Social and Distributional Impact Assessment

Technical Note

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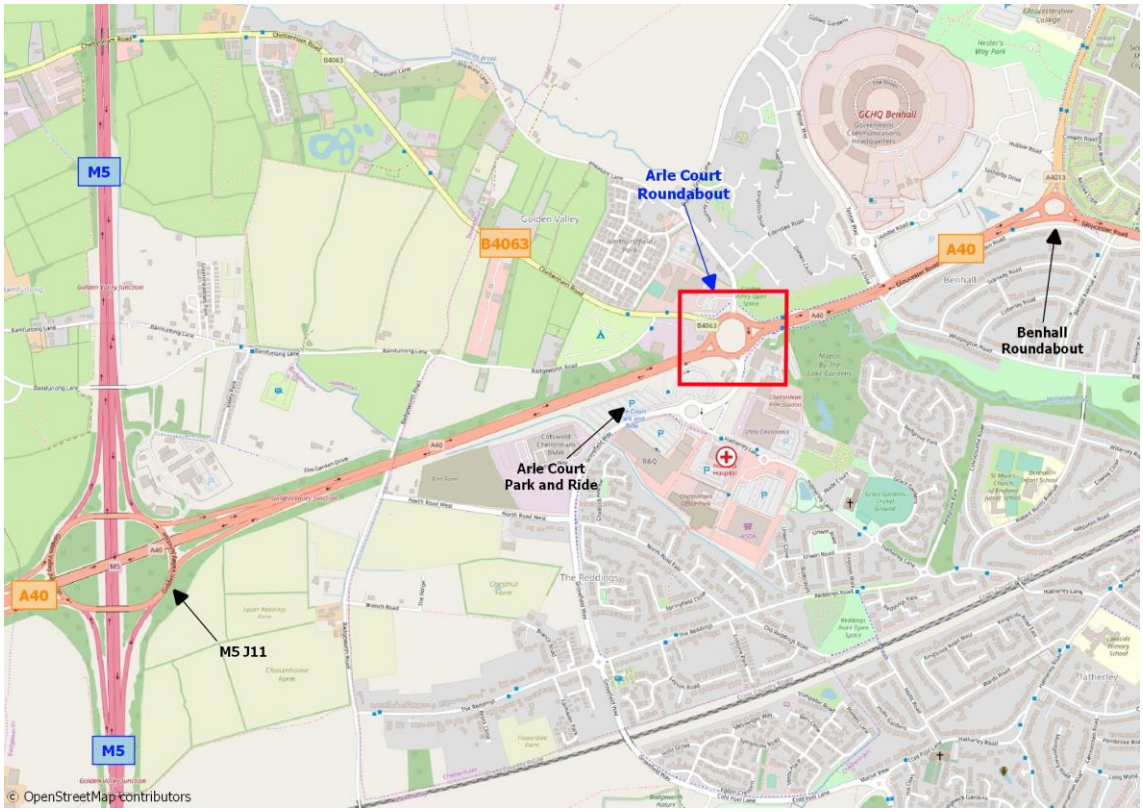
Social and Distributional Impact Assessment

1. Introduction

This technical note details the findings of a Social and Distributional Impact (SDI) Appraisal undertaken for the Arle Court Improvement Scheme (Phase 1). The scheme is the first of four phases proposed as part of the West of Cheltenham Improvement Package. Arle Court signalised roundabout is to the west of Cheltenham and connects the A40 with the B4063, Fiddler's Green Lane and Hatherley Lane, shown in **Figure 1-1**. The junction currently creates significant delays and congestion for traffic travelling on the A40 into and out of Cheltenham. The scheme aims to address this issue and is made up of the following interventions;

- Provision of an additional lane to the circulatory of the signalised roundabout;
- Corresponding additional lanes to the A40 on the approaches and exits to and from the junction;
- Provide a bus lane on the B4063 approach to the roundabout:
- Widening the Hatherley Lane arm to the south side of the roundabout;
- Park and Ride access/egress westbound from Arle Court Roundabout; and
- Widening of the existing subway that passes below the A40 on the eastern side of the junction.

Figure 1-1 *Scheme Location*



The key transport objectives of the Arle Court Improvement Scheme are to;

- Increase the capacity of the Arle Court Roundabout to remove existing pinch point;
- Improve connectivity with the surrounding network; and
- Future proof the roundabout to facilitate planned developments.

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All above objectives are considered when assessing the impact to users within this SDI Appraisal.

1.1. SDI Process

Social impacts consider the overall impact of transport interventions on different indicators, while Distributional Impacts (DIs) consider the variance of impacts across different social groups. The analysis of SDIs is mandatory in the appraisal process and undertaken in accordance with WebTAG guidance Unit A4.1 and A4.2 and is a constituent of the Appraisal Summary Table (AST). Both beneficial and/or adverse SDIs of transport interventions are considered, along with the identification of social groups likely to be affected.

The indicators considered for social or distributional impacts are shown in **Table 1-1**.

Table 1-1 *Indicators considered for social and distributional impacts*

Indicator	Social Impact	Distributional Impact
User Benefits		✓
Air Quality		✓
Noise		✓
Personal Security	✓	✓
Severance	✓	✓
Accessibility	✓	✓
Personal Affordability	✓	✓
Accidents	✓	✓
Physical Activity	✓	
Journey Quality	✓	
Option Values and Non-Use Values	✓	

The DI process involves the following three stages (see

Table 1-2 overleaf):

- Screening;
- DI Assessment;
- Appraisal of Impacts

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Table 1-2 *DI Process*

Step		Description	Output
Screening	1	Identification of likely impacts for each indicator	Screening Proforma
Full appraisal	2	Assessment: • Confirmation of the area impacted by the transport intervention (impact area) • Identification of social groups in the impact area (such as transport users, people living in those areas affected by the scheme) • Identification of amenities in the impact area	DIs social groups statistics and amenities affected within the impact area
	3	Appraisal of impacts: Core analysis of the impacts (including providing an assessment score for each indicator based on the following seven-point scale: • large beneficial (✓✓✓) • moderate beneficial (✓✓) • slight beneficial (✓) • neutral (*0*) • slight adverse (×) • moderate adverse (××) • large adverse (×××) Full appraisal of DIs and input into AST	Appraisal tables and AST Inputs

Section 3 of this technical note details the outcome of the DI appraisal undertaken on the required indicators for the scheme.

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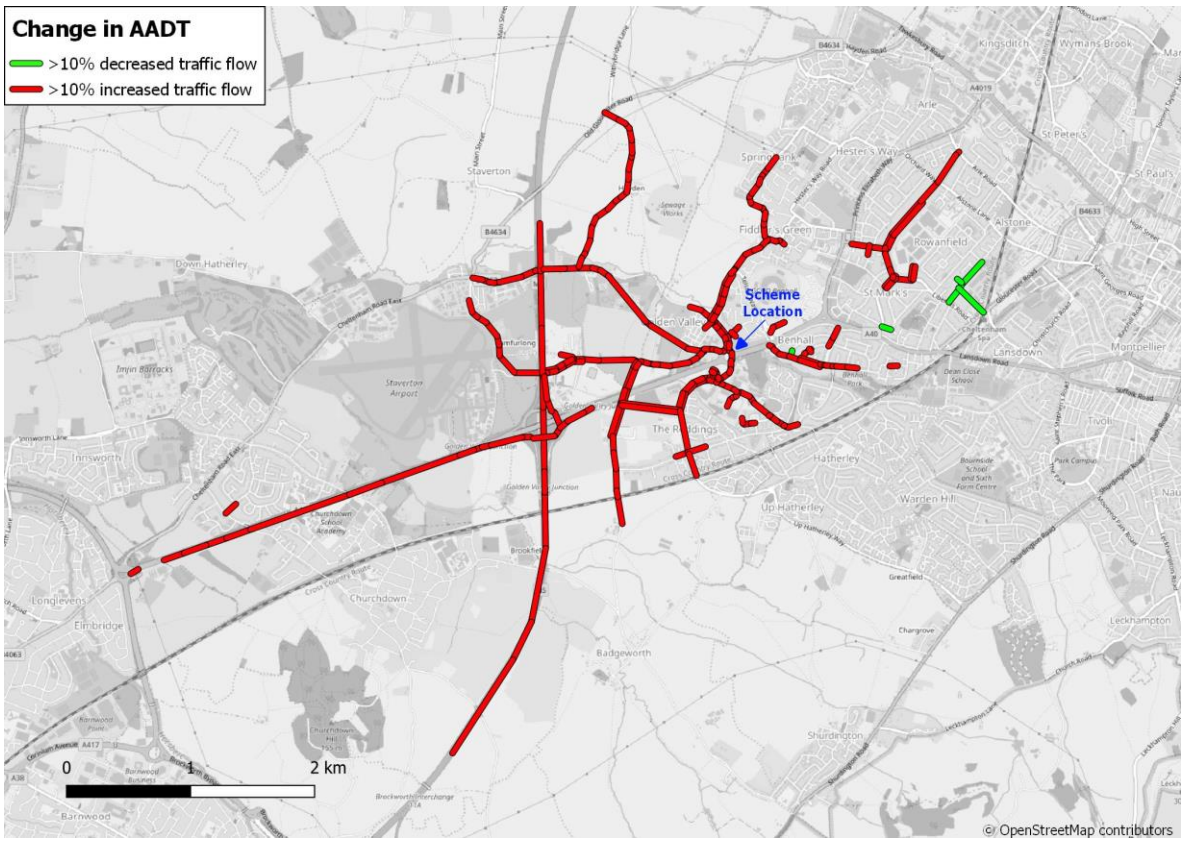
1.1.1. Assessment

A quantitative analysis of user benefits and affordability has been undertaken using outputs from the 60-year appraisal from TUBA. In order to ensure the level of detail is proportionate for this stage in the scheme design a qualitative analysis has been undertaken for each of the other six indicators.

Vehicle flow and speed outputs from the Paramics microsimulation model have been used to inform the qualitative assessments. The Average Annual Daily Traffic (AADT) was calculated from the average link flow over the morning and evening peak hours. Since data is not currently available on the proportion of daily traffic which passes through the network in each peak, this assessment assumes this value to be a tenth across the whole network. Links with greater than 100 vehicle difference and 10% change in AADT as a result of the scheme are shown in **Figure 1-2**.

The limitations of using this method to calculate the AADT is that only vehicles that travel on a link in the peak hour are recorded, rather than the demand on a link. Therefore, vehicles queueing at the end of the peak hour are not recorded, causing a distortion to the AADT value. In this instance, traffic modellers noted high levels of congestion in the base scenario, which are significantly reduced with the scheme in place. This resulted in more vehicles being able to travel through the network with the scheme in place within the peak hour. While all vehicles still complete journeys in congested conditions, increasing congestion will lead to increased journey times which means more vehicles may travel on links outside of the peak hour. Therefore, the average AADT across the network is higher with the scheme in place than without. It is not known whether this is the case without assessment of the AADT factor with and without the scheme. In order to ensure a proportionate assessment, this has not been calculated at this stage.

Figure 1-2 *Links with a change in AADT of greater than 10% and 100 vehicles due to the scheme*



There are many links with a greater than 10% increase in traffic flow as a result of the scheme. This includes the M5 in the vicinity of junction 11, the B4063 and Grovefield Way on approach to the scheme location and Hayden Lane. There are some links with greater that 10% reduction in traffic flow due to the scheme, these include Rowanfield Road and Roman Road, by Lansdown Industrial Estate.

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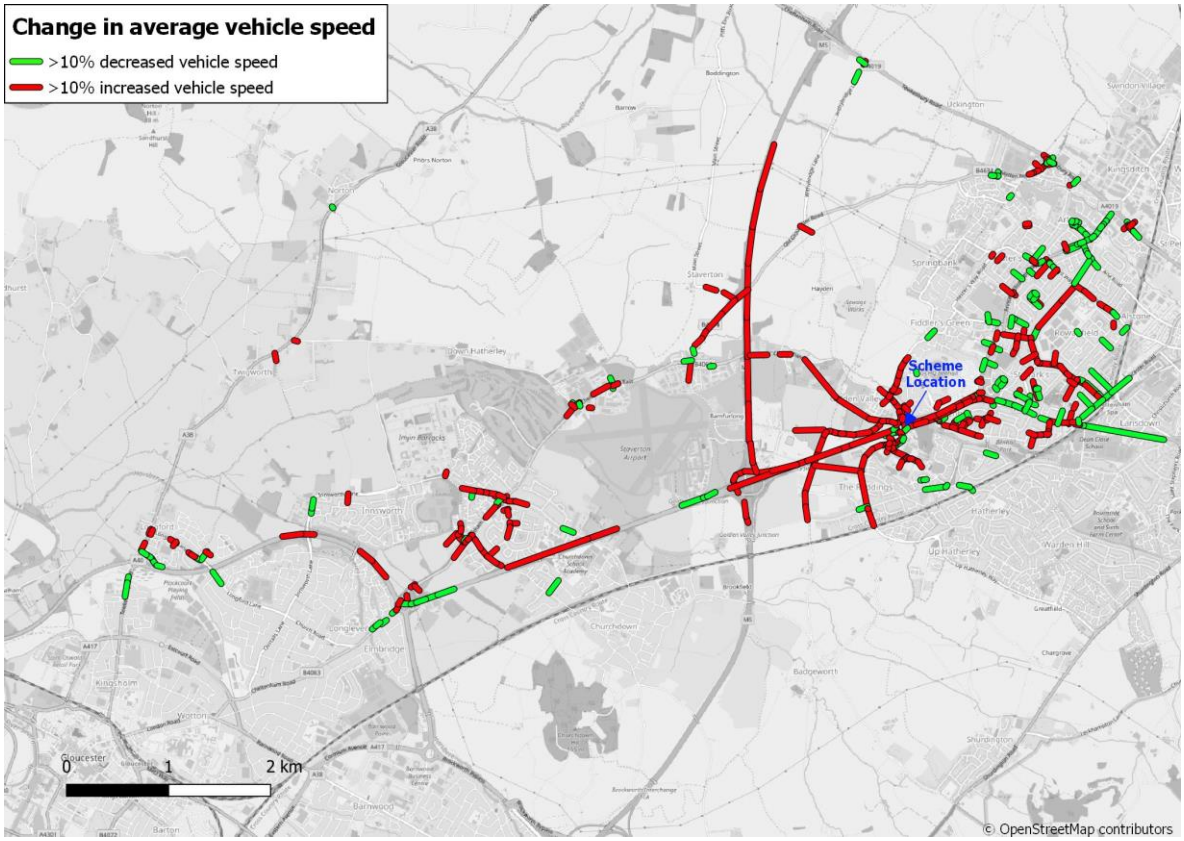
The average peak hour vehicle speed in mph has also been calculated to inform this assessment. **Figure 1-3** shows links with greater than 10% and 1mph change in traffic speed caused by the scheme.

Figure 1-3 *Links with a change in traffic speed of greater than 10% due to the scheme*



There are many links with greater than 10% change in traffic speed as a result of the scheme. Links with a significant increase in speed include all approaches to Arle Court Roundabout, the M5 junction 11 southbound off-slip and Tennyson Road. Links with a significant decrease in traffic flow include a section of Princess Elizabeth Way, a section of Gloucester Road by Cheltenham Spa and a section of Lansdown Road by Dean Close School. This is likely due to the increased capacity through Arle Court Roundabout, causing more vehicles to reach these parts of the network in a smaller amount of time, hence increasing congestion in these areas.

The assessment of AADT and average vehicle speed are shown to be consistent in **Figure 1-2** and **Figure 1-3**. Reduced congestion through Arle Court Roundabout leads to increased traffic speed in the area, meaning more vehicles are able to complete a movement. Therefore, there is increased vehicle flow and speed in this area. There is decreased traffic speed and increased vehicle flow on approach to the A417 roundabout from the A40. This is likely due to more vehicles travelling through Arle Court Roundabout due to the increased capacity and reaching this point in the network. Hence, congestion will increase in this area causing traffic speeds to decrease.

2. Social Impact Assessment

2.1. Accidents

2.1.1. Introduction

A transport intervention can influence the number of accidents and resulting casualties. It is important to examine these changes in accidents / casualty levels as there are significant costs associated with accidents for individuals, the government and private businesses. For example, casualty costs include the suffering of individuals and families, loss of economic output and medical costs. Costs of an accident include, damage to vehicles and infrastructure, police cost, legal and insurance costs and in certain cases losses due to extended journey times and road closures.

As the Arle Court Improvement Scheme aims to reduce congestion through the Arle Court signalised roundabout, which may lead to increased traffic flow and speed, an assessment of accidents is required.

2.1.2. Assessment

During the 5-year period between January 2013 and December 2017, the number of accidents in the neighbourhood surrounding the Arle Court roundabout, the GCHQ centre and the proposed Cyber Park increased from the years 2013 to 2015 by 36% and then decreased by 42% from the years 2015 to 2017. This was met by contrasting data concerning the average severity of incidents, calculated by averaging the severity scores for each accident each year. The scale of average severity is ranked where a Fatal accident is the most severe type and given a scoring of 1, a Serious accident is given a score of 2 and a Slight accident is the least severe and given a ranking of 3. A less severe location is therefore displayed as having a higher average severity score. The average severity score decreased from 2.87 in 2013 to 2.68 in 2016, which suggests accidents became more severe over time until 2017, where the score increased

Figure 2-1 *Number of Accidents in the area surrounding Arle Court Roundabout 2013-2017*

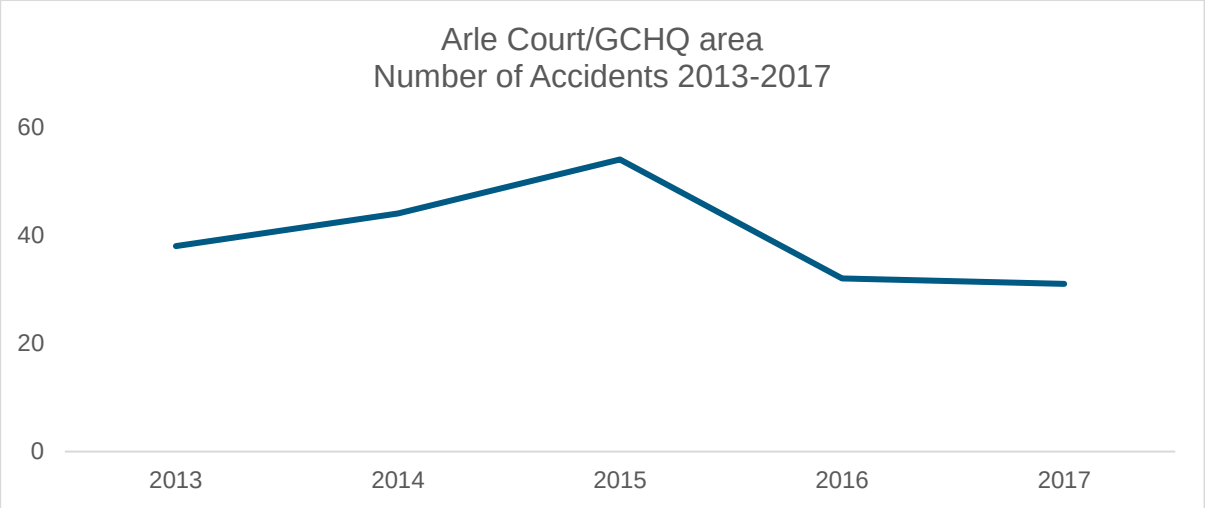


Figure 2-2 *Average Severity score in the area surrounding Arle Court Roundabout 2013-2017*

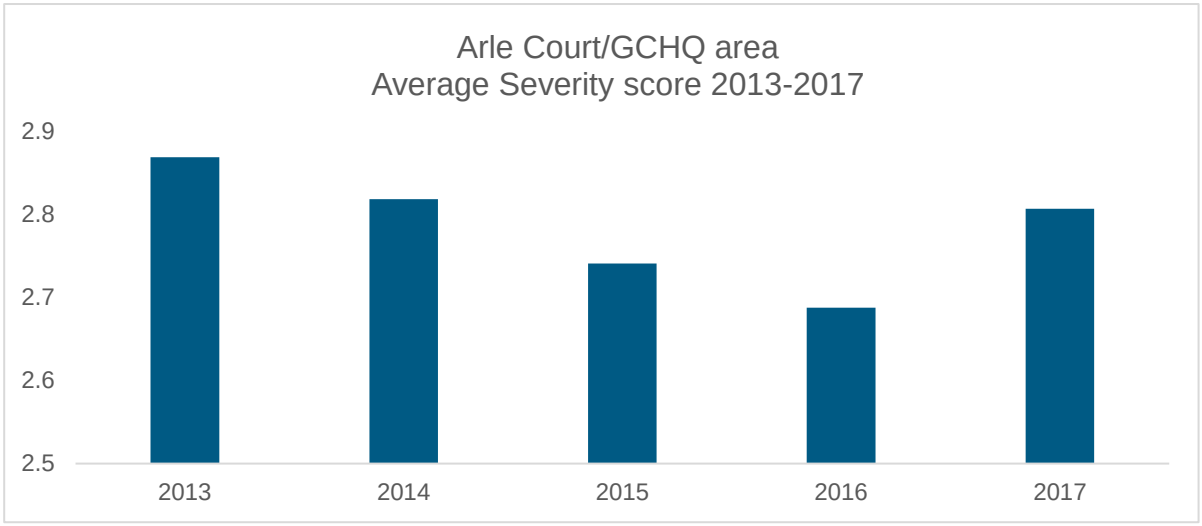
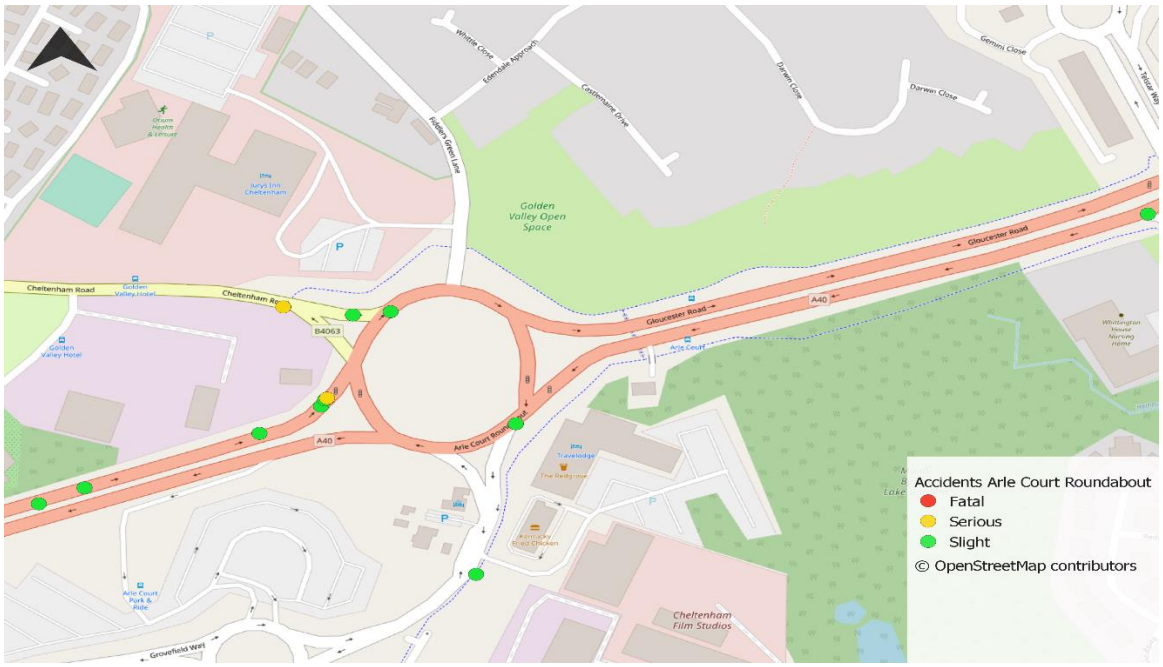


Figure 2-3 *DfT Accident data Arle Court Roundabout 2013-2017*



The map represents the DfT data for accidents that have occurred at Arle Court Roundabout during the 5-year period between January 2013 and December 2017. The database revealed a total of twelve accidents occurred on or directly next to Arle Court roundabout. Three accidents repeatedly occurred in each of the years 2013, 2014 and 2015, one accident occurred in 2016 and two accidents occurred in 2017. Below is a breakdown of the dates of the incidents, the severity of the accident, in addition to the number of casualties per accident and the number of pedestrians involved. There are three discrete scores to categorise an accident; fatal being of the highest severity, serious the second level and slight being the lowest level.

Table 2-1 *Casualties in the impact area*

Date of Accident	Severity	Number of Casualties	Pedestrians involved
19/06/2013	Slight	1	0
08/10/2013	Slight	1	0
16/12/2013	Slight	1	0
19/02/2014	Slight	1	0
06/06/2014	Slight	1	0
12/07/2014	Slight	2	0
19/02/2015	Serious	1	0
22/04/2015	Serious	1	0
23/09/2015	Slight	1	0
04/11/2017	Slight	2	0
31/03/2017	Slight	1	0
04/11/2017	Slight	1	0

From the table, two incidents involved more than one casualty and no accident involved pedestrians.
On the A40 Eastbound, six incidents have occurred in this 5-year period, one of which was ranked as severe and the rest as slight. Three of the six incidents occurred at the A40 Eastbound entrance to the Arle Court roundabout, the remaining three occurred further down the A40 lane. Five of the six incidents were attributed to rear end shunts, one of which were regarded as serious. The final incident was due to a motorcyclist who lost control during wet conditions.

The B4063 incurred three accidents from January 2013 to December 2017. Two of the accidents were regarded as slight whilst one which were regarded as serious. The serious accident involved a cyclist who reportedly pulled out of a line of stationary traffic and collided with an oncoming vehicle. One of the slight accidents involved a rear end shunt whilst the other involved a vehicle pulling out of stationary traffic to collide with an incoming motorcyclist.

A slight incident occurred on the southern section of the circulatory carriageway where a vehicle cut into the path of another vehicle. This occurred during the day and with dry conditions.

A single accident took place on the Westbound lane of Gloucester Road, heading towards Arle Court roundabout.

A single collision took place on Hatherley Lane involving a car and a cyclist. The incident involves the cyclist cycling into a vehicle edging out from a driveway.

No accidents occurred at Fiddler's Green Lane during this 5-year period.
According to the Traffic Modelling report, the Do Something 3 option was found to marginally improve journey times in the 2021 AM and PM Peaks when compared to the original DS1 scenario and showed significant improvements to queueing on almost all the approach arms to the Arle Court Roundabout. The traffic modelling shows that all approaches to the Arle Court Roundabout generate a greater than 10% increase in traffic speed; this will subsequently lead to an increased probability of accidents occurring. Therefore, it is estimated there will be a **slight adverse** impact to accidents as a result of this scheme.

2.2. Physical Activity

2.2.1. Introduction

TAG Unit 4.1 notes that transport and the physical environment of urban areas both play a major role in the amount of physical activity that people are engaged in on a day-to-day basis. There is a longstanding recognition of the interrelationship between transport, the environment and health. A 2012 meta-analysis estimated that physical inactivity was responsible for 5.3 million deaths worldwide; like that of smoking and obesity. Hence, physical activity will be assessed further in this Social Impact Assessment.

2.2.2. Assessment

WebTAG Guidance Unit 4-1 requires consideration of the impacts of any travel scheme on physical activity. This is the case even if an intervention is unlikely to significantly affect active modes of travel directly, as is the case for the Arle Court Scheme, as it could cause modal shift away from active travel. This assessment is qualitative and based on professional judgement.

It is not anticipated that the scheme will have any impact on physical activity as all existing pedestrian facilities are maintained. Arle Court Roundabout is expected to form part of a dedicated cycle route linking Gloucester and Cheltenham in the future, which will benefit physical activity. Therefore, the immediate impact of the scheme to physical activity is **neutral**.

2.3. Security

2.3.1. Introduction

WebTAG unit A4-1 states that security concerns are greater on roads where motorists are required to slow or stop their vehicle. This includes traffic lights or congested areas. Vehicles are also vulnerable when left unattended such as in car parks or at service stations.

2.3.2. Assessment

Without further scheme information, it is not possible to fully assess security impacts. However, where possible, a qualitative comment and assessment has been given for each security indicator, shown in **Table 2-1**.

Table 2-1 *Security impacts of the Arle Court Improvement Scheme*

Group	Relative Importance	Impact
Site perimeters, entrances, exits	High	Neutral
Formal surveillance	High	Neutral
Informal surveillance	Low	Slight beneficial
Landscaping	Medium	Neutral
Lighting and visibility	High	Neutral
Emergency Call	Medium	N/A

The scheme includes a small movement of the existing bus stop at the Arle Court Park and Ride and the addition of a new bus stop on the opposite side of the road. It is assumed that the bus stops will have sufficient lighting and surveillance cameras, so will not impact users' perceptions of personal security. However, journey distances and times will be reduced for bus services using the new link road from the Park & Ride to the A40 westbound. This may make bus travel on these routes a more attractive mode of travel, hence leading to a mode shift from private car to public transport. This would increase the number of people waiting at bus stops and hence improve perceptions of informal security. At this stage of assessment, it is assumed that there will be no change to site perimeters, landscaping or emergency call facilities, hence having a neutral impact. Overall, the beneficial impacts to security resulting from informal surveillance are likely to be small. Hence, the overall impact to security is **neutral**.

2.4. Severance

2.4.1. Introduction

Community severance is defined in WebTAG unit A4.1 as the separation of residents from facilities and services they use within their community caused by substantial changes in transport infrastructure, or by changes in traffic flows. The scheme includes the widening of the subway below the A40, construction of an on-slip to the A40 westbound from the Park and Ride as well as changes in traffic flows.

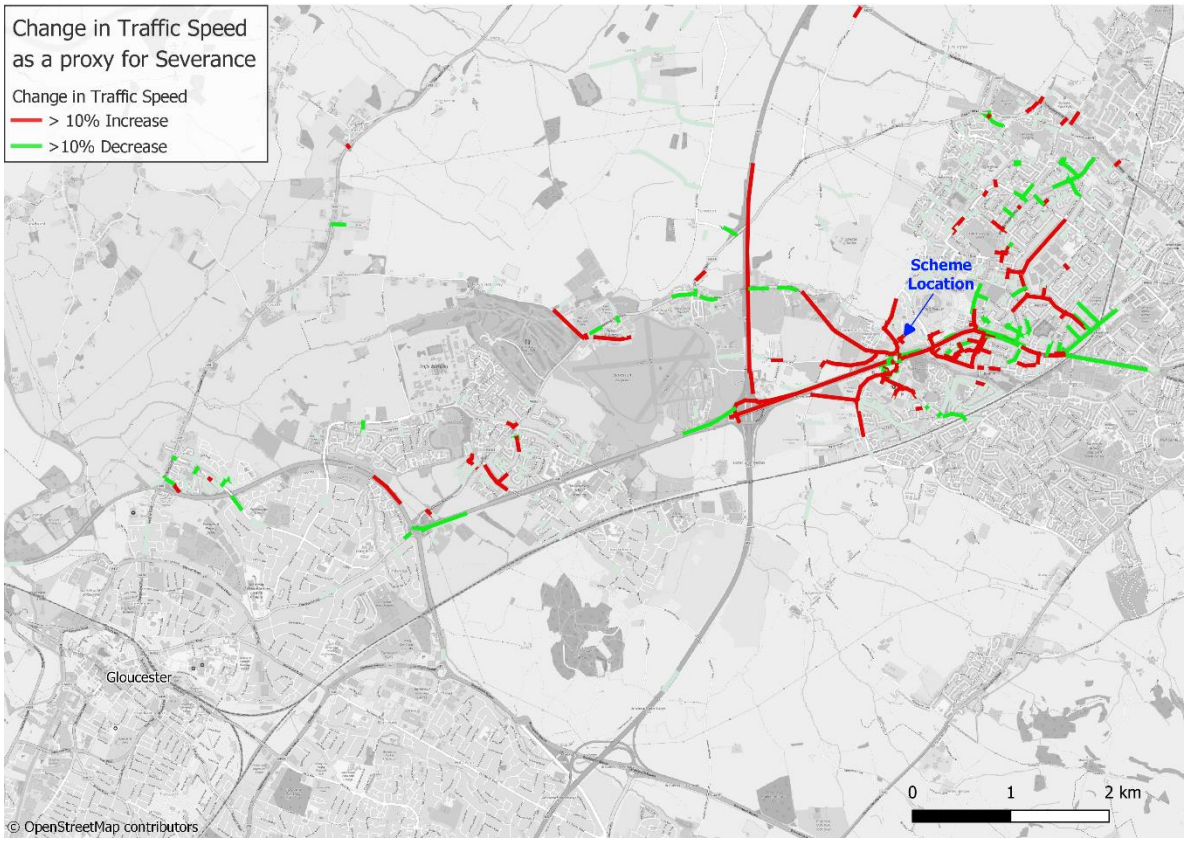
2.4.2. Assessment

Severance can be affected in two ways; either through physical changes to infrastructure or through changes to traffic conditions Changes in traffic flow are measured by assessing completed trips in the peak hour, however this measurement appeared unrepresentative of actual traffic flow changes and therefore inappropriate as a proxy for changes in severance. For this reason, the study assessed changes in traffic speed of greater than 10% to be used as a proxy for severance.

It is envisaged that the underpass at Arle Court Roundabout will be widened as result of the scheme. This may make it more comfortable for pedestrians to cross the A40, as there is more space to pass other pedestrians or cyclists. This may encourage more users to make journeys across the A40 as a result. As the underpass already exists it is unlikely that severance will be affected significantly due to the widening.

Figure 2-4 shows the speed changes resulting from the Arle Court scheme. These generally occur on all entrances and exits approaching the Arle Court roundabout; the roads such as duelled areas are not accessible to pedestrians of the A40 and the M5. There are however significant increases in speed on minor routes radiating from Arle Court that can be accessed by pedestrians. It is likely that increased speeds will increase severance on these routes. Within the eastern suburbs of Cheltenham there are approximately the same number of links with increased traffic speed as decreased traffic speed. Therefore, changes to this area are not significantly impacting severance within this area.

Figure 2-4 *Changes in traffic speeds (proxy for severance) as a result of the Arle Court scheme*



Overall, it is likely that the effect of the Arle Court scheme on severance will be **slight adverse** mainly due to the effects on vehicle speed on minor routes radiating out from Arle Court Roundabout.

2.5. Journey Quality

2.5.1. Introduction

WebTAG Unit A4-1 states that in most cases travel is derived demand and hence, users are trying to access other services and therefore a poor journey experience is easily noticed. Travel on an urban motorway is likely to be exclusively a derived demand due to the lack of traveller care facilities and traveller views that the journey will provide compared to scenic drive or rail journey for example. Therefore, it is assumed that urban motorway trips result from people wanting to access services and amenities quickly, rather than for the pleasure of the journey. It is therefore, important that journeys on this section of road are made as simple and easy as possible to prevent boredom and associated psychological issues.

With the increasing research into travel behaviour, there is increasing evidence that users are willing to pay to improve the quality of a journey. Consequently, it is important to measure changes in journey quality as a result of a scheme.

2.5.2. Assessment

WebTAG Unit A4-1 states that there is limited evidence on monetary valuations of quality in relation to highway projects. Therefore, a qualitative approach is recommended. There are several factors which may impact on journey quality, each is assessed separately in **Table 2-2**.

Table 2-2 *Journey Quality Assessment for the Arle Court Improvement Scheme*

Factor	Sub-factor	Impact of the scheme for different users			
		Motorists	**Cyclists**	**Pedestrians**	**Public Transport Users**
Traveller Care	Cleanliness	Neutral	Neutral	Neutral	Slight Beneficial
	Facilities	Neutral	Neutral	Neutral	Slight Beneficial
	Information	Neutral	Neutral	Neutral	Neutral
	Environment	Slight Beneficial	Neutral	Slight Beneficial	Neutral
Travellers' Views	-	Neutral	Neutral	Neutral	Neutral
Traveller Stress	Frustration	Moderate Beneficial	Neutral	Neutral	Moderate Beneficial
	Fear of potential accidents	Neutral	Neutral	Neutral	Neutral
	Route uncertainty	Neutral	Neutral	Neutral	Neutral
Overall		**Slight Beneficial**	**Neutral**	**Slight Beneficial**	**Slight Beneficial**

2.5.2.1. Traveller Care

The scheme maintains all existing pedestrian and cycle facilities, but there is unlikely to be any significant impact to traveller care for cyclists. The scheme includes the widening of the subway below the A40 at Arle Court Roundabout, which may reduce overcrowding of the underpass. Hence there is a slight beneficial impact for pedestrians. The scheme includes the resurfacing of the road

over the scheme extent. This may improve the smoothness of ride for motorists, hence having a slight beneficial impact to the environment for motorists. The construction of new bus stops at the Park and Ride will have a slight beneficial impact to cleanliness and facilities for public transport users as a new construction is assumed to be clean, of good condition and have no graffiti.

2.5.2.2. Travellers' Views

It is not expected that there will be any significant impact to travellers' views as a result of the Arle Court Improvement Scheme.

2.5.2.3. Traveller Stress

An aim of the scheme is to increase capacity of the Arle Court Roundabout, which is likely to reduce travel time for motorists and hence have a moderate beneficial impact to frustration. There is also a moderate beneficial impact to frustration for public transport users as reduced congestion and the additional on-slip at the A40 westbound may reduce travel distances and times, hence improving the reliability of buses in the area. There is unlikely to be any impact to traveller stress for cyclists or pedestrians, as all cycle routes and footpaths are maintained. There are unlikely to be any significant impacts for any user groups to fear of potential accidents or route uncertainty as a result of the scheme.

2.5.3. Scheme Assessment

Overall, there is a slight beneficial impact to journey quality for motorists, pedestrians and public transport users. Cyclists are unlikely to be significantly impacted by the scheme, hence there is a neutral impact to journey quality for this these users. Therefore, the overall impact of the Arle Court Improvement Scheme to journey quality is **slight beneficial**.

2.6. Option Values and Non-Use Values

2.6.1. Introduction

Option values and non-use values relate to the implementation or withdrawal of a public transport service. An option value is the benefit an individual receives from knowing a service exists should they need to use it. A non-use value stems from the knowledge that other people can use the service providing an altruistic benefit.

2.6.2. Assessment

TAG Unit 4.1 requires that option values and non-use values are assessed if the scheme being appraised includes measures that will substantially change the availability of transport services within the study area (e.g. the opening or closure of a rail service, or the introduction or withdrawal of buses serving a particular rural area). The scheme includes the addition of a bus stop from the Arle Court Park & Ride to the A40 westbound. However, this doesn't significantly change any bus routes, or the bus services provided in the area. Therefore, there are no significant changes to transport services, so this indicator will not be assessed.

2.7. Accessibility

2.7.1. Introduction

Accessibility benefits can be similar to transport user benefits as the changes in journey time and operating costs reduce the generalised cost associated with travel and hence make transport more affordable. Reduced journey times and operating costs also increase the range of services that can be accessed for the same cost.

Apart from the cost of transport the following barriers can impact accessibility:

- Availability and physical accessibility of transport
- Services and activities located in inaccessible places
- Safety and security
- Travel horizons – knowing and trusting using a service

All these barriers relate more to public transport than they do to private vehicles. For example, cars are almost always available (if owned) and can access the vast majority of destinations.

2.7.2. Assessment

At this stage in the assessment it is not known if the frequency or routings of buses will be altered as a result of the Arle Court Improvement Scheme. However, it is assumed that there will be journey time savings as a result of reduced congestion though the roundabout, the addition of a bus lane on the B4063 approach to the roundabout and the additional on-slip from the Park and Ride to the A40 westbound. It is assumed that services towards Gloucester, which currently stop at the existing bus stop at the Park & Ride, will instead stop at the new bus stop. Since this is directly across the road from the existing stop, it is unlikely there will be any significant accessibility impact as a result of this.

Therefore, there is a **slight beneficial** impact to accessibility due to the scheme.

2.8. Personal Affordability

2.8.1. Introduction

Affordability of transportation can be a major barrier to the mobility of certain groups. Consequently, it will be assessed here. As this intervention only significantly affects road users, changes in affordability are only relevant if a household owns a car.

2.8.2. Assessment

It is assumed that public transport fares are not affected by the Arle Court Improvement Scheme. Additionally, the scheme will not implement any charges on users for using the road and will not result in any changes to parking charges. Therefore, the only relevant change in personal affordability is changes in car fuel and non-fuel costs, as shown in **Table 2-3**.

The changes in vehicle operating costs are captured in the TUBA outputs. The total impact to vehicle operating costs for home-based 'commuting and other' trips is over £1.75 million benefit, for the assessment area shown in **Figure 3-11**. In other words, the scheme decreases the costs associated with operating a car. This occurs due to the scheme increasing speeds at which vehicles can travel.

Table 2-3 *Scope of potential changes in cost of travel for the scheme*

Mode	Cost Change	Cost Change Expected	Change Captured in TUBA?	Quantified Impact
Car	Car fuel and non-fuel costs	Yes	Yes	£1,764,642[1]
	Road user charges	No	N/A	N/A
	Public parking Charges	No	N/A	N/A
	Other car charges/costs	No	N/A	N/A
	Cycling Costs	No	N/A	N/A

Increased capacity through Arle Court roundabout and a mode shift from private car to public transport will reduce congestion through in the area. This is likely to reduce vehicle operating costs as there's reduced vehicles idling, braking and accelerating whilst queueing. Increased vehicle speeds can lead to increased fuel consumption which may cause vehicle operating costs to increase in some cases. However, this is small compared to the affordability benefits caused by the scheme. Therefore, the overall impact of the scheme to personal affordability is **slight beneficial**.

2.9. Conclusion

Table 2-4 *Social Impact Assessment Summary of the Arle Court Improvement Scheme*

Indicator	Assessment	Conclusion
Accidents	Slight adverse	Traffic speed is likely to increase as a result of the Arle Court Scheme, hence increasing the probability of accidents.
Physical Activity	Neutral	No impact to physical activity is expected as a result of the scheme.

[1] The VOC impact is the cost change in home-based 'commuting and other' trips within the DI affordability assessment area

Security	Neutral	There are no significant changes which are likely to impact users' perceptions of security.
Severance	Slight adverse	Increased vehicle speeds on routes within the impact area are likely to have an adverse impact on severance.
Journey Quality	Slight beneficial	Reduced congestion will reduce traveller stress and new bus stops will likely improve facilities and cleanliness. Hence, there is a beneficial impact to journey quality.
Option and Non-Use Values	Not assessed	No significant changes to bus routes or services are included with the scheme, so this indicator isn't assessed.
Accessibility	Slight beneficial	Reduced travel time for bus services as a result of the scheme will have a slight beneficial impact to accessibility.
Personal Affordability	Moderate beneficial	The scheme will cause a reduction in vehicle operating costs as a result of reduced congestion in the area.

3. Distributional Impact Appraisal

3.1. Population Data Sources

Analysis of the scheme impact area was undertaken using labour market statistics from Nomis. Most of this data was collected during the 2011 census. Two levels of geography were used in appraisal. Output Areas (OAs) have been used for the population belonging to vulnerable groups considered that reside in each area. This includes children, elderly, women and black and minority ethnic (BAME) residents. The exception to this is income group and Disability Living Allowance (DLA) claimants, which data is only available at Lower Super Output Area (LSOA) level. DLA claimant data is only available for 2001 LSOA geographical areas. Hence, the data used was the most recently collected DLA claimant data (November 2018) at 2001 LSOA level. The source for each population statistic is shown in **Table 3-1**.

When identifying social groups, percentages have been calculated using the total populations of affected OAs or LSOAs. For the national average this is all OAs / LSOAs within England and OAs / LSOAs within the impact area for each indicator. The proportion of no car households differs, as percentages are calculated based on total households within the geographic area rather than total population.

Table 3-1 *Data sources for socio-demographic mapping and population statistics*

Statistic	Source
Household Income	English Indices of Deprivation – Income domain
Age	2011 Census KS102EW – Age Structure
Ethnicity	2011 Census QS201EW – Ethnic Group
DLA claimants	Department for Work and Pensions, Work and Pensions Longitudinal Study – Benefit claimants, Disability Living Allowance for small areas
Car Ownership	2011 Census – KS404EW – Car or van availability
Gender	2011 Census KS101EW – Usual resident population

3.2. Screening Outcome

Step one of the DI process involved the completion of a screening proforma, based upon qualitative assessment of the likely impacts of the scheme on each of the eight DI indicators.

The outcome of this screening process identified that all eight indicators should be appraised in detail to determine the affect the measure will have on different social groups of the population, as shown in **Table 3-2**. The detailed appraisals of each indicator are included in the next section.

Table 3-2 *Summary of the screening proforma*

Indicator	Likely DI Impact	Recommendation
User benefits	Yes	Proceed to Step 2
Noise	Yes	Proceed to Step 2
Air quality	Yes	Proceed to Step 2
Accidents	Yes	Proceed to Step 2
Security	Yes	Proceed to Step 2
Severance	Yes	Proceed to Step 2
Accessibility	Yes	Proceed to Step 2
Affordability	Yes	Proceed to Step 2

3.3. Socio-demographic Overview

Please see figures **Figure 4-1** to **Figure 4-7** which give an overview of where there are high proportions of vulnerable groups in the area surrounding the scheme. These show that a high proportion of LSOAs surrounding the scheme location belong to income quintiles 4 and 5 (least income deprived). There are some LSOAs belonging to income quintile 1 (most income deprived) in Gloucester and to the north of Cheltenham. Furthermore, there are OAs with the 20% highest proportion of elderly, and women surrounding the location of the scheme. There are high proportions of children, DLA claimants and no car households around Cheltenham and Gloucester. There is an area in the centre of Gloucester with the 20% highest proportion of BAME residents in England, although there are few high proportions of this surrounding the scheme.

3.4. Accessibility

3.4.1. Screening

Comments

The scheme includes a new bus stop and the relocation of a bus stop on the Park and Ride access/egress. It is not yet known if there will be any changes to the timings of public transport facilities. However, the impact of the scheme to accessibility will need to be examined.

Outcome

Continue to full DI appraisal

3.4.2. Assessment

3.4.2.1. Step 2a: Confirmation of Impacted Area

This assessment is qualitative and includes OAs within 1km of the Park and Ride, who may use the bus services towards Gloucester and Cheltenham, from the Park and Ride.

3.4.2.2. Step 2b: Identification of Social Groups in Impact Area

Table 3-3 *Proportion of the population in each vulnerable group for England and the accessibility study area*

Group	England	Accessibility Study Area
Older people (aged 70+)	7.7%	9.4%
Children (aged under 16)	18.9%	16.4%
No car households	25.8%	11.6%
DLA claimants	2.9%	3.4%
Women	50.8%	50.8%
Black and Minority Ethnic (BME)	14.6%	4.3%

3.4.2.3. Step 2c: Identification of Amenities in Impact Area

There are several amenities including retail stores, schools and care homes in Cheltenham and Gloucester which may be accessed by vulnerable groups. Therefore, the presence of all groups is assumed for this appraisal.

3.4.3. Appraisal

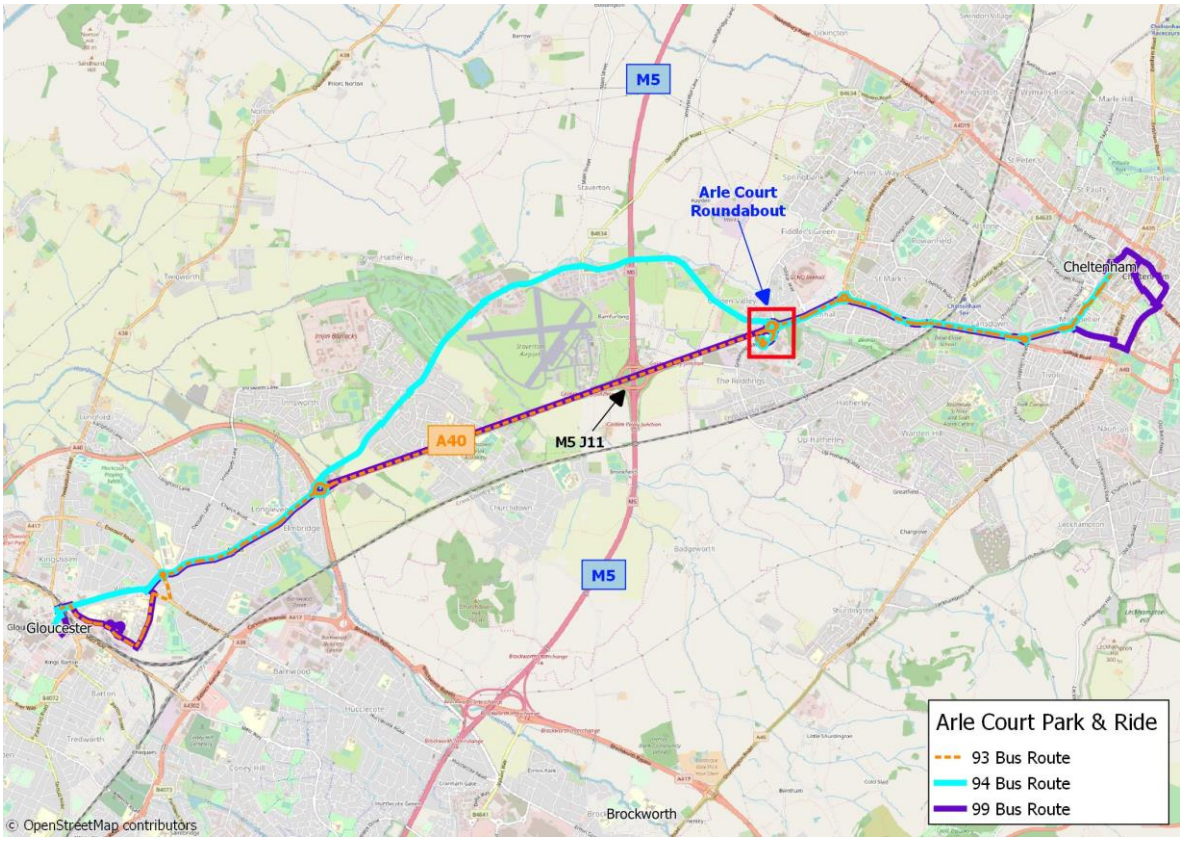
There is currently a one-way, bus only off-slip from the A40 westbound to Arle Court Park and Ride. There is one bus stop at Arle Court Park and Ride, located on this off-slip. The scheme proposes the addition of an on-slip from the Park and Ride to the A40 westbound, with a new bus stop on this on-slip. There is also a small movement of the existing bus stop, which is unlikely to have any significant impact to accessibility.

There are three bus services which stop at the Arle Court Park and Ride. These services run between Gloucester and Cheltenham, as shown in **Figure 3-1**. The frequency of each service is shown in **Table 3-4**.

Table 3-4 *Arle Court Park and Ride bus frequencies*

Bus service	Frequency (minutes)
93	12
94	10
99	30

Figure 3-1 *Arle Court Park and Ride bus routes*



The scheme includes the addition of a bus lane on approach to the roundabout on the B4063. This may improve journey times for bus service 94 towards Cheltenham, which follows this route. While this may improve the reliability of the service, it is unlikely to have a significant impact to accessibility for users.

At this stage in the assessment it is not known if the frequency or routings of buses will be altered as a result of the Arle Court Improvement Scheme. However, it is assumed that buses travelling from the Park and Ride to the A40 westbound (services 93 and 99) will use the new bus stop and entry slip road, rather than travelling through Arle Court Roundabout. This is likely to reduce journey distances and times for services towards Gloucester, hence having a beneficial impact on accessibility.

Eastbound services and service number 94 will still travel along the same route, through Arle Court Roundabout, using the new bus lane on approach to the roundabout. Reduced congestion through the signalised roundabout may improve reliability of these services, but the accessibility impact of this is assumed to be negligible.

Therefore, this assessment assumes there will be a beneficial accessibility impact for those using the 93 or 99 bus service towards Gloucester.

3.4.3.1. Outcome and Qualitative Comment

Within the accessibility study area there are slightly above average proportions of residents aged 70 and over and DLA claimants. These two vulnerable groups are less likely to drive and hence may be reliant on public transport services. They may use the 93 or 99 bus services to access amenities, such as retail or health centres and hence have reduced travel times as a result of the Arle Court Improvement Scheme. Therefore, there is a slight beneficial impact to accessibility for older people and DLA claimants.

There are below average proportions of no car households, residents aged under 16 and BME residents and within the study area. The proportion of women in the accessibility impact area is similar to the average for England. Since any accessibility impacts caused by the scheme are assumed to be slight, the impact to these groups is unlikely to be significant. Therefore, there is a neutral accessibility impact for these vulnerable groups.

The overall impact of the Arle Court Improvement Scheme to accessibility is **slight beneficial**.

Table 3-5 *Accessibility assessment of scheme by vulnerable group*

Vulnerable Group	Assessment
Older people (aged 70+)	✓
Children (aged under 16)	**0**
No car households	**0**
DLA claimants	✓
Women	**0**
BME	**0**
Overall	✓

3.5. Severance

3.5.1. Screening

Comments

The widening of the subway below the A40 may have a perceived impact on severance as conflict points are reduced. There is likely to be a change in traffic flow and speed as a result of increased capacity through Arle Court Roundabout. Therefore, the impact of the scheme to severance will need to be assessed further.

Outcome

Continue to full DI appraisal

3.5.2. Assessment

3.5.2.1. Step 2a: Confirmation of Impacted Area

The impact area for this severance assessment is a 1km buffer of the scheme and links with greater than 10% change in traffic speed.

3.5.2.2. Step 2b: Identification of Social Groups in Impact Area

Table 3-6 *Proportion of population in each vulnerable group for England and the severance study area*

Group	England	Severance Study Area
Older people (aged 70+)	7.7%	8.2%
Children (aged under 16)	18.9%	18.6%
No car households	25.8%	19.7%
DLA claimants	2.9%	2.9%

3.5.2.3. Step 2c: Identification of Amenities in Impact Area

Nuffield Hospital, Whittington House Nursing Home and St Marks School are in the vicinity of the proposed scheme. There are several more amenities including retail stores, schools and care homes, to the east of the scheme, in Cheltenham which may be accessed by vulnerable groups.

3.5.3. Appraisal

Speed increases and decreases of 10% and above have been used as proxy for severance. Higher speeds make crossing roads more difficult which increases severance. Lower speeds reduce severance by making roads easier to cross.

Figure 3-2 shows the proportion of elderly compared to where changes in speeds of greater than 10% occur. Elderly people are likely to find crossing the road more difficult hence are likely to be more vulnerable to changes in severance. The main increases in speeds occur on the A40 and M5 which cannot be accessed by pedestrians and are crossed by grade separated footways in most cases. Consequently, increased speeds on these roads will not increase severance.

From Figure 3-2, it is evident there are several Output Areas featuring the highest proportion of elderly people located in the vicinity of Arle Court roundabout. The scheme features an increase in traffic speeds on minor roads radiating from Arle Court Roundabout. These roads can be accessed by pedestrians and are located predominantly in areas that have higher levels of elderly people. The placement of care homes in Cheltenham suggests many of the traffic speed increases occur nearby to the care homes, negatively affecting the elderly.

There are several changes in speed levels within Cheltenham. There are a similar number of increases and decreases in speed levels within Cheltenham's western suburbs, however the low proportion of elderly residents in this area suggest that speed changes will have little effect on the

elderly's ability to cross the road. The overall effect of severance is likely to be slight adverse on the elderly due to the positioning of care homes and a high proportion of elderly residing near links resulting in overall increases in traffic speed.

Figure 3-2 *Changes in Traffic Speeds (proxy for changes in severance) compared to levels of elderly*

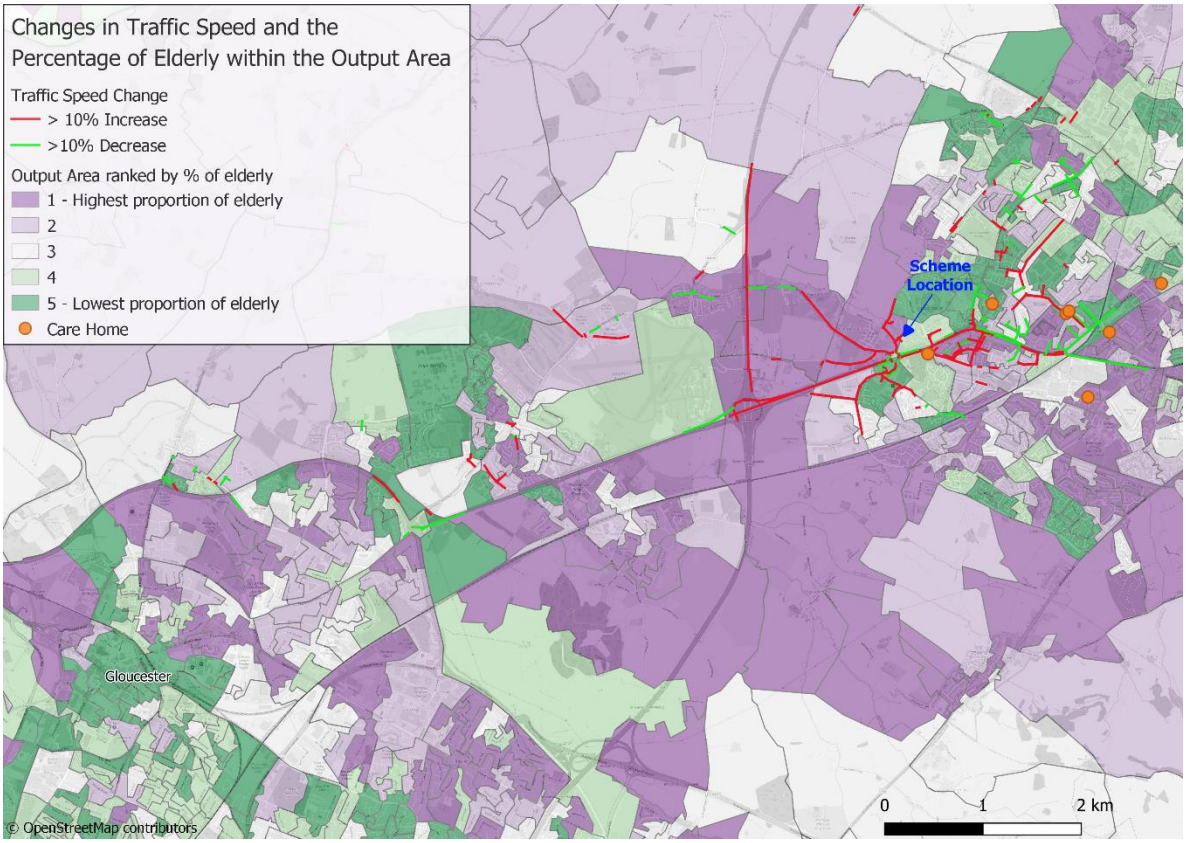


Figure 3-3 shows the proportion of children compared to where changes in speeds of greater than 10% occur. From Figure 3-3, a predominant number of links containing significant speed increases in the Arle Court scheme occur within areas that have a low proportion of children per Output Area. In Cheltenham's western suburbs, the effects tend to be both negative (increases in speed) and positive (decreases in speed), with a mixture of a high and low proportion of children. Figure 3-3 also shows that two schools lie on or near to links that experience increased traffic speeds, while two lie on links that experience decreased speeds. The main improvement in severance is likely to occur at Dean Court School which lies on a crossable section of the A40 which experiences high traffic levels. The overall effect of severance on children is neutral due to an equal number of areas containing high proportion of children experience increases and decreases in traffic speed.

Figure 3-3 *Changes in Traffic Speeds (proxy for changes in severance) compared to levels of children*

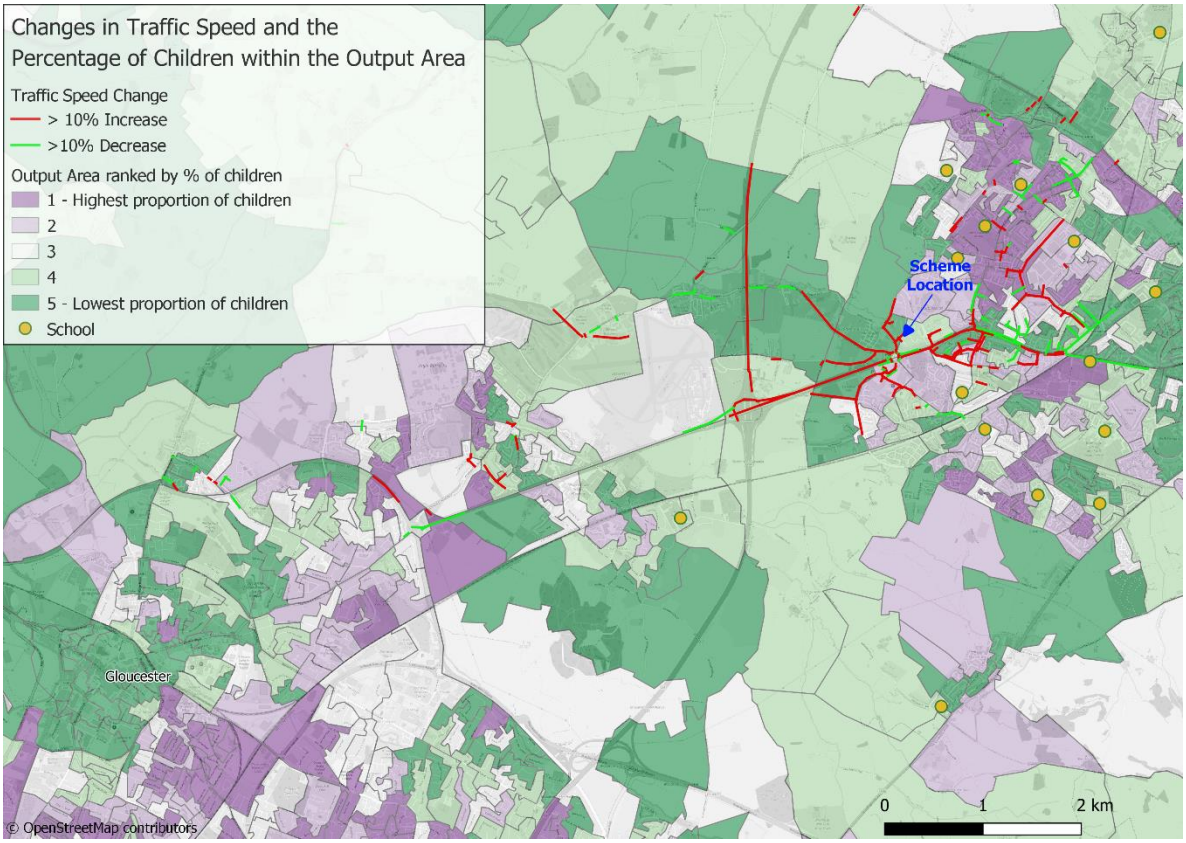


Figure 3-4 shows the proportion of no car households compared to where changes in speeds of greater than 10% occur. Areas with no car households are likely to contain more pedestrians. When traffic speed increases, severance increases due to the perception of inaccessibility of crossing roads containing fast moving vehicles. Output Areas with a high proportion of no car households are generally situated towards the suburbs Western Cheltenham. An even number of roads experience increases and decreases in traffic speed, creating a neutral net effect.

Figure 3-4 *Changes in Traffic Speeds (proxy for changes in severance) compared to levels of households without a car*

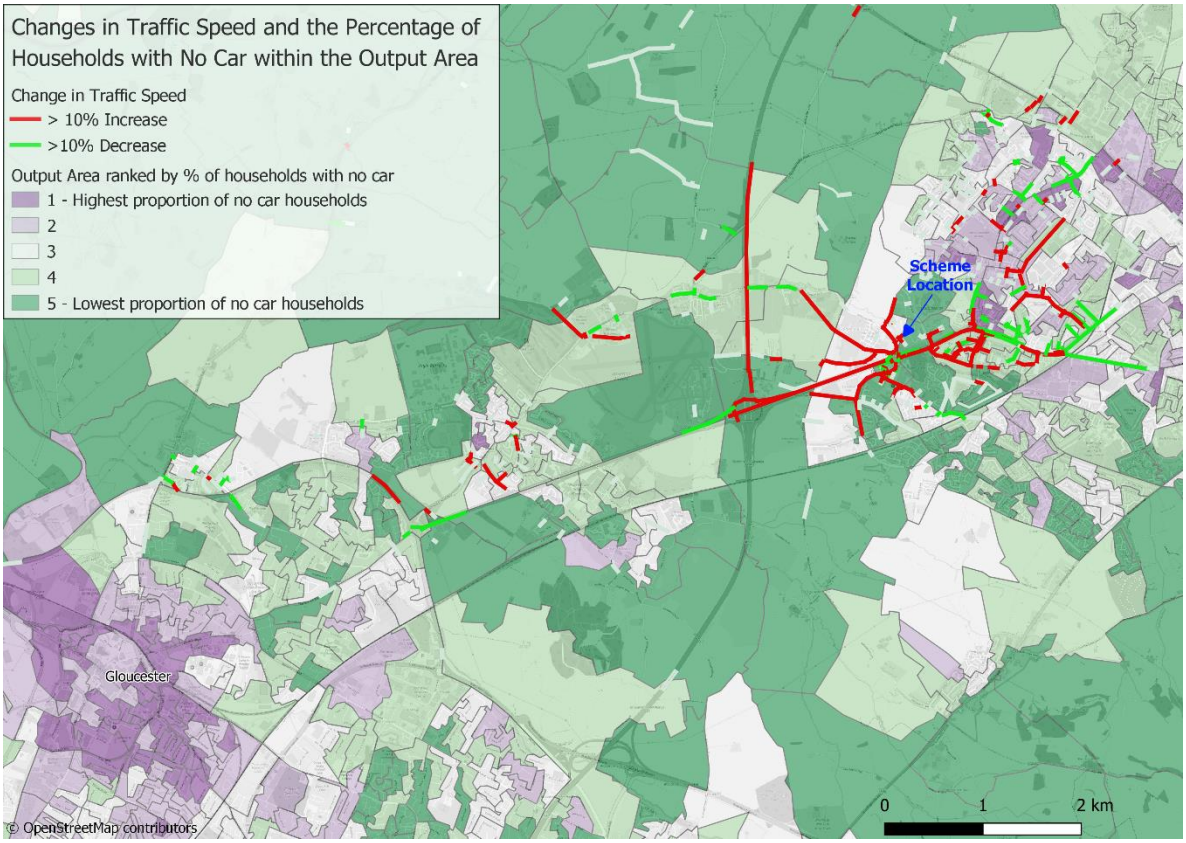
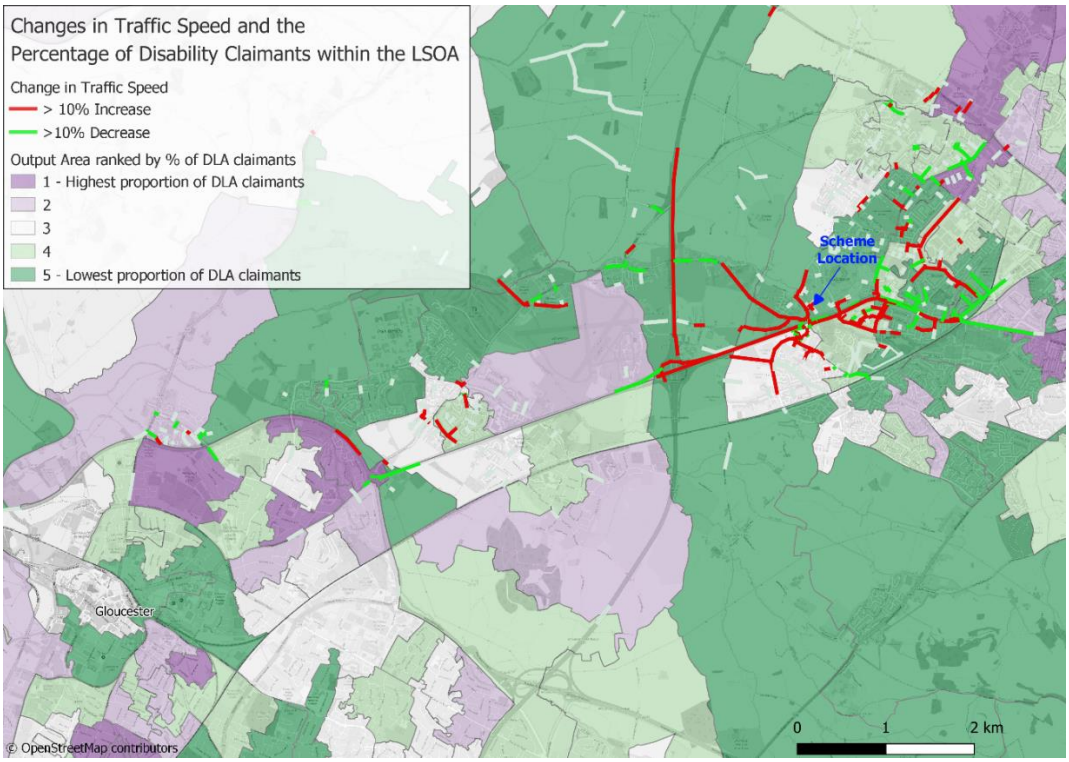


Figure 3-5 shows the proportion of Disability Living Allowance (DLA) Claimants where changes in speeds of 10% or greater occur. The vicinity surrounding Arle Court has a low proportion of DLA

claimants. The highest levels of DLA claimants are in north west Cheltenham. This area experiences reduced traffic speeds, translating as reduced severance. Large negative effects on severance are likely to occur south of Arle Court and to the west of the M5, where there is a moderate proportion of DLA claimants per LSOA. It is likely that effect on severance is neutral.

Figure 3-5 *Changes in Traffic Speeds (proxy for changes in severance) compared to levels of DLA Claimants*



3.5.3.1. Outcome and Qualitative Comment

The effect of severance on the elderly has been ranked as slight adverse as a result of the increases in speed radiating from Arle Court on minor roads. The effects are only slight as the main effects occur on the A40 and M5 which are not accessible to pedestrians.

The effect of severance on children has been ranked as neutral. This is because both positive and negative changes occur within areas with high proportions of children and near schools.

The effect of severance on households without a car has been ranked as neutral. This is because there are similar number of increased speeds and decreased speeds in areas with high levels of households without cars.

The effect of severance on DLA claimants has been ranked as neutral as although the highest DLA claimant areas experience improvements, areas with moderate to high levels of DLA claimants experience larger negative effects.

Overall the effect of severance on vulnerable groups resulting from the Arle Court scheme is likely to be **neutral**.

Table 3-7 ***Severance assessment of scheme by vulnerable group***

Vulnerable Group	Assessment
Older people (aged 70+)	**x**
Children (aged under 16)	**0**
No car households	**0**
DLA claimants	**0**
Overall	**0**

3.6. Security

3.6.1. Screening

Comments

The scheme includes the relocation of bus shelters on the new link to the Park and Ride from the A40 westbound, with footpaths to access the bus stops from the Park and Ride. While it is assumed that the bus shelters and footpaths will be well lit with formal security in place, the impact to users will need to be assessed.

Outcome

Continue to full DI appraisal

3.6.2. Assessment

3.6.2.1. Step 2a: Confirmation of Impacted Area

Security impacts are likely to occur for those accessing the Park and Ride bus stations. Therefore, the security impact area is a 1km buffer of the location of the Park and Ride, as residents within this area may walk to the bus stops.

3.6.2.2. Step 2b: Identification of Social Groups in Impact Area

Table 3-8 *Proportion of population in each vulnerable group for England and the security study area*

Group	England	Security Study Area
Older people (aged 70+)	7.7%	9.4%
Children (aged under 16)	18.9%	16.4%
DLA claimants	2.9%	3.4%
Women	50.8%	50.8%
BME	14.6%	4.3%

3.6.2.3. Step 2c: Identification of Amenities in Impact Area

Nuffield Hospital is by the proposed scheme location. Cheltenham has many amenities which may be accessed by vulnerable users, including schools, care homes, hospitals and retail stores.

3.6.3. Appraisal

The scheme includes a small movement of the existing bus stop at the Arle Court Park and Ride and the addition of a new bus stop on the opposite side of the road. It is assumed that the bus stops will have sufficient lighting and surveillance cameras, which may slightly improve users' perceptions of personal security. In addition, reduced journey distances and times as a result of the additional link to the A40 westbound may make bus travel on these routes a more attractive mode of transport, leading to a mode shift from private car to public transport. This would increase the number of people waiting at bus stops and improve perceptions of informal security. At this stage of assessment, it is assumed that any security impact as a result of the scheme will be slight.

3.6.3.1. Outcome and Qualitative Comment

The proportion of elderly and DLA claimants in the security impact area is slightly above the average for England, as shown in **Table 3-8**. There are below average proportions of children and BME residents within the impact area and approximately the same proportions of women as the average for England. There are also OAs with the 20% highest proportion of elderly and women within the vicinity of the Park and Ride, as shown in **Figure 4-2** and **Figure 4-7**.

Since there are higher proportions than the average for England of elderly and DLA claimants and OAs with the 20% highest proportions of elderly and women within the impact area, these groups may be more likely to use the Park and Ride to access local amenities. Therefore, these groups may be more likely to benefit from increased informal surveillance and improved lighting and security in the area. Therefore, there is a slight beneficial impact to elderly, women and DLA claimants due to the scheme.

Since there are no high proportions of any vulnerable groups within the study area or in the immediate vicinity of the Park and Ride and any security impacts as a result of the scheme are slight, there is a neutral impact to security for all other vulnerable groups. Therefore, the overall security impact of the scheme is **slight** beneficial. These results are summarised in

Table 3-9.

Table 3-9 *Security assessment of scheme by vulnerable group*

Vulnerable Group	Assessment
Older people (aged 70+)	✓
Children (aged under 16)	**0**
DLA claimants	✓
Women	✓
BME	**0**
Overall	✓

3.7. Accidents

3.7.1. Screening

Comments

The scheme intervention of a Park and Ride access/egress connecting to the A40 westbound to the west of Arle Court Roundabout may impact on the number of accidents in the area. Also, increased vehicle speed as a result of reduced congestion could impact on the severity of casualties.

Outcome

Continue to full DI appraisal

3.7.2. Assessment

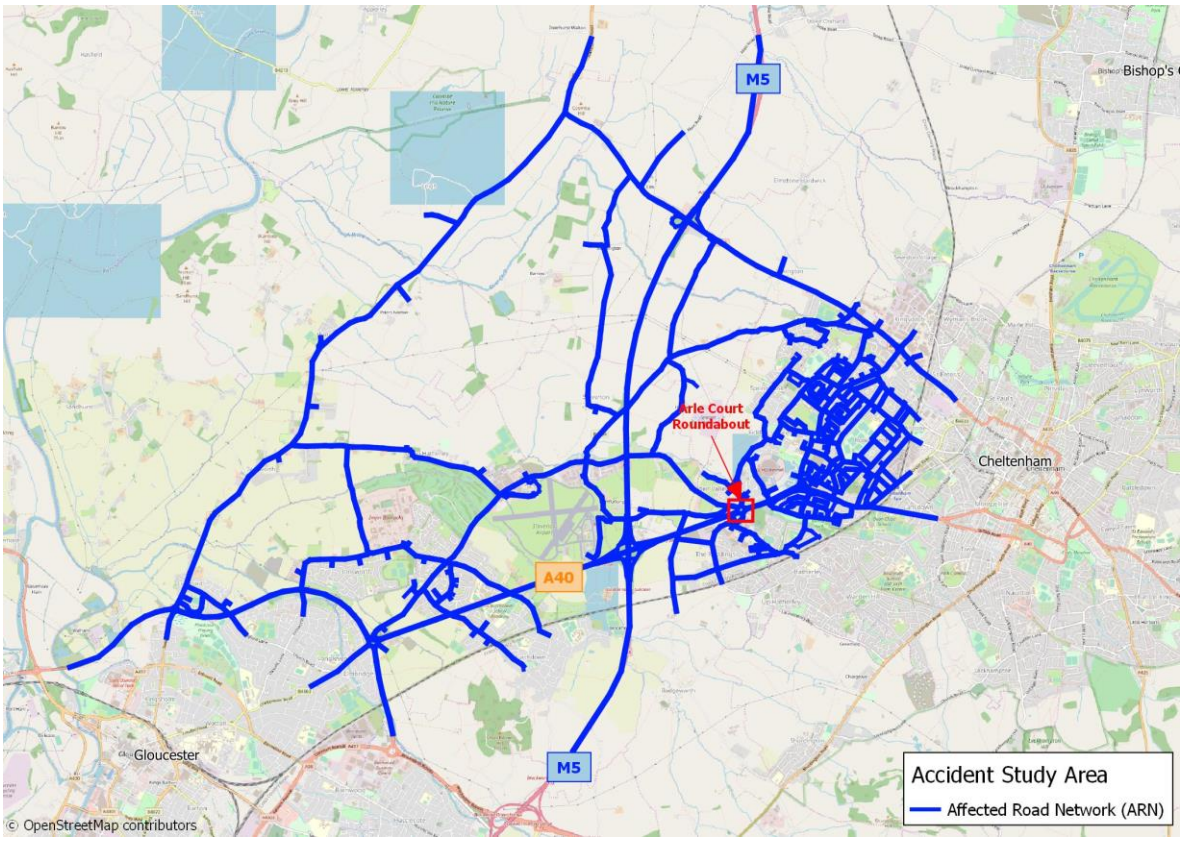
3.7.2.1. Step 2a: Confirmation of Impacted Area

According to WebTAG any change in alignment of a transport corridor (or road layout) that may have positive or negative safety impacts should be considered in the safety assessment.

This assessment is qualitative and based on the peak hour change in traffic speed. The accident impact area comprises links and casualties that lie within the road network that will be affected by the scheme, as shown in **Figure 3-6**. Links within the Affected Road Network (ARN) that are forecast to experience +/-10% change in traffic speed as a result of the scheme and casualties which occur on these links are used to determine the impact to accidents as a result of the scheme.

Percentages are calculated using the total number of casualties (536) that occurred between 2013 and 2017 on all links within the impact area. The casualties have been linked to the LSOAs they reside within, allowing us to calculate the number of casualties across the most and least deprived areas. As this statistic is not always recorded / known, only casualties with known income quintile data were used to calculate percentages. Consequently, the percentages are calculated using lower totals (e.g. for the impact area 503 casualties had income quintile data recorded compared to 536 overall casualties).

Figure 3-6 *Affected Road Network*



3.7.2.2. Step 2b: Identification of Social Groups in Impact Area

Table 3-10 *All accident casualties (2013 – 2017)*

Casualty Type	All Casualties (national rate)		All Casualties (impact area)	
	Quantity	%	Quantity	%
Vulnerable Users				
Pedestrians	120,209	13.1%	59	11.0%
Cyclists	96,368	10.5%	74	13.8%
Motorcyclists	96,293	10.5%	68	12.7%
Male drivers aged 16-25	96,893	10.6%	57	10.6%
Vulnerable Groups				
Under 16	80,117	8.7%	45	8.4%
People aged 70+	78,346	8.5%	29	5.4%
Deprivation				
Casualty from 20% Most deprived LSOAs in England	206,883	23.9%	67	13.3%
Casualty from 20% Least deprived LSOAs in England	135,033	15.6%	152	30.2%
Total Casualties	**866,216**	**100.0%**	**536**	**100.0%**

Table 3-10 shows there is a slightly lower presence of casualties amongst pedestrians, elderly and from the 20% most income deprived LSOAs in England. The proportion of accidents for male drivers aged 16-25 and children is roughly the same as the average for England. There is a higher proportion of casualties than the average for England for cyclists, motorcyclists and casualties from the 20% least income deprived LSOAs in England.

3.7.2.3. Step 2c: Identification of Amenities in Impact Area

Nuffield Hospital is by the proposed scheme location. Cheltenham has many amenities which may be accessed by vulnerable users, including schools, care homes, hospitals and retail stores.

3.7.3. Appraisal

The number of accidents which occurred on links which are expected to have greater than 10% change in traffic speed are shown in **Table 3-11**. In this instance, any link with greater than 10% decrease in traffic speed is assumed to have a reduction in accident rate. Any link with greater than 10% increase in traffic speed is assumed to have a increase in accident rate. The percentages are calculated based on the total number of casualties on all links within the impact area (including increase, decrease and no change / negligible links).

Table 3-11 *Profile of existing casualties by forecast benefit in accidents (2013 to 2017)*

Casualty Type	Links with >10% decrease in traffic speed (Benefit)		Links with >10% increase in traffic speed (Disbenefit)	
	N	%	N	%
Vulnerable User				
Pedestrians	8	1.5%	7	1.3%
Cyclists	14	2.6%	20	3.7%
Motorcyclists	14	2.6%	15	2.8%
Male drivers aged 16-24	10	1.9%	12	2.2%
Vulnerable Groups				
People aged under 16	6	1.1%	6	1.1%
People aged 70+	5	0.9%	5	0.9%
Deprivation				

20% Most deprived LSOAs in UK	17	3.4%	18	3.6%
20% Least deprived LSOAs in UK	40	8.0%	28	5.6%
Total casualties	112	20.9%	106	19.8%

There are only 106 casualties which occurred on links which have greater than 10% increase in traffic speed and 101 on links which are expected to have greater than 10% decrease in traffic speed, as shown in **Table 3-11**.

Figure 1-3 shows a map of the links which are expected to have an increase or decrease in traffic speeds of 10% or greater as a result of the scheme.

3.7.3.1. Outcome and Qualitative Comment

This accident assessment is based on the difference in casualties which occur on links with an increase and decrease in traffic speed. The difference between the number of casualties which occurred on increased and decreased links is approximately the same for pedestrians, motorcyclists, young male drivers, children, elderly and from the 20% most income deprived LSOAs. Therefore, there is be a neutral impact to accidents for these vulnerable users.

There is a greater number of cyclist casualties which occurred on links with a decrease in traffic speed than on links with an increase in traffic speed. Therefore, the scheme may result in a decrease in accident rate for this vulnerable user. Since the proportion of accidents occurring on links with greater than 10% change in traffic speed is small for this group, there will be a slight beneficial impact to accidents for cyclists.

There are more casualties involving residents in the 20% least income deprived LSOAs that occurred on links with an increase in traffic speed than those on links with a decrease in traffic speed. Hence, the scheme may cause the accident rate for this vulnerable group to increase. Since, there are 12 more casualties involving income deprived resident that occurred on links with increased traffic speed than those with decreased traffic speed any impact to accidents is likely to be small. Therefore, the impact of the scheme to the 20% least income deprived resident is slight adverse.

Therefore, since there is a neutral impact to accidents for most vulnerable users, the overall impact of the scheme to accidents is **neutral**.

Table 3-12 *Accident assessment of scheme by vulnerable users*

Group	Outcome
Pedestrians	**0**
Cyclists	**0**
Motorcyclists	**x**
Young male drivers	**0**
People aged under 16	**0**
People aged 70+	**0**
Most deprived residents	**0**
Overall score	**0**

3.8. Air Quality

3.8.1. Screening

Comments

There is likely to be increased vehicle flow and speed caused by increased capacity through the signalised roundabout. This will have an impact on emissions in the area, so air quality impacts need further assessment.

Outcome

Continue to full DI appraisal

3.8.2. Assessment

3.8.2.1. Step 2a: Confirmation of Impacted Area

The DI guidance (TAG Unit A4.2) outlines that air quality impacts are likely to occur where an intervention results in changes to traffic flows or speeds, or where the physical gap between people and traffic is altered.

WebTAG Unit A4.2.3 defines the air quality impact area as a 200m buffer of the scheme and/or where there are any indirect impacts on the transport network. In this instance, the air quality impact area covers links with a change in peak hour traffic speed of greater than 20kph.

3.8.2.2. Step 2b: Identification of Social Groups in Impact Area

Table 3-13 *Proportion of income groups and children in the air quality study area and England*

Group	England	Air Quality Study Area
Quintile 1 (most deprived)	20.0%	0.0%
Quintile 2	20.0%	20.0%
Quintile 3	20.0%	0.0%
Quintile 4	20.0%	46.0%
Quintile 5 (least deprived)	20.0%	34.0%
Children (under 16)	18.9%	17.2%

3.8.2.3. Step 2c: Identification of Amenities in Impact Area

The nearest school is St Marks Church of England Junior School which is about 600m from the proposed scheme location.

3.8.3. Appraisal

To assess air quality, traffic speed was used as proxy. Reduced speeds of 20kph or greater would result in improved air quality and increased speeds of greater than 20kph would result in reduced air quality. Significant changes in traffic speeds between the Do Minimum and Do Something tend to occur within a close proximity of the scheme area. Air Quality is therefore likely to be affected in areas closely connected to the scheme. Income deprived households are affected the greatest as they are less capable of adapting to the changes in air quality when they do occur and may suffer from adverse health as a result.

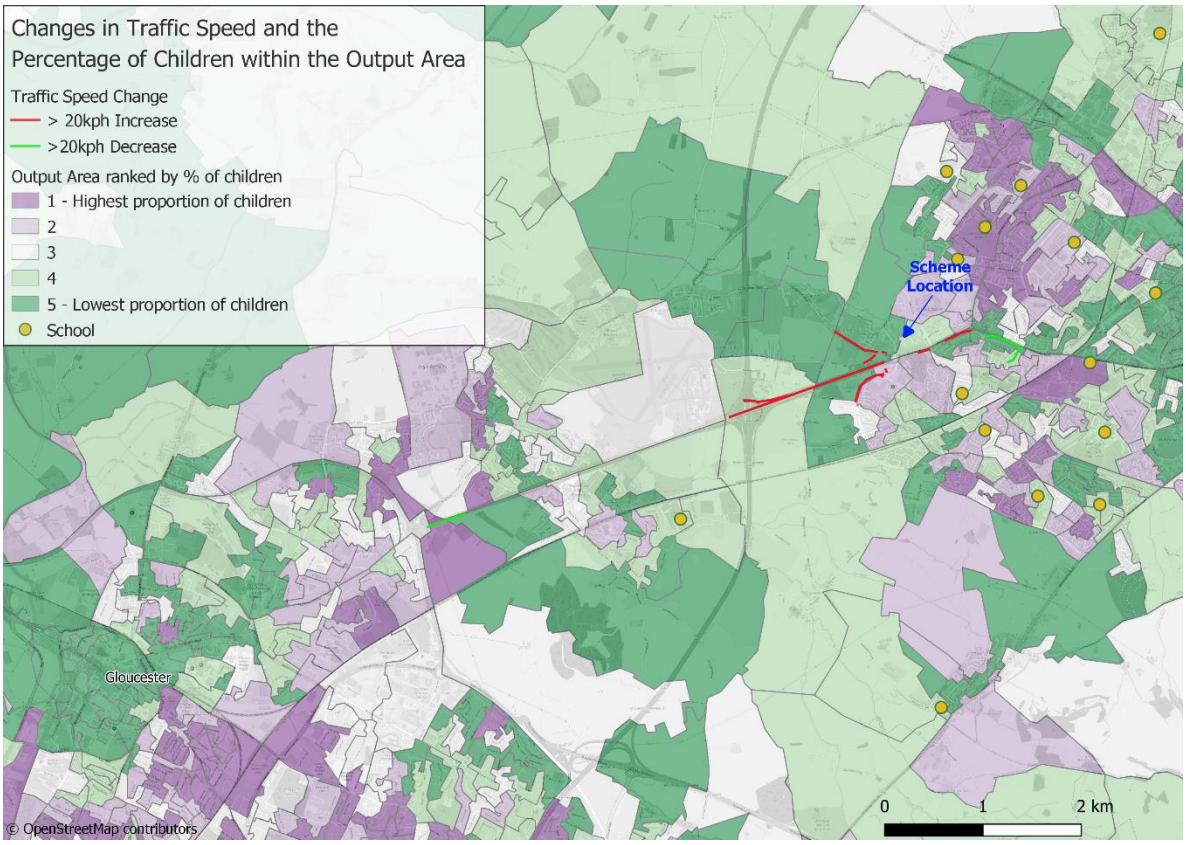
From Figure 3-7, changes to traffic speed were largely insignificant, aside from 3 link speed increases directly connecting to the roundabout in LSOAs where the population is the least income deprived. There is one link with a decrease in traffic speed by over 10%, occurring in the vicinity a highly deprived income LSOA. This is likely to achieve a slight beneficial overall score for air quality in income deprived LSOAs.

Figure 3 -7 *Changes in traffic speeds (proxy for changes in air quality) compared to income deprivation levels*

Figure 3-8 shows where perceivable air quality effects are likely to occur in relation to the percentage of children in the area. Children are more likely to be affected by air quality changes due to their immune systems not providing sufficient protection leading them to be more vulnerable to the dispersion of pollutants.

The Arle Court Scheme causes very few changes in speed of greater than 20kph. Those that do occur are generally increases in speed and hence, have a negative effect on air quality. However, these occur in predominately rural areas with low levels of children and away from schools. There is therefore a slight adverse risk of reduced air quality affecting children.

Figure 3-8 *Changes in traffic speeds (proxy for changes in air quality) compared to levels of children*



3.8.3.1. Outcome and Qualitative Comment

The main negative effects occur within LSOAs that are less deprived (income quintile 4). Consequently, income quintile 4 experiences a slight adverse impact on air quality with all other areas experiencing no effect.

Due to the air quality effects generally occurring in more rural areas with low numbers of children, air quality effects of the Arle Court Scheme on children has been ranked as neutral.

Overall, the Arle Court scheme is likely to have a **neutral** effect on air quality.

Table 3-14 *Air quality assessment of scheme by vulnerable group*

Vulnerable Group	Assessment
Quintile 1 (most deprived)	*0*
Quintile 2	*0*
Quintile 3	*0*
Quintile 4	×
Quintile 5 (least deprived)	*0*

Children (under 16)	*0*
Overall	*0*

3.9. Noise

3.9.1. Screening

Comments

Increased capacity through the Arle Court Roundabout will likely lead to an increase in vehicle flow and speed, which will likely impact noise levels in the area.

Outcome

Continue to Full DI Appraisal

3.9.2. Assessment

3.9.2.1. Step 2a: Confirmation of Impacted Area

The WebTAG guidance on DI assessment (Unit A4.2) outlines that noise impacts are likely to occur where an intervention results in changes to traffic flows or speeds, or where the physical gap between people and traffic is altered. The noise impact area is defined as a 600m buffer of an intervention likely to impact on noise. In this instance, the noise impact area covers links with an increase in peak hour traffic speed of greater than 25% or decrease in traffic speed of greater than 20%.

3.9.2.2. Step 2b: Identification of Social Groups in Impact Area

Table 3-15 *Proportion of income groups and children in the noise study area and England*

Income Group	England	Noise Study Area
Quintile 1 (most deprived)	20.0%	11.6%
Quintile 2	20.0%	17.1%
Quintile 3	20.0%	17.4%
Quintile 4	20.0%	23.2%
Quintile 5 (least deprived)	20.0%	30.7%
Children (under 16)	18.9%	17.9%

3.9.2.3. Step 2c: Identification of Amenities in Impact Area

The nearest school is St Marks Church of England Junior School which is about 600m from the proposed scheme location.

3.9.3. Appraisal

Figure 3-9 shows the perceivable changes in traffic speed mapped out against income quintiles. This change in speed has been used as a proxy to determine the change in noise levels by link. Analysis was undertaken in GIS to determine the number of LSOAs which contained links with a greater than 25% increase in traffic speed (increased noise) and greater than 20% decrease in traffic speed (decreased noise) as well as the income quintile of each LSOA. This analysis showed that there are generally an equal number of LSOAs belonging to each income quintile which have been categorised as having an increase and decrease in noise levels, as shown in **Table 3-17**. An exception to this is LSOAs ranked in income quintile 4, where there are 3 more LSOAs which experience a decrease in speeds / noise levels than LSOAs which experience an increase in speeds / noise levels.

Table 3-16 *Number of LSOAs with a significant change in traffic speed for each income quintile.*

Income Group	Number of LSOAs containing links with >25% increase in traffic speed (increased noise)	Number of LSOAs containing links with >20% decrease in traffic speed (decreased noise)
Quintile 1 (most income deprived)	5	6
Quintile 2	5	5
Quintile 3	3	3
Quintile 4	4	7
Quintile 5 (least income deprived)	6	7

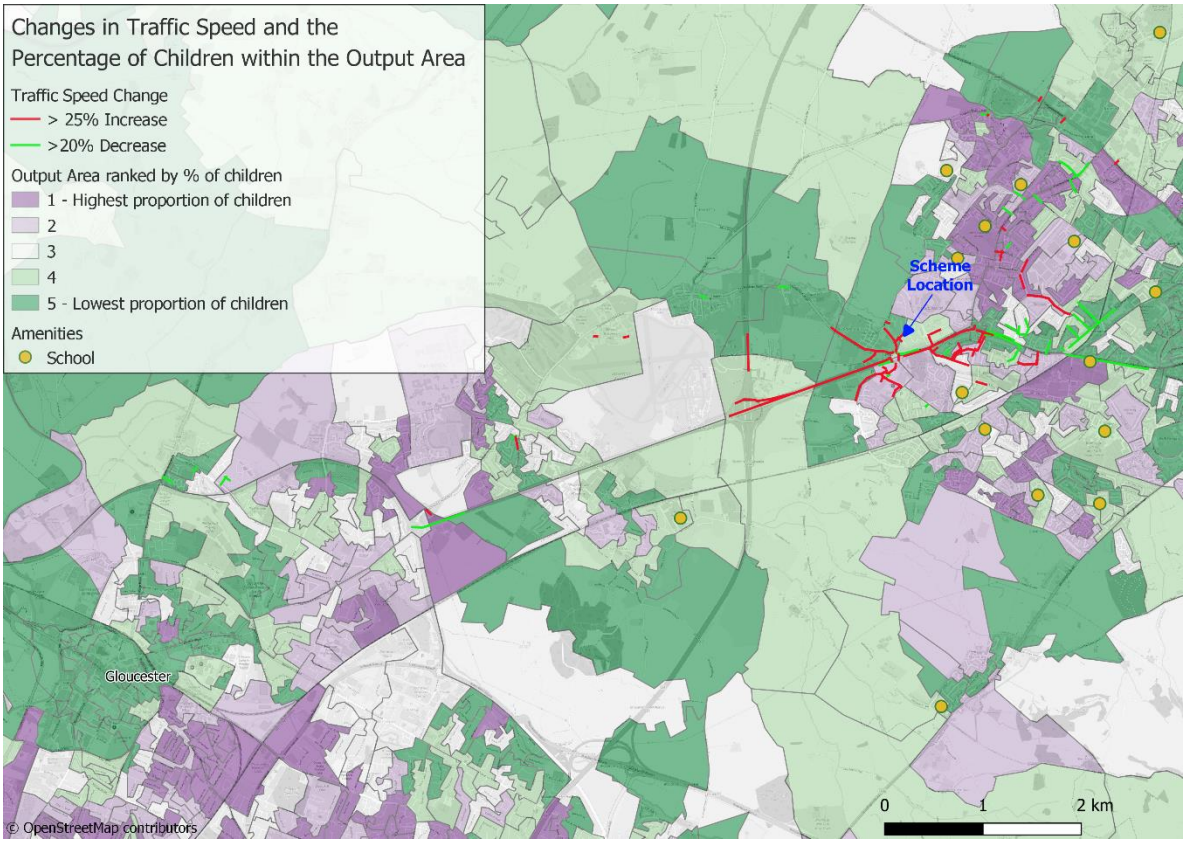
Figure 3-9 shows the perceivable changes in traffic speed mapped out against income quintiles. This change in speed has been used as a proxy to determine the change in noise levels by link. Income deprived households are considered more vulnerable to changes in noise. Figure 3-9 suggests there is an overall negative effect on noise levels due to an increase in traffic speed in areas that are in close proximity to Arle Court roundabout. These changes largely occur where the proportion of income deprived households is low, suggesting a minimal impact. Where there is higher income deprivation traffic speed is shown to increase and decrease in equal amounts. The overall effect is likely to be a slight adverse impact of noise on income deprived households.

Figure 3-9 *Changes in traffic speeds (proxy for changes in noise levels) compared to income deprivation levels*

Figure 3-10 shows where perceivable noise changes (speeds used as a proxy for noise) are likely to occur in relation to the percentage of children in the area. As can be seen the links that experience a 25% or greater increase in speed and hence, an increase in perceivable noise, occur predominantly in more rural areas around the scheme location and along the M5.

Consequently, very few children are affected by the main negative effects on noise levels. Within the Cheltenham urban area, where there several schools and a high proportion of children, there is generally an even number of links with greater than 20% speed increased and decreases between the do minimum and do something scenarios. Several schools are located on links expected to see both increases and decreases in speeds and hence precipitable noise. The overall effect of noise on children is likely to be neutral.

Figure 3-10 *Changes in traffic speeds (proxy for changes in noise levels) compared to level of children*



3.9.3.1.1. Outcome and Qualitative Comment

The number of LSOAs containing links expected to have greater than 25% increase in traffic speed and greater than 20% decrease in traffic speed are approximately the same for LSOAs belonging to income quintiles 1, 2, 3 and 5. Hence, assuming increasing traffic speeds lead to increased noise levels, these income groups have been ranked as neutral. There are more LSOAs belonging to income quintile 4 which contain links expected to have greater than 20% decrease in traffic speed than those containing links expected to have greater than 25% increase in traffic speed. Therefore, income quintile 4 has been ranked as slight beneficial.

Due to links near schools generally experiencing reduced speeds and hence, noise and there being a large number of links that experience reduced speeds in the Cheltenham urban area where there are a large number of children, the effect of the Arle Court Scheme is expected to be slight beneficial.

Overall the positive and negative effects of noise changes tend to balance each other out. Consequently, the Arle Court Scheme has a **neutral** effect on noise.

Table 3-17 *Noise assessment of scheme by vulnerable group*

Group	Assessment
Quintile 1 (most deprived)	*0*
Quintile 2	*0*
Quintile 3	*0*
Quintile 4	✓
Quintile 5 (least deprived)	*0*
Children (under 16)	✓
Overall	*0*

3.10. User Benefits

3.10.1. Screening

Comments

Additional lanes on the roundabout circulatory, the A40 approaches and exits and the widening of the southern arm will increase the junction capacity. This will likely lead to increased traffic flow and speed and hence reduced journey times. Therefore, the impact to user benefits will need to be assessed.

Outcomes

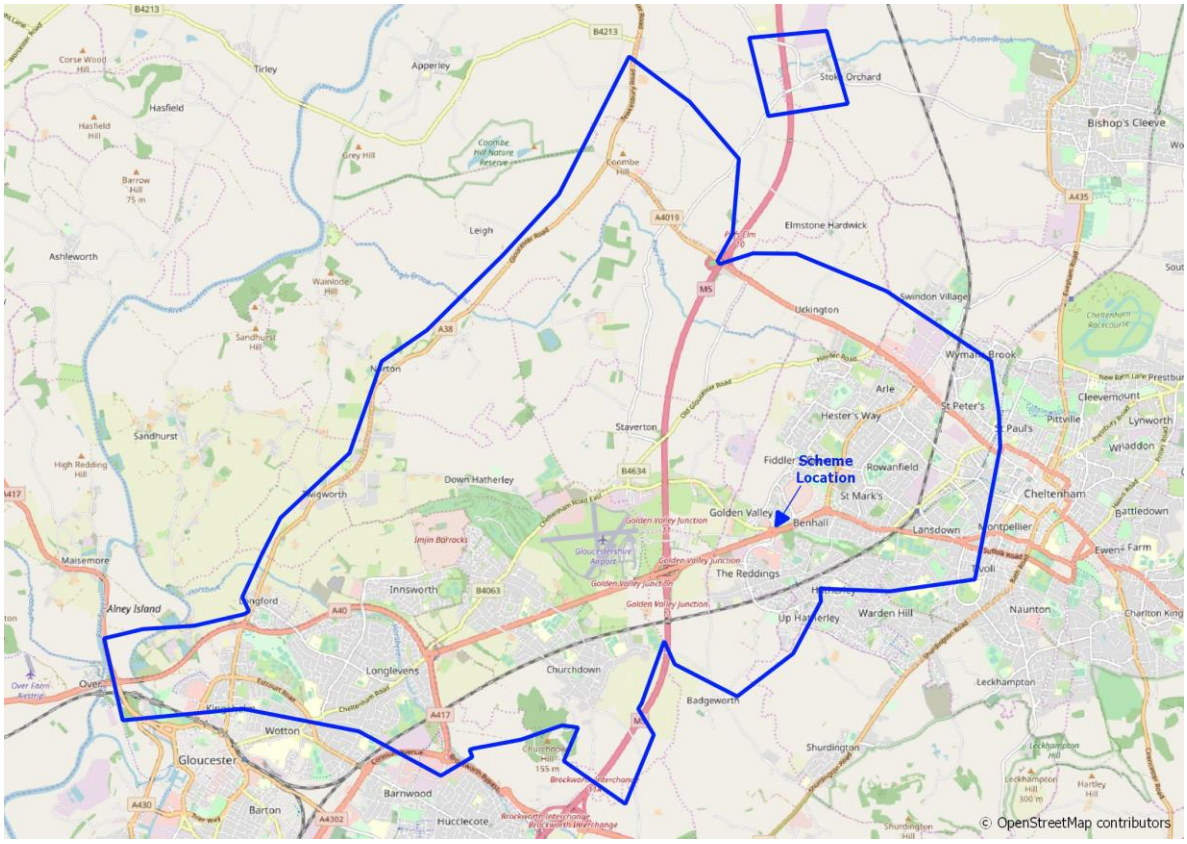
Continue to full DI appraisal

3.10.2. Assessment

3.10.2.1. Step 2a: Confirmation of Impacted Area

The assessment of the distributional impact of the user benefits arising from the Arle Court Improvement Scheme uses the outputs of the 60-year appraisal from TUBA. The user benefit impact area, defined by the modellers, is shown in **Figure 3-11**.

Figure 3-11 *User benefit and affordability study area*



The table in Step 2b represents the proportion of population within the assessment area which lies within each income quintile. Step 3 displays the total population in each income quintile in the assessment area. The assessment is completed by determining the overall impact on each income quintile and then comparing the proportion of the impact against the proportion of the population.

The calculation of impact by income quintile in the appraisal tables are based on vehicle operating costs and journey time benefits for home-based 'commuting and other' trips (i.e. excluding business users). Only highways benefits have been modelled, and only internal to internal trips within an assessment area which has been defined by the modellers.

3.10.2.2. Step 2b: Identification of Social Groups in Impact Area

Table 3-18 *Proportion of income groups in the user benefit study area and England*

Income Group	England	Study Area
Quintile 1 (most deprived)	20.0%	15.3%
Quintile 2	20.0%	19.7%
Quintile 3	20.0%	14.5%
Quintile 4	20.0%	20.3%
Quintile 5 (least deprived)	20.0%	30.3%

3.10.2.3. Step 2c: Identification of Amenities in Impact Area

Identification of amenities is not required according to WebTAG guidance for user benefits.

3.10.3. Appraisal

The percentage of the population in each income quintile is calculated based on the postcodes that are within the assessed impact area. **Table 3-19** represents the proportion of the population in each income quintile in the assessment area. The calculations include the overall impact, a sum of the total benefits and disbenefits, this is then further segregated into the total benefits and disbenefits for each income quintile. Furthermore, the percentage proportion of benefits and disbenefits across each of the income quintiles is calculated in order to determine the overall assessment score for each quintile.

Table 3-19 *Distribution of user benefits by income quintiles in the study area*

	Income Quintile					Total
	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	
Total population in the assessment area	12,239	15,696	11,540	16,164	24,175	79,814
Proportion of total population in each quintile in the assessment area	15.3%	19.7%	14.5%	20.3%	30.3%	-
Sum of benefits	£4,801,106	£6,408,100	£4,298,988	£30,640,633	£32,668,818	£78,817,645
Proportion of benefits for each income quintile	6.1%	8.1%	5.5%	38.9%	41.4%	-
Sum of disbenefits	£-	-£539,746	-£253,339	-£431,832	-£913,088	-£2,138,006
Proportion of disbenefits for each income quintile	0.0%	25.2%	11.8%	20.2%	42.7%	-
Overall net change	£4,801,106	£5,868,354	£4,045,649	£30,208,801	£31,755,730	£76,679,639
Assessment	Slight Beneficial	Slight Beneficial	Slight Beneficial	Large Beneficial	Large Beneficial	**Slight Beneficial**

Key: ✓✓✓ Large Beneficial ✓✓ Moderate Beneficial ✓ Slight beneficial 0 Neutral
× Slight adverse ×× Moderate adverse ××× Large adverse

Key to individual assessment of each Income quintile

Beneficial and 5% greater (or more) than the proportion of the group in the total population	***Large Beneficial***
Beneficial and in line (+/-5%) with the proportion of the group in the total population	***Moderate Beneficial***
Beneficial and 5% smaller (or less) than the proportion of the group in the total population	***Slight Beneficial***
There are no user benefits or disbenefits experienced by the group	***Neutral***
A disbenefit which is 5% smaller (or less) than the proportion of the group in the total population	***Slight Adverse***
A disbenefit which is in line (+/-5%) with the proportion of the group in the total population	***Moderate Adverse***

A disbenefit which is 5% greater (or more) than the proportion of the group in the total population	***Large Adverse***

There are beneficial impacts to user benefits for all income quintiles. This is likely caused by reduced congestion through Arle Court roundabout as a result of increased capacity and a mode shift from private car to public transport. This will lead to a reduction in travel times and vehicle operating costs as there's reduced vehicles idling and braking and accelerating while queueing.

3.10.3.1. Outcome and Qualitative Comment

There are beneficial impacts for all income quintiles as a result of the Arle Court Improvement Scheme. The majority of the benefits (80.3%) are concentrated within the 40% least income deprived areas (income quintiles 4 and 5). Since the proportion of benefits for income quintiles 4 and 5 are greater than 5% of the proportion of the population belonging to these income groups within the assessment area, there is a large beneficial impact to user benefits for income quintile 4 and 5.

Income quintile 1 (most income deprived), receives a small proportion of benefits, 6.1%. Since income quintile 1 makes up 15.3% of the population, there is a slight beneficial impact to user benefits for this income group. There are also slight beneficial impacts for income quintiles 2 and 3, since the proportion of the total benefits received by these groups is less than 5% of the proportion of the population which they make up.

Overall, the scheme disproportionately benefits the least income deprived areas since the benefits are concentrated within income quintiles 4 and 5. Since there are beneficial impacts for all income groups and there are slight beneficial impacts for income quintiles 1-3, the overall impact of the scheme to user benefits is **slight beneficial**.

Table 3-20 *User benefit assessment of scheme by vulnerable group*

Vulnerable Group	Outcome
Quintile 1 (most deprived)	✓
Quintile 2	✓
Quintile 3	✓
Quintile 4	✓✓✓
Quintile 5 (least deprived)	✓✓✓
Overall	✓

3.11. Affordability

3.11.1. Screening

Comments

Increased capacity through the Arle Court Roundabout due to additional lanes on the circulatory and A40 and the widening of the southern arm will likely increase vehicle flow and speed. This will have a cost impact and hence the affordability impact of the scheme will need to be examined.

Outcome

Continue to full DI appraisal

3.11.2. Assessment

3.11.2.1. Step 2a: Confirmation of Impacted Area

The assessment of the distributional impact of the user benefits arising from the Arle Court Improvement Scheme uses the outputs of the 60-year appraisal from TUBA. The affordability study area is the same as the user benefit study area, shown in Figure 3-11**.**

The table in Step 2b represents the proportion of population within the assessment area which lies within each income quintile. Step 3 displays the total population in each income quintile in the assessment area. The assessment is completed by determining the overall impact on each income quintile and then comparing the proportion of the impact against the proportion of the population.

The calculation of impact by income quintile in the appraisal tables are based on vehicle operating costs and journey time benefits for home-based 'commuting and other' trips (i.e. excluding business users). Only highways benefits have been modelled, and only internal to internal trips within an assessment area which has been defined by the modellers.

3.11.2.2. Step 2b: Identification of Social Groups in Impact Area

Table 3-21 *Proportion of income groups in the affordability study area and England*

Income Group	England	Study Area
Quintile 1 (most deprived)	20.0%	15.3%
Quintile 2	20.0%	19.7%
Quintile 3	20.0%	14.5%
Quintile 4	20.0%	20.3%
Quintile 5 (least deprived)	20.0%	30.3%

3.11.2.3. Step 2c: Identification of Amenities in Impact Area

Identification of amenities is not required according to WebTAG guidance for affordability.

3.11.3. Appraisal

The percentage of the population in each income quintile is calculated based on the postcodes that are within the assessed impact area. **Table 3-22** represents the proportion of the population in each income quintile in the assessment area. The calculations include the overall cost impact, a sum of the total benefits and disbenefits, this is then further segregated into the total benefits and disbenefits for each income quintile. Furthermore, the percentage proportion of benefits and disbenefits across each of the income quintiles is calculated in order to determine the overall assessment score for each quintile.

Table 3-22 *Distribution of affordability impacts by income quintiles in the study area*

	Income Quintile					Total
	Quintile 1	**Quintile 2**	**Quintile 3**	**Quintile 4**	**Quintile 5**	
Total population in the assessment area	12,239	15,696	11,540	16,164	24,175	79,814
Proportion of total population in each quintile in the assessment area	15.3%	19.7%	14.5%	20.3%	30.3%	-
Sum of benefits	£21,624	£167,522	£65,065	£850,934	£914,539	£2,019,683
Proportion of benefits for each income quintile	1.1%	8.3%	3.2%	42.1%	45.3%	-
Sum of disbenefits	-£52,011	-£43,180	-£40,546	-£27,269	-£92,035	-£255,041
Proportion of disbenefits for each income quintile	20.4%	16.9%	15.9%	10.7%	36.1%	-
Overall net change	-£30,387	£124,341	£24,519	£823,665	£822,504	£1,764,642
Assessment	Large Adverse	Slight Beneficial	Slight Beneficial	Large Beneficial	Large Beneficial	**Slight Adverse**

Key: ✓✓✓ Large Beneficial ✓✓ Moderate Beneficial ✓ Slight beneficial 0 Neutral
× Slight adverse ×× Moderate adverse ××× Large adverse

Key to individual assessment of each Income quintile

Beneficial and 5% greater (or more) than the proportion of the group in the total population	***Large Beneficial***
Beneficial and in line (+/-5%) with the proportion of the group in the total population	***Moderate Beneficial***
Beneficial and 5% smaller (or less) than the proportion of the group in the total population	***Slight Beneficial***
There are no user benefits or disbenefits experienced by the group	***Neutral***
A disbenefit which is 5% smaller (or less) than the proportion of the group in the total population	***Slight Adverse***
A disbenefit which is in line (+/-5%) with the proportion of the group in the total population	***Moderate Adverse***
A disbenefit which is 5% greater (or more) than the proportion of the group in the total population	***Large Adverse***

There is an adverse impact to affordability to income quintile 1 and beneficial affordability impacts for all other income quintiles. Increased capacity through Arle Court roundabout and a mode shift from private car to public transport will reduce congestion through in the area. This is likely to reduce vehicle operating costs as there's reduced vehicles idling, braking and accelerating while queueing. The adverse affordability impacts are likely caused by increased vehicle speeds leading to increased fuel consumption and hence increased vehicle operating costs. This is likely the cause of the affordability disbenefit for income quintile 1, as shown in **Table 3-22**.

3.11.3.1.1. Outcome and Qualitative Comment

The proportion of affordability disbenefits which occur within income quintile 1 is 20.4%. This is greater than 5% of the proportion of the population in the impact area belonging to this group. Therefore, there is a large adverse affordability impact for the 20% most income deprived residents (income quintile 1).

A high proportion of affordability benefits occur in areas belonging to income quintiles 4 and 5 (42.1% and 45.3% respectively). This is much higher than the proportion of the population made up by each of these income groups, hence there is a large beneficial impact to affordability for income quintiles 4 and 5 (least income deprived).

There are beneficial affordability impacts to income quintiles 2 and 3, although these income groups receive a small proportion of the benefits, 8.3% and 3.2% respectively. Since this is less than 5% of the proportion of the population that these income groups make up, there is a slight beneficial impact to affordability for income quintiles 2 and 3.

Overall, there is a disproportionate affordability impact across each income quintile, with the least income deprived residents receiving the majority of the benefits and the 20% most income deprived residents receiving a large adverse impact. Therefore, the overall impact of Arle Court Phase 1 to affordability is **slight adverse**.

Table 3-23 *Affordability assessment of scheme by vulnerable group*

Vulnerable Group	Outcome
Quintile 1 (most deprived)	×××
Quintile 2	✓
Quintile 3	✓
Quintile 4	✓✓✓
Quintile 5 (least deprived)	✓✓✓
Overall	×

4. Summary

An assessment of each of the eight indicators has been undertaken for this DI assessment. The impact area has been determined for each indicator as an area likely to be affected by the Arle Court Improvement Scheme.

There is a neutral impact overall to air quality and noise, as there is no significant impact to income quintiles 1-3 or 5. However, there is a slight adverse air quality impact for income quintile 4 and a slight beneficial impact to noise for this income group, as shown in **Table 4-1**.

There are beneficial impacts for all income quintiles and overall for user benefits and affordability. The overall impact is slight beneficial for both these indicators since there are slight beneficial impacts for income quintiles 1-3.

Table 4-1 *Distribution of impacts across income groups for each indicator with the scheme in place*

	Distributional impact of income deprivation					Are the impacts evenly distributed?	Key impacts – Qualitative statements
	0-20%	20-40%	40-60%	60-80%	80-100%		
Air Quality	**0**	**0**	**0**	×	**0**	**No**	There are neutral air quality impacts for all income quintiles other than income quintile 4, which has a slight adverse impact.
Noise	**0**	**0**	**0**	✓	**0**	**No**	There is a slight beneficial noise impact for income quintile 4 and neutral impacts for all other income groups.
User Benefits	✓	✓	✓	✓✓✓	✓✓✓	**No**	There are beneficial user benefits for all income quintiles. However, the majority of benefits are concentrated within postcodes belonging to income quintiles 4 and 5.
Affordability	×××	✓	✓	✓✓✓	✓✓✓	**No**	There is a large adverse impact for income quintile 1 and beneficial affordability impacts for all income quintiles.

A.1. Screening Proforma

ASSESSMENT OF DISTRIBUTIONAL IMPACTS (DIs) OF TRANSPORT INTERVENTIONS

Proforma for reporting conclusions of first screening stage (Step 1)

This form is intended for use by scheme promoters to capture the considerations, assessment and conclusions of the first screening stage of the DI analysis (Step 1). For a full description of Step 1 please see WebTAG guidance unit A4.2. These initial screening tests are not intended to be onerous and should require no additional data collection or analysis. At this stage promoters are only expected to carry out a qualitative assessment, based on their professional judgement and that of the technical specialists responsible for undertaking assessment of noise, air quality, safety, security, severance, accessibility, personal affordability and user benefits.

Scheme name: Arle Court Improvement Scheme (Phase 1)

Brief description of scheme

The Arle Court Improvement Scheme is the first of four phases for the West of Cheltenham Improvement Package. Arle Court signalised roundabout is to the west of Cheltenham and connects the A40 with the B4063, Fiddler's Green Lane and Hatherley Lane. The junction currently creates significant delays and congestion for traffic travelling on the A40 into and out of Cheltenham. The improvement scheme includes the following interventions;

- Provision of an additional lane to the circulatory of the signalised roundabout;
- Corresponding additional lanes to the A40 on the approaches and exits to and from the junction;
- Provide a bus lane on the B4063 approach to the roundabout;
- Widening the Hatherley Lane arm to the south side of the roundabout; and
- Park and Ride Access/Egress westbound from Arle Court Roundabout.

All of the above interventions will be considered when assessing the scheme within this screening proforma.

Scheme Objectives

The objectives of the Arle Court Improvement Scheme are;

- Increase the capacity of the roundabout to remove existing pinch point;
- Improve connectivity with the surrounding network; and
- Future proof the roundabout to facilitate planned developments.

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 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	Additional lanes on the roundabout circulatory, the A40 approaches and exits and the widening of the southern arm will increase the junction capacity. This will likely lead to increased traffic flow and hence reduced journey times. Therefore, the impact to user benefits will need to be assessed.	Yes
Noise	Any change in alignment of transport corridor or any links with significant changes (>25% or <-20%) in vehicle flow, speed or %HDV content.	Yes, negative	Increased capacity through the Arle Court Roundabout will likely lead to an increase in vehicle flow and speed, which will likely impact noise levels in the area.	Yes
Air quality	Any change in alignment of transport corridor or any links with significant changes in vehicle flow, speed or %HDV content: • Change in 24 hour 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	Yes	There is likely to be increased vehicle flow and speed caused by increased capacity through the signalised roundabout. This will have an impact on emissions in the area, so air quality impacts need further assessment.	Yes
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	The scheme intervention of a Park and Ride access/egress connecting to the A40 westbound to the west of Arle Court Roundabout may impact on the number of accidents in the area. Also, increased vehicle speed as a result of reduced congestion could impact on the severity of casualties.	Yes

Security	Any change in public transport waiting/interchange facilities including pedestrian access expected to affect user perceptions of personal security.	Yes	The scheme includes the relocation of bus shelters on the new link to the Park and Ride from the A40 westbound, with footpaths to access the bus stops from the Park and Ride. While it is assumed that the bus shelters and footpaths will be well lit with formal security in place, the impact to users will need to be assessed. In addition, the extension of the bridge over the subway may have a perceived impact on severance.	Yes
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	The construction of a footpath to the south of the Park and Ride access may have an impact to severance. There is likely to be a change in traffic flow and speed as a result of increased capacity through Arle Court Roundabout. Therefore, the impact of the scheme to severance will need to be assessed further.	Yes
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).	Yes	The scheme includes the relocation of bus stops on the Park and Ride access/egress. It is not yet known if there will be any changes to the timings of public transport facilities. However, the impact of the scheme to accessibility will need to be examined.	Yes

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]).	Yes	Increased capacity through the Arle Court Roundabout due to additional lanes on the circulatory and A40 and the widening of the southern arm will likely increase vehicle flow and speed. This will have a cost impact and hence the affordability impact of the scheme will need to be examined.	Yes

A.2. Socio-demographic Mapping

Figure 4-1 *Map showing quintiles of income deprivation for LSOAs over England*

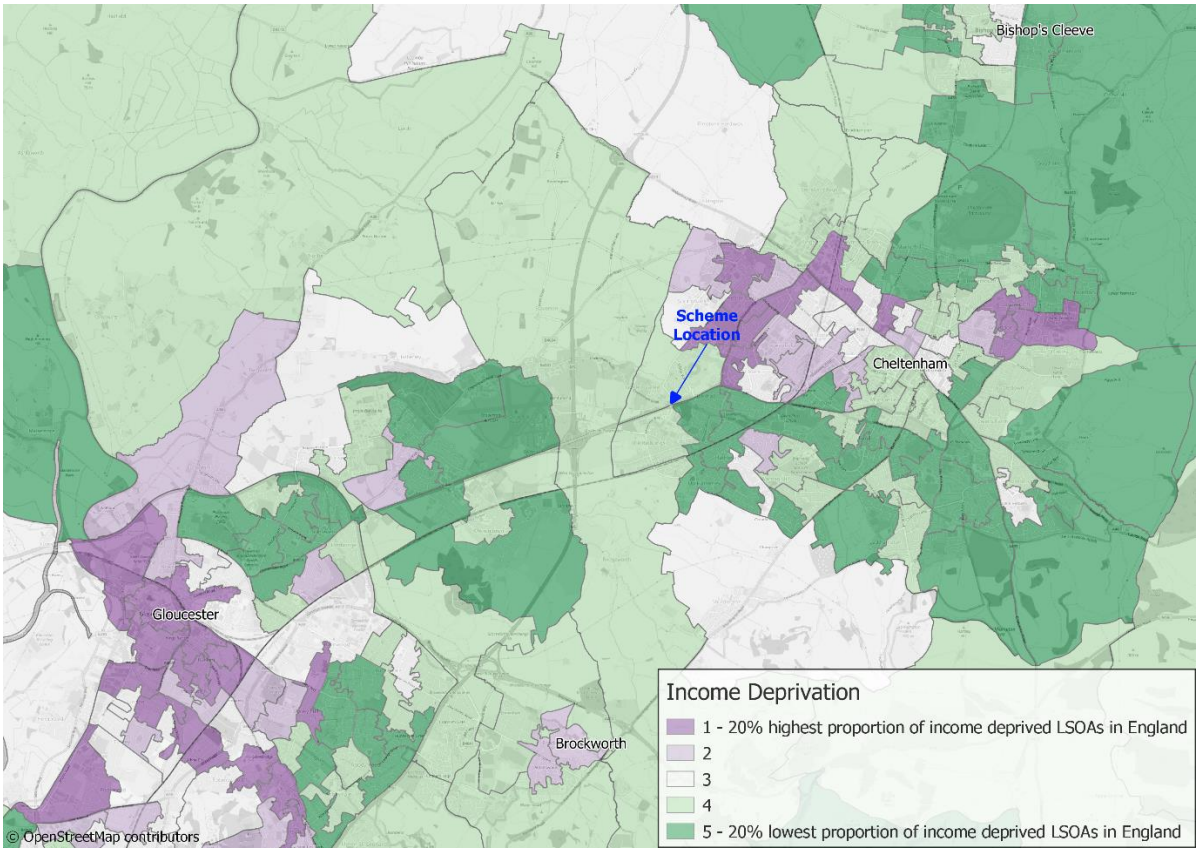


Figure 4-2 *Map showing OAs with the 20% highest proportion of residents aged 70 and over for England*

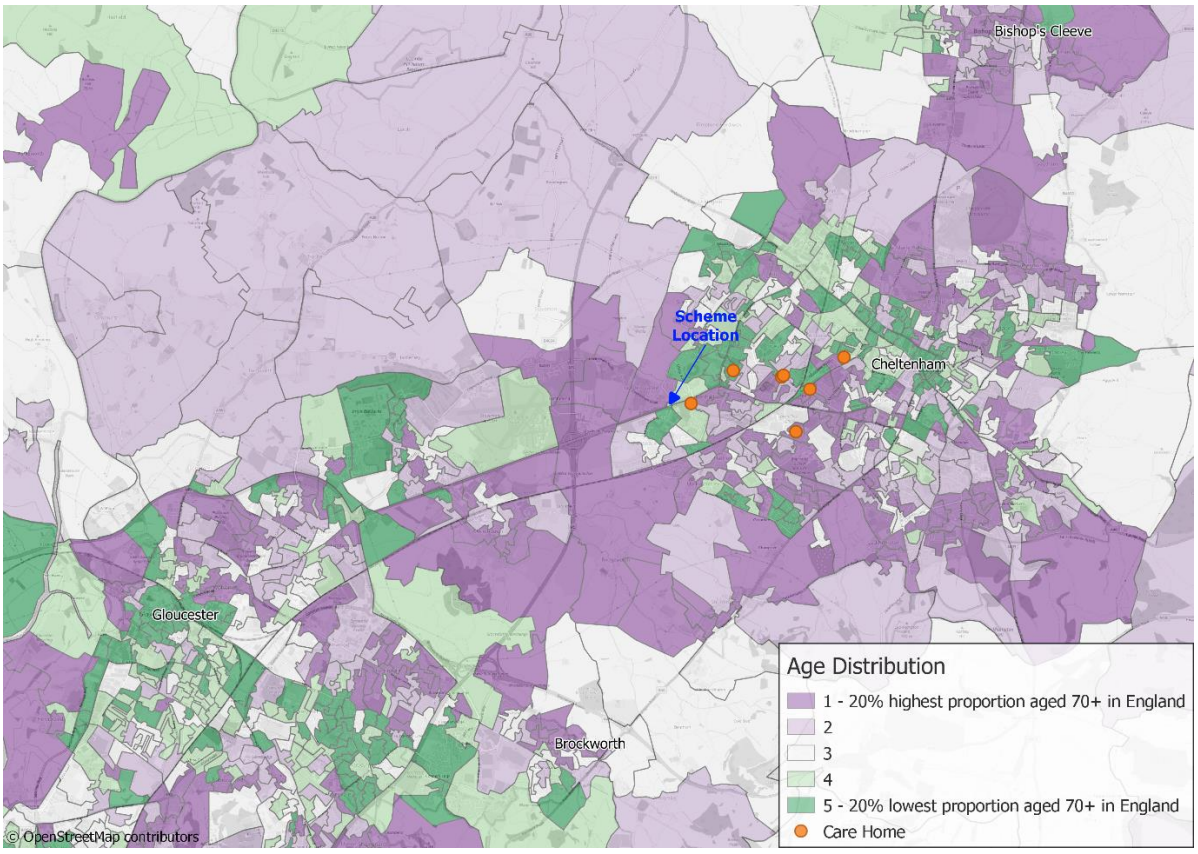


Figure 4-3 *Map showing OAs with the 20% highest proportion of BME residents for England*

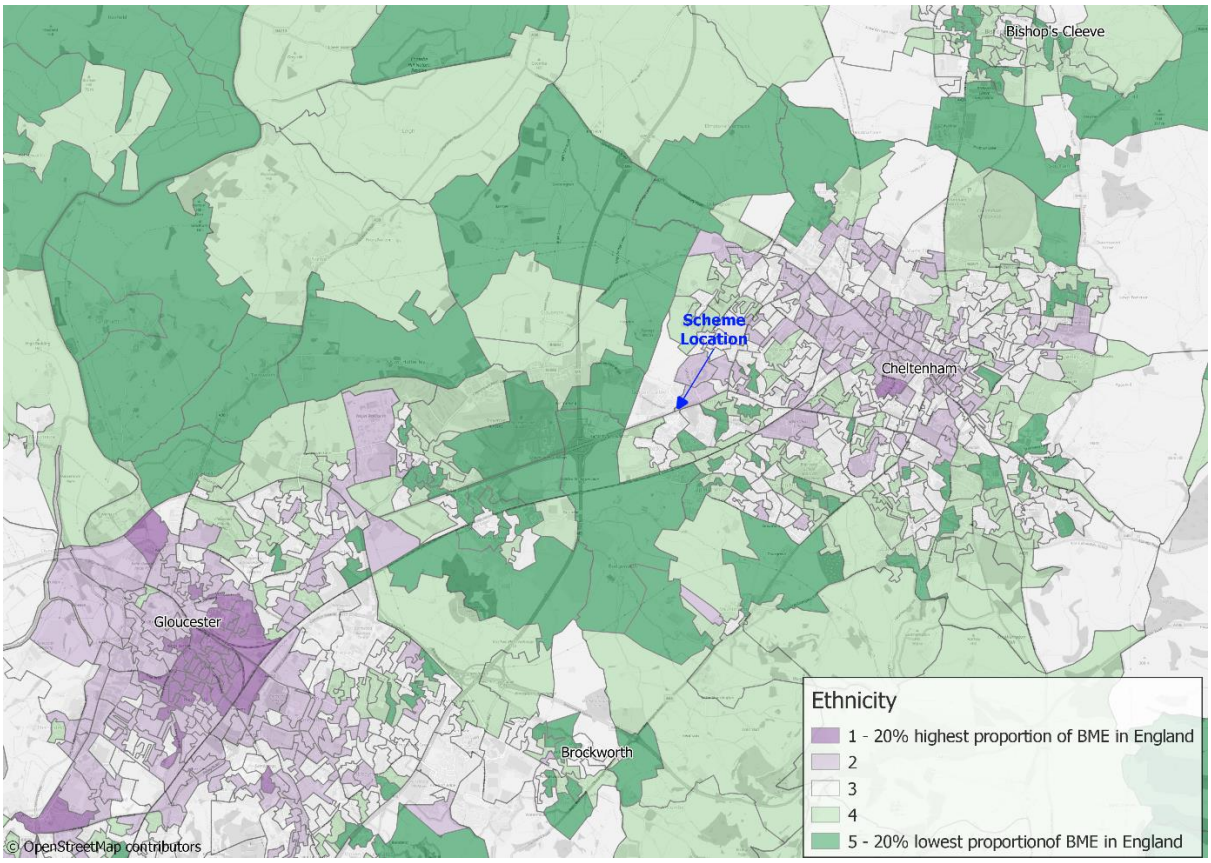


Figure 4-4 *Map showing OAs with the 20% highest proportion of DLA claimants for England*

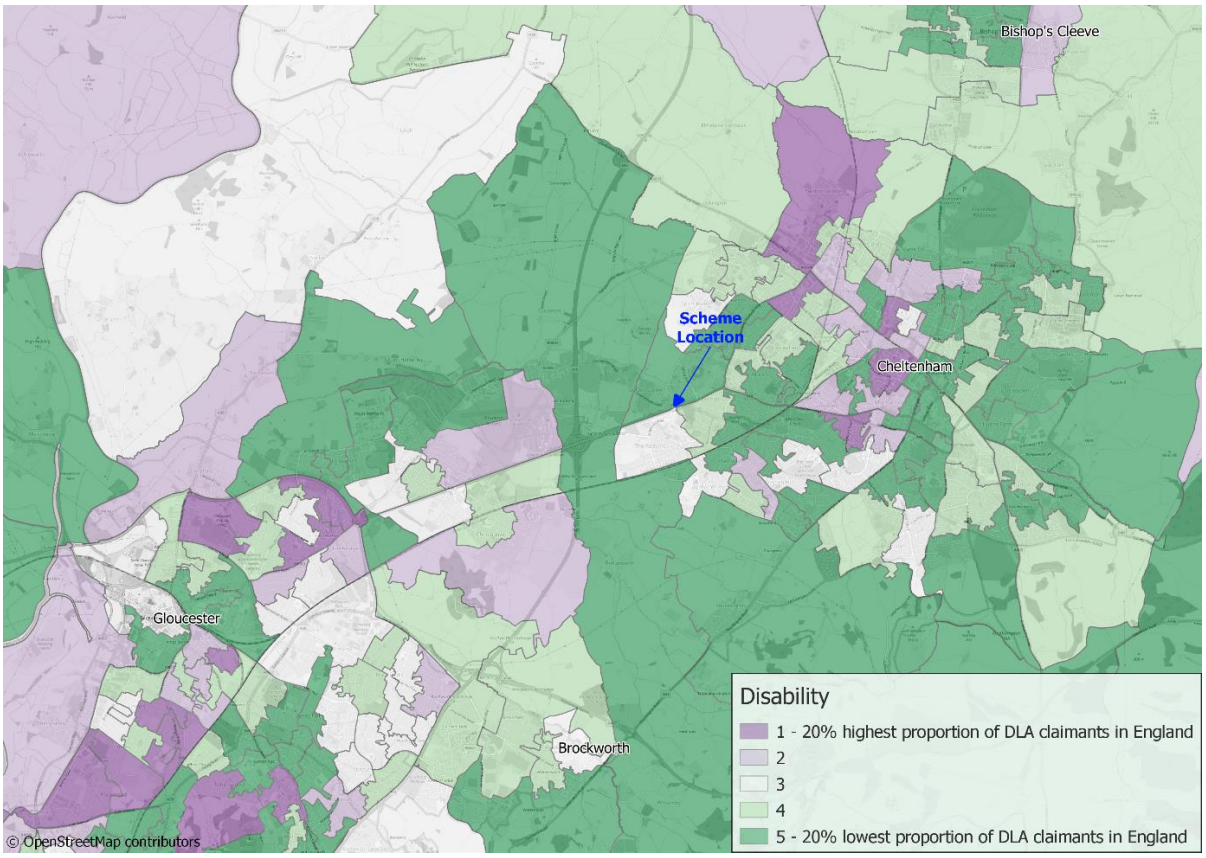


Figure 4-5 *Map showing OAs with the 20% highest proportion of households without a vehicle for England*

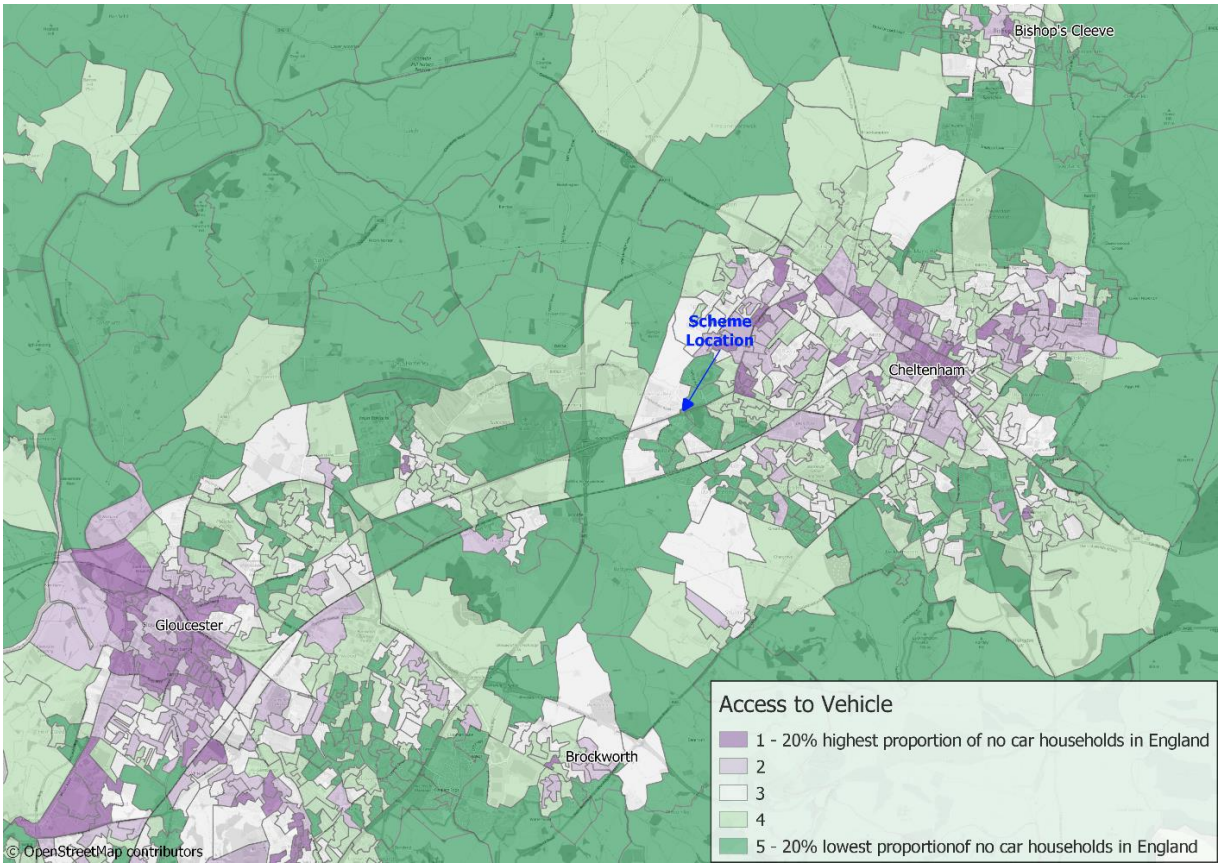


Figure 4-6 *Map showing OAs with the 20% highest proportion of residents aged under 16 for England*

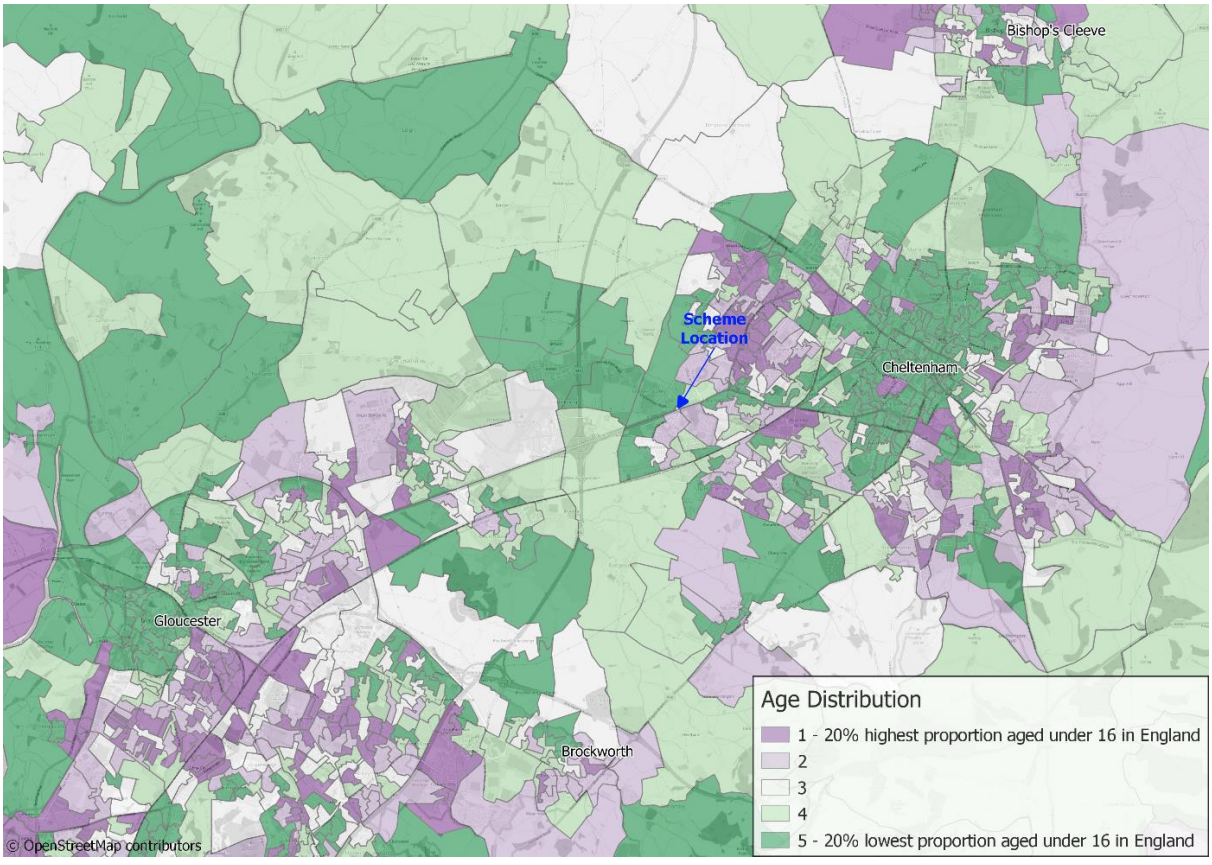


Figure 4-7 *Map showing OAs with the 20% highest proportion of women for England*