MOTT MACDONALD

Foxton Park and Ride Travel Hub

Initial Demand Forecasting

Technical Note

21st May 2018

Greater Cambridge Partnership

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Contents

Executive summary

This technical note sets out the results of an initial car parking demand forecasting exercise, undertaken by Mott MacDonald, to inform the development of the proposed Foxton Park and Ride (P&R) Travel Hub.

If developed, the Foxton Travel Hub would form part of a proposed network of rural transport interchanges in South Cambridgeshire. The aim of these transport interchanges is to connect people with public transport and cycling/walking routes to jobs and services.

The provision of sustainable and accessible transport options has the potential to reduce the levels of private car journeys into Cambridge amid rising demand to access the city, and provide connections between neighbouring villages and towns.

The need to develop the Foxton Travel Hub was outlined in the GRIP 2 Feasibility Study, reported in May 2013. Following the submission and approval of our proposal (dated 13 March 2018), Mott MacDonald was commissioned by Cambridgeshire County Council (CCC) to carry out three stages of work:

- Phase 1 – Inception
- Phase 2 – Options Assessment
- Phase 3 – Outline Business Case

The focus of this technical note is to provide early-stage demand forecasts and sensitivity tests for the proposed Foxton P&R site, as part of the Phase 2 - Options Assessment work.

Specifically, the note informs the potential scale of any P&R site at Foxton to allow early optioneering work to be undertaken, and to provide input into ongoing work on proposals for park and ride at M11 Junction 11.

The methodology applied to generate the initial demand forecasts is based on a first principles analysis of Census 2011 Journey to Work matrices. Here, data from origin-destination (OD) pairs 'in-scope' to use a P&R service at Foxton station were used to generate an early-stage approximation of car parking demand with some additional manipulation to reflect issues such as growth, and the potential impact of the proposed Cambridge South station.

This car parking demand forecasting exercise produced the following results:

- Trips to Central and Inner London could generate a demand for 149 spaces;
- Trips to Cambridge South could generate a demand for 150 spaces;
- Trips to the existing stations could generate a demand for 203 spaces; and
- The combined demand for parking from both existing stations and sensitivity tests could be 552 spaces, rising to 635 if the assumption is made that a car park is at its effective capacity when 85% occupied (CCC-advised factor).

In summary, our early-stage analysis of potential car parking demand at Foxton station, suggests that up to approximately 650 spaces could be required. The work undertaken to date will be progressed through more detailed demand forecasting and reassignment modelling to inform the option generation process.

1 Introduction

The purpose of this report is to set out the approach and results of the initial demand forecasting carried out for the proposed Foxton Park & Ride (P&R) Travel Hub.

As a part of the options development process for the Foxton Level Crossing Closures project, reported in the GRIP 2 Feasibility Study Report in May 2013[1], options to develop and deliver new P&R facilities near Foxton Rail Station were identified.

The Greater Cambridge Partnership (GCP) is now seeking to progress the Foxton Rural P&R Travel Hub as a separate project. As such, Mott MacDonald has been commissioned (March 2018) to progress with the necessary work required to develop the options and a scheme business case.

The focus of this technical note is to outline the initial demand forecasts for a Foxton P&R site (based on a first principles analysis of Census 2011 Journey to Work data), to inform the potential scale of any P&R site, how this interacts with other interventions such as the Foxton Level Crossing Closure scheme and the M11 Junction 11 P&R scheme, and how this may impact on levels of traffic reassignment along the A10. The findings reported in this technical note will be refined when though further assessment of the level of demand at Foxton for a P&R site and its impacts on traffic reassignment using the CSRM (Cambridge Sub Regional Model) SATURN highway mode and the Highway England's South East Regional Traffic Model (SERTM). This will ultimately feed into the evidence review being carried out to establish the need for investment in a P&R site at Foxton as part of the options generation and assessment process, as well as inform the development of the business case for the closure of the level crossing.

The methodology applied to generate the initial demand forecasts is based on Census 2011 Journey to Work matrices. Here, origin-destination (OD) pairs 'in-scope' to use a park and ride service at Foxton station were defined.

The calculated demand was based on a commuting travel time of up to 75 minutes, which is inclusive of all time spent travelling between the trip origin and destination. To establish what zone pairs were potentially 'in-scope' to use a P&R service at Foxton station, ARC Geographical Information System (GIS) modelling was used to define a series of polygons related to each stage of travel. Once the zone pairs were defined, OD data was extracted from the dataset WF01BEW 'Location of usual residence and place of work' and the corresponding modal data was taken from the dataset WU03EW 'Location of usual residence and place of work by method of travel to work'.

Following the Census extractions, a trip forecasting exercise using the Census data was undertaken to define how many rail trips were likely to be made between the Foxton station origin area and the workplace destinations; the tests were run using four different mode share scenarios. Next, factors relating to absence from the workplace and estimated parking space demand were applied to the trip forecast data, which produced an initial estimation of parking demand at the proposed Foxton P&R. Finally, a growth factor of 1.15 was applied to the parking demand outputs to reflect CCC's optimal maximum occupancy for a car park, set at 85%.

[1] The GRIP 2 Feasibility Study Report was published by Mott MacDonald in May 2013

Whilst this report is based on Census 2011 Journey to Work data, some consideration of potential growth has been included together with two specific sensitives to understand the impact of the proposed Cambridge South station and potential changes in rail service patterns to Central and Inner London.

The structure of this document is as follows:

- Section 2: Catchment definition and selection;
- Section 3: Stages of data extraction;
- Section 4: Trip forecasting and car parking demand;
- Section 5: Sensitivity test; and;
- Section 6: Conclusion.

2 Catchment Definition and Selection

2.1 Journey Time Methodology

The following analysis details the process of defining and selecting the origin and destination zones, defined as catchment areas, from which commuters could potentially use Foxton station.

The calculated demand was based on a commuting travel time of up to 75 minutes, which is inclusive of all time spent travelling from the person's home to their ultimate destination. The 75-minute travel time was informed by data from the Greater Cambridge Travel Survey, provided by Travel for Cambridgeshire in the table below.

Table 1: Journey Time in the Greater Cambridge Area (Source: Travel for Cambridgeshire)

Time	No Responses	All Employers 2015	All Employers 2014	All Employers 2013
< 20 mins	3713	31.41%	32.45%	34.68%
21 to 40 mins	4237	35.84%	35.37%	36.43%
41 to 60 mins	2505	21.19%	21.32%	19.03%
61 to 90 mins	1098	9.29%	8.87%	7.97%
91 mins+	268	2.27%	2.00%	1.89%
Total	11821	100%	100%	100%

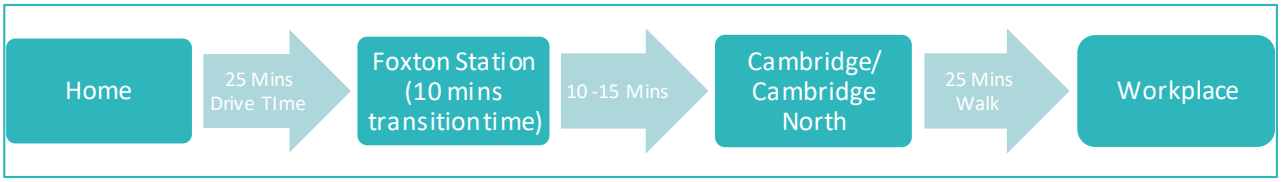
Source: Travel for Cambridgeshire

The Travel Survey demonstrated that in 2015 88% of respondents from the Greater Cambridge area had a commute of 60 minutes or less, and 98% of respondents commuted 90 minutes or less. Therefore, it is considered reasonable to apply a 75-minute travel window, because this encapsulates at least 90% of commuter journeys.

The 75-minute travel window is made up of 3 stages of travel and associated transition time between modes. The stages of travel are as follows, and are also presented in the figure 1:

- Up to 25 mins of car travel from the person's home to Foxton station;
- Up to 10 mins of transition time (i.e. from the person's car to boarding their train at Foxton station);
- 10 mins scheduled travel time between Foxton Station and Cambridge station, and 16 mins to Cambridge North station; and
- Up to 25 mins walking from the person's destination station to their workplace.

Figure 1: Up to 75 Minute Journey Time Breakdown



Source: Mott MacDonald

2.2 Catchment Definition

The following section sets out the geographical extent of the study area; namely geographies within 25 mins drive of Foxton station and 25 mins walk of Cambridge, Cambridge North and the indicative location of the proposed Cambridge South stations. Here, ARC Geographical Information System (GIS) was used to define a series of polygons related to each stage of travel.

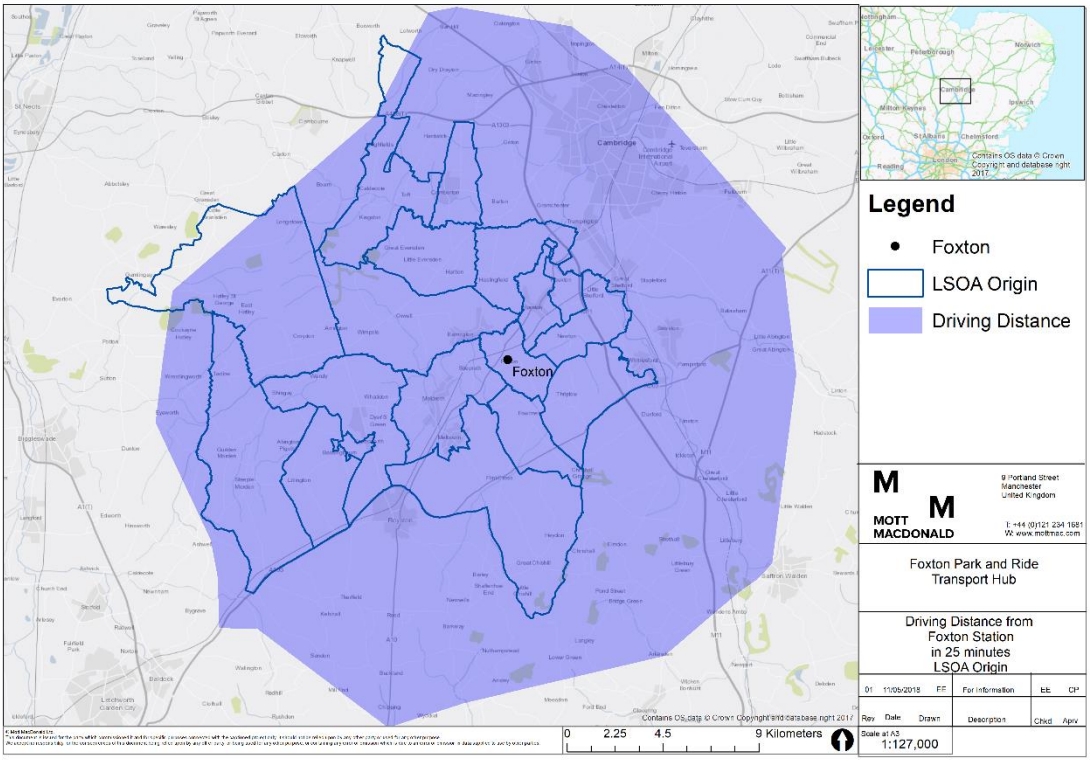
The polygons set out below were subsequently used to inform the selection of Lower Layer Super Output Areas (LSOAs), which are overlaid by the GIS polygons in Figures 3 to 6.

LSOAs are built from clusters of output areas, which are the base unit for Census data releases. Due to their smaller size, LSOAs allow for a finer resolution of data analysis. The method behind the selection of these LSOAs is described in Section 3.3.

2.2.1 Origin Polygon Foxton Station

The following figure provides a GIS visualisation of how far one could travel to/from Foxton station, driving for 25 minutes at 30mph in free-flow conditions.

Figure 2: 25 Min Drive, Travelling At 30mph in Free Flow Conditions

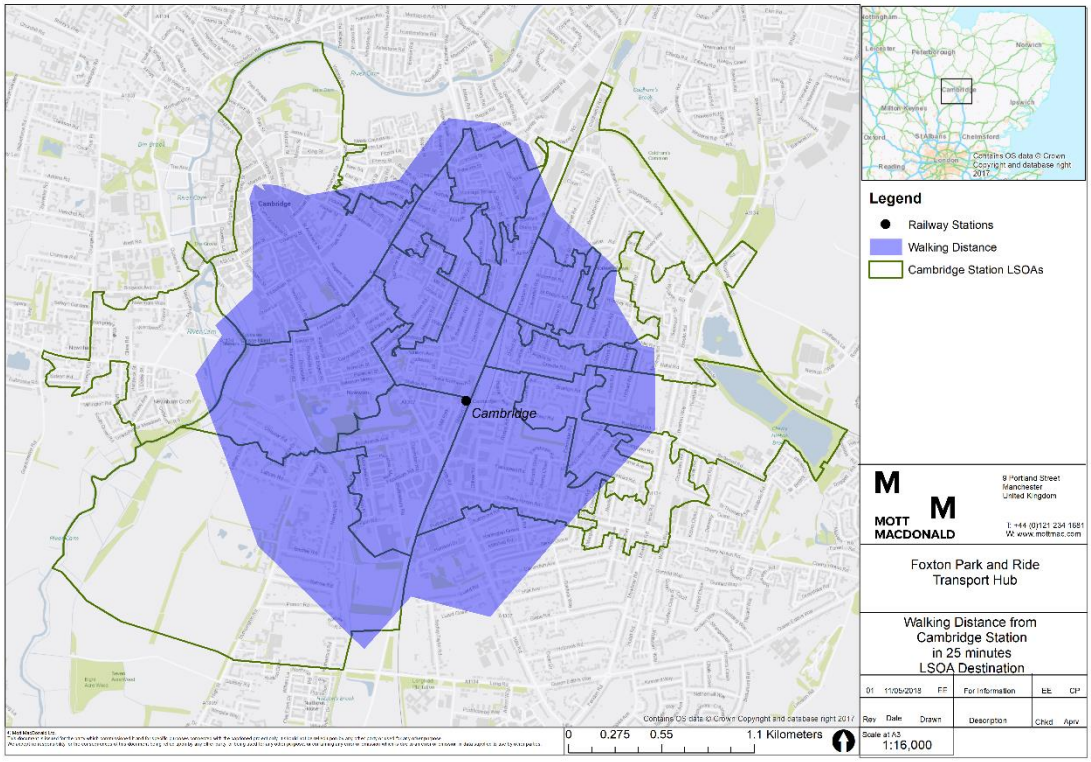


Source: Mott MacDonald

2.2.2 Walking and Cycling Distances from Cambridge Station

Figure 3 summarises how far one can travel from Cambridge station in 25 minutes, walking at a speed of 1.2 metres per second (m/s).

Figure 3: Walk Distance from Cambridge Station

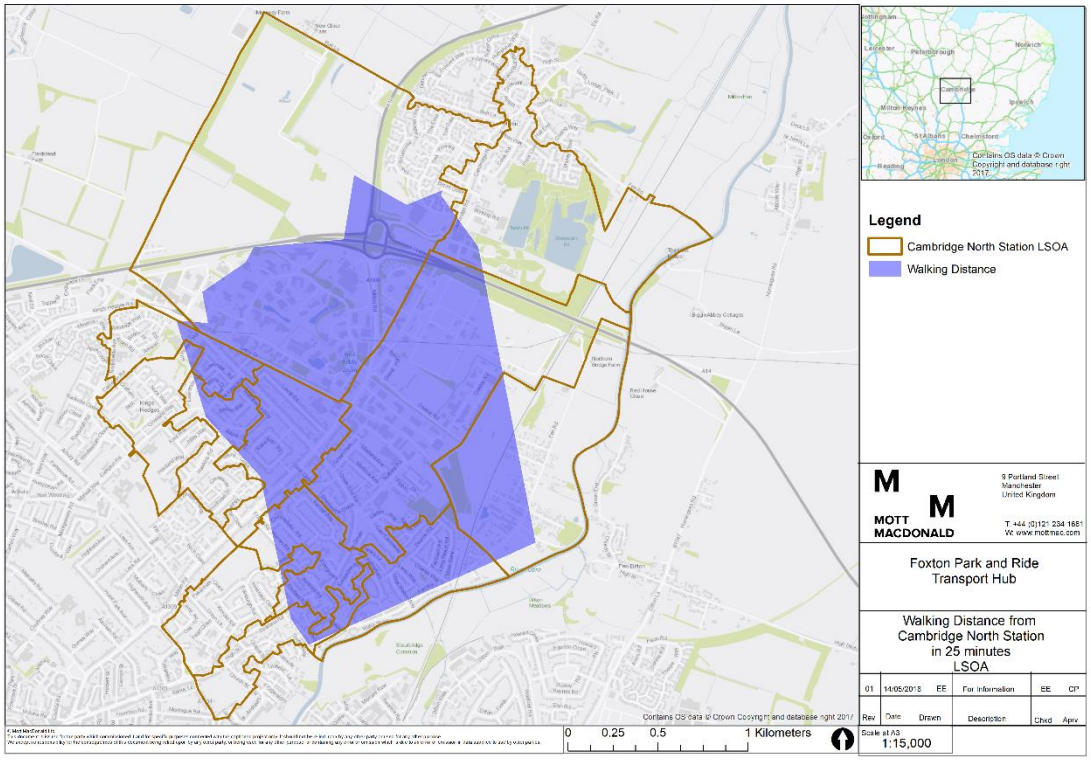


Source: Mott MacDonald

2.2.3 Walking Distance from Cambridge North Station

Figure 4 summarises how far one can travel from Cambridge North station in 25 minutes walking at a speed of 1.2 m/s.

Figure 4: Walk Distance from Cambridge North Station

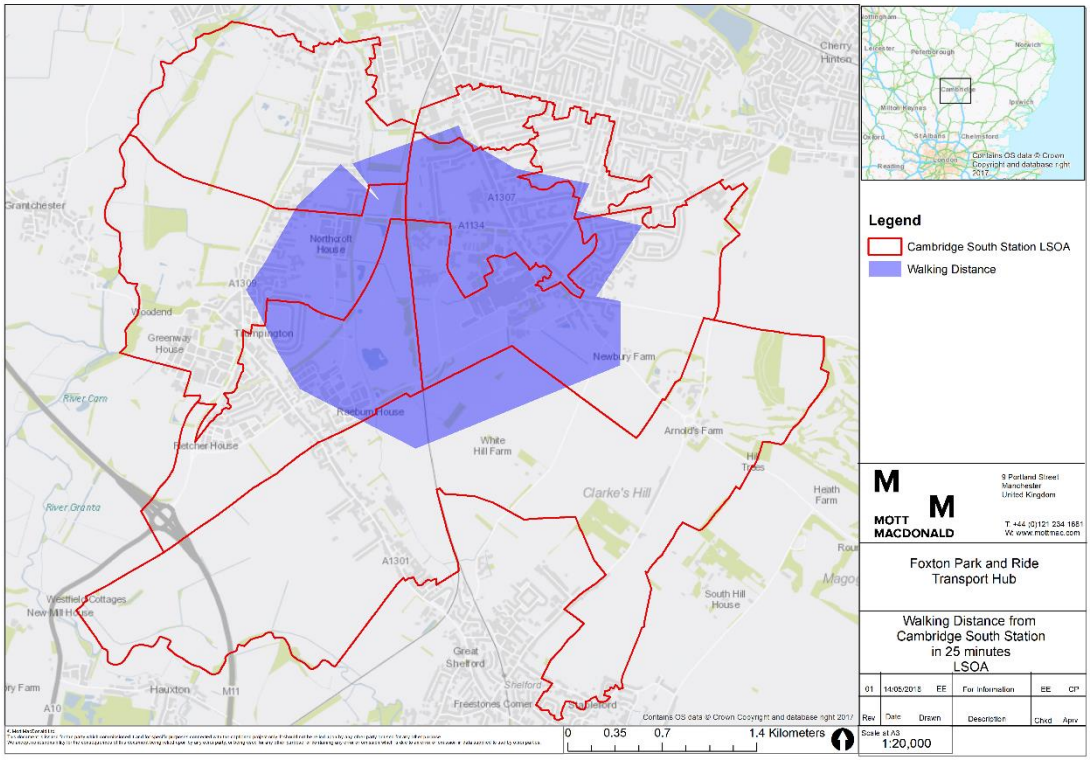


Source: Mott MacDonald

2.2.4 Walking Distances from the Proposed Cambridge South Station

Figure 5 summarises how far one can travel from the assumed proposed location of Cambridge South station in 25 minutes of walking at a speed of 1.2 m/s.

Figure 5: Walking Distance from the Proposed Cambridge South Station



Source: Mott MacDonald

3 Stages of Data Extraction

3.1 Introduction

Section 3 sets out the processes of data extraction used to inform the trip forecasting exercise.

3.2 Method Used

The first step of data extraction involved obtaining LSOA level origin-destination data from the dataset WF01BEW 'Location of usual residence and place of work'; this data set does not provide modal data.

The second step of data extraction used modal data from the dataset WU03EW 'Location of usual residence and place of work by method of travel to work'. WU03EW provides origin destination data by mode at the Middle Super Output Area (MSOA) level.

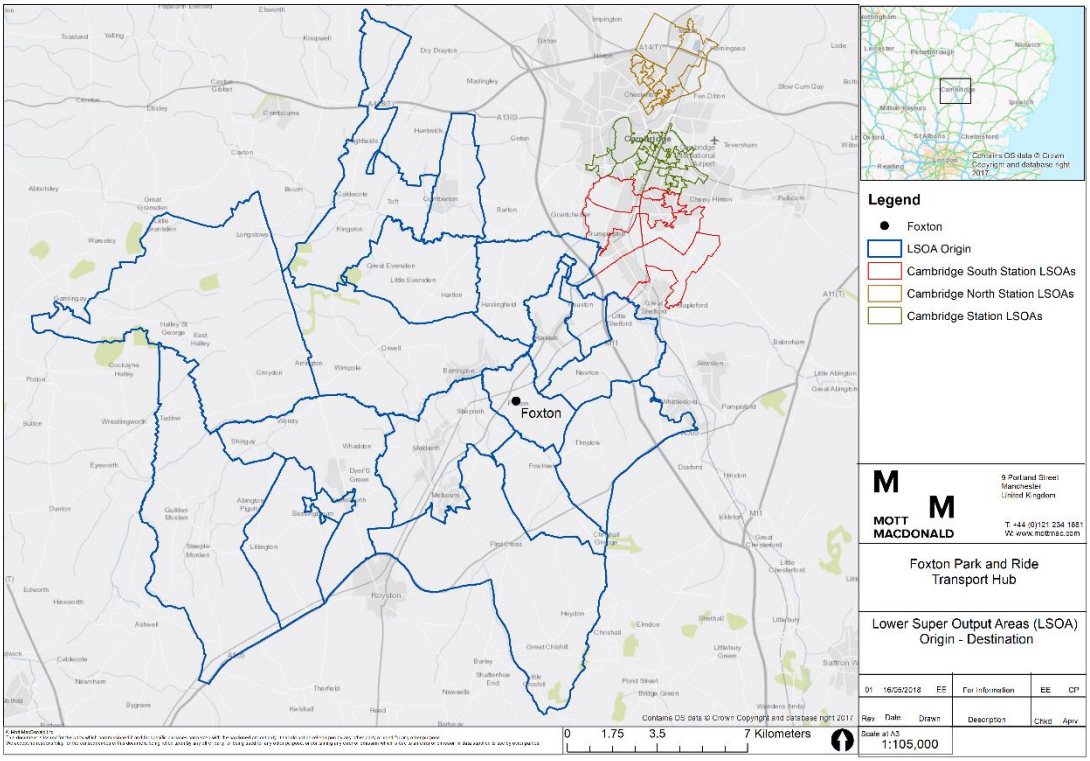
The third step of the data extraction process involved combining elements of the two data sets outlined above. This involved applying the modal element of the WU03EW dataset to the origin destination data extracted from the WF01BEW dataset. In doing this, the lack of modal data in the WF01BEW dataset, and the less spatially discrete nature of the WU03EW was mitigated.

3.3 Output Area Selection

The following section sets out how the output areas for each method of data extraction were selected.

The GIS polygons presented in Figure 2 to Figure 5 were used to inform the selection of the relevant LSOAs for the census data extraction. Figure 6 shows the origin output areas selected at the LSOA level.

Figure 6: Selected Origin and Destination LSOA areas



Source: Mott MacDonald

During the process of selecting the relevant LSOAs professional judgement was used to exclude certain LSOAs from the Foxton origin catchment.

The reasoning behind the selection of the presented LSOAs is as follows. It was deemed likely that commuting from LSOAs to the east of the M11 corridor to Foxton station would lead to longer journey times. To demonstrate, commuters are unlikely to make this movement due to the provision of more proximate high quality public transport (HQPT) links, namely rail connections at Whittlesford, Great Chesterford and the Shelfords, the Citi 7 bus service, and Babraham Road Park and Ride.

Furthermore, LSOAs containing high quality public transport links to Cambridge that are more accessible than Foxton station were not selected because people are more likely to use more proximate HQPTs. Examples include the LSOAs that contain Meldreth and Melbourne, Shepreth, Royston, Whittlesford and Great Chesterford.

4 Trip Forecasting

4.1 Introduction

Section 4 presents the results of the initial trip forecasting exercise. The purpose of this section is to provide an indication of how many rail trips will be made between the Foxton station origin area, and the two workplace destinations areas around Cambridge and Cambridge North station.

4.2 Scenario Selection

In order to develop an understanding of the potential demand for parking spaces at the proposed Park and Ride site at Foxton station, we created four potential scenarios.

Each scenario provides a percentage that represents how many people travel between the Foxton origin catchment and the destination station catchment by rail. The four scenarios are listed in Table 2 below.

Table 2: Proposed Scenarios

Scenario	Proportion of Potential Park and Ride (rail) Commuters
Scenario 1	Existing
Scenario 2	10%
Scenario 3	20%
Scenario 4	30%

Source: Mott MacDonald

To determine which scenario might be most appropriate for the proposed Foxton Park and Ride site, a series of calculations based on existing observed local travel patterns in the vicinity of Whittlesford Parkway station were made. Whittlesford Parkway station was chosen as a comparator for Foxton due to its rural location and comparable journey times to Cambridge. Unlike Foxton station however, Whittlesford Parkway currently provides 383 car parking spaces.

Firstly, origin-destination by mode data was extracted from the Census 2011 dataset WU03EW – 'Location of usual residence and place of work by method of travel to work'. Here, the output areas South Cambridgeshire 017 and South Cambridgeshire 018 were selected as origin locations with reasonable access to Whittlesford Parkway, and were paired with destination output areas proximate to Cambridge station (these being the same as those identified for the Foxton catchment analysis above). The rail mode share of these two geographies is as follows:

- South Cambridgeshire 017, which includes Duxford, Whittlesford and Hinxton/Ickleton, had a rail mode share to Cambridge of 8%;
- South Cambridgeshire 018, which includes Meldreth and Shepreth, had a rail mode share to Cambridge of 16%.
- The weighted average rail mode share to Cambridge of both output areas was 12%.

Given the proposed high-quality park and ride facilities at Foxton station, growth in demand and an increasing focus on parking restraint at the destination end, a working assumption of 20% of

people travelling between the Foxton origin catchment area and the destination station catchment area was deemed reasonable for the basis of this initial analysis.

4.3 Trip Forecast

Table 3 presents the forecast number commuting trips to Cambridge Station from the Foxton polygon, and Table 4 presents the forecast number of commuting trips to Cambridge North.

Table 3: Total Commuters to Cambridge Station

Destination Station: Cambridge		
Combined Origin Area Scenario	**Proportion of Commuters**	**Total Commuters**
Scenario 1	Average Existing Mode Share (5%)	47
Scenario 2	10%	141
Scenario 3	20%	282
Scenario 4	30%	423

Source: Mott MacDonald

Table 4: Total Commuters to Cambridge North

Destination Station: Cambridge North		
Combined Origin Area Scenario	**Proportion of Commuters**	**Total Commuters**
Scenario 1	Average Existing Mode Share (1%)	10
Scenario 2	10%	46
Scenario 3	20%	92
Scenario 4	30%	138

Source: Mott MacDonald

The trip forecasting exercise shows that with the most up to date data available (Census 2011):

- 47 commuters travel to Cambridge station, and;
- 10 to Cambridge North station, giving;
- 57 trips in total.

If the level of rail mode share increased to 20%, this would generate:

- 282 rail commuting trips to Cambridge, and;
- 92 to Cambridge North, giving;
- 374 in total.

4.3.1 Trip Forecasting with CNFE

The Cambridge Northern Fringe East (CNFE) proposed development represents a significant development opportunity for the Greater Cambridge area. The detailed proposals for the site still require further development and exploration through the planning process; however, any proposal that come forward are likely to create significant transport demand under any scenario. Therefore, it is likely that CNFE will impact upon rail trips between Foxton and Cambridge North station.

Given the above, it is important to reflect this in our demand forecasting exercise; however, the uncertainties warrant the need to make a working assumption about potential growth. It is

therefore considered reasonable, for the purposes of this initial approach to forecasting, to double the number of trips made to Cambridge North, although this will need refining through the detailed demand forecasting process.

Table 5 presents the forecast number of commuting trips to Cambridge North from the Foxton polygon with the CNFE growth factor applied.

Table 5: Total Commuters to Cambridge North with CNFE Growth

Destination Station: Cambridge North		
Combined Origin Area Scenario	**Proportion of Commuters**	**Total Commuters**
Scenario 1	Average Existing Mode Share (1%)	19
Scenario 2	10%	92
Scenario 3	20%	184
Scenario 4	30%	275

Source: Mott MacDonald

Table 6 shows the combined number of forecast trips for both Cambridge and Cambridge North stations with the CNFE growth factor applied.

Table 6: Total Commuters to Cambridge Station and Cambridge North

Combined Station Data		
Combined Origin Area Scenario	**Proportion of Commuters**	**Total Commuters**
Scenario 1	Combined Average Existing Mode Share	66
Scenario 2	10%	233
Scenario 3	20%	466
Scenario 4	30%	698

Source: Mott MacDonald

The trip forecasting exercise shows that with the most up to date data available (Census 2011) and the CNFE growth factor applied, the combined number of trips to Cambridge and Cambridge North station for each scenario would be:

- 66 in Scenario 1;
- 233 in Scenario 2;
- 466 in Scenario 3; and
- 698 in Scenario 4.

5 Car Parking Demand

5.1 Introduction

The initial trip forecasting presented in Section 4 provides an approximate figure of the total number of people commuting by rail to Cambridge and Cambridge North station.

The following section provides an overview of the methods used to derive anticipated demand for car parking spaces at Foxton station. The note specifically considers the impact of employee absence from work, and the proportion of car trips to Foxton station that are likely to result in the use of a car parking space.

5.2 Absence from the Workplace

For the purposes of this study, we assumed that on any given day a proportion of employees do not attend their usual place of work. Absence from the workplace occurs for many reasons including, but not limited to, the following:

- Illness;
- Annual leave;
- Externals meetings/ business trips;
- Home working arrangements, and;
- Site work.

Considering these variables, we subsequently made a series of calculations to determine the percentage of employees in the workplace on any given day. The calculations were informed by the following evidence and assumptions:

- The average number of working days in the UK is 252 (ONS 2017);
- The majority of workers who work a 5-day week receive at least 28 days paid annual leave per year. After public holidays, this equates to 20 days of annual leave per year;
- The ONS 'Sickness absence in the labour market: 2016' study shows that an estimated 137.3 million working days were lost due to sickness or injury in the UK in 2016; this is equivalent to 4.3 days per worker, and;
- The Travel to Work Survey produced by Travel for Cambridgeshire states that on average 2.03% of people work from home.

Considering the information presented above, it was calculated that on average 88.4% of people travel to their workplace on any given weekday, which is deemed to be a reasonable figure.

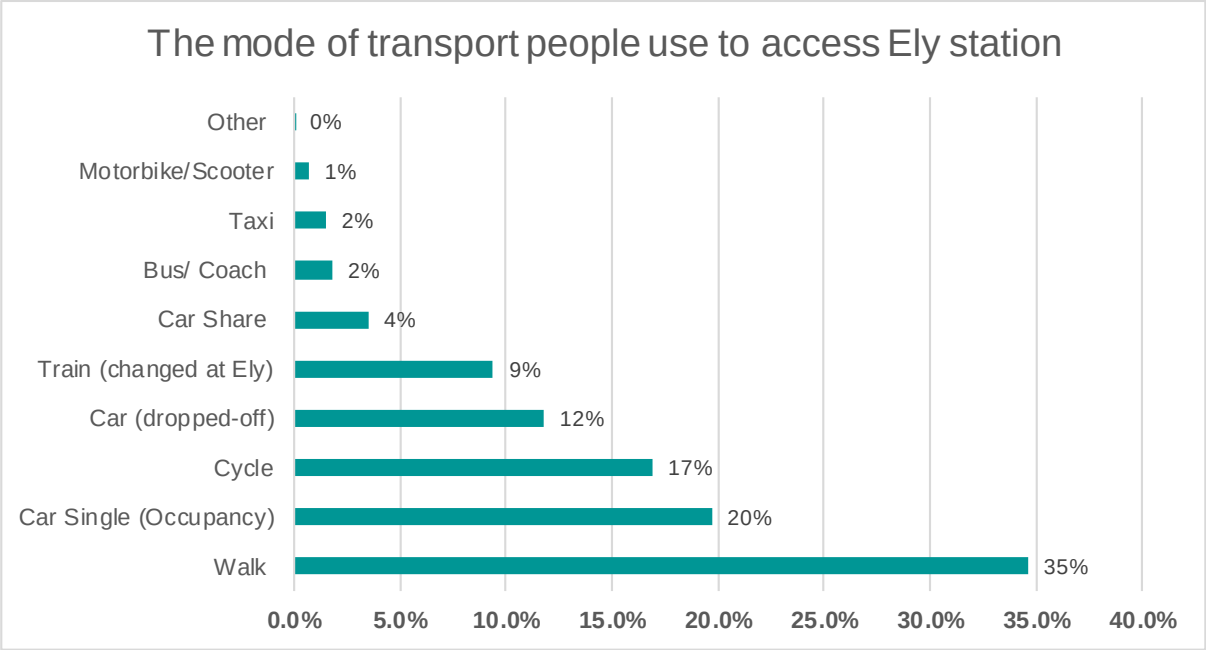
5.3 Car Park Usage

In order to produce an estimated percentage of people likely to park at Foxton station, we drew on the Ely Railway Station Interchange Study, produced by Integrated Transport Planning on behalf of East Cambridgeshire District Council (ECDC)[2].

[2] East Cambridgeshire District Council (2011). Ely Railway Station Interchange Study.

The Ely Railway Station Interchange Study contains information on how commuters currently travel to Ely station at peak hours on an average weekday, as summarised approximately in Figure 7.the figure below.

Figure 7: The Method of Travel People Use to Access Ely Station



Source: ECDC, Ely Railway Station Interchange Study

Whilst it is acknowledged that Ely, as a small city, is not wholly representative of the transport conditions found in the village of Foxton the high-quality modal data provided in the Ely Railway Station Interchange Study, which includes commuting journey's to/from Ely station, is not readily available for other rural stations in Cambridgeshire and is therefore a useful Cambridgeshire-specific data source for use in early forecasting.

In order to use the data from the study as a basis for calculating car parking demand at Foxton, walking, cycling and public transport modes were not used in the calculations. Instead, it has been assumed that all trips to Foxton station would be car-based.

Therefore, we divided the combined total of car (single occupancy), car (drop-off) and car share trips, by the combined total of car (single occupancy) trips and half of the total car share trips to reach the estimated percentage of people car parking at Foxton station. This calculation produced a figure of 61.3%.

Underlying this calculation were the following assumptions:

- Vehicles associated with car drop-off trips and taxis will not stay in the car park for an extended period, and;
- People who access Ely station via a car sharing arrangement will not constitute an entire single occupancy car trip; therefore, it was assumed that two people use one vehicle when car sharing.

In summary, we assumed that all single occupancy car trips result in a parked vehicle at the station, and that 1 car share trip constituted 0.5 cars parked.

5.4 Car Parking Demand

In this section, an estimation of car parking demand that considers absence from the workplace, and the proportion of car trips requiring car parking bays is provided.

1. Firstly, the average attendance at work rate was applied to previously calculated origin-destination data, and;
2. Secondly, the ratio of car-based trips to cars parked was applied to the absentee adjusted origin-destination data.

5.4.1 Cambridge North

Table 7 provides an estimate of the number of rail commuters travelling to the Cambridge North station destination catchment area, who require car parking spaces at Foxton station.

Table 7: Car parking spaces required at Foxton station for people who work within a 25-minute walk of Cambridge North Station

Destination Station: Cambridge North		
Combined Origin Area Scenario	**Proportion of Commuters**	**Spaces Required**
Scenario 1	Average Existing Mode Share	10
Scenario 2	10%	50
Scenario 3	20%	99
Scenario 4	30%	149

Source: Mott MacDonald

Table 7 shows that under Scenario 1 'existing rail mode share', 10 commuters who travel to Cambridge North would require car parking spaces at Foxton station. A growth to 20% rail mode share would require 99 spaces, and a 30% rail mode share would require 149 spaces.

5.4.2 Cambridge Station

Table 8 shows the calculated number of commuters travelling to the Cambridge Station destination catchment area, who require car parking spaces at Foxton station.

Table 8: Car parking spaces required at Foxton station for people who work within a 25-minute walk of Cambridge Station

Destination Station: Cambridge		
Combined Origin Area Scenario	**Proportion of Commuters**	**Spaces Required**
Scenario 1	Average Existing Mode Share	25
Scenario 2	10%	76
Scenario 3	20%	153
Scenario 4	30%	229

Source: Mott MacDonald

Table 8 shows that under Scenario 1 'existing rail mode share', 25 commuters traveling to the Cambridge Station polygon would require car parking spaces at Foxton station. A growth to 20% rail mode share would require 153 spaces, and a 30% rail mode share would require 229 spaces.

5.4.3 Combined Stations

Table 8**Error! Reference source not found.** presents the estimated number of commuters travelling to the Cambridge Station and Cambridge North destination catchment areas described above, who require car parking spaces at Foxton station.

Table 9: Car parking Demand for Commuters Travelling to Cambridge and Cambridge North Stations

Destination Station: Cambridge North and Cambridge Station Combined		
Combined Origin Area Scenario	**Proportion of Commuters**	**Spaces Required**
Scenario 1	Combined Average Existing Mode Share	36
Scenario 2	10%	126
Scenario 3	20%	252
Scenario 4	30%	378

Source: Mott MacDonald

The table shows that under Scenario 1 'existing rail mode share', 36 commuters would require car parking spaces at Foxton station. A growth to 20% rail mode share would require 252 spaces, and a 30% rail mode share would require 378 spaces.

6 Sensitivity Tests

6.1 Introduction

As part of the options development process for a Foxton Park & Ride Travel Hub, there is need to consider sensitivities to other potential transport interventions that may impact upon the scheme.

In this technical note, we focus on two of these sensitivities:

1. The proposed Cambridge South station, and;
2. Changes in rail service patterns that may result in additional fast trains from Foxton to London.

Additional sensitivity tests will be carried out as part of the demand forecasting and reassignment modelling using the CSRM SATURN highway model and the Highway England's SERTM model.

6.2 Cambridge South

A station at Cambridge South has been identified as part of the Cambridgeshire Long Term Transport Strategy (2015), reflecting the growth in the number of people working at and visiting the Cambridge Biomedical Campus (CBC). The proposed station has reached an advanced stage of feasibility work, and has the potential to substantially change travel patterns within the study area. As a result, we have replicated the trip forecasting methods used for Cambridge and Cambridge North station. The results of the trip forecasting exercise follow.

6.2.1 Trip Forecast

Table 10 presents the trip forecast for the proposed Cambridge South station based on the forecasting method set out in Section 4.

Table 10: Cambridge South Trip Forecast

Destination Station: Cambridge South		
Combined Origin Area Scenario	**Proportion of Commuters**	**Total Commuters**
Scenario 1	Average Existing Mode Share (4%)	27
Scenario 2	10%	92
Scenario 3	20%	184
Scenario 4	30%	275

Source: Mott MacDonald

The table shows that under Scenario 1 'existing rail mode share', 27 commuters travel to the proposed Cambridge South polygon. A growth to 20% rail mode share would generate 184 rail commuting trips, and a 30% rail mode share would generate 275 commuting trips.

6.2.2 Trip Forecast with CBC Growth

The proposed Cambridge South station is identified in the Cambridgeshire Long Term Transport Strategy, and has the potential to play a major role in meeting the transport needs of the Cambridge Biomedical Campus (CBC).

The CBC is a significant asset in the development of the UK's life science research, teaching and innovation. At present the CBC provides 17,250 jobs, but is forecast to grow significantly to 22,450 jobs by 2022, and to 26,00 jobs by 2026[3] as shown in table 11.

Table 11: Employment Growth at CBC

	2017	2022	2026
Employment Level	17,250	22,450	26,000
Growth	N/A	5,200.00	3,550.00
% Growth	N/A	30%	16%
Growth Factor	N/A	1.30	1.51

Source: Mott MacDonald

The significant forecast employment growth of approximately 50% between 2017 and 2026 has been considered in this report. The identified growth factor of 1.51 from 2017 to 2026 has been applied to the initial trip forecasting figures, which are shown below.

Table 12: Cambridge South Trip Forecast with CBC Growth

Destination Station: Cambridge South		
Combined Origin Area Scenario	**Proportion of Commuters**	**Total Commuters**
Scenario 1	Existing Mode Share	40
Scenario 2	10%	139
Scenario 3	20%	277
Scenario 4	30%	416

Source: Mott MacDonald

The table shows that under Scenario 1 'existing rail mode share', 40 commuters travel to the proposed Cambridge South polygon. A growth to 20% rail mode share would generate 277 rail commuting trips, and a 30% rail mode share would generate 416 commuting trips.

6.2.3 Car Parking Demand

The following table shows the estimated number of commuters travelling to the previously defined Cambridge South destination catchment area, who require car parking spaces at Foxton station.

[3] Cambridge Biomedical Campus Transport Needs Review

Table 13: Car Parking Spaces Required at Foxton Station - Cambridge South

Destination Station: Cambridge South		
Combined Origin Area Scenario	**Proportion of Commuters**	**Spaces Required**
Scenario 1	Average Existing Mode Share	22
Scenario 2	10%	75
Scenario 3	20%	150
Scenario 4	30%	225

Source: Mott MacDonald

The table shows that under Scenario 1 'existing rail mode share', 22 commuters travelling to the proposed Cambridge South catchment area would require car parking spaces at Foxton station. A growth to 20% rail mode share would require 150 spaces, and a 30% rail mode share would require 225 spaces.

6.3 Inner London

6.3.1 Introduction

The second sensitivity considered in this report is the potential for commuters to use Foxton as a hub for journeys to London and intermediate stations.

In order to test the potential number of number of trips from Foxton to London, Inner London was selected as a destination. Inner London is formed of the following boroughs of London:

- Camden
- Greenwich
- Hackney
- Hammersmith and Fulham
- Islington
- Kensington and Chelsea
- Lambeth
- Lewisham
- Southwark
- Tower Hamlets
- Wandsworth
- City of Westminster
- City of London

Inner London was selected because it makes up 62% of total jobs in Greater London, and thus was deemed the most attractive employment area (GLA Economics, 2017). In addition, it was deemed likely that the majority of commuters from the Foxton catchment area would travel to Inner London by train, whereas other modes of transport may be more viable for trips to areas in Outer London.

To inform the trip forecasting and car parking demand exercise, we replicated the methods used for the three Cambridge stations. The results of the trip forecasting and car parking demand exercises follow.

6.3.2 Trip Forecast

Table 14 presents the results of the trip forecasting exercise for those travelling to Inner London from the Foxton origin area.

Table 14: Total Commuters to Inner London

Destination: Inner London		
Combined Origin Area Scenario	**Proportion of Commuters**	**Spaces Required**
Scenario 1	Existing Mode Share (86%)	531
Scenario 2	87.5%	536
Scenario 3	90.0%	552
Scenario 4	92.5%	567

Source: Mott MacDonald

The table shows that under Scenario 1 'existing rail mode share', 531 commuters will travel to Inner London. A growth to 90.0% rail mode share would generate 552 rail commuting trips, and a 92.5% rail mode share would generate 567 commuting trips.

6.3.3 Car Parking Demand

Table 15 shows the estimated number of commuters travelling to Central and Inner London who might require car parking spaces at Foxton station under different scenarios.

Table 15: Total Commuters to Inner London

Destination: Inner London		
Combined Origin Area Scenario	**Proportion of Commuters**	**Spaces Required**
Scenario 1	Existing (86%)	288
Scenario 2	87.5%	291
Scenario 3	90.0%	299
Scenario 4	92.5%	307

Source: Mott MacDonald

The table shows that under Scenario 1 'existing rail mode share' 288 commuters traveling to Inner London require a car parking space. A growth to a rail mode share of 90% would generate a demand for 299 spaces, and a 92.5% rail mode share would generate a demand for 307 spaces.

At present however, approximately 86% of people who travel to London from the Foxton catchment area already do so by rail. Therefore, given the limited parking at Foxton station these commuters must park and rail at alternative stations; such as, Shepreth, Royston, Meldreth, the Shelford's or Whittlesford.

In light of this overall demand, we deemed it reasonable for the purposes of this initial assessment to assume that half of potential park and rail commuters originating in the Foxton catchment area, would potentially divert to use the proposed Foxton station park and ride car park. The table below shows the results of this assumption.

Table 16: Total Commuters to Inner London with 50% Demand

Destination: Inner London 50% of Total Parking Demand

Combined Origin Area Scenario	Proportion of Commuters	Spaces Required
Scenario 1	Existing (86%)	144
Scenario 2	87.5%	146
Scenario 3	**90.0%**	**150**
Scenario 4	92.5%	154

Source: Mott MacDonald

The table shows that under Scenario 1 'existing rail mode share', 144 commuters traveling to Inner London would require a car parking space. A growth to a rail mode share of 90% would generate a demand for 150 spaces, and a 92.5% rail mode share would generate a demand for 154 spaces.

7 Total Car Parking Demand

7.1 Introduction

Section 7 provides a summary of total car parking demand at Foxton station under the six calculated scenarios.

7.2 Car Parking Demand

Table 17 provides a summary of total anticipated car parking demand from commuters travelling to Cambridge Station, Cambridge North, Inner London and the proposed Cambridge South Station.

The table separates out car parking demand for each destination and sensitivity, before summarising total demand.

Table 17: Car Parking Demand for All Destinations

Destination	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Cambridge Station	25	76	**153**	229
Cambridge North	10	50	**99**	149
Existing Total	36	126	**252**	378
Cambridge South	22	75	**150**	225
Inner London	144 (Existing)	145 (87.5%)	**149 (90%)**	154 (92.5%)
Sensitivities	166	220	**300**	379
Existing + Sensitivities Total	201	347	**552**	757

Source: Mott MacDonald

Table 18 provides a combined summary of total anticipated car parking demand from commuters travelling to Cambridge Station, Cambridge North, Inner London and the proposed Cambridge South station.

Table 18: Car Parking Demand for Existing Conditions and Sensitivity Tests

Car parking Demand including Existing Conditions and Sensitivity Tests			
Scenario	**Proportion of Cambridge Commuters**	**Proportion of London Commuters**	**Spaces Required**
Scenario 1	Existing	Existing	201
Scenario 2	10%	87.5%	347
Scenario 3	**20%**	**90%**	**552**
Scenario 4	30%	92.5%	757

Source: Mott MacDonald

The initial car parking demand forecasting results shows that under Scenario 1, which is based on existing commuting rail mode share, 201 commuters will require a car parking space at Foxton Station.

The calculated car parking demand under the conditions of Scenario 2, which assumes a 20% rail mode share for trips to Cambridge Station, Cambridge North and Cambridge South, and an 90% rail mode share for those travelling to Inner London, predicts that 552 car parking spaces will be required at Foxton station.

Scenario 3 assumes a 30% rail mode share for trips to Cambridge Station, Cambridge North and Cambridge South and a 92.5% rail mode share for trips to Inner London. Scenario 6 produces the highest number of 757 required car parking spaces at Foxton station.

7.3 Car parking Demand with Capacity Limit Applied

Cambridgeshire County Council consider a car park to be full when it reaches 85% capacity; this is because 85% occupancy is considered to be the number beyond which issues of circulation, queuing, and a perception amongst users that they may not get a space in the car park occur. Therefore, the final anticipated demand for car parking spaces was multiplied by a ratio of 1.15.

Table 19: Car Parking Demand All Destinations

Car parking Demand Including Existing Conditions and Sensitivity Tests			
Scenario	**Proportion of Commuters**	**Proportion of London Commuters**	**Spaces Required**
Scenario 1	Existing	Existing	232
Scenario 2	10%	87.5%	399
Scenario 3	**20%**	**90%**	635
Scenario 4	30%	92.5%	871

Source: Mott MacDonald

The adjusted car parking demand forecasting results shows that under Scenario 1 ‘existing conditions’ 232 commuters will require a car parking space at Foxton Station. Scenario 3, which assumes a 20% rail mode share for trips to Cambridge Station, Cambridge North and Cambridge South, and a 90% rail mode share for those travelling to Inner London, predicts that 635 car parking spaces will be required at Foxton station, and Scenario 4 predicts that 871 car parking spaces will be required at Foxton station.

8 Conclusion

The information presented in this technical note provides an initial indication of the potential demand for car parking spaces at the proposed P&R site at Foxton station.

The early-stage analysis suggests that a scenario where 20% of people commuting between the Foxton origin catchment and Cambridge, Cambridge North and the proposed Cambridge South catchment areas, and 90% of people travel to Inner London, use rail services, would result in a demand for 552 car parking spaces. The results show that the demand for parking spaces for trips to the existing Cambridge stations of 252 spaces is marginally less than the 300 spaces forecast for the sensitivity test destinations.

Once CCC's guidance that a car park is at effective capacity when 85% of spaces are occupied, this figure rises to 635 spaces. Therefore, as a working assessment ahead of the forthcoming detailed modelling forecasts, a car park of 650 spaces is deemed a reasonable assumption.

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