



Land at The Hill, Littlebourne

Transport & Highways Proof of Evidence
Vanessa Eggleston: Volume 2 - Appendices

Planning Application Reference: CA/23/00484

Appeal Reference: APP/J2210/W/25/3373183

Client: Gladman Developments Ltd

i-Transport Ref: VE/dc/ITM16283-015B

Date: 19 January 2026

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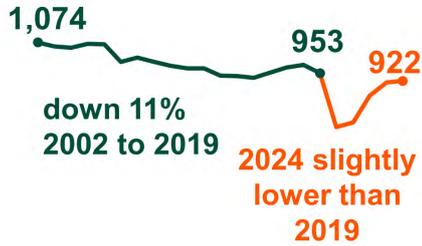
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APPENDIX A. National Travel Survey 2024 Main
Results Factsheet



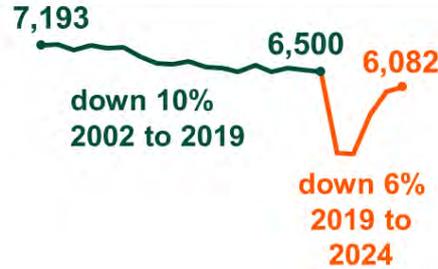
Trips [NTS0101]

Average trips per person per year



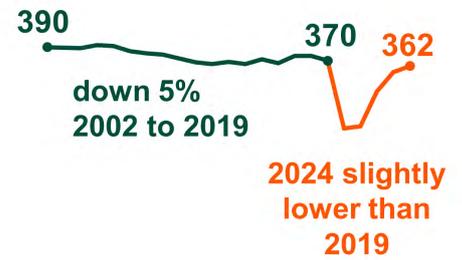
Distance [NTS0101]

Average distance (miles) per year



Time [NTS0101]

Average time (hours) per year



2002

2024

2002

2024

2002

2024

How we travelled [NTS0303]

Modal share

Trips

Distance



People made 922 trips on average in 2024, or 18 trips a week. This was similar to 2023 (915 trips on average), but slightly lower than 2019 prior to the coronavirus (COVID-19) pandemic, when people made an average of 953 trips per person.

People travelled an average of 6,082 miles in 2024, this was a slight increase compared to 2023 (5,974 miles on average) and a 6% decrease from 6,500 miles in 2019.

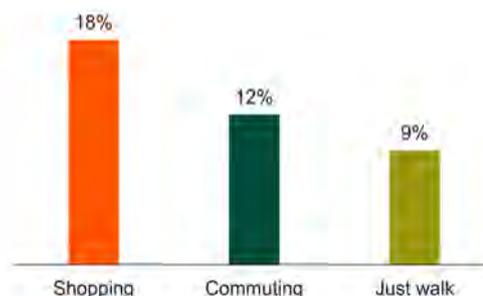
On average, people spent around 362 hours travelling in 2024 (around 60 minutes per day), a slight increase compared to 2023 but slightly lower than the 370 hours of travelling in 2019.

Cars remained the most popular mode of travel, making up 59% of all trips in 2024 (a decrease of 2 percentage points from 2019), and 76% of all miles travelled (a decrease of 1 percentage point from 2019). The proportion of trips that were walked was higher in 2024 than in 2019, with a 3 percentage point increase to 29% of all trips in 2024.

The most common trip purpose in 2024 was shopping, with 18% of journeys being made for this purpose. Journeys for the purpose of commuting represented 12% of average trips in this year. 'Just walk' was the third most common trip purpose in 2024, accounting for 9% of all trips. These 3 were also the most popular purposes in each of the past 4 years.

Why we travelled [NTS0403]

The most common trip purposes were:

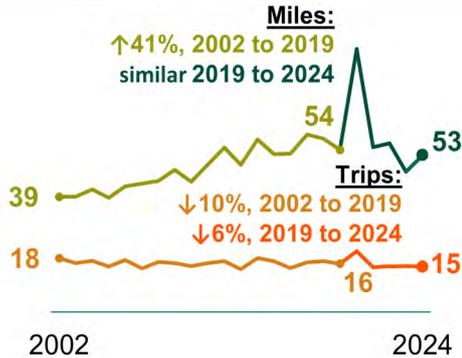


Similarly, in 2019 the 2 most common trip purposes were shopping and commuting, while the third most common trip purpose was personal business.

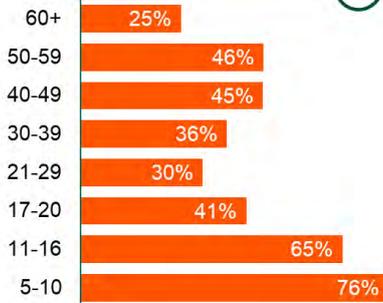


Cycling [NTS0303, NTS0608]

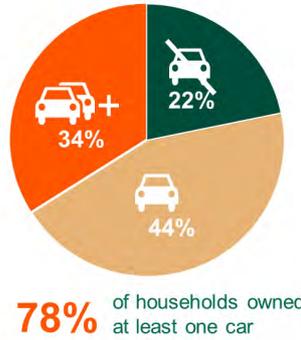
Average cycling trips per person per year



People with access to a pedal cycle, by age (2023 to 2024)



Car ownership [NTS0205]



Licence holding [NTS0201]



75% of individuals (17+) held a driving licence



80% of males



71% of females

People made 15 cycling trips on average in 2024. This was similar to 2023, and slightly lower than in 2019 (16 cycling trips). People travelled an average of 53 miles by pedal cycle in 2024, similar to 2019 (54 miles per person). In 2023 to 2024, people aged between 5 and 10 were most likely to own or have access to a pedal cycle (76%). People aged 60 and over were least likely to own or have access to a pedal cycle, with 25%.

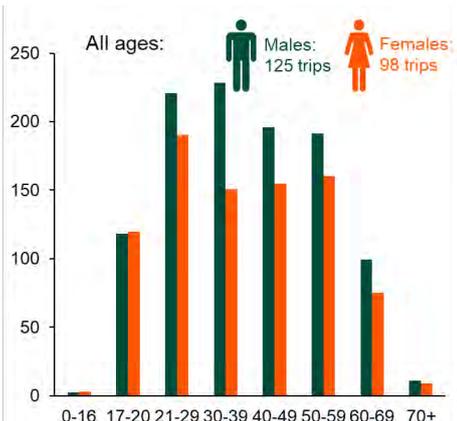
In 2024, males made 4% fewer trips (904 trips per person) than females (939 trips per person) but travelled 16% further (6,549 miles per person by males, compared to 5,633 miles per person by females). In 2024, males made an average of 125 commuting trips per person (a decrease of 23% on 2019), while females made an average of 98 commuting trips per person (a decrease of 17% on 2019).

Sex [NTS0601, NTS0611]

Average trips and distance per person per year, by the sex of the respondent



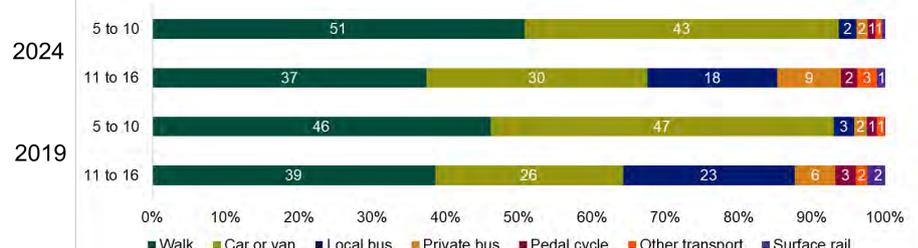
Commuting trips per person per year, by age and sex



Looking at households in England, 78% own at least one car, an increase of 4 percentage points since 2002. In 2024, 75% of English residents aged 17 and over held a driving licence. Around 80% of males and 71% of females held a licence. For males, this percentage is unchanged since 2002, but for females, driving licence holding has increased by 9 percentage points in the same period.

In 2024, the proportion of trips to and from school by walking made by children aged 5 to 10 was 5 percentage points higher than in 2019. The proportion of trips to and from school made by car decreased by 4 percentage points for children aged 5 to 10 but increased by 5 percentage points for children aged 11 to 16.

Trips to and from school by main mode and age [NTS0613]



APPENDIX B. Car Clubs Rapid Evidence Assessment

NatCen

Social Research that works for society

Car Clubs Rapid Evidence Assessment

Authors: Elizabeth Bromley, Tim Vanson, Anna Marcinkiewicz, Nevena Ilic, Thomas Freeguard

Date: 31/01/2024

Prepared for: Department for Transport

At NatCen we believe that social research has the power to make life better. By really understanding the complexity of people's lives and what they think about the issues that affect them, we give the public a powerful and influential role in shaping decisions and services that can make a difference to everyone. And as an independent, not for profit organisation we're able to put all our time and energy into delivering social research that works for society.



CoMoUK (Collaborative Mobility UK) is the national charity dedicated to the social, economic and environmental benefits of shared transport. CoMoUK supported NatCen in the delivery of the rapid evidence assessment by: advising on draft versions of the research tools, outputs and analysis; providing CoMoUK published reports and carrying out analysis of their car club data; and identifying wider grey literature through a call for evidence.

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Executive summary

Car clubs provide a variety of social, economic, and environmental benefits by giving people low cost, flexible access to cars. The Vehicle Emissions Trading Schemes Order 2023 that implements the zero emission vehicle mandate includes a bonus credit available to vehicle manufacturers that sell zero emission cars or vans to car clubs, and grant funding for car club chargepoints is available through the Local Electric Vehicle Infrastructure fund. This is intended to encourage greater access to zero emission vehicles in communities. The Government also provides guidance for local authorities implementing car clubs through the *Local Authority Transport Decarbonisation Toolkit: Car Clubs*.

The Department for Transport commissioned a rapid evidence assessment to build on these policies to capture robust evidence about the benefits of car clubs, which allow members to rent cars for a short period of time, typically using an app or a card, without the need for a staff member. Car clubs also represent the largest and growing market within shared travel. The Department for Transport wanted to understand the reasons users engage with car clubs, the benefits and barriers, potential trends for future vehicle ownership models and wider impacts (e.g. on the environment). This research is intended to help inform further policy considerations.

The report presents findings from 37 pieces of literature that were selected following a process of systematic searching, screening, prioritisation and extraction of the evidence. The evidence reviewed predominantly comprised primary research with participants of car club schemes however, overall, the review found a lack of use of more rigorous research methodologies, such as control groups or longitudinal studies.

Definitions and car club user characteristics

The term car club is used throughout this report to refer to the short-term renting of vehicles, typically using an app or a card, without the need for a staff member. There are different types of car club referenced in this report, which are defined in detail in the introduction section. Briefly, these are:

- **Commercial car clubs** – car sharing platforms that are hosted by a business that also own the cars. Commercial car clubs commonly take two forms:
 - Back-to-bay – typically members must return vehicles to their unique, designated parking place.
 - Free-floating - members can pick up a car and return it to another location within a wider area.
- **Peer-to-peer car clubs** – car sharing platform that allows members to offer privately-owned vehicles for rent to others.

The literature reviewed provided an overview of car club user profiles. Car club members tended to be male, be based in urban areas, have higher than average education and income, and use public transport and active travel modes more frequently than the general population.

Car club members used car club cars for a variety of journey purposes, including leisure, shopping, visiting friends and family, work-related trips, medical appointments, and volunteering or caring responsibilities.

Headline findings:

- The review found evidence relating to the impact of car clubs on: (1) vehicle ownership; (2) annual distance and mileage members travelled in any type of car (i.e. including private and shared cars); (3) some wider societal factors like the environment. Evidence was also found on barriers to car club participation.
- There was a lack of literature available dealing with the impact of car clubs on other societal factors like congestion, public health and integration into mobility hubs. There was, however, evidence for the relationship between car clubs and access to opportunities (including employment, health and social opportunities).
- There was a lack of literature available on how impacts vary by the different procurement models used to deliver car clubs.

(1) Vehicle ownership

Car club membership was found to be associated with a reduction in private vehicle ownership.

- Car club users in the US, UK and Europe reported relinquishing a household vehicle (between 9.5% and 33.1% of members).
- Car club users tended not to acquire an additional household vehicle (27% of UK car club members claimed they would have bought or leased a car if they had not joined a car club).

Studies based in Germany and Canada found that certain factors increased the likelihood of relinquishing a car, including being a member of a back-to-bay car club service rather than a free-floating car club service, members having owned more cars prior to joining a car club scheme, and if members' motivation to join a car club was due to associated cost savings or to reduce pollution or fuel consumption.

However, one European study suggested that the relationship between car club membership and a reduction in vehicle ownership is over-stated when viewing the impact of car clubs through the lens of regional and national motorisation growth rates (passenger cars per 1000 inhabitants).

(2) Distance and vehicle mileage

There was evidence that, on average, the annual distance car club users travel in any type of car decreases once they start participating in car clubs.

- One UK study highlighted that the average car club member reduced their annual distance travelled by car by 170 miles.
- This reduction occurred despite the finding that car club members were able to take trips that would not have been possible without their membership. (UK evidence found that 22% of members would not have been able to take their most common car club trip were it not for their membership.)
- For the majority of members, joining a car club scheme has limited impact on levels of public transport use and participation in active travel modes, such as walking and cycling.

(3) Societal impacts

Emissions and environmental impacts is one of the areas with the highest volume of available research. The evidence demonstrated that a reduction in emissions as a result of car clubs is linked to a range of factors, including:

- Car occupancy levels – *where there was a higher occupancy rate*
- Car ownership – *through reduction in vehicle ownership and use*
- Vehicle technology – *through the use of lighter vehicle fleets and electric vehicles*

A UK study drawing on car club fleet analysis indicated that in 2020, the average car club car emitted 27% less CO₂e per kilometre than the average car in the UK.

(4) Barriers to car club participation

The biggest limiting factors on the growth of car clubs include local availability, accessibility, and reach.

- A US study focusing on peer-to-peer car clubs found a general lack of car availability caused difficulty for members.
- One literature review reported that if car club depots are not placed in easily accessible locations, adoption of the service remains low.
- Another study from Norway reported that users want good access to the types of cars they actually want.
- Certain demographic groups were underrepresented among car club user profiles, including lower socio-economic groups, older age groups, and people living in rural areas.

These observations indicate areas of car club schemes that could be improved and specific groups to engage to increase growth and reach a wider user base.

1 Introduction

This report presents findings from a rapid evidence assessment which aims to understand the reasons users engage with car clubs, the benefits and barriers related to car clubs, and the impact of car clubs in areas such as vehicle ownership, travel choices and wider impacts (e.g. on the environment). The rapid evidence assessment also seeks to understand to what extent and how these impacts may vary according to different factors, such as type of area, journey purpose and demographic and socioeconomic factors. NatCen worked in partnership with CoMoUK throughout this rapid evidence assessment. NatCen led on the delivery of the research and CoMoUK provided expert advice and quality assurance on our tools and outputs.

1.1 Background to review

This report focuses specifically on car clubs. Car clubs allow people to rent or access cars for a short period of time. Variations of car clubs are described comprehensively below, but they include commercial car clubs and peer-to-peer car clubs.

The Department for Transport has already undertaken several projects focusing on consumer characteristics and barriers and motivations to using car clubs. However, they are lacking a robust understanding of the specific impacts of these services on vehicle ownership, the environment and travel choices. To address this gap, and to build on current policies related to car clubs the Department for Transport commissioned a rapid evidence assessment to provide a comprehensive synthesis of the existing literature.

Although this rapid evidence assessment focuses on the impacts of car clubs specifically, the environment in which car clubs operate is also an important consideration. The potential for car clubs to have an impact depends on adjacent policies and practices, such as parking policies, provision of active travel infrastructure and public transport service levels. The environment car clubs operate in, therefore, provide important context to the impacts they can create.

1.2 Definitions

1.2.1 Types of car clubs

The literature reviewed in this rapid evidence assessment focuses specifically on car clubs. The different types of car clubs considered in the report are described below:

- **Commercial car clubs** – car sharing platforms that are hosted by a business that also own the cars that are rented out by the hour, typically using a card or an app, without the need for a staff member. Commercial car clubs commonly take two forms:
 - Back-to-bay (also referred to as two-way, round-trip or station-based services in the literature) – typically members have to return vehicles to their unique, designated parking place.
 - Free-floating (also referred to as one-way or flexible in the literature) – members can pick up a car and return it to another location within a wide area (note there are currently no car club operators in the UK that exclusively offer a one-way scheme).
 - The terminology used throughout this report will be “back-to-bay” and “free-floating”.
- **Peer-to-peer car clubs** – car sharing platform that allows members to offer privately-owned vehicles for rent to others.

Multi-occupancy vehicles and services (i.e. carpooling, lift-sharing and ride-sharing) were regarded as out of scope in this rapid evidence assessment.

1.2.2 Car club user characteristics

Profiling car club users was not a key aim of this rapid evidence assessment, but the literature reviewed provided some contextual evidence about users.

The evidence reviewed suggested car club users are more likely to:

- be male (CoMoUK, 2022; Wiegmann, et al., 2020; Giesel & Nobis, 2016; Esfandabadi, et al., 2022)
- be based in urban areas (Giesel & Nobis, 2016; Nenseth & Ellis, 2022; Esfandabadi, et al., 2022; Goddeke, et al., 2022)
- have higher than average education and income (Chicco, et al., 2022; Wiegmann, et al., 2020; Giesel & Nobis, 2016; Nenseth & Ellis, 2022; Esfandabadi, et al., 2022; Goddeke, et al., 2022)
- use public transport and active travel modes more frequently than the general population (CoMoUK, 2022; Nenseth & Ellis, 2022; Goddeke, et al., 2022; Kopp, et al., 2015)

The literature found that car club users are motivated to participate in car clubs for a variety of reasons, including:

- Not needing a car very often (CoMoUK, 2022; Wiegmann, et al., 2020)
- Car club use is cheaper overall than owning a car (Nenseth & Ellis, 2022)
- Avoiding the hassle of ownership (Nenseth & Ellis, 2022)
- Additionally, free-floating car club service users highlighted car clubs as being more flexible than public transport (Wiegmann, et al., 2020)

The literature also suggested that car club members use these cars for a variety of reasons, including: leisure; shopping; visiting friends and family; work-related trips; medical appointments; and volunteering or caring responsibilities.

Additionally, free-floating car club service users indicated car club use for getting to the airport (CoMoUK, 2022; Wiegmann, et al., 2020). Conversely, the trips that car clubs are less likely to be used for tend to be those that are taken every day, such as for commuting purposes.

1.3 Research questions

The review focused on the following key priority research question:

1. What is the measured impact of car club options on:
 - a. Vehicle ownership
 - b. Environmental impacts
 - i. PM2.5 emissions (and concentrations)
 - ii. NOx emissions (and concentrations)
 - iii. Greenhouse gas emissions
 - c. Transport mode choice (number of walking/cycling trips, public transport trips and trips made by car)
 - d. Vehicle mileage, total journey time and trip generation
 - e. Access to opportunities and services (e.g. employment, education, socialising, healthcare, key services)
 - f. Congestion
 - g. Public health

Secondary research questions were also considered where evidence was available:

2. To what extent are the impacts heterogeneous across:
 - a. different areas (urban vs. rural),
 - b. journey purposes,
 - c. demographics,
 - d. socio-economic groupings,
 - e. accessibility needs?
 - f. Are the above differences quantified and robustly measured?
3. What is the impact on car clubs when they are integrated into shared mobility hubs¹?
4. To what extent do the car club operating models (e.g. back-to-bay, back to area, and one-way or flexible) encourage greater use of car clubs?

¹ A hub where sustainable transport modes, such as shared mobility, public transport and active travel are integrated.

5. How do impacts vary according to the different procurement models (e.g., service arrangement, concession²) used to deliver car clubs?
6. What are the barriers and opportunities to encouraging car clubs?
7. For all answers, what is the quality of evidence? Are there any evidence gaps and what further questions could be explored in additional research?

1.4 Overview of approach

The study used a rapid evidence assessment methodology. A rapid evidence assessment sits between a literature review and systematic review: it follows rigorous and explicit methods for searching, screening, assessing and synthesising evidence, whilst making informed compromises on aspects of the systematic review process in order to deliver findings quickly.

The rapid evidence assessment involved a review and assessment of academic texts, grey literature and published car club data collected and analysed by CoMoUK. Academic texts were identified through complex search strings. Grey literature was provided by CoMoUK and their contacts. A total of **136** sources were identified as meeting the inclusion criteria and **37** sources were selected for inclusion in the review after following a rigorous prioritisation process. The final source list includes quality assured data³ on commercial car clubs provided by CoMoUK and data provided by their contacts. Further details on methodology can be found in chapter 2.

When reading this report, it should be noted that a number of the prioritised primary research studies use convenience sampling approaches. There is limited evidence that uses more rigorous methodologies, such as randomised control trials and forms of sampling, such as non-probability based and quota sampling, to provide more robust evidence. A full assessment of the quality of research included in this rapid evidence assessment can be found in chapter 9.

1.5 Report structure

The report structure is as follows:

- Chapter 2: detailed methodology used to conduct the REA

² Definition of these procurement models:

- a concession agreement – where a supplier is invited to operate and receive all the revenue from a scheme, without being funded by the local authority, usually without restrictions on key business and operational decisions

- a traditional services arrangement – where a local authority procures a specific service and contributes funding to the scheme (for example, through the operator charging the council a management or operating fee

³ The data CoMoUK collate is from accredited car clubs. It goes through a series of checks internally through senior staff reviews and is then externally verified by an independent transport research company with many years of experience in the field.

- Chapters 3 to 7: cover the impact of car clubs on: vehicle ownership; vehicle mileage, total journey time and trip generation; mode choice; environmental impacts; and access to opportunities, public health and congestion (address research questions 1, 2 and 4)
- Chapter 8: covers the barriers and opportunities of car club use (address research question 6)
- Chapter 9: covers the quality of evidence (address research question 7)
- Further research: summarises the availability of evidence and suggests areas for further research

2 Methodology

This chapter provides a summary of the methodological approach used to complete this rapid evidence assessment, including the criteria and processes for the search strategy, screening, data extraction and synthesis.

2.1 Search strategy

The study involved a search for academic literature. Grey literature sources were provided by CoMoUK and included: data collected and analysed by them on predominantly commercial car clubs; research produced by regional and national transport organisations; case studies on specific car club organisations. Data provided by car club organisations was included, as it provided high-quality evidence and analysis to effectively answer the research questions, maximising the value of this exercise.

Academic literature was searched for using complex search strings in academic databases including, Scopus, Transport Research International Documentation (TRID), EconLit, GreenFILE and PsycInfo.

Grey literature was provided by CoMoUK and their contacts. The literature was selected based on the research priorities.

2.2 Screening

Academic papers were screened at two stages – at title and abstract and at full text. A total of **1773** papers were screened at the title and abstract stage. **136** sources were taken to the full text screening stage. After full text screening, **111** papers met the inclusion criteria (outlined in Appendix A). A systematic prioritisation process was undertaken based on assessing the relevance and quality of each paper and a total of **37** papers were included in this study. A detailed overview of this process can be found in Appendix A. Table 1 outlines the results of the search and screening stages completed.

Table 1 Result of each screening stage

Stage	Academic Sources	Grey sources
Identification	N=1773 papers identified through academic database searches	N=7 grey literature sources provided by CoMoUK
Screening	N=136 papers met the inclusion criteria at title and abstract screening stage	N=7 grey literature sources met the inclusion criteria at title and summary screening stage
Eligibility	N=111 papers met the inclusion criteria at the full text screening stage	N=5 grey literature sources met the inclusion criteria at the full text screening stage

Included	N=32 papers prioritised for inclusion in the rapid evidence assessment	N=5 grey literature sources prioritised for inclusion in the rapid evidence assessment
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2.3 Data extraction and synthesis

A thematic framework was developed to help organise the evidence extracted from the prioritised papers. The framework was structured by the key themes included in the research questions, including the potential impact areas; factors that might influence impacts; barriers and opportunities of car club use; quality of evidence and evidence gaps. Members of the research team read each paper in full and populated the framework with the relevant evidence.

Once extraction was complete, the evidence was synthesised by research question. This was done by using a 'framework method', employing an analytical matrix incorporating the primary and secondary research questions.

3 Vehicle ownership

This chapter explores whether car clubs have an impact on levels of private vehicle ownership. The literature suggests that there is an association between car clubs and vehicle ownership reduction. Factors that influence the strength of this relationship are also explored.

3.1 The evidence base

Twelve sources are considered in this chapter. There was substantial evidence found in the literature highlighting a relationship between car clubs and a reduction in vehicle ownership. The evidence presented in most of the sources was based on online surveys of car club members. There were limitations to this methodology: surveys were distributed via car club providers and participation was on a voluntary basis, with relatively low response rates across sources (see chapter 9 for a more detailed discussion of this) – there are therefore issues with representation and most papers did not conduct any weighting of the data. In all but one of the papers, the surveys did not engage non-car club users, therefore there were no control groups. Two sources drew on wider data sources. One of these sources stressed that one of the main challenges for car club studies is collecting reliable data on car club services. This study acknowledged that, although various data sources were analysed, data on some car club services could have been missing or inaccurate, which would have impacted their results (Bucsky & Juhasz, 2022).

3.2 Key findings

- The main finding from the literature was that participating in car clubs is associated with a reduction in vehicle ownership. The reduction in vehicle ownership was illustrated in the literature in two main ways:
 - That car club members relinquished previously owned vehicles (sources suggested that between 9.5% and 33.1% of car club users reported having relinquished a vehicle).
 - That car club members avoided purchasing additional vehicles (one UK report found that 27% of car club members claimed they would have bought or leased a car if they had not joined a car club).
- Evidence from the application of binomial regression models suggested that certain factors were associated with a high likelihood to decrease vehicle ownership. These factors, based on research in Canada and Germany, included:
 - If membership was to a back-to-bay car club scheme, rather than a free-floating car club scheme.
 - Owning more cars prior to joining a car club scheme.

- If the motivation to join a car club scheme was because car clubs provided cost savings compared to owning/leasing a car; or to reduce pollution or fuel consumption.
- One study looked at motorisation growth rates (number of registered passenger cars per 1000 inhabitants) across regions in the European Union before and after a car sharing scheme was introduced. The study concluded that the difference in average annual motorisation rates between the regions and the countries they were in remained almost consistent before and after the introduction of a car sharing system. The study therefore concluded that the potential for car sharing to have an impact on vehicle reduction was marginal. The authors collected data on 129 car sharing services across 26 EU countries using desktop research. The Eurostat database and national statistics were used to collect available background data to assess potential impacts. This methodology differed from the other sources in this section that largely relied on online surveys with car club members.
- Two sources hypothesised on the potential for car clubs to act as a gateway for users to increase their vehicle ownership. However, these sources found little evidence to support this hypothesis.

3.3 Car clubs and the impact on vehicle ownership

The majority of the evidence related to car clubs and vehicle ownership came from surveys conducted among car club users. The data from these surveys strongly indicated that there is a relationship between car club membership and a reduction in vehicle ownership. The evidence focused on two main points: 1) that car club users relinquished previously owned cars; and 2) that car club users avoided purchasing additional cars.

3.3.1 Evidence for relinquished vehicles

There was extensive evidence that participating in car clubs was associated with users relinquishing privately-owned vehicles. This finding was illustrated in different ways within the literature:

- Five studies, based on online survey data, reported that between 9.5% and 33.1% of car club members had decreased their vehicle ownership since they joined a car club.
- Two studies, based on online survey data, reported a significant decrease (between 0.1 and 0.43) in the average number of vehicles owned by participants before and after they started participating in car clubs.
- One study reported that for each additional free-floating car club vehicle in a city, three fewer vehicles were sold.

The proportion of car club users that reported having relinquished a car varied in each of the five studies considered. Studies also varied in the parameters they considered, three focused on whether participants themselves had relinquished a vehicle, while two considered whether a vehicle had been

relinquished within a participants' household. There were also differences in whether findings were presented at a total sample level, or if the sample was divided by car club service type. The data presented in each survey is summarised in Table 2.

Table 2 Data on relinquishing cars

<i>Source</i>	<i>Country</i>	<i>Question phrasing</i>	<i>Car club service type</i>	<i>Proportion of car club users that reported having relinquished a car</i>
(Giesel & Nobis, 2016)	Berlin & Munich, Germany	Asked at the household level	Free-floating	~9.5%
(Giesel & Nobis, 2016)	Berlin & Munich, Germany	Asked at the household level	Back-to-bay	~21.8%
(Weigmann et al., 2020)	Brussels, Belgium	Asked at the participant level	Free-floating	13.6%
(Weigmann et al., 2020)	Brussels, Belgium	Asked at the participant level	Back-to-bay	33.1%
(CoMoUK, 2022)	UK	Asked at the household level	Mixture – but predominantly back-to-bay	19%
(Nenseth & Ellis, 2022)	Bergen, Norway	Asked at the participant level	Mixture – but predominantly back-to-bay	25%
(Shaheen et al., 2021)	US	Asked at the participant level	Peer-to-peer	~14%

There was limited evidence available to suggest the reasons why car club users relinquished their cars. One study reported that car club members relinquished ownership because of their car club membership, the high costs associated with a private car, and because a private car was no longer needed. However, despite evidence that a car club membership can contribute to the decision to relinquish cars, two studies reported that participants do not always give car

club membership as a reason for reducing their vehicle ownership (Giesel & Nobis, 2016; Shaheen, et al., 2021).

The two studies that reported a significant decrease in the average number of vehicles owned before and after joining a car club used similar time intervals to measure this. “Before” was given as 12 months before joining a car club and “after” was defined as the time of the survey (Namazu & Dowlatabadi, 2018; Chicco, et al., 2022). One study, based in Vancouver, reported that households who joined a free-floating car club saw a drop in average car ownership rates from 1.08 to 0.98, while members of a back-to-bay car club saw a reduction from 0.68 to 0.36 (Namazu & Dowlatabadi, 2018). The second study, which focused on three German inner-city areas, found a reduction from 1.13 to 0.9 for free-floating members and 0.61 to 0.18 for back-to-bay members. This study noted that the most significant decrease in average number of vehicles owned happened in the twelve months leading up to joining a car club service, casting uncertainty on the causal relationship between car club participation and vehicle ownership reduction (Chicco, et al., 2022).

One study found that an additional free-floating car club vehicle in a city meant that three fewer vehicles were sold annually on average. To produce this finding, the study compared monthly data on car club service launch dates and fleet sizes in German cities with monthly data on new car registrations. The study took this approach to avoid the potential for overestimation that they associated with voluntary surveys of car club users. The decline was explained by a decrease in the sales of small, compact and medium-sized models specifically. Sales of larger and more expensive models were not affected (Schmidt, 2020).

Another source suggested that studies that rely on data generated from car club member surveys over-state the potential for vehicle reduction. This source reported that car sharing has the potential to have a marginal impact on vehicle ownership. This finding was based on a consideration of motorisation growth rates (passenger cars per 1000 inhabitants) across the NUTS2 regions (groupings of regional authorities) within European Union countries before and after a car sharing scheme was introduced. The study compared these regional growth rates with the national growth rates for the countries each region was in before and after the introduction of a regional car sharing scheme. In both periods, the average national growth rates were higher, and the difference between regional and national rates remained similar before and after the introduction of the car sharing system (Bucsky & Juhasz, 2022).

3.3.2 Reduction in car purchasing

Evidence of a relationship between car club membership and vehicle reduction was presented in the form of users avoiding obtaining a first or an additional car. This evidence was presented in different ways in the literature:

- A UK study reported that 27% of members claimed they would have bought or leased a car if they had not joined a car club (CoMoUK, 2022).
- One study, based on an online survey of Brussels car club members, found that one reason car club members joined a car club was because it was an alternative to buying a second vehicle (Wiegmann, et al., 2020).
- Another study, based on an online survey among car club members in Bergen, Norway, reported that half the car club users surveyed reported they had not bought a car because of car clubs (Nenseth & Ellis, 2022).
- Four further studies, conducted in Vancouver, Germany, Oregon and the Netherlands, used online surveys to explore the perceived likelihood for car club members to get either a first car or an additional car, were car clubs to not exist. In each study it was found that a proportion of participants indicated that they would buy another car in the circumstance that car clubs did not exist (Namazu & Dowlatabadi, 2018; Chicco, et al., 2022; Dill, et al., 2017; Nijland & van Meerkerk, 2017).

3.4 Factors that impact the level of reduction

Three sources covering Germany and Canada listed factors that could predict the likelihood of decreasing vehicle ownership among car club members. These findings tended to be based on logistic regression models. In the absence of much data related to why car club members reduce their vehicle ownership, this analysis provided useful suggestions for influencing factors. Ordered by how frequently they appeared across sources and strength of impact, the factors that were suggested to be associated with a high likelihood to relinquish vehicles were:

- Membership to a back-to-bay car club scheme, as opposed to a free-floating car club scheme
- Owning more cars prior to joining a car club scheme
- If the motivation to join a car club was:
 - Cost savings compared to owning or leasing a car
 - To reduce pollution or fuel consumption

Certain factors were also identified as being associated with a low likelihood to relinquish vehicles. The key factors found were:

- The more people there are in the household
- The more a private car is used
- If car clubs are used for going to restaurants or bars

Frequency of use of car club schemes was also found to be an influencing factor. However, studies disagreed on whether it was more frequent use or less frequent use that led to reduced ownership. Giesel & Nobis (2016) considered free-floating car club members only and found that more frequent use of car clubs was associated with a decrease in car ownership. Two papers found the opposite: that less frequent use led to decreased ownership (Namazu &

Dowlatabadi, 2018; Chicco, et al., 2022). More detailed findings are presented in Table 3.

Table 3 Factors that influence vehicle ownership reduction

<i>Factors that were associated with a high likelihood to relinquish vehicles</i>	<i>Factors that were associated with a low likelihood to relinquish vehicles</i>	<i>Factors where the likelihood to relinquish vehicles is unclear</i>
Membership to a back-to-bay car club scheme (Chicco, et al., 2022) ⁴ , (Namazu & Dowlatabadi, 2018) ⁵	As household size increases (Namazu & Dowlatabadi, 2018)	Frequency of use (Chicco, et al., 2022; Giesel & Nobis, 2016; Namazu & Dowlatabadi, 2018)
Memberships to both a back-to-bay car club scheme and a free-floating car club scheme (Chicco, et al., 2022) (Namazu & Dowlatabadi, 2018) (Giesel & Nobis, 2016) ⁶	The more a private car is used/The more a car club is considered as an additional alternative to a private car (Giesel & Nobis, 2016) (Chicco, et al., 2022)	
The more cars that are owned prior to joining a car club (Chicco, et al., 2022) (Namazu & Dowlatabadi, 2018)	If a car club is used for: going to restaurants or bars (Namazu & Dowlatabadi, 2018)	
If the motivation to join a car club was: cost savings compared to owning/leasing a car (Namazu & Dowlatabadi, 2018)	As number of driving licenses in the household increase (Chicco, et al., 2022)	
If the motivation to join a car club was: to reduce pollution/fuel consumption (Namazu & Dowlatabadi, 2018)		

A description of the logistic regression models used in each study can be found in the footnotes of this page.

⁴ The results referenced in this paper were based on a model which looked at members who owned a car at the time of registration and then later reduced vehicle ownership.

⁵ The model referenced in this paper excluded participants who did not own a car when they became a car club user. The model was said to be moderately to highly accurate.

⁶ The model developed was only based on free-floating car club users and was said to have a relatively high accuracy.

3.5 Car clubs and increasing vehicle ownership

Two sources considered the potential for car clubs to be associated with an increase in vehicle ownership. There is very limited evidence to support this idea, but what is available is summarised below:

- One study, focused on peer-to-peer members in the US, found that 2% of users suggested they had purchased a vehicle because of a peer-to-peer car club. The main reason given was to loan a car through the scheme (Shaheen, et al., 2021).
- Another study used a binary logistic regression model to explore factors that might explain why certain car club members reported a desire to purchase another car (Giesel & Nobis, 2016). The factors associated with this were:
 - The larger the household size.
 - The more important a private car is deemed to be.
 - If a person assessed that car clubs were more comfortable than public transport.

4 Vehicle mileage, total journey time and trip generation

This section explores the impact of participation in car clubs on vehicle mileage (travelled by private and shared vehicles, rather than by public transport), total journey time and trip generation (i.e. the potential for car clubs to influence the number and type of trips taken). The literature reviewed primarily focused on changes in vehicle mileage and trip generation associated with car clubs, rather than total journey time.

4.1 The evidence base

There was limited literature available focusing on the impact of car club schemes on the vehicle mileage and trip generation of car club users, and a lack of focus on the impact on total journey time. Four sources are cited in this chapter. Most of these sources were based on quantitative surveys among car club users, which collected self-reported data on distances travelled and trips taken before and after joining a car club scheme. This methodology poses limitations for accurate measurement of vehicle mileage and trip numbers, since it relies on participant recall. One study tracked participant cars using GPS data, providing a more accurate measurement method.

4.2 Key findings

There was limited literature available exploring an association between car club membership and changes in vehicle mileage and trip generation.

- Evidence found that car club members decreased the distance they travelled in any type of car annually after becoming members. One study in the Netherlands measured this decrease as 1760km, while a UK study measured the average decrease as 170 miles.
 - The study in the Netherlands identified a decrease in private vehicle ownership as leading to this outcome.
- Car clubs were also found to be associated with a decrease in private car use specifically.
- There was evidence to suggest that car clubs supported increased trip generation in the form of trips that would not have been possible without car club membership. One Netherlands study suggested that 15% of the kilometres driven by car among car club members would not have been travelled without their membership.
 - Despite this increase in trip generation, the evidence still pointed towards an overall decrease in distance travelled by car.

4.3 The impact of car club membership on vehicle mileage, total journey time and trip generation

There is evidence to show that joining a car club scheme is associated with a reduction in the annual distance travelled by car. The impact on use of any type of car (i.e. including both private and shared car use) will be explored first, followed by private car use specifically.

Impact of car clubs on distance travelled in any type of car:

- One source, based on an online survey with car club users in the UK, found that the average member of a commercial car club scheme decreased the distance they travelled by car in a year by 170 miles since becoming a member (CoMoUK, 2022).
- Another source, based on an online survey with car club users in the Netherlands, found that the annual distance travelled by car of car club members decreased from an average of 9220km before they became a member to around 7460km at the time of the survey (Nijland & van Meerkerk, 2017). At the time of the survey, most participants had been engaging in car clubs for between one and three years. This source reported that this decrease was driven by users who had disposed of a privately-owned car, and consequently drove less since doing so (for more detail on the relationship between car clubs and private vehicle reduction, see chapter 3).
- A final source provided a different perspective. This source, based on a survey conducted among peer-to-peer car club members in the US, identified an increase in driving. It found that 27% of respondents drove “more often” as a result of peer-to-peer vehicle access (Shaheen, et al., 2021). The authors connected this finding to an overall increase in trips taken, suggesting this was due to improved mobility. However, there was no evidence shared relating to specific vehicle mileage or journey time.

Impact of car clubs on distance travelled in private cars:

- The Netherlands study referenced above reported that 1850km of the average annual distance car club members travelled by car were made using a shared car. Of those 1850km, 34% were previously travelled by another type of car (Nijland & van Meerkerk, 2017).
- 68% of UK business-to-business car club members used a car club vehicle for their usual business travel. Of these individuals, 51% previously used a private car for these trips (Clark, et al., 2015).
- A UK study by CoMoUK (2022) also found that if car clubs were not available, 8% of car club members would swap back to using a rental or private car for the journeys they currently take using car club vehicles.

Car club use was also found to be associated with trip generation in the form of trips that would not have been possible without a car club membership. In one study in the UK, 22% of users said they would not have taken their most

common car club trip if car clubs were not available (CoMoUK, 2022). Another source, which reported that 1850km of the average annual distance car club members travelled by car were made using a shared car, reported that 15% of these kilometres would not have been travelled were it not for the availability of a shared car (Nijland & van Meerkerk, 2017). Both these studies reported a reduction in annual distance travelled by car since joining a car club scheme, demonstrating that despite the fact car clubs made new trips possible, they still had the overall impact of reducing distances travelled by car.

One source, drawing on an online survey and GPS data of car owners who rented out their cars via a peer-to-peer scheme in the US, suggested the potential for car clubs to increase total journey time. This source found that, overall, owners who rented their cars out drove for an extra 3.8 minutes a day one year after joining a peer-to-peer scheme (Dill, et al., 2019). Looking at individual behaviour change, the study found that despite an overall increase in total journey time, 39% of owners did actually reduce their driving by 10% or more, as measured by minutes per day. Further analysis using a binomial logit model⁷ showed that owners who used their car more frequently before joining the scheme, and who rented out their car more frequently when on the scheme were more likely to reduce their use a year later.

⁷ A multivariate analysis to predict whether owners reduced their vehicle use while their vehicle was available for rental. The accuracy of the model was not provided.

5 Mode choice

This section explores the impact of participation in car clubs on the number of walking and cycling trips and public transport trips members make. It starts by discussing the key findings before exploring in detail the impact of participation in car club schemes on public transport and active travel use, as well as the key factors that can influence this impact.

5.1 The evidence base

Nine papers are cited in this chapter. There was a good amount of evidence in the literature investigating the impact of different car club schemes on members' wider transport behaviours. These sources tended to draw on data from online surveys carried out with different types of cars club users. Only a minority of studies included the use of follow-up interviews to explore the reasons behind changes in travel choices.

There are methodological limitations within some of these studies, as they generated data from presenting hypothetical scenarios to participants, rather than reporting on participants' actual behaviours. Examples of this are highlighted when the sources are referenced.

5.2 Key findings

There was evidence within the literature that car clubs can contribute to changes in the way members choose to travel.

- The weight of the evidence, including from the UK and the US, suggested that, for the majority of members, joining a car club scheme has limited impact on levels of use of public transport and active travel modes.
- Among the minority of members who did report a change in their travel behaviour, there was mixed evidence for whether their use of public transport or active travel modes increased or decreased.
- The direction of impact car club membership has on levels of public transport use is influenced by the type of car club scheme being used.
 - Two studies, from Spain and Belgium, found that participation in back-to-bay car club schemes was more likely to lead to an increase in public transport use, whilst participation in a free-floating car club scheme was more likely to lead to a decrease in public transport use.

5.3 The impact of car club schemes on public transport and active travel use

The literature considered whether use of public and active transport modes changed after members joined car clubs. The evidence reviewed found that, for the majority of members, car club membership does not impact their levels of

public transport and active travel use. To come to this conclusion, studies compared self-reported public transport and active travel use before and after joining a car club scheme. This meant that studies had to rely on participant recall of how they travelled pre-membership.

- One study, based on an area of New York in the US, by Stasko, et al., (2013) found that 80% of car club members reported no change in their levels of public transport and active travel mode use.
- A study from Brussels, Belgium reported that the majority of car club members (~62% of free-floating members and ~72% of station-based members) stated their frequency of public transport use remained unchanged since becoming a member.
- In the UK, one study found that 80% of car club members who reported that cycling was their typical mode of travel for business trips, still said this was the case after joining a business-to-business car club scheme⁸ (Clark, et al., 2015).
- One study presented a contrary view, as it suggested that the majority of car club members changed their behaviour in relation to public transport after becoming members. Caulfield & Kehoe (2021) found that 64% of car club members in Dublin reported using less public transport since they joined an online-booking based car club scheme.

Among the studies that found that only the minority of car club users demonstrated a change in public transport and active travel use, there was mixed evidence for the direction of this change. The US study, based on an area of New York, by Stasko, et al. (2013), which found that 80% of members reported no change in their levels of public transport and active travel use, also found that while 9% of respondents reported an increase in public transport use post-car club membership, 11% reported a decrease in public transport use. Similarly, 14% of respondents reported an increase in cycling and walking post car club membership, while 4% reported a decrease.

Two studies provided evidence that car club membership was associated with a decrease in public transport use:

- Section 4.3 referenced a study that reported that the annual distance car club members travelled by car reduced from 9220km to 7460km post-membership. Of those 7460km travelled, a shared car was used to travel 1850km. Prior to joining a car club, 41% of the trips associated with that 1850km were made by train (Nijland & van Meerkerk, 2017).
- When car club members in the UK were asked hypothetically, what transport modes they would use if car clubs were not available, 19% indicated that they would use public transport while only 1% said they would replace this with cycling and walking (CoMoUK, 2022).

⁸ A business-to-business car club scheme refers to a scheme where a commercial car club rents out cars specifically to other businesses

On the other side, two studies focusing on peer-to-peer car clubs demonstrated evidence for an increase in public transport or active travel use following car club membership:

- Dill, et al., (2017) reported that, in Portland in the US: 28% of peer-to-peer car club members increased their levels of public transport use, 31% increased the amount they walked and 32% increased the amount they cycled.
 - Follow-up interviews suggested that this increase was down to users having less access to their private car while it was being used in the scheme; they in turn used this as a motivation to take up other modes of transport.
- Another US study by Shaheen, et al., (2021) which asked about walking, cycling and public transport found that peer-to-peer car clubs had no impact on public transport use. Despite this, they found that 15% of respondents reported walking more or much more often than before peer-to-peer and 10% of respondents reported cycling more or much more often.

5.4 Factors that influence the impact of car clubs on transport mode choice

The likelihood of car club membership influencing wider transport behaviours was found to be influenced by the type of car club scheme used. Research comparing free-floating car club users and back-to-bay car club users tended to show that the former reduced public transport use post-membership, while the latter increased it.

- One study in Belgium found that ~31% of free-floating car club users self-reported using public transport less or much less often since they joined (Wiegmann, et al., 2020). In comparison, ~18% of back-to-bay car club users, self-reported that they used public transport more or much more since they joined the scheme.
- A study by Silvestri, et al., (2021) in Spain produced similar findings. This study compared free-floating car club and back-to-bay car club schemes by conducting semi-structured interviews with their users. The study found that members using free-floating car clubs only reported an overall decrease in public transport use, whereas back-to-bay car club users reported either no change or in some cases, an increase.

Silvestri, et al (2021) investigated why back-to-bay car club members increased their public transport use. Members reported that the car club pick-up points were well connected with public transport, therefore they tended to use public transport to travel to or from the car locations.

6 Environmental impacts

This chapter provides an overview of the impacts of car clubs on the environment. The first section presents evidence on whether car clubs lead to a decrease in CO₂ and other greenhouse gas emissions. The next section analyses the factors that determine the strength of the environmental impact of car clubs.

6.1 The evidence base

Eighteen papers discussed the environmental impacts of car clubs, although only eight papers had a major focus on this topic.

- Eight papers which reported on environmental impacts of car clubs based their findings on car club users' survey data. In some cases, the surveys were conducted at one time point, which might impact the accuracy of the findings (e.g. issues with participant recall when asking respondents about vehicle usage prior to joining the car club scheme).
- Seven papers with a major environmental focus used scenario modelling to analyse environmental impacts of car clubs. The models were developed to assess the environmental impacts in the event of wider expansion of car clubs or, for example, if current car club fleets were replaced with electric cars. The scenarios drew on a range of sources, including national statistics, economic and environmental data and findings from other peer-reviewed literature and user surveys.
- Other sources of evidence referred to in this section included two evidence reviews, four progress reports for UK car clubs and European car club projects, a road test experiment involving test drives and one paper using the social life cycle assessment method (a method to assess the social impacts of products and services along the life cycle).

In terms of coverage of different environmental emission indicators, the majority of papers report on CO₂ emissions and other greenhouse gas emissions. There is limited data specifically on emissions such as NO_x or PM_{2.5} emissions.

6.2 Key findings

The evidence base of this review demonstrated that car clubs lead to a decrease in emissions. However, the strength of the impact of car clubs on emissions was dependent on a range of factors, which included:

- Transport mode choice (e.g. whether users used car-free or car-dependent means of transport prior to joining a car club)
- Occupancy levels (e.g. the number of passengers travelling in car club vehicles)
- Car ownership (e.g. whether car clubs were associated with a slower growth rate of car ownership)

- Vehicle technology employed in a car club fleet (e.g. the use of newer, lighter, and electric vehicle fleets)

6.3 Evidence of impacts of car clubs on emissions

Several sources found a decrease in emissions as a result of car club use, though the estimates differed between papers as they employed different methodologies and units of analysis (e.g. different types of car clubs or types of emissions - CO₂ specifically, total-mobility related emissions or transport-related energy use).

- A study of car club users in the Netherlands aimed to quantify the savings in CO₂ emissions (Nijland & van Meerkerk, 2017). The authors conducted a survey of business-to-consumer and peer-to-peer car club users and used these findings to estimate the impact of car clubs on emissions. Their model accounted for emissions generated through vehicle use and vehicle ownership (linked to emissions at manufacturing and end-of-life stages). They concluded that car clubs led to an average reduction of between 236 and 392 kg of CO₂ per person per year, an estimated reduction of around 13%–18% compared to past emissions.
- One study (Amatuni, et al., 2020) evaluated changes in total mobility-related emissions for business-to-consumer car clubs in three case study areas – the Netherlands, San Francisco and Calgary. They employed a before-and-after user survey analysis and showed a reduction between 3-18% in total annual mobility-related emissions (3% in Calgary, 7-10% in the Netherlands and 16-18% in San Francisco). The authors noted the calculated impacts were lesser than in other studies of the same cases, as their model considered additional factors (such as the rebound effects of more intensive use of other transport options while decreasing driving) and the potential shifting lifetime of shared vehicles due to increased use.
- A study of car clubs in the USA (Chen & Kockelman, 2016) cited in a literature review (Esfandabadi, et al., 2022) looked at the lifecycle impacts of car clubs on energy use and greenhouse gas emissions. The authors reported a 5% reduction in all household transport-related energy use and greenhouse gas emissions and adjusted this figure down to 3%, as they assumed that a part of the travel-cost saving would be spent on other goods and services.
- CoMoUK's Annual Car Club Report (CoMoUK, 2022) provides evidence that car club fleets in the UK emitted less than an average car. For example, in 2020, the average car club car in the UK emitted 27% less CO_{2e} per kilometre than the average car. The report authors attribute this difference to the fact that car club fleets use newer vehicles and have a higher share of electric cars than the average UK fleet (the report found that in 2022, 14% of car club cars in the UK were electric and less than 2% of all cars in the UK were).

The evidence base included a discussion covering factors determining the extent of environmental impacts. Papers which employed scenario modelling

tested different assumptions about the degree to which these factors would decrease emissions as a result of car club use. The section below outlines the key issues referred to in the literature and categorises them into factors related to user behaviour and factors related to car technology.

6.4 Factors affecting the impact of car clubs on emissions – user behaviour

6.4.1 Transport mode choice

Mode choice was cited extensively as a key factor affecting the impacts of car clubs on emissions. An in-depth look at the relationship between car clubs and mode choice is provided in chapter 5. The key takeaway from across the literature was that there is a net decrease in emissions from participation in car clubs, but the environmental benefits of car clubs are partially offset by the fact that some users who previously used more environmentally-friendly modes increase their car use by joining a car club.

This observation was central to the analysis in the evaluation of effects of car clubs in Amsterdam which measured the effects of both business-to-consumer and peer-to-peer car club fleets on transport-related emissions (Arbeláez Vélez & Plepys, 2021). The paper at first estimated average travel habits based on a mobility survey conducted by Statistics Netherlands and grouped users into car-dependent and car-free individuals. They then applied this data to a model and calculated that those who shifted from car-dependent to car club travel reduced their greenhouse gas emissions by about two-thirds (68.68% for peer-to-peer and 69.92% for business-to-consumer car clubs). Contrary to that, those who shifted from a position of being car-free to using car clubs increased their emissions by 11.63% for business-to-consumer users and 12.51% for peer-to-peer users.

The impact of mode choice on emission reduction was also considered in another Dutch study of car club users (Nijland & van Meerkerk, 2017). The authors estimated that reduction in vehicle use as a result of car clubs leads to a 279 kg reduction in CO₂, but adjusted their estimate by 168 kg given that some groups who previously used more environmentally friendly modes of transport will be increasing their car use, which decreased the reduction to 111 kg. Both papers, however, concluded that the savings in emissions from those who shift from car-dependent modes are higher than the increase in emissions from those who migrate from car-free travel habits. The mode choice findings from this study are outlined in further detail in chapter 5.

A study of car clubs in Ireland (Rabbitt & Ghosh, 2016) estimated the potential economic and environmental impacts of switching to car clubs using hypothetical travel behaviour change scenarios. Their estimates showed that car owners who travel predominantly on alternative modes (such as active

travel or public transport) could also make significant CO₂ emission savings through car clubs. Car owners who use active travel modes could reduce their CO₂ emissions by 65% and car owners using public transport by 14-20%. Non-car owners joining car clubs would increase their CO₂ emissions slightly.

Two papers (Chicco & Diana, 2021) and (Rabbitt & Ghosh, 2016) also suggested that having a more modern fleet of cars (either less pollutant or electric) would outweigh the increased emissions from previously car-free users. The impact on car technology will be discussed in more detail in section 6.5.

6.4.2 Occupancy levels

Two papers suggested that occupancy levels should be a key factor to consider when analysing the environmental impacts of car clubs, as modes of transport attracting a greater number of passengers lead to lower emissions. A study compared the greenhouse gas emissions of transport modes with different occupancy rates: car clubs, carpooling and car ownership (Fernando, et al., 2020). Carpooling was found to cause the lowest greenhouse gas emissions which was attributed to a higher occupancy rate than car clubs or private cars. The paper concluded that the highest reduction in the total greenhouse gas impact can be achieved through higher occupancy rates in combination with the development of vehicle technology (discussed further in section 6.5). Another study (Amatuni, et al., 2020) argued that, based on the study findings around lifetime shift rebound effect, if the number of kilometres a driver travels would not change as a result of car sharing, then ride-sharing or carpooling would have a higher impact on reducing total mobility-related emissions due to higher occupancy levels. However, this hypothesis was not tested.

6.4.3 Car ownership reduction

Two studies highlighted that car ownership reduction as a result of car clubs is a crucial factor when trying to lower emissions. A study of car clubs in Ireland (Rabbitt & Ghosh, 2016), which used hypothetical travel behaviour scenarios estimated that the long-term benefits of car club services included a slower growth rate of car-ownership and reduction in number of car trips, contributing to significant CO₂ savings of up to 84 kt for Dublin and 229 kt for Ireland. A study of car clubs in Belgium (Chapman, et al., 2020) tested a number of counterfactual scenarios and concluded that the impact of car clubs on car use is highly dependent on the reduction in vehicle ownership. As a result, the environmental benefits of car clubs may be realised only if a significant number of users reduce their car ownership. The relationship between car clubs and car ownership reduction is discussed in detail in chapter 3.

6.5 Factors related to car technology

6.5.1 Newer, light vehicle fleets

A number of papers discussed having newer, lighter cars in car club fleets as a factor affecting emissions. A study on car clubs in Vancouver, Canada (Namazu & Dowlatabadi, 2015) cited in a literature review (Esfandabadi, et al., 2022) showed that using newer and optimised car club fleets in Canada could reduce greenhouse gas emissions by more than 30% regardless of mode choice. The newer fleet of cars was attributed as a key factor which led to lower emissions for UK car clubs as well (CoMoUK, 2022). As stated in the CoMoUK 2022 annual report, in 2022 58% of car club cars were under 2 years old and almost 100% were under 5 years old. Using lightweight vehicles was also discussed as a factor which lowered CO₂ emissions across car clubs, carpooling and private car use (Fernando, et al., 2020).

6.5.2 Electric vehicles

Several papers pointed to the electrification of vehicles as a factor that can impact emissions. Baptista, et al., 2015 tested different vehicle technology scenarios applied to car clubs in Lisbon, Portugal, and found that shifting to more efficient vehicle technologies (hybrid and electric vehicles) led to greater reductions in Well-to-Wheel (WTW) energy consumption and CO₂ emissions. The use of electric batteries was also mentioned as a factor which led to lower emissions from car clubs (CoMoUK, 2022). In 2022 14% of the UK car club fleet used electric cars compared with less than 2% of all UK cars (CoMoUK, 2022). The Tisbury Electric Car Club (a community car club based in a rural area of the UK) estimates that by using a fully electric fleet they have saved 5.5 tons of CO₂ emissions (Tisbury Electric Car Club, 2023).

One study reported on the findings of an experiment to analyse the CO₂ emissions from different types of engines used for car club vehicles (Kubik, et al., 2023). It revealed that the electric car, regardless of road conditions, achieved lower carbon dioxide emissions ranging from savings of 10–65% compared to cars with a combustion engine. A paper modelling the impacts of car clubs in Turin, Italy found that impacts on emissions would be more positive if current car club fleets were substituted with electric ones, minimising the increase in emissions as a result of mode switch (Chicco & Diana, 2021).

The discussion of the environmental benefits of switching to electric vehicles in the context of car clubs also points at a number of factors which affect the extent to which the benefits of electric power are realised. These factors are relevant to car use more widely, and include:

- The power sources used - two papers highlighted that the electricity grid mix used to generate power for electric vehicles needs to be taken into account when considering the total emissions of an electric car, as the majority of greenhouse gas are caused by electrical power generation (Fernando, et al., 2020; Amatuni, et al., 2020).

- Eco-friendly driving style - maintaining a conservative driving style helps to charge the car battery less often and as a result contributes to a reduction in CO₂ emissions. This was especially important when travelling in low temperatures, as temperature was found to have the greatest impact on battery life (Kubik, et al., 2023). The paper did not contain empirical data on car club users driving style. Instead, it discussed potential incentives to encourage drivers to follow this driving style, such as implementation of a kilometre fee rather than a minute fee, or a rewards system for the manner of driving.
- Manufacturing phase - The manufacturing phase is an important step to consider when assessing the emissions across all lifecycle phases. According to one study, electric vehicles generated more greenhouse gas emissions during that phase than for internal combustion engine vehicles. However, the authors note that the greenhouse gas emissions overall were still lower for electric vehicles (Fernando, et al., 2020).

7 Access to opportunities, public health and congestion

This section explores evidence related to whether car club membership impacts on access to opportunities (e.g., employment, education, socialising, healthcare, key services), public health and congestion.

7.1 Evidence base

Three sources are cited in this chapter. There was limited evidence available on the impact of car clubs across the three areas described above. The three sources all draw on online surveys of car club users. The limitations of this are that participation was often on a voluntary basis, so findings may not be representative of the car club population. Control groups, in the form of non-car club users were not used.

7.2 Key findings

- There is evidence to suggest that car clubs can make trips possible that would not be otherwise.
- Car clubs were used for a range of reasons in the UK, including to visit family and friends, attend medical appointments and to make work-related trips.
- Car clubs might free-up road space because of the space saved by a reduction in private vehicle ownership.

7.3 Access to opportunities and public health

There was evidence that car clubs support users to make trips that would otherwise be difficult to make. A source drawing on survey data from members of the main commercial car club operators in the UK found that:

- 22% of car club members would not have been able to take their most common car club trip were it not for their car club membership (CoMoUK, 2022).
- 26% of members with a constraining health condition would not have made their last trip without a car club (CoMoUK, 2022).
- Members on lower incomes were more likely to say that they would not have made their last trip without a car club compared to users with higher incomes (29% of members with less than £10 000 annual personal income compared to 18% of those where that figure is more than £50 000) (CoMoUK, 2022).

There was also evidence on the types of journeys car clubs are used for. Journey purposes included trips related to leisure activities, visiting people, employment, health, and caring responsibilities. These purposes suggest that

car clubs have some association with access to both economic opportunities and public health (CoMoUK, 2022; Wiegmann, et al., 2020; Dill, et al., 2017). Additionally, among free-floating car club users, car clubs were specifically used for going to the airport (Wiegmann, et al., 2020).

7.4 Congestion and spatial planning

The relationship between car clubs and road space is not explored in reference to congestion in the literature, but in the form of parking road space saved because of a reduction in private car ownership. One study estimated that, in the UK, 150 hectares of space previously used for parking was freed up because of the reduction of private vehicle ownership associated with commercial car clubs (CoMoUK, 2022). This estimate was based on online survey data conducted among users of the main commercial car club operators in the UK.

8 Barriers and opportunities

This chapter provides an overview of opportunities and barriers to greater utilisation of car club schemes. It identifies that dependability, accessibility and convenience of car club services help to encourage greater use. It then discusses related shortcomings and opportunities for improvement. Finally, it explores opportunity areas associated with the reasons people join and use car clubs.

8.1 The evidence base

A total of thirteen papers are cited in this chapter. Seven of the papers applied quantitative methods, while others were either qualitative studies, mixed methods studies or literature reviews. There were limitations to the quantitative studies in that all but two focused on existing car club users, with no comparison group, while in all of them representativeness was compromised due to the voluntary nature of participation. Furthermore, one paper used secondary data collected by different car club companies and cautioned that the information collected may be inconsistent (such as missing car services or different publicised fleet sizes), thus impacting the results. One qualitative study showed limitations in that it tried to quantify the data and give weight to more frequent views. Finally, the literature reviews did not indicate that the process included a quality appraisal of the sources.

8.2 Key findings

- Two key barriers to the use of car club services identified in the literature were poor or inconvenient access to vehicles and lack of accessibility. These represent key areas that could be improved to increase growth.
 - Opportunities to improve accessibility included having smarter booking systems, placing car club vehicles in more convenient locations, improving peer-to-peer services for owners and renters, and being able to use car clubs in conjunction with other transport services.
- People in lower income groups, older age groups and those living in remote areas are underrepresented among members of car club schemes. A targeted approach for these groups could enable car clubs to reach a wider user base.
 - To reach lower income groups, the literature suggested reducing the cost of car clubs relative to car ownership and promoting peer-to-peer car club services in low-income areas.
 - The evidence suggested aiming campaigns at older people and those whose households are reducing in size (for example when children leave home) as car clubs suit their travel needs.

- To reach more remote areas, the evidence suggested providing better infrastructure such as motorways, tax incentives and workplace mobility management schemes.
- Evidence found that people joined car club schemes because of perceived environmental benefits, and the benefits and flexibility that car clubs provide compared to owning a car or using public transport. Members mostly used car clubs for leisure purposes, shopping, and visiting friends and family.

8.3 Accessibility and convenience of car club services

The literature found that it was a barrier to use if car clubs were not convenient or straight forward to access. This section explores how access to car club services can be improved by taking a range of actions:

- Smarter booking systems - Improvements highlighted by car club users who participated in studies in Spain and Bergen, Norway, respectively, included: the ability to control everything by smart phone (Silvestri et al., 2021); and for the booking system to be simple to use (Nenseth & Ellis, 2022). Furthermore, as car clubs require the use of a smartphone, which not everyone has, as well as the installation of apps that may conflict with users' wishes to protect their privacy, a study based in Copenhagen recommended that such barriers should be overcome by offering routes to access that improve accessibility for all (Haustein, 2021).
- Convenient location of cars - Several papers found a positive link between convenient location of cars and use of car clubs. A literature review looking into the role of car clubs in sustainable urban transport worldwide, reported that if car club depots are not placed in easily accessible locations, adoption of the service remains low (Jain et al, 2016; Correia & Antunes, 2012 cited in Esfandabadi et al., 2022). Thus, to increase use of car clubs, a study from Norway found that cars must be a close to where users live (Nenseth & Ellis, 2022); while Diana & Ceccatto (2019) found that in Turin, Italy, both personal car drivers and public transport users are willing to walk up to 5 minutes to reach a car club vehicle (cited in Esfandabadi et al., 2022).
- Suitable vehicles - Drawing on a quantitative survey of car club users in Bergen, Norway, it was suggested that companies should pay attention to the types of cars car club members need. It was found that participants required access to small city cars, vans and station wagons, but there was less demand for larger cars, such as SUVs and 9-seaters (Nenseth & Ellis, 2022).
- Using car clubs with other transport services - Evidence highlighted opportunities to improve access to car clubs by using them in conjunction with other transport services. Esfandabadi et al. (2022) drew on the findings of a study based in Turin, Italy, which highlighted that people who have multi-modal travel habits were more willing to engage with new transport modes such as car clubs (Ceccato et al., 2021). Furthermore, Haustein's (2021) study looking at free-floating car clubs in Copenhagen, suggested that to prevent people who do not own a car from feeling that they need one, there must be better opportunities to use free-floating car clubs in

combination with car rental, different modes of transport (for example via MaaS solutions), as well as with other car club systems.

- A study of peer-to-peer car renters and owners in Portland, Oregon found that peer-to-peer renters faced difficulties using the service because of owners not responding to or honouring reservations/requests from renters (33% of renters surveyed reported this as the worst thing about peer-to-peer) and because of a lack of general car availability and/or an unclear scheduling process (24% reported this as the worst thing about peer-to-peer) (Dill, et al., 2017). Peer-to-peer car owners also faced obstacles to renting out their cars including that they did not get enough rental requests (84% of owners surveyed), that their vehicle was at risk of damage in the rental process (24% reported this as the worst thing about peer-to-peer), or that peer-to-peer technology did not function properly (15% reported this as the worst thing about peer-to-peer). Overall, 49% of peer-to-peer car owners surveyed in Portland, Oregon, stated that renting out their car was a hassle and not worth it. Dill et al.'s (2017) research findings from Portland, Oregon, suggested that concerns related to peer-to-peer would be reduced by:
 - Having an instant rental option, which allows the renter to reserve and drive the car without having to wait for the owner's approval
 - A larger customer base to make it more worthwhile for owners to rent their cars out
 - Improving functionality of the technology, including web and mobile platforms and GPS monitoring devices
- A dependable car club market – A case study looking into a community-based electric car club in a rural area of the UK, cited cases of established car club providers setting up and then pulling out or folding, which the case study suggested would have a discouraging effect for people thinking of using car club services.

8.4 Reach and inclusivity of car club services

There was evidence that some groups are underrepresented among car club members. A number of suggestions were therefore made in the literature about the barriers and facilitators to attracting a wider and more diverse user base:

- Lower socio-economic groups: A study looking into car clubs in the Brussels region concluded that those with lower socio-economic status are underrepresented (Wiegmann et al., 2020). Further evidence suggested that the desire to save money by joining car clubs is not being realised to its full potential due to users being dissatisfied with the cost. This is evidenced by findings from the CoMoUK Annual Car Club Report, UK (2022), which found that while 34% of car club users surveyed said that saving money was a reason for joining a car club, price ranked lowest of nine aspects on which user satisfaction was measured.
- Additionally, while some sources, such as Rabbitt and Ghosh's (2016) Ireland-based study, suggested that car clubs are more cost-effective compared to owning a car, a case study into the Tisbury Electric Car Club (a community car club based in a rural area of the UK) found that for those who

need a car every day, the price of a car club is likely to exceed their budget for transport (Tisbury Electric Car Club, 2023).

- To help reach lower-income groups, Silvestri et al.'s (2021) qualitative study in Spain found that lower cost of car clubs when compared with owning a vehicle was a motivator to use. Through analysis of the geographic distribution of car club vehicles in Portland, Oregon, Dill et al. (2017) stated that the peer-to-peer car club model has the potential to reach a greater number of lower-income households than other car club services. However, the authors stressed that this will be dependent on how the service is priced and marketed to these populations.
- Older age groups: Haustein's (2021) study into free-floating car clubs in Copenhagen reported that car club services tended to target the young and mobile urban population. However, referring to previous research, the author noted that older people represent a suitable target group to promote car clubs to. This group have become more physically and socially active, more often wish to retain their driver's license until later in life (Haustein and Siren, 2015, 2013, cited in Haustein 2021), and are increasingly more likely to use a smartphone (Statista, 2015 cited in Haustein, 2021). Haustein argued that this, combined with the overall lower car demand of retired people, makes free-floating car clubs a good option for older people. Furthermore, Haustein's study found that decreasing household size is associated with choosing to relinquish a car, and thus also recommended promoting car clubs to people when their household reduces in size, such as when children leave home, when they may be re-assessing their need to own a car.
- Remote areas: In their analysis of European Research and Innovation projects available in the Transport Research and Innovation Monitoring and Information System (TRIMIS) database, Ortega Hortelano et al. (2022) found that most car club projects focused on the urban environment. The authors also cited a recommendation by the European Urban Mobility Framework that shared and on-demand mobility be extended to rural areas. In order to make this happen, in their Europe-wide study Bucsky and Juhasz (2022) suggested the need for higher quality infrastructure, such as motorways, to sustain these services, while a study into car clubs in Ireland suggested that governmental policy support, such as tax incentives and workplace mobility management schemes, may help to make car clubs viable in medium-density areas (Rabbitt and Ghosh, 2016).

8.5 Reasons for joining car clubs

A better understanding of what motivates car club users to join schemes, as well as how they use the service, could inform how car clubs are marketed and communicated, and therefore potentially increase the user base. Below is an overview of the motivators to joining a car club scheme:

- Benefits compared to car ownership and public transport - The CoMoUK Annual Car Club Report, UK (2022) found that car club users joined the scheme for the following reasons: 71% do not need a car very often, 46% wanted to avoid the hassle of car ownership, 25% wanted access to a van, and 25% because they found parking difficult or expensive where they live. Furthermore, in their report on car clubs in the Brussels region, Wiegmann

et al (2020) found that 57% of free-floating car club users said that car clubs are a more flexible option compared to public transport.

- Environmental benefits - Looking at car clubs in Spain, Silvestri et al (2021) found that car club users were motivated by using a more environmentally friendly mode of transport compared to a private car; while the CoMoUK Annual Car Club Report, UK (2022) found that 35% of UK-wide users joined car clubs in order to reduce their environmental impact.
- Journey types associated with car club schemes - Across three sources, drawing on data from the UK, London and the Brussels region, the most common reasons for using car clubs were for leisure purposes, shopping and visiting friends and family. In the Brussels region, free-floating car clubs were used for trips to the airport. Other, less common reasons for using car clubs UK-wide were for regular commuting, children's activities, other business trips, DIY/moving large loads, medical appointments and volunteering or caring responsibilities. (CoMoUK 2022; Wiegmann et al, 2020).

9 Quality of Evidence

The evidence base across the review drew on academic and grey literature sources which utilised a range of methodologies. The methods included surveys, scenario modelling, monitoring data analysis, qualitative interviews and focus groups, evidence reviews, life cycle analysis methods (a method to assess the impacts of products and services along the entire life cycle), and GPS tracking or road test experiments (involving test drives to measure emissions). The majority of sources (35) presented evidence on impacts of car clubs from Europe and Northern America. Only three studies discussed impacts of car clubs in the UK context specifically.

A substantial part of the evidence that focused on understanding impacts on vehicle ownership, mode choice, vehicle mileage and trip generation and access to opportunities was based on surveys, with the majority of studies surveying car club user groups. The representativeness of the survey samples varied. Participants were often recruited through an opt-in approach, which could skew the sample towards early adopters of the technology with a different demographic profile (e.g. male, younger, inner city residents) or more engaged users. Only one in three studies which used survey methods reported on response rates. For studies which stated the response rate, it varied between 3%-38%. Some studies used methods to help control for this, such as including comparison groups (e.g. non users or the general population) or weighting the sample.

There were some examples of studies with a longitudinal design, but these tended to be limited. Most were conducted at one time point. In these cases, they often relied on participant self-assessment, which could be prone to under or over estimation. For example, participants were asked to respond to a hypothetical scenario assessing if they would own a car if they had not joined a car club and estimating their vehicle mileage prior to joining the scheme. As the surveys were conducted at one point, the direction of the impact was not possible to determine, e.g. if car clubs were causing people to switch to different modes, or if people who use car clubs were more inclined to switch to different transport modes because of other factors.

A number of studies focused on understanding environmental impacts of car clubs developed scenarios based on different sources of empirical data (e.g. census data, environmental and economic data, national statistics and findings from peer-reviewed literature). In a few studies the scenarios were modelled on survey data, which led to similar limitations as discussed above. For example, survey data was used to develop counterfactuals e.g. whether a person would own a vehicle if they had not joined a car club scheme. The use of different metrics to measure decarbonisation and different units of analysis across the included studies made drawing comparisons across the evidence base challenging.

There were also some issues with the quality of the data which authors used to analyse car club impacts, such as inconsistencies in the monitoring data collected by different car club companies which made comparisons more difficult. In cases where GPS tracker data was used, the kits did not record the location continuously but at regular intervals, which impacted the accuracy of the mileage calculations.

Further research

This section of the report highlights potential areas for future research, based on gaps in the literature.

Suggested further research by methodology

The limitations listed in chapter 9 suggest methodological gaps in current car club research. The recommended methods for further research on impacts of car clubs therefore include:

- Greater use of robust quantitative methodologies, such as the use of weighting, control groups and longitudinal survey approaches to understand the changes in car use and car ownership and how car user groups compare to the general population.
- Further development of innovative approaches such as GPS tracking to understand the impacts of car clubs on vehicle mileage and trip generation. When developing such methods, great care needs to be taken around personal data.
- Conducting studies with other groups that show promise of take up e.g. lower income groups, older people, people outside of urban areas.

Suggested further research by topic

High priority areas for further research relate to areas of interest that had limited or no coverage in the literature. Research suggestions are summarised below according to the research area they relate to.

- Measured impact of car clubs on:
 - Access to opportunities – while there was evidence on the types of trips car clubs are used for, there was very limited consideration of which journeys would not have been possible without car clubs.
 - There is potential for further research to quantify the potential for car clubs to provide unique access to certain opportunities, including employment, health and social opportunities. A caveat to this is that such a study may require an experimental or quasi-experimental design which tend to require large budgetary investments.
 - Congestion – some estimations were provided in the literature for the amount of parking space freed up by a reduction in vehicle ownership, but the relationship between car clubs and congestion could be explored further.
 - Public health – while it would be difficult to prove a causal link between car clubs and public health benefits, there are two areas that could be explored: 1) impact on public health of reduced emissions associated with car clubs (identified in chapter 6), 2) impact on public health of increased active travel associated with car clubs (identified in chapter 5).

- The impact on car clubs when integrated into shared mobility hubs - as more mobility hubs are introduced in Europe, this provides an opportunity to observe the before and after impacts on car club integration within hubs.
- Whether the impacts of car clubs vary by different procurement models used to deliver car clubs – it would be most effective to explore this as part of a broader consideration of the overall quality of car club services.

Lower priority areas for consideration for future research relate to the impacts where a reasonable level of evidence was found. Suggestions for further research are summarised below.

- Vehicle ownership – an investigation into the potential for car clubs to reduce vehicle ownership, based on car club industry data, purchasing data and wider vehicle usage data. It must be noted that it would be difficult to prove a causal link between car clubs and vehicle ownership change, due to the variety of other factors likely to contribute to the decision to relinquish a car.
 - A qualitative exploration of the reasons why car club users relinquish their vehicles or avoid getting additional cars would provide a more nuanced understanding of behaviour change.
- Vehicle-mileage, total journey time and trip generation – a qualitative investigation to explore the reasons for the decrease in annual mileage observed. Again, it would be difficult to prove a causal link between car clubs and mileage decrease, due to the variety of other factors likely to contribute to this decision. Impact of car clubs on total journey time could be explored further.
- Mode choice – a qualitative investigation into what factors or situations lead people to switch from public transport or private vehicle use to car clubs. Studies used estimations and modelling to suggest that mode choice impacts environmental emissions, therefore future research could explore whether there is real world evidence for this.
- Environment – further research in this area could explore wider methodologies and integrate different approaches of data collection e.g. combining emission models and user behaviour data (the literature reviewed in this report largely relied on car club user survey data and scenario modelling)
- Barriers and opportunities – further research is needed to develop an understanding of how: car club operators can be supported to provide their services; and how harder-to-reach groups, such as people in less urbanised areas, low-income groups and older people can be encouraged and supported to participate in car clubs.

The recommendations made in this section relate specifically to the research questions initially posed, but it is also important to consider the environment within which car clubs operate. The impacts car clubs can have heavily depend on external factors, such as parking policies, provision of active travel infrastructure and public transport service levels. Research into these conditions and international best practices would therefore also be highly useful.

Appendix A. Approach to prioritisation

Title and abstract screening identified a total of 136 sources which looked potentially relevant. These sources were then read in full and the prioritisation described in this report is based on this full text review. As a first step, we immediately screened out sources that were found to not be relevant based on location or content. We then took a staged approach to prioritisation of the remaining sources:

1. We initially selected papers considering a combination of the overall score a source received, and the depth of information it provided on the key research question. Sources received a score between 1 and 3 for each sub-theme related to the key research question they covered, where 3 means the sub-theme is covered in a high amount of detail and 1 means it is covered in a low amount of detail. For each source, it was also noted which secondary research questions were covered. Sources received 1 point if at least 1 secondary research question was covered. Sources that had a score of at least 2 for one of the sub-themes related to the key research question and an overall score of at least 4 were initially selected.
2. The remaining sources that had an overall score of at least 3 were considered and additional sources were selected based on the following criteria:
 - a. the source focused on a shared mobility mode with less representation e.g. peer-to-peer or
 - b. the source had a score of 3 for one of the sub-themes related to the key research question or
 - c. the source covered a sub-theme that had less representation e.g. access to opportunities
3. The sources selected were reviewed and removals were made for any sources that:
 - a. were based purely on theoretical simulations
 - b. focused primarily on car pooling
 - c. received a score of less than 3 in relation to the Weight of Evidence Framework which was used to assess the quality of the source. Using this framework the quality of sources was assessed on four questions:
 - i. Is there a clear statement of the aims/objectives or clear research questions?
 - ii. Is the sampling strategy (or data selection strategy if not collecting primary data) clearly described and appropriate?
 - iii. Is the method of data collection clearly described, and appropriate to answer the aims/research questions?
 - iv. Are there any concerns regarding accuracy (e.g. discrepancies within the report)?

4. The date range of the sources was checked to ensure they were not weighted towards the pre-pandemic years, which had an impact on travel habits

Appendix B. Bibliography

Amatuni, L., Ottelin, J., Steubing, B. & Mogollón, J. M. (2020) 'Does car sharing reduce greenhouse gas emissions? Assessing the modal shift and lifetime shift rebound effects from a life cycle perspective', *Journal of Cleaner Production*, 266

Arbeláez Vélez, A. M. & Plepys, A. (2021) 'Car Sharing as a Strategy to Address GHG Emissions in the Transport System: Evaluation of Effects of Car Sharing in Amsterdam', *Sustainability*, 13(4)

Baptista, P., Melo, S. & Rolim, C. (2014) 'Energy, Environmental and Mobility Impacts of Car-sharing systems. Empirical results from Lisbon, Portugal' *Procedia – Social and Behavioural Sciences*, 111, pp. 28-37

Becker, H., Ciari, F. & Axhausen, K. W., (2018) 'Measuring the car ownership impact of free-floating car-sharing - A case study in Basel, Switzerland' *Transportation Research Part D: Transport and Environment*, 65, pp. 51-62

Bucsky, P. & Juhász, M. (2022) 'Is car ownership reduction impact of car sharing lower than expected? A Europe wide empirical evidence' *Case Studies on Transport Policy*, 10(4), pp. 2208-2217

Caulfield, B. & Kehoe, J. (2021) 'Usage patterns and preference for car sharing: A case study of Dublin' *Case Studies on Transport Policy*, 9(1), pp. 253-259

Ceccato, R. & Diana, M. (2021) 'Substitution and complementarity patterns between traditional transport means and car sharing: a person and trip level analysis' *Transportation*, 48, pp. 1523-1540

Chapman, D. A., Eyckmans, J. & Van Acker, K. (2020) 'Does Car-Sharing Reduce Car-Use? An Impact Evaluation of Car-Sharing in Flanders, Belgium' *Sustainability*, 12(19)

Chicco, A. & Diana, M. (2021) 'Air emissions impacts of modal diversion patterns induced by one-way car sharing: A case study from the city of Turin' *Transportation Research Part D: Transport and Environment*, 91

Chicco, A., Diana, M., Loose, W. & Nehrke, G. (2022) 'Comparing car ownership reduction patterns among members of different car sharing schemes operating in three German inner-city areas' *Transportation Research Part A: Policy and Practice*, 163, pp. 370-385

Clark, M., Gifford, K., Anable, J. & Le Vine, S. (2015) 'Business-to-business carsharing: evidence from Britain of factors associated with employer-based carsharing membership and its impacts' *Transportation*, 42, pp. 471-495

CoMoUK (2022) 'CoMoUK Annual Car Club Report UK' Available at: <https://www.como.org.uk/documents/car-club-annual-report-uk-2022>

Cyriac, G. & Julsrud, T. E. (2019) 'Cars and the sharing economy: The emergence and impacts of shared automobility in the urban environment' in *Advances in Transport Policy and Planning*, 4, pp. 7-38

Dill, J., McNeil, N. & Howland, S. (2017) 'Peer-To-Peer Carsharing: Short-Term Effects on Travel Behaviour in Portland, OR' *Transportation Research and Education Center (TREC)*

Dill, J., McNeil, N. & Howland, S. (2019) 'Effects of peer-to-peer carsharing on vehicle owners' travel behavior' *Transportation Research Part C: Emerging Technologies*, 101, pp. 70-78

Enochsson, L., Voytenko Palgan, Y., Plepys, A. & Mont, O. (2021) 'Impacts of the Sharing Economy on Urban Sustainability: The Perceptions of Municipal Governments and Sharing Organisations' *Sustainability*, 13(8)

Esfandabadi, Z. S., Diana, M. & Zanetti, M. C. (2022) 'Carsharing services in sustainable urban transport: An inclusive science map of the field' *Journal of Cleaner Production*, 357

Fernando, C., Soo, V. K., Compston, P., Kim, H.C., De Kleine, R., Weigl, D., Keith, D.R. & Doolan, M. (2020) 'Life cycle environmental assessment of a transition to mobility' *Procedia CIRP*, 90, pp. 238-243.

Giesel, F. & Nobis, C. (2016) 'The Impact of Carsharing on Car Ownership in German Cities' *Transportation Research Procedia*, 19, pp. 215-224.

Göddecke, D., Krauss, K. & Gnann, T. (2022) 'What is the role of carsharing toward a more sustainable transport behaviour? Analysis of data from 80 major cities' *International Journal of Sustainable Transportation*, 16(9), pp. 861-873

Gompf, K., Traverso, M. & Hetterich, J. (2022) 'Applying social life cycle assessment to evaluate the use phase of mobility services: a case study in Berlin' *The International Journal of Life Cycle Assessment*, 27(4), pp. 603-622

Harris, S., Mata, E., Plepys, A. & Katzeff, C. (2021) 'Sharing is daring, but is it sustainable? An assessment of sharing cars, electric tools and offices in Sweden' *Resources, Conservation and Recycling*, 170

Haustein, S. (2021) 'What role does free-floating car sharing play for changes in car ownership? Evidence from longitudinal survey data and population segments in Copenhagen' *Travel Behaviour and Society*, 24, pp. 181-194

Ortega Hortelano, A., Tsakalidis, A., Haq, G., Gkoumas, K., Stepniak, M., Marques dos Santos, F., Grosso, M., & Pekár, F. (2022) 'Research and innovation in car sharing in Europe: An assessment based on the Transport Research and Innovation Monitoring and Information Systems (TRIMIS)' EUR 30998 EN, Publications Office of the European Union, Luxembourg

Kopp, J., Gerike, R. & Axhausen, K. W. (2015) 'Do Sharing people behave differently? An empirical evaluation of the distinctive mobility patterns of free-floating car-sharing members' *Transportation*, 42, pp. 449-469

Kubik, A., Turoń, K., Folęga, P. & Chen, F. (2023) 'CO2 Emissions—Evidence from Internal Combustion and Electric Engine Vehicles from Car-Sharing Systems' *Energies*, 16(5)

Namazu, M. & Dowlatabadi, H. (2018) 'Vehicle ownership reduction: A comparison of one-way and two-way carsharing systems' *Transport Policy*, 64, pp. 38-50.

Nenseth, V. & Ellis, I. O. (2022) 'Car sharing in Bergen - experiences and effects' Oslo: Institute of Transport Economics Norwegian Centre for Transport Research.

Nijland, H. & van Meerkerk, J. (2017) 'Mobility and environmental impacts of car sharing in the Netherlands' *Environmental Innovation and Societal Transitions*, 23, pp. 84-91.

Pede, E. & Staricco, L. (2021) 'Car sharing and social-spatial justice: evidences from the three Italian cities' *Town Planning Review*, 92(4), pp. 479-505

Rabbitt, N. & Ghosh, B. (2016) 'Economic and environmental impacts of organised Car Sharing Services: A case study of Ireland' *Research in Transportation Economics*, 57, pp. 3-12.

Schmidt, P. (2020) 'The effect of car sharing on car sales' *International Journal of Industrial Organization*, 71

Shaheen, S., Martin, E. & Hoffman-Stapleton, M. (2021) 'Shared mobility and urban form impacts: a case study of peer-to-peer (P2P) carsharing in the US' *Journal of Urban Design*, 26(2), pp. 141-158.

Silvestri, A., Foudi, S., Galarraga, I. & Ansuategi, A. (2021) 'The contribution of carsharing to low carbon mobility: Complementarity and substitution with other modes' *Research in Transportation Economics*, 85

Stasko, T., Buck, A. B. & Gao, O. H. (2013) 'Carsharing in a university setting: Impacts on vehicle ownership, parking demand, and mobility in Ithaca, NY' *Transport Policy*, 30, pp. 262-268.

Tisbury Electric Car Club (2023) Case study of a local community car club. UK

Wiegmann, M., Keserü, I. & Macharis, C. (2020) 'Carsharing in the Brussels region' *Brussels Studies*, 146

APPENDIX C. 2025 Traffic Survey Data – A257 /
Nargate Street / Bekesbourne Lane

Site Plan

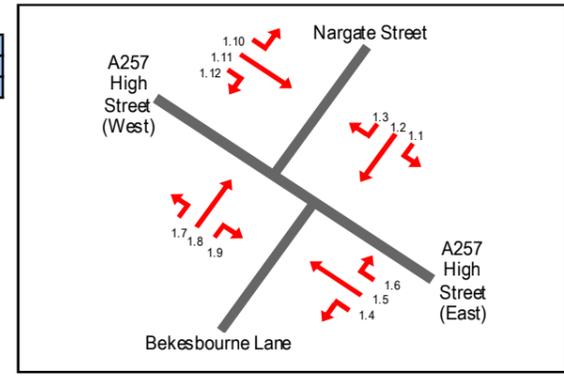
	Movement Number
	Number of Vehicles
	PCU Value

Network Peak Hour

07:15 - 08:15

1.10	59	59
1.11	506	516
1.12	156	157

1.3	1.2	1.1
99	231	54
100	230	54



1.6	51	52
1.5	720	733
1.4	432	433

Peak Hour

07:15 - 08:15

1.7	1.8	1.9
91	128	361
91	128	363

Network Peak Hour Generator
click on yellow cell to change Peak Hour parameters

Session: Weekday AM Peak

Vehicle Class: ALL

Start Time: 07:00

End Time: 10:00

Note: The site diagram is for reference purposes only and is not an exact representation of the site surveyed

Littlebourne, Kent
Classified Junction Count

Site 1 of 1
Nargate Street
A257 High Street (East)
Bekesbourne Lane
A257 High Street (West)

Lat/Long
lat 51.272796° lon 1.166399°

Date
Tuesday 09 December 2025

Weather
Cloudy
Temp: 10°C

0700 - 1000 (Weekday AM Peak)

TIME	Movement 1.1: Left from Nargate Street to A257 High Street (East)								Original Data	
	P/CYCLE	M/CYCLE	CAR	TAXI	LGV	OGV1	OGV2	BUS/COACH	TOTAL	PCU TOTAL
0700 - 0715	0	0	1	0	0	0	0	0	1	1.00
0715 - 0730	0	0	4	0	0	0	0	0	4	4.00
0730 - 0745	0	0	2	0	0	0	0	0	2	2.00
0745 - 0800	0	0	4	0	2	0	0	0	6	6.00
Hourly Total	0	0	11	0	2	0	0	0	13	13.00
Hourly Average	0.00	0.00	2.75	0.00	0.50	0.00	0.00	0.00	3.25	3.25
0800 - 0815	0	0	2	0	1	0	0	0	3	3.00
0815 - 0830	0	0	6	0	1	0	0	0	7	7.00
0830 - 0845	0	0	4	0	1	0	0	0	5	5.00
0845 - 0900	0	0	5	0	3	0	0	0	8	8.00
Hourly Total	0	0	17	0	6	0	0	0	23	23.00
Hourly Average	0.00	0.00	4.25	0.00	1.50	0.00	0.00	0.00	5.75	5.75
0900 - 0915	0	0	4	0	1	0	0	0	5	5.00
0915 - 0930	0	0	6	0	1	0	0	0	7	7.00
0930 - 0945	0	0	3	0	0	0	0	0	3	3.00
0945 - 1000	0	0	3	0	0	0	0	0	3	3.00
Hourly Total	0	0	16	0	2	0	0	0	18	18.00
Hourly Average	0.00	0.00	4.00	0.00	0.50	0.00	0.00	0.00	4.50	4.50
Session Total	0	0	44	0	10	0	0	0	54	54.00
Session Average	0.00	0.00	3.67	0.00	0.83	0.00	0.00	0.00	4.50	4.50

Date
Tuesday 09 December 2025

Weather
Cloudy
Temp: 12°C

1600 - 1900 (Weekday PM Peak)

TIME	Movement 1.1: Left from Nargate Street to A257 High Street (East)								Original Data	
	P/CYCLE	M/CYCLE	CAR	TAXI	LGV	OGV1	OGV2	BUS/COACH	TOTAL	PCU TOTAL
1600 - 1615	0	0	9	0	1	0	0	0	10	10.00
1615 - 1630	0	0	11	0	2	0	0	0	13	13.00
1630 - 1645	0	0	15	0	1	0	0	0	16	16.00
1645 - 1700	0	0	15	0	1	0	0	0	16	16.00
Hourly Total	0	0	50	0	5	0	0	0	55	55.00
Hourly Average	0.00	0.00	12.50	0.00	1.25	0.00	0.00	0.00	13.75	13.75
1700 - 1715	0	0	12	0	2	0	0	0	14	14.00
1715 - 1730	0	0	5	0	1	0	0	0	6	6.00
1730 - 1745	0	0	12	0	1	0	0	0	13	13.00
1745 - 1800	0	0	7	0	0	0	0	0	7	7.00
Hourly Total	0	0	36	0	4	0	0	0	40	40.00
Hourly Average	0.00	0.00	9.00	0.00	1.00	0.00	0.00	0.00	10.00	10.00
1800 - 1815	0	0	7	0	1	0	0	0	8	8.00
1815 - 1830	0	0	9	0	0	0	0	0	9	9.00
1830 - 1845	0	0	9	0	1	0	0	0	10	10.00
1845 - 1900	0	0	0	0	0	0	0	0	0	0.00
Hourly Total	0	0	25	0	2	0	0	0	27	27.00
Hourly Average	0.00	0.00	6.25	0.00	0.50	0.00	0.00	0.00	6.75	6.75
Session Total	0	0	111	0	11	0	0	0	122	122.00
Session Average	0.00	0.00	9.25	0.00	0.92	0.00	0.00	0.00	10.17	10.17

Littlebourne, Kent
Classified Junction Count

Site 1 of 1
Nargate Street
A257 High Street (East)
Bekesbourne Lane
A257 High Street (West)

Lat/Long
lat 51.272796° lon 1.166399°

Date
Tuesday 09 December 2025

Weather
Cloudy
Temp: 10°C

0700 - 1000 (Weekday AM Peak)

TIME	Movement 1.2: Southbound from Nargate Street to Bekesbourne Lane								Original Data	
	P/CYCLE	M/CYCLE	CAR	TAXI	LGV	OGV1	OGV2	BUS/COACH	TOTAL	PCU TOTAL
0700 - 0715	0	0	6	0	2	0	0	0	8	8.00
0715 - 0730	0	1	14	0	1	0	0	0	16	15.40
0730 - 0745	0	0	21	0	2	0	0	0	23	23.00
0745 - 0800	0	0	22	1	4	0	0	0	27	27.00
Hourly Total	0	1	63	1	9	0	0	0	74	73.40
Hourly Average	0.00	0.25	15.75	0.25	2.25	0.00	0.00	0.00	18.50	18.35
0800 - 0815	0	0	40	0	3	0	0	0	43	43.00
0815 - 0830	0	0	23	1	7	0	0	0	31	31.00
0830 - 0845	0	0	19	0	5	0	0	0	24	24.00
0845 - 0900	0	0	18	0	1	0	0	0	19	19.00
Hourly Total	0	0	100	1	16	0	0	0	117	117.00
Hourly Average	0.00	0.00	25.00	0.25	4.00	0.00	0.00	0.00	29.25	29.25
0900 - 0915	0	0	11	1	1	0	0	0	13	13.00
0915 - 0930	0	0	7	0	2	0	0	0	9	9.00
0930 - 0945	1	0	7	0	1	0	0	0	9	8.20
0945 - 1000	0	0	7	0	2	0	0	0	9	9.00
Hourly Total	1	0	32	1	6	0	0	0	40	39.20
Hourly Average	0.25	0.00	8.00	0.25	1.50	0.00	0.00	0.00	10.00	9.80
Session Total	1	1	195	3	31	0	0	0	231	229.60
Session Average	0.08	0.08	16.25	0.25	2.58	0.00	0.00	0.00	19.25	19.13

Date
Tuesday 09 December 2025

Weather
Cloudy
Temp: 12°C

1600 - 1900 (Weekday PM Peak)

TIME	Movement 1.2: Southbound from Nargate Street to Bekesbourne Lane								Original Data	
	P/CYCLE	M/CYCLE	CAR	TAXI	LGV	OGV1	OGV2	BUS/COACH	TOTAL	PCU TOTAL
1600 - 1615	0	0	7	2	0	0	0	0	9	9.00
1615 - 1630	0	0	6	0	0	0	0	0	6	6.00
1630 - 1645	0	0	11	0	1	0	0	0	12	12.00
1645 - 1700	0	0	5	0	2	0	0	0	7	7.00
Hourly Total	0	0	29	2	3	0	0	0	34	34.00
Hourly Average	0.00	0.00	7.25	0.50	0.75	0.00	0.00	0.00	8.50	8.50
1700 - 1715	0	0	9	0	0	0	0	0	9	9.00
1715 - 1730	0	0	3	0	3	0	0	0	6	6.00
1730 - 1745	0	0	6	0	0	0	0	0	6	6.00
1745 - 1800	0	0	4	0	0	0	0	0	4	4.00
Hourly Total	0	0	22	0	3	0	0	0	25	25.00
Hourly Average	0.00	0.00	5.50	0.00	0.75	0.00	0.00	0.00	6.25	6.25
1800 - 1815	0	0	6	0	0	0	0	0	6	6.00
1815 - 1830	0	0	2	0	1	0	0	0	3	3.00
1830 - 1845	0	0	3	0	1	0	0	0	4	4.00
1845 - 1900	0	0	3	0	0	0	0	0	3	3.00
Hourly Total	0	0	14	0	2	0	0	0	16	16.00
Hourly Average	0.00	0.00	3.50	0.00	0.50	0.00	0.00	0.00	4.00	4.00
Session Total	0	0	65	2	8	0	0	0	75	75.00
Session Average	0.00	0.00	5.42	0.17	0.67	0.00	0.00	0.00	6.25	6.25

Littlebourne, Kent
Classified Junction Count

Site 1 of 1
Nargate Street
A257 High Street (East)
Bekesbourne Lane
A257 High Street (West)

Lat/Long
lat 51.272796° lon 1.166399°

Date
Tuesday 09 December 2025

Weather
Cloudy
Temp: 10°C

0700 - 1000 (Weekday AM Peak)

TIME	Movement 1.3: Right from Nargate Street to A257 High Street (West)								Original Data	
	P/CYCLE	M/CYCLE	CAR	TAXI	LGV	OGV1	OGV2	BUS/COACH	TOTAL	PCU TOTAL
0700 - 0715	0	0	5	0	0	0	0	0	5	5.00
0715 - 0730	0	0	9	0	0	0	0	0	9	9.00
0730 - 0745	0	0	5	0	0	0	0	0	5	5.00
0745 - 0800	0	0	7	0	1	0	0	0	8	8.00
Hourly Total	0	0	26	0	1	0	0	0	27	27.00
Hourly Average	0.00	0.00	6.50	0.00	0.25	0.00	0.00	0.00	6.75	6.75
0800 - 0815	0	0	7	0	0	0	0	1	8	9.00
0815 - 0830	0	0	9	0	1	0	0	0	10	10.00
0830 - 0845	0	0	5	0	0	0	0	0	5	5.00
0845 - 0900	0	0	13	0	0	0	0	0	13	13.00
Hourly Total	0	0	34	0	1	0	0	1	36	37.00
Hourly Average	0.00	0.00	8.50	0.00	0.25	0.00	0.00	0.25	9.00	9.25
0900 - 0915	0	0	12	0	1	0	0	0	13	13.00
0915 - 0930	0	0	7	0	0	0	0	0	7	7.00
0930 - 0945	0	0	6	0	1	0	0	0	7	7.00
0945 - 1000	0	0	7	0	2	0	0	0	9	9.00
Hourly Total	0	0	32	0	4	0	0	0	36	36.00
Hourly Average	0.00	0.00	8.00	0.00	1.00	0.00	0.00	0.00	9.00	9.00
Session Total	0	0	92	0	6	0	0	1	99	100.00
Session Average	0.00	0.00	7.67	0.00	0.50	0.00	0.00	0.08	8.25	8.33

Date
Tuesday 09 December 2025

Weather
Cloudy
Temp: 12°C

1600 - 1900 (Weekday PM Peak)

TIME	Movement 1.3: Right from Nargate Street to A257 High Street (West)								Original Data	
	P/CYCLE	M/CYCLE	CAR	TAXI	LGV	OGV1	OGV2	BUS/COACH	TOTAL	PCU TOTAL
1600 - 1615	0	0	5	0	0	0	0	0	5	5.00
1615 - 1630	0	0	5	0	0	0	0	0	5	5.00
1630 - 1645	0	0	10	0	3	0	0	0	13	13.00
1645 - 1700	0	0	7	0	0	0	0	0	7	7.00
Hourly Total	0	0	27	0	3	0	0	0	30	30.00
Hourly Average	0.00	0.00	6.75	0.00	0.75	0.00	0.00	0.00	7.50	7.50
1700 - 1715	0	0	7	0	2	0	0	0	9	9.00
1715 - 1730	0	0	10	0	0	0	0	0	10	10.00
1730 - 1745	0	0	11	0	0	0	0	0	11	11.00
1745 - 1800	0	0	6	0	0	0	0	0	6	6.00
Hourly Total	0	0	34	0	2	0	0	0	36	36.00
Hourly Average	0.00	0.00	8.50	0.00	0.50	0.00	0.00	0.00	9.00	9.00
1800 - 1815	0	1	5	0	1	0	0	0	7	6.40
1815 - 1830	0	0	3	0	0	0	0	0	3	3.00
1830 - 1845	0	0	3	0	0	0	0	0	3	3.00
1845 - 1900	0	0	4	0	0	0	0	0	4	4.00
Hourly Total	0	1	15	0	1	0	0	0	17	16.40
Hourly Average	0.00	0.25	3.75	0.00	0.25	0.00	0.00	0.00	4.25	4.10
Session Total	0	1	76	0	6	0	0	0	83	82.40
Session Average	0.00	0.08	6.33	0.00	0.50	0.00	0.00	0.00	6.92	6.87

Littlebourne, Kent
Classified Junction Count

Site 1 of 1
Nargate Street
A257 High Street (East)
Bekesbourne Lane
A257 High Street (West)

Lat/Long
lat 51.272796° lon 1.166399°

Date
Tuesday 09 December 2025

Weather
Cloudy
Temp: 10°C

0700 - 1000 (Weekday AM Peak)

TIME	Movement 1.4: Left from A257 High Street (East) to Bekesbourne Lane								Original Data	
	P/CYCLE	M/CYCLE	CAR	TAXI	LGV	OGV1	OGV2	BUS/COACH	TOTAL	PCU TOTAL
0700 - 0715	0	0	29	0	3	0	0	0	32	32.00
0715 - 0730	0	0	41	0	7	0	0	0	48	48.00
0730 - 0745	0	0	43	0	9	0	0	0	52	52.00
0745 - 0800	0	0	51	1	6	0	0	0	58	58.00
Hourly Total	0	0	164	1	25	0	0	0	190	190.00
Hourly Average	0.00	0.00	41.00	0.25	6.25	0.00	0.00	0.00	47.50	47.50
0800 - 0815	0	0	44	0	6	0	0	0	50	50.00
0815 - 0830	0	0	21	0	4	0	0	0	25	25.00
0830 - 0845	0	0	34	0	3	0	0	0	37	37.00
0845 - 0900	0	0	37	0	4	0	0	0	41	41.00
Hourly Total	0	0	136	0	17	0	0	0	153	153.00
Hourly Average	0.00	0.00	34.00	0.00	4.25	0.00	0.00	0.00	38.25	38.25
0900 - 0915	0	0	25	0	3	0	0	0	28	28.00
0915 - 0930	0	0	18	0	4	0	0	0	22	22.00
0930 - 0945	0	0	11	0	4	1	0	0	16	16.50
0945 - 1000	0	0	17	0	6	0	0	0	23	23.00
Hourly Total	0	0	71	0	17	1	0	0	89	89.50
Hourly Average	0.00	0.00	17.75	0.00	4.25	0.25	0.00	0.00	22.25	22.38
Session Total	0	0	371	1	59	1	0	0	432	432.50
Session Average	0.00	0.00	30.92	0.08	4.92	0.08	0.00	0.00	36.00	36.04

Date
Tuesday 09 December 2025

Weather
Cloudy
Temp: 12°C

1600 - 1900 (Weekday PM Peak)

TIME	Movement 1.4: Left from A257 High Street (East) to Bekesbourne Lane								Original Data	
	P/CYCLE	M/CYCLE	CAR	TAXI	LGV	OGV1	OGV2	BUS/COACH	TOTAL	PCU TOTAL
1600 - 1615	0	0	17	1	4	0	0	0	22	22.00
1615 - 1630	0	0	27	0	3	0	0	0	30	30.00
1630 - 1645	0	0	32	0	10	0	0	0	42	42.00
1645 - 1700	0	0	24	0	1	0	0	0	25	25.00
Hourly Total	0	0	100	1	18	0	0	0	119	119.00
Hourly Average	0.00	0.00	25.00	0.25	4.50	0.00	0.00	0.00	29.75	29.75
1700 - 1715	0	0	26	0	4	0	0	0	30	30.00
1715 - 1730	0	0	24	0	4	0	0	0	28	28.00
1730 - 1745	0	0	28	0	3	0	0	0	31	31.00
1745 - 1800	0	0	24	0	1	0	0	0	25	25.00
Hourly Total	0	0	102	0	12	0	0	0	114	114.00
Hourly Average	0.00	0.00	25.50	0.00	3.00	0.00	0.00	0.00	28.50	28.50
1800 - 1815	0	0	23	0	1	0	0	0	24	24.00
1815 - 1830	0	0	18	0	0	0	0	0	18	18.00
1830 - 1845	0	0	32	0	0	0	0	0	32	32.00
1845 - 1900	0	0	8	0	1	0	0	0	9	9.00
Hourly Total	0	0	81	0	2	0	0	0	83	83.00
Hourly Average	0.00	0.00	20.25	0.00	0.50	0.00	0.00	0.00	20.75	20.75
Session Total	0	0	283	1	32	0	0	0	316	316.00
Session Average	0.00	0.00	23.58	0.08	2.67	0.00	0.00	0.00	26.33	26.33

Littlebourne, Kent
Classified Junction Count

Site 1 of 1
Nargate Street
A257 High Street (East)
Bekesbourne Lane
A257 High Street (West)

Lat/Long
lat 51.272796° lon 1.166399°

Date
Tuesday 09 December 2025

Weather
Cloudy
Temp: 10°C

0700 - 1000 (Weekday AM Peak)

TIME	Movement 1.5: Westbound from A257 High Street (East) to A257 High Street (West)								Original Data	
	P/CYCLE	M/CYCLE	CAR	TAXI	LGV	OGV1	OGV2	BUS/COACH	TOTAL	PCU TOTAL
0700 - 0715	0	1	36	0	5	0	0	1	43	43.40
0715 - 0730	0	1	66	0	6	1	0	1	75	75.90
0730 - 0745	0	0	71	0	8	1	0	0	80	80.50
0745 - 0800	1	1	59	1	5	0	0	0	67	65.60
Hourly Total	1	3	232	1	24	2	0	2	265	265.40
Hourly Average	0.25	0.75	58.00	0.25	6.00	0.50	0.00	0.50	66.25	66.35
0800 - 0815	0	0	56	3	5	3	0	2	69	72.50
0815 - 0830	0	0	42	0	1	0	0	0	43	43.00
0830 - 0845	0	0	56	1	5	2	0	0	64	65.00
0845 - 0900	0	0	47	1	3	0	1	2	54	57.30
Hourly Total	0	0	201	5	14	5	1	4	230	237.80
Hourly Average	0.00	0.00	50.25	1.25	3.50	1.25	0.25	1.00	57.50	59.45
0900 - 0915	0	2	49	1	6	0	2	0	60	61.40
0915 - 0930	0	0	50	1	5	0	0	1	57	58.00
0930 - 0945	0	0	41	0	3	1	0	0	45	45.50
0945 - 1000	0	0	53	1	7	0	1	1	63	65.30
Hourly Total	0	2	193	3	21	1	3	2	225	230.20
Hourly Average	0.00	0.50	48.25	0.75	5.25	0.25	0.75	0.50	56.25	57.55
Session Total	1	5	626	9	59	8	4	8	720	733.40
Session Average	0.08	0.42	52.17	0.75	4.92	0.67	0.33	0.67	60.00	61.12

Date
Tuesday 09 December 2025

Weather
Cloudy
Temp: 12°C

1600 - 1900 (Weekday PM Peak)

TIME	Movement 1.5: Westbound from A257 High Street (East) to A257 High Street (West)								Original Data	
	P/CYCLE	M/CYCLE	CAR	TAXI	LGV	OGV1	OGV2	BUS/COACH	TOTAL	PCU TOTAL
1600 - 1615	0	0	26	0	5	0	0	0	31	31.00
1615 - 1630	0	0	45	0	4	0	2	1	52	55.60
1630 - 1645	0	0	44	1	7	1	0	1	54	55.50
1645 - 1700	0	0	38	0	3	0	0	0	41	41.00
Hourly Total	0	0	153	1	19	1	2	2	178	183.10
Hourly Average	0.00	0.00	38.25	0.25	4.75	0.25	0.50	0.50	44.50	45.78
1700 - 1715	0	0	46	0	5	0	1	0	52	53.30
1715 - 1730	0	1	35	0	5	0	0	1	42	42.40
1730 - 1745	0	0	37	0	4	0	0	0	41	41.00
1745 - 1800	0	0	44	0	6	0	0	1	51	52.00
Hourly Total	0	1	162	0	20	0	1	2	186	188.70
Hourly Average	0.00	0.25	40.50	0.00	5.00	0.00	0.25	0.50	46.50	47.18
1800 - 1815	0	1	31	0	1	0	0	0	33	32.40
1815 - 1830	0	0	31	1	0	0	0	1	33	34.00
1830 - 1845	0	0	36	0	0	0	0	0	36	36.00
1845 - 1900	0	0	26	0	0	0	0	1	27	28.00
Hourly Total	0	1	124	1	1	0	0	2	129	130.40
Hourly Average	0.00	0.25	31.00	0.25	0.25	0.00	0.00	0.50	32.25	32.60
Session Total	0	2	439	2	40	1	3	6	493	502.20
Session Average	0.00	0.17	36.58	0.17	3.33	0.08	0.25	0.50	41.08	41.85

Littlebourne, Kent
Classified Junction Count

Site 1 of 1
Nargate Street
A257 High Street (East)
Bekesbourne Lane
A257 High Street (West)

Lat/Long
lat 51.272796° lon 1.166399°

Date
Tuesday 09 December 2025

Weather
Cloudy
Temp: 10°C

0700 - 1000 (Weekday AM Peak)

TIME	Movement 1.6: Right from A257 High Street (East) to Nargate Street								Original Data	
	P/CYCLE	M/CYCLE	CAR	TAXI	LGV	OGV1	OGV2	BUS/COACH	TOTAL	PCU TOTAL
0700 - 0715	0	0	2	0	0	0	0	0	2	2.00
0715 - 0730	0	0	1	0	1	0	0	0	2	2.00
0730 - 0745	0	0	3	0	1	0	0	0	4	4.00
0745 - 0800	0	0	10	0	0	1	0	0	11	11.50
Hourly Total	0	0	16	0	2	1	0	0	19	19.50
Hourly Average	0.00	0.00	4.00	0.00	0.50	0.25	0.00	0.00	4.75	4.88
0800 - 0815	0	0	2	0	0	0	0	0	2	2.00
0815 - 0830	0	0	2	0	1	0	0	0	3	3.00
0830 - 0845	0	0	4	0	1	0	0	0	5	5.00
0845 - 0900	0	0	12	0	1	0	0	0	13	13.00
Hourly Total	0	0	20	0	3	0	0	0	23	23.00
Hourly Average	0.00	0.00	5.00	0.00	0.75	0.00	0.00	0.00	5.75	5.75
0900 - 0915	0	0	3	0	0	0	0	0	3	3.00
0915 - 0930	0	0	3	0	0	0	0	0	3	3.00
0930 - 0945	0	0	1	0	1	0	0	0	2	2.00
0945 - 1000	0	0	1	0	0	0	0	0	1	1.00
Hourly Total	0	0	8	0	1	0	0	0	9	9.00
Hourly Average	0.00	0.00	2.00	0.00	0.25	0.00	0.00	0.00	2.25	2.25
Session Total	0	0	44	0	6	1	0	0	51	51.50
Session Average	0.00	0.00	3.67	0.00	0.50	0.08	0.00	0.00	4.25	4.29

Date
Tuesday 09 December 2025

Weather
Cloudy
Temp: 12°C

1600 - 1900 (Weekday PM Peak)

TIME	Movement 1.6: Right from A257 High Street (East) to Nargate Street								Original Data	
	P/CYCLE	M/CYCLE	CAR	TAXI	LGV	OGV1	OGV2	BUS/COACH	TOTAL	PCU TOTAL
1600 - 1615	0	0	6	0	3	0	0	0	9	9.00
1615 - 1630	0	0	8	0	1	0	0	0	9	9.00
1630 - 1645	0	0	5	0	0	0	0	0	5	5.00
1645 - 1700	0	0	8	0	0	0	0	0	8	8.00
Hourly Total	0	0	27	0	4	0	0	0	31	31.00
Hourly Average	0.00	0.00	6.75	0.00	1.00	0.00	0.00	0.00	7.75	7.75
1700 - 1715	0	0	10	0	1	0	0	0	11	11.00
1715 - 1730	0	0	2	0	0	0	0	0	2	2.00
1730 - 1745	0	0	4	0	0	0	0	0	4	4.00
1745 - 1800	0	0	4	0	1	0	0	0	5	5.00
Hourly Total	0	0	20	0	2	0	0	0	22	22.00
Hourly Average	0.00	0.00	5.00	0.00	0.50	0.00	0.00	0.00	5.50	5.50
1800 - 1815	0	0	6	0	0	0	0	0	6	6.00
1815 - 1830	0	0	8	0	0	0	0	0	8	8.00
1830 - 1845	0	0	3	0	0	0	0	0	3	3.00
1845 - 1900	0	0	0	0	0	0	0	0	0	0.00
Hourly Total	0	0	17	0	0	0	0	0	17	17.00
Hourly Average	0.00	0.00	4.25	0.00	0.00	0.00	0.00	0.00	4.25	4.25
Session Total	0	0	64	0	6	0	0	0	70	70.00
Session Average	0.00	0.00	5.33	0.00	0.50	0.00	0.00	0.00	5.83	5.83

Littlebourne, Kent
Classified Junction Count

Site 1 of 1
Nargate Street
A257 High Street (East)
Bekesbourne Lane
A257 High Street (West)

Lat/Long
lat 51.272796° lon 1.166399°

Date
Tuesday 09 December 2025

Weather
Cloudy
Temp: 10°C

0700 - 1000 (Weekday AM Peak)

TIME	Movement 1.7: Left from Bekesbourne Lane to A257 High Street (West)								Original Data	
	P/CYCLE	M/CYCLE	CAR	TAXI	LGV	OGV1	OGV2	BUS/COACH	TOTAL	PCU TOTAL
0700 - 0715	0	0	1	0	0	0	0	0	1	1.00
0715 - 0730	0	0	3	0	1	0	0	0	4	4.00
0730 - 0745	0	0	2	0	0	0	0	0	2	2.00
0745 - 0800	0	0	5	0	1	0	0	0	6	6.00
Hourly Total	0	0	11	0	2	0	0	0	13	13.00
Hourly Average	0.00	0.00	2.75	0.00	0.50	0.00	0.00	0.00	3.25	3.25
0800 - 0815	0	0	7	0	4	0	0	0	11	11.00
0815 - 0830	0	0	3	0	0	0	0	0	3	3.00
0830 - 0845	0	0	10	1	1	0	0	0	12	12.00
0845 - 0900	0	0	3	0	0	0	0	0	3	3.00
Hourly Total	0	0	23	1	5	0	0	0	29	29.00
Hourly Average	0.00	0.00	5.75	0.25	1.25	0.00	0.00	0.00	7.25	7.25
0900 - 0915	0	0	8	0	2	0	0	0	10	10.00
0915 - 0930	0	0	3	1	6	0	0	0	10	10.00
0930 - 0945	0	0	13	0	5	0	0	0	18	18.00
0945 - 1000	0	0	8	0	3	0	0	0	11	11.00
Hourly Total	0	0	32	1	16	0	0	0	49	49.00
Hourly Average	0.00	0.00	8.00	0.25	4.00	0.00	0.00	0.00	12.25	12.25
Session Total	0	0	66	2	23	0	0	0	91	91.00
Session Average	0.00	0.00	5.50	0.17	1.92	0.00	0.00	0.00	7.58	7.58

Date
Tuesday 09 December 2025

Weather
Cloudy
Temp: 12°C

1600 - 1900 (Weekday PM Peak)

TIME	Movement 1.7: Left from Bekesbourne Lane to A257 High Street (West)								Original Data	
	P/CYCLE	M/CYCLE	CAR	TAXI	LGV	OGV1	OGV2	BUS/COACH	TOTAL	PCU TOTAL
1600 - 1615	0	0	21	0	1	0	0	0	22	22.00
1615 - 1630	0	0	16	0	2	0	0	0	18	18.00
1630 - 1645	0	0	18	0	1	0	0	0	19	19.00
1645 - 1700	0	0	11	0	4	0	0	0	15	15.00
Hourly Total	0	0	66	0	8	0	0	0	74	74.00
Hourly Average	0.00	0.00	16.50	0.00	2.00	0.00	0.00	0.00	18.50	18.50
1700 - 1715	0	0	10	0	3	0	0	0	13	13.00
1715 - 1730	0	0	20	0	3	0	0	0	23	23.00
1730 - 1745	0	0	11	0	0	0	0	0	11	11.00
1745 - 1800	0	0	8	0	2	0	0	0	10	10.00
Hourly Total	0	0	49	0	8	0	0	0	57	57.00
Hourly Average	0.00	0.00	12.25	0.00	2.00	0.00	0.00	0.00	14.25	14.25
1800 - 1815	0	0	8	0	0	0	0	0	8	8.00
1815 - 1830	0	0	12	0	2	0	0	0	14	14.00
1830 - 1845	0	0	6	0	0	0	0	0	6	6.00
1845 - 1900	0	0	8	0	1	0	0	0	9	9.00
Hourly Total	0	0	34	0	3	0	0	0	37	37.00
Hourly Average	0.00	0.00	8.50	0.00	0.75	0.00	0.00	0.00	9.25	9.25
Session Total	0	0	149	0	19	0	0	0	168	168.00
Session Average	0.00	0.00	12.42	0.00	1.58	0.00	0.00	0.00	14.00	14.00

Littlebourne, Kent
Classified Junction Count

Site 1 of 1
Nargate Street
A257 High Street (East)
Bekesbourne Lane
A257 High Street (West)

Lat/Long
lat 51.272796° lon 1.166399°

Date
Tuesday 09 December 2025

Weather
Cloudy
Temp: 10°C

0700 - 1000 (Weekday AM Peak)

TIME	Movement 1.8: Northbound from Bekesbourne Lane to Nargate Street								Original Data	
	P/CYCLE	M/CYCLE	CAR	TAXI	LGV	OGV1	OGV2	BUS/COACH	TOTAL	PCU TOTAL
0700 - 0715	0	0	2	0	0	0	0	0	2	2.00
0715 - 0730	0	0	5	0	1	0	0	0	6	6.00
0730 - 0745	0	0	4	0	2	0	0	0	6	6.00
0745 - 0800	0	0	1	0	2	0	0	0	3	3.00
Hourly Total	0	0	12	0	5	0	0	0	17	17.00
Hourly Average	0.00	0.00	3.00	0.00	1.25	0.00	0.00	0.00	4.25	4.25
0800 - 0815	0	0	12	0	3	0	0	0	15	15.00
0815 - 0830	0	0	8	0	4	0	0	0	12	12.00
0830 - 0845	0	0	16	2	6	0	0	0	24	24.00
0845 - 0900	0	0	21	0	2	0	0	0	23	23.00
Hourly Total	0	0	57	2	15	0	0	0	74	74.00
Hourly Average	0.00	0.00	14.25	0.50	3.75	0.00	0.00	0.00	18.50	18.50
0900 - 0915	0	0	7	1	5	0	0	0	13	13.00
0915 - 0930	0	0	5	0	3	0	0	0	8	8.00
0930 - 0945	0	0	6	0	0	0	0	0	6	6.00
0945 - 1000	0	0	9	0	1	0	0	0	10	10.00
Hourly Total	0	0	27	1	9	0	0	0	37	37.00
Hourly Average	0.00	0.00	6.75	0.25	2.25	0.00	0.00	0.00	9.25	9.25
Session Total	0	0	96	3	29	0	0	0	128	128.00
Session Average	0.00	0.00	8.00	0.25	2.42	0.00	0.00	0.00	10.67	10.67

Date
Tuesday 09 December 2025

Weather
Cloudy
Temp: 12°C

1600 - 1900 (Weekday PM Peak)

TIME	Movement 1.8: Northbound from Bekesbourne Lane to Nargate Street								Original Data	
	P/CYCLE	M/CYCLE	CAR	TAXI	LGV	OGV1	OGV2	BUS/COACH	TOTAL	PCU TOTAL
1600 - 1615	0	1	22	0	3	0	0	0	26	25.40
1615 - 1630	0	0	18	0	0	0	0	0	18	18.00
1630 - 1645	0	0	19	0	2	0	0	0	21	21.00
1645 - 1700	0	0	19	0	1	0	0	0	20	20.00
Hourly Total	0	1	78	0	6	0	0	0	85	84.40
Hourly Average	0.00	0.25	19.50	0.00	1.50	0.00	0.00	0.00	21.25	21.10
1700 - 1715	0	0	29	0	0	0	0	0	29	29.00
1715 - 1730	0	0	15	0	0	0	0	0	15	15.00
1730 - 1745	0	0	14	0	0	0	0	0	14	14.00
1745 - 1800	0	0	21	0	2	0	0	0	23	23.00
Hourly Total	0	0	79	0	2	0	0	0	81	81.00
Hourly Average	0.00	0.00	19.75	0.00	0.50	0.00	0.00	0.00	20.25	20.25
1800 - 1815	0	0	8	0	0	0	0	0	8	8.00
1815 - 1830	0	0	19	0	2	0	0	0	21	21.00
1830 - 1845	0	0	8	0	0	0	0	0	8	8.00
1845 - 1900	0	0	5	0	1	0	0	0	6	6.00
Hourly Total	0	0	40	0	3	0	0	0	43	43.00
Hourly Average	0.00	0.00	10.00	0.00	0.75	0.00	0.00	0.00	10.75	10.75
Session Total	0	1	197	0	11	0	0	0	209	208.40
Session Average	0.00	0.08	16.42	0.00	0.92	0.00	0.00	0.00	17.42	17.37

Littlebourne, Kent
Classified Junction Count

Site 1 of 1
Nargate Street
A257 High Street (East)
Bekesbourne Lane
A257 High Street (West)

Lat/Long
lat 51.272796° lon 1.166399°

Date
Tuesday 09 December 2025

Weather
Cloudy
Temp: 10°C

0700 - 1000 (Weekday AM Peak)

TIME	Movement 1.9: Right from Bekesbourne Lane to A257 High Street (East)								Original Data	
	P/CYCLE	M/CYCLE	CAR	TAXI	LGV	OGV1	OGV2	BUS/COACH	TOTAL	PCU TOTAL
0700 - 0715	0	0	22	0	5	0	0	0	27	27.00
0715 - 0730	0	0	22	0	9	0	0	0	31	31.00
0730 - 0745	0	0	32	0	4	0	0	0	36	36.00
0745 - 0800	0	0	23	0	10	0	0	0	33	33.00
Hourly Total	0	0	99	0	28	0	0	0	127	127.00
Hourly Average	0.00	0.00	24.75	0.00	7.00	0.00	0.00	0.00	31.75	31.75
0800 - 0815	0	0	33	1	5	0	0	0	39	39.00
0815 - 0830	0	0	28	0	7	0	0	0	35	35.00
0830 - 0845	0	0	25	0	7	0	0	0	32	32.00
0845 - 0900	0	0	20	0	9	0	0	0	29	29.00
Hourly Total	0	0	106	1	28	0	0	0	135	135.00
Hourly Average	0.00	0.00	26.50	0.25	7.00	0.00	0.00	0.00	33.75	33.75
0900 - 0915	0	0	28	0	7	0	0	0	35	35.00
0915 - 0930	0	0	22	0	4	0	0	0	26	26.00
0930 - 0945	0	0	11	0	6	2	0	0	19	20.00
0945 - 1000	0	0	14	0	4	1	0	0	19	19.50
Hourly Total	0	0	75	0	21	3	0	0	99	100.50
Hourly Average	0.00	0.00	18.75	0.00	5.25	0.75	0.00	0.00	24.75	25.13
Session Total	0	0	280	1	77	3	0	0	361	362.50
Session Average	0.00	0.00	23.33	0.08	6.42	0.25	0.00	0.00	30.08	30.21

Date
Tuesday 09 December 2025

Weather
Cloudy
Temp: 12°C

1600 - 1900 (Weekday PM Peak)

TIME	Movement 1.9: Right from Bekesbourne Lane to A257 High Street (East)								Original Data	
	P/CYCLE	M/CYCLE	CAR	TAXI	LGV	OGV1	OGV2	BUS/COACH	TOTAL	PCU TOTAL
1600 - 1615	0	0	33	0	5	0	0	0	38	38.00
1615 - 1630	0	0	49	0	4	0	0	0	53	53.00
1630 - 1645	0	0	27	0	1	0	0	0	28	28.00
1645 - 1700	0	0	41	0	4	0	0	0	45	45.00
Hourly Total	0	0	150	0	14	0	0	0	164	164.00
Hourly Average	0.00	0.00	37.50	0.00	3.50	0.00	0.00	0.00	41.00	41.00
1700 - 1715	0	0	32	0	0	0	0	0	32	32.00
1715 - 1730	0	0	42	0	1	0	0	0	43	43.00
1730 - 1745	0	0	52	0	4	0	0	0	56	56.00
1745 - 1800	0	0	31	0	4	0	0	0	35	35.00
Hourly Total	0	0	157	0	9	0	0	0	166	166.00
Hourly Average	0.00	0.00	39.25	0.00	2.25	0.00	0.00	0.00	41.50	41.50
1800 - 1815	0	0	23	0	3	0	0	0	26	26.00
1815 - 1830	0	1	32	0	4	0	0	0	37	36.40
1830 - 1845	0	0	33	0	2	0	0	0	35	35.00
1845 - 1900	0	0	30	0	0	0	0	0	30	30.00
Hourly Total	0	1	118	0	9	0	0	0	128	127.40
Hourly Average	0.00	0.25	29.50	0.00	2.25	0.00	0.00	0.00	32.00	31.85
Session Total	0	1	425	0	32	0	0	0	458	457.40
Session Average	0.00	0.08	35.42	0.00	2.67	0.00	0.00	0.00	38.17	38.12

Littlebourne, Kent
Classified Junction Count

Site 1 of 1
Nargate Street
A257 High Street (East)
Bekesbourne Lane
A257 High Street (West)

Lat/Long
lat 51.272796° lon 1.166399°

Date
Tuesday 09 December 2025

Weather
Cloudy
Temp: 10°C

0700 - 1000 (Weekday AM Peak)

TIME	Movement 1.10: Left from A257 High Street (West) to Nargate Street								Original Data	
	P/CYCLE	M/CYCLE	CAR	TAXI	LGV	OGV1	OGV2	BUS/COACH	TOTAL	PCU TOTAL
0700 - 0715	0	0	1	0	0	0	0	0	1	1.00
0715 - 0730	0	0	6	0	0	0	0	0	6	6.00
0730 - 0745	0	0	2	0	1	0	0	0	3	3.00
0745 - 0800	0	0	5	0	0	0	0	0	5	5.00
Hourly Total	0	0	14	0	1	0	0	0	15	15.00
Hourly Average	0.00	0.00	3.50	0.00	0.25	0.00	0.00	0.00	3.75	3.75
0800 - 0815	1	0	3	0	0	0	0	0	4	3.20
0815 - 0830	0	0	6	0	1	0	0	0	7	7.00
0830 - 0845	0	0	8	0	0	0	0	0	8	8.00
0845 - 0900	0	0	8	0	0	0	0	0	8	8.00
Hourly Total	1	0	25	0	1	0	0	0	27	26.20
Hourly Average	0.25	0.00	6.25	0.00	0.25	0.00	0.00	0.00	6.75	6.55
0900 - 0915	0	0	2	0	0	0	0	0	2	2.00
0915 - 0930	0	0	2	0	2	0	0	0	4	4.00
0930 - 0945	0	0	4	0	0	0	0	1	5	6.00
0945 - 1000	0	0	3	0	3	0	0	0	6	6.00
Hourly Total	0	0	11	0	5	0	0	1	17	18.00
Hourly Average	0.00	0.00	2.75	0.00	1.25	0.00	0.00	0.25	4.25	4.50
Session Total	1	0	50	0	7	0	0	1	59	59.20
Session Average	0.08	0.00	4.17	0.00	0.58	0.00	0.00	0.08	4.92	4.93

Date
Tuesday 09 December 2025

Weather
Cloudy
Temp: 12°C

1600 - 1900 (Weekday PM Peak)

TIME	Movement 1.10: Left from A257 High Street (West) to Nargate Street								Original Data	
	P/CYCLE	M/CYCLE	CAR	TAXI	LGV	OGV1	OGV2	BUS/COACH	TOTAL	PCU TOTAL
1600 - 1615	0	0	11	0	0	0	0	0	11	11.00
1615 - 1630	0	0	12	0	0	0	0	0	12	12.00
1630 - 1645	0	0	13	0	0	0	0	1	14	15.00
1645 - 1700	0	0	9	0	1	0	0	0	10	10.00
Hourly Total	0	0	45	0	1	0	0	1	47	48.00
Hourly Average	0.00	0.00	11.25	0.00	0.25	0.00	0.00	0.25	11.75	12.00
1700 - 1715	0	0	7	0	0	0	0	0	7	7.00
1715 - 1730	0	0	6	0	1	0	0	0	7	7.00
1730 - 1745	0	0	6	0	0	0	0	0	6	6.00
1745 - 1800	0	0	7	0	0	0	0	0	7	7.00
Hourly Total	0	0	26	0	1	0	0	0	27	27.00
Hourly Average	0.00	0.00	6.50	0.00	0.25	0.00	0.00	0.00	6.75	6.75
1800 - 1815	0	0	4	0	0	0	0	0	4	4.00
1815 - 1830	0	0	4	0	0	0	0	0	4	4.00
1830 - 1845	0	0	1	0	0	0	0	0	1	1.00
1845 - 1900	0	0	4	0	0	0	0	0	4	4.00
Hourly Total	0	0	13	0	0	0	0	0	13	13.00
Hourly Average	0.00	0.00	3.25	0.00	0.00	0.00	0.00	0.00	3.25	3.25
Session Total	0	0	84	0	2	0	0	1	87	88.00
Session Average	0.00	0.00	7.00	0.00	0.17	0.00	0.00	0.08	7.25	7.33

Littlebourne, Kent
Classified Junction Count

Site 1 of 1
Nargate Street
A257 High Street (East)
Bekesbourne Lane
A257 High Street (West)

Lat/Long
lat 51.272796° lon 1.166399°

Date
Tuesday 09 December 2025

Weather
Cloudy
Temp: 10°C

0700 - 1000 (Weekday AM Peak)

TIME	Movement 1.11: Eastbound from A257 High Street (West) to A257 High Street (East)								Original Data	
	P/CYCLE	M/CYCLE	CAR	TAXI	LGV	OGV1	OGV2	BUS/COACH	TOTAL	PCU TOTAL
0700 - 0715	0	0	23	0	1	0	0	1	25	26.00
0715 - 0730	0	1	42	0	6	0	0	0	49	48.40
0730 - 0745	0	0	32	0	13	0	0	2	47	49.00
0745 - 0800	0	0	37	2	5	0	0	0	44	44.00
Hourly Total	0	1	134	2	25	0	0	3	165	167.40
Hourly Average	0.00	0.25	33.50	0.50	6.25	0.00	0.00	0.75	41.25	41.85
0800 - 0815	0	0	34	1	8	0	0	1	44	45.00
0815 - 0830	0	0	43	0	6	0	0	0	49	49.00
0830 - 0845	0	0	39	1	9	1	0	0	50	50.50
0845 - 0900	0	0	39	1	6	1	0	1	48	49.50
Hourly Total	0	0	155	3	29	2	0	2	191	194.00
Hourly Average	0.00	0.00	38.75	0.75	7.25	0.50	0.00	0.50	47.75	48.50
0900 - 0915	0	0	28	1	5	0	0	1	35	36.00
0915 - 0930	0	0	31	1	5	0	0	1	38	39.00
0930 - 0945	0	0	26	2	16	0	0	0	44	44.00
0945 - 1000	0	0	18	2	11	0	1	1	33	35.30
Hourly Total	0	0	103	6	37	0	1	3	150	154.30
Hourly Average	0.00	0.00	25.75	1.50	9.25	0.00	0.25	0.75	37.50	38.58
Session Total	0	1	392	11	91	2	1	8	506	515.70
Session Average	0.00	0.08	32.67	0.92	7.58	0.17	0.08	0.67	42.17	42.98

Date
Tuesday 09 December 2025

Weather
Cloudy
Temp: 12°C

1600 - 1900 (Weekday PM Peak)

TIME	Movement 1.11: Eastbound from A257 High Street (West) to A257 High Street (East)								Original Data	
	P/CYCLE	M/CYCLE	CAR	TAXI	LGV	OGV1	OGV2	BUS/COACH	TOTAL	PCU TOTAL
1600 - 1615	1	0	61	0	8	0	0	0	70	69.20
1615 - 1630	0	0	53	0	4	1	0	1	59	60.50
1630 - 1645	0	0	53	0	4	0	0	2	59	61.00
1645 - 1700	0	1	58	0	3	0	0	0	62	61.40
Hourly Total	1	1	225	0	19	1	0	3	250	252.10
Hourly Average	0.25	0.25	56.25	0.00	4.75	0.25	0.00	0.75	62.50	63.03
1700 - 1715	0	0	53	0	3	1	1	0	58	59.80
1715 - 1730	0	2	65	0	4	0	0	3	74	75.80
1730 - 1745	0	1	42	0	2	0	0	0	45	44.40
1745 - 1800	0	0	46	1	2	0	0	0	49	49.00
Hourly Total	0	3	206	1	11	1	1	3	226	229.00
Hourly Average	0.00	0.75	51.50	0.25	2.75	0.25	0.25	0.75	56.50	57.25
1800 - 1815	0	0	41	0	5	0	0	0	46	46.00
1815 - 1830	0	1	50	0	4	0	0	1	56	56.40
1830 - 1845	0	0	46	0	4	0	0	1	51	52.00
1845 - 1900	0	0	36	0	0	0	0	0	36	36.00
Hourly Total	0	1	173	0	13	0	0	2	189	190.40
Hourly Average	0.00	0.25	43.25	0.00	3.25	0.00	0.00	0.50	47.25	47.60
Session Total	1	5	604	1	43	2	1	8	665	671.50
Session Average	0.08	0.42	50.33	0.08	3.58	0.17	0.08	0.67	55.42	55.96

Littlebourne, Kent
Classified Junction Count

Site 1 of 1
Nargate Street
A257 High Street (East)
Bekesbourne Lane
A257 High Street (West)

Lat/Long
lat 51.272796° lon 1.166399°

Date
Tuesday 09 December 2025

Weather
Cloudy
Temp: 10°C

0700 - 1000 (Weekday AM Peak)

TIME	Movement 1.12: Right from A257 High Street (West) to Bekesbourne Lane								Original Data	
	P/CYCLE	M/CYCLE	CAR	TAXI	LGV	OGV1	OGV2	BUS/COACH	TOTAL	PCU TOTAL
0700 - 0715	0	0	4	0	1	0	0	0	5	5.00
0715 - 0730	0	0	9	0	3	0	0	0	12	12.00
0730 - 0745	0	0	13	0	3	0	0	0	16	16.00
0745 - 0800	0	0	16	1	2	0	0	0	19	19.00
Hourly Total	0	0	42	1	9	0	0	0	52	52.00
Hourly Average	0.00	0.00	10.50	0.25	2.25	0.00	0.00	0.00	13.00	13.00
0800 - 0815	0	0	19	0	1	0	0	0	20	20.00
0815 - 0830	0	0	17	0	5	0	0	0	22	22.00
0830 - 0845	0	0	12	0	1	0	0	0	13	13.00
0845 - 0900	0	0	12	0	2	0	0	0	14	14.00
Hourly Total	0	0	60	0	9	0	0	0	69	69.00
Hourly Average	0.00	0.00	15.00	0.00	2.25	0.00	0.00	0.00	17.25	17.25
0900 - 0915	0	0	7	0	2	0	0	0	9	9.00
0915 - 0930	0	0	8	0	2	0	0	0	10	10.00
0930 - 0945	0	0	10	0	0	0	0	0	10	10.00
0945 - 1000	0	0	4	0	1	1	0	0	6	6.50
Hourly Total	0	0	29	0	5	1	0	0	35	35.50
Hourly Average	0.00	0.00	7.25	0.00	1.25	0.25	0.00	0.00	8.75	8.88
Session Total	0	0	131	1	23	1	0	0	156	156.50
Session Average	0.00	0.00	10.92	0.08	1.92	0.08	0.00	0.00	13.00	13.04

Date
Tuesday 09 December 2025

Weather
Cloudy
Temp: 12°C

1600 - 1900 (Weekday PM Peak)

TIME	Movement 1.12: Right from A257 High Street (West) to Bekesbourne Lane								Original Data	
	P/CYCLE	M/CYCLE	CAR	TAXI	LGV	OGV1	OGV2	BUS/COACH	TOTAL	PCU TOTAL
1600 - 1615	0	0	6	0	0	0	0	0	6	6.00
1615 - 1630	0	0	3	0	0	0	0	0	3	3.00
1630 - 1645	0	0	14	0	1	0	0	0	15	15.00
1645 - 1700	0	0	9	0	0	0	0	0	9	9.00
Hourly Total	0	0	32	0	1	0	0	0	33	33.00
Hourly Average	0.00	0.00	8.00	0.00	0.25	0.00	0.00	0.00	8.25	8.25
1700 - 1715	0	0	5	0	1	0	0	0	6	6.00
1715 - 1730	0	0	4	0	1	0	0	0	5	5.00
1730 - 1745	0	0	7	0	0	0	0	0	7	7.00
1745 - 1800	2	0	6	0	1	0	0	0	9	7.40
Hourly Total	2	0	22	0	3	0	0	0	27	25.40
Hourly Average	0.50	0.00	5.50	0.00	0.75	0.00	0.00	0.00	6.75	6.35
1800 - 1815	0	0	5	1	0	0	0	0	6	6.00
1815 - 1830	0	0	2	0	0	0	0	0	2	2.00
1830 - 1845	0	0	4	0	0	0	0	0	4	4.00
1845 - 1900	0	0	5	0	0	0	0	0	5	5.00
Hourly Total	0	0	16	1	0	0	0	0	17	17.00
Hourly Average	0.00	0.00	4.00	0.25	0.00	0.00	0.00	0.00	4.25	4.25
Session Total	2	0	70	1	4	0	0	0	77	75.40
Session Average	0.17	0.00	5.83	0.08	0.33	0.00	0.00	0.00	6.42	6.28

APPENDIX D. Extracts from DfT's Inclusive Mobility



Department
for Transport

Inclusive Mobility

A Guide to Best Practice on Access to
Pedestrian and Transport Infrastructure

December 2021

An easy way of judging whether there is good contrast is to take a black and white photograph of the scene or a black and white photocopy of a colour photograph. Good contrast will show up black and white, poor contrast will show up as grey.

4.2 Width and height clearance

Footways and footpaths should be made as wide as is practicable, but under normal circumstances, a width of **2000mm** is the minimum that should be provided, as this allows enough space for two wheelchair users to pass, even if they are using larger electric mobility scooters. If this is not feasible due to physical constraints, then a minimum width of **1500mm** could be regarded as the minimum acceptable under most circumstances, as this should enable a wheelchair user and a walker to pass each other. Where there is an obstacle, such as lamp columns, sign posts or electric vehicle charging points, the absolute minimum width should be **1000mm**, but the maximum length of such a restricted space should be **6 metres**.

Unobstructed height above a pedestrian way is also important, especially for vision impaired people. Generally, this should be a minimum of **2300mm**, except on sub-surface station platforms, where it should be **3000mm**. Where a sign is suspended over a footway or pedestrian area, for example in a railway station, a minimum clearance of **2100mm** is acceptable (**2300mm** on cycleways). Signs should be placed at a height that is appropriate for those for whom the message is intended. For example, signs for cyclists should be placed at a height that makes them legible from a good distance, but they should also be legible for recumbent cyclists.

Where trees overhang a footway, the management of them, covered by Forestry Commission Operations Note 051 Highway Tree Management (available on GOV.UK), should ensure the maintenance of a minimum of 2300mm unobstructed height above the pedestrian way. The specific approach and height of pruning to ensure this is maintained after regrowth will need to be carried out to appropriate arboriculture standards, taking into consideration the tree species and how they respond to targeted pruning, avoiding clearance issues that can arise if branches regrow rapidly.

Tapering overhead obstructions, such as a flight of steps with an open area underneath, can constitute a particularly dangerous hazard for many,

APPENDIX E. Correspondence with KCC regarding
Puffin Crossing Capacity

Jon Wilkinson

From: Jon Wilkinson
Sent: 06 November 2023 14:48
To: Fiona.Wiles@kent.gov.uk; Paul.Thrower@kent.gov.uk; luke.mockridge@kent.gov.uk
Cc: andrew.gambrill@canterbury.gov.uk; Steve Barker; Victoria Richardson; Christien Lee; Vanessa Eggleston
Subject: RE: Land South of the Hill, Littlebourne (CA/23/00484)
Attachments: ITM16283-GA-022C.pdf; A257 The Hill Pedestrian Crossing.pdf; Client Results - 10047 - Canterbury ATC.pdf

Hi Fiona,

Thank you very much for your time last week to go through your requirements for the proposed signal controlled pedestrian crossing at The Hill, Littlebourne.

As discussed, we have amended the pedestrian crossing to include (i-Transport drawing ITM16283-GA-022 Rev C, attached):

- widening of the crossing to 3.2m.
- retained 3.0m between crossing and stoplines.
- providing 8 zig-zags on either side of the crossing.
- signal controller box provided within highway land with additional space around the crossing. Where it falls outside of the current adopted highway boundary, the land will be dedicated as highway.

We have carried out an assessment of the operation of the pedestrian crossing to determine if queuing to the west of the pedestrian crossing would impact on the existing build-out opposite the site access. The distance between the stop line and buildout is 25.6m (or over 4 vehicles in length). The traffic flows used the agreed 2045 Base + Committed + Development, including the reassignment of traffic flows between The Hill and Bekesbourne Lane. Our assessment has used a robust analysis with the pedestrian crossing called every minute in the peak hours. The operational assessment results in a maximum queue to the west of the pedestrian crossing of 3.5 vehicles (or c.20m in length), which can therefore be accommodated between the pedestrian crossing and existing build-out. The full LinSig model results are attached.

I have attached the ATC carried out on The Hill, as discussed, which sets out the speeds recorded on The Hill in the vicinity of the proposed signal controlled crossing.

As discussed in our meeting, the forward visibility splays are shown to the primary signal heads, with no changes necessary.

In terms of the street lighting we understand that new street lighting will be needed and to be provided in accordance with appropriate national guidance, with the existing lighting removed and returned to CCC. As discussed the need for appropriately designed street lighting design can be included as planning condition and form part of the in the S278 works, with no further design work needed at this time. Any new street lighting would only be required for the site access and the signal controlled pedestrian crossing.

Please can you confirm that you are satisfied with this arrangement for the signal controlled pedestrian crossing as part of this outline planning application. If you are satisfied we will arrange a Road Safety Audit to be carried out and associated Design Team Response (if required).

We trust you will find the above and attached satisfactory. If there are any queries, please do not hesitate to contact us.

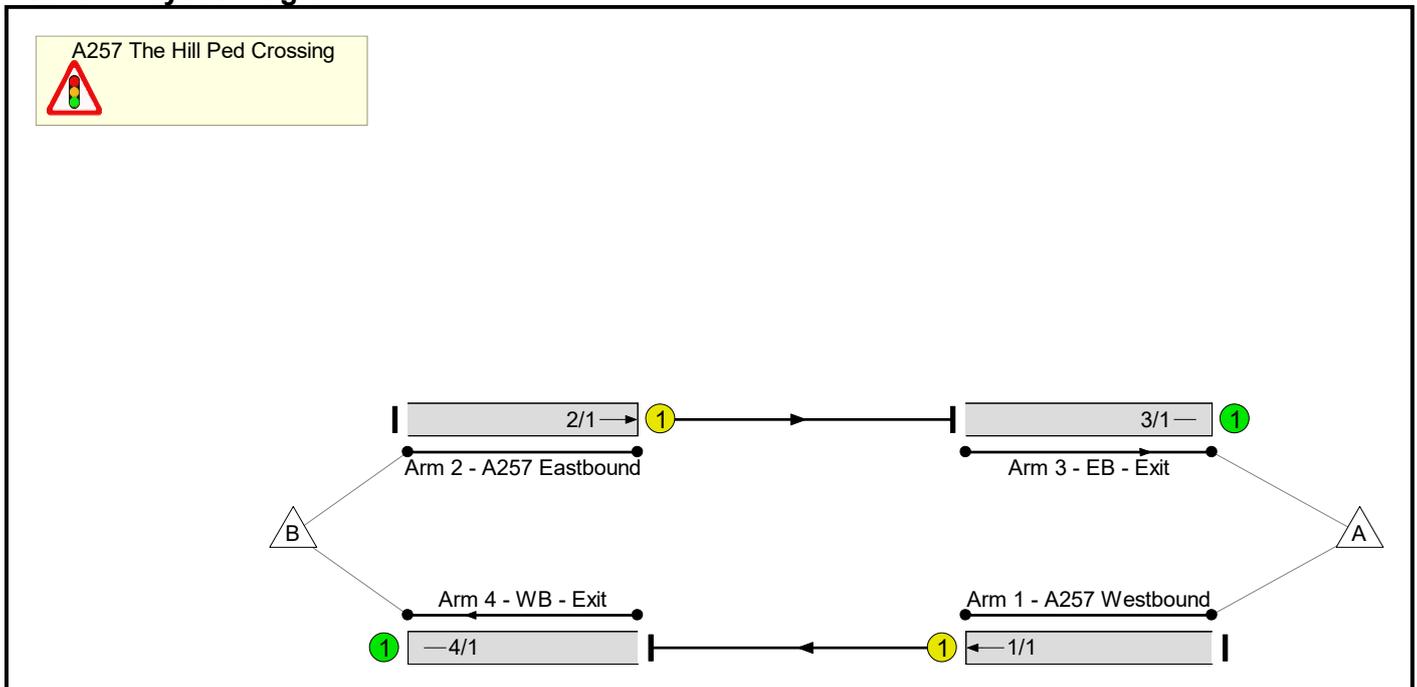
Regards

Full Input Data And Results
Full Input Data And Results

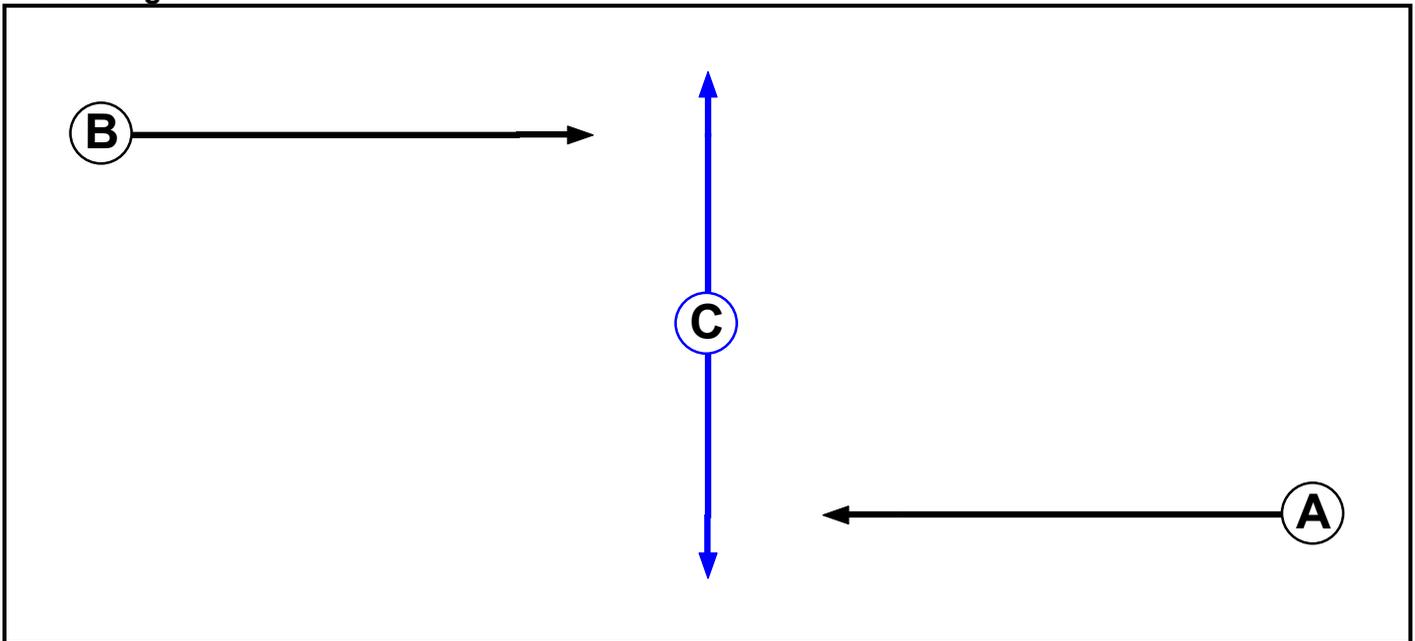
User and Project Details

Project:	Littlebourne
Title:	A257 The Hill Pedestrian Crossing
Location:	
Client:	Gladman
Date Started:	02.11.2023
Additional detail:	
File name:	A257 The Hill Pedestrian Crossing.lsg3x
Author:	Jon Wilkinson
Company:	i-Transport
Address:	Manchester

Network Layout Diagram



Phase Diagram



Phase Input Data

Phase Name	Phase Type	Assoc. Phase	Street Min	Cont Min
A	Traffic		7	7
B	Traffic		7	7
C	Pedestrian		7	7

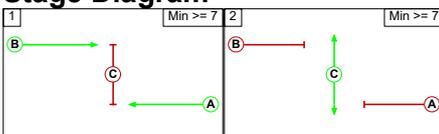
Phase Intergreens Matrix

	Starting Phase			
	A	B	C	
Terminating Phase	A	-	5	
	B	-	5	
	C	7	7	

Phases in Stage

Stage No.	Phases in Stage
1	A B
2	C

Stage Diagram



Phase Delays

Term. Stage	Start Stage	Phase	Type	Value	Cont value
There are no Phase Delays defined					

Full Input Data And Results

Prohibited Stage Change

From Stage	To Stage	
	1	2
1	5	
2		7

Full Input Data And Results

Give-Way Lane Input Data

Junction: A257 The Hill Ped Crossing

There are no Opposed Lanes in this Junction

Full Input Data And Results

Lane Input Data

Junction: A257 The Hill Ped Crossing												
Lane	Lane Type	Phases	Start Disp.	End Disp.	Physical Length (PCU)	Sat Flow Type	Def User Saturation Flow (PCU/Hr)	Lane Width (m)	Gradient	Nearside Lane	Turns	Turning Radius (m)
1/1 (A257 Westbound)	U	A	2	3	60.0	Geom	-	3.00	0.00	Y	Arm 4 Ahead	Inf
2/1 (A257 Eastbound)	U	B	2	3	60.0	Geom	-	3.00	0.00	Y	Arm 3 Ahead	Inf
3/1 (EB - Exit)	U		2	3	60.0	Inf	-	-	-	-	-	-
4/1 (WB - Exit)	U		2	3	60.0	Inf	-	-	-	-	-	-

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
1: '2045 B+C+D AM'	08:00	09:00	01:00	
2: '2045 B+C+D PM'	17:00	18:00	01:00	

Scenario 1: '2045 B+C+D AM' (FG1: '2045 B+C+D AM', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

	Destination			
		A	B	Tot.
Origin	A	0	662	662
	B	480	0	480
	Tot.	480	662	1142

Traffic Lane Flows

Lane	Scenario 1: 2045 B+C+D AM
Junction: A257 The Hill Ped Crossing	
1/1	662
2/1	480
3/1	480
4/1	662

Full Input Data And Results

Lane Saturation Flows

Junction: A257 The Hill Ped Crossing								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (A257 Westbound)	3.00	0.00	Y	Arm 4 Ahead	Inf	100.0 %	1915	1915
2/1 (A257 Eastbound)	3.00	0.00	Y	Arm 3 Ahead	Inf	100.0 %	1915	1915
3/1 (EB - Exit Lane 1)	Infinite Saturation Flow						Inf	Inf
4/1 (WB - Exit Lane 1)	Infinite Saturation Flow						Inf	Inf

Scenario 2: '2045 B+C+D PM' (FG2: '2045 B+C+D PM', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

	Destination			
		A	B	Tot.
Origin	A	0	451	451
	B	435	0	435
	Tot.	435	451	886

Traffic Lane Flows

Lane	Scenario 2: 2045 B+C+D PM
Junction: A257 The Hill Ped Crossing	
1/1	451
2/1	435
3/1	435
4/1	451

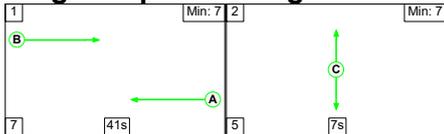
Lane Saturation Flows

Junction: A257 The Hill Ped Crossing								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (A257 Westbound)	3.00	0.00	Y	Arm 4 Ahead	Inf	100.0 %	1915	1915
2/1 (A257 Eastbound)	3.00	0.00	Y	Arm 3 Ahead	Inf	100.0 %	1915	1915
3/1 (EB - Exit Lane 1)	Infinite Saturation Flow						Inf	Inf
4/1 (WB - Exit Lane 1)	Infinite Saturation Flow						Inf	Inf

Full Input Data And Results

Scenario 1: '2045 B+C+D AM' (FG1: '2045 B+C+D AM', Plan 1: 'Network Control Plan 1')

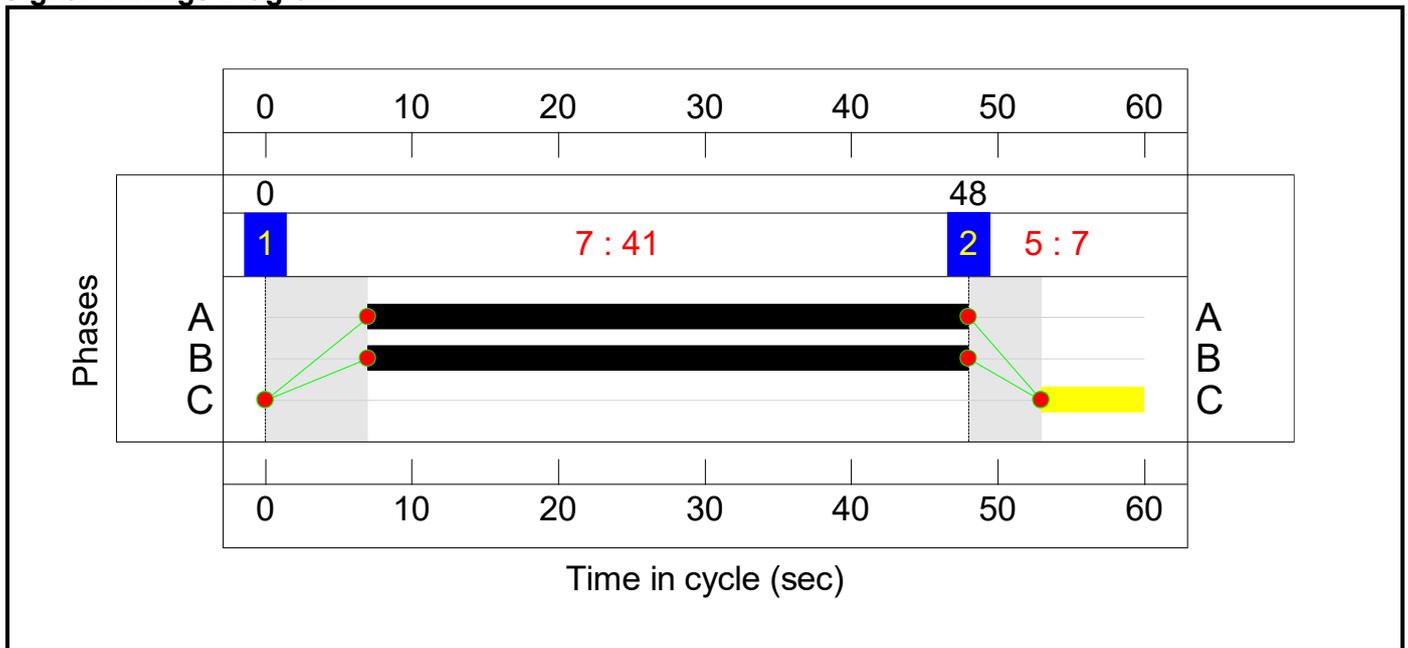
Stage Sequence Diagram



Stage Timings

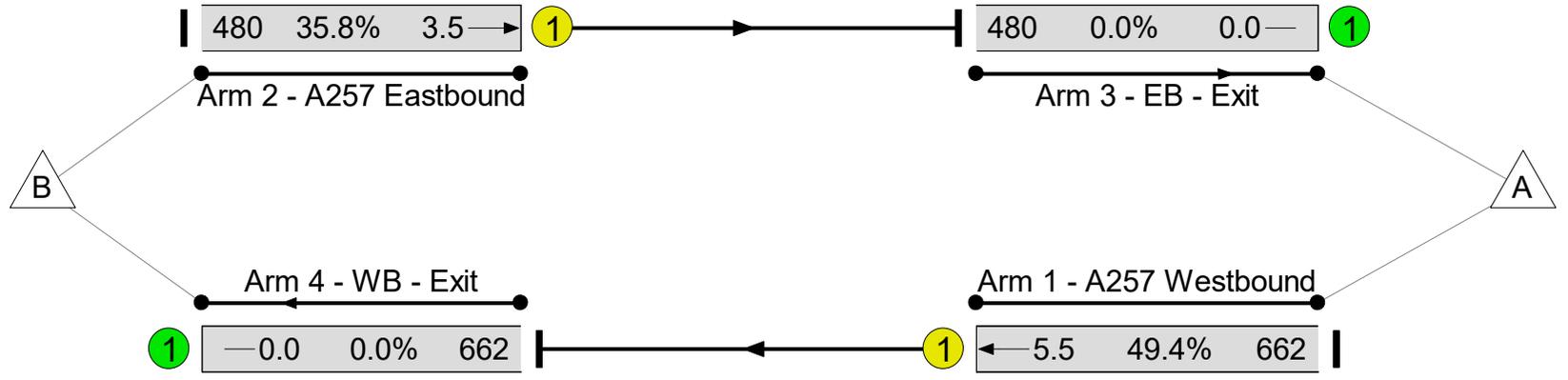
Stage	1	2
Duration	41	7
Change Point	0	48

Signal Timings Diagram



Network Layout Diagram

A257 The Hill Ped Crossing
PRC: 82.2 %
Total Traffic Delay: 2.0 pcuHr



Full Input Data And Results

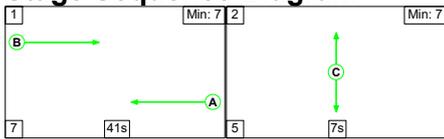
Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: A257 The Hill Pedestrian Crossing	-	-	N/A	-	-		-	-	-	-	-	-	49.4%
A257 The Hill Ped Crossing	-	-	N/A	-	-		-	-	-	-	-	-	49.4%
1/1	A257 Westbound Ahead	U	N/A	N/A	A		1	41	-	662	1915	1340	49.4%
2/1	A257 Eastbound Ahead	U	N/A	N/A	B		1	41	-	480	1915	1340	35.8%
3/1	EB - Exit	U	N/A	N/A	-		-	-	-	480	Inf	Inf	0.0%
4/1	WB - Exit	U	N/A	N/A	-		-	-	-	662	Inf	Inf	0.0%
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: A257 The Hill Pedestrian Crossing	-	-	0	0	0	1.2	0.8	0.0	2.0	-	-	-	-
A257 The Hill Ped Crossing	-	-	0	0	0	1.2	0.8	0.0	2.0	-	-	-	-
1/1	662	662	-	-	-	0.8	0.5	-	1.2	6.8	5.0	0.5	5.5
2/1	480	480	-	-	-	0.5	0.3	-	0.8	5.7	3.2	0.3	3.5
3/1	480	480	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
4/1	662	662	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
C1 PRC for Signalled Lanes (%): 82.2 Total Delay for Signalled Lanes (pcuHr): 2.01 Cycle Time (s): 60 PRC Over All Lanes (%): 82.2 Total Delay Over All Lanes(pcuHr): 2.01													

Full Input Data And Results

Scenario 2: '2045 B+C+D PM' (FG2: '2045 B+C+D PM', Plan 1: 'Network Control Plan 1')

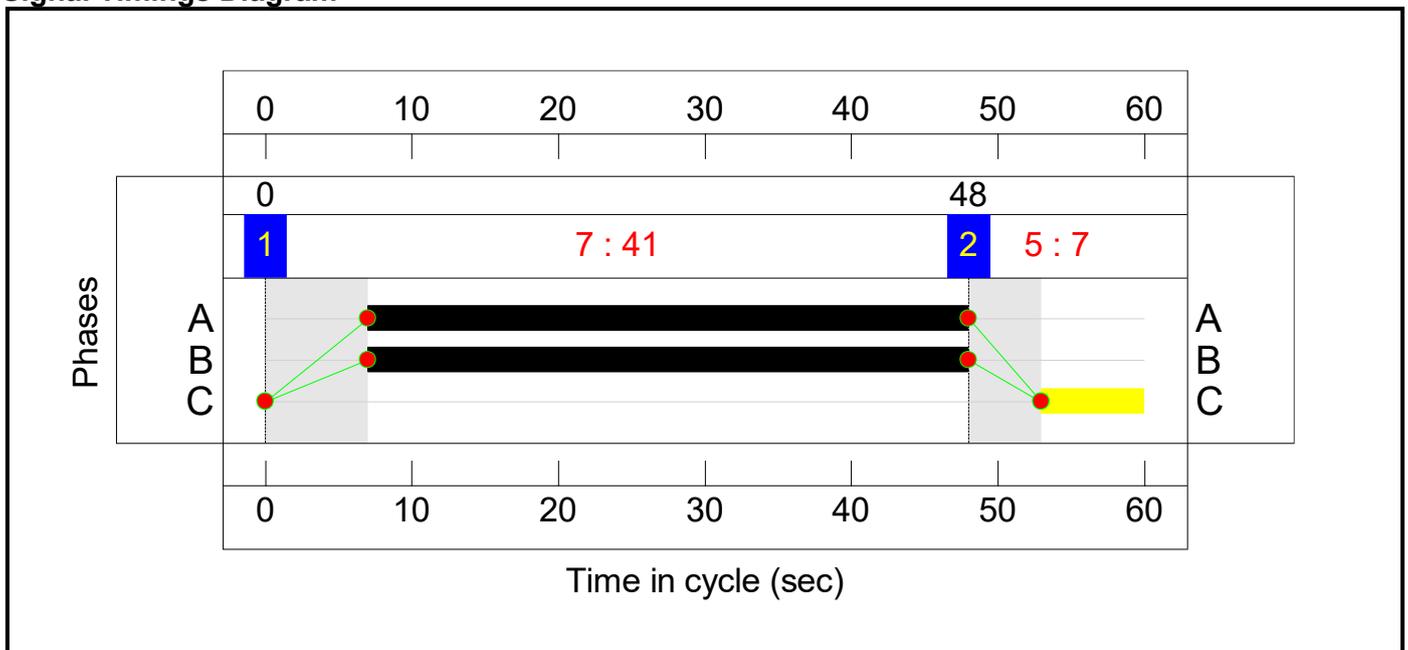
Stage Sequence Diagram



Stage Timings

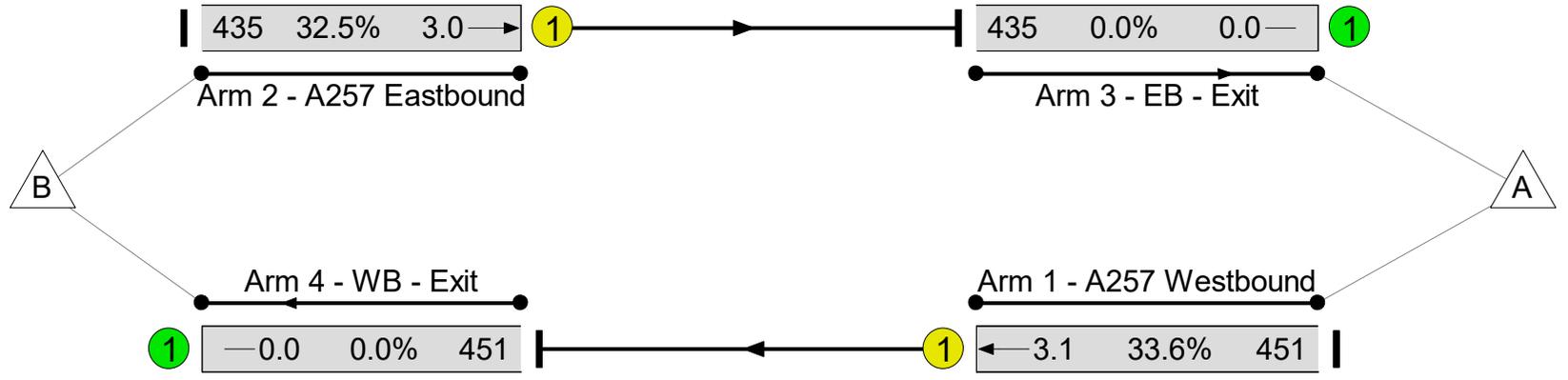
Stage	1	2
Duration	41	7
Change Point	0	48

Signal Timings Diagram



Network Layout Diagram

A257 The Hill Ped Crossing
PRC: 167.5 %
Total Traffic Delay: 1.4 pcuHr



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: A257 The Hill Pedestrian Crossing	-	-	N/A	-	-		-	-	-	-	-	-	33.6%
A257 The Hill Ped Crossing	-	-	N/A	-	-		-	-	-	-	-	-	33.6%
1/1	A257 Westbound Ahead	U	N/A	N/A	A		1	41	-	451	1915	1340	33.6%
2/1	A257 Eastbound Ahead	U	N/A	N/A	B		1	41	-	435	1915	1340	32.5%
3/1	EB - Exit	U	N/A	N/A	-		-	-	-	435	Inf	Inf	0.0%
4/1	WB - Exit	U	N/A	N/A	-		-	-	-	451	Inf	Inf	0.0%
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: A257 The Hill Pedestrian Crossing	-	-	0	0	0	0.9	0.5	0.0	1.4	-	-	-	-
A257 The Hill Ped Crossing	-	-	0	0	0	0.9	0.5	0.0	1.4	-	-	-	-
1/1	451	451	-	-	-	0.4	0.3	-	0.7	5.6	2.9	0.3	3.1
2/1	435	435	-	-	-	0.4	0.2	-	0.7	5.5	2.8	0.2	3.0
3/1	435	435	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
4/1	451	451	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
<p>C1 PRC for Signalled Lanes (%): 167.5 Total Delay for Signalled Lanes (pcuHr): 1.36 Cycle Time (s): 60 PRC Over All Lanes (%): 167.5 Total Delay Over All Lanes(pcuHr): 1.36</p>													

APPENDIX F. Littlebourne Parish Council Response
to the Appeal



ADDITIONAL EVIDENCE-BASED ARGUMENTS AGAINST GLADMAN DEVELOPMENTS' PROPOSAL TO BUILD 300 HOUSES BESIDE LITTLEBOURNE

This development is demonstrably not sustainable and the planning permission appeal should be refused

The plan would create an isolated enclave with no safe pedestrian access. It will fail to promote social interaction

It will add severe pressure to already stressed local infrastructure – particularly traffic on narrow lanes and the A257 junctions

It increases the volume of traffic, increases dangers to pedestrians & cyclists and offers no infrastructure improvements

Bekesbourne Lane is already under severe transport pressure as a shortcut around Canterbury

Bekesbourne Lane is too narrow for legal overtaking of bicycles within Highway Code rules. This development cannot offer sustainable transport options

The Traffic Assessment supplied by the developer is so inaccurate that it is not a sound basis for Planning decisions

Sewerage connection will likely take many years – Southern Water is loss-making and has over £6 billion in debt. It has other capex priorities to supply existing customers before connecting new ones

Specific additional regulatory issues raised in this paper:

- NPPF 8 - ***fails to promote social interaction***
- Disability Discrimination Act and the Disability Equality Duty – ***inadequate pedestrian provision discriminates against disabled people***
- Highway Code Rule 163 – ***Overtaking bicycles or pedestrians on Bekesbourne Lane is impossible without breaking the law***
- Breach of 3.2, The Kent Downs Area of Outstanding Natural Beauty Rural Streets and Lanes: A Design Handbook, adopted as part of the CDLP - ***walking and cycling are essential modes of transport in rural areas but inhibited by fear from speeding traffic***
- ***Lost connection between National Cycle Route 1 and routes 16 and 17***
- TRICs data: three hundred new houses could generate 4.2 trips (arrivals and departures) per dwelling per day. ***This suggests an additional 1,256 vehicle movements per day onto either The Hill or Bekesbourne Lane***
- CDLP T16 Rural Lanes - ***increased traffic volume reduces the amenity value of Bekesbourne Lane***
- NPPF 116 – severe impact of residual cumulative safety impacts on the A257 / Bekesbourne Lane junction suggests ***development should be refused on highways grounds***
- NPPF 116 – severe impact of congestion on the A257 / The Hill site exit junction suggests ***development should be refused on highways grounds***
- Water Industry Act 1991 ‘right to connect’ duty conflicts with legal and regulatory duty to existing customers. Southern Water condition to phase occupation with delivery of network reinforcement indicates ***conflicting regulatory pressures*** and likely lack of delivery of connection before 2030 at the earliest.

Introduction

Canterbury City Council (CCC) Planning Committee has refused planning permission for the proposed development on several grounds related to the Canterbury District Local Plan 2017 (CDLP). The CDLP is a key consideration in the appeal process. According to the National Planning Policy Framework (NPPF):

*“Decision-makers at every level should seek to approve applications for sustainable development where possible. However, **the presumption in favour of sustainable development does not change the statutory status of the development plan** as the starting point for decision-making. **Where a planning application conflicts with an up-to-date development plan** (including any neighbourhood plans that form part of the development plan), **permission should not usually be granted.**”*

This document has been prepared by a resident of Littlebourne to present additional evidence-based arguments for consideration at the appeal against the refusal of planning permission.

A central issue in both the NPPF and the CDLP is whether the proposed development meets the criteria for “sustainable development.” This paper demonstrates that the development does not satisfy these requirements in several respects, particularly regarding provisions for walking and cycling, community safety, and the impact on local highways.

The developer has submitted data intended to support the sustainability of the proposal. However, if the traffic data is accepted as presented, it indicates severe impacts on the local highways, which may be inconsistent with NPPF 116. The data includes traffic flow estimates that appear unrealistic and may not accurately reflect the potential effects of increased traffic on Bekesbourne Lane and Nargate Street. Additionally, the assessment does not fully address the risks to cyclists and pedestrians, especially those with disabilities or young children.

The Transport Plan and Traffic Assessment provided by the developer contain projections that suggest, for example, that the nearby South Canterbury development (comprising 4,000 houses) would result in no additional traffic on Bekesbourne Lane, despite this being a direct route to East and North East Kent. Such findings raise questions about the reliability of the data as a basis for planning decisions.

The traffic forecasts lack detailed explanation, and it may be advisable to commission an independent traffic consultant to review the developer’s data and provide further analysis. Updated traffic data may also be necessary, as the current report is based on information from June 2022. In particular, the assumptions underlying the claimed benefits of diverting traffic through the site from the Bekesbourne Lane/A257 junction, which have been referenced by KCC Highways and Transportation, may require further examination.

The developer’s reliance on the statutory ‘right to connect’ to the sewerage system does not address Southern Water’s responses regarding a firm timeline for connection. Southern Water has not committed to connecting the development within its 2025–2030 plan, citing regulatory obligations to existing customers. Given Southern Water’s financial position (it has balance sheet debt of over £6 billion) and ongoing investment requirements, it may not be reasonable to assume that the necessary resources for connection will be available in the near term. This uncertainty may be relevant to the planning appeal.

The reasons for the refusal of planning permission by Canterbury City Council are listed in Appendix 1. This paper aims to support those reasons and provide further evidence-based arguments, focusing on the sustainability of the development and the financial and regulatory challenges faced by Southern Water.

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Sustainability

Failure to create a safe and inclusive community

NPPF 8, Promoting healthy and safe communities, states that planning decisions should aim to achieve inclusive and safe places which:

*“a) promote social interaction, including opportunities for meetings between people who might not otherwise come into contact with each other – for example through mixed-use developments, strong neighbourhood centres, street layouts **that allow for easy pedestrian and cycle connections within and between neighbourhoods**, and active street frontages;*

*b) are safe and accessible, so that crime and disorder, and the fear of crime, do not undermine the quality of life or community cohesion – for example **through the use of well-designed, clear and legible pedestrian and cycle routes**”*

The developer’s characterization of this housing development as ‘sustainable’ does not adequately consider the site’s context. The proposed site is effectively an isolated enclave, bordered by hedges and roads, with no pedestrian entrances or exits that avoid either crossing the busy A257 or walking along Bekesbourne Lane, which lacks pavements. Unlike previous post-war infill developments, which are typically integrated within the village and well connected (see maps at Appendix 3), this proposal would increase Littlebourne’s housing stock by 50%, placing significant strain on infrastructure that has not been upgraded since the village’s pre-war era.

Pedestrian access is particularly problematic. The proposed puffin crossing on the A257 would be the only safe pedestrian entry or exit point. However, the design does not sufficiently address the limitations of the existing paths and pavements beyond the crossing. For example, footpath CB143 is only 1.5 meters wide, and sections of the A257’s north-side pavement are frequently narrowed by parked cars, reducing them to single file. This raises concerns under the Disability Discrimination Act and the Disability Equality Duty, which require that new schemes be designed inclusively for all potential users. The current plans lack a comprehensive assessment of their impact on pedestrians, including those with disabilities, parents with pushchairs, and the elderly.

Additionally, the introduction of a new puffin crossing and associated traffic lights on this busy A road may have adverse effects on vehicle flow, yet these have not been fully considered or addressed in the proposal

Pressure on narrow road junction – The four-way junction of the A257 with Bekesbourne Lane and Nargate Street is inherently hazardous due to poor visibility and increasing traffic volumes. According to Kent County Council Highways and Transportation, the geometry of the junction and the lack of available land make meaningful improvements unfeasible.

While the National Planning Policy Framework (NPPF 116) sets a high threshold for refusing development on highways grounds, requiring evidence of an unacceptable or severe cumulative impact, current conditions at this junction already present significant safety risks for both pedestrians and road users. With no viable mitigation options and anticipated further increases in traffic, the proposed development would exacerbate these issues and further compromise safety.

Traffic jams on The Hill from site turning and puffin crossing – If the i-Transport figures are accepted, they show a severe level of congestion on the A257 The Hill at the proposed exit from the site. In their response to their KCC consultation of 12 September 2023, at Appendix 4.G, i-Transport show 2045 Base + Committed + Development Traffic Flows Westbound on The Hill, past the exit from the site, at a.m. peak 656 cars – one every 5.5 seconds. At this point there are traffic calming extensions into the Eastbound lane, making the road single track.

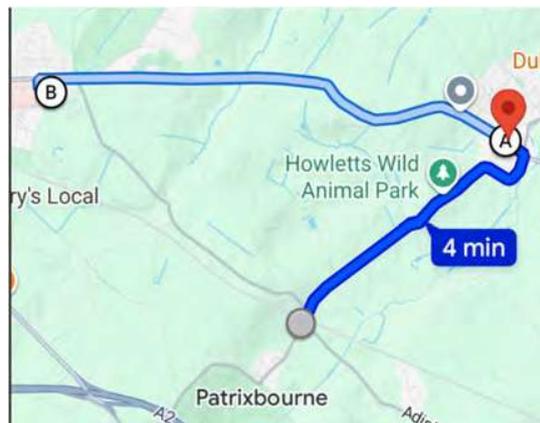
Across this Westbound stream of traffic, 154 cars will attempt to turn right, across the stream, into the site. Another 441 will attempt to carry on down The Hill Eastbound, in the single lane, giving way to the oncoming traffic. This is only after they have first waited for a gap in the Westbound traffic to go round the traffic calming by the Evenhill pub. 162 cars from the site will attempt to join the stream heading West. This is a required turn-rate into or out of the site every 11.4 seconds. However, as the only pedestrian route from the development across the A257, the puffin crossing red light a few meters to the East of the site junction will likely be activated many times in the peak hour, causing cars heading East to back-up in the single lane. When the light turns green, they will face a stream of cars coming West towards them in a part of the road East of the puffin crossing that is very narrow due to parked cars (about 4.5m wide). If one of these vehicles is a lorry, there will be no room to edge past.

At this point it is worth considering how a resident of the development may respond to traffic jams at the A257 exit. Instead they may use the Bekesbourne Lane exit and the Littlebourne junction.

Based on the i-Transport data, these traffic flows simply will not work and severe congestion will ensue. Therefore under NPPF 116, this development should be refused on highways grounds due to the severe residual cumulative impacts on the road network, taking into account all reasonable future scenarios.

Increase (not decrease) in junction traffic volume – some scepticism is warranted in accepting the calculations used to claim a reduction in traffic through the Bekesbourne Lane / Nargate Street / A257 junction (The Junction) – these are covered in the developer's Traffic Assessment at para 6.4. However, the case is made on the extrapolation of a limited traffic survey in June 2022. In particular it seems that an overestimate has been made in suggesting that the proposed link road through the site

would alleviate significant traffic from/to Bekesbourne (and points beyond)¹. The developer ignores the more direct route to Canterbury from Bekesbourne along Bekesbourne Hill (2.2 miles). Few drivers choose to drive along two sides of a triangle, along Bekesbourne Lane, through Littlebourne to Canterbury (4.4 miles), when there is a more direct route (see Map 1 Google Maps – Bekesbourne to Canterbury via Bekesbourne Hill 2.2 miles and Map 2 Google Maps – Bekesbourne to Canterbury via Bekesbourne Lane and Littlebourne 4.4 miles).



A proportion of the traffic turning left from Bekesbourne Lane does not head up The Hill towards Canterbury but turns down Nargate Street or Jubilee Road. However, the traffic assessment shows no cars making that turn (see Appendix 2). This is implausible and flies in the face of amateur observations of the traffic at the junction.

A false assumption (that significant traffic from Bekesbourne Lane is heading to Canterbury and that the proposed new link road through the site would significantly reduce the traffic using the junction) may have been relied on by CCC and KCC Highways and Transportation in making their assessment of the suitability of the scheme. This traffic diversion through the site to relieve the A257/ Bekesbourne Lane junction is put forward by the developer as the major benefit of the scheme to the local community and it seems wrong. Instead the proposed development would increase the amount of traffic considerably and put further pressure on already unsustainable village roads.

No consideration has been made to the link road in the development being closed to through traffic (or a Low Traffic Neighbourhood² (LTN) being imposed) in the future on

¹ It appears that the Streetwise traffic survey commissioned by the developer, only measured flows on three of the four roads at the junction, ignoring Nargate Street. This may have led to an assumption that all traffic turning left from Bekesbourne Lane went to Canterbury and thus would take the opportunity to avoid the junction and turn left earlier, through the development. In fact a significant proportion of traffic turning left from Bekesbourne Lane then turns right down Nargate Street. See Extract 1

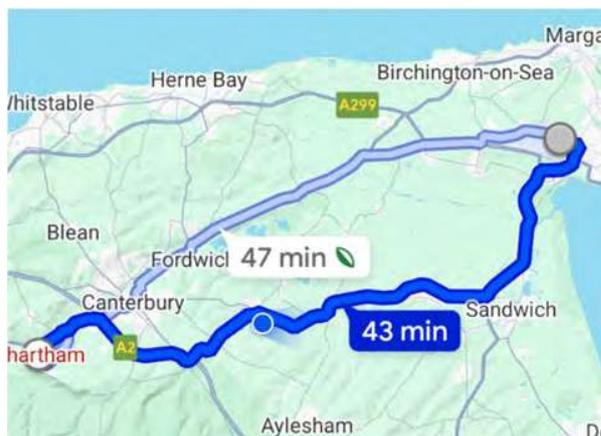
² In South London, traffic restrictions have been introduced as part of Low Traffic Neighbourhoods (LTNs). These schemes aim to reduce traffic congestion and improve air quality by closing residential streets to non-resident traffic.

safety or pollution grounds given the density of the development. Or alternatively, the section of Bekesbourne Lane in Littlebourne near the junction could be turned into an LTN, thereby funnelling nearly all traffic through the development.

‘Unofficial Canterbury bypass’ creates unsustainable traffic pressure -

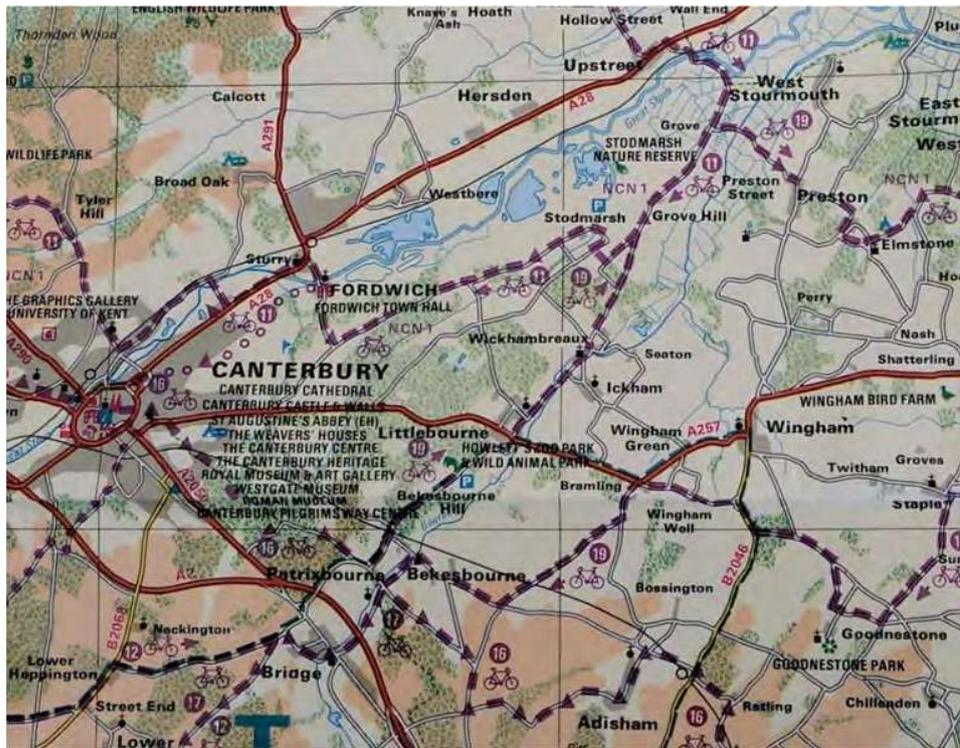
Bekesbourne Lane is already being used as an unofficial bypass around Canterbury and link-road from the A2 towards East and North East Kent. It is unsuitable for this purpose and the traffic volumes along it are already dangerous (particularly in rush hours) to cyclists and pedestrians who are obliged to share the narrow lane with vehicles – there are no pavements or cycle paths.

A vehicle journey to the East Kent coastal towns starting South of Canterbury on the A28 would use the A2 and then cut through to the A257 via Bekesbourne Lane and Littlebourne. As an example, Map 3 - Google Maps – Chartham to Manston.



Other journeys that might have gone through Canterbury are being forced along this route by congestion in the city. There is a level crossing in Sturry (next to Fordwich on Map 3) which many commuters try and avoid due to the delays it causes.

An impediment to sustainable transport - The narrow and winding nature of Bekesbourne Lane and Nargate Street for miles from the village means there are few straights or clear sight-lines to allow safe overtaking of cyclists. Bekesbourne Lane is a logical link for cyclists between National Cycle Route 1 and cycle routes 16 and 17 and is used for charity bike rides, such as the Pilgrims’ Hospice annual fund raising ride. Map 4 below is taken from the ‘Cycling Country Lanes & Byways, Kent’ map published by Goldeneye. It shows a cycle route between Patricbourne and Grove, along Bekesbourne Lane and Nargate Street, linking routes 16 & 17 with route 1.



The growing volume of traffic on Bokesbourne Lane is making it increasingly untenable for all but larger groups of club cyclists who ride two abreast (see Highway Code rule 213 below). The increasing danger to cyclists from overtaking cars has already dissuaded many villagers from cycling along Bokesbourne Lane.

Specifically, the risks to cyclists lie in the inability of cars to overtake cyclists within the safe overtaking rules of the Highway Code (see below). In practice, it is not possible to recommend cycling to prospective residents of the proposed development due to the dangerous road conditions. This is a key factor in judging the sustainability of the development.

Why Bokesbourne Lane is dangerous for cyclists and pedestrians -

Bokesbourne Lane is used by cars, vans and lorries, the speed limit is 40 mph and i-Transport have measured the width at 4.3 to 5 metres in their travel plan (for comparison, note that the proposed new road through the site is 6.75m wide). It is insufficiently wide to allow overtaking of a bicycle within the safe distance stipulated in the Highway Code. Nevertheless, motorists do overtake bicycles by leaving too little space, which is illegal, dangerous and frightening.

The Highway Code promotes safety and supports a sustainable transport system. Failure to comply with the rules can result in fines, penalty points on the license, disqualification from driving, or even imprisonment in serious cases. The Code is used in court to establish liability.

Highway Code Rule 163³

Overtake only when it is safe and legal to do so. You should:

give motorcyclists, cyclists and horse riders and horse drawn vehicles at least as much room as you would when overtaking a car (see [Rules 211 to 215](#)). As a guide:

- **leave at least 1.5 metres when overtaking cyclists** at speeds of up to 30mph, and give them **more space when overtaking at higher speeds**
- pass horse riders and horse-drawn vehicles at speeds under 10 mph and allow at least 2 metres of space
- **allow at least 2 metres of space** and keep to a low speed **when passing a pedestrian who is walking in the road** (for example, where there is no pavement)
- take extra care and give more space when overtaking motorcyclists, cyclists, horse riders, horse drawn vehicles and pedestrians in bad weather (including high winds) and at night
- you should wait behind the motorcyclist, cyclist, horse rider, horse drawn vehicle or pedestrian and not overtake if it is unsafe or not possible to meet these clearances.

Highway Code guidance for people cycling: “keeping at least 0.5 metres (just over 1.5 feet) away from the kerb edge (and further where it is safer) when riding on busy roads with vehicles moving faster than them”⁴

If you add together the safe and legal space – the distance from the curb (0.5m), the width of a bicycle handlebar (these vary, but a mountain bike may be 0.8m), and the safe overtaking distance at 40 mph (>1.5m), the space required to leave on the left is more than 2.8m (say 3m minimum) and up to 3.3m. The typical dimensions of an SUV / Crossover is 1.8m to 2m⁵, a Luton box van is 2.2m wide. So at any point where Bekesbourne Lane is less than the maximum 5m wide, a larger car or van cannot overtake within the law. Hedges and verge plants such as brambles and stinging nettles tend to grow into the lane, reducing the width until the verge is cut (normally only once or twice a year). Unless it is rigidly policed, vehicle drivers will continue to overtake cyclists on Bekesbourne Lane within the safe space, making the Lane dangerous and unsuitable for cyclists.

The Highway Code goes on to say at Rule 213: “On narrow sections of road, on quiet roads or streets, at road junctions and in slower-moving traffic, cyclists may sometimes ride in the centre of the lane, rather than towards the side of the road. It can be safer for

³ <https://www.gov.uk/guidance/the-highway-code/using-the-road-159-to-203#rule163>

⁴ <https://www.gov.uk/government/news/the-highway-code-8-changes-you-need-to-know-from-29-january-2022>

⁵ <https://www.carveto.co.uk/dimensions-check>

groups of cyclists to ride two abreast in these situations". Cyclists riding two abreast cannot be overtaken given the narrow space and motorists seem to find it particularly frustrating and a deliberate impediment to them. This can cause even more dangerous driver behaviour.

To ride in to Canterbury from Littlebourne the only route is along the A257. The section of the A257 between the top of The Hill in Littlebourne and Polo Farm is made dangerous to cyclists by the traffic speeds (50 mph), long and sharp corners with poor line-of-sight and the overhanging trees making it dark.

Harm to the rural lanes - The CDLP, at paragraph 5.9 Rural Areas, adopts "The Kent Downs Area of Outstanding Natural Beauty Rural Streets and Lanes: A Design Handbook" (KDAONB Handbook), which has a statutory basis. It states that the handbook "*should be adhered to when considering road improvements, new roads and development in rural areas*". The handbook explains at 3.2, Planning for Pedestrians, Cyclists and Horseriders:

*"In rural areas walking and cycling are essential modes of transport, including for those without access to a car. Walking and cycling for recreation are important activities in the countryside... **The rural lanes can offer a very pleasant travel experience for walkers and cyclists - however fear and perceived fear from speeding traffic is a large and growing problem.** It can lead to vulnerable users "withdrawing" from use of the street. Although this might lead us to believe that the streets are becoming safer, this may be a misconception, the number of pedestrian and cycle casualties might reduce, but this only reflects the loss of activity"*.

The developer has suggested that local routes are suitable for "experienced cyclists" – the issue is not experience but risk. In these circumstances it is also irresponsible to promote cycling from the site with vouchers for cycle purchase in order to appear to tick the box of a sustainable development.

The only way to improve the safety on Bekesbourne Lane and make it suitable for cyclists is to reduce the volume of traffic, not increase it. This proposed development is not in the AONB but is in a rural area, adjacent to a picturesque village, surrounded by beautiful countryside in the valley of a rare chalk stream. In proposing the placement of the exit from this large development on Bekesbourne Lane, the special context of a lane, where vehicles, cycles and pedestrians share space, has been ignored.

The provisions of the KDAONB Handbook have not been adhered to. The NPPF presumption in favour of sustainable development refers to "directing development to sustainable locations", a test this proposal fails. CDLP Policy T16 Rural Lanes states:

“Rural lanes which are of landscape amenity, nature conservation, historic or archaeological importance will be protected from changes and management practises which would damage their character, and where possible be enhanced”

The development fails CDLP T16 and on this basis the appeal should be refused.

Flawed traffic assessment and Transport Plan - i-Transport LLP was commissioned by Gladman Developments Ltd to provide transport and highways advice in support of the proposed development. The resulting Travel Plan is not an objective assessment and, in writing it only to support the development, the authors have deliberately omitted certain relevant factors and certain claims and distortions have been included which are inaccurate and irrelevant. Some of the key forecasts for future traffic flows are implausible. The Travel Plan was written in February 2023, with traffic measurements taken in June 2022. Some of these may already be out-of-date.

According to the developer’s Transport Plan (Appendix 6G), three hundred new houses could generate 4.2 trips (arrivals and departures) per dwelling⁶ per day. This suggests 1,256 vehicle movements per day onto either The Hill or Bekesbourne Lane. This is a very significant increase in traffic within the village and along those two roads which will have only detrimental impacts. The plan does not present a balanced assessment of the impact but presents hundreds of pages of poorly-labelled spreadsheets. A fresh, more balanced traffic analysis might paint a very different picture.

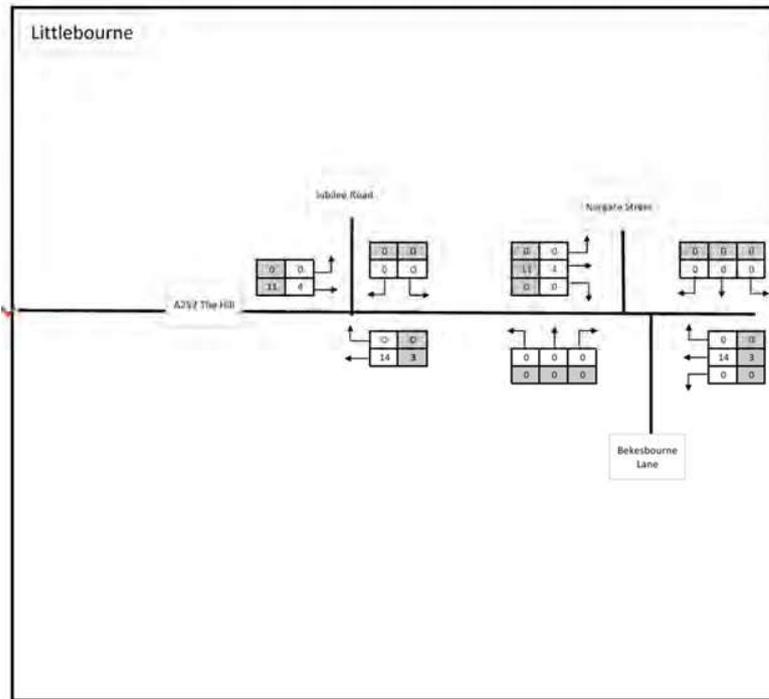
Increased traffic pressure from other local developments - Given the danger to cyclists and pedestrians the existing volume of traffic on Bekesbourne Lane is unsustainable, without adding more traffic from this development. The developer refers to a “significant level of background traffic growth (>20%)” in the Traffic Assessment para 6.2.6. However, if full account of other local developments is included, the traffic pressures on Bekesbourne Lane could be much greater.

The developer’s Traffic Assessment appears to contain some unfeasible forecasts for increases in traffic flow from other large local developments. For example, the recently approved South Canterbury development, adding 4,000 new houses two miles away, will also use Bekesbourne Lane to access East and North East Kent, greatly expanding traffic volumes on it and through the junction in Littlebourne. As a typical journey example, this Google Map shows the routes from The Old Gate Inn, in the centre of the South Canterbury development, to the shopping centre at Westwood Cross. It can be seen that the suggested route is down Bekesbourne Lane through Littlebourne.

⁶ i-Transport Transport Assessment Document 2 15 March 2023 Page 56: APPENDIX 6.G Residential TRICs Outputs, Residential Category : A - Houses Privately Owned, shows an average trip rate (arrivals and departures) of 4.189 for an average 210 DWELLS (reference TRICS 7.9.2 180622 B20.49)



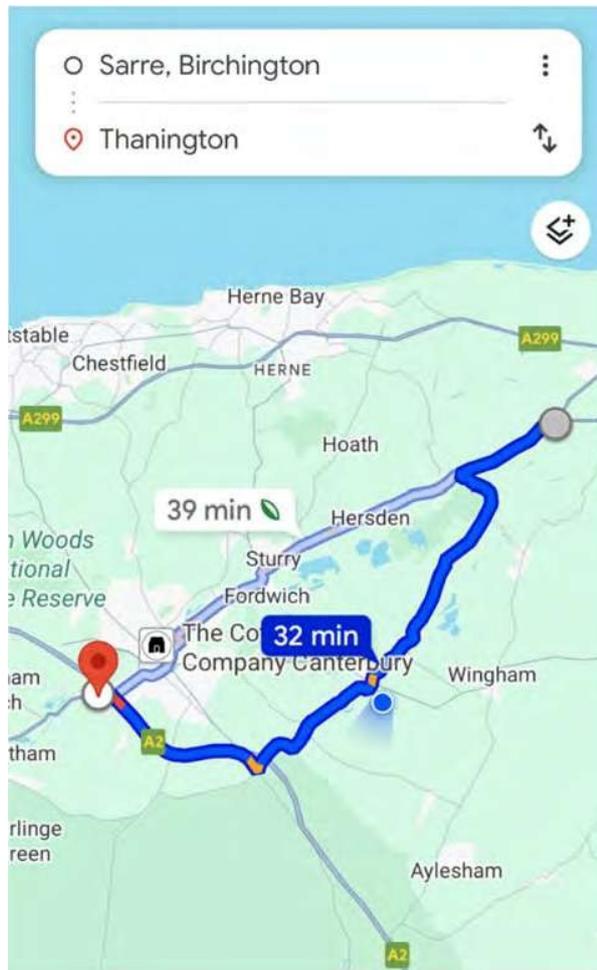
The Travel Plan makes the unfeasible assumption that there will be no additional traffic down Bekesbourne Lane from 4,000 houses at South Canterbury. Appendix 4.B of the i-Transport 'Response to KCC Consultation' of 12 September 2023 claims to have corrected and updated figures for committed development traffic flows but shows zero traffic emerging from Bekesbourne Lane or turning into it.



KEY = AM Peak = PM PEAK		Carrillon House, 129 Desfordgate, Manchester, M13 3WR Tel: 0161 8552172 www.i-transport.co.uk
	Land South of the Hill, Littlebourne	
	Appendix 4B-5	
	South Canterbury Traffic Flows	

If the TRICs 4.2 traffic movements per dwelling is applied to 4,000 houses, it results in 16,756 movements per day. If even a small proportion of these use Bokesbourne Lane, the volumes will clearly increase the risks.

Other developments are not included in the Assessment, such as the large new housing (750 houses at Saxon Fields) and business developments at Thanington. The quickest journey to Thanington from North East Kent (from Sarre as a central point) uses Nargate Street and Bokesbourne Lane as a shortcut to avoid Canterbury. This would also apply to journeys to/from South Canterbury. It can be seen from the following map that the satnav route is along Nargate Street and then Bokesbourne Lane.



Distance from school, health centre, church will increase traffic -

Assumptions that working parents will walk with their children for 15-20 minutes to the primary school in the morning and then back home again to collect their car to go to work are adventurous. Most busy families face time pressures in the morning and many would drive to drop their children at school on the way to work, increasing the traffic volume in the village.

Safety impact of increased traffic on rural lanes – The developer was warned about the adverse impact on non-motorised users (NMUs) but fails to mention that: *“KCC PROW and Access would also take this opportunity to raise concern regarding the impact of the proposed development on the local rural Highway network and NMU. Rural lanes are often used by users to connect between PROW routes, as well as provide Active Travel and leisure routes for both pedestrians and cyclists. In particular*

the connection to Bekesbourne station is along a rural lane and significant consideration should be given to this impact”⁷.

Littlebourne lacks pavements - There are limited roadside pavements along the A257 in the village of Littlebourne and some are narrow and dangerous (there is a 70 metre section of the A257 in the village where there is pavement only on the North side and is less than one metre wide, in some places 60cm). There are no pavements in Bekesbourne Lane and Nargate Street or alongside the South side of The Hill between the end of School Path, which leads directly onto the A257 carriageway, and the corner of the proposed development.



Photographs show, from top left clockwise: The exit of School Path directly onto the carriageway of the A257; A section of School Path which is 1.5m wide in many places; parked cars on the North side of the High Street narrowing the pavement; the pavement on the North side of The Hill, looking up towards the proposed puffin crossing site and showing the narrowing of the pavement from parked cars.

The Government’s Active Travel England website⁸ says that “*Pavements should offer a safe, comfortable, and accessible space for walking and wheeling, while also creating a sense of place for people to socialise, rest, and play*” and “*Walking routes should be at least two metres wide*”. Being less than this in many places, the pavements alongside the A257 are already challenging for pedestrians, prams & buggies and mobility scooters. In Bekesbourne Lane and Nargate Street there are no pavements and pedestrians are obliged to share the road with vehicles. The proposed access to the village is not suitable for a 50% increase in population from this proposed development,

⁷ KCC Public Protection PROW & Access Service letter to CCC Planning 10 May 2023

⁸ <https://www.activetravelengland.gov.uk/planning-active-places/pavements-and-footpaths>

particularly for disabled people, blind and partially sighted people, children or the elderly. The added traffic would increase the danger to pedestrians and cyclists.

The Hill A257 is very difficult to cross at peak times – according to KCC Highways and Transportation in their letter to Canterbury Planning of 16 August 2023, using a scenario of 950 two way movements in peak hours equates to one vehicle every four seconds or assuming the (erroneous) maximum relief on the link road, 725 two way movements still equates to one vehicle every 5 seconds.

The site has no pedestrian access without crossing or walking down busy roads – The proposed site is entirely surrounded by hedges, making it effectively an isolated enclave from which there are two vehicle exits, otherwise there is no pedestrian exit/entrance that does not require either crossing the busy A257 (estimated one car every four or five seconds at peak times) or walking down Bekesbourne Lane amongst the traffic.

For those wishing to exit the Eastern end of the proposed development they can walk 250m down School Path (CB156). It is 1.5m wide and difficult to walk down two-abreast, for instance a parent holding a child's hand. The path ends directly onto the A257 carriageway opposite the junction with Jubilee Road – there is no pavement at the end on the South side of the A257 and so pedestrians have to cross the road from the end of School Path. This is made more dangerous by the need to avoid the Jubilee Road junction opposite. (Note contrary to the TP, cycles are not allowed to use School Path CB156. Cycles are also not allowed on CB143).

In an attempt to address the lack of pedestrian access, it has been proposed that a Puffin crossing⁹ traffic light is put across the A257 near the new road junction to the development on The Hill. The puffin crossing proposal would create the only safe crossing point, through which all pedestrian traffic from/to the development would have to be funnelled. Having crossed the puffin crossing to the North side of The Hill, to access the centre of the village pedestrians would have the choice of continuing North East for 150m down the narrow alley of footpath CB143 (see photos below) or to reach the shop, hall, pavilion and High Street, turning right down the A257 pavement, past houses numbered 2 to 26 on The Hill, which has cars parked half-up on it. This narrows the pavement to single file.

Other than potentially resurfacing the CB143 footpath that may be used from the puffin crossing, the developer has failed to add any meaningful pedestrian or cycleway improvements except within the development. KCC PROW and Access pointed to

⁹ A puffin crossing is a type of pedestrian crossing that prioritizes the safety of pedestrians. It stands for "Pedestrian User-Friendly Intelligent" crossing and is designed to enhance safety and efficiency for both pedestrians and motorists. Puffin crossings use cameras to detect pedestrians waiting to cross and adjust the traffic light duration accordingly, ensuring that pedestrians can cross safely.

“National Planning Policy Framework - Paragraph 98 States that planning policies and decisions should protect and enhance public rights of way and access, including taking opportunities to provide better facilities for users, for example by adding links to existing rights of way networks including National Trails”.

Simply resurfacing CB143 will not make it suitable for some pedestrians – at 1.5 meters wide it is not wide enough for two to walk together or for two mobility scooters to pass. The following pictures show CB143. After a one-off resurfacing there is no provision to maintain it and prevent foliage growing across again.



Puffin crossing impact on others – The proposed new traffic lights on the A257 would be less than 300m from the existing traffic light crossing and would mean two sets of traffic lights in quick succession on a busy A road. The increased traffic volume and idling time at junctions and traffic lights resulting from the proposed development would increase harmful emissions. The crossing sensors detecting the pedestrians determine the amount of time the lights would stay red. At rush hour it is reasonable to assume that the population of the proposed development crossing The Hill would stop the traffic frequently. No estimate has been provided of the likely number of additional times traffic would be halted, but anecdotally, each time the existing lights turn red in the rush hours queues quickly build up.

This is both an inconvenience to road users, delaying journeys, and will increase pollution. According to the RAC, idling increases the amount of exhaust emissions in the air containing harmful gasses including carbon dioxide, nitrogen dioxide, carbon monoxide and hydrocarbons which are linked to asthma and other lung diseases

Southern Water – connection in serious doubt

Southern Water stated that *“There is currently inadequate capacity within the foul sewerage network to accommodate a foul flow of 2.71 l/s for the above development at manhole reference TR20576501. The proposed development would increase flows to the public sewerage system which may increase the risk of flooding to existing properties and land. Additional off-site sewers or improvements to existing sewers will be required to provide sufficient capacity to service the development”*.

Southern Water failed to make a commitment to connect this development (although they *“aim to provide this within 24 months following the date that planning has been granted for developments not identified as strategic sites”*) and said that whilst they cannot refuse connection to new housing developments they also have a duty to provide services to existing customers:

“We will not be able to comment on the decision of the planning application, under the Water Industry Act 1991 we have a duty to provide a suitable sewer network and the opportunity for all domestic properties to connect to the sewer system. This ultimately equates to a ‘right to connect’ which prevents us from refusing connections. Simultaneously, we have a duty to ensure that the service we provide to our existing customers does not deteriorate as a result of new homes being built”.

Where there is lack of capacity in the foul network, Southern Water would ask for a condition to be applied to the planning decision to phase occupation with delivery of network reinforcement, or provide alternative methods of drainage should the infrastructure not be in place by then.

I have included (attached) the Canterbury Catchment brief to give you some further insight into what Southern Water will be doing over the next AMP (2025-2030)”.

[Document not found in planning papers]

The developer has assumed that Southern Water will prioritise this capital expenditure over other requirements it has across its network to upgrade sewage treatment, clean-up rivers and seas, reduce flooding, reduce the impacts water abstractions have on river and wetland habitats, mitigate climate change impacts and increase fresh water supply (SW had a four month hosepipe ban during 2025). However, the company has been loss making, has over £6 billion¹⁰ of net debt and the regulator constrains the amount the company can increase customer bills. The company’s shareholders have

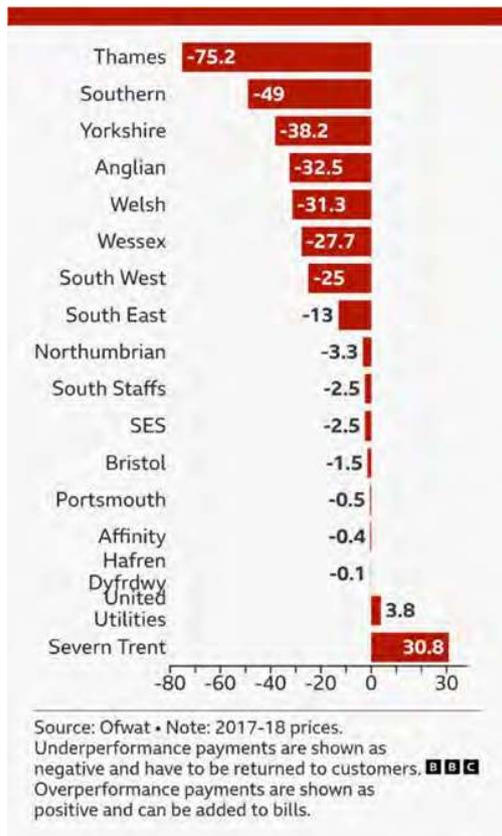
¹⁰ <https://dv.southernwater.co.uk/media/mmcogsam/southern-water-annual-report-2023-24.pdf>

received no dividends since 2017, and have injected £1.65 billion of new equity funding between 2021-24¹¹.

Plans for capital investment between 2025-2030 are ambitious, are financially stretching, involve significant customer bill increases and focus on performance improvement: “*past performance has not lived up to our customers’ and our regulators’ expectations*”. It is unclear from the correspondence with Southern Water that any commitment can be made to accommodate the additional demands of connecting this proposed development before meeting the needs of existing customers.

In a BBC News story¹² on 23 October 2025 by Mark Poynting and Jonah Fisher, entitled “Water companies told to refund £260m to customers for poor performance”, it was reported that Southern Water has been made to pay the second highest ‘underperformance’ payment of any of the water companies for failing to meet agreed targets on areas such as pollution and leaks.

Table 1 - ‘Underperformance’ and ‘overperformance’ payments reported for each company for 2024-25, in millions of pounds



¹¹ [Southern Water Business Plan 2025-30](#)

¹² <https://www.bbc.co.uk/news/articles/cdjrymnx1e8o>

When the context for capital expenditure by Southern Water is properly taken into account, it is inappropriate to rely on the 'right to connect' for this proposed development being achieved within the current 2025-2030 plan.

Appendix 1 – Letter to developer refusing planning permission

Canterbury City Council, the district planning authority under the Town and Country Planning Act 1990, has REFUSED your application, as described above, subject to the following reasons:

1. The location of the development is not sustainable and the applicant has failed to demonstrate that the Travel Plan measures proposed will be sufficient to encourage people to choose buses, which serve the site at a maximum of every half an hour, as opposed to travel by private car. Therefore the development is contrary to Local plan policy T1 that states that, in considering the location of new development, the Council will always take account of the provision of alternative modes of transport to the car, by extending provision for pedestrians, cyclists and the use of public transport.
2. The applicant has failed to demonstrate that the measures proposed, both during the construction of the development and when the development is occupied, are sufficient to ensure that the Chalk Stream will be adequately protected from chemicals and microplastics generated by the proposed residential development entering the stream. The development is therefore contrary to National Planning Policy Framework paragraph 187 which says that planning decisions should contribute to and enhance the natural and local environment by preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of water pollution. It is also contrary to policy QL12 of the Canterbury District Local Plan which requires that adequate mitigation measures, where possible, are agreed and undertaken to mitigate pollution.
3. The Local Planning Authority is not convinced that adequate sewerage disposal will be in place at the time of the development and therefore the development poses a risk of pollution to watercourses. The development is therefore contrary to National Planning Policy Framework paragraph 187 which says that planning decisions should contribute to and enhance the natural and local environment by preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of water pollution. It is also contrary to policy QL12 of the Canterbury District Local Plan 2017, which requires that adequate mitigation measures, where possible, are agreed and undertaken to mitigate pollution.
4. The proposed development would result in the loss of Best and Most Versatile agricultural land which, given that the development is otherwise unsustainable, would be unjustified and as such the development would be contrary to policy EMP12 of the Canterbury District Local Plan 2017.
5. The landscape harm caused by the proposed development, given that the development is otherwise unsustainable, is unjustified and as such the development

would harm the character and setting of the village contrary to NPPF para 135(c) and Local Plan policy LB4.

This application relates only to that required under the Town and Country Planning Acts and does not include any consent or approval under any other enactment or under the Building Regulations. Any other consent or approval which is necessary must be obtained from the appropriate authority.

The application was processed having regard to the National Planning Policy Framework, which requires that where there are potential solutions to problems arising in relation to dealing with planning applications, the council will work with the applicant in a positive and proactive manner to seek solutions to those problems.

Appendix 2 – Traffic survey omits traffic into Nargate Street

Streetwise Traffic Survey 2022

One explanation for the error in claiming a reduction in traffic is the design of the Streetwise traffic survey commissioned the developer in 2022. It only counted three arms of the four-way junction, leaving out Nargate Street. It shows that of the cars coming from Bekesbourne Lane (B), the majority turned right towards Wingham, not left (C). Crucially the report does not state how many of those turning left continued up the Hill towards Canterbury or then turned down Nargate Street towards Thanet. This is likely as many cars using Bekesbourne Lane are cutting through from the A2 to reach destinations in North East Kent. The link road through the proposed new development would only take cars that were turning left up the Hill to Canterbury. The report does not split the count at Arm C and assumes that all cars turning left could use the proposed link road.



Canterbury - Manual Traffic Survey: Thursday, 30 June 2022

Produced by Streetwise Services Ltd.

Junction: A - (South East) A257 High Street / B - Bekesbourne Lane / C - (North West) A257 High Street



Matrix Totals:

Show single Session:

Custom Start / End:

Show Peak Times:

		Arm Destination			Total	% Total
		A	B	C		
Arm Origin	A	0	692	2017	2709	100.00%
	B	741	0	550	1291	100.00%
	C	1869	510	1	2380	100.00%
Total		2610	1202	2568		
% Total		100.00%	100.00%	100.00%		

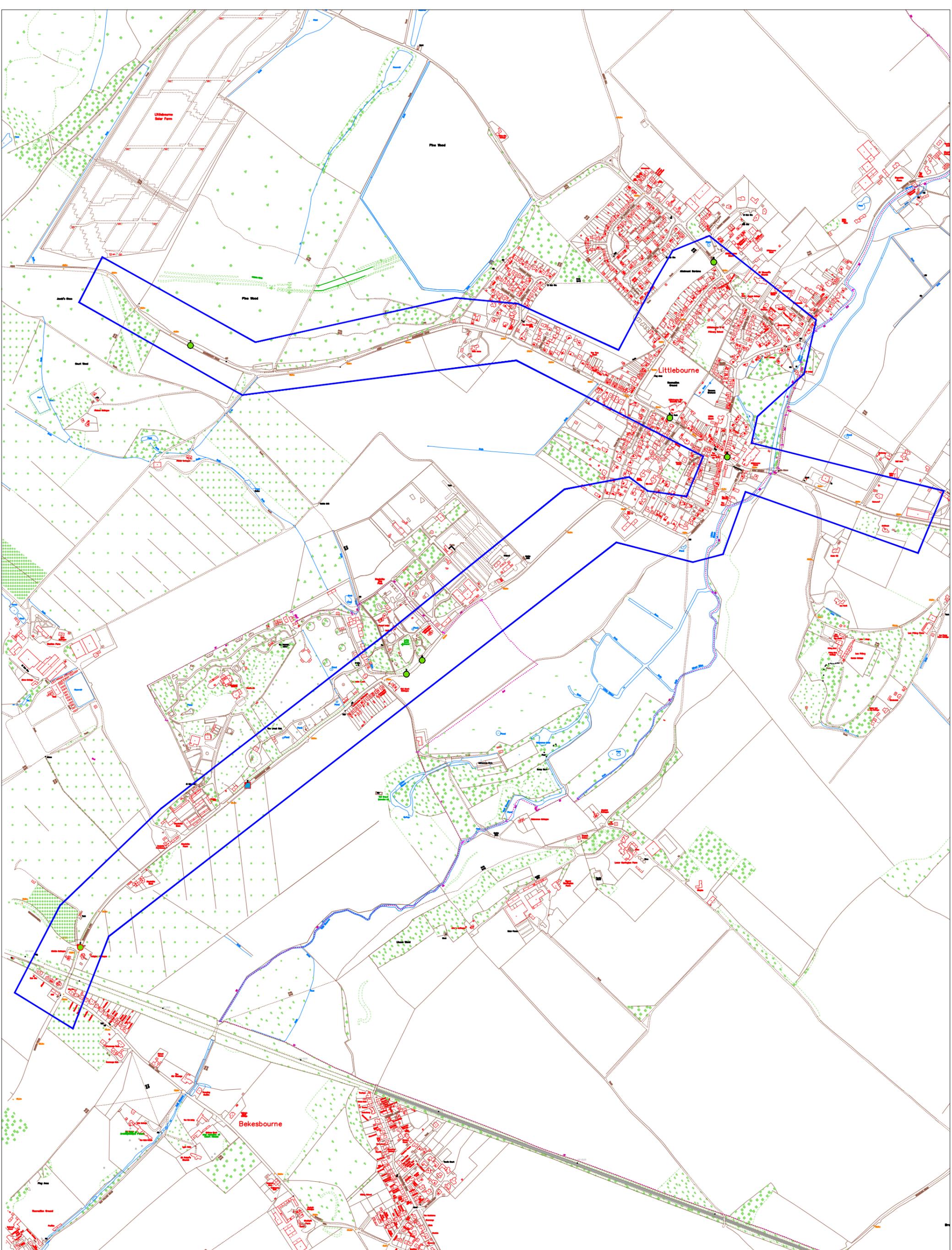
Classifications	Include
CAR	Yes
LGV	Yes
OGV1	Yes
OGV2	Yes
BUS	Yes
P/CYCLE	Yes
M/CYCLE	Yes

Ordnance Survey map today showing extensive recent infills to the village:



The original infrastructure capacity of a small village cannot cope with this further large proposed development.

APPENDIX G. Updated 2020 – 2025 Personal Injury
Collision Data



Location: Littlebourne & Bekesbourne

5 years personal injury collision data up to 30/06/2025

KCC Ref number: EXT/233/25

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Crash Severity	
	Slight
	Serious
	Fatal



Date: 17-December-2025

Time: 13:10:05

Title: **Littlebourne & Bekesbourne**

Requested output: **D - Print Crash Report**

Date: 17-December-2025

Accident Date BETWEEN '01-Jul-2020' AND '30-Jun-2025'

There were 8 reported crashes resulting in injury

D-PRINT CRASH REPORT

17-Dec-2025

13:10:05

Littlebourne & Bekesbourne
Accident Date BETWEEN '01-Jul-2020' AND '30-Jun-2025'

No	Location	Severity	Date	Day	Time	Street Lighting	Road Surface	Weather	Pedestrian Direction	Factors	Involved
1	Road No C203 Grid 619196E Section 019 Ref 156042N	SLIGHT	05/10/2020	2	15:45	L	Dry	Fine	U	R.TURN	GV
C203 BEKESBOURNE LANE J/W C206 BEKESBOURNE HILL, BEKESBOURNE HILL									Canterbury	PED	
V1 was straddled across the road attempting to turn right onto Bekesbourne Lane. V2 was travelling northeast on Bekesbourne Lane and had to swerve around V1. D1 and D2 then got involved in a verbal altercation. D2 got out of their vehicle, D1 drove at them at them and pushed them 1-2 metres pinning them up against a tree. V1 then made off from the scene without exchanging details. (No gender, age, or postcode for V1).							Veh1, car, NW -> SW Veh2, goods < 3.5t, SW -> NE			Casualties 1 Vehicles 2	
2	Road No C203 Grid 619653E Section 019 Ref 156485N	SERIOUS	03/08/2021	3	14:15	L	Dry	Fine	U U	S.VEH	
C203 BEKESBOURNE LANE, BEKESBOURNE (MAPPED TO COORDS)									Canterbury	PED	
V1 was travelling southwest on Bekesbourne Lane in the middle of the road. On approaching another car, V1 slowed down and went towards the nearside of the carriageway where they struck C1 and C2.							Veh1, car, NE -> SW			Casualties 2 Vehicles 1	
3	Road No C203 Grid 620087E Section 163 Ref 156789N	SLIGHT	26/08/2022	6	23:56	DRK NSL	Dry	Fine		S.VEH +VE	
C203, BEKESBOURNE LANE, BEKESBOURNE (MAPPED TO COORDS)									Canterbury		
V1 WAS TRAVELLING ALONG THE CARRIAGEWAY WHEN D1 CLAIMS AN ANIMAL RAN OUT INTO THE ROAD. TO TRY AND AVOID THE ANIMAL D1 SWERVED RESULTING IN THE VEHICLE GOING UP A SLIGHT BANK CAUSING IT TO FLIP ONTO ITS ROOF. D1 IS UNSURE OF THE SPEED THEY WERE TRAVELLING AT THE TIME OF THE ACCIDENT.							Veh1, car, SW -> NE			Casualties 1 Vehicles 1	

Key Involved

PED Pedestrian
HGV Heavy Goods Vehicle
GV Goods Vehicle
M/C Motor Cycle
P/C Pedal Cycle
PSV Bus/Coach

Street Lighting

L Daylight

STL Street Lights
USL Street Lights Unlit
NSL No Street Lights
STU Street Lights Unknown

FACTORS

+VE Positive Breath Test
R.TURN Right Turn Manoeuvre
O/TAKE Overtaking Manoeuvre
S.VEH Single Vehicle

Special Conditions

ATS OUT Traffic Lights Not Working
ATS DEF Traffic Lights Defective
SIGNS Road Signs Defective or Obscured
RD WRKS Road Works
Surface Road Surface Defective

D-PRINT CRASH REPORT

17-Dec-2025

13:10:05

Littlebourne & Bekesbourne
Accident Date BETWEEN '01-Jul-2020' AND '30-Jun-2025'

No	Location	Severity	Date	Day	Time	Street Lighting	Road Surface	Weather	Pedestrian Direction	Factors	Involved
4	Road No C203 Grid 620130E Section 163 Ref 156827N	SLIGHT	22/08/2020	7	16:00	L	Dry	Fine			
C203 BEKESBOURNE LANE J/W PRIVATE ENTRANCE, BEKESBOURNE.									Canterbury		
D3 was driving down Bekesbourne Lane, Canterbury & used a side road to turn around. As they've stopped their car adjacent with Bekesbourne Lane, they've looked in their offside mirror to check for oncoming traffic & pulled away. Colleague has then advised D3 that they heard a bang, suspected they'd been rear ended. D3 circled back around and saw 3 damaged vehs.							Veh1, car, SW -> NE Veh2, car, SW -> NE Veh3, car, SW -> NE Veh4, car, P -> P			Casualties 1 Vehicles 4	
5	Road No A257 Grid 620964E Section Ref 157383N	SLIGHT	03/02/2022	5	10:09	L	Wet/Damp	Fine			GV
A257 HIGH ST J/W C203 BEKESBOURNE LANE, LITTLEBOURNE									Canterbury		
V2 was travelling west on High St and slowed down due to a vehicle in the carriageway ahead of them. V1, travelling behind V2, tried to stop in time but skidded on the damp road surface and collided with the rear of V2.							Veh1, goods < 3.5t, SE -> NW Veh2, car, SE -> NW			Casualties 1 Vehicles 2	
6	Road No A257 Grid 620807E Section 038 Ref 157490N	SLIGHT	05/06/2024	4	07:21	L	Dry	Fine		O/TAKE R.TURN	
A257 HIGH ST J/W PRIVATE DR TO FOUR VILLAGES STORE, LITTLEBOURNE									Canterbury		
OLR: V2 indicating and turning right into car park for Four Villages Store. V1 overtaking V2 and collided with same. D1 failed to stop/exchange details. C1 details not given.							Veh1, car, SE -> NW Veh2, car, SE -> N			Casualties 1 Vehicles 2	

Key Involved

PED Pedestrian
HGV Heavy Goods Vehicle
GV Goods Vehicle
M/C Motor Cycle
P/C Pedal Cycle
PSV Bus/Coach

Street Lighting

L Daylight

STL Street Lights
USL Street Lights Unlit
NSL No Street Lights
STU Street Lights Unknown

FACTORS

+VE Positive Breath Test
R.TURN Right Turn Manoeuvre
O/TAKE Overtaking Manoeuvre
S.VEH Single Vehicle

Special Conditions

ATS OUT Traffic Lights Not Working
ATS DEF Traffic Lights Defective
SIGNS Road Signs Defective or Obscured
RD WRKS Road Works
Surface Road Surface Defective

D-PRINT CRASH REPORT

17-Dec-2025

13:10:05

Littlebourne & Bekesbourne
Accident Date BETWEEN '01-Jul-2020' AND '30-Jun-2025'

No	Location	Severity	Date	Day	Time	Street Lighting	Road Surface	Weather	Pedestrian Direction	Factors	Involved
7	Road No A257 Grid 619497E Section 028 Ref 157688N	SLIGHT	13/09/2020	1	18:00	L	Dry	Fine		O/TAKE	P/C PSV
A257 CANTERBURY RD, LITTLEBOURNE (MAPPED TO COORDS)									Canterbury		
R2 was travelling southeast on Canterbury Rd when they were struck by the front nearside of V1 as it attempted to overtake. (No age for V1).							Veh1, bus or coach, NW -> SE Veh2, pedal cycle, NW -> SE			Casualties 1 Vehicles 2	
8	Road No U Grid 620927E Section 163 Ref 157916N	SLIGHT	03/09/2023	1	12:45	L	Dry	Fine			P/C
COURT HILL J/W CHERRY ORCHARD, LITTLEBOURNE.									Canterbury		
R2 was cycling at Court Hill by the allotment then V1 sped by R2 and made it crash into a park by the allotment before speeding off.							Veh1, car, NW -> SE Veh2, pedal cycle, SE -> NW			Casualties 1 Vehicles 2	

Key Involved

PED Pedestrian
HGV Heavy Goods Vehicle
GV Goods Vehicle
M/C Motor Cycle
P/C Pedal Cycle
PSV Bus/Coach

Street Lighting

L Daylight

STL Street Lights
USL Street Lights Unlit
NSL No Street Lights
STU Street Lights Unknown

FACTORS

+VE Positive Breath Test
R.TURN Right Turn Manoeuvre
O/TAKE Overtaking Manoeuvre
S.VEH Single Vehicle

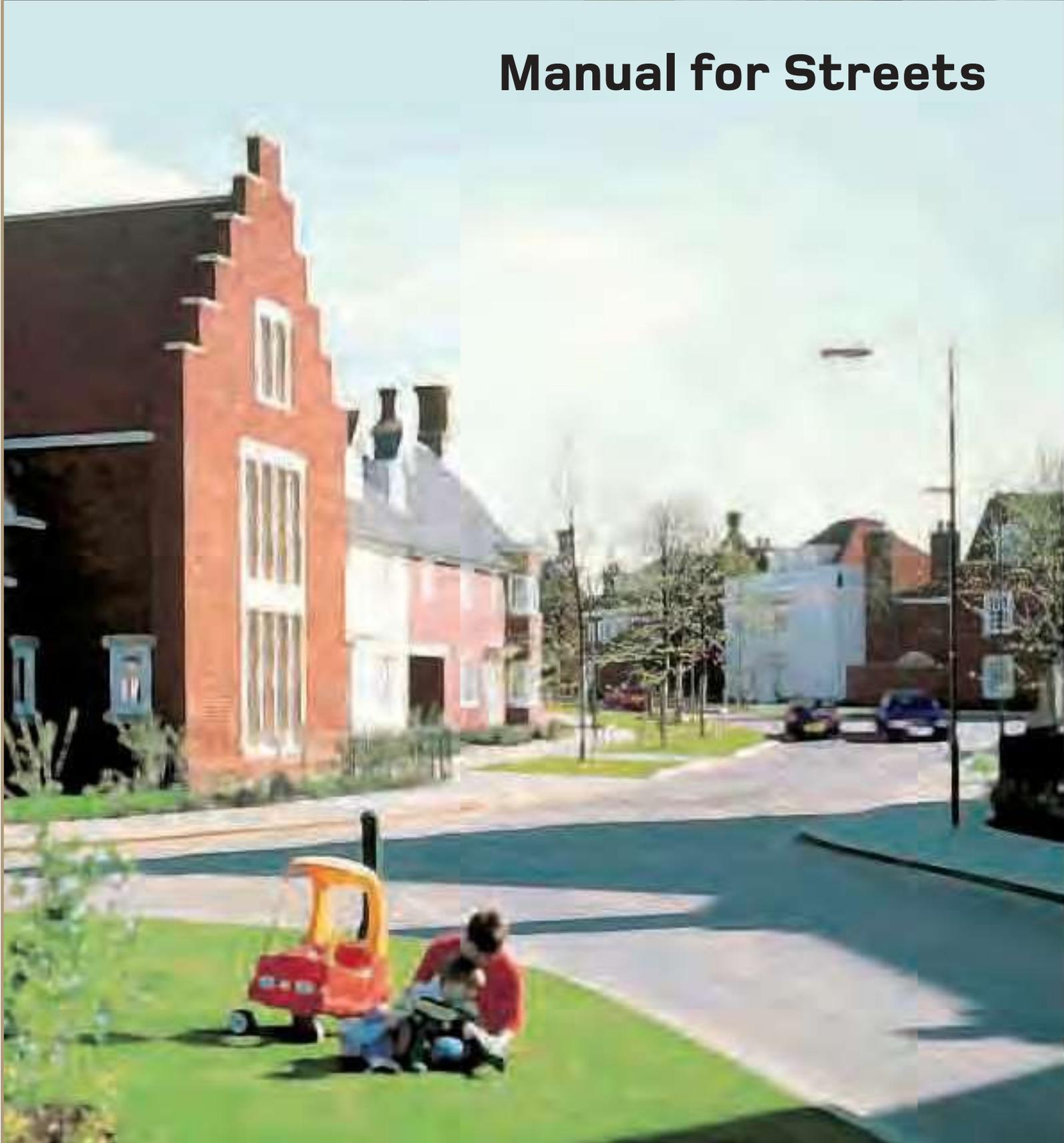
Special Conditions

ATS OUT Traffic Lights Not Working
ATS DEF Traffic Lights Defective
SIGNS Road Signs Defective or Obscured
RD WRKS Road Works
Surface Road Surface Defective

APPENDIX H. Extracts from Manual for Streets on
Road Widths



Manual for Streets



7

Street geometry



Chapter aims

- Advise how the requirements of different users can be accommodated in street design.
- Summarise research which shows that increased visibility encourages higher vehicle speeds.
- Describe how street space can be allocated based on pedestrian need, using swept path analysis to ensure that minimum access requirements for vehicles are met.
- Describe the rationale behind using shorter vehicle stopping distances to determine visibility requirements on links and at junctions.
- Recommend that the design of streets should determine vehicle speed.
- Recommend a maximum design speed of 20 mph for residential streets.

7.1 Introduction

7.1.1 Several issues need to be considered in order to satisfy the various user requirements detailed in Chapter 6, namely:

- street widths and components;
- junctions;
- features for controlling vehicle speeds;
- forward visibility on links; and
- visibility splays at junctions.

7.2 Street dimensions

7.2.1 The design of new streets or the improvement of existing ones should take into account the functions of the street, and the type, density and character of the development.

7.2.2 Carriageway widths should be appropriate for the particular context and uses of the street. Key factors to take into account include:

- the volume of vehicular traffic and pedestrian activity;
- the traffic composition;
- the demarcation, if any, between carriageway and footway (e.g. kerb, street furniture or trees and planting);
- whether parking is to take place in the carriageway and, if so, its distribution, arrangement, the frequency of occupation, and the likely level of parking enforcement (if any);
- the design speed (recommended to be 20 mph or less in residential areas);
- the curvature of the street (bends require greater width to accommodate the swept path of larger vehicles); and
- any intention to include one-way streets, or short stretches of single lane working in two-way streets.

7.2.3 In lightly-trafficked streets, carriageways may be narrowed over short lengths to a single lane as a traffic-calming feature. In such single lane working sections of

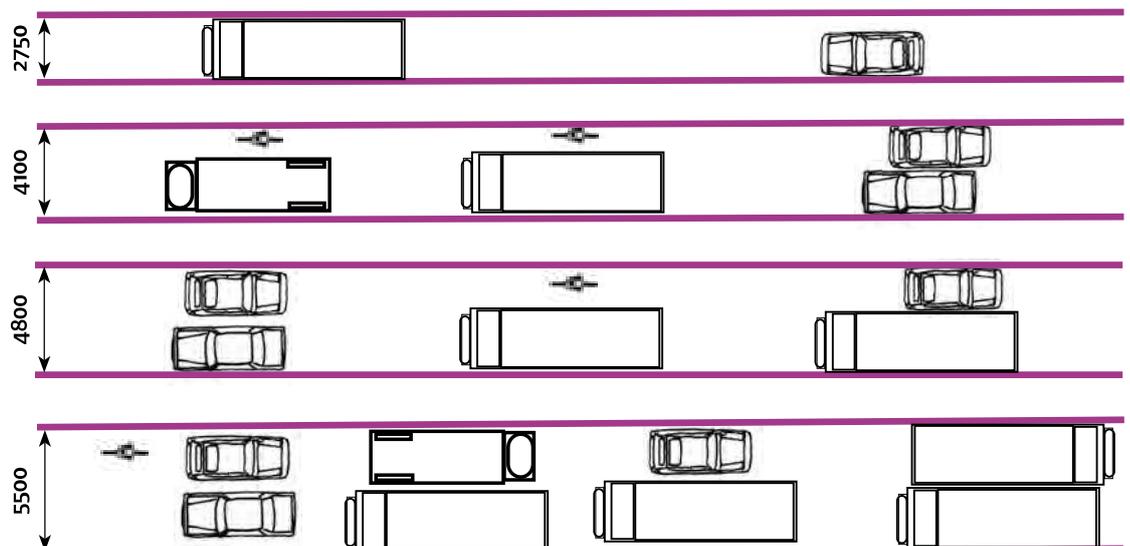


Figure 7.1 Illustrates what various carriageway widths can accommodate. They are not necessarily recommendations.

APPENDIX I. Bekesbourne Lane Carriageway Widths
– Google Streetview Images



REPRODUCED FROM THE ORDNANCE SURVEY MAP WITH THE PERMISSION OF THE CONTROLLER OF HER MAJESTY'S STATIONERY OFFICE. LICENCE NO. 10004286. © CROWN COPYRIGHT RESERVED.

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SCALE BAR @ 1:1000

0 10 25 50 100

<p>Centurion House, 129 Deansgate Manchester, M3 3WR Tel: 0161 830 2172 www.i-transport.co.uk</p>		<p>REV: DATE: BY: DESCRIPTION: CHG: APC: PROJECT: TITLE: CLIENT: PROJECT:</p>	<p>WIDTHS AND CHARACTERISTICS FOR BEKESBOURNE LANE (PLAN 2)</p> <p>LAND SOUTH OF THE HILL, LITTLEBOURNE</p> <p>GLADMAN DEVELOPMENT LTD</p>	<p>DRAWN: MS CHECKED: VE APPROVED: VE</p> <p>PROJECT No: ITM16283 SCALE @ A1: 1:1000 DATE: 17.12.25</p> <p>DRAWING No: ITM1683-GA-029 REV:</p>
<p>FOR INFORMATION</p>				

APPENDIX J. Extracts from DfT Traffic Signs Manual
Chapter 5

Traffic Signs Manual

CHAPTER 5

Road Markings
2018

2.2.6. On rural roads below 5.5 m in width, over-running of the carriageway edge can occur if centre line markings are provided, causing maintenance problems. Drivers might also expect a road marked with a centre line to be wide enough for opposing lanes of traffic to pass. In these circumstances the centre line should be omitted, but it is recommended that edge of carriageway markings would be helpful.

2.3 Lane lines

2.3.1. Lane lines (see [Figure 2-3](#)) ensure that available carriageway space is used to its maximum capacity. In helping drivers to maintain a consistent lateral position, they also offer safety benefits and should be used wherever practicable.

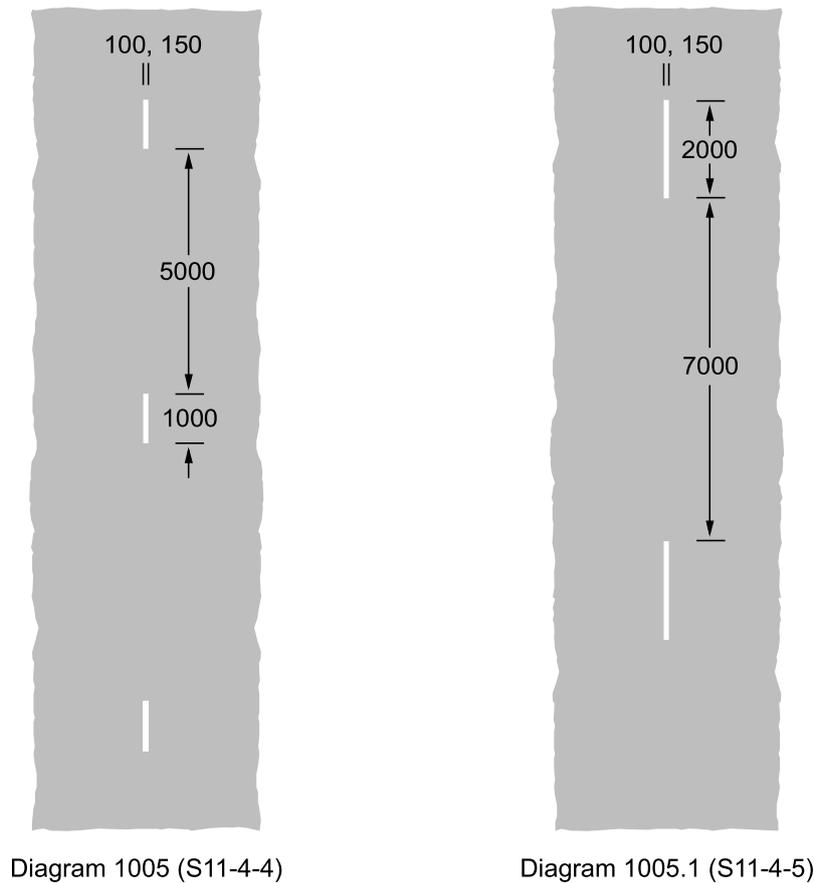


Figure 2-3 Lane lines

2.3.2. The marking is intended for dividing the carriageway into lanes where traffic on either side of the line travels in the same direction, and not for separating opposing flows of traffic. Details are set out in [Table 2-2](#).

2.3.3. Lane lines on the approach to Give Way and Stop markings, including roundabouts and traffic signals, should change to warning lines in accordance with [Table 2-3](#) and [2.4.9](#) to [2.4.13](#).

2.3.4. On single carriageway two-way roads with two or more lanes for traffic travelling in the same direction, the centre line should normally be of a greater width than the lane lines. This is particularly important when the warning module is used for both, making it more difficult to determine which line divides the opposing traffic streams.

2.3.5. On 70 mph dual carriageway all-purpose roads and on motorways, the wider (150 mm) marking should be used as this increases its visibility distance. It is also likely to be of benefit on concrete roads, or roads with a buff coloured surface dressing, even with a lower speed limit, helping to compensate for the reduced contrast.

2.5.8. The marking should be laid with a gap of approximately 225 mm to the nearside edge of the carriageway. The continuous line should not be carried across the mouths of side roads, acceleration or deceleration splays, gaps in the central reservation or lay-bys, where lines to diagrams 1009A or 1010 should be used as appropriate.

2.5.9. Where the carriageway is less than 5.5 m in width, the centre line should be omitted (see [2.2.6](#)) but edge lines, where used, continued. Where edge lines are not already in use, their introduction over the length where the centre line is interrupted will help draw attention to the hazard.

2.5.10. The following are examples of situations where the edge of carriageway marking might be particularly appropriate:

- a) where the demarcation between the carriageway and the verge is poor,
- b) along lengths prone to fog and mist,
- c) on heavily-trafficked single carriageway roads where headlamp dazzle is severe,
- d) at sudden changes of carriageway width,
- e) on the approaches to narrow bridges,
- f) on the approaches to bends indicated by bend warning signs,
- g) at the back of a hard shoulder, generally 150 mm wide and laid 50 mm from the back of the hard shoulder, or
- h) at traffic calming measures e.g. chicanes.

2.5.11. Edge lines are also recommended for use along the off side carriageway edge of unlit dual carriageway roads. The line should be laid with a gap of approximately 225 mm to the central reservation. The marking should not be carried across a junction where there is a break in the central reservation; in this case a line to diagram 1010 should be used. Where there is a hard strip, edge lines should be laid as indicated in [Figure 2-18](#). They should be used on all motorways in the positions shown in [Figure 2-19](#).

2.5.12. Where, because of the traffic importance or nature of the road, clearer delineation is required, red uni-directional reflecting road studs may be used on the nearside edge (see [Table 2-5](#)) and, on dual carriageway roads, amber studs may be used adjacent to the central reservation (see [4.4](#)).

2.5.13. When depressible studs are used, they should always be placed on the carriageway side of the edge line to facilitate the cleaning action of the lenses. Non-depressible studs also benefit from trafficking to keep them free from road dirt and maintain their performance. At locations where experience has shown that placing the studs on the carriageway side of the edge line reduces their operational life to unacceptable levels, it may be better to place them behind the line. Further guidance on the use of road studs is given in section [4](#).

2.6 Raised profile edge lines

2.6.1. Raised profile lines are prescribed for use as an alternative to the edge of carriageway marking to diagram 1012.1 (S11-4-11). They consist of a continuous line marking with ribs across the line at regular intervals (see [Figure 2-7](#)). The vertical edges of the raised ribs stand clear of the water film in wet conditions, improving retroreflective performance under headlight illumination. The ribs also provide an audible vibratory warning to drivers should they stray from the carriageway and run onto the marking.

2.6.2. Two types are specified, diagram 1012.2 (S11-4-12) for use on motorways and diagram 1012.3 (S11-4-13) for use on all-purpose roads with a hard strip or hard shoulder. The base

