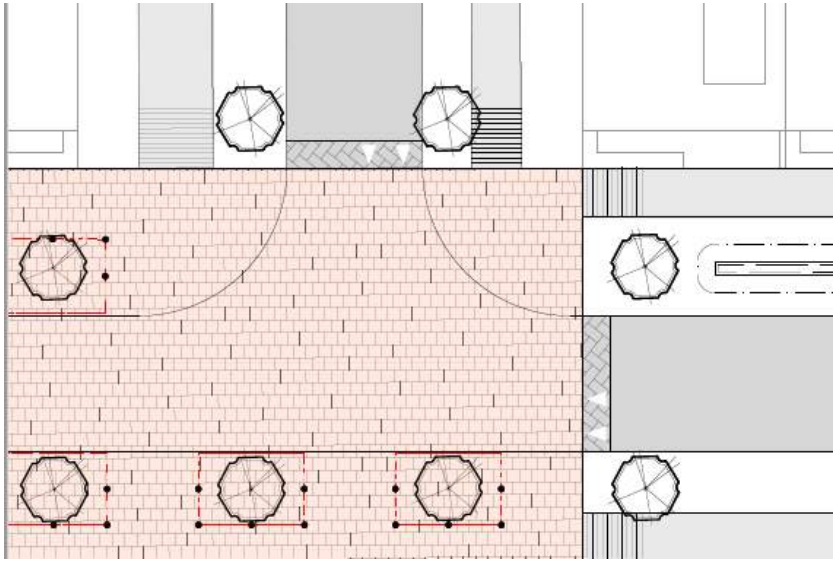


Figure 22 - Secondary Vehicular Junction with Primary Pedestrian Crossing

3.4.1.6 Primary Pedestrian Route Crossing Access Vehicular Route

- Must provide tactile paving in accordance with guidance
- Should minimise crossing distance for pedestrians

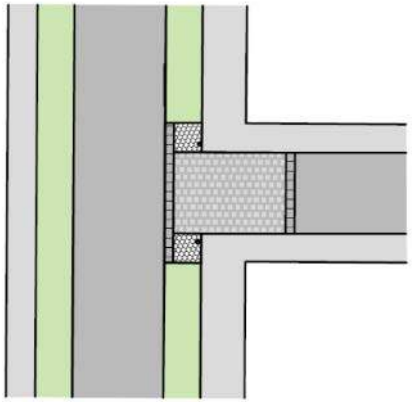


Figure 25 - Primary Pedestrian Route Crossing Access Vehicular Route Option 2

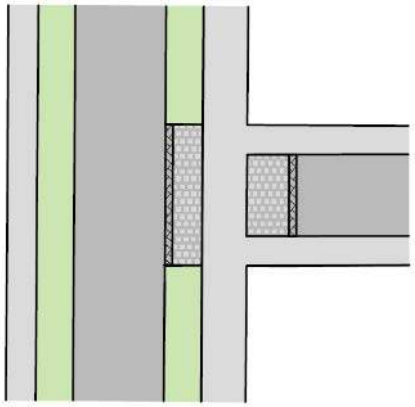


Figure 23 - Primary Pedestrian Route Crossing Access Vehicular Route Option 3

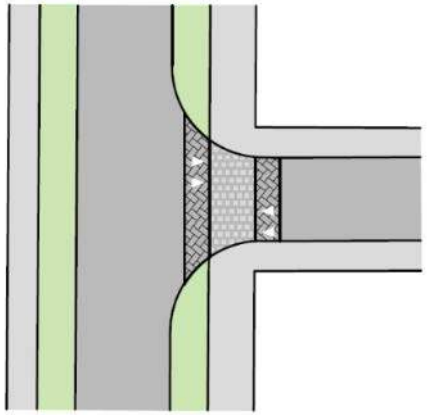


Figure 24 - Primary Pedestrian Route Crossing Access Vehicular Route Option 4

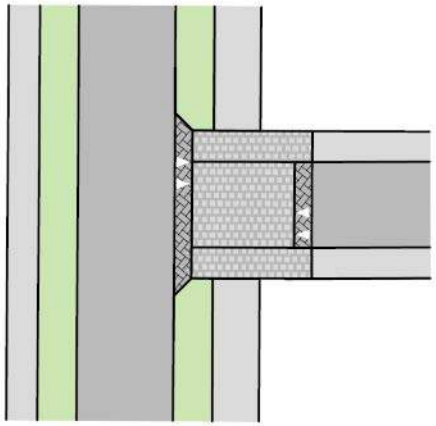


Figure 26 - Primary Pedestrian Route Crossing Access Vehicular Route Option 1

3.4.1.7 Secondary Pedestrian Route Crossing Access Vehicular Junctions

Crossings and junctions on tertiary carriageways can still take a classical junction form. Figure 27 shows a typical junction with a pedestrian crossing provided on the desire line. This is not suited for primary pedestrian routes.

- Must be treated as typical junctions with standard kerb heights
- Must have a kerb radius of 6m
- Must provide road markings
- Must minimise crossing distance for pedestrians
- Must provide tactile paving in accordance with guidance

For smaller developments that serve only a few properties from a vehicular crossing or for rural developments designers should refer to the standard details published by Development Control. These provide guidance on access layout, footways, passing places, car turning place and layout.

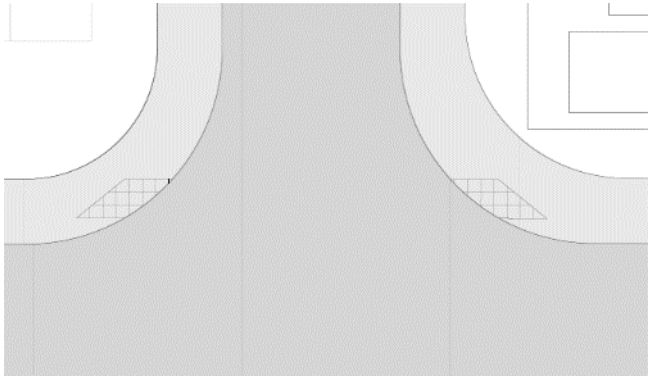
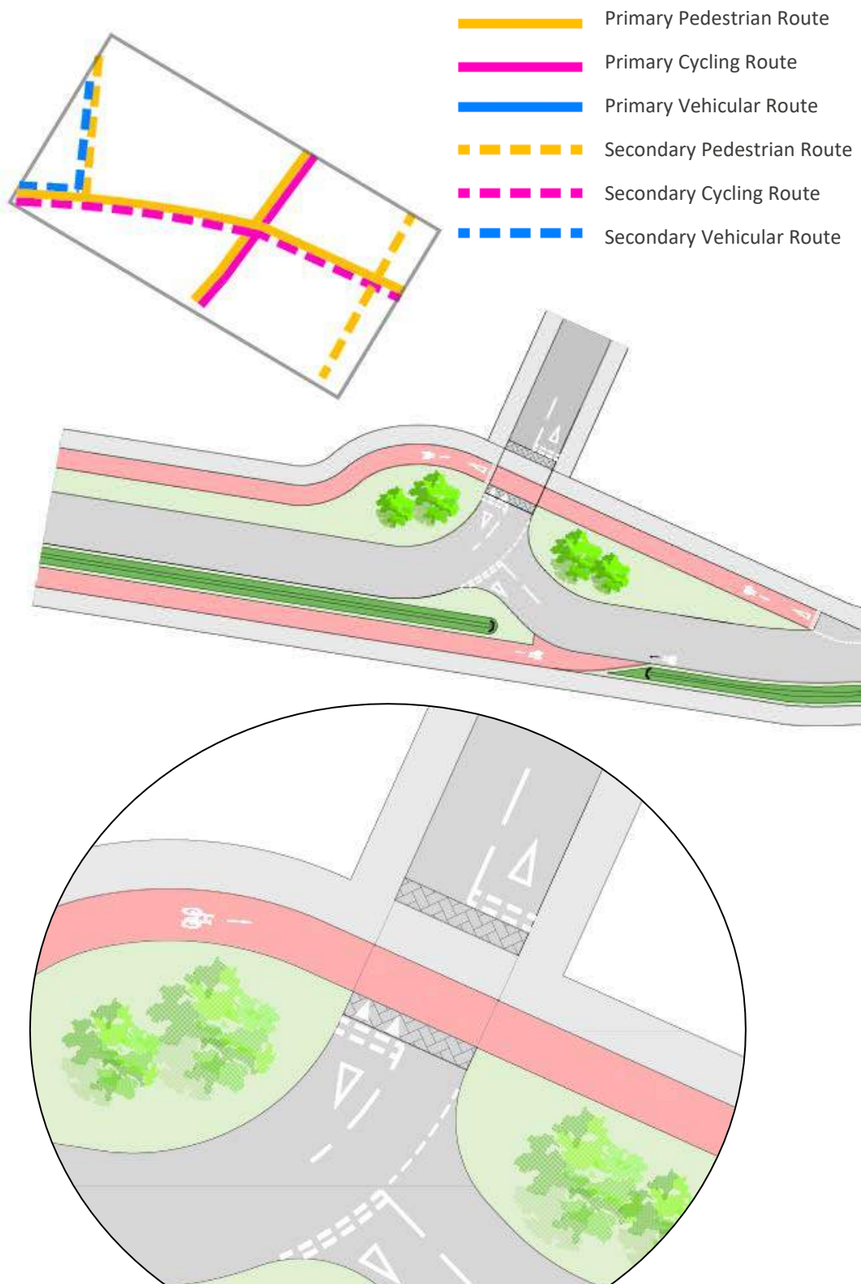


Figure 27 - Secondary Pedestrian Route Crossing Access Vehicular Junctions

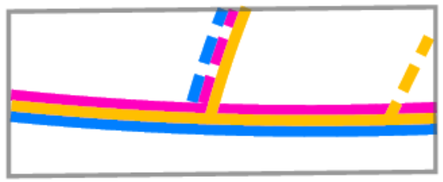
3.5 Street Typologies

In the following section the movement corridors identified in 3.2 Compiling Movement Corridors are developed into street typologies. This shows the potential street arrangements and typical junction and intersection arrangements. These street typologies have also been used to populate the street schedule in 4.2 and the junction and intersections schedule in 4.3.

3.5.1.1 Movement Corridor 1

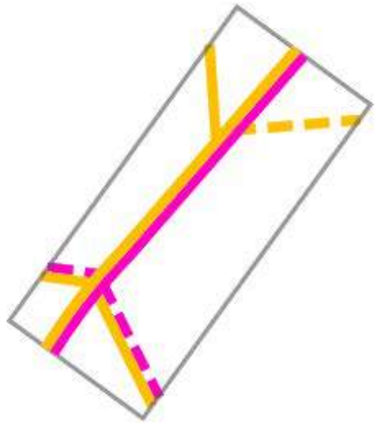


3.5.1.2 Movement Corridor 2



- Primary Pedestrian Route
- Primary Cycling Route
- Primary Vehicular Route
- Secondary Pedestrian Route
- Secondary Cycling Route
- Secondary Vehicular Route

3.5.1.3 Movement Corridor 3



Primary Pedestrian Route

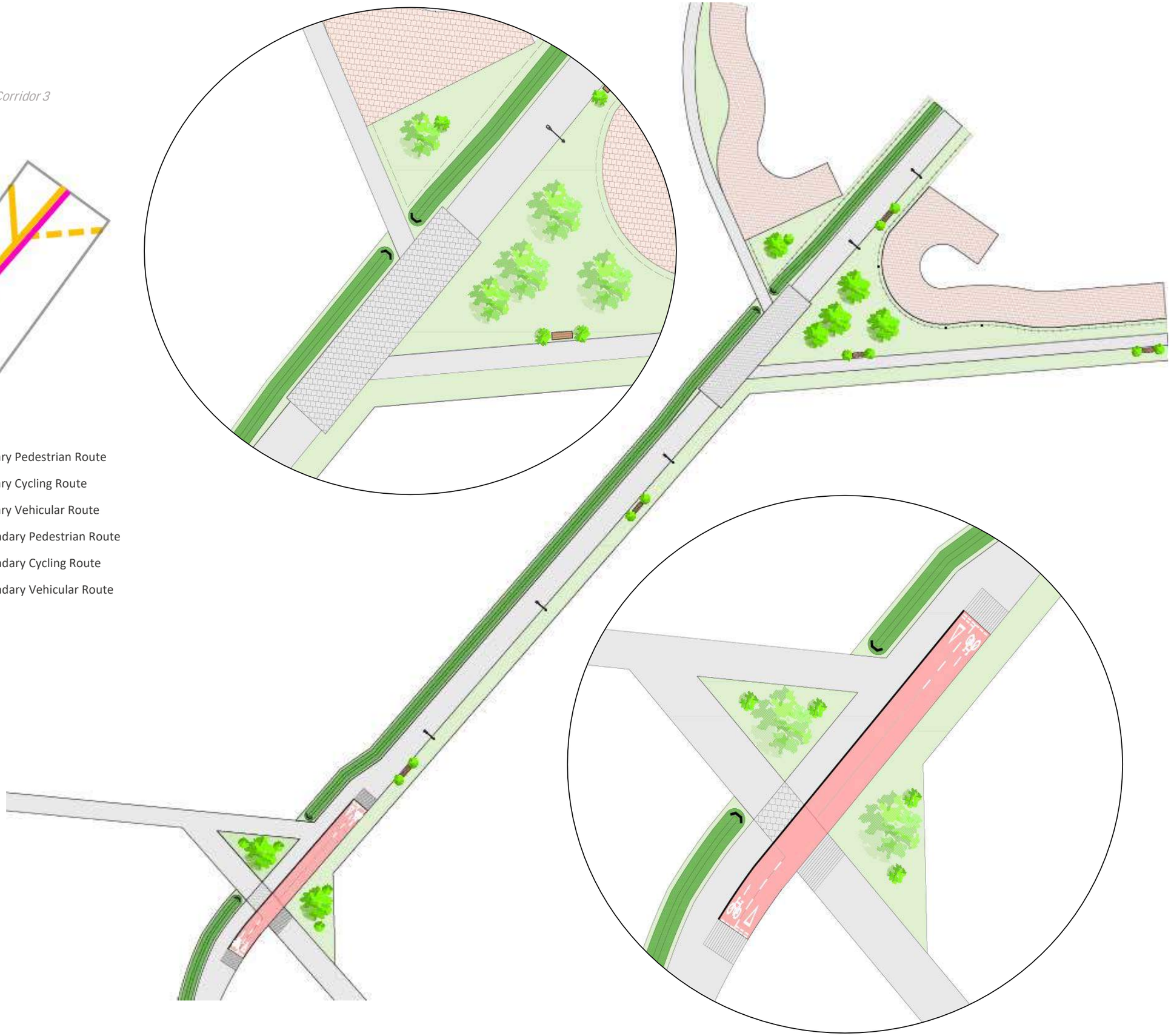
Primary Cycling Route

Primary Vehicular Route

Secondary Pedestrian Route

Secondary Cycling Route

Secondary Vehicular Route



CHAPTER FOUR

DESIGN DEVELOPMENT

4

4 Design Development

This final chapter guides designers through a self-checking process to ensure a design is suitably prepared for submission. All parts of the checklist should be completed by the designer, but the level of detail provided will vary depending on if the design is;

- Pre-planning concept design
- Outline planning design
- Detailed planning design
- Technical Approval

The checklist should guide the designer through the various elements of the design process and ensures that the logic of the proposed movement network, hierarchy of routes and junction designs have been followed.

Section 4.1 provides the Design Checklist; this guides the designer through a range of questions relating to the design process and asks them to sketch out the relevant movement networks.

Section 4.2 provides the Street Schedule; this asks the designer to code the movement route and set out the hierarchy and user types for each route, providing necessary justifications.

Section 4.3 provides the Junction Schedule; this asks the designer to code the junctions and intersections in their network, and through reference to the users and hierarchies of each street provide justification for the design approach.

The Designers checklist, street schedule and junction schedule are available as working forms from the Suffolk Highways website. 4.1 has been left blank below but shows the questions that are within the document. Section 4.2 & 4.3 below show the worked example used throughout this document. Designs should specifically refer to 3.2 Compiling Movement Corridors & 3.5 Street Typologies for further details on the examples.

4.1 Designer's Checklist

	Consideration	Questions for Designer	Designers Response	
Stakeholder Engagement				
1.1	Design Collaboration	Has a collaborative approach being taken? *Who has contributed to the design?*		
1.2	Roles & Responsibilities	Has the lead designer and design team been identified and their responsibilities determined? (May be just one designer). *Highway Engineer* *Project Manager* *Other*		
1.3	Consultations (during planning stage)	During consultations, what considerations have arisen? Select stakeholder consultee and discuss relevant considerations that have been raised. *Highways Authority* *Local Council urban design team* *Other local interest groups (i.e. cycling campaign groups)*		
Movement & Place Framework				
2.1	Movement Framework	Provide a sketch of the Movement Framework for the development identifying the following; Pedestrian, Cycling, Vehicular routes		
2.2	Placemaking and Local Character	How has place making affected the street topography and material choices? How will a consistent street language be achieved? Which elements of street design will be used consistently?		
2.3	Street Schedule	Complete the Street Schedule		
2.4	Junction Schedule	Complete the Junction Schedule		
Street Geometry				
3.1	Site topography	Does the horizontal alignment of the routes respond to the existing topography?		
		Are there any streets (or sections of) with gradients longitudinal gradients steeper than 1:30?		Yes
			Provide movement route numbers and length of route over which gradient is steeper than 1:30	[Enter Free Text]
3.2	Visibility	Have forward and junction visibility splays been checked?		Yes
		Is a reduction in visibility used in any areas as a means of speed control?		Yes
			Describe the area(s) where this approach has been taken	[Enter Free Text]
3.3	Street widths	Are the widths of movement routes consistent across the development?		Yes
		Are the proposed widths appropriate for the user needs and hierarchy of the streets?		No
				[Enter Free Text]
3.4	Speed Control	Does each street have suitable features in place to control speeds to the design speed (as set out in the Street Schedule) How do the movement framework, junctions and intersections, geometry and any specific highways features help to manage speed?	Ensure these are all set out in the Street Schedule	Yes

Components of the Public Realm				
4.1	Materials	What material types are proposed for kerbing and surfacing within the adoptable highway? What are the characteristics shared between the adoptable and private streets? Has a consistent approach been taken to material selection within street infrastructure, reflecting the materials used in the surrounding streets and best practice? Has the role of placemaking and design best practice affected the choice of materials and if so why? Are materials in line with the requirements set out in Suffolk Highways Specification? Have standard details been produced for any features not included with SHS that are intended to be adopted by Suffolk Highways?		
4.2	Street Furniture	What street furniture is in the highway and how is it being managed? Details of historic design context may be provided (e.g. using lanterns for historic lighting design). *Cycle Parking* *Bus stops/shelters* *Seating* *Refuse bins* *Bollards* *Street name plates* *Play Equipment* *Public Art* *Street Lighting*		
4.3	Vehicle Parking	Is vehicle parking provided within the adoptable highway? If yes, how has this allowance been indicated on the design plans? What type of parking bays are proposed? What parking controls need to be in place?		
4.4	Electric Vehicle Charging	Is EV charging provided with the adoptable highway? Who will own and maintain the EV charging infrastructure?		
4.5	Street Lighting	Has a street lighting design been undertaken? If so, has this been produced based on a recently requested lighting brief from Suffolk CC Streetlighting Team? Will pedestrian/cycle infrastructure be lit? Is any non-adoptable lighting proposed? If so, please provide brief details.		

Drainage				
5.1	Highway drainage design principles, including drainage context.	How does the highway drainage feature as part of the overall drainage strategy?		
		Complete flow chart questions (Section 2.4 Figure 12):	Can the site drain via Infiltration?	No
			Are there adoptable sewers in the vicinity of the site?	No
		Highway Drainage Strategy:	Highway drainage to be provided to convey flows to suitable outfall	

4.2 Street Schedule

Street Schedule								
For each route identified on the Framework, identify what role it plays and which users it serves.								
Movement Route No.	**Existing or New Route?**	**User & hierarchy of street (refer to Section 3.4)**	**Does this route link to an existing route or destination?**	**Street Element (Refer to Section 3.5)**	**Secondary Street Element (If Required)**	**Vehicle Design Speed**	**Designers justification of Design Speed**	**SuDS Features**
M1	New	Primary pedestrian route Secondary cycling route Access vehicle route	**N/A**	Footway Cycle track Tertiary carriageway	Tertiary carriageway	N/A (non-vehicle route) N/A (non-vehicle route) 15	**Tertiary Street forms part of secondary cycle network**	**Swale in the southern Highway Verge**
M2	Existing	Primary vehicle route Primary pedestrian route Primary cycling route	**Route provides access to local railway station and forms the key cycling and walking route into the town centre**	Primary carriageway Shared path		N/A (non-vehicle route) N/A (non-vehicle route) 20	**30mph based on existing speed limit and proposed enhanced bus route**	**Kerb Drainage**
M3	New	Primary pedestrian route Primary cycling route	**Route is the key cycle and walking route through the development (north south) providing route into town centre, school and railway station**	Cycle track	N/A (non-vehicle route)		**N/A**	**Strategic Swale (To be offered for adoption by Anglian Water)**

4.3 Junction Schedule

Junction Schedule			
This schedule should refer to route references set out in the 'Street Schedule'			
Junction No.	**Intersection of Which Routes (If Applicable)**	**Junction/ Intersection Form**	Design Justification (Should refer to Section 3.4)
J1	Start of M1	Secondary Vehicular with Access Vehicular	N/A
I1	Start of M1	Primary Pedestrian and Secondary Cycle with Secondary Vehicular	Forward visibility limited. Give way markings laid and vertical deflection to slow vehicles. Cycle track utilises coloured surfacing over intersection
I2	M1 & M3	Primary Pedestrian and Cyclist with Primary Pedestrian and Secondary Cyclist	Shared surface and increased width of construction to indicate user conflict and allow for additional space. Secondary cycle route uses to give way upon approach
I3	M1 & M4	Secondary Pedestrian Route with Access Vehicular	Material and vertical deflection to control vehicle speeds. Tactile paving to allow for safe pedestrian crossing
J2	M1 & M5	Primary pedestrian Route Over Access Vehicular	Access vehicular required to give way. Continuous use of material to indicate pedestrian priority and vertical direction to reduce speeds. Dutch kerb used to reduce junction radius.
J3	M2 & M6	Junction with Primary and Secondary Vehicular with Primary Pedestrian and Cyclist routes across the junction	Raised table used & block paving used to reduce speeds and indicate potential conflict of users. Primary Pedestrian and Cycle routes given priority over Secondary Vehicular through materials, raised tables and give way markings on the carriageway
I4	M2 & M7	Secondary vehicular crossing primary pedestrian and cycle routes	Large junction radius and localised widening to increase manoeuvrability. Route shared between users so no further action required.
I5	M3	Primary pedestrian and cycle route intersecting with a primary and secondary pedestrian route	Widened shared surface to be provided and material change
I6	M3	Primary pedestrian and cycle route intersecting with two primary pedestrian routes and two secondary cycle routes	Cycle Lane introduced to allow for primary cycle route to continue without interruption. Secondary cycle route and primary pedestrians to give way over the cycleway.

Appendices

A – Designing for Users Examples

B – Suffolk Design Management Process

C – Trees near the Highway

D - Highway horizontal and vertical design

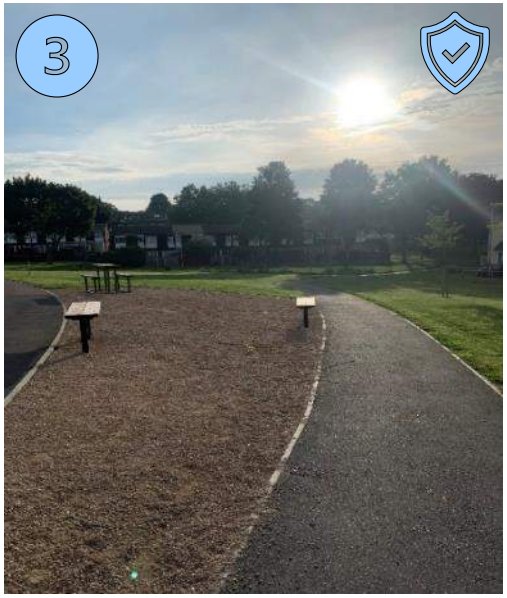
E – Highway Drainage Parameters

F – Vehicle Library

G – MfS Position Statement

H – References

A – Designing for Users Examples



Pedestrian infrastructure Examples

1 Footpath to local amenities of suitable width and high-quality surfacing.

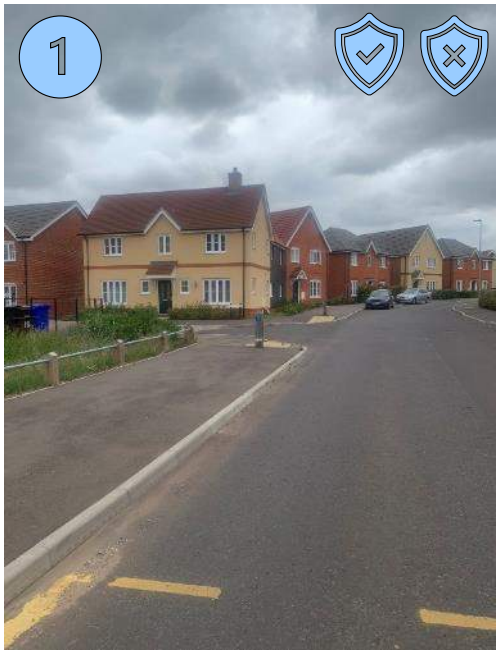
2 Footway alongside private drive allowing for pedestrian filtered permeability.

3 Footpath through open space providing direct routes for pedestrians and street furniture allowing for rest areas.

4 Footpath through matured trees offering a direct, motor traffic free route for pedestrians

5 Footpath through open space providing direct routes for pedestrians. Natural surveillance provided by neighbouring properties.

6 . Pedestrian route with no natural surveillance, overgrown, narrow, unlit and unmaintained.



Cycling infrastructure Examples

1 Dedicated mandatory cycle lane with well-maintained markings and acceptable width. However alongside heavy flows with no segregation

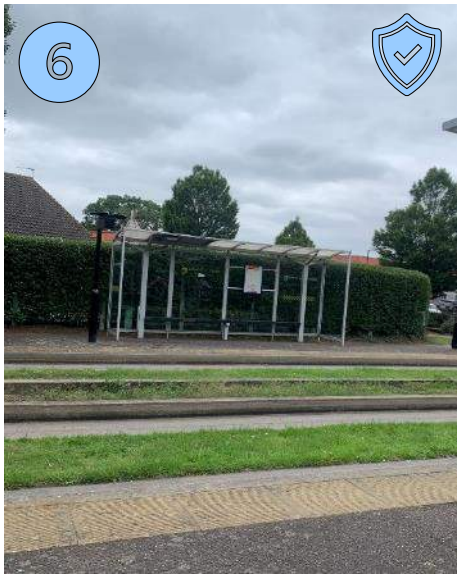
2 Motor traffic free route through interesting surroundings with acceptable width and high-quality surfacing

1 Shared footway cycle track with acceptable width however no priority given over access roads.

2 Motor traffic free route allowing for filtered permeability for pedestrians and cycle. However narrow width.

5 Shared footway cycle track with acceptable width and offset from the carriageway.

6 . Filtered permeability for cyclists who are given a direct route through the use of a one-way vehicular route and a two-way cycling route



Public Transport infrastructure Examples

1 Bus route accommodated on existing primary street. Allowing for a high quality, fast and reliable service.

2 Rural bus stop reflecting the local character and with public furniture nearby

1 High quality public realm outside of Ipswich train station, acting as a transportation hub.

2 Specific bus & cycle infrastructure to increase the service efficiency.

5 Bus stop installed retrospectively, set back from the highway to reduce clutter for pedestrians.

6 High quality bus stop in dense urban area with live bus times and ample waiting space.

Vehicle infrastructure Examples

1 Raised table to control vehicle speeds

2 Access onto private courtyard. Materials delineate the highway and the courtyard provides natural surveillance

1 Shared surface to accommodate vehicles and slow vehicle speeds

2 On street parking provided accommodate vehicles

5 Modern mews street with vehicles generally accommodate off the street.

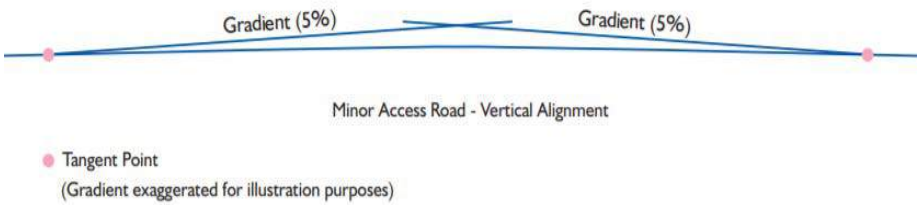
B – Suffolk Design Management Process (overarching version in production)

C – Trees near the Highway

The following **minimum** distances from highway infrastructure should be followed (see also Figure 1). Where this is not possible, for example, because the trees are proposed to be in highway, bespoke design will be required and agreed with the highway authority:

Infrastructure	Distance from centre of tree trunk	Distance from centre of hedge	Other Guidance	Further Details
Streetlight	5.0m	1.0m[1]		SCC will require a plan (for approval) showing location of streetlights and planting to avoid conflict. [1]Beech, hornbeam and other hedges composed of tree species to be 5.0m
Traffic sign	5.0m[2]	2.0m	TSRGD	[2]For columnar or fastigiate trees this may be reduced when supported with evidence on the mature tree canopy width.
Footway/cycleway and metaled public rights of way (outside edge)	2.5m with root protection*	1.0m		Canopy not lower than 2.6m Footway/Cycleway – Clear stem height of 2.0m at planting Hedgerow mixes should avoid the use of spikey species where immediately adjacent to cycleway
Carriageway - where there is no adjacent footway/cycleway (kerb line or channel)	2.5m with root protection*	2.0m	DMRM MfS	Canopy not lower than 5.2m over metalled carriageway and not within visibility splays when mature.
Public Rights of Way (unmetalled)	Not applicable	1.0m		Canopy not lower than 3.4m (bridleway) 2.6m (footpath)
Buried services	Use HAUC Specification if greater than above		NRSWA	See also guidance from each specific utility company.
AW adoptable foul and surface water sewers	Use Sewers for Adoption Specification if greater than above			
Open SuDS	Refer to advice from LLFA			
Adjacent residential dwelling	NHBC Standard			

D - Highway horizontal and vertical design



Minor Access Road - Vertical Alignment

Tangent Point

(Gradient exaggerated for illustration purposes)

Speed	Kilometres per hour	16	20	24	25	30	32	40	45	48	50	60
	Miles per hour	10	12	15	16	19	20	25	28	30	31	37
SSD (metres)		9	12	15	16	20	22	31	36	40	43	56
SSD adjusted for bonnet length. See 7.6.4		11	14	17	18	23	25	33	39	43	45	59
		Additional features will be needed to achieve low speeds										

Vertical Design at Junctions:

The designer should look to minimise the vertical gradient into junctions. A target gradient of 1:40 (2.5%) is preferred for the first 10m but it is acknowledged this may not always be practical. Therefore this can be increased to 1:20 5%) for the first 10m.

Category	Minimum headroom
Main and Secondary Carriageways	5.3m
Tertiary and Shared Carriageways	2.7m
Cycle track	2.7m

Junction visibility

Using an X distance in excess of 2.4 m is not generally required in built-up areas.

The Y distance should be based on values for SSD

Vertical alignment. The Maximum and minimum gradients allowable on new development are detailed within the table below: If the topography of the site yields particular difficulties for the street layout consultation should be undertaken

Category	Maximum Gradient	Minimum Gradient
Tertiary, secondary and main carriageways	1:20	1:125 (0.8%) 1:200 (0.5%) when used with channel blocks
Shared carriageways	1:20	1:80
Cycle tracks and Footways	1:20	1:200 (0.50%)

When connecting two vertical alignments designers must consider the curvature of the new highway. **K-Value**. This **value** represents the horizontal distance along which a 1% change in grade occurs on the vertical curve. It expresses the abruptness of the grade change in a single **value**. 'K' values are provided in the table below:

The minimum vertical curve length of any section of road should not be less than 20m.

Category	Minimum 'K' value
Main and Secondary Carriageways	6
Tertiary and Shared Carriageways	2
Cycle track	2

E – Highway Drainage Parameters

Gullies: For residential roads with a crossfall of 1/40 the spacing of gullies shall be in accordance with the table below. The areas indicate the maximum areas that can be drained by a gully. The drained areas shall include all impermeable highway land and should make allowances for run-off from verges.

Gradient	Area m^2
1:200	75
1:100	90
1:80	105
1:60	120
1:40	150
1:30	170
1:20	200

Highway Drainage Design Criteria

Designers will need to reference Suffolk 'Specification for estate road' section 7 for specification details such as pipe materials etc. This section will only cover the Design Criteria.

Piped system:

- All drains must accommodate a one-year storm without surcharging.
- All drains must be designed to accommodate a 30-year storm without flooding.
- Above the 30-year storm, piped systems can be designed to flood but these flooded volumes must be safely managed on site and conveyed back into the adoptable network or to the allocated infiltration feature.
- The piped system needs to be modelled for the 100 year return period plus an allowance for climate change to ensure surface water run-off is contained within the site boundary and discharge is restricted to greenfield run-off rates or the infiltration system is correctly sized.
- For minimum and maximum depths, sizing and modelling parameters refer to SfA.
- The minimum self-cleansing velocity shall be 0.85m/s at full flow.
- The Highway system should be designed with a MADD factor of 0 and an area reduction factor of 1.

A minimum cover to all pipes shall be:

- 1.2m (in carriageway)
- 0.9m (in footway, footpaths and soft landscaping)

Where it is not feasible to meet these standards, they can be reduced by 300mm subject to a class Z bed and surround being provided.

The minimum pipe diameter shall be:

- 150mm for gully connections.
- 225mm for highway drains.

Infiltration testing shall be conducted in accordance with BRE365 ‘soakaway design’

Under-drained Swales:

Specific planting for Suffolk

Refer to the SuDS manual for design criteria

Swales:

Specific planting for Suffolk

Refer to the SuDS manual for design criteria

Filter Drains:

Refer to the SuDS manual for design criteria

Gullies:

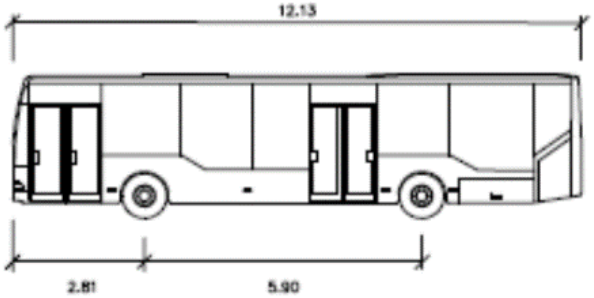
Gully spacing shall be calculated in accordance with the design criteria laid out above.

Double gullies shall be provided at low points and shall have two separate connections.

Gully shall connect to catchpits and manholes where possible. Gully laterals shall not exceed 20m.

F – Vehicle Library

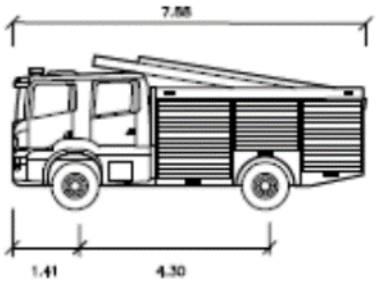
Vehicle model		OL-27W 8x4MS
Compaction body type - effective volume(s)		Olympus 27W (26.5 m^3)
Elite chassis type		8x4MS (Mid Steer) Wide Track
GVW (Gross Vehicle Weight)		32000
Front axle plated weight		8000
Rear axle/bogie plated weight		24000
Recycling box type		-
Recycling box type (capacity m^3)		-
V1	Overall wheelbase	6400
Turning circle - overall (metres)		22.4***
Vehicle unladen weight**		15600
V2	Overall length[8]	10290
	Overall length - tailgate raised[9]	11370
V3	Front axle to front of compaction body	650
V4	Front overhang	1665
	Front overhang - cab tilted	3465
V5	Rear overhang	2225
	Rear overhang - tailgate raised	3085
V6	Overall height	3450
	Overall height - tailgate raised	5100
V7	Height at exhaust tip - nominal	3500
V8	Cab roof height	3130
	Cab roof height - cab tilted	3690
V9	Cab floor height	825 Driver side, 885 Passenger side
V10	First cab step height from ground	495
V11	Rave rail height	1050
V12	Ground clearance at lowest part of vehicle	250
V13	Ground clearance - tailgate	435
V14	Approach angle	15.5°
V15	Departure angle	15°



Bus Mercedes Citaro

meters

Width	:	2.55
Track	:	2.50
Lock to Lock Time	:	6.0
Steering Angle	:	50.9



Fire Appliance Scania Emergency One

meters

Width	:	2.45
Track	:	2.45
Lock to Lock Time	:	6.0
Steering Angle	:	33.7

G – MfS Position Statement

The purpose of this position statement is to provide guidance for the application of *"Manual for Streets"* to the minimum visibility requirements at new junctions and new minor accesses within the public highway maintained or to be adopted by Suffolk County Council. It should be used in conjunction with the process for determining visibility splays for junctions and private accesses (DM-P-03-11). It should also form the basis of judging the suitability of existing junctions and access during the planning process although it is acknowledged that other factors will also need to be considered.

"Manual for Streets" volume 1 (MfS1) was published by the Department of Communities & Local Government and Department of Transport on 29 March 2007 replacing *"Design Bulletin 32"* and its companion guide, *"Places, Street and Movement".* MfS1 was supplemented by Volume 2 (MfS2) in September 2010, explaining how the principles of MfS1 can be applied more widely. Both volumes 1 & 2 (MfS) comprise technical guidance and *do not set out any new policy or legal requirements.*

MfS2 (Para 1.3.2) makes it clear that **most** (not all) advice contained in MfS relating to highway design can be applied to a highway regardless of speed limit. However, the important consideration to consider is Local Context i.e. is the highways main function as a 'street' or a 'road'. MfS Volume 1 paragraph 2.2.1 draws a clear distinction between 'streets' which are defined as '*…. typically lined with buildings and public spaces, and while movement is still a key function, there are several others, of which the place function is the most important'* and 'roads' which are defined as *'…. essentially highways whose main function is accommodating the movement of motor traffic'.*

When considering a site, designers should consider the layout in totality, including the relationship of the highway to its surroundings, both in urban and rural areas. Information on road safety, traffic flows, vehicle speeds and type could be required to assist in this assessment. Most towns and villages in Suffolk are within 30mph speed limits therefore it is considered that generally, for carriageways with speed limits of 40mph or more traffic movement dominates. Designers should refer to SCC standard drawings for vehicular accesses for further details such as visibility requirements for pedestrians.

When considering detailed layout design, it is particularly important that an applicant ensures that all land required to provide the necessary visibility is within their control or within the existing public highway

In all cases the application of DMRB and MfS shall be agreed with the relevant Local Highway Authority. For sites where it is not necessarily clear what the primary function of the highway is early consultation with SCC is strongly recommended. Departures from this guidance will only be permitted if confirmed in writing by SCC.

kph	Measured 85%ile speed (mph)[1]	Nominal Speed limit (mph)	Private Accesses	Junctions		
				U class roads	C class roads and heavily trafficked U class roads[3]	A and B Roads
			Place function dominates[2]			
			Movement function dominates[2]			
			X=2.4m [4]			X=4.5m[4]
			Stopping sight distance (m) = Y[5]			
32	20	20	25	33	43	43
40	25	30	33	33	43	43
48	30		43	43	43	70
60	37		59	59	70	90
70	43	40	90	120		
85	53	50	120	160		
100	62	60	160	215		
120	75	70	215	295		

Table 1: Stopping sight distances and recommended visibility for various 85th percentile speeds

Notes:

1: Where traffic speed survey data has been collected near to the access, the measured 85th percentile speed can be used to determine the stopping sight distance, to a minimum speed of 20mph. In the absence of survey data, the nominal speed limit shall be used subject to local context and safety record.

2: Generally, when considering layout and design, MfS will be taken as a starting point, particularly in urban areas where *place* dominates, and vehicle speeds are low. However, the design principles contained in The Design Manual for Roads & Bridges (or appropriate local design standards) should apply where the primary function of a highway is deemed to be '*movement*' (for example on Principal, Strategic, Main or Secondary routes and assigned HGV routes shown in the Suffolk Lorry Rout Network CC https://www.suffolk.gov.uk/assets/Roads-and-transport/lorry-management/Lorry-Route-Map-Amended-MAY-17.pdf.)

3: Where the combined proportion of HGV and bus traffic is greater than 5% of the total daily number of vehicles, or peak flow exceeds 300 vehicles / hour / lane, or road is on an HGV route or the junction or access forms part of an industrial development.

4: For A and B class roads and all roads on commercial estates the starting point for design shall be X distance of 4.5m; if this cannot be achieved a relaxation to 2.4m may be acceptable in certain circumstances at the discretion of the highway authority.

If the desirable visibility cannot be achieved, it may be possible to adjust the splays at the discretion of the highway authority as follows:

The X distance may be relaxed to 2m in very lightly trafficked areas where traffic speeds are low and where children and other vulnerable road users are unlikely to be present. *This value will mean that the front of some vehicles will protrude slightly* into the running carriageway.

5: The Y distance must not be relaxed below the values set out without written agreement from SCC.

H – References

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