



Social Impact Assessment

Outline Business Case - Appendix K

17 January 2020

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1 Introduction

1.1 Appraisal overview

Mott MacDonald has been commissioned by the Greater Cambridgeshire Partnership (GCP) to support the development of the Outline Business Case (OBC) for the proposed Cambourne to Cambridge Better Public Transport scheme.

This report presents the results of the social impact (SI) and distributional impact (DI) appraisals of the preferred option that has been shortlisted for OBC stage. These appraisals have been carried out at a high level and proportionate to the size of the scheme, the availability of data and the stage of the appraisal. The report will be included as an appendix to the OBC document.

1.2 Appraisal scoring

Each SI and DI is assessed on a seven-point scale of beneficial, adverse or neutral impacts, with a score then input into the Appraisal Summary Table (AST). The seven-point scale for DI appraisal is set out in Table 1: SI / DI Impact Scale.

Table 1: SI / DI Impact Scale

Impact	Assessment
Beneficial and the population impacted is significantly greater than the proportion of the group in the total population	Large beneficial
Beneficial and the population impacted is broadly in line with the proportion of the group in the total population	Moderate beneficial
Beneficial and the population impacted is smaller than the proportion of the group in the total population	Slight beneficial
There are no significant benefits or disbenefits experienced by the group for the specified impact	Neutral
Adverse and the population impacted is smaller than the proportion of the population of the group in the total population	Slight adverse
Adverse and the population impacted is broadly in line with the proportion of the population of the group in the total population	Moderate adverse
Adverse and the population impacted is significantly greater than the proportion of the group in the total population	Large adverse

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2 Social Impact Appraisal

SI appraisal covers the human experience of the transport system and its impact on social factors. Guidance is included in WebTAG Unit 4.1. The eight social impacts considered are:

- Accidents
- Physical activity
- Security
- Severance
- Journey quality
- Option values and non-use values
- Accessibility
- Personal affordability

The methods prescribed in WebTAG Unit 4.1 have been utilised to determine any beneficial or adverse impacts of the schemes preferred option. In most instances, social impact appraisals are qualitative due to the lack of quantifiable data though where available quantitative data is used. A full summary of the methodology and rationale for scoping in or out an impact for this scheme can be found in Table 2: Scoping rationale and approach.

Table 2: Scoping rationale and approach

Social impact	Methodology guidance from WebTAG Unit A4.1	Scoped in	Rationale	Approach
Accidents	Guidance suggests that in most cases it is proportionate to calculate and present the monetary value of accidents	Yes	WebTAG guidance suggests that for schemes where COBALT analysis may not be available or appropriate, standard accident investigation and prevention assessments should be used.	Qualitative approach undertaken at this stage. To be updated once COBALT analysis is available.
Physical activity	For schemes that are deemed to have a neutral or slight impact on physical activity, it is satisfactory to conduct a qualitative assessment.	Yes	Physical activity and mode shift impacts are expected	Analysis of AMAT assessment
Security	Security impacts are assessed and presented qualitatively, using the security indicator worksheet.	Yes	There are real and perceived security impacts expected as a result of the new route and new park and ride.	High level qualitative assessment based on security impacts sheet
Severance	Severance impacts are assessed and presented qualitatively using the severance impacts worksheet.	Yes	Some temporary and permanent severance expected as a result of the scheme.	Qualitative assessment using the severance impacts worksheet
Journey quality	A qualitative assessment is proportionate in most cases where an intervention does not aim to directly influence quality factors.	Yes	Journey quality impacts are expected.	Qualitative assessment using journey quality factors worksheet.
Option and non-use values	Option and non-use values should be assessed by calculating the scale of impact and estimating the	Yes	Option and non-use values should be assessed where the intervention includes	Quantitative analysis to give the number of impacted

Social impact	Methodology guidance from WebTAG Unit A4.1	Scoped in	Rationale	Approach
	number of households within the impacted area that could experience option and non-use value impacts.		measures that will substantially change the availability of transport services within the study area.	households and qualitative analysis used to show the nature of the transport services proposed, the nature of the change in service and alternatives available to households in the absence of the scheme.
Accessibility	Accessibility impact appraisal should consider current and future transport challenges. There are five key barriers which should be considered as part of an accessibility appraisal	Yes	Accessibility impacts may arise with the introduction of new public transport services.	Qualitative assessment
Affordability	Guidance suggests that TUBA outputs may be used, but if the outputs are not sufficiently qualitative analysis is appropriate.	Yes	Affordability impacts are expected in terms of reduction in parking charges, public transport fares charges and changes in car fuel costs.	Qualitative analysis to be updated once TUBA outputs are available.

Source: Mott MacDonald and WebTAG Unit A4.1

While the SI looks at the social impacts of the scheme on the whole population, a number of impacts are further assessed as part of the DI appraisal which looks at the impact of the schemes on vulnerable population groups, and whether any impacts are disproportionately experienced by these groups.

3 Accidents

3.1 Accidents impacts

Transport interventions may alter the risk of individuals being killed or injured as a result of accidents. Accidents occur across all modes of transport, particularly on the road network.

3.2 Qualitative appraisal

In 2018 almost 20,000¹ motor vehicles per day passed through the A428 / A1303 junction which has increased from just over 11,000 per day in 2008 resulting in increased congestion in the area.

Current accident rates² indicate there have been high number of serious and slight accidents along the A428/A1303 route between 2012-17, including:

- 19 serious accidents along the A1303 Madingley Road between 2012-17, including one fatal;
- 24 serious accidents along the A428 between the A1 and Madingley Road roundabout; and
- one hot spot at the junction between the A1303 and Cambridge Road which has had nine accidents (five serious and four slight).

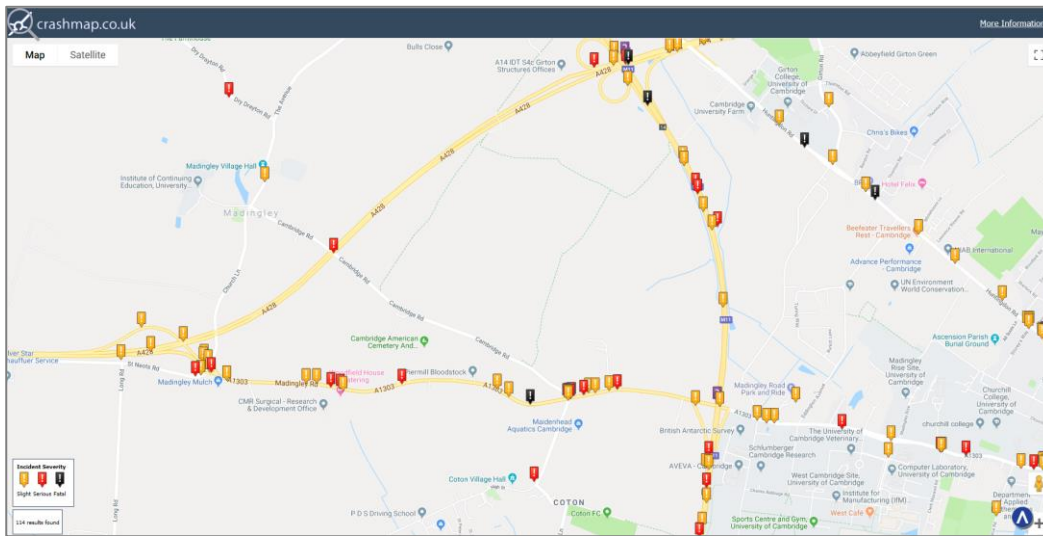
Figure 1: Collisions in the A428/A1303/M11 area demonstrates that over a five-year period, there have been multiple accidents of varying severity in the areas surrounding the A11/A1307 junction and the route into Cambridge. As a result of changes to the road alignment, changes in the number of vehicles on the network and other contributing factors, there may be a positive impact on the number of accidents in future years.

A COBALT analysis is being undertaken and an analysis of the results from a social impact point of view will be included within this section within the full business case. At this stage accident impacts have been assessed as slight beneficial due to the potential for the reduction of traffic along the route and the segregation of cyclists and pedestrians from the highway.

¹ DfT Road traffic statistics.

² All accident data is collected by the police in relation to any road traffic crashes where there is an injury. This is reported to and published by the DfT.

Figure 1: Collisions in the A428/A1303/M11 area



Source: www.crashmap.co.uk. Collision data source: Department for Transport. Basemap: Google. Accessed 05/08/2019.

Summary assessment score: Slight beneficial

4 Physical activity

4.1 Physical activity impacts

It is recognised that there is a relationship between transport, the environment and health. Transport can affect levels of physical activity both through the promotion of active modes over motorised transport but also through the provision of facilities at public transport access points and the provision of infrastructure to promote walking and cycling.

4.2 Qualitative appraisal

Given the increase in traffic along the route over the past ten years (see Section 3– Accidents) the route is likely to have become more difficult for cyclists and pedestrians to use. There is a relatively low level of cycle commuting along this corridor (20%) when compared to the Cambridge average (30%).³

The preferred off-road option for the scheme will provide segregated continuous cycling and walking facilities along the route which may make non-motorised travel more attractive and accessible. The scheme includes cycle parking, sheds and shelters at the park and ride site and at stops along the route. This is likely to encourage higher levels of physical activity.

An Active Modes Appraisal Tool (AMAT, TAG Unit A5-1) assessment has been carried out on the scheme which shows monetised benefits of almost £7m over 30 years for the reduced risk of premature death and almost £1m of benefits from reduction in absenteeism. This assumes an uplift of 154% in cycle trips based on the results of the guided busway delivered in a different location in Cambridge in 2011 providing off-road tracks suitable for cycling and walking alongside a guided bus way. This produced positive results in terms of increasing the usage of both modes. At this stage, physical activity impacts have been scored as moderate beneficial.

Summary assessment score: Moderate beneficial

³ 2011 Census

5 Security

5.1 Security impacts

It is understood that transport interventions may affect the level of security for transport users. There are personal security implications for users while they are travelling on public transport and for cyclists and pedestrians using tracks alongside the off-road bus route. These relate to lighting and visibility, formal and informal surveillance and segregation. This appraisal considers the real and perceived security impacts to road users, public transport users and active travel users.

We have noted that there is a potential for overlap with journey quality impacts; to avoid double counting some indicators (which reflect perception of security and journey quality) will only be considered in the journey quality impact assessment.

5.2 Qualitative appraisal

The scheme aims to encourage mode shift from car to public transport and active modes by means of park and ride and a new off-road bus and non-motorised user route. There is a potential negative security impact in encouraging users to leave their vehicles, however using the park and ride will help to prevent car users parking in potentially less secure locations closer to the centre.

The scheme will provide mitigation for some negative impacts of car users leaving their vehicles through security measures designed within the Park and Ride facilities (CCTV and lighting) delivering high security indicators. However, there is not the intention to light the bus route, which may create negative impacts for cyclist and pedestrians using the route during off-peak and darker periods.

Summary assessment score: Neutral

6 Severance

6.1 Severance impacts

Community severance is defined in WebTAG as the separation of residents from facilities and services they use within their community caused by significant changes in transport infrastructure which impede pedestrian movement or present a physical barrier to movement.

6.2 Qualitative appraisal

The scheme does not specifically aim to address severance issues however the provision of paths for non-motorised use alongside the off-road bus routes will provide improvements to non-motorised movement compared to the current infrastructure. In Phase 1 the proposed new bridge over the M11 will provide additional access for non-motorised users connecting villages such as Coton more closely with Cambridge. There are more than 500 domestic residences within 1km of the bridge which represents a large catchment of residents who may benefit from the bridge⁴ although the potential benefit is limited given that an existing bridge is available.

Despite largely being an off-road route there are a few aspects of the scheme which may create severance.

In Phase 1 the route will cross:

- High Cross / Ada Lovelace Road
- Wilberforce Road – cutting in front of the access road to the University of Cambridge Athletics Sports Ground.

The path next to the “West Cambridge Canal” and the Coton Path are intended to be connected with the pedestrian provision alongside the bus route therefore this access is expected to be enhanced by the scheme.

There is a public right of way to the east of the M11 which will pass under the scheme. As this already connects to the existing non-motorised user bridge, there is no significant benefit to providing an additional connection although some leisure users might welcome such a facility.

More significantly, the route will also cross the well-used footpath from Madingley to Coton and a crossing will be needed. Any potential severance will be addressed through a properly marked crossing.

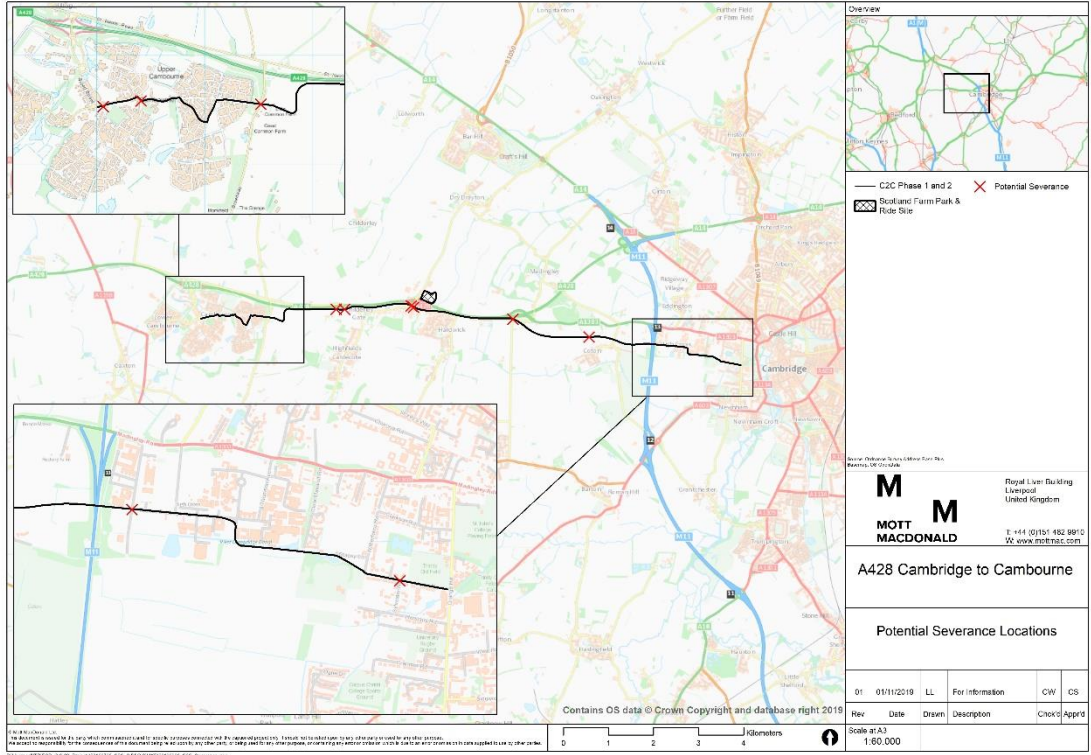
In Phase 2 the route will cross footways associated with:

- Broadway
- Wellington Way
- Saint Neots Road in Cambourne
- Southern junction roundabout from the A428 next to the Park and Ride site
- Saint Neots Road approaching Madingley Mulch Roundabout
- Cambridge Road

These are highlighted in the map below.

⁴ Ordnance Survey AddressBase Plus

Figure 2 – Potential Severance Locations



These roads in Phase 2 are not typically heavily utilised by pedestrians so should not have significant severance impacts. Signals will be introduced allowing the busway to cross Broadway and St Neots Road, this may also result in slight journey time lengthening.

It is important that appropriate crossing points are provided at these points to ensure pedestrian and cycle journeys can still be made. While cycle and pedestrian movements would still take place, with little to no deviation from the desired route, there could be a small amount of hindrance to movement resulting in slightly longer journey times. However, the provision of better connections and footpaths for pedestrians along the route into Cambridge are likely to outweigh any slight journey lengthening due to new crossing points, therefore this impact is judged at slight beneficial.

Summary assessment score: Slight beneficial

7 Journey quality

7.1 Journey quality impacts

As stated within WebTAG Unit 4.1 journey quality is a measure of the real and perceived physical and social environment experienced whilst travelling. The journey quality impacts considered in this chapter include aesthetics and human experience, which have not been considered elsewhere in this document. Journey quality factors can influence travel choices, with poor journey quality dissuading individuals from making journeys on certain modes of transport, while good journey quality often goes unnoticed and becomes expected.

Journey quality impacts can be divided into three categories, as below:

- Traveller care (including cleanliness, facilities, information and environment)
- Travellers' views
- Traveller stress (frustration, fear of potential accidents and route uncertainty).

7.2 Qualitative appraisal

A qualitative review of the impacts using WebTAG 4.1 journey quality impacts worksheet was conducted (as shown in Table 3 below) and determines that there will be a moderate beneficial impact on journey quality can be expected following improvements through the A428 scheme.

Table 3: TAG journey quality impacts worksheet

Factor	Sub-factor	Better with scheme	Neutral	Worse with scheme
Traveller care	Cleanliness	-	✓	-
	Facilities	✓	-	-
	Information	✓	-	-
	Environment	✓	-	-
Travellers' views	-	-	✓	-
Traveller stress	Frustration	✓	-	-
	Fear of potential accidents	✓	-	-
	Route uncertainty	✓	-	-

Traveller care impacts are expected to be beneficial, with travellers benefitting from the clean surroundings, good facilities and information and an improved travelling environment typically provided by modern park and ride facilities. Traveller stress would be expected to reduce as a result of the scheme. The scheme would encourage travellers to leave their vehicles at the park and ride, reducing the number of vehicles in Cambridge city centre and associated congestion and frustration. Wait times for services and stress associated with finding a parking space will be reduced. Views are not expected to be impacted significantly.

TAG unit 4.1 suggests a moderate assessment score where the number of travellers affected is neither low (approximately 500 per day) nor high (approximately 10,000 per day). Modelling data is unavailable at this stage therefore a conservative slight beneficial assessment has been made. This will be updated at FBC stage should data become available.

Summary assessment score: Slight beneficial

8 Option values and non-use values

8.1 Option values and non-use values impacts

In transport assessments, an option value is a term for the value that is placed on a person's private willingness to pay for maintaining a service, even if there is a small chance they will ever use it. This is common with rail stations, as residents who usually drive may value living near a rail station and having an alternative travel option.

A non-use value are the values placed on the existence of a service by a person, regardless of any future use by that individual. For example, individuals may value the existence of a service for other existential, bequest, or intrinsic value.

8.2 Qualitative appraisal

WebTAG 4.1 suggests that a 'larger catchment' should be used for free standing towns. Given the nature of the scheme it could be assumed that people would make fairly long journeys to Cambourne or more likely to the park and ride service to make onward travel into Cambridge. It is appropriate that the catchment area is large enough to reflect this.

Analysis of 2011 Census Travel to Work data has identified areas where there are more than 100 people per MSOA⁵ who travel to work in the central Cambridge area. This data, though indicative, is useful to identify a catchment area that could be used for option and non-use value impact analysis. This catchment area encompasses the more urban areas to the east of Cambridge including Huntingdon, St Neots and Biggleswade as well as any rural areas between these centres.

The estimated number of households in this identified area that could benefit from the option of using the transport scheme is in excess of 40,000, past the threshold of 1,000 households that signifies large impacts. Future development sites should also be taken into consideration as there is significant potential development in the area. These include sites at Hardwick, Cambourne and Bourne Airfield totalling more than 6,000 dwellings. It is acknowledged that not all residents in this area will have access to a private car and therefore have the option to access the route however, due to car ownership levels in the area being higher than the national average this number will still significantly exceed the threshold to be considered large.

Summary assessment score: Large beneficial

⁵ MSOA – Middle Super Output Area: [Middle Layer Super Output Areas](#) are a geographic hierarchy designed to improve the reporting of small area statistics in England and Wales. [Middle Layer Super Output Areas](#) are built from groups of contiguous [Lower Layer Super Output Areas](#). The minimum population is 5000 and the mean is 7200.

9 Accessibility

9.1 Accessibility impacts

The appraisal of accessibility within WebTAG focuses on public transport: journey times to key destinations, service frequencies, and accessible boarding at stops.

9.2 Qualitative appraisal

Table 4: Accessibility Appraisal

Barrier to accessibility	Assessment
The availability and physical accessibility of public transport	The preferred option provides improvements to public transport provision along the corridor between Cambourne and Cambridge. There will be impacts for the residents of Cambourne who will benefit from wider public transport accessibility. There will be impacts for those who would travel by private car to Cambourne or the park and ride service, giving those residents, particularly in rural areas, better private car and public transport access to the centre.
Cost of transport	Finalised costs of the services are unknown at present, although the assumed bus fare (for modelling purposes) is slightly higher than typical for other park and ride services locally. This is, however, offset by the more costly options of parking in Cambridge city centre. For users of the park and ride part of the scheme, parking is expected to be free.
Services and activities located in inaccessible places	Many services and activities are located in Cambridge city centre, therefore can be difficult to access by public transport for users in more remote, rural locations. For those who live on the proposed routes, they would feel benefits associated with improved access to the centre. For those residents who live more remotely who currently find it difficult to access to services in more urban areas, these difficulties would still exist as a private car would be required to access the park and ride site to access the service.
Safety and security	Accessibility impacts surrounding safety and security are not expected to be significant. The typical facilities within a park and ride facility are designed to provide a sense of safety and security for users with lighting and CCTV. The busway is intended to provide a safe environment for cyclists and pedestrians. This needs to be confirmed once detailed design is available for this scheme.
Travel horizons	Travel horizons are not expected to broaden to a significant extent as a result of the scheme. Residents in Cambourne may be more likely to use public transport to reach Cambridge with improved journey times and reliability. Those from the wider area with access to a private car will be most likely to realise the benefits of the scheme.

Source: DfT and Mott MacDonald

The assessment of accessibility impact has been found to generate slight beneficial impacts. This is due to the scheme providing better access to public transport and access to services and activities via the new route.

Summary assessment score: Slight beneficial

10 Personal affordability

10.1 Personal affordability impacts

As stated in WebTAG unit 4.1 monetary costs of travel can be a major barrier to mobility for certain social groups, with particularly acute effects on their ability to access key destinations. Personal affordability impacts are generally assessed qualitatively.

10.2 Qualitative appraisal

There are no significant expected personal affordability impacts as a result of the preferred option. Parking at the park and ride will be free of charge and the cost of bus services into the centre is expected to be in line with costs on the rest of the network across Cambridge, though at the time of writing this has yet to be confirmed. There may be slight beneficial impacts that arise from the free parking compared to costly parking in the city centre, and the reduction of miles travelled therefore a reduction in fuel consumption. However, this may be offset by the cost of the bus service.

Summary assessment score: Neutral

11 SI appraisal summary

The appraisal has drawn upon the data that is currently available. It has sought to best represent the anticipated positive and negative changes for users of the project, relating to the human experience of the scheme.

The initial qualitative appraisal has found that the scheme will deliver a broadly positive benefit within relevant impacts, with only severance anticipated to result in potentially adverse impacts. The anticipated assessment scores for the social appraisal can be seen in Table 5 below.

Table 5: Social impacts – Summary assessment scores

Impact area	Score
Accidents	Slight beneficial
Physical activity	Moderate beneficial
Security	Neutral
Severance	Slight beneficial
Journey quality	Slight beneficial
Option values and non-use values	Large beneficial
Accessibility	Slight beneficial
Personal affordability	Neutral

12 Distributional impact appraisal

12.1 Introduction

This DI appraisal has been carried out in line with WebTAG Unit A4.2, proportionate to the size of the scheme and the level of quantitative data available at this stage. A DI appraisal considers the variance of transport intervention impacts across different social groups, seeking to identify those social groups that would be adversely or beneficially disproportionately impacted by the intervention(s). A DI appraisal is comprised of three stages; an initial screening stage, assessment of impacts and appraisal of the impacts. The eight distributional impacts are as follows:

- User benefits
- Noise
- Air quality
- Accidents
- Security
- Severance
- Accessibility
- Affordability

To comply with Tag unit A4.2, the social groups that will be assessed for each distributional impact are displayed in Table 6 below.

Table 6: Scope of socio-demographic analysis

Social group (tick indicated analysis required for each impact)	Distributional impacts							
	User benefits	Noise	Air quality	Accidents	Security	Severance	Accessibility	Affordability
Income distribution	✓	✓	✓				✓	✓
Children: proportion of population aged under 16		✓	✓	✓	✓	✓	✓	
Young adults: proportion of population aged between 16 and 25				✓			✓	
Older people: proportion of population aged 70 and over		✓		✓	✓	✓	✓	
Proportion of population with a disability					✓	✓	✓	
Proportion of population of Black, Asian and Minority Ethnic (BAME) origin					✓		✓	
Proportion of households without access to a car						✓	✓	
Carers: proportion of households with dependent children							✓	

Source: Department for Transport (Dec 2015) WebTAG Unit A4.2 Distributional Impact Appraisal

12.1.1 Step 1: Screening process

Each indicator is assessed individually using a screening proforma to determine whether it needs to be appraised further. The screening process should consider whether there are expected positive or negative impacts on specific social groups, whether any potential negative impacts can be designed out and whether any positive or negative impacts are sufficiently minor and socially and/or spatially dispersed, such that a full DI appraisal is disproportionate to the potential impacts.

12.1.2 Step 2: Assessment of impacts

Step 2 is comprised of three sub-steps, which seek to confirm the areas impacted by the intervention, identify the social groups in the impact area, in accordance with the guidance in Table 6 and identify amenities within the impacted area. Step 2 gives an overview of the socio-demographic profile of the area, including amenities that would be utilised by impacted social groups. The results of step 2 are presented in an output summary table, displaying the proportion of the resident population in the impact area, compared with local and national comparators, and an indication of the presence of amenities within the impacted area. There are five shortlisted options that require assessment.

12.1.3 Step 3: Appraisal of impacts

Step 3 provides an assessment of the impact of the intervention on each indicator's social group for input into the Appraisal Summary Table (AST). Analysis of the proportions of social groups within the impacted area against the total population gives beneficial or adverse impacts on a seven-point scale, ranging from large beneficial to large adverse, as highlighted in Table 7. Some impacts, such as noise, air quality and accidents, require detailed modelling data to complete a full appraisal.

Table 7: System for grading distributional impacts

Impact	Definition	Assessment
Beneficial and the population impacted is significantly greater than the proportion of the group in the total population	Beneficial and 5% or more greater than the proportion of the group in the total population	Large beneficial ✓✓✓
Beneficial and the population impacted is broadly in line with the proportion of the group in the total population	Beneficial and in line (+/-5%) with the proportion of the group in the total population	Moderate beneficial ✓✓
Beneficial and the population impacted is smaller than the proportion of the group in the total population	Beneficial and 5% or more smaller than the proportion of the group in the total population	Slight beneficial ✓
There are no significant benefits or disbenefits experienced by the group for the specified impact	There are no transport user benefits or disbenefits experienced	Neutral
Adverse and the population impacted is smaller than the proportion of the population of the group in the total population	A disbenefit which is 5% or more smaller than the proportion of the group in the total population	Slight adverse x
Adverse and the population impacted is broadly in line with the proportion of the population of the group in the total population	A disbenefit which is in line (+/- 5%) with the proportion of the group in the total population	Moderate adverse xx
Adverse and the population impacted is significantly greater than the proportion of the group in the total population	A disbenefit which is 5% or more greater (or more) than the proportion of the group in the total population	Large adverse xxx

Source: Department for Transport (Dec 2015) WebTAG Unit A4.2 Distributional Impact Appraisal

13 Distributional impact appraisal of user benefits

In most cases, transport interventions have been developed for the very purpose of generating benefits to users. User benefits 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 must be considered. This appraisal seeks to understand the pattern of user benefits and disbenefits generated by an intervention as it develops in order to consider mitigation where there is evidence of the intervention having particularly high benefits or disbenefits to a particular income group.

Transport User Benefits Appraisal (TUBA) values are being produced as part of the economic appraisal of the scheme. These figures will be used once available at FBC stage to assess the proportion of residents in each of the income deprivation quintiles, to represent the distributional share of user benefits. WebTAG guidance suggests that in the absence of detailed TUBA modelling, user benefits should be assessed in relation to income distribution in the impact area.

13.1.1 Step 1: Screening

Table 8: Screening table for user benefits impacts

Indicator	(a) Appraisal output criteria	(b) Potential impact (yes / no, positive/negative if known)	(c) Qualitative Comments	(d) Proceed to Step 2
User benefits	The TUBA (Transport User Benefit Appraisal) 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 impacts expected.	In the absence of detailed user benefits data, benefits have been assumed to be positive. The distributional appraisal will analyse the TUBA data in relation to the deprivation levels within the impact area to assess whether benefits are experienced by all income groups.	Yes, proceed to step 2.

Source: Department for Transport (Dec 2015) WebTAG Distributional impact appraisal screening proforma

13.1.2 Step 2: Assessment of impacts

13.1.2.1 Step 2a: Confirmation of areas impacted by the intervention

In the absence of detailed TUBA modelling data which would usually be used at this stage as the study area, a user benefit study area comprising of Cambridge and South Cambridgeshire local authorities has been assumed.

WebTAG guidance suggests that in the absence of detailed TUBA modelling, user benefits should be assessed in relation to income distribution in the impact area.

13.1.2.2 Step 2b: Identification of social groups in the impact area

Table 9: Distribution of residents across income deprivation quintiles within Cambridge and South Cambridgeshire

	< Most deprived		Income quintile	Least deprived >	
	0% -20%	20 -40%	40% -60%	60% -80%	80% -100%
Impact area	0.4%	8%	19%	25%	48%
England	20%	20%	20%	20%	20%
<i>England variance</i>	-19.6%	-12%	-1%	5%	28%

Source: 2015 Index of Multiple Deprivation. 2017 Mid-Year Population Estimates

Broadly across the region, there are low levels of income deprivation as shown in the map in Appendix A. Only 0.4% of residents reside in the most deprived income quintile whereas 48% of residents live in the least deprived income quintile, as summarised in Table 9: Distribution of residents across income deprivation quintiles within Cambridge and South Cambridgeshire. All but the middle quintile display large variance to the national average and therefore the scheme is expected to realise disproportionate impacts, with fewer benefits likely to be experienced by the most deprived group compared with the least deprived.

13.1.2.3 Step 2b: Identification of amenities in the impact area

As per WebTAG guidance, the identification of amenities within the impact area has not been conducted due to the impact area being too large to warrant the identification of local attractors and the appraisal focussing on the impact across income deprivation quintiles only.

13.1.3 Step 3: Appraisal of impacts

In the absence of quantitative user benefits data for the scheme, user benefits of the options are assumed to be positive. The variance figures in Table 9 have been scored using the seven-point scale method outlined in Table 1.

Table 10: Summary appraisal scores

Index of Multiple Deprivation Quintile	Impacts
Most deprived quintile	Slight beneficial
Second most deprived quintile	Slight beneficial
Third most deprived quintile	Moderate beneficial
Second least deprived quintile	Moderate beneficial
Least deprived quintile	Large beneficial

14 Distributional impact appraisal of noise

Noise impacts are likely to occur where an intervention results in changes to traffic flows, speeds or where the physical gap between people and traffic is altered. In addition to the focus on annoyance, which remains an important impact of noise, there is clear evidence of links between environmental noise and health outcomes. Groups particularly vulnerable to noise impacts include children, older populations and those with lower incomes who may be less able to make adjustments to changing noise levels.

14.1.1 Step 1: Screening

Table 11: Screening table for noise impacts

Indicator	(a) Appraisal output criteria	(b) Potential impact (yes / no, positive/negative if known)	(c) Qualitative Comments	(d) Proceed to Step 2
Noise	Any change in alignment of transport corridor or any links with significant changes (>25% or <-20%) in vehicle flow, speed or %HDV (Heavy Duty Vehicle)content. Also note comment in TAG Unit A3.	Unknown	A qualitative appraisal within the draft environmental assessment indicates that that scheme options would result in neutral or minor adverse impacts. Minor adverse impacts are anticipated for off-line options due to the introduction of new noise sources; however, the scheme is not expected to result in substantial changes to traffic flows on the surrounding road network and therefore impacts would be localised to areas around the scheme route which are in general sparsely populated.	Only if detailed noise assessment is carried out at FBC stage.

Source: Mott Macdonald, based on Department for Transport (Dec 2015) WebTAG Distributional impact appraisal screening proforma

At this stage, based on initial assessments from the Mott MacDonald environment team returning a neutral impact and due to the lack of detailed modelling data related to noise impacts at this stage, the distributional impacts have been deemed to be neutral and therefore this impact has been scoped out.

15 Distributional impact appraisal of air quality

Air quality impacts, like noise impacts, are likely to occur where an intervention results in changes to traffic flows, speeds or where the physical gap between people and traffic is altered.

At-risk groups for air quality impacts are suggested to be children (who may experience more exposure being outside more frequently) and people already suffering relatively poor health. There are also issues of social injustice to be considered where there are populations with low car ownership who are experiencing the impacts of car usage.

15.1.1 Step 1: Screening

Table 12: Screening table for air quality impacts

Indicator	(a) Appraisal output criteria	(b) Potential impact (yes / no, positive/negative if known)	(c) Qualitative comments	(d) Proceed to step 2
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 Average Annual Daily Traffic(AADT) of 1000 vehicles or more • Change in 24 hour AADT of HDV of 200 HDV vehicles or more • Change in daily average speed of 10kph or more • Change in peak hour speed of 20kph or more • Change in road alignment of 5m or more 	Unknown	A qualitative appraisal within the draft environmental assessment indicates that the changes in air would not be significant. It was considered that increases in public transport numbers along the route options would be offset by a reduction in car numbers on the A428 and other local roads due to the expected modal shift towards public transport. As such it was concluded that air quality should not form part of the decision making process at the OAR phase.	Only if detailed air quality assessment is carried out at FBC stage.

Source: Mott Macdonald, based on Distributional Impacts screening proforma

Based on initial assessments from the Mott MacDonald environment team returning a judgement showing no significant changes to air quality the distributional impacts have been deemed to be neutral and this impact has been scoped out.

16 Distributional impact appraisal of accidents

The screening process for accidents considers the change in alignment of road layout that may have positive or negative safety impacts, identified through a qualitative assessment in this instance. In addition, the assessment also considers qualitatively whether the intervention may cause any significant changes (>10%) in vehicle flow, speed, use or a significant change (>10%) in the number of pedestrians, cyclists or motorcyclist using the road network.

16.1.1 Step 1: Screening

Table 13: Accident impacts screening

Indicator	(a) Appraisal output criteria	(b) Potential impact (yes / no, positive/negative if known)	(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, %HDV (heavy goods vehicles) content or any significant change (>10%) in the number of pedestrians, cyclists or motorcyclists using road network.	Unknown	Changes in the alignment of the transport corridor could have potential impacts on accidents. As the screening process has been undertaken in advance of receiving detailed accident modelling outputs, it should be assumed that a full appraisal will be needed.	Yes, proceed to step 2.

Source: Mott Macdonald, based on Distributional Impacts screening proforma

16.1.2 Step 2: Assessment of impacts

16.1.2.1 Step 2a: Confirmation of areas impacted by the intervention

In the absence of detailed accident modelling data available at this stage, a study area of 1km around the scheme options and travel hub has been assumed which aims to capture potential impacts of pedestrians and road users living in the area. If detailed accident modelling data is provided at FBC stage for the preferred option, this will be revised to include any links on the network that trigger the appraisal output criteria in column (a) of Table 13 above.

16.1.2.2 Step 2b: Identification of social groups in the impact area

As per WebTAG Unit 4.1 guidance, the distribution of children (under 16), young people (16-25) and older people are appraised as part of this chapter as evidence suggests these groups have a greater risk of being involved in a traffic collision. Young people are particularly at risk of being in a traffic accident, particularly young male drivers. In general, children and older people are particularly at risk as pedestrians. .

Table 14: Proportion of residents within the 1km impacted area surrounding the C2C route

	Population aged under 16s	Population aged between 16 and 25	Population aged 70 and over
Study area population	4,791	8,453	1581
Study area proportion	18%	32%	6%
<i>Study area variance</i>	-1%	20%	-7%
National average (England)	19%	12%	13%

Source: Mott MacDonald based on 2017 mid-year population estimates

The population of children is broadly in line with the national average. However the proportions of young people are greater than the national average therefore these groups are likely to experience impacts to a disproportionate extent. The population of older people is lower than national average therefore this group will experience less impacts proportionately.

16.1.2.3 Step 2c: Identification of amenities in the impact area

A summary of the numbers and types of amenities that would be impacted by the transport schemes and could act as trip attractors for the impacted social groups are highlighted in Table 15 (also see appendix I). Here it is evident that there are a number of amenities for one or more of the social groups therefore potentially generating journeys made by those groups, including nurseries and schools, universities, sporting facilities such as playing fields and tennis courts, health centres and play areas. The University of Cambridge has a significant presence to the east of the study area.

Table 15: Numbers of impacted amenities within the study area

Amenity	Number within study area
University	95
Residential Education	27
Indoor / Outdoor Leisure / Sporting Activity	23
Place of Worship	11
Dentist / Health Centre / GP / Clinic	8
Prep / First / Primary / Infant / Junior / Middle	9
Public / Village Hall / Other Community Facility	8
Children's Nursery / Crèche	6
College	4
Care / Nursing Home	3
Secondary / High School	1

Source: Mott Macdonald based on Ordnance Survey Address Base Plus

16.1.3 Step 3: Appraisal of impacts

At present, COBALT or other accident analysis has not been undertaken, therefore the qualitative accident assessment from the SI appraisal has been used (see section 3.2). This suggests that there will less risk of accidents due to fewer cars on the road and the segregated off-road route.⁶

⁶ As this study area is based on an indicative 1km study area, the final appraisal scores may change once assessed at FBC level should detailed modelling data become available.

Table 16 sets out the summary appraisal score for each option and each social group.

Table 16: Summary assessment scores

Expected overall impact (derived from SI appraisal)	Social group	Distributional impact (seven-point scale)
Beneficial	Children	Moderate beneficial
	Young people	Large beneficial
	Older people	Moderate beneficial

17 Distributional impact appraisal of security

There are potential security impacts from making changes to the transport system and these should consider the specific concerns of children (under 16), young adults (16-25), older people (over 70), those with long-term health problem or disability (LTHD) and those from black, asian and minority ethnic (BAME) communities.

These groups tend to perceive risk more acutely when using public transport. Furthermore, public transport users tend to be from lower income groups. These users may suffer from greater anxiety when using public transport leading to the potential suppression of travel, which could reduce the effective accessibility of the transport system.

17.1.1 Step 1: Screening

Table 17: Security impacts screening

Indicator	(a) Appraisal output criteria	(b) Potential impact (yes / no, positive/negative if known)	(c) Qualitative Comments	(d) Proceed to Step 2
Security	Any change in public transport waiting/interchange facilities including pedestrian access expected to affect user perceptions of personal security.	Yes, potentially negative and positive therefore neutral	The scheme is expected to provide more secure facilities compared to general city centre parking and improvements in facilities for pedestrians and cyclists should improve people's perception of security, however there could be concerns surrounding personal security on more remote cycle and pathways into the centre.	No, scoped out

Source: Mott Macdonald, based on Distributional Impacts screening proforma

18 Distributional impact appraisal of severance

WebTAG guidance suggests that older people, those with disabilities, parents with pushchairs, children and those without car access can suffer the effects of severance disproportionately more than other groups. These groups can often experience longer journey times or are often required to use pedestrian routes that are inappropriate and/or difficult to use. Mitigation measures such as footbridges and underpasses can also cause severance by creating longer journey times for users rather than using at grade crossings.

18.1.1 Step 1: Screening

Table 18: Severance impacts screening

Indicator	(a) Appraisal output criteria	(b) Potential impact (yes / no, positive/negative if known)	(c) Qualitative comments	(d) Proceed to step 2
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, potentially positive and some minor negative	It is expected that the proposed new busway will provide unhindered pedestrian pathways however changes to road alignment could cause minor changes to the pedestrian crossing provision along the route.	Yes

Source: Mott Macdonald, based on Distributional Impacts screening proforma

18.1.2 Step 2: Assessment of impacts

18.1.2.1 Step 2a: Confirmation of areas impacted by the intervention

The impacted area has been assessed as a 1km buffer around the scheme. 1km is deemed to be an appropriate figure that takes into consideration pedestrian activity around the route.

18.1.2.2 Step 2b: Identification of social groups in the impact area

Social groups that are particularly sensitive to severance impacts include children, older people, those with an LTHD and no car households.

Table 19: Proportion of residents within the 1km study area

	Population aged under 16s	Population aged 70 and over	Population with a LTHD	Households with no car access
Study area population	4,791	1,580	2,008	971
Study area proportion	18%	6%	8%	15%
Study area variance	-1%	-7%	-10%	-11%
National average (England)	19%	13%	18%	26%

Source: Mott Macdonald based on 2017 mid-year population estimates

For children, the proportion of residents within the study area is broadly in line with that of the national average (see appendix B) and therefore this groups would experience the slight beneficial severance impacts in line with the general population. However, the proportion of older people (see appendix D), households with LTHD (see appendix E) and those with no access to a car (see appendix H) is less than that of the national average and therefore a disproportionately low number of these resident groups would experience these impacts.

18.1.2.3 Step 2c: Identification of amenities in the impact area

A summary of the numbers and types of amenities that would be impacted by the transport schemes and could act as trip attractors for the impacted social groups are highlighted in Table 15. It is evident that there are a number of trip attractors for that could act as trip attractors for one or more of the vulnerable social groups mentioned, therefore increasing journeys including nurseries and schools, universities, sporting facilities such as playing fields and tennis courts, health centres and play areas. The University of Cambridge has a significant presence to the east of the study area.

18.1.3 Step 3: Appraisal of impacts

Table 20: Summary assessment scores

Expected overall impact (derived from SI appraisal)	Social group	Distributional impact (seven-point scale)
Slight beneficial	Children	Moderate beneficial
	Older people	Slight beneficial
	Those with a LTHD	Slight beneficial
	Households with no car access	Slight beneficial

19 Distributional impact appraisal of accessibility

Accessibility assessment within a DI appraisal focuses on public transport accessibility in terms of accessing employment, services and social networks.

Social groups included within this appraisal section include:

- Income distribution
- Children < 16
- Young people 16 – 25
- Older people 70+
- Those with an LTHD
- Those from BAME backgrounds
- Households with no car
- Households with dependent children

19.1.1 Step 1: Screening

Accessibility impacts, as discussed in the social appraisal section are focused on the public transport aspect of accessing services, employment and social networks. This approach considers the accessibility needs of vulnerable user groups, considering a range of factors including journey times to reach key destinations, service frequencies, accessible boarding and the end-to-end journey. Access to the transport network can enable vulnerable people to access services and recreational activities, therefore reducing social exclusion. The Accessibility Strategy as part of the Cambridge Local Transport Plan⁷ concluded that barriers to accessing services were the length of journeys by public transport and being unable to access services at the times they are needed.

Table 21: Accessibility impacts screening

Indicator	(a) Appraisal output criteria	(b) Potential impact	(c) Qualitative comments	(d) Proceed to steps 2a & 2b
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).	Neutral	New public transport route and service being provided	Yes

⁷ Cambridgeshire Local Transport Plan (2011-2031)

19.1.2 Step 2: Assessment of impacts

19.1.2.1 Step 2a: Confirmation of areas impacted by the intervention

The study area comprises of the proposed public transport corridor between Cambourne and Cambridge. A 1km study area has been used around the scheme as a reasonable estimate of walking distances to the public transport stops.

19.1.2.2 Step 2b: Identification of social groups in the impact area.

The social groups who are particularly vulnerable to the effects of poor accessibility are those from income deprived areas, children, young adults, older people, those with a long-term health problem or disability, BAME residents, households without access to a car and households with dependent children.

Table 22: Proportion of residents in income deprivation quintiles within the 1km study area

	Most deprived quintile	Second most deprived quintile	Third most deprived quintile	Fourth most deprived quintile	Least deprived quintile
Study area population	0	1174	3500	3693	18113
Study area proportion	0%	4%	13%	14%	68%
Study area variance	-20%	-16%	-7%	-6%	48%
National average	20%	20%	20%	20%	20%

Source: Mott MacDonald based on ONS 2017 mid-year population estimates and Indices of Multiple Deprivation 2015

It is evident from Table 22 that the study area has low levels of income deprivation (see appendix A). The quintile with the highest proportion is the least deprived quintile, with a figure of 68%, 58% greater than the national average. For these residents, financial costs associated with accessing transport would be less of a barrier, and a higher proportion of residents compared to the national average would feel these benefits. There are no areas within the study area falling within in the most deprived quintile. It is likely that because the area has low levels of income deprivation, cost of travel would act as less of a barrier than it does for the wider population.

Table 23: Proportion of residents within the 1km study area

	Population aged under 16s	Population aged between 16 and 25	Population aged 70 and over	Population with a LTHD	BAME residents	Households with no car access	Households with dependent children
Study area population	4,791	8,453	1,581	2,008	7,257	971	2312
Study area proportion	18%	32%	6%	8%	30%	15%	37%
Study area variance	-1%	20%	-7%	-10%	10%	-11%	8%
National average (England)	19%	12%	13%	18%	20%	26%	29%

Source: Mott Macdonald based on ONS Census 2011 and ONS mid-year population estimates 2017

Within the study area the under 16 population is broadly in line with that of the national average, however there is a much higher proportion of 16-25s (see appendix C) given the large presence of the University of Cambridge within the study area. There is also a larger than average presence of BAME residents in this area (see appendix F). Older residents (see appendix D), residents with LTHD (see appendix E), and households without car access (see appendix G) both see proportions 9% and 10% respectively lower than that of the national average.

19.1.2.3 Step 2c: Identification of amenities in the impact area

A summary of the numbers and types of amenities that would be impacted by the transport schemes and could act as trip attractors for the impacted social groups are highlighted in Table 15 and shown within appendix I. Here it is evident that there are a number of amenities that could act as trip attractors for one or more of the social groups mentioned, therefore increasing security risks including nurseries and schools, universities, sporting facilities such as playing fields and tennis courts, health centres and play areas. The University of Cambridge has a significant presence to the east of the study area.

19.1.3 Step 3: Appraisal of impacts

The SI appraisal identified the potential for beneficial accessibility impacts for the scheme. Table 24: Summary assessment scores utilises the SI appraisal score and assesses this in accordance with the DI scoring criteria in Table 7, based on a 1km study area surrounding the scheme.

Table 24: Summary assessment scores

Expected overall impact (derived from SI appraisal)	Social group	Distributional impact (seven-point scale)
Moderate beneficial	Most deprived quintile	Neutral
	Second most deprived quintile	Moderate beneficial
	Third most deprived quintile	Moderate beneficial
	Second least deprived quintile	Moderate beneficial
	Least deprived quintile	Large beneficial
	Children	Moderate beneficial
	Young adults	Large beneficial
	Older people	Slight beneficial
	Those with a LTHD	Slight beneficial
	BAME residents	Large beneficial
	Households with no car access	Slight beneficial
	Households with dependent children	Moderate beneficial

Source: Mott Macdonald

Young adults and BAME groups have a larger proportionate representation, and a large number of amenities catering to young adult requirements, therefore these groups are likely to feel large beneficial impact. The groups with LTHD, older people and those without access to a car are underrepresented within this area therefore this group will experience proportionately slighter benefits.

20 Distributional impact appraisal of personal affordability

The most significant affordability impacts relating to travel costs are experienced by young adults (16-25) and older people (over 70) and those within low income households, particularly when travelling to employment and education sites.

20.1.1 Step 1: Screening

Table 25: Affordability impacts screening

Indicator	(a) Appraisal output criteria	(b) Potential impact	(c) Qualitative comments	(d) Proceed to steps 2a & 2b
Affordability	<p>In cases where the following charges would occur:</p> <ul style="list-style-type: none"> • 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). • 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). 	Expected to be neutral	As per the Social Impact assessment the scheme is likely to have some affordability impacts in terms of reduced parking charges and potential reduced car fuel costs but being off-set by bus fare charges.	No, scoped out

21 DI appraisal summary

21.1 Distributional impact summary assessment scores

This appraisal has screened the eight distributional impact areas outlined in TAG Unit 4.2. The scheme has been assessed as mostly generating positive impacts across the social groups identified within WebTAG Unit 4.2. The exception is severance which may see slight adverse impacts.

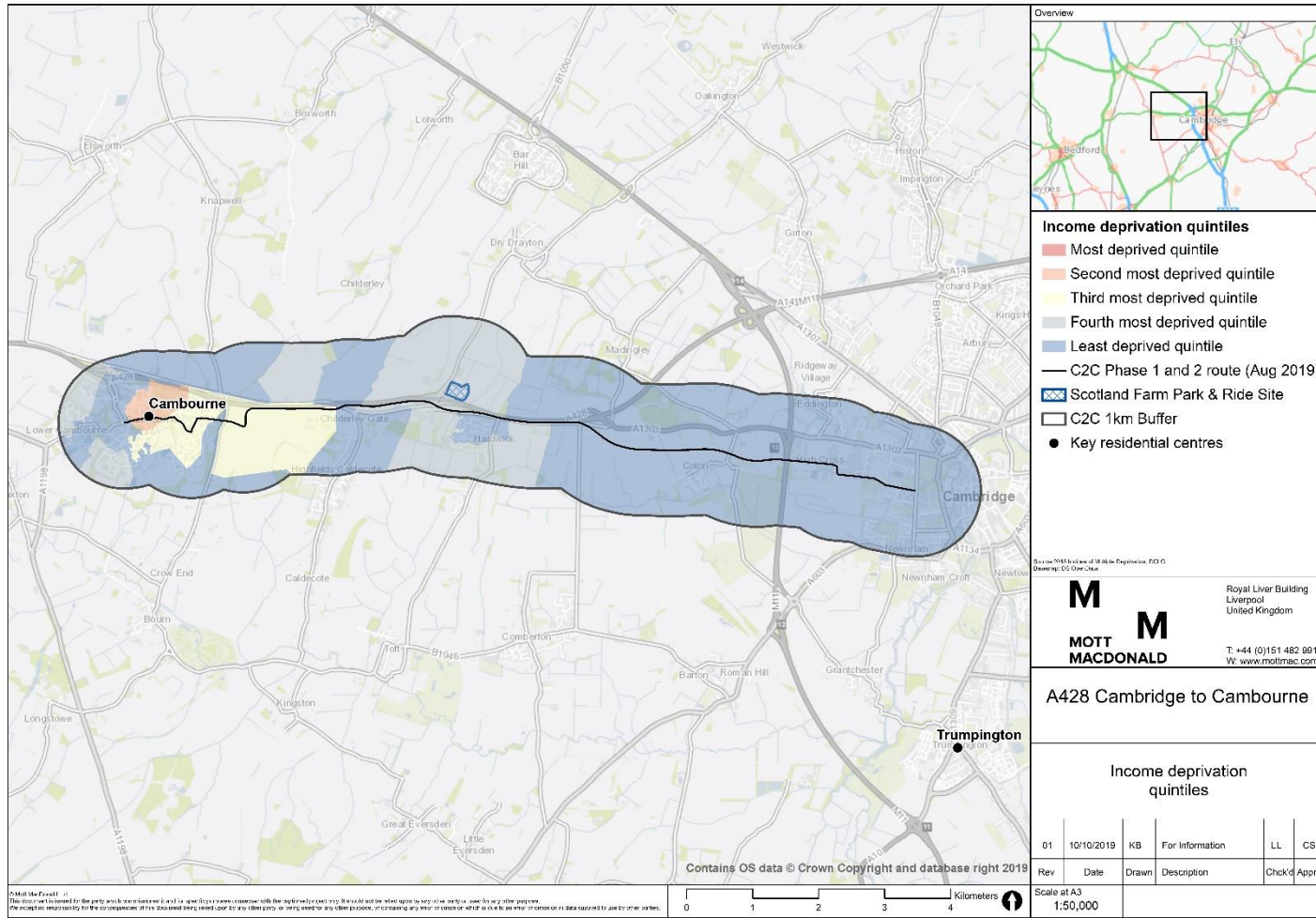
Table 26: Summary distributional impact screening results

Impact Area	Score	
User benefits	Most deprived quintile	Slight beneficial
	Second most deprived quintile	Slight beneficial
	Third most deprived quintile	Moderate beneficial
	Second least deprived quintile	Moderate beneficial
	Least deprived quintile	Large beneficial
Noise	Neutral (scoped out)	N/A
Air quality	Neutral (scoped out)	N/A
Accidents	Children	Moderate beneficial
	Young Adults	Large beneficial
	Older people	Moderate beneficial
Security	Neutral (scoped out)	N/A
Severance	Children	Moderate beneficial
	Older people	Slight beneficial
	Those with a LTHD	Slight beneficial
	Households with no car access	Slight beneficial
Accessibility	Most deprived quintile	Neutral
	Second most deprived quintile	Moderate beneficial
	Third most deprived quintile	Moderate beneficial
	Second least deprived quintile	Moderate beneficial
	Least deprived quintile	Large beneficial
	Children	Moderate beneficial
	Young adults	Large beneficial
	Older people	Slight beneficial
	Those with a LTHD	Slight beneficial
	BAME residents	Large beneficial
	Households with no car access	Slight beneficial
	Households with dependent children	Moderate beneficial
	Personal affordability	Neutral (scoped out)

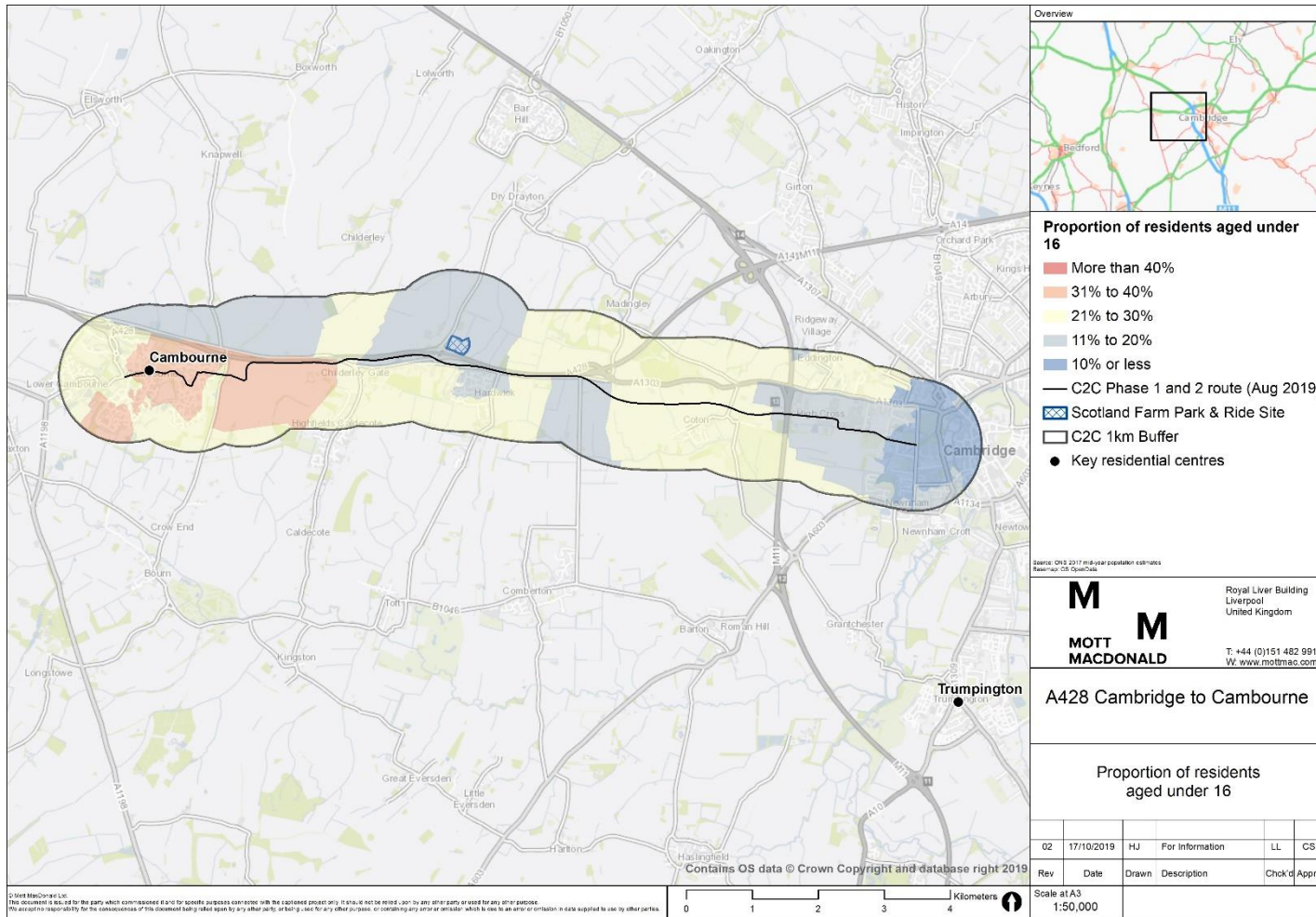
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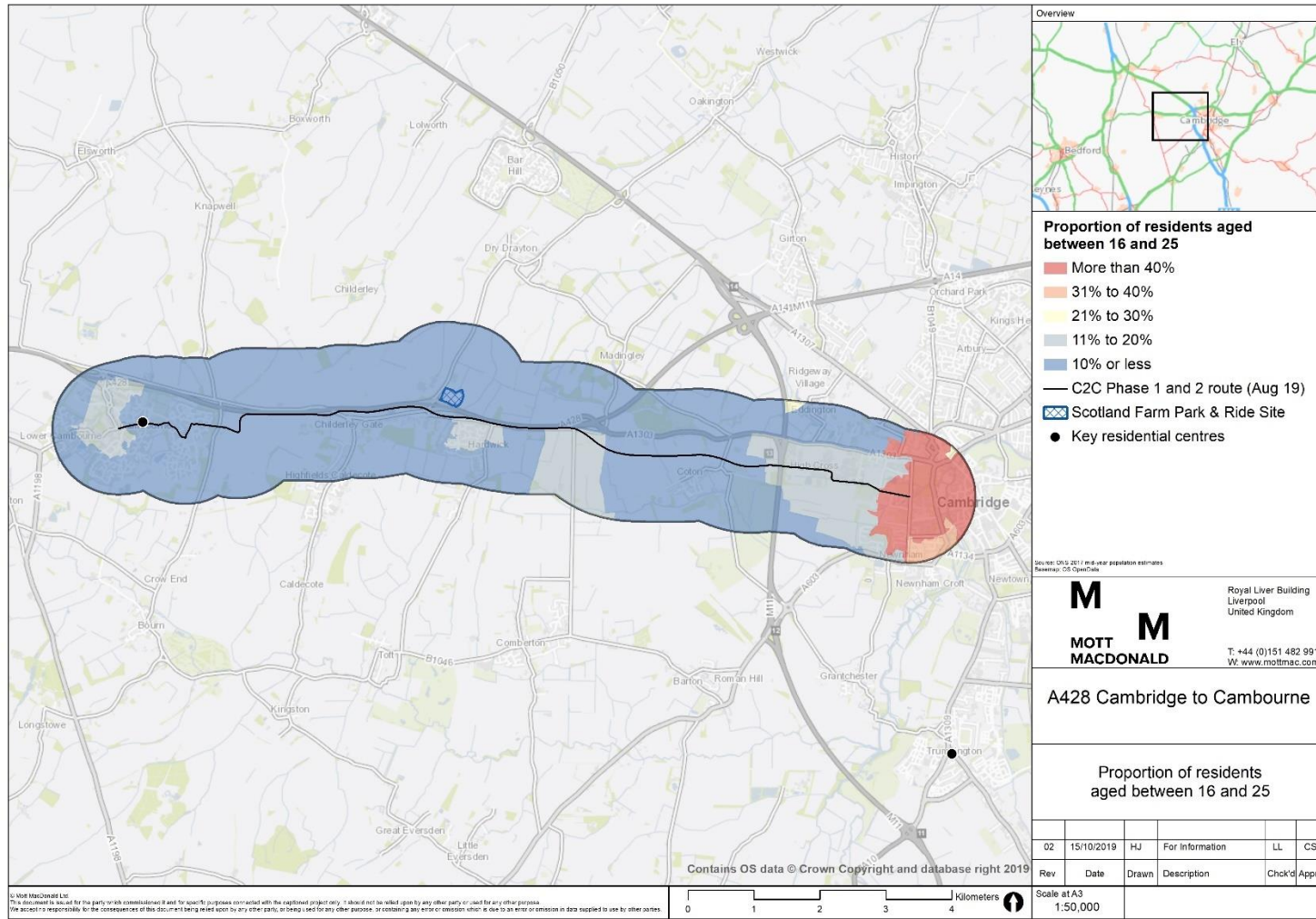
Appendix A - Map showing income deprivation quintiles



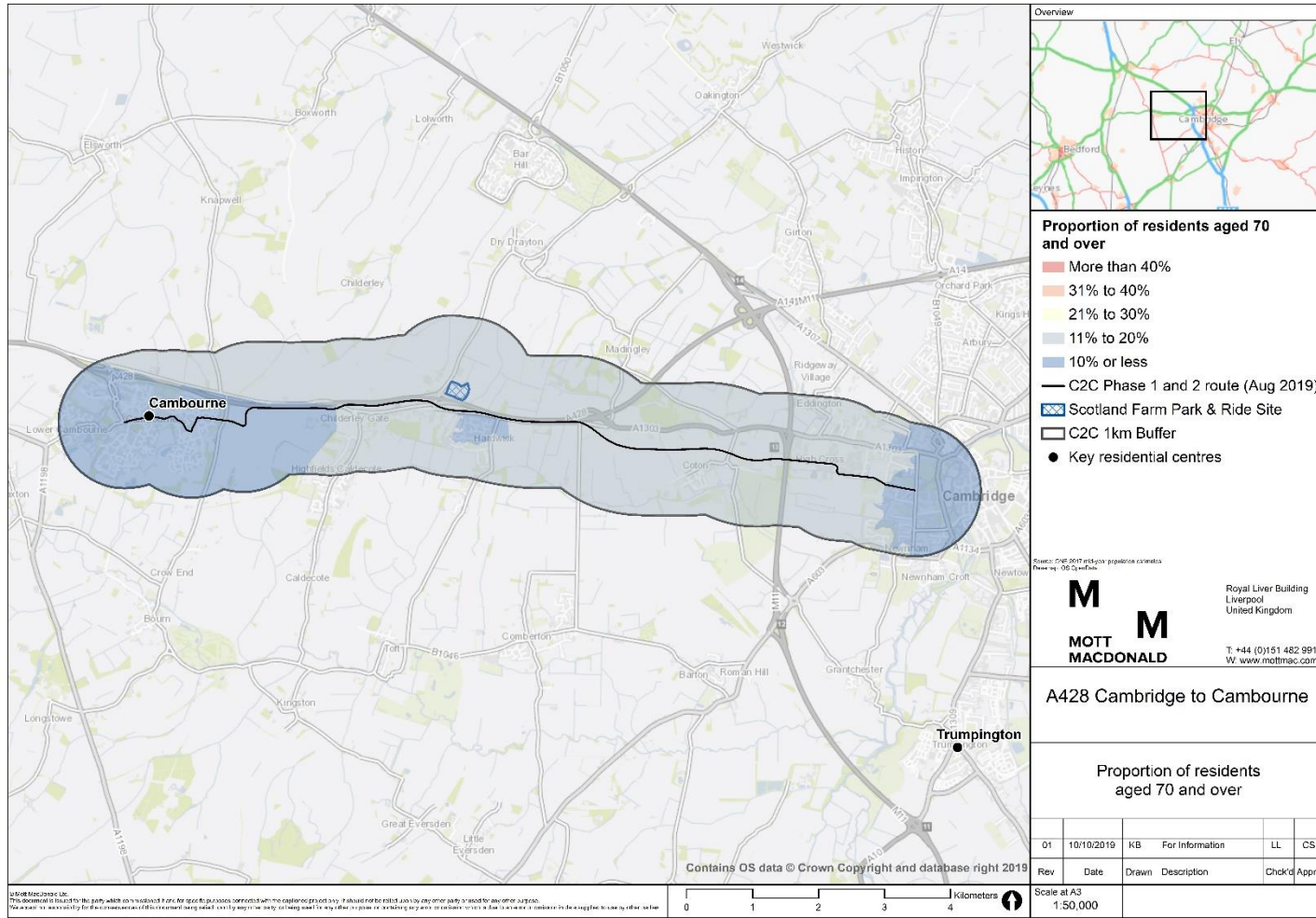
Appendix B - Map showing proportion of residents under 16



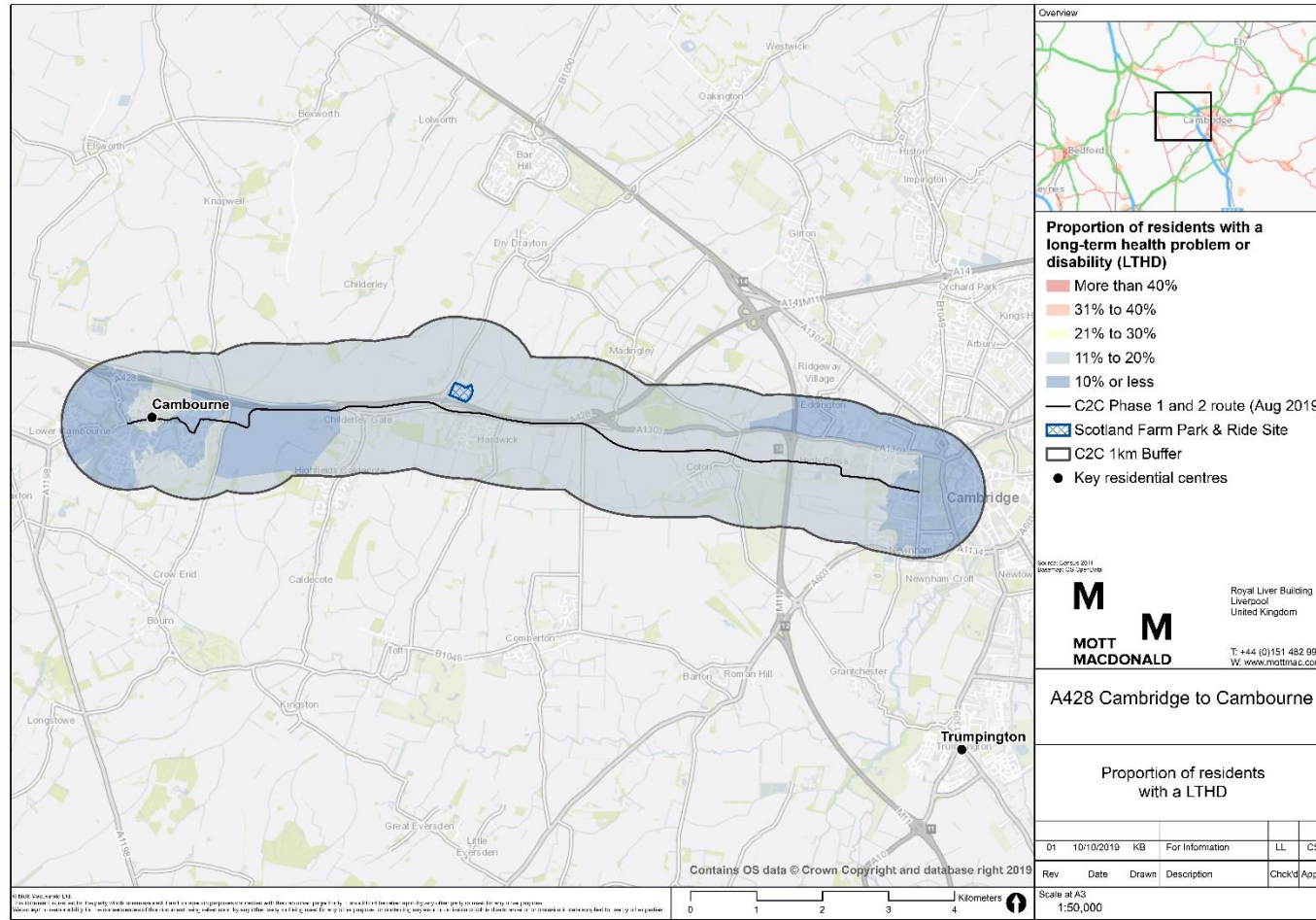
Appendix C – Map showing proportion of residents aged between 16 and 25



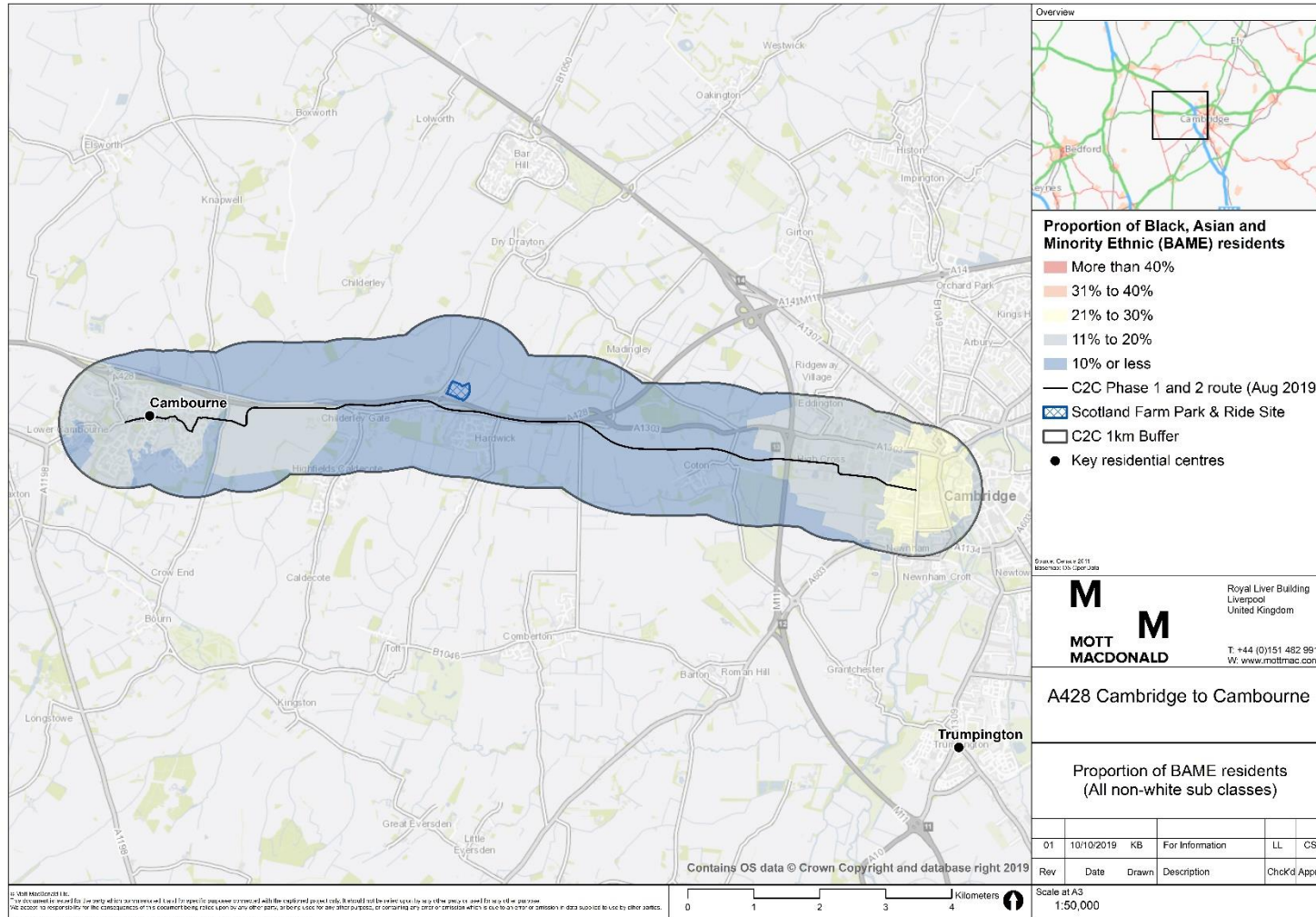
Appendix D - Map showing proportion of residents aged 70 and over



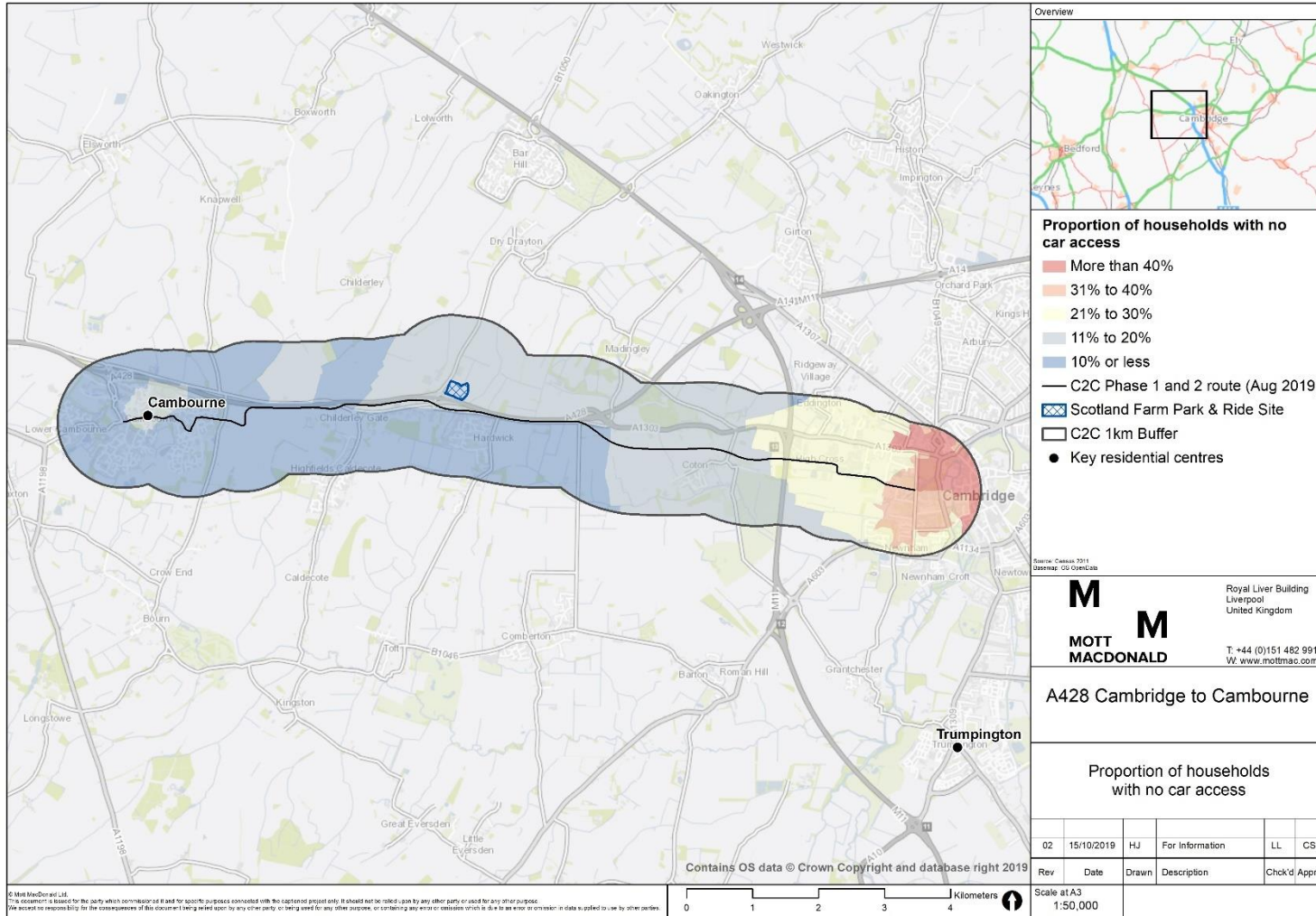
Appendix E - Map showing proportion of residents with a Long-Term Health Problem or Disability (LTHD)



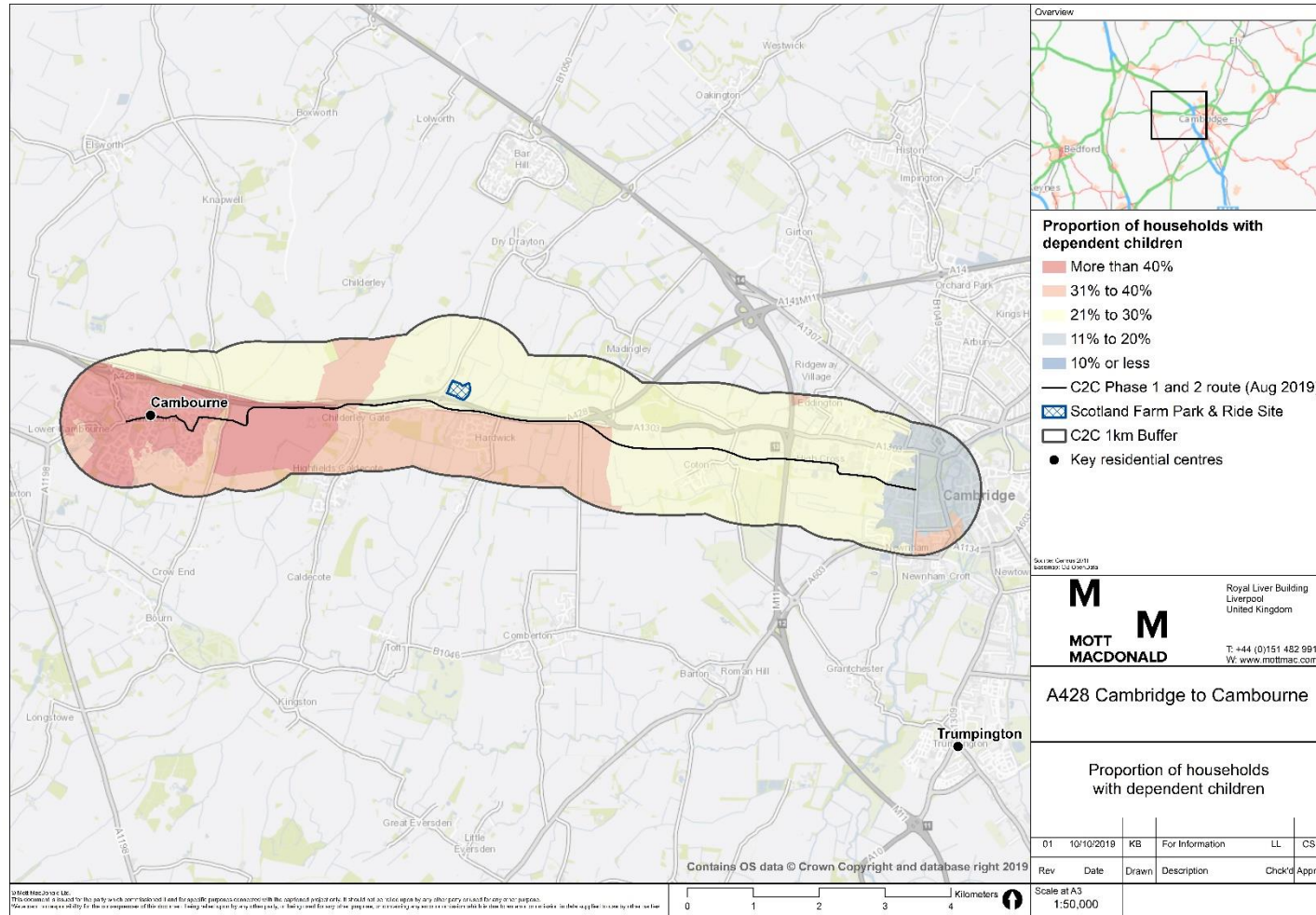
Appendix F - Map showing proportion of black, Asian and minority ethnic residents



Appendix G - Map showing proportion of households with no access to a car



Appendix H - Map showing proportion of households with dependant children



Appendix I - Map showing community resources within 1km

