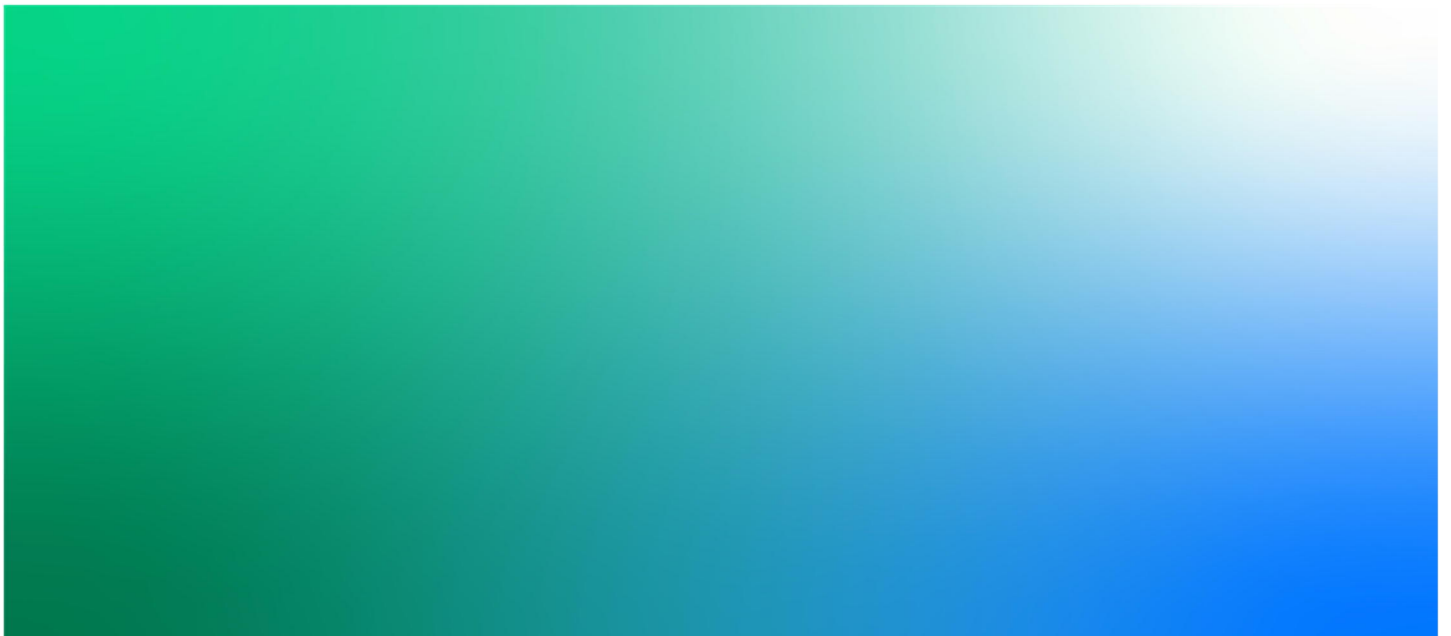




A10 Junctions and Dualling
SOBC Distributional Impacts Appraisal

July 2020

Cambridgeshire and Peterborough Combined Authority



A10 Junctions and Dualling

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Jacobs U.K. Limited

Cottons Centre, Cottons Lane
London SE1 2QG
United Kingdom
T +44 (0)20 3980 2000

www.jacobs.com

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1. Introduction

1.1 Purpose of report

This report details the Distributional Impact assessment undertaken for the A10 Junctions and Dualling scheme shortlist options. It supports the Economic Case chapter of the Strategic Outline Business Case (SOBC). The output from the report is a set of summary scores for the Distributional Impacts of the Scheme on different groups of people. These scores are entered into the Scheme's Appraisal Summary Table (AST) in Appendix I of the SOBC.

The assessment of Distributional Impacts (DIs) is designed to help understand the impacts of transport interventions on different groups of people, including those people that are potentially more vulnerable to the effects of transport.

The appraisal of DIs is split into three steps. Step 1 forms the screening phase, Step 2 forms the assessment and Step 3 forms the appraisal of impacts. This report considers steps 1 and 2, in line with the methodology set out in the SOBC Appraisal Methodology Report.

Consideration of the DIs of transport schemes is a requirement of the Department for Transport's (DfT) Transport Analysis Guidance (TAG). This report has therefore been produced in line with best practice guidance set out in the following TAG Unit A4.2: Distributional Impact Appraisal (May 2020).

2. Methodology overview

2.1 Screening Process

Each indicator is assessed individually in order to ensure a proportionate approach to the appraisal and to determine whether it needs to be appraised further. Consideration is given to whether:

- The transport intervention may have a negative or positive impact on specific social groups such as children, young people, older people, people with a disability, people without access to a car and the most deprived areas.
- Some or all of the expected negative impacts can be eliminated through amendment or re-design.
- The impacts are sufficiently minor and / or spatially dispersed such that a detailed DI appraisal is disproportionate to the potential impacts.

The impacts have been qualitatively assessed in the Strategic Outline Business Case. Not all impacts have been assessed because either information does not exist, or it is considered unproportionate to take into consideration at this time.

Where impacts are either significant or concentrated, it is considered that a full appraisal should be undertaken.

2.2 Assessment

Step 2 is divided into three further subsets, which are described below.

Step 2a: Confirmation of Areas Impacted by the Intervention

Step 2a of the DI process identifies the overall affected area for those indicators identified in Step 1 as necessary of a DI assessment. Not all indicators have the same affected area.

Step 2b: Identification of the Social Groups on the Impact Area

This step analyses the socio-economic, social and demographic characteristics of:

- Transport users that will experience changes in travel costs from the intervention.
- People living in the area who may experience impacts of the intervention.
- People travelling in areas identified as likely to be affected by the intervention.

Analysis of the characteristics of people in the area likely to be affected by the intervention should be undertaken through mapping social characteristics of interest at a suitably disaggregate level. Table 1 (TAG Unit 4.2 – Table 2) shows how impacts should be assessed for each group.

Table 1: Scope of Demographic Analyses (adjusted from TAG Unit 4.2 - Table 2)

Dataset / Social Group	User Benefits	Noise	Air Quality	Accidents	Security	Severance	Accessibility	Affordability
Income Distribution	✓	✓	✓				✓	✓
Children: proportion of population aged <16		✓	✓	✓	✓	✓	✓	
Young adults: proportion of population aged 16-25				✓			✓	
Young males: proportion of males aged 16-25				✓			✓	
Older people: proportion of population aged 70+				✓	✓	✓	✓	
Proportion of population with a disability					✓	✓	✓	
Proportion of population of Black and Minority Ethnic (BME) origin					✓		✓	
Proportion of households without access to a car						✓	✓	
Carers: proportion of households with dependent children							✓	

Step 2c: Identification of Amenities in the Impact Area

This step identifies the local amenities which are likely to be used by the identified social groups for each indicator such as schools, nurseries, hospitals, community centres, open spaces etc. This is not relevant for all indicators.

2.3 Appraisal

Step 3 provides an assessment of the impact of the intervention on each indicator's social groups for input into the Appraisal Summary Table (AST) and is split in to Core and Full appraisal. Core appraisal provides an assessment score for each indicator and each social group under consideration. The assessment score follows the guidance given for each indicator as set out in TAG Unit A4.2, but follows the broad principles set out in Table 5 of the TAG Unit, shown in Table 2 2.

Step 3 Appraisal will be undertaken at OBC stage for the screened-in impacts.

3. Screening Proforma

Step 1 identifies which of the eight DI indicators should proceed to Step 2, by assessing whether their impacts are either significant or concentrated. In accordance with DfT requirements, this assessment has been undertaken using a screening proforma provided in TAG Unit A4.2, which has been completed and is shown in Table 2.

Table 2 demonstrates that three DI indicators fulfilled the criteria to be taken to Step 2 of the appraisal for the Strategic Outline Business Case. These are:

- User Benefits
- Accidents
- Severance

These three indicators are discussed in the following chapters of the report individually.

Table 2: DI screening proforma

Indicator	(a) Appraisal Output Criteria	(b) Likely Potential Impact (yes/no, positive/negative)	(c) Qualitative Comments	(d) Proceed to Step 2
User benefits	The TUBA user benefit analysis software or an equivalent process has been used in the appraisal; and/or the value of user benefits Transport Economic Efficiency (TEE) table is non-zero.	Yes, positive	Expected journey time saving benefits for all car and bus users. Overall marginal impact on VOC with spatial distribution of beneficial/adverse impacts uncertain.	Yes (at SOBC stage)
Noise	Any change in alignment of transport corridor or any links with significant changes (>25% or <-20%) in vehicle flow, speed or %HDV content. Also note comment in TAG Unit A3.	To be evaluated at OBC	To be evaluated at OBC stage	Potentially yes (at OBC stage)
Air quality	Any change in alignment of transport corridor or any links with significant changes in vehicle flow, speed or % HDV content: <ul style="list-style-type: none"> • Change in 24 hour AADT of 1,000 vehicles or more • Change in 24 hour AADT of HDV of 200 HDV vehicles or more • Change in daily average speed of 10 kph or more • Change in peak hour speed of 20 kph or more • Change in road alignment of 5 m or more 	To be evaluated at OBC	To be evaluated at OBC stage	Potentially yes (at OBC stage)

Indicator	(a) Appraisal Output Criteria	(b) Likely Potential Impact (yes/no, positive/negative)	(c) Qualitative Comments	(d) Proceed to Step 2
Accidents	Any change in alignment of transport corridor (or road layout) that may have positive or negative safety impacts, or any links with significant changes in vehicle flow, speed, %HGV content or any significant change (>10%) in the number of pedestrians, cyclists or motorcyclists using road network.	Yes, positive.		Yes (at SOBC stage)
Security	Any change in public transport waiting/interchange facilities including pedestrian access expected to affect user perceptions of personal security.	No expected impact on security.	The scheme is not considered to impact on public transport waiting facilities / interchange facilities; changes to pedestrian access; changes to provision of lighting and visibility; changes to landscaping; or changes to formal or informal surveillance.	No
Severance	Introduction or removal of barriers to pedestrian movement, either through changes to road crossing provision, or through introduction of new public transport or road corridors. Any areas with significant changes (>10%) in vehicle flow, speed, %HGV content.	Yes, slight beneficial		Yes (at SOBC Stage)
Accessibility	Changes in routings or timings of current public transport services, any changes to public transport provision, including routing, frequencies, waiting facilities (bus stops / rail stations) and rolling stock, or any indirect impacts on accessibility to services (e.g. demolition & re-location of a school).	No expected impact on accessibility	The scheme design at this stage does not specifically address public transport routes.	No

Indicator	(a) Appraisal Output Criteria	(b) Likely Potential Impact (yes/no, positive/negative)	(c) Qualitative Comments	(d) Proceed to Step 2
Affordability	In cases where the following charges would occur; Parking charges (including where changes in the allocation of free or reduced fee spaces may occur); Car fuel and non-fuel operating costs (where, for example, rerouting or changes in journey speeds and congestion occur resulting in changes in costs); Road user charges (including discounts and exemptions for different groups of travellers); Public transport fare changes (where, for example premium fares are set on new or existing modes or where multi-modal discounted travel tickets become available due to new ticketing technologies); or Public transport concession availability (where, for example concession arrangements vary as a result of a move in service provision from bus to light rail or heavy rail, where such concession entitlement is not maintained by the local authority[1]).	To be evaluated at OBC	The scheme is not expected to impact on public transport fares. Impacts on vehicle operating costs to commuters and other users is expected.	Potentially yes (at OBC stage)

Table 3: Scope of Demographic Analyses (adjusted from TAG Unit 4.2 - Table 2) for SOBC analysis

Dataset / Social Group	User Benefits	Accidents	Severance
Income Distribution	✓		
Children: proportion of population aged <16		✓	✓
Young adults: proportion of population aged 16-25		✓	
Young males: proportion of males aged 16-25		✓	
Older people: proportion of population aged 70+		✓	✓
Proportion of population with a disability			✓
Proportion of households without access to a car			✓

5. User Benefits

5.1 Qualitative assessment of impacts

According to TAG, user benefits of schemes are experienced in certain areas and by certain groups of people. Whilst it is not possible to attribute social impacts to user benefits, there are distributional impacts that should be considered in the appraisal process. Consequently, it is important to understand the pattern of user benefits and disbenefits generated by the transport intervention as it develops.

User Benefits describe the travel time and vehicle operating cost (VOC) benefits provided by the Scheme. They are calculated using the industry standard software TUBA in accordance with TAG Unit A1.3. The DI appraisal of User Benefits is only concerned with home-based non-business car trips within the affected area.

The quantitative assessment of user benefits will be undertaken for the preferred option at OBC stage. For SOBC, the assessment has focused on identifying the distribution of income within the expected area of impact of the scheme, common to all options.

5.2 Spatial distribution of user benefits

Comparison of the spatial distribution of benefits between options has been undertaken by calculating the non-business user benefits over all time periods by origin sector, obtained from the TUBA outputs produced for the economic analysis. Table 4 compares the results for all options. Option G shows negative net user benefits for trips originating in East Cambridgeshire and Huntingdonshire. Across all options the strongest user benefits per head of population are experience in South Cambridgeshire.

Table 4 Non business user benefits per usual resident population (£PV over the appraisal period, 2010 prices)

Sector	Option A	Option B	Option C	Option D	Option E	Option F	Option G
Cambridge	939	805	452	905	948	390	274
East Cambridgeshire	1,132	1,206	266	1,070	1,239	111	-246
Huntingdonshire	328	376	38	229	339	115	-71
South Cambridgeshire	1,898	1,820	1,192	1,660	1,232	592	252
Other	2	2	1	2	2	1	0

Figure 2 presents the distribution of user benefits for option A and Figure 3 presents the distribution of user benefits for option B. For both options the highest concentration of user benefits map to South Cambridgeshire, followed by East Cambridgeshire.

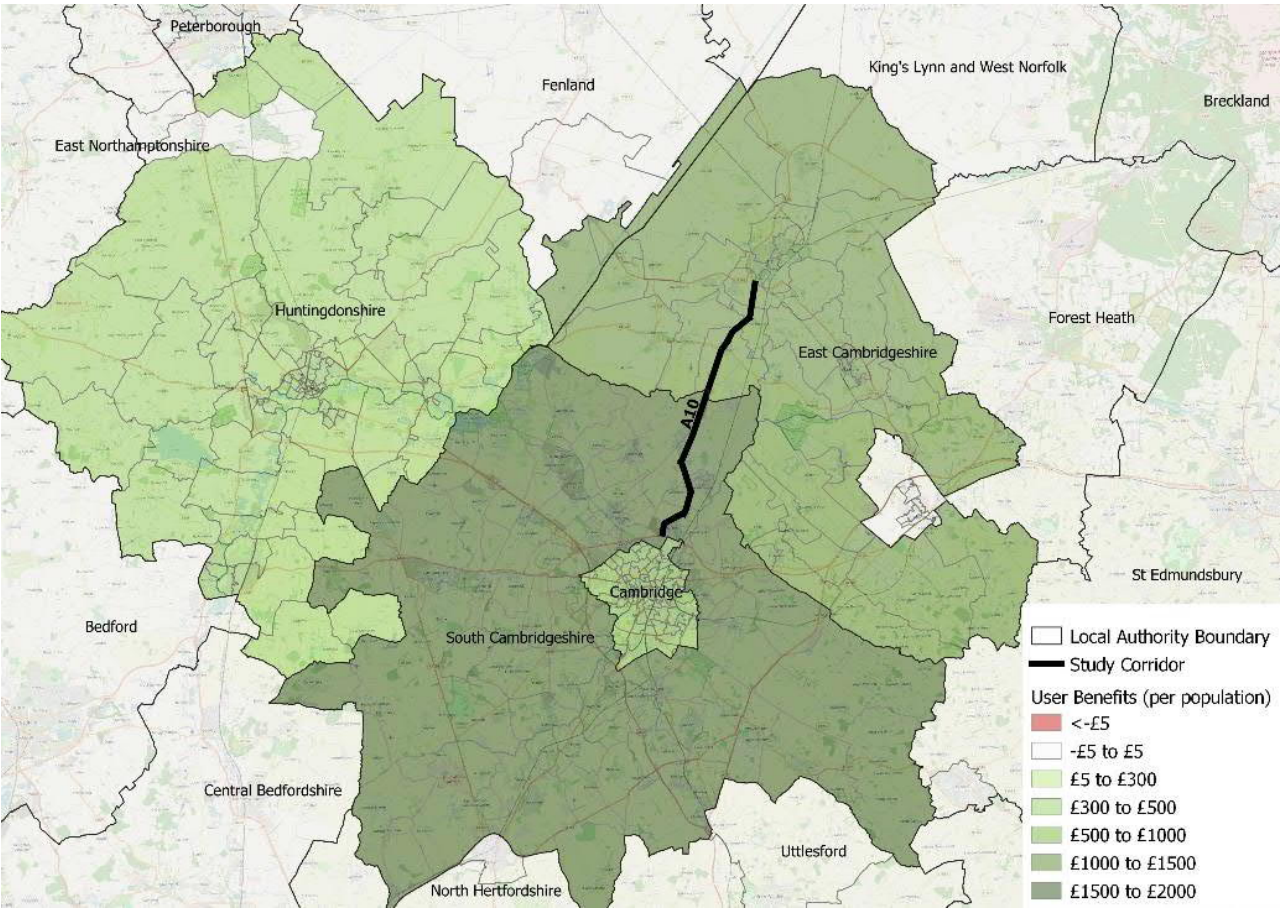


Figure 2 Distribution of user benefits by trip origin, non-business users, all time periods - Option A

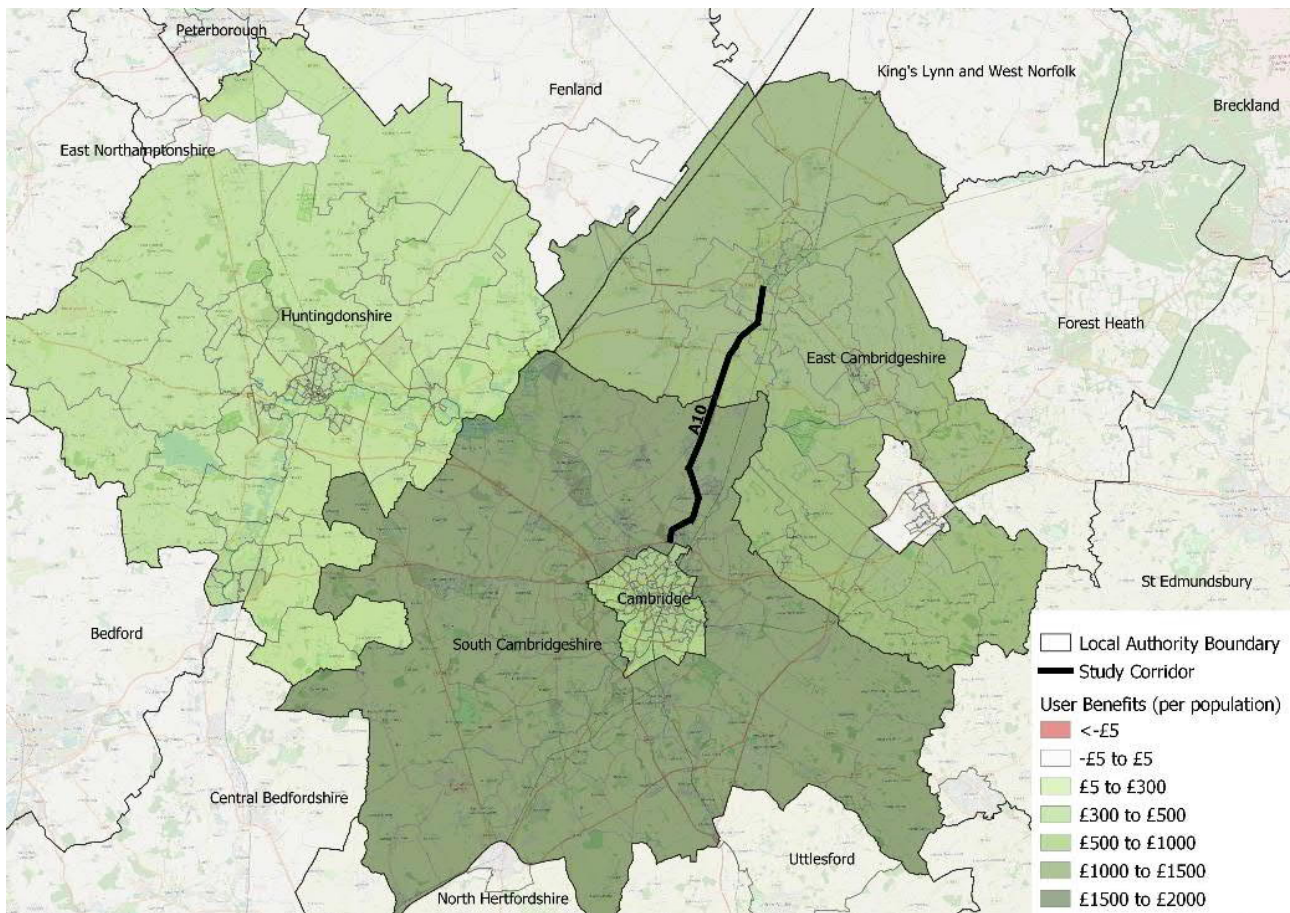


Figure 3 Distribution of user benefits by trip origin, non-business users, all time periods - Option B

Figure 4 presents the distribution of user benefits for option C.

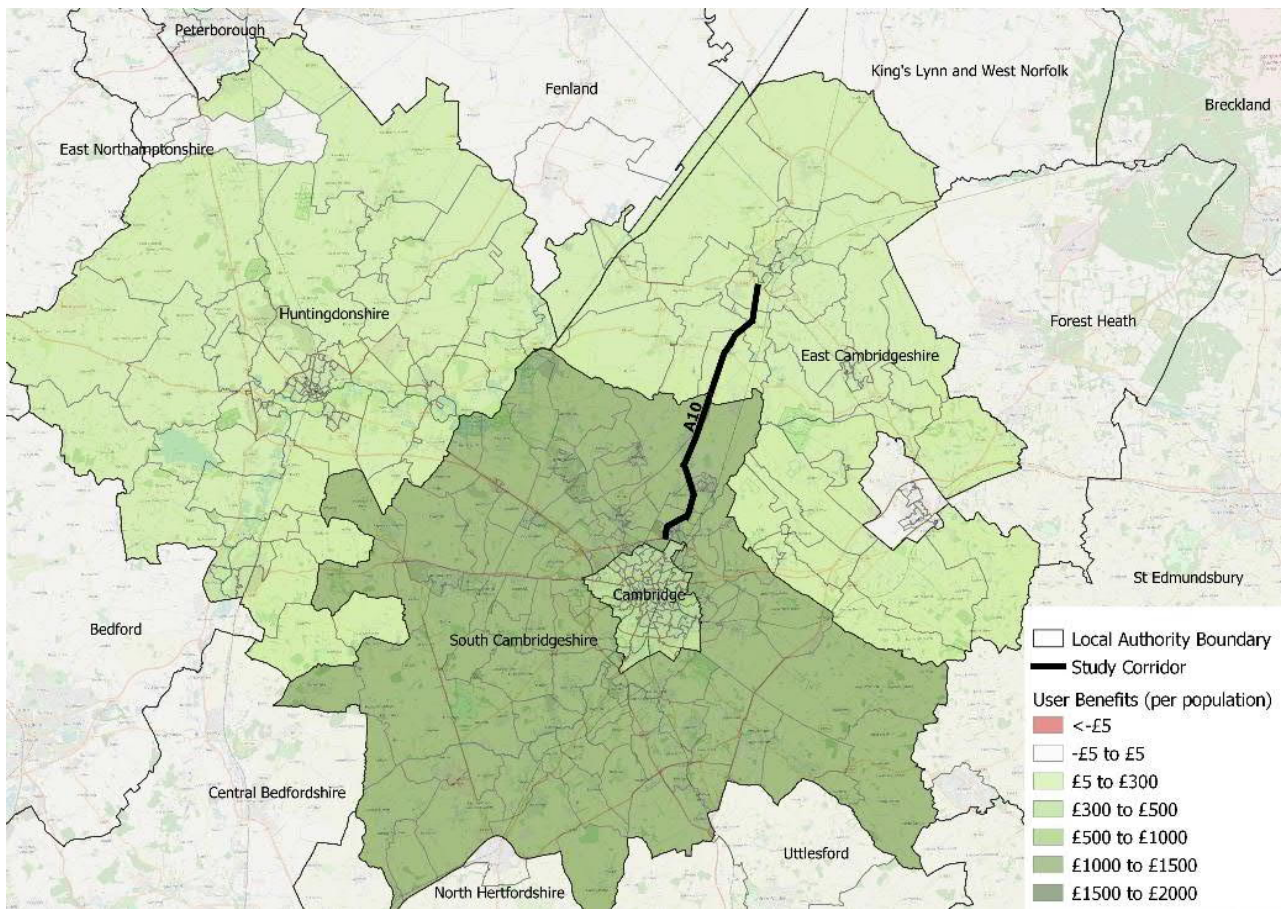


Figure 4 Distribution of user benefits by trip origin, non-business users, all time periods - Option C

Figure 5 presents the distribution of user benefits for option D.

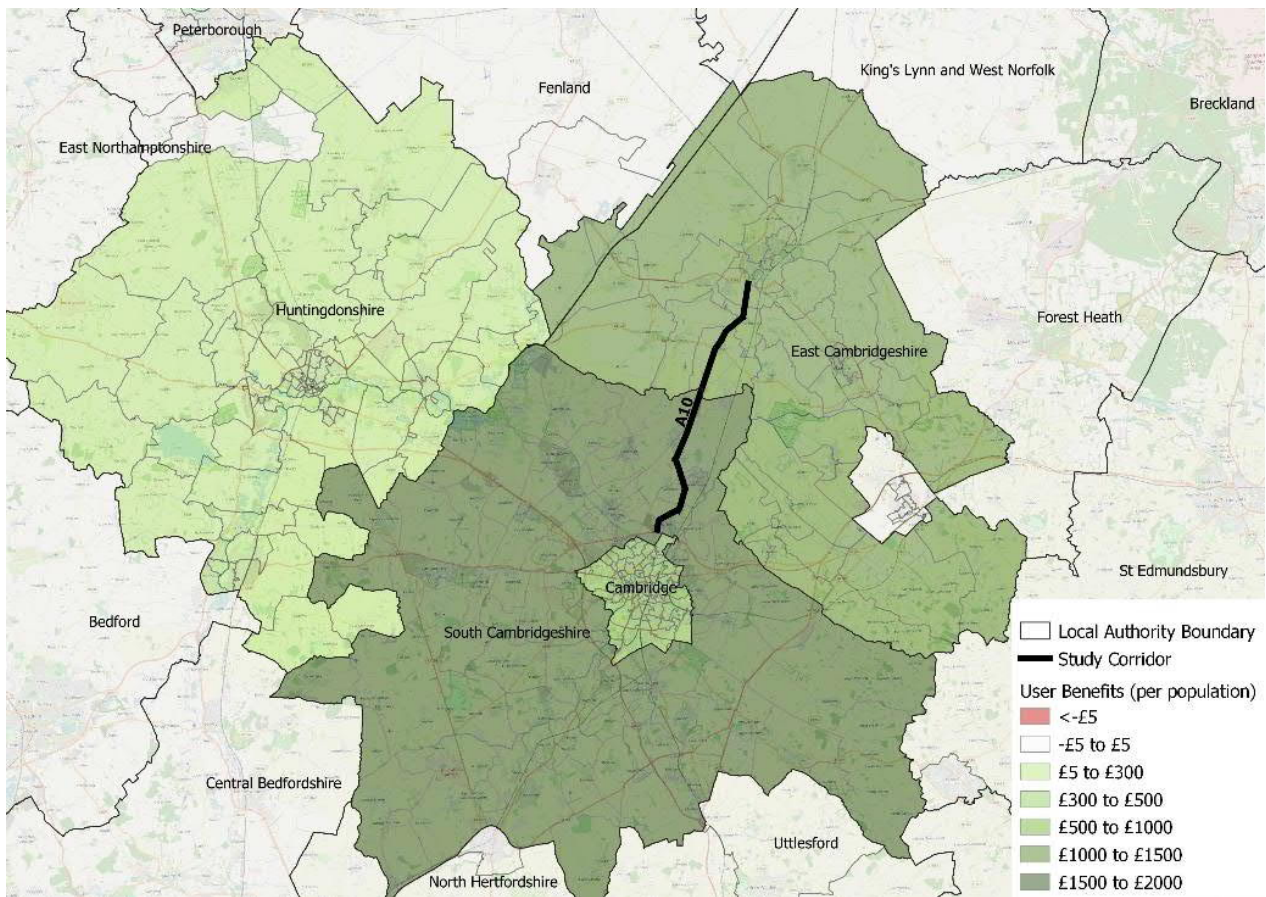


Figure 5 Distribution of user benefits by trip origin, non-business users, all time periods - option D

Figure 6 presents the distribution of user benefits for option E.

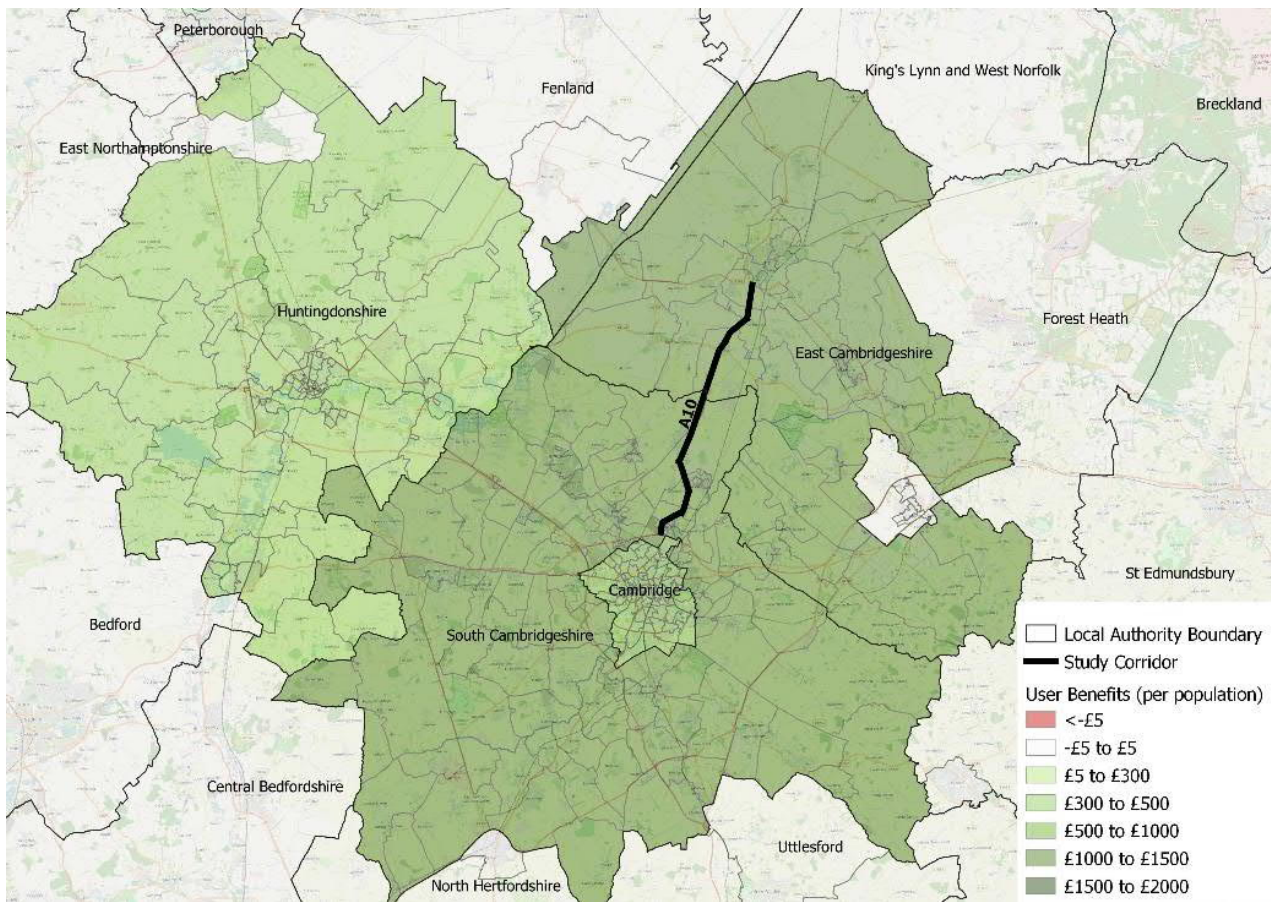


Figure 6 Distribution of user benefits by trip origin, non-business users, all time periods - Option E

Figure 7 presents the distribution of user benefits for option F.

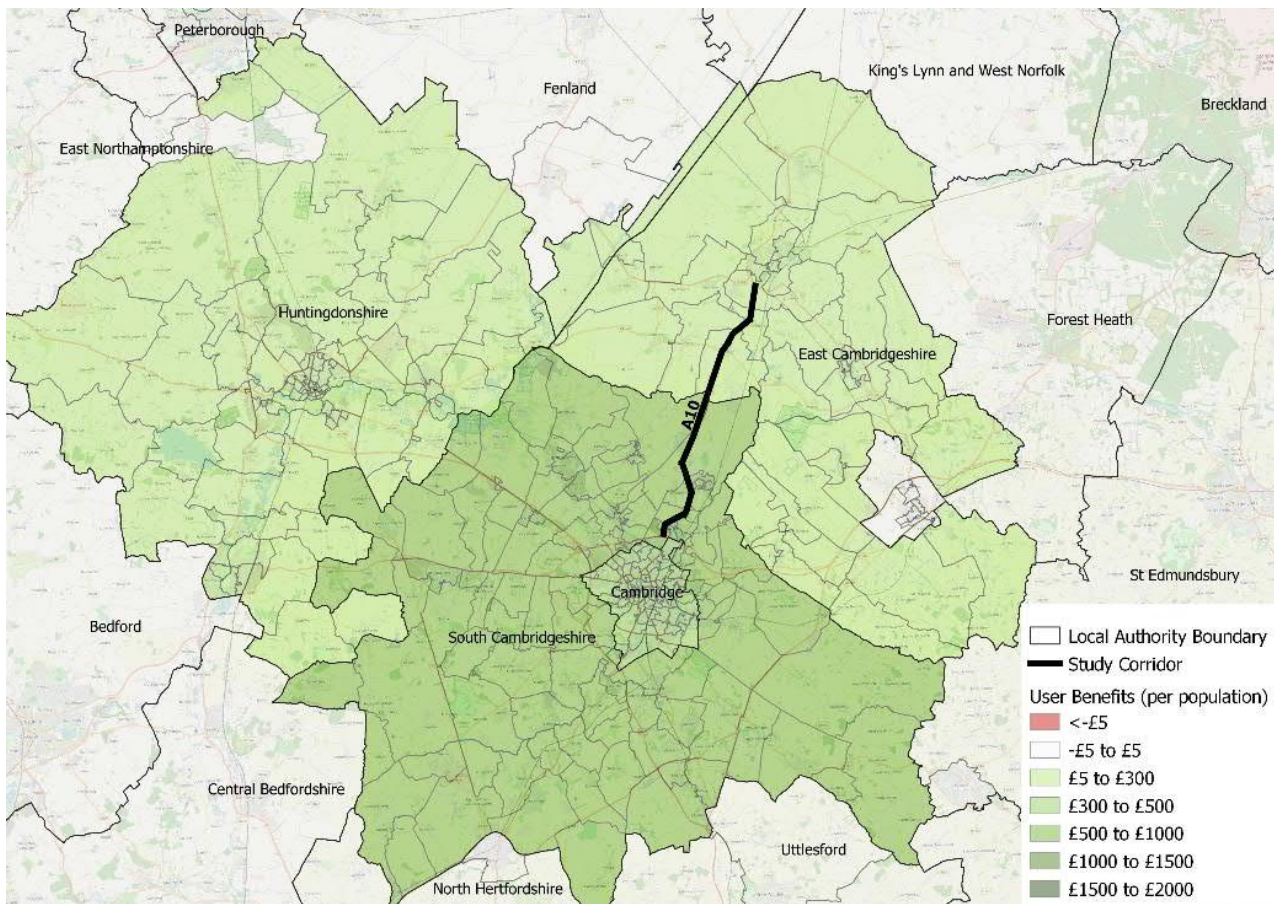


Figure 7 Distribution of user benefits by trip origin, non-business users, all time periods - Option F

Figure 8 presents the distribution of user benefits for option G.

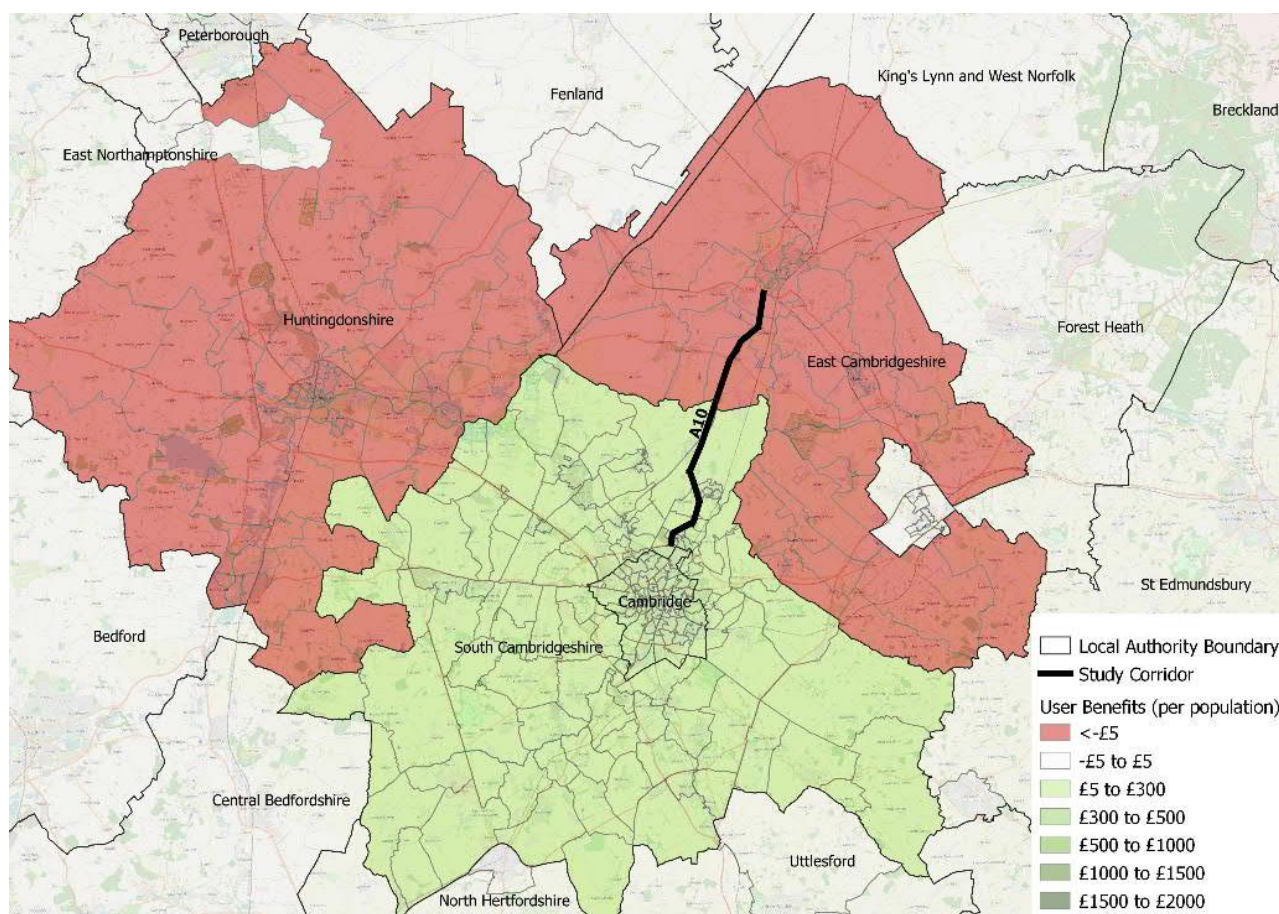


Figure 8 Distribution of user benefits by trip origin, non-business users, all time periods - Option G

For all options the strongest concentrations of user benefits are assigned to South Cambridgeshire. For all options except option G, East Cambridgeshire is associated with the next highest concentration of benefits. The full length dualling options A, B, D and E provide the strongest benefits to East Cambridgeshire, with the fully offline dualling option D providing East Cambridgeshire as a whole with a similar level of benefit as received by South Cambridgeshire as a whole. The two partial dualling options C and F provide a weaker level of net user benefit for East Cambridgeshire.

5.3 Identification of social groups and amenities

The purpose of Step 2b & 2c is to identify the different social groups and amenities within the area affected by the scheme (as defined within Step 2a).

The analysis of social groups within the affected area for User Benefits is restricted to assembling an income profile of the affected area, as shown in Table 5. The income profile of the area, based on the Indices of Income Deprivation at the LSOA level, as shown in Figure 9.

Population estimates for each of the Income Quintiles within the User Benefits affected area are summarised in Table 5.

Table 5: Income deprivation within the study area

	Income Quintiles					Totals
	Most Deprived ← → Least Deprived					
	1	2	3	4	5	
No of LSOAs in affected area	5	23	79	85	118	310
Population in affected area	8,187	38,163	141,455	153,848	200,438	542,091
Share of overall population	2%	7%	26%	28%	37%	

The majority of residents in the area are in the top three income quintiles, particularly in the immediate vicinity of the scheme. As such, the most and second most deprived social groups are not expected to experience significant changes of travel time as a result of the A10 scheme.

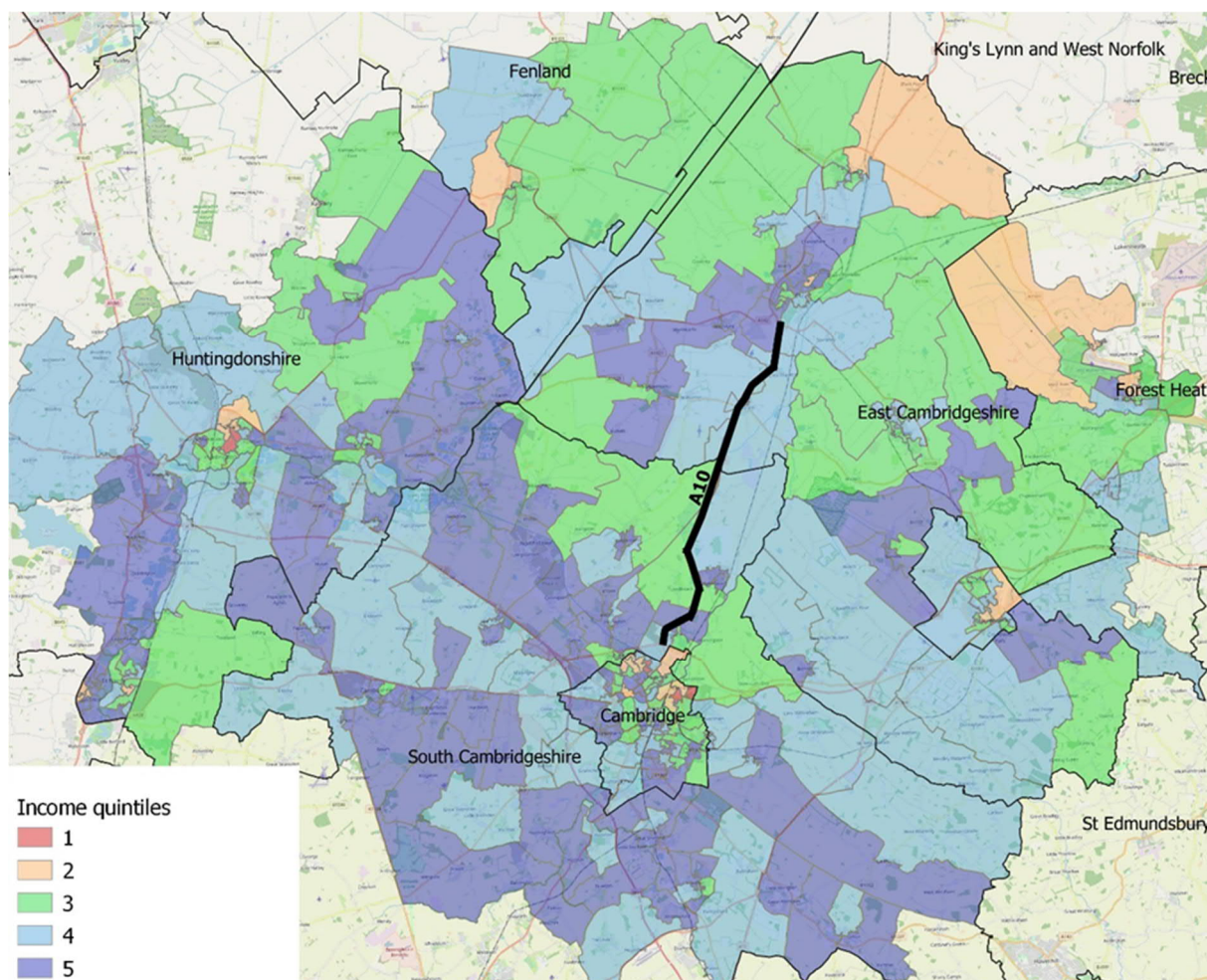


Figure 9 Income deprivation quintiles (1 = most deprived)

Since only 2% of the study area population live in the areas with the highest levels of income deprivation it can be expected that the scheme will have little impact overall on those from the lowest income groups.

6. Accidents

6.1 Confirmation of impacted areas

All options would be expected to have a beneficial impact on accidents. Table 6 shows the qualitative assessments for each option, as presented in the Appraisal Summary Tables.

Table 6 Accident impacts assessment

Option	Qualitative assessment	Score
A	Significant reduction in collisions would be expected between A14 and Cambridge Research Park and on minor alternative routes due to demand diverting to the new offline sections. Modern dual carriageways are statistically safer than older single carriageway A roads.	Moderate beneficial
B	Significant reduction in collisions would be expected between A14 and Cambridge Research Park and on minor alternative routes due to demand diverting to the new offline sections. Modern dual carriageways are statistically safer than older single carriageway A roads.	Moderate beneficial
C	Significant reduction in collisions would be expected between A14 and Cambridge Research Park and on minor alternative routes due to demand diverting to the new offline section. Slight decrease in collisions at junctions along the rest of the route. Whilst the northern section would not be dualled, its safety record is better than the national average.	Moderate beneficial
D	Significant reduction in collisions would be expected along the length of the existing alignment and on minor alternative routes due to demand diverting to the new route. Modern dual carriageways are statistically safer than older single carriageway A roads.	Large beneficial
E	Moderate reduction in collisions due to congestion reduction along the route and bypass of Stretham. Modern dual carriageways are statistically safer than older single carriageway A roads.	Moderate beneficial
F	Moderate reduction in collisions between A14 and Cambridge Research Park, slight improvements at upgraded junctions. Whilst the northern section would not be dualled, its safety record is better than the national average.	Moderate beneficial
G	Moderate reduction in collisions at upgraded junctions but no impact on congestion-related collisions along A10	Slight beneficial

6.2 Identification of social groups and amenities

The sensitive population groups relevant to accidents DI are: Children aged under 16, young people aged 16-25 and Older People aged 70 and over.

Children aged under 16 account for 20% of the population in South Cambridgeshire and 19% in East Cambridgeshire. Figure 10 presents the proportions of population aged under 16 close to the areas identified as having potential accident impacts. In areas adjacent to expected accident impacts the proportion of population aged under 16 ranges between 17% and 22%, which is not significantly different from the local average.

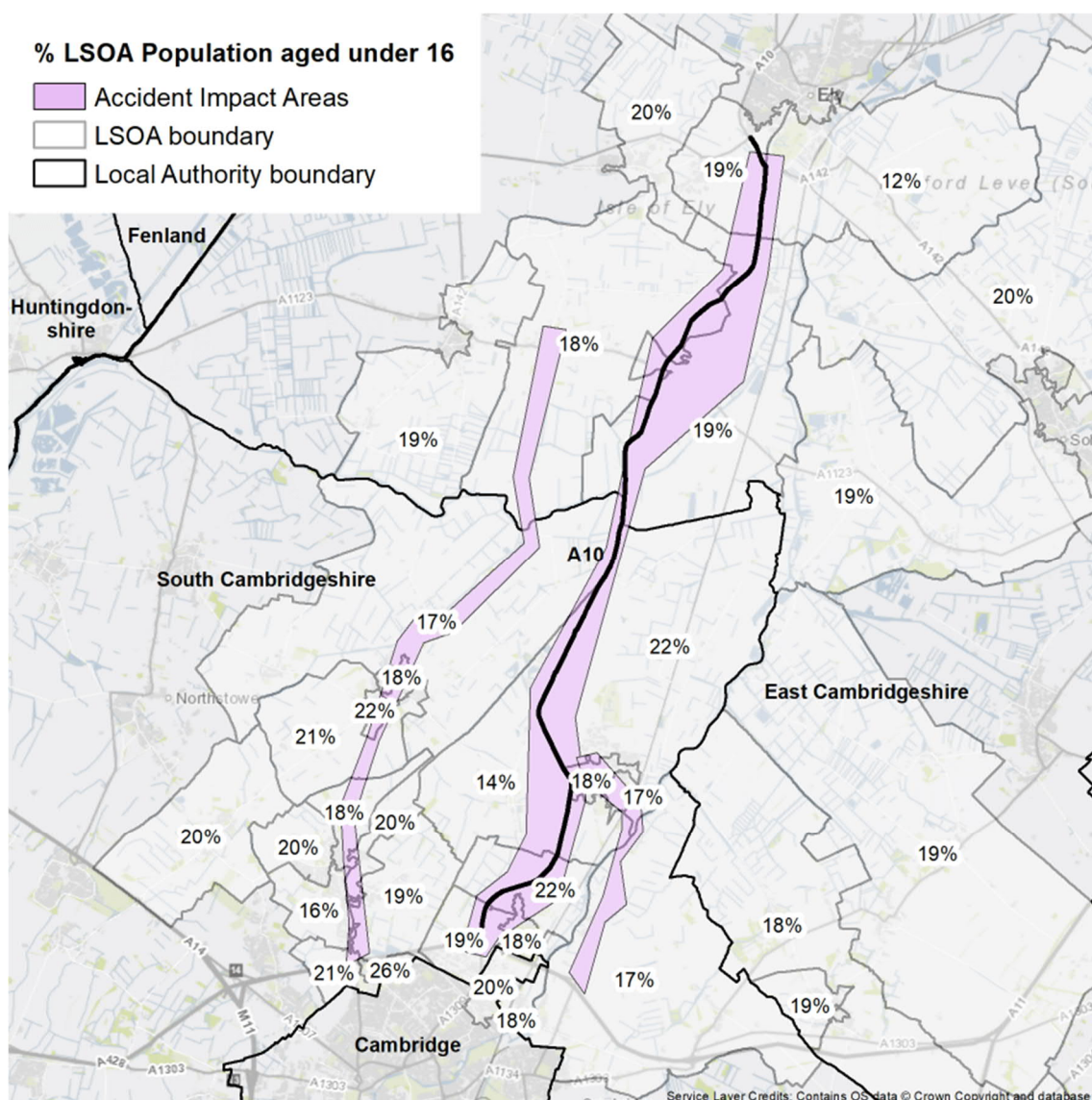


Figure 10 Population aged under 16

Young people aged 16-25 account for 16% of the population in both South Cambridgeshire and East Cambridgeshire. Figure 11 presents the proportions of population aged 16-25 close to the areas identified as having potential accident impacts. In areas adjacent to expected accident impacts the proportion of population aged 16-25 ranges between 15% and 18%, which is not significantly different from the local average. Some nearby locations have particularly high concentrations of young people, particularly in north of Cambridge and north of Waterbeach.

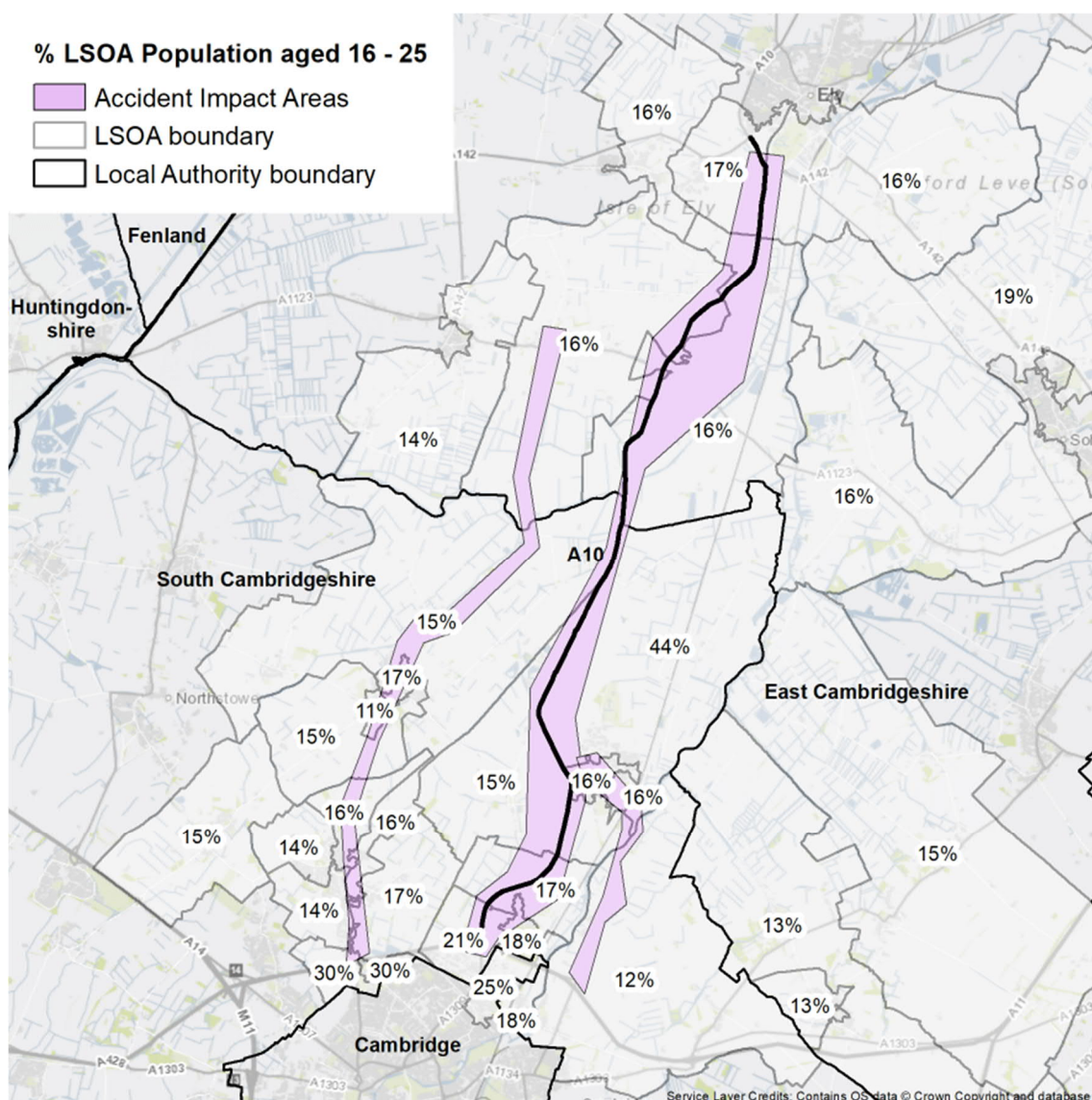


Figure 11 Population aged 16-25

Older people aged 70 and over account for 12% of the population in both South Cambridgeshire and East Cambridgeshire. Figure 12 presents the proportions of population aged 70 and over close to the areas identified as having potential accident impacts. Most of these areas are close to the local average, however some areas have particularly low proportions of older people, coinciding with higher concentrations of younger people.

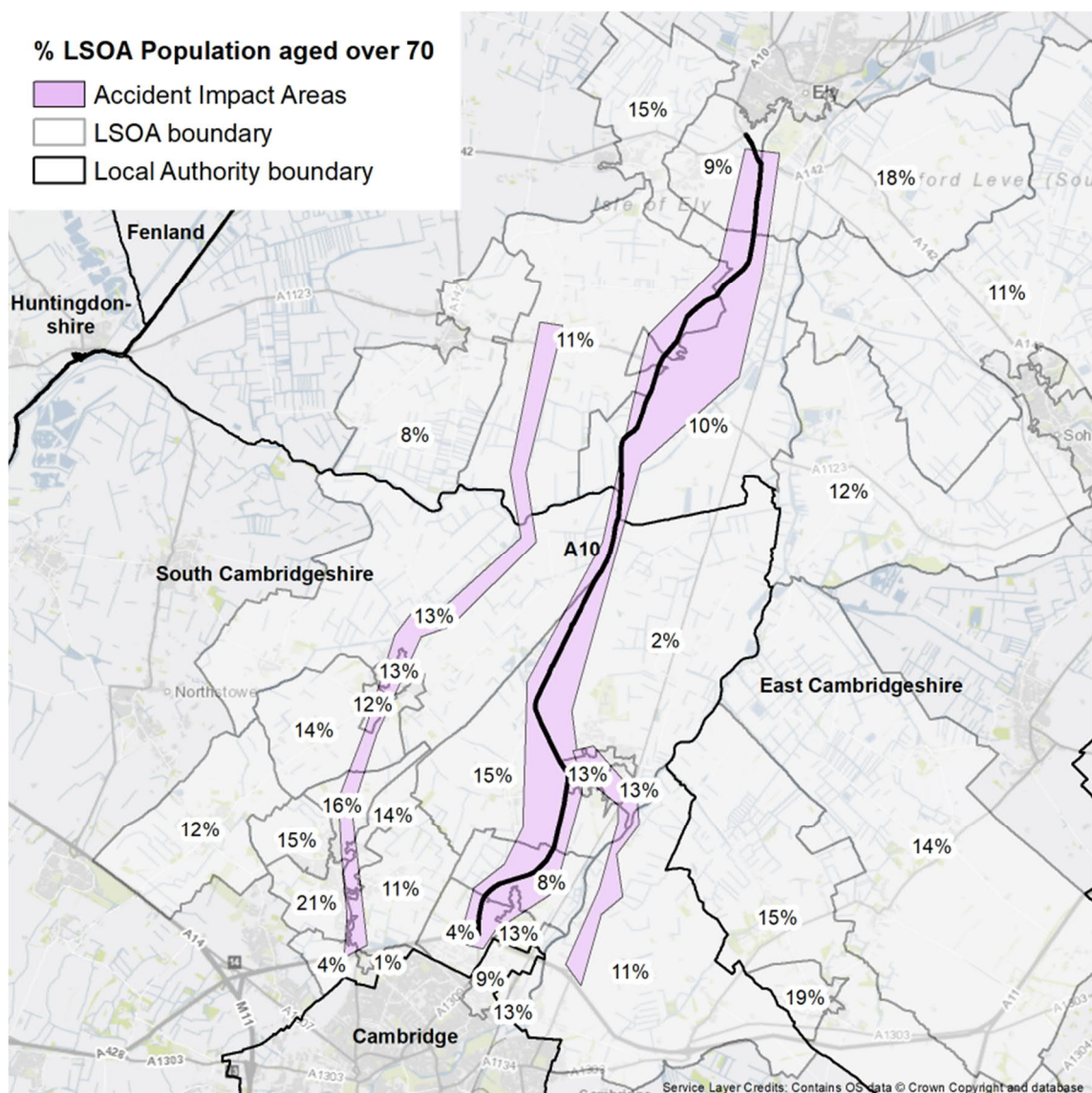


Figure 12 Population aged 70 and over

The impact area includes several amenities that could be considered attractors for sensitive population groups including schools, play areas, churches, GP surgeries and post offices.

Accident DI are also assessed for sensitive casualty groups namely pedestrians, cyclists and young male drivers. These will be assessed at OBC stage through further interrogation of DfT accident data.

7. Severance

It is stated in TAG Unit A4.2 that certain groups in society are potentially vulnerable to the effects of severance. Such groups include people without access to a car, older people, children, and people with disabilities and parents with pushchairs. Children are also considered to be potentially vulnerable to severance as they are more likely to cross the road at dangerous crossing points and find it difficult to judge the speed of traffic, hence putting themselves at risk of road accidents. These groups often experience longer journey times or are often required to use pedestrian routes that are inappropriate and difficult to use. Mitigation measures such as footbridges and underpasses can also cause severance, by creating longer journey times for users, compared with at grade crossings.

7.1 Confirmation of impacted areas

The main locations which experience severance in the study area are:

- Communities directly adjacent to the A10, namely Little Thetford, Stretham, Chittering and Waterbeach. These communities experience a slight hindrance to pedestrian movement due to the high volumes of traffic using the existing route.
- Populated areas that are close to roads that would be affected by an offline A10 alignment, such as between Waterbeach and Landbeach. These areas could experience severe severance if a new alignment causes a barrier to pedestrian movements.
- Communities directly adjacent to alternative routes to the A10, such as the B1049 through Cottenham, Histon, Impington, as well as unclassified roads through Landbeach and Horningsea. These communities may experience some hindrance to pedestrian movement depending on the volume of traffic using the routes.

Landbeach and Waterbeach are villages with populations of just over 1,000 and 2,000 respectively. Chittering is a small hamlet that sits within an LSOA level with a population of around 1,500. Little Thetford and Stretham are identified as small villages, with populations of around 800 and 1,800 respectively. The B1049 runs through Cottenham, Histon and Impington, with populations of 5,700, 8,400 and 4,800 respectively.

A high-level assessment of severance effects of each of the scheme options is summarised in Table 7. These currently do not include the impacts of any mitigation measures associated with new road alignments, which will be explored as the designs develop.

Table 7 Severance impacts of scheme options

Option	Description of impact	Overall Assessment
A	Slight increase in severance at Chittering due to widening and large increase between Landbeach and Waterbeach due to new offline section, likely to affect <200 people per day. Bypasses will slightly decrease severance at Stretham and Little Thetford. Slight severance benefits for communities along B1049 and Horningsea Road depending on magnitude of change in traffic volumes.	Neutral
B	Slight increases in severance at Chittering and Waterbeach due to widening of existing carriageway. Bypasses will slightly decrease severance at Stretham and Little Thetford. Slight severance benefits for communities along B1049 and Horningsea Road depending on magnitude of change in traffic volumes. Likely to affect <200 people per day	Slight positive
C	Severe increase in severance between Landbeach and Waterbeach due to new offline section, likely to impact <200 people per day. Neutral impact in settlements along the rest of the route.	Slight negative

Option	Description of Impact	Overall Assessment
D	Slight decreases in severance at Stretham, Little Thetford, Chittering and for communities along B1049 and Horningsea Road depending on magnitude of change in traffic volumes. Likely to affect <200 people per day	Slight positive
E	Bypasses will slightly decrease severance at Stretham and Little Thetford. Slight increase in severance at Chittering and Waterbeach due to carriageway widening. Slight severance benefits for communities along B1049 and Horningsea Road depending on magnitude of change in traffic volumes. Likely to affect <200 people per day	Slight positive
F	Slight increase in severance at Waterbeach, slight decrease in severance in Stretford at A10/A1123. Likely to balance out overall	Neutral
G	Junction improvements will have localised slight severance benefits but likely to impact few people as they are not in populated areas	Slight positive

Options A and F would have a neutral impact on severance overall, because their positive and negative impacts would broadly balance out. Option C would have a slight negative impact due to severe severance impact of the offline alignment between Waterbeach and Landbeach, likely to affect a relatively low number of pedestrian movements. Options B, D, E and G would have a slight positive overall impact on severance.

7.2 Identification of social groups and amenities

The sensitive groups relevant to severance DI are: Children, Older People, People with a disability and households without access to a car. Proportions of Children and Older people across the study area are presented and discussed in chapter 6 above.

People with a disability or long-term health condition account for 5% of the population in South Cambridgeshire and 6% in East Cambridgeshire. Figure 13 presents the proportions of the population with a disability or long-term health condition in areas close to where severance impacts have been identified. In areas affected by severance the proportions of population with a disability or long term health condition are not significantly different from the local average.

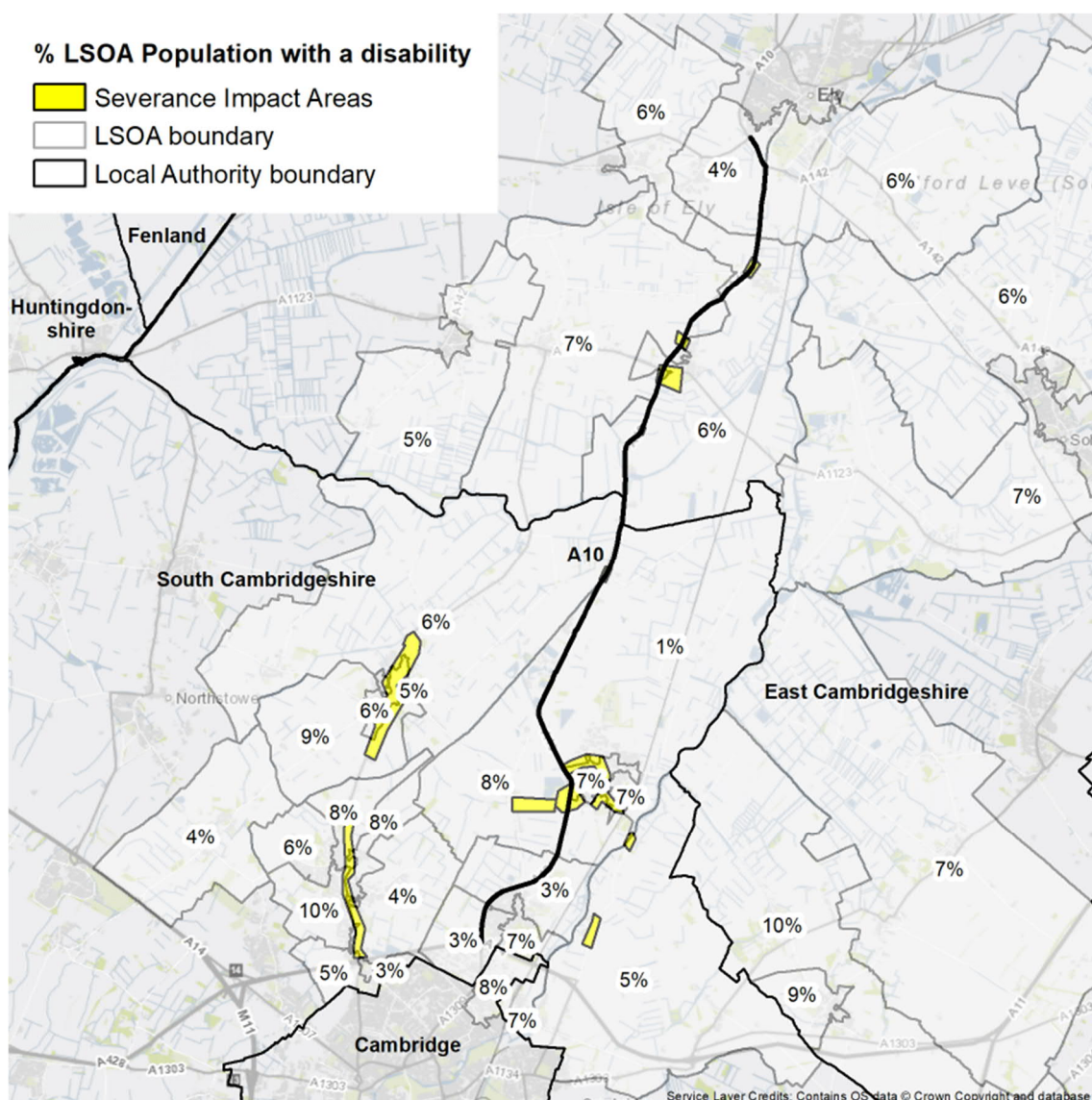


Figure 13 Population with a disability or long term health condition (Census 2011)

The proportion of households without access to a car averages 5% for both South Cambridgeshire and East Cambridgeshire. Figure 14 presents the proportion of households without access to a car in areas close to where severance impacts have been identified, ranging between 5% and 8%, which is not significantly higher than the local average.

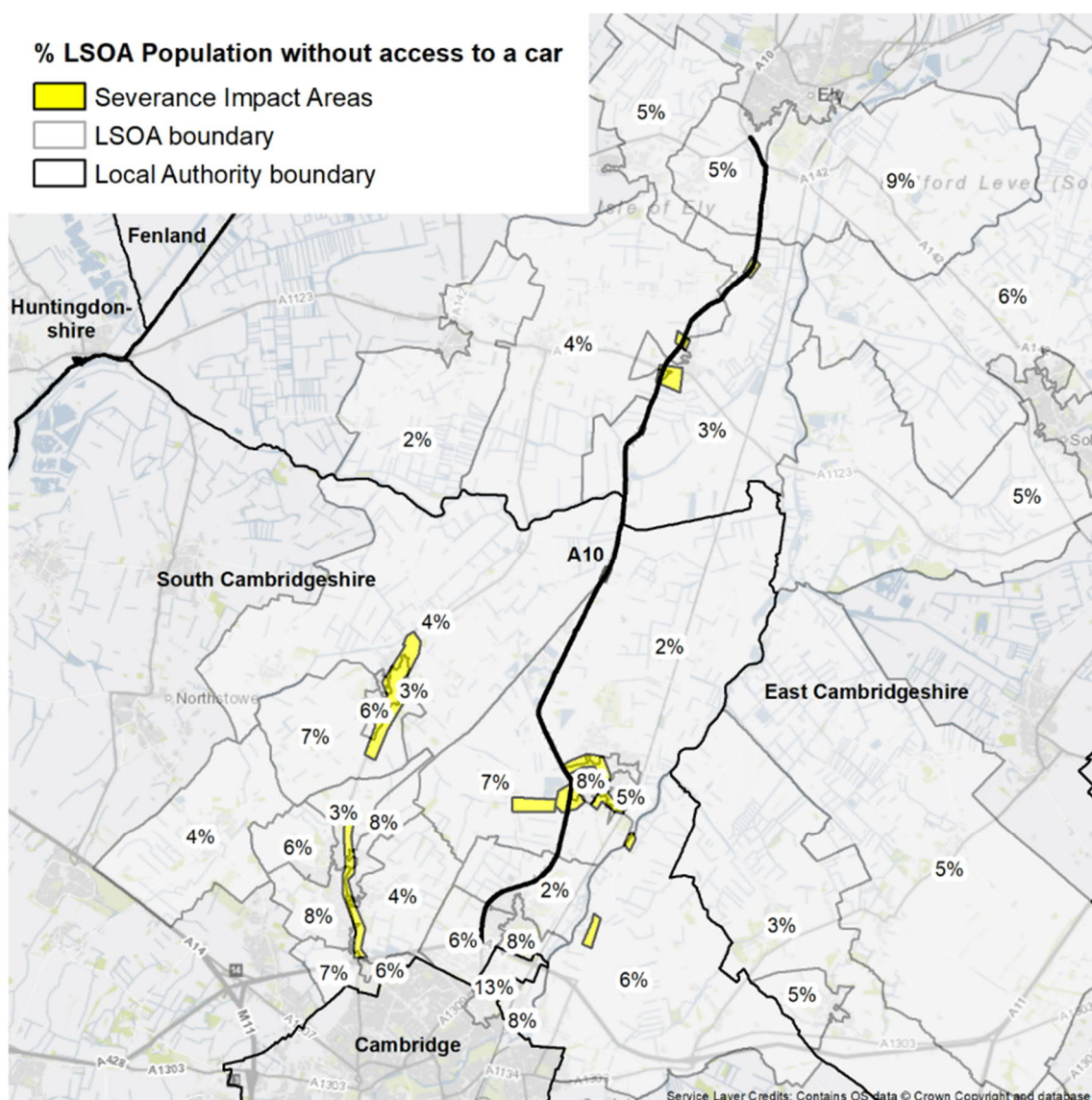


Figure 14 Households without access to a car (Census 2011)

Desktop research has been undertaken to identify the locations of community facilities of importance to the sensitive groups for severance. Table 8 presents the amenities identified near to the potentially impacted areas.

Table 8 Amenities in areas with severance impacts

Location	Amenities and facilities
Little Thetford	In the vicinity of Little Thetford, there are three schools and a parish council.
Stretham	Similarly, Stretham does not have a high street as such, but Stretham Surgery and a youth centre are in the vicinity of the scheme as are two schools.
Chittering	Chittering is mainly residential, with a few shops and a business park in the south.
Landbeach and Waterbeach	Waterbeach has a small high street with restaurants, cafes and a church and there are three schools in the vicinity. There is a café in Landbeach as well.

Location	Amenities and facilities
B1049	There are three schools in Cottenham, one in Impington and five in Histon. The restaurants, post offices, retail and other hospitality facilities on the Histon and Cottenham high streets would also be impacted as would the Cottenham Sports Centre.
Horningsea	Goose Green playground