

# CHAPTER 9: TRAFFIC & TRANSPORT

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## Chapter Alterations

A9.1 This chapter of the ES Addendum updates the ES with respect to the following:

1. Updated references to National Planning Policy Framework (NPPF)
2. Updated status of the West of England Joint Spatial Plan
3. Review of the assessment methodology, taking in to account the changes to the development proposals
4. Updates to the existing highway network
5. Provides a comparison of trips between the previous and current proposals
6. Updated reference case and test case modelling results for the Butt Lane junction and associated significance of effects
7. Updated mitigation proposals.

All amendments are highlighted in bold and underlined.

## **9.1 INTRODUCTION**

9.1.1 This chapter of the ES has been produced by Peter Brett Associates LLP (PBA) now part of Stantec. In addition, PBA has prepared a Transport Assessment (TA), dated July 2018 and Framework Travel Plan (FTP), dated July 2018. **Both of these documents have been updated, in December 2019, to collate the technical work undertaken since submission of the application and reflect the updated development proposals.** Those documents contain more detailed transport-related information upon which this chapter is based. These documents and have been developed in consultation with South Gloucestershire Council (SGC) and Highways England (HE).

9.1.2 This ES Chapter assesses the likely significant effects of the Proposed Development at Land West of Park Farm, Thornbury in terms of transportation, including effects of development traffic and proposed mitigation measures.

9.1.3 This Chapter describes the assessment methodology; the baseline transport conditions; the likely effects of the Proposed Development relating to transport and access; and the mitigation measures required to prevent, reduce or offset any significant effects.

9.1.4 Due to the outline nature of the planning application and in line with the approach adopted in the TA, this chapter considers the parameters of the Proposed Development, as set out in Chapter 3, rather than assessing a detailed masterplan.

9.1.5 The TA has been submitted as part of the evidence base for the outline application and forms the basis of this chapter. It details the proposed sustainable access strategy for the Project Site, particularly focusing on the opportunities for travel by non-car modes. The TA is supported by transport modelling which analyses the impact of the forecast future traffic on top of the existing base flows to determine whether there is adequate capacity within the network to support the Proposed Development. Furthermore, the future condition of the network is considered through analysis of the growth in traffic for the future year of 2028. Where the analysis suggests that there are capacity issues within the network, mitigation measures have been proposed for implementation. The findings of the analysis were that there were no peak time impacts identified that, following implementation of mitigation strategies, would result in a severe impact.

## **9.2 ASSESSMENT CRITERIA & METHODOLOGY**

### **Previous Assessment**

9.2.1 No previous traffic and transport assessment has been carried out for this Project Site.

### **Scoping Opinion**

9.2.2 The proposed assessment criteria and methodology followed within this ES Chapter was submitted to SGC for their consideration on 22<sup>nd</sup> March 2018. A Transport Assessment Scoping Note was also submitted to SGC Highways Officers for their consideration on 12<sup>th</sup> April 2018 (see TA for further information).

9.2.3 SGC's Scoping Opinion covered technical elements of the Transport Assessment and Framework Travel Plan which had been prepared under separate cover. The scoping agreed the following items which were included within the Transport Assessment and this Transport Chapter:

- Trip rates, journey purpose and modal splits;
- Trip distribution based on gravity model and local destinations
- Committed developments;
- Year of assessment and growth rates; and
- Junctions within the assessment.

## Legislative Context

9.2.4 The assessment approach utilised in this chapter has been developed to fulfil the requirements of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017.

## Planning Policy and Guidance

### National Planning Policy

#### *National Planning Policy Framework (NPPF) - 2019*

9.2.5 The revised National Planning Policy Framework (NPPF) came into force in **February 2019** and replaced the 2012 edition of the NPPF **and July 2018 revision**.

9.2.6 To promote sustainable transport, paragraph 108 states that *“In assessing sites that may be allocated for development in plans, or specific applications for development, it should be ensured that:*

- *appropriate opportunities to promote sustainable transport modes can be – or have been – taken up, given the type of development and its location;*
- *safe and suitable access to the site can be achieved for all users; and*
- *any significant impacts from the development on the transport network (in terms of capacity and congestion), or on highway safety, can be cost effectively mitigated to an acceptable degree.*

9.2.7 Additionally, paragraph 111 of the NPPF states *“All developments that generate significant amounts of movement should be required to provide a travel plan, and the application should be supported by a transport statement or transport assessment so that the likely impacts of the proposal can be assessed.”*

9.2.8 In Section 9 ‘Promoting sustainable transport’, paragraph 102 states that *“Transport issues should be considered from the earliest stages of plan-making and development proposals, so that:*

- *the potential impacts of development on transport networks can be addressed;*
- *opportunities from existing or proposed transport infrastructure, and changing transport technology and usage, are realised – for example in relation to the scale, location or density of development that can be accommodated;*
- *opportunities to promote walking, cycling and public transport use are identified and pursued;*

- *the environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account – including appropriate opportunities for avoiding and mitigating any adverse effects, and for net environmental gains; and*
- *patterns of movement, streets, parking and other transport considerations are integral to the design of schemes, and contribute to making high quality places.”*

9.2.9 Paragraph 109 of the NPPF states *“Development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe.”*

*National Planning Practice Guidance (2014)*

9.2.10 The Government has revised and updated much of the previous planning practice guidance (PPGs) with the aim of making it more accessible, and to support the NPPF.

9.2.11 As of 6th March 2014, the Ministry of Housing, Communities and Local Government (MHCLG) launched the web-based National Planning Practice Guidance (NPPG) resource.

9.2.12 With particular relevance to this TA, the guidance on *“Travel plans, transport assessments and statements in decision-taking”* has been reviewed.

9.2.13 This guidance sets out a section dedicated to *“why are Travel Plans, Transport Assessment and Statements important”*, citing the following points:

- Encouraging sustainable travel;
- Lessening traffic generation and its detrimental impacts;
- Reducing carbon emissions and climate impacts;
- Creating accessible, connected, inclusive communities;
- Improving health outcomes and quality of life;
- Improving road safety; and
- Reducing the need for new development to increase existing road capacity or provide new roads.

9.2.14 The guidance specifies that it is linked directly to Paragraphs 17 (bullet point 11), 39 and 40 of the NPPF and explains that planning should actively manage patterns of growth in order to make the fullest possible use of public transport, walking and cycling, and focus significant development in locations which are, or can be made, sustainable.

9.2.15 The guidance also sets out the ways in which these documents can be made to be as useful and accessible as possible, by ensuring that any information or assumptions should be set out clearly and be publicly accessible.

#### DfT Circular 02/13

9.2.16 This document sets out the way in which Highways England will engage with communities and the development industry to deliver sustainable development whilst safeguarding the primary function and purpose of the strategic road network. With regards to Transport Assessments, the Circular states in Paragraph 48:

*“Transport assessment undertaken by the promoter of the development should be comprehensive enough to establish the likely environmental impacts, including air quality, light pollution and noise, and to identify the measures to mitigate these impacts.”*

#### Local Planning Policy

##### *South Gloucestershire Core Strategy (2006 - 2027)*

9.2.17 The **adopted Development Plan for** South Gloucestershire comprises three documents, one of which is the Core Strategy 2006-2027 which was adopted on 11th December 2013. The Core Strategy sets out the vision for the area based on evidence, community objectives and the detailed spatial strategy for future development in South Gloucestershire to 2027.

9.2.18 The document deals with issues facing each part of the District and sets out spatial policies to achieve priorities such as mixed and balanced communities, economic development, job creation and transport investment.

9.2.19 With regards to Strategic Transport Infrastructure, Policy CS7 states that:

*“Priority will be given to the implementation of strategic infrastructure proposals that reduce congestion and improve accessibility by means other than the private car. In particular, the Council will work with its partners to deliver within the plan period key projects including...7. The Rural Package.”*

9.2.20 The Rural Package includes an extension of the A38 Showcase Bus Corridor to Thornbury and extension of the A38 Cycling City route to Thornbury. In addition, it includes a park and share site at Falfield near junction 14 of the M5. It intended that this Package be funded by the private sector through the development management process.

9.2.21 Policy CS8 – Improving Accessibility lists the following principles to be applied in the consideration of planning applications:

- Accessibility;

- Off-site mitigation;
- Provision and Promotion of sustainable travel options; and
- Parking and vehicular access for new development.

9.2.22 The priority of this Policy is to provide *“users of new development with a range of travel options other than the private car”*.

9.2.23 Section 15 of the Core Strategy specifically **addresses** Thornbury. Policy CS32 – Thornbury states that development proposals will:

*“maximise opportunities for sustainable travel by improving the legibility and publicity of us routes through the town and enhancing opportunities for walking and cycling to, from and within the town and town centre”*

*South Gloucestershire Local Plan: Policies, Sites and Places Plan (Adopted November 2017)*

9.2.24 The South Gloucestershire Local Plan: Policies, Sites and Places Plan Development Plan Document (DPD) (adopted November 2017) also forms part of the **Development** Plan. The DPD **provides many of the Development Management policies used in the determination of planning applications** in the **District**.

9.2.25 The Policies, Sites and Places Plan DPD list 46 Development Management policies. With reference to transport in the vicinity of the site, the following DPD policies are relevant:

9.2.26 Policy PSP10 – Active Travel Routes (ATR) refers to any routes specifically catering for travel by pedestrians, cyclists and/or horse riders. This Policy states that *“where appropriate, new development proposal(s) will be expected to provide links to an existing or proposed ATR”*.

9.2.27 A Strategic ATR is shown within the Policies map, crossing the north eastern corner of the Project Site, in the form of Public Right of Way OTH/18.

9.2.28 The general objectives underpinning Policy PSP10 relevant to the Project Site are:

- *‘barriers to active movement should be removed to provide accessible, direct and convenient routes, whilst also creating safe routes;*
- *access to public transport facilities via active travel modes should be maximised to improve convenience and accessibility;*
- *clear signposting of ATRs should be provided;*

- *safety and security should be ensured through adequate and appropriate design, lighting and surveillance, especially on ATRs where the primary journey purpose is commuting and/or the journey to school or other educational facilities;*
- *they should provide adequate and safe pedestrian and cycle routes to schools; and*
- *the needs of disabled and less able people should be fully taken into account in the design and layout of any routes.'*

9.2.29 Policy PSP11 – Transport Impact Management relates to the management traffic from development proposals. Of relevance to Land West of Park Farm it states that proposals will be acceptable where:

- *“appropriate, safe, accessible, convenient, and attractive access is provided for all mode trips arising to and from the proposal;*
- *any new or improved bus stops meet the Council’s adopted standards and the appropriate national guidance; and*
- *residential development proposal(s) are located on:*
  - i. safe, useable walking and, or cycling routes, that are an appropriate distance to key services and facilities; and then*
  - ii. where some key services and facilities are not accessible by walking and cycling, are located on safe, useable walking routes, that are an appropriate distance to a suitable bus stop facility, served by an appropriate public transport service(s), which connects to destination(s) containing the remaining key services and facilities; and...*
- *Potentially significant transportation impact are accompanied by an appropriate Transport Assessment and where necessary a Travel Plan.”*

9.2.30 Policy PSP11 also details appropriate walking and cycling distances and appropriate public transport services, which have been set out in detail in the Transport Assessment.

9.2.31 Policy PSP13 – Safeguarding Strategic Transport Scheme and Infrastructure primarily considers strategic transport schemes which are not in the vicinity of the Project Site. However, in addition to these key schemes, it states that:

*“Other strategic transport schemes (for example: future strategic public transport routes, including provision of dedicated/segregated lanes, where appropriate, to communities, such as*

*Yate, Thornbury and the other areas in the East Fringe) may be progressed during the Plan period.”*

9.2.32 Policy PSP16 – Parking Standards details the acceptable cycle and car parking standards which have been considered in detail in the Transport Assessment.

9.2.33 Appendix 3 of the DPD contains ‘Town Centre Summaries’, which includes a section of Thornbury Town Centre. Better waiting facilities for bus passengers has been raised through consultation to improve the Town Centre.

9.2.34 The New South Gloucestershire Local Plan (2018-2036) is in the process of being **produced but is currently at an early stage of preparation.**

#### *West of England, Joint Local Transport Plan 3 (2011 – 2026)*

9.2.35 The Joint Local Transport Plan 3 (2011 – 2026) (JLTP3) was adopted by the West of England (WoE) authorities in **March** 2011. Its vision is for a transport system that strengthens the local economy, improves access, ensures alternatives to the car are a realistic first choice as well as being affordable, safe, secure, reliable, simple to use and available to all. To deliver the JLTP3, SGC is working with the other WoE authorities, the WoE Local Enterprise Partnership, Highways England, Network Rail and public transport operators.

9.2.36 The core transport goals presented within the JLTP3 are to:

- Reduce carbon emissions;
- Support economic growth;
- Promote accessibility;
- Contribute to better safety, security and health; and
- Improve quality of life and a health natural environment.

9.2.37 **A new version of the Joint Local Transport Plan (JLTP4) was consulted on in February and March 2019.**

#### **West of England Joint Spatial Plan and Joint Transport Study**

9.2.38 **The Joint Spatial Plan (JSP) sets out the strategic vision for the region by the combined authorities of Bristol City, Bath and North East Somerset, South Gloucestershire and North Somerset. Alongside the JSP, a Joint Transport Plan has been drafted by the combined authorities which will provide the transport strategy to support the JSP which will inform the Joint Local Transport Plan 4 (JLTP4). These documents will provide the strategies for the local authorities to produce their local plans.**



9.2.39 **At the time of writing, the status of the West of England Joint Spatial Plan (JSP), which was submitted to the Secretary of State on 13<sup>th</sup> April 2018 and subject to Examination by an Inspector in July 2019, is unknown. The Inspectors have raised some significant concerns with the JSP and suggest in their letter to the WoE Councils, dated 1<sup>st</sup> August 2019, that the Plan should be withdrawn.**

#### Guidance/ Best Practice

9.2.40 As a matter of best practice, this assessment has generally been undertaken based on the relevant guidance set out in the Guidelines for the Environmental Assessment of Road Traffic published by the Institute of Environmental Assessment (now the Institute of Environmental Management and Assessment (IEMA)) (IEA, 1993). These guidelines have been used, together with professional judgement, to gauge the significance of the changes in environmental conditions caused by traffic and transport including consideration of the effects of severance, driver delay, pedestrian delay, pedestrian amenity, accidents and safety, and hazardous loads.

#### **Baseline Data Collection**

9.2.41 Traffic flows used in the assessment are based on Manual Classified Counts (MCCs) undertaken in the Thornbury area. As agreed with SGC during the Transport Assessment scoping exercise, traffic flow data was collected at the following junctions:

1. Butt Lane / Morton Way / Gloucester Road Staggered Junction;
2. Gloucester Road / A38 Junction;
3. Grovesend Road / Morton Way, Midland Way Roundabout;
4. Grovesend Road / A38 / Tytherington Road Signalised Staggered Junction;
5. Gloucester Road / Quaker Lane / The Plain / Castle Street / High Street;
6. A38 / B4509;
7. A38 / Old Gloucester Road; and
8. A38 / Church Road.

9.2.42 PBA commissioned 360 TSL to carry out the traffic surveys. The MCCs and queue surveys were undertaken at all junctions on Tuesday 14<sup>th</sup> November 2017. Also agreed with SGC, Junction 5 was re-surveyed on Thursday 3<sup>rd</sup> May 2018, due to issues with the original survey data.

9.2.43 Five ATC's were also laid at the following locations for a one-week period 16<sup>th</sup> to 22<sup>nd</sup> November 2017:

- Oldbury Lane (west side of site frontage);

- Oldbury Lane (east side of site frontage);
- Gloucester Road (north of Butt Lane/Morton Way);
- Gloucester Road (north of Eastland Road); and
- Alveston Hill.

9.2.44 In order to assess the impact of the proposals in line with the guidelines (detailed below), 18-hour AAWT and data has been generated from the AM and PM peak hours surveyed flows. A peak hour to 18-hour factor has been calculated for each ATC and applied to the study area links. Where necessary, donor ATCs have been matched to a link to best match the type and nature of that link. This is considered to provide an appropriate reflection of the daily traffic characteristics in the vicinity of the site.

9.2.45 Personal Injury Collision (PIC) data was obtained from SGC for a five-year period between 1<sup>st</sup> January 2013 to 31<sup>st</sup> December 2017. The PIC data obtained covered the area along the site frontage on Oldbury Lane as well as the area around each of the junction's subject to traffic counts identified above.

#### **Assessment Methodology**

9.2.46 **The inclusion of the primary school, and associated reduction in dwelling numbers, was confirmed following completion of the assessment of impacts of the previously proposed 630 dwellings.**

9.2.47 **It has been agreed with SGC that a full reassessment of development impacts is not required as the resultant reductions in traffic generation therefore reflect an overestimate of development impacts and therefore the analysis set out within this ES can be considered a robust assessment. This conclusion is confirmed by the analysis in Figures 9.5 and 9.6.**

9.2.48 **On this basis, the following sections of this Chapter assess the impacts of 630 dwellings.**

#### **Traffic Flow Assessment Methodology**

9.2.49 The forecast years and associated modelling scenarios were agreed with SGC during the scoping process. The forecast years that were identified were 2028. The following scenarios have been assessed in the TA and were tested for both AM (08:00-09:00) and PM (17:00-18:00) peak hours:

- 2017 Surveyed base
- 2028 Reference Case (future base including forecast growth)
- 2028 Test Case (future base including forecast growth and Proposed Development).

9.2.50 The trip generation calculations have been agreed with SGC and HE during the scoping process. The TA provides details the derivation of vehicle trips to/from the Proposed Development.

9.2.51 The methodology for calculating growth was agreed with SGC and HE, who confirmed that using TEMPro would be appropriate for generating the majority of the growth on the highway network. Traffic flows for the M5 Junction 14 has been provided by HE within their VISSIM model for assessment, including committed developments.

#### Technical Context

9.2.52 An EIA should focus on the likely significant environmental effects of a development. While the Proposed Development will generate traffic that will use roads across a very wide geographic area, likely significant effects will be more localised.

9.2.53 The significance of likely transport effects has been determined using a two-stage process, with criteria developed from best practice techniques. The effect of significance has been derived from measures of the magnitude of the change and the sensitivity of the receptors affected.

9.2.54 The Guidelines for the Environmental Assessment of Road Traffic (1993) published by the Institute of Environmental Assessment (IEA), now the Institute of Environmental Management and Assessment (IEMA), recommend two rules to be considered when assessing the impact of development traffic on a highway link:

- Rule 1: Include highway links where traffic flows will increase by more than 30% (or the number of heavy goods vehicles will increase by more than 30%); and
- Rule 2: Include any other specifically sensitive areas where traffic flows will increase by 10% or more.

9.2.55 The above guidance is based upon knowledge and experience of environmental effects of traffic set out within the IEA and Department of Environment, which also acknowledges in para 3.16 that "*Traffic forecasting is not an exact science...*". The 30% threshold is based upon research and experience, referenced within the IEA guidance, of the environmental effects of traffic, with less than a 30% increase generally resulting in imperceptible changes in the environmental effects of traffic apart from within sensitive locations.

9.2.56 Categories of receptor sensitivity have been defined from the principles set out in the IEA (1993) guidelines, and including the following:

- The need to identify particular groups or locations which may be sensitive to changes in traffic conditions;
- The list of affected groups and special interests set out in the guidance;

- The identification of links or locations where it is felt that specific environmental problems may occur;
- Such locations "... would include accident black-spots, conservation areas, hospitals, links with high pedestrian flows etc."

9.2.57 These principles have been used to outline in broad terms the sensitivity of receptors to traffic for the categories of effect assessed in this chapter. These criteria are summarised in **Error! Reference source not found.**

**Table 9.1 Criteria for Receptor Sensitivity**

Significance of Criteria (receptors)	Description of Criteria
High	<ul style="list-style-type: none"> <li>• Educational institutions such as schools and colleges;</li> <li>• care and retirement homes for the elderly or infirm;</li> <li>• roads that have no footpaths and are likely to be used by pedestrians; and</li> <li>• accident blackspots.</li> </ul>
Medium	<ul style="list-style-type: none"> <li>• Health care facilities such as hospitals, surgeries and clinics;</li> <li>• parks and recreational areas such as sports grounds;</li> <li>• retail areas such as shopping malls; and</li> <li>• roads with narrow footpaths that may be used by pedestrians.</li> </ul>
Low	<ul style="list-style-type: none"> <li>• Open spaces;</li> <li>• tourist and visitor attractions including historic buildings; and</li> <li>• places of worship such as churches.</li> </ul>
Negligible	<ul style="list-style-type: none"> <li>• Links not covered by the above</li> </ul>

9.2.58 In addition, although not specifically identified within the guidelines as being sensitive for transport effects, it has been assumed that individual residential areas and employment areas have low sensitivity.

9.2.59 The following environmental effect categories have been considered in line with IEA (1993):

- Severance
- Fear and Intimidation
- Pedestrian Delay
- Pedestrian Amenity
- Driver Delay
- Accidents and Safety.

9.2.60 IEA (1993) also lists the following categories:

- Noise & Vibration – the potential effects relating to noise and vibration as a result of Proposed Development related traffic is set out in Chapter 10 of this ES.

- Visual Effects - the potential visual effects as a result of the Proposed Development is set out in Chapter 13 of this ES.
- Hazardous Load – in this instance, the Proposed Development would not result in any hazardous loads and therefore this effect is not considered further
- Air Quality – the potential effects relating to air quality as a result of Proposed Development related traffic is set out in Chapter 11 of this ES

9.2.61 To determine the magnitude of change experienced by the receptors and determine the likely significance of the effects resulting from the Proposed Development, thresholds for these categories, from the IEA (1993), have been used and interpreted using professional judgement. The thresholds which have been used to determine the magnitude of change are outlined in Error! Reference source not found..

**Table 9.2 Criteria for Magnitude of Impact**

Impact	Magnitude of Impact / Threshold			
	Negligible	Low	Medium	High
Severance	Change in 18 hr AAWT of <30%	Change in 18 hr AAWT of 30% - 60%	Change in 18 hr AAWT of 60% - 90%	Change in 18 hr AAWT of > 90%
Pedestrian Delay	The guidance recommends that professional judgement is used to determine the impact on Pedestrian Delay, taking into account local factors such as pedestrian activity, visibility and the physical conditions of the site.			
Driver Delay	Network working below capacity.	Changes in driver delay times will be calculated by comparing the differences between the baseline and 'with Project' scenarios for AM and PM peaks at junctions in the study area using industry standard junction modelling software. Driver delays are only likely to be significant where the network surrounding the development is at, or nearing, capacity.		
Pedestrian Amenity	Pedestrian Amenity is impacted by traffic flow, composition and width of pavement and is related to fear and intimidation thresholds. As suggested by national guidance a threshold of where traffic or HGV flows have halved or doubled will be used to indicate whether there is a significant effect.			
Accidents and Safety	Number of predicted personal injury collisions (PICs) does not exceed the number of observed PICs.	The number of observed PICs will be compared against the predicted number of PICs that could be expected over the time period of the observed data (e.g. 3 years) in accordance with the COBA Manual (DMRB Volume 13, Section 1, Chapter 4). The calculations will be based on variables including: observed AADT traffic flow, road speed, length of road section and type of road. This analysis will be interpreted with professional judgement and used to inform and determine the impact on Accidents and Safety.		

9.2.62 As shown in **Table 9.2**, the assessment includes a qualitative appraisal of effects in relation to safety and pedestrians where a more quantified approach is less appropriate. The assessment of these aspects has been undertaken based on professional judgement, drawing upon guidance and the significance criteria above.

9.2.63 In addition to this, fear and intimidation thresholds identified in the IEA (1993) guidelines have also been considered and interpreted with professional judgement to determine likely significant effects of the Proposed Development (Error! Reference source not found.).

**Table 9.3 Fear and Intimidation Thresholds**

Degree of Hazard	Average traffic flow over 18-hour day (vehicle/hour)	Total 18-hour HGV flow	Average vehicle speed over 18hr day (mph)
High	1800	>3000	>20
Medium	1200 - 1800	2000 - 3000	15-20
Low	600 – 1200	1000 - 2000	10-15
Negligible	<600	<1000	<10

9.2.64 Effect significance is determined by combining the predicted magnitude of impact (**Tables 9.2 and 9.3**) with the assigned sensitivity of the receptor (**Table 9.1**). The effect significance set out within **Table 9.4**, and definition of significance criteria set out within **Table 9.5**.

**Table 9.4 Effect Significance**

Magnitude of Impact	Sensitivity of Receptor				
	High	Medium	Low	Negligible	
High	Major	Major	Moderate	Neutral	
Medium	Major	Moderate	Minor to Moderate	Neutral	
Low	Moderate	Minor to Moderate	Minor	Neutral	
Negligible	Neutral	Neutral	Neutral	Neutral	

**Table 9.5 Significance Criteria**

Significance Criteria	Description of Criteria
Major Beneficial	There has been a considerable positive change to the receptor on a scale which is of more than local importance.
Moderate Beneficial	There has been a positive effect on the receptor in terms of the extent, duration or magnitude.
Minor Beneficial	There has been a positive impact on the receptor that has been small, highly localised or short term.
Neutral	No perceivable impact

Significance Criteria	Description of Criteria
Minor Adverse	There has been a negative impact on the receptor that has been small, highly localised or short term.
Moderate Adverse	There has been a negative effect on the receptor in terms of the extent, duration or magnitude.
Major Adverse	A negative effect has occurred that will have an impact on the wider area or that may be in breach of standards or legislation.

9.2.65 Effects that are identified as ‘major’ or ‘moderate’ will be deemed to be significant for the purposes of this ES Chapter.

#### Geographical Scope

9.2.66 A link flow assessment has been used to predict traffic flows along links on the local highway network in the year 2028 (expected year of full operation) for two scenarios; with the Project Site (Test Case) and in absence of the Project Site (Reference Case). **Figure 9.1** shows the links included within the TA study area.

#### Temporal Scope

9.2.67 The transport impact of the Proposed Development has been tested for both its construction and operation phases for the assessment year of 2028 when the site will have full development traffic generated, as agreed at the scoping stage with SGC and HE.

#### Assumptions & Limitations

9.2.68 The assessment of transport and access effects in this ES is based on the estimated traffic flows with, and without, the Proposed Development. The assumptions used in the preparation of these traffic flows are set out in the TA.

9.2.69 The TA focuses on assessing effects during observed weekday peak hours (08:00 – 09:00 and 17:00 – 18:00), while the ES, in accordance with guidance, considers effects over 18-hour days (06:00 – 00:00). Peak hour traffic data from the TA has been used to calculate 18-hour flows using factors calculated from Automatic Traffic Count (ATC) data. It has therefore been assumed that the relationship between peak hour flows and 18-hour flows is fairly uniform across the study area and consistent with the recorded ATC data.

9.2.70 The assessment of construction effects is limited due to the outline nature of the planning application, with no detailed construction programme available. A robust assessment has been undertaken based on broad assumptions of the construction of the Project Site of 100 construction workers on site per day based on experience on similar projects.

## 9.3 CONSULTATION

- 9.3.1 PBA has consulted with South Gloucestershire Council (SGC) **at the pre- and post-application stage** to discuss the emerging development proposals and agree the requirements for a Transport Assessment. A copy of the Transport Assessment scoping note and the subsequent SGC highways response received on 30<sup>th</sup> May 2018 is contained within the Transport Assessment.
- 9.3.2 PBA has also consulted with Highways England (HE) regarding the development proposals. A copy of the scoping correspondence with HE is also contained within the Transport Assessment. **Discussions with HE regarding the proposals are ongoing.**
- 9.3.3 The scoping with HE determined that the Proposed Development will not have a significant impact on Junction 16 of the M5. Further analysis was required of Junction 14 as the development flows were considered by HE to be sufficient to have an impact, and is covered in further detail in the Transport Assessment.

## 9.4 BASELINE ENVIRONMENT

### Introduction

- 9.4.1 The Proposed Development is anticipated to be fully constructed by 2028, where it will generate the highest traffic flows. This is considered to be the year of peak impact, where generated flows impact on the future traffic years. Therefore, the Reference Case scenario for 2028 is the most suitable baseline to be used in the assessment as agreed with SGC.
- 9.4.2 The 2028 Reference Case includes background growth (extracted from TEMPro as detailed within the TA) and the committed developments which were requested by SGC Highways Officers in their scoping response to the EIA. **As set out in paragraph 9.2.47, this is considered to be robust on the basis of the revised masterplan proposals resulting in fewer vehicle trips.** The cumulative sites are considered in accordance with Table 5.3 from Chapter 5 of this ES. The following committed developments have been included within the TA and the Reference Case scenario for this assessment:
- Park Farm (PT11/1442/O) – 500 units
  - Land off Morton Way (PT12/2395/O) – 300 units
  - Land at Post Farm (PT15/2917/O) – 125 units
  - Land West of Gloucester Road (PT16/4774/O) – 130 units
  - Land at junction of Morton Way & Grovesend Road (PT16/35650/O) – 350 resi units and 70 sheltered accommodation units.



9.4.3 The 2028 Test Case scenario includes all of the above committed developments, background growth and the Proposed Development. As a result, the assessment inherently considers the cumulative effect of the Proposed Development and other local developments.

9.4.4 In addition, the following sites identified in Table 5.3 were considered, but have not been included in the cumulative effects assessment undertaken in this Chapter for the reasons set out below:

- Stokefield House, Thornbury (PT16/0982/F) - the Transport Statement associated with this development (Mott MacDonald, 2016) shows that the expected daily trip generation of the proposals will be significantly lower than the potential of the existing site use. Furthermore, it is outlined within the Transport Statement, that the proposals are unlikely to generate vehicle trips during peak hours. Therefore, it is not considered necessary to include additional traffic associated with this development in the cumulative traffic impact assessment; and
- Land West of Pound Mill, Lower Morton, Thornbury (PT13/3101/F) – the Highways Statement associated with this development (BWB Consulting, 2013) shows that it is not anticipated to generate 30 vehicle movements in a peak hour such that it will not cause a material increase in traffic. For this reason, it has not been included within the cumulative traffic impact assessment.

#### Existing Road Network

9.4.5 The Project Site's location in the context of the local and strategic highway network is illustrated in **Figure 9.2**.

9.4.6 The Project Site has direct frontage onto Oldbury Lane which is a single carriageway road with grassed verges on either side and is not street lit. The road is rural in nature, but large sections are kerbed with highway drainage. Several private dwellings and small businesses take access from Oldbury Lane, however there is no footway provision. Oldbury Lane is currently subject to the national speed limit.

9.4.7 Oldbury Lane provides a connection from the north of Thornbury to the small village of Oldbury on Severn, running in an east west direction.

9.4.8 To the east of the Project Site, Oldbury Lane leads to Butt Lane, which is also a single carriageway road with one lane in each direction. The speed limit reduces to 30mph at the Oldbury Lane end of Butt Lane. New residential developments, and more established residential areas, have access off Butt Lane which forms a staggered priority junction with Gloucester Road.

- 9.4.9 Gloucester Road is an urban road, with a 30mph speed limit, which extends from the centre of Thornbury, and meets the A38, north east of Thornbury, near the village of Whitfield. Gloucester Road has dwellings directly fronting onto the carriageway and is street lit between Butt Lane and the centre of Thornbury.
- 9.4.10 To the east and south east of Thornbury, the town connects to the A38 at two further locations, via signalised junctions, the A38/B4061 junction at Alveston, and A38 / Grovesend Road / Tytherington Road junction. The A38 is a strategic A road, with varying speed restrictions, which runs from Devon to the Midlands, providing access to Bristol.
- 9.4.11 To the east of the A38 is the M5. Thornbury residents can access the M5 at Junction 14, near Falfield to the north, or at Junction 16 near the M4 / M5 interchange to the south. The M5 runs between Exeter and Birmingham, it therefore provides an alternative route to Bristol south of the site and Gloucester to the north.

#### Existing Pedestrian and Cyclist Facilities

- 9.4.12 Oldbury Lane has no dedicated pedestrian or cycle facilities, however, footways are provided along Butt Lane, throughout the existing residential areas of Thornbury and as part of the adjacent Park Farm site.
- 9.4.13 As shown in **Figure 9.3** there are two Public Rights of Way (PRoW) through the site. OTH/13 crosses the site west to east and connects to the existing residential area in north Thornbury. OTH/18 crosses the northeast corner of the Project Site and runs north-south through the adjacent Park Farm development. The wider PRoW network connects OTH/18 to the Castle Secondary School via its playing fields. The PRoW runs through the school's playing fields and becomes a surfaced, lit footpath running between residential properties and the school, with a 1.5m width, with access onto Park Road. Along the footway on Park Road, pedestrians can access the Castle School.
- 9.4.14 There is a wider network of footpaths throughout the existing residential area in north Thornbury. Three footpaths are shown on **Figure 9.3** which facilitate pedestrian movement from northwest Thornbury to the Town Centre. These are formal routes which are lit, of generous width at 1.5-2.0m wide, and are generally of good quality, with some localised unevenness. These footpaths are not adjacent to highway, running between residential streets or through wooded areas. Where the footpaths meet the carriageway, dropped kerbs are provided to facilitate crossing.
- 9.4.15 A number of predominantly informal pedestrian crossing points are provided along Gloucester Road between Butt Lane and town centre. A zebra crossing is also provided on Gloucester Road between the aforementioned footpath and Thornbury Hospital, health centre and pharmacy.

9.4.16 Cyclists are generally required to travel on-carriageway in Thornbury. There are cycle symbols on the carriageway, in the vicinity of The Castle Secondary School and Manorbrook Primary School which is the route of National Cycle Route (NCR) 410 (Avon Cycleway), but little in the way of dedicated cycle infrastructure. NCR 410 is well sign-posted.

9.4.17 In addition to NCR 410, NCR 41 and a Local Cycle Route (Thornbury Loop) lie within 1km of the centre of the site. These routes connect Thornbury to Bristol and Gloucester and are a combination of on- and off-road.

#### Existing Public Transport Network

9.4.18 **The nearest bus stop to the site is situated within a 750m walk distance on Morton Street, and is served by bus service 913 that operates once a day to The Castle School. Bus services 60 and 622 serve bus stops on Park Road, off Alexandra Way, approximately 1km from the site. The services provide access to Cribbs Causeway, Gloucester, Chipping Sodbury and Dursley. The 60 bus has six services Monday to Saturday, between 07:15 and 17:30. The 622 has eight services per day between 07:44 and 18:34, Monday to Friday, with seven services on a Saturday and three on a Sunday. The bus stops are equipped with a flag and pole and timetable information.**

9.4.19 **Bus service 77 operates four times a day in each direction. The bus stop is equipped with a flag and pole and timetable information. The nearest stop for service 77, which operates throughout the day, is within 1300m on Morton Way, which is served at an hourly frequency Monday – Saturday. Bus service 77 provides access to Thornbury Town Centre and Bristol City Centre.**

9.4.20 **First in Bristol Bath & The West began operating two new services, T1 and T2, on 27<sup>th</sup> May 2018. Both services operate from Thornbury Health Centre, within 1500m of the proposed development, to Thornbury Town Centre. The T1 then routes to Bristol City Centre, via Bradley Stoke and M32, while the T2 routes to Bristol City Centre via Filton Airfield and A38 Gloucester Road. The combined frequency of these routes is 3 per hour, with T1 operating half hourly and T2 operating hourly Monday - Sunday. The current journey times from Thornbury Health Centre on the T1 is 4 minutes to Thornbury Town Centre and 55 minutes to Bristol City Centre.**

9.4.21 The bus services operating in the vicinity of the Project Site are summarised in **Table 9.6** below and shown in **Figure 9.4**.

Table 9.6 – Local Bus Services and Frequencies

<u>Operator</u>	<u>Service</u>	<u>Route</u>	<u>Frequency</u>		
			<u>Mon - Fri</u>	<u>Sat</u>	<u>Sun and Bank Holiday</u>
<u>Stagecoach West</u>	<u>77</u>	<u>Bristol City Centre – Westbury – Southmead Hospital – Bristol Parkway Station - Thornbury</u>	<u>Every 60 mins</u> <u>(06:15 – 18:02)</u> <u>(4 services per direction to Manor Walk)</u>	<u>Every 60 mins</u> <u>(06:25 – 18:00)</u> <u>(4 services per direction to Manor Walk)</u>	<u>No service</u>
<u>Stagecoach West</u>	<u>60</u>	<u>Gloucester – Dursley – Wotton-under-Edge – Thornbury</u>	<u>Six per day</u> <u>(07:15 – 17:30)</u>	<u>Six per day</u> <u>(07:15 – 17:30)</u>	<u>No service</u>
<u>Stagecoach West</u>	<u>622</u>	<u>Chipping Sodbury – Yate - Thornbury – Cribbs Causeway</u>	<u>Eight per day</u> <u>(07:48 – 18:38)</u>	<u>Seven per day</u> <u>(08:01 – 17:11)</u>	<u>Three per day</u> <u>(11:06 – 16:16)</u>
<u>First Bristol, Bath &amp; The West</u>	<u>T1</u>	<u>Thornbury – Bradley Stoke – Aztec West - Bristol City Centre (Colston Street)</u>	<u>Every 30 minutes</u> <u>(06:08 – 20:12)</u>	<u>Every 30 minutes</u> <u>(06:12 – 19:08)</u>	<u>Every 60 minutes</u> <u>(07:50 – 18:03)</u>
<u>First Bristol, Bath &amp; The West</u>	<u>T2</u>	<u>Thornbury – Filton Airfield – Cribbs Causeway – Bristol Bus Station</u>	<u>Every 60 minutes</u> <u>(05:30 – 00:38)</u>	<u>Every 60 minutes</u> <u>(05:30 – 00:38)</u>	<u>Every 60 minutes</u> <u>(07:10 – 00:38)</u>

Source: Travelline South West (<http://www.travelinesw.com/>)

Note: Bus routes and frequencies correct as at **December 2019**.

9.4.22 **Table 9.8** indicates that the local area is served by a number of bus routes which together provide four services per hour to Bristol City Centre, 1-2 services per hour to Cribbs Causeway, one service per hour to Southmead Hospital, and access to Gloucester and Chipping Sodbury every 1.5 – 2 hours during the weekday daytime. Buses can also be used to make internal connections within Thornbury for facilities further away from the site, such as the Leisure Centre.

## Rail Service

9.4.23 There are several Rail Stations located within 12.5km of the site. Bristol Parkway Station is located 12.3km south of the site, the rail station can be accessed by bus service 77 from Manor Way which provides direct access to the Rail Station and connections to destinations further afield. Rail services at the Station are provided by Great Western Railway who provide most of the services available. Services are provided to a wide variety of destinations including London Paddington, Plymouth, Aberdeen, Cardiff, Manchester and a range of local destinations.

9.4.24 In addition, Yate station is located under 11.5km to south east of the site. Yate Rail Station can be accessed by bus service 622 from Alexandra Walk which provides access to Yate town centre, within a short walk of the Rail Station. Rail services at Yate Rail Station are provided by Great Western Railway. Services from Yate Rail Station are provided to a wide variety of destinations including Weymouth, Westbury, Bath, Bristol Temple Meads, Gloucester, Brighton and Frome.

## Receptors and Flows

9.4.25 In line with the Guidelines produced by IEMA this ES considers the impact of development traffic based on Rule 1 of the guidance of an increase in flows of more than 30%, or for 10% in sensitive areas.

## Baseline Analysis

9.4.26 Traffic flow data on all links, with, and without, the Proposed Development, is set out in full in **Table 9.7**. The M5 Junction 14 development trips are obtained from Link 154 (B4509). As the M5 carries higher flows than the B4509, and the development flows will be distributed across the north and southbound links, the impact has not been considered further as the impact on Link 154 is less than 10%, and as such, the impact on the M5 flows will be lower.

9.4.27 As with the M5 Junction 14, using the flows from Link 176 (A38 Gloucester Road), the impact of the development is below the 10% threshold for a sensitive link. As the M5 carries higher flows than the A38, the impact will also be below 10%, and no further assessment has been undertaken.

9.4.28 **Figures 9.5 and 9.6 provide a comparison of the previous proposals for 630 dwellings and the current proposals for 595 dwellings and a school. This confirms that there will be fewer trips arising from the development and that this assessment is therefore robust.**

9.4.29 Applying Rule 1 and 2 of the IEA (1993) guidelines set out above to the predicted link flows, the following links have an increase in traffic of equal to, or more than, 10%:

- Butt Lane – Link 149

- Morton Way (north) – Link 150
- Gloucester Road south of Butt Lane – Link 151
- Quaker Lane – Link 164
- Gloucester Road near the Plain – Link 170
- Oldbury Lane Between Site Accesses – Link 175

9.4.30 Links 150, 151 and 164 have increases in traffic of between 10% and 30% but have been scoped out from needing to undergo any further assessment because the desk-based assessment identified no high or medium sensitivity receptors near the links. This is in accordance with Rule 2 of the IEA (1993) guidelines outlined above.

Table 9.7: Link Traffic Flow Summary

Link	18 hr AAWT Reference Case	18 hr AAWT Test Case	% change	18 hr AAWT HGV flows Reference Case	18 hr AAWT HGV flows Test Case	% change
<b>149</b>	<b>6211</b>	<b>9313</b>	<b>49.9%</b>	<b>274</b>	<b>274</b>	<b>0%</b>
<b>150</b>	<b>8761</b>	<b>9777</b>	<b>11.6%</b>	<b>124</b>	<b>124</b>	<b>0%</b>
<b>151</b>	<b>9490</b>	<b>11446</b>	<b>20.6%</b>	<b>102</b>	<b>102</b>	<b>0%</b>
152	7828	8385	7.1%	131	131	0%
153	15788	15989	1.3%	834	834	0%
154	18283	18773	2.7%	728	728	0%
155	14643	15333	4.7%	346	346	0%
156	329	329	0.0%	20	20	0%
157	7321	7321	0.0%	222	222	0%
158	7775	7775	0.0%	240	240	0%
159	6185	6360	2.8%	78	78	0%
160	13539	14268	5.4%	318	318	0%
161	16333	17237	5.5%	385	385	0%
162	5877	6023	2.5%	85	85	0%
163	4267	4278	0.2%	200	200	0%
<b>164</b>	<b>5236</b>	<b>5759</b>	<b>10.0%</b>	<b>82</b>	<b>82</b>	<b>0%</b>
165	8628	9167	6.2%	186	186	0%
166	8740	9164	4.8%	176	176	0%
167	5047	5047	0.0%	71	71	0%
168	15136	15389	1.7%	672	672	0%
169	10728	11616	8.3%	130	130	0%
<b>170</b>	<b>8749</b>	<b>9696</b>	<b>10.8%</b>	<b>176</b>	<b>176</b>	<b>0%</b>
171	5676	6234	9.8%	124	124	0%
172	14170	14861	4.9%	353	353	0%
173	30148	30876	2.4%	799	799	0%
174	4349	4411	1.4%	424	424	0%
<b>175</b>	<b>4376</b>	<b>5958</b>	<b>36.2%</b>	<b>415</b>	<b>415</b>	<b>0%</b>
176	30079	30555	1.6%	1160	1160	0%

9.4.31 The remaining four links (149, 170 and 175) either have an increase in flow equal to or over 10% and are located near medium or high sensitivity receptors, or have an increase in flow of over 30%. The sensitivity of receptors in the vicinity of these links are summarised in **Table 9.8**. These four links comprise the 'ES study area' referred to in the remainder of this Chapter.

Table 9.8: Summary of Receptor Sensitivity

Link ID	Name	Sensitivity			
		High	Medium	Low	Negligible
149	Butt Lane			Residential dwellings	
170	Gloucester Road near the Plain	Educational Institution		Residential dwellings	
175	Oldbury Lane East			Residential dwellings	Agricultural Land

#### *Fear and Intimidation*

9.4.32 The 2028 Reference Case 18-hour AAWT and HGV percentages are set out for each link in the ES Study Area in **Table 9.9** below:

Table 9.9: 2028 Reference Case Scenario Traffic Data

Link ID	Name	2028 Reference Case AAWT	HGV%
149	Butt Lane	6211	4.4%
170	Gloucester Road near the Plain	8749	2.0%
175	Oldbury Lane Between Site Accesses	4376	9.5%

9.4.33 With regards to the Fear and Intimidation thresholds set out in **Table 9.3**, each link has a **negligible** Degree of Hazard in the 2028 Reference Case with average traffic flow over 18-hour day below 600 vehicles per hour, and total 18-hour HGV flow of below 1000.



### Existing Driver Delay

- 9.4.34 The quantification of development impact at each of the junctions in the TA study area has been set out in the TA and detailed capacity assessment undertaken for junctions which are predicted to have a proportional increase in flow of more than 2% during the weekday peak hours as a result of the Proposed Development.
- 9.4.35 The capacity of junctions in the TA study area was tested using industry standard software ARCADY for roundabouts, PICADY for priority junction and LinSig for the signalised junctions.
- 9.4.36 Two junctions in the TA study area were shown to be near or over capacity in the 2028 Reference Case scenario – Junction 1 Butt Lane / Morton Way / Gloucester Road junction and Junction 4 A38 / Grovesend Road / Tytherington Road junction. The driver delay results for these junctions are set out in **Tables 9.10-9.11**.

Table 9.10: Junction 1 - Butt Lane / Morton Way / Gloucester Road – 2028 Reference Case driver delay

Approach	2028 Reference Case Scenario (seconds)	
	AM	PM
Butt Lane – Left Turn	<u>22.06</u>	<u>11.19</u>
Butt Lane – Right Turn	<u>34.38</u>	<u>24.93</u>
Ghost Island Right Turn into Butt Lane	<u>9.29</u>	<u>12.71</u>
Morton Way – Left Turn	<u>12.28</u>	<u>11.18</u>
Morton Way – Right Turn	<u>22.46</u>	<u>17.69</u>
Ghost Island Right Turn into Morton Way	<u>9.29</u>	<u>12.71</u>

- 9.4.37 **Table 9.10** shows that, in the 2028 Reference Case, the Butt Lane / Morton Way / Gloucester Road junction is predicted to experience **minor** driver delay in both peak periods. In the 2028 Reference Case, without the Proposed Development, delay is predicted at **34.38 and 22.46** seconds during the AM peak hour on Butt Lane and Morton Way. Across the PM peak hour, delay is also **minor** at **24.93** seconds on Butt Lane (right turn).

9.4.38 The operation of this junction suggests that vehicles on the side arms, during the AM peak, will **experience a slight delay** in the future year baseline scenario.

Table 9.11: Junction 4 – A38 / Grovesend Road / Tytherington Road Junction - 2028 Reference Case driver delay

Approach	2028 Reference Case Scenario (seconds)	
	AM	PM
A38 North	<u>35.7</u>	<u>40.1</u>
Tytherington Road	<u>40.6</u>	<u>45.6</u>
A38 South	<u>64.4</u>	<u>33.5</u>
Grovesend Road	<u>29.1</u>	<u>36.2</u>

9.4.39 The modelled operation of Junction 4 shows that the junction is nearing capacity, with driver delay at **64.4** seconds on the A38 South arm in the AM peak. Therefore, there is a baseline level of congestion at this junction, although it is not considered to be severe, with queues clearing within the signal cycle.

*Existing Pedestrian Amenity and Delay*

9.4.40 A review of pedestrian facilities detailed above shows that there is a good level of existing facilities on desire lines to local facilities and amenities. These pedestrian facilities include informal and formal crossing points and a network of footpaths and footways. It is therefore concluded that the baseline level of pedestrian amenity is good, and delay is likely to be small.

*Existing Accidents and Safety*

9.4.41 The latest Personal Injury Collision (PIC) data was obtained from SGC for a five-year period between 1<sup>st</sup> January 2013 to 31<sup>st</sup> December 2017. The PIC data was collected to establish the existing highway safety in the vicinity of the Project Site, identify any highway safety issues and inform improvement measures where necessary.

9.4.42 The PIC data assessment provides an overview of the number and severity of accidents and a summary of the vulnerable road users involved in the casualties. The assessment also defines the likely causes of the collisions, considering any trends in the incidents recorded or collisions caused as a result of the existing highway layout.

9.4.43 The PIC study area includes the Project Site frontage along Oldbury Lane and the area around each of the junctions for which traffic survey data was collected as set out above.

9.4.44 A total of 12 collisions were observed in the study area. Of the observed incidents:

- 0 were classified as fatal in severity;
- 2 were classified as serious in severity; and
- 10 were classified as slight in severity.

9.4.45 There were 13 casualties as a result of the 12 collisions. Of these 13 casualties, 7 were vulnerable road users (classed as pedestrians, cyclists and powered two wheeled vehicles).

9.4.46 There were no recorded collisions along the Project Site's frontage on Oldbury Lane within the five-year period.

9.4.47 The data received does not identify any specific accident black spots on the local road network or any specific patterns or issues with accidents that occurred in the study area. Most accidents involved motorised vehicles and were classed as slight in severity. The accidents recorded are also spread across the study area, without any specific clusters. Further information relating to accidents and safety can be found in the accompanying TA.

## **9.5 INHERENT DESIGN MITIGATION**

9.5.1 Inherent design mitigation measures include measures taken from the parameter plans for the Project Site.

### **Proposed Primary School and Community Facilities**

9.5.2 **Whilst not quantified within the analysis, the updated development proposals include land for a primary school and community facilities within a local centre. The provision of these facilities on site will reduce the need to travel, especially by car, for residents of existing communities and also proposed residents.**

### **Main Vehicle Access / Connectivity**

9.5.3 A primary road through the site that will link to secondary roads which provide access to dwellings and other uses. The primary road will be connected to the existing highway network via two vehicle access points on the site frontage, one on the west part of Oldbury Lane and one on the east part of Oldbury Lane. The vehicle access points will comprise of priority T-junctions.

### **Sustainable Travel Corridor**

9.5.4 A Sustainable Travel Corridor will be provided in the south east corner of the Project Site. The Corridor will provide a bus only access into the development, with a shared foot / cycleway adjacent to the northern carriageway. The Corridor will link the Proposed Development to

adjacent committed development, Park Farm and be key link towards the local facilities and amenities in Thornbury.

- 9.5.5 The Sustainable Travel Corridor comprises a bus only carriageway which is 6.5m in width, and a 3.0m shared footway / cycleway on the northern side **to connect to the existing provision on the adjacent Park Farm.** The design speed of the link is 20mph which is enforced by a priority pinch point.

#### Walking and Cycling

- 9.5.6 Pedestrian / cycle links will be provided within the Project Site boundary to maintain access to the existing Public Rights of Way and connect to existing facilities on the local highway network.
- 9.5.7 The TA sets out two walking and cycling strategies, to demonstrate that the Proposed Development can be delivered with sustainable travel connections, with and without reliance on the Alexandra Way bus link connection. In both strategies, users of the Proposed Development will be able to access the full range of key facilities and services in the local area, including those in the Town Centre.

## **9.6 POTENTIAL ENVIRONMENTAL IMPACTS & EFFECTS**

- 9.6.1 This section assesses the potential environmental impacts and effects of the Proposed Development in line with the assessment methodology outlined under **9.2** above.

#### **Construction Impacts and Effects**

- 9.6.2 The construction of the Proposed Development would generate traffic that would affect the local road network. Effects may arise in relation to fear and intimidation as a result of HGV movements associated with construction.
- 9.6.3 As a result of the range of construction projects and processes occurring on any one day, there will be some variation in the flows accruing from the construction of the Project Site. Typically, the final rate of project completion reflects many competing factors, such as access to the Project Site, completing the sales of buildings and availability of labour and materials, as well as maintaining a quality environment during the early phases of a project during these construction phases. Nevertheless, a reasonable robust assessment of the likely extent of construction-related activities occurring at any one time has been undertaken for the purposes of assessing environmental effects.

#### Assumptions in relation to construction activities

- 9.6.4 Potential traffic generated by the Proposed Development during a peak construction year has been calculated using a number of specific assumptions related to land uses proposed on the

Project Site and inputted into a construction traffic generation model. This model has been developed by PBA and has been used widely on projects throughout the country, and accepted by various local authorities to date.

9.6.5 For the purpose of the ES assessment, it has been assumed that the following elements of the Project Site would be constructed in a single year and that they would form a representative range of activities over a year on which to base the assessment at the Construction Stage:

- On-site earthworks and landscaping, related to an initial phase of development on site;
- 100 residential units to be constructed; and
- Education, retail and community buildings to be constructed.

9.6.6 An assessment of the indicative peak daily construction two-way flows arising from the Project Site has been forecast.

9.6.7 The traffic associated with construction of the development comprises of both Light and HGV trips. The light trips will be generated by construction workers arriving to and from the Project Site for work purposes each day. It is assumed that the development will require 800 person-years of construction work over an eight year construction period. This equates to 100 onsite workers per annum for 8 year period during a typical day.

9.6.8 In order to ensure a robust approach is undertaken, all construction workers are assumed to travel to the Project Site using single occupancy vehicle, therefore generating one vehicle trip arriving and one departing the construction site per worker per day. This is likely to be considerably overestimating the resulting level of light vehicles travelling to and from the Project Site and is therefore considered to be robust.

9.6.9 Taking the above into account, the model estimates that the peak construction year could generate approximately 6,739 two-way HGV construction vehicle movements and 50,600 light movements associated with construction workers accessing the Project Site.

9.6.10 Assuming that construction will take place five days a week, this equates to approximately 253 construction days. On average, therefore, the Project Site is forecast to generate around 27 HGV and 200 light construction vehicle movements per day. The working hours of most construction operatives do not coincide with the network peak – with the hours of work starting and ending earlier than most

9.6.11 With regards to the distribution of construction traffic it is anticipated that HGV movements will route along the M5, and north Thornbury via Gloucester Road and Butt Lane. For light vehicles, the same distribution has been assumed as for the residential element of the Project Site as set out within the TA. This distribution was based on observed turning movements.

9.6.12 On the basis of the predicted flow relating to the construction activities, a robust assessment of the likely effect against 2028 Reference Case AAWT flow is shown in **Table 9.12**.

Table 9.12: Construction Traffic Analysis

Link	18 hr AAWT 2028 Reference Case	Daily construction traffic (HGV + Light vehicles)	% change
149	6211	222	3.6%
150	8761	7	0.1%
151	9490	78	0.8%
152	7828	58	0.7%
153	15788	17	0.1%
154	18283	41	0.2%
155	14643	58	0.4%
156	329	0	0.0%
157	7321	0	0.0%
158	7775	0	0.0%
159	6185	15	0.2%
160	13539	52	0.4%
161	16333	15	0.1%
162	5877	6	0.1%
163	4267	204	4.8%
164	5236	12	0.2%
165	8628	16	0.2%
166	8740	16	0.2%
167	5047	0	0.0%
168	15136	15	0.1%
169	10728	15	0.1%
170	8749	78	0.9%
171	5676	58	1.0%
172	14170	58	0.4%
173	30148	52	0.2%
174	4349	7	0.2%
175	4376	7	0.2%
176	30079	52	0.2%

9.6.13 The results in **Table 9.12** above show that there are no links exceeding the assessment magnitude threshold of a 30% or more increase in total traffic flow. There are also no links exceeding the assessment magnitude threshold of a 10% or more increase in total traffic flow in sensitive area. In the vast majority of cases, the magnitude of daily flow increases in total traffic is Very Low (less than 1%). Therefore, the magnitude of impact is **Negligible** and with regards to all environmental effect categories, the significance of criteria is **Neutral**.

### Operation Impacts and Effects

9.6.14 The environmental effect categories, as set out above, have been considered for the links in the ES Study Area; as identified through the baseline. The analysis is summarised below.

## Severance and Fear and Intimidation

9.6.15 **Table 9.13** outlines 2028 Test Case traffic flows (all vehicles and HGVs) and percentage increase on the 2028 Reference Case flows, for the ES study area links. Full flow details for each link can be found in **Table 9.6**.

Table 9.13: Traffic flows and percentage changes for ES study area links

Link ID	Name	2028 Test Case All Traffic 18 hr AAWT	2028 Test Case HGV 18 hr AAWT	Change in 18 hr Total Traffic on 2028 Reference Case (veh/%)		Change 18 hr HGV Traffic on 2028 Reference Case (veh/%)	
149	Butt Lane	9211	274	+3102	+49.9%	0	0.0%
170	Gloucester Road near the Plain	9696	176	+947	+10.8%	0	0.0%
175	Oldbury Lane Between Site Accesses	5958	415	+1582	+36.2%	0	0.0%

### *Link 149 – Butt Lane*

9.6.16 With reference to severance thresholds set out in **Table 9.2**, it is anticipated that this link will experience a **low** change in 18 hour AAWT in the order of 49.9%. There is anticipated to be a **negligible** increase in HGVs. Adjacent to the link there are residential dwellings, which is a **low** sensitivity receptor so the overall effect significance on severance is anticipated to be **minor adverse**.

9.6.17 In relation to fear and intimidation thresholds set out in **Table 9.3**, the 18-hour AAWT flow per hour is identified to be a **negligible** degree of hazard with average flow on the link at 512 vehicles per hour. The degree of hazard resulting from HGV flows is also **negligible**. Due to the **low** receptor sensitivity of this link, the overall effect significance on fear and intimidation is anticipated to be **neutral**.

### *Link 170 – Gloucester Road near the Plain*

9.6.18 With reference to severance thresholds set out in **Table 9.2**, it is anticipated that this link will experience a **negligible** change in 18 hour AAWT in the order of 10.8%. Likewise, there is anticipated to be a **negligible** increase in HGVs. Adjacent to the link there is an educational institution, Castle School Sixth Form Centre, which is a **high** sensitivity receptor, and a residential area, which is a **low** sensitivity receptor, so the overall effect on severance is anticipated to be **neutral**.

9.6.19 In relation to fear and intimidation thresholds set out in **Table 9.3**, the 18-hour AAWT flow per hour is identified to be a **negligible** degree of hazard with average flow on the link at 539 vehicles per hour. The degree of hazard resulting from HGV flows is also **negligible**. Despite the **high** receptor sensitivity of this link, due to the negligible magnitude of impact effect significance on fear and intimidation is anticipated to be **neutral**.

*Link 175 – Oldbury Lane between site accesses*

9.6.20 With reference to severance thresholds set out in **Table 9.2**, it is anticipated that this link will experience a **low** change in 18 hour AAWT in the order of 36.2%. There is anticipated to be a **negligible** increase in HGVs. Adjacent to the link there are residential dwellings, which is a **low** sensitivity receptor so the overall effect significance on severance is anticipated to be **minor adverse**.

9.6.21 In relation to fear and intimidation thresholds set out in **Table 9.3**, the 18-hour AAWT flow per hour is identified to be a **negligible** degree of hazard with average flow on the link at 331 vehicles per hour. The degree of hazard resulting from HGV flows is also **negligible**. Due to the **low** receptor sensitivity of this link, the overall effect significance on fear and intimidation is anticipated to be **neutral**.

Driver Delay

9.6.22 As detailed above, there is anticipated to be some **minor** congestion at two junctions in the TA study area – Junction 1 Butt Lane / Morton Way / Gloucester Road junction and Junction 4 A38 / Grovesend Road / Tytherington Road junction. The driver delay results for these **existing** junctions in the 2028 Test Case, and a comparison against the 2028 Reference Case, are set out in **Tables 9.14-9.15**.

Table 9.14: Junction 1 - Butt Lane / Morton Way / Gloucester Road – Existing junction layout - driver delay analysis

Approach	2028 Test Case Scenario (seconds)		Percent Difference (Reference Case vs Test Case Scenario)	
	AM	PM	AM	PM
Butt Lane – Left Turn	<u>1043.77</u>	<u>281.88</u>	<u>4731.5%</u>	<u>2519.03%</u>
Butt Lane – Right Turn	<u>1056.11</u>	<u>1056.11</u>	<u>3071.87%</u>	<u>4236.30%</u>
Ghost Island Right Turn into Butt Lane	<u>10.05</u>	<u>33.80</u>	<u>8.18%</u>	<u>265.93%</u>



Morton Way – Left Turn	<u>284.33</u>	<u>444.23</u>	<u>2315.39%</u>	<u>3973.43%</u>
Morton Way – Right Turn	<u>415.70</u>	<u>520.20</u>	<u>1852.85%</u>	<u>2940.64%</u>
Ghost Island Right Turn into Morton Way	<u>17.56</u>	<u>10.75</u>	<u>89.02%</u>	<u>-15.43%</u>

9.6.23 **Table 9.14** shows that, in the 2028 Test Case, the Butt Lane / Morton Way / Gloucester Road junction is predicted to operate **over** theoretical capacity, such that no further traffic is able to enter the junction.

9.6.24 The increase in delay is associated with an increase in total flow at the junction of 18.2% in the AM peak and 20.1% in the PM peak. It is therefore considered that the magnitude of impact at the junction is **low** however, due to the **capacity constraints of the existing junction arrangement**, the effect significance is considered to be **moderate adverse**.

9.6.25 On the basis of the predicted operation of the junction, in both assessment scenarios, the effect of the Proposed Development at this junction is considered to be **significant**. **Mitigation is therefore proposed at this junction.**

Table 9.15: Junction 4 – A38 / Grovesend Road / Tytherington Road Signalised Staggered Junction – driver delay analysis

Approach	2028 Test Case Scenario (seconds)		Percent Difference (Reference Case vs Test Case Scenario)	
	AM	PM	AM	PM
A38 North	<u>30.6</u>	<u>44.3</u>	<u>0.0%</u>	<u>9.5%</u>
Tytherington Road	<u>29.8</u>	<u>46.1</u>	<u>26.6%</u>	<u>1.1%</u>
A38 South	<u>102.5</u>	<u>35.0</u>	<u>37.2%</u>	<u>4.3%</u>
Grovesend Road	<u>61.1</u>	<u>40.0</u>	<u>52.4%</u>	<u>9.5%</u>

9.6.26 **Table 9.15** shows that the Proposed Development increases driver delay by between **1-52%** across the peak periods at the A38 / Grovesend Road / Tytherington Road junction. This equates to a maximum increase of **23.3** seconds per vehicle, which is predicted on Grovesend Road in the AM peak.

- 9.6.27 The increase in delay is associated with an increase in total flow at the junction of 4.8% in the AM peak and 3.4% in the PM peak. It is therefore considered that the magnitude of impact at the junction is **negligible** and the effect of significance is **neutral**.
- 9.6.28 It should be noted that the comments above are based on an assessment of conditions which occur for only two hours in the day. Over the course of a day, driver delay associated with these junctions is likely to be less than the times associated with peak AM and PM traffic.
- 9.6.29 **Whilst the environmental impacts at the A38 / Church Road and A38 / B4061 Thornbury Road junctions is negligible, and therefore not reported here, from an operational performance perspective SGC have requested financial contributions towards improvements at the junctions. It is agreed that a reasonable financial contribution will be made towards a wider mitigation scheme in these locations.**

#### Effects on Pedestrians Amenity

- 9.6.30 As set out earlier in this chapter, the existing situation with regards to pedestrian amenity is that there is a good provision of facilities in the local area.
- 9.6.31 The Proposed Development is anticipated to provide future residents with attractive and direct connectivity to the existing good provision **as well as a Primary School and Retail and Community Hub**. As detailed above, with regards to the magnitude of effects of the Proposed Development on severance and fear and intimidation, which are related to pedestrian amenity, these are at worst **low**. Significance of effects is considered to be, at worst, **minor adverse**.

#### Accidents and Safety

- 9.6.32 The PIC data for Thornbury for the 5-year period between 1<sup>st</sup> January 2013 to 31<sup>st</sup> December 2017 indicated that there are no accident black spots and that the resulting accidents were not related to the layout of the road.
- 9.6.33 It is not anticipated that the Proposed Development will worsen the situation with regards to accidents and safety therefore the magnitude of impact is considered to be **negligible** and the significance of effect is **neutral**.

## **9.7 ADDITIONAL MITIGATION, COMPENSATION & ENHANCEMENT MEASURES**

- 9.7.1 As part of the evolving development parameters and the EIA process, potential transport and access effects have been identified and design solutions sought to minimise any potential adverse effects. Opportunities for enhancements have also been identified.

9.7.2 This section summarises the key transport mitigation and enhancement measures. The mitigation measures for the Proposed Development are considered for the following scenarios:

- The movements associated with the construction phases; and
- The movements associated with the operational flows

### **Construction**

9.7.3 As set out under 9.6, during construction, it is anticipated that the additional traffic would have a neutral and temporary effect on severance, pedestrian amenity, driver delay, highway safety and fear and intimidation. In addition, no hazardous loads are anticipated to arise during the construction period.

9.7.4 Despite the anticipated level of effect significance, a Construction Environmental Management Plan (CEMP) will be prepared in advance of construction, this will set out measures to manage the construction works. The CEMP will be progressed by the principal contractor(s) based on the proposed working practices. It is therefore proposed that CEMP would include the following transport and access mitigation measures:

- To ensure that construction vehicle movements are kept away from minor roads wherever possible, the contract documents for each contractor will set out the requirements for construction traffic as part of a freight and construction vehicle management plan.
- The CEMP will include a Travel Plan Framework (TPF) for construction personnel to reduce traffic generated by the construction works.
- There will also be the need to ensure safe movement of vehicles within the site during construction. These measures will include as appropriate:
  - Clearly demarked pedestrian and vehicle routes on site, where possible these will be kept separate;
  - Where pedestrian routes cross vehicle routes, the crossing points will be clearly marked and warning signs posted;
  - Main entry and exit points must be signposted;
  - At each construction parcel, vehicles will enter and exit where possible in a forward direction;
  - Drivers will be provided with a site map and site safety instructions on arrival;

- Where possible, vehicle routes on site will be specifically constructed and be permanent; and
- A site speed limit will apply.

9.7.5 A Construction Traffic Management Plan (CTMP) should also be implemented to minimise the effects of construction traffic upon local sensitive receptors. The CTMP will outline a range of measure to be implemented including:

- The identification of construction traffic routes to be used when travelling to and from site;
- HGVs to access the site outside of peak traffic movement periods (where feasible);
- Encouraging staff working on site to car-share, walk, cycle and use public transport; and
- Provision of adequate onsite parking to negate the need for construction vehicles to park on highways.

9.7.6 Overall, through the use of these documents, best practice would be adopted to minimise any adverse effects of construction on sensitive receptors.

## **Operational Stage**

### Local Highway Network

9.7.7 The Junction Butt Lane / Morton Way / Gloucester Road staggered junction is predicted to operate above capacity in the 2028 Test Case scenario (**Table 9.14**). A mitigation scheme has been proposed for this junction, which comprises a staggered signalised layout with arm widening on **all four** arms. The mitigation scheme **proposed is** shown at **PBA Drawing 39209/5501/SK08-D**. Further detail on the mitigation proposals for this junction are set out within the TA. **This confirms that the proposed mitigation scheme will result in the junction operating within capacity with minimal queuing and delay. Whilst discussions are going with SGC to reach agreement on the detailed design of the mitigation scheme, this will not result in any changes to the conclusion of this ES chapter.**

9.7.8 **Although the impact of development at the A38 / Church Road and A38 / B4061 Thornbury Road junctions is negligible, it is agreed that a reasonable financial contribution will be made towards a wider mitigation scheme in these locations.**

### Framework Travel Plan

- 9.7.9 A Framework Travel Plan (FTP) has been prepared and sets out a holistic package of measures designed to reduce single occupancy car use associated with the Proposed Development, by supporting and providing alternative forms of transport.
- 9.7.10 The FTP sets out an action plan which details the proposed measures, commitments and obligations that the developer and future occupiers will adhere to in delivering the Travel Plan. These are intended to deliver the lowest practical level of car use to, from and within the development, as well as providing high quality and easy to use opportunities for alternative modes of transport.
- 9.7.11 Targets will be identified for reducing single occupancy car journeys to and from the site at the outset with performance monitored and reviewed through the implementation period. The FTP also sets out the mechanisms through which ongoing monitoring, review and intervention would be enforced. **The FTP will be handed over to SGC for implementation and management. A financial contribution towards this will be identified in the Section 106 Agreement in due course.**

### Walking and Cycling

- 9.7.12 As part of the highway mitigation measures for the Butt Lane / Morton Way / Gloucester Road staggered junction detailed above, formal signalised pedestrian crossing **facilities are** proposed. These will offer a safety benefit to pedestrians, not only from the development site, but also from the wider residential area.
- 9.7.13 **It is also agreed with SGC that a reasonable financial contribution will be made towards additional cycle parking in the town centre.**

### Public Transport

- 9.7.14 A bus contribution will be provided to extend the existing T1, or whichever bus service will serve the Park Farm development in accordance with its Section 106 agreement. Two route options are set out within the TA, with and without reliance on the Alexandra Way bus link connection.
- 9.7.15 New bus stops will be provided, within 400m of each part of the development, to meet SGC's adopted Bus Shelter Design and Procurement Process document.
- 9.7.16 It is important to ensure that the proposed development will support and encourage sustainable transport. In addition to the bus service extension a contribution could therefore be provided for better waiting facilities for bus passengers in the centre of Town in line with the locally identified need, as set out within SGC's PSP Plan Appendix 3 'Thornbury'.

9.7.17 The contribution could be for the provision of an improved bus shelter on Rock Street and new shelter/improved facilities on the High Street bus stop. These facilities would include bus timetables and real time information. These facilities would make the overall bus use more attractive for residents of the proposed development travelling to and from the town centre, as well as those connecting to additional bus services.

9.7.18 The provision of new or improved Town Centre bus facilities will therefore help to increase bus patronage for residents from the proposed development, as well as within Thornbury itself, reducing the number of vehicle movements on the local highway network. This contribution would be in addition to the bus facilities required as part of the proposed development.

## 9.8 RESIDUAL ENVIRONMENTAL IMPACTS & EFFECTS

### Construction

9.8.1 There is likely to be a neutral effect due to construction related to the Proposed Development. Nonetheless, additional mitigation measures are identified above, in the form of a CEMP.

### Operation

9.8.2 With regards to Severance the Proposed Development Site effect significance has been shown to be **minor adverse**.

9.8.3 With regards to Fear and Intimidation the Project Site effect significance has been shown to be **neutral**. Nonetheless, the proposed mitigation measures, namely the public transport proposals and FTP, are anticipated to reduce the amount of traffic from the Project Site, improving conditions for pedestrians (and other vulnerable users).

9.8.4 With regards to driver delay, the Proposed Development effect significance has been shown to be **moderate adverse**. With the implementation of the mitigation scheme the signalised Butt Lane / Morton Way / Gloucester Road junction **is forecast to** operate **within or at** capacity in the 2028 Test Case **scenarios**. The introduction of the scheme improves **pedestrian amenity, delay and severance in this location**.

9.8.5 On balance, the magnitude of effect of this mitigation scheme is considered to be **low** with effect significance of **minor beneficial** when compared to the 2028 Test Case.

9.8.6 To accommodate vehicular access to the Project Site, it is proposed that the speed limit along Oldbury Lane be reduced from national speed limit, to 40mph in the vicinity of the site frontage. This is considered to offer a safety benefit to existing residents and users of the area, including pedestrians using the PRow which crosses Oldbury Lane. The magnitude of effect of this speed limit reduction scheme mitigation scheme is considered to be **low** with effect significance of **minor beneficial**.

- 9.8.7 With regards to pedestrian amenity, and accidents and safety it is considered that the residual effect of the development will be **minor beneficial** as a result of the pedestrian and cycle links, along with improvements in public transport which will benefit not only users of the Project Site but also the wider community in Thornbury. With the provision of the pedestrian crossing facilities at the proposed Butt Lane/Gloucester Road/Morton Way junction, it is anticipated that the overall effect of the Project Site on pedestrians and cyclists is therefore likely to be **low** in magnitude, and **minor beneficial** in significance

## 9.9 CUMULATIVE EFFECTS

- 9.9.1 The assessment of likely impacts outlined in this Chapter inherently considers the cumulative effect of the Proposed Development, background traffic growth, and committed developments within the vicinity of the Project Site for the period to 2028 as outlined in the baseline above. Therefore, this ES has already considered these cumulative effects and the measures proposed to ensure that any cumulative effects are mitigated.

## 9.10 ASSESSMENT SUMMARY

- 9.10.1 A Transport Assessment has been undertaken in the context of scoping discussions with SGC and HE, which has been used to inform this Chapter.
- 9.10.2 This ES chapter has assessed the likely effects that the Proposed Development will have on sensitive receptors in relation to a range of access and movement matters including severance, fear and intimidation, pedestrian amenity, driver delay, accidents and safety and hazardous loads.
- 9.10.3 The study area has been defined by the anticipated change in traffic flow on highway links, based on established guidance. Sensitive receptors surrounding these links were identified and considered within the assessment, including educational establishments, footpath provision and residential areas.
- 9.10.4 The proposal for Land West of Park Farm responds to a number of local and national policies in relation to access and movement such as providing connections for pedestrians and cyclists as well as bus users to key local facilities and amenities.
- 9.10.5 The assessment of likely impacts outlined in this Chapter inherently considers the cumulative effect of the Proposed Development, background traffic growth, and committed developments within the vicinity of the Project Site for the period to 2028. Therefore, this ES has considered these cumulative effects and the measures proposed to ensure that any cumulative effect is mitigated.
- 9.10.6 **The inclusion of the primary school, and associated reduction in dwelling numbers, was confirmed following completion of the assessment of impacts of the previously**

proposed 630 dwellings. It has been agreed with SGC that a full reassessment of development impacts is not required as the resultant reductions in traffic generation result in fewer vehicle trips and therefore the assessment reflects an overestimate of development impacts and a robust assessment.

9.10.7 Mitigation measures have been proposed to include local junction capacity measures, pedestrian and cycling measures, and public transport measures.

9.10.8 Overall, the residual effect of the Proposed Development, including the proposed mitigation measures, is anticipated to be **not significant**.

9.10.9 **Table 9.17** below presents a summary of likely effects related to the Proposed Development with the proposed mitigation measures put in place. **Table 9.18** presents a provisional implementation schedule for the mitigation measures.



Table 9.17: Traffic & Transport Assessment Summary

Environmental Effect	Sensitivity of Receptor	Nature of Impact	Impact Magnitude	Significance	Additional Mitigation	Residual Impact Magnitude	Residual Significance of Effect	Confidence Level
<b>Construction Effects</b>								
Severance	Some high sensitivity receptors affected within the Study Area	Level of construction traffic	Negligible	Neutral	CEMP	Negligible	Neutral	High
Pedestrian Amenity								
Fear and Intimidation								
Driver Delay								
Accidents and Safety								
<b>Operation Effects</b>								
Severance	Some high sensitivity receptors affected within the Study Area	Level of operation traffic	Low	Minor Adverse	None required. <b><u>However, improved facilities for pedestrians are provided via the provision of formal signalised crossings at Butt Lane / Morton Way / Gloucester Road junction.</u></b>	Low	Minor Adverse	High
Pedestrian Amenity	Some high sensitivity receptors	Level of operation traffic and pedestrian	Low	Minor Adverse	None required. However, improved facilities for pedestrians are	Low	Minor Beneficial	High

	affected within the Study Area	facilities provided			provided via the provision of formal signalised crossings <b><u>at Butt Lane / Morton Way / Gloucester Road junction.</u></b>			
Fear and Intimidation	Some high sensitivity receptors affected within the Study Area	Level of HGV traffic	Negligible	Neutral	None required. However, contributions to bus service extension and implementation of FTP is anticipated to reduce traffic flows.	Negligible	Neutral	High
Driver Delay	Some high sensitivity receptors affected within the Study Area	Level of operation traffic during peak hours where network likely to be operating close to capacity	Low	Moderate adverse	Signalisation scheme at Butt Lane / Morton Way / Gloucester Road junction.  <b><u>Financial contribution towards cycle parking in town centre and junction improvement schemes at A38 / Church Road and A38 / B4061 junctions.</u></b>	Low	Neutral	High
Accidents and Safety	Some high sensitivity receptors affected within the Study Area	No accident black-spots were identified within the study area	Negligible	Neutral	None required. However, safety benefits associated with speed limit reduction on Oldbury Lane and provision of formal signalised crossings on Gloucester Road south.	Low	Minor Beneficial	High

Hazardous Loads	Some high sensitivity receptors affected within the Study Area	None expected	Negligible	Neutral	None required	Negligible	Neutral	High
<b>Cumulative Effects - Due to Assessment Methodology – Inherent to Assessment Presented Above</b>								

**Table 9.18: Provisional Mitigation Implementation Schedule**

Mitigation Measure	Implementing Agent(s)	Legal Instrument	Compliance Target	Implementation Timescale
Framework Travel Plan	The Developer / <u>SGC</u>	S106	-	To be agreed with SGC
Butt Lane / Morton Way / Gloucester Road Junction Improvement	The Developer	S278	-	To be agreed with SGC
<u>Financial contribution towards junction improvements schemes on A38 at junctions with Church Lane and Thornbury Road</u>	<u>The Developer</u>	<u>S106</u>	=	<u>To be agreed with SGC</u>
<u>Financial contribution towards cycle parking in the town centre.</u>	<u>The Developer</u>	<u>S106</u>	=	<u>To be agreed with SGC</u>
Speed limit reduction along Oldbury Lane	SGC	TRO	-	To be agreed with SGC
Public Transport Contribution	The Developer	S106	-	To be agreed with SGC