ATKINS

Gloucestershire County Council
Elmbridge Transport Scheme

EIA Scoping Report

March 2013

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1. Introduction

1.1 Gloucestershire County Council (GCC) is proposing to develop the Elmbridge Transport Scheme on the north eastern outskirts of Gloucester. The scheme broadly consists of three elements namely: a Park and Ride Scheme, alterations to Elmbridge Court Roundabout together with the construction of new bus priority measures to the A40 near the Arle Court Roundabout, Cheltenham. Pursuant to Regulation 8(1) of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 the County Council requests a Scoping Opinion from the Secretary of State regarding the scope of an environmental impact assessment in relation to the proposed development.

1.2 On 30th August 2005 a request for a screening opinion under Regulation 5 of the Town and Country Planning (Environmental Impact Assessment) (England & Wales) Regulations 1999 was submitted to GCC for a proposed public transport interchange scheme (ITEC). The current proposal differs from the ITEC scheme in that it does not include a new Gloucestershire Parkway Railway Station nor a new link road from the B4063 to the A40.

1.3 GCC concluded that the ITEC scheme fell under the description of development contained in Schedule 2, column 1 of section 10 (b): *'Urban development projects, including the construction of shopping centres and car parks, sports stadiums, leisure centres and multiplex cinemas'.* GCC also confirmed that the area of the development exceeded 0.5 hectare therefore was 'Schedule 2' development. Having regard to the selection criteria in Schedule 3 of the 1999 Regulations, GCC concluded that the ITEC scheme was 'EIA development'.

1.4 In view of the similarities between the current scheme and the ITEC scheme it is considered that the current scheme is a 'Schedule 2 Development' and is also 'EIA Development'.

1.5 This EIA scoping report contains a description of the nature and purpose of the intended development and a preliminary assessment of the environmental baseline and the potential environmental effects of the scheme.

2. Description of the Proposed Development

2.1 Current traffic levels in the Gloucester and Cheltenham area are at the point where congestion is starting to become a problem. Forecast levels of housing and employment growth up to the year 2026 mean that without new transport infrastructure, levels of congestion could get significantly worse in the future.

2.2 Elmbridge Court Roundabout is one of the busiest in Gloucestershire and, as traffic levels increase, congestion and unreliable journey times will become more of a problem for people travelling to/from Cheltenham and Gloucester, as well as further afield.

2.3 In response to the problem described above Gloucestershire County Council is proposing to develop a 1,000-space Park and Ride (P&R) site, on an area of approximately 7ha of agricultural land adjacent to the Elmbridge Court Business Park, with access off the A40 Golden Valley bypass via a new signalised junction.

2.4 The proposed works include a complementary scheme of improvements to the Elmbridge Court Roundabout, which will enable the roundabout to accommodate the increased bus traffic as a result of the P&R, as well as reduce overall levels of congestion.

2.5 In addition, the works include the construction of a new bus gate and bus lane on the A40 west-bound carriageway as it approaches the Arle Court Roundabout at the Cheltenham end of the Golden Valley road. This will improve bus times from Cheltenham to the Arle Court Park and Ride and then on to the Elmbridge elements of the scheme.

2.6 The proposed site for the P&R parking area lies with the Green Belt. The National Planning Policy Framework (March 2012) makes no specific reference to P&Rs in the Green Belt. However, it does state that local transport infrastructure which can demonstrate a requirement for a Green Belt location is not 'inappropriate development', provided it preserves the openness of the Green Belt and does not conflict with the purposes of including land in Green Belt.

2.7 Whilst the contract to provide the bus service is still under discussion with potential operators, and will not be finalised until closer to the time of opening, the envisaged service will be as follows: A 10-12 minute express bus service will run between Elmbridge Court P&R and Gloucester city centre/Gloucester Royal Hospital, linking in with Arle Court P&R and Cheltenham town centre. The Elmbridge and Arle Court P&R sites will both serve Gloucester and Cheltenham. The P&R site is likely to operate, as a minimum, from 7am to 7pm six days a week.

2.8 It is anticipated that the P+R site will primarily be used by commuters, university students, visitors to the hospital and shoppers. However potentially the site might be used by football and/or rugby supporters and a shuttle bus to transfer employees to large employers in the vicinity is also a possibility.

2.9 **Appendix A**: Drawing number SD.25988.P.075.RevC, Site Extents, shows the boundary, with the blue line incorporating stretches of highway where new or altered highway signage is proposed. Drawing number SD.25988.P.002 Rev H, provides a preliminary layout of the Park and Ride development and the proposed works to the Elmbridge Court Roundabout. Drawing number SD.25885.40.002 Rev A provides a similar level of detail for the Arle Court works.

2.10 For the purposes of EIA scoping, it is assumed that the development would comprise the following:

Park and Ride Site

- A high frequency park and ride service from Elmbridge Court to Gloucester city centre, linking in with Cheltenham town centre and the Arle Court P&R site;
- Approximately 1,000 parking spaces;
- Bus and cycle shelter & potential covered walkway;
- Lighting;
- CCTV and Real Time Passenger Information;
- Landscaping;
- Sustainable drainage measures;
- A security fence;
- A connection to the local electricity network;
- Diversion/stopping up of a Public Right of Way; and
- Ancillary additional or modified signage and associated street furniture within and outside the P&R site;

Elmbridge Court Roundabout Alterations

- Capacity improvements to the Elmbridge Court junction through the construction of a new "straight on" lane between A40 Golden Valley bypass to A40 Gloucester Northern bypass;
- A left turn only lane constructed from A40 Golden Valley to A40/A417 Barnwood Link Road;
- Alteration of the access to Elmbridge Court Business Park and Elmbridge Court Farm such that they can be accessed via the Park & Ride site rather than directly onto the Elmbridge Court Roundabout (to facilitate the above roundabout improvements);
- Carriageway widening at Elmbridge Court Roundabout in three locations;
- Construction of a signal controlled right turn lane on the A40 facilitating access to the P&R site the business park and Elmbridge Court Farm;
- Changes to the signal arrangements, including 24 hour operation and greater coordination with the traffic signals at the Nine Elms/Cheltenham Road signal junction; and

Bus Priority Measures

- Bus capacity improvements on the A40 west bound carriageway immediately east of the Arle Court roundabout and A40 Whittington Road junction.

Alternatives

2.11 During the course of developing the Elmbridge Transport Scheme a number of alternative forms of development have been considered. Those alternatives include different transport solutions, different sites and different layouts. In accordance with Schedule 4, Part 2 (27) of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 the ES will include an outline of the main alternatives considered and an indication of the main reasons for the choice, taking into account the environmental effects.

3. Planning Policy Context

3.1 As part of the EIA it will be important to understand to what extent the development proposals will support or be at variance with current and relevant planning policy and future development proposals.

3.2 The EIA will identify the national and local spatial planning and transport planning policies that will need to be taken into account during the assessment.

National Policy

3.3 At the national level, the government has recently published the National Planning Policy Framework (NPPF) (March 2012). This has superseded all previously existing national level guidance. At the national level, the following key policy areas of the NPPF that are likely to be considered include:

- Promoting sustainable transport;
- Protecting Green Belt land;
- Meeting the challenge of climate change, flooding and coastal change;
- Conserving and enhancing the natural environment; and
- Conserving and enhancing the historic environment.

Regional/Sub-Regional Policy

3.4 The Localism Bill was introduced by the Government and became an Act of Parliament on 15th November 2011. The central purpose of the Bill, to shift power back from Central Government into the hands of individuals, communities and Council's, through the revocation of Regional Strategies. This includes the Regional Planning Guidance for the South West (RPG 10), 2001. With their intention for regional planning to be abolished clearly set out, the Government has been preparing Environmental Reports which assess the impacts of revoking each of the Regional Plans. Following the announcement to revoke regional strategies work on revising the Regional Spatial Strategy (RSS) for the South West ceased. As policies contained within RPG10 and the draft RSS may still be a material consideration to the determination of the application relevant policies in both of these documents will be set out in the ES.

3.5 The Local Transport Plan for Gloucestershire (LTP3) sets out the transport strategy for the County from 2011 to 2026. The vision for transport in the future is: "*"Providing a safe and sustainable transport network within Gloucestershire" where safe means a transport network that people feel safe and secure using and sustainable means a transport network that is both environmentally and financially sustainable." "A comprehensive public transport network (including Park & Ride, bus, rail, community transport, taxis and home to school transport) will be required to meet our priorities."* In the medium to long term, one of the main aims is to: *"Implement Elmbridge Transport Park &Ride"* alongside other projects and schemes.

3.6 Sub-regional planning policy documents that shall be considered are likely to include:

- Adopted 2nd Review Gloucestershire Structure Plan (1991 - 2011); and
- Deposit Draft 3rd Alteration Gloucestershire Structure Plan (2001 - 2016) (unadopted plan used as a material consideration in determining planning applications).

Local Policy

3.7 The scheme footprint spans the administrative areas of Tewkesbury Borough Council, Gloucester City Council and Cheltenham Borough Council. Although none of these Councils will be the decision making authority for this development proposal, regard will still be had for local level planning policy. Documents that shall be considered are likely to include:

- Tewkesbury Borough Local Plan to 2011 (Adopted March 2006) (saved policies)
- Gloucester Local Plan 1983 (Schedule of Saved Policies September 2007)
- City of Gloucester (Pre-1991 Boundary Extension) Local Plan (unadopted plan but forms a material consideration)
- City of Gloucester (Additional Areas Post-1991 Boundary Extension) Local Plan (unadopted plan but forms a material consideration)
- City of Gloucester Second Stage Deposit Draft Local Plan 2002 (adopted by the Council for development control purposes)
- Cheltenham Borough Local Plan Second Review (adopted July 2006)

3.8 Tewkesbury Borough Council, Gloucester City Council and Cheltenham Borough Council are currently working in partnership to prepare a Joint Core Strategy that will guide development in the area up to 2031. The 'Developing the preferred option' document was subject to public consultation between 13th December 2011 and 12th February 2012. This document includes an overarching vision for the area and four scenarios with different levels of future development up to 2031. Strategic allocations include 750 houses to the north of A40, in proximity to the proposed scheme. The current programme predicts the adoption of the Core Strategy in August 2014.

3.9 All relevant policies within the documents identified above will be set out in the ES.

4. Noise and Vibration

Introduction

4.1 This scoping assessment is based on a professional judgement of the likely noise impacts from the scheme, based on the findings of an assessment undertaken in 2009 and the differences between that and the current 2012 scheme. No new traffic data has been used in this assessment.

4.2 Since the assessment was undertaken in 2009, the Design Manual for Roads & Bridges (DMRB) for noise assessments of road schemes has been revised (latest version November 2011) giving further advice on describing short term and long term changes in noise. The current advice has been taken into account in this screening / scoping assessment.

Baseline Conditions

4.3 The ambient noise climate at noise sensitive receivers in the area near the scheme is likely to be dominated by noise from traffic using the existing road network. Noise measurements have not been undertaken for this scoping assessment, but would be for the EIA.

Potential Impacts

Construction

4.4 The 2009 assessment considered it likely that the construction of the scheme would generate adverse noise impacts, particularly at Elmbridge Court Business Park. The proximity of the revised access to receptors could affect these noise impacts, although such changes were considered unlikely to affect the significance of the impacts.

4.5 On the whole the construction noise impacts of the scheme are likely to be similar to those in expected in 2009. The revised access to the business park will bring construction activities closer to buildings in the business park, which may result in noise impacts being slightly more adverse, although this is unlikely to affect the significance of the impacts.

4.6 Elmbridge Court Roundabout new no stopping lane and through lane will add new construction noise impacts to near by residential receptors on Lavington Drive, Cheltenham Road and Blackwater Way.

4.7 The new bus lane works will now add new construction noise impacts around Whittington Road, Darwin Close, Castlemaine Drive, and hotels on Golden Valley Roundabout.

Operation

4.8 The 2009 assessment considered it likely that there would be moderate adverse impacts at Elmbridge Court Business Park. The revised access to the P&R would bring traffic closer to the buildings within the business park. Noise impacts at the nearest residential properties were considered likely to be negligible.

4.9 On the wider road network some minor increases and decrease in noise are expected were opening, with all impacts being negligible by the design year.

4.10 2012 Scheme Park & Ride: These impacts would be expected to be broadly similar to those reported in 2009. The revised access to the park and ride and the business park will bring traffic closer to the buildings within the business park. Noise impacts are likely to be similar in level, but may affect a larger part of the business park. Impacts in the surrounding area are likely to be

similar. Noise impacts at the nearest residential properties are likely to be the same as shown in 2009 – negligible

4.11 2012 Scheme Wider Road Network: These impacts are expected to be broadly the same as shown in 2009 – some minor increases and decrease in noise on opening, and all impacts being negligible by the design year. In particular the assessment should be updated to account for the new bus lane, no stopping lane and through lane.

4.12 2012 Scheme New Link Road and Cheltenham Road East: The new link road is not part of the scheme, so the moderate adverse impacts shown previously would not occur. Similarly, Cheltenham Road East would remain open to traffic, and the substantial decreases in noise would not occur. There may be changes in traffic on Cheltenham Road East expected as a result of this change to the scheme which may have corresponding changes in noise.

4.13 2012 Scheme Bus Lane Improvements: Noise impacts at the nearest residential properties are likely to be the same as shown in 2009 – negligible.

Potential Mitigation Measures

4.14 Construction noise impacts would be mitigated by the use of Best Practical Means. Other mitigation measures would be recommended depending on the location, duration and magnitude of the impacts. It is unlikely that mitigation measures would be required for operational impacts.

Assessment Methodology

4.15 Ambient noise levels would be measured at the nearest noise sensitive receivers in the area including Elmbridge Court Business Park and the nearest residential properties.

4.16 Construction noise impacts would be assessed using the advice, assessment procedures and calculation methodology described in BS5228, Part 1, 2009.

4.17 Operational noise impacts from the P&R site would be assessed by considering the expected change in ambient noise levels at noise sensitive receptors, making use of appropriate noise calculation methodologies including that described in BS5228, Part 1, 2009.

4.18 Operational noise impacts on the wider road network would be assessed using the advice in the Design Manual for Roads and Bridges (DMRB – HD213/11 Revision 1) with noise levels calculated using the advice in DMRB and Calculation of Road Traffic Noise (CRTN 1988).

Conclusions

4.19 The 2009 assessment indicated that moderate adverse impacts would be expected from the operation of the P&R affecting the business park and nearby amenity areas. Minor adverse and beneficial effects were expected on the wider road network.

4.20 A number of minor and moderate changes in noise affecting receptors were also assessed in different areas and it was recommended that noise be scoped in to the EIA.

4.21 The most significant impacts predicted in 2009 would not be expected to occur with the current scheme. Similar moderate impacts are expected from the operation of the park and ride site affecting the business park and nearby amenity areas. Similar minor adverse and beneficial effects are expected on the wider road network.

4.22 As there are a number of minor and moderate changes in noise affecting receptors in different areas it is recommended that noise is scoped in to the EIA for the 2012 scheme, especially considering the need to account for the new bus lane, no stopping lane and through lane. A construction noise assessment should also be included cover new proposed areas of works and associated receptors. The 2009 assessment did not benefit from a baseline noise survey to

establish existing noise levels, and this would be required to allow the impacts, particularly of the park and ride, to be predicted with greater certainty.

5. Air Quality

Introduction

5.1 This section examines the potential effect of the scheme on construction dust during construction of the scheme, and on local air quality and greenhouse gas emissions from operation of the opened scheme.

Baseline Conditions

Local Air Pollutants

5.2 In most urban areas, including Cheltenham and Gloucester, the main source of pollution is road traffic. Emissions from motor vehicle exhausts contain a number of pollutants including oxides of nitrogen (NOx), carbon monoxide (CO), hydrocarbons, carbon dioxide (CO_2) and particulate matter (PM). The quantities of each pollutant emitted depend upon the vehicle, type, quantity and type of fuel used, engine size, speed of the vehicle and abatement equipment fitted. Once emitted, the pollutants are diluted and dispersed in the ambient air. Pollutant concentrations in the air can be measured or modelled and then compared with air quality criteria.

5.3 The air pollutants of concern in the context of this assessment are nitrogen dioxide (NO_2) and fine particles known as PM_{10} and $PM_{2.5}$. These pollutants are the most likely to be present at concentrations close to or above their statutory limit values in an urban environment, and are hence the focus of the assessment of the scheme.

Nitrogen Dioxide

5.4 Nitrogen dioxide is generally produced by the oxidation of nitric oxide (NO) in ambient air (i.e. is not formed directly and as such is known as a 'secondary' pollutant). Nitric oxide and nitrogen dioxide are collectively termed oxides of nitrogen. Just over a third of the UK oxides of nitrogen emissions are from road transport. The majority of oxides of nitrogen emitted from vehicles are in the form of nitric oxide, which oxidises rapidly in the presence of ozone to form nitrogen dioxide. In high concentrations, nitrogen dioxide can affect the respiratory system.

PM_{10}

5.5 Particulate matter in vehicle exhaust gases consists of carbon nuclei onto which a wide range of compounds are absorbed. These particles are generally very small (1-10□□µm), and include those in the size range referred to as PM_{10}. Diesel engines produce the majority of particulate emissions from the vehicle fleet. About a quarter of primary PM_{10} emissions in the UK are derived from road transport. Particulate matter appears to be associated with a range of symptoms of ill health including effects on the respiratory and cardiovascular systems, on asthma and on mortality. Recent reviews by the World Health Organisation (WHO) and Committee on the Medical Effects of Air Pollutants (COMEAP) have suggested exposure to a finer fraction of particles ($PM_{2.5}$, which typically make up around two thirds of PM_{10} emissions and concentrations) give a stronger association with the observed ill health effects.

Dust

5.6 Dust is defined within the Institute of Air Quality Management's 'Guidance on the Assessment of the Impacts of Construction on Air Quality[1] (IAQM Construction Dust Guidance) as all airborne particulate matter that give rise to soiling (deposited dust) and to human health effects (particulate matter as discussed above).

5.7 The IAQM Construction Dust Guidance states that there is evidence that major construction sites can lead to increase annual PM_{10} concentrations and the number exceedances of the short term 24 hour objective for PM_{10}. In addition demolition and construction activities have the potential to cause higher than normal levels of dust deposition in the surrounding area. Dust emissions from a site may be mechanically generated due to land preparation (e.g. demolition, land clearing and earth moving) or as a result of release from site plant and road vehicles moving over temporary roads and open ground.

5.8 In general, elevated dust levels due to emissions from a source area that is at or near ground level will rapidly diminish with distance. Particles larger than 30 µm tend to deposit within 100 metres.

Carbon dioxide

5.9 Carbon dioxide is a major product of the combustion of carbon containing materials. Carbon dioxide does not affect human health at ambient levels and so is not significant as a local pollutant but is important for its national and international role in climate change. About 20% of the UK carbon dioxide emissions are produced by transport.

Air Quality Criteria

5.10 Mandatory legislative air quality criteria are set in EU Directives that are implemented nationally by The Air Quality Standards Regulations 2010 (SI 2010 No 1001). Air quality is further regulated by the Air Quality (England) Regulations 2000 (SI 2000/928) and the Air Quality (England) (Amendment) Regulations 2002 (SI 2002/3043), which implement the objectives of the national air quality strategy. Further details of the EU Directive limit values and national air quality strategy objectives are given below and local air quality criteria that are relevant to this assessment are summarised in **Table 5.1** below.

5.11 The Government's Air Quality Strategy for England, Scotland, Wales and Northern Ireland[2] (AQS) provides details of national air quality standards and objectives for a number of local air pollutants. The standards are set by expert organisations on the basis of scientific and medical evidence on the effects of the particular pollutant on health, and define the level of pollution below which health effects are expected to be minimal or low risk even to the most sensitive members of the population. The objectives are targets for air pollution levels which should be achieved within a specified timescale, which take account of the costs and benefits of achieving the standard, either without exception or with a permitted number of exceedances. Local authorities have a responsibility (under the Environment Act 1995) to review and assess local pollution levels against these objectives. These criteria are defined in Regulations SI 2000/928 and SI 2002/3043.

Table 5.1 - Relevant Local Air Quality Criteria

Pollutant	Criteria	Compliance Date	
		AQS Objectives	EU Limit Values
NO_2	Hourly average concentration should not exceed 200 µg/m^3 more than 18 times a	31 December 2005	1 January 2010

[1] Institute of Air Quality Management, Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance, January (2012)
[2] The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, Defra, July 2007

Pollutant	Criteria	Compliance Date	
		AQS Objectives	EU Limit Values
	year		
	Annual mean concentration should not exceed 40 µg/m^3	31 December 2005	1 January 2010
PM_{10}	24-hour mean concentration should not exceed 50 µg/m^3 more than 35 times a year	31 December 2004	1 January 2005
	Annual mean concentration should not exceed 40 µg/m^3	31 December 2004	1 January 2005
$PM_{2.5}$	UK (except Scotland): annual mean concentration should not exceed 25 µg/m^3	2020	-
	EU Stage 1 Limit Value: annual mean concentration should not exceed 25 µg/m^3	-	1 January 2015
	EU Stage 2 Limit Value: annual mean concentration should not exceed 20 µg/m^3*	-	1 January 2020
	Exposure Reduction: UK urban areas: target of 15% reduction in concentrations at urban background	Between 2010 and 2020	-
	Exposure Reduction: Target of 20% reduction	-	Between 2010 and 2020
Notes: * indicative EU Limit Value to be reviewed in 2013			

Ecological Limit Values

5.12 The EU has set limit values for the protection of vegetation for NO_x based on the work of the United Nations Economic Commission for Europe (UNECE) and World Health Organisation (WHO) and these limit values have been incorporated into the Air Quality Limit Value Regulations (SI 2001/2315).

5.13 The limit value for NO_x for the protection of vegetation is 30 µg/m^3 for the annual mean. This is the same as the AQS objective adopted by the UK Government. The limit values for the protection of vegetation apply to locations more than 20 kilometres from towns with more than 250,000 inhabitants or more than 5 kilometres from other built-up areas, industrial installations or motorways. As monitoring sites need to be representative of an area of 1000 square kilometres, the limit does not have a statutory basis in micro-scale environments such as those close to a road.

5.14 The UNECE and the WHO have set a critical level for NO_x for the protection of vegetation, therefore the Statutory Nature Conservation Agencies' (in England, English Nature) policy is to apply the 30 µg/m^3 criterion, on a precautionary basis, as a benchmark, in internationally designated conservation sites and SSSIs.

5.15 In addition, critical loads for nitrogen deposition have been set that represent (according to current knowledge) the exposure below which there should be no significant harmful effects on sensitive elements of the ecosystem.

Dust

5.16 There are no statutory quantitative controls or limits on general dust emissions from construction sites. Dust levels that are substantially elevated above the norm can cause annoyance. This commonly relates to increased rates of dust deposition on exposed surfaces and / or soiling (discolouration / contamination), although less commonly the term may relate to levels that are "prejudicial to health", including airborne dust.

5.17 The Statutory Nuisance provisions under the Environmental Protection Act 1990 require local authorities to detect and invoke action to prevent Statutory Nuisance from occurring. In the context of the proposed development, dust emissions from demolition and construction activities could potentially result in a Statutory Nuisance if not properly controlled. The defence against this is the use of 'Best Practicable Means' (BPM) to mitigate and control dust emissions. In practical terms, application of BPM essentially means the managed, diligent application of 'best practice' techniques to minimise emissions in the context of the receiving environment, changing conditions and cost.

Local Air Quality Management

5.18 All local authorities are required by Part IV of the Environment Act 1995 to review air quality in their area and to assess present and likely future air quality against objectives set out in the Government's Air Quality Strategy (AQS). Where a local authority anticipates non-compliance with one or more AQS objective it must designate an Air Quality Management Area (AQMA) and develop an action plan to reduce pollution levels.

5.19 The Elmbridge Transport Scheme lies within the local authority areas of Gloucester City Council (GCC), Tewkesbury Borough Council (TBC) and Cheltenham Borough Council (CBC). Elmbridge Court Roundabout to the west of the Scheme is within GCC's local area, the proposed Park and Ride site is located within TBC's local area, while the connecting A40 lies in all three local areas.

5.20 GCC has declared three AQMAs. These AQMAs are located in Barton Street, Priory Road and Painswick Road, and are all over 3 km to the west of the Scheme area:

- Barton Street AQMA – an area encompassing the properties fronting on both side of Barton Street, designated for NO_2. This area is located approximately 3.5 km south west of the proposed Park & Ride site.
- Priory Road AQMA - The designated area incorporates St Oswalds Road from the railway bridge to Mount Street, the houses known as nos. 46-72 Priory Road and Priory Road for a distance of 50m from its junction with St Oswalds Road, designated for NO_2. This area is located approximately 3.5 km south west of the proposed Park & Ride site.
- Painswick AQMA – an area encompassing properties fronting the B4073 (Painswick Road), close to the roundabout junction with the A38, designated for NO_2. This area is located approximately 3.8 km south west of the proposed Park & Ride site.

5.21 TBC has currently declared one AQMA (Tewkesbury Town Centre) approximately 10 km to the north of the Scheme area, while CBC has declared its entire borough an AQMA. Both of these AQMAs have been designated for NO_2.

5.22 The Elmbridge Court Roundabout and the proposed Park and Ride site are not located within any of the AQMAs, although the road to which they connect (the A40) would pass into the Cheltenham AQMA. The A40 Arle Court and Westal Green Bus Lanes are also both located within the Cheltenham AQMA. All the other declared AQMAs are unlikely to be affected, as they are not in direct proximity to the Scheme or any of the connecting roads.

Air Quality Monitoring

5.23 Measurements of pollutant concentrations can be made by deploying analytical instruments that measure continuously and record average concentrations over specified time intervals. Simpler sampling devices, such as diffusion tubes, react with pollutants over a longer time period and are subsequently analysed at a laboratory to given an average concentration for the sampling period. National survey results from both types of monitoring are published on Defra's UK-Airwebsite[3].

5.24 Defra funds a network of automated continuous monitoring sites throughout the UK. The closest sites in the network are located in Bristol and Bath, both some distance from the proposed Park & Ride at Elmbridge and not considered relevant to the present study. GCC operates a continuous monitor within its Barton Street AQMA adjacent to the inner ring road. The AQS objective was exceeded at this site in both 2010 and 2011 with average NO_2 concentrations of 46 µg/m^3 and 44 µg/m^3, respectively.

5.25 TBC operated one continuous monitor in the AQMA which ceased in March 2010, the results of which are not considered relevant to this study.

5.26 CBC operated an urban background monitoring site until 2009, which showed that concentrations were below AQS objectives. In August 2011, CBC began monitoring at a roadside site at the junction of Swindon Road and St. George's Street. The average NO_2 concentration for the period August to December 2011 was 36 µg/m^3. This was adjusted to give a full annual mean of 35 µg/m^3, which was below the AQS objective. This site is over 1 km to the north east of the Westal Green bus lanes.

5.27 NO_2 can also be monitored passively using diffusion tubes. TBC, GCC and CBC all measure NO_2 in this way at a number of sites within their boroughs. The results of monitoring undertaken at the sites closest to the proposed scheme are presented in **Table 5.2** below. These sites are shown on the constraints map in **Figure 5.1**.

5.28 Annual mean concentrations were below the AQS objective in 2007 to 2011 at all the TBC sites, and at all but one of the CBC sites (CBC 21 in 2010). Roadside concentrations are approximately double those at background sites, with two of the roadside sites within GCC listed below exceeding the nitrogen dioxide annual mean objective. These two roadside sites (GCC8 and GCC26) are located in Barnwood Road, a busy urban A-road, located approximately 2.2 km south-east of the proposed Park and Ride site. There were no exceedances at any of these sites in 2011.

Table 5.2 – Bias Adjusted Annual Mean Nitrogen Dioxide Concentrations (µg/m^3)

Site	Type	2007	2008	2009	2010	2011
TBC						
TBC15 Comus Bamfurlong	Roadside	37.7	38.1	36.8	28.7	31.1
TBC11 3 Stocken Close	Urban	26.1	21.2	22.1	-	-
TBC 12 Windrush Belmont Ave	Urban	34.6	29.5	29.2	26.2	24.9
TBC14 69 Sussex Gardens	Urban	34.6	29.2	29.4	27.1	25.4
GCC						
GCC1 Elmbridge Junior School	Urban Background	18.0	21.2	19.1	19.9	21.7

[3] http://uk-air.defra.gov.uk/

GCC 2 Gloucester Guildhall	Urban Background	18.6	21.6	21.5	22.2	20.1
GCC3 79 Millbrook Street	Roadside	31.5	36.0	35.0	32.4	29.2
GCC8 53 Barnwood Road	Roadside	31.0	38.3	**40.6**	39.1	37.3
GCC9 35 Buscombe Gardens	Background	26.4	33.7	31.4	29.9	29.0
GCC26 61 Barnwood Road	Roadside	33.7	**45.0**	**42.5**	**43.0**	38.2
CBC						
CBC (7) 338 Gloucester Road	Roadside	-	-	-	-	37.3
CBC(12) Telstar Road	Kerbside	-	-	-	36.5	33.9
CBC(13) Miserden Road	Roadside	32.9	31.3	28.5	32.7	28.2
CBC(17) P.E. Way Roundabout	Roadside	32.0	30.0	29.3	30.4	28.3
CBC (18) Westal Green	Roadside	35.2	31.6	33.9	35.8	30.3
CBC (21) 340 Gloucester Road	Roadside	-	-	-	**44.5**	39.7

Note: Bold Text indicates an exceedance of the AQS Objective of 40 µg/m^3

Background Concentrations

5.29 Background pollutant concentrations for NO_x, NO_2, PM_{10} and $PM_{2.5}$ are published on the UK Air Quality Archive website for every 1 x 1 km grid square covering the UK. These data are based on the extrapolation and interpolation of empirical measurements and modelled dispersion of road and industrial sources. In each grid square the background concentrations are made up of contributions from the different source sectors (roads, industry and so on) within and surrounding the cell.

5.30 Background concentrations for the base year, 2010, for the grid squares in which the proposed Park & Ride site lies are presented in **Table 5.3**. The NO_2 background concentrations are slightly lower than the concentrations measured at diffusion tubes at the background sites (GCC1 and GCC2) in Gloucester.

Table 5.3 - 2010 Annual Mean Background Concentrations (µg/m^3)

Grid Reference	NOx	NO_2	PM_{10}	$PM_{2.5}$
386500, 220500	24.3	17.0	15.6	10.7
386500, 219500	28.9	19.5	15.6	10.9
Average	26.6	18.3	15.6	10.8

Summary

5.31 Air quality monitoring data for the area around the proposed scheme has been reviewed. Although the three local authorities have all declared AQMAs as a result of exceedances of NO_2 AQS objectives, the proposed scheme is, however, over two kilometres away from all these AQMAs with the exception of Cheltenham, which has declared its entire borough an AQMA. Monitoring data at the nearest diffusion tube sites to the scheme shows higher concentrations at the kerbside and roadside sites, as would be expected. Exceedances of the annual mean

objective for nitrogen dioxide were recorded at 2 roadside locations within GCC and 1 roadside location within CBC, although there were no exceedances at any site in 2011. There were no exceedances within TBC in any year. Mapped background concentrations suggest that there are unlikely to be exceedances of AQS objectives in the immediate vicinity of the Park and Ride site.

Potential Impacts

Construction

5.32 During construction, local air quality could potentially be affected by the following:

- Dust emissions arising from any dust raising activities on site;
- Emissions from any plant on site; and,
- Emissions from the changes in numbers of construction vehicles (both heavy duty vehicles and construction workers) travelling to and from the construction site, and from any traffic management measures on the A40.

5.33 It should be noted that any effect during construction would be of a temporary nature only.

5.34 There are some residential properties in Yew Tree Way, Grove Road, and Cheltenham Road East, to the north-east of the Park and Ride site, which could potentially be affected by dust, as they are within 350m of the project site boundary, and would need to be considered in the EIA.

5.35 In addition, there are properties to the west of Elmbridge Court Junction, and on the A40 where the bus lanes would be implemented. There would also be properties within 200m of roads potentially affected by traffic changes during construction.

5.36 It is unlikely that there would be significant effects from dust during the implementation of the signing improvements.

Operation

5.37 Once the scheme is complete and operational, air quality could be affected by any changes in vehicle activity (flows, speeds and composition) travelling to and from the Park and Ride site, from changes to Elmbridge Court junction, and the bus priority schemes on the A40. Air quality could also be affected by any changes to the distance between sources of emissions and sensitive receptors with these schemes.

5.38 There are a small number of properties within 200 m to the north-east of the Park and Ride site in Yew Tree Way which could be affected by changes in traffic emissions. In addition, there are properties to the west of Elmbridge Court Junction, and there are many properties within 200 m of the A40. There would also be properties within 200 m of roads affected by traffic changes as a result of the scheme.

5.39 Properties would not be affected by changes in air quality resulting from the signing improvements.

Potential Mitigation Measures

5.40 Mitigation measures to control dust during construction will be specified within contract documentation and incorporated into a CEMP. The precise measures will depend on the intended operations and the degree of severity of the dust issue. Such measures may include but not necessarily be limited to:

- Regular water-spraying and sweeping of unpaved and paved roads to minimise dust and remove mud and debris;

- Using wheel washes, shaker bars or rotating bristles for vehicles leaving the site where appropriate to minimise the amount of mud and debris deposited on the roads;
- Sheeting vehicles carrying dusty materials to prevent materials being blown from the vehicles whilst travelling;
- Enforcing speed limits for vehicles on unmade surfaces to minimise dust entrainment and dispersion;
- Ensuring any temporary site roads are no wider than necessary to minimise surface area;
- Dampening down of surfaces prior to their being worked; and
- Storing dusty materials away from site boundaries and in appropriate containment (e.g. sheeting, sacks, barrels etc).

5.41 The scope for mitigating adverse effects on air quality during operation is limited compared with the reductions in emissions achievable through improved vehicle technology and more stringent emission control legislation.

Assessment Methodology

5.42 The assessment will consist of the following tasks:

- A discussion of existing baseline conditions
- An assessment of the impacts from construction
- An assessment of the impacts during operation including assessment of ecologically designated sites if required
- A calculation of the total change in emissions that will result from the scheme

Existing Conditions

5.43 The findings provided in this scoping report will be reviewed and updated as necessary.

Construction

5.44 A qualitative assessment of the impacts of nuisance dust arising during the construction of the development would be undertaken, adopting guidance produced by the Institute of Air Quality Management[1]. The assessment would identify residential and other sensitive properties that could be at risk of being affected. It would consider the activities to be carried out and their duration.

5.45 Construction traffic would be assessed quantitatively (if sufficient data are available) using the screening method outlined in Volume 11, Section 3, Part 1 of the Highways Agency's DMRB[4], and the associated DMRB Screening Tool (Annex C & D of DMRB 11:3:1 and available at http://www.dft.gov.uk/ha/standards/tech_info/index.htm). The findings of the assessment would be assessed with reference to EPUK's guidance[5].

Operation

5.46 The Highways Agency's Design Manual for Roads and Bridges (DMRB) Chapter 11.3.1 (Air Quality) provides criteria for identifying whether an assessment of the effect of a road scheme on air quality is required. The criteria are:

- Road alignment changes by five metres or more;

[4] Highways Agency (May 2007)
[5] Development Control: Planning for Air Quality (2010 Update) EPUK, April 2010

- Daily traffic flows change by 1,000 annual average daily traffic (AADT) or more;
- Heavy Duty Vehicle (HDV) flows change by 200 AADT or more;
- Daily average speed change of 10 kph or more; or
- Peak hour speed change of 20 kph or more.

5.47 The DMRB criteria for defining "affected" roads should be applied to the findings of the traffic assessment. According to the DMRB guidance, there may be a change in air quality within 200 metres of roads affected by a scheme or development. The changes in air quality may affect residential properties, other sensitive receptors (schools, hospitals, elderly care homes), and designated ecological sites within 200 metres of affected roads.

5.48 Traffic data to inform this Scoping Report has been provided by Atkins Highways and Transportation. The data has been converted to two way flows and the change with the scheme in speed, flow and percentage HDV was calculated across the network. **Figure 5.1** shows the affected road network (ARN) as determined by applying the change criteria listed above. The road sections highlighted are expected to have traffic changes requiring assessment within the EIA. These road sections include the A 40, A 417, B 4063 and B 4634. A *Detailed* level of assessment using the ADMS Roads dispersion model will be undertaken to determine the potential effects on NO_2 and PM_{10} concentrations at selected sensitive receptors (locations of relevant public exposure and designated ecological receptors); in particular, comparisons will be made of modelled concentrations with the air quality criteria for the these pollutants.

The reasons for adopting a *Detailed* rather than *Simple* approach are in keeping with the DMRB guidance and include:

- the current set of vehicle emission factors are implemented in Defra's Emission Factor Toolkit (EFT) version 4.2.2 (November 2010)[6] but not the current release of the DMRB screening model, which incorporates factors that have been superseded; and
- There are baseline exceedances of criteria within existing AQMAs which could be affected by the proposed development.

5.49 To provide some validation of the modelled concentrations, a comparison of estimated and measured concentrations will be undertaken. Verification will be undertaken for a base year, using the principles laid out in Defra's Technical Guidance. Additional receptor points will be included to represent the location of any diffusion tube monitoring sites within 200 metres of the affected road network.

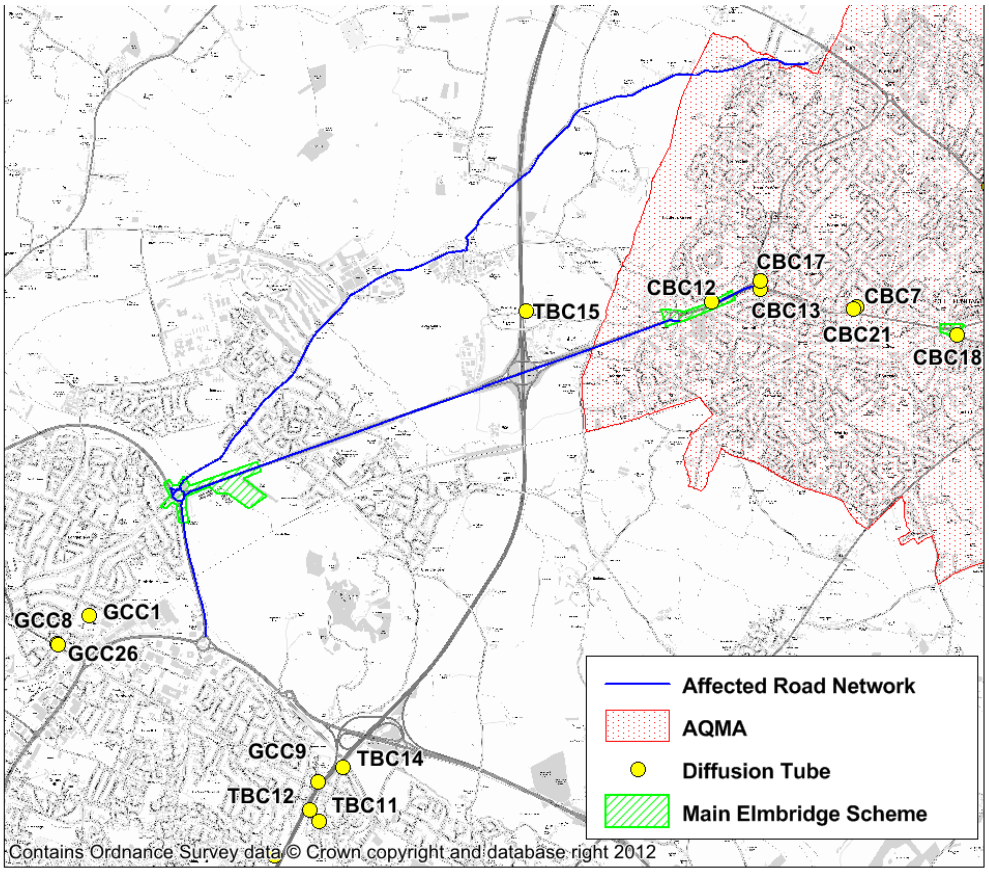
5.50 In addition, a sensitivity test will be undertaken in accordance with Defra guidance, to account for variations in future year NO_2 predictions.

5.51 There are no ecologically designated sites within 200m of the current ARN. Should the extent of the ARN alter before the EIA, the effects of air pollutants on any ecological designated site within 200 m of an affected link, will be assessed in accordance with Annex F in Volume 11, Section 3, Part 1 of the Highways Agency's DMRB.

5.52 Regional pollutant and carbon emissions from the entire road network associated with the scheme would be calculated using annual average traffic flow, speed, proportion of HDVs, and emission rates. Emissions would be calculated for an existing case (2008) and with and without the Preferred Scheme in the opening year (2016) and the design year.

[6] http://www.defra.gov.uk/environment/quality/air/airquality/local/support/index.htm

Figure 5.1 – Affected Road Network



Conclusions

5.53 Although the three local authorities that encompass the Scheme have all declared AQMAs, the Scheme is only likely to affect the Cheltenham Borough AQMA, as this includes the A40 and B4634 at its eastern extent. The closest NO_2 diffusion tube sites to the scheme have recorded concentrations below the AQS objective in the most recent years of monitoring, although at roadside locations in Cheltenham and Gloucester there have been some exceedances. Air quality in the area of the Park and Ride site is likely to be relatively good.

5.54 During construction there may be dust raising activities which if not effectively mitigated, may affect nearby sensitive properties. The proposed scheme may have an effect on local air quality as a result of changes in traffic flows both during construction and when complete.

6. Health Impact

Introduction

6.1 This chapter comprises a Health Impact Assessment (HIA) Screening for the proposed Elmbridge Park and Ride and the Elmbridge Court Roundabout improvements. The purpose of the screening is to determine whether health impact should be included in the scope of the EIA. This HIA Screening considers the possible impacts on public health from the construction and operation of the proposed P&R, the Elmbridge Court Roundabout improvements and the bus priority measures. Consideration has also been given to changes in traffic flow, speed and composition on the existing roads due to these improvements.

6.2 Screening is the first step in HIA. In the HIA context, screening means making a quick map of whether there are potential linkages between the proposed scheme and health, and what different aspects of health it might affect. This is done on the basis of informed opinion and the evidence already available (see **Table 6.1**). Screening also needs to establish whether disproportionate impacts on health of any vulnerable or disadvantaged groups (see **Table 6.2**) in the population are likely.

6.3 If screening indicates a negligible potential health impact, either positive or negative, or if the resulting health impact is well known, this is reported in the screening report and the report made available for appraisal by the decision-makers and those affected by the proposed scheme.

6.4 If however, screening indicates that more information is needed, then the scope of this further action has to be decided[7].

Potential linkages

6.5 An analysis focused on the identification of potential links between the proposed scheme and health, including both health determinants and outcomes, has been undertaken as demonstrated in **Table 6.1**. This analysis has informed the identification of potential impacts of the proposed scheme.

Table 6.1 – Health Determinants of Relevance to a Transport Scheme

Determinants	Explanation and health outcomes
Accessibility to transport options	Accessible and affordable transport, enabling good access to education, employment, fresh food, friends and family, leisure and health services, enhances general physical health. There is a link between access to a car and improved health through such factors as improved access to essential services and health promoting amenities, reflection of socio-economic status and raised self-esteem. However, a proportion of those who are at most risk of social exclusion have no access to cars. A more sustainable transport alternative is the provision of good access to reliable, efficient and affordable public transport.
Risk of injuries and deaths	Road trauma is a leading cause of mortality across all age groups. Reducing the impact of road trauma has been a great public health success in the past 20 years, however vehicle crashes and collisions still produce a great deal of avoidable death and disability. Road users at highest risk of being killed or seriously injured are cyclists and pedestrians. The most commonly cited cause of a road crash is speed.

[7] Health Impact Assessment: main concepts and suggested approach Gothenburg consensus paper, December 1999

Determinants	Explanation and health outcomes
Active travel	Walking and cycling are physically active forms of transport. A supportive environment for physical activity is a decisive factor in stimulating its uptake. High quality new footway / cycleways and appropriate modern and safe crossing points promote active travel. Physically active transport may lead to increases in overall levels of physical activity. On the other hand, car dependence may be linked with a sedentary lifestyle and lack of physical activity which can contribute to or be a risk factor for many preventable health conditions, including cardiovascular disease, obesity, osteoporosis and depression.
Access to green space & land blight	Access to green space opportunities aid healthy activity and should be integral to people's daily lives particularly close to where they live. Land blight caused by roads and other transport infrastructure reduces enjoyment and discourages active recreation. Accessibility can be negatively affected as a result of the barrier effect (physical and social) caused by roads. The physical barrier effect may concern accessibility and safety and the social barrier effect may concern changed transport routes and social contacts.
Air pollution	The pollutants most associated with traffic are small particles (PM), nitrogen dioxide (NO_2), carbon monoxide (CO) and toxicants such as benzene. Increased outdoor air pollution is associated with increased cardio-respiratory mortality and morbidity. Some effects are more or less immediate and affect vulnerable groups (e.g. children, people whose health is already impaired) in particular, whereas the effects of long-term exposure are more widespread. PMs are the constituent most closely associated with adverse health outcomes. Some evidence shows that PMs from traffic are more toxic (per unit mass) than PM from other sources.
Noise pollution and vibration	Motorised forms of transport are a common source of noise pollution, with road traffic being the most common. Noise pollution at the levels generated by traffic can lead to serious annoyance, interference with speech and sleep disturbance. Stress has been suggested as a possible mechanism through which noise may affect mental and physical health. Evidence suggests noise pollution may limit children's learning. Vibrations can give rise to stress reactions and other stressful feelings.
Soil and water pollution	Particles from car tyres, brake linings and road surfaces contribute to the spread of hazardous substances, such as metals in the environment, and can threaten human health. Oil and vehicle fuel also contain harmful organic substances. Land use, e.g. when building a road, can bring about changes in groundwater levels and pollute nearby water bodies.
Quality of life	Noise pollution generated by transport can lead to stress. Where public transport passengers feel 'overcrowded' this may lead to stress but the perceptions of overcrowding and related stress may be mediated by feelings of safety and control. Traffic jams can be a source of stress for transport users. For low income families, dependency on walking as a primary form of transport can impact on their time for other recreational activity and may add to psycho-social stress. Increased levels of physical activity may have a positive effect on mental health. Transport schemes may lead to loss of green space and have negative aesthetic impact on the local amenity.
Personal safety and perceptions of safety	Streets dominated by motorised vehicles with reduced numbers of people on the streets may create a social environment that is conducive to increased crime, which then discourages more people from walking, in particular women and children.

Determinants	Explanation and health outcomes
	Fear of crime is an important factor influencing travel choices. Women's fear is greater than men's, and women are more likely to avoid using public transport as a result. Personal safety concerns may also affect decisions to walk or cycle.
Social interaction and community severance	There is an observed relationship between positive social capital and health. Good transport planning, promoting a less-car dominated environment, can enhance social capital by increasing the number of people walking or cycling on the streets and making the streets a place of social interaction. Community severance results from the divisive effects of major roads & railways running through an existing community.
Climate change	Greenhouse gases (GHG) from transport contribute to climate change. Climate change consequences are likely to affect the health of the population, particularly with an increase in flooding, summer temperature, levels of solar radiation and frequency of extreme weather events leading to increased levels of fatalities, injury, infectious diseases, heat related deaths, skin cancer cases and cataracts.

Vulnerable groups

6.6 Priority groups of people which need to be considered in the HIA process for transport schemes have also been identified. This includes vulnerable social groups and other target groups. Vulnerable social groups are likely to be more susceptible to the scheme's impacts than other social groups due to various factors as explained in **Table 6.2**. Other wider target groups include adults and professionals and the entire population (see **Table 6.3**).

Table 6.2 – Vulnerable Social Groups

Vulnerable Group	Explanation
Children and adolescents	Children and adolescents constitute a vulnerable population group due partly to their need to be able to move around freely to and from school and recreational activities, whilst they lack the experience and judgement displayed by adults when moving around in traffic and public spaces. Furthermore, children are more sensitive than adults to air pollution, noise and other environmental factors. A particularly susceptible group is children in low-income families.
Women	Women who are more likely not to own a car and find it harder to travel to shops, employment, healthcare and other services. They are more reliant on the provision of good public transport
Older people	Generally speaking, the older they are, the slower their movement and reactions and the poorer their hearing. They may feel vulnerable using public transport. They also often need to seek health services and they are particularly vulnerable to road crash related injuries. Their continuing independence at home is often dependent on reliable transport options.
Disabled and people with other health problems	This group may not be able to access many forms of transport or need special arrangements to access those. They are likely to find it difficult to walk and may also be disadvantaged by the cost of transport. Chronically ill persons, for example people with impaired lung function, are more adversely affected by air pollution. The same is true of hypersensitive individuals such as asthmatics. Noise can cause hypertension and cardio-vascular problems. Those who already have these symptoms can be more troubled by noise than others.
Those in low-income groups/ People without access to a car	These people are likely to walk further because they cannot afford public transport or to own a car, and whose lack of transport options may limit life opportunities. They suffer the most from injuries, noise pollution and air pollution.

Table 6.3 – Other Target Groups

Target Group	Explanation and health outcomes
Adults/professional	This social group needs easily accessible and safe communications to and from home/work as well as easily accessible recreational areas.
Entire population	The overall impacts of the scheme on local people (those living near the proposed route) and users of the scheme during the implementation will also need to be assessed.

Screening checklist

6.7 Checklists are commonly used methods to screen for potential health impacts. The checklist questions[8] used to determine whether an HIA is required for the scheme are as follows:

- Is the proposed development likely to have significant direct impacts (positive or negative) on health and wellbeing?
- Is the proposed development likely to have significant impacts (negative or positive) on social, economic and environmental living conditions that would indirectly affect health and wellbeing?
- Is the proposed development likely to have a significant impact (negative or positive) on an individual's ability to maintain or improve their own health and wellbeing (i.e. easily live a healthy lifestyle)?
- Is the proposed development likely to cause a significant change in demand for or access to health and social care services?
- Is the proposed development likely to have a significant and/or a disproportionate impact on any vulnerable or disadvantaged groups in the population?

6.8 The results of the screening exercise against the identified health determinants are reported in **Table 6.4**.

[8] The checklist questions are taken from 'Policy Advice Note (draft) the Health Impact of Development', NHS Bristol, Bristol City Council, January 201

Table 6.4 – Screening Checklist

Health determinants	Is the proposed development likely to have **significant direct impacts** (positive or negative) on health and wellbeing?	Is the proposed development likely to have **significant impacts** (negative or positive) on social, economic and environmental living conditions that would **indirectly affect health and wellbeing**?	Is the proposed development likely to have a **significant impact** (negative or positive) on an **individual's ability to maintain or improve their own health and wellbeing** (i.e. easily live a healthy lifestyle)?	Is the proposed development likely to cause a **significant** change in demand for or **access to health and social care services**?	Is the proposed development likely to have a **significant and/or a disproportionate** impact on any **vulnerable or disadvantaged groups** in the population?
Accessibility to transport options	Positive impact anticipated as the P&R scheme, changes to Elmbridge Court Roundabout and the bus priority measures will help improve bus service reliability and frequency, making this transport option more convenient and desirable. Gloucestershire Royal Hospital is one of the destinations which will be provided by the bus service and therefore improved access is likely to result in improved health for those needing to access the hospital. Impacts are deemed **positive but non-significant**, as the scheme directly improves access but resulting health benefits are indirect.	Positive impact anticipated as the scheme will help improve bus service reliability and frequency, as well as giving bus users access to a wider range of destinations, including Kingsholm rugby stadium (match days); Gloucester Quays (a major retail, employment and further education centre); Quedgeley employment area; Gloucester Business Park; Barnwood Business Park; Eastern Avenue employment area; large scale government office area (GCHQ); Cheltenham railway station; and Cheltenham town centre. Potentially residents in Churchdown would be able to cycle into the P&R and then take a bus from there. Contributing to the provision of good access to a range of facilities can have indirect positive impacts on public health. Impacts are deemed **positive**, but **non-significant** due to indirect link with public health.	No impact anticipated.	The scheme will improve access to Gloucestershire Royal Hospital, which will be one of the destinations provided by the bus service and may lead to an increase in demand for health services. An improvement in access is a **significant positive** change..	Positive impact anticipated as the scheme will contribute towards improving bus service reliability and frequency, as well as giving bus users a wider range of options when travelling between Cheltenham and Gloucester. Bus priority measures will result in reliability benefits to both existing and proposed bus services. As bus services tend to attract passengers disproportionately from low income groups/ people without access to a car, women, older people and disabled and people with other health problems, it can be considered that the Wider Scheme is likely to deliver **significant positive** impacts on these vulnerable groups.
Risk of injuries and deaths	Improving safety, in particular at the Elmbridge Court Roundabout, is one of the aims of the Scheme. Impacts at the Elmbridge Court Roundabout are likely to be **significant positive** in	No impact anticipated.	Increased safety and security will help people to avoid risks of damaging their health but the P&R itself is **unlikely to have a significant impact.**	Reduced casualty rates may lead to a decrease in demand for health and social care services but the P&R itself is unlikely to cause a significant change in demand for	Vulnerable groups that are most likely to benefit from the safety improvements are those without access to a car (including cyclists and pedestrians), children and older people. Impacts are

Health determinants	Is the proposed development likely to have **significant direct impacts** (positive or negative) on health and wellbeing?	Is the proposed development likely to have **significant impacts** (negative or positive) on social, economic and environmental living conditions that would **indirectly affect health and wellbeing**?	Is the proposed development likely to have a **significant impact** (negative or positive) on an **individual's ability to maintain or improve their own health and wellbeing** (i.e. easily live a healthy lifestyle)?	Is the proposed development likely to cause a **significant** change in demand for or **access to health and social care services**?	Is the proposed development likely to have a **significant and/or a disproportionate** impact on any **vulnerable or disadvantaged groups** in the population?
	terms of casualty reduction, as they prevent deaths. There may also be some benefits, as a result of mode switch due to the P&R and hence a reduction in urban road traffic.			or access to health and social care services.	deemed **significant positive**.
Active travel	No impact anticipated.	Potentially a dedicated cycle route would connect Churchdown with the P&R. The P&R will also include the provision of cycle shelters. There is the potential for a reduction in levels of private vehicles, due to modal shift to buses and bicycles. The impact in terms of active travel (by bicycle / foot) is likely to be **positive but non-significant**.	Potentially a dedicated cycle route would connect Churchdown with the P&R. The P&R will also include the provision of cycle shelters. This will encourage the P&R users and local residents to cycle. The impact in terms of active travel (by bicycle / foot) is likely to be **positive but non-significant**.	An increase in active travel and a shift away from sedentary lifestyles may help reduce the demand for health care services in the longer term for the population in the vicinity of the P&R. This is unlikely to cause a significant change in demand for or access to health services given the small population size.	No impact anticipated.
Access to green space & land blight	No impact anticipated.	The proposed P&R, some of the changes to Elmbridge Court Roundabout and part of the bus priority measures will be developed on Greenfield land; however, this land, which includes a PRoW, does not appear to be currently used for recreational purposes. Therefore, impacts are deemed **neutral**.	The proposed P&R, some of the changes to Elmbridge Court Roundabout and part of the bus priority measures will be developed on Greenfield land; however, this land does not appear to be currently used for recreational purposes. Therefore, impacts are	No impact anticipated.	No impact anticipated.

Health determinants	Is the proposed development likely to have **significant direct impacts** (positive or negative) on health and wellbeing?	Is the proposed development likely to have **significant impacts** (negative or positive) on social, economic and environmental living conditions that would **indirectly affect health and wellbeing**?	Is the proposed development likely to have a **significant impact** (negative or positive) on an **individual's ability to maintain or improve their own health and wellbeing** (i.e. easily live a healthy lifestyle)?	Is the proposed development likely to cause a **significant** change in demand for or **access to health and social care services**?	Is the proposed development likely to have a **significant and/or a disproportionate** impact on any **vulnerable or disadvantaged groups** in the population?
			deemed **neutral**.		
Air pollution	The scheme has been identified as having little impact upon air quality with a negligible impact on pollutant concentrations in the Environmental Assessment Working Paper report. Therefore, effects on public health are deemed **neutral**.	No impact anticipated.	The scheme will not constrain individual's ability to maintain good health. No impact anticipated.	No impact anticipated.	No impact anticipated.
Noise pollution and vibration	The Environmental Assessment Working Paper report indicated that construction activities may have the potential to have negative noise impacts on the nearby receptors. The operational noise impacts of the scheme are predicted to be moderate at the Elmbridge Court Business Park and negligible at all other noise sensitive receptors. r Overall impacts are **deemed negative** but **not significant**, as construction and operational noise will be assessed and appropriate mitigation measures and best practice techniques will be recommended in order to minimise potential impacts. Provision of additional	No impact anticipated.	The P&R, the changes to Elmbridge Court Roundabout and the bus priority measures will not constrain individual's ability to maintain good health. No impact anticipated.	No impact anticipated.	Elmbridge Court Business Park is the nearest receptor. However, office workers do not constitute a vulnerable group in HIA. The nearest residential properties at Chosen Drive are about 300m away and school in Churchdown is more than 850m away. Therefore, **significant or disproportionate impacts are not anticipated.**

Health determinants	Is the proposed development likely to have **significant direct impacts** (positive or negative) on health and wellbeing?	Is the proposed development likely to have **significant impacts** (negative or positive) on social, economic and environmental living conditions that would **indirectly affect health and wellbeing**?	Is the proposed development likely to have a **significant impact** (negative or positive) on an **individual's ability to maintain or improve their own health and wellbeing** (i.e. easily live a healthy lifestyle)?	Is the proposed development likely to cause a **significant** change in demand for or **access to health and social care services**?	Is the proposed development likely to have a **significant and/or a disproportionate** impact on any **vulnerable or disadvantaged groups** in the population?
	insulation may need to be considered for the Elmbridge Court Business Park if residual impacts are identified in the EIA.				
Soil and water pollution	No impact anticipated.	Environment Agency indicated that the small watercourse on the southern boundary is a vulnerable receptor for run-off from the site. As advised by Environment Agency any direct discharges of surface run off to controlled watercourses should pass through an interceptor system before discharge to a SUDS/controlled waters. This will provide a pollution fail safe should a bus oil/fuel whilst parked or waiting for passengers. EIA will have to set out mitigation measures to ensure greenfield run off rates are not exceeded following completion of the proposed development and risk of water pollution is prevented. Potential **negative** impacts are deemed **non significant**, as mitigation measures will be set out, and the site does not lie within a source protection zone. It is also classified as non aquifer. Therefore, provided that water quality issues are covered in the EIA process, they can be screened out from HIA.	No anticipated impact.	No impact anticipated.	No impact anticipated.

Health determinants	Is the proposed development likely to have **significant direct impacts** (positive or negative) on health and wellbeing?	Is the proposed development likely to have **significant impacts** (negative or positive) on social, economic and environmental living conditions that would **indirectly affect health and wellbeing**?	Is the proposed development likely to have a **significant impact** (negative or positive) on an **individual's ability to maintain or improve their own health and wellbeing** (i.e. easily live a healthy lifestyle)?	Is the proposed development likely to cause a **significant** change in demand for or **access to health and social care services**?	Is the proposed development likely to have a **significant and/or a disproportionate** impact on any **vulnerable or disadvantaged groups** in the population?
Quality of life	No impact anticipated.	Individual residential properties within Churchdown and public rights of way users may experience some adverse impacts due to land take, construction and increased traffic flows in the P&R vicinity. However, these can be mitigated to the level when the impacts can be considered minor/neutral. The Elmbridge Court Roundabout changes are expected to reduce congestion levels and provide safety benefits. The bus priority measures are also designed to reduce congestion. The Scheme will generate wider benefits with reduced traffic entering the city, and more reliable provision of public service with a wide range of destinations. Therefore, overall effects of the scheme can be considered **positive non-significant**.	Overall the scheme does not prevent individual's ability to maintain their health. Potential localised negative effects considered **minor/neutral** and can be mitigated therefore **non-significant.**	No impact anticipated.	No impact anticipated.
Personal safety and perceptions of safety	Safety and security are improved, through a reduction in accidents at the Elmbridge Court Roundabout and lighting / CCTV coverage at the P&R. The removal of trees to accommodate a bus lane at Arle Court should improve personal safety for cyclists and pedestrians. Impacts are deemed **significant positive**.	Perception of safety may also be improved through an increased presence of cyclists and pedestrians. Impacts are deemed **positive but non-significant**.	Increased safety and security will help people avoid risks of damaging their health. Impacts are deemed **minor positive**.	Reduction in accidents and improvement of perception of safety may help reduce the demand for health and social care services. Impacts are deemed **minor positive**.	Increased safety and security will in particular benefit such vulnerable groups as children, women, older people and disabled and people with other health problems. Impacts are deemed **significant positive**.

Health determinants	Is the proposed development likely to have **significant direct impacts** (positive or negative) on health and wellbeing?	Is the proposed development likely to have **significant impacts** (negative or positive) on social, economic and environmental living conditions that would **indirectly affect health and wellbeing**?	Is the proposed development likely to have a **significant impact** (negative or positive) on an **individual's ability to maintain or improve their own health and wellbeing** (i.e. easily live a healthy lifestyle)?	Is the proposed development likely to cause a **significant** change in demand for or **access to health and social care services**?	Is the proposed development likely to have a **significant and/or a disproportionate** impact on any **vulnerable or disadvantaged groups** in the population?
Social interaction and community severance	No impact anticipated.	The scheme is anticipated to have, at best, a **minor positive non-significant** impact on community severance through a minor reduction in background traffic flows on affected radial routes into Cheltenham (A40) and Gloucester (B4063).	No impact anticipated.	No impact anticipated.	No impact anticipated.
Climate change	No impact anticipated.	Benefits in terms of carbon reduction will result from reduced traffic volumes as a result of increased P&R and bus patronage. Given the potential for buses and coaches to reduce carbon emissions per passenger by up to 88%, the proposed P&R should deliver benefits through promoting modal shift from the car to the bus; and also enabling the use of bicycles to complete local journeys. Implications for public health as a result of changes of this health determinant due to the P&R implementation are likely to be **minor positive and therefore non-significant**. This is due to the global nature of this determinant and complexity of links between climate change and health and time lag in both climate change consequences and health impacts being manifested.	No impact anticipated.	No impact anticipated.	No impact anticipated.

Conclusions

6.9 The HIA Screening considered the possible impacts on public health from the construction and operation of the proposed P&R scheme, the Elmbridge Court Roundabout improvements and the A40 bus priority measures. This has been carried out by answering the HIA screening checklist questions in relation to the identified health determinants and by specifically considering impacts on the HIA vulnerable groups.

6.10 It has been established that the P&R scheme, the Elmbridge Court Roundabout improvements and the bus priority measures are likely to result in a number of direct and indirect positive impacts on public health across all health determinants. Impacts on casualty reduction have been deemed positive, as deaths for all social groups, including vulnerable groups, will be prevented. Impacts in terms of providing accessibility to transport options are also positive in relation to vulnerable groups, as bus services tend to disproportionately attract passengers that belong to HIA vulnerable groups (e.g. low-income groups, people without access to a car, etc). Further, improved personal safety and perceptions of safety are likely to deliver positive impacts on both the total population (i.e. local residents and Scheme's users) and the HIA vulnerable groups such as children, women, older people, disabled people and people with other health problems.

6.11 Potential negative impacts have been identified in relation to the health determinant on soil and water pollution due the presence of a small watercourse on the southern boundary which is a vulnerable receptor for run-off from the site. However, these impacts are deemed non-significant, as they can be adequately mitigated through the EIA process. Similarly, potential negative non-significant impacts are likely to arise in relation to the health determinant on noise, but they will also be considered and adequately mitigated through the EIA process. It is proposed that the provision of additional insulation may need to be considered for the Elmbridge Court Business Park if residual noise impacts are identified in the EIA.

6.12 It is concluded that health impact identified in this chapter will be incorporated into the Traffic and Access, Noise and Water Quality sections of the ES.

References

Elmbridge Transport Major Scheme Bid Environmental Assessment Working Paper, 2009

Elmbridge Transport Major Scheme Business Case Submission, 2009

Assessment of social and distributional impacts (SDIs) of transport interventions

Correspondence with Environment Agency (EA). The EA letter of 12.06.2008

7. Cultural Heritage

Overview

7.1 The study area lies within the hinterland of the major Romano-British and medieval urban settlement of Gloucester. Archaeological remains associated with these settlements are unlikely to survive within highway boundaries following trunk road and roundabout construction in the 1970's onwards. Due to the lack of archaeological fieldwork in the immediate vicinity of this scheme, there is little known evidence for significant activity from these or other periods.

7.2 The past agricultural regime within this part of Gloucester's green belt, combined with a lack of recent large-scale development generally, has given little scope for the definition or chance discovery of archaeological sites (BUFAU 1993). In 1990, an archaeological desk based assessment was undertaken by Gloucestershire County Council Archaeology Service (GSMR 20258) in connection with a proposed road corridor. The area of investigation included the present park and ride study area. A number of areas of possible archaeological interest were identified ranging in date from the Romano-British period through to the present day, although the study area was not highlighted as an area of archaeological interest.

7.3 Archaeological investigation in 1993, by Birmingham University (GSMR 2025 8), included geophysical survey within the study area and test pitting immediately adjacent to site of the new Gloucestershire Fire & Rescue Station. No features of archaeological significance were identified.

7.4 A desk based assessment of the proposed park and ride site has recently been undertaken (Atkins 2012), together with a geophysical survey (GSB Prospecting 2012) and field evaluation (CA 2012). Extant ridge and furrow was identified and recorded by topographical survey across the northern most field, while trenching confirmed the presence of cropmark ridge and furrow in the southern field. A small number of field ditches and a pit were also found suggesting the land has been consistently used for agriculture since the medieval period.

Prehistoric

7.5 There is no direct evidence of either patterns of settlement or any other activity during the prehistoric period within the study area. No prehistoric remains were identified during the evaluation.

Roman

7.6 In the Roman period the scheme lay in the hinterland of the major Roman town of *Glevum* (Gloucester), 3.5km to the south-west. However, evidence of Roman period settlement and activity within the study area is limited, comprising the spot find of a coin of Claudius I (GHER 6678) and a possible Romano-British settlement 400m south of the site at Pirton Farm (GHER 14631). Further Romano-British material, including a scatter of 2nd to 4th century potsherds (GHER 9744), was recovered during an archaeological watching brief at Sandyleave, near Elmbridge, c.1km south-west of the park and ride site.

Early & Later Medieval

7.7 The study catchment covers an area the low-lying land outside of Gloucester, an area in which the characteristic form of settlement has remained one of small hamlets restricted to the main roads and surrounded by agricultural land. Late medieval settlements are known at Elmbridge Court (GHER 4826), a moated site demolished during the construction of the existing road by-pass, and Pirton Court (GHER 15911), which remains standing alongside its 15th century barn. Extensive ridge and furrow and other potentially related features has been identified across the site (GHER

11133) and throughout the study area (GHER 11037, 11038, 11039, 11040, 11041, 11134, 11135, 11136). The form of the surviving earthworks within the northern field of the proposed park and ride site would suggest a medieval origin. This may also be reflected in field patterns enclosing former open fields shown on the 1769 map of the Elmbridge Court Estate (GRO ref: D184/P1) and 1842 Tithe Map (Gwatkin 1993). The extent of the ridge and furrow is visible on aerial photographs of the study area, which indicate that the entire site was covered by extant earthwork remains of ridge and furrow until c.30 years ago (NMR Ref OS/69097; V; 134). The southern part of the site has been subject to arable use, removing any extant features, although the ridge and furrow can be traced on modern satellite photographs.

Post-Medieval & Modern

7.8 Cartographic evidence indicates that the proposed park and ride site remained in agricultural use throughout the post-medieval and modern period. The 1769 map of the Elmbridge Court Estate would indicate that the former open fields had been enclosed by this time, although some of the enclosed fields within the area retained the shape and form of the earlier medieval landscape. Later maps, including the 1842 Tithe Map and 1885 1st Edition Ordnance Survey map reflect little indication of change in the landscape until the later 19th century, which saw the construction of the Cheltenham and Great Western Railway line (GHER 11189).

7.9 The area to the east of this site was utilised for defence purposes during World War Two, with a heavy anti-aircraft battery (GSMR 22371) located in the field to the north and four 3.7(s) guns and a GL Mk II radar. Remains are still visible as patches of concrete and related earthworks. The war time site included the distinctive H-block buildings (GSMR 22372), which were possibly associated with the anti-aircraft battery to the north or with a separate rocket battery. The site is now used as the Elmbridge Court Business Park.

7.10 The later 20th century saw the encroachment of urban expansion and construction of the A40 / A417 dual carriageway that truncates the study area and incorporates Arle Court bus priority measures and associated new verges and signage within the scheme's highway boundary.

Potential impacts

7.11 The proposed scheme may have an impact on the historic environment in the following ways:

- Whole or partial truncation of upstanding heritage assets and/or buried archaeological remains;
- Change to setting, including views to and from individual heritage assets; and
- Change to the historic landscape from affects on component heritage assets.

7.12 Each of these factors is used in determining whether the development proposals need to be altered or whether further investigation is required (see Section 16.11).

7.13 Impacts on the historic environment can be broadly separated into three key asset groups; built heritage, archaeological remains and the historic landscape. These assets groups are assessed below.

Impact on built heritage

7.14 The proposed scheme would have no direct physical impact on listed buildings, locally listed buildings, historic parks and gardens or conservation areas. Due to the intervening presence of mature vegetation and modern housing there will be no significant impact on the setting of built heritage assets from the proposed park and ride development, Arle Court bus priority measures or associated new highway vergers and signage.

Impact on Archaeological Remains

7.15 The proposed park and ride site includes evidence for both extant and cropmark medieval ridge and furrow (GHER 11133). However, recent archaeological evaluation has proved that no significant remains survive below this agricultural horizon, which has been recorded by topographical survey. Areas immediately adjacent to the A40 and within the highway boundaries; including Elmbridge Court Roundabout and Arle Court bus priority measures, will have been subject to significant intrusive works during highway construction. It is therefore unlikely that any remains survive in areas of cut and where areas have been filled; archaeology is likely to be deeply buried and therefore preserved *in situ*.

Impact on Historic Landscape

7.16 Proposed development of Elmbridge Court Roundabout, Arle Court Bus priority measures and associated highway verges and signage will remain in keeping with the modern sub-urban landscape. The proposed new park and ride development will have an impact on the historic character of this Greenfield site; and in particular on extant ridge and furrow across the northern most field. However, commercial and highway developments bounding the site to the west and north respectively have already significantly changed the historic landscape in this area. The proposed development will not therefore have a significant adverse effect.

Recommendations for Further Assessment

7.17 Based on a review of known heritage assets across the proposed scheme and results from recent field investigations, the following recommendations for further assessment have been made for each development proposal.

Arle Court bus priority measures

7.18 Bus priority measures will have no significant impact on built heritage, archaeological remains or the historic landscape. However, any associated temporary compounds or access roads outside of the highway boundary could have a limited impact on the historic environment. It is therefore recommended that this development is scoped out of the EIA process and dealt with under normal planning regulations.

Highway verges and signage

7.19 Additional verges and signage located within the existing highway boundary and will have no significant effect on built heritage, archaeological remains or the historic landscape. No further assessment is recommended or mitigation is recommended.

Elmbridge Court Roundabout

7.20 Developments to the roundabout will have no significant effect on built heritage, archaeological remains or the historic landscape. However, any associated temporary compounds or access roads outside of the highway boundary could have a limited impact on the historic environment. It is therefore recommended that this development is scoped out of the EIA process and dealt with under normal planning regulations.

Elmbridge Park and Ride

7.21 Development of a park and ride facility at Elmbridge Court will have no significant effect on built heritage, archaeological remains or the historic landscape. However, any associated temporary compounds or access roads outside of the site and highway boundary could have a limited impact on the historic environment. It is therefore recommended that this development is scoped out of the EIA process and dealt with under normal planning regulations.

7.22 Further assessment will inform the need to mitigate any adverse impacts in agreement with Gloucestershire County Archaeological Service. Mitigation requirements may take the form of either localised field excavation prior to enabling or construction works, or a watching brief during construction and will require approval of a written scheme of investigation by GCAS before implementation.

8. Contaminated Land

8.1 To screen for any potential significant impacts of the scheme with regards to land contamination the following sources of information have been reviewed:

- a Landmark Envirocheck Report including historical plans, flood risk and geology; and
- Environment Agency website for details on landfills, hydrology and hydrogeology.

8.2 From a review of historical plans for both site areas no historical contaminative land uses have been identified prior to the development of the road network within the site area, additionally no development is shown to have taken place on the proposed park and ride area (1884 – 2011).

8.3 With regards to surrounding potentially contaminative land uses the Environment Agency (EA) website holds one landfill record within 500m of the site boundary. This is located approximately 200m to the south west of the A40/B4063 roundabout. The landfill was filled in 1994, the EA do not hold any records of the type of waste accepted. Due to the distance from the site the landfill is not considered to affect the scheme. According to the Landmark Envirocheck Report, a waste management facility is located approximately 200m east of the A40/A417 roundabout. This site was licensed to store waste for construction and is likely to have been a construction depot, it is not considered to affect the scheme.

8.4 Easy Mix Ltd. is located immediately to the west of the A40 Arle Court roundabout, which undertakes the blending packing and loading of bulk cement. There are many other commercial premises within 500m of the site (hotel, leisure centre, film and media premises). However, these are not considered to be sources of contamination with regards to the proposed site works.

8.5 From a brief review of desk study information, no sources of contamination have been identified within the site boundary and no sources of contamination within 500m of the site have been identified which could affect the proposed scheme.

8.6 It is considered unlikely that the proposed scheme will present any significant environmental effects with regards to land contamination and it is not proposed to include land contamination in the environmental impact assessment documentation.

9. Landscape

Introduction

Introduction

9.1 This section comprises the landscape chapter as part of a combined Screening and Scoping Opinion Request for the proposed Elmbridge Park and Ride, Gloucestershire.

Methodology

9.2 Landscape and Visual Impact Assessment (LVIA) will follow the Landscape Character Assessment (LCA), based on the good practice guidelines produced jointly by the Landscape Institute and Institute of Environmental Assessment in 2002. LCA provides a sound basis for guiding, informing and understanding the ability of any location to accommodate change and to make positive proposals for conserving, enhancing or regenerating character, as detailed proposals are developed.

9.3 Guidance on LCA is set out in the publication Guidelines for Landscape and Visual Impact Assessment, produced by the Landscape Institute and the Institute of Environmental Assessment and Management in 2002 (2nd edition). The methodology set out is almost universally used for landscape and visual impact assessment.

9.4 In order to foster high quality development that respects, maintains, or enhances, local landscape character and distinctiveness, Natural England encourages all new development to consider the character and distinctiveness of the area, with the siting and design of the proposed development reflecting local design characteristics and, wherever possible, using local materials. The Environmental Impact Assessment process should detail the measures to be taken to ensure the building design will be of a high standard, as well as detail of layout alternatives together with justification of the selected option in terms of landscape impact and benefit.

Baseline Conditions

9.5 Baseline conditions for this assessment have been based upon information gathered from a desk based only study of available relevant data and previous studies. The study area covers an approximately 1km radius from the scheme footprint to include the extent of visibility.

9.6 Documentation and sources of information used in the desk study included:

- Multi-Agency Geographic Information for the Countryside (Magic) web site;
- County and City councils' local designations;
- 1:50 000 Scale Digital Ordnance Survey Maps;
- Aerial Photography (publicly available internet material); and
- Additional information gathered as a result of searches of available information concerning the site, its surroundings and the potential impacts of the proposals.

9.7 The P+R and Elmbridge Roundabout elements of the scheme do not fall within a designated landscape (other than the wider Green Belt status) and there are no TPO's in existence covering land within Gloucester City Council area. Within Tewkesbury Borough Council the majority of trees on the Park + Ride site are covered by a TPO made on 28th March 2012, following contact with the borough to establish the existence or otherwise of such designations. There is a TPO protected woodland immediately south of the proposed P+R scheme, as well as a TPO protected

woodland along the existing A4075 roadside just beyond the western extent of the scheme. There is a mature woodland belt taking up much of the eastern boundary of the Park and Ride site and a mature hedgerow making up the western and northern boundary. The works at Arle Court lie within the urban envelope of Cheltenham and thus have no specific landscape designation or character assessment. The works are fully within the highway and no TPOs apply.

9.8 The village of Churchdown is surrounded by undulating fields with a prominent rise in the landscape to the south. The field boundaries comprise mixed species hedgerows with some mature trees. Some of the hedgerows are likely to qualify as important under the Hedgerow Regulations 1997.

9.9 Information collated from the British Listed Buildings online resource state that there are two listed buildings within close proximity to the east of the site in Churchdown with potential views of the proposed site; Pirton Court and Barn at Pirton Court on Pirton Lane. There are two listed buildings to the wider area in Churchdown; The Old School House on Criftycraft Lane approximately 500m south of the site and the Church of St Bartholomew approximately 1km south of the site, though unlikely to be directly affected by the proposals. It is not anticipated that either of these two properties will experience any significant temporary or permanent impacts.

9.10 Significant receptors for the Park and Ride element of the scheme are:

- Residential properties in Churchdown, north of the site and theA40;
- Residential properties east of the site on the edge of Churchdown;
- Isolated residential properties south of the site and south of the railway line including Zoons Court;
- Public right of way users that currently use two routes that pass through the north and south end of the Park and Ride site;
- Public rights of way users on the network of paths on the north and west shoulders of Tinker's Hill and Churchdown Hill;
- Users of the Elmbridge Business Park offices to the west of the site; and
- Users of the A40 and the mainline railway.

9.11 Significant receptors for the Elmbridge Roundabout element of the scheme are:

- Residential properties to the west of the A40 on Blackwater Way
- Residential properties to the west of the A417 on Lavington Drive
- Elmbridge Court businesses
- Elmbridge Farm
- Non-motorised users of the existing footpath and cycleway network
- Users of the A40, A417 and B4063

9.12 Significant receptors for the Arle Court bus improvements are:

9.12.1 Business properties on south east quadrant of the Arle Court Roundabout and on Hatherley Lane

9.12.2 Residential properties north of the A40 including Castlemaine Drive, Darwin Close and on the GCHQ approach road

9.12.3 Residential properties on Miserden Road

9.12.4 Nursing home on Whittigton Road

9.12.5 Cyclists and Pedestrians using the footpath/cycleway on the south side of the A40 and Arle Court Roundabout underpasses

9.12.6 Motorists and other users of the A40 Gloucester Road

Landscape Character

9.13 Landscape character assessment in England has been undertaken by Natural England which is an Executive Non-departmental Public Body responsible to the Secretary of State for Environment, Food and Rural Affairs. Their purpose is to protect and improve England's natural environment.

9.14 Natural England classifies the area as National Character Area 106; Severn and Avon Vales. Key characteristics of the character area are; diverse range of flat and gently undulating landscapes, united by broad river valley character with open riverside landscapes with little woodland. Variety of land uses from pastures fields to intensive agriculture. Many ancient market towns and large villages along rivers along with nucleated villages. There are prominent views of hills such as the Cotswolds, Bredon and the Malverns.

9.15 The Arle Court section of the proposals, to the east of the M5, falls within the urban area of Cheltenham

Baseline Landscape Character Assessment

9.16 A Landscape Character Assessment was produced by Landscape Design Associates (LDA) for Gloucestershire County Council identifying key characteristic features of the County Landscape character areas, the proposals falls within character area 18 Settled Unwooded Vale; SV6B Vale of Gloucester. The landscape and surroundings may be summarised as:

- Soft, gently undulating to flat landscape, but with intermittent locally elevated areas that project above flatter landform;
- Area drained by a series of east west aligned tributaries of the Severn;
- Mixed arable and pastoral land use enclosed by hedgerow network which form a strong landscape pattern in places;
- Limited woodland cover with mature hedgerow trees and occasional orchards;
- Rural areas bordered by large urban and suburban areas interspersed with commercial and industrial premises;
- A mix of buildings materials and styles; and
- Major transport corridors pass through the Vale.

9.17 The local landscape comprises a primarily pastoral landscape surrounded by suburban settlements and isolated properties, connected by various local roads. As such, in its current condition the site may be said to be of ordinary condition, currently contributing to the wider landscape character.

9.18 Within LDA's Landscape Character Assessment the Arle Court section of the proposed works falls within the Cheltenham 'urban area' and as such was not covered by the study. This area comprises a mix of commercial and residential buildings with significant developments in the immediate vicinity of the proposals being the Cheltenham park and ride site, a Travelodge hotel and restaurant complex, the Golden Valley Hotel and the GCHQ building. However, as the majority of the developments in this area are set back from the road corridors, with the intervening land having significant mature tree cover, the overall impression is one of an open and green landscape.

Potential Impacts

9.19 Within the local area there are a limited number of visual receptors, with topography and intervening vegetation obscuring most views of the proposed route. Generally, there are likely to be views of the Park & Ride site from the western side of Churchdown, from isolated properties south of the railway and from the local footpath network. There will be views from the A40 and the railway line but these receptors are normally classified as being of low significance and low sensitivity.

9.20 It is likely that the Park & Ride development will not be visible from the majority of residential properties in Elmbridge and Barnwood nor from the A40 Gloucester Northern Bypass or A40/A417 Barnwood Link.

9.21 The Elmbridge junction works will be visible from residential properties to the west however topography and existing vegetation will largely screen views from further west than blackwater Way and lavington Drive, other than limited, oblique views from properties fronting the B4063 west of the scheme. views from isoloated properties to the east and from Churchdown are limited by landform and vegetation such that main views will be of the highway improvements and new park & ride junction.

9.22 Potentially there may be minor loss of hedgerow and agricultural land on the north east quadrant. There will be loss of existing trees and scrub to the roundabout itself and to the arms of the roundabout where the highway is reconfigured and underpass bridges widened.

9.23 It is likely that the construction of the Arle Court bus improvements will result in the loss of existing tree cover between the A40 Gloucester Road and ad joining, contiguous woodland south of the road. Potentially there may be some vegetation loss to the area between Misenden Road and the A40

9.24 Potentially there will be loss of existing highway vegetation at the entrance to the Arle Court Park + Ride on the south of the A40 and to the verges of the B4063

9.25 Extension of the bus lane through the Whittingdon Road/A40 junction may impact adversely on the new residential property and on properties at the western end of Miserden Road, south of the A40.

Construction

9.26 Due to the nature of the proposals, with potentially significant land take and ground modelling within a rural suburban area, the most significant impacts from the Park and Ride scheme will be in relation to:

- Loss of areas of agricultural landscape and important landscape features including historic field patterns, hedgerows, mature trees and field boundaries;
- Disruption to the existing public right of way routes that passes through the north edge of the site (although this appears disused at present with no means of access/signing);
- Visibility of construction vehicles and machinery along temporary site access routes, the proposed final routes and Park and Ride site;
- Damage to existing vegetation to be retained including ground compaction to root zone; and
- Night time lighting impact from site compound, construction lighting and from construction vehicle lights.

9.27 The most significant impacts from the Elmbridge junction improvements will be in relation to:

- Loss of vegetation to the arms and centre of the roundabout
- Disruption to the existing public rights of way around the roundabout and through the underpasses
- Visibility of construction machinery in day and night time conditions

9.28 The most significant impacts from the Arle Court bus improvements will be in relation to:

9.28.1 Loss of existing maturing tree cover

9.28.2 Loss of improved grassland (highway verge)

Operation

9.29 The most significant landscape and visual impacts during operation will be in relation to:

- Visibility of vehicles on the roundabout, along the proposed bus routes and Park and Ride site;
- Change in visual character of the Park + Ride area from agricultural land to hard surfacing;
- Change in visual character arising from parked and moving vehicles;
- Potential adverse impact on adjacent woodland through physical damage or change in wildlife activity;
- Unsuitable diversion of PRoWs;
- Potential introduction of taller incongruous features including road signage, signals and lighting;
- Night time lighting impact from fixed lighting and from vehicle lights; and
- Potential adverse impact on properties within the eastern fringe of Cheltenham, Gloucester and Churchdown village.
- Change in character (temporary) to the approach to Cheltenham until replacement tree planting matures

Potential Mitigation Measures

9.30 There are a number of mitigation measures that could be considered as the scheme is developed. These include:

- minimise loss of trees and vegetation - adaptation of the design to minimise the area of trees and vegetation to be lost to the scheme, this can be achieved through amendments to the footprint of the scheme or through engineering design of the scheme (such as use of retaining solutions for earthworks rather than re-grading so as to minimise clearance);mitigation planting where appropriate, using appropriate species and mixes to replace lost vegetation but also to enhance the existing landscape and provide visual screening;
- locally occurring plants should be used in the species selection to ensure that planting is sympathetic to the setting. In order to improve biodiversity, stock used should be of local provenance – mechanisms for advanced ordering and procurement of local provenance seed/planting stock should be investigated to try and secure local provenance stock from the site or locality;
- control of working hours during construction, including avoiding night time working;
- the identification of opportunities for street scene improvements in areas adjoining the scheme:
- early identification of design palette for street furniture etc;
- The effects of night time lighting could be reduced by careful siting, and the use of the latest specification luminaires to minimise glare and light spill;
- Adopting best practice in reducing visual clutter from signage, lighting etc for the roundabout, new junctions and road and within the existing local network;
- Ensure early consideration of drainage design to ensure it is coordinated with landscape design and visual impact mitigation requirements;
- Consider potential for translocation of existing hedgerows and retention of mature tree(s) within the scheme;
- Minimise light pollution though careful design of cut-off lighting and lighting strategy
- Use of bunding and intermediate planting to assist in screening views from the high ground to the south and from the edge of Churchdown;
- Realignment and extension of the footpath to the north to provide positive link with that to the west that ends at the Elmbridge roundabout and provision of new access links;
- Effective protection of vegetation adjacent to the properties backing onto the roundabout
- Effective protection of the adjacent woodland;

- Ensure landforms do not appear too regular and engineered to integrate into existing landform;
- Effective recording of heritage landscape features, notably the ridge and furrow system in the fields adjacent to the A40; and
- Minimise construction phase impacts through careful siting of site compound and use of best practice construction methodologies.
- Early consideration of design matters in regard to the design of the physical elements of the scheme, I.e. floor surfaces, fences, barriers, shelters, covered walkways, lighting bollards, signage, etc.
- Ensure detailed design that is functional, robust and contains those qualities of design that could enhance the quality of the local environment.
- Planting of semi mature trees to A40 at Arle Court to give 'day 1' visual maturity

Assessment Methodology

9.31 The assessment methodology will be developed in accordance with the following best practice documents for this environmental topic:

- The Guidelines for Landscape and Visual Impact Assessment, Second Edition, the Landscape Institute and the Institute of Environmental Management and Assessment, 2002;
- Landscape Character Assessment, the Countryside Agency, 2002; and
- Photography and photomontage in landscape and visual impact assessment, Landscape Institute Advice Note 01/11 (2011).

9.32 The assessment will aim to examine the existing baseline conditions and potential impacts during the life of the scheme and also following the implementation of mitigation proposals. In order to establish the degree of impact the assessment will establish the baseline conditions through a process of detailed desk study and site survey. The broad area of study will include a 500m study area, offset from the centreline of the scheme.

9.33 The views experienced by vehicle travellers have not been examined and will not be considered further in the EIA, as it is considered that highway infrastructure is a part of the visual experience expected by vehicle travellers.

9.34 A full nightime lighting assessment will not be undertaken as part of the landscape and visual impact assessment. Such a study would require specialist input.

9.35 For the purposes of the landscape and visual impact assessment, direct views from private properties (business and residential) will not be assessed. Only those that are publicly accessible will represent sensitive views.

Desk Study

9.36 The desk study will identify potentially sensitive landscape features and elements by reference to OS maps, existing landscape character studies and relevant planning policy. Analysis of these resources will contribute to an understanding of landform, location of public rights of way and national cycle network routes, areas of open access land, and the extent and type of vegetation and land use. This analysis will also enable the identification of potentially important and sensitive visual receptors such as footpaths, other rights of way, residential properties etc.

Site Survey

9.37 Site survey work will be undertaken to confirm and identify key public rights of way, residential properties, public highways and other public amenity areas that contribute to the landscape character of the area or would have potential views of the scheme.

9.38 Subject to the timing of the assessment site survey work will be completed at the optimum time to account for the worst case scenario for the proposed scheme (i.e. on a day with clear visibility during seasons where screening from vegetation is minimal). The survey work will contribute to an understanding of the existing landscape character and the location and nature of visual receptors, and will supplement the available information collected during the desk study. The site survey will also establish the nature and likely effects of the potential mitigation measures.

9.39 A series of representative photographs will be captured during the site visits. The method for capture and presentation of photographs will be in accordance with Landscape Institute Advice Note 01/2011 (Photography and photomontage in landscape and visual assessment).

9.40 Site survey work will be completed by experienced landscape architects. Where possible a team of two will complete the site survey work as this facilitates discussion and consensus on the main elements and key features of the landscape and also the sensitivity of visual receptors.

9.41 This scoping exercise sets out the proposed study corridor of 500m offset from the centreline of the scheme.

9.42 Visualisations in support of the scheme will be prepared, together with a series of photomontages showing existing and proposed road layouts at key points along the route. These will provide proposed views at Years 1 and 15, including seasonal variations. The locations proposed for photographs and photomontages are shown on **Table 9.1**

9.43 These have been agreed with Mrs S Pearce (GCC Case Officer) by e-mail of 27 March 2012. The agreed details are:

Table 9.1 – Photographic Locations

LOCATION	COMMENT
1	To cover view from isolated property on south of B4063
2	Representative of views from properties either side of B4063 at start of Churchdown
3	Representative of views from properties with views on Grove Road, Yew Tree Way and Oakhurst Close
4	View from overbridge across A40
5	Representative of views from Pirton Court
6	View across Recreation Ground covering Public Open Space and properties on Chosen Drive and John Daniels Way (please note this needs to be checked in detail as Pirton Break woodland may obscure some or all views from this housing area)
7	View from PRoW south of site. This in part best accessible view relative to mainline railway. (PRoW north of site will either be extinguished/realigned as part of scheme or will be covered by viewpoint 5
8	Representative of views from various paths on open side of Tinker's Hill. This location selected as highest point with views of the site before paths go into woodland area.
9	View from Churchdown Hill trig point. Site is just visible above the treeline. There are no other obvious viewpoints on the hill between this point and viewpoint 8 – all screened by woodland. Views from St Bart's Church are screened by the natural landform.
10	View from open space above terraced housing east of Zoons Court to equate to top floor views. (these properties are prominent in views back to the hill from the north)
11	View from PRoW (approximately equivalent to view from upper floors of Zoons Court)
12	View from PRoW adjacent Zoons Court
13	View from major footpath 'interchange' part way up slope (note: this extent of paths does not appear to exist on the ground – closer to black dotted routes)
14	Views from the residential area of Elmbridge and from the A40/A417 ring road are screened by embankment and/or existing vegetation. Viewpoint 14 gives a good spread coverage from PRoWs with viewpoints 13 and 7 and is similar to views from the isolated farm property just to the north.

15	Representative of views for A40 traffic from the west
16	View from Lay-by opposite (this subject to scheme design that may remove this viewpoint)
17, 20	From the SE quadrant of Elmbridge Roundabout
18	From the NW quadrant of Elmbridge Roundabout
21	From the SW quadrant of Elmbridge Roundabout
22,23	From the NE quadrant of Elmbridge Roundabout
19	From Tinker's Hill (location requested 11/12 by TBC Landscape officer)
24, 25	From the Arle Court Roundabout
26, 27, 28	From the A40 East of Arle Court roundabout

Photomontages, will be:

- From Viewpoint 2 (to represent views from Churchdown north of the A40)
- From Viewpoint 7 (to cover views from the main line and from the PRoW)
- From Viewpoint 8 (to cover views from the hill)
- From either Viewpoint 10 or 11 to cover views from housing south east of the site.
- From Viewpoint 19 (as requested by TBC landscape Officer)
- From viewpoints 21 and 22 (to cover Elmbridge Roundabout views)
- From viewpoints 25 and 28 (to cover views of the Arle Court bus lane works)

Conclusions

9.44 Based upon the level of assessment undertaken for this study, a sensitively planned scheme with well designed mitigation measures is considered likely to have slight adverse to neutral impacts on the wider area, offset by the benefit brought about by the improved transport links which encourages sustainable transport. Individual residential properties within Elmbridge, Churchdown and public rights of way users will potentially experience more significant impacts; however it is anticipated that this will be largely during the construction phase and that visual impacts will reduce to slight to negligible over time as planting matures.

9.45 Views from housing around the A40 Arle Court works will be little changed however there will be significant visual impacts for road users and users of the footway and cycleways from the loss of trees on the embankment.

10. Ecology

Introduction

10.1 This chapter provides an outline of the ecological baseline of the Elmbridge Court Park and Ride scheme and associated road improvements around Elmbridge Court Roundabout. It identifies the potential impacts on ecological receptors from the scheme and considers initial proposals for mitigation to address those impacts. The chapter also provides proposals for further studies/surveys needed to inform the next stage of the EIA to ensure that all impacts relating to biodiversity are appropriately identified, assessed and mitigated.

10.2 The purpose of this chapter is to provide the scope for the ecological chapter of the ES.

10.3 The scheme has been classified as a Nationally Significant Infrastructure Project and a Development Control Order will be submitted to the Planning Inspectorate for approval.

10.4 This assessment is based on the results of:

- Extended Phase 1 habitat survey undertaken by Atkins on the 28th February 2012,
- Phase 2 surveys undertaken during 2012 – badger, botany, bat, breeding bird, great crested newt habitat suitability assessment, dormouse, otter and water vole
- A desk study report produced in February 2009 (*Elmbridge Court Park and Ride – Ecological Desk Study Report*, Atkins 2009).

10.5 The application site consists of three areas, which can be viewed on the Scheme Extents figure in Appendix A:

- The main Park and Ride site on the outskirts of Gloucester, including associated works to the adjacent roundabout;
- Arle Court Roundabout bus lane along the A40 within Cheltenham; and,
- Landsdown Road / Andover Road bus lane along the A40 within Cheltenham.

10.6 An increase in the extent of the application site has resulted in the requirement for additional survey work at all three locations in 2013. This chapter assumes that all the proposed surveys detailed herein will be commissioned and undertaken in time to inform the findings of the ES ecology chapter.

10.7 In addition, the scheme will include signage modifications in the wider area. The extent of these are shown on the Scheme Extents figure, although the specific locations are not yet known.

10.8 The principal area of potential ecological impacts will be the Elmbridge Court Park and Ride site, and this has been the key focus for the Ecological scoping. The new bus lanes at two locations within Cheltenham are both located along a main road within an urban area, and will be provided by widening into the existing highway verge. Specific locations of proposed signage modifications are not yet known. The study area for the scheme has been set at:

- 5 km from the application site for desk study data in relation to bats;
- 2 km from the application site for all other desk study data; and
- a minimum of 50 m from the application site (excluding the signage modifications as specific locations unknown) for field study data.

Baseline Conditions

10.9 An Ecological Constraints plan of the Park and Ride site can be found in Appendix B.

Designated sites

10.10 The application site is not covered by any statutory or non-statutory conservation designations.

10.11 Innsworth Meadow Site of Special Scientific Interest (SSSI) is approximately 2km north of the Park and Ride site. This site is designated for the presence of unimproved neutral grassland, a rare habitat in the Severn Vale.

10.12 Badgeworth SSSI is present approximately 2 km southwest of the Arle Court Roundabout Bus Lane. This wetland site is designated for the presence of adder's-tongue spearwort.

10.13 Griffiths Avenue Local Nature Reserve (LNR) is approximately 500m east of the Arle Court Roundabout Bus Lane. This site is designated for neutral grassland and woodland.

10.14 A stream which passes along the south-western boundary of the Park and Ride site ultimately discharges into the Severn Estuary Special Area of Conservation / Special Protection Area / Wetland of International Importance (Ramsar site), approximately 15 km from the application site.

10.15 No non-statutory designated sites were identified within 2 km of the application site.

Habitats and Flora

Park and Ride site (see Ecological constraints plan in Appendix B)

10.16 The Park and Ride site comprises an area of farmland south of the A40, Golden Valley By-pass and Elmbridge Court Roundabout. The site is located on the outskirts of Gloucester, between Longlevens and the village of Churchdown. Habitats within the application site include arable farmland, semi-improved grassland, hedgerows and areas of scrub, and grassland road verges of the A40 and Elmbridge Court Roundabout.

10.17 A single mature English oak is located in the centre of the application site. Approximately 10 mature English oaks are also present just outside the south-eastern boundary of the application site, although a number of these appear to be dead or dying.

10.18 Two mixed species deciduous hedgerows pass through the application site. These hedgerows do not qualify as 'ecologically important' with regards to the Hedgerow Regulations 1997. Hedgerows are a UK[9] Biodiversity Action Plan (BAP) habitat. All UK BAP habitats and species occurring in the county have been incorporated into a Local Delivery Plan for Biodiversity.

10.19 The application site is bordered on its north eastern boundary by Pirton Brake – a strip of semi-natural broadleaved woodland, likely to be a relict area of ancient woodland. Broadleaved woodland is a UK BAP habitat. To the south west, the application site is bordered by a small stream (a tributary of Hatherley Brook) and a thick hedgerow containing mature pollarded willows.

Arle Court Roundabout and Landsdown Road / Andover Road bus lanes

10.20 Arle Court Roundabout bus lane: semi-improved roadside verge habitat, scrub, and a number of semi-mature/mature ornamental trees including beech and horse chestnut.

10.21 Landsdown Road/Andover Road bus lane: mature Turkey oak located outside of the highways boundary but with overhanging branches which may need to be removed as part of the proposed scheme.

[9] The Biodiversity Action Plan (BAP) is the UK's initiative to maintain and enhance biodiversity in response to the Convention on Biological Diversity signed in 1992. The original BAP list of species and habitats, prepared over 10 years ago, was updated in 2007 to produce a new list of species and habitats of principal importance. Some of the species have been taken off the new list and additional species and habitats have been included.

Legally Protected and Notable Species

10.22 No bats were found to be roosting within the mature oak tree within the Park and Ride site during surveys in 2012. No bats roosts have been identified within potential roost features within the mature trees just outside the southern boundary of the Park and Ride site.

10.23 Mature trees within hedgerows and within Pirton Break woodland adjacent to the Park and Ride site are suitable for roosting bats. Bats have been identified commuting and foraging within and adjacent to the site during activity surveys in 2012. Species recorded at the site include common and soprano pipistrelle bats, noctule bats, and Myotis bat species.

10.24 Approximately 15 semi-mature/mature beech and horse chestnuts trees may be affected by the Arle Court Roundabout bus lane. These offer negligible potential for roosting bats.

10.25 The mature Turkey oak likely to be affected by the proposed Landsdown Road/Andover Road bus lane offers negligible potential for roosting bats.

10.26 Two ponds have been identified within 500m of the Park and Ride site in the gardens of Pirton Court (approximately 400m east of the Park and Ride site, and 300m from associated works on the highway verge). Habitat Suitability Index (HSI) surveys were undertaken on 15th March 2012 using the methodology as set out by Natural England[10], and set out within Amphibian and Reptile Group Advice Note 5[11] to determine the suitability of the two ponds identified to support great crested newts. The HSI scores for both ponds were calculated as below average (between 0.5 and 0.59).

10.27 Further surveys to determine the presence or absence of great crested newts within the two ponds are not considered necessary for the following reasons:

- The below average habitat suitability of the ponds, largely due to the presence of predatory fish;
- The ponds are located approximately 400 m from the Park and Ride site, and 300m from associated works on the A40 highway verge. Research[12] has shown the vast majority of great crested newts will spend the majority of their time within 250 m of a breeding pond.
- Pirton Brake (an area of broadleaved woodland) is present between the ponds and the Park and Ride site (see Appendix B). The woodland habitat within Pirton Brake will provide shelter and foraging for any great crested newts that may be using the ponds for breeding. The majority of the Park and Ride site is arable farmland, a habitat that is considered to be of poor suitability for great crested newts[13] and that may support newt populations where there is a high density ponds which is not the case in the vicinity of the application site. If great crested newts were breeding in the two ponds, it is very unlikely they would pass through the suitable woodland habitat of Pirton Brake onto the Park and Ride site;
- The lack of terrestrial habitat connections (such as hedgerows) between the ponds and the Park and Ride site and associated works on the A40 highway verge; and,
- Using the Natural England Great Crested Newt Rapid Risk Assessment[3], the likelihood of an offence being committed during the implementation of the proposed park and ride development was calculated in the event that newts to be present within the ponds, was calculated. Given that the approximate area of land 250m-500m from the ponds that will

[10] Natural England Great crested newt Development Licence Method Statement document: WML-A14-2 (version August 2012)
[11] Amphibian and Reptile Groups of the United Kingdom ARG UK Advice Note 5 (May 2010) Great Crested Newt Habitat Suitability Index
[12] An assessment of the efficiency of capture techniques and the value of different habitats for the great crested newt *Triturus cristatus*. Research Report 576 (English Nature, 2004).
[13] Great Crested Newt Mitigation Guidelines (English Nature, 2001)

be lost/ damaged will be between one to five hectares, the result of the rapid risk assessment is 'Green: offence highly unlikely'.

10.28 Breeding bird species identified at the Park and Ride site during surveys in 2012, include a common assemblage of farmland species, including the UK BAP species skylark, song thrush and dunnock.

10.29 No evidence of otter or water vole has been observed within the stream (see 10.14) running through the Park and Ride site during surveys in 2012.

10.30 No evidence of dormouse has been found during nest tubes surveys in 2012 within hedgerows on the Park and Ride site or Pirton Break woodland. No badger setts have been identified within the Park and Ride site, Pirton Break woodland, or the bus lanes in Cheltenham.

10.31 Marginal habitats within the Park and Ride site and verge habitats along the A40 bus lanes have some suitability for reptiles.

10.32 The habitats within the entire application site appear of low suitability for a diverse invertebrate assemblage.

Potential Impacts

10.33 Impacts to ecological receptors may come through habitat loss, habitat degradation, disturbance through light or noise, and pollution.

Construction

Designated Sites

10.34 Due to the distance from the application site, negative impacts on the Severn Estuary SAC/SPA/Ramsar site are considered very unlikely. An appropriate assessment of impacts to this European site will not be required and this has been confirmed by Natural England (Elmbridge Court Park and Ride Pre-Application Scoping Opinion, July 2012).

10.35 Due to the distance from the application site and the lack of connecting pathways, the scheme is assessed having no impacts on Insworth Meadow SSSI, Badgeworth SSSI, or Griffiths Avenue LNR.

Habitats

10.36 The Park and Ride scheme will result in the loss of 5ha of arable farmland, semi-improved grassland and roadside verge. Approximately 250m of mixed species hedgerow will be lost.

10.37 Some mature trees along the edge of Pirton Break woodland, and at the south west of the Park and Ride site may be felled for health and safety reasons.

10.38 Associated road improvements along the A40 within all three sections of the application site will result in loss of small areas of roadside verge, areas of scrub and a small number of semi-mature trees.

10.39 Signage modifications have the potential to affect road verge habitat, the ecological value of which is currently unknown, but expected to be low.

Species

10.40 Habitat used by bats, reptiles, and nesting birds within the Park and Ride site may be lost or disturbed.

10.41 Habitat with potential to be used by reptiles and nesting birds in areas along the A40 (all three sections of the application site) may be lost or disturbed.

10.42 Impacts to the breeding bird community of Pirton Break woodland may come through disturbance and displacement. Lighting, noise, and the loss of adjacent foraging habitats such as hedgerows and farmland will reduce the suitability of this area to birds.

Operation

Designated Sites

10.43 Due to the distance from the application site, negative impacts on the Severn Estuary SAC/SPA/Ramsar site are considered very unlikely. An appropriate assessment of impacts to this European site will not be required and this has been confirmed by Natural England (Elmbridge Court Park and Ride Pre-Application Scoping Opinion, July 2012).

10.44 Due to the distance from the application site and the lack of connecting pathways, the scheme is assessed having no impacts on Insworth Meadow SSSI, Badgeworth SSSI, or Griffiths Avenue LNR.

Habitats

10.45 Impacts to Pirton Brake woodland may come through increase in human activities resulting in vandalism of trees, noise and light pollution, and fly-tipping.

10.46 Pollutants within surface water runoff could enter the stream running adjacent to the Park and Ride site.

Species

10.47 Potential operational impacts will come through disturbance to commuting and foraging bats along the boundaries to the north-east and south-west of the Park and Ride site. Lighting, noise, and the loss of semi-natural habitats will reduce the suitability of this area to bats.

10.48 Impacts to the breeding bird community of Pirton Break woodland may come through disturbance and displacement. Lighting, noise, and the loss of adjacent foraging habitats such as hedgerows and farmland will reduce the suitability of this area to birds.

Potential Mitigation Measures

10.49 Buffer strips between the Park and Ride site, the hedgerow and stream along the south-western boundary, and the Park and Ride site and Pirton Break woodland along the north-eastern boundary of the Park and Ride site are being integrated into the design. These will reduce impacts to these ecological features from impacts such as noise, run-off, light spill, pollutant deposition, and litter.

10.50 Terrestrial landscape planting within these buffer strips will be designed to enhance biodiversity, with native species providing habitat for foraging bats, reptiles, and breeding birds.

10.51 Attenuation ponds will be provided between the Park and Ride site and the stream along the southwest margin. Along with their primary function of attenuating surface water flows, these will be designed for the benefit of biodiversity with shallow margins, convoluted sides, and aquatic vegetation.

10.52 Lighting for the Park and Ride site will incorporate measures to reduce light spill such as the use of low-pressure sodium bulbs and deflectors. This will reduce the impact of foraging bats potentially using the area.

10.53 The mature English oak tree within the Park and Ride site will be retained and incorporated into the scheme design.

10.54 Other mature trees around the margin of the Park and Ride site will be retained where possible, unless overriding health and safety reasons dictate their removal.

10.55 Pollarding will be undertaken of mature willows along the stream at the southwest of the Park and Ride site to increase their life span.

10.56 Landscape planting around the Park and Ride site will enhance and complement the surrounding habitats.

10.57 A post-construction habitat management plan will be produced and implemented by Gloucester Highways to ensure the long-term ecological benefit of habitats provided by the scheme.

Assessment Methodology

10.58 The proposed Ecological Impact Assessment methodology will be guided by methods outlined in the Institute for Ecological and Environmental Management *Guidelines for Ecological Impact Assessment in the United Kingdom*[14].

Nature Conservation Evaluation

10.59 A number of criteria have become accepted as a means of assessing the nature conservation value of a defined area of land which are set out in *A Nature Conservation Review*[15] and include diversity, rarity and naturalness.

10.60 The nature conservation value or potential value of an ecological feature is determined within a defined geographic context:

- International importance (e.g. Special Areas of Conservation, Special Protection Areas, Ramsar sites);
- National importance (e.g. Sites of Special Scientific Interest in England, Scotland and Wales and Areas of Special Scientific Interest in N Ireland);
- Regional importance (e.g. EA regional biodiversity indicators, important features in NE Natural Areas);
- County importance (e.g. Local Nature Reserves, non-statutory locally designated wildlife sites);
- Important within the District
- Local (parish) importance (e.g. significant ecological features such as old hedges, woodlands, ponds);
- Important within the site and immediate environs e.g. habitat mosaic of grassland and scrub (i.e. within the zone of influence only);
- Negligible importance would usually be applied to areas such as built development or areas of intensive agricultural land.

10.61 It should be noted that it is usual to consider habitats and species together when ascribing a value to a feature using this geographic context. However, there are circumstances where an ecologist may feel it necessary to assign a value to a particularly valuable species. In assigning value to species it is necessary to consider the species distribution and status including a consideration of trends based on available historical records and to make use of any relevant published evaluation criteria. For instance, the presence of a significant population of European protected species such as bats and great crested newts may be worth separate consideration.

10.62 The nature conservation value of a habitat or a species population and can also take into account features that have legal protection, or that are included in national and county Biodiversity Action

[14] Institute of Ecology and Environmental Management (2006). *Guidelines for Ecological Impact Assessment in the United Kingdom*

[15] Ratcliffe, D. A. 1977. *A Nature Conservation Review*. Cambridge University Press, Cambridge.

Plans. It also considers habitats and species of principal importance for nature conservation included in Annex C in the joint ODPM Circular 06/2005 & DEFRA Circular 01/2005 *Biodiversity and geological conservation – statutory obligations and their impact within the planning system*, which accompanies the National Planning Policy Framework (NPPF).

Impact Assessment

10.63 The assessment of the potential impacts of the proposed development will take into account both on-site impacts and those that may occur to adjacent and more distant ecological features. Impacts can be positive or negative. Negative impacts can include:

- Direct loss of wildlife habitats;
- Fragmentation and isolation of habitats;
- Disturbance to species from noise, light or other visual stimuli;
- Changes to key habitat features;
- Changes to the local hydrology, water quality and/or air quality.

10.64 Negative and positive impacts on nature conservation features will be characterised based on predicted changes as a result of the proposed activities. In order to characterise the impacts on each feature, the following parameters will be taken account of:

- The magnitude of the impact;
- The spatial extent over which the impact would occur;
- The temporal duration of the impact;
- Whether the impact is reversible and over what timeframe;
- The timing and frequency of the impact.

10.65 The assessment identifies those positive and negative impacts which would be 'significant', based on the integrity and the conservation status of the ecological feature. Impacts are unlikely to be significant where features of local value or sensitivity are subject to small scale or short-term impacts. However, where there are a number of small scale impacts that are not significant alone, it may be that, cumulatively, these may result in an overall significant impact.

10.66 The integrity of 'defined' sites is described as follows and has been used in this assessment to determine whether the impacts of the proposals on a designated site are likely to be significant:

> *The integrity of a site is the coherence of the ecological structure and function across its whole area that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified.*[16]

10.67 The conservation status of habitats and species within a defined geographical area is described as follows and will be used in the assessment to determine whether the impacts of the proposals on non-designated habitats and species are likely to be significant:

> *For habitats, conservation status is determined by the sum of influences acting on the habitat and its typical species, that may affect its long term distribution, structure and functions as well as the long term survival of its typical species within a given geographical area;*
>
> *For species, conservation status is determined by the sum of influences acting on the species concerned that may affect the long term distribution and abundance of its population within a given geographical area*[4]*.*

[16] Institute of Ecology and Environmental Management (2006) *Guidelines for Ecological Impact Assessment in the United Kingdom* (version 7 July 2006). http://www.ieem.org.uk/ecia/index.html

10.68 Any mitigation measures identified will be agreed, incorporated into the design and programme and taken into account in the assessment of impacts. The residual impact assessment will reflect the completed scheme. These measures will include those required to achieve the minimum standard of established practice plus additional measures to further reduce the negative impacts of the scheme.

10.69 In addition to determining the significance of an impact on any ecological features, the ecological impact assessment will also identify any legal requirements for mitigation measures and discusses any policy implications. This refers to policies as set out in Local Development Plans and/or Local Development Frameworks.

Summary of Further Surveys

10.70 Table 10. 1 summarises additional ecological surveys considered to be necessary to support detailed ecological assessment for the Environmental Impact Assessment in order to allow impacts for be fully identified and where possible avoided, minimised and/or mitigated.

10.71 Surveys will focus on legally protected species and habitats, and those which are listed on the UK BAP.

10.72 Surveys will follow standard published methodologies wherever possible and appropriate.

Table 10.1 - Additional ecological surveys required 2013

Ecological Feature	Survey Details.
Habitats	• Update Phase 1 habitat survey of application site, including survey for non-native invasive species. • Survey proposed signage modification locations, with potential for subsequent Phase 2 survey work.
Bats	Detailed survey and assessment of any potential roost site with Park and Ride site directly affected by tree removal for health and safety reasons.
Reptiles	Reptile survey of suitable habitats within the Park and Ride site.

Conclusions

10.73 Given the existing ecological and design information available in relation to the scheme and the existing conditions at the application site, and assuming appropriate avoidance, reduction and/or mitigation measures are incorporated into the scheme design and implemented, the current assessment is that impacts on the identified ecological receptors are unlikely to be significant.

11. Water & Drainage

Introduction

11.1 As part of the screening study for Elmbridge Court Park and Ride, a broad overview of potential impacts on flood risk and the water environment has been carried out. Previous work and existing data has been reviewed and an assessment has been undertaken in accordance with the general procedures laid out in the Water Environment Sub-Objective of the Transport Analysis Guidance (TAG). This section summarises key flood risk issues and makes recommendations for further investigations.

Baseline Conditions

Elmbridge Flood Risk Assessment, May 2008

11.2 In May 2008 Atkins Limited carried out a Flood Risk Assessment (FRA) of Elmbridge Court Park and Ride (Elmbridge Transport Major Scheme Bid) for Gloucestershire County Council. The proposed development was found not to be at risk from tidal or fluvial flooding, as identified by the Environment Agency Indicative Floodplain Map. The FRA describes two drainage ditches running adjacent to the site; one along the south-west boundary, and one along the north-west boundary. The keys findings and recommendations from the FRA were:

- The proposed site is categorised as 'less vulnerable' and falls within the Environment Agency Flood Zone 1; consequently the proposed development is deemed appropriate for this site;
- The surface water drainage arrangement for the development should be such that the volumes and peak flow rates of surface water leaving the site and associated changes at the Elmbridge Court roundabout are no greater than the rates prior to the proposed development; and,
- The use of Sustainable Drainage Systems (SuDs) should be considered if ground conditions permit.

Strategic Flood Risk Assessment, February 2008

11.3 In September 2008 Halcrow carried out a Level 1 Strategic Flood Risk Assessment (SFRA) for Gloucestershire County Council. The SFRA states that:

11.4 *"Not all minor watercourses have had Flood Zone maps produced for them, specifically, those with a catchment area of less than 3km². These watercourses may appear to be fully in Flood Zone 1, when in reality a degree of flood risk will be posed. For any development site located adjacent to an unmapped watercourse within Flood Zone 1, an 8m development easement from the top of bank must be applied and a site specific FRA undertaken"* (Paragraph 2.5).

11.5 The proposed development site is adjacent to two minor watercourses (drainage ditches), which will need a site specific FRA.

11.6 Paragraph 4.6.10 of the SFRA highlights that:

11.7 *"towards the north of Longlevens, the Flood Zone maps are misaligned in a number of places… It should be noted that a flood mapping study is currently being undertaken for the Horsbere Brook with revised modelled flood outlines expected to be available at the end of 2008. Caution should therefore be taken when interpreting the existing Flood Zone information and the SFRA should be amended when the updated Flood Zone maps become available."*

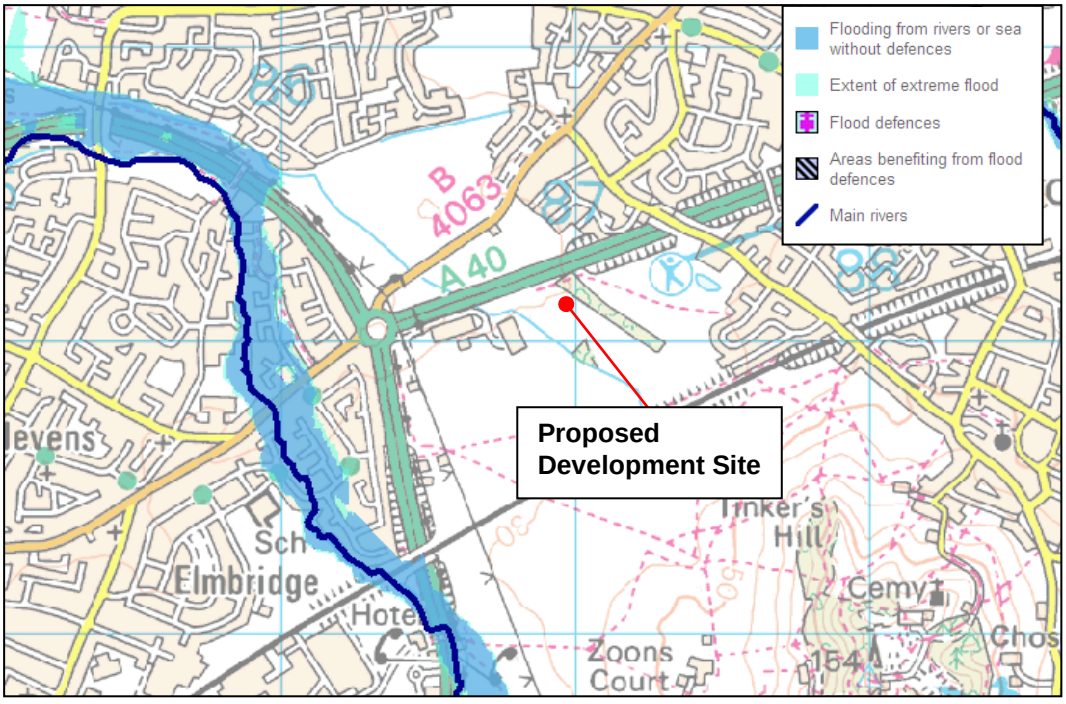
11.8 The flood zones currently available on the Environment Agency website (**Figure 11.1**) do not appear to include the revised outlines discussed in the SFRA. Updated flood zone mapping should be obtained to inform future FRAs of the development.

Arle Court bus lane

11.9 Arle Court bus lane, this scheme comprises of highway works providing an additional bus lane within and adjacent to the existing highway land. Hatherley Brook runs approximately 150m to the south west of the proposed works and care should be taken during construction as discussed below in section 11.11. The site falls outside of the current flood zones.

11.10 The works proposed include provision of a new bus lane which will replace an existing greenfield strip with hard standing. Approximately 3.5m of land will be taken for the distance between the Arle Court roundabout to the GCHQ junction. A surface water drainage arrangement for the works will be required such that the volumes and peak flow rates of surface water leaving the area affected by the changes are no greater than the rates prior to the proposed bus lane.

Figure 11.1 – Environment Agency Flood Zone Map[17] centred on proposed development site



Potential Impacts

Construction

11.11 The effects of the scheme are expected to fall into both the " construction of new transport infrastructure" and the "changes in pattern of use" categories.

All new development has the potential to impact on surface water during the construction phase. If the development site is located in close proximity to a watercourse, appropriate care will need to be taken.

Precautions should be put in place to reduce the pollution from surface water runoff and also, if required, whilst working in the watercourse.

[17] http://maps.environment-agency.gov.uk/ , 01/03/2012

To reduce the impact of pollution during the construction phase, good working practices should be followed throughout all stages of the Proposed Scheme. The procedures in the following relevant standards should be followed.

1. Environment Agency *Pollution Prevention Guidelines 1 - General Guide to the Prevention of Pollution*.
2. Environment *Agency Pollution Prevention Guidelines 5 - Works in, near or liable to affect Watercourses*.
3. Environment Agency *Pollution Prevention Guidelines 6 - Working at Construction and Demolition Sites*.
4. Environment Agency *Pollution Prevention Guidelines 8 – Safe Storage and Disposal of Used Oils*.
5. Environment Agency *Fact Sheets FD1 to FD10*.

Operation

11.12 The project will increase the impermeable surface area which will impact on transport and dilution of waste products and conveyance of flow and material. The Scheme may impact the conveyance of flow in the local drains.

Potential Mitigation Measures

11.13 Current guidance from the Environment Agency recommends that all surface water runoff from a developed site and associated changes at the Elmbridge Court roundabout should be regulated to match the current greenfield runoff of the site, both in terms of quantity and hydrological timing unless it is providing wider environmental benefits.

11.14 The use of grey water recycling systems on the site and the use of soakaways and swales if soil conditions will allow, will help regulate the flow. If soil conditions negate the use of such SuDs, attenuation on site will need to be provided.

11.15 The term SuDs covers a wide range of drainage facilities, including:

- End of pipe facilities e.g. wetlands or retention ponds;
- Source control systems e.g. pervious paving;
- Storm control devices e.g. soakaways; and
- Site controls e.g. infiltration trenches and basins and swales.

Assessment Methodology

Transport Analysis Guidance

11.16 Assessment of the Elmbridge Park and Ride Car Park has been undertaken in accordance with the general procedures laid out in the Water Environment Sub-Objective of the TAG Unit 3.3.11, November 2009. The TAG Unit 3.3.11 guidance provides a method by which the significance of the identified potential impacts can be appraised consistently by decision makers. The evaluation process can be broken down into four distinct stages:

- Stage 1: Review the activities proposed and the potential impacts identified;
- Stage 2: Appraisal of the importance of the water environment within the study area;
- Stage 3: Appraisal of the potential impacts of the proposal on the important attributes; and,
- Stage 4: Determine a final assessment score.

Application of the TAG Unit 3.3.11 Guidance

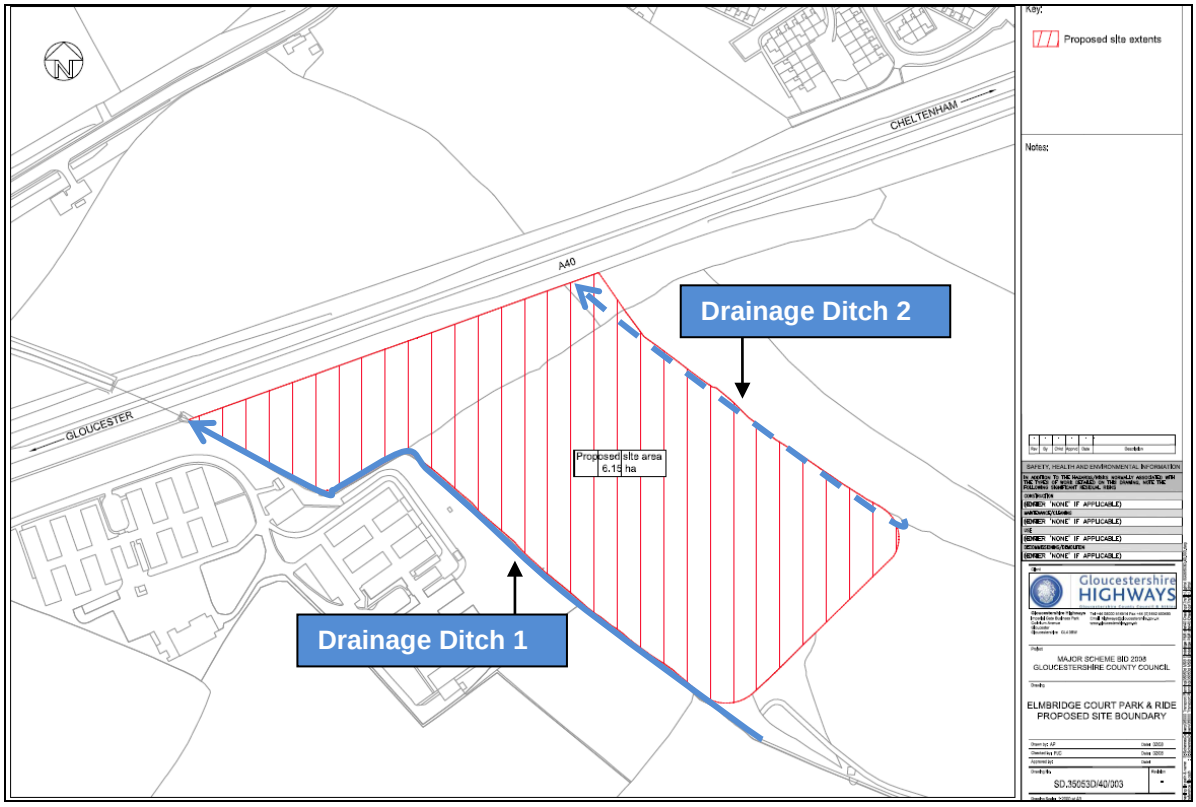
11.17 Qualitative assessment using TAG Unit 3.3.11 guidance, which can be found at http://www.dft.gov.uk/webtag/documents/expert/unit3.3.11.php, requires the identification of receptors potentially impacted by the proposed works. A review of existing data highlights two receptors:

- Drainage ditch 1: runs along the western boundary of the site;
- Drainage ditch 2: exact location is unknown; it is thought that the ditch runs along the eastern boundary of the site.

11.18 As shown in **Figure 11.2**, both ditches flow in a northwesterly direction, and are culverted underneath the A40.

11.19 Using information from the 2008 Elmbridge FRA, the two receptors have been assumed to have similar characteristics to one another. The exact location of drainage ditch 2 is unknown but it is thought to be adjacent to the proposed development site boundary. For this assessment, it has been assumed that the two receptors will be similarly impacted and the summary assessment scores the same. When further information and details are available, this assumption should be revisited.

Figure 11.2 – Indicative Location of Drainage Ditches



11.20 Whilst a precautionary principle has been applied; predicted potential impacts may be highly uncertain due to a lack of information or insufficient design detail. Despite this uncertainty, all potential impacts have been included to ensure all risks are considered. Since detailed designs and potential mitigation measures are not currently known, it has been assumed that no mitigation measures are included as part of the design.

11.21 The cumulative impact of the proposed development was found to have **slight adverse impacts** on the water environment.

Conclusions

11.22 A number of conclusions and recommendations can be made as a result of this study:

- It is recommended that a site specific, Level 3 FRA is carried out. This should assess the flood risk from the adjacent minor watercourses and include hydrological and hydraulic analysis.
- The surface water drainage arrangement for the development site and associated changes at the Elmbridge Court roundabout should be such that the volumes and peak flow rates of surface water leaving the site are no greater than the rates prior to the proposed development.
- It is recommended that SuDs techniques are used to manage surface water on the proposed site.
- A qualitative assessment using TAG Unit 3.3.11 guidance indicated that the proposed development is likely to have slight adverse impacts on the local water environment. It is recommended that this is revisited as and when further information, including design details, becomes available.
- It is recommended that the following information is obtained to inform the above:
    1. Updated Environment Agency flood zone maps including model outputs from the Horsbere Brook study completed in 2008, and the new 2011 Horsbere Brook flood alleviation scheme; and,
    2. Topographic survey of the site and adjacent watercourses.
- A surface water drainage arrangement for the Arle Court works will be required such that the volumes and peak flow rates of surface water leaving the area affected by the changes are no greater than the rates prior to the proposed bus lane.

12. Socio-Economics

12.1 This section of the Scoping Report presents a brief introduction into the socio-economic conditions in the area of the proposed location for the Elmbridge Park and Ride facility and associated bus priority schemes. An overview of potential areas of impact is provided along with a method statement for undertaking a full socio-economic assessment.

12.2 The scheme falls within three local authority areas of Tewkesbury Borough, Gloucester City and Cheltenham Borough Councils. In order to place the project in the wider context the assessment will consider and compare the socio-economic conditions across a number of spatial areas (where possible) including three Scheme Areas – Elmbridge Roundabout and Park & Ride[18], Arle Court Bus Priority[19] and A40 Westall Green Bus Priority[20] and broader benchmark areas of Tewkesbury and Cheltenham Borough's, Gloucester City, Gloucestershire LEP, Gloucestershire County and England.

Existing Situation

12.3 This section provides a brief insight into the socio-economic conditions in the area of the scheme and compares it to the wider geographic context. This will inform the further socio-economic analysis that will be undertaken in the full assessment, as detailed in the Assessment Methodology section.

Population and Demographics[21]

12.4 The population in the three Scheme Areas and associated benchmark areas is presented in the table below.

Table 12.1 – Population of Scheme Areas

Area	Population
Elmbridge Roundabout and P&R	21,495
Arle Court Bus Priority	11,052
A40 Westall Green Bus Priority	16,770
Tewkesbury	76,405
Cheltenham	110,013
Gloucester	109,885
Gloucestershire	564,559

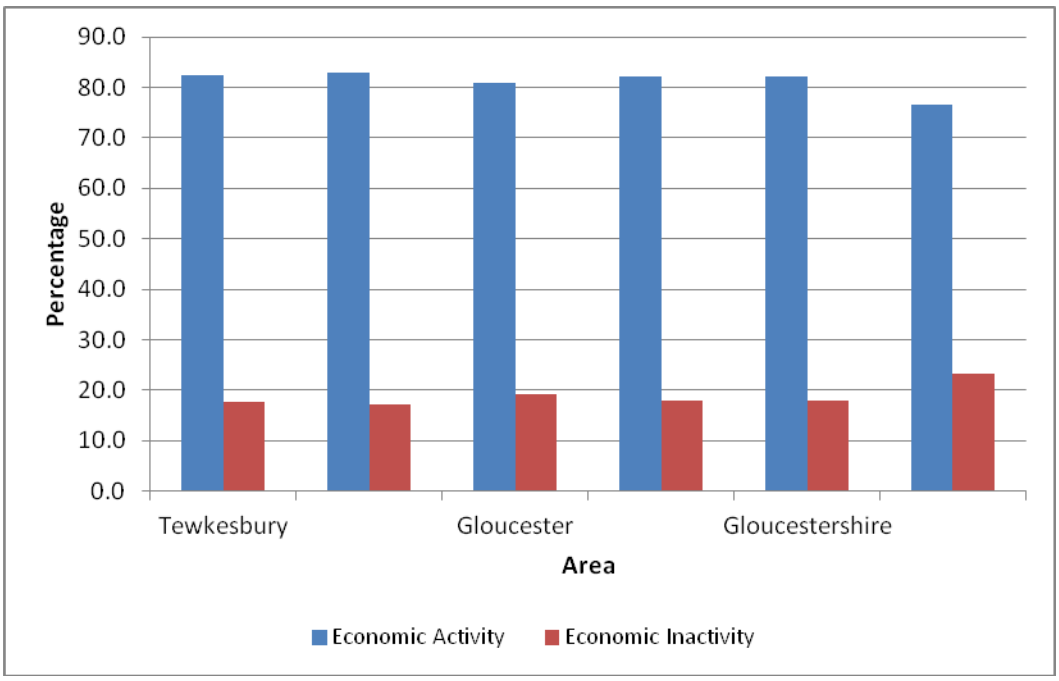
(Source: Census 2001)

12.5 The key benchmark areas experienced population growth over the period 2001-2010 with the population of Tewkesbury Borough increasing by 6.9%, 7.7% across Gloucester City and 4.8% for Cheltenham Borough. Updated population estimates at ward level for the study area are currently unavailable but this will be investigated further at the next stage when Census 2011 data may have become available.

[18] Churchdown Broofield and Innsworth with Down Hatherley Wards in Tewkesbury Borough and Elmbridge and Longlevens in Gloucester City.
[19] Benhall and The Reddings, Hesters Way and St Mark's Wards, Cheltenham Borough.
[20] Landsdown and Park Wards, Cheltenham Borough.
[21] Data sources include: Census 2001, Claimant Count & Annual Population Survey available via NOMIS.

12.6 **Figure 12.1** shows the economic activity rate within the local authority and benchmark areas for the twelve month period up to June 2012.

Figure 12.1 – Economic Activity and Inactivity July 2011–June 2012 (as a % of Working Age Persons)



(Source: NOMIS Annual Population Survey)

12.7 The economic activity rate demonstrates that the overall participation rate in the labour market was high in Cheltenham at 82.9% and Tewkesbury at 82.4%. The rate across Gloucester City was slightly lower at 80.8%. All three areas have a higher economic activity rate than the national average of 76.7% and are just higher than the average across the Gloucestershire LEP area at 82.1%.

12.8 Latest Claimant Count Data is set out in Table 12.2 below for each of the Scheme and benchmark areas.

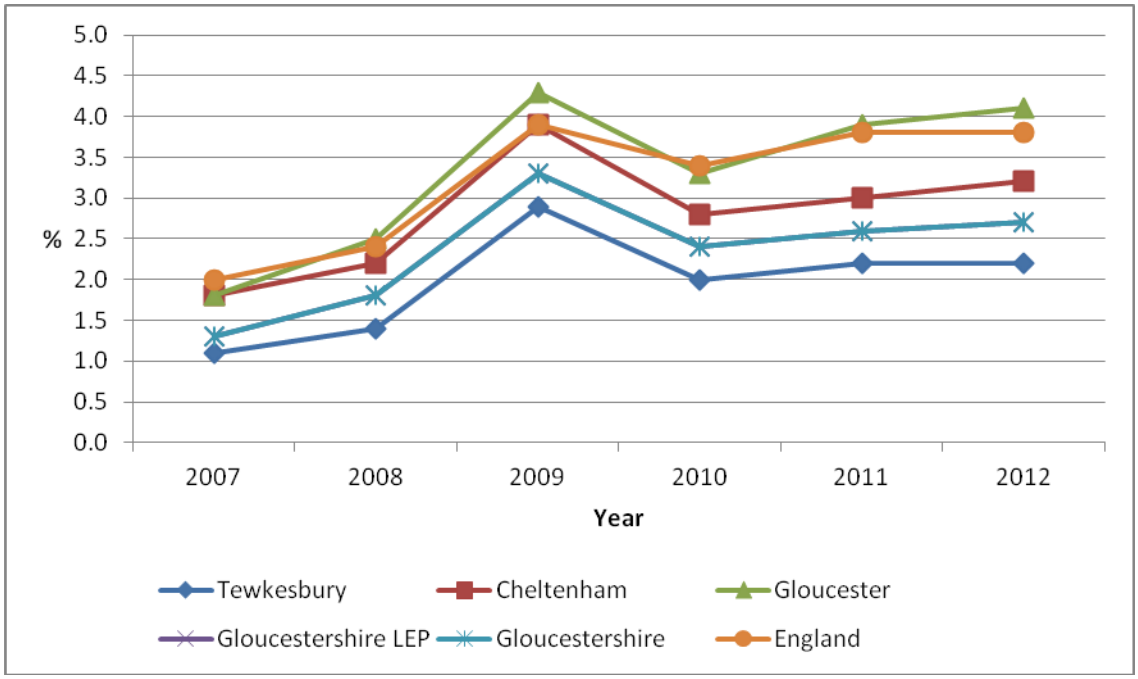
Table 12.2 – Comparison of Claimant Count Rates across all areas

Area	Rate (%)
Elmbridge Roundabout and P&R	0.9
Arle Court Bus Priority	1.3
A40 Westall Green Bus Priority	2.7
Tewkesbury Borough	2.2
Cheltenham Borough	3.2
Gloucester City	4.1
Gloucestershire LEP	2.7
Gloucestershire	2.7
England	3.8

(Source: NOMIS Claimant Count, October 2012)

12.9 The three Scheme Areas all have lower rates than the corresponding local authority areas. The area which includes the Elmbridge Roundabout and Park & Ride has very low levels of claimants at just 0.9% especially compared to the average for Tewkesbury Borough (2.2%) and Gloucester City at 4.1%.

Figure 12.2 – Claimant Count Rate (Annual as of February) 2007- 2012



(Source: NOMIS Claimant Count October 2007 –October 2012)

12.10 **Figure 12.2** illustrates the rising trend in the proportion of people claiming unemployment benefits in the benchmark areas. All areas experienced a sharp rise in claimant levels between 2008 and 2009, this was followed by a small dip in numbers during 2010. Subsequently all areas, except England, experienced a small rise between 2011 and 2012. These trends are in line with the experience of claimant levels nationally and are in line with the impact of the economic recession.

12.11 The area's socio-economic indicators suggest relative economic prosperity in the three Scheme Areas as well as across the benchmark areas of Cheltenham and Tewkesbury Boroughs. Gloucester City experienced slightly worse economic conditions when compared to the other two local authority areas and the sub-region/ county areas. Further analysis is now required at the ES stage to understand further the character of the labour market in the Scheme Areas and comparator areas in terms of availability of labour, skill levels and in particular travel movements in order to establish where people are travelling to work and for what type of employment. Analysis of deprivation issues will also be undertaken.

Potential Impacts

12.12 This section presents an initial consideration of the potential socio-economic effects of the proposed scheme. It is not predicted at this stage that the level of direct impacts (e.g. direct jobs) will be substantial although some direct job creation is anticipated during the operational stage.

12.13 The proposed scheme has some potential to generate wider regeneration/ socio-economic impacts. All the potential socio-economic effects outlined below will be examined and assessed fully in terms of likelihood and significance at the ES stage. The socio-economic impacts of the scheme are likely to include the following:

Construction phase

- Creation of temporary jobs during the construction phase (direct, indirect and induced).
- Temporary disruption to local residents and businesses.

Operational phase

- Creation of additional direct, indirect and induced jobs from the operation of the park and ride facility;
- Wider regeneration/ socio-economic effects, including:
  - Improved accessibility to employment and training opportunities in nearby Cheltenham town centre and Gloucester City due to new and improved public transport provision;
  - Impact on housing development due to improved access to job opportunities and new housing areas;
  - Improved quality of life as a result of reduced congestion/ quality of public transport and carbon emissions and associated cleaner environment; and,
  - Contribution to economic development/ regeneration policy objectives.

Approach to Assessment

12.14 The socio-economic impact assessment will examine the baseline conditions and potential impacts of the proposed scheme at a finer geographic detail. The baseline assessment will include qualitative and quantitative information including an in-depth study of the local socio-economic conditions, a review of relevant regeneration and economic development documents/ initiatives and consultation with relevant stakeholders.

Socio-economic Baseline

12.15 At the EIA stage a full and detailed socio-economic baseline will be produced for the Scheme Areas each benchmarked against the local authority areas of Tewkesbury Borough, Cheltenham Borough and Gloucester City, Gloucestershire LEP area, the county of Gloucestershire and England. The analysis will focus on the indicators below, which are deemed to be the most relevant to this study:

- Working Age Population – current and projected levels of the working age population will be analysed in order to understand the potential availability of labour at present and in the future;
- Economic Activity – levels of economic activity indicate the current size of the available workforce and are an indication of how active the population is within a labour market. This is currently fairly high; however, the types of economic activity, the impact of the recession and likely trends over time will be examined further;
- Unemployment – analysis of unemployment data will help identify the current supply and demand for labour in the Scheme Areas and assessment of the potential for travel to other areas;
- Employment and Business structure – the number of people employed in the area and the number of business units will be analysed and broken down by sector in order to identify the most dominant industries in the local area. This will help further identify the current demand for employment and match against supply;
- Travel to work patterns – this will be examined in terms of the types of journeys currently made from the defined Scheme Areas and provide greater understanding of the spatial movement of labour, by number and mode around the area; and,

- Deprivation – levels of overall deprivation in the area will be analysed, alongside individual measures of deprivation such as education, skills and training, employment and income.

12.16 This evidence base will inform the assumptions that can be made about the socio-economic impacts in the locality.

Consultation and Contextual Analysis

12.17 A brief review will be undertaken of the socio-economic policy context at the local, sub-regional and national level. At the EIA stage we will consult with relevant stakeholders including regeneration and economic development officers at Tewkesbury, Gloucester and Cheltenham Councils, Gloucestershire County Council and the Gloucestershire LEP in order to gain a more detailed understanding of the area, the key socio-economic challenges and opportunities it faces and how the proposed scheme may affect them.

Economic Impact Assessment

12.18 The socio-economic baseline, review of relevant policy context and discussion with key stakeholders, as described above, will form the basis for assessing the economic impact of the scheme. The economic impact analysis will set out the contribution of the link road to the local economy and will consider the following impacts, dependent upon the evidence from the earlier analysis:

- Employment Effects. This will include direct and indirect jobs during both construction and operational phases;
- Income Effects. This will assess the income projections into the local economy, calculated for the construction and operational phases including potential supply chain and consumption effects where applicable;
- Wider Economic Impacts. This will assess any other impact, including impact on potential labour market movement, employment and training opportunities due to improved accessibility, reduced journey times on productivity and the strategic policy fit and any regeneration impacts; and,
- Any disruption to local residents and businesses, especially during the construction phase. If any adverse impacts are identified then appropriate mitigation measures will be considered.

13. Soils and Land Use

Overview

13.1 This section details the scope of the soils and land use assessment for the proposed Elmbridge Court Park and Ride development. The assessment will consider two key elements:

- Impacts that relate to agricultural land quality, including soils; and
- Impacts on individual farm business there are present on, or linked to, the study area.

Baseline Conditions

Land use

13.2 The land use within the wider study area is a mix of urban fringe and agriculture. The proposed site lies in a pocket of predominantly rural land use to the north east of Gloucester. The residential areas of Elmbridge, Innsworth and Churchdown border the rural land use pocket to the west, north and east of the proposed site. Aerial photographs show that agricultural land use within the study area predominantly comprises arable land (e.g. under cereals) and improved grassland.

13.3 The land use within the site is unmanaged, semi-improved grassland. The site lies within an area of designated Green Belt.

Geology

13.4 The study area is predominantly underlain by mudstones of the Blue Lias Formation and Charmouth Mudstone Formation. Superficial Alluvium deposits that comprise clay, silt, sand and gravel overlay the mudstone at the northern edge of the site.

Soils

13.5 Initial assessment of soils has been obtained from the National Soil Resources Institute Soilscapes dataset and provides a preliminary indication of soil characteristics in the study area. The predominant soilscape at the site is lime-rich loamy and clayey soil with impeded drainage. This soil can support grassland and arable land uses.

Climate

13.6 The mean annual temperature is 9.8^0C – 11.0^0C, with an average maximum daily temperature of 13.8^0C – 14.8^0C and an average minimum daily temperature of 6.0^0C – 7.2^0C. The average precipitation between 1971 and 2000 was 500mm to 650mm.

Agricultural land classification

13.7 The Provisional Agricultural Land Classification maps shows the study area to comprise predominantly ALC Grade 3. The current land use and desk study suggest that the site comprises Grade 3b land and is not likely to be 'best and most versatile'.

13.8 The classification does not subdivide Grade 3 land into 3a and 3b. The maps provide an indicative understanding of potential ALC grade only. Grades 1, 2 and 3a represent 'best and most versatile' land and it is these that require proper consideration of the impacts of development under Government Planning Policy Statement 7 (PPS7) *Sustainable Development in Rural Areas* published in August 2004 (paragraphs 28-29).

Potential Impacts

13.9 Potential impacts relate to agricultural land quality and to farm businesses e.g.:

- Permanent land take of the footprint of the development area;
- Severance or disruption to access during and after construction; and
- Impacts on field drainage and water supplies.

13.10 The overall significance of the impact is likely to be very minor:

- The site is owned by a single landowner who is keen to negotiate a compulsory purchase order for the land. The site lies within a wider parcel of land under the same ownership. The impact on farm business and on severance, access and drainage is therefore mitigated.
- The site is likely to be ALC Grade 3b. Loss of less than 10ha of lower quality agricultural land can be considered to be a 'very minor adverse' impact on the national soil resource.

Assessment

Overall

13.11 Assessment of the impact of the proposed development on farm business is scoped out. The land may be purchased via voluntary agreement or Compulsory Purchase Order. No further mitigation is required.

13.12 Assessment of the impact of the proposed development on the soil resource is consistent with the approach as set out in Planning Policy Statement 7 (PPS7) Sustainable Development in Rural Areas published in August 2004 (paragraphs 28-29). The Government has re-affirmed the importance of protecting our natural resources and the services they provide in Securing the Future – delivering UK sustainable development strategy published in March 2005 (chapter 5). PPS7 requires that local government seeks to direct development away from areas of superior agricultural land. The Agricultural Land Classification system classifies land into 5 grades. Grade 3 is subdivided into grades 3a and 3b. The 'best and most versatile' land is defined as Grades 1, 2 and 3a by PPS7 and it is these grades that require proper consideration of the impacts of development alongside other sustainability considerations such as the protection of natural resources (including soil resources). According to MAFF's 1988 Revised Guidelines for Agricultural Land Classification of England and Wales, where possible, development should be avoided on land of Grades 1-3a.

13.13 Desk study for this report has considered: option proposals, plans, drawings and proposed mitigation measures; national and local policy guidance; and published soil, climatic, agricultural and geological maps and data.

13.14 Detailed field analysis of soils to assess ALC grade is outside the scope of this project. Preliminary assessment based on desk study suggests that the site is not likely to receive special protection in respect of its agricultural quality under national and local planning policies.

13.15 The general methodology for assessment of the significance of land use impact includes consideration of the area of land take and the ALC grade of the soil. A nationally recognised set of standard assessment criteria for effects on agricultural land and farm and other businesses does not exist; a bespoke set of criteria are therefore used for this assessment, developed in the light of relevant European, national, regional and local policies and guidance (see **Table 13.1**). Most agricultural impacts are neutral or negative, few being positive, and are graded on a scale from neutral to major.

13.16 The area of proposed land take is ca.7 ha. The assessment suggests that the site is likely to be classified as Subgrade 3b. Loss of less than 10ha of Subgrade 3b and below suggests that the effect is 'very minor adverse'.

Table 13.1 – Significance of Effect on Agricultural Land Quality

Effect	Criteria
Major Adverse	Loss of 20 ha or more of the best and most versatile agricultural land – that is, land classified as grades 1, 2 or 3a under the MAFF ALC system. This follows the approach of Annex B15 of PPG7 as amended March 2001, which stipulated that MAFF had a right to be consulted and hence object to schemes where a significant amount of such land was required for development. This has not been retained in the subsequent PPS7 but nonetheless represents a measure of land loss that has been used in planning issues for 20 years or more.
Moderate Adverse	Loss of 10 to 19 ha of best and most versatile agricultural land - grades 1, 2 or 3a - or 50 ha or more of lower quality agricultural land - grades 3b, 4 and 5 under the MAFF ALC system.
Minor Adverse	Loss of 5 to 9 ha of best and most versatile agricultural land - grades 1, 2 or 3a - or 10 to 49 ha of lower quality agricultural land - grades 3b, 4 and 5 under the MAFF ALC system. A threshold of 10 acres (approximately 4 ha) or more follows the approach of paragraph 6 of the Department of the Environment Circular 71/71 'Development of Agricultural Land'
Very minor Adverse	Loss of less than 4 ha of best and most versatile agricultural land - grades 1, 2 or 3a - or less than 10 ha of lower quality agricultural land - grades 3b, 4 and 5 under the MAFF ALC system.

Note: The effects relate entirely to loss of agricultural land relative to the national resource and do not reflect any other inherent characteristics, such as scenic or habitat value

Potential Mitigation Measures

Effects on soils

13.17 The EC Thematic Strategy for Soil and Government policy set out in the First Soil Action Plan for England 200 1-2006 a nd s ubsequent dr aft S oil Strategy f or England (March 2008) has m oved away from the protection of land towards the sustainable use of soil. Whilst there is no mitigation for the loss of agricultural land (apart from compensation at market value), it is possible to partially mitigate effects of the proposals on soil.

13.18 The quality and quantity of soil on site would be maintained by implementing appropriate techniques for stripping, storing and re-use. This approach would be adopted in a Soil Handling and M anagement S trategy (SHMS), which would in due c ourse f orm par t of t he C onstruction Environmental Management Plan (CEMP).

13.19 Where pos sible, l oss of agr icultural land would b e m inimised b y c areful en gineering d esign, sensitive landscape works and restoration of disturbed land.

Summary

13.20 This assessment of soils and land use has considered two key elements:

- Impacts that relate to agricultural land quality, including soils; and
- Impacts on individual farm business there are present on, or linked to, the study area.

13.21 The overall significance of the impacts is likely to be very minor:

- The site is owned by a single landowner who is keen to negotiate on selling the land. The site lies within a wider parcel of land under the same ownership. The impact on farm business and on severance, access and drainage is therefore mitigated.

- The site is likely to be ALC Grade 3b. Loss of less than 10ha of lower quality agricultural land can be considered to be a 'very minor adverse' impact on the national soil resource.

13.22 In view of the above, further assessment of soils and land use is not required and is scoped out at this stage. Mitigation of the impacts should however be undertaken via compulsory purchase order and development of a SHMS.

References

http://maps.bgs.ac.uk/geologyviewer_google/googleviewer.html

http://www.landis.org.uk/soilscapes/

http://magic.defra.gov.uk/

http://www.metoffice.gov.uk/climate/uk/

MAFF (1988). Agricultural Land Classification of England and Wales. Revised Guidelines and Criteria for Grading the Quality of Agricultural Land

14. Transport and Access

Introduction

14.1 The proposed P&R facility and modifications to the Elmbridge Court Roundabout would have an impact on existing travel patterns both during construction and operation. This chapter assesses the potential for the proposed scheme to have significant impacts on transport and accessibility.

Baseline Conditions

14.2 Current traffic levels on the roads around Elmbridge Court junction, and within the wider Gloucester and Cheltenham areas, are at the point where congestion is starting to become a problem. Forecast levels of housing and employment growth up to the year 2026 mean that without new transport infrastructure, levels of congestion could get significantly worse in the future.

14.3 Elmbridge Court roundabout is one of the busiest in Gloucestershire, and as traffic levels increase, congestion and unreliable journey times will become more of a problem for people travelling to/from Cheltenham and Gloucester, as well as further afield.

14.4 The A40 is a Trunk Road which is owned and operated by the Highways Agency. The A40/A417 Barnwood Link and B4063 roads are owned and operated by Gloucestershire County Council.

14.5 A public right of way runs from east to west along a line close to the northern boundary of the proposed site. This appears disused as there is no visible means of access/signage to it.

Potential Impacts

Construction

14.6 Construction of an all-movement traffic signal controlled junction on the A40 is proposed to facilitate access/egress to/from the P&R site and Elmbridge Business Park. Significant modification to the Elmbridge Court Roundabout junction is also proposed. The significance of the temporary impact on traffic flow on A40 Golden Valley bypass, and through the roundabout will depend on the traffic management arrangements that are proposed as part of the construction contract. There is the potential for disruption as a result of lane closures and possible contra-flow working.

14.7 The Development Consent Order (DCO) application also includes for;

- Modification to the A40 junction opposite GCHQ (Whittington Road / Telstar Road) in Cheltenham to create bus priority measures,
- New cabling along the highway verges of the B4063 Cheltenham Road between the Elmbridge Court roundabout and the Nine Elms signalised junction,
- New highway signs in the verges to direct drivers to the P&R site within the extent of the highway signage strategy area.

As with the modifications to Elmbridge Court roundabout and the creation of the new signalised junction on the A40 Golden Valley bypass, the impacts of the A40 junction improvements opposite GCHQ will depend on the traffic management arrangements that are proposed as part of the construction contract. The bus lane will be accommodated by carriageway widening, so any impacts on general traffic will be temporary. However, it is noted that the felling of 23 existing trees between the existing kerbline and embankment will be required. It may also be necessary to

implement a temporary footpath / cycleway closure or diversion whilst these works are undertaken which could impact on National Cycle Network (NCN) route 41.

The cabling required to link the Elmbridge Court roundabout and the Nine Elms crossroad signals will have a temporary impact to the shared use footpath/cycleway on Cheltenham Road. This path also connects private driveways to the carriageway and so there could be disruption to the access of driveways during these works. However, there is approximately 240m between these two junctions and therefore the duration of works and disruption caused should be minimal.

The highway signage area extends along the A40 and A417 to the north and east of Gloucester; M5 on approach to junctions 11 and 11a; the A40 from western Cheltenham; and from the A417 at Brockworth. There should be minimal impact from the erection of signage on existing traffic flows, although there may be limited impacts to flora and fauna on verges during the erection of signposts and to ensure adequate visibility of signage from approaching drivers.

14.8 As part of the scheme, access to Elmbridge Court Business Park and Elmbridge Court Farm is to be altered such that the business park/farm will be accessed via the Park & Ride site rather than directly onto the Elmbridge Court Roundabout. The new point of access will be put in place before the existing access is closed up. Therefore there will be no significant adverse effect on access to the business park during construction.

Operation

14.9 Traffic modelling, undertaken as part of the business case for the scheme, suggests that the all-movement traffic signal controlled junction on the A40 is unlikely to have a significant adverse impact on traffic flow on A40 Golden Valley bypass.

14.10 Similarly, capacity of the Elmbridge Court Roundabout is shown to increase, producing minor benefits in terms of traffic congestion and delay, and reduction in vehicle movement (pcu-kms). The changes to the access arrangements to Elmbridge Court Business Park/Elmbridge Court Farm are not expected to give rise to any significant adverse transport impacts – although there may be a small increase in the distance travelled for commuters from the Gloucester direction (depending on where they work and park within the business park site). The bus priority measures on the A40 Gloucester Road in proximity to the Arle Court P&R facility will improve bus journey times whilst having negligible impact on general traffic.

14.11 The 1,000 space P&R facility will be designed to make it an attractive alternative to car-only journeys. The facility is proposed to reduce congestion on the local road network and to improve journey reliability; by substituting car-only journeys by bus for the journey into Gloucester and Cheltenham centres. This will also improve bus access to the centres of Gloucester and Cheltenham. The potential for the P&R facility to be used for other bus/coach services is being actively considered. e.g. to destinations which are significant trip generators such as the hospitals, universities and key employers in the area. The reduction in congestion and improvement in reliability will be for the benefit of all road users and the impact is predicted to be significant.

14.12 The P&R facility will sever an existing public right of way. Without mitigation the severance of this public right of way may have a significant impact.

14.13 Potential pedestrian/cycleway routes to the P&R facility from Churchdown and Longlevens/Elmbridge are to be investigated to enable effective access to the facility by non motorised users. This would have a positive impact on accessibility to the P&R facility.

14.14 The site is located approximately 1.8km from Gloucestershire Airport. Without suitable mitigation the P&R site may have an adverse impact on flight navigation (e.g. from lighting).

Potential Mitigation Measures

14.15 Mitigation of construction impacts on the Elmbridge Court Roundabout, and A40 is an important consideration and is dependent on the traffic management arrangements that are proposed as part of the construction contract. The public right of way directly affected by the proposed scheme

will be diverted to ensure no there is no severance following construction of scheme. Due to its disused/inaccessible nature investigations will be undertaken to review whether extinguishment of the PROW may be more appropriate. However improved pedestrian/cycleway facilities are being considered for accessing the facility from adjacent residential areas and existing pedestrian/cycle routes.

Assessment Methodology

14.16 Assessment of the scheme will be based upon junction and micro-simulation modelling work undertaken as part of the detailed design development. This in turn uses traffic flow data derived from SATURN model outputs contained within the ETMSB.

14.17 Transyt junction modelling software will be used to assess the new Elmbridge Court Roundabout junction and P&R access junction from the A40. This network will then also be tested using Paramics micro-simulation software, to fully understand the potential impacts of queuing and blocking-back.

14.18 Base-line models have been validated against previously obtained queue and delay information and observations of peak hour operation undertaken in Spring 2012. As agreed in previous discussions, the base-line model uses a traffic flow matrix assembled from existing traffic count data. The Elmbridge Court vehicular access from the roundabout has not been modelled due to this adding unnecessary complexity to the model for essentially zero traffic flow.

14.19 To provide a robust assessment, forecast patronage levels for the P&R have been manually adjusted from the SATURN Output to take account of likely use by private organisations running private shuttle services, not included in the SATURN network.

14.20 Once a detailed design has been finalised, assessments will be undertaken for an AM and PM weekday peak hour in all cases.

Future Scenarios

14.21 The scenarios tested will be consistent with the requirements of the Transport Assessment (TA). As the A40 remains the responsibility of the Highways Agency, the TA needs to take into account the guidelines set out in Circular 02/07 'Planning and the Strategic Road Network' and in the Department for Transport (DfT) document 'Guidance on Transport Assessment'. The proposed years of assessment are as follows:

- 2012 Baseline model;
- 2016 Opening year, without development;
- 2016 Opening year, with development;
- 2026 Future design Year (Opening +10), without development; and
- 2026 Future design Year (Opening +10), with development;

14.22 Initial scoping will be undertaken with the HA and Gloucestershire County Council to establish their requirements for assessment years and to gain approval of the flows used in the assessments. In some instances, it is understood the HA have required a future design year to be 15 years after opening (2031 in this case). Such traffic flow data is not available from existing SATURN modelling work, and is further complicated by the fact that the JCS is not defined beyond the 2021 allocations. Hence, if required, 2031 traffic flow data would be obtained by applying TEMPRO NTM growth factors to either the 2021 or 2026 data set, as agreed with the HA and GCC.

Summary

14.23 The P&R scheme and modifications to Elmbridge Roundabout are proposed to reduce road congestion in the Gloucester/Cheltenham area and to improve journey time reliability. This is

expected to have a significant positive impact on accessibility. During construction, it is possible that there may be some disruption to traffic flow on the A40 and through Elmbridge Roundabout. During operation no significant adverse impact on vehicular access and traffic flow on the A40 are anticipated. Additional capacity at the Elmbridge Roundabout is expected to have benefits in terms of traffic congestion and delay, and reduction in vehicle movement (pcu-kms). Without mitigation adverse impacts on Gloucestershire Airport are possible.

14.24 Without mitigation the P&R facility may have a significant impact on a public right of way. With the potential improvements to pedestrian/cycle routes and Public Rights of Way into the park and ride facility, non motorised user access to public transport network will be improved.

15. Interaction and Cumulative Effects

Overview

15.1 Significant interaction of effects identified in the specialist chapters could lead to further 'in combination' effects that should be considered.

15.2 Cumulative effects may arise from the combination of effects on the same receptor from other proposed or permitted schemes in the vicinity. The effects may be positive or negative and may occur during the construction and/or operational phases.

15.3 A second Park and Ride proposal within the adjacent Elmbridge Court Business Park is proposed to serve a major employer in the area. That proposal is the subject of a planning application submitted on behalf of the landowner and, in combination with the Elmbridge Transport Scheme, could give rise to significant environmental effects. This is the Park and Ride proposal within Elmbridge Court Business Park which is located adjacent to the application site and is the subject of a planning application. It is currently anticipated that the scheme in the business park will be constructed and operational before construction of the Elmbridge Transport Scheme commences. However it is expected that the constructed schemes may co-exist for a short period.

Potential Impacts

Construction

Interactive

15.4 As reported elsewhere in this scoping report the Elmbridge Transport Scheme will have environmental impacts specific to the construction phase e.g. traffic and noise. The in-combination effects of the Elmbridge construction programme will not be significant. Any significant in-combination effects will be reported in the ES.

Cumulative

15.5 Cumulative Impact of the respective construction programmes for the two P&R sites do not overlap and thus no cumulative impacts during construction of the two schemes will result.

Operation

Interactive

15.6 The impacts arising from loss of habitat, noise and lighting may give rise to significant adverse in-combination effects on ecology.

15.7 During operation of the scheme local residents may experience both noise and visual impacts from the Elmbridge Transport Scheme which together could cause a significant environment effect.

Cumulative

15.8 During operation the cumulative effects from the two P&R developments relating to traffic, noise, air quality, visual amenity, flood risk, water pollution, cultural heritage and ecology may potentially be significant.

15.9 The Elmbridge Transport Scheme and the proposed Park and Ride facility at Elmbridge Business Park are expected to have a number of significant positive impacts on transport and on health. The schemes are intended to encourage modal shift from the car to public transport and walking and cycling thereby reducing carbon emissions, encouraging more active travel and reducing accidents.

Methodology

15.10 Cumulative effects arise where several proposals individually may or may not have a significant environmental effect, but in-combination have a significant effect due to spatial and/or temporal overlap between proposals and actions and repeated removal or addition of resources due to proposals and actions. Cumulative effects can be:

- Additive- the simple sum of all the effects;
- Neutralising- where effects counteract each other to reduce the overall effect; and
- Synergistic– is the effect of two or more effects acting together which is greater than the simple sum of the effects when acting alone.

15.11 Cumulative effects assessment is a systematic procedure for identifying and evaluating the significance of effects from multiple activities. The analysis of the causes, pathways and consequences of these effects is an essential part of the process.

15.12 Cumulative (including additive, neutralising and synergistic) effects will be considered throughout the EIA process. The effects may be positive or negative and may occur during the construction and/or operational phases. In the process of collecting baseline information cumulative effects have been considered by identifying key receptors (e.g. local residents). Through the analysis of environmental effects, receptors will be identified that are particularly sensitive, in decline or near to their threshold (where such information is available). The likely cumulative effects of the proposed development and from other proposed or permitted schemes in the vicinity will then be identified, along with the likely cumulative effects in the form of multiple effects on the same receptor.

15.13 Subject to available information the following types of projects will be included in the assessment:

- approved but uncompleted projects;
- ongoing activities;
- plans or projects for which an application has been made and which are under consideration by the consenting authorities; and
- plans and projects which are reasonably foreseeable e.g. any proximate strategic sites identified in the emerging Joint Core Strategy Preferred Option.

Summary

15.14 Either in combination with other proposed schemes, or due to multiple impacts on one receptor, the Elmbridge Transport Scheme has the potential to give rise to significant cumulative effects.

16. Conclusions

16.1 The P&R scheme and modifications to Elmbridge Roundabout are proposed to reduce road congestion in the Gloucester/Cheltenham area and to improve journey time reliability. This is expected to have a significant positive impact on accessibility. During construction, it is possible that there may be some disruption to traffic flow on the A40 and through Elmbridge Roundabout. During operation no significant adverse impact on vehicular access and traffic flow on the A40 are anticipated. Additional capacity at the Elmbridge Roundabout is expected to have benefits in terms of traffic congestion and delay, and reduction in vehicle movements.

16.2 Without mitigation the P&R facility may have a significant impact on a Public Right of Way. With the potential improvements to pedestrian/cycle routes and Public Rights of Way into the park and ride facility, non-motorised user access to public transport network will be improved.

16.3 Given current information available in relation to the scheme, and the existing conditions at the application site, significant effects on ecological receptors cannot be ruled out.

16.4 Based upon the level of assessment undertaken for the landscape study, initial conclusions are that a sensitively planned scheme with well designed mitigation measures is considered likely to have slight adverse to neutral impacts on the wider area, offset by the benefit brought about by the improved transport links which encourages sustainable transport. Individual residential properties within Elmbridge, Churchdown and public rights of way users will potentially experience significant impacts; however it is anticipated that this will be largely during the construction phase.

16.5 There are a number of minor and moderate changes in noise affecting receptors in different areas. Moderate adverse impacts are expected from the operation of the P&R affecting the business park and nearby amenity areas. Minor adverse and beneficial effects are expected on the wider road network.

16.6 Although the three local authorities that encompass the Scheme have all declared AQMAs, the Scheme is only likely to affect the Cheltenham Borough AQMA, as this includes the A40 and B4634 at its eastern extent. Air quality in the area of the scheme is likely to be relatively good. During construction there may be dust raising activities which if not effectively mitigated, may affect nearby sensitive properties. The proposed scheme may have an effect on local air quality as a result of changes in traffic flows both during construction and when complete.

16.7 Construction will include ground levelling and hard surfacing, together with the provision of associated drainage and services. There may also be disturbance due to the construction of temporary works compounds and haulage roads. Given the presence of known archaeological features on the site, the works will lead to the disturbance and loss of potential archaeological deposits. This will include the loss of the extant ridge and furrow earthworks to the north of the site.

16.8 A qualitative assessment using TAG Unit 3.3.11 guidance indicated that the proposed development is likely to have slight adverse impacts on the local water environment.

16.9 The socio-economics section presents an initial consideration of the potential socio-economic effects of the proposed Elmbridge Park and Ride scheme. It is not predicted at this stage that the level of direct impacts (e.g. direct jobs) will be substantial although some direct job creation is anticipated during the operational stage. However, the proposed scheme has significant potential to generate wider regeneration/socio-economic impacts. All the potential socio-economic effects will be examined and assessed fully in terms of likelihood and significance at the EIA stage.

16.10 There is the potential for the scheme to have significant adverse cumulative effects either from the results of multiple effects on one receptor, or from the effect of the combination of different schemes in the local area.

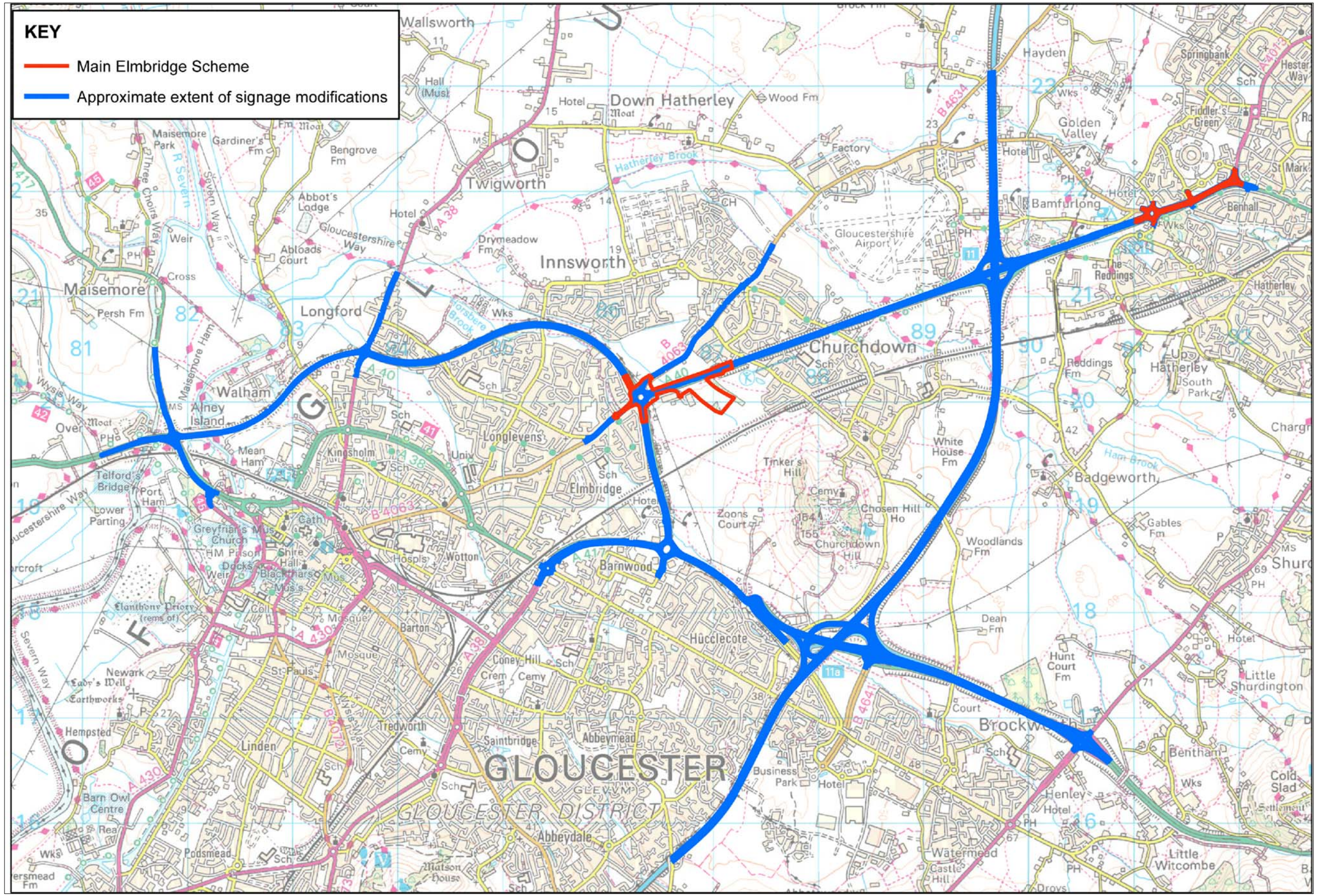
16.11 The Environmental Statement will include chapters covering the following:

- Description of the Proposed Scheme;
- Planning Policy Context;
- Alternative Sites and Layouts; an outline of the alternatives considered with the main reasons for the choice taking account of the environmental effects.
- Noise and Vibration;
- Air Quality;
- Heritage;
- Landscape and Visual Amenity;
- Ecology;
- Water and Drainage (including Flood Risk);
- Socio-economics;
- Transport and Access;
- Cumulative Effects; and
- Non-technical Summary.

16.12 The following topic areas are scoped out of the EIA because, as a result of the analysis set out in this report, it is concluded that the construction and operation of the scheme is unlikely to have significant impacts on:

- Soils and Land Use; and
- Land Contamination.

Appendix A : Site Extents & General Arrangement Drawings



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PURPOSE OF ISSUE: PINS NOTIFICATION

Key:

Notes:

Rev	By	Chkd	Apprvd	Date	Description
C	GMB	PR	PR	03.13	Extents amended
B	GMB	PR	PR	01.13	Westcliff Green section removed
A					FIRST ISSUE

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RESIDUAL RISKS

CONSTRUCTION
NONE
MAINTENANCE/CLEANING
NONE
USE
NONE
DECOMMISSIONING/DEMOLITION
NONE

Gloucestershire HIGHWAYS
Gloucestershire County Council & Atkins

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Project

ELMBRIDGE MAJOR TRANSPORT SCHEME

Drawing

Scheme Extents

Drawn by:	GMB	Date:	11.12
Checked by:	PR	Date:	11.12
Approved by:	PR	Date:	11.12

Drawing No. SD.25988.P.075

Revision C

Drawing Scale: NTS

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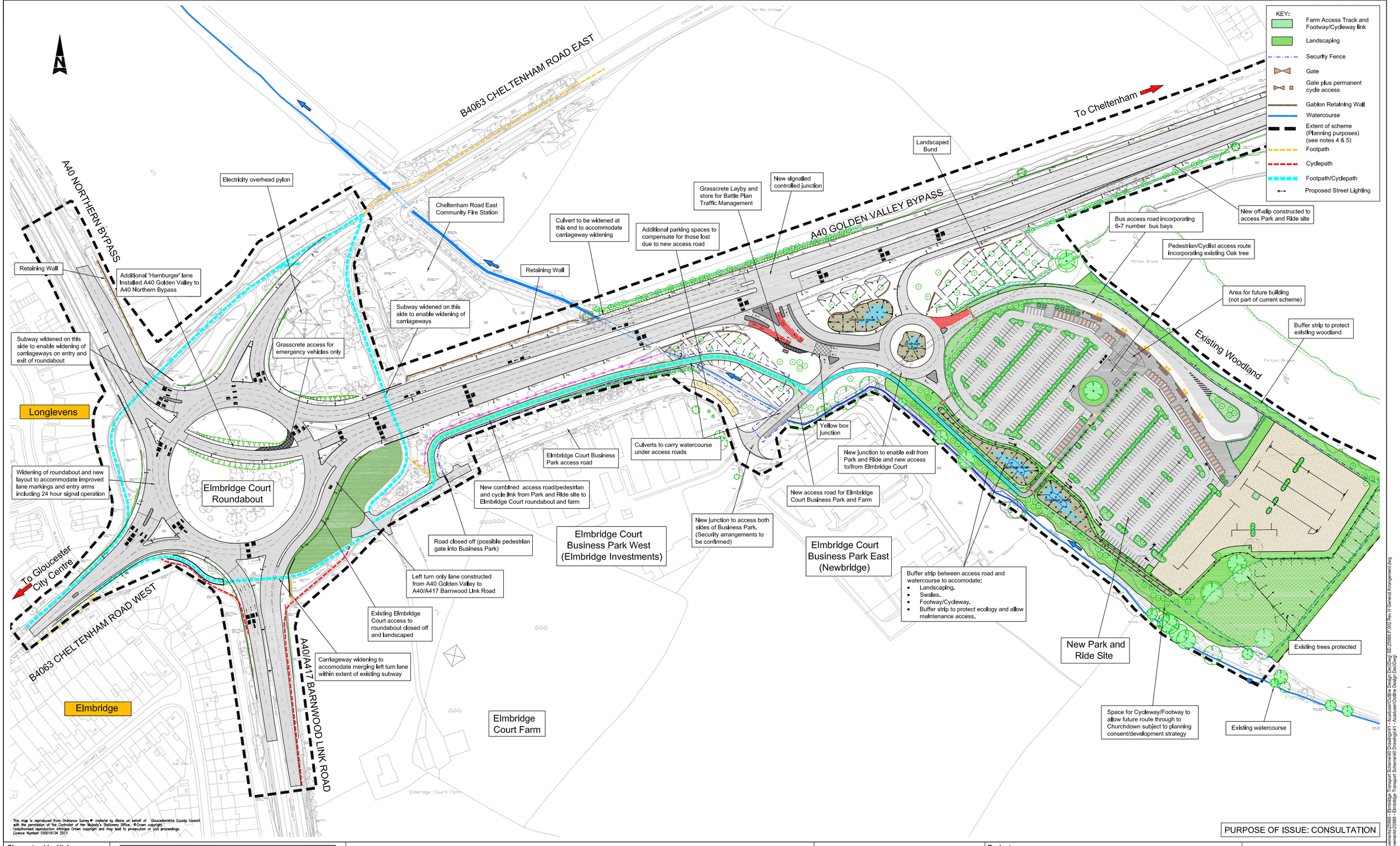

PURPOSE OF ISSUE: CONSULTATION

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SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RESIDUAL RISKS
CONSTRUCTION
Major highway junction, tar bound materials, overhead and underground utilities, adjacent to businesses and residents
MAINTENANCE/CLEANING
Major highway junction, tar bound materials, overhead and underground utilities, adjacent to businesses and residents
USE
High traffic flows, signal failure on roundabout
DECOMMISSIONING/DEMOLITION
NONE

Note:

1. This layout is outline only and is subject to further design, consultation and planning consent.
2. This layout is based on a topographical survey undertaken in 2012, some information outside the extents of the scheme based on OS base plan data.
3. This drawing does not show the exact extents of the scheme and so should not be relied upon for land purposes.
4. The scheme includes a package of bus priority improvements on the A40 in Cheltenham - refer to other General Arrangement drawings for details.
5. The scheme also includes modifications to signage outside the site extents - refer to other scheme drawings.

Rev	By	Chkd	Apprvd	Date	Description
H	GMB	PC	PR	11.12	Park and Ride layout amended. Layout amended, Cheltenham Road (west) approach amended.
G	GMB	PC	PR	09.12	Elmbridge Park and Ride site access and exit amended. Park and Ride layout amended, Cheltenham Road (west) approach amended. Topographical Survey updated, Additional notes added
F	GMB	PC	PR	07.12	A40 GV Bypass carriageway alignment amended to show new splitter island. Extent of Scheme boundary amended along Barnwood Link Road
E	GMB	AJF	PR	07.12	Amendments made to Park and Ride Site, Security Fence amended, Elmbridge Roundabout markings amended
D	GMB	AJF	PR	06.12	Park and Ride access amended and new filtering added to EC roundabout
C	GMB	AH	PR	06.12	Park and Ride access amended
B	GMB	AJF	PR	04.12	Boundary of scheme requiring planning added
A					FIRST ISSUE - S/S drawing SD.25879.A0.01 REV C

Project:

ELMBRIDGE MAJOR TRANSPORT SCHEME

Drawing

Outline General Arrangement

Gloucestershire HIGHWAYS
Gloucestershire County Council & Atkins

Drawn by: GMB	Date: 06.12
Checked by: AH	Date: 06.12
Approved by: PR	Date: 06.12
Drawing No. SD.25988.P002	Revision H
Drawing Scale: 1:1250@A1	

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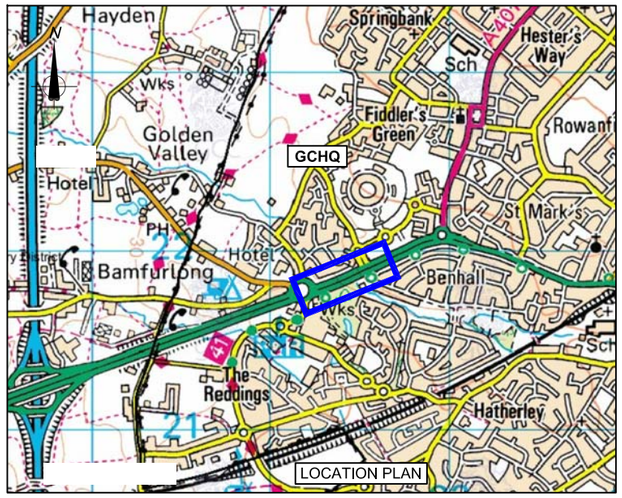
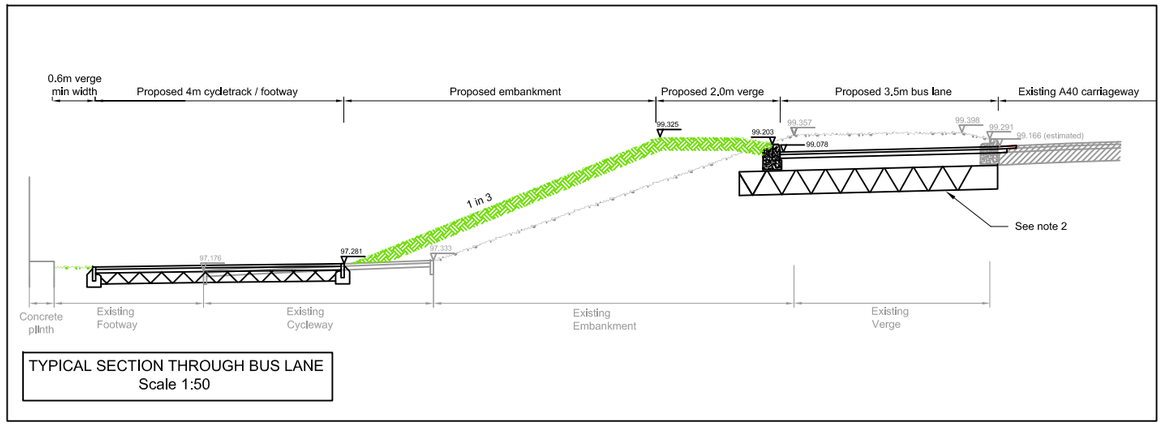
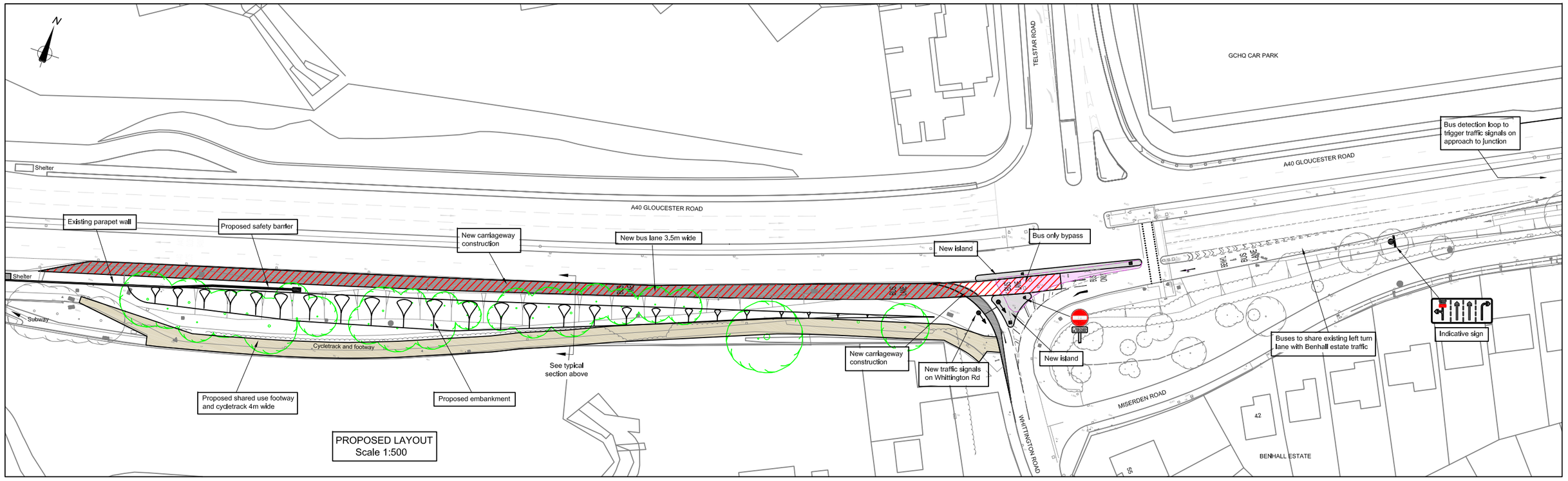
User and Plot Date



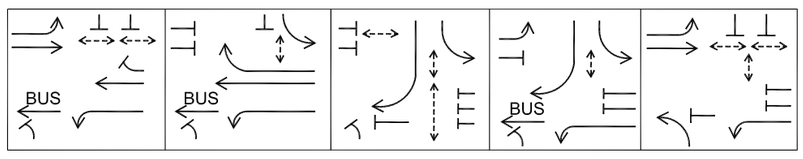


TYPICAL SECTION THROUGH BUS LANE
Scale 1:50



PROPOSED LAYOUT
Scale 1:500

PROPOSED METHOD OF CONTROL



NO ADVANCED BUS PRIORITY REQUIRED

KEY

- Proposed new carriageway, 40mm surface course, 60mm binder course, 200mm base course, 380mm type 1 sub-base
- Proposed bus lane 3,5m wide
- Proposed new traffic island, 25mm surface course, 100mm regulating/base course
- New traffic signal pole
- Bus with path through junction
- Proposed share use segregated footway and cycletrack, 25mm surface course, 50mm binder course, 175mm type1 sub-base
- Existing island to be removed
- Proposed embankment
- Trees to be removed

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RESIDUAL RISKS
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NONE
USE
NONE
DECOMMISSIONING/DEMOLITION
NONE

PURPOSE OF ISSUE: FEASIBILITY DESIGN

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Gloucestershire HIGHWAYS
Gloucestershire County Council & Atkins

Elmbridge Major Transport Scheme

Notes
1. Dimensions and levels on layouts and sections are indicative only. Exact dimensions to be confirmed after completion of MX model.
2. Ground investigation is required to determine the CBR. Road construction is indicative only. A capping layer may be required.

Rev	By	Chkd	Apprvd	Date	Description
A					FIRST ISSUE

Drawing
General Arrangement
Outbound Bus Lane and Bypass
Arle Court to Whittington Road
A40 Gloucester Road

Drawn by: GMB	Date: Nov 12	
Checked by: HC	Date: Nov 12	
Approved by: AJF	Date: Nov 12	
Drawing No. SD.25885.40.002		Revision A
Drawing Scale: 1:500 at A1		

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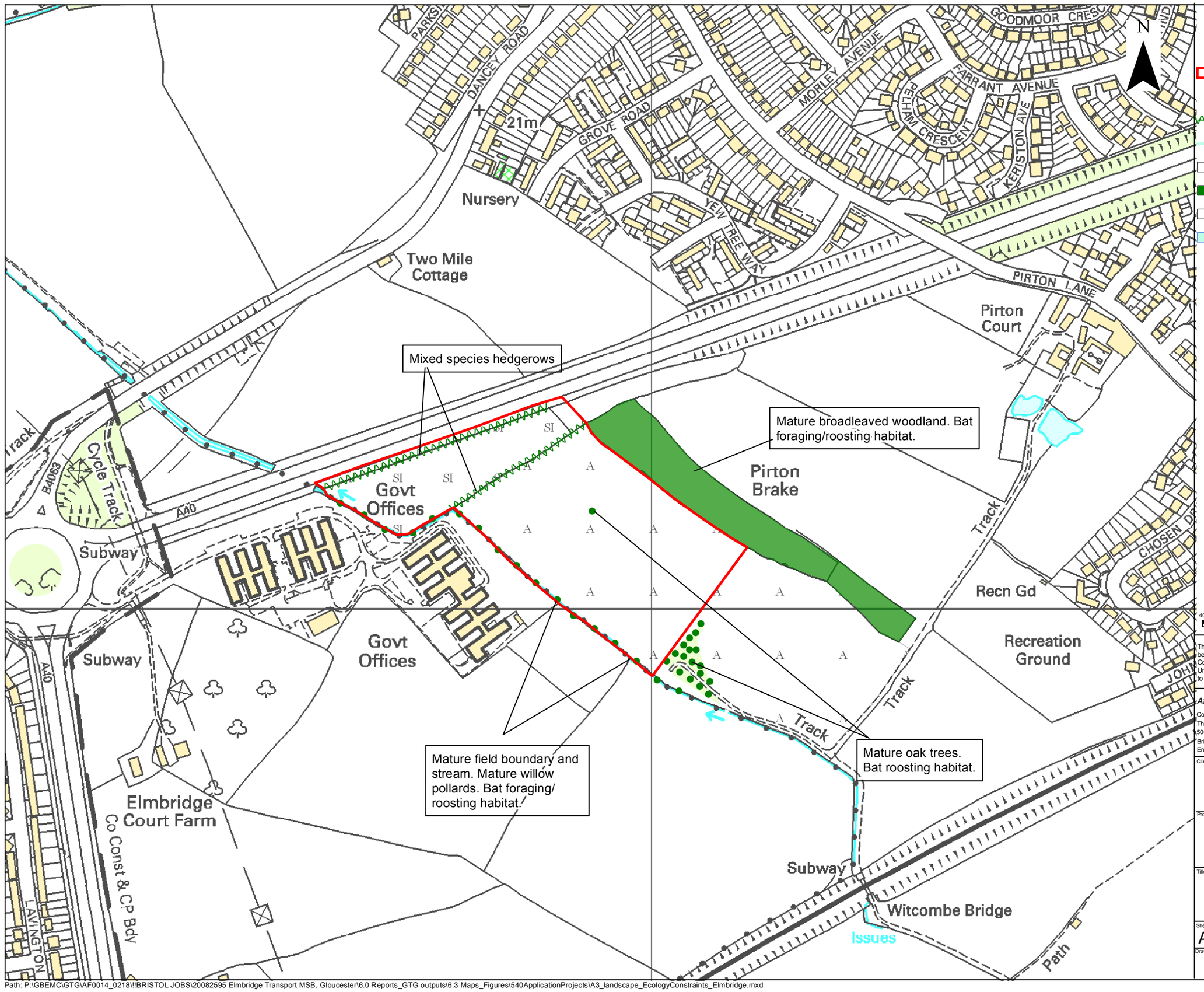
Appendix B : Landscape & Ecological Constraints Plans



ATKINS™

- Application Boundary
- Broadleaved Trees
- Mixed Species Hedgerow
- Watercourse
- SI Poor Semi Improved Grassland
- Mature Broadleaved Woodland
- A Arable
- Pond

40 20 0 40 80 120 160 Metres

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Client: Gloucestershire County Council

Project: Elmbridge Court Park & Ride

Title: Ecological Constraints Plan

Sheet Size	Original Scale	Designed/Drawn	Checked	Authorised
A3	1:4,000	RJS Date 15/05/12	DM Date 15/05/12	NR Date 15/05/12

Drawing Number: Figure 1 Rev 01

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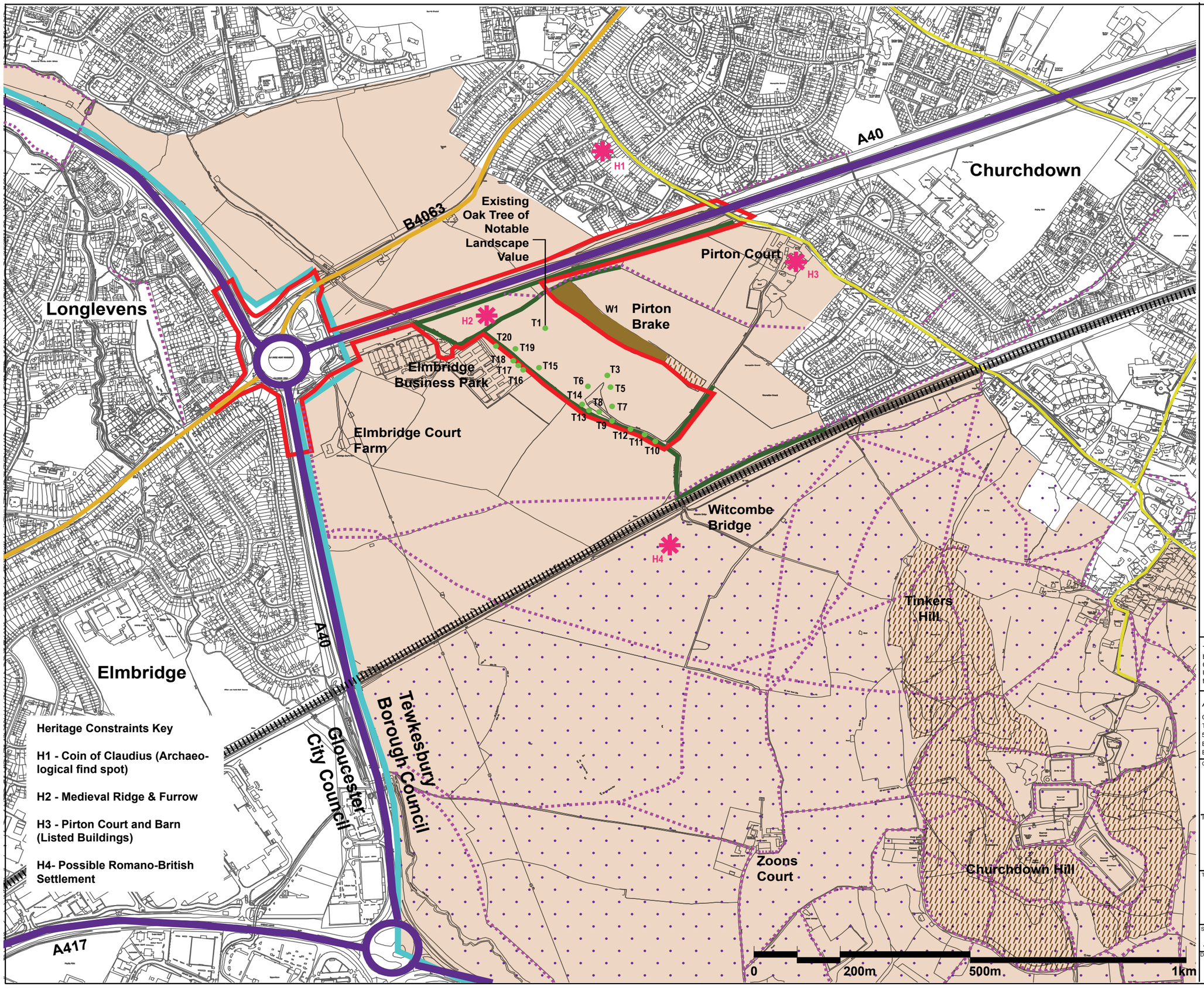

Heritage Constraints Key

H1 - Coin of Claudius (Archaeological find spot)

H2 - Medieval Ridge & Furrow

H3 - Pirton Court and Barn (Listed Buildings)

H4- Possible Romano-British Settlement

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- Site Extents
- Boundary of Tewkesbury Borough Council and Gloucester City Council
- Green Belt
- Special Landscape Area
- T15 — Tewkesbury Borough Council Tree Preservation Order
- Tewkesbury Borough Council Tree Preservation Order - W1 Area of Woodland
- Existing Woodland
- Existing Hedgerow in vicinity of site
- Public Rights of Way
- Railway
- A Roads
- B Roads
- Minor Roads
- Heritage Constraints

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Client: Gloucestershire County Council

Project: Elmbridge Transport Scheme

Title: Landscape & Heritage Constraints Plan

Sheet Size	Original Scale	Designed/Drawn	Checked	Authorised
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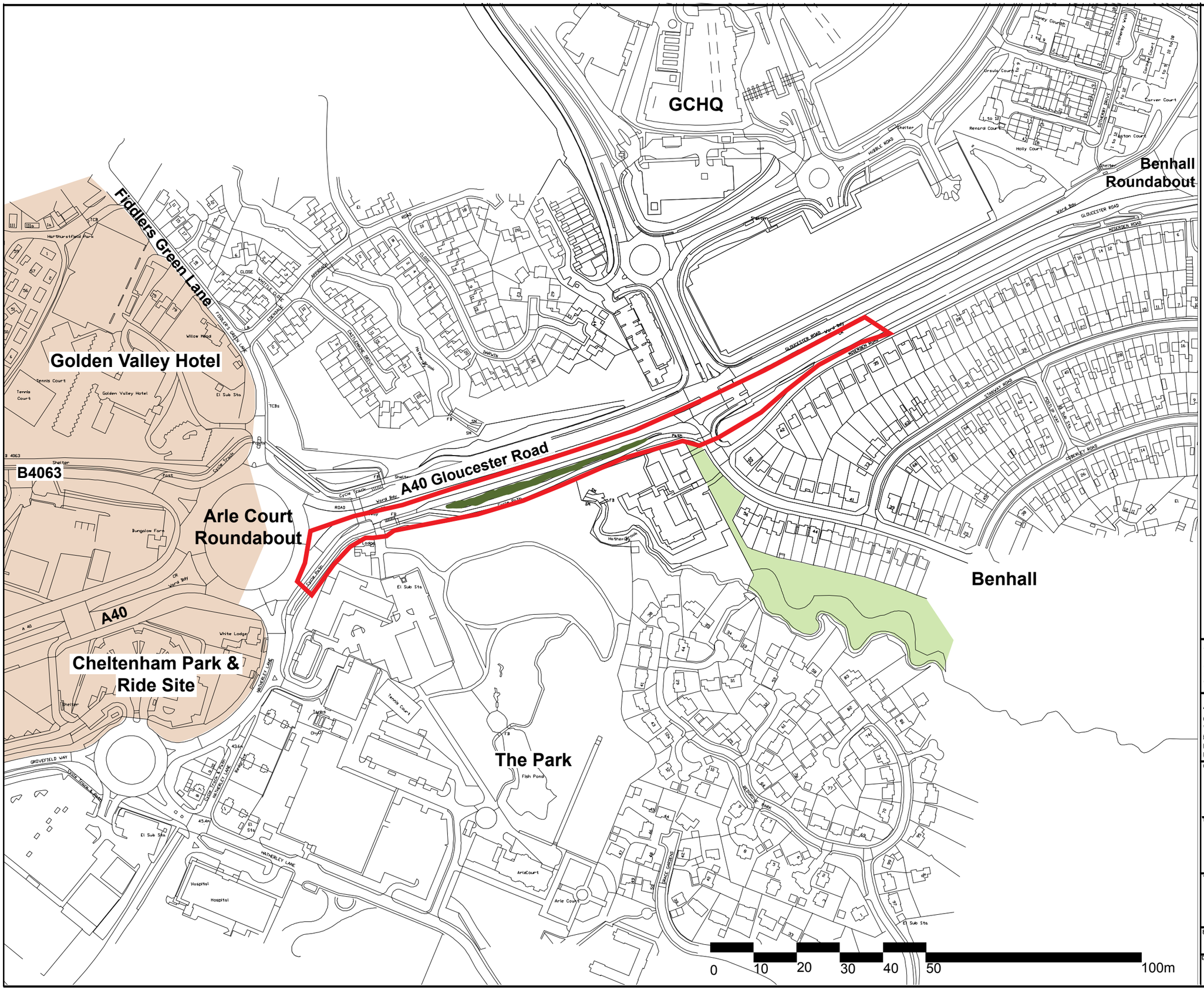
Drawing Number: Figure 2a

Rev:



ATKINS™

- Site Extents
- Green Belt
- Public Green Space
- Mature Trees

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Client
Gloucestershire County Council

Project
Elmbridge Transport Scheme

Title
Landscape Constraints Plan
Arle Court Bus Lane Improvement Works

Sheet Size	Original Scale	Designed/Drawn	Checked	Authorised
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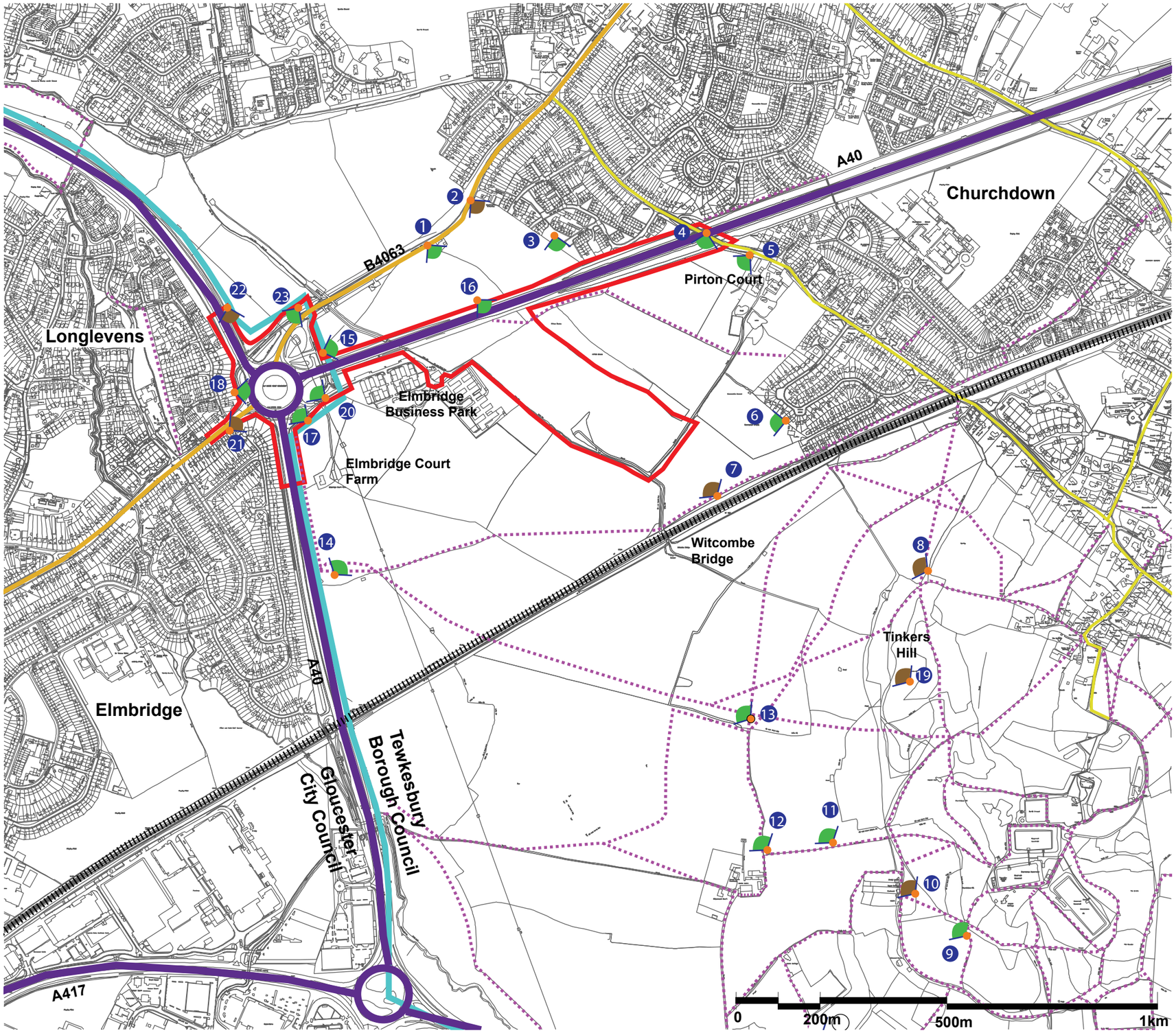
Drawing Number
Figure 2b

Rev

Appendix C : Viewpoints



KEY

- Site Extents
- Boundary of Tewkesbury Borough Council and Gloucester City Council
- Photographic Viewpoints
- Photomontage Viewpoints
- Public Rights of Way
- Railway
- A Roads
- B Roads
- Minor Roads

N

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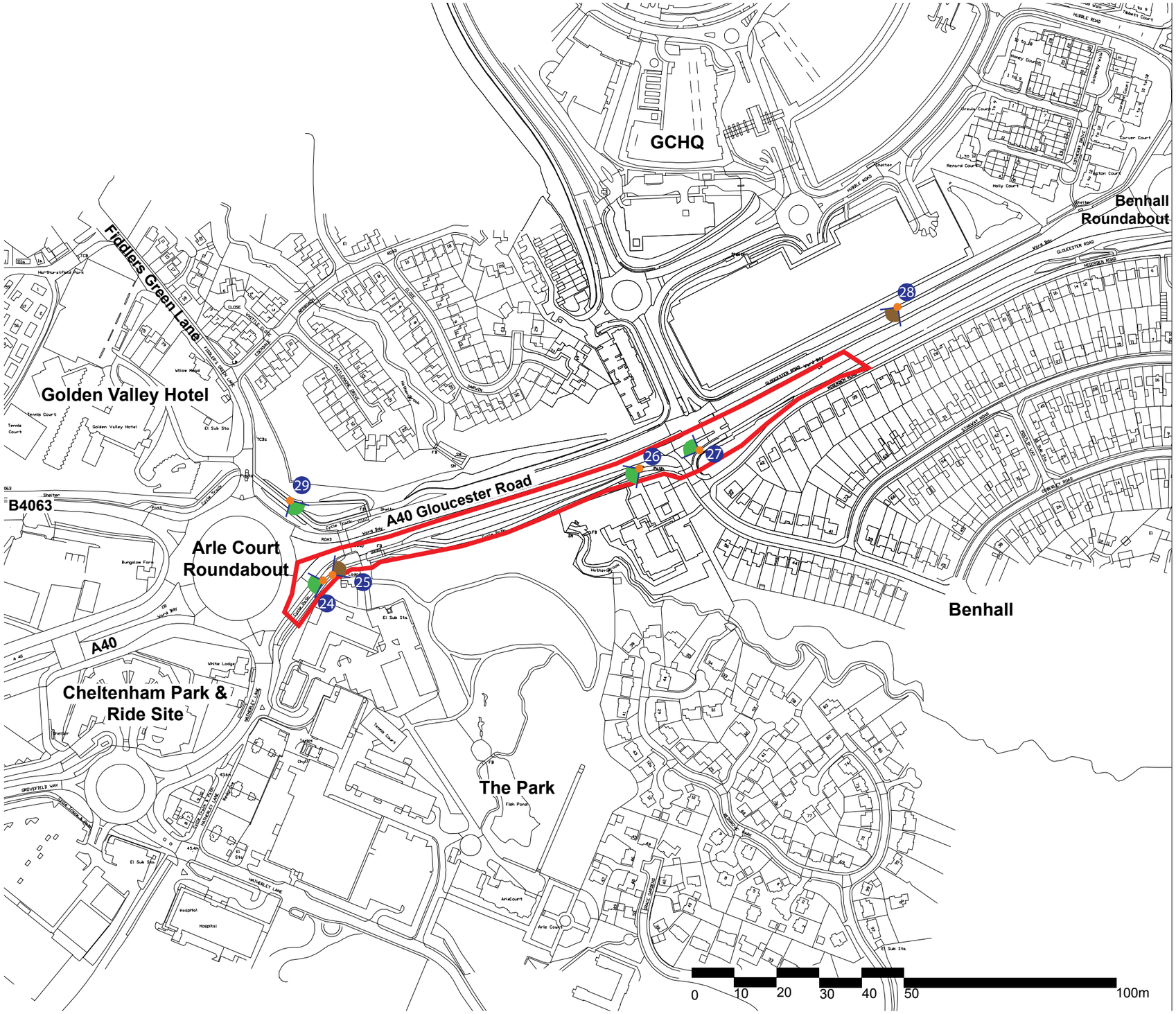
Elmbridge Major Transport Scheme

Viewpoint Locations

Figure 2

Panoramic Photography Locations - Sheet 1 of 2 (Elmbridge)

5094508/ 6390/ 730/ Figure 2
29.03.12



KEY

- Site Extents
- Photographic Viewpoints (13)
- Photomontage Viewpoints (2)

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Elmbridge Major Transport Scheme

Viewpoint Locations

Figure 3

Panoramic Photography Locations - Sheet 2 of 2 (Arle Court)

5094508/ 6390/ 730/ Figure 3
18.12.12

Appendix D : TAG Unit 3.3.11 Worksheet

Worksheet 1 Environment: Water Environment - Plan Level

Description of study area / Summary of potential impacts	Feature	Attributes / Services	Quality	Scale	Rarity	Substitutability	Importance	Magnitude	Significance
Study Area: Elmbridge park and Ride Car Park **Receptors: Construction adjacent to drainage ditches – increase in rainfall runoff and potential loss of local floodplain storage**	Drainage ditches and floodplain	Conveyance of flood flows	Medium – predominantly rural area, little development adjacent to the watercourse	Local	There are a number of small drainage ditches running through greenfield land north east of Gloucester	High – The use of SUDS on site could provide flood flow attenuation, and improve water quality prior to runoff entering the watercourse	Medium	Minor	Insignificant
Potential Impacts: An increase in impermeable surfaces will potentially result in quicker response to rainfall events and an increase in discharge in drainage ditches 1 and 2. This may increase the flood risk to the surrounding areas, notably Elmbridge cottages to the west of the site.									

Reference Source(s): Elmbridge Court Park and Ride proposed outline design (Major Scheme Bid 2008, Gloucestershire County Council), current Environment Agency (EA) Flood Zones and The Water Environment Sub-Objective TAG Unit 3.3.11 (November 2009).

Summary assessment score: Slight Adverse Impacts

Qualitative comments: In line with the TAG Unit 3.3.11 guidance the assessment follows the precautionary principle, such that whilst a predicted potential impact may be highly uncertain (as a result of lack of information or insufficient design details) if the impact is significant this will be included to ensure it is taken into account. All assessments are based on Elmbridge Court Park and Ride proposed outline design correct as of February 2008. The impacts discussed are associated with points of constraint where the proposed works may affect watercourses. The proposal at this location is to construct new transport infrastructure. Since detailed designs and potential mitigation measures are not currently known, we have assumed that no mitigation measures are included as part of the design. Due to the current lack of information relating to both the existing site and the specific design of the proposed works, scores and assessments of environmental impacts are based on a qualitative interpretation.

Subsequent revisions to this assessment are likely to be appropriate when more information on detailed design and route planning becomes available. Hydraulic modelling of the proposed works may be required to ascertain the impacts on flood risk, model potential mitigation measures and to gain approval from the Environment Agency, depending on the detailed design.