now part of

PT18/6450/O Land West of Park Farm, Thornbury

Transport Assessment

On behalf of **Barwood Development Securities Ltd & North West Thornbury Landowner Consortium**

Project Ref: 39209/5560 | Rev: - | Date: December 2019

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Revision	Date	Description	Prepared	Reviewed	Approved
A	15/11/18	Team comments	SG	RH	MP
B	16/11/18	Team comments – planning submission	SG	SG	RH
C	19/12/19	Updated to include revised masterplan proposals for submission	KS	NT	NT
D	20/01/20	Team comments – for submission	KS	NT	NT

Note to Reader

This Transport Assessment (TA) has been produced in support of an outline planning permission at Land West of Park Farm, Thornbury. A TA and Transport Assessment Addendum (TAA) has previously been submitted to South Gloucestershire Council and there has been significant liaison between PBA and SGC on the approach and assessment.

This revision of the TA covers the change of development proposals to include less proposed residential development to allow provision of a new primary school, and incorporates both the previous TA and TAA content and additional submissions made to SGC following the submission of the planning application.

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PBA Drawings

39209/5501/SK17-A - Concept Eastern Site Access – Right-turn Ghost Option Swept Path Analysis
39209/5501/SK23-A - Oldbury Lane Widening
39209/5501/SK24-A - Butt Lane Tracking
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1 Introduction

1.1 Background

1.1.1 Peter Brett Associates LLP (PBA) now part of Stantec has been commissioned by Barwood Development Securities Ltd & North West Thornbury Landowner Consortium (the Developer) to provide highway and transport advice in support of a mixed use residential-led development on Land West of Park Farm, Thornbury.

1.1.2 This TA is prepared in support of an outline planning application for up to 595 dwellings and a primary school on approximately 36Ha of land to the north west of Thornbury.

1.1.3 As part of the original planning application (ref PT18/6450/O), the following documents were submitted:

- Transport Assessment, dated November 2018 (39209-5501/004B)
- Framework Travel Plan, dated November 2018 (39209-5501-002B)
- Transport Assessment Addendum, dated May 2019 (39209-5505-005)

1.1.4 This updated Transport Assessment (TA) provides an overview of the proposed development, sets out an assessment of the transport issues associated with the site and identifies a package of transport measures aimed at encouraging sustainable travel, managing the existing transport networks and mitigating the residual transport impacts of the development.

1.1.5 This updated TA also draws together all of the technical work undertaken in consultation with South Gloucestershire Council (SGC) and Highways England (HE) since the submission of the original TA.

1.1.6 An updated Framework Travel Plan (FTP) has also been submitted in support of the application and should be read in conjunction with this TA.

1.2 Development Proposals

1.2.1 The development site is located on approximately 36Ha of land to the north west of Thornbury. The site is bound by Oldbury Lane to the north, agricultural fields to the west and south, and a new development currently under construction to the east, known as Park Farm. The proposals comprise the following:

- Up to 595 dwellings;
- Land for a primary school;
- Land for a Neighbourhood Hub (up to 700sqm of retail and community uses);
- Two vehicle access junctions from Oldbury Lane; and
- A sustainable travel link, including a bus, cycle and pedestrian link, south east through to the Park Farm development.

1.2.2 A copy of the latest illustrative masterplan for the proposed development is contained at **Appendix A**.

1.3 Scoping of the Transport Assessment

1.3.1 Prior to submission of the planning application, PBA consulted with SGC 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 30th May 2018 is contained at **Appendix B**.

1.3.2 PBA has also consulted with Highways England (HE) regarding the development proposals. A copy of the scoping correspondence with HE is also contained at **Appendix B**.

1.3.3 Comments from SGC Highways were also received as part of the EIA Scoping Opinion (issued 30th May 2018) which is discussed further in the Environmental Statement submitted with this planning application.

1.3.4 The scoping has agreed the following within the TA:

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

1.3.5 During the determination period, PBA has continued to liaise with SGC and HE regarding the proposals. This TA provides an update in response to comments provided by SGC in various emails, formal consultation response dated 29th March 2019, and discussed meetings at SGC's office in Yate between March and December 2019.

1.3.6 It has been agreed with SGC that a full reassessment of development impacts is not required as the resultant reductions in traffic generation, as a result of the revised development proposals, therefore reflect an overestimate of development impacts and therefore a robust assessment.

1.3.7 The table below summarises the contents of the original TA, together with the technical work that has been undertaken since (including that within the TA Addendum) and identifies where within this updated TA this has been set out to assist the reader.

Table 1.1: Summary of TA Updates

	Existing TA Contents	Superseded by TA Addendum? If yes, how?		Additional Technical work completed post-submission	Updated TA reference
1	**Policy Review**	No			Minor updates to account for changes to NPPF and JSP **Section 2.2; 2.4**
2	**Existing Transport Conditions**				
	Site Location	No			
	Local Highway Network	No			
	Existing Traffic Flows and Vehicle Speeds	No			
	Local Facilities & Amenities: Walking & Cycling	In part	Walking & Cycling distances	Walking & Cycling routes and distances TN	Summary of TN included, and TN appended to updated TA **Paragraph 3.5.4; 3.5.12; 3.5.24; Section 3.6**
	Site Accessibility by Non Car Modes	No			**Section 3.6**
	Committed Infrastructure	Yes	Additional schemes included in junction modelling		**Section 3.7**
	Personal Injury Collision Data	In part	Updated to include A38 / B4061 junction		**Section 3.8**
	Committed Development	In part	TEMPro growth removed		
3	**Development Proposals**	No			**Chapter 4**
4	**Access and Movement Strategy**				
	Framework TP	Yes	Updated FTP appended to TAA		**Section 5.2**

	Existing TA Contents	Superseded by TA Addendum? If yes, how?		Additional Technical work completed post-submission	Updated TA reference
	STL	Yes	Revised STL drawings	Revised STL drawings	**Section 5.3**
	Walking and Cycling Strategy	No			
	Public Transport Strategy	No		Additional tracking of Oldbury Lane & Butt Lane. Need for additional bus stops agreed with SGC	**Section 5.7**
				Bus Business Case	**Section 5.5**
	Oldbury Lane Speed Limit Strategy	No			
	Vehicular Access Strategy	Yes	Revised drawings to include ghost island junctions following RSA; tracking of junctions	Additional tracking of access junction	**Section 5.8**
	Vehicular Parking Strategy	No			
5	**Development Travel Demand**				
	Development Proposals	No			**Section 6.2**
	Vehicle Trip Generation	No			**Section 6.3**
	Baseline Mode Split	No			
	Development Traffic Distribution & Assignment	Yes	Gravity model updated		**Section 6.5**
	Traffic flow figures	Yes	To account for changes in gravity model		**Figures updated to account for above changes**
6	**Base Validation**				
	Assessment Years & Traffic Growth	Yes	TEMPro growth removed		**Section 7.2**

	Existing TA Contents	Superseded by TA Addendum? If yes, how?		Additional Technical work completed post-submission	Updated TA reference
	Baseline Traffic Flows	Yes	Additional junction locations included		
	Quantification of Development Impact	No			
	Junction Base Model Validation	Yes	Updated to address SGC queries		**Section 7.4**
	Model Validation	No			**Section 7.5**
7	**Development Impact**				
	Junction modelling results	Yes	Updated to account for above changes & additional A38/B4061 junction	Butt Lane junction reference case amended to include committed LWoGR scheme	**Section 8.2**
	Mitigation	No		Butt Lane signalised mitigation option being revised	A38 / Church Road: **Paragraphs 8.2.56-8.2.61** A38/B4061: **Paragraph 8.2.67** Butt Lane: **Chapter 9**
8	**Primary School Sensitivity Test**	No			Chapter removed and incorporated into **Chapter 5**

1.4 Content of Transport Assessment Report

1.4.1 This report therefore includes the following sections, with the updated technical work set out within:

- Policy Review;
- Existing Transport Conditions;
- Development Proposals
- Access and Movement Strategy;
- Development Travel Demand;
- Base Validation;
- Development Impact;
- Sensitivity Test – Updated Masterplan; and
- Conclusions.

2 Policy Review

2.1 Introduction

2.1.1 A review has been undertaken of the national, regional and local transport policy documents to inform the development proposals. This section of the report sets out the key relevant policies and demonstrates how the development proposals accord and comply with these policies.

2.2 National Planning Policy Framework (NPPF) - 2019

2.2.1 The revised National Planning Policy Framework (NPPF) came into force in February 2019, replacing the 2012 edition of the NPPF and July 2018 revision. The presumption in favour of sustainable development remains the core objective of the NPPF (paragraph 10 states that "*So that sustainable development is pursued in a positive way, at the heart of the Framework is a presumption in favour of sustainable development*").

2.2.2 *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:*

a. appropriate opportunities to promote sustainable transport modes can be – or have been – taken up, given the type of development and its location;

b. safe and suitable access to the site can be achieved for all users; and

c. 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.

2.2.3 Paragraph 109 states that development should only be prevented or refused on highway grounds *"if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe."*

2.2.4 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."*

2.2.5 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:*

a. the potential impacts of development on transport networks can be addressed;

b. 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;

c. opportunities to promote walking, cycling and public transport use are identified and pursued;

d. 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

e. patterns of movement, streets, parking and other transport considerations are integral to the design of schemes, and contribute to making high quality places."

2.2.6 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."*

2.3 Planning Practice Guidance – Transport Assessment

2.3.1 The Planning Practice Guidance (PPG) provides the overarching framework within which the transport implications of development should be considered. It provides advice on the preparation of Transport Assessment, Transport Statements and Travel Plans. The key advice is as follows:

'Travel Plans, Transport Assessments and Statements are all ways of assessing and mitigating the negative transport impacts of development in order to promote sustainable development. They are required for all developments which generate significant amounts of movements.'

2.3.2 The key principles within which Transport Assessments should be undertaken are detailed as follows:

'Travel Plans, Transport Assessments and Statements should be:

- proportionate to the size and scope of the proposed development to which they relate and build on existing information wherever possible;
- established at the earliest practicable possible stage of a development proposal;
- be tailored to particular local circumstances (other locally-determined factors and information beyond those which are set out in this guidance may need to be considered in these studies provided there is robust evidence for doing so locally);
- be brought forward through collaborative ongoing working between the Local Planning Authority/ Transport Authority, transport operators, Rail Network Operators, Highways Agency where there may be implications for the strategic road network and other relevant bodies. Engaging communities and local businesses in Travel Plans, Transport Assessments and Statements can be beneficial in positively supporting higher levels of walking and cycling (which in turn can encourage greater social inclusion, community cohesion and healthier communities)'.

2.3.3 The guidance emphasises the importance to consult the relevant local authority at the outset in order to scope the transport assessment work, on the basis of the principles highlighted above.

Circular 02/2013: The Strategic Road Network and the Delivery of Sustainable Development (Sept 2013)

2.3.4 This document was produced by the Highways Agency (now Highways England) on behalf of the Department of Transport (DfT), setting out the way in which the HA will deliver sustainable development whilst safeguarding the primary function and purpose of the Strategic Road Network (SRN).

2.3.5 Paragraph 16 states that through the production of Local Plans, the HA encourage development:

"at locations that are or can be made sustainable, that allow for uptake of sustainable transport modes and support wider social and health objectives, and which support existing business sectors as well as enabling new growth".

2.3.6 Para 27 states that:

"Where the overall forecast demand at the time of opening of the development can be accommodated by the existing infrastructure, further capacity mitigation will not be sort".

2.3.7 The HA will encourage the preparation and implementation of a robust travel plan that promotes the use of sustainable transport modes such as walking, cycling and public transport as an effective means of managing the impact of development on the road network, and reducing the need for major transport infrastructure. Para 30 accepts that within the provisions of a travel plan for a new development:

"It may be possible to free up additional capacity within the road network so that the demand generated by a proposed development, which would otherwise be unacceptable, can be accommodated".

2.3.8 Para 33 refers to capacity enhancement measures and states:

"Only after travel plan and demand management measures have been fully explored and applied will capacity enhancement measures be considered."

2.4 Local Planning and Transport Policy Context

South Gloucestershire Core Strategy (2006 - 2027)

2.4.1 The South Gloucestershire Development Plan comprises three documents, one of which is the Core Strategy 2006-2027 which was adopted on 11th December 2013. The Core Strategy is the key document forming the strategic vision for South Gloucestershire. It 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.

2.4.2 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.

2.4.3 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."

2.4.4 The Rural Package (which includes Thornbury) 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. The Core Strategy sets out that it is intended that this Package will be funded by the private sector through the development management process.

2.4.5 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
- Parking and vehicular access for new development

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

2.4.7 Section 15 of the Core Strategy looks specifically at Thornbury. Policy CS32 – Thornbury states that development proposals will:

- *"9. maximise opportunities for sustainable travel by improving the legibility and publicity of bus 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)

2.4.8 The South Gloucestershire: Policies, Sites and Places Plan Development Plan Document (DPD) (adopted November 2017) also forms part of the South Gloucestershire Development Plan. The DPD guides future planning decisions in the district.

2.4.9 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:

Policy PSP10 – Active Travel Routes (ATR)

2.4.10 Active Travel Routes are 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"*.

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

2.4.12 The general objectives underpinning Policy PSP10 relevant to the proposed development 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."*

Policy PSP11 – Transport Impact Management

2.4.13 This Policy relates to the management traffic from development proposals. Of relevance to Land West of Park Farm it states that proposals will be acceptable where:

- *"1. appropriate, safe, accessible, convenient, and attractive access is provided for all mode trips arising to and from the proposal; and*
- *2. any new or improved bus stops meet the Council's adopted standards and the appropriate national guidance; and*
- *3. 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…
- *9. Potentially significant transportation impact are accompanied by an appropriate Transport Assessment and where necessary a Travel Plan."*

2.4.14 Policy PSP11 also details appropriate walking and cycling distances and public transport services, which will be set out in detail in the relevant section of this Transport Assessment.

Policy PSP13 – Safeguarding Strategic Transport Scheme and Infrastructure.

2.4.15 Policy PSP13 primary considers strategic transport schemes which are not in the vicinity of the proposed development. However, in addition to these key schemes, it states

"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."

Policy PSP16 – Parking Standards

2.4.16 This policy details the acceptable cycle and car parking standards which will be considered in detail in **Section 5** of this Transport Assessment.

Thornbury Town Centre

2.4.17 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.

2.4.18 The New South Gloucestershire Local Plan (2018-2036) is in the process of being prepared and will replace the Core Strategy and Policies, Sites and Places DPD in its entirety. No detailed drafts have been published to date.

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

2.4.19 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, South Gloucestershire Council is working with the other WoE authorities, the WoE Local Enterprise Partnership, Highways England, Network Rail and public transport operators.

2.4.20 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 healthy natural environment.

2.4.21 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

2.4.22 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.

2.4.23 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 13th 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 1st August 2019, that the Plan should be withdrawn.

2.5 Relevance to the proposed development

2.5.1 The proposed development takes account of the planning and transport policies identified above and the rest of this report demonstrates how the proposed development responds positively to these policies.

3 Existing Transport Conditions

3.1 Introduction

3.1.1 This section considers the existing transport conditions in the vicinity of the development site. It provides details of the site's location, proximity to local facilities and amenities and accessibility by walking, cycling and public transport. Finally, it provides an overview of the operation of the local highway network and a review of local Personal Injury Collision data.

3.2 Site Location

3.2.1 The site is located in South Gloucestershire to the north west of Thornbury, which is approximately 19km north of Bristol city centre.

3.2.2 Thornbury is a market town with access to the A38, a north-south corridor connecting to Bristol to the south and Gloucester to the north.

3.2.3 The site is presently agricultural fields, adjacent to a housing development currently under construction to the east, known as Park Farm. The site is south of Oldbury Lane and is bound on the western and southern sides by further agricultural fields.

3.2.4 The location of the site in the context of the local and strategic highway network is illustrated in **Figure 3.1.**

3.3 Local Highway Network

3.3.1 The 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.

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

3.3.3 To the east of the 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.

3.3.4 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.

3.3.5 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.

3.3.6 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.

3.4 Existing Traffic Flows and Vehicle Speeds

3.4.1 In order to establish the baseline traffic conditions and to enable junction capacity analysis to be carried out, traffic flow information has been obtained.

3.4.2 As part of the scoping exercise, PBA and South Gloucestershire Council agreed the study area and the scope of the data collection required. The following is a list of junctions that were surveyed (shown on **Figure 3.2**):

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

3.4.3 PBA commissioned 360 TSL to carry out the traffic surveys. The Manual Classified Counts (MCCs) and queue surveys were undertaken at all junctions on Tuesday 14th November 2017. Also agreed with SGC, Junction 5 was re-surveyed on Thursday 3rd May 2018, due to issues with the original survey data. In addition to MCCs, Automatic Traffic Counters (ATCs) were installed at various points on the network. The ATCs recorded data for 7 days between 16th November 2017 to 22nd November 2017.

3.4.4 The surveys confirmed the following peak periods 0800 – 0900 in the AM and 1700 – 1800 in the PM.

3.4.5 Vehicular speeds have been confirmed along Oldbury Lane at two locations; an easterly position was 40.2mph on average and the 85th percentile was 48.5mph and the westerly location was 46.1mph on average and the 85th percentile was 58.4mph.

3.4.6 The 2017/2018 peak hour traffic flows which have been obtained through the surveys are shown on **Figures 7.1 to 7.2.**

3.5 Local Facilities and Amenities: Walking and Cycling

3.5.1 Thornbury is a busy market town within South Gloucestershire, in the West of England region. **Figure 3.3** demonstrates the accessibility of the site to key facilities and amenities. The following section summaries the facilities and amenities in the local area which are accessible to potential future residents by walking and cycling.

3.5.2 In line with the local policy requirements set out within SGC's 'The Policies, Sites and Places Plan (PSP Plan, November 2017), the assessment considers the distances as the crow flies, to services and facilities as set out in the supporting text of Policy PSP11. As requested by SGC during scoping discussions distances have been provided from the nearest and furthest parts of the proposed residential development on the application site, resulting in a range of distances as noted in following sections. As identified at paragraph 5.26 of the PSP, designated Town Centres are considered to meet the requirement for walking and cycling distances for the range of key services, facilities and employment opportunities. In addition, as identified at paragraph 5.27 of the PSP, Safeguarded Employment Areas are identified employment areas for assessing suitable walking and cycling facilities.

3.5.3 Thornbury Town Centre lies between 1.4-2.0km from the proposed residential development (from the nearest and furthest points of the site), and as such in accordance with paragraph 5.26 of the PSP, key employment services and facilities are within walking and cycling distance of the application site.

3.5.4 The Proposals include a Retail and Community Hub which provides an opportunity to deliver a range of the key services and facilities set out in PSP11. The planning application is not prescriptive on the precise nature of the uses which would be delivered, with this a matter for future reserved matter applications, however, the provision of up to 700m^2 of A1, A2 and D1 Uses could support the delivery of a community building, retail unit(s) and health provision within the Application Site. Importantly, these facilities would not only serve the residents of the proposed development, but also offer improved local facilities, within short walking and cycling distance of a significant number of existing and new residential developments in north Thornbury, thereby reducing the reliance on the private car.

Amenities

3.5.5 The nearest existing convenience shops are located in Thornbury Town Centre, the edge of which is 1.4-2.0km walking distance from the site. The town centre includes Aldi supermarket and other convenience and comparison stores. The nearest public house, Anchor Inn, is 1.0-1.6km to the east of the site, on Gloucester Road.

Employment

3.5.6 Thornbury Town Centre, 1.4-2.0km southeast of the site, hosts many independent and chain shops, cafes and services. In accordance with PSP11, these facilities would provide good opportunity for local employment. In addition, the Safeguard Employment Area at the north of the Town Centre is 2.3-2.9km from the site.

3.5.7 Further south of the Town Centre is a large industrial estate, accessed from Midland Way, which hosts various businesses and is also a Safeguard Employment Area. The edge of this designation is 2.0-2.6km from the site.

Education

3.5.8 The nearest existing primary school to the site is Manorbrook Primary School, which accommodates children from 5 – 11 years old and is located approximately 0.8-1.5km walking distance. The nearest secondary school is The Castle School, which is a 0.8-1.4km walking distance south of the site. The school accommodates pupils from 11 – 18 years of age.

Health

3.5.9 Thornbury Hospital is located 1.2-1.8km south east of the site. The Hospital includes an in-patient rehabilitation ward, and outpatient department and physiotherapy suite. Adjacent to the Hospital is the Thornbury Health Centre.

Community Centres

3.5.10 There are three identified existing Community Centres in Thornbury; Armstrong Hall, Turnberrie's and The Chantry, the closest of which is 1.1km from the application site.

Leisure

3.5.11 Thornbury has a local Rugby/Football club located 1.0-1.8km to the north on Gloucester Road. Thornbury Leisure Centre sits 2.3-2.9km south of the site. The Centre hosts many different fitness classes and contains a swimming pool, a gym, squash courts and Bowls Hall. Mundy Playing Fields are located 1.7-2.2km south of the site, which provides football pitches, tennis courts and a children's play area. The Park Farm development is providing further sports pitches, between 0.2-1.0km.

Walking Distances Guidance

3.5.12 **Table 3.1** lists key services and facilities and their appropriate walking and cycling distances as defined by the PSP Plan (PSP11). As previously stated, these are 'as the crow flies' distances for consistency with the PSP Plan.

3.5.13 As above, distances have been provided from the nearest and furthest parts of the proposed residential elements of the site.

Table 3.1: Proximity to key service and facilities

Key services and facilities (PSP11)	Appropriate walking and cycling distances (PSP11)	Distance from nearest residential area	Distance from furthest residential area
Retail (comparison) shops and services and/or Market towns and Town Centres (CS14 of Core Strategy)	1,200 metres	1,910 metres to edge of town centre (24 min walk, 6 min cycle)	2,680 metres to edge of Town Centre (34 min walk, 8 min cycle)
(Weekly) Superstore or supermarket		*Potential on-site provision	*Potential on-site provision
(Day to Day) Smaller food (convenience) shops			
Retail – Aldi	1,200 metres	2,015 metres to Aldi front entrance (25 min walk, 6 min cycle)	2,788 metres to Aldi front entrance (35 min walk, 9 min cycle)
Local health services	800 metres	1,485 metres to Thornbury Hospital & Health Centre (19 min walk, 5 min cycle) *Potential on-site provision	2,250 metres to Thornbury Hospital & Health Centre (28 min walk, 7 min cycle) *Potential on-site provision
Pharmacy	800 metres	1,670 metres (Eastland Road)	2,440 metres (Eastland Road)

Key services and facilities (PSP11)	Appropriate walking and cycling distances (PSP11)	Distance from nearest residential area	Distance from furthest residential area
		(21 min walk, 5 min cycle) *Potential on-site provision	(31 min walk, 8 min cycle) *Potential on-site provision
Community Centre	800 metres	1,865 metres (23 min walk, 6 min cycle) *Potential on-site provision	2,635 metres (33 min walk, 8 min cycle) *Potential on-site provision
Post office	800 metres	1,910 metres (24 min walk, 6 min cycle) *Potential on-site provision	2,680 metres (34 min walk, 8 min cycle) *Potential on-site provision
Public House	800 metres	1,443 metres (18 min walk, 5 min cycle)	2,215 metres (28 min walk, 7 min cycle)
Secondary school The Castle Secondary School	3 miles	1,141 metres (14 min walk, 4 min cycle)	1,910 metres (24 min walk, 6 min cycle)
Primary school Manorbrook Primary school	2 miles	1012 metres (13 min walk, 3 min cycle) *Potential on-site provision	1,780 metres (22 min walk, 6 min cycle) *Potential on-site provision
Major employers. Designated Town Centres and Safeguarded Employment Areas (CS12 of Core Strategy) Thornbury Town Centre[1] Thornbury Industrial Estate	2,000 metres	1,910 metres (24 min walk, 6 min cycle) 2,820 metres (35 min walk, 9 min cycle)	2,680 metres (34 min walk, 8 min cycle) 3,590 metres (45 min walk, 11 min cycle)

3.5.14 **Table 3.1** shows that the Town Centre employment facilities are within the appropriate walking and cycling distances as defined by the PSP Plan.

[1] Taken to Co-Op on High Street, as requested by SGC

3.5.15 In addition to local level policy however, the proximity of facilities and amenities can be considered at the national level. In this regard, the most recent transport statistics are set out within the DfT's 'National Travel Survey: 2016' (NTS).

3.5.16 This indicates that 25% of all journeys and 80% of journeys under one mile (1.6km) are made by foot. Table NTS0306 within the NTS also indicates that the average walking trip length is 0.7miles (1.3km).

3.5.17 In addition, national guidance on this issue is provided by Manual for Streets (MfS) which, at Para 4.4.1, states that:

"Walkable neighbourhoods are typically characterised by having a range of facilities within 10 minutes' [up to about 800m] walking distance of residential areas which residents may access comfortably on foot. However, this is not an upper limit and PPG13 states that walking offers the greatest potential to replace short car trips, particularly those under 2km.'

3.5.18 Whilst MfS suggests that the greatest potential to replace short car trips is for those under 2km, this is not a maximum distance to which pedestrians are willing to walk. The NTS (at Table NTS0308) also identifies that 26% of walking trips are over 1 mile (1.6km) and 4% over 2 miles (3.2km) in length.

3.5.19 The Local Transport Note (LTN) 1/04 – Policy, Planning and Design for Walking and Cycling provides further guidance stating that:

"There are limits to the distances generally considered acceptable for utility walking and cycling. The mean average length for walking journeys is approximately 1 km (0.6 miles) and for cycling, it is 4 km (2.4 miles), although journeys of up to three times these distances are not uncommon for regular commuters. The distances people are prepared to walk or cycle depend on their fitness and physical ability, journey purpose, settlement size, and walking/cycling conditions".

3.5.20 Again, this is reiterated and substantiated in the recent NTS, which identifies that the average trip length by bicycle is 3.1 miles (5.0km). Furthermore, Table NTS0308 identifies that 86% of all cycle trips are over 1 mile (1.6km) and 57% over 2 miles (3.2km). A total of 79% of all cycle journeys are made over distances less than 5 miles (8km).

3.5.21 Together, these statistics demonstrate that 81% of all trips under 1 mile (1.6km) are by walking and cycling, and indeed, over half (61%) of all trips under 2 miles are by walking and cycling.

3.5.22 Following submission of the previous TA, SGC requested additional information on the calculation of walking distances and quality of routes between the site and key facilities.

3.5.23 **Appendix C** contains a copy of Technical Note 39209-5540-TN001 Rev.A "Walking Distances to Key Facilities and Quality of Routes". This note confirms the routes measured and concludes that the majority of facilities within Thornbury are accessible on foot or by cycle.

3.5.24 Considering the distances to local facilities detailed above, in light of these national statistics, suggests that the great majority of facilities within Thornbury are accessible on foot or by cycle.

3.6 Site Accessibility by Non-Car Modes

Walking and Cycling

3.6.1 The site is located on the edge of the existing built-area of Thornbury, such that there is little existing provision for pedestrians and cyclists. 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.

3.6.2 As shown in **Figure 3.3** 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 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.

3.6.3 There is a wider network of footpaths throughout the existing residential area in north Thornbury. Three footpaths are shown on **Figure 3.3** 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.

3.6.4 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.

3.6.5 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.

3.6.6 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.

3.6.7 The Technical Note included at **Appendix C** demonstrates that key destinations can be accessed from the site via existing routes which are of good quality, with appropriate width, surfacing and lighting, in line with PSP11. It should be noted that these routes are the same as those considered suitable for the now consented Park Farm scheme.

3.6.8 On the basis of the above, and the TN at **Appendix C,** the proposed development will be served by appropriate, safe, accessible, convenient and attractive routes to key facilities both on and off site by multiple sustainable modes of transport, including walking and cycling.

Public Transport

Bus

3.6.9 The nearest bus stop to the site is situated within a 750m walk distance on Moreton Street, and is served by bus services 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.

3.6.10 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.

3.6.11 First in Bristol Bath & The West began operating two new services, T1 and T2, on 27th 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.

3.6.12 The bus services operating in the vicinity of the site are summarised in **Table 3.2** below and shown in **Figure 3.4**.

Table 3.2: Local Bus Services and Frequencies

Operator	Service	Route	Frequency		
			Mon - Fri	Sat	Sun and Bank Holiday
Stagecoach West	77	Bristol City Centre – Westbury – Southmead Hospital – Bristol Parkway Station - Thornbury	Every 60 mins (06:15 – 18:02) (4 services per direction to Manor Walk)	Every 60 mins (06:25 – 18:00) (4 services per direction to Manor Walk)	No service
Stagecoach West	60	Gloucester – Dursley – Wotton-under-Edge – Thornbury	Six per day (07:15 – 17:30)	Six per day (07:15 – 17:30)	No service
Stagecoach West	622	Chipping Sodbury – Yate - Thornbury –- Cribbs Causeway	Eight per day	Seven per day	Three per day

Operator	Service	Route	Frequency		
			Mon - Fri	Sat	Sun and Bank Holiday
			(07:48 – 18:38)	(08:01 – 17:11)	(11:06 – 16:16)
First Bristol, Bath & The West	T1	Thornbury – Bradley Stoke – Aztec West - Bristol City Centre (Colston Street)	Every 30 minutes (06:08 – 20:12)	Every 30 minutes (06:12 – 19:08)	Every 60 minutes (07:50 – 18:03)
First Bristol, Bath & The West	T2	Thornbury – Filton Airfield – Cribbs Causeway –- Bristol Bus Station	Every 60 minutes (05:30 – 00:38)	Every 60 minutes (05:30 – 00:38)	Every 60 minutes (07:10 – 00:38)

Source: Travellne South West (http://www.travelinesw.com/)
Note: Bus routes and frequencies correct as at December 2019.

3.6.13 **Table 3.2** indicates that the local area is served by a number of bus routes which together provide four services per hour to Bristol City Centre including Aztec West and Filton employment areas, 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.

3.6.14 Buses can also be used to make internal connections for facilities further away from the site, such as the Leisure Centre within Thornbury.

3.6.15 SGC's Local Plan Policy PSP11 sets out the Council's policy on appropriate distance to a suitable bus stop and appropriate frequencies for public transport services connecting to destinations containing key services, facilities and employment opportunities. These are:

- Appropriate distance to a bus stop of 400m; and
- Appropriate service of:

  i. Individual or combined services, total journey time under 1 hour; and
  ii. at least 5 services a day during the week, 3 at weekends, to and from the destination; and
  iii. during the week; one service arriving at the destination before 9am, and one leaving after 5pm.

3.6.16 A comparison of **Table 3.1** and **Figure 3.3** against PSP11 highlights that the appropriate bus service provision, in accordance with PSP11, is delivered through the existing T1 service, but that the current nearest bus stop is approximately 1500m from the proposed development.

Rail

3.6.17 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 Park Road 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.

3.6.18 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 Park Road 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.

3.7 Committed Infrastructure

3.7.1 There are a number of committed developments in Thornbury which have associated infrastructure and public transport commitments. The full list of committed developments is set out within **Section 7** however the following commitments are pertinent to the proposed development.

- Bus service extension through the Park Farm development (PT11/1442/O) connecting to the existing highway at Butt Lane and Alexandra Way (see next bullet). The Park Farm Section 106 Agreement listed routes 309/301 and 615 to be routed through the site; these routes have subsequently been amended and are replaced by T1/T2 and 77.

- Construction of a bus only link between the southern boundary of Park Farm and Alexandra Way; secured through a legal agreement between the developers of Park Farm, SGC and relevant landowners (dated 24th March 2015)

- Provision of two pedestrian refuge islands on Butt Lane, one between the access of Park Farm and Parkland Way and a second approximately 40m west of the Gloucester Road / Butt Lane priority junction. These are associated with the committed developments of Land at Post Farm (PT15/2917/O) and Land West of Gloucester Road (PT16/4774/O).

- Junction improvements at Gloucester Road / Butt Lane / Morton Way staggered crossroad junction, including central island crossing on Gloucester Road North associated with committed development at Land West of Gloucester Road (PT16/4774/O).

- Junction improvements at A38 / Grovesend Road / Tytherington Road Signalised Staggered Junction,and A38 / B4509 Signalised Junction. Further detail regarding the committed layouts is provided at **Section 7** with designs included at **Appendix D**, however they are associated with committed developments Heneage Farm, Moorslade Lane, Falfield (PT17/4800/O) and Land at Post Farm (PT15/2917/O).

- A38 / Grovesend Road / Tytherington Road – additional lanes on A38 Gloucester Road North and South, agreed as part of the Cleve Park proposals (PT16/3565/O); and

- A38 / B4061 Thornbury Road – lengthening of the left turn lane from A38S, agreed as part of the Cleve Park proposals (PT16/3565/O).

3.8 Personal Injury Collision Data

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

3.8.2 The PIC study area includes all of the junctions in the agreed study area, set out in **3.4** as well as the extent of site frontage along Oldbury Lane.

3.8.3 As part of the scoping exercise, Highways England requested also that a PIC review also be undertaken in the vicinity of the M5 Junction 14. Therefore, additional PIC data was obtained from SGC for the five-year period between 30th April 2013 and 1st May 2018 to inform this review.

3.8.4 The full PIC data reports can be found in **Appendix E**.

Methodology

3.8.5 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.

Accident and Casualty Overview

3.8.6 A total of 20 collisions were observed in the study area, of which eight were identified at Junction 14 of the M4. Of the observed incidents:

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

3.8.7 There were 25 casualties as a result of the 20 collisions. Of these 25 casualties, 8 were vulnerable road users. Vulnerable road users are classed as pedestrians, cyclists and powered two wheeled vehicles (P2W). A summary of the casualties by severity involving vulnerable road users is presented in **Table 3.3** below.

Table 3.3: Summary of Vulnerable Road User Casualties by Severity

	Fatal	Serious	Slight	Total
Pedestrian	0	0	3	3
Cycles	0	1	1	2
P2W	0	0	3	2
Total	**0**	**1**	**7**	**8**

3.8.8 A detailed collision analysis has been undertaken of the study area junctions/links as set out below.

Oldbury Lane (site frontage)

3.8.9 There were no recorded collisions along the site's frontage within the five-year period.

Junction 1 - Butt Lane / Norton Way / Gloucester Road Staggered Junction

3.8.10 One collision was recorded at this junction within the five-year period. This collision was recorded as slight in severity and involved one vulnerable road user.

3.8.11 The incident was recorded as being the result of a cyclist swerving, losing control and falling from their bike after attempting to pass a car which was pulling out of Butt Lane.

Junction 2 - A38 / Gloucester Road Junction

3.8.12 One collision was recorded at this junction within the five-year period. This collision was recorded as slight in severity and did not involve a vulnerable road user.

3.8.13 The incident was recorded as being the result of a vehicle driving into the rear of another vehicle after getting their foot stuck in the pedals.

Junction 3 - Grovesend Road / Morton Way / Midland Way Roundabout

3.8.14 Two collisions were recorded at this junction within the five-year period. Both collisions were recorded as serious in severity and one involved a vulnerable road user.

3.8.15 The incident involving the vulnerable road user was the result of a vehicle colliding with a cyclist when attempting to enter the roundabout.

3.8.16 The second incident was the result of a vehicle swerving to avoid a collision with a second vehicle entering the roundabout.

3.8.17 These two incidents occurred on separate arms of the roundabout.

Junction 4 - A38 / Grovesend Road / Tytherington Road Signalised Junction

3.8.18 Two collisions were recorded at this junction within the five-year period. Both collisions were recorded as slight in severity and neither involved vulnerable road users.

3.8.19 Both collisions were the result of vehicles colliding with stationary vehicles at a red light. One was reporting to be the result of brake failure and the other driver error.

Junction 5 - Gloucester Road / Quaker Lane / The Plain / Castle Street / High Street Priority Junction and Mini-Roundabout

3.8.20 Four collisions were recorded at these junctions within the five-year period. All collisions were recorded as slight in severity and each collision involved a vulnerable road user. All four incidents occurred at least 50m away from the junction layout, and each one on a different approach arm.

3.8.21 Three of the incidents involved collisions with pedestrians as they were crossing the road.

3.8.22 The final incident involved a car and a motorcycle. The motorcyclist was overtaking stationary vehicles as the car made a right turn resulting in a collision.

Junction 6 - A38 / B4509 Signalised Junction

3.8.23 There were no recorded collisions at the A38 / B4509 signalised junction within the five-year period.

Junction 7 - A38 / Old Gloucester Road Priority Junction

3.8.24 Two collisions were recorded at this junction within the five-year period. Both collisions were recorded as slight in severity and did not involve a vulnerable road user.

3.8.25 Both collisions were reported to occur as a driver pulled into the path of another vehicle when making a right turn, one out of the minor arm and one into the minor arm.

Junction 8 - A38 / Church Road Signalised Junction

3.8.26 There were no recorded collisions at the A38 / Church Road signalised junction within the five-year period.

Junction 9 - A38 / B4061 Signalised Junction

3.8.27 Following submission of the TA, SGC has requested that the PIC data for the junction of the A38/B4061 is also considered.

3.8.28 A review of crashmap.com for the most recent five-year period from January 2014 to June 2018 identified one serious and one slight PIC at the junction.

3.8.29 The serious incident appears to have occurred on 19th February 2014 and involved two vehicles. The slight incident appears to have occurred on 18th November 2015 and involved two vehicles.

3.8.30 Two PICs in the five-year period is not considered to demonstrate an inherent highway safety problem in this location that would be exacerbated by the proposed development.

M5 Junction 14

3.8.31 Eight collisions were recorded in the vicinity of this motorway junction within the five-year period. All collisions were recorded as slight in severity and one involved a vulnerable road user.

3.8.32 The incident involving the vulnerable road user occurred on the B4509 when a motorcyclist collided with a vehicle stopped to allow for a right turning vehicle to manoeuvre.

3.8.33 Three of the collisions involved vehicles rear-ending the car in front whilst they were approaching stationary traffic or preparing to make a turn. Two of these collisions took place on the M5 mainline, and one on the B4059, approximately 300m east of Junction 14.

3.8.34 Two of the collisions involved vehicles attempting to change lane or driving at excess speed on the M5 mainline.

3.8.35 One of the collisions involved a vehicle who had pulled into the hard shoulder being hit (glancing blow) by a passing heavy goods vehicle.

3.8.36 The final collision involved a vehicle failing to give-way at one of the M5 slips roads and pulling out of the junction and colliding with a car travelling along B4509.

3.8.37 Overall at this location, there does not appear to be a pattern in collisions which is the result of a prevailing highway safety issue. The majority of collisions appear to be the result of driver error, reckless driving and failing to slow down when approaching stationary traffic.

PIC Data Summary

3.8.38 Overall the PIC analysis has demonstrated that there is no pattern of highway safety issues on the local road network within the study area.

3.8.39 Additional development traffic within the study area is not therefore anticipated to present a safety risk.

3.9 Committed Development

3.9.1 Scoping discussions have been carried out with SGC in order to identify committed developments to be taken account of as part of the assessment. The following committed developments have been factored into the assessment; unless otherwise stated, traffic flows associated with the entire development has been included in the 2028 future year scenarios:

- Park Farm (PT11/1442/O) – 500 residential units – Barratt Homes and David Wilson Homes have confirmed that the number of occupied units on site at the time of the November 2017 traffic surveys was 126, therefore, the flows associated with these units have not been included in the assessment. The total number of units accounted for at Park Farm is therefore 374.

- Land off Morton Way (PT12/2395/O) – 300 residential units – Bloor Homes have confirmed that Phase 1 was occupied at the time of the November 2017 traffic surveys, equating to 109 units. The flows associated with these units have not been included in the assessment. In addition, 63 units were occupied at Phase 2, however this information was not received in time for the assessment, such that the traffic associated with all Phase 2 units have been included. The total number of units accounted for at Land off Morton Way is therefore 191.

- Land at Post Farm (PT15/2917/O) – 125 residential units

- Land West of Gloucester Road (PT16/4774/O) – 130 residential units

- Land at junction of Morton Way & Grovesend Road (PT16/3565/O) – 350 residential units and 70 unit sheltered accommodation.

3.9.2 For each committed development, trip rates have been extracted from each respective Transport Assessment and the corresponding number of trips on the local highway network included. Where committed development flows did not extend to every junction in the study area, existing turning movements were used to assign the trips at these junctions.

3.9.3 It should be noted that although Junctions 5a and 5b were resurveyed in May 2018 the same level of committed development has been included as for the junctions surveyed in November 2017. This is a robust position, in that the junctions have been assessed with an overestimation of committed development trips.

3.9.4 The further approved developments at Land West of Pound Mill Business Centre (P/13/3101/F) for change of use from paddocks to 12 caravan pitches, and The Council Offices, Castle Street (PT/16/0982/F) for 5 cottages and 57 sheltered apartments for the elderly are considered as being of a scale and distance from the development to have no impact. These have not been considered within the TA.

3.9.5 **Figures 3.5 to 3.14** detail the traffic flows for each respective committed development in turn in the AM and PM peaks, Total committed development flows are shown in **Figures 3.15** to **3.16**.

4 Development Proposals

4.1 Development Proposals

4.1.1 The development site is located on approximately 36Ha of land to the north west of Thornbury. The site is bound by Oldbury Lane to the north, agricultural fields to the west and south, and a new development currently under construction to the east, known as Park Farm. The proposals would comprise the following:

- Up to 595 residential dwellings;
- Land for a primary school;
- Land for a Neighbourhood Hub (to include 700sqm of retail and commercial uses);
- Two vehicle access junctions from Oldbury Lane; and
- A sustainable travel link, south east through Park Farm.

4.1.2 A copy of the latest illustrative masterplan for the proposed development is contained at **Appendix A**.

4.1.3 As shown on the illustrative masterplan, in the south east corner of the site, the red line extends into the Park Farm development to include an area of safeguarded land. As described further in **Section 5**, this land will be utilised to create a sustainable transport link between the proposed site and Park Farm.

4.2 Benefits to the Existing Community

4.2.1 The inclusion of a Neighbourhood Hub within the proposals will provide additional facilities to residents of neighbouring communities. This will also offer the opportunity for walk, cycle or public transport trips to and from these facilities, trips which may otherwise have been made by car to alternative facilities; thereby having a wider benefit on traffic within the Town.

4.2.2 The inclusion of a sustainable travel link and extension of bus services into the site, which are discussed in more detail in **Section 5**, will increase the catchment of bus services; thereby making the services more viable, to the benefit of all those on the existing routes and any future routes which may serve the site.

4.2.3 The provision of a Primary School at the site will bring additional benefits which, from a transport perspective, would reduce walking distances to school from this and neighbouring developments.

4.2.4 In addition, the payment of a Community Infrastructure Levy will contribute to the positive community benefits which will be secured through that mechanism.

5 Access and Movement Strategy

5.1 Site Access and Sustainable Transport Proposals

5.1.1 A set of transport proposals has been developed to maximise the potential to travel by modes other than the private car and hence limit the potential traffic impacts arising from the development. The transport proposals consist of the following packages of measures that are discussed in more detail within this section:

- Framework Travel Plan;
- Sustainable Travel Link;
- Walking and Cycling Strategy;
- Public Transport Strategy;
- Speed Limit Strategy;
- Vehicular Access Strategy; and
- Vehicular Parking Proposals.

5.1.2 **Figure 5.1** illustrates the Access and Movement strategy for the Land West of Park Farm development.

5.1.3 Discussions are ongoing with the local authority to confirm a balanced package of sustainable transport mitigation measures as part of the development proposals, which could be secured by S106 agreement in due course.

5.2 Framework Travel Plan

5.2.1 A Framework Travel Plan (FTP) for the site has been developed in accordance with appropriate guidance including the PPG and NPPF.

5.2.2 The key aim of the TP is to:

- Reduce the need to travel by car, focusing on single occupancy car trips associated with the development, by promoting more sustainable alternatives such as car sharing, public transport and walking and cycling.

5.2.3 These aims and objectives will be achieved through a combination of hard and soft measures aimed at discouraging single occupancy car use and facilitating the use of alternative modes of transport. The FTP should be read in parallel to this Transport Assessment.

5.2.4 Following submission of the planning application, comments have been received from SGC's Travel Planning officer. The FTP for the site has been updated and should be read in parallel to this TA. This includes further transport planning measures, sets out the current multi-modal split (from the TA), and the potential targets and future modal split to reduce the number of single occupancy vehicles generated by the site and reduce the development impact on the highway network. The updated document also confirms the mechanism by which the FTP will be taken forward for implementation and secured by S106.

5.3 Sustainable Travel Link

5.3.1 A Sustainable Travel Link will be provided in the south east corner of the proposed development; the closest point of the site to the facilities within Thornbury, as shown on **Drawing 39209-5501-SK25-A**. The Link will provide a bus only access into the development. The Link will connect the proposed development to adjacent committed development, Park Farm and through this scheme to existing connections in the town.

5.3.2 The Sustainable Travel Link comprises a bus only carriageway which is 6.5m in width, to allow for two-way bus movement in the future as appropriate. The design speed of the link is 20mph which is enforced by a priority pinch point.

5.3.3 Whilst the bus strategy for the proposals includes for a one-way bus loop, the 6.5 metre corridor is wide enough to allow for two-way bus movement if SGC choose to develop different routes in future. **PBA Drawing 39209-5501-SK25-A** shows the layout of the Sustainable Travel Link.

5.3.4 The general alignment, footway, visitor parking spaces and traffic calming along the Sustainable Travel Link have been agreed with SGC highways officers, subject to a stage one Road Safety Audit which will be undertaken as part of the detailed design process.

5.3.5 As set out in **Section 3.7**, there is a committed bus only link between the southern boundary of Park Farm and Alexandra Way. This has not yet commenced; with the trigger linked to the later stages of development at Park Farm. In this context, two transport strategies have been developed, with and without reliance on the Alexandra Way bus link connection. Whilst the proposed strategy utilises this bus link, the alternative strategy is set out to demonstrate that connectivity is deliverable in the interim until such time that it is delivered. These strategies are set out for walking and cycling, and public transport, below.

5.4 Walking and Cycling Strategy

5.4.1 Pedestrian and cycle accessibility is given a high priority in the proposed access strategy and this is reflected in the facilities to be provided.

5.4.2 As set out under **5.3**, pedestrian and cycle movement will be facilitated via the Sustainable Travel Link which provides connectivity into the adjacent Park Farm development.

Proposed Strategy 1 - With the Alexandra Way bus-only link

5.4.3 In the context of the bus-only link being delivered to Alexandra Way, pedestrian movement will continue through the southern part of Park Farm to Alexandra Way, on the committed footway which runs adjacent to the bus only link. From Alexandra Way, a good quality, lit, existing footway and footpath is provided to Park Road, and from Park Road to Gloucester Road, where a zebra crossing is provided as well as footways to the Town Centre (see **Figure 5.1**). This route will facilitate movement by foot to Manorbrook Primary School, St Marys Primary School, The Castle Secondary school, health facilities, employment, and retail opportunities in the Town Centre.

5.4.4 Cyclists would be required to join the carriageway through Park Farm and the Alexandra Way bus link, which will be a quiet route, serving only the southern part of Park Farm, and local bus movements. The design of the bus link will be agreed with SGC as part of the Park Farm development. Just south of the Alexandra Way connection, cyclists can join National Cycle Route 410 and the Local Cycle Route, the Thornbury Loop, which connects to the Town Centre (both shown on **Figure 3.3**).

Alternative Strategy 2 - Without the Alexandra Way bus-only link

5.4.5 Prior to the delivery of the bus-only link to Alexandra Way, pedestrian movement will continue from the proposed Sustainable Travel Link through the northern part of Park Farm along the committed footway / footpath network as shown in **Figure 5.2**. Pedestrians would join the existing footpath provision in the vicinity of Manor Walk and use the existing footpath network to access education, health, employment and retail facilities. This route is surfaced, lit and of good quality.

5.4.6 In this strategy, cyclists would be required to join the carriageway through Park Farm and exit Park Farm at its vehicle access on Butt Lane. The route to the Town Centre would then be on-carriageway via the Butt Lane / Morton Way / Gloucester Road Staggered Junction and Gloucester Road south.

Cycle Parking

5.4.7 Cycle parking will be provided in accordance with SGC's cycle parking standards as set out in PSP16 of SGC Local Plan: Policies, Sites and Places Plan (November 2017). The cycle parking requirements for which are set out in the PSP16, are summarised in **Table 5.1**; these are minimum parking standards.

Table 5.1: Cycle Parking Standards (PSP16 Schedule A)

Type of land use	Per	Proposed cycle parking standards (minimum)
Newly built dwellings with garage (C3)	1 bed space / bedroom unit	1 (provided garage design accommodation both car and cycle storage). Otherwise 1 secure, undercover space
	2 or more bedrooms	2 secure, undercover spaces
Newly built dwellings without garage	1 bed space / bedroom unit	1 secure, undercover space
	2 or more bedrooms	2 secure, undercover spaces
Flats (C3)	unit	1 secure, undercover space
Primary schools (non-residential) (D1)	Visitor/parents	1 per 100 pupils
	Staff	1 per 8
	Students	To be determined on merit

5.4.8 Cycle parking for the Primary School and any community or retail uses on site, will also be provided in line with the standards set out within PSP16 Schedule A.

5.4.9 Future reserved matter applications would confirm the level of cycle parking provided across the Application Site.

5.4.10 A reasonable financial contribution will also be provided towards enhanced cycle parking facilities in the town centre.

5.5 Public Transport Strategy

5.5.1 As previously set out in **Section 3.6**, the site is accessible by bus with existing services offering connections to key destinations such as Thornbury Town Centre, Aztec West, Cribbs Causeway, Filton, Southmead Hospital and Bristol City Centre. The nearest existing bus stops to the site are between 750 – 1300m of the proposed development. It is acknowledged that this exceeds the typical desired distance to a bus stop of 400m, as set out in SGC's Local Plan Policy PSP11.

5.5.2 First in Bristol Bath & The West service T1 operates a half hourly frequency (Monday-Saturday) from Thornbury Health Centre to Thornbury Town Centre before routing to Bristol City Centre, via Bradley Stoke and M32. The current journey time from Thornbury Health Centre is 4 minutes to Thornbury Town Centre and 55 minutes to Bristol City Centre. This service currently satisfies the appropriate service requirements of PSP11 (detailed in full **Section 3.6**), however the nearest stop is located within 1500m of the proposed development.

5.5.3 As detailed at **Section 3.7** a bus service extension is committed through the Park Farm development (PT11/1442/O) connecting to the existing highway at Butt Lane and Alexandra Way. It is unclear at the time of writing exactly which bus service(s) will be extended to serve Park Farm as the routes listed at the time of planning permission (309/301, 615) now go under different route numbers (T1/T2 and 77). From discussions with local bus operator First in June 2018 and during the determination of the planning application, it is considered that the T1 would be the more appropriate route to extend to Park Farm given its most direct routing to Bristol City Centre. The public transport strategy for this site has been developed on this basis.

5.5.4 The committed scheme at Park Farm will result in new bus stops being provided, which will be approximately 250m from the Application Site. This will deliver bus stops within the requisite 400m from the Project Site. This is agreed with SGC highway officers.

5.5.5 In addition to the committed scheme, two strategies are set out for public transport, one with, and one without reliance on the Alexandra Way bus link connection.

Proposed Strategy 1 – With the Alexandra Way bus-only link

5.5.6 As set out under **5.3**, bus movement will be facilitated via the Sustainable Travel Link which provides a 6.5m bus-only link connecting into the adjacent Park Farm development. Discussions have been held between PBA and First as the local bus operator for potential bus improvements within Thornbury including extending services through the Park Farm site.

5.5.7 A bus contribution will be provided to extend the existing T1, or whichever bus service will serve the Park Farm development. The proposed routing assuming the T1 will be extended is shown at **Figure 5.1**. The proposals are for a one-way bus loop to be formed to include Park Farm and Land West of Park Farm. To allow for any future two way operation if required, 6.5m wide access junctions have been designed, with a 6.5m corridor allowed for within the masterplan. The extension of the T1 service has been discussed with First who agree that this is the best service option for this site.

5.5.8 The proposed strategy is for the T1 service to route along Butt Lane and Oldbury Lane, accessing Land West of Park Farm via the western site access on Oldbury Lane. It would then route through the proposed development, exiting via the Sustainable Travel Link, routing through the southern part of Park Farm and the bus link at Alexandra Way. It would operate along Park Road to Gloucester Road to re-join the existing route.

5.5.9 The proposed route would mean that part of the Park Farm development will no longer be served in the same way as currently planned, as some of the committed Park Farm route would be bypassed. However, as demonstrated at **Figure 5.1**, bus stops within the combined Park Farm could be relocated such that all of the development would remain within 400m of the proposed route which is the typical desirable distance to a bus stop. This is supported by Local Plan Policy (PSP11).

5.5.10 The proposed anti-clockwise routing would also mean a reversal of the direction of the committed service extension to Park Farm as set out within its Transport Assessment (FMW, 2011); however, we understand from recent discussions with First that they would now expect the extension to Park Farm be delivered in an anti-clockwise direction regardless of the proposed development coming forward.

5.5.11 The actual routing is to be agreed with SGC and First and based on service viability calculations. However, the proposed routing envisaged will connect future residents of the proposed development with additional key facilities and services dictated by PSP11 i.e. to comparison retail, supermarkets, pharmacies, post office and public houses. This will also provide an alternative sustainable transport option to those facilities which residents will also be able to access via appropriate walking and cycling distances. The service will also provide a direct connection from the proposed site to further retail and employment destinations including Aztec West and Bristol City Centre. From here, there are further routes to other destinations within Bristol and the surrounding areas.

5.5.12 Technical Note 39209-5534-TN001 at **Appendix F** sets out a business case for the extension of bus service T1 to the West of Park Farm site on the basis that a bus-only link is provided between Park Farm and Alexandra Way. The TN:

- summarises the discussions held to date with local bus operators and South Gloucestershire Council;
- considers the operational implications of a scenario where service T1 is extended into both the Park Farm and West of Park Farm developments; and
- considers the financial implications of this scenario to inform a potential Section 106 obligation (subject to overall viability considerations).

5.5.13 The TN concludes that the proposed development could add an additional 650m of route length and additional journey time of two minutes which could be accommodated within any service extension to Park Farm. Therefore, no further contributions are required to make the service sustainable.

5.5.14 It also concludes that revenue from Park Farm is demonstrated to be insufficient to secure commercial viability in isolation, meaning that Park Farm could be left with no bus service in the longer term if further development does not take place. However, revenue from the combined developments would be sufficient to fund the additional vehicle required to serve both sites in the long term, securing commercial viability for both sites.

5.5.15 It is finally concluded that the long-term commercial viability of a frequent bus service at Park Farm cannot be guaranteed and only further development at West of Park Farm can assist in maintaining public transport services to this area of Thornbury in the longer term.

5.5.16 In line with SGC's Local Plan Policy PSP11 new bus stops will be provided so that each part of the development is within 400m of the service. The bus stops will also meet the Council's adopted Bus Shelter Design and Procurement Process protocol.

5.5.17 Policy CS7 of the Core Strategy/West of England Joint Transport Study 2017proposes an extension of the A38 Showcase Bus Corridor / MetroBus and A38 Strategic Cycling routes to Thornbury.

5.5.18 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'.

5.5.19 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, up to a limit of £10,000 each (£20,000 total). 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.

5.5.20 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.

5.5.21 The potential MetroBus extension to Thornbury would improve the public transport offer and facilitate sustainable travel to Bristol. The Sustainable Travel Link will allow more direct access by bus/walk/cycle to the centre of Thornbury and the likely location of the MetroBus route. It should also be noted that additional development at Thornbury would be expected to result in increased patronage for Metrobus and thereby increase the viability of this new strategic infrastructure.

Alternative Strategy 2 – Without the Alexandra Way bus-only link

5.5.22 The Sustainable Travel Link will be provided connecting to the Park Farm site as in Proposed Strategy 1 however it will no longer connect the development to the Alexandra Way development.

5.5.23 From discussions with SGC, it is considered likely that, should the Alexandra Way bus link not be delivered, the extension to Park Farm (prior to the addition of the proposed development) will be in the form of a loop accessing and exiting Park Farm via the Butt Lane access.

5.5.24 In this scenario, a bus contribution (agreed via the S106 Agreement) will be provided to extend the T1, or whichever bus service will serve the Park Farm development, with a proposed routing shown at **Figure 5.2**. The proposed route would be along Butt Lane and Oldbury Lane, accessing Land West of Park Farm via the western site access on Oldbury Lane. It would then route through the proposed development, exiting via the Sustainable Travel Link, routing through the northern part of Park Farm and re-join the Park Farm routing at Butt Lane.

5.5.25 As in Proposed Strategy 1, in line with SGC's Local Plan Policy PSP11 new bus stops will be provided so that each part of the development is within 400m of the service. The bus stops will also meet the Council's adopted Bus Shelter Design and Procurement Process protocol.

5.5.26 The appropriateness of this route extension will need to be agreed with the bus operators. If the extension of service T1 is not viable there is the potential to provide funding for a single bus service between Land West of Park Farm, the Park Farm development and Thornbury Town Centre as an alternative option. Services to other destinations including Bristol are then accessible from the Town Centre. The viability of these options would require further investigation and approval with SGC and First.

5.5.27 All other elements of the Strategy would be the same as in Proposed Strategy 1.

5.5.28 Whilst it is understood that SGC are committed to delivery of the bus link to Alexandra Way and they expect it to be delivered within the next two years, SGC highway officers requested that an alternative business case was prepared should the bus-only link not come forward. This is set out in Technical Note 39209-5534-TN002, included at **Appendix G.**

5.5.29 This TN concludes that, in the event that the Alexandra Way link does not come forward, the proposed development site is necessary to promote the long-term sustainability of the already consented Park Farm site. The revenue expected to be accrued from the Park Farm development alone is insufficient to provide for long-term commercial viability of the extended bus route. However, the relatively short extension to this through West of Park Farm will result in substantial additional patronage ensuring the combined development can be served by a viable extension to the T1 route.

5.6 Oldbury Lane Speed Limit Strategy

5.6.1 As part of the access strategy for the development, a speed limit reduction is proposed along Oldbury Lane.

5.6.2 As described in **Section 3**, Oldbury Lane is currently subject to national speed restrictions (60mph). Towards the eastern end of Oldbury Lane, the speed limit changes to 30mph, as this marks the edge of the town and the start of residential dwellings.

5.6.3 The proposed development will extend the edge of the town further west along Oldbury Lane. Consequently, the character of Oldbury Lane would change from rural in nature, to more urban. The residential nature of Oldbury Lane would not suit the speed limit of 60mph and all road users would benefit from a lower speed restriction, in line with national objectives to reduce vehicular speeds in residential areas.

5.6.4 It is therefore proposed that the development introduce a section of restricted road with a 40mph speed limit from approximately 200m west of the proposed western site access on Oldbury Lane. The position of the existing 30mph speed limit change at the far eastern end of Oldbury Lane would be maintained. This would also allow for a phased increase/decrease in speed as vehicles leave/approach Thornbury.

5.6.5 The location of the proposed speed limit change, from national speed limit to 40mph, is shown on **PBA Drawing: 39209/5501/SK15-A**, with the provision of a gateway feature incorporating rumble strips and coloured surfacing with speed limit roundels**.** If deemed necessary by SGC, further traffic calming measures could be introduced to mark the new edge of the town, which could include additional road markings or similar measures.

5.7 Oldbury Lane / Butt Lane Improvements

5.7.1 As requested by SGC a swept path analysis of buses has been undertaken on Oldbury Lane at the section by the junction with Moreton Street to determine the impact of two-way bus movements at this location. **PBA Drawing 39209/5501/SK23-A** shows the swept paths, and potential widening of Oldbury Lane required to allow two buses to pass.

5.7.2 Drawing **39209/5501/SK24-A** illustrates some localised widening of the Butt Lane carriageway to the west of the Park Farm access (Barley Fields) to six metres, as agreed with SGC. It is agreed that this will only be required if the pedestrian refuge island proposed as part of the Post Farm application is not implemented following speed surveys on Butt Lane.

5.8 Vehicular Access Strategy

5.8.1 It is proposed that the development is accessed from the existing or committed highway network from three points; two primary vehicle accesses and a sustainable travel link which will be a bus-only access. The primary vehicle accesses are shown on **PBA Drawing 392098/5501/SK15-A.**

5.8.2 The site access strategy including junction design and swept path analysis is agreed with SGC highway officers. The details for the three site accesses are set out in turn below:

Western Site Access Junction

5.8.3 The western access is a ghost island priority T-junction which connects into Oldbury Lane, on the northwest boundary of the site. The access has been designed to achieve DMRB visibility splays of 4.5m x 120m for the proposed speed restriction of 40mph on Oldbury Lane. The concept access proposals are set out on **PBA Drawing: 39209/5501/SK15-A** which demonstrates that visibility splays are achievable within the extent of adopted highway or within land under the control of our client.

5.8.4 The junction has a ghost island right turn lane into the site following comments from SGC. The provision of the right turn lane is to reduce the risk of eastbound vehicles colliding with vehicles waiting to right turn into the site. Following the recommendations of the Stage One Road Safety Audit, traffic islands have been added to the proposed junction design.

5.8.5 The through lanes are 3.25m wide, with a reduced 2.5m wide right turning lane due to existing constraints, as discussed and agreed with SGC Highways. This is considered as sufficient for the low traffic flows turning right into the site, whilst ensuring that any HGV movements have sufficient width to pass through the junction.

5.8.6 The access has a carriageway width of 6.5m and corner radii of 10m, which has been designed to accommodate the swept path of a 6x4 Dennis Eagle Elite II Refuse Truck in line with SGC's Waste Collection Design Guidance (2015) as shown on **PBA Drawing: 39209/5501/SK16-A**. Swept path analysis has also been undertaken at of a 12.0m rigid bus to demonstrate that this junction could serve as part of a bus route. This is shown on **PBA Drawing: 39209/5501/SK16-A.** The dimensions of this junction are in line with the recommendations of SGC for a proposed bus route, in their scoping response to the development.

5.8.7 The location of the access has been positioned to take into account the junction spacing of the Oak Leaf Nurseries Garden Centre and not to impede upon the existing drainage ditch which runs between Oldbury Lane and the development.

5.8.8 The access does not incorporate footway provision to Oldbury Lane, as there is no onward footway connection and no desire line in this direction. As detailed above, the development will promote non-vehicle trips by providing direct pedestrian and cycle access via the Sustainable Travel Link in the south east corner of the development.

Eastern Site Access Junction

5.8.9 The eastern access is a ghost island priority T-junction which connects into Oldbury Lane, on the northeast boundary of the site. The access has been designed to achieve DMRB visibility splays of 4.5m x 120m for the proposed speed restriction of 40mph on Oldbury Lane. The junction can also accommodate 4.5m x 215m visibility for a speed limit of 60mph. The concept access proposals are set out in **PBA Drawing: 39209/5501/SK15-A** which demonstrates that visibility splays are achievable within the extent of adopted highway or within land under the control of our client.

5.8.10 The junction has a ghost island right turn lane into the site following comments from SGC. The provision of the right turn lane is to reduce the risk of eastbound vehicles colliding with vehicles waiting to right turn into the site. Following the recommendations of the Stage One Road Safety Audit, traffic islands have been added to the proposed junction design.

5.8.11 The through lanes are 3.25m wide, with a 3.5m wide right turning lane. This is considered as sufficient for the low traffic flows turning right into the site, whilst ensuring that HGV movements associated with the power station have sufficient width to pass through the junction.

5.8.12 The access has a carriageway width of 6.5m and corner radii of 10m, which has been designed to accommodate the swept path of a 6x4 Dennis Eagle Elite II Refuse Truck in line with SGC's Waste Collection Design Guidance (2015) as shown on **PBA Drawing: 39209/5501/SK17-A.** Swept path analysis has also been undertaken at of a 12.0m rigid bus to demonstrate that this junction could serve as part of a bus route as shown on **PBA Drawing: 39209/5501/SK17-A**.

5.8.13 The dimensions of the junction are in line with the recommendations of SGC for a proposed bus route, in their scoping response to the development. The public transport strategy set out at **Section 5.5** promotes a bus route extension which utilises the proposed western site access, however the eastern site access has been designed to accommodate bus movements to future proof the development.

5.8.14 The location of the access has been positioned to maximise visibility along Oldbury Lane.

5.8.15 The access does not incorporate footway provision to Oldbury Lane, as there is no onward footway connection and no desire line in this direction. As detailed above, the development will promote non-vehicle trips by providing direct pedestrian and cycle access via the Sustainable Travel Link in the south east corner of the development.

Highways Stage 1 Road Safety Audit

5.8.16 The junction proposals for the site have been subject to a Stage 1 Road Safety Audit (RSA) undertaken by TMS. A Designers Response has been produced following the Audit, which is attached in **Appendix H.** The RSA identified that the junctions should have traffic islands on Oldbury Lane to prevent eastbound vehicles overtaking adjacent to the access, and these have been incorporated within the design as submitted. The RSA1 Designers Response was issued to SGC in August 2018, who have agreed in principle the access junction layouts.

5.9 Vehicular Parking Strategy

5.9.1 Vehicular parking will be provided in accordance with the local authority's car parking standards as set out in PSP16 of SGC's Local Plan: Policies, Sites and Places Plan (November 2017). The car parking requirements for residential dwellings (C3), as set out in the PSP16, are summarised in **Table 5.2**; these are minimum parking standards.

Table 5.2: Car Parking Standards (PSP16) – C3 dwellings

Dwelling type	Parking space provision (minimum)
1 bed dwelling/flat/apartment	1
2 bed dwelling/flat/apartment	1.5**
3 bed dwelling/flat/apartment	2
4 bed dwelling/flat/apartment	2
5 and 5+ bed dwelling/flat/apartment	3

**requirement rounded down to the nearest whole number. Where 2 bed flats are provided the Council will encourage the provision of 1 parking space per flat, with the remainder of the requirement provided as unallocated visitor spaces in close proximity of the units they serve.

5.9.2 PSP16 also states that:

- An additional 0.2 spaces per dwelling for use by visitors should be provided. The requirement for visitor spaces will be rounded to the nearest whole number.
- Garages will not be acceptable as the sole parking space serving a dwelling.

5.9.3 The exact number and location of parking spaces will be agreed with SGC through appropriate planning conditions and the reserved matters process.

5.9.4 Car parking for community or retail uses on site, will also be agreed with SGC through appropriate planning conditions and reserved matters applications.

5.9.5 The parking strategy for the site will ensure that vehicles which are associated with the development proposals will be contained within the site as far as is practical.

6 Development Travel Demand

6.1 Introduction

6.1.1 This section provides an overview of the anticipated travel demand resulting from the proposed development by all modes of travel including walking, cycling, public transport and private car trips. The predicted number of person trips have been generated and the modal split of those journeys has been considered. The travel demand methodology and subsequent person trip generation has been agreed with SGC highways officers through pre and post-application engagement in line with the approach set out in the NPPF.

6.1.2 The AM and PM peak hours have been assessed and, whilst it is recognised that these periods do not represent the entire travel demand resulting from development proposals, they do provide a recognised benchmark from which to consider the access and movement needs of future residents to the site.

6.2 Development Proposals

6.2.1 The primary development proposals for the purpose of estimating travel demand are:

- 595 residential dwellings.
- Land for a primary school – likely to be internal local trips.
- A proposed Neighbourhood Hub of up to 700sqm of retail and community uses - likely to be internal local trips or outside of highway peak hours.

6.3 Vehicle Trip Generation

6.3.1 SGC requested that residential vehicle trip rates for the proposed development be generated using a proxy site, based on an in/out survey undertaken by SGC of Otter Way, a small cul-de-sac consisting of 44 residential dwellings located off Badger Road, Thornbury. The peak hour trip rates provided by SGC are set out in **Table 6.1**.

Table 6.1: Otter Way Vehicle Trips Rates

	IN	OUT	2-way
AM (0745-0845)	0.091	0.523	0.614
PM (1700-1800)	0.477	0.114	0.591

Internalisation

6.3.2 As there is no opportunity for internalisation at the Badger Road development the trip rates set out in **Table 6.1** represent both trips which would remain within the development at West of Park Farm and those which would impact on the external highway network.

6.3.3 The retail and community hub will lead to the internalisation of some trips. However, to ensure that a robust assessment is presented within this TA, no alteration of trip rates has been implemented to account for these land uses. This means that the number of trips on the external highway network assessed is higher than would be expected to materialise.

6.3.4 It is also necessary to consider the internalisation of trips within the site by the inclusion of the Primary School, as Otter Way does not accommodate a Primary School.

6.3.5 The total development vehicle trip rates have therefore been reduced to account for the internalisation of primary school trips associated with the 1 FE primary school proposed at Land West of Park Farm and which would not present themselves onto the external highway network. In addition to the primary school, the retail and community hub will also lead to the internalisation of trips. However, as set out in paragraph 6.3.3, no alteration of trip rates has been implemented to account for these land uses to ensure a robust assessment. This method and the resultant trip rates have been agreed with SGC.

6.3.6 To calculate the residential trip rates by journey purpose and the primary school trip internalisation, peak period car driver journey purpose splits have been derived for the future assessment year (2028) for the TEMPro zone South Gloucestershire 001 (E02003090). These journey purpose splits are set out in **Table 6.2**.

Table 6.2: TEMPro Residential Journey Purpose Splits 2028 South Gloucestershire 001 (E02003090)

2028	AM	PM
Employment	66.9%	53.0%
Education	12.7%	5.8%
'Other' (Retail / Leisure / Personal Business)	20.4%	41.2%
Total	100.0%	100.0%

6.3.7 This confirms that 12.7% of all trips in the AM peak are associated with education, and 5.8% of the PM peak trips are associated with education**.**

6.3.8 The resulting vehicle trip rates by journey purpose are set out in **Table 6.3**.

Table 6.3: Residential Trip Rates by Journey Purpose

	AM Peak			PM Peak		
	IN	OUT	2-way	IN	OUT	2-way
Employment	0.061	0.350	0.411	0.253	0.060	0.313
Education	0.012	0.066	0.078	0.028	0.007	0.034
'Other'	0.019	0.107	0.126	0.197	0.047	0.244
Total	0.091	0.523	0.614	0.477	0.114	0.591

6.3.9 To account for the internalisation of primary school trips, the residential to education trip rates set out in **Table 6.3** have firstly been halved. This allows for external trips to secondary/further education. Secondly, the number of primary school aged children at the proposed development of 595 units has been estimated at 214, using a child per residential unit ratio of 0.36 taken from the 2011 Census data. The 1 FE primary school will have capacity of 210. Of these children, therefore, it has been assumed for the purpose of this assessment that 100% of primary school aged children will be accommodated on-site.

6.3.10 Consequently, 100% of residential to primary school trips rates, or 50% of all residential to education rates have been removed, resulting in the following external vehicle trip rates for the proposed development in **Table 6.4**.

Table 6.4: Residential Trip Rates for Education – external only

	AM Peak			PM Peak		
Education	IN	OUT	2-way	IN	OUT	2-way
Trip Rate	0.006	0.036	0.042	0.015	0.004	0.018
Trips	4	21	25	9	2	11

6.3.11 No additional trips have been estimated, associated with the primary school, as the non-pupil element is considered to be negligible during the peak hours.

6.3.12 The resulting vehicle trips calculated for the 595 units at Land West of Park Farm are set out within **Table 6.5.**

Table 6.5: Land West of Park Farm Vehicle Trips - 595 units

	IN	OUT	2-way
AM	51	291	342
PM	276	66	341

6.3.13 The proposed development is supported by a Travel Plan that aims at reducing vehicular trip generation from the development and sets targets for modal shift away from the private car. Although NPPF and the associated PPG recognise that Travel Plans are an integral part of mitigation, the assessment presented in this section does not take account of the potential for reduced vehicular trip generation that the Travel Plan could lead to. In this respect the assessment presented here is robust, based on higher number of trips than would be expected.

Vehicle Trip Comparison

6.3.14 **Table 6.5** provides a summary of the total number of vehicle trips forecast to be associated with the revised development proposals. When compared to the previous TA, this account for a reduction of 35 dwellings and addition of a primary school at the site. **Table 6.6** below sets out the difference between the previous proposals and current quantum of development proposed.

Table 6.6: Comparison of Vehicle Trips

	AM Peak	PM Peak
A. Previous scheme (630 dwellings)	387	372
B. Current scheme (595 dwellings + primary school)	342	341
Difference (B-A)	-45	-31

6.3.15 **Table 6.6** demonstrates that the reduction in 35 dwellings and provision of an on-site primary school will result in 45 fewer vehicle trips in the AM peak and 31 fewer in the PM peak when compared to the previous proposals.

Summary

6.3.16 The requirement for 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.

6.3.17 As set out in **Section 1**, 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 a robust assessment.

6.3.18 On this basis, the following sections of the TA assess the impacts of 630 dwellings.

6.4 Baseline Mode Split

6.4.1 A baseline mode split for the development has been estimated from 2011 Census journey to work data for MSOA South Gloucestershire 001 (E02003090). The area covered by this MSOA includes residential areas near the site in the north of Thornbury. The mode split of residents in this area is considered to best represent the future baseline mode split of residents in the proposed development at peak hours. The baseline mode split is shown in **Table 6.7**.

Table 6.7: Development Baseline Modal Split – 2011 Census

Mode	%
Car Driver	75.4%
Car Passengers	5.1%
Cyclists	2.8%
Pedestrians	11.7%
Public Transport	2.5%
Other	2.6%
Total	100%

6.4.2 The resulting number of trips by mode is set out in **Table 6.8**. This number of trips has been generated using the trip rates set out within **Table 6.1** and is therefore the total number of trips generated by the site.

Table 6.8: Residential Trips by mode (630 dwellings)

	AM Peak			PM Peak		
	IN	OUT	2-way	IN	OUT	2-way
Car Driver	57	329	387	301	72	372
Car Passengers	4	22	26	20	5	25
Cyclists	2	12	14	11	3	14
Pedestrians	9	51	60	47	11	58
Public Transport	2	11	13	10	2	12
Other	2	11	13	10	2	13
Total	**76**	**437**	**514**	**399**	**95**	**494**

6.5 Development Traffic Distribution and Assignment

6.5.1 The proposed development traffic flows have been distributed and assigned to the network on a journey purpose basis. The journey purpose splits used for this purpose are those set out above, at **Table 6.2.** The corresponding number of trips by journey purpose are set out at **Table 6.9**

Table 6.9: External Trips by Journey Purpose (630 dwellings)

Journey purpose	AM		PM	
	IN	OUT	IN	OUT
Employment	39	221	160	38
Primary Education	4	21	9	2
Secondary/Further Education	4	21	9	2
Retail / Leisure / Personal Business	12	68	124	30
Total	59	331	302	72

6.5.2 The methodology used to distribute and assign the trips associated with each journey purpose is set out below:

- Residential to employment: a gravity model has been developed by identifying the likely commuter destinations based on 2011 Census data. The destinations have been grouped appropriately, depending on proximity to the proposed site; with smaller areas closer to the site (e.g. LSOA level) and larger areas further away from the site (e.g. local authority level). The number of jobs (workplace population) per destination area has been estimated using 2011 Census data. Distance and journey times to the approximate centre of each destination area have been estimated, as well as the generalised cost per journey based on vehicle operating costs, the parameters for which have been taken from the Transport Analysis Guidance (TAG) data book May 2018.

- Following comments received from SGC, the gravity model has been updated so 23 percent of employment trips remain within Thornbury to reflect changes in the level of employment available within the town. The resulting distribution, by links within the study area, is summarised in **Table 6.10**. The assignment of residential to employment traffic is illustrated in percentage form on **Figure 6.1**. The corresponding number of trips is shown on **Figures 6.2** and **6.3** for the AM and PM respectively. The updated gravity model has been agreed with SGC and Highways England.

Table 6.10: Gravity model distribution by study area link

Study area link	Distribution %
Oldbury Lane (west of Thornbury)	4.8%
A38 North	5.3%
J14 M5	26.2%
Tytherington Road	6.7%
Church Lane	10.7%
A38 South	22.6%
Castle Street	0.0%
Morton Way	1.7%
Grovesend Road via Quaker Lane	0.5%
Grovesend Road via Morton Way	0.3%
Midland Way	1.4%
High Street	6.1%
Gloucester Road	11.6%
Quaker Lane	2.2%
Total	**100.0%**

- Due to the size of the MSOA's within Thornbury, 11.6% of development traffic is assigned to Gloucester Road, which includes the areas of Church Road, Eastland Road, Easton Hill Road and Oakleaze Road. This contains employment areas including Thornbury Hospital, retail and employment facilities as well as Primary, Secondary and 6th Form schools.

- Residential to Secondary education: education trips have been distributed to The Castle Secondary School Thornbury; and higher education trips have been distributed equally between Bristol University (City Centre) and University of the West of England (north Bristol). The assignment of residential to Secondary/Further education traffic is illustrated in percentage form on **Figure 6.4,** with the primary school trip assignment on **Figure 6.5.** The corresponding number of trips is shown on **Figures 6.6** and **6.7** for the AM and PM for Secondary/Further education respectively. **Figures 6.8** and **6.9** show the primary school peak hour trips.

- Residential to 'other' (retail/leisure/personal business): trips have been revised in discussion with SGC. As a result, 70% of these trips have been distributed between the various facilities on offer within Thornbury; including retail such as supermarkets and the High Street; health such as Thornbury Hospital and Health Centre; and leisure such as Thornbury Leisure Centre; the remaining 30% have been distributed evenly to Bristol and Gloucester/Stroud. The internal (to Thornbury) and external assignment of residential to 'other' traffic is illustrated in percentage form on **Figures 6.10 and 6.11**. The corresponding number of trips is shown on **Figures 6.12** and **6.13** for the AM and PM respectively.

6.5.3 The gravity model has been subject to review by SGC and HE. It is considered that the gravity model is only applicable to employment trips, as it is based on Census work population, and is not relevant to education or other uses, where these are likely to be more local during the peak hours.

6.5.4 The corresponding number of total development trips is shown on **Figures 6.14** and **6.15** for the AM and PM respectively.

7 Base Validation

7.1 Introduction

7.1.1 This section of the TA sets out the agreed future year traffic growth and validation of the junction assessments.

7.2 Assessment Years and Traffic Growth

7.2.1 In accordance with pre and post-submission discussions with South Gloucestershire Council (SGC), it has been agreed that the following assessment years will be used for traffic impact assessments:

- 2017 / 2018 base situation (2018 for junctions 5a and 5b only – see **3.4.3**);
- 2028 future year – year of full build out.

7.2.2 It is agreed the TEMPro database uses old assumptions which does not reflect the current development context of Thornbury. It was therefore agreed that no TEMPro traffic growth would be applied to the base traffic flows to ensure that there is no double counting of new development traffic. The 2028 future year traffic flows have therefore been derived by adding the baseline survey data to flows extracted from the Transport Assessments of those committed development sites set out at **paragraph 3.9**.

Traffic Flow Figures

7.2.3 The surveyed peak hour traffic flows, shown on **Figures 7.1 to 7.2**, have been adjusted using the TEMPro growth factors above to form the base traffic flows for future year assessments. The resultant 2028 Base traffic flows are shown on **Figures 7.3 to 7.4**.

7.2.4 **Figures 7.5 to 7.6** detail the 2028 Reference Case HGV % in the AM and PM peaks respectively. **Figures 7.7 to 7.8** detail the 2028 Reference Case PCUs in the AM and PM peaks respectively.

7.2.5 The predicted development traffic flows set out in Figures 6.11 and 6.12 have been added to the 2028 Reference Case flows to derive 2028 Test Case flows.

7.2.6 **Figures 7.9 and 7.10** detail the 2028 Test Case traffic flows (all vehicles) derived in the AM and PM peaks respectively. **Figures 7.11 and 7.12** detail the 2028 Test Case HGV % in the AM and PM peaks respectively. **Figures 7.13 and 7.14** detail the 2028 Test Case PCUs in the AM and PM peaks respectively.

7.3 Quantification of Development Impact

7.3.1 This section of the TA considers the net change in traffic resulting from the development proposals and how that development is predicted to impact upon local routes and junctions within the agreed study area. This assessment establishes the proportional impact at each local junction in the study area and determines if this is significant enough to require more detailed capacity assessments, taking into consideration the recorded operation of those junctions in the baseline situation.

7.3.2 As set out in **Section 1**, changes to the proposed development quantum results in fewer vehicle trips on the highway network and as such this represents an overestimation / robust assessment of trips.

7.3.3 The likely traffic impact of the development proposals has been assessed at the following local junctions/links as agreed with SGC:

1. Butt Lane / Morton Way / Gloucester Road Staggered Junction;
2. A38 / Gloucester Road Junction;
3. Grovesend Road / Morton Way, Midland Way Roundabout;
4. A38 / Grovesend Road / Tytherington Road Signalised Staggered Junction;
5. Gloucester Road / Quaker Lane / The Plain / Castle Street / High Street Mini-roundabout (5a) and Priority Junctions (5b);
6. A38 / B4509 Signalised Junction;
7. A38 / Old Gloucester Road Priority Junction;
8. A38 / Church Road Signalised Junction;
9. A38 / B4061 Signalised Junction.

7.3.4 The summary of the development impact at each junction is shown below in **Table 7.1** below.

Table 7.1: Proportional Impact of Development

Junction	Development Traffic		Development Impact on 2028 Reference Case	
	AM	PM	AM	PM
1	376	364	20.3%	21.8%
2	99	97	8.6%	8.8%
3	131	107	7.7%	6.1%
4	120	87	6.1%	4.7%
5a	58	85	5.7%	7.6%
5b	30	39	2.6%	3.8%
6	99	97	5.1%	4.9%
7	0	0	0%	0%
8	105	83	3.3%	2.8%
9	92	77	3.8%	3.5%

7.3.5 **Table 7.1** shows that there is a negligible predicted development impact on the following junctions:

7. A38 / Old Gloucester Road Priority Junction – 0% impact, with no development traffic anticipated to use this junction in the AM and PM peaks respectively.
8. A38 / Church Road Signalised Junction – 2.8-3.3% impact in the peak hours, with 105 and 83 vehicles (two-way) in the AM and PM peaks respectively.
9. A38 / B4061 Thornbury Road Junction – 3.5-3.8% impact in the peak hours, with 92 and 77 vehicles (two-way) in the AM and PM peaks respectively.

7.3.6 The predicted increase in flows, due to the proposed development, is considered sufficiently high to require further analysis at the following junctions:

1. Butt Lane / Morton Way / Gloucester Road Staggered Crossroad Junction;
2. A38 / Gloucester Road Priority Junction;
3. Grovesend Road / Morton Way, Midland Way Roundabout;
4. A38 / Grovesend Road / Tytherington Road Signalised Staggered Junction;
5. Gloucester Road / Quaker Lane / The Plain / Castle Street / High Street Mini-roundabout (5a) and Priority Junctions (5b); and
6. A38 / B4509 Signalised Junction.

7.4 Junction Base Model Validation

7.4.1 Following the initial traffic impact assessment, Junctions 1-6 are predicted to experience a net increase in traffic flows that triggers the need for further detailed capacity assessment. This further assessment work is described in the following sections.

7.4.2 The capacity of the junctions was tested using industry standard software ARCADY for roundabouts, PICADY for priority junctions and LinSig for signalised junctions.

7.4.3 The models were validated using queue surveys undertaken at the same time as the traffic surveys. The process of validating the models is detailed in next section.

7.5 Model Validation

7.5.1 This section of the report sets out the validation of the 2017 / 2018 base junction capacity models.

7.5.2 Validation of junction models has been undertaken to ensure the model represents the existing capacity of the junction. The validated models will provide a base against which to test future year scenarios.

7.5.3 The junction models have been validated against queue surveys that were recorded at each junction at the time of undertaking the turning count surveys as detailed in **3.4.3**.

7.5.4 It should be noted that the queue survey for junctions 5a (Gloucester Road / Quaker Lane / The Plain mini-roundabout) and 5b (Castle Street / The Plain junction) were re-surveyed on Thursday 3rd May 2018 due to issues with the original survey data. The re-surveying of the junctions was agreed with SGC. Therefore, these two junctions have a base year of 2018, while all other junctions have a base year of 2017.

7.5.5 For priority junctions, the queue surveys recorded the stationary traffic that was queueing in each approach lane to the junction, at the end of each five-minute period. Similarly, for signalised junctions, queues were recorded at the end of each five-minute period, to the nearest red phase. This methodology is recommended by the respective modelling software creators, TRL Software and JCT Consultancy.

Junction 1 – Butt Lane / Morton Way / Gloucester Road Staggered Junction

7.5.6 The Butt Lane / Morton Way / Gloucester Road Staggered Junction is a four arm left-right staggered junction situated approximately 1.2km east of the proposed development. Footways are provided in the vicinity of the junction at Butt Lane, adjacent to the westbound side of the carriageway, Gloucester Road south, adjacent to the northbound side of the carriageway, and Morton Way, adjacent to the westbound side of the carriageway.

7.5.7 A pedestrian refuge island is located on Gloucester Road south and an informal crossing with tactile paving and dropped kerbs is provided approximately 45m west of the junction on Butt Lane. There is a proposed scheme associated with Land West of Gloucester Road (PT16/4774/O) which provides a pedestrian refuge island in the location of this informal crossing, however this proposal does not affect the modelling of the junction.

7.5.8 The base junction model for the Butt Lane / Morton Way / Gloucester Road Staggered Junction was run using the 2017 observed flows and junction geometries undertaken onsite by PBA.

7.5.9 A comparison of queues from the model and surveyed queues have been provided in **Table 7.2.**

Table 7.2: Butt Lane / Morton Way / Gloucester Road Staggered Junction – 2017 Validation Model

Link	AM Peak		PM Peak	
	Modelled Queue (veh)	Queue Survey (veh)	Modelled Queue (veh)	Queue Survey (veh)
Butt Lane	1.1	4	1.0	3
Gloucester Road (S)	0.5	2	0.5	1
Morton Way	0.9	4	0.6	3
Gloucester Road (N)	0.5	1	0.4	0

7.5.10 As shown in **Table 7.2** the observed queues are small at 0-4 across all arms in each peak period. By comparison the modelled queues are similar, although slightly lower, between 0-1 vehicles. Highest modelled and observed queues are shown on Butt Lane and Morton Way in both peak periods.

7.5.11 The base model for this junction includes the flare on the Morton Way minor arm. It is confirmed that the Butt Lane surveyed queue accounted for one lane on Butt Lane and showed an average queue of 4 vehicles in the AM peak.

7.5.12 It is acknowledged that the modelled queues are shorter by three vehicles than the surveyed queues on the Butt Lane and Morton Way arms in the AM peak, and two vehicles on these arms in the PM peak. However, PBA considers this to be a negligible amount and it is considered that the model provides an accurate reflection of the junction operation.

Junction 2 – A38 / Gloucester Road Junction

7.5.13 The A38 / Gloucester Road Junction is a priority T-junction with duelling on the A38, situated approximately 3.9km east of the proposed development. The A38 comprises the major arm and Gloucester Road comprises the minor arm. Footways are provided adjacent to all arms except for the A38 west, eastbound carriageway.

7.5.14 The base junction model for the A38 / Gloucester Road Junction was run using the 2017 observed flows and junction geometries undertaken onsite by PBA.

7.5.15 A comparison of queues from the model and surveyed queues have been provided in **Table 7.3.**

Table 7.3: A38 / Gloucester Road Junction - 2017 Validation Model

Link	AM Peak		PM Peak	
	Modelled Queue (veh)	Queue Survey (veh)	Modelled Queue (veh)	Queue Survey (veh)
Gloucester Road	0.5	4	0.4	3
A38 (E)	0.5	2	0.4	2

7.5.16 As shown in **Table 7.3** the observed queues are small at 2-4 across all arms in each peak period. By comparison the modelled queues are also small at under 1 vehicle.

7.5.17 It is considered that the model is suitable for future year assessment scenarios.

Junction 3 – Grovesend Road / Morton Way / Midland Way Roundabout

7.5.18 The Grovesend Road / Morton Way / Midland Way Roundabout is a four-arm roundabout situated approximately 2.8km southeast of the proposed development. There are footways provided along all arms of the carriageway.

7.5.19 The base junction model for the A38 / Gloucester Road Junction was run using the 2017 observed flows and junction geometries undertaken onsite by PBA.

7.5.20 A comparison of queues from the model and surveyed queues have been provided in **Table 7.4.**

Table 7.4: A38 / Gloucester Road Junction - 2017 Validation Model

Link	AM Peak		PM Peak	
	Modelled Queue (veh)	Queue Survey (veh)	Modelled Queue (veh)	Queue Survey (veh)
Morton Way	0.2	2	0.1	1
Grovesend Road (E)	0.4	3	0.6	4
Midland Way	0.1	1	0.3	3
Grovesend Road (W)	0.3	3	0.3	2

7.5.21 As shown in **Table 7.4** the observed queues are small at 1-4 across all arms in each peak period. By comparison the modelled queues are also small, at under 1 vehicle.

7.5.22 The modelled queues are only slightly shorter than the surveyed queues of less than 2 vehicles in the AM peak, and 3 vehicles on Grovesend Road (East) in the PM peak.

7.5.23 PBA can confirm that the entry width for each arm has been measured to the hatched lane width rather than the width to the actual islands' kerbs and so the model is accurate and robust.

7.5.24 It is considered that the model is suitable for future year assessment scenarios.

Junction 4 – A38 / Grovesend Road / Tytherington Road Signalised Staggered Junction

7.5.25 The A38 / Grovesend Road / Tytherington Road junction is a signalised staggered situated approximately 3.3km north east of the proposed development. The A38 comprises the major arm and Grovesend Road and Tytherington Road comprise the minor arms. Footways are provided on at least one side of each arm, and there are signalised crossings in the form of a Pegasus and Toucan crossing, across the A38 south arm.

7.5.26 The base junction model for the A38 / Grovesend Road / Tytherington Road Junction was run using the 2017 observed flows and junction geometries undertaken onsite by PBA.

7.5.27 A comparison of queues from the model and surveyed queues have been provided in **Table 7.5.**

Table 7.5: A38 / Grovesend Road / Tytherington Road Junction – 2017 Validation Model

Link	AM Peak		PM Peak	
	Modelled Queue (veh)	Queue Survey (veh)	Modelled Queue (veh)	Queue Survey (veh)
A38 North	6.8	5	7.5	5
Tytherington Road	4.8	4	4.0	3
A38 South	9.1	*8	10.0	*12
Grovesend Road	12.9	15	12.8	14

*highest single lane average

7.5.28 As shown in **Table 7.5** the observed queues are between 4-15 in the AM peak and 3-14 in the PM peak. The largest queues are observed on Grovesend Road in both peaks. By comparison the modelled queues are similar at between 4.8-12.9 in the AM peak and 4.0-12.8 in the PM peak, with the largest queues mirroring those observed.

7.5.29 The modelled queues are longer across three of the four arms in both peaks with a maximum difference of two vehicles. The modelled queues are shorter than the surveyed queues by two vehicles on Grovesend Road in the AM and the modelled queues are shorter than the surveyed queues by two vehicles on the A38 south in the PM.

7.5.30 Considering the difference between modelled and observed queues is low, it does not indicate that these results are erroneous. PBA consider this to be a generally accepted variance in the modelling software and the model is therefore considered to be acceptable.

Junction 5a – Gloucester Road / Quaker Lane / The Plain Mini-Roundabout

7.5.31 Gloucester Road / Quaker Lane / The Plain Mini-Roundabout is a three-arm mini-roundabout situated approximately 1.6km southeast of the proposed development. There are footways provided on at least one side of the carriageway of each arms. No footways are provided along Gloucester Road northbound side of the carriageway, or The Plain eastbound side of the carriageway. A zebra crossing located just south of the junction on Quaker Lane.

7.5.32 On-site observations at the time of the surveys, were that queueing occurred as a result of the zebra crossing on Quaker Lane, but not as a result of the operation of the junction. The average queue at the zebra crossing during the peak hours was observed to be 3 and 2 in the AM and PM respectively.

7.5.33 The base junction capacity model for Gloucester Road / Quaker Lane / The Plain Mini-Roundabout was run using the 2018 observed flows and junction geometries undertaken onsite by PBA.

7.5.34 A comparison of queues from the model and surveyed queues have been provided in **Table 7.6.**

Table 7.6: Gloucester Road / Quaker Lane / The Plain Mini-Roundabout - 2018 Validation Model

Link	AM Peak		PM Peak	
	Modelled Queue (veh)	Queue Survey (veh)	Modelled Queue (veh)	Queue Survey (veh)
Gloucester Road	1.6	2	0.9	3
Quaker Lane	0.5	0	0.7	0
The Plain	0.5	2	0.9	2

7.5.35 As shown in **Table 7.6** the observed queues are small at 0-3 across all arms in each peak period. By comparison the modelled queues are similar, although slightly lower, between 0-2 vehicles.

7.5.36 There is a maximum difference of two vehicles between the surveyed queues and modelled queues across the junction.

7.5.37 Considering the difference in queues is negligible, it does not indicate that these results are erroneous, as this is a generally accepted variance in the modelling software. The model is therefore considered to be acceptable.

Junction 5b – The Plain / Castle Street / High Street Junction

7.5.38 The Plain / Castle Street / High Street Junction is a priority T-junction situated approximately 60m west of junction 5a. Castle Street and High Street comprise the major arm and The Plain comprises the minor arm. There are footways provided along all arms and on-street parking is provided within close proximity of the junction.

7.5.39 The base junction model for The Plain / Castle Street / High Street Junction was run using the 2018 observed flows and junction geometries undertaken onsite by PBA.

7.5.40 A comparison of queues from the model and surveyed queues have been provided in **Table 7.7.**

Table 7.7: The Plain / Castle Street / High Street junction – 2018 Validation Model

Link	AM Peak		PM Peak	
	Modelled Queue (veh)	Queue Survey (veh)	Modelled Queue (veh)	Queue Survey (veh)
Castle Street	0.6	1	0.5	0
The Plain	0.5	0	0.3	0

7.5.41 As shown in **Table 7.7** the observed queues are small at 0-1 across all arms in each peak period. By comparison the modelled queues are similar, all under 1 vehicle.

7.5.42 It is considered that the model is suitable for future year assessment scenarios.

Junction 6 – A38 / B4509 Signalised Junction

7.5.43 The A38 / B4509 is a signalised T-junction situated approximately 5.3km north east of the proposed development. The A38 comprises the major arm and B4509 comprises the minor arm. The M5 Junction 14 is situated approximately 450m to the east of this junction. There are footways provided along the A38, however there are no signal controlled crossings at the junction.

7.5.44 This junction is included in the VISSIM modelling undertaken for Junction 14 of the M5. A Technical Note has been prepared and submitted separately setting out the assessment of this junction.

M5 Junction 14

7.5.45 Junction 14 of the M5 is located approximately 7km drive north from the site. Through scoping discussions with Highways England it was agreed to consider the impact of the development at this junction.

7.5.46 Taking in to account the revised gravity model, set out at **Section 6.5,** the trip generation and distribution has identified that the development will result in the following trips at M5 junction 14 set out in **Table 7.8**.

Table 7.8: Development Trips at M5 Junction 14 (630 dwellings)

Junction	AM			PM Peak		
	Arrival	Depart	Total	Arrival	Depart	Total
Junction 14	13	73	86	70	17	87

7.5.47 Highways England has confirmed that the level impact on Junction 16 does not require capacity testing as set out in the scoping correspondence in **Appendix B**, no further assessment has therefore been undertaken. HE has however requested that Junction 14 be subjected to capacity testing using their own VISSIM model.

7.5.48 Junction 14 is a grade separated junction, with signalised T-junctions on the off slips with the B4509, including the movements from the B4509 on to both the M5 on-slip roads north and south bound. The right turn movements on to the on-slips both have dedicated lanes, of approximately 40m length.

7.5.49 The VISSIM traffic model of Junction 14, including the signalised junction of the B4509 with the A38 has been provided by HE. The parameters within the model have been agreed with HE.

7.5.50 The directional flows for Junction 14, to and from the development, are set out at **Table 7.9**.

7.5.51 Taking in to account the revised masterplan and reduction in trips set out in **Section 6.3**, these are considered to provide a robust assessment of the impact at Junction 14.

Table 7.9: Development Trips at M5 Junction 14 – directional flows

Junction	AM Peak		PM Peak	
	Arrival	Depart	Arrival	Depart
North	7	39	37	9
East (B4509)	2	10	10	2
South	3	24	22	6
Total	12	73	69	17

8 Development Impact

8.1 Introduction

8.1.1 This section of the TA considers the vehicular traffic impact of the proposed development upon the local highway network. The conclusions of this section will quantify the severity of the traffic impact and identify whether intervention will be required to mitigate the traffic impact predicted.

8.2 Junction Modelling Results

8.2.1 The following section presents the results from the junction capacity assessments for each junction in turn, for each assessment year. The full modelling outputs are located in **Appendix I** for existing or committed junction layouts. Modelling outputs associated with mitigation proposals in **Appendix J**.

8.2.2 As requested by SGC during post-submission negotiations, a number of the junctions were reassessed to include an assessment of the revised gravity model and committed infrastructure improvements. This includes:

- Junction 1 - Butt Lane / Morton Way / Gloucester Road Staggered Junction;
- Junction 4 - A38 / Grovesend Road / Tytherington Road Signalised Staggered Junction;
- Junction 8 - A38 / Church Road Signalised Junction; and
- (new junction) Junction 9 - A38 / B4061 Signalised Junction.

8.2.3 The results of these assessments are therefore set out below.

Site Access Junctions

8.2.4 PICADY models have been set up for each of the proposed site accesses onto Oldbury Lane, further details of which are set out within **Section 5**. The proposed layouts for the Eastern and Western site accesses, which are both priority T-junctions, are shown on **PBA Drawing 39209/5501/SK15-A.**

8.2.5 The 2028 Test Case flows have been run through the site access models and the results are detailed in **Tables 8.1 and 8.2** for each access in turn.

Eastern Site Access

Table 8.1 Eastern Site Access - 2028 Test Case

Eastern Site Access						
2028 Test Case	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	Max RFC	MMQ	Delay (Secs)	Max RFC	MMQ	Delay (Secs)
Site Access (left)	0.01	0	8.94	0.00	0	7.39
Site Access (right)	0.47	1	18.18	0.11	0	10.96
Oldbury Lane right turn	0.00	0	5.72	0.01	0	6.19

RFC = Ratio of Flow to Capacity, MMQ = Maximum Mean Queue

8.2.6 **Table 8.1** shows that, in the 2028 Test Case, the Eastern Site Access junction is operating within capacity in the AM and PM peaks. There is a maximum RFC of 0.47 and queue of one vehicle on the site access arm in the AM Peak. Across the PM peak hour, the site access arm has the maximum RFC of 0.11 and queue of less than one vehicle.

Western Site Access

Table 8.2: Western Site Access - 2028 Test Case

Western Site Access						
2028 Test Case	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	Max RFC	MMQ	Delay (Secs)	Max RFC	MMQ	Delay (Secs)
Site Access (left)	0.01	0	6.81	0.00	0	5.46
Site Access (right)	0.44	1	15.90	0.09	0	9.68
Oldbury Lane right turn	0.00	0	6.30	0.01	0	6.36

RFC = Ratio of Flow to Capacity, MMQ = Maximum Mean Queue

8.2.7 **Table 8.2** shows that, in the 2028 Test Case, the Western Site Access junction is operating within capacity in the AM and PM peaks. There is a maximum RFC of 0.44 and queue of one vehicle on the site access arm in the AM peak. Across the peak hour, the site access arm has the maximum RFC of 0.09 and queue of less than one vehicle.

8.2.8 These results demonstrate that the site accesses have been adequately designed to accommodate the traffic associated with the proposed development.

Junction 1 – Butt Lane / Morton Way / Gloucester Road Staggered Crossroads

8.2.9 At the request of SGC highways officers, the baseline junction model has been updated to include the improvement scheme committed as part of the Land West of Gloucester Road application. This includes widening of Butt Lane and Morton Way, as shown on Aecom drawing 60478443.011 “Site Access and Gloucester Road / Butt Lane / Morton Way Proposals”, included at **Appendix K.**

8.2.10 The results of the operation of the Butt Lane / Morton Way / Gloucester Road Staggered Crossroads model in the 2017 Base scenario are detailed in **Table 8.3**.

Table 8.3: Butt Lane / Morton Way / Gloucester Road junction - 2017 Base

Junction 1 - Butt Lane / Morton Way / Gloucester Road Junction						
2017 Base	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	Max RFC	MMQ	Delay (Secs)	Max RFC	MMQ	Delay (Secs)
Butt Lane – Left Turn	0.30	0.4	9.13	0.26	0.4	8.84
Butt Lane – Right Turn	0.43	0.7	17.61	0.37	0.6	15.75
Ghost Island Right Turn into Butt Lane	0.31	0.5	8.71	0.32	0.5	7.98
Morton Way – Left Turn	0.42	0.7	10.41	0.30	0.4	8.04
Morton Way – Right Turn	0.18	0.2	13.82	0.16	0.2	12.31
Ghost Island Right Turn into Morton Way	0.31	0.5	8.37	0.27	0.4	8.38

RFC = Ratio of Flow to Capacity, MMQ = Maximum Mean Queue

8.2.11 **Table 8.3** shows that, in the 2017 Base scenario, the Butt Lane / Morton Way / Gloucester Road junction is operating within capacity in the AM and PM peaks. There is a maximum RFC of 0.43 and queue of less than one vehicle on Butt Lane (right turn) in the AM peak. Across the PM peak hour, Butt Lane has a maximum RFC of 0.37 and a queue of less than one vehicle.

8.2.12 The 2028 Reference Case and 2028 Test Case flows have been run through the model and the results are detailed in **Tables 8.4 and 8.5** below.

Table 8.4: Butt Lane / Morton Way / Gloucester Road junction - 2028 Reference Case

Junction 1 - Butt Lane / Morton Way / Gloucester Road Junction						
2028 Reference Case	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	Max RFC	MMQ	Delay (Secs)	Max RFC	MMQ	Delay (Secs)
Butt Lane – Left Turn	0.72	2.6	22.06	0.44	0.8	11.19
Butt Lane – Right Turn	0.65	1.8	34.38	0.50	1.0	24.93
Ghost Island Right Turn into Butt Lane	0.42	0.9	9.29	0.56	1.5	12.71
Morton Way – Left Turn	0.53	1.1	12.28	0.52	1.1	11.18
Morton Way – Right Turn	0.35	0.5	22.46	0.32	0.5	17.69
Ghost Island Right Turn into Morton Way	0.42	0.9	9.29	0.56	1.5	12.71

RFC = Ratio of Flow to Capacity, MMQ = Maximum Mean Queue

8.2.13 **Table 8.4** shows that, in the 2028 Reference Case, the Butt Lane / Morton Way / Gloucester Road junction is predicted to operate within capacity in the AM and PM peaks with a maximum RFC of 0.72 on Butt Lane in the AM peak and 0.56 on Gloucester Road in the PM peak. Queues are forecast to be no more than 2 vehicles.

Table 8.5: Butt Lane / Morton Way / Gloucester Road junction - 2028 Test Case

Junction 1 - Butt Lane / Morton Way / Gloucester Road Junction						
2028 Test Case	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	Max RFC	MMQ	Delay (Secs)	Max RFC	MMQ	Delay (Secs)
Butt Lane – Left Turn	1.32	155.7	1043.77	1.14	23.3	281.88
Butt Lane – Right Turn	1.32	77.7	1056.11	1.11	14.4	314.06
Ghost Island Right Turn into Butt Lane	0.48	1.1	10.05	0.84	6..4	33.80
Morton Way – Left Turn	1.43	30.8	284.33	1.13	53.0	444.23
Morton Way – Right Turn	1.31	8.8	415.70	1.08	12.78	520.20
Ghost Island Right Turn into Morton Way	0.71	3.1	17.56	0.54	1.3	10.75

RFC = Ratio of Flow to Capacity, MMQ = Maximum Mean Queue

8.2.14 **Table 8.5** shows that, in the 2028 Test Case, the Butt Lane / Morton Way / Gloucester Road junction is forecast to operate over capacity in the AM and PM peaks. As the model exceeds an RFC of 1.0, the modelling becomes less accurate although the results provide an indication of the impact of the development traffic. In the AM peak hour on Butt Lane (left turn) the queue extends to 156 vehicles. Across the PM peak hour, Morton Way (left turn) has an increase in the maximum queue to 53 vehicles.

8.2.15 The operation of the junction suggests that vehicles on the side arms, during the AM peak, will not be able to get through the junction in the future year test case scenario

8.2.16 This analysis shows that as the junction is predicted to be at capacity in 2028 with the introduction of the West of Park Farm development traffic. We have therefore identified a mitigation scheme to address the impacts of the proposed development in this location. This is set out within **Section 9.2** of this report.

Junction 2 – A38 / Gloucester Road Priority Junction

8.2.17 The results of the operation of the A38 / Gloucester Road Priority junction model in the 2017 Base scenario are detailed in **Table 8.6**.

Table 8.6: A38 / Gloucester Road junction - 2017 Base

Junction 2 – A38 / Gloucester Road Junction						
2017 Base	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	Max RFC	MMQ	Delay (Secs)	Max RFC	MMQ	Delay (Secs)
Gloucester Road (left)	0.33	0.5	7.02	0.30	0.4	6.59
Gloucester Road (right)	0.01	0.0	9.07	0.01	0.0	8.81
A38 (east)	0.32	0.5	6.89	0.31	0.4	6.49

RFC = Ratio of Flow to Capacity, MMQ = Maximum Mean Queue

8.2.18 **Table 8.6** shows that, in the 2017 Base scenario the A38 / Gloucester Road junction is operating within capacity in the AM and PM peaks. There is a maximum RFC of 0.33 and queue of 0.5 vehicles on Gloucester Road (left turn) in the AM peak. Across the PM peak hour, A38 (east) has the highest RFC at 0.31 and a queue of 0.4 vehicles.

8.2.19 The 2028 Reference Case and 2028 Test Case flows have been run through the model and the results are detailed in **Tables 8.7 and 8.8** below.

Table 8.7: A38 / Gloucester Road junction - 2028 Reference Case

Junction 2 – A38 / Gloucester Road Junction						
2028 Reference Case	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	Max RFC	MMQ	Delay (Secs)	Max RFC	MMQ	Delay (Secs)
Gloucester Road (left)	0.49	0.9	9.26	0.39	0.6	7.58
Gloucester Road (right)	0.01	0.0	10.91	0.01	0.0	10.21
A38 (east)	0.40	0.7	7.80	0.43	0.7	7.84

RFC = Ratio of Flow to Capacity, MMQ = Maximum Mean Queue

8.2.20 **Table 8.7** shows that, in the 2028 Reference Case, the A38 / Gloucester Road junction is operating within capacity in the AM and PM peaks. There is a maximum RFC of 0.49 and queue of 0.9 vehicle on Gloucester Road (left turn) in the AM peak. Across the PM peak hour, A38 (east) has the highest RFC at 0.43 and a queue of 0.7 vehicles.

Table 8.8: A38 / Gloucester Road junction - 2028 Test Case

Junction 2 – A38 / Gloucester Road Junction						
2028 Test Case	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	Max RFC	MMQ	Delay (Secs)	Max RFC	MMQ	Delay (Secs)
Gloucester Road (left)	0.58	1.3	11.04	0.40	0.7	7.74
Gloucester Road (right)	0.01	0	12.17	0.01	0.0	10.77
A38 (east)	0.41	0.7	8.00	0.48	0.9	8.72

RFC = Ratio of Flow to Capacity, MMQ = Maximum Mean Queue

8.2.21 **Table 8.8** shows that, in the 2028 Test Case, the A38 / Gloucester Road junction is operating within capacity in the AM and PM peaks. There is a maximum RFC of 0.58 and queue of 1.3 vehicles on Gloucester Road (left turn) in the AM peak. Across the PM peak hour, A38 (east) has the highest RFC at 0.48 and a queue of 0.9 vehicle.

Junction 3 – Grovesend Road / Morton Way / Midland Way Roundabout

8.2.22 The results of the operation of the Grovesend Road / Morton Way / Midland Way Roundabout model in the 2017 Base scenario are detailed in **Table 8.9**.

Table 8.9: Grovesend Road / Morton Way / Midland Way Roundabout - 2017 Base

Junction 3 - Grovesend Road / Morton Way / Midland Way Roundabout						
2017 Base	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	Max RFC	MMQ	Delay (Secs)	Max RFC	MMQ	Delay (Secs)
Morton Way	0.19	0.2	3.02	0.12	0.1	2.76
Grovesend Road (east)	0.30	0.4	3.65	0.37	0.6	3.89
Midland Way	0.10	0.1	2.93	0.2	0.3	3.39
Grovesend Road (west)	0.22	0.3	3.37	0.21	0.3	3.72

RFC = Ratio of Flow to Capacity, MMQ = Maximum Mean Queue

8.2.23 **Table 8.9** shows that, in the 2017 Base scenario, the Grovesend Road / Morton Way / Midland Way Roundabout is operating within capacity in the AM and PM peaks. There is a maximum RFC of 0.37 and queue of 0.6 vehicles on Grovesend Road (east) in the PM peak. Across the AM peak hour, Grovesend Road (east) has the highest RFC at 0.30 and a queue of 0.4 vehicles.

8.2.24 The 2028 Reference Case and 2028 Test Case flows have been run through the model and the results are detailed in **Tables 8.10 and 8.11** below.

Table 8.10 Grovesend Road / Morton Way / Midland Way Roundabout - 2028 Reference Case

Junction 3 - Grovesend Road / Morton Way / Midland Way Roundabout						
2028 Reference Case	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	Max RFC	MMQ	Delay (Secs)	Max RFC	MMQ	Delay (Secs)
Morton Way	0.61	1.5	6.23	0.32	0.5	3.64
Grovesend Road (east)	0.46	0.8	5.10	0.63	1.6	6.75
Midland Way	0.16	0.2	3.34	0.38	0.6	5.24
Grovesend Road (west)	0.27	0.4	3.94	0.31	0.4	5.47

RFC = Ratio of Flow to Capacity, MMQ = Maximum Mean Queue

8.2.25 **Table 8.10** shows that, in the 2028 Reference Case, the Grovesend Road / Morton Way / Midland Way Roundabout is operating within capacity in the AM and PM peaks. There is a maximum RFC of 0.63 and queue of 1.6 vehicles on Grovesend Road (east) in the PM peak. Across the AM peak hour, Morton Way has the highest RFC at 0.61 and a queue of 1.5 vehicles.

Table 8.11: Grovesend Road / Morton Way / Midland Way Roundabout - 2028 Test Case

Junction 3 - Grovesend Road / Morton Way / Midland Way Roundabout						
2028 Test Case	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	Max RFC	MMQ	Delay (Secs)	Max RFC	MMQ	Delay (Secs)
Morton Way	0.67	2.0	7.52	0.33	0.5	3.70
Grovesend Road (east)	0.47	0.9	5.26	0.67	2.0	7.56
Midland Way	0.16	0.2	3.38	0.41	0.8	5.67
Grovesend Road (west)	0.27	0.4	3.98	0.32	0.5	5.85

RFC = Ratio of Flow to Capacity, MMQ = Maximum Mean Queue

8.2.26 **Table 8.11** shows that, in the 2028 Test Case, the Grovesend Road / Morton Way / Midland Way Roundabout is operating within capacity in the AM and PM peaks. There is a maximum RFC of 0.67 and queue of 2.0 on Grovesend Road (east) in the PM peak. Across the AM peak hour, Morton Way has the highest RFC of 0.67 and queue of 2.0 vehicles.

Junction 4 – A38 / Grovesend Road / Tytherington Road Signalised Staggered Junction

8.2.27 As requested by SGC, the base, reference case and test case scenarios for the junction have been assessed utilising the 2015 baseline surveys recorded for the Cleve Park development. The 2015 baseline flows are shown in **Figures 8.1** and **8.2,** with the 2028 Reference Case in Figures 8.3 and 8.4, and the Test Case scenario in **Figures 8.5** and **8.6.**

8.2.28 The results of the sensitivity test are detailed in **Table 8.12**.

Table 8.12: A38 / Grovesend Road / Tytherington Road junction - 2015 Base

Junction 4 - A38 / Grovesend Road / Tytherington Road Junction						
2015 Base	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	DoS	MMQ	Delay (Secs)	DoS	MMQ	Delay (Secs)
A38 North	44.9%	8.7	34.8	39.9%	5.1	38.3
Tytherington Road	40.1%	18.6	30.4	43.2%	3.1	44.5
A38 South	53.6%	6.1	51.3	43.8%	5.9	28.5
Grovesend Road	53.8%	6.8	23.8	44.3%	6.8	28.0

DoS = Degree of Saturation, MMQ = Maximum Mean Queue

8.2.29 **Table 8.12** shows that, in the 2015 Base scenario, the A38 / Grovesend Road / Tytherington Road junction is operating within capacity in the AM and PM peaks. There is a maximum DoS of 53.8% on Grovesend Road and queue of 18.6 PCUs on Tytherington Road in the AM peak. Across the PM peak hour, Grovesend Road has the maximum DoS of 44.3% and queue of 6.8 PCUs.

8.2.30 The Base LinSig model has been updated for the future year assessment to reflect a committed scheme as part of the Cleve Park development (ref PT16/3565/O). The mitigation scheme proposed as part of this committed development is included in **Appendix D**.

8.2.31 The 2028 Reference Case and 2028 Test Case flows have been run through the updated model and the results are detailed in **Tables 8.13 and 8.14** below.

Table 8.13: A38 / Grovesend Road / Tytherington Road junction - 2028 Reference Case

Junction 4 - A38 / Grovesend Road / Tytherington Road Junction						
2028 Reference Case	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	DoS	MMQ	Delay (Secs)	DoS	MMQ	Delay (Secs)
A38 North	45.9%	6.1	35.7	41.7%	5.3	40.1
Tytherington Road	52.4%	8.9	40.6	48.0%	6.9	45.6
A38 South	79.1%	8.7	64.4	73.7%	13.4	33.5
Grovesend Road	81.7%	18.9	29.1	73.7%	9.5	36.2

DoS = Degree of Saturation, MMQ = Maximum Mean Queue

8.2.32 **Table 8.13** shows that, in the 2028 Reference Case, the A38 / Grovesend Road / Tytherington Road junction is predicted to operate within capacity. There is a maximum DoS of 81.7% and queue of 18.9 PCUs on Grovesend Road in the AM peak. Across the PM peak hour, Grovesend Road also has the maximum DoS of 73.7%. A queue of 13.4 PCUs is forecast on the A38 South.

Table 8.14: A38 / Grovesend Road / Tytherington Road junction - 2028 Test Case

Junction 4 - A38 / Grovesend Road / Tytherington Road Junction						
2028 Test Case	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	DoS	MMQ	Delay (Secs)	DoS	MMQ	Delay (Secs)
A38 North	40.4%	5.5	30.6	46.1%	5.5	44.3
Tytherington Road	42.4%	7.9	29.8	50.1%	7.2	46.1
A38 South	88.6%	10.9	102.5	79.3%	16.4	35.0
Grovesend Road	89.6%	25.9	61.1	78.9%	10.5	40.0

DoS = Degree of Saturation, MMQ = Maximum Mean Queue

8.2.33 **Table 8.14** shows that, in the 2028 Test Case, the A38 / Grovesend Road / Tytherington Road junction is predicted to operate within capacity. Across the AM peak hour, Grovesend Road has a maximum DoS of 89.6% and queue of 26 vehicles. Each approach is on a straight road with good forward visibility to allow drivers to see any queues at the junction. Other than private accesses, the only junction within the vicinity of the signals is Itchington Road, which is a lightly trafficked rural road connecting to the village of Itchington to the south east. As such, the queues predicted at this junction in the 2028 Test Case scenario do not extend back beyond existing junctions, we therefore consider these queues to have a negligible impact on highway safety.

8.2.34 The results of the updated junction modelling, with the 2015 base flows and incorporation of the committed mitigation scheme agreed as part of the Cleve Park development, demonstrate that the junction is forecast to operate within capacity. Further mitigation at this location is therefore not considered necessary. This is agreed with SGC highway officers.

Junction 5a – Gloucester Road / Quaker Lane / The Plain Mini-Roundabout

8.2.35 The results of the operation of the Gloucester Road / Quaker Lane / The Plain Mini-roundabout in the 2018 Base scenario are detailed in **Table 8.15**.

Table 8.15: Gloucester Road / Quaker Lane / The Plain Mini-roundabout - 2018 Base

Junction 5a - Gloucester Road / Quaker Lane / The Plain Mini-roundabout						
2018 Base	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	Max RFC	MMQ	Delay (Secs)	Max RFC	MMQ	Delay (Secs)
Gloucester Road	0.62	1.6	11.08	0.48	0.9	7.96
Quaker Road	0.32	0.5	6.66	0.43	0.8	7.33
The Plain	0.32	0.5	6.08	0.49	0.9	8.61

RFC = Ratio of Flow to Capacity, MMQ = Maximum Mean Queue

8.2.36 **Table 8.15** shows that, in the 2018 Base scenario, the Gloucester Road / Quaker Lane / The Plain Mini-roundabout is operating within capacity in the AM and PM peaks. There is a maximum RFC of 0.62 and queue of 1.6 vehicles on Gloucester Road in the AM peak. Across the PM peak hour, The Plain has the maximum RFC of 0.49 and queue of 0.9 vehicles.

8.2.37 The 2028 Reference Case and 2028 Test Case flows have been run through the model and the results are detailed in **Tables 8.16 and 8.17** below.

Table 8.16: Gloucester Road / Quaker Lane / The Plain Mini-roundabout - 2028 Reference Case

Junction 5a - Gloucester Road / Quaker Lane / The Plain Mini-roundabout						
2028 Reference Case	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	Max RFC	MMQ	Delay (Secs)	Max RFC	MMQ	Delay (Secs)
Gloucester Road	0.72	2.5	15.16	0.53	1.1	8.91
Quaker Road	0.36	0.6	7.54	0.48	0.9	8.10
The Plain	0.36	0.6	6.54	0.57	1.3	10.30

RFC = Ratio of Flow to Capacity, MMQ = Maximum Mean Queue

8.2.38 **Table 8.16** shows that, in the 2028 Reference Case, the Gloucester Road / Quaker Lane / The Plain Mini-roundabout is operating within capacity in the AM and PM peaks. There is a maximum RFC of 0.72 and queue of 2.5 vehicles on Gloucester Road in the AM peak. Across the PM peak hour, The Plain has the maximum RFC of 0.57 and queue of 1.3 vehicles.

Table 8.17: Gloucester Road / Quaker Lane / The Plain Mini-roundabout - 2028 Test Case

Junction 5a - Gloucester Road / Quaker Lane / The Plain Mini-roundabout						
2028 Test Case	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	Max RFC	MMQ	Delay (Secs)	Max RFC	MMQ	Delay (Secs)
Gloucester Road	0.82	3.9	21.72	0.56	1.2	9.48
Quaker Road	0.38	0.6	8.03	0.56	1.2	9.62
The Plain	0.37	0.6	6.66	0.66	1.9	13.77

RFC = Ratio of Flow to Capacity, MMQ = Maximum Mean Queue

8.2.39 **Table 8.17** shows that, in the 2028 Test Case, the Gloucester Road / Quaker Lane / The Plain Mini-roundabout continues to operate within capacity in the AM and PM peaks. There is a maximum RFC of 0.82 and queue of 3.9 vehicles on Gloucester Road in the AM peak. Across the PM peak hour, The Plain has the maximum RFC of 0.66 and queue of 1.9 vehicles.

Junction 5b – The Plain / Castle Street / High Street Priority Junction

8.2.40 The results of the operation of The Plain / Castle Street / High Street Priority junction in the 2018 Base scenario are detailed in **Table 8.18**.

Table 8.18: The Plain / Castle Street / High Street junction - 2018 Base

Junction 5b - The Plain / Castle Street / High Street Junction						
2018 Base	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	Max RFC	MMQ	Delay (Secs)	Max RFC	MMQ	Delay (Secs)
Castle Street (left)	0.14	0.2	6.57	0.12	0.1	6.71
Castle Street (right)	0.28	0.4	10.92	0.28	0.4	10.91
The Plain	0.24	0.5	6.29	0.19	0.3	6.2

RFC = Ratio of Flow to Capacity, MMQ = Maximum Mean Queue

8.2.41 **Table 8.18** shows that, in the 2018 Base scenario, The Plain / Castle Street / High Street junction is operating within capacity in the AM and PM peaks. There is a maximum RFC of 0.28 and queue of 0.4 vehicles on Castle Street (right turn) in both AM and PM peaks.

8.2.42 The 2028 Reference Case and 2028 Test Case flows have been run through the model and the results are detailed in **Tables 8.19 and 8.20** below.

Table 8.19: The Plain / Castle Street / High Street junction - 2028 Reference Case

Junction 5b - The Plain / Castle Street / High Street Junction						
2028 Reference Case	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	Max RFC	MMQ	Delay (Secs)	Max RFC	MMQ	Delay (Secs)
Castle Street (left)	0.17	0.2	7.67	0.14	0.2	7.43
Castle Street (right)	0.46	0.8	15.05	0.37	0.6	13.32
The Plain	0.28	0.6	6.35	0.21	0.4	6.38

RFC = Ratio of Flow to Capacity, MMQ = Maximum Mean Queue

8.2.43 **Table 8.19** shows that, in the 2028 Reference Case, The Plain / Castle Street / High Street junction is operating within capacity in the AM and PM peaks. There is a maximum RFC of 0.46 and queue of 0.8 vehicles on Castle Street (right turn) in the AM peak. Across the PM peak hour, Castle Street (right turn) also has the maximum RFC of 0.37 and queue of 0.6 vehicles.

Table 8.20: The Plain / Castle Street / High Street junction - 2028 Test Case

Junction 5b - The Plain / Castle Street / High Street Junction						
2028 Test Case	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	Max RFC	MMQ	Delay (Secs)	Max RFC	MMQ	Delay (Secs)
Castle Street (left)	0.17	0.2	7.75	0.14	0.2	7.67
Castle Street (right)	0.47	0.8	15.58	0.39	0.6	14.11
The Plain	0.28	0.7	6.23	0.22	0.4	6.45

RFC = Ratio of Flow to Capacity, MMQ = Maximum Mean Queue

8.2.44 **Table 8.20** shows that, in the 2018 Test Case, The Plain / Castle Street / High Street junction is operating within capacity in the AM and PM peaks. In the AM peak the junction has a maximum RFC of 0.47 and queue of 0.8 vehicle on Castle Street (right turn). Across the PM peak hour, Castle Street also has the maximum RFC of 0.39 and queue of 0.6 vehicles. These results demonstrate that the proposed development has a minimal impact on this junction.

Junction 6 – A38 / B4509 Signalised Junction

8.2.45 The outputs of the A38 / B4509 signalised junction in the 2017 Base scenario are detailed in **Table 8.21**.

Table 8.21: A38 / B4509 signalised junction - 2017 Base

Junction 6 - A38 / B4509 Junction						
2017 Base	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	DoS	MMQ	Delay (Secs)	DoS	MMQ	Delay (Secs)
A38 North	68.8%	6.3	18.1	76.2%	5.9	22.4
B4509	68.2%	5.6	19.0	77.9%	9.7	20.0
A38 South	68.6%	6.8	22.7	70.5%	3.9	19.5

DoS = Degree of Saturation, MMQ = Maximum Mean Queue

8.2.46 **Table 8.21** shows that, in the 2017 Base scenario, the A38 / B4509 junction is operating within capacity in the AM and PM peaks. There is a maximum DoS of 77.9% and queue of 9.7 vehicles on B4509 in the PM peak. Across the AM peak hour, the A38 North has a maximum DoS of 68.8%, with A38 South demonstrating the maximum queue of 6.8 vehicles.

8.2.47 The 2017 Base LinSig model has been updated for the future year assessment to reflect a committed scheme as part of the Heneage Farm, Moorslade Lane, Falfield development (Reference Number: PT17/4800/O). The mitigation scheme proposed as part of this committed development increases the flare length of the left turning movement on the northern A38 arm, which improves the stacking capacity. The drawing demonstrating the improvement scheme, upon which the modelling has been is located in **Appendix D**.

8.2.48 The 2028 Reference Case and 2028 Test Case flows have been run through the updated model and the results are detailed in **Tables 8.22 and 8.23** below.

Table 8.22: A38 / B4509 signalised junction - 2028 Reference Case

Junction 6 - A38 / B4509 Junction						
2028 Reference Case	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	DoS	MMQ	Delay (Secs)	DoS	MMQ	Delay (Secs)
A38 North	75.4%	7.0	19.1	79.7%	6.9	23.7
B4509	76.9%	6.5	21.9	85.4%	11.4	24.2
A38 South	80.1%	9.3	25.7	82.3%	4.8	20.0

DoS = Degree of Saturation, MMQ = Maximum Mean Queue

8.2.49 **Table 8.22** shows that, in the 2028 Reference Case, the A38 / B4509 junction is operating within capacity in the AM and PM peaks. There is a maximum DoS of 85.4% and queue of 11.4 vehicles on the B4509 in the PM peak. Across the AM peak hour, the B4509 has a maximum DoS of 80.1%, with A38 South demonstrating the maximum queue of 9.3 vehicles.

Table 8.23: A38 / B4509 signalised junction - 2028 Test Case

Junction 6 - A38 / B4509 Junction						
2028 Test Case	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	DoS	MMQ	Delay (Secs)	DoS	MMQ	Delay (Secs)
A38 North	76.2%	7.2	19.9	82.8%	7.5	25.9
B4509	83.3%	7.4	26.3	85.4%	11.4	23.7
A38 South	82.3%	10.3	25.9	84.4%	5.0	20.4

DoS = Degree of Saturation, MMQ = Maximum Mean Queue

8.2.50 **Table 8.23** the AM and PM peaks. There is a maximum DoS of 85.4% and queue of 11.4 vehicles on the B4509 in the PM peak. Across the AM peak hour, the B4509 has a maximum DoS of 83.3% and the A38 South has a maximum queue of 10.3 vehicles. This demonstrates that the proposed development is not predicted to increase the maximum DoS or queue length across the peak hours at this junction compared to the 2028 Reference Case.

Junction 8 – A38 / Church Road Signalised Junction

8.2.51 The outputs of the A38 / Church Road signalised junction including the committed mitigation scheme agreed as part of the Cleve Park development in the 2028 Reference and Test scenarios are detailed in **Table 8.24** and **8.25**.

Table 8.24: A38 / Church Road signalised junction - 2028 Reference Case

Junction 8 - A38 / Church Road Junction						
2028 Test	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	DoS	MMQ	Delay (Secs)	DoS	MMQ	Delay (Secs)
A38 North	118.7%	202.4	342.1	110.1%	101.3	223.9
Church Road	113.4%	51.2	293.0	110.8%	52.2	254.5
A38 South	119.5%	148.7	341.1	109.5%	97.2	203.1

DoS = Degree of Saturation, MMQ = Maximum Mean Queue

8.2.52 **Table 8.24** shows that, in the 2028 Reference Case, The A38 / Church Road junction is operating over capacity in both peak periods. There is a maximum DoS of 119.5% on the A38S and queue of 202.4 PCUs on A38N in the AM peak. Across the PM peak hour, the A38N also has the maximum DoS of 110.1% and queue of 101.3 PCUs.

Table 8.25: A38 / Church Road signalised junction - 2028 Test Case

Junction 8 - A38 / Church Road Junction						
2028 Test	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	DoS	MMQ	Delay (Secs)	DoS	MMQ	Delay (Secs)
A38 North	122.6%	233.7	392.5	111.7%	109.6	247.9
Church Road	123.6%	74.4	430.5	112.7%	59.1	282.0
A38 South	121.6%	159.7	368.7	111.7%	112.7	237.7

DoS = Degree of Saturation, MMQ = Maximum Mean Queue

8.2.53 **Table 8.25** shows that, in the 2028 Test Case, The A38 / Church Street junction will continue to operate over capacity in both peak periods. There is a DoS of 122.6% and queue of 233.7 PCUS on the A38N in the AM peak. This represents an increase in queue of 21 PCUs when compared to the reference case. Across the PM peak hour, the A38S also has the maximum DoS of 111.7% and queue of 112.7 PCUS, representing an increase of 15 PCUs. This is considered to be immaterial.

8.2.54 As with PICADY, LinSig provides a good guide when comparing the relative impact of one set of flow scenarios to another. As the degree of saturation goes above 100% the impact it concludes when a junction is anticipated to operate above capacity is not a true representation of how the junction would operate in reality and the modelling results would not be expected to be borne out to such an extent in reality. However, mitigation has been tested in this location as set out below.

Proposed Mitigation

8.2.55 As set out above, the proposed development will increase queuing and delay at this junction.

8.2.56 Prior to the Appeal being dismissed, SGC requested that the mitigation scheme proposed as part of the Land South of Gloucester Road development was considered in this location. A copy of the mitigation scheme is included at **Appendix D.**

8.2.57 The outputs of the A38 / Church Road signalised junction with this mitigation in place in the 2028 Test scenario are detailed in **Table 8.26**.

Table 8.26 A38 / Church Road signalised junction - 2028 Test Case (with mitigation)

Junction 8 - A38 / Church Road Junction						
2028 Test	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	DoS	MMQ	Delay (Secs)	DoS	MMQ	Delay (Secs)
A38 North	115.2%	195.5	288.6	100.7%	47.1	85.4
Church Road	112.4%	46.6	269.8	97.4%	21.0	84.0
A38 South	109.7%	83.4	199.5	99.1%	37.8	62.8

DoS = Degree of Saturation, MMQ = Maximum Mean Queue

8.2.58 **Table 8.26** shows that, with the mitigation scheme in place, The A38 / Church Road junction is forecast to operate over capacity in the AM peak and at capacity in the PM peak. However, when compared to the 2028 test case without the mitigation scheme in place, this represents a significant improvement to the operation of the junction with DoS, queues and delay better than those forecast in the 2028 reference case test.

8.2.59 The mitigation at the A38 / Church Road junction also provides a betterment when compared to the 2028 reference case, with a reduction in queuing and delay in both the AM and PM peak periods. This mitigation scheme is therefore considered appropriate to mitigate the impact of the trips associated with the development in this location.

8.2.60 The applicant is happy in principle to contribute towards this identified scheme through a financial contribution, subject to agreement of the required contribution level to be secured by S106 in due course.

Additional Junction – A38 / B4061 Thornbury Road Signalised Junction

8.2.61 The previous TA demonstrated that the proposed Park Farm development would have a minimal impact at this junction, with an increase in flows of 3.7% in the AM peak and 3.5% in the PM peak. Since the submission of the TA, SGC has requested that the A38/B4061 junction is assessed due to the future congestion predicted from the Cleve Park and Land South of Gloucester Road proposed developments.

8.2.62 A committed mitigation scheme is proposed at this junction as part of the Cleve Park planning consent. The Cleve Park proposed mitigation scheme has therefore been considered as part of this junction assessment. The proposed mitigation scheme is included in **Appendix D.**

8.2.63 The outputs of the A38 / B4061 signalised junction, including the committed mitigation scheme agreed as part of the Cleve Park development, in the 2028 Reference and Test scenarios are detailed in **Table 8.27 and 8.28**.

Table 8.27: A38 / B4061 signalised junction - 2028 Reference Case

Junction 9 - A38 / B4061 Junction						
2028 Test	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	DoS	MMQ	Delay (Secs)	DoS	MMQ	Delay (Secs)
A38 North	94.8%	15.3	23.3	59.9%	6.6	19.1
B4061	95.8%	23.1	86.6	87.8%	16.1	51.4
A38 South	88.3%	28.7	27.7	87.3%	21.0	24.8

DoS = Degree of Saturation, MMQ = Maximum Mean Queue

8.2.64 **Table 8.27** shows that, in the 2028 Reference Case, with the Cleve Park mitigation scheme in place, the A38 / B4061 junction is operating within capacity in both peak periods. There is a maximum DoS of 95.8% on the B4061 and queue of 23 PCUs in the AM peak. Across the PM peak hour, the A38S has a maximum DoS of 87.3% and a queue of 21 PCUs.

Table 8.28: A38 / B4061 signalised junction - 2028 Test Case

Junction 9 - A38 / B4061 Junction						
2028 Test	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	DoS	MMQ	Delay (Secs)	DoS	MMQ	Delay (Secs)
A38 North	97.1%	19.2	24.9	81.8%	8.0	22.4
B4061	98.2%	27.0	105.9	91.1%	20.2	66.2
A38 South	87.4%	30.3	27.0	90.8%	30.7	30.5

DoS = Degree of Saturation, MMQ = Maximum Mean Queue

8.2.65 **Table 8.28** shows that, in the 2028 Test Case, the A38 / B4061 junction will continue to operate within capacity in both peak periods. Increases in queuing and delay at the junction with the addition of development traffic are marginal.

Proposed Mitigation

8.2.66 The applicant is happy in principle to contribute towards a wider mitigation scheme through a financial contribution, subject to agreement of the required contribution level to be secured by S106 in due course.

M5 Junction 14

8.2.67 The impact of the development on the M5 Junctions 14 was discussed at scoping with Highways England. The potential development trips generated by the development was provided, and Highways England agreed that further assessment of Junction 14 would be required. The scoping response from Highways England is attached in **Appendix B**.

8.2.68 The M5 Junction 14 has been assessed with VISSIM V8.00- with MOVA 7, with the results of the existing layout in 2021 base scenario detailed in **Table 8.29**. Additional detail on the VISSIM modelling and the latest position can be found within **Appendix L** within the report titled "Highways England Post-Application Technical Response" dated June 2019. The VISSIM model was produced by Highways England and provided by their consultants Jacobs, and also includes the A38/B4509 signalised junction.

8.2.69 A total of 20 model runs were undertaken starting at a random seed of 42 with an increment of 1 after each run. The seed used represents the point in time a vehicle enters the network, increasing the seed by 1 each run means that vehicles will not enter the network at the same time therefore ensuring each model run is random.

8.2.70 The key performance measures used to assess the impact of the development on the junctions were the recording of latent demand, queues a specific locations and journey times for routes already defined as part of the base model development.

Results

Network Performance- Latent Demand

8.2.71 Latent Demand is the term used to explain the vehicles that are required to enter the network at the end of the modelled period, but as a result of congestion and delay they aren't able to complete their journeys. **Table 8.29** summarises the Latent Demand for each modelled peak hour within each scenario.

Table 8.29: Network Performance Latent Demand (Vehicles)

Attribute	2021 AM Ref	2021 AM Test Case	2028 AM Ref	2028 AM Test Case	2021 PM Ref	2021 PM Test Case	2028 PM Ref	2028 PM Test Case
Latent Demand (Max at end of period)	818	888	1292	1422	270	277	597	671

8.2.72 The Latent Demand is dependent on the operation of the signals or priority rule interactions downstream of the junction and with the additional random seed being included within each run, a slight variation between each model run could result in the small overall variations between each scenario.

Queue

8.2.73 Queue counters have been positioned within the network at give way lines or at signal stop lines; in VISSIM queues are counted from this point upstream until the end of the queue or link whichever is greater. The locations of these have not been amended since the base model was developed by Jacobs. **Tables 8.30** and **8.31** below summarises the queues in the modelled network for each scenario and for the AM and PM peaks respectively.

Table 8.30: AM Peak Maximum Queue Length (metres)

LOCATION	2021 AM Ref	2021 AM Test Case	2028 AM Ref	2028 AM Test Case
A38 SB to B4509 EB	1072	1072	1073	1073
A38 SB Ahead	27	26	25	23
B4509 WB Junction with A38	98	94	96	107
A38 NB Ahead	69	92	107	199
A38 NB to B4509 EB	97	133	128	229
M5 SB Off-Slip to B4509 EB	20	22	24	24
M5 SB Off-Slip to B4509 WB	20	22	24	24
B4509 WB M5 Junction - M5 SB	16	28	36	26
B4509 EB Ahead at M5 SB Off-Slip	0	0	0	0
B4509 EB to M5 SB	136	136	137	136
B4509 WB Ahead at M5 NB Off-Slip	77	81	78	80
B4509 WB to M5 NB	67	73	70	73
M5 NB Off-Slip	1155	1206	1410	1409
B4509 EB M5 Junction - M5 NB	394	396	396	398

8.2.74 Comparing the 2021 Reference and Test Case scenarios during the AM peak, the model indicates that the largest, increase in maximum queue length, is on the M5 NB off-slip with an increase of 51 metres (approximately 9 vehicles).

8.2.75 The existing off slip has an approximate length of 360m. In the 2021 Reference Case it is forecast there will be a queue of approximately 1.16 km. In the Reference Case it is therefore already predicted that queuing will extend beyond the slip road onto the M5 mainline carriageway by approximately 800m. With the additional traffic generated as a result of the development, the queue length is expected to increase by 51m to a maximum of 1.21 km, the equivalent of approximately 9 vehicles. In the 2028 Reference and Test cases, there will be no increase in queue lengths on the southbound off-slip, and a decrease of 1m on the northbound off-slip. The proposed development will therefore have a negligible impact on the operation of the M5 in the AM peak in 2028.

Table 8.31: PM Peak Maximum Queue Length (metres)

LOCATION	2021 AM Ref	2021 AM Test Case	2028 AM Ref	2028 AM Test Case
A38 SB to B4509 EB	1048	1065	1071	1071
A38 SB Ahead	663	846	911	910
B4509 WB Junction with A38	128	136	141	153
A38 NB Ahead	36	40	56	79
A38 NB to B4509 EB	46	61	73	96
M5 Off-Slip to B4509 EB	84	84	93	94
M5 Off-Slip to B4509 WB	83	83	92	94
B4509 WB M5 Junction - M5 SB	957	991	1073	1073
B4509 EB Ahead at M5 SB Off-Slip	92	91	108	111
B4509 EB to M5 SB	100	98	108	108
B4509 WB Ahead at M5 NB Off-Slip	128	131	137	139
B4509 WB to M5 NB	113	115	122	123
M5 NB Off-Slip	124	133	144	152
B4509 EB M5 Junction - M5 NB	390	389	389	390

8.2.76 During the 2021 PM peak, impacts on the SRN as a result of development traffic are very limited, with an increase of 9m, approximately 2 vehicles, on the northbound off-slip and no increase on the southbound off-slip. Queueing on the northbound off-slip is fully accommodated within the slip road extent and does not extend on to the M5 mainline carriageway, in both the Reference and Test Cases. There is therefore no impact on the safe operation of this junction in 2021 in the PM peak.

8.2.77 During the 2021 PM peak period, the largest increase in maximum queue is on the A38 southbound, which shows an increase of 183 metres between the Test Case and Reference Case scenario, which is approximately 32 vehicles.

8.2.78 As set out within the previous modelling note (5519-001 Thornbury TA – Forecast VISSIM Modelling), this level of queuing increase is disproportionate to the modest level of impact which would be expected from this development. We have therefore considered the nature of the model in general and considering the level of saturation identified. We consider that the modelling in this instance therefore likely does not present an accurate reflection of what may occur in the real world, as PTV VISSIM FAQs states:

'In a saturated network, minor changes may lead to big consequences. For instance, due to a slight variation of green time, the number of vehicles passing through may be one vehicle less per cycle. This vehicle might be the critical one which leads to a queue that builds up continuously during the simulation whereas in the other case, the green time was just sufficient to accommodate the entire demand. These effects can also be seen on the field, where normal day-to-day changes may lead to different traffic situations. A minor change (e.g. in lane change) can also lead to different results within the typical statistical boundaries. Generally speaking, a network which is not operating at capacity will react less to changes of the random seed.'

8.2.79 This model also does not consider that people would adjust their travel behaviour in response, by travelling earlier or later, route choice or by using alternative modes of transport. We therefore consider that the higher queueing shown on the A38 southbound in the PM peak is as a result of the saturated network struggling to accurately represent the true impacts of the modest development trips impacting on the model.

8.2.80 The current model uses MOVA during the PM peak only at the M5 J14 junction, with the A38/B4509 junction operating on MOVA for both peaks, this has remained the same for these tests.

Journey Time

8.2.81 The journey time routes of vehicles through the modelled network have not been amended since the assessment of the 2021 and 2028 scenarios. The journey routes are provided within the ch2m LMVR report included in Appendix H. **Tables 8.32** and **8.33** below summarise the travel time results for those used within the LMVR of the base model for the AM and PM peak hours assessed for the scenarios.

Table 8.32: AM Peak Total Travel Time (seconds)

Route	2021 AM Ref	2021 AM Test Case	2028 AM Ref	2028 AM Test Case
Route 1 - M5 s/b off-slip	17	18	18	18
Route 2 - M5 n/b off-slip	189	193	209	205
Route 3 - A38 (N) to M5 (S)	590	639	769	816
Route 4 - A38 (S) to M5 (N)	276	286	338	380
Route 5 - B4509 (E) to M5 (N)	109	111	107	108
Route 6 - M5 (N) to A38 (S)	88	87	86	88
Route 7 - B4509 (E) to A38 (N)	147	149	147	150
Route 8 - M5 (S) to B4509 (E)	430	441	463	459
Route 9 - A38 (N) to A38 (S)	322	358	436	479
Route 10 - A38 (S) to A38 (N)	86	95	102	145

8.2.82 During the AM peak the travel times between the 2021 with and without development show there is no significant impact on average journey times over the 20 runs between the two scenarios.

Table 8.33: PM Peak Total Travel Time (seconds)

Route	2021 PM Ref	2021 PM Test Case	2028 PM Ref	2028 PM Test Case
Route 1 - M5 s/b off-slip	50	51	53	55
Route 2 - M5 n/b off-slip	47	48	49	50
Route 3 - A38 (N) to M5 (S)	439	456	487	509
Route 4 - A38 (S) to M5 (N)	292	323	362	401
Route 5 - B4509 (E) to M5 (N)	445	463	554	560
Route 6 - M5 (N) to A38 (S)	120	119	122	123
Route 7 - B4509 (E) to A38 (N)	488	506	593	596
Route 8 - M5 (S) to B4509 (E)	90	90	91	91
Route 9 - A38 (N) to A38 (S)	221	235	248	264
Route 10 - A38 (S) to A38 (N)	71	75	84	100

8.2.83 In 2021, Route 4 is predicted to see the largest increase in travel times, with an increase of 31 seconds between the 'Reference Case' and 'Test Case'.

Conclusions

8.2.84 The modelling shows that development is predicted to only impact on the SRN in the 2021 AM peak hour, by increasing queues on the mainline, originating from the M5 north-bound off-slip. Queues are predicted to increase by approximately 51 meters, or 9 vehicles, over the Reference Case. However, as the queue length of 1.16 km forecast within the Reference Case extends beyond the slip-road on to the M5 mainline carriageway by approximately 800m, we consider that an increase of 51m, to 851m of mainline queuing, would be indiscernible in any practical sense from the Reference Case conditions.

8.2.85 Notwithstanding this, discussions remain ongoing with HE in order to resolve their concerns.

8.3 Summary

8.3.1 This section of the TA sets out the vehicular traffic impact of the proposed development upon the local highway network. 2028 Reference Case flows have been estimated by adding the 2017/2018 Base flows and traffic associated with five committed development sites. This approach has been agreed with SGC. 2028 Test Case flows have been generated to include the traffic associated with the proposed development.

8.3.2 As agreed with SGC, a full reassessment of development impacts has not been undertaken as the resultant reductions in traffic generation, as a result of the revised development proposals. The assessment set out here is therefore for 630 dwellings and provides an overestimation of development impacts and therefore a robust assessment.

8.3.3 No allowance has been made for reductions in vehicle trips as a result of the Travel Plan that will be implemented at the site.

8.3.4 The operation of the two site access junctions onto Oldbury Lane has been tested for the impact of development traffic. The site accesses have been shown to adequately accommodate development traffic with the junction models operating well within capacity.

8.3.5 The net change in traffic resulting from the development proposals has been established for each of the junctions in the agreed study area which demonstrates that there is a negligible predicted development impact on the following junctions:

7. A38 / Old Gloucester Road Priority Junction

8. A38 / Church Road Signalised Junction.

8.3.6 Junction capacity assessment has been undertaken on the remaining six off-site junctions.

8.3.7 Committed schemes have been tested in the 2028 Reference and 2028 Test Case scenarios at the following two junctions:

4. A38 / Grovesend Road / Tytherington Road Signalised Staggered Junction;

6. A38 / B4509 Signalised Junction.

8.3.8 The following junction is predicted to operate above capacity in the 2028 Test Case:

1. Butt Lane / Morton Way / Gloucester Road Staggered Junction.

8.3.9 The applicant is willing in principle to contribute towards the implementation of a wider mitigation shame at the A38 / Church Road and A38 / B4061 Thornbury Road junctions. A mitigation scheme is proposed at the Butt Lane junction, as set out in detail at **Section 10**.

8.3.10 Finally, discussions remain ongoing with HE regarding the development impacts at M5 J14, in order to resolve their concerns.

9 Sensitivity Test – Updated Masterplan

9.1 Revised Masterplan Proposals

9.1.1 As set out in **Section 6,** the requirement for 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.

9.1.2 As set out in **Section 1**, 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 a robust assessment.

9.1.3 On this basis, the previous sections of the TA assess the impacts of 630 dwellings.

9.1.4 A trip comparison exercise has been undertaken, as set out at Table 6.5, which demonstrates that the current proposals for 595 dwellings and a primary school will result in 45 fewer vehicle trips in the AM peak and 31 fewer in the PM peak.

9.1.5 **Figures 9.1** and **9.2** provide a comparison of the flows for the AM and PM peak hours across the assessed network for the '630 dwelling' and '595 plus primary school' proposals.

9.2 Butt Lane / Morton Way / Gloucester Road Junction Mitigation

9.2.1 The junction assessments set out in Section 8 of this TA identified that the Butt Lane/Morton Way/Gloucester Road staggered crossroad junction is predicted to operate above capacity in the 2028 test case.

9.2.2 As a mitigation scheme is to be agreed for the Butt Lane junction, it is agreed with SGC that the scheme design and modelling should take account of the reduced traffic generation.

9.2.3 At a meeting on 20th November, SGC confirmed that the prioritisation of pedestrians and cyclists is of higher priority than the vehicle queuing and a balanced view on a reviewed signal solution would be taken.

9.2.4 PBA has therefore reviewed the design and modelling of the signalised mitigation to see whether a scheme could be presented which balances the provision for active modes as well as improve the reported operational performance of the junction.

9.2.5 The signalised mitigation option previously proposed for the Butt Lane junction has been reviewed and developed to seek to reduce the degree of saturation (DoS) for the AM and PM peak hour scenario tests.

Proposed Mitigation Scheme

9.2.6 The proposed mitigation scheme is shown at **PBA Drawing 39209/5501/SK08-D**.

9.2.7 This scheme signalises the staggered junction to improve the flow of traffic through it, whilst facilitating pedestrian and cycling movements. Further details of the improvement scheme are set out by arm below. The improvement scheme has been proposed to be accommodated within the highway boundary as shown on **PBA Drawing 39209/5501/SK08-D**. The modelling outputs associated with this mitigation scheme are in **Appendix J and** summarised in **Table 9.3.**

9.2.8 The Gloucester Road North arm has been widened and a second approach lane has been provided for left turning traffic.

9.2.9 The Morton Way arm has been widened and a second approach lane has been provided for right turning traffic.

9.2.10 A pedestrian crossing has been provided on the Gloucester Road south, Gloucester Road north and Butt Lane arms to formalise and better facilitate pedestrian desire lines through the junction, providing a significant safety benefit for pedestrians.

9.2.11 The Gloucester Road south arm has been widened and a second approach lane has been provided for left turning traffic.

9.2.12 For Butt Lane, the consented pedestrian refuge island has been removed to accommodate the signalised crossing. This means that a two-lane approach to the signal junction on Butt Lane can be accommodated for around 120 metres.

9.2.13 The existing informal pedestrian refuge island crossing on Morton Way, around 85 metres to the east of the junction, will be retained as part of the proposals.

9.2.14 Following previous comments received from SGC, the revised scheme includes advanced stop lines on all arms and straight-across crossings.

9.2.15 The assessment of the proposed traffic signal-controlled junction has been undertaken using LINSIG, which is an industry standard traffic modelling software package. For signalised junctions, a Degree of Saturation (DoS - %) value of less than 90% typically demonstrates that a junction arm or turning movement is operating 'within capacity'.

9.2.16 The following colour coding in **Table 9.1** has been applied to the results within the tables below and those shown in the figure for consistency.

Table 9.1: Colour coding for modelling results

	Junction DoS Results	Junction RFC Results
Within capacity	Less than or equal to 90%	Less than or equal to 0.85
At capacity	Between 91%-99%	Between 0.85 – 0.99
Over capacity	Greater than or equal to 100%	Greater than or equal to 1.00

9.2.17 The results of the operation of the LinSig model in the 2028 Test Case are detailed in **Table 9.2** with the existing layout Reference Case for comparison.

Table 9.2: Butt Lane / Morton Way / Gloucester Road Junction Mitigation – 2028 Reference Case

Junction 1 - Butt Lane / Morton Way / Gloucester Road Junction - mitigation						
2028 Reference Case Existing layout	AM Peak (08:00 – 09:00)			PM Peak (17:00 – 18:00)		
	Max RFC	MMQ	Delay (Secs)	Max RFC	MMQ	Delay (Secs)
Butt Lane – Left Turn	0.72	2.6	22.06	0.44	0.8	11.19
Butt Lane – Right Turn	0.65	1.8	34.38	0.50	1.0	24.93
Ghost Island Right Turn into Butt Lane	0.42	0.9	9.29	0.56	1.5	12.71
Morton Way – Left Turn	0.53	1.1	12.28	0.52	1.1	11.18
Morton Way – Right Turn	0.35	0.5	22.46	0.32	0.5	17.69
Ghost Island Right Turn into Morton Way	0.42	0.9	9.29	0.56	1.5	12.71

Table 9.3: Updated 2028 Test Case modelling results 0800-0900 and 1700-1800 peak hours (SK08-D)

Modelled Scenario	Gloucester Rd S			Butt Lane			Gloucester Rd N			Morton Way		
	DoS	Queue (PCU)	Delay (Secs)	DoS	Queue (PCU)	Delay (Secs)	DoS	Queue (PCU)	Delay (Secs)	DoS	Queue (PCU)	Delay (Secs)
Revised Signalised Layout SK08-D – AM Peak Hour (0800 – 0900)												
2028 Test Case (with revised masterplan)	70.1%	8.2	47.7	108.2%	49.8	220.9	109.7%	39.2	255.8	106.7%	32.7	219.3
2028 Test Case (ped stage every other cycle)	63.4%	7.7	42.0	95.6%	30.2	82.7	96.6%	20.3	101.0	95.9%	19.5	102.2
2028 Test Case (no ped stage)	58.3%	7.1	36.8	85.6%	21.4	50.0	86.4%	15.2	61.5	87.0%	14.7	68.5
Revised Signalised Layout SK08-D – PM Peak Hour (1700 – 1800)												
2028 Test Case (with revised masterplan)	109.8%	50.9	241.2	89.2%	12.9	89.4	110.0%	30.8	265.7	90.0%	18.9	67.5
2028 Test Case (ped stage every other cycle)	86.2%	18.9	48.2	87.0%	13.1	84.1	82.4%	12.1	63.8	86.5%	19.4	60.0
2028 Test Case (no ped stage)	77.7%	13.1	37.0	77.5%	10.8	64.5	69.2%	8.9	43.9	77.6%	15.5	46.6

DoS = Degree of Saturation

9.2.18 **Table 9.3** shows that, in the 2028 Test Case, the proposed Butt Lane / Morton Way / Gloucester Road signalised junction is forecast to operate within capacity in both the AM and PM peak when the pedestrian crossings are called every other cycle. The maximum Degree of Saturation in the AM peak is on Gloucester Road north at 96.6% and the maximum queue is on Butt Lane at 30 vehicles. In the PM peak. The maximum DoS is on Butt Lane at 87.0% with a maximum queue of 19 on Morton Way.

9.2.19 The proposed signalised mitigation scheme is considered acceptable to accommodate baseline and development traffic in this location, whilst enhancing the facilities for pedestrians and cyclists through the provision of signalised crossings and advance stop lines.

9.2.20 Notwithstanding this, discussions remain ongoing with SGC in order to resolve their concerns which relate to the detailed consideration of pedestrian provision at the junction.

Emerging Travel Trends

9.2.21 There is a growing evidence base demonstrating a shift in travel behaviour as a result of disruptive technological and societal changes, in particular amongst the younger generations for whom a significant part of future housing development demand applies.

9.2.22 There is widespread evidence demonstrating that there is less reliance on the car from younger generations, aspiration to socialise or work while travelling, high costs of car ownership and change in priorities of spend (car not being a status symbol) all leading to a consensus that future travel behaviour will lead to lower levels of private car use.

Travel Plan and Sustainable Transport Link

9.2.23 It should be noted that no account has been taken of potential reductions in vehicular trips as a result of the successful implementation of a Travel Plan at the site or the delivery of the Sustainable Transport Link (STL) between the Land West of Park Farm and Park Farm sites and Alexandra Way bus link (provided by others).

9.2.24 The Framework Travel Plan identifies a target reduction of 6% car driver trips. However, with the provision of the STL between the site and Park Farm and extension of bus services, there is the potential for a mode shift greater than set out in the FTP, particularly in locations where there is existing delay or congestion, for both development and baseline trips.

9.2.25 The STL and Alexandra Way bus link will not only provide a benefit to residents of the application site, but it will also enhance the accessibility of the whole Butt Lane / Oldbury Lane area by providing greater connectivity to schools and the town centre, and further afield for buses.

9.2.26 It is therefore reasonable to assume that the number of vehicle trips associated with the proposed development and adjacent developments (new and existing) will be lower than has been assessed.

Implications for Land West of Park Farm Transport Strategy and Assessment

9.2.27 This growing evidence base demonstrates that travel behaviour is changing, and that traditional methods of predicting future car travel based on historical trends, and for providing for the ever-increasing required capacity, is outdated and predicts inaccurate forecasts.

9.2.28 Perhaps more importantly, providing for future car demand, based on historical trends, also create negative (often unintended) consequences. A simple rule being that *'planning for people will result in places for people; planning for cars will result in places dominated by cars'* Creating a car dominant public realm, inducing additional traffic, and therefore bot solving congested networks in the medium term, worsening air pollution, and diverting funding and undermining the success of sustainable alternatives does not meet either National or Local Policy.

9.2.29 On this basis, the transport strategy for the proposed development has prioritised sustainable modes – with the networks on which people walk, cycle and use public transport considered, with the provision of the STL, before any highway capacity increases are planned. Together with the Alexandra Way link, this provides a high quality, direct and attractive route to meet the needs of the new and existing communities, who will have a genuine opportunity to embrace more sustainable travel habits.

9.2.30 The junction capacity results for the proposed mitigation scheme are therefore considered to be robust and likely to over-estimate the amount of traffic through the junction – even before considering how disruptive technological and societal changes are shifting people's travel behaviour.

Summary

9.2.31 Following discussions with SGC, the mitigation proposals for the Butt Lane / Morton Way / Gloucester Road junction have been developed to achieve a more balanced solution for the provision of active modes and seek to minimise delay for vehicular traffic.

9.2.32 Following previous comments received from SGC, the proposed scheme includes straight-across crossings on Gloucester Road north, Gloucester Road south and Butt Lane and advanced stop lines on all arms.

9.2.33 The proposed mitigation scheme offers a safety improvement for pedestrians when compared to the existing situation, with the provision of signalised pedestrian crossings.

9.2.34 The LinSig models have also been reviewed to enhance the operational performance for vehicles. The updated results demonstrate that with a pedestrian all red stage running every other cycle (which is considered to provide a robust assessment of the junction operation) the junction is forecast to operate within capacity in the typical AM and PM peak hours.

9.2.35 The proposed signalised mitigation scheme shown on **PBA drawing 39209-5501-SK08-D** and the accompanying LinSig analysis is therefore considered acceptable to accommodate baseline and development traffic, whilst allowing for active modes to negotiate the junction safely. However, discussions are going with SGC to reach agreement on the detailed design of the mitigation scheme.

10 Conclusions

10.1 Introduction

10.1.1 This Transport Assessment (TA) has been prepared by Peter Brett Associates LLP on behalf of Barwood Development Securities Ltd and presents a comprehensive assessment of the transport issues arising from the proposed development of Land West of Park Farm, Thornbury.

10.1.2 The TA has been prepared in accordance with advice set out within the National Planning Practice Guidance and PBA has consulted with South Gloucestershire Council, the local highway authority and Highways England.

10.2 Development proposals

10.2.1 The development site is located on approximately 36Ha of land to the north west of Thornbury. The site is bound by Oldbury Lane to the north, agricultural fields to the west and south, and a new development currently under construction to the east, known as Park Farm. The proposals would comprise the following:

- Up to 595 residential dwellings;
- Land for a Primary School;
- Land for a Neighbourhood Hub (up to 700sqm of retail and community uses);
- Two vehicle access junctions from Oldbury Lane; and
- A sustainable travel link, south east through Park Farm.

10.3 Transport Proposals

10.3.1 The proposed development will be accompanied by a set of transport measures and mitigation schemes aimed at promoting sustainable travel patterns from the development and addressing any impacts associated with the development.

10.3.2 The sustainable transport strategy for the site is set out within **Section 5** of this TA and includes:

- A Framework Travel Plan (FTP) - an FTP for the site has been developed to discourage single occupancy car use and facilitate the use of alternative modes of transport. The FTP should be read in parallel to this Transport Assessment.
- A Sustainable Travel Link will be provided to facilitate walk, cycle and bus travel to and from the proposed development. The Link comprises a bus only carriageway which is 6.5m in width.
- Two walking and cycling, and public transport strategies have been developed, to demonstrate that the proposed development can be delivered with sustainable travel connections, with and without reliance on the Alexandra Way bus link connection.
- Cycle Parking will be provided in accordance with SGC's cycle parking standards as set out in PSP16 of SGC Local Plan: Policies, Site and Places Plan (November 2017).

- 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.

- In line with SGC's Local Plan Policy PSP11 new bus stops will be provided, within 400m of each part of the development, to meet the Council's adopted Bus Shelter Design and Procurement Process document. It is proposed that the development introduce a section of restricted road with a 40mph speed limit approximately 200m west of the proposed western site access on Oldbury Lane.

- In addition, to the Sustainable Travel Link, two vehicle accesses with be provided on Oldbury Lane, in the form of priority T-junctions.

- It is proposed that the Butt Lane / Morton Way / Gloucester Road staggered junction be signalised to improve operation in future years and provide safety benefits for pedestrians via the provision of formal signalised crossings across Gloucester Road and Butt Lane.

- Vehicular parking will be provided in accordance with the local authority's car parking standards as set out in PSP16 of SGC's Local Plan: Policies, Sites and Places Plan (November 2017).

- A contribution towards cycle parking facilities in the town centre.

- A Community Infrastructure Levy will be collected by SGC, which can be used by the Local Highway Authority to deliver strategic transport improvements.

10.3.3 The sustainable transport strategy for the site demonstrates the developer's commitment to the principles of sustainable development. The proposed localised improvements to transport infrastructure and the provision of a Framework Travel Plan serves to promote sustainable travel behaviour.

10.4 Highway impact mitigation

10.4.1 The traffic impact of the proposed development has been identified and a mitigation scheme has been proposed for the Butt Lane / Morton Way / Gloucester Road Staggered Junction. A reasonable financial contribution towards mitigation at the A38 / Church Road and A38 / B4061 Thornbury Road signalised junctions is also agreed in principle.

10.4.2 Capacity assessment of the remaining junctions has demonstrated that the junctions can accommodate traffic associated with the proposed development. The junction capacity assessments do not allow for revisions to the forecast trips as a result of the revised masterplan proposals for 35 fewer dwellings and the addition of a primary school at the site and is therefore considered to be robust. However, as has been demonstrated in **Section 5 and 9**, the proposed changes will result in fewer peak hour vehicle trips at the site. The proposed mitigation is therefore acceptable.

10.5 Policy Compliance

10.5.1 The TA has demonstrated that the proposed development complies with the following local transport policies:

- Policy PSP11 – safe, useable walking and cycling routes are provided within an appropriate distance to many key services and facilities. An appropriate public transport service is proposed, in the form of an extension of the half hourly, T1 service.

- Policy PSP16 – the proposed cycle and car parking standards are in line with this policy.

- Core Strategy Policy CS8 – In line with this Policy the access and movement strategy of the proposed development demonstrates that users of the new development will be provided with a range of attractive travel options other than private car.

- Core Strategy Policy CS32 – in line with this Policy, the proposed walking, cycling and public transport proposals are focused on maximising opportunities for sustainable travel within Thornbury and particularly to the town centre.

10.6 Benefits to the Existing Community

10.6.1 The inclusion of a Neighbourhood Hub within the proposals will provide additional facilities to residents of neighbouring communities. This will also offer the opportunity for walking, cycling or public transport trips to and from these facilities, trips which may otherwise have been made by car to alternative facilities; thereby having a wider benefit on traffic within the Town.

10.6.2 The inclusion of a sustainable travel link and extension of bus services into the site will increase the catchment of bus services; thereby making the services more viable, to the benefit of all those on the existing routes and any future routes which may serve the site.

10.6.3 The Primary School will bring additional benefits which from a transport perspective would reduce external vehicle trips and walking distances to school from this and neighbouring developments.

10.6.4 A financial contribution will also be provided towards enhanced cycle parking facilities in the town centre.

10.6.5 The payment of a Community Infrastructure Levy will contribute to the positive community benefits which will be secured through that mechanism.

10.7 Overall conclusion

10.7.1 This report demonstrates that the transport impact of the proposed development can be mitigated and accommodated within the local transport networks. The development would not therefore result in an unacceptable impact on highway safety or a residual cumulative severe impact on the surrounding transport networks as set out in Para 109 of NPPF.

10.7.2 Furthermore, the proposed development would include a set of measures that would encourage sustainable travel patterns. This includes the proposed extension of the existing bus service through the site, pedestrian and cycle links, and improved pedestrian and cycle facilities at the Butt Lane / Morton Way/ Gloucester Road junction.

10.7.3 In conclusion, it is considered that there are no valid highway or transportation reasons that should prevent the development proposals from being awarded planning consent.

Figures

Appendix A Illustrative Masterplan

Appendix B Scoping

Appendix C 39209-5540-TN001 Rev.A 'Walking Distances to Key Facilities and quality of Routes'

Appendix D Committed Infrastructure Improvements

Appendix E Personal Injury Collision Data

Appendix F 39209-5534-TN001 Bus Service Business Case

Appendix G 39209-5534-TN002 Bus Service Business Case (Supplementary Note)

Appendix H Stage 1 Road Safety Audit

Appendix I Junction Capacity Test – Existing / Committed Layouts

Appendix J Junction Capacity Test - Mitigation

Appendix K AECOM Drawing 60478433.011 'Site Access and Gloucester Road / Butt Lane / Morton Way Proposals

Appendix L VISSIM Modelling

Drawings