CDB Planning and Architecture

Holmer House Farm, Hereford

Transport Assessment

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Version Control and Approval

Version	Date	Main Contributor	Issued by	Approved by
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Contents

Appendices

1 Introduction

1.1 Overview

1.1.1 PJA has been commissioned by CDB Planning and Architecture to prepare a Transport Assessment to accompany a hybrid planning application for the development of up to 100 dwellings on land known as Holmer House Farm, Hereford.

1.1.2 This report aims to identify the transport characteristics of the development site and surrounding area, and to examine the likely transport implications.

1.2 Scoping

1.2.1 Prior to preparing this report, pre-application advice was sought from Herefordshire Council (HC) and Highways England (HE). At the time of writing no formal response has been received from HC.

1.2.2 As a result of initial discussions with HE the following points were agreed:

- Use of trip rates and distribution approved as part of the adjacent Holmer West application;
- Use of an Automatic Traffic Count (ATC) undertaken for the Holmer West application to derive speeds and associated visibility splays;
- Access via the existing farm access is acceptable, provided that there is no intensification of use;
- HE are willing to accept a marginal increase in vehicle movements at the existing access if a scheme can be demonstrated to provide an improvement to safety of the lay-by; and
- Full scale modelling is not required; however, the Starting Gate roundabout should be assessed.

1.2.3 As part of these discussions with HE, the following technical notes, written by PJA, were issued:

- Trip Generation Technical Note - January 2018; and
- Lay-by Survey Note – April 2018.

1.2.4 Each of these notes and the subsequent HE responses have been included within **Appendix A.**

1.3 Structure of Report

1.3.1 The remainder of this report is structured as follows:

- Chapter 2: Policy Context;
- Chapter 3: Baseline Conditions;
- Chapter 4: Development Proposals;
- Chapter 5: Travel Demand;
- Chapter 6: Junction Capacity Assessments; and

- Chapter 7: Summary and Conclusion.

2 Policy Context

2.1 Revised National Planning Policy Framework (2018)

2.1.1 The Revised National Planning Policy Framework (NPPF) was published in July 2018 and sets out the Government's planning policies for England and how these are expected to be applied to achieve sustainable development.

2.1.2 Policies aimed at promoting sustainable transport are covered within Section 9, Paragraphs 102 to 111 of the NPPF, with Paragraph 102 stating 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."*

2.1.3 Paragraph 103 states:

"The planning system should actively manage patterns of growth in support of these objectives. Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health. However, opportunities to maximise sustainable transport solutions will vary between urban and rural areas, and this should be taken into account in both plan-making and decision-making."

2.1.4 Paragraph 109 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."

2.1.5 Paragraph 111 states:

"All developments that will 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 Planning Practice Guidance (PPG) 2014

2.2.1 PPG 2014 stipulates that the scope and level of detail in a Transport Assessment or Statement will vary from site to site but the following should be considered when setting the scope of the proposed assessment:

- *"Information about the proposed development, site layout, (particularly proposed transport access and layout across all modes of transport)*
- *Information about neighbouring uses, amenity and character, existing functional classification of the nearby road network;*
- *Data about existing public transport provision, including provision/ frequency of services and proposed public transport changes;*
- *A qualitative and quantitative description of the travel characteristics of the proposed development, including movements across all modes of transport that would result from the development and in the vicinity of the site;*
- *An assessment of trips from all directly relevant committed development in the area (i.e. development that there is a reasonable degree of certainty will proceed within the next three years);*
- *Data about current traffic flows on links and at junctions (including by different modes of transport and the volume and type of vehicles) within the study area and identification of critical links and junctions on the highways network;*
- *An analysis of the injury accident records on the public highway in the vicinity of the site access for the most recent three-year period, or five-year period if the proposed site has been identified as within a high accident area;*
- *An assessment of the likely associated environmental impacts of transport related to the development, particularly in relation to proximity to environmentally sensitive areas (such as air quality management areas or noise sensitive areas);*
- *Measures to improve the accessibility of the location (such as provision/ enhancement of nearby footpath and cycle path linkages) where these are necessary to make the development acceptable in planning terms;*
- *A description of parking facilities in the area and the parking strategy of the development;*
- *Ways of encouraging environmental sustainability by reducing the need to travel; and*

- *Measures to mitigate the residual impacts of development (such as improvements to the public transport network, introducing walking and cycling facilities, physical improvements to existing roads."*

2.2.2 The PPG continues:

"In general, assessments should be based on normal traffic flow and usage conditions (e.g. non-school holiday periods, typical weather conditions) but it may be necessary to consider the implications for any regular peak traffic and usage periods (such as rush hours). Projections should use local traffic forecasts such as TEMPRO drawing where necessary on National Road Traffic Forecasts for traffic data."

2.3 Herefordshire Local Transport Plan (LTP 2016-2031)

2.3.1 The Herefordshire LTP provides the transport strategy for the Herefordshire area for the period 2016-2031. The document outlines the significant role that transport will play to enable the delivery of the Herefordshire Core Strategy. the growth strategy and details how Herefordshire's transport ambitions will be achieved.

2.3.2 The Herefordshire strategy outlines a clear focus on partnership working, and builds upon opportunities to which seek to address the following key challenges:

- *"Regular congestion and lack of resilience as a result of single river crossing…;*
- *The system which controls traffic signals is aging and is prone to instability…;*
- *Strategic long-distance traffic routed through the city centre….;*
- *Good rail service provision within the city at the rail station but poor access to the station…;*
- *HEZ will provide a major catalyst of additional economic activity…; and*
- *High levels of cycling already recorded within the city but ongoing problems providing continuous and attractive cycling routes."*

2.4 Herefordshire Local Plan Core Strategy 2011-2031

2.4.1 The Herefordshire Local Plan Core Strategy acts as a guide to development and change within the county between 2011 and 2031. The Core Strategy outlines the following key issues to be addressed within the plan period:

- *"deliver more, better quality homes (especially affordable homes) to meet growing needs in this 'high house price' compared to 'average income' area;*
- *Deliver improved infrastructure to support economic development and a growing population;*

- *Promote a thriving local economy with successful city, town and village centres and provide sufficient employment land to meet business needs and provide higher incomes through a wider range of better quality jobs.*
- *Protect, conserve and enhance valued natural, historic and built environments, including areas of outstanding natural beauty, special area*
- *s of conservation, open spaces as well as the county's intrinsic attractive character;*
- *Address issues arising from an ageing population and the reducing younger age population;*
- *Meet the challenge of climate change and adapt to its impacts such as increased risk of flooding and air pollution;*
- *Create places that actively promote and enable healthy lifestyles; and.*
- *Achieve sustainable development and reduce reliance on the private car whilst accepting the sparsely populated nature of the area and difficulty communities have in accessing services."*

2.5 Policy Summary

2.5.1 In summary, the development site meets national and local policy objectives, with regard to transport as:

- Safe and suitable access can be gained for all users;
- The site is accessible by a range of sustainable travel modes; and
- Overall, the site is sustainably located and has been designed to accommodate both vehicular and non-vehicular travel modes.

3 Baseline Conditions

3.1 Site Location

3.1.1 The site is located on the northern periphery of Hereford, to the west of the A49. The site is bound to the north and west by the Holmer West development, residential properties and Holmer Parish Church via the A49 to the south, and the A49 to the east. The site is an existing farm, with a listed farm house and associated agricultural buildings. Access is currently provided via the A49.

Figure 3-1: Site Location (outlined in red)

3.2 Local Highway Network

A49

3.2.1 The A49 provides a strategic link from the development site to Hereford City Centre to the south, and Leominster to the north. The A49 is a single carriageway road, approximately 8m in width and is subject to a 30mph speed limit, increasing to a national speed limit approximately 25m to the north of the A49 lay-by and associated farm access. As part of the approved Holmer West development, the 30mph speed limit will extended northwards as part of the new signalised Holmer West/A49 access junction.

3.2.2 The existing farm access meets the A49 within a lay-by, which also serves as access to residential properties, Holmer Parish Church and Holmer Care Home.

3.2.3 Further to the south, the A49 meets Roman Road by means of a four-arm roundabout, known as the Starting Gate roundabout. The A49 continues to the south of the Starting Gate Roundabout as Holmer Road.

Holmer West Spine Road

3.2.4 When completed the Holmer West Spine Road will form an alternative route for existing traffic routing between the A49 and Roman Road. The street will comprise a 6.2m carriageway with a 2m footway to the north, and a 3m shared footway/cycleway to the south of the carriageway. The Holmer West Spine Road will meet the A49 (to the east), and Roman Road (to the south) by means of signalised junctions.

3.3 Access by Sustainable Modes

Pedestrian and Cycle Facilities

3.3.1 To the south of the site, there are footways, approximately 2m in width, on the western edge of the A49. This footway continues to the Starting Gate roundabout, whereby it connects into the wider network.

3.3.2 There is a toucan crossing across the A49 in the vicinity of Church Way, connecting onto an approximate 2m wide footway on the eastern edge of the A49.

3.3.3 The Public Right of Way (PROW) Holmer Footpath 3 meets the A49 to the east of the development site, linking from the A49 onto Church Way. From Church Way, Holmer Footpath 4 continues northwards connecting with further footpaths on the PROW network.

3.3.4 When completed the Holmer West Spine Road will have a 2m footway to the north, and a 3m shared footway/cycleway to the south of the carriageway. This will be complemented by a series of signalised pedestrian/cycle crossing points across Roman Road.

3.3.5 NCN route 46 starts in Hereford, approximately 2km to the south of the site. Provides a mixture of on-road and traffic free sections between Hereford and villages within Wales and the Rotherwas Industrial Estate (via NCN 44).

Bus Services

3.3.6 The nearest bus stops are located on the A49, approximately 200m to the south of the site. Further services are located on Roman Road, approximately 350m from the site access. The services available from these stops are summarised in Table 3-1.

Table 3-1: Bus Services Summary

Bus Stop Location	Route No.	Operator	Route	Frequency	Days of Operation
A49	492	Lugg Valley Travel	Hereford - Leominster	1 per hour	Mon - Sat
Roman Road	72/A/B	Yeomans Travel	Hereford - Bobblestock	2 per hour	Mon - Sat
	77/A/B/C	Yeomans Travel	Hereford – Holmer Circular	1 per hour	Mon - Sat
	477	Yeomans Travel	Hereford – Canon Pyon	2 per day	Mon - Sat
	492	Lugg Valley Travel/Yeomans Travel	Hereford – Leominster	1 per hour	Mon - Sun
	498	Lugg Valley Travel	Hereford – Bucknell	2 per day	Wednesday Only
	802	Lugg Valley Travel	Hereford - Leintwardine	1 per peak	School Days Only

Rail Services

3.3.7 Hereford Railway Station is approximately 2.8km to the southeast of the site, within an acceptable cycling distance. Hereford Station is an approximate 350m walk from Hereford Country Bus Station, which is served by the 72 bus.

3.3.8 The railway station has sheltered parking facilities for 50 bicycles, car parking and CCTV coverage. Direct train services are available to other major cities including Birmingham, Manchester and Cardiff.

3.3.9 A summary of train services from Hereford station is given in Table 3-2.

Table 3-2: Train Services Summary

Route	Operator	Peak Hour Frequency
Birmingham	London Midland	1 per hour
Cardiff	Arriva Trains Wales	3 per hour
Manchester	Arriva Trains Wales	1 per hour
Milford Haven	Arriva Trains Wales	2 per hour

3.4 Accessibility

3.4.1 The proximity of local amenities to a site and the ability to reach such facilities by foot and cycle are a key consideration when determining the sustainability of a development. Guidance provided by the Institution of Highways and Transportation (IHT) in their publication 'Guidelines for Providing for Journeys on Foot' (2000) suggests that in terms of commuting, walking to school and recreational journeys; walk distances of up to 2km can be considered as a preferred maximum with 'desirable' and 'acceptable' distances being 500m and 1,000m respectively. It should however be noted that journeys of a longer length are often undertaken.

3.4.2 For non-commuter journeys, the Guidance suggests that walk distances of up to 1,200m can be considered as a preferred maximum, with the 'desirable' and 'acceptable' distances being 400 and 800m respectively. Again, it should be noted that journeys of a longer length are often undertaken.

3.4.3 There are a number of local facilities within walking/cycling distance of the site providing a wide range of services for everyday needs. The Government's index of multiple deprivation statistics includes an indicator of "Transport Inclusion", which is defined in terms of access to four essential types of facilities, which are:

- Primary Schools;
- Health Centres;
- Convenience Stores; and
- Post Offices.

Table 3-3: Walk Journey Distance and Time Thresholds

IHT Standard	Distance (m)		Walk Time (mins)	
	Commuting, Walking to School and Recreation	Other, non-commuter journeys	Commuting, Walking to School and Recreation	Other, non-commuter journeys
Desirable	500	400	6	5
Acceptable	1000	800	12	10
Preferred Maximum	2000	1200	25	15

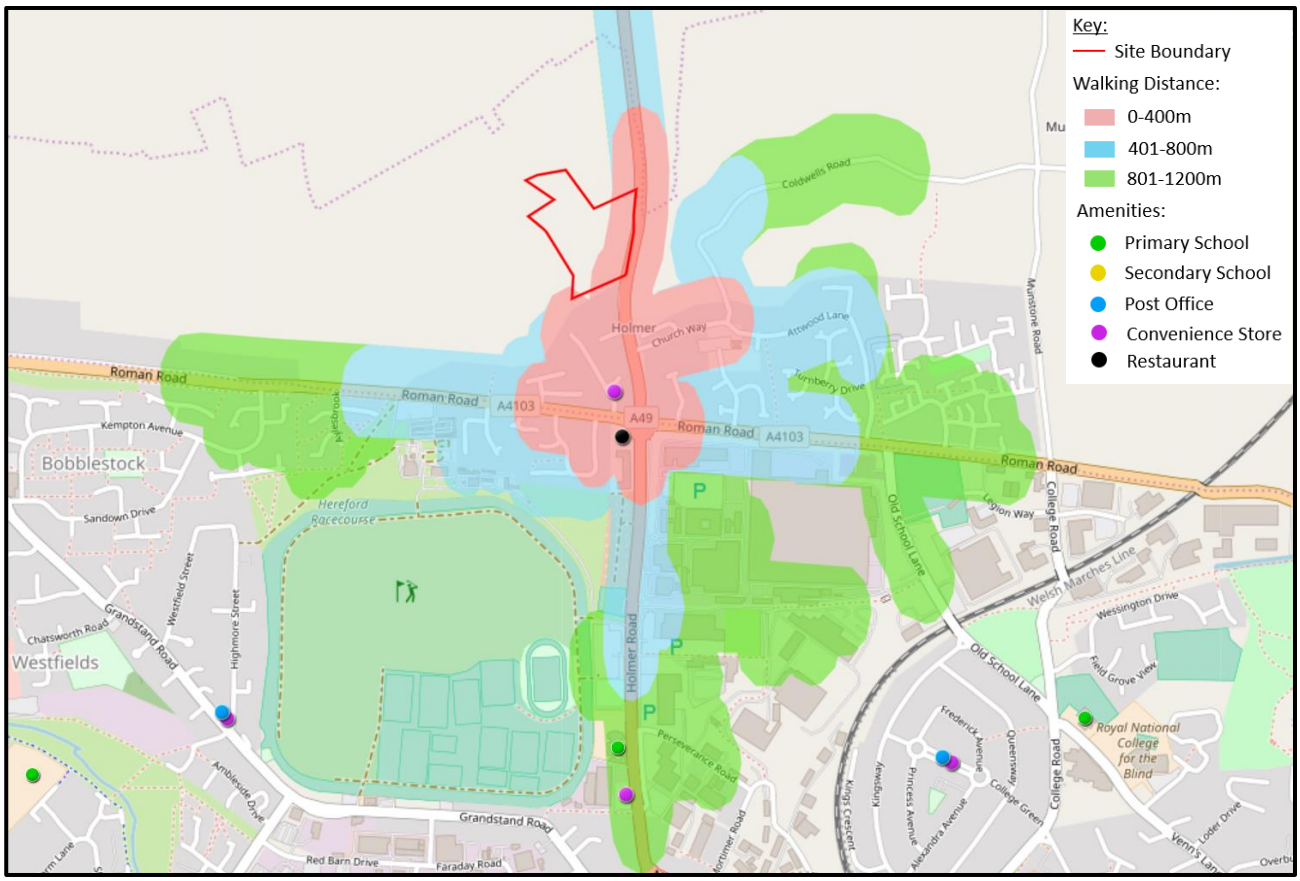
3.4.4 Taking account of the IHT walk journey time and distance thresholds outlined in Table 3-3, a summary of journey times to local amenities from the A49 site access are presented in Table 3-4.

Table 3-4: Local Amenities

Amenity	Location	Amenity Type	Distance from Site (km)	Walking Time (minutes)[1]	IHT Standard
Premier Andrew's Holmer Stores	Belle Bank Avenue	Convenience Store	0.5	6	Acceptable
Beefeater Starting Gate	Holmer Road	Restaurant	0.6	7	Acceptable
Holmer CE Academy	Holmer Road	Primary School	1.1	13	Preferred Maximum
Co-op Food	Holmer Road	Supermarket	1.2	15	Preferred Maximum
Spar	College Green	Convenience Store/Post Office	1.8	21	-
Grandstand Pharmacy	Grandstand Road	Pharmacy	2.3	27	-
One Stop	Grandstand Road	Convenience Store/Post Office	2.3	27	-

3.4.5 Figures 3-2 and 3-3 highlight the various walking and cycling distances alongside the local amenity provision.

Figure 3-2: Walking Isochrones



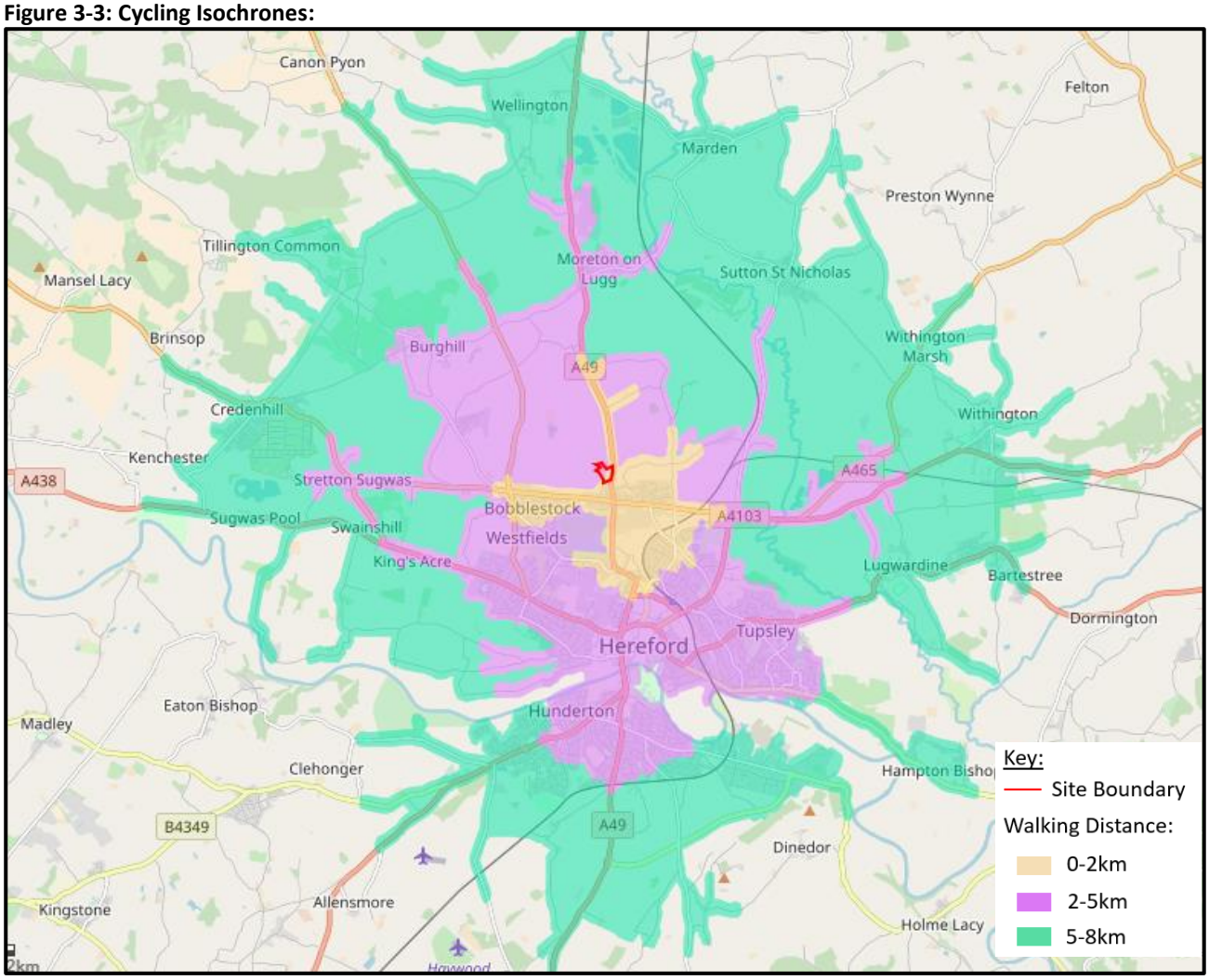
[1] Assumes a 1.4m/s walk speed as suggested within 'Guidelines for Journeys on Foot' 2000.

3.4.6 Figure 3-2 illustrates that several key amenities are located within an acceptable walking distance, including a Co-op Food Store, Holmer CE Academy Primary School and Premier Holmer Stores Convenience Store.

Retail and Leisure Opportunities

3.4.7 In addition to the key amenities highlighted above, the Spur Retail Park, Hereford Trade Park, Herford Leisure Centre and Skatepark are located approximately 1.0km to the south of the site, adjacent to the A49. Retail units within the Retail and Trade Parks comprise a B&Q, Dunelm, Home Bargains, Halfords and Topps Tiles, amongst others. Combined with the leisure centre and skatepark, these facilities offer a wide range of retail, leisure and possible employment opportunities, within an acceptable walking distance.

Figure 3-3: Cycling Isochrones:



3.4.8 Figure 3-3 illustrates that a number of suburbs of Hereford and villages, including Hunderton, Tupsley, Moreton-on-Lugg and Credenhill are located within an acceptable cycling distance.

3.4.9 Although several amenities are not located within walking distance of the site, the site is located approximately 2.8km to the north of Hereford city centre, whereby there are a significant number of amenities. Hereford city centre is accessible by bus, with bus stops within 350m of the site, and by cycle. In addition, pedestrian and cycle facilities will be provided within the site, connecting with the Holmer West development and association play and sport facilities. Therefore, the site is considered to be acceptably located for residential development.

3.5 Highway Safety

3.5.1 Personal Injury Collision (PIC) data has been obtained from www.crashmap.co.uk for the most recent five-year period for which data is available, between 01/01/2013 and 31/12/2017. The collisions have been summarised in Table 3-5.

Figure 3-4: Collision Locations

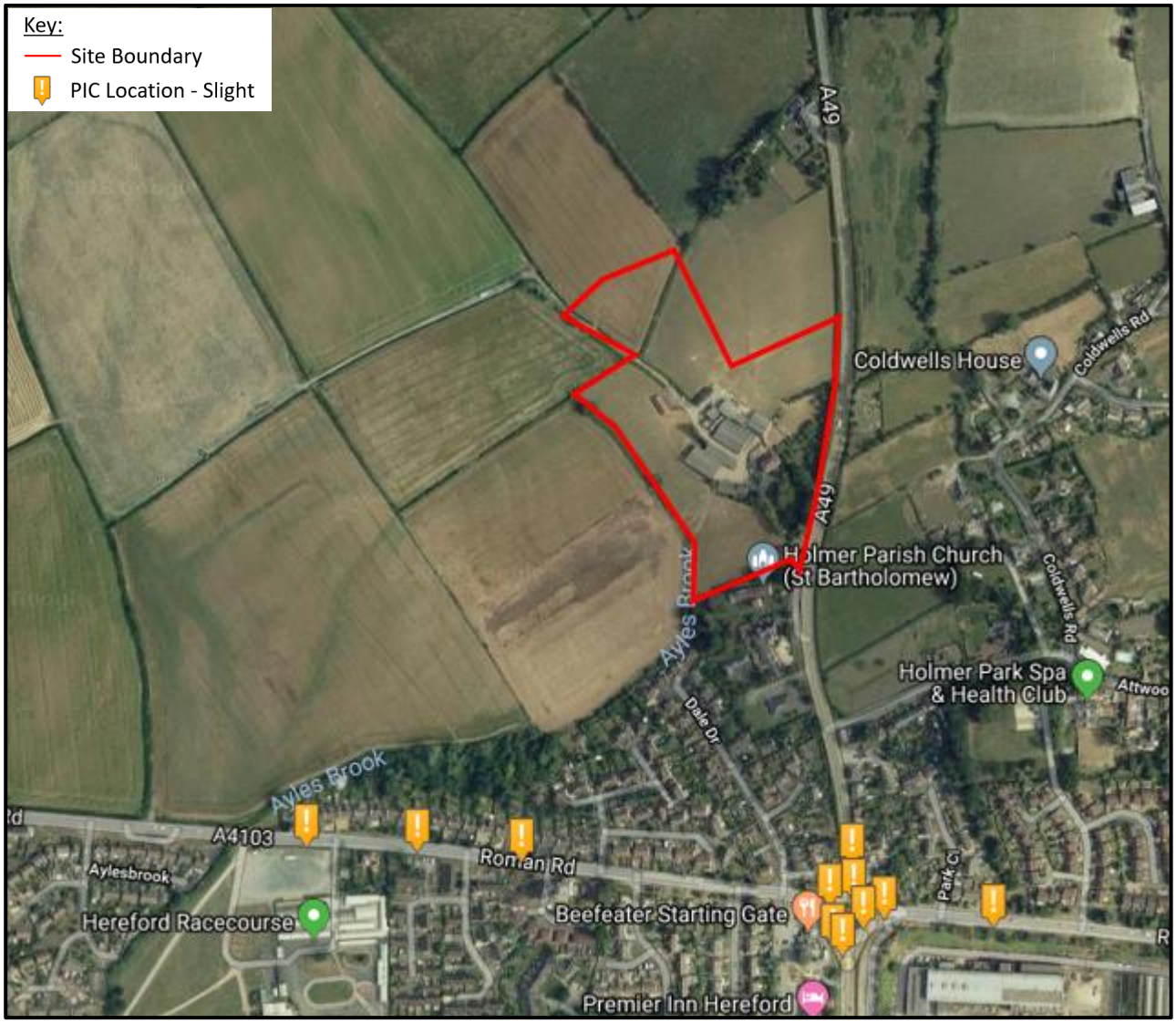


Table 3-5: Collision Summary

Junction/Link	Severity			Sensitive Road Users		
	Slight	Serious	Fatal	Pedestrian	Pedal Cycle	Motorcycle
A49/Roman Road (Starting Gate Roundabout) Junction	7	-	-	-	-	3
Roman Road (E) Link	1	-	-	1	-	-
Roman Road (W) Link	3	-	-	-	1	-
Total	**11**	**0**	**0**	**1**	**1**	**3**

A49/Roman Road (Starting Gate Roundabout)

3.5.2 A total of seven collisions occurred at this junction, all of which were slight in severity. Three collisions involved motorcyclists.

Roman Road (East) Link

3.5.3 One collision occurred on this link, which was slight in severity. The collision involved a pedestrian.

Roman Road (West) Link

3.5.4 Three collisions occurred on this link, all of which were slight in severity. One collision involved a cyclist.

Highway Safety Summary

3.5.5 A total of 11 collisions occurred in the vicinity of the development site in the most recent five-year period between 01/01/2013 and 31/12/2017. All 11 collisions were slight in severity, three involved motorcyclists, one a pedestrian and another a cyclist. It is recognised there is a cluster of collisions at the Starting Gate Roundabout and along Roman Road. Given that these form part of a major arterial route with high levels of traffic flow and the development in itself will only result in a small proportional increase in traffic, the development is considered unlikely to exacerbate any highway safety concerns. Additionally, a number of improvements have been agreed along Roman Road in association with the Holmer West development. These include footpath widening, a series of new pedestrian/cycle crossings and a new signalised access junction, which will slow traffic along this link. As a result, there are not considered to be any highway safety issues that require further assessment.

3.6 Summary

The site is considered to be well located for residential development for the following reasons:

- It is adjacent to the consented Holmer West development, which is currently under construction;
- There are a number of local amenities including a Co-op Food, the Holmer CE Academy Primary School, Hereford Leisure Centre, Hereford Skatepark and Spur Retail Park, which are all considered to be within the maximum recommended walking distance. In addition, a significant number of amenities are located within Hereford city centre, which is easily accessible by bus and cycle;
- A bus service is located within 200m of the site, providing services to Hereford city centre and station. A greater variety of services are provided within 350m walking distance of the site, providing services to Hereford, Leominster, Canon Pyon and Bucknell;
- Hereford Railway Station is approximately 2.8km to the southeast of the site, providing services to Birmingham, Cardiff, Manchester and Milford Haven; and
- The safety record of the local highway network has been considered, and the impact of development is not expected to exacerbate any existing issues.

4 Development Proposals

4.1 Development Quantum

4.1.1 This report accompanies a hybrid planning application for the construction of up to 100 dwellings.

4.1.2 As part of the application, full permission is being sought for 17 dwellings, comprising the following development mix.

- 4 x 1-bedroom unit;
- 5 x 2-bedroom unit;
- 5 x 3-bedroom unit; and
- 3 x 4-bedroom unit.

4.1.3 Outline permission is sought for the remaining 83 dwellings.

4.1.4 An indicative masterplan has been included within **Appendix B.**

4.2 Vehicle Access Strategy

4.2.1 Access to the site will be provided in two locations, as follows:

- Seven dwellings to be accessed via the existing farm access on the A49 (six of which are to be provided within the refurbished farmhouse, and one new dwelling); and
- The remainder of development to be accessed via a new priority junction with the Holmer West Spine Road.

4.2.2 Each access will be independent, with only a pedestrian, cycle and emergency vehicle link between the two access points. Details of each access junction are provided below.

A49 – Existing Access

4.2.3 A total of seven dwellings will take access from the existing farm access onto the A49 at the northern edge of the existing lay-by. This is considered to be appropriate for the following reasons:

- The proposals do not intensify the use of the access given that it already provides access for the farm and associated large farm house (which includes a self-contained independent second floor apartment); and
- Given the land use, the existing access is likely to be used by large farm vehicles, often slow moving and with constrained manoeuvres. The proposed development would reduce the number of large vehicles manoeuvring through this access onto the A49.

4.2.4 HE has confirmed acceptance of the use of the existing access, on the basis that the development proposals do not intensify the use of the access.

Holmer West Spine Road

4.2.5 The remainder of the development will take access via a new priority junction with the Holmer West Spine Road. The junction will be 5.5m in width, with a 2m footway on both sides of the carriageway. Visibility splays of 2.4x43m can be achieved both east and west in accordance with the 30mph design speed for the spine road.

4.2.6 Drawing 3168-02 illustrating the access has been included within **Appendix C.**

4.2.7 This access junction will also accommodate a potential access to the Park and Choose facility, comprising circa 100 spaces, associated with the approved Holmer West application.

Swept Path Analysis

4.2.8 Swept path analysis for an 8.5m refuse vehicle[2] servicing the dwellings seeking full permission has been included within **Appendix D.**

4.3 Pedestrian/Cycle Strategy

4.3.1 Pedestrian and cycle access will be provided alongside both vehicle access points. A 2m wide footway will be provide a pedestrian/cycle connection between the two access points.

4.3.2 A 3m strategic cycle route will be provided through the site, connecting from the potential Park and Choose access to the A49 and Holmer West development. An indicative routing is illustrated in Figure 4-1.

[2] Refuse vehicle dimensions within the Herefordshire Council document 'Guidance Notes for Developers and Landlords on the Storage & Collection of Domestic General Rubbish and Recycling' (July 2015) state that an 8.2m refuse vehicle should be used. An 8.5m vehicle has been tracked, representing a worst-case assessment.

Figure 4-1: Indicative Strategic Cycle Route

4.4 Parking Provision

4.4.1 As this Transport Assessment accompanies a hybrid application, the number and design of parking spaces has yet to be determined for the majority of the development. It is anticipated that the parking provision will be provided in accordance with the relevant standards contained within the Herefordshire Highways Design Guide for New Developments (July 2006) document and paragraphs 105 and 106 of the NPPF.

Table 4-1: C3 Dwellings (areas outside of Hereford City central area) - Maximum Car Parking Standards

Description	Standard
Units with 1 bedroom where grouped parking	Max 1 space per unit
Units with 1 bedroom where individual parking	Max 1 space per unit*
Units with 2 or 3 bedrooms where grouped or individual parking	Max 2 spaces per unit*
Units with more than 3 bedrooms where grouped or individual parking	Max 3 spaces per unit*
This should produce an average maximum rate of 1.5 Spaces per unit for the development. *The possible effect of garages being used for purposes other than parking a car should be considered.	

4.4.2 The detailed component of the application comprises 17 dwellings, which will provide 28 parking spaces. In addition, 13 dwellings will have a garage, comprising a minimum internal size of 6mx3m, which would allow for additional parking and cycle parking. This level of parking provision accords with the Herefordshire Highways Design Guide (2006).

4.4.3 Exact details of the proposed car parking provision for the outline elements of the site will be submitted with the Reserved Matters application(s).

5 Travel Demand

5.1 Introduction

5.1.1 This section details the methodology for calculating the vehicle travel demand associated with the development proposals. The development comprises up to 100 dwellings, however for the purpose of this assessment, the impact of up 110 dwellings has been considered for the AM and PM peak hours of 08:00-09:00 and 17:00-18:00.

5.2 Vehicular Trip Generation

5.2.1 As part of pre-application discussions, it was agreed that trip rates approved as part of the Holmer West application should be used to assess the development. Table 5-1 summarises the approved trip rates and subsequent trip generation.

Table 5-1: Trip Generation

	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrive	Depart	Total	Arrive	Depart	Total
Consented Trip Rates (per dwelling)	0.13	0.39	0.52	0.36	0.13	0.49
Trip Generation (110 dwellings)	14	43	57	40	14	54

5.2.2 The proposed development would result in 57 two-way trips in the AM peak and 54 in the PM peak.

5.3 Trip Distribution and Assignment

5.3.1 Trip distribution and assignment of the development trips has been undertaken within the HE VISSIM model, in line with the approved Holmer West development (as agreed with HE).

6 Junction Capacity Assessment Methodology

6.1 Introduction

6.1.1 This section provides a summary of the detailed junction capacity assessments that have been undertaken to understand the impact of the development proposals on the highway network.

6.2 Scope of Assessment

6.2.1 Junction capacity assessments have been carried out at a number of junctions on the local highway network. The assessment has taken two forms, a run of the HE Hereford VISSIM Model, undertaken by Systra, and detailed stand-alone models using LinSig software. The junctions have been modelled, as follows:

HE Hereford VISSIM Model

- A49/Roman Road (Starting Gate) Roundabout.

LinSig V3

- Holmer West Spine Road/A49 Signalised Junction; and
- Holmer West Spine Road/Roman Road Signalised Junction.

6.3 Assessment Scenarios

6.3.1 The following scenarios have been modelled as follows:

1 2018 Base Year;
2 2023 Opening Year + Committed Development; and
3 2023 Opening Year + Committed Development + Proposed Development;
4 2031 Forecast Year + Committed Development; and
5 2031 Forecast Year + Committed Development + Proposed Development.

6.3.2 It should be noted that whilst a 2031 future year scenario has been assessed within the VISSIM model, the results have been provided for information only and should not be used as a basis for decision. Detailed junction assessments undertaken in Linsig have been assessed for the 2018 Base Year and 2023 Opening Year scenarios only, in accordance with DfT 'Guidance on Transport Assessments'.

7 Highway Assessment – VISSIM

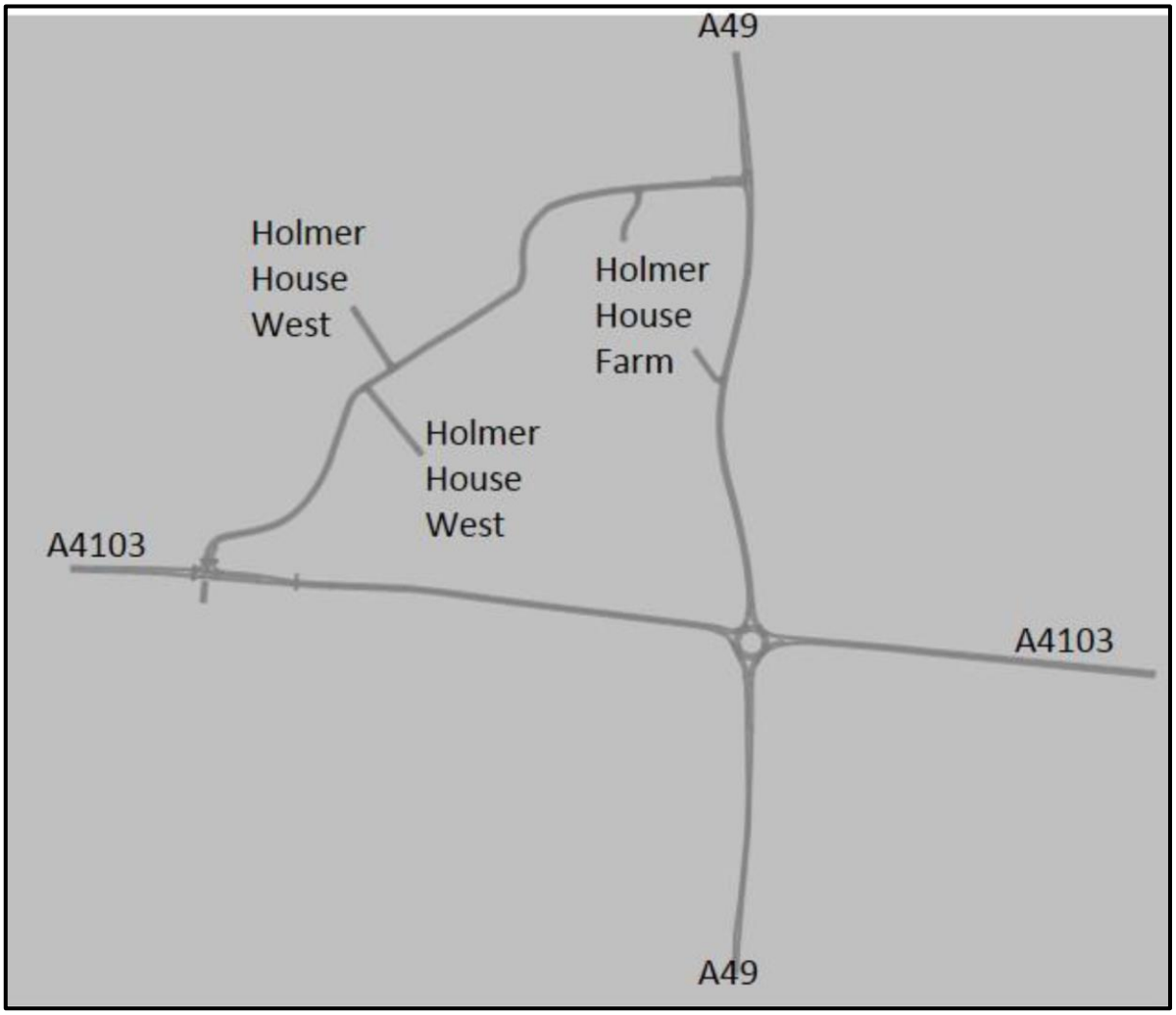
7.1 Introduction

7.1.1 This chapter sets out the VISSIM traffic modelling undertaken to inform the impact of development on the HE network.

7.1.2 As agreed with HE, the model has been cordoned to only include the A49/Roman Road (Starting Gate) roundabout and Holmer West Spine Road. Figure 7-1 illustrates the cordon model coverage.

7.1.3 The assessment utilises the Highways England Hereford VISSIM model developed by JMP (now SYSTRA) for a 2014 Base Year. This model has been reviewed by WSP-PB on behalf of Herefordshire Council (HC) and is considered as suitable for the assessment of infrastructure interventions and development impact assessments.

Figure 7-1: Cordon Model Coverage



7.2 Network Scenarios

7.2.1 The model has tested the weekday AM and PM peak periods, 08:00-09:00 and 17:00-18:00 respectively for the following scenarios.

Table 7-1: Scenarios

Scenario No.	Scenario Name	Graph Reference
1	2018 Base Year	BY 2018
2	2023 Opening Year + Committed Development	SC2 2023_OY_CD
3	2023 Opening Year + Committed Development + Proposed Development	SC3 2023_OY_CD_PD
4	2031 Forecast Year + Committed Development	SC4 2031_OY_CD
5	2031 Forecast Year + Committed Development + Proposed Development	SC5 2031_OY_CD_PD

7.3 VISSIM Results

Network Performance

7.3.1 The overall network performance results are summarised in Table 7-2.

Table 7-2: Network Performance Results

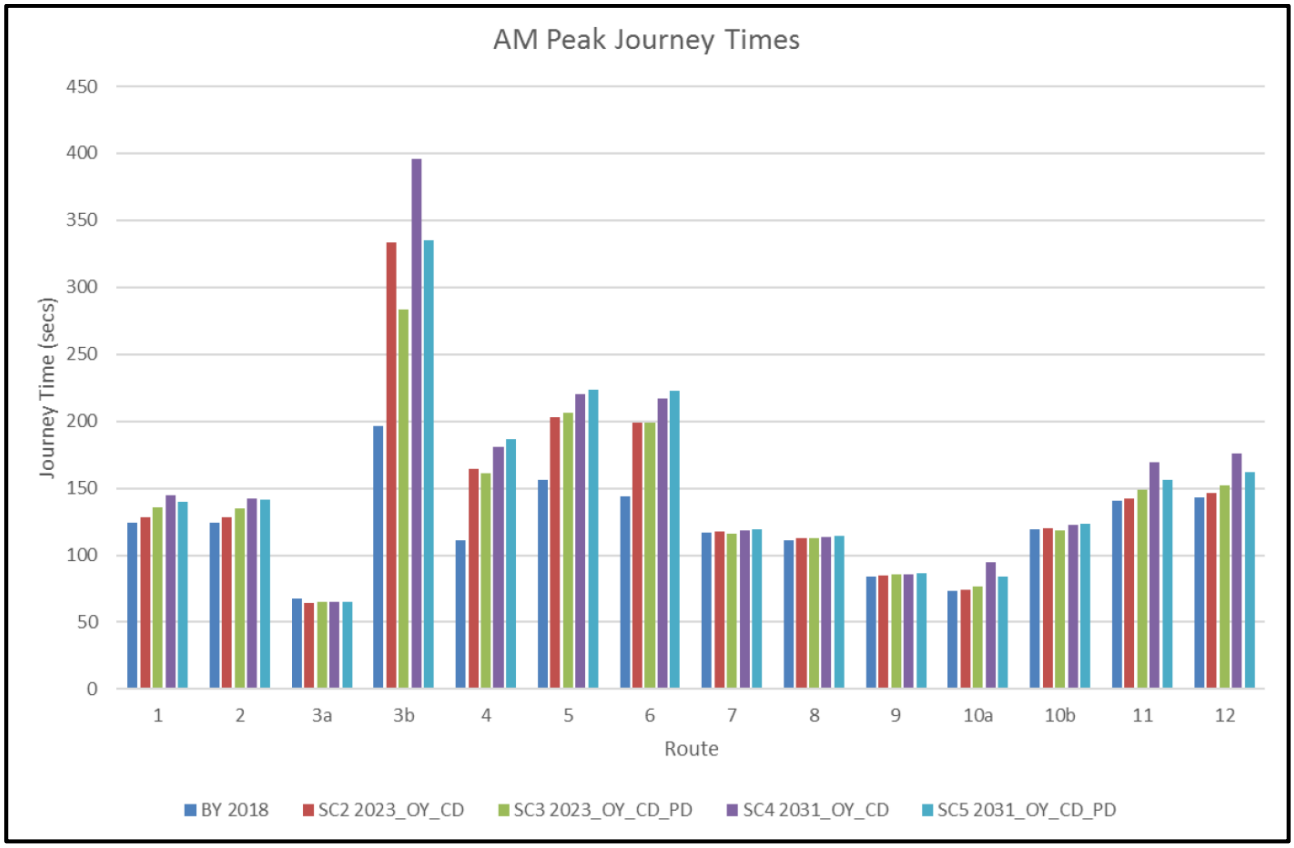
Scenario	AM Peak			PM Peak		
	Avg. Speed (kph)	Avg. Delay (secs)	Unassigned Vehicles	Avg. Speed (kph)	Avg. Delay (secs)	Unassigned Vehicles
1) 2018 Base	33	39	0	32	43	0
2) 2023 Opening Year + Committed Development	28	61	21	26	75	173
3) 2023 Opening Year + Committed Development + Proposed Development	28	61	11	26	72	125
4) 2031 Forecast Year + Committed Development	25	79	73	27	69	216
5) 2031 Forecast Year + Committed Development + Proposed Development	26	72	81	27	70	240

7.3.2 The results indicate that the proposed development would have a negligible impact on the average speed, average delay and latent demand in both the AM and PM peaks, when compared to both the baseline scenarios. In the AM peak, with the proposed development for the 2031 scenario, the average speed increases by 1kph, and the level of the delay reduces by seven seconds. The number of unassigned vehicles increases by eight. In the PM peak, the proposed development in the 2031 scenario, has no impact on the average speed, and increases the average delay by one second.

Journey Time

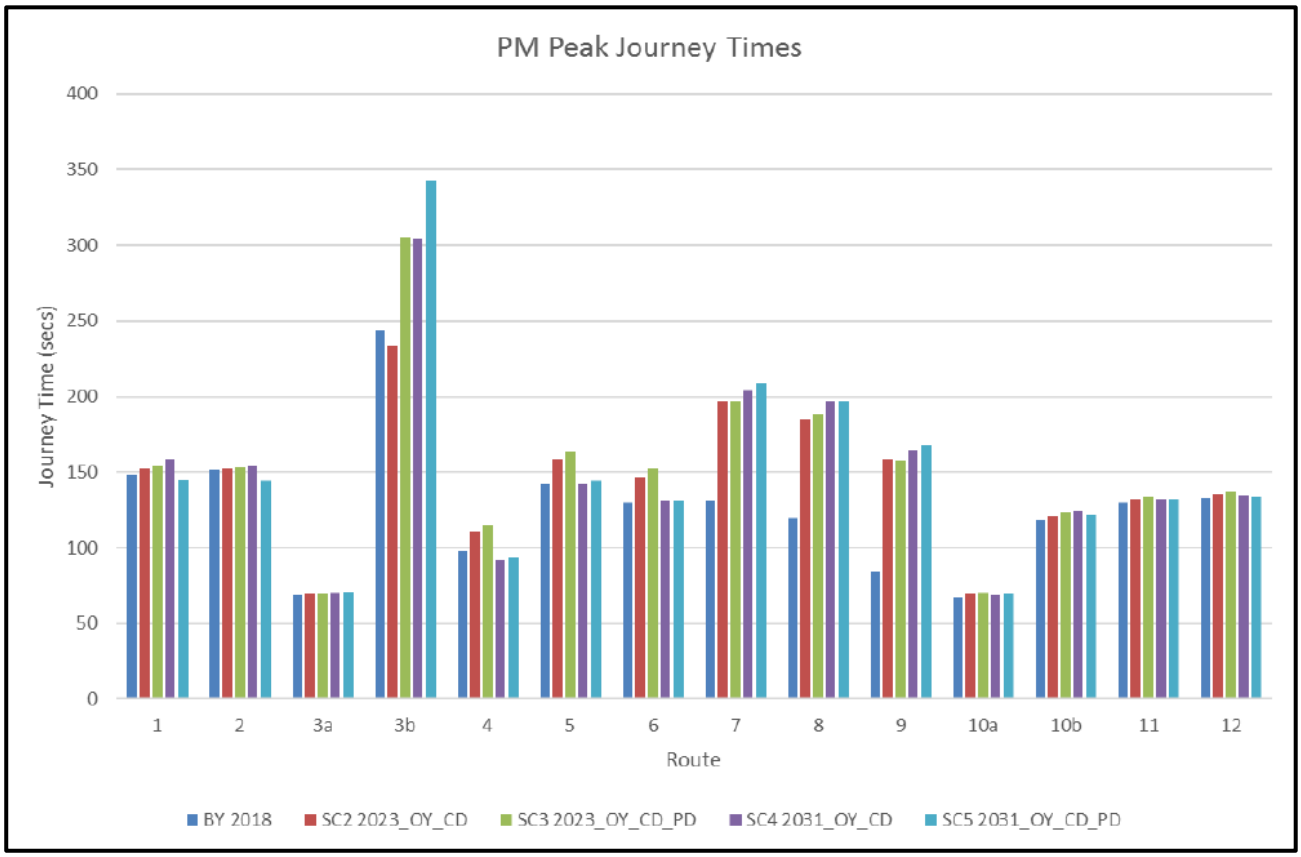
7.3.3 Average journey times for 12 routes have been extracted from the VISSIM model. The routes, detailed within Systra's Appraisal Note, and the average journey time for each is summarised in Figures 7-2 and 7-3 below.

Figure 7-2: Journey Times – AM Peak



7.3.4 Figure 7-2 indicates that there is a negligible difference in journey times with the addition of the proposed development, in the AM peak. In the PM peak, the proposed development has a minor impact.

Figure 7-3: Journey Times – PM Peak



7.3.5 Figure 7-3 indicates that the proposed development has a minor impact on journey times in both the AM and PM peaks.

Queues

7.3.6 The average queue lengths, given in vehicles, are summarised in Tables 7-3 to 7-4.

Table 7-3: Network Performance Results – AM Peak

Scenario	Approach Arm			
	A49 (N)	A4103 Roman Road (E)	A49 Holmer Road	A4103 Roman Road (W)
1) 2018 Base	1	9	0	1
2) 2023 Opening Year + Committed Development	2	40	0	2
3) 2023 Opening Year + Committed Development + Proposed Development	3	42	0	3
4) 2031 Forecast Year + Committed Development	6	49	0	12
5) 2031 Forecast Year + Committed Development + Proposed Development	3	49	1	6

Table 7-4: Network Performance Results – PM Peak

Scenario	Approach Arm			
	A49 (N)	A4103 Roman Road (E)	A49 Holmer Road	A4103 Roman Road (W)
1) 2018 Base	1	4	1	0
2) 2023 Opening Year + Committed Development	1	10	35	1
3) 2023 Opening Year + Committed Development + Proposed Development	1	9	36	1
4) 2031 Forecast Year + Committed Development	1	2	38	1
5) 2031 Forecast Year + Committed Development + Proposed Development	1	3	40	0

7.3.7 The results indicate that the proposed development will have a minor impact on the average queue length at the Starting Gate roundabout. The proposed development results in a maximum increase in queue length of two vehicles in both the 2023 AM peak and 2031 PM peak when compared to the respective 'without development' scenarios.

7.4 VISSIM Modelling Summary

7.4.1 The modelling results indicate that the proposed development has a negligible impact on the operation of the junction. A full model appraisal note is included within **Appendix E.**

8 Highway Assessment – Detailed Junction Capacity Assessments

8.1 Introduction

8.1.1 Further detailed junction assessments undertaken to supplement the VISSIM modelling. The following junctions have been modelled using LinSig software:

- Holmer West Spine Road/A49 Signalised Junction; and
- Holmer West Spine Road /Roman Road Signalised Junction.

8.1.2 Full model outputs have been included within **Appendix F.**

8.2 Holmer West Spine Road/A49 Signalised Junction

8.2.1 LinSig V3 modelling software has been used to assess the performance of the Holmer West Spine Road/A49 signalised junction. The results are summarised in Tables 8-1 to 8-5.

Table 8-1: Holmer West Spine Road/A49 - 2018 Base

	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	DoS	Delay (s/pcu)	Queue (PCU)	DoS	Delay (s/pcu)	Queue (PCU)
Holmer Road S (left, ahead)	46.7%	13	5	60.4%	16	7
Holmer West Spine Road (right, left)	52.8%	37	2	52.9%	40	3
Holmer Road N (ahead, right)	48.7%	9	4	66.1%	13	5
Cycle Time	**60 seconds**			**60 seconds**		
PRC (%)	**84.9**			**36.2**		

Table 8-2: Holmer West Spine Road/A49 - 2023 Base + Committed Development

	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	DoS	Delay (s/pcu)	Queue (PCU)	DoS	Delay (s/pcu)	Queue (PCU)
Holmer Road S (left, ahead)	57.5%	14	7	70.3%	18	10
Holmer West Spine Road (right, left)	62.2%	44	3	66.8%	47	4
Holmer Road N (ahead, right)	58.7%	10	6	76.7%	15	6
Cycle Time	**60 seconds**			**60 seconds**		
PRC (%)	**44.8**			**17.3**		

Table 8-3: Holmer West Spine Road/A49 - 2023 Base + Committed Development + Proposed Development

	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	DoS	Delay (s/pcu)	Queue (PCU)	DoS	Delay (s/pcu)	Queue (PCU)
Holmer Road S (left, ahead)	59.0%	14	7	72.1%	18	10
Holmer West Spine Road (right, left)	75.9%	54	4	72.6%	51	4
Holmer Road N (ahead, right)	58.7%	10	6	80.4%	17	7
Cycle Time	**60 seconds**			**60 seconds**		
PRC (%)	**18.6**			**11.9**		

8.2.2 The results indicate that the proposed development has a negligible impact on the operation of the junction in both the AM and PM peaks.

8.3 Holmer West Spine Road/Roman Road Signalised Junction

8.3.1 The Holmer West Spine Road/Roman Road signalised junction has been assessed using LinSig v3 software. The results are summarised in Tables 8-6 to 8-10.

Table 8-4: Holmer West Spine Road/Roman Road - 2018 Base

	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	DoS	Delay (s/pcu)	Queue (PCU)	DoS	Delay (s/pcu)	Queue (PCU)
Roman Road W (ahead, right, left)	85.6%	26	22	60.4%	16	11
Site Access (left, ahead, right)	83.0%	65	8	82.5%	63	8
Roman Road E (left, ahead, right)	60.6%	17	10	82.6%	25	18
Aylesbrook (right, left, ahead)	0.0%	0	0	0.0%	0	0
Cycle Time	**160 seconds**			**160 seconds**		
PRC (%)	**5.1**			**9.0**		

Table 8-5: Holmer West Spine Road/Roman Road - 2023 Base + Committed Development

	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	DoS	Delay (s/pcu)	Queue (PCU)	DoS	Delay (s/pcu)	Queue (PCU)
Roman Road W (ahead, right, left)	92.0%	33	27	68.8%	18	14
Site Access (left, ahead, right)	92.7%	95	10	87.8%	74	9
Roman Road E (left, ahead, right)	59.9%	16	10	89.3%	31	22
Aylesbrook (right, left, ahead)	0.0%	0	0	0.0%	0	0
Cycle Time	**160 seconds**			**160 seconds**		
PRC (%)	**-3.0**			**0.8**		

Table 8-6: Holmer West Spine Road/Roman Road - 2023 Base + Committed Development + Proposed Development

	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	DoS	Delay (s/pcu)	Queue (PCU)	DoS	Delay (s/pcu)	Queue (PCU)
Roman Road W (ahead, right, left)	94.0%	38	29	69.7%	18	14
Site Access (left, ahead, right)	90.6%	83	10	86.5%	71	9
Roman Road E (left, ahead, right)	61.7%	17	10	89.6%	32	22
Aylesbrook (right, left, ahead)	0.0%	0	0	0.0%	0	0
Cycle Time	**160 seconds**			**160 seconds**		
PRC (%)	**-4.4**			**0.5**		

8.3.2 The results indicate that the proposed development has a minor impact on the operation of the junction in the AM and a negligible impact in the PM peak. This level of impact is not considered to be significant.

9 Summary and Conclusion

9.1 Summary

9.1.1 PJA has been commissioned by CDB Planning and Architecture to prepare a Transport Assessment to accompany a hybrid planning application for the development of up to 100 dwellings on land known as Holmer House Farm, Hereford.

9.1.2 The site is considered to be well located for residential development for the following reasons:

- It is adjacent to the consented Holmer West development, which is currently under construction;
- There are a number of local amenities including a Co-op Food, the Holmer CE Academy Primary School, Hereford Leisure Centre, Hereford Skatepark and Spur Retail Park, which are all considered to be within the maximum recommended walking distance. In addition, a significant number of amenities are located within Hereford city centre, which is easily accessible by bus and cycle;
- A bus service is located within 200m of the site, providing services to Hereford city centre and station. A greater variety of services are provided within 350m walking distance of the site, providing services to Hereford, Leominster, Canon Pyon and Bucknell; and
- Hereford Railway Station is approximately 2.8km to the southeast of the site, providing services to Birmingham, Cardiff, Manchester and Milford Haven.

9.1.3 A review of the Personal Injury Collision data for the local highway network has been undertaken, and the impact of development is not considered to exacerbate any existing issues.

9.1.4 Access will be gained in two locations, via the existing farm access and a new priority junction onto the Holmer West Spine Road. The existing farm access will serve seven dwellings, and the new priority junction the remainder of development.

9.1.5 The proposed development is predicted to result in a total of 57 and 54 two-way vehicle trips in the AM and PM peak hours respectively.

9.1.6 Junction modelling has been undertaken on three junctions on the local and strategic highway network. The proposed development is considered to have a negligible impact on the operation of the three junctions.

9.2 Conclusion

9.2.1 In conclusion, it is considered that the site is sustainably located and that the impact from development on the highway network is not significant and could not be considered severe.

Therefore, in the context of paragraph 109 of the revised NPPF, there is not considered to be any transport or highways reason why the development should not be granted planning permission.

Appendix A Pre-application Correspondence

Technical Note

Project: Holmer House Farm, Hereford

Subject: Trip Generation

Client:	CDB Planning and Architecture	**Version:**	A
Project No:	3168	**Author:**	BL/SB
Date:	12 January 2018	**Approved:**	ME

1 Introduction

1.1.1 Phil Jones Associates (PJA) has been commissioned by Collins Design & Build Limited to prepare a technical note to summarise the trip generation and distribution associated with the proposed redevelopment of Holmer House Farm, Hereford.

1.1.2 This note references the approved Holmer West Addendum Transport Assessment, produced by PJA (hereafter referred to as the 'Holmer West application'), which was approved by Herefordshire Council (HC) and Highways England (HE) on 09/11/2015 (application reference: P150478/O). This document has been included within **Appendix A.**

2 Development Proposals.

2.1.1 The proposed development is for circa 72 dwellings on land at Holmer House Farm, Hereford. The site is currently an operational farm and farmhouse and is approximately three hectares in size. The site boundary abuts the highway boundary adjacent to the A49.

2.1.2 This note considers three access scenarios, comprising:

- Scenario 1 - A small number of dwellings accessed via the existing farm access;
- Scenario 2 - All 72 dwellings accessed via the existing farm access; and
- Scenario 3 - A small number of dwellings via the existing farm access, with the remainder accessed via the Holmer West Spine Road.

2.1.3 An indicative layout has been included within **Appendix B**.

2.2 Access

2.2.1 The existing junction is located adjacent to a lay-by and is located within the 30mph speed limit on the A49. The junction provides the following visibility splays:

- 2.4x109m (South); and
- 2.4x135m (North).

2.2.2 These visibility splays are in accordance with the observed 85th percentile speeds of 42mph (NB) and 47.6mph (SB), recorded by ATC undertaken on the A49 in January 2016 as part of the Holmer West application.

2.2.3 A proposed access arrangement via the existing farm access is illustrated in drawing number 3168-01 contained within **Appendix C**. The access includes additional white lining marking the give way and lay-by, and illustrates the visibility splays set out above.

3 Scenario 1

3.1 Existing Land Use

3.1.1 The site is currently in use as a farm with associated farm buildings and at least one residential dwelling. It is considered that the active farm and farmhouse could generate traffic movements equivalent to that of approximately six dwellings. Therefore, it is considered that up to six dwellings could use the existing A49 access without intensification.

4 Scenario 2

4.1.1 Scenario 2 considers the entire development served from the existing farm access on the A49.

4.2 Proposed Trip Generation

4.2.1 To calculate the anticipated trip generation for proposed residential use, trip rates agreed as part of the Holmer West application have been used. Table 5-1 summarises the trip rates.

Table 4-1: Consented Trip Rates

	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrive	Depart	Total	Arrive	Depart	Total
Houses (per dwelling)	0.13	0.39	0.52	0.36	0.13	0.49

4.2.2 Table 5-2 summarises the resultant trip generation for the proposed residential development.

Table 4-2: Proposed Trip Generation

	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrive	Depart	Total	Arrive	Depart	Total
Trip Generation (72 dwellings)	9	28	37	26	9	35

4.2.3 The proposed development would result in 37 two-way trips in the AM peak and 35 in the PM.

4.3 Trip Distribution and Assignment

4.3.1 It is considered appropriate that trips from the proposed development will be similar to those at Holmer West, and therefore the trip distribution and route assignment has been taken from the Holmer West application.

4.3.2 The trip distribution used within the Holmer West application was calculated using 2001 Journey to Work Census data, and later refined to account for separate distribution patterns for residential journey types. The methodology used has been detailed within the Holmer West Addendum TA, included within **Appendix A.**

4.3.3 Route assignment for Holmer West was undertaken using the Hereford Strategic VISSIM Model. The assignment used for this assessment, has been derived from the Holmer West development flows from the strategic modelling outputs.

4.3.4 Table 5-3 summarises the resultant assignment for the proposed development. Full distribution diagrams are included within **Appendix D.**

Table 4-3: Route Assignment

Route	AM Peak				PM Peak			
	Percentage	Arrive	Depart	Total	Percentage	Arrive	Depart	Total
A49 Existing Site Access → A49 (N)	7%	1	2	2	5%	1	0	2
A49 Existing Site Access → Starting Gate Roundabout → Roman Road (E)	5%	0	1	2	3%	1	0	1
A49 Existing Site Access → Starting Gate Roundabout → Holmer Road (S)	81%	8	23	30	84%	22	8	30
A49 Existing Site Access → Starting Gate Roundabout → Roman Road (W)	6%	1	2	2	7%	2	1	2

4.4 Local Road Network Assessment

4.4.1 The proposed development would result in an additional 35 and 33 two-way trips on the Starting Gate roundabout in the AM and PM peaks respectively.

4.4.2 The development is not considered to result in an increase of more than 30 trips on any further junctions.

5 Scenario 3

5.1.1 Scenario 3 considers access in two locations, with a small number of dwellings taking access from the existing farm access located on the A49, and the remainder from with the Holmer West Spine Road.

5.1.2 For the purpose of this assessment it has been considered that a maximum of six dwellings will take access via the existing access junction, with the remaining 66 taking access via the Holmer West Spine Road.

5.2 Trip Generation

5.2.1 Using the trip rates identified above, the proposed access split would result in the following development trips, summarised in Table 6-1.

Table 5-1: Access Split Development Trips

Access	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrive	Depart	Total	Arrive	Depart	Total
Existing A49 Access	1	2	3	2	1	3
Holmer West Spine Road	9	26	34	24	9	32
Total	**9**	**28**	**37**	**26**	**9**	**35**

5.3 Trip Distribution and Assignment

5.3.1 It is considered appropriate that trips accessing the network from the Holmer West Spine Road will follow the same distribution and assignment as those within the Holmer West application. Trips accessing the network from the existing A49 farm access will follow the assignment outlined in Section 5.3.

5.3.2 A distribution diagram, included within **Appendix D**, outlines the resultant distribution.

5.4 Local Road Network Assessment

5.4.1 The proposed development would result in an additional 33 and 32 two-way trips on the Starting Gate roundabout in the AM and PM peaks respectively.

5.4.2 The development is not considered to result in an increase of more than 30 trips on any further junctions.

6 Summary

6.1.1 Phil Jones Associates (PJA) has been commissioned by Collins Design & Build Limited to prepare a technical note to summarise the trip generation and distribution associated with the proposed redevelopment of Holmer House Farm, Hereford for circa 72 dwellings.

6.1.2 Access is sought from the existing vehicle access on the A49 and the Holmer West spine road. Drawing 3168-01 illustrates the proposed junction, which has been designed in accordance with recorded 85th percentile speeds.

6.1.3 The proposed development results in a 37 and 35 two-way trips in the AM and PM peaks respectively. This increase in trips is not considered to be significant, with no junction assessments considered to be necessary.

6.1.4 This note is for review and agreement with Highways England and Herefordshire Council.

Spatial Planning Framework Commission – Technical Note

Prepared by SYSTRA as named Sub-Consultant to AECOM under the Highways England 2016 SPA

Job No.	**GB01T17D46 78**						
Job Title	A49 Holmer House Farm, Hereford						
To	Patrick Thomas	**cc**					
Topic	A49 Holmer House Farm, Hereford – Pre-application review						
Prepared	Ruairidh MacVeigh	**Date**	24/01/18	**Checked**	Nick Oram	**Date**	25/01/2018
Approved	Lee White	**Date**	26/01/2018	**Verified**	Matthew Jopp	**Date**	29/01/2018

INTRODUCTION

1. Highways England have received a pre-application Scoping Note, dated 12 January 2018, for a proposed residential development north of Hereford. The trip generation and trip distribution technical note has been prepared by Phil Jones Associates (on behalf of Collins Design & Build Limited).

2. SYSTRA have been instructed to review this Technical Note as sub-consultant to Highways England.

BACKGROUND

3. Phil Jones Associates (PJA) have been appointed by Collins Design & Build Limited to undertake transport scoping for a proposed residential development consisting of approximately 72 dwellings on what is currently the Holmer House Farm, situated 1.5 miles north of Hereford city centre, off the A49.

4. The site is immediately adjacent to the A49, the primary road connection between Hereford, Ludlow and Shrewsbury, which forms part of the Strategic Road Network (SRN). Based on indicative site plans, intentions are for the site to be accessed at two locations; a south entrance directly onto the A49 using the existing Holmer House Farm driveway, and a northern entrance which connects to the access for the Holmer West development. Based on these proposals there would be no new access on to the SRN.

5. The document makes frequent reference to the previously approved Transport Assessment (TA) undertaken for the Holmer West development which is situated adjacent to the Holmer House Farm site. This Transport Assessment was approved by Herefordshire Council and Highways England on November 9th, 2015 (Ref no.: P150478/O) and has been included in the appendices of the Technical Note.

PLANNING STATUS

6. The proposed development is not allocated within the adopted Herefordshire Local Plan Core Strategy (2015), however, policy HD1 indicates that a significant amount of housing will be required outside of the three major sites in the Hereford area, relying on existing committed development, windfall development and development of non-strategic sites that are allocated through a yet to be produced Hereford Area Plan or Neighbourhood Development Plans.

7. It is also noted that this site has recently been promoted as a potential non-strategic allocation in the Hereford Area Plan through the Issues and Options Paper and associated 'Call for Sites' exercise. It is therefore considered that the proposed development is not currently in line with Local Plan policy but could be at some point in the future. This is a matter that Herefordshire Council will need to advise on.

TECHNICAL NOTE REVIEW

General

8. Although it is primarily focused on trip generation and distribution, the note makes no reference to local or national policy/guidance.

9. The technical note makes reference to the previous Holmer West TA, which set out a Public Transport and Cycling Strategy so as to promote and encourage the use of sustainable transport alternatives.

10. These strategies included an analysis of bus and rail services within the vicinity of the site, as well as an assessment of pedestrian and cycle access.

11. However, there is no specific information regarding how this development will provide access to sustainable modes of travel. Circular 02/2013 expects developers to put forward initiatives that manage down the traffic impacts of proposals to support sustainable transport.

Highway Safety

12. As part of the Holmer West TA, a Road Safety Audit (RSA1) was undertaken to measure any potential safety issues which could be raised following the implementation of a new site entrance onto the A49. This RSA was approved by Herefordshire Council.

13. However, with the proposed alteration and increased use of the existing farm access for development traffic, no further RSA's or measurement of possible safety issues which may arise from conflicting turning movements have either been undertaken or mentioned within th24e Technical Note.

14. An Assessment of Personal Injury Accidents should be undertaken as part of an RSA and should include link and junction appraisals of the A49 between the proposed Holmer West access onto the A49 and Church Way.

Development Access

15. Access to the site is to be provided via two routes. The northern entry will connect to the proposed Holmer West site, with access being provided via that development's internal network. The southern entry is to make use of the existing farm lane access to Holmer House Farm which connects directly onto the A49 and will be modified accordingly to handle development traffic.

16. At present, PJA have stated that the farm access in its existing configuration (width, lanes and visibility) is capable of handling six dwellings worth of additional traffic movements before it would require rebuilding to a suitable standard.

17. The proposed access arrangements have been considered in three scenarios:

- Scenario 1 – Partial build-out using existing farm access
- Scenario 2 – Full build-out using existing farm access
- Scenario 3 – Full build-out with both existing farm access and access to Holmer West Spine Road. In this instance, no through route between the two access options will be provided in order that only individual accesses can serve one half of the development each.

Traffic Data

18. No specific junction assessments have been proposed in PJA's technical note for Holmer House Farm but trip assignments have been produced showing the number of vehicles forecast to use access junctions. SYSTRA advise that the applicant's consultant assess the access junction directly onto the A49 at Holmer House Farm as well as the proposed Holmer West Spine Road access to the A49. This should be done using a junction assessment package or, as it is available, using the VISSIM model that was used to assess the impact of the Holmer West development.

19. Automatic Traffic Counts (ATC) were undertaken near the proposed site access during January 2016 as part of the Holmer West application to inform the TA on current speeds on the A49. As these are still valid, they can be used for assessing the impact of the Holmer House Farm development traffic on the SRN.

Committed Highway Improvements

20. PJA have noted proposed transport infrastructure improvements and their method of delivery as part of the Holmer West TA. However, as that TA was submitted in June 2016, it is recommended that PJA request further clarification from the Highway Authorities to advise if any other highway improvements are proposed in the vicinity of the development.

TRIP RATES AND TRIP GENERATION

21. The PJA Technical Note for Holmer House Farm makes use of the same trip rates that were consented by Highways England and Herefordshire Council

as part of the Holmer West TA. These trip rates are summarised, with corresponding trip generations, in Table 1:

Table 1 Trip Rates and Trip Generation – Holmer House Farm Site – 72 Dwellings

	AM			PM		
	ARR	DEP	TOTAL	ARR	DEP	TOTAL
Trip Rates (per dwelling)						
Houses Privately Owned	0.13	0.39	0.52	0.36	0.13	0.49
Trip Generation (72 dwellings)						
Houses Privately Owned	9	28	37	26	9	35

**As presented in the PJA TN*

22. As these were already consented trip rates, SYSTRA agree that they can be used for the Holmer House Farm development. All corresponding trip generations have been calculated correctly.

TRIP DISTRIBUTION

23. The Technical Note states that trip distribution for the Holmer House Farm site was based on data derived from the 2001 Journey to Work UK Census data. 2001 data was also used in the Holmer West TA, though it was agreed with Highways England and Herefordshire Council that the Journey to Work data used should be updated to the 2011 UK Census.

24. It is therefore recommended that the same is applied to the Technical Note and that 2011 UK Census data is made use of instead.

25. SYSTRA is therefore unable to agree the proposed development distributions illustrated in Table 4-3 of the Technical Note until figures derived from the latest UK Census have been provided.

26. It is important to note that any trip distribution assumptions based on highway infrastructure which is to be provided by the Holmer West development should be made with caution. The exact timescales for delivery of the link road and the new junction onto the A49 is yet to be determined and may not fit in with the timescales of this proposed development.

KIER COMMENTS

27. As Highways England Area 9 Asset Support Contractor, Kier have provided the following comments with regard to the effects of the development:

> *The proposed development is for circa 72 dwellings on land at Holmer House Farm Hereford. The site is currently an operational farmhouse with the site boundary abutting the A49. The existing farmhouse benefits a field access with the A49 sited to the northern end of a lay by. It is noted the A49 and the lay by form part of The Strategic Road Network (SRN) at this location.*

The Note considers three access scenarios, comprising:

- *Scenario 1 – A small number of dwellings accessed via the existing farm access,*
- *Scenario 2 – All 72 dwellings accessed via. the existing farm access and,*
- *Scenario 3 – A small number of dwellings via the existing farm access with the remainder accessed via the Holmer West Spine Road.*

It should be noted that the proposed development relies upon other permitted developments yet to be delivered as described below:

- *The Holmer West signalised junction with the A49 to which the spine road refers.*
- *The development, Land East of Holmer Road with regard to the speed limit reduction.*

With regard to utilising the existing farm access a conceptual access arrangement drawing has been provided which shows a simple "T" junction, albeit somewhat convoluted, formed by road markings to the existing layby.

The proposal to severely intensify the use of the existing farm access is likely to give rise to significant conflicting turning movements from and onto the A49 at a location where vehicles are exiting or entering the lay by. As a consequence, the core principles as laid out in The Circular are likely to be compromised.

28. It should also be noted that as the site abuts the SRN on the A49 all boundary issues covered in DfT Circular 02/2013 paragraphs 46 to 50 need to be taken into account by the applicant as the pre-application process progresses.

SUMMARY AND RECOMMENDATION

29. A Technical Note prepared by Phil Jones Associates (PJA) has been submitted to Highways England in respect of a proposed residential development located north of Hereford.

30. SYSTRA have reviewed the Technical Note prepared by PJA and have summarised the following comments:

- The trip rates and trip generations presented within the scoping note for both sites are considered to be acceptable. The trip rates had been previously agreed as part of the Holmer West Transport Assessment (TA), which was approved by Herefordshire Council in November 2015.
- The use of Census 2001 data has been considered unacceptable as it does not make use of the latest figures available for Journey to Work data. This issue was raised previously with the Holmer West TA and it was agreed with highways England and Herefordshire Council that the Census 2011 data is used instead.

- Additional comments regarding the inclusion of committed, local plan, and proposed development within these assessment years as per DfT Circular 02/2013 also need to be considered.
- Further considerations for junction safety should be undertaken for the existing farm access so as to measure, and potentially mitigate, any potential safety issues at this location. This could include either an amendment to the existing or a new RSA for this section of road.
- It is requested that a full list of committed developments be obtained from the Local Planning Authority and that this list be submitted to Highways England for review and agreement. These should include any proposed road improvement schemes within the vicinity of the site.
- Kier Associates have commented on the proposed access to the site, which intends to utilise the existing farm access from the A49 to the south of the development. Kier have stated that the use of this access has the potential to cause an increase in conflicting turning movements. As a consequence, the core principles as laid out in DfT Circular 02/2013 are likely to be compromised.

31. We therefore recommend that the applicant continues to engage with Highways England as the proposals progress in order to avoid any undue delay in Highways England forming its position on a formal planning application.

32. Based on the information presented, it may be necessary for the applicant to carry out modelling of the strategic road network to assess the traffic impacts of the development. This will be confirmed once we have an agreed trip distribution and assignment.

33. As the site abuts the SRN on the A49 all boundary issues covered in DfT Circular 02/2013 paragraphs 46 to 50 need to be addressed by the applicant as the pre-application process progresses.

Spatial Planning Framework Commission – Technical Note

Prepared by SYSTRA as named Sub-Consultant to AECOM under the Highways England 2016 SPA

Job No.	**GB01T17D46 78**						
Job Title	A49 Holmer House Farm, Hereford						
To	Patrick Thomas	**cc**					
Topic	A49 Holmer House Farm, Hereford – Pre-application review						
Prepared	Nick Oram	**Date**	02/03/18	**Checked**	Alan Crawford	**Date**	06/03/18
Approved	Alan Crawford	**Date**	06/03/18	**Verified**	Matthew Jopp	**Date**	07/03/18

INTRODUCTION

1. Highways England has received further information from Phil Jones Associates (PJA) (on behalf of Collins Design & Build Limited) regarding 2011 Census Journey to Work data as well as information on the use of an existing access.

2. SYSTRA and Kier have reviewed the information on behalf of Highways England.

BACKGROUND

3. Phil Jones Associates (PJA) has been appointed by Collins Design & Build Limited as transport consultants for a proposed residential development consisting of approximately 72 dwellings on what is currently the Holmer House Farm, situated 1.5 miles north of Hereford city centre, immediately adjacent to the A49 Strategic Road Network (SRN).

4. Based on indicative site plans, intentions are for the site to be accessed at two locations; a south entrance directly onto the A49 using the existing Holmer House Farm driveway, and a northern entrance which connects to the access for the Holmer West development. Based on these proposals there would be no new access on to the SRN.

5. A pre-application Transport Assessment (TA) Scoping Note, dated 12 January 2018, was sent to Highways England for review. The document made frequent reference to the previously approved TA undertaken for the Holmer West development which is situated adjacent to Holmer House Farm. From the Scoping Note Highways England concluded that the Journey to Work data should be updated to 2011 Census data.

6. Highways England received further comments from PJA on 31 January 2018 on the Census Data which explained that 2011 Census data had been used for the Journey to Work Data. However, the data that PJA referenced had not been provided to Highways England.

7. At a meeting between Highways England, PJA and SYSTRA on 21 February 2018 the following key points were covered:

- Subject to a review of the 2011 Census data used within the Holmer West distribution assessment, Highways England was content with the trip generation and distribution outlined in the PJA technical note.
- Agreement in principle for development to utilise the existing access onto the A49 for a limited development quantum.
- Highways England was willing to accept a marginal increase in vehicle movements at the existing access if a scheme could be demonstrated to provide an improvement to safety of the adjoining lay-by. A survey of the usage of the lay-by was advised.
- Highways England confirmed that wider, full scale, modelling would not be necessary due to the scale of development. However, some assessment could be required at the Starting Gate roundabout subject to later agreement of the trip distributions.
- Highways England requested that a proposed junction scheme at the existing access be sent to Kier for agreement on the suitability of design, prior to undertaking an RSA.

8. After the meeting, PJA sent a drawing of the proposed junction scheme at the existing access to Highways England along with 2011 Census data used within the Holmer West distribution assessment. The new data has been reviewed in this technical note.

PLANNING STATUS

9. The proposed development is not allocated within the adopted Herefordshire Local Plan Core Strategy (2015). However, policy HD1 indicates that a significant amount of housing will be required outside of the three major sites in the Hereford area, relying on existing committed development, windfall development and development of non-strategic sites that are allocated through a yet to be produced Hereford Area Plan or Neighbourhood Development Plans.

10. It is also noted that this site has recently been promoted as a potential non-strategic allocation in the Hereford Area Plan through the Issues and Options Paper and associated 'Call for Sites' exercise. It is therefore considered that the proposed development is not currently in line with Local Plan policy but could be at some point in the future. This is a matter that Herefordshire Council will need to advise on.

TRIP DISTRIBUTION

11. The correct appendices data from the Holmer West TA Addendum were provided to SYSTRA by PJA (Appendix E). The appendices confirmed that the trip distributions used for Holmer House Farm were derived from 2011 Census Data, which Highways England are happy with.

12. SYSTRA has reviewed the trip distribution produced in PJA's scoping note dated 12 January 2018 and agree that the proposed distributions are sensible. The Trip distribution data provided by PJA shows that the majority of

development traffic is forecast to use the A49 Starting Gate Roundabout with 93% using it in the morning peak and 95% in the evening peak. This equates to 35 and 33 two-way trips in the AM and PM peaks respectively.

LOCAL ROAD NETWORK ASSESSMENT

13. With a forecast total of 35 two-way additional trips on the Starting Gate roundabout in the morning peak and 33 two-way trips in the evening peak, there is likely to be a measurable impact on the junction.

14. Highways England require that an ARCADY junction assessment of the Starting Gate roundabout be undertaken for review. This is to assess whether any mitigation on the existing junction is required.

15. As the majority of the development traffic using the Holmer West Spine Road Access will use the proposed A49/Spine Road signalised junction, to the north of Holmer House Farm, Highways England will require a LinSig junction assessment of this. This will be to ascertain the extra impact the Holmer House Farm development will have on the proposed junction, on top of the proposed Holmer West development.

16. For access and junction assessment purposes traffic survey data is required on the layby next to the existing site access. As the layby provides parking for the adjacent church and care home specific attention will need to be given to Saturday and Sunday peaks. Contact with the church and care home will be needed to establish existing parking arrangements as well as the likely peak times for cars to be parked on the layby.

17. At this stage, as no agreement has been reached on the existing site access, Highways England will require an assessment of this junction once an appropriate junction design has been agreed.

18. For clarity, the following junction assessment scenarios are required for the AM, IP and PM peak periods:

    - 2018 Base Year;
    - Development Opening year + Committed Developments (fully built out);
    - Development Opening year + Committed Developments (fully built out) + Proposed Development (fully built out);
    - Future Year + Committed Developments (fully built out) + Local Plan Developments (fully built out);
    - Future Year + Committed Developments (fully built out) + Local Plan Developments (fully built out) + Proposed Development (fully built out).

19. The future year scenario is to be for the end of the Local Plan Period or 10 years after the opening year, whichever is greater.

20. It is appreciated that for the A49/Holmer West Spine Road junction assessment only the scenarios from opening year onwards will be feasible.

21. Further discussion is recommended on this issue.

KIER COMMENTS

22. As Highways England Area 9 Asset Support Contractor, Kier has provided the following comments with regard to the existing site access proposals. These have already been sent to PJA:

> *Regarding the proposed use of an existing farm access to support an application for a change of use of the access to serve up to 16 dwellings and comment as follows:*
>
> *Drg. No. 3168-01 is indicative and suggests the provision of road markings to achieve a simple layout junction similar to layout 3 in DMRB, TD 41/95. Notwithstanding this type of junction arrangement is likely to satisfy the requirements as laid out in Table 2/2 of the Standard its convoluted design, as it is incorporated within a lay by, leads to the suggestion that it might fail with regard to safety concerns due to the likely conflicting vehicle movements associated with its design.*
>
> *Furthermore, TD 41/95 in figure 2/1 prescribe how visibility is measured and the table in paragraph 2.2 prescribes the corresponding visibility required. Drg. No. 3168-01 is unclear in this regard. Therefore, it is not possible to ascertain if the visibility requirements as laid out in the Standard could be achieved.*
>
> *We therefore confirm that we cannot accept an "in principle design" at this stage and an RSA should not be commissioned until one has been agreed.*

SUMMARY AND RECOMMENDATION

23. Information prepared by Phil Jones Associates (PJA) has been submitted to Highways England in respect of a proposed residential development located north of Hereford.

24. SYSTRA and Kier have reviewed the information submitted by PJA and have summarised the following comments:

- Highways England accept the trip distributions used for Holmer House Farm, now that correct evidence has been provided confirming that the trip distributions were derived from 2011 Census Data.
- Highways England require that a junction assessment of the Starting Gate roundabout be undertaken for review. This is to assess whether any mitigation on the existing junction is required.
- A LinSig assessment of the proposed A49/Holmer West Spine Road junction will be required to ascertain the extra impact the Holmer House Farm development will have on the proposed junction, on top of the proposed Holmer West development.
- Traffic survey data is required on the layby next to the existing site access. Contact with the church and care home will be necessary to establish existing parking arrangements as well as the likely peak times for trips on the layby.

- A junction assessment of the existing site access will be necessary once an appropriate junction design has been agreed.
- As the proposed design for the existing site access is likely to fail with regards to safety concerns and visibility Highways England cannot accept an “in principle design” at this stage and an RSA should not be commissioned until one has been agreed.

Technical Note

Project: Holmer House Farm, Hereford

Subject: Lay-by Survey Summary

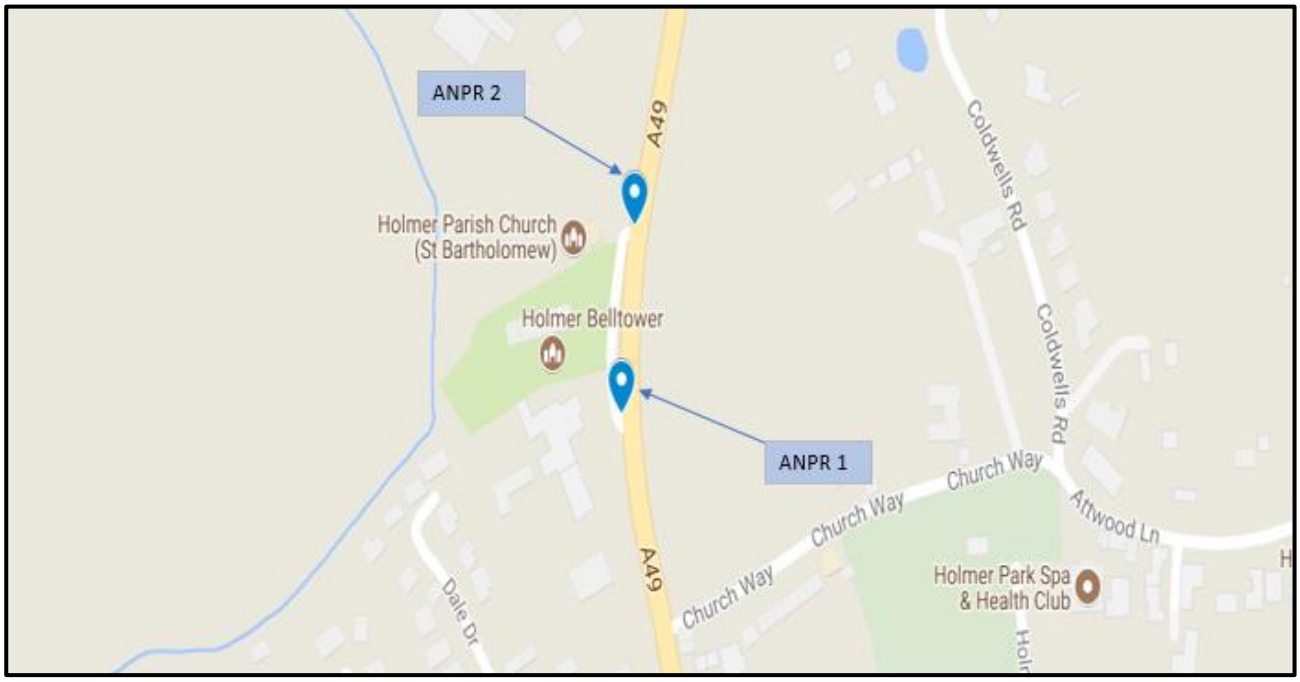
Client:	CBD Planning and Architecture	**Version:**	-
Project No:	3168	**Author:**	BL
Date:	25th April 2018	**Approved:**	SB

1 Introduction

1.1.1 At the request of Highways England, an ANPR survey has been undertaken on the A49 lay-by in order to understand existing usage and traffic movements. The purpose of this note is to quantify the existing usage of the lay-by, in order to understand the implications for the proposed access strategy for the development of Holmer House Farm.

1.1.2 The survey was undertaken between Saturday 24/03/18 and Tuesday 27/03/18 and covered the entire 96-hour period. This technical note summarises the results of the survey. Full survey results have been included within **Appendix A**.

Figure 1-1: Lay-by Survey Location



2 Lay-by Results

2.1.1 The results of the lay-by survey have been summarised in Tables 3-1 and 3-2 below.

Table 2-1: Lay-by Usage – Total Vehicles

Time	Monday	Tuesday	Saturday	Sunday
00:00-01:00	0	0	0	0
01:00-02:00	0	0	0	0
02:00-03:00	0	0	0	0
03:00-04:00	0	0	0	0
04:00-05:00	0	0	0	0
05:00-06:00	1	2	0	0
06:00-07:00	4	5	1	4
07:00-08:00	5	2	3	2
08:00-09:00	3	6	2	0
09:00-10:00	9	6	1	3
10:00-11:00	16	3	8	7
11:00-12:00	3	5	6	3
12:00-13:00	3	3	4	11
13:00-14:00	3	5	4	7
14:00-15:00	7	14	7	7
15:00-16:00	7	13	11	8
16:00-17:00	5	5	0	3
17:00-18:00	2	4	5	4
18:00-19:00	4	6	2	1
19:00-20:00	7	2	1	2
20:00-21:00	0	0	0	1
21:00-22:00	0	2	2	1
22:00-23:00	0	1	0	1
23:00-24:00	0	1	0	0
Total	**79**	**85**	**57**	**65**

2.1.2 Table 3-1 identifies that a maximum of 85 vehicles use the lay-by per day. Peak usage occurs at the following times:

- Monday – 10:00-11:00 – maximum 16 vehicles;
- Tuesday - 14:00-15:00 – maximum 14 vehicles;
- Saturday – 15:00-16:00 – maximum 11 vehicles; and
- Sunday – 12:00-13:00 – maximum 11 vehicles.

Table 2-2: Vehicle Classifications

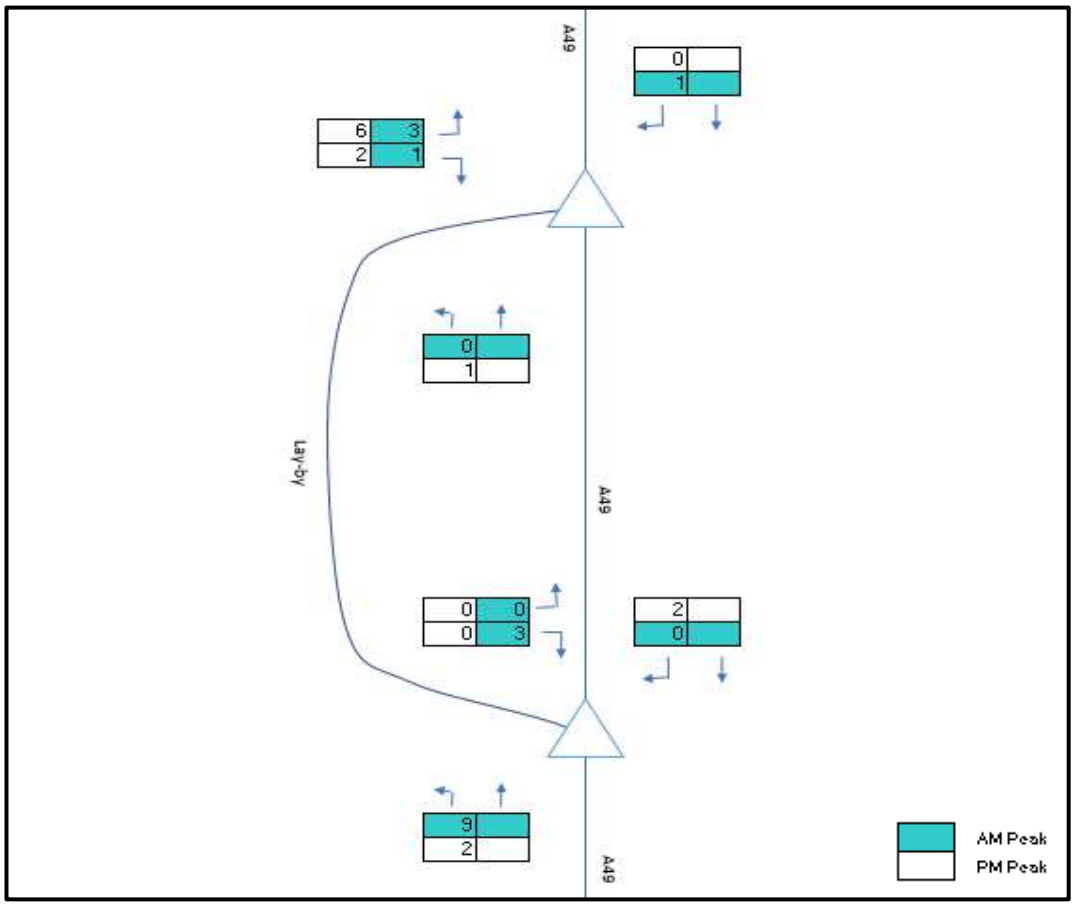
Vehicle Classification	Monday	Tuesday	Saturday	Sunday
Car	65	66	53	61
LGV	11	17	3	3
HGV	2	0	0	0
Other	0	1	0	0
Total	**78**	**84**	**56**	**64**

2.1.3 Table 3-2 identifies that the majority of vehicles using the lay-by are cars and LGV's, with limited usage by HGV's.

3 Turning Counts

3.1.1 Turning counts at each of the lay-by entrances/exits have been recorded from the survey footage. Turning counts for the Tuesday AM (08:00-09:00) and PM (17:00-18:00) peak periods have been provided in Figure 4-1 below.

Figure 3-1: Tuesday Observed Turning Counts



4 Further Observations

4.1.1 An analysis of video footage from the survey has identified a number of additional observations:

- A large proportion of arrivals from the southernmost access are visitors to the Holmer Manor Nursing Home and park within the car park, not the lay-by;
- A maximum of three vehicles were parked in the layby at any one time; and
- The lay-by is considered to act more as an access road to the Holmer Manor Nursing Home than a standard lay-by.

5 Proposed Development

5.1 Trip Generation

5.1.1 As part of the proposed development, it is proposed that up to 16 dwellings will take access from the existing farm access, located within the lay-by.

5.1.2 Table 5-1 identifies the trip generation associated with the proposals.

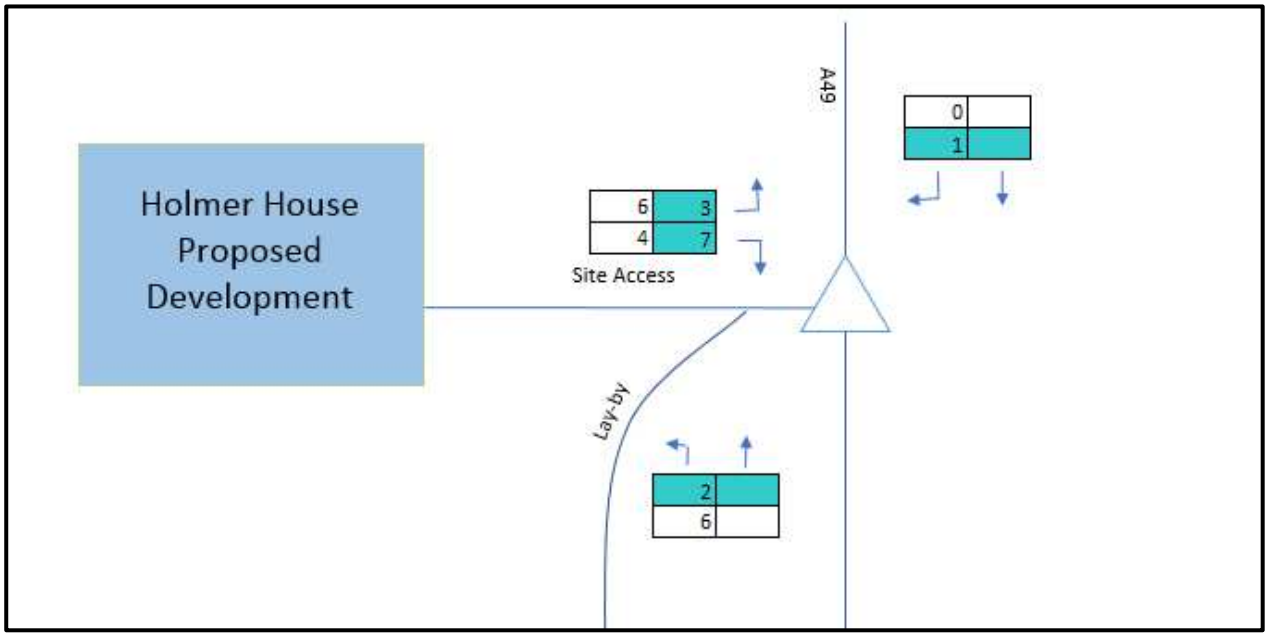
Table 5-1: Trip Rate & Subsequent Trip Generation

	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrive	Depart	Total	Arrive	Depart	Total
Consented Trip Rate (per dwelling)	0.13	0.39	0.52	0.36	0.13	0.49
Trip Generation (16 dwellings)	2	6	8	6	2	8

5.1.3 The proposals would result in an additional eight trips within the lay-by in both the AM and PM peaks.

5.1.4 These trips have been distributed onto the network, following the distribution outlined within the PJA 'Trip Generation Technical Note', dated January 2018. Figure 5-1 illustrates the total traffic flows at the proposed access junction in the AM and PM peak.

Figure 5-1: Existing Lay-By Usage + Proposed 16 Dwellings - Junction Traffic Flows



5.1.5 The proposed development would result in a maximum of 12 two-way vehicle trips through the junction in the AM peak and 16 in the PM peak. This level of trips is not considered to be significant.

5.2 Net Trip Generation

5.2.1 As stated within the PJA Trip Generation Technical Note, dated January 2018, issued to Highways England previously, the current farm buildings and farmhouse could generate traffic movements equivalent to that of approximately six dwellings, without intensification. Therefore, it is considered that the net trip impact would be equivalent to that of 10 dwellings.

Table 5-2: Net Trip Generation

	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrive	Depart	Total	Arrive	Depart	Total
Net Trip Generation (10 dwellings)	1	4	5	4	1	5

5.2.2 The proposals would result in five net trips within the lay-by in both the AM and PM peaks. This level of trip generation is not considered to have a significant impact on the operation or safety of the junction.

6 Summary

6.1.1 This technical note summarises the results of an ANPR survey undertaken on a lay-by adjacent to the A49, Hereford. The contents of this note will be used to inform access strategy discussions with Highways England.

Beth Linnell

From: Wilcox, Heather <Heather.Wilcox@highwaysengland.co.uk>
Sent: 10 May 2018 17:52
To: Beth Linnell
Cc: Jaffier, Robert; Timothy, Richard; AECOM Inbox (Midlandsspa.europe@aecom.com); Jopp D, Matthew; 'kgibbons@herefordshire.gov.uk'
Subject: A49 - Holmer House Farm - Lay-by Survey Technical Note

Categories: Filed by Newforma

Good afternoon Beth

Thank you for providing a Technical Note regarding the Lay-by Survey for the proposed development at Holmer House Farm, Hereford on 27 April 2018. We have reviewed the Technical Note and have the following comments:

The survey period considers ANPR data recorded over a continuous 4 day period between Saturday 24 March and Tuesday 27 March and demonstrates that a maximum of 85 daily trips uses the layby. This is understood to comprise both of vehicles stopping at the layby as well as those accessing a number of nearby properties. On an hourly basis a peak of 16 vehicles in a single hour was observed on Monday between 10 and 11am. The survey data appears to show that peak hours for the lay-by use do not correlate with typical hours of A49 peak flow.

As the survey demonstrates a relatively low volume of recorded traffic flow, a higher margin of error is likely to exist. This is compounded by the relatively short survey period (4 days) and the nature of differences between the weekday and weekend profile of traffic data. These weaknesses in the survey data collected are not acknowledged in the Technical Note and should be considered when analysing the traffic data for use in any further assessment.

The note provides a comparison between the survey data and the agreed development traffic generation during the SRN AM and PM peak hours. The ‘net’ development trips (increase in flow) for the weekday AM and PM peak hours is calculated as 5 trips for both the AM and PM peaks, which is accepted. The survey data shows there are currently between 3 and 6 trips during the weekday AM and PM peaks.

During the A49 peak hours the result of the development traffic + existing layby use would therefore be expected to double the existing peak hour flow to approximately 11 trips per hour. This remains lower than the recorded present off peak maximum of 16 trips but would occur at times when a higher flow would be expected on the A49 mainline. It is particularly of note that approximately 1 vehicle during the peak hour is anticipated to turn right from the A49 southbound to the site access. This flow would conflict with lay-by merging traffic and needs to be carefully considered in the further safety risk assessment.

No figures are provided for traffic generation during the off-peak hours or for the total daily traffic generation. As such the off peak impact cannot therefore be determined. It is recommended that the traffic generation data for the off peak and the total daily flow are presented for comparison to the survey data.

The survey data confirms that the traffic volumes presented will not necessitate use of traffic modelling to assess the development impacts on the A49. Nonetheless the Technical Note confirms significant intensification of use of the lay-by access would arise. Following previous Highways England comments that a full geometric review of the access/layout/junction arrangements in accordance with DMRB is required, we would emphasise that this should provide evidence of an appropriate engineering options assessment being undertaken and that a safety risk assessment conforming to DMRB GD 04/12 requirements is required to be undertaken.

Any subsequent engineering proposals will be subject to the requirements for a Road Safety Audit and, if retaining the access from the rear of the layby, then it is also a likely requirement that a Departures from Standard approval will subsequently be required. 'Approval in principal' for any Departures should therefore be obtained from Highways England's Safety Engineering and Standards (SES) directorate.

I trust the above comments provide helpful guidance on the further information that Highways England will require, but if you have any questions about these comments, please don't hesitate to contact me.

Kind regards

Heather

Heather Wilcox, Asset Manager, Worcestershire
Highways England | The Cube | 199 Wharfside Street | Birmingham | B1 1RN
Tel: 0300 470 7882 | **Mobile:** 07849 078819
Web: http://www.highways.gov.uk

From: Beth Linnell [mailto:beth@philjonesassociates.co.uk]
Sent: 27 April 2018 10:53
To: Thomas, Patrick <Patrick.Thomas@highwaysengland.co.uk>; Martyn Sutton <Martyn.Sutton@kier.emhighways.co.uk>
Cc: noram1@systra.com; Steve Bates <steve@philjonesassociates.co.uk>
Subject: Holmer House Farm - Lay-by Survey Technical Note

Hi Patrick and Martyn,

Please find attached a Technical Note summarising the results of a survey of the A49 lay-by. I would be grateful if you could both review the note in order for us to progress discussions regarding access to the Holmer House Farm development.

Many thanks,

Beth
Beth Linnell
Graduate Consultant
www.philjonesassociates.co.uk

Seven House, 18 High Street, Longbridge, Birmingham, B31 2UQ

T. 0121 475 0234

PHIL JONES ASSOCIATES

Offices in Birmingham, London, Reading, Bristol and Exeter
Part of the PJA group of companies - Multimodal - PJA Engineering

Highways England Company Limited | General enquiries: 0300 123 5000 |National Traffic Operations Centre, 3 Ridgeway, Quinton Business Park, Birmingham B32 1AF | *https://www.gov.uk/government/organisations/highways-england* **|** *info@highwaysengland.co.uk*

Registered in England and Wales no 9346363 | Registered Office: Bridge House, 1 Walnut Tree Close, Guildford, Surrey GU1 4LZ

Appendix B Indicative Masterplan

1 PC-Proposed site plan

1 : 500

Collins Design & Build & Project Management

UNIT 5, WESTWOOD INDUSTRIAL ESTATE, PONTRILAS, HEREFORD, HR2 0EL
TEL: 01981 240682 FAX: 01981 242926

TITLE
Proposed development at Holmer House Farm

CUSTOMER	DRN gcm	JOB No. 5057
SITE ADDRESS Holmer House Farm Holmer, Hereford	DATE 3.12.18	DRG No. 5057-8
	SCALE 1 : 500	Paper size A1

Scale 1:1250 @A1
0m 25 50 75 100 125m

Scale 1:500 @A1
0m 10 20 30 40 50m

Scale 1:200 @A1
0m 4 8 12 16 20m

Scale 1:100 @A1
0m 2 4 6 8 10m

Appendix C Site Access Drawings

A3 1:250 4 6 8 10 12 14 16 18

NOTES

These drawings have been produced with reference to the CDM Regulations 2015. Please note that these are pre-construction phase drawings and should be subject to further design risk management as required in accordance with Regulation 9

REV	DATE	REVISION NOTE	BY

PJA
Seven House · High Street
Longbridge · Birmingham
B31 2UQ · Tel: 0121 475 0234
London · Birmingham
Bristol · Reading · Exeter
www.pja.co.uk

CLIENT
CDB Planning and Architecture

PROJECT
Holmer House Farm
Redevelopment

DRAWING TITLE
Holmer Spine Road
Access Drawing

DRAWING ISSUE STATUS
INFORMATION

JOB CODE	SUB-CODE	DRAWING NO.	REVISION
3168	- TR -	02	- P

Revision Letter : P - Prelim / T - Tender / C - Construction

SCALE	DRAWN	REVIEWED	DATE
A3@ 1:500	JT	SB	15/05/18

Appendix D Swept Path Analysis

A3

1:750 10 20 30 40 50

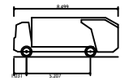
N

W E

S

NOTES

These drawings have been produced with reference to the CDM Regulations 2015. Please note that these are pre-construction phase drawings and should be subject to further design risk management as required in accordance with Regulation 9



Hino 338 M + Wayne Royal GT14 Refuse Truck	
Overall Length	8.499m
Overall Width	2.451m
Overall Body Height	3.197m
Min Body Ground Clearance	0.402m
Track Width	2.451m
Lock to lock time	6.00s
Kerb to Kerb Turning Radius	8.352m

Cycle storage

Refuse collection point

15

16

17

14

13

12

Plots 1-7

Refuse collection point

Holmer House Farm

Masterplan Layout provided by Collins Design & Build & Project Management.
Ref : *'Holmer House-Detailed site-5057-13 - General Site Plan'*

REV	DATE	REVISION NOTE	BY

PJA

Seven House · High Street
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CLIENT

Collins Design & Build

PROJECT

Holmer House farm Redevelopment

DRAWING TITLE

Vehicle Tracking (8.5m Refuse Vehicle)

DRAWING ISSUE STATUS

INFORMATION

JOB CODE	SUB-CODE	DRAWING NO.	REVISION
3168	-	03	-

Revision Letter : P - Prelim / T - Tender / C - Construction

SCALE	DRAWN	REVIEWED	DATE
A3@ 1:750	JAL	BL	19.12.18

Appendix E VISSIM Modelling Appraisal Report

Reference number GB01T18E20

HOLMER HOUSE FARM DEVELOPMENT APPRAISAL

SYSTRA

IDENTIFICATION TABLE	
Client/Project owner	Collins Design & Build
Project	**Holmer House Farm Development Appraisal**
Study	Model Review
Type of document	Draft Technical Analysis Report
Date	13/08/2018
File name	
Reference number	GB01T18E20
Number of pages	33

TABLE OF CONTENTS

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LIST OF APPENDICES

1. INTRODUCTION

1.1 Background

1.1.1 SYSTRA has been commissioned by Phil Jones Associates (PJA) on behalf of Collins Design and Build to undertake a development impact assessment of the proposed Holmer House Farm (HHF) residential development in north Hereford. The development has direct connections with the A49 and A4103 Roman Road.

1.1.2 The HHF development consists of the 110 dwellings, trip generation was provided by PJA as presented in **Error! Reference source not found.** below. Figure 1 below illustrated the development site.

Table 1. Development Traffic (vehs)

Access Split – Trip Generation	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	Arrive	Depart	Total	Arrive	Depart	Total
Cul-de-sac (10 dwellings)	1	4	5	4	1	5
Remaining (100 dwellings)	13	39	52	36	13	49
Total (110 dwellings)	14	43	57	40	14	54

1.1.3 This assessment utilises the Highways England Hereford VISSIM model developed by JMP (now SYSTRA) for a 2014 Base Year. This model has been reviewed by WSP-PB on behalf of Herefordshire Council (HC) and is considered as suitable for the assessment of infrastructure interventions and development impact assessments.

1.1.4 The following Technical Note (TN) provides an overview of the study, scenarios developed and the subsequent assessment of the proposed HHF development. This document should be read in conjunction with JMP's initial technical note: Holmer West Development Impact Assessment Modelling 2017 & 2022, February 2015, as this provides further background to the study. A copy of this document is provided in Appendix A.

1.1.5 It should be noted, that due to SYSTRA's role on the Highways England's West Midlands Spatial Framework (HEWMSP), the analysis of the development impact assessment is based on a factual presentation of the results and excludes any interpretation.

Figure 1. Holmer House Farm Development Access

1.1.6 The assessment is required to establish the impact of the development demand against a set scenario which includes all consented development, for the AM (07:30-09:30) and PM (16:30-18:30) peak periods, in accordance with planning guidance. The assessment considers the following years and forecast scenarios:

- 2018 Base Year;
- 2023 Opening Year + Committed Development;
- 2023 Opening Year + Committed Development + Proposed Development;
- 2031 Forecast Year + Committed Development; and
- 2031 Forecast Year + Committed Development + Proposed Development.

1.1.7 Within this document we have set out the following topics:

- methodology;
- model inputs; and
- development impact assessment.

1.2 Methodology

1.2.1 The model used was built and assigned using the microsimulation package VISSIM, version 9.00-06. The model covers the area illustrated in Figure 2 below.

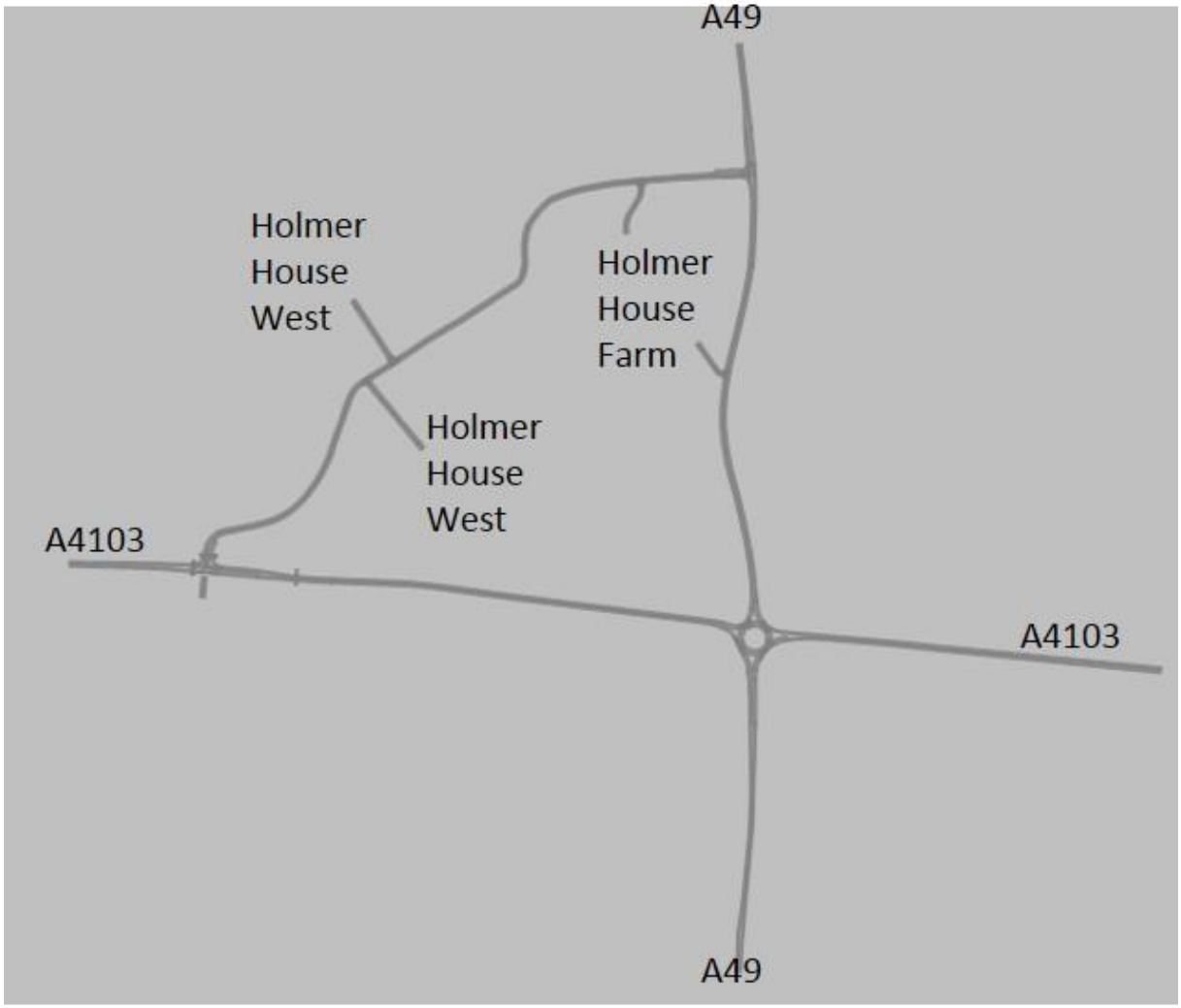


Figure 2. Modelled Extent

1.2.2 The project took the existing base Highways England Hereford VISSIM model and created a cordon of the A49 Starting Gate roundabout and associated development access points. The base model was cut just to the north of the A49 Homer Road junction with Old School Lane. Any traffic to the south of this junction not routing through our new cordoned area has been removed from the matrices used to assign the traffic flows within the modelling. Traffic

routing to and from the South (ie Hereford town centre) to or from the remaining network extents is kept within the assigned matrices.

1.2.3 The boundaries of the model are as follows:

- A49 Homer Road
- A4103 Roman Road; and
- Development link Road.

1.2.4 The model covers the following peak hours based on a 2 hour peak period simulation:

- AM peak hour (08:00-09:00)
- PM peak hour (17:00-18:00)

1.2.5 Under instruction from PJA, the development link road is open to through traffic, thus allowing an alternative route for traffic routing to/from the north/west.

1.2.6 The VISSIM model uses the following vehicle classes:

- Cars;
- Light Goods Vehicles (LGVs);
- Other Goods Vehicles Class 1 (OGV1); and
- Other Goods Vehicles Class 2 (OGV2).

1.2.7 The existing base model has already been signed off as a calibrated and validation base model by Highways England and independently checked by auditing consultants WSP-PB for Herefordshire Council. No further changes to the base VISSIM network have been undertaken other than the get the model into format ready for cordoning as per the project brief.

1.2.8 A summary of the modelled years and scenarios is provided below:

Scenario 1 - 2018 Base Year;

- TEMPRO factors applied to existing base 2014 Matrices; and
- Development Link Road modelled with through routing permitted.

Scenario 2 2023 Opening Year + Committed Development;

- 2023 TEMPRO factors applied to existing 2022 Matrices;
- Development Link Road modelled with through routing permitted; and
- Committed Developments from Holmer West included and other areas of Hereford which originate or destinates within our modelled area.

Scenario 3 2023 Opening Year + Committed Development + Proposed Development;

- As Scenario 2 but with Holmer House Farm traffic added.

Scenario 4 2031 Forecast Year + Committed Development; and

- As Scenario 2 but 2031 TEMPRO factors applied to 2023 traffic.

Scenario 5 2031 Forecast Year + Committed Development + Proposed Development.

- As Scenario 4 but with Holmer House Farm traffic added.

1.2.9 No changes to the existing signalised junction at either end of the Development Link Road have been made. A summary of the matrix totals used in the assignment is provided in Table 2 and Table 3 below. In line with previous modelling, only a growth in car trips is noted. The tables note that an increase of 57 vehicles is noted as a result of the proposed development in with the AM peak period within both the 2023 and 2031 forecast scenarios. The PM proposed development is noted as being 54 in both scenarios, this is in line with the development totals noted in Table 1.

1.2.10 The following committed infrastructure are contained within the existing 2022 models and hence their impact is included within the cordoned model used in our forecast years (2023 and 2031):

- South Wye Link Road (Drawing N^{o} 3512983A-HHR)
- City Centre Transport Package – City Centre Link Road

1.2.11 Our modelling uses the same assumption as contained within the Holmer West Development Impact modelling programme, the matrices have been cordoned from the larger model. Although proposed development traffic volumes have been provided, the traffic pattern is based on the adjacent Holmer West zones. Further information of the Holmer West Development Assumptions can be found in section 4 of Appendix A.

Table 2. Modelled Peak Period

Vehicle Type	AM Peak (08:00-09:00)				
	Base Year 2018	2023 Opening Year + Committed Development	2023 Opening Year + Committed Development + Proposed Development	2031 Opening Year + Committed Development	2031 Opening Year + Committed Development + Proposed Development
Car	2,882	3,291	3,348	3,460	3,517
LGV	421	439	439	462	462
OGV1	50	53	53	55	55
OGV2	42	43	43	46	46
TOTAL	3,395	3,825	3,882	4,023	4,080

Table 3. Modelled Peak Period

Vehicle Type	PM Peak (17:00-18:00)				
	Base Year 2018	2023 Opening Year + Committed Development	2023 Opening Year + Committed Development + Proposed Development	2031 Opening Year + Committed Development	2031 Opening Year + Committed Development + Proposed Development
Car	2,797	3,549	3,603	3,730	3,784
LGV	264	275	275	289	289
OGV1	72	75	75	79	79
OGV2	49	51	51	53	53
TOTAL	3,182	3,950	4,004	4,151	4,205

It should be noted in both the AM and PM models, the Hereford VISSIM model actually covers a 30 minute pre and post peak hour period, which is set as 40% of the peak hour demand for the development trips.

2. DEVELOPMENT IMPACT ASSESSMENT

2.1 Overview

2.1.1 In order to simplify the presentation of the assessment results, each scenario has been presented in a combined format.

2.1.2 The model analysis presents the following information:

- Network Performance Statistics;
- Junction Performance Analysis;
- Queue Length Analysis; and
- Journey Time Analysis.

2.1.3 Comparisons are focused on the impact of the development traffic for the two forecast year scenarios 2023 and 2031.

2.2 Network Performance Statistics

2.2.1 The VISSIM model produces a series of set network performance indicators for the modelled peak hour from the assignment. The comparison of these indicators is a representation of the change in the overall network conditions during the peak hour between the scenarios.

2.2.2 The following indicators have been extracted and compared for the set scenarios:

- Demand (vehs);
- No of Vehicles in Assignment (vehs);
- Total Travel Time (hrs);
- Total Distance Travelled (km);
- Average Travel Time (mins);
- Average Distance Travelled (km);
- Average Speed (kph);
- Average Delay (secs);
- Total Delay (hrs);
- % Total Travel Time Delay (%); and
- Unassigned Vehicles (vehs).

2.2.3 The network performance statistics for the comparison of all the scenarios is contained below in Table 4 and Table 5.

2.2.4 Analysis shows that the growth in traffic between the 2023 Opening Year + Committed Development and 2018 base year model is as expected and that traffic levels increase along with travel time, distance travelled and delay. Average speed is shown to decrease. In both time periods, the results show that there are some unassigned vehicles not being able to load onto the network.

2.2.5 The effects of the proposed development indicate that additional vehicles are being assigned, which leads to a minor increase in travel time, distances travelled. Average speed and average

delay remain consistent within the AM Peak, however the PM Peak notes a minor reduction in average delay when compared to the same forecast year (2023) without the proposed development.

2.2.6 Analysing the proposed development in 2031, shows that within the AM Peak hour there is a minor reduction in total travel time and delay (average and total), minor increase in distance travelled. The results indicate that there is a slight increase in unassigned vehicles. The PM Peak generally shows a marginal increase in travel time, distance travelled and average delay. Again unassigned vehicles increase.

2.2.7 In summary, the addition of proposed development traffic causes minor inconveniences to the network, however the impact is thought to be negligible based on the modelled results. The results show a number of unassigned vehicles not being able to be loaded onto the network, this can point to the model junctions not operating at their most optimum.

Table 4. Key Performance Indicatory Summary AM Peak Period (all vehicle types)

Indicator	2018 Base Year	2023 Opening Year + Committed Development	2023 Opening Year + Committed Development + Proposed Development	2031 Opening Year + Committed Development	2031 Opening Year + Committed Development + Proposed Development
Demand (vehs)	3,395	3,825	3,882	4,023	4,080
*No of Vehicles in Assignment (vehs)	3,482	3,897	3,969	4,042	4,096
*Total Travel Time (hrs)	129	168	171	194	188
*Total Distance Travelled (km)	4,286	4,749	4,834	4,898	4,971
*Average Travel Time (mins)	2	3	3	3	3
*Average Distance Travelled (km)	1	1	1	1	1
*Average Speed (kph)	33	28	28	25	26
*Average Delay (secs)	39	61	61	79	72
*Total Delay (hrs)	38	66	67	89	81
*% Total Travel Time Delay (%)	0	0	0	0	0
Unassigned Vehicles (vehs)	0	21	11	73	81

Table 5. Key Performance Indicatory Summary PM Peak Period (all vehicle types)

Indicator	2018 Base Year	2023 Opening Year + Committed Development	2023 Opening Year + Committed Development + Proposed Development	2031 Opening Year + Committed Development	2031 Opening Year + Committed Development + Proposed Development
Demand (vehs)	3,182	3,950	4,004	4,151	4,205
*No of Vehicles in Assignment (vehs)	3,515	3,910	3,958	3,831	3,879
*Total Travel Time (hrs)	134	183	182	171	175
*Total Distance Travelled (km)	4,303	4,780	4,816	4,628	4,676
*Average Travel Time (mins)	2	3	3	3	3
*Average Distance Travelled (km)	1	1	1	1	1
*Average Speed (kph)	32	26	26	27	27
*Average Delay (secs)	43	75	72	69	70
*Total Delay (hrs)	42	81	80	73	75
*% Total Travel Time Delay (%)	0	0	0	0	0
Unassigned Vehicles (vehs)	0	173	125	216	240

2.3 Junction Performance Analysis

2.3.1 In terms of the junction performance results, the analysis contains the following information for the 2018 Base Year, the subsequent scenarios. This analysis is based on the junctions as a whole and the individual turning movements.

- Total traffic volumes (vehicles);
- Weighted Average delay (seconds);
- Average delay Level of Service (LOS);
- Maximum delay (seconds); and
- Maximum delay Level of Service (LOS).

2.3.2 The detailed junction performance results are presented in Appendix B and have been provided in spreadsheet format. A summary of the total traffic volumes are presented in Table 6 below.

2.3.3 It should be noted, that the Level of Service (LOS) analysis is based on principals within the USA Highway Capacity Manual (HCM) 2010 and is not directly applicable to the UK road network or conditions. Therefore, the analysis is presented as a recognised indicator for change in junction conditions only.

Total traffic volumes (vehicles)

2.3.4 Table 6 illustrates the increased levels of traffic associated with the proposed developments, specifically within the AM Peak. Table 7 reveals that 2023 processes a higher number of vehicles than 2031, this indicates that in 2031 PM Peak Opening Year + Committed Development scenario there are traffic issues. This is also highlighted within the Network Performance Statistics whereby a number of unassigned vehicles are unable to be released into the network. As expected in both forecast year scenarios: 2023 and 2031, both junctions on the Holmer access road increase in flow.

Table 6. AM Total Traffic Volume (vehs)

Site	2018 Base Year	2023 Opening Year + Committed Development	2023 Opening Year + Committed Development + Proposed Development	2031 Opening Year + Committed Development	2031 Opening Year + Committed Development + Proposed Development
Starting Gate R'bout	3,118	3,429	3,491	3,528	3,583
Holmer Southern Access	1,890	1,996	2,016	2,062	2,065

Holmer Northern Access	1,283	1,598	1,649	1,674	1,730
Total	6,291	7,023	7,156	7,264	7,378

Table 7. PM Total Traffic Volume (vehs)

Site	2018 Base Year	2023 Opening Year + Committed Development	2023 Opening Year + Committed Development + Proposed Development	2031 Opening Year + Committed Development	2031 Opening Year + Committed Development + Proposed Development
Starting Gate R'bout	3,018	3,347	3,348	3,174	3,213
Holmer Southern Access	1,824	2,002	2,011	2,015	2,010
Holmer Northern Access	1,501	1,726	1,784	1,654	1,701
Total	6,343	7,075	7,143	6,843	6,924

Weighted Average delay (seconds)

2.3.5 The impact of the proposed development within the AM Peak for both forecast scenarios (20232 and 2031) indicates that at both the Starting Gate Roundabout and the Northern access, minor increases are expected. At the Southern access, a slight reduction in noted. The PM Peak indicates no change at the roundabout, however increases are shown at both the Northern and Southern access. Tables 8 and 9 present a summary of the results.

Table 8. AM Weighted Average Delay (secs)

Site	2018 Base Year	2023 Opening Year + Committed Development	2023 Opening Year + Committed Development + Proposed Development	2031 Opening Year + Committed Development	2031 Opening Year + Committed Development + Proposed Development
Starting Gate R'bout	13	15	16	15	16

Holmer Southern Access	22	38	34	37	33
Holmer Northern Access	12	11	12	10	11

Table 9. PM Weighted Average Delay (secs)

Site	2018 Base Year	2023 Opening Year + Committed Development	2023 Opening Year + Committed Development + Proposed Development	2031 Opening Year + Committed Development	2031 Opening Year + Committed Development + Proposed Development
Starting Gate R'bout	11	16	16	16	16
Holmer Southern Access	21	21	30	21	31
Holmer Northern Access	30	30	32	30	31

Average delay Level of Service (LOS);

2.3.6 Using the HCM descriptions, LOS values have been attributed to each junction. The impact of the proposed development in 2023 shows that there is a reduction in LOS at Starting Gate Roundabout and Holmer Northern access in the AM Peak. No change is noted with the proposed development in 2031 at the roundabout, however the other junction mirror the change in 2023.

2.3.7 The PM Peak generally remains constant with the addition of the proposed development traffic for both forecast years, with the exception of the Southern access with reduces slightly. Tables 10 and 11 present a summary of the results.

Table 10. AM Average Delay Level of Service (LOS)

Site	2018 Base Year	2023 Opening Year + Committed Development	2023 Opening Year + Committed Development + Proposed Development	2031 Opening Year + Committed Development	2031 Opening Year + Committed Development + Proposed Development

Starting Gate R'bout	B	B	C	B	B
Holmer Southern Access	C	D	C	D	C
Holmer Northern Access	B	A	B	A	B

Table 11. PM Average Delay Level of Service (LOS)

Site	2018 Base Year	2023 Opening Year + Committed Development	2023 Opening Year + Committed Development + Proposed Development	2031 Opening Year + Committed Development	2031 Opening Year + Committed Development + Proposed Development
Starting Gate R'bout	A	C	C	C	C
Holmer Southern Access	B	B	C	B	C
Holmer Northern Access	C	C	C	C	C

Maximum delay (seconds)

2.3.8 The impact of the proposed development in both forecast years shows that there is a no change in maximum delay at Starting Gate Roundabout, reductions are noted at the Southern Access, whereas slight increases are noted at the Northern access within the AM Peak.

2.3.9 The PM Peak shows increased delay at the Southern access with the introduction of the proposed development traffic in both forecast years. The Northern access show minimal changes. Delay at the roundabout is show in increase slightly in 2023, however in 2031, a slight reduction occurs with the proposed development included. Tables 12 and 13 present a summary of the results.

Table 12. AM Maximum Delay (secs)

Site	2018 Base Year	2023 Opening Year + Committed Development	2023 Opening Year + Committed Development + Proposed Development	2031 Opening Year + Committed Development	2031 Opening Year + Committed Development + Proposed Development
Starting Gate R'bout	31	30	30	36	34
Holmer Southern Access	94	289	200	334	306
Holmer Northern Access	28	32	37	31	38

Table 13. PM Maximum Delay (secs)

Site	2018 Base Year	2023 Opening Year + Committed Development	2023 Opening Year + Committed Development + Proposed Development	2031 Opening Year + Committed Development	2031 Opening Year + Committed Development + Proposed Development
Starting Gate R'bout	22	29	31	32	29
Holmer Southern Access	118	102	239	175	206
Holmer Northern Access	102	99	99	116	118

Maximum delay Level of Service (LOS).

2.3.10 The impact of the proposed development in both forecast years shows that there is a no change in maximum delay LOS at Starting Gate Roundabout and the Southern Access, whereas the Northern access show reduction in LOS within the AM Peak. The PM Peak reveals no change in either of the forecast year comparisons. Tables 14 and 15 present a summary of the results.

Table 14. AM Maximum LOS

Site	2018 Base Year	2023 Opening Year + Committed Development	2023 Opening Year + Committed Development + Proposed Development	2031 Opening Year + Committed Development	2031 Opening Year + Committed Development + Proposed Development
Starting Gate R'bout	D	D	D	D	D
Holmer Southern Access	F	F	F	F	F
Holmer Northern Access	C	C	D	C	D

Table 15. PM Maximum LOS

Site	2018 Base Year	2023 Opening Year + Committed Development	2023 Opening Year + Committed Development + Proposed Development	2031 Opening Year + Committed Development	2031 Opening Year + Committed Development + Proposed Development
Starting Gate R'bout	C	D	D	D	D
Holmer Southern Access	F	F	F	F	F
Holmer Northern Access	F	F	F	F	F

2.4 Journey Time Analysis

2.4.1 Journey routes used within the base model are no longer relevant for the purposes of the cordoned model. As a result, new journey time routes have been developed to cater for comparison purposes.

2.4.2 The journey time routes stretch from the model extents, results are presented for the following routes:

- Route 1 – A49 North to A4103 East;
- Route 2 – A49 North to A49 South;

- Route 3a – A49 North to A4103 West (via Starting Gate Roundabout);
- Route 3b – A49 North to A4103 West (via Development Road);
- Route 4 – A4103 East to A49 South;
- Route 5 – A4103 East to A4103 West;
- Route 6 – A4103 East to A49 North;
- Route 7 – A49 South to A4103 West;
- Route 8 – A49 South to A49 North;
- Route 9 – A49 South to A4103 East;
- Route 10a – A4103 West to A49 North (via Starting Gate Roundabout);
- Route 10b – A4103 West to A49 North (via Development Road);
- Route 11 – A4103 West to A4103 West; and
- Route 12 – A4103 West to A49 South.

2.4.3 Caution should be used when interpreting the journey times associated with routes 3a/3b and 10a/10b. Both routes have been split to determine the number of vehicles and the associated time segments of routing via Starting Gate Roundabout and Development Road. Analysis of the route 3a and 10a have shown no or little vehicles using Starting Gate Roundabout to complete their journeys, where no vehicles are recording, no journey time is recorded.

2.4.4 As expected, analysis of the journey times shows general increases when comparing 2023 and 2018, overall an 18 % is noted in the AM Peak and 14% within the PM Peak.

2.4.5 The impact of the proposed development in the AM Peak reveals that overall journey times will marginally reduce in 2023, however there are noticeable increase from the A49 North to all routes via Starting Gate Roundabout. The remainder of the routes show minor fluctuations. The corresponding PM Peak generally shows an increase in overall journey times, however this is mainly associated with the A49 North to A4103 West (via the Development Road).

2.4.6 Analysis of the proposed development in 2031 indicates that overall there will be a minor reduction in journey time in the AM Peak, this follows a similar pattern to 2023, whereby from A49 North to A4103 West (via the Development Road) reductions are noted. The PM Peak generally shows a reduction in times from the A49 North to all destinations except via the Development Road to the A4103 West, where an increase in noted. Within the graphs we have used the following notifications within Table 16.

Table 16. Scenarios

Scenario	Description
BY 2018	2018 Base Year
SC2 2023 OY_CD	2023 Opening Year + Committed Development
SC3 2023 OY_CD_PD	2023 Opening Year + Committed Development + Proposed Development
SC4 2031 OY_CD	2031 Opening Year + Committed Development

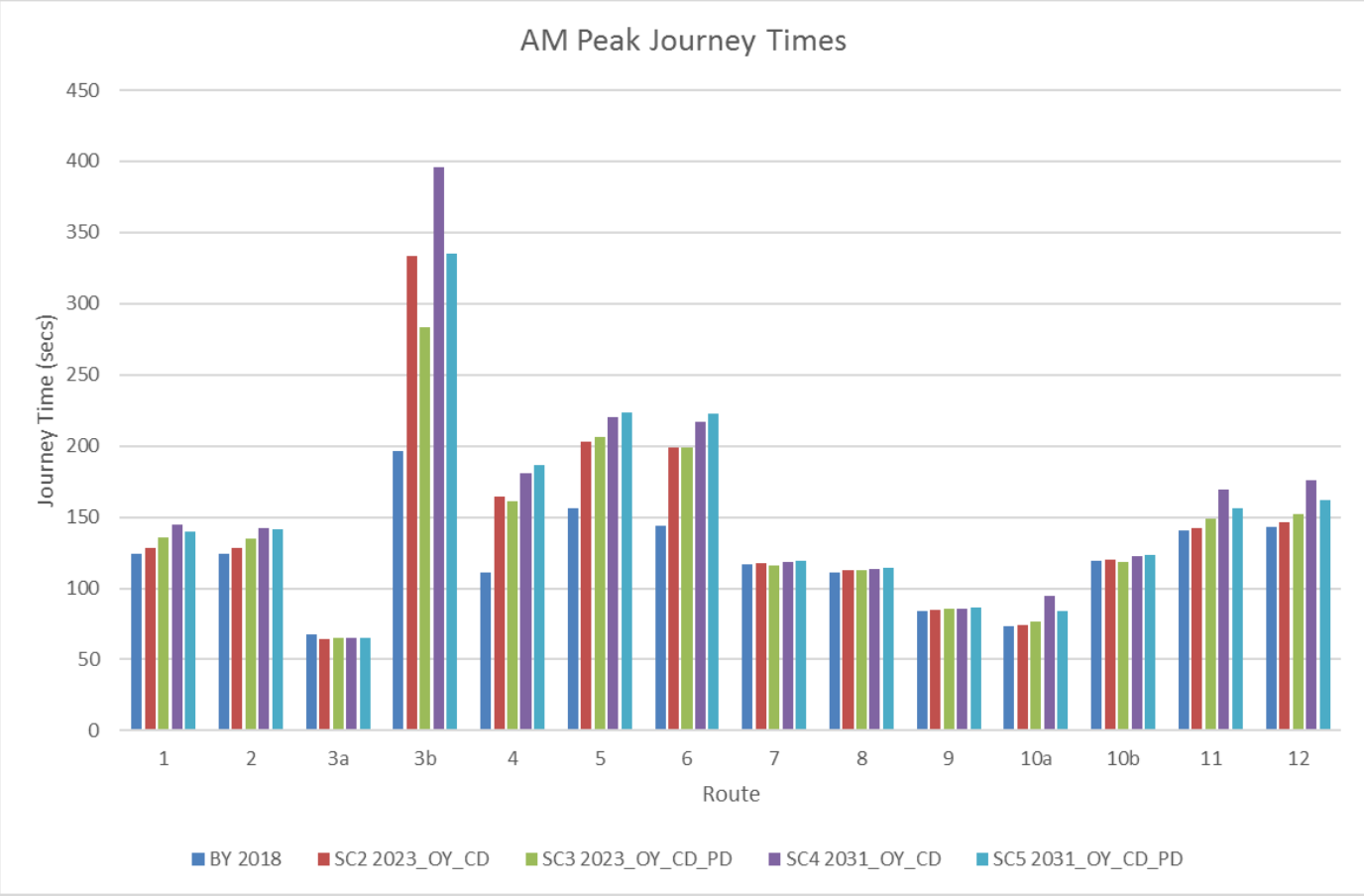


Figure 3. AM Peak Hour Journey Times

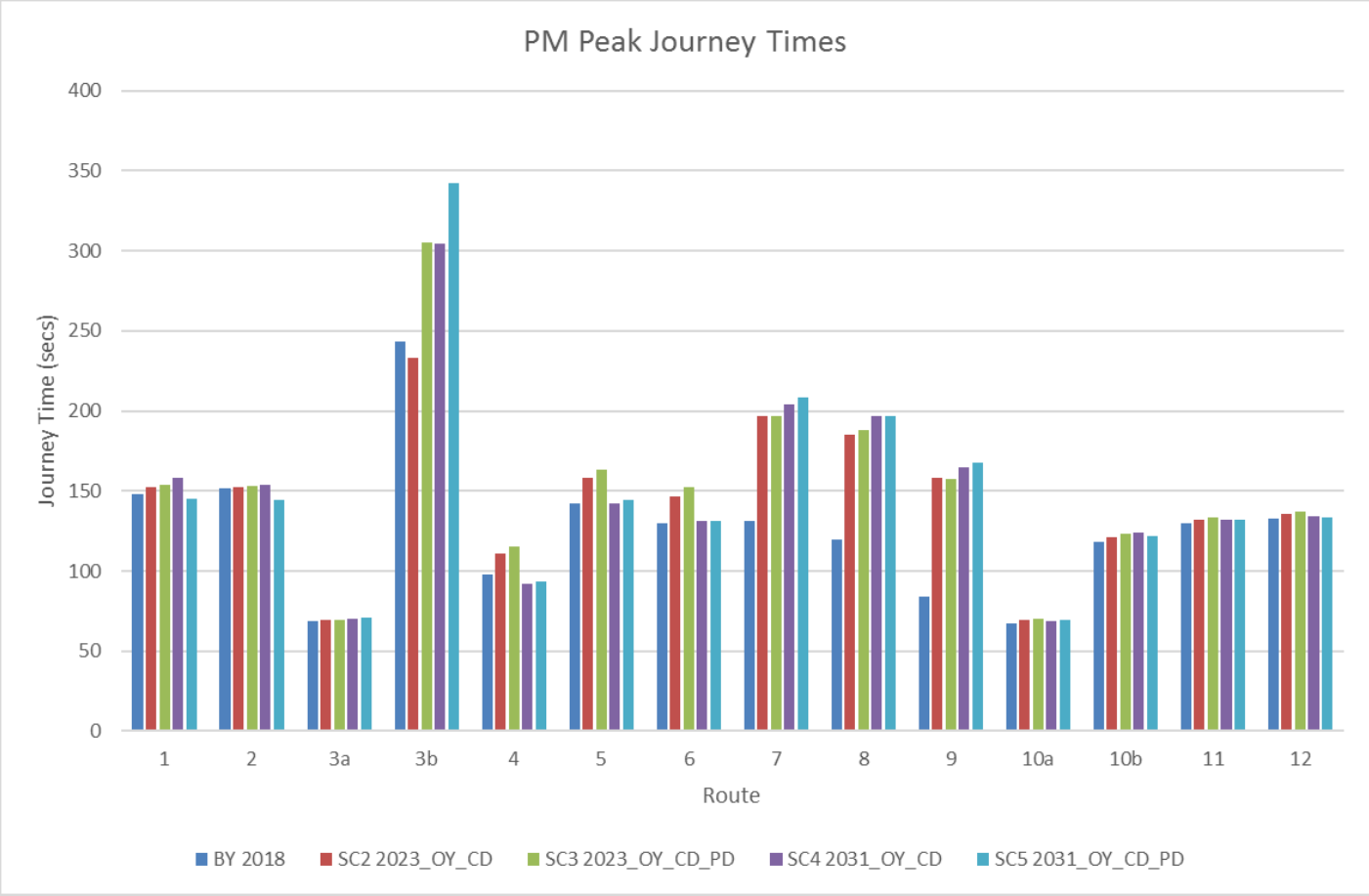


Figure 4. PM Peak Hour Journey Times

2.5 Queue Length Analysis

2.5.1 The micro-simulation model enables the detailed assessment of the variability in network conditions based on queued vehicles at the junction in the assignment.

2.5.2 The following information has been extracted from the model assignment for the peak hour, for the junction as a whole and the individual approaches:

- Average Queue Length (vehicles); and
- Maximum Queue Length (vehicles)

Average Queue Length (vehicles)

2.5.3 The impact of the proposed development shows that in the AM Peak of 2023, there is an small increase at Starting Gate Roundabout, minor reduction at the Southern access with a marginal increase at the Northern access. In 2031, there is a reduction at the roundabout and Southern access and a marginal increase at the Northern access.

2.5.4 The PM Peak shows minor changes at both the Roundabout and Northern access. The Southern access expects to see increases. Tables 17 and 18 present a summary of the results.

Table 17. AM Average Queue Length (Vehs)

Junction	2018 Base Year	2023 Opening Year + Committed Development	2023 Opening Year + Committed Development + Proposed Development	2031 Opening Year + Committed Development	2031 Opening Year + Committed Development + Proposed Development
Starting Gate R'bout	12	44	48	67	59
Holmer Southern Access	10	23	19	31	26
Holmer Northern Access	3	3	4	4	5

Table 18. PM Average Queue Length (Vehs)

Junction	2018 Base Year	2023 Opening Year + Committed Development	2023 Opening Year + Committed Development	2031 Opening Year + Committed Development	2031 Opening Year + Committed Development

			+ Proposed Development		+ Proposed Development
Starting Gate R'bout	6	47	46	42	44
Holmer Southern Access	9	10	17	15	21
Holmer Northern Access	12	13	14	14	12

Maximum Queue Length (vehicles)

2.5.5 The impact of the proposed development shows that maximum queue lengths are expected to increase at the Roundabout in the AM Peak of 2023, there is a minor reduction at the Southern access with a marginal increase at the Northern access. In 2031, there is a negligible increase at the roundabout, the Southern access reduces slightly.

2.5.6 The PM Peak shows a reduction in maximum queue lengths at the Roundabout, with increased queue lengths present at the Southern access. Tables 19 and 20 present a summary of the results.

Table 19. AM Maximum Queue Length (Vehs)

Junction	2018 Base Year	2023 Opening Year + Committed Development	2023 Opening Year + Committed Development + Proposed Development	2031 Opening Year + Committed Development	2031 Opening Year + Committed Development + Proposed Development
Starting Gate R'bout	145	152	181	233	234

Holmer Southern Access	61	78	65	88	79
Holmer Northern Access	37	36	40	42	42

Table 20. PM Maximum Queue Length (Vehs)

Junction	2018 Base Year	2023 Opening Year + Committed Development	2023 Opening Year + Committed Development + Proposed Development	2031 Opening Year + Committed Development	2031 Opening Year + Committed Development + Proposed Development
Starting Gate R'bout	128	229	181	188	166
Holmer Southern Access	53	51	84	65	75
Holmer Northern Access	44	46	42	46	47

2.5.7 Appendix C contains more detailed information relating to the individual queue lengths on each of the modelled approaches.

2.6 Traffic Flow Analysis

2.6.1 In order to further understand the impact of the proposed development, traffic flow diagrams are located in Appendix D. The following traffic flow difference diagrams are shown for both time periods.

- 2023 Opening Year + Committed Development vs 2023 Opening Year + Committed Development + Proposed Development;
- 2031 Forecast Year + Committed Development vs 2031 Forecast Year + Committed Development + Proposed Development.

2.6.2 From the diagrams, the following significant changes in flow are noted:

- 2023 AM Peak - North to South increase through the Starting Gate Roundabout, predominately routing from the proposed development;
- 2023 PM Peak – Reduction in traffic turning east and west from the A49 South at Starting Gate Roundabout, increase in northbound traffic;

- 2023 PM Peak – Reduction in northbound traffic at the expense of an increase in traffic turning left onto the Development Road, increase of southbound traffic;
- 2031 AM Peak - North to South increase through the Starting Gate Roundabout, predominately routing from the proposed development, this results in a reduction of traffic turning from the A4103 East; and
- 2031 PM Peak - North to South increase through the Starting Gate Roundabout, predominately routing from the proposed development, this results in a reduction of traffic turning from the A4103 East. Reduction in northbound traffic at the expense of an increase in traffic turning left onto the Development Road, increase of southbound traffic.

3. SUMMARY

3.1 Overview

3.1.1 The Forecast Year 2023 and 2031 assessment has included the impact of several key committed infrastructure interventions and developments across the Herefordshire area. The analysis provided in this document has aimed to provide an understanding of the change in traffic conditions around the Starting Gate Roundabout and Holmer area.

3.1.2 Holmer House Farm proposed development volumes were provided by PJA. Using the traffic pattern from the adjacent Holmer West development, these trips were added to the VISSIM micro-simulation models developed for the Hereford area. A series of forecast year scenario were assigned using the micro-simulation software package VISSIM, the results of which have been reported and discussed in this document.

3.1.3 The overall picture demonstrates that there are issues with not all the vehicles being able to be loaded onto the road network. As these vehicles can't be loaded, any impact is not recorded in terms of junction performance, queue lengths and journey times. The PM model contains a higher number of vehicles being unable to load into the network. Notwithstanding, the model outputs as expected indicate a reduction in the performance of the network with development traffic added. A review of LOS values generally shows that a minor reduction in overall junction performance. Starting Gate Roundabout caters for a slightly higher level of traffic within the AM peak, the PM Peak is known to have issues with unreleased vehicles. Mitigation measures to the roundabout may allow the model to cater for those vehicles.

APPROVAL

Version	Name		Position	Date	Modifications
1	Author	Grant Paterson	Principal Consultant	24/08/2018	First Issue for comment
	Checked by	Paul Gray	Associate Director	29/08/2018	
	Approved by	Paul Gray	Associate Director	29/08/2018	
2	Author				
	Checked by				
	Approved by				

Appendix A – Holmer West Development Report

Technical Note

Date	22 February 2015	**Job No**	MID4063
Author	Adrian Hewitt (JMP)	**Subject**	Holmer West Development Impact Assessment Modelling – 2017 & 2022

1 Introduction

1.1 JMP Consultants (Ltd) has been commissioned by Phil Jones Associates (PJA) to undertake a development impact assessment of the proposed Holmer West residential development in north Hereford. The development has direct connections with the A49 and A4103 Roman Road.

1.2 The Holmer West development consists of the following development quantum:

- Dwellings – 380 units
- Extracare facility – 80 units
- Non-food retail facility

1.3 This assessment utilises the Highways England Hereford VISSIM model developed by JMP for a 2014 Base Year. This model has been reviewed by WSP-PB on behalf of Herefordshire Council (HC) and is considered as a suitable for the assessment of infrastructure interventions and development impact assessments.

1.4 The following Technical Note (TN) provides an overview of the approach to establishing a benchmark Do-Minimum (DM), the analysis of this scenario and the subsequent assessment of the proposed Holmer West development.

1.5 It should be noted, that due to JMP's role on the West Midlands Highways England Spatial Framework, the analysis of the development impact assessment is based on a factual presentation of the results and excludes any interpretation.

1.6 The assessment is required to establish the impact of the development demand against a set Do-Minimum "benchmark" scenario which includes all consented development, for the AM (07:30-09:30) and PM (16:30-18:30) peak periods, in accordance with planning guidance:

1.7 The assessment considers the following years:

- 2017 Opening Year
- 2022 Forecast Year

1.8 In accordance with DfT TAG (Transport Appraisal Guidance) Unit M4 – Forecasting and Uncertainty Jan14, the forecasting approach considers the following items:

- Committed Infrastructure
- Committed Developments
- Background Traffic Growth

1.9 The forecasting approach has been discussed and agreed with HC framework consultant (WSP-PB) and utilises information from the Hereford Strategic Transport Model for the assignment of the committed developments.

1.10 The information presented within this TN focuses on the impact of the Holmer West development as an isolated development. It should be noted, that further independent work is being undertaken to understand the impact of the Hereford Local Plan, which includes the Holmer West development. However, the results from this assessment are not presented within this analysis document.

1.11 The Highways England Hereford VISSIM model is a detailed representation of the highway network within Hereford, as shown in Figure 1.1 below.

1.12 The model includes a detailed representation of the principal corridors within Hereford, including:

- A49
- A438
- A465

1.13 The model is calibrated and validated to comprehensive set of observed data (counts and queue lengths) collected in 2014, including over 25 junctions as shown in Figure 1.1.

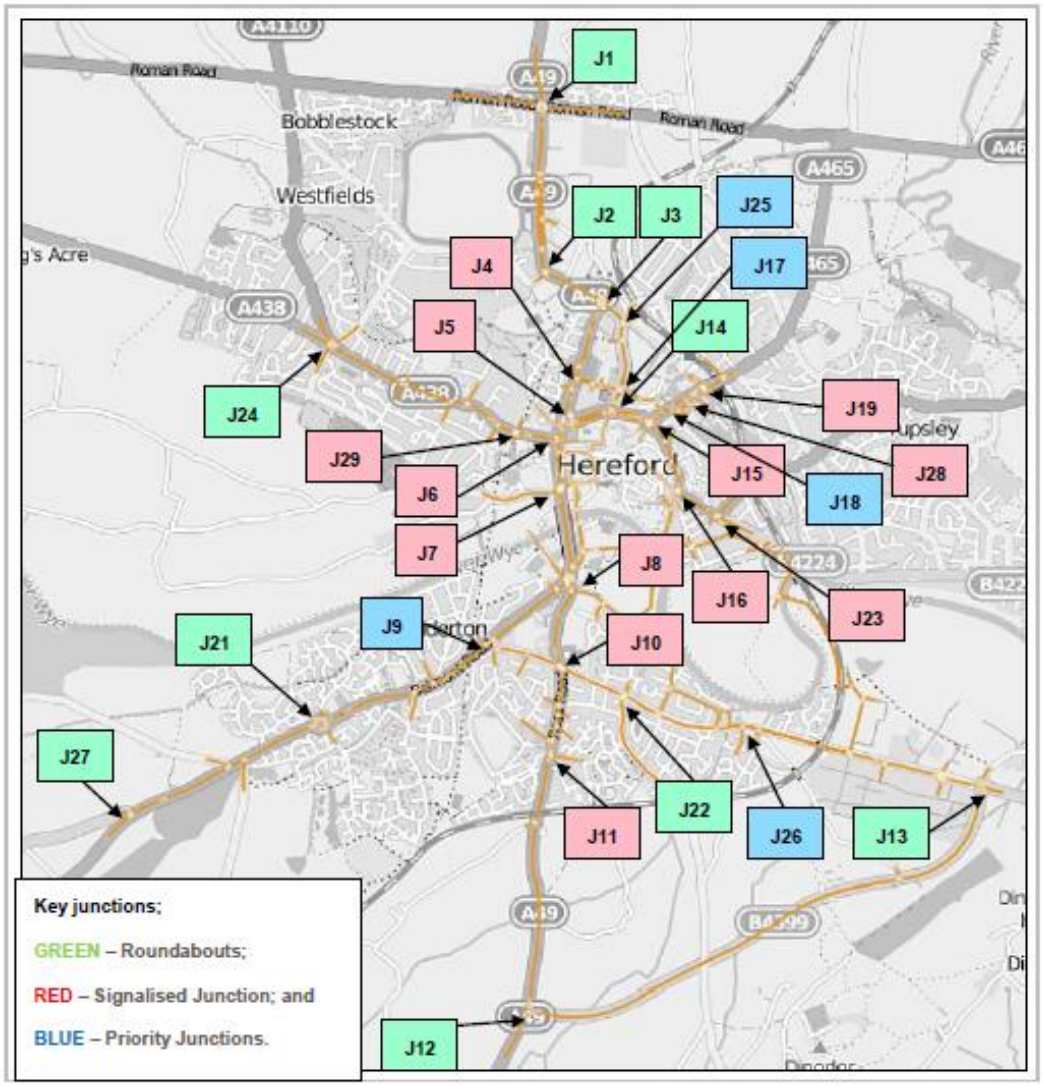
1.14 The model covers the following peak hours based on a 2 hour peak period simulation:

- AM peak hour (08-09)
- PM peak hour (17-18)

1.15 The model development and calibration is documented in the following Local Model Validation Report (LMVR). This report and associated modelling has been reviewed by Highways England and Herefordshire Council and deemed suitable for this assessment.

- X812089 Hereford 2014 PYV LMVR_FINAL_ June_2015

Figure 1.1 – Highways England Hereford VISSIM model coverage



2 Do-Minimum - Committed Infrastructure

2.1 It is agreed that the Opening Year 2017 transport network will remain as the current 2014 Base Year.

2.2 In context of the Forecast Year 2022, the network includes the following committed infrastructure:

- South Wye Link Road (Drawing N° 3512983A-HHR)
- City Centre Transport Package – City Centre Link Road (Drawing N° 551535-DD-002 Rev E)

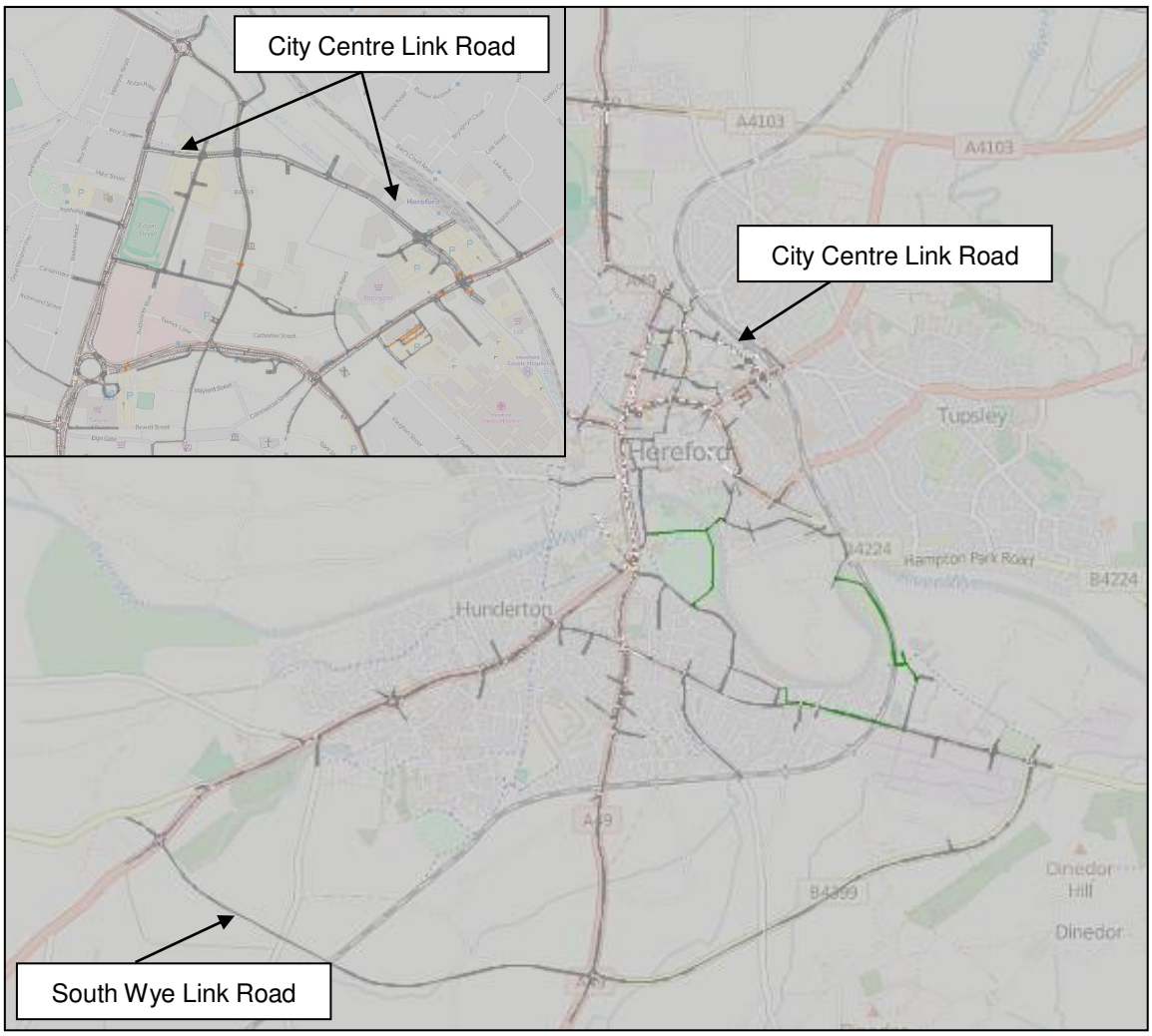
2.3 Appendix B contains the design drawings, as referenced above.

2.4 Figure 2.1 below presents the Highways England Hereford model network structure for 2022, based on the inclusion of the committed infrastructure.

- South Wye Link Road
  - Provides a direct connection between the A465, A49 and the B4399 Rotherwas Access Road
- City Centre Transport Package – City Centre Link Road
  - Provides a direct connection between the A49 and the A465 corridors in the City Centre.
  - The City Centre link road includes four signalised junction within its design.

2.5 The available route choice within the modelling following the introduction of the infrastructure has been controlled to ensure that the model represents a realistic response to the newly available network capacity and that unrealistic responses are minimised.

Figure 2.1 – Highways England Hereford VISSIM DM 2022 Network



3 Do-Minimum - Committed Developments

3.1 In case of the committed development, the overarching assessment is designed to evaluate the impact of the Hereford Strategic developments within the Local Plan independently. The focus of this assessment is the Holmer West development in isolation. Therefore, in this instance the committed developments only considers those sites with planning consent, which is effectively the sites with approved planning permission within the following periods:

- 2014 - 2017
- 2017 - 2022

3.2 The consented development information has been provided by Herefordshire Council for the 2017 horizon, with additional information provided by WSP-PB within their development certainty log for Hereford's Strategic Transport model to 2022. A key site within the assessment is the extension of the Hereford Enterprise Zone

3.3 The trip generation and distribution has been determined for each applicable development by WSP-PB.

3.4 Table 3.1 & Table 3.2 provides as summary of the developments included within the assessment as consented sites, for the respective assessment period. Further information is presented in Appendix A.

Table 3.1 – Development Assumptions 2014-2017

Land Use	Sites	Total	AM (08-09) New Vehicle Trips	PM (17-18) New Vehicle Trips
Residential - Units >25	10 sites	1,280 Dwellings	544	632

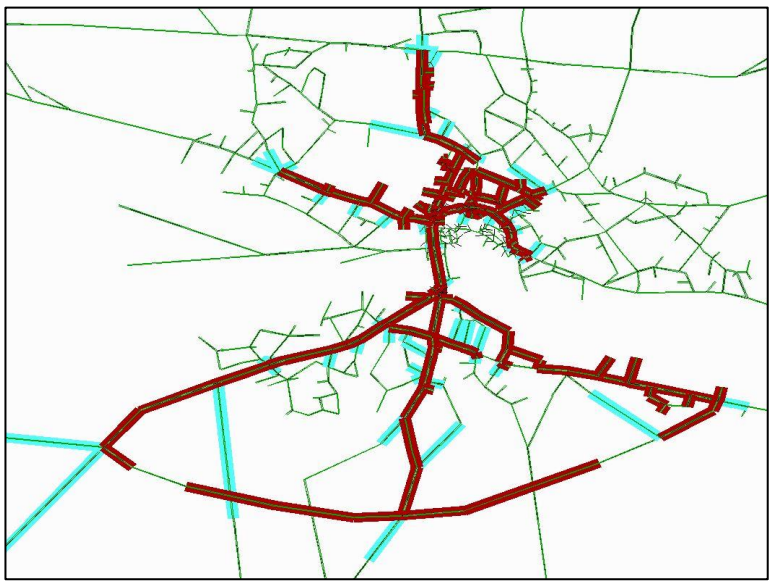
Table 3.2 – Development Assumptions 2017-2022

Land Use	Sites	Total	AM (08-09) New Vehicle Trips	PM (17-18) New Vehicle Trips
Residential - Units >25	3 sites	600 Dwellings	324	335
Employment	3 sites	111 ha	554	484
Other	1 site	1 ha	50	50
		Total	**928**	**869**

3.5 A development trip matrix has been produced and assigned to the Hereford Strategic Transport model.

3.6 Figure 3.1 below presents the Hereford VISSIM model area, which the development trip information has been extracted from the Hereford Strategic Transport model.

Figure 3.1 - VISSIM model Hereford Strategic Model Cordon



3.7 The consented development assignment has been extracted directly from the AM and PM assignment for the 2017 and 2022, excluding additional background demand growth.

3.8 It should be noted, that the VISSIM model represents an extract from the strategic model assignment, therefore the trips volumes within the Hereford model area are related to the proportion of the development demand accessing the VISSIM model area, representing a proportion of the input trip totals will be observed.

3.9 In addition, due to the structure of the VISSIM model, it is likely that specific development trips will be replicated as double movements within the cordon.

3.10 Further consideration was given to additional growth generated by improvements in the economy and demand for freight in accordance with DfT TAG Unit M4. However, in the case of the Hereford assessment, it was considered that this additional growth would have a minimal impact on the demand volumes within the peak hour modelled periods and is therefore excluded from the assessment.

3.11 Table 3.2 below presents a comparison of the Hereford VISSIM demand totals for the each modelled period and forecast year. This demonstrates that the freight classifications (LGV, OGV1 & OGV2) have been fixed to the 2014 Base Year volumes. The growth in cars is driven by the committed developments, which equates to a ~2.5% growth in total traffic between 2014 and 2017 and ~7% to 2022.

3.12 Table 3.2 presented that baseline demand totals included in the Do-Minimum assessment, excluding the proposed Holmer West development.

Table 3.2 – Hereford VISSIM Model Matrix Totals 2014, 2017 & 2022

Vehicle Type	AM Peak Hour (08-09)					PM Peak Hour (17-18)				
	BY2014	AM2017	%	AM2022	%	BY2014	AM2017	%	AM2022	%
Car	12,924	13,292	2.8%	13,891	7.5%	14,363	14,794	3.0%	15,419	7.4%
LGV	1,590	1,590	0.0%	1,590	0.0%	1,045	1,045	0.0%	1,045	0.0%
OGV1	212	212	0.0%	212	0.0%	113	113	0.0%	113	0.0%
OGV2	148	148	0.0%	148	0.0%	104	104	0.0%	104	0.0%
Total	**14,874**	**15,242**	**2.5%**	**15,841**	**6.5%**	**15,625**	**16,056**	**2.8%**	**16,681**	**6.8%**

3.13 It should be noted, that the Hereford VISSIM model actually covers a 30 minute pre and post peak hour period, which is set as 40% of the peak hour demand for the development trips.

4 Development – Holmer West Development Assumptions

4.1 The Holmer West development is located in the north Hereford, between the A49 and A4103 corridors.

4.2 Figure 4.1 below presents the Masterplan for the development, which includes two signalised site accesses, one on the A49 and a second on the A4103 Roman Road (W).

4.3 The design includes an interlinking road through the development, which provides an alternative direct connection between the A49 and the A4103 Roman Road.

4.4 Figure 4.1 also presents the Hereford VISSIM model representation of the proposed development infrastructure, including the traffic signalised access based on signal information provided by PJA.

Figure 4.1 – Holmer West Masterplan and Hereford VISSIM Model Representation

Development Design

- A49 Signalised Access
- A4103 Roman Road Signalised Access
- The link road through the development is designed as an alternative route or bypass for the A49 / A4103 "Starting Gate" junction.

The model contains a simplified representation of the access and egress points to the network from within the development.

4.5 The trip generation and distribution of the Holmer West development has been discussed and agreed with Highways England and Herefordshire Council prior to the operational assessment in the Hereford model.

4.6 Table 4.1 provides a summary of the arrival and departure trip totals for the Holmer West development. The development is a residential development with a tidal traffic profile.

4.7 It should be noted, that the Holmer West development equates to an additional ~1.5% increase in the demand within the Opening Year forecast.

Table 4.1 – Holmer West Trip Generations

Vehicle Type	AM Peak Hour (08-09)			PM Peak Hour (17-18)		
	Arrival	Departure	Total	Arrival	Departure	Total
Car	55	153	208	147	58	205

4.8 The Holmer West development distribution has been converted to the Hereford VISSIM model zone structure as car based vehicle trips, which is controlled to the totals as specified with Table 4.1.

5 Do-Minimum (DM) Analysis

5.1 In order to simplify the presentation of the assessment results, the Do-Minimum (DM) and the subsequent Holmer West impact assessment have been presented in a combined format. Therefore, the analysis of the DM results makes reference to the information presented in the following Section 6 and the adjoining appendices.

5.2 The Hereford VISSIM model represents the principal highway network and associated key junctions, which enables a detailed assessment of the DM and subsequent development impact assessment.

5.3 The model analysis presents the following information:

- Network Performance Statistics
- Junction Performance Analysis
- Queue Length Analysis
- Journey Time Analysis

5.4 The remaining section provides further information regarding the each of the above analysis and the DM results.

Network Performance Statistics

5.5 The Hereford VISSIM model produces a series of set network performance indicators for the modelled peak hour from the assignment. The comparison of these indicators is a representation of the change in the overall network conditions during the peak hour between the scenarios.

5.6 The following indicators have been extracted and compared for the set scenarios:

1. Number of vehicles is the assignment (vehicles)
2. Total travel time (hours)
3. Total distance travelled (km)
4. Average travel time (minutes)
5. Average distance travelled (kph)
6. Average speed (kph)
7. Average delay (seconds)
8. Total delay (hours)
9. Percentage total travel time as delay (%)
10. Unassigned vehicles (vehicles)
11. Latent demand delay for unassigned vehicles (hours)

5.7 The network performance statistics for the comparison of the DM with the 2014 Base Year is presented within the following Section 6, in Tables 6.1 & 6.2 for Opening Year 2017 and Tables 6.3 and 6.4 for the Forecast Year 2022.

5.8 The following conclusions can be drawn from the DM network performance results analysis for the representative assessment years.

- Opening Year 2017
- The results for the Opening Year indicates a consistency or minor improvement in the network performance results from the Base Year 2014, despite the minor increase in demand.
- Forecast Year 2022
- In the forecast year scenario, the net impact of the additional demand is partially offset by the additional network capacity provided by the committed infrastructure, particularly the City Centre Link Road.
- The result indicates that the network continues to operate with the 7% increase in demand, which generates a ~11% increase in the total travel time.
- It should be noted, that the capacity constraint of the A49 / A465 Belmont Road junction (ASDA) generates unassigned vehicles along the A465 corridor in the PM peak hour.

Junction Performance Analysis

5.9 The detailed junction performance results are presented in the following appendices and have been provided in spreadsheet format.

- Appendix C – Opening Year 2017 Results
- Appendix D – Forecast Year 2022 Results

5.10 In terms of the junction performance results, the analysis contains the following information for the 2014 Base Year, Do-Minimum and the subsequent development scenario. This analysis is based on the junctions as a whole and the individual turning movements.

1. Total traffic volumes (vehicles)
2. Development trips (development scenario only)
3. Average delay (seconds)
4. Average delay Level of Service (LOS)
5. Maximum delay (seconds)
6. Maximum delay Level of Service (LOS)

5.11 It should be noted, that the Level of Service (LOS) analysis is based on principals within the USA Highway Capacity Manual (HCM) 2010 and is not directly applicable to the UK road network or conditions. Therefore, the analysis is presented as a recognised an indicator for change in junction conditions only.

5.12 The junction analysis covers the following analysis based on the available network within the modelled scenarios.

- Base Year 2014 and Opening Year 2017
  - 18 junctions
- Forecast Year 2022 (Do-Minimum)
  - 21 junctions, including 2 junctions on the City Centre Link Road and the South Wye Link Road junction with the A465.
- Development Scenarios
  - 2 additional site access junctions

5.13 The following conclusions can be drawn from the DM junction performance results analysis for the representative assessment years.

- Opening Year 2017
- The analysis indicates that the overall volume of traffic at the analysed junctions increase by ~3% in the peak hours.
- The key constraint in the junction remains the A49 / A465 Belmont Road which present congested conditions are exacerbated by the increase in demand.
- On average the network continues to operate satisfactory, with the exception of the A49 / A465 junction.
- In addition, individual movement delays are demonstrated within the City Centre along the A465 Commercial Road corridor.
- Forecast Year 2022
- The Do-Minimum results present a further exacerbation of the constrained junctions to the south of the river in the Do-Minimum, particularly the A49 / A465 Belmont Road junction, which is operating over capacity. This results in extensive queues on the A49 Ross Road and A465 Belmont Road.
- The constraint of the A49 / A465 Belmont Road junction leads to breakdown of the A49 Ross Road / Holme Lacy Road junction.
- In the City Centre, the inclusion of the City Centre Link Road has produced sufficient capacity to sustain the increases in demand. However, the constrained movements along the A465 Commercial Road corridor remain and have been exacerbated by the scheme and demand increase.

Queue Length Analysis

5.14 The micro-simulation model enables the detailed assessment of the variability in network conditions based on queued vehicles at the junction in the assignment.

5.15 The following information has been extracted from the model assignment for the peak hour, for the junction as a whole and the individual approaches:

- Average Queue Length (vehicles)
- Maximum Queue Length (vehicles)

5.16 The analysis is presented in the following appendices and provided in spreadsheet format:

- Appendix C – Opening Year 2017 Results
- Appendix D – Forecast Year 2022 Results

5.17 The following conclusions can be drawn from the DM queue length results analysis for the representative assessment years.

- Opening Year 2017
- The queue length analysis demonstrates the impact of the traffic management system within Hereford which controls that traffic conditions through a range of traffic signals, principally within the City Centre. This results in a continually moving next in the Opening Year, with controlled and minimised average queuing.
- The results indicate the AM peak hour presents the most congested period in terms of queued vehicles, with the Opening Year results indicating a minor exacerbation of the queue lengths within the 2014 Base Year.
- The results indentifies the following junction constraints based on the scale of queued vehicles:
    A. A49 / A4103 Roman Road “Starting Gate” junction
    B. A49 / A465 Belmont Road (ASDA) junction
    C. A49 Ross Road / Holme Lacy Road / Walnut Tree Avenue junction
- Forecast Year 2022
- The analysis of the Forecast Year results indicates a significant increase in the volume of queued vehicles within the network from the 2014 Base Year, in both the AM and PM peak hours.
- Minor improvements are observed within the City Centre, based on the additional capacity provided by the City Centre Link Road. However, the overall trend is a reduction in network conditions, particularly in the PM peak hour.
- Clear queue increases are observed at the key junction identified in the Opening Year, particularly the A49 / A465 Belmont Road (ASDA) junction. The capacity constraint of the junction, leads to extensive queues on the A49 Ross Road and A465 Belmont Road corridors.

Journey Time Analysis

5.18 Following the journey time validation approach adopted for the 2014 Base Year model development, the journey routes from the same specified routes in the model have been extracted for comparison purposes.

5.19 The journey time results are presented for the following routes:

1. Route 1 – A49
2. Route 2 – A465 (Commercial Road corridor)
3. Route 3 – A438 corridor (Yazor Road to St Owens Street)
4. Route 4 – Holme Lacy Road (A465 to The Straight Mile)
5. Route 5 – A465 (Ruckhall Lane to A49 junction)
6. Route 6 – B4399 (A49 to The Straight Mile)

5.20 Following the format for the junction and queue analysis, the results for the journey time analysis are presented in the following appendices and have been provided in spreadsheet format:

- Appendix C – Opening Year 2017 Results
- Appendix D – Forecast Year 2022 Results

5.21 In addition, to the analysis presented in the appendix a further set of graphs are presented in the analysis of the development impacts within Section 6. Figure 6.1 and 6.2 presents the Opening Year 2017 comparison, followed by the Forecast Year 2022 results.

5.22 It should be noted, that the analysis is based on vehicle journeys completed between set points. Therefore, the results will not represent the net impact of the extensive queues, which will include incomplete journeys.

5.23 The following conclusions can be drawn from the DM journey time results analysis for the representative assessment years.

- Opening Year 2017
- Following the network performance results the journey time results for the DM scenario presents near consistent trend in journey times with the 2014 Base Year, with the exception of several routes in the PM peak hour.
- In the PM peak hour noticeable increases are observed on the following routes, Route 2 – A465 Commercial Road corridor and Route 4 –Holme Lacy Road, due to constraints on the Holme Lacy Road and the A49
- Forecast Year 2022
- The analysis of the Forecast Year results indicates reverse in the trend observed in the Opening Year assessment, based on a noticeable increase the AM peak hour journey times, with a consistency in the travel time in the PM peak hour. However, the extraction approach is based on completed journeys and the level of congestion within the modelling is potentially underestimated in the journey time results.
- The impact of the additional capacity provided by the infrastructure measures is presented in the for the City Centre routes, along the A438 and the A465 corridors.
- It should be noted, that the journey time analysis is potentially misrepresentative of the extent of congestion within the assignment

DM Analysis Summary

5.24 In summary, the Hereford modelling has process has generated modelled scenarios for the Opening Year 2017 and Forecast Year 2022, which have been compared with the 2014 Base Year across a series of analysis sets, as below and presented in the results appendices.

5.25 The DM network performance for each assessment period can be summarised as follows;

- Opening Year 2017
- General consistency with the 2014 Base Year model performance with locations of increased congestion and subsequent improvements.
- Forecast Year 2022
- The DM results for the Forecast Year demonstrate a clear reduction in the network performance, which is partially offset by the introduction of the infrastructure interventions.
- Key capacity constraints exist in the network, most noticeably the A49 / A465 Belmont Road junction, which is a significant constraint and is operating in excess of its design capacity in the Forecast Year. The introduction of the committed infrastructure has virtually no impact on alleviating the congestion at the A49 / A465 Belmont Road junction.
- The DM network in the 2022 Forecast Year continues to operate, due to the traffic management provided by the traffic signals. However, the network is heavily congested, particularly south of the river, along the A49 Ross Road and A465 Belmont Road.

6 Holmer West Development Impact Results

6.1 Following the assessment and acceptance of realism the DM modelling, the model has been adapted to represent the network including the Holmer West infrastructure and the development demand, as described with Section 4.

6.2 In order to remain impartial in the interpretation of the development impacts, the results are presented as factual information.

6.3 The results for the development impacts are presented in same analysis tables as the DM, with the following appendices.

- Appendix C – Opening Year 2017 Results
- Appendix D – Forecast Year 2022 Results

6.4 Further analysis results are presented below:

Network Performance Statistics

6.5 Table 6.1 and 6.2 presents the network performance statistics for the 2014 Base Year, Opening Year 2017 for the "with" and "without" the Holmer West development.

Table 6.1 – AM Peak Hour Opening Year 2017 - Network Performance Statistics

Dev.A1.1	Network Performance Results - BY 2014, DM 2017 & HW Dev - AM Peak Hour (08-09)						
ID	Indicator	Unit	BY 2014	DM 2017	% DIFF BY	Dev HW 2017	% DIFF DM
-	Demand	vehicles	14,874	15,242	2%	15,450	1%
1	*No of Vehicles in Assignment	vehicles	15,609	16,062	3%	16,286	1%
2	*Total Travel Time	hrs	1,226	1,169	-5%	1,241	6%
3	*Total Distance Travelled	km	29,802	31,690	6%	32,286	2%
4	*Average Travel Time	mins	4.9	4.4	-11%	4.6	5%
5	*Average Distance Travelled	km	1.9	2.0	3%	2.0	0%
6	*Average Speed	kph	24.0	27.1	13%	26.0	-4%
7	*Average Delay	secs	134.0	108.3	-19%	119.2	10%
8	*Total Delay	hrs	584.0	483.3	-17%	539.3	12%
9	*% Total Travel Time Delay	%	48%	41%	-14%	43%	5%
10	Unassigned Vehicles	vehicles	0.0	0.0	-	0.0	-
11	Latent Demand Delay	hrs	0.0	0.0	-	0.0	-

Table 6.2 – PM Peak Hour Opening Year 2017 - Network Performance Statistics

Dev.A2.1	Network Performance Results - BY 2014, DM 2017 & HW Dev - PM Peak Hour (17-18)						
ID	Indicator	Unit	BY 2014	DM 2017	% DIFF BY	Dev HW 2017	% DIFF DM
-	Demand	vehicles	15,625	16,056	3%	16,261	1%
1	*No of Vehicles in Assignment	vehicles	16,695	17,156	3%	17,116	0%
2	*Total Travel Time	hrs	1,192	1,197	0%	1,240	4%
3	*Total Distance Travelled	km	31,238	33,060	6%	33,606	2%
4	*Average Travel Time	mins	4.6	4.2	-9%	4.3	4%
5	*Average Distance Travelled	km	1.9	1.9	2%	2.0	2%
6	*Average Speed	kph	26.0	27.6	6%	27.1	-2%
7	*Average Delay	secs	114.0	102.6	-10%	107.6	5%
8	*Total Delay	hrs	521.0	481.8	-8%	511.7	6%
9	*% Total Travel Time Delay	%	44%	40%	-9%	41%	3%
10	Unassigned Vehicles	vehicles	0.0	0.0	-	0.0	-
11	Latent Demand Delay	hrs	0.0	0.0	-	0.0	-

6.6 Table 6.3 and 6.4 presents the network performance statistics for the 2014 Base Year, Forecast Year 2022 for the "with" and "without" the Holmer West development.

Table 6.3 – AM Peak Hour Forecast Year 2022 - Network Performance Statistics

Dev.E1.1	Network Performance Results - BY 2014, DM 2022 & HW Dev - AM Peak Hour (08-09)						
ID	Indicator	Unit	BY 2014	DM 2022	% DIFF BY	Dev HW 2022	% DIFF DM
-	Demand	vehicles	14,874	15,841	7%	16,049	1%
1	*No of Vehicles in Assignment	vehicles	15,609	16,700	7%	16,927	1%
2	*Total Travel Time	hrs	1,226	1,356	11%	1,392	3%
3	*Total Distance Travelled	km	29,802	36,176	21%	36,235	0%
4	*Average Travel Time	mins	4.9	4.9	-1%	4.9	1%
5	*Average Distance Travelled	km	1.9	2.2	13%	2.1	-1%
6	*Average Speed	kph	24.0	26.7	11%	26.0	-2%
7	*Average Delay	secs	134.0	131.5	-2%	136.6	4%
8	*Total Delay	hrs	584.0	609.8	4%	642.1	5%
9	*% Total Travel Time Delay	%	48%	45%	-6%	46%	3%
10	Unassigned Vehicles	vehicles	0.0	0.0	-	24.0	-
11	Latent Demand Delay	hrs	0.0	0.0	-	7.8	-

Table 6.4 – PM Peak Hour Forecast Year 2022 - Network Performance Statistics

Dev.E2.1	Network Performance Results - BY 2014, DM 2022 & HW Dev - PM Peak Hour (17-18)						
ID	Indicator	Unit	BY 2014	DM 2022	% DIFF BY	Dev HW 2022	% DIFF DM
-	Demand	vehicles	15,625	16,681	7%	16,886	1%
1	*No of Vehicles in Assignment	vehicles	16,695	17,854	7%	17,778	0%
2	*Total Travel Time	hrs	1,192	1,324	11%	1,364	3%
3	*Total Distance Travelled	km	31,238	36,321	16%	37,014	2%
4	*Average Travel Time	mins	4.6	4.5	-3%	4.6	3%
5	*Average Distance Travelled	km	1.9	2.0	7%	2.1	2%
6	*Average Speed	kph	26.0	27.4	5%	27.1	-1%
7	*Average Delay	secs	114.0	116.3	2%	120.3	3%
8	*Total Delay	hrs	521.0	566.1	9%	594.2	5%
9	*% Total Travel Time Delay	%	44%	43%	-3%	44%	2%
10	Unassigned Vehicles	vehicles	0.0	64.0	-	0.0	-100%
11	Latent Demand Delay	hrs	0.0	29.2	-	0.0	-100%

Journey Time Analysis

6.7 The journey time results are presented graphically for the Holmer West development impact assessment, based on a series of defined routes:

1. Route 1 – A49
2. Route 2 – A465 (Commercial Road corridor)
3. Route 3 – A438 corridor (Yazor Road to St Owens Street)
4. Route 4 – Holme Lacy Road (A465 to The Straight Mile)
5. Route 5 – A465 (Ruckhall Lane to A49 junction)
6. Route 6 – B4399 (A49 to The Straight Mile)

6.8 Figure 6.1 and 6.2 presents the journey time results for the 2014 Base Year, 2017 Opening Year modelling for the "with" and "without" the Holmer West development, covering the AM and PM peak hours.

Figure 6.1 – AM Peak Hour Opening Year 2017 – Journey Time Results

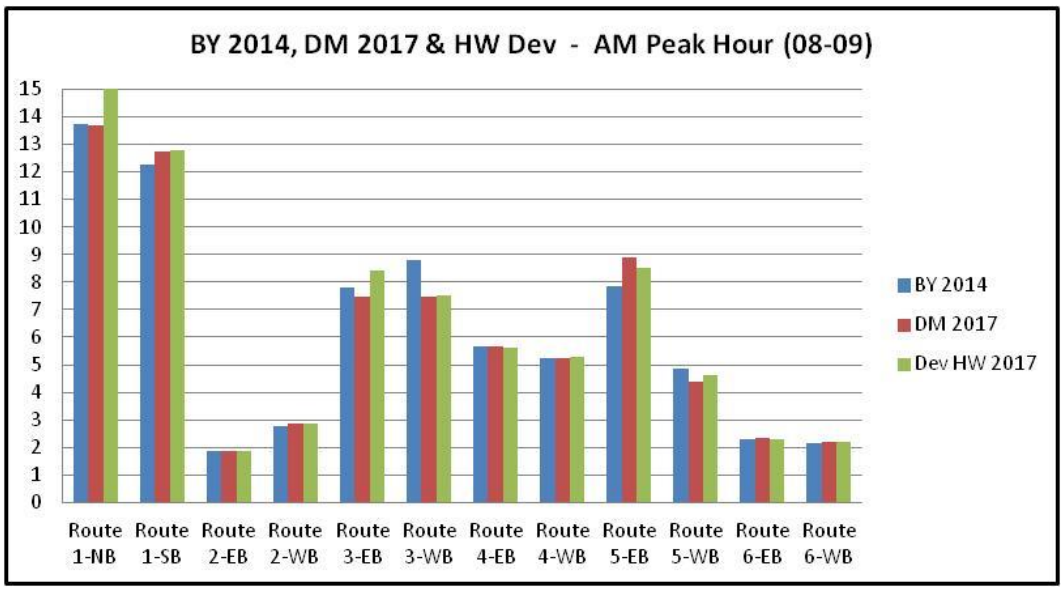
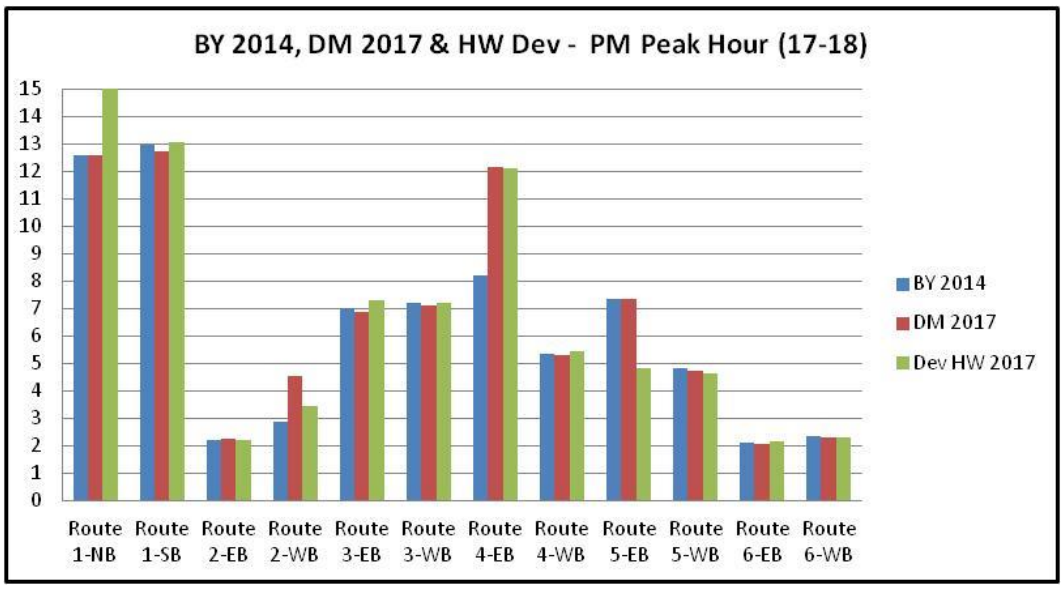


Figure 6.2 – PM Peak Hour Opening Year 2017 – Journey Time Results



6.9 Figure 6.3 and 6.4 presents the journey time results for the 2014 Base Year, 2022 Forecast Year modelling for the "with" and "without" the Holmer West development, covering the AM and PM peak hours.

Figure 6.3 – AM Peak Hour Forecast Year 2022 – Journey Time Results

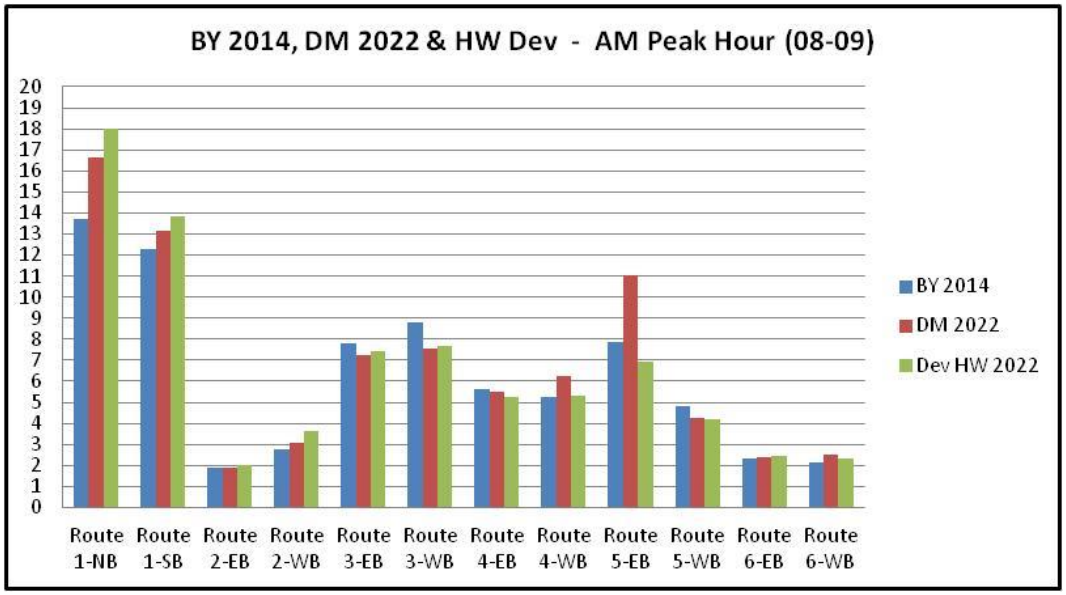
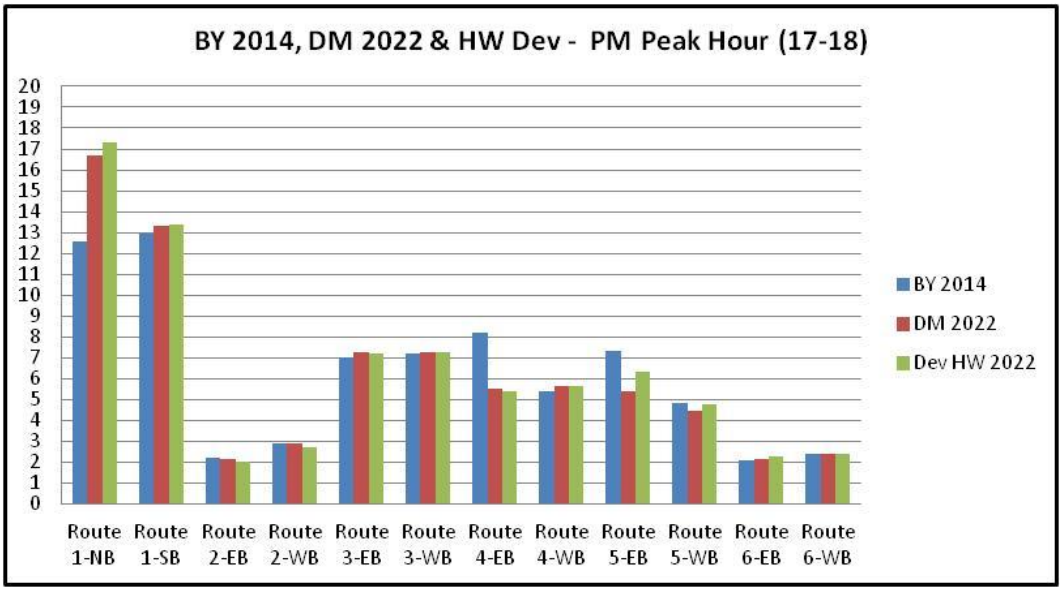


Figure 6.4 – PM Peak Hour Forecast Year 2022 – Journey Time Results



7 Summary

7.1 In summary, the Hereford modelling assessment has established and analysed a “benchmark” Do-Minimum scenario for the Opening Year 2017 and Forecast Year 2022, from the calibrated and validated 2014 Base Year.

7.2 The Forecast Year 2022 assessment has included the impact of several key committed infrastructure interventions, which has resulted in the improvement of the network capacity and overall route choice, particularly within the City Centre.

7.3 It is considered that the evidence presented within the document demonstrates that the Do-Minimum results are representative of potential future year conditions and the related change from the 2014 Base Year.

7.4 The analysis is presented in a comprehensive format, covering the principal network within Hereford, with particular focus on the A49 corridor.

7.5 The conclusions from the Do-Minimum assessment can be summarised as follows:

- Opening Year 2017
- General consistency with the 2014 Base Year model performance with locations of increased congestion and subsequent improvements.
- Forecast Year 2022
- The DM results for the Forecast Year demonstrate a clear reduction in the network performance, which is partially offset by the introduction of the infrastructure interventions.
- The DM network in the 2022 Forecast Year continues to operate, due to the traffic management provided by the traffic signals. However, the network is heavily congested, particularly south of the river, along the A49 Ross Road and A465 Belmont Road.

7.6 The subsequent Holmer West development impact assessment results have been presented in a consistent format to the Do-Minimum for interpretation by Phil Jones Associates.

Name/ Signed Adrian Hewitt (JMP) / Alan Crawford (JMP)

Appendix A – Consented Developments

Appendix A.1 – 2014-2017 Consented Developments

2014-2017

WSP | PB Ref	Application Number	Site Address	Parish	Housing Market Area	Notes	Total	Decision Date	AM Arrival (vehs)	AM Dep (vehs)	PM Arr (Vehs)	PM Dep (vehs)	Productions / Attrations
J1	S110884/RM	Land To The North Of, Roman Road, Holmer, Hereford, HR1 1LE	Holmer & Shelwick	Hereford	Residential development 300 dwellings including access from Roman;Road essential infrastructure, open space balancing pond, landscaping,;roads, parking, footpaths, cycleways and engineering earth works.	300	14-Sep-11	47	124	124	82	P
J2	S102921/O	Land to the East of, Holywell Gutter Lane, Hampton Bishop, Hereford, HR1 4JN	Hampton Bishop	Hereford	Development of grass and all weather sports pitches, clubhouse, indoor;training building, car parking and landscaping supported by enabling;residential development of 190 units.	190	17-Sep-12	51	81	98	58	P
J3	113168	Former land of Hunderton Infants School, Belmont Avenue, Hereford, HR2 7JF	Hereford	Hereford	Outline planning application for new residential development with;mixed housing types and garages, including access road, pavements and;bicycle track on vacant site which formed part of the former Hunderton;Infant & Junior Schools.	26	02-May-13	5	9	11	6	P
J4	130888	Land at Merton Meadow, Edgar Street, Hereford, HR4	Hereford	Hereford	Redevelopment of site, including demolition works to provide;residential development comprising up to 192 units including a 60 bed;extra care home	192	07-Aug-13	-276	-28	-18	-223	P
J5	131709	Land at Faraday Road, Hereford, Herefordshire, HR4	Hereford	Hereford	Replacement of extant planning application 092932/O for the;construction of a total care facility to include 100 assisted living;units (use class C2 and C3).	100	19-Sep-13	22	17	11	15	P
J6	131391	The Oval, Hereford	Hereford	Hereford	Proposed demolition and regeneration to include 259 new build;flats/houses, external refurbishment works to the existing flats;above the oval shops,	259	09-Dec-13	6	46	55	16	P
J7	131885	Site adjacent to 4 Valentine Court, Canon Pyon, Hereford,	Canon Pyon	Hereford	Proposed erection of 30 no. new dwellings including 10 affordable;units and associated works to provide a new access and road.	30	16-Apr-14	3	11	12	6	P
J8	130287	Land adjacent to Whitestone Chapel, Withington,	Withington	Hereford	Application to replace extant permission CE092929/O - development;proposal for 33 no. new homes and construction of new vehicular access;on the A4103.	33	06-Jun-14	4	12	13	7	P
J9	141526	Land South of Hampton Dene Road, Hereford	Hampton Bishop	Hereford	Proposed residential development (up to 110 dwellings), access,;parking, public open space with play facilities and landscaping.	110	11-Aug-14	19	51	48	28	P
J10	143720	Land south of A438 forming parcel no 0008 and part parcel	Lugwardine	Hereford	Proposed erection of 40 dwellings including 14 affordable houses and;change of use of land to form community open space.	40	16-Mar-15	10	26	28	14	P
						1280		**167**	**377**	**400**	**232**	

Appendix A.2 – 2014-2017 Consented Developments

2017-2022

	Input	Size	Forecast Year	Code	Source	Policy	Specific Location	Map	Description	Uncertainty Assumption	TA AM Arrival Vehs	TA AM Departure Vehs	TA PM Arrival Vehs	TA PM Departure Vehs
Housing	**Housing Location in Hereford**	100-120	2018	D38	Planning Officers		Land at Holmer Trading Estate, College Road		Application has been granted on appeal for 120 dwellings on a brownfield site.	Near Certain	-40	26	22	-64
Housing	**Housing Location in Cleohonger**	80	2018	D104	Planning Officers		Land between Gosmore Road and The Seven Stars PH, Clehonger			Near Certain	8	35	40	10
Housing	**Housing Location in Leominster.**	425	2018	D85	CS	LO1	Barons Cross Camp Cholstrey Road Leominster HR6 8RT		Erection of 425 dwellings, community building, vehicular access foul pumping station, association works.(Reserved matters application) (Landscaping only)	Near Certain	93	202	201	126
Employment	**Employment Location at Hereford Enterprise Zone.**	30ha	2032	D64	CS	HD7	HEZ		Additional 30ha of new employment land	Near Certain Reasonably Foreseeable	181	62	54	161
Employment	**Employment Location at Three Elms Trading Estate, Hereford. 10 ha**	60ha	2018	D66	CS	HD7	Three Elms Trading Estate		Permission granted in 2014 for development	Near Certain	6	5	4	7
Employment	**Employment Location at Moreton Business Park, Moreton-on-Lugg.**	21ha	2018	D68	CS	HD7	Moreton Business Park, Moreton-on-Lugg		Site for B1(c) light industrial, B2 general industry and B8 storage and distribution uses, together with motor vehicle showroom, ancillarynursery, access and associated works including demolition of redundant buildings.	Near Certain	206	94	77	181
Other	**Kington Household Recycling Centre.**	1ha	2018	D18	IDP	N/A	Land to the east of A411, south of Banley Road		Household recycling centre to serve Kington and surrounding villages	Near Certain	25	25	25	25
Transport	**Hereford City Link Road**	N/A	2017	I06	IDP	Hereford City Centre Transport Package	Hereford City Centre		Connecting the A49 Edgar Street with the A465 Commercial Road, reducing traffic on the existing inner ring road and enabling expansion of the city centre.	Near Certain				
											479	**449**	**423**	**446**

Appendix B – DM Committed Infrastructure

- South Wye Link Road (Drawing 3512983A-HHR
- City Centre Transport Package – City Centre Link Road (Drawing No 551535-DD-002 Rev E)

Appendix C – Opening Year 2017 Results

Appendix D – Forecast Year 2022 Results

Appendix B – Junction Performance Analysis

Junction Performance Results - TEMPRO Constrained - AM Peak Hour (08-09)

Junction Traffic Volume and Level of Service Analysis - Junction Summary

Highway Capacity Manual Level of Service (LOS)		Signalised Intersection	Other Intersection
A	A- free flow	≤10 sec	≤10 sec
B	B- reasonably free flow	10–20 sec	10–15 sec
C	C- stable flow, at or near free flow	20–35 sec	15–25 sec
D	D- approaches unstable flow	35–55 sec	25–35 sec
E	E- unstable flow, operating at capacity	55–80 sec	35–50 sec
F	F- forced or breakdown flow	≥80 sec	≥50 sec

Site	Arms	Type	Junction	Turns	Total Traffic Volume								Weighted Average Delay (sec)								Average Delay Level of Service (LOS)								Maximum Delay (sec)								Maximum LOS							
					BY 18	2023 OY_CD	DIH BY	2023 OY_CD	2023 OY_CD	DIH 2023	SC4 2031_OY	SC5 2031_OY	DIH 2031	BY 18	2023 OY_CD	DIH BY	2023 OY_CD	2023 OY_CD	DIH 2023	2031 OY_CD	2031 OY_CD	DIH 2031	BY 18	2023 OY_CD	2023 OY_CD	2023 OY_CD	2031 OY_CD	2031 OY_CD	DIH 2031	BY 18	2023 OY_CD	DIH BY	2023 OY_CD	2023 OY_CD	DIH 2023	2031 OY_CD	2031 OY_CD_P	DIH 2031	BY 18	2023 OY_CD	2023 OY_CD RANK	2023 OY_CD	2023 OY_CD_PD	2023 OY_CD_PD	2031 OY_CD	2031 OY_CD_PD	2031 OY_CD_PD
1	4	RB	A49 / A4103 Roman Rd	12	1,118	1,420	313	1,429	1,491	62	1,538	1,583	55	18	21	3	18	21	3	19	21	2	B	B	2	B	C	2	B	B	2	B	C	2	B	C	2	D	D	3	D	D	3	D	D	3
HW1	3	SIG	Holmer West Southern Access / A4103 Roman Rd.	6	1,890	1,996	106	1,996	2,016	20	2,062	2,065	3	23	38	15	38	54	16	33	33	1	C	D	1	D	C	1	D	C	1	E	F	1	F	F	1	F	F	1	F	F	1	F	F	1
HW2	3	SIG	Holmer West Northern Access / A49	6	1,283	1,598	315	1,598	1,649	51	1,674	1,738	56	12	11	-1	13	12	-1	20	21	1	B	A	3	A	B	3	A	B	3	B	C	2	C	D	2	C	D	2	C	C	2	C	D	2
		TOTAL		12	6,291	7,023	732	7,023	7,156	133	7,268	7,378	973	46	68	17	68	83	-1	63	61	-1							153	201	198	201	267	-84	402	378	-23									
						%	12%		%	2%	%		15%		%	37%		%	-2%		%	-2%									100%		%	-24%		%	-6%									

Junction Performance Results - TEMPRO Constrained - AM Peak Hour (08-09)

Junction Movement Summary

Highway Capacity Manual Level of Service (LOS)		Signalised Intersection	Other Intersection
A	A- free flow	≤10 sec	≤10 sec
B	B- reasonably free flow	10–20 sec	10–15 sec
C	C- stable flow, at or near free flow	20–35 sec	15–25 sec
D	D- approaches unstable flow	35–55 sec	25–35 sec
E	E- unstable flow, operating at capacity	55–80 sec	35–50 sec
F	F- forced or breakdown flow	≥80 sec	≥50 sec

Site	Count	From Arm	From	To Arm	To	Ref	Total Traffic Volume								Average Delay (sec)								Average Delay LOS								Maximum Delay (sec)								Maximum LOS							
							BY 18	2023 OY_CD	DIH BY	2023 OY_CD	2023 OY_CD	DIH 2023	SC4 2031_OY	SC5 2031_OY	DIH 2031	BY 18	2023 OY_CD	DIH BY	2023 OY_CD	2023 OY_CD	DIH 2023	2031 OY_CD	2031 OY_CD	DIH 2031	BY 18	2023 OY_CD	2023 OY_CD	2023 OY_CD	2031 OY_CD	2031 OY_CD	2031 OY_CD	BY 18	2023 OY_CD	DIH BY	2023 OY_CD	2023 OY_CD	DIH 2023	2031 OY_CD	2031 OY_CD_P	DIH 2031	BY 18	2023 OY_CD	2023 OY_CD RANK	2023 OY_CD	2023 OY_CD_PD	2023 OY_CD_PD	2031 OY_CD	2031 OY_CD_PD	2031 OY_CD_PD
1	1	A	A49 (N)	B	A4103 Roman Road (E)	1-A-B	127	144	17	144	145	1	142	140	-2	14	18	4	18	21	3	18	21	3	B	C	2	C	C	2	B	C	2	C	D	2	D	D	2	C	C	2	C	D	2	D	D	2
1	2	A	A49 (N)	C	A403 Holmer Rd (S)	1-A-C	473	575	102	575	612	37	597	641	44	12	16	4	16	18	2	16	18	2	B	C	2	C	C	2	B	C	2	C	C	2	C	C	2	B	C	2	C	C	2	C	C	2
1	3	A	A49 (N)	D	A4103 Roman Road (W)	1-A-D	0	0	0	0	0	0	0	0	0										A	A	-	A	A	-	A	A	-	A	A	-	A	A	-	A	A	-	A	A	-	A	A	-
1	4	B	A4103 Roman Road (E)	A	A49 (N)	1-B-A	150	182	32	182	184	2	189	193	4	20	25	5	25	27	2	27	27	0	C	C	5	C	C	5	C	C	5	C	C	5	C	C	5	D	D	5	D	D	5	D	D	5
1	5	B	A4103 Roman Road (E)	C	A49 Holmer Rd (S)	1-B-C	236	269	33	269	272	3	279	276	-3	20	26	6	24	24	0	24	24	0	C	D	3	D	C	7	D	C	7	D	D	4	D	D	7	D	D	4	D	D	4	D	D	4
1	6	B	A4103 Roman Road (E)	D	A4103 Roman Road (W)	1-B-D	464	464	0	464	469	5	468	454	-14	20	25	5	25	25	0	25	25	0	C	C	5	C	C	5	C	C	5	C	C	5	C	C	5	D	D	6	D	D	6	D	D	6
1	7	C	A49 Holmer Rd (S)	A	A49 (N)	1-C-A	316	417	101	417	427	10	438	443	5	6	8	2	8	8	0	8	8	0	A	A	2	A	A	2	A	A	2	A	A	2	A	A	2	A	A	19	A	A	19	A	A	19
1	8	C	A49 Holmer Rd (S)	B	A4103 Roman Road (E)	1-C-B	169	173	4	173	173	0	180	188	8	6	7	1	7	7	0	7	7	0	A	A	2	A	A	2	A	A	2	A	A	2	A	A	2	A	A	17	A	A	18	A	A	18
1	9	C	A49 Holmer Rd (S)	D	A4103 Roman Road (W)	1-C-D	189	194	5	194	194	0	209	206	-3	3	5	2	5	5	0	5	5	0	A	A	2	A	A	2	A	A	2	A	A	2	A	A	2	A	A	20	A	A	20	A	A	20
1	10	D	A4103 Roman Road (W)	A	A49 (N)	1-D-A	0	0	0	0	0	0	0	0	0										A	A	-	A	A	-	A	A	-	A	A	-	A	A	-	A	A	-	A	A	-	A	A	-
1	11	D	A4103 Roman Road (W)	B	A4103 Roman Road (E)	1-D-B	692	672	40	672	675	3	706	706	-2	12	12	0	14	14	0	14	14	0	B	B	14	B	B	12	B	B	12	B	C	10	C	C	12	B	B	14	B	C	10	C	C	12
1	12	D	A4103 Roman Road (W)	C	A49 Holmer Rd (S)	1-D-C	362	378	16	378	380	2	383	386	3	12	14	2	14	16	2	14	16	2	B	B	11	B	C	11	B	C	11	B	C	10	C	C	12	B	C	9	C	C	12	C	C	10
HW1	13	A	Holmer West Southern Access	B	A4103 Roman Rd. (E)	HW1-A-B	128	119	-9	119	125	6	133	132	-1	76	198	122	198	168	-30	198	168	-30	F	F	2	F	F	2	F	F	2	F	F	1	F	F	1	F	F	1	F	F	1	F	F	1
HW1	14	A	Holmer West Southern Access	D	A4103 Roman Rd. (W)	HW1-A-D	126	139	13	139	149	10	139	144	5	75	203	127	203	166	-36	203	166	-36	F	F	1	F	F	2	F	F	2	94	275	181	275	194	-81	314	273	-40	F	F	2	F	F	2	F	F	2
HW1	15	B	A4103 Roman Rd. (E)	A	Holmer West Southern Access	HW1-B-A	46	46	0	46	46	0	49	49	0	21	33	12	33	26	-7	33	26	-7	C	C	7	C	D	3	C	D	3	28	22	-6	22	31	9	28	22	-6	C	C	7	C	D	4	C	D	4
HW1	16	B	A4103 Roman Rd. (E)	D	A4103 Roman Rd. (W)	HW1-B-D	589	605	6	605	610	5	632	606	-26	12	13	1	13	11	-2	11	11	0	B	B	16	B	B	17	B	B	17	18	12	-6	12	13	1	13	11	-2	B	B	16	B	B	16	B	B	17
HW1	17	D	A4103 Roman Rd. (W)	A	Holmer West Southern Access	HW1-D-A	95	142	46	142	142	0	148	143	-5	15	16	1	16	14	-2	14	14	0	B	B	11	B	B	14	B	B	16	18	16	-2	16	14	-2	16	13	-3	B	B	11	B	B	13	C	C	11
HW1	18	D	A4103 Roman Rd. (W)	B	A4103 Roman Rd. (E)	HW1-D-B	897	945	48	945	944	-1	995	954	-41	13	13	0	13	13	0	13	13	0	B	B	10	B	B	12	B	B	12	18	17	-1	17	18	1	17	16	-1	C	C	10	C	C	11	C	C	11
HW2	19	A	A49 (N)	B	A49 (S)	HW2-A-B	600	720	120	720	723	3	756	766	9	6	8	2	8	8	0	8	8	0	A	A	2	A	A	3	A	A	3	9	8	-1	8	11	3	11	11	0	A	A	3	A	A	3	A	A	3
HW2	20	A	A49 (N)	C	Holmer West Northern Access	HW2-A-C	119	143	24	143	144	1	149	143	-6	24	28	4	28	26	-2	26	26	0	C	D	3	D	D	3	D	D	3	28	32	4	32	33	1	33	32	-1	D	D	3	D	E	3	D	E	3
HW2	21	B	A49 (S)	A	A49 (N)	HW2-B-A	462	587	125	587	591	4	620	620	0	13	15	2	15	13	-2	13	13	0	B	B	9	B	B	10	B	B	10	14	14	0	14	14	0	14	14	0	B	B	9	B	B	9	B	B	10
HW2	22	B	A49 (S)	D	Holmer West Northern Access	HW2-B-D	0	0	0	0	11	11	0	11	11										A	A	-	A	A	-	A	A	-	A	A	-	A	A	-	A	A	-	A	A	-	A	A	-
HW2	23	C	Holmer West Northern Access	A	A49 (N)	HW2-C-A	102	148	46	148	149	1	154	153	-1	12	12	0	12	12	0	12	12	0	B	B	14	B	B	16	B	B	16	17	15	-2	15	15	-1	16	17	1	C	B	13	B	B	14	C	C	14
HW2	24	C	Holmer West Northern Access	B	A49 (S)	HW2-C-B	0	0	0	0	35	35	0	35	35										A	A	-	A	C	9	A	C	9	14	14	0	14	14	0	14	14	0	A	A	-	A	A	-	A	A	-
			Total Traffic, Average & Maximum (seconds)		6,291	7,023	732	7,023	7,156	133	7,268	7,378	114	20	40	20	34	33	0	34	33	0							94	289	195	289	260	-90	334	306	-29									

Junction Performance Results - TEMPRO Constrained - PM Peak Hour (17-18)

Junction Traffic Volume and Level of Service Analysis - Junction Summary

Highway Capacity Manual Level of Service (LOS)		Signalised Intersection	Other Intersection
A	A: free flow	≤10 sec	≤30 sec
B	B: reasonably free flow	10–20 sec	10–15 sec
C	C: stable flow, at or near free flow	20–35 sec	15–25 sec
D	D: approaching unstable flow	35–55 sec	25–35 sec
E	E: unstable flow, operating at capacity	55–80 sec	35–50 sec
F	F: forced or breakdown flow	≥80 sec	≥50 sec

Total Traffic Volume

Site	Arms	Type	Junction	Turns	BY 18	2023 OY_CD	Diff BY	2023 OY_CD	2023 OY_CD	Diff 2023	SC4 2031_OY	SC5 2031_OY	Diff 2031
1	4	RB	A49 / A4103 Roman Rd	12	1,018	1,147	129	1,147	1,148	1	1,174	1,213	39
HW1	3	SIG	Holmer West Southern Access / A4103 Roman Rd.	6	1,824	2,002	178	2,002	2,011	9	2,015	2,010	-5
HW2	3	SIG	Holmer West Northern Access / A49	6	1,501	1,728	227	1,728	1,784	56	1,654	1,701	47
			TOTAL	12	6,343	7,075	732	7,075	7,143	68	6,843	6,924	-232
						%	12%		%	1%		%	-3%

Weighted Average Delay (secs)

BY 18	2023 OY_CD	Diff BY	2023 OY_CD	2023 OY_CD	Diff 2023	2031 OY_CD	2031 OY_CD	2031 OY_CD	Diff 2031
11	11	0	11	11	0	11	11	11	0
21	21	0	21	30	9	21	31	10	10
30	30	0	30	32	1	30	31	1	1
62	62	0	62	73	11	62	73	12	12
	%	0%		%	16%		%	17%	

Average Delay Level of Service (LOS)

BY 18	2023 OY_CD	DM RANK	2023 OY_CD	2023 OY_CD	Diff 2023	2031 OY_CD	2031 OY_CD	2031 OY_CD
A	C	3	C	C	3	C	C	3
B	B	2	B	C	2	B	C	2
C	C	1	C	C	1	C	C	1

Maximum Delay (secs)

BY 18	2023 OY_CD	Diff BY	2023 OY_CD	2023 OY_CD	Diff 2023	2031 OY_CD	2031 OY_CD_PD	Diff 2031
22	29	7	29	31	2	32	29	-3
128	120	-8	102	239	137	175	206	30
102	98	-3	98	98	0	136	118	-18
262	251	-11	231	368	138	324	353	29
	%	-5%		%	60%		%	9%

Maximum LOS

BY 18	2023 OY_CD	2023 OY_CD RANK	2023 OY_CD	2023 OY_CD_PD	2023 OY_CD_PD RANK	2031 OY_CD	2031 OY_CD_PD	2031 OY_CD_PD RANK
C	D	3	D	D	3	D	D	3
F	F	1	F	F	1	F	F	1
F	F	2	F	F	2	F	F	2

Junction Performance Results - TEMPRO Constrained - PM Peak Hour (17-18)

Junction Traffic Volume and Level of Service Analysis - Junction Movement Summary

Highway Capacity Manual Level of Service (LOS)		Signalised Intersection	Other Intersection
A	A: free flow	≤10 sec	≤30 sec
B	B: reasonably free flow	10–20 sec	10–15 sec
C	C: stable flow, at or near free flow	20–35 sec	15–25 sec
D	D: approaching unstable flow	35–55 sec	25–35 sec
E	E: unstable flow, operating at capacity	55–80 sec	35–50 sec
F	F: forced or breakdown flow	≥80 sec	≥50 sec

Total Traffic Volume

Site	Count	From Arm	From	To Arm	To	Ref	BY 18	2023 OY_CD	Diff BY	2023 OY_CD	2023 OY_CD	Diff 2023	SC4 2031_OY	SC5 2031_OY	Diff 2031
1	1	A	A49 (N)	B	A4103 Roman Road (E)	1-A>B	183	184	1	184	187	3	187	191	4
1	2	A	A49 (N)	C	A49 Holmer Rd (S)	1-A>C	418	483	65	483	496	13	399	423	24
1	3	A	A49 (N)	D	A4103 Roman Road (W)	1-A>D	0	0	0	0	0	0	0	0	0
1	4	B	A4103 Roman Road (E)	A	A49 (N)	1-B>A	150	198	48	198	199	1	211	210	-1
1	5	B	A4103 Roman Road (E)	C	A49 Holmer Rd (S)	1-B>C	195	196	1	196	198	2	134	133	-1
1	6	B	A4103 Roman Road (E)	D	A4103 Roman Road (W)	1-B>D	572	632	60	632	634	2	672	659	-13
1	7	C	A49 Holmer Rd (S)	A	A49 (N)	1-C>A	403	479	77	474	486	12	446	472	26
1	8	C	A49 Holmer Rd (S)	B	A4103 Roman Road (E)	1-C>B	173	186	13	186	190	4	175	175	0
1	9	C	A49 Holmer Rd (S)	D	A4103 Roman Road (W)	1-C>D	321	333	12	333	333	0	316	316	0
1	10	D	A4103 Roman Road (W)	A	A49 (N)	1-D>A	0	0	0	0	0	0	0	0	0
1	11	D	A4103 Roman Road (W)	B	A4103 Roman Road (E)	1-D>B	387	437	50	437	439	2	465	462	-3
1	12	D	A4103 Roman Road (W)	C	A49 Holmer Rd (S)	1-D>C	212	226	12	224	220	-4	169	172	3
HW1	13	A	Holmer West Southern Access	B	A4103 Roman Rd. (E)	HW1-A>B	51	52	1	52	49	-3	48	54	6
HW1	14	A	Holmer West Southern Access	D	A4103 Roman Rd. (W)	HW1-A>D	204	216	12	239	218	-21	220	230	10
HW1	15	B	A4103 Roman Rd. (E)	A	Holmer West Southern Access	HW1-B>A	111	127	16	127	125	-2	126	123	-3
HW1	16	B	A4103 Roman Rd. (E)	D	A4103 Roman Rd. (W)	HW1-B>D	753	824	71	824	829	5	858	843	-15
HW1	17	D	A4103 Roman Rd. (W)	A	Holmer West Southern Access	HW1-D>A	182	166	84	168	173	5	175	176	1
HW1	18	D	A4103 Roman Rd. (W)	B	A4103 Roman Rd. (E)	HW1-D>B	554	614	60	614	619	5	588	584	-4
HW2	19	A	A49 (N)	B	A49 (S)	HW2-A>B	599	685	86	685	683	-18	593	596	3
HW2	20	A	A49 (N)	C	Holmer West Northern Access	HW2-A>C	217	229	12	229	240	11	236	241	5
HW2	21	B	A49 (S)	A	A49 (N)	HW2-B>A	559	673	114	673	654	-19	660	649	-11
HW2	22	B	A49 (S)	C	Holmer West Northern Access	HW2-B>C	0	0	0	0	0	0	33	0	-33
HW2	23	C	Holmer West Northern Access	A	A49 (N)	HW2-C>A	126	158	32	158	163	4	165	169	4
HW2	24	C	Holmer West Northern Access	B	A49 (S)	HW2-C>B	0	0	0	0	11	11	0	12	12
			Total Traffic Average & Maximum (seconds)				6,343	7,075	732	7,075	7,143	68	6,843	6,924	81

Average Delay (secs)

BY 18	2023 OY_CD	Diff BY	2023 OY_CD	2023 OY_CD	Diff 2023	2031 OY_CD	2031 OY_CD	Diff 2031
9	13	4	13	13	0	13	13	0
8	10	2	10	9	-1	10	9	-1
14	17	3	17	17	0	17	17	0
13	17	4	17	16	-1	17	16	-1
13	17	4	12	17	5	13	17	4
11	23	12	23	23	1	24	25	1
11	22	11	23	24	2	23	24	2
11	28	17	24	25	1	24	25	1
8	8	0	8	8	0	8	8	0
8	13	5	13	13	0	11	11	0
77	79	2	78	184	106	78	144	66
68	65	-3	66	136	71	65	136	71
12	16	4	13	13	0	13	13	0
13	14	1	14	14	0	14	14	0
12	13	1	13	12	-1	13	12	-1
12	13	1	13	13	0	13	13	0
37	38	1	38	40	2	38	40	2
69	75	6	75	76	1	75	76	1
12	13	1	13	13	0	13	13	0
13	16	3	16	16	0	16	16	0
22	28	6	25	35	10	25	31	6

Average Delay LOS

BY 18	2023 OY_CD	DM RANK	2023 OY_CD	2023 OY_CD	DM RANK	2031 OY_CD	2031 OY_CD	2031 OY_CD
A	B	15	B	B	16	B	B	16
A	A	19	A	A	21	A	A	21
A	A	-	A	A	-	A	A	-
B	C	9	C	C	9	C	C	9
B	C	9	C	C	11	C	C	11
B	C	9	C	C	9	C	C	9
B	C	5	C	C	5	C	C	5
B	C	7	C	C	7	C	C	7
B	C	5	C	C	5	C	C	5
A	A	-	A	A	-	A	A	-
A	A	20	A	A	21	A	A	21
A	B	16	B	B	20	B	B	20
F	F	1	F	F	1	F	F	1
F	F	3	F	F	2	F	F	3
C	C	8	C	C	11	C	C	11
B	B	13	B	B	14	B	B	14
B	B	16	B	B	16	B	B	16
B	B	14	B	B	15	B	B	15
E	E	4	E	E	4	E	E	4
F	F	2	F	F	3	F	F	3
B	B	10	B	B	10	B	B	10
A	A	-	A	B	16	A	B	16
B	C	12	C	C	11	C	C	11
A	A	-	A	C	8	A	C	8

Maximum Delay (secs)

BY 18	2023 OY_CD	Diff BY	2023 OY_CD	2023 OY_CD	Diff 2023	2031 OY_CD	2031 OY_CD_PD	Diff 2031
16	15	-1	15	15	0	28	13	-15
10	11	1	11	12	1	14	11	-3
22	21	-1	21	21	0	36	15	-21
21	20	-1	20	21	1	13	15	2
16	20	4	20	23	3	16	17	1
13	27	14	27	30	3	32	29	-3
12	28	16	28	30	2	27	29	2
13	25	12	25	31	6	32	27	-5
10	13	3	13	11	-2	31	10	-21
13	13	0	15	13	-2	13	11	-2
118	102	-16	102	239	137	175	206	30
F	F	1	F	F	1	F	F	1
104	90	-14	90	228	138	143	185	42
F	F	3	F	F	2	F	F	2
20	20	0	20	17	-3	24	21	-3
15	15	0	15	15	0	15	16	1
16	15	-1	15	16	1	12	13	1
14	14	0	14	15	1	14	13	-1
83	80	-3	80	61	-19	72	64	-8
102	99	-3	99	99	0	136	118	-18
15	12	-3	12	13	1	13	13	0
118	102	-16	102	239	137	175	206	30

Maximum LOS

BY 18	2023 OY_CD	2023 OY_CD RANK	2023 OY_CD	2023 OY_CD_PD	2023 OY_CD_PD RANK	2031 OY_CD	2031 OY_CD_PD	2031 OY_CD_PD RANK
A	B	15	B	B	15	C	B	17
A	B	16	B	B	19	B	A	19
A	A	-	A	A	-	A	A	-
C	C	9	C	C	9	C	B	12
C	C	12	C	C	10	B	B	13
C	C	10	C	C	8	C	C	10
B	D	6	D	D	6	D	D	5
B	D	5	D	D	7	D	D	6
B	C	7	C	D	5	D	D	7
A	A	-	A	A	-	A	A	-
A	B	19	B	B	20	B	A	20
B	B	13	B	B	18	B	B	18
F	F	1	F	F	1	F	F	1
F	F	3	F	F	2	F	F	2
C	C	11	C	C	12	C	C	9
B	B	17	B	B	16	B	C	11
B	B	14	B	B	13	B	B	15
B	B	18	B	B	14	B	B	14
F	F	4	F	F	4	F	F	4
F	F	2	F	F	3	F	F	3
B	B	20	B	B	17	B	B	16
A	A	-	A	A	-	A	A	-
B	C	8	C	C	11	C	C	8
A	A	-	A	A	-	A	A	-

Appendix C – Queue Length Analysis

Junction Performance Results - TEMPRO Constrained - (08-09) AM Peak Hour

Average Vehicle Length (m)									5.75

Junction Queue Length Results

Average Queue Length (Vehicles)

Junction	Site	Arms	Description	Lanes	BY 18	SC2 2023_OY_CD	Diff BY	SC2 2023_OY_CD	SC3 2023_OY_CD PD	Diff 2023	SC4 2031_OY_CD	SC5 2031_OY_CD PD	Diff 2031
1	1	4	A49 / A4103 Roman Rd	8	12	44	33	44	48	4	67	59	-8
2	HW1	3	Holmer West Southern Access / A4103 Roman Rd.	5	10	23	13	23	19	-4	31	26	-5
3	HW2	3	Holmer West Northern Access / A49	5	3	3	1	3	4	1	4	5	0
					25	71	46	71	72	0	102	89	-13

Maximum Queue Length (Vehicles)

BY 18	SC2 2023_OY_CD	Diff BY	SC2 2023_OY_CD	SC3 2023_OY_CD PD	Diff 2023	SC4 2031_OY_CD	SC5 2031_OY_CD PD	Diff 2031
145	152	7	152	181	29	233	234	1
61	78	17	78	65	-13	88	79	-8
37	36	-1	36	40	3	42	42	0
243	267	23	267	286	19	362	356	-7

Junction Performance Results - TEMPRO Constrained - (08-09) AM Peak Hour

Individual Approach Queue Length Results

Average Queue Length (Vehicles)

Queue Counter	Site	Arm	Description	Lanes	BY 18	SC2 2023_OY_CD	Diff BY	SC2 2023_OY_CD	SC3 2023_OY_CD PD	Diff 2023	SC4 2031_OY_CD	SC5 2031_OY_CD PD	Diff 2031
1	1	Arm A	A49 (N)	2	1	2	1	2	3	1	6	3	4
2	1	Arm B	A4103 Roman Rd (E)	2	9	40	32	40	42	2	49	49	9
3	1	Arm C	A49 Holmer Rd (S)	2	0	0	0	0	0	0	0	1	0
4	1	Arm D	A4103 Roman Rd (W)	2	1	2	0	2	3	1	12	6	10
102	HW1	Arm A	Holmer West Sourthern Access	2	5	18	13	18	13	-4	24	18	7
103	HW1	Arm B	A4103 Roman Rd. (E)	2	2	2	0	2	2	0	2	2	0
104	HW1	Arm D	A4103 Roman Rd. (W)	1	4	4	1	4	4	0	5	6	1
105	HW2	Arm A	A49 (N)	2	1	1	0	1	2	0	2	2	1
106	HW2	Arm B	A49 (S)	1	1	2	0	2	2	0	2	2	0
107	HW2	Arm C	Holmer West Northern Access	2	0	0	0	0	0	0	0	1	0
			Total		25	71	46	71	72	0	102	89	31

Maximum Queue Length (Vehicles)

BY 18	SC2 2023_OY_CD	Diff BY	SC2 2023_OY_CD	SC3 2023_OY_CD PD	Diff 2023	SC4 2031_OY_CD	SC5 2031_OY_CD PD	Diff 2031
31	22	-9	22	35	13	44	42	-2
62	87	25	87	86	-1	86	86	0
6	12	6	12	17	5	14	27	12
47	31	-16	31	43	12	88	80	-9
17	36	18	36	25	-11	46	36	-10
16	15	-1	15	13	-2	14	16	2
27	27	0	27	27	-1	27	27	0
22	15	-7	15	20	5	23	24	2
11	17	5	17	15	-2	15	13	-2
4	4	1	4	4	0	5	5	0
243	267	23	267	286	19	362	356	-7

Junction Performance Results - TEMPRO Constrained - (17-18) PM Peak Hour

Average Vehicle Length (m)									5.75

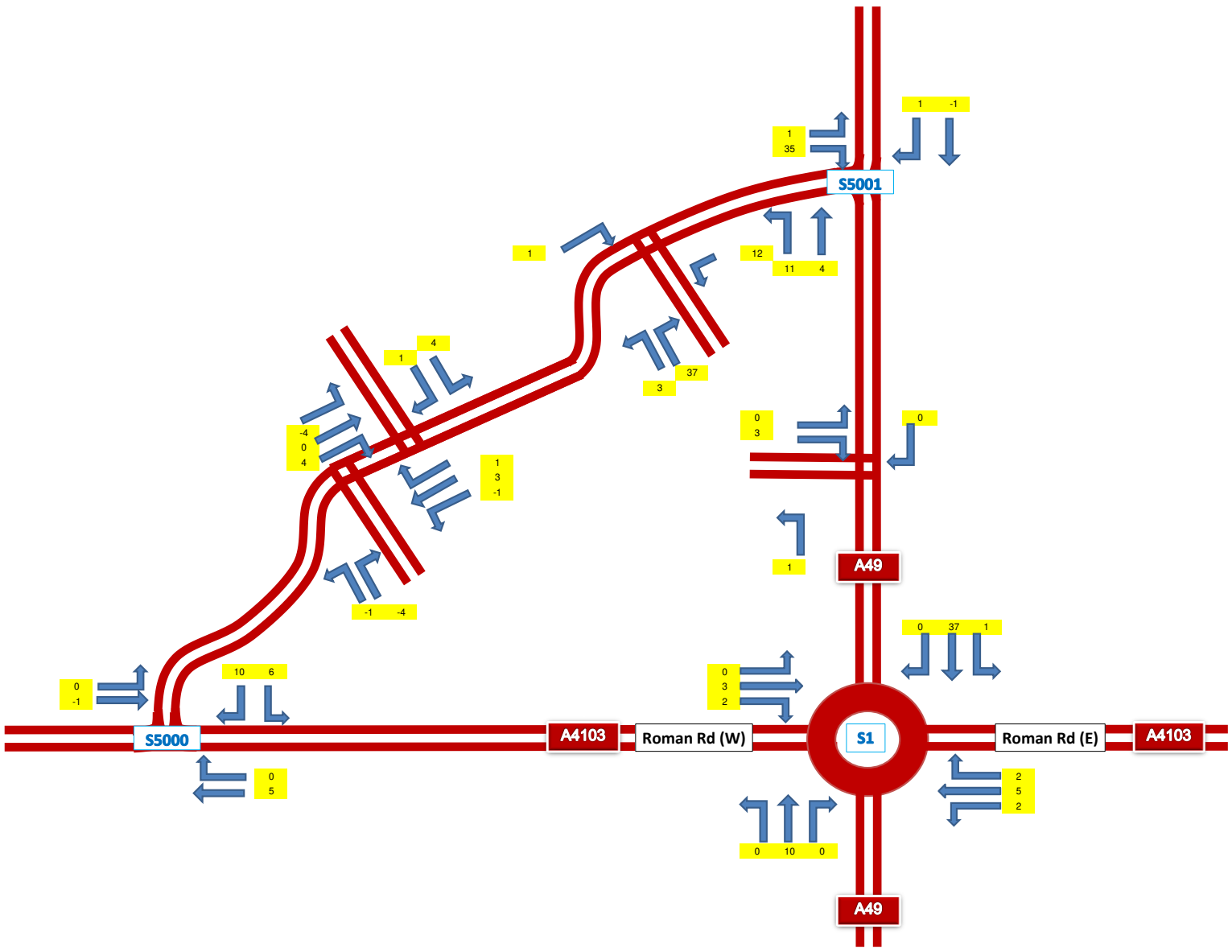
Junction Queue Length Results					Average Queue Length (Vehicles)									Maximum Queue Length (Vehicles)								
Junction	Site	Arms	Description	Lanes	BY 18	SC2 2023_OY_CD	Diff BY	SC2 2023_OY_CD	SC3 2023_OY_CD RD	Diff 2023	SC4 2031_OY_CD	SC5 2031_OY_CD RD	Diff 2031	BY 18	SC2 2023_OY_CD	Diff BY	SC4 2031_OY_CD	SC3 2023_OY_CD RD	Diff 2023	SC4 2031_OY_CD	SC5 2031_OY_CD RD	Diff 2031
1	1	4	A49 / A4103 Roman Rd	8	6	47	41	47	46	-1	42	44	2	128	229	101	229	181	-48	188	166	-23
2	HW1	3	Holmer West Southern Access / A4103 Roman Rd.	5	9	10	1	10	17	7	15	21	5	53	51	-2	51	84	33	65	75	10
3	HW2	3	Holmer West Northern Access / A49	5	12	13	2	13	14	1	14	12	-2	44	46	2	46	42	-4	46	47	1
					27	70	44	70	77	7	71	76	5	224	326	102	326	308	-18	299	288	-12

Junction Performance Results - TEMPRO Constrained - (17-18) PM Peak Hour

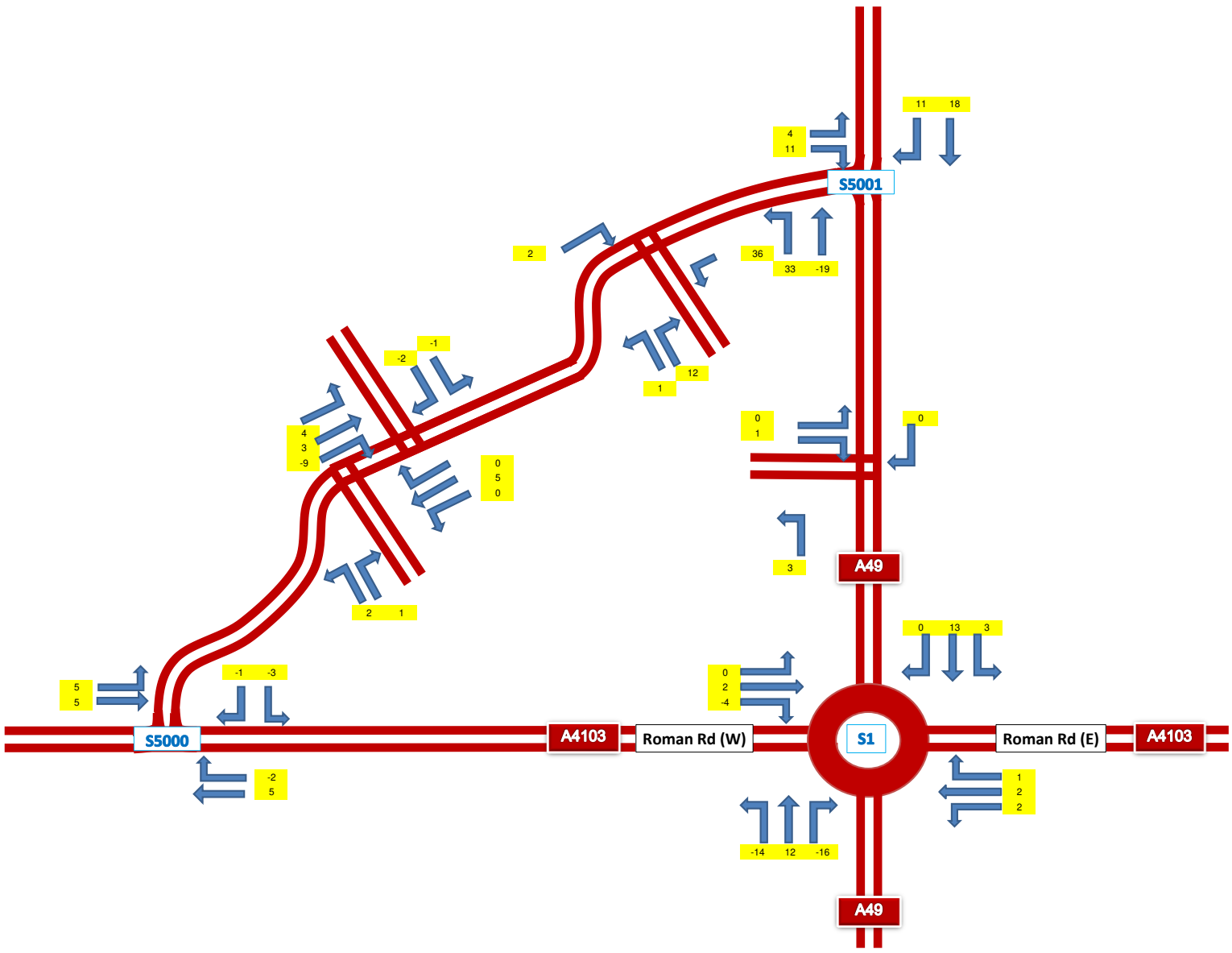
Individual Approach Queue Length Results					Average Queue Length (Vehicles)									Maximum Queue Length (Vehicles)								
Queue Counter	Site	Arm	Description	Lanes	BY 18	SC2 2023_OY_CD	Diff BY	SC2 2023_OY_CD	SC3 2023_OY_CD RD	Diff 2023	SC4 2031_OY_CD	SC5 2031_OY_CD RD	Diff 2031	BY 18	SC2 2023_OY_CD	Diff BY	SC4 2031_OY_CD	SC3 2023_OY_CD RD	Diff 2023	SC4 2031_OY_CD	SC5 2031_OY_CD RD	Diff 2031
1	1	Arm A	A49 (N)	2	1	1	1	1	1	-1	1	1	0	20	49	29	49	14	-36	40	13	-27
2	1	Arm B	A4103 Roman Rd (E)	2	4	10	6	10	9	-1	2	3	0	70	86	16	86	83	-3	61	64	4
3	1	Arm C	A49 Holmer Rd (S)	2	1	35	34	35	36	0	38	40	2	27	71	44	71	72	1	72	70	-1
4	1	Arm D	A4103 Roman Rd (W)	2	0	1	0	1	1	0	1	0	0	11	23	12	23	13	-10	16	18	1
102	HW1	Arm A	Holmer West Sourthern Access	2	5	5	0	5	12	7	10	15	5	16	13	-3	13	31	19	24	27	4
103	HW1	Arm B	A4103 Roman Rd. (E)	2	3	3	1	3	3	0	3	3	0	19	20	1	20	29	9	25	24	-1
104	HW1	Arm D	A4103 Roman Rd. (W)	1	2	2	0	2	2	0	2	2	0	17	18	1	18	24	6	16	23	7
105	HW2	Arm A	A49 (N)	2	10	11	1	11	12	1	12	9	-2	26	27	1	27	26	-1	27	27	0
106	HW2	Arm B	A49 (S)	1	1	2	0	2	2	0	2	2	0	13	14	1	14	12	-3	14	16	2
107	HW2	Arm C	Holmer West Northern Access	2	0	1	0	1	1	0	1	1	0	5	5	0	5	4	0	5	4	-1
			Total		27	70	44	70	77	7	71	76	5	224	326	102	326	308	-18	299	288	-12

Appendix D – Turning Flow Movements

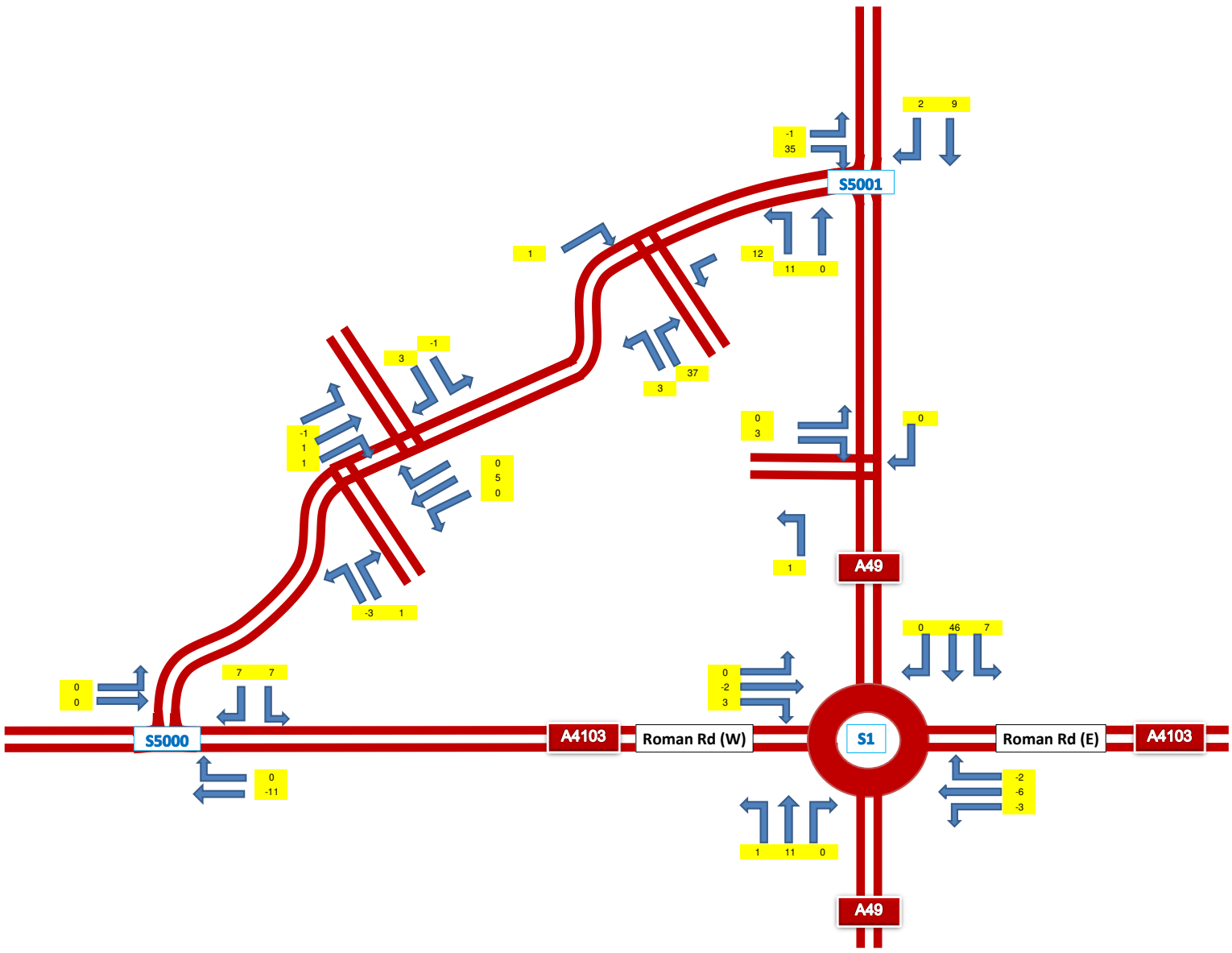
Holmer House Farm VISSIM Model - 2023 Proposed Development Impact AM Peak Hr (8-9)-Total Traffic (Lights & Heavies)



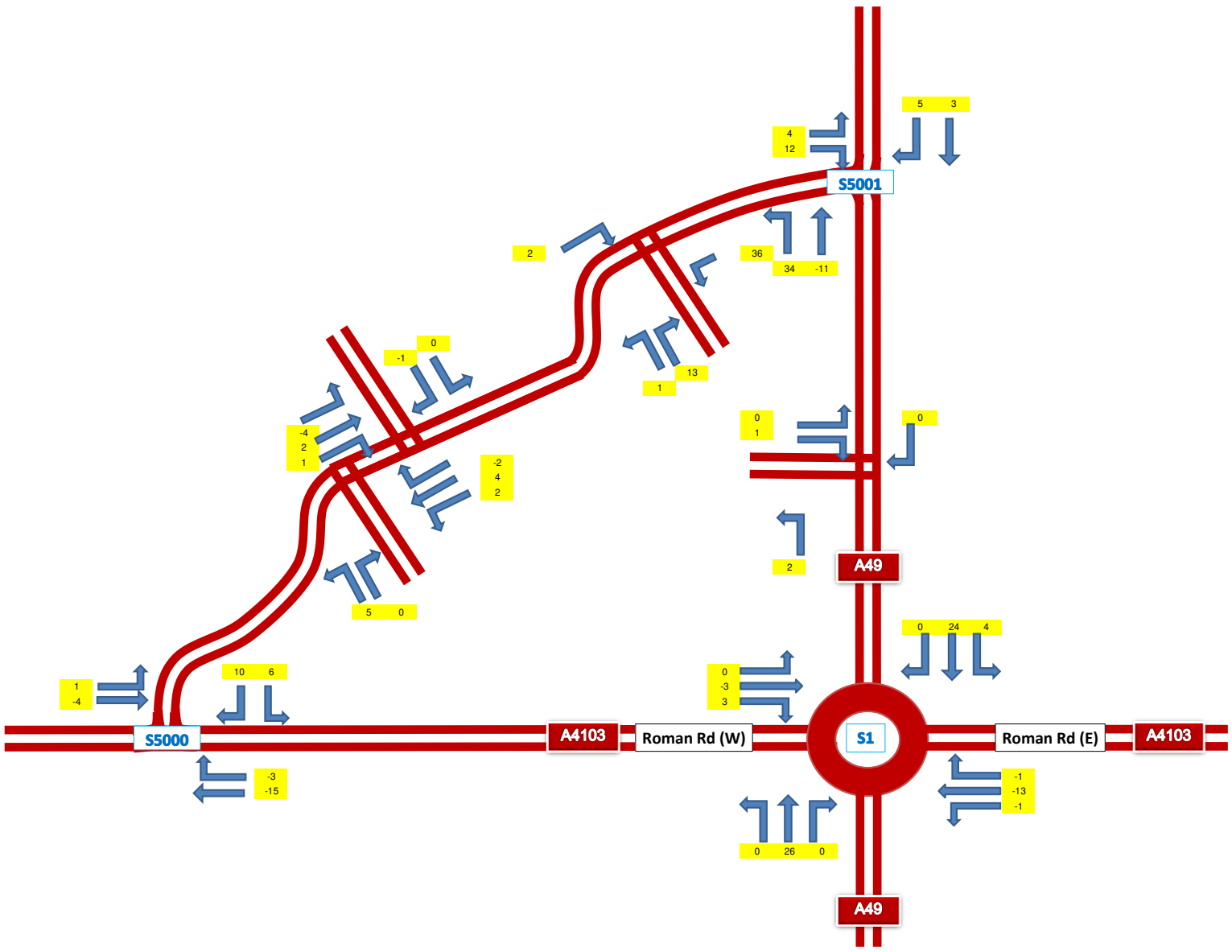
Holmer House Farm VISSIM Model - 2023 Proposed Development Impact Pm Peak Hr (17-18)-Total Traffic (Lights & Heavies)



Holmer House Farm VISSIM Model - 2031 Proposed Development Impact AM Peak Hr (8-9)-Total Traffic (Lights & Heavies)



Holmer House Farm VISSIM Model - 2031 Proposed Development Impact Pm Peak Hr (17-18)-Total Traffic (Lights & Heavies)



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Appendix F Detailed Junction Modelling Outputs

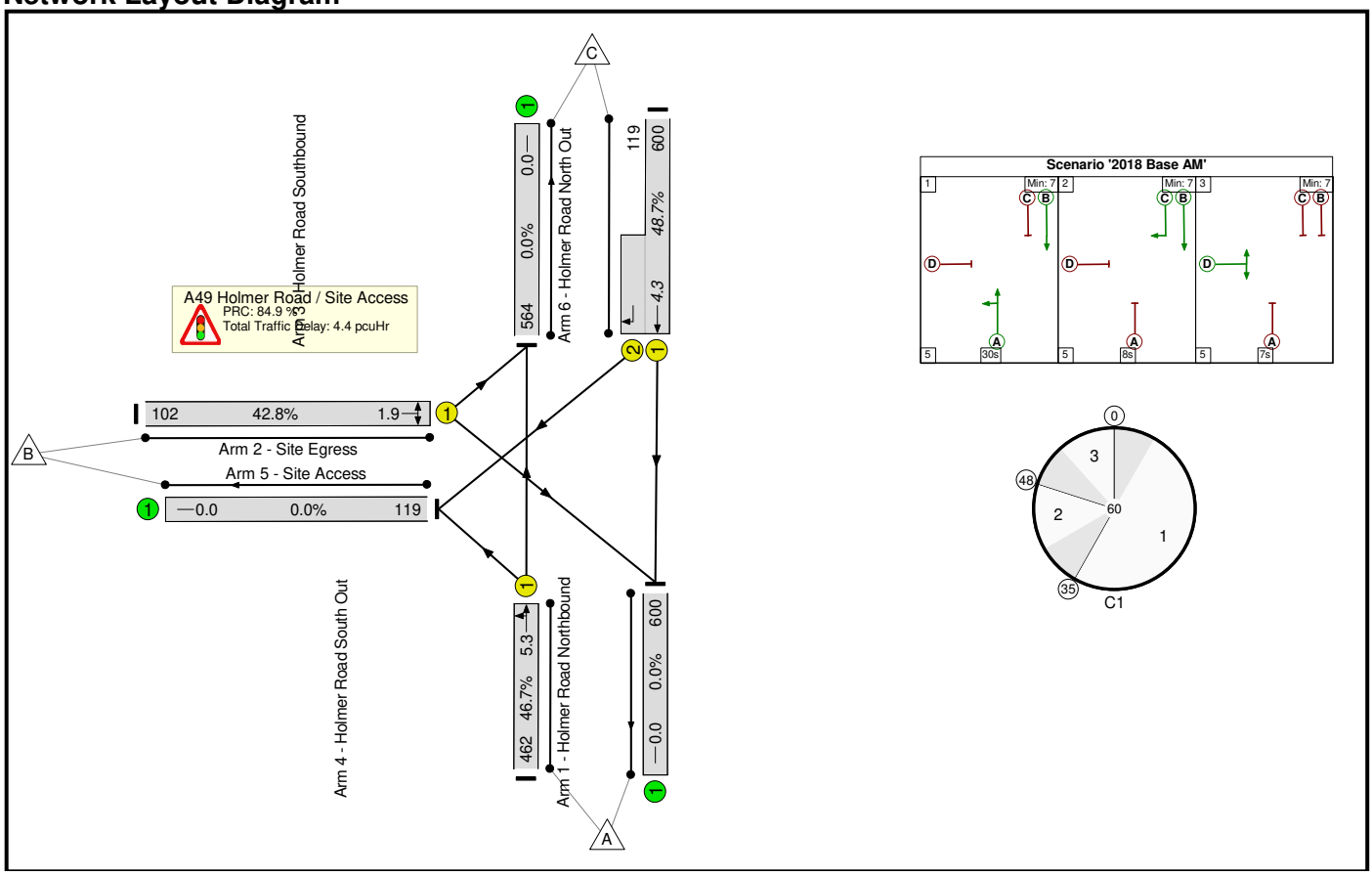
Basic Results Summary

User and Project Details

Project:	**Holmer Farm, Hereford**
Title:	**Site Access from A49_Signals**
Location:	
Additional detail:	
File name:	Holmer West Spine Road_A49.lsg3x
Author:	IDS
Company:	Phil Jones Associates
Address:	

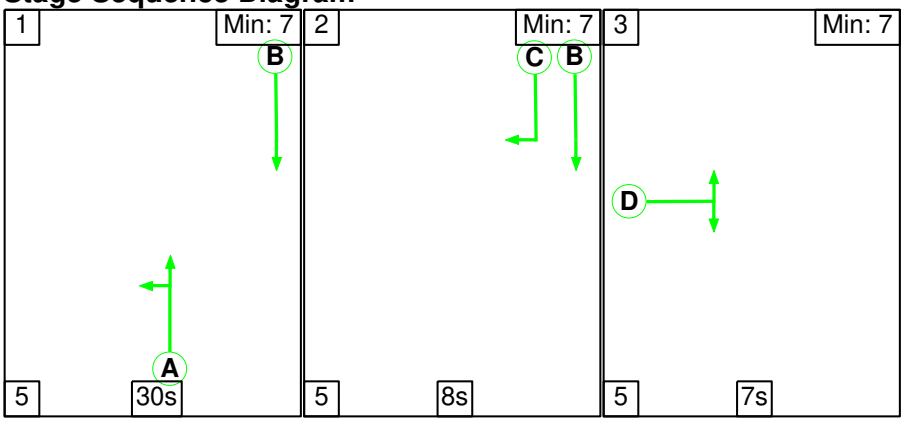
Scenario 1: '2018 Base AM' (FG1: '2018 Base AM', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



Basic Results Summary

Stage Sequence Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: Site Access from A49_Signals	-	-	-		-	-	-	-	-	-	**48.7%**	**0**	**0**	**0**	**4.4**	-	-
A49 Holmer Road / Site Access	-	-	-		-	-	-	-	-	-	**48.7%**	**0**	**0**	**0**	**4.4**	-	-
1/1	Holmer Road Northbound Left Ahead	U	A		1	30	-	462	1915	989	46.7%	-	-	-	1.6	12.6	5.3
2/1	Site Egress Right Left	U	D		1	7	-	102	1786	238	42.8%	-	-	-	1.1	37.1	1.9
3/1+3/2	Holmer Road Southbound Ahead Right	U	B C		1	43:8	-	719	1915:1791	1477	48.7%	-	-	-	1.8	8.8	4.3

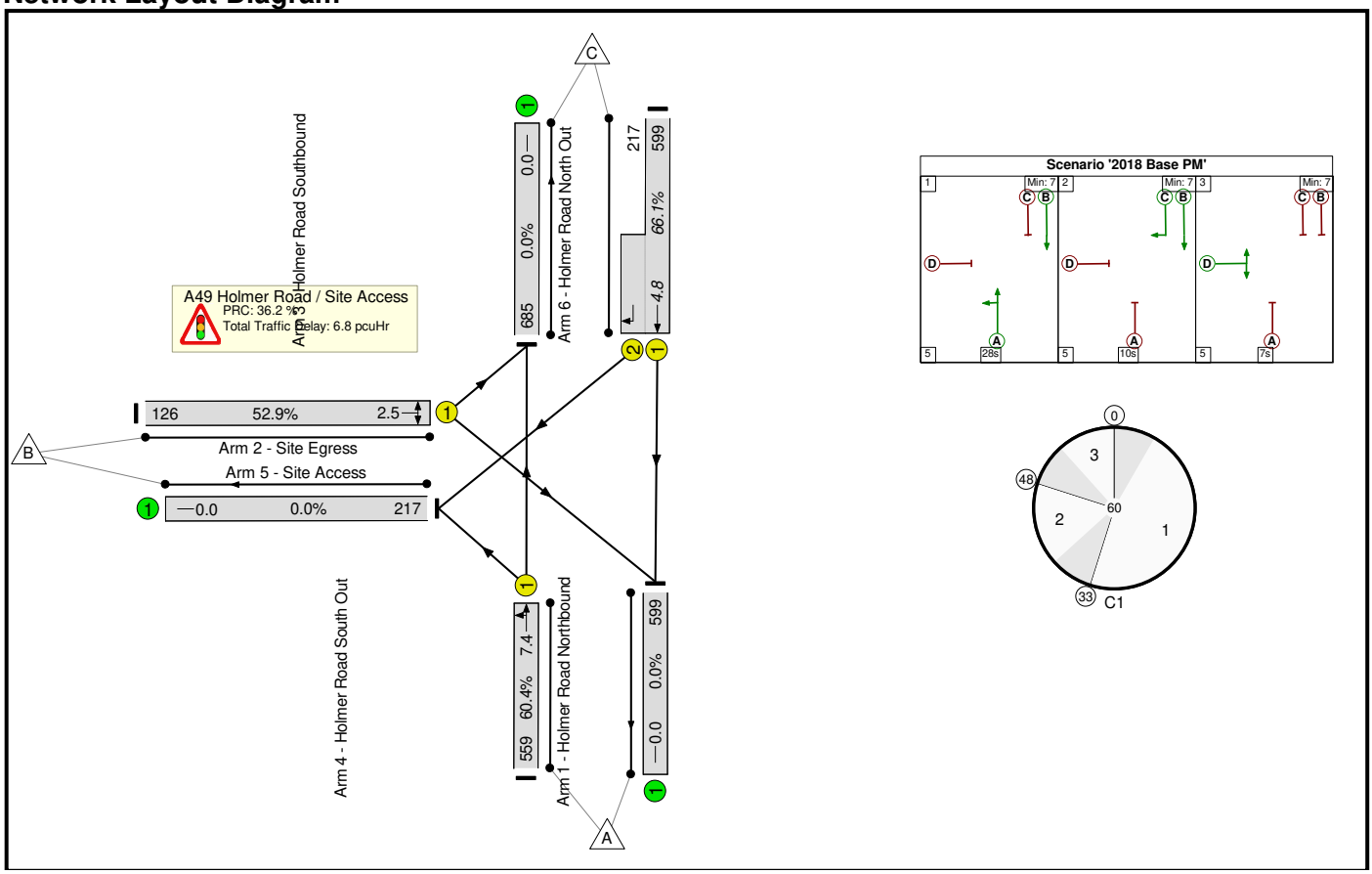
C1 PRC for Signalled Lanes (%): 84.9 Total Delay for Signalled Lanes (pcuHr): 4.43 Cycle Time (s): 60

PRC Over All Lanes (%): 84.9 Total Delay Over All Lanes(pcuHr): 4.43

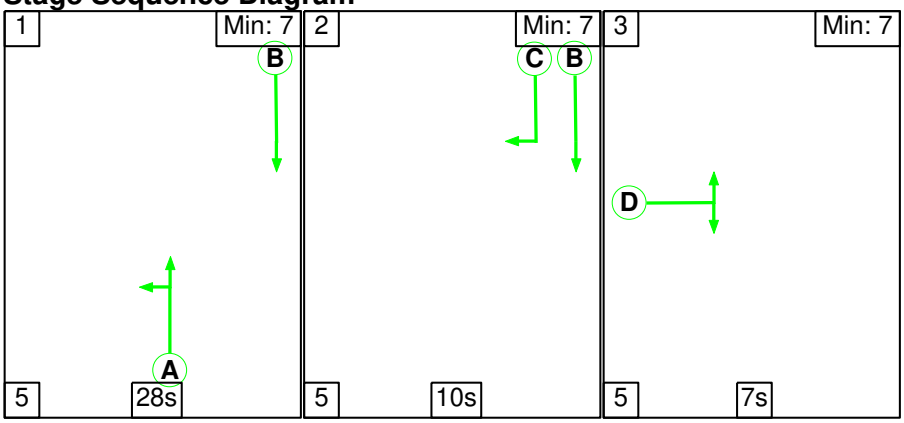
Basic Results Summary

Scenario 2: '2018 Base PM' (FG2: '2018 Base PM', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



Stage Sequence Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: Site Access from A49_Signals	-	-	-		-	-	-	-	-	-	**66.1%**	**0**	**0**	**0**	**6.8**	-	-
A49 Holmer Road / Site Access	-	-	-		-	-	-	-	-	-	**66.1%**	**0**	**0**	**0**	**6.8**	-	-
1/1	Holmer Road Northbound Left Ahead	U	A		1	28	-	559	1915	926	60.4%	-	-	-	2.5	16.2	7.4
2/1	Site Egress Right Left	U	D		1	7	-	126	1786	238	52.9%	-	-	-	1.4	40.1	2.5
3/1+3/2	Holmer Road Southbound Ahead Right	U	B C		1	43:10	-	816	1915:1791	1235	66.1%	-	-	-	2.9	12.6	4.8

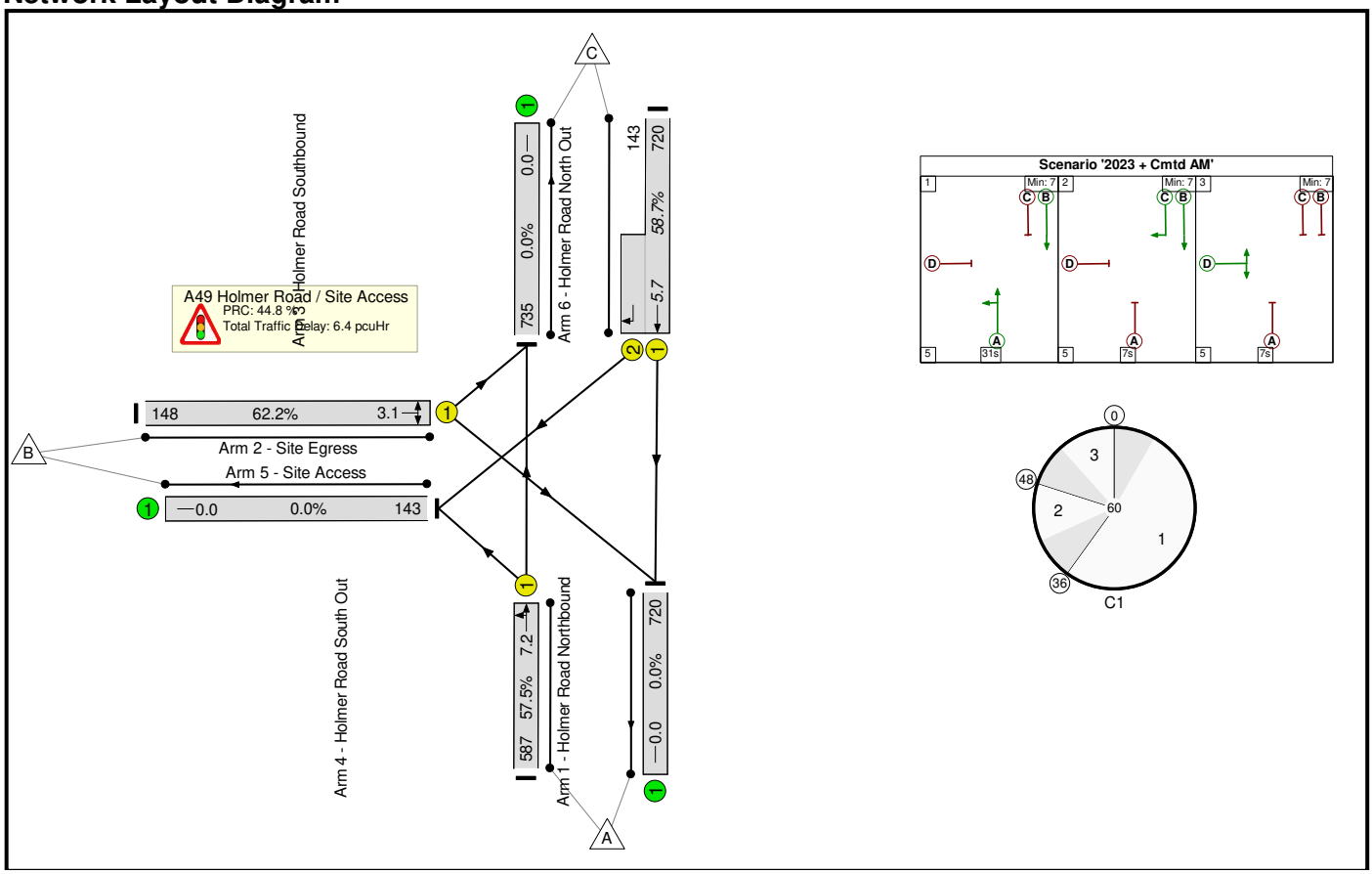
C1

PRC for Signalled Lanes (%): 36.2
PRC Over All Lanes (%): 36.2
Total Delay for Signalled Lanes (pcuHr): 6.78
Total Delay Over All Lanes(pcuHr): 6.78
Cycle Time (s): 60

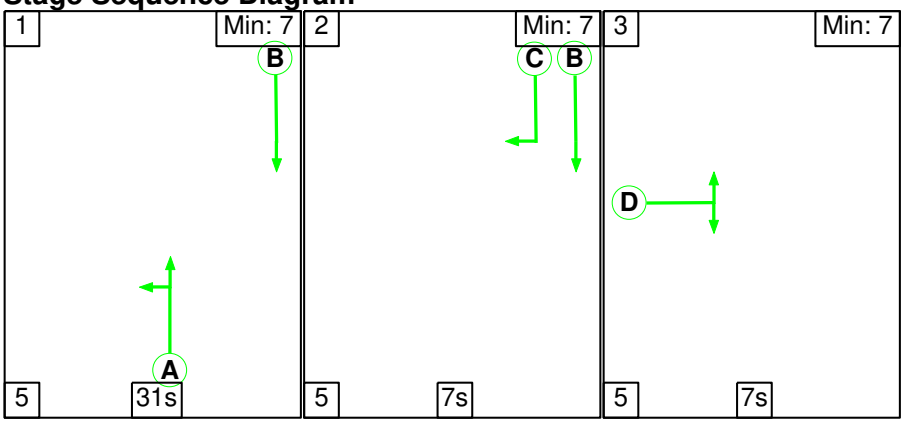
Basic Results Summary

Scenario 3: '2023 + Cmtd AM' (FG3: '2023 + Cmtd AM', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



Stage Sequence Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: Site Access from A49_Signals	-	-	-		-	-	-	-	-	-	**62.2%**	**0**	**0**	**0**	**6.4**	-	-
A49 Holmer Road / Site Access	-	-	-		-	-	-	-	-	-	**62.2%**	**0**	**0**	**0**	**6.4**	-	-
1/1	Holmer Road Northbound Left Ahead	U	A		1	31	-	587	1915	1021	57.5%	-	-	-	2.2	13.6	7.2
2/1	Site Egress Right Left	U	D		1	7	-	148	1786	238	62.2%	-	-	-	1.8	44.2	3.1
3/1+3/2	Holmer Road Southbound Ahead Right	U	B C		1	43:7	-	863	1915:1791	1471	58.7%	-	-	-	2.4	9.9	5.7

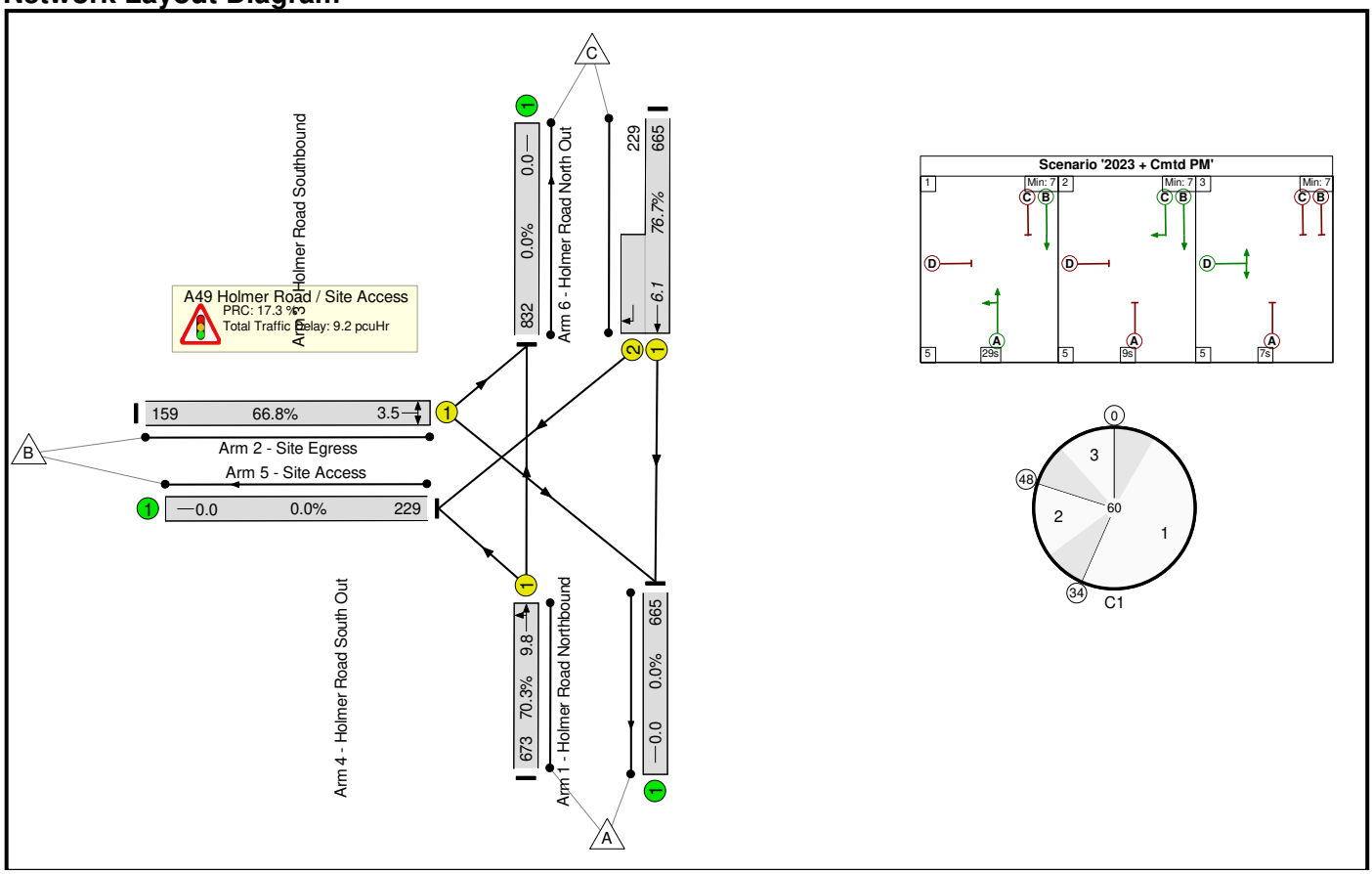
C1 PRC for Signalled Lanes (%): 44.8 Total Delay for Signalled Lanes (pcuHr): 6.39 Cycle Time (s): 60

PRC Over All Lanes (%): 44.8 Total Delay Over All Lanes(pcuHr): 6.39

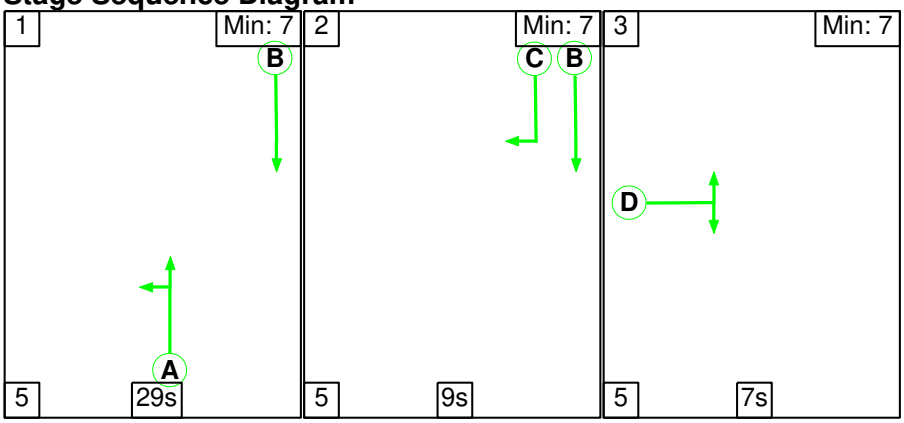
Basic Results Summary

Scenario 4: '2023 + Cmtd PM' (FG4: '2023 + Cmtd PM', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



Stage Sequence Diagram



Basic Results Summary

Network Results

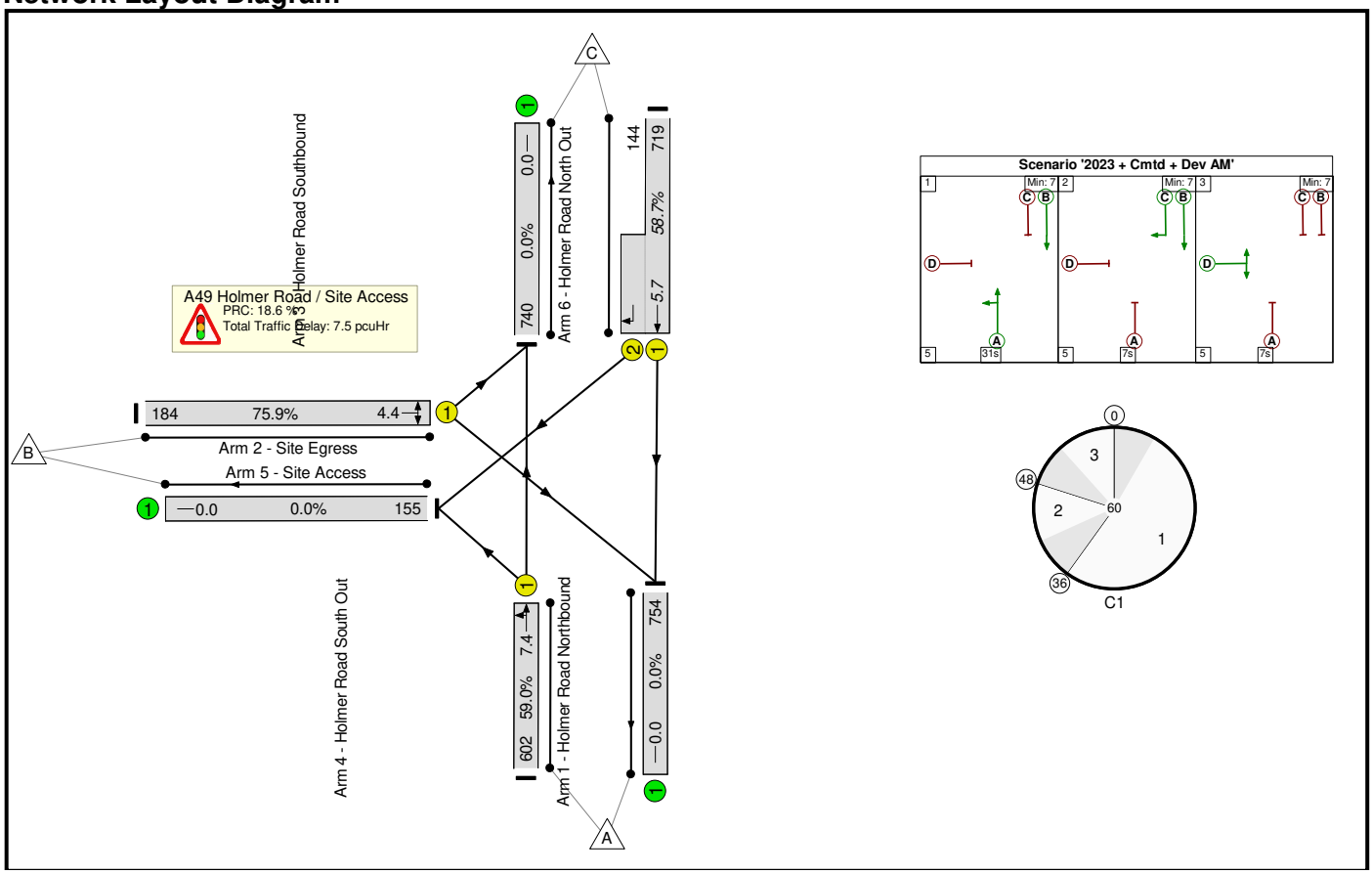
Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: Site Access from A49_Signals	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**76.7%**	**0**	**0**	**0**	**9.2**	**-**	**-**
A49 Holmer Road / Site Access	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**76.7%**	**0**	**0**	**0**	**9.2**	**-**	**-**
1/1	Holmer Road Northbound Left Ahead	U	A		1	29	-	673	1915	957	70.3%	-	-	-	3.3	17.8	9.8
2/1	Site Egress Right Left	U	D		1	7	-	159	1786	238	66.8%	-	-	-	2.1	46.9	3.5
3/1+3/2	Holmer Road Southbound Ahead Right	U	B C		1	43:9	-	894	1915:1791	1165	76.7%	-	-	-	3.8	15.1	6.1

C1 PRC for Signalled Lanes (%): 17.3 Total Delay for Signalled Lanes (pcuHr): 9.16 Cycle Time (s): 60
PRC Over All Lanes (%): 17.3 Total Delay Over All Lanes(pcuHr): 9.16

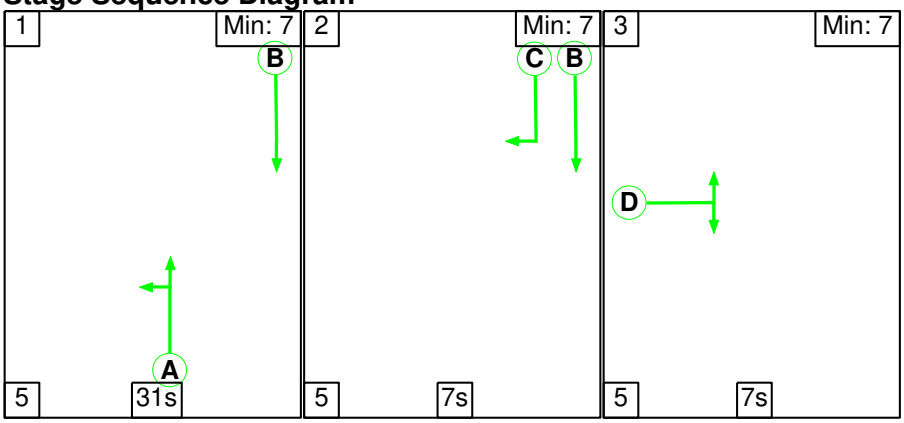
Basic Results Summary

Scenario 5: '2023 + Cmtd + Dev AM' (FG5: '2023 + Cmtd + Dev AM', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



Stage Sequence Diagram



Basic Results Summary

Network Results

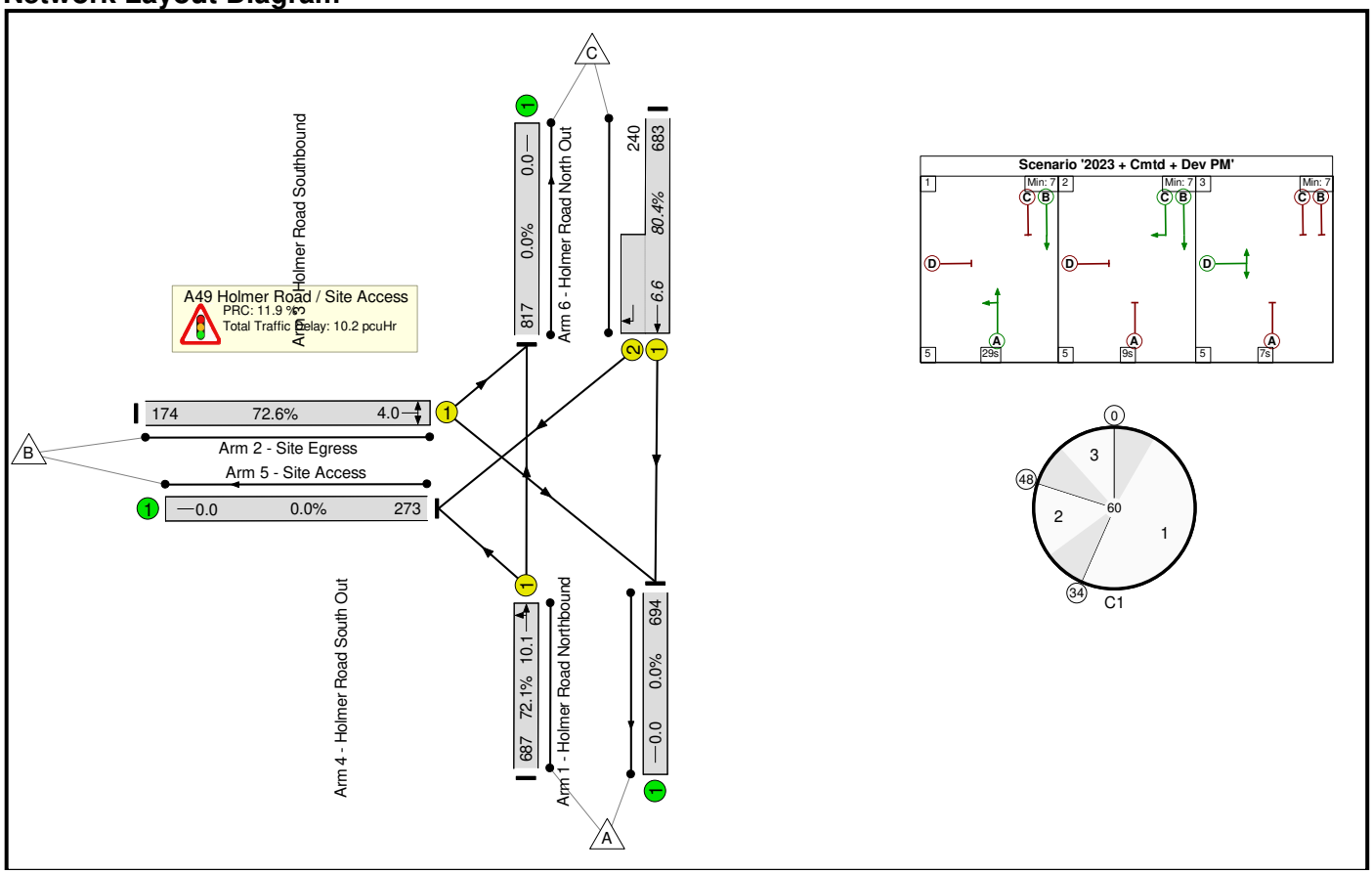
Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: Site Access from A49_Signals	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**75.9%**	**0**	**0**	**0**	**7.5**	**-**	**-**
A49 Holmer Road / Site Access	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**75.9%**	**0**	**0**	**0**	**7.5**	**-**	**-**
1/1	Holmer Road Northbound Left Ahead	U	A		1	31	-	602	1912	1020	59.0%	-	-	-	2.3	13.8	7.4
2/1	Site Egress Right Left	U	D		1	7	-	184	1818	242	75.9%	-	-	-	2.8	54.4	4.4
3/1+3/2	Holmer Road Southbound Ahead Right	U	B C		1	43:7	-	863	1915:1791	1470	58.7%	-	-	-	2.4	9.9	5.7

C1	PRC for Signalled Lanes (%):	18.6	Total Delay for Signalled Lanes (pcuHr):	7.47	Cycle Time (s):	60
	PRC Over All Lanes (%):	18.6	Total Delay Over All Lanes(pcuHr):	7.47		

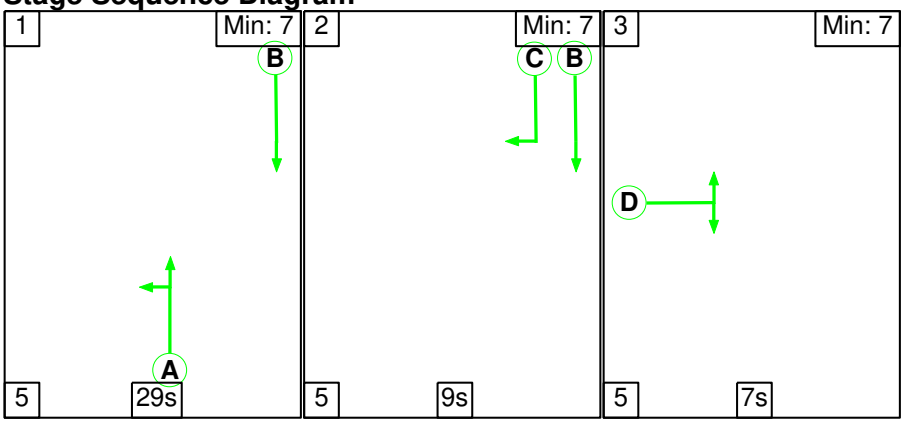
Basic Results Summary

Scenario 6: '2023 + Cmtd + Dev PM' (FG6: '2023 + Cmtd + Dev PM', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



Stage Sequence Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: Site Access from A49_Signals	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**80.4%**	**0**	**0**	**0**	**10.2**	**-**	**-**
A49 Holmer Road / Site Access	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**80.4%**	**0**	**0**	**0**	**10.2**	**-**	**-**
1/1	Holmer Road Northbound Left Ahead	U	A		1	29	-	687	1906	953	72.1%	-	-	-	3.5	18.4	10.1
2/1	Site Egress Right Left	U	D		1	7	-	174	1797	240	72.6%	-	-	-	2.5	51.4	4.0
3/1+3/2	Holmer Road Southbound Ahead Right	U	B C		1	43:9	-	923	1915:1791	1148	80.4%	-	-	-	4.2	16.6	6.6

C1 PRC for Signalled Lanes (%): 11.9 Total Delay for Signalled Lanes (pcuHr): 10.25 Cycle Time (s): 60

PRC Over All Lanes (%): 11.9 Total Delay Over All Lanes(pcuHr): 10.25

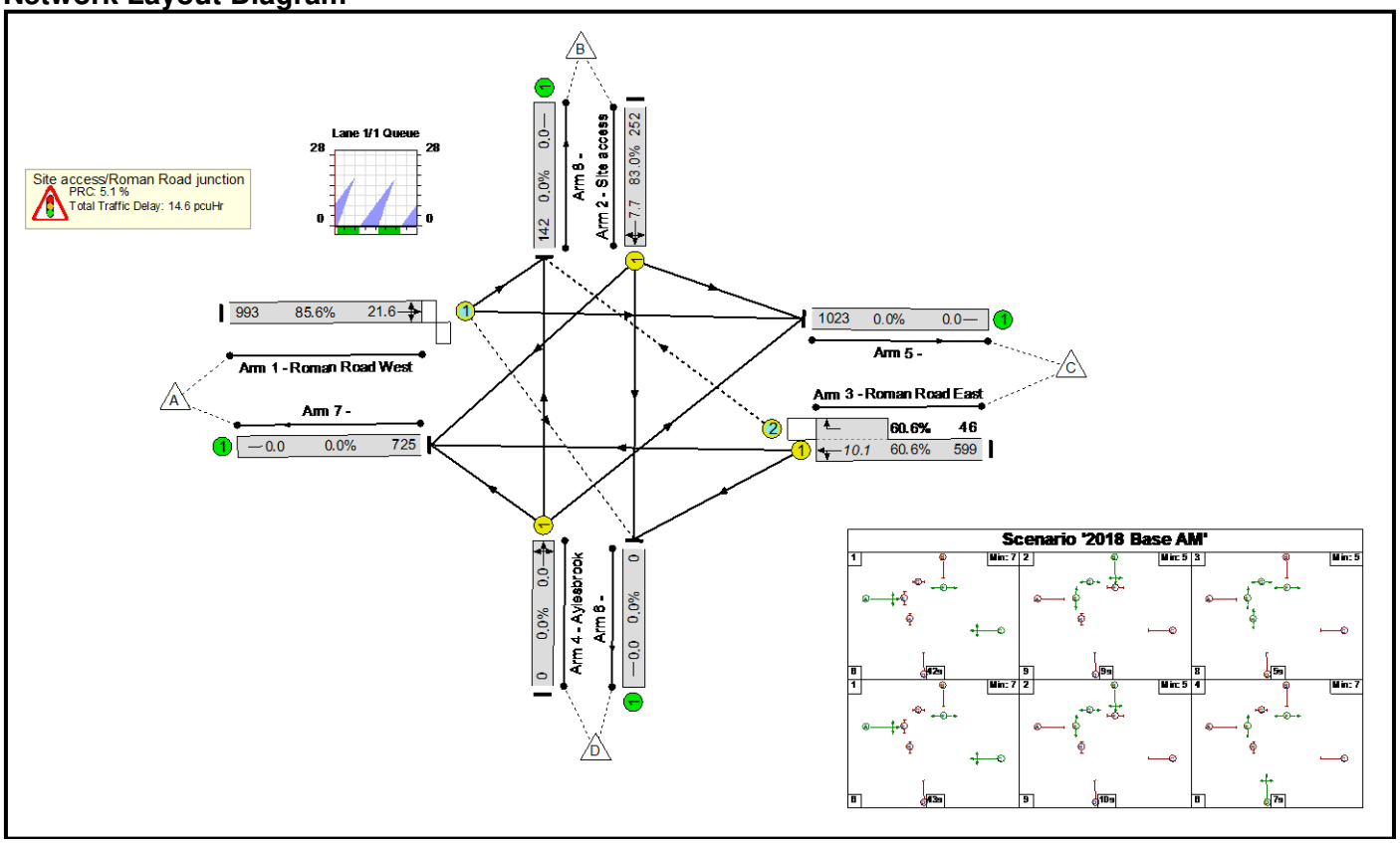
Basic Results Summary

User and Project Details

Project:	
Title:	
Location:	
Additional detail:	
File name:	Holmer West Spine Road_Roman Road (as per s278).lsg3x
Author:	
Company:	
Address:	

Scenario 1: '2018 Base AM' (FG1: '2018 Base AM', Plan 2: 'Network Control South double cycle')

Network Layout Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**85.6%**	**46**	**0**	**0**	**14.6**	**-**	**-**
Site access/Roman Road junction	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**85.6%**	**46**	**0**	**0**	**14.6**	**-**	**-**
1/1	Roman Road West Ahead Right Left	O	A		2	87	-	993	2085	1160	85.6%	0	0	0	7.0	25.5	21.6
2/1	Site access Left Ahead Right	U	B		2	23	-	252	1942	303	83.0%	-	-	-	4.5	64.9	7.7
3/1+3/2	Roman Road East Left Ahead Right	U+O	C		2	85	-	645	1915:1781	988+76	60.6 : 60.6%	46	0	0	3.0	16.9	10.1
4/1	Aylesbrook Right Left Ahead	U	D		1	7	-	0	1915	96	0.0%	-	-	-	0.0	0.0	0.0

C1

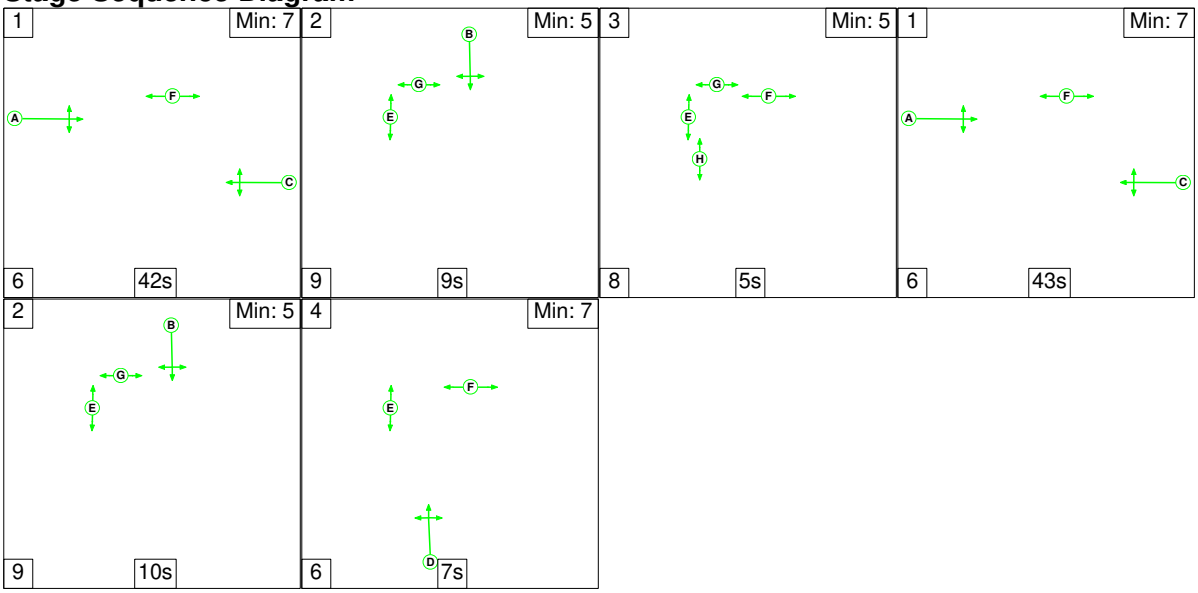
PRC for Signalled Lanes (%): 5.1
PRC Over All Lanes (%): 5.1

Total Delay for Signalled Lanes (pcuHr): 14.60
Total Delay Over All Lanes(pcuHr): 14.60

Cycle Time (s): 160

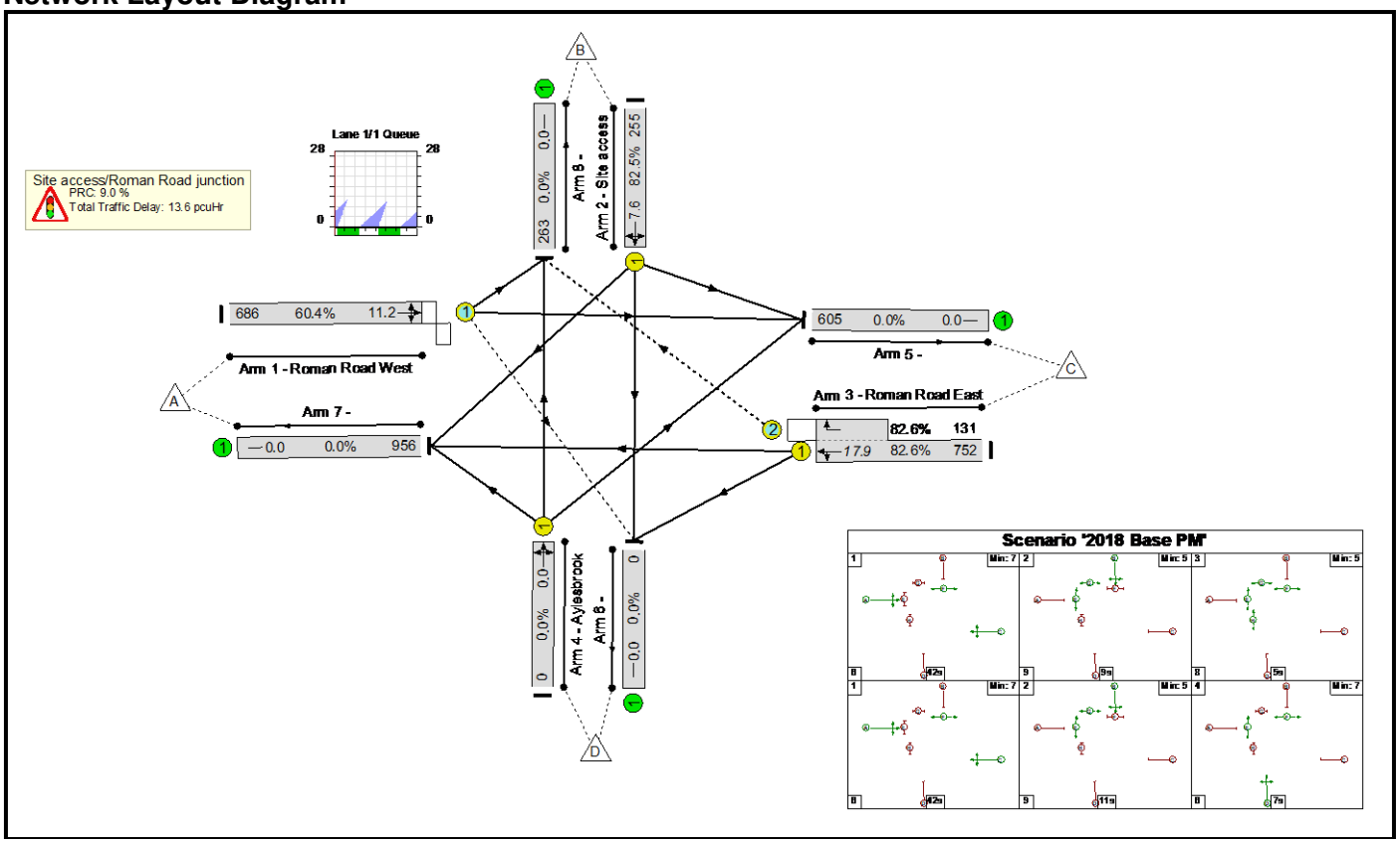
Basic Results Summary

Stage Sequence Diagram



Scenario 2: '2018 Base PM' (FG2: '2018 Base PM', Plan 2: 'Network Control South double cycle')

Network Layout Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**82.6%**	**131**	**0**	**0**	**13.6**	**-**	**-**
Site access/Roman Road junction	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**82.6%**	**131**	**0**	**0**	**13.6**	**-**	**-**
1/1	Roman Road West Ahead Right Left	O	A		2	86	-	686	2065	1136	60.4%	0	0	0	3.1	16.2	11.2
2/1	Site access Left Ahead Right	U	B		2	24	-	255	1901	309	82.5%	-	-	-	4.5	63.3	7.6
3/1+3/2	Roman Road East Left Ahead Right	U+O	C		2	84	-	883	1915:1781	910+159	82.6 : 82.6%	131	0	0	6.0	24.5	17.9
4/1	Aylesbrook Right Left Ahead	U	D		1	7	-	0	1915	96	0.0%	-	-	-	0.0	0.0	0.0

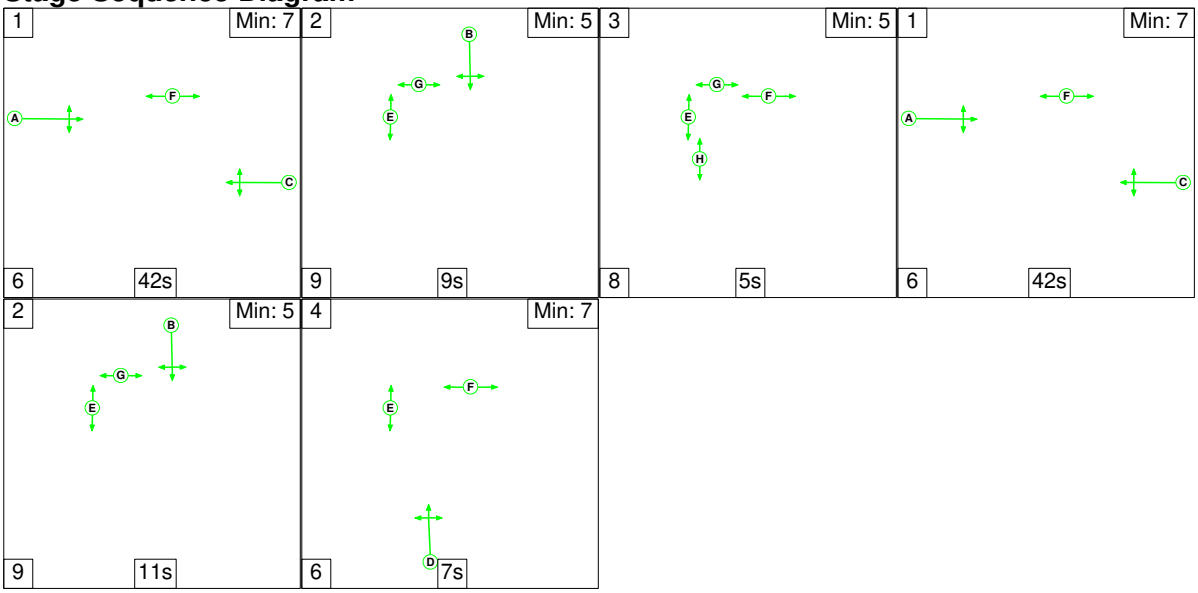
C1

PRC for Signalled Lanes (%): 9.0 | Total Delay for Signalled Lanes (pcuHr): 13.59 | Cycle Time (s): 160

PRC Over All Lanes (%): 9.0 | Total Delay Over All Lanes(pcuHr): 13.59

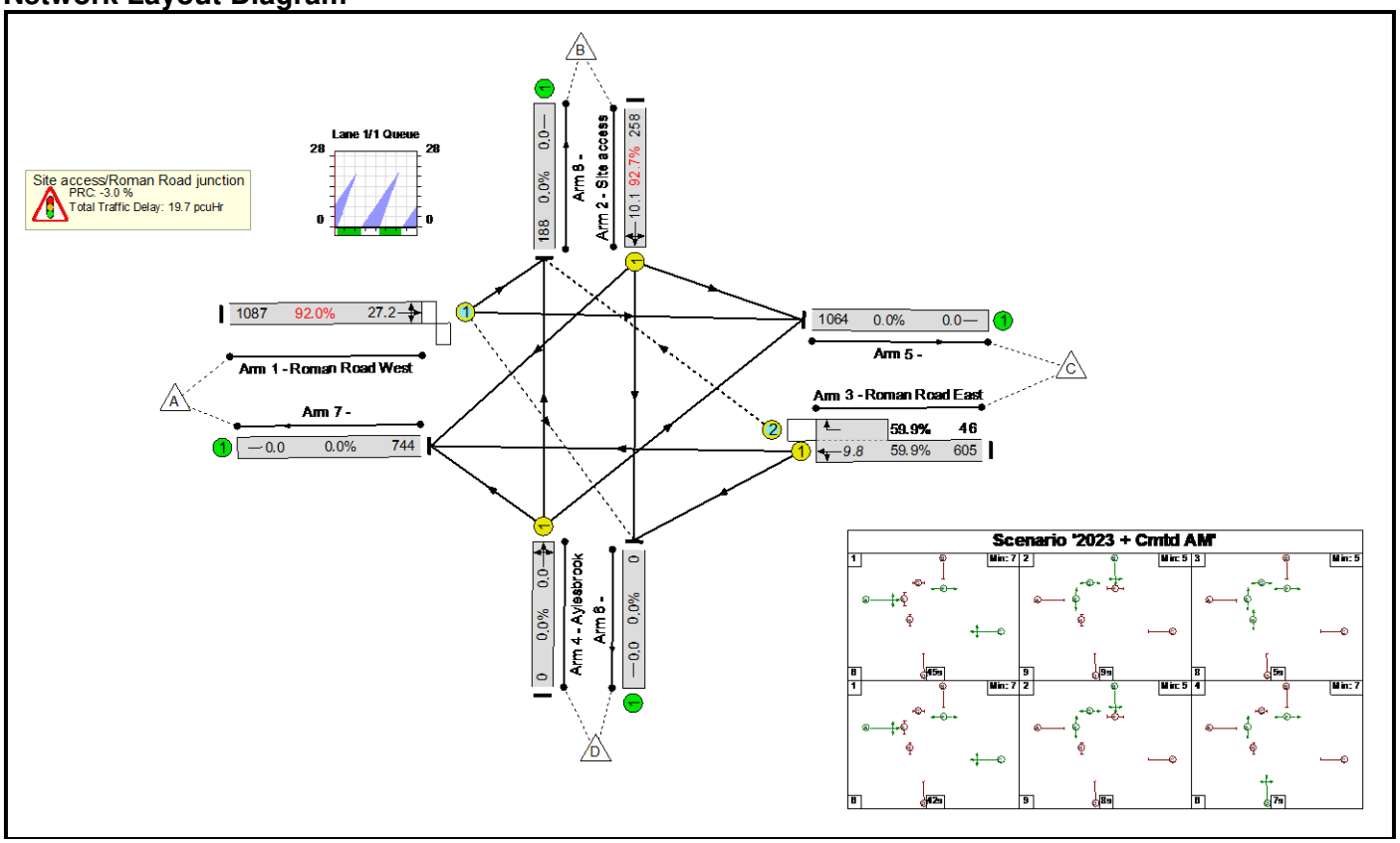
Basic Results Summary

Stage Sequence Diagram



Scenario 3: '2023 + Cmtd AM' (FG3: '2023 + Cmtd AM', Plan 2: 'Network Control South double cycle')

Network Layout Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**92.7%**	**42**	**0**	**4**	**19.7**	**-**	**-**
Site access/Roman Road junction	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**92.7%**	**42**	**0**	**4**	**19.7**	**-**	**-**
1/1	Roman Road West Ahead Right Left	O	A		2	89	-	1087	2078	1182	92.0%	0	0	0	9.9	32.7	27.2
2/1	Site access Left Ahead Right	U	B		2	21	-	258	1937	278	92.7%	-	-	-	6.8	95.4	10.1
3/1+3/2	Roman Road East Left Ahead Right	U+O	C		2	87	-	651	1915:1781	1011+77	59.9 : 59.9%	42	0	4	3.0	16.4	9.8
4/1	Aylesbrook Right Left Ahead	U	D		1	7	-	0	1915	96	0.0%	-	-	-	0.0	0.0	0.0

C1

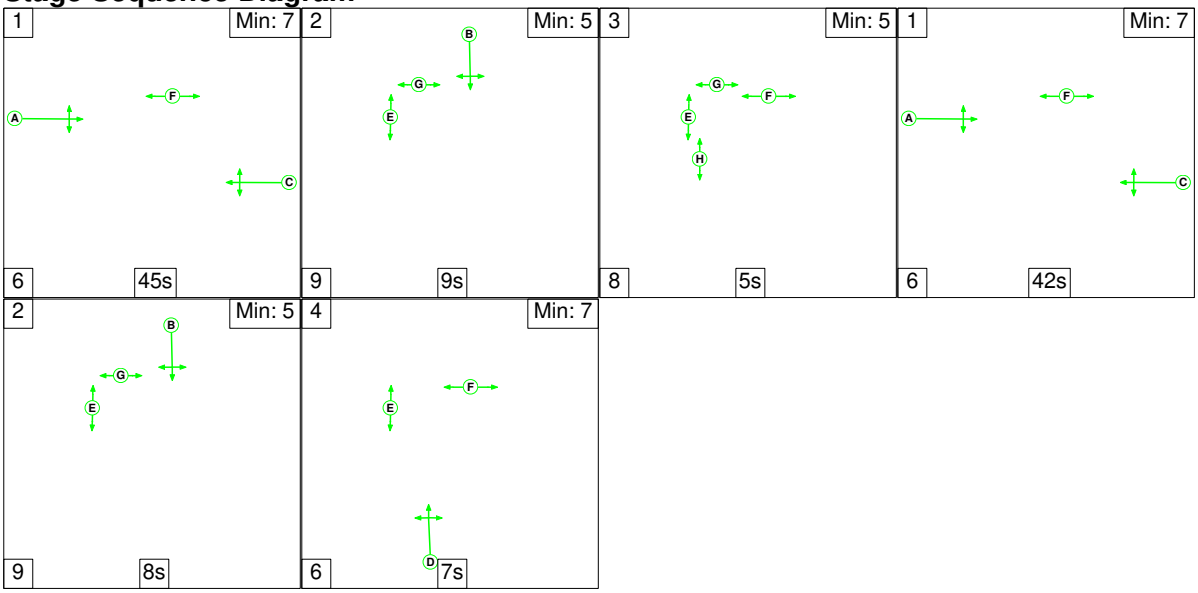
PRC for Signalled Lanes (%): -3.0
PRC Over All Lanes (%): -3.0

Total Delay for Signalled Lanes (pcuHr): 19.67
Total Delay Over All Lanes(pcuHr): 19.67

Cycle Time (s): 160

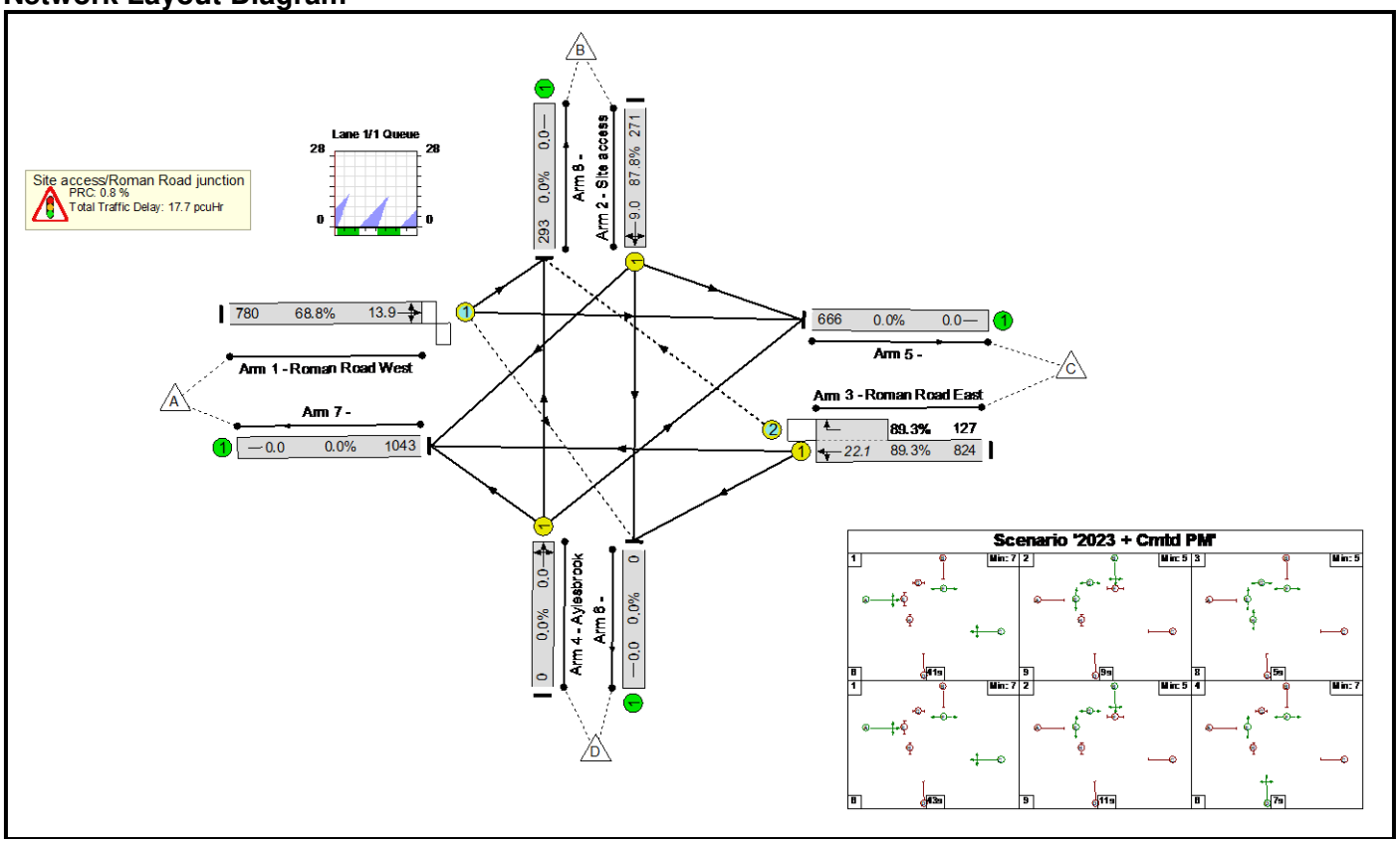
Basic Results Summary

Stage Sequence Diagram



Scenario 4: '2023 + Cmtd PM' (FG4: '2023 + Cmtd PM', Plan 2: 'Network Control South double cycle')

Network Layout Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**89.3%**	**127**	**0**	**0**	**17.7**	**-**	**-**
Site access/Roman Road junction	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**89.3%**	**127**	**0**	**0**	**17.7**	**-**	**-**
1/1	Roman Road West Ahead Right Left	O	A		2	86	-	780	2061	1134	68.8%	0	0	0	3.9	18.2	13.9
2/1	Site access Left Ahead Right	U	B		2	24	-	271	1900	309	87.8%	-	-	-	5.5	73.7	9.0
3/1+3/2	Roman Road East Left Ahead Right	U+O	C		2	84	-	951	1915:1781	923+142	89.3 : 89.3%	127	0	0	8.2	31.0	22.1
4/1	Aylesbrook Right Left Ahead	U	D		1	7	-	0	1915	96	0.0%	-	-	-	0.0	0.0	0.0

C1

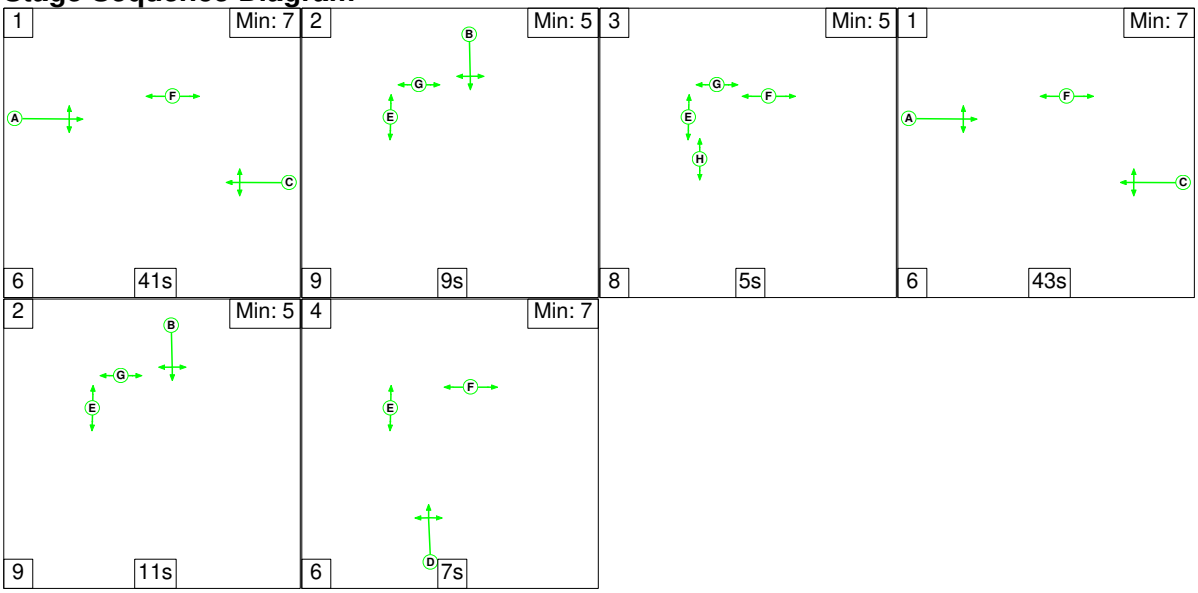
PRC for Signalled Lanes (%): 0.8
PRC Over All Lanes (%): 0.8

Total Delay for Signalled Lanes (pcuHr): 17.69
Total Delay Over All Lanes(pcuHr): 17.69

Cycle Time (s): 160

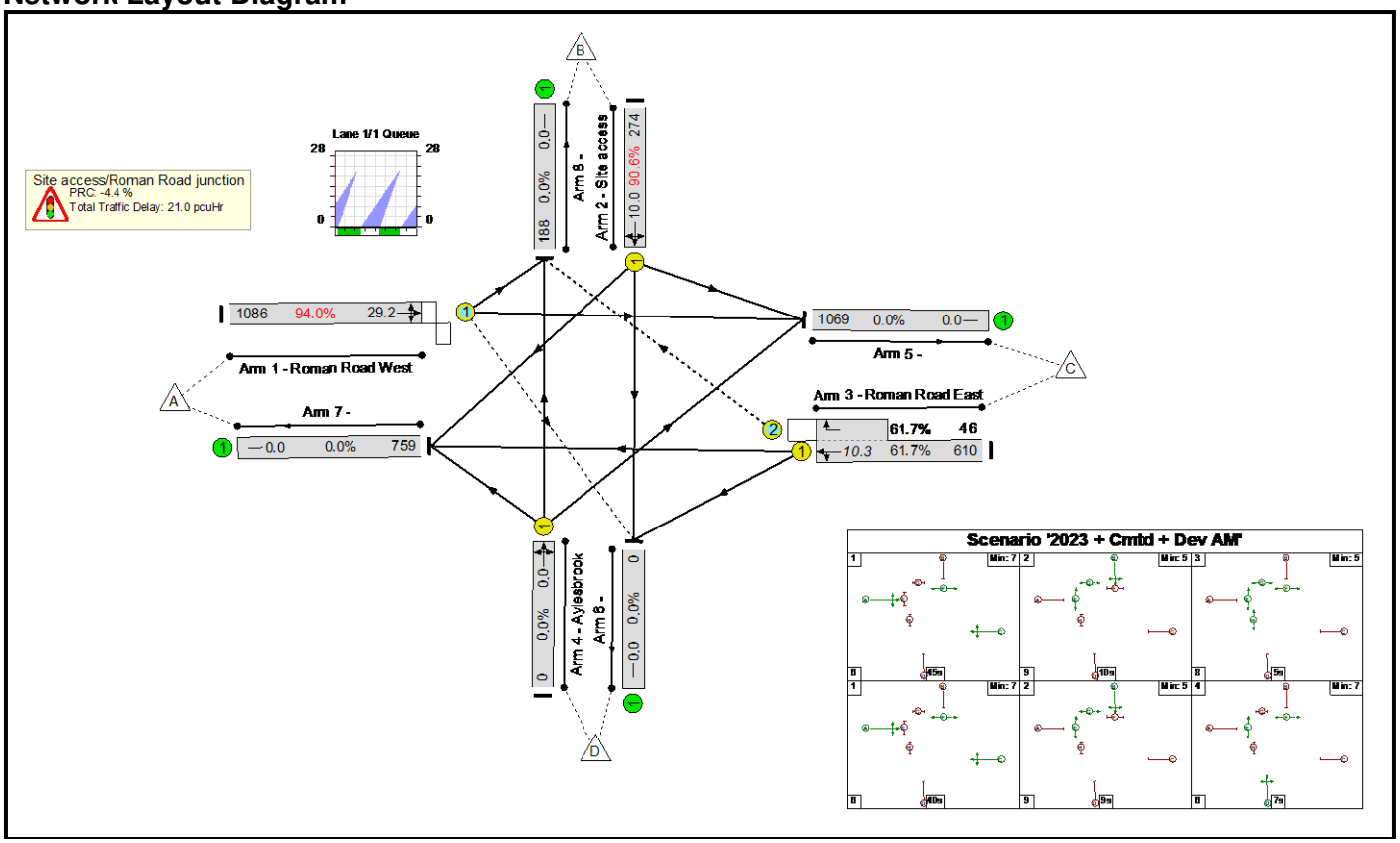
Basic Results Summary

Stage Sequence Diagram



Scenario 5: '2023 + Cmtd + Dev AM' (FG5: '2023 + Cmtd + Dev AM', Plan 2: 'Network Control South double cycle')

Network Layout Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**94.0%**	**35**	**0**	**11**	**21.0**	**-**	**-**
Site access/Roman Road junction	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**94.0%**	**35**	**0**	**11**	**21.0**	**-**	**-**
1/1	Roman Road West Ahead Right Left	O	A		2	87	-	1086	2078	1156	94.0%	0	0	0	11.5	38.2	29.2
2/1	Site access Left Ahead Right	U	B		2	23	-	274	1936	303	90.6%	-	-	-	6.3	83.1	10.0
3/1+3/2	Roman Road East Left Ahead Right	U+O	C		2	85	-	656	1915:1781	989+75	61.7 : 61.7%	35	0	11	3.2	17.4	10.3
4/1	Aylesbrook Right Left Ahead	U	D		1	7	-	0	1915	96	0.0%	-	-	-	0.0	0.0	0.0

C1

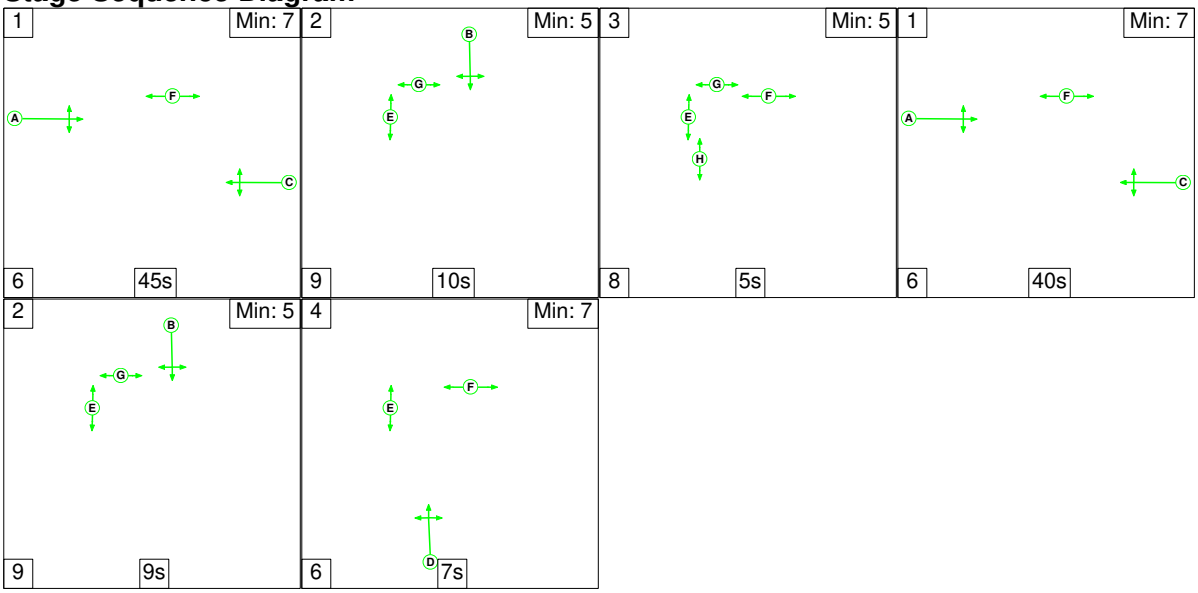
PRC for Signalled Lanes (%): -4.4
PRC Over All Lanes (%): -4.4

Total Delay for Signalled Lanes (pcuHr): 21.02
Total Delay Over All Lanes(pcuHr): 21.02

Cycle Time (s): 160

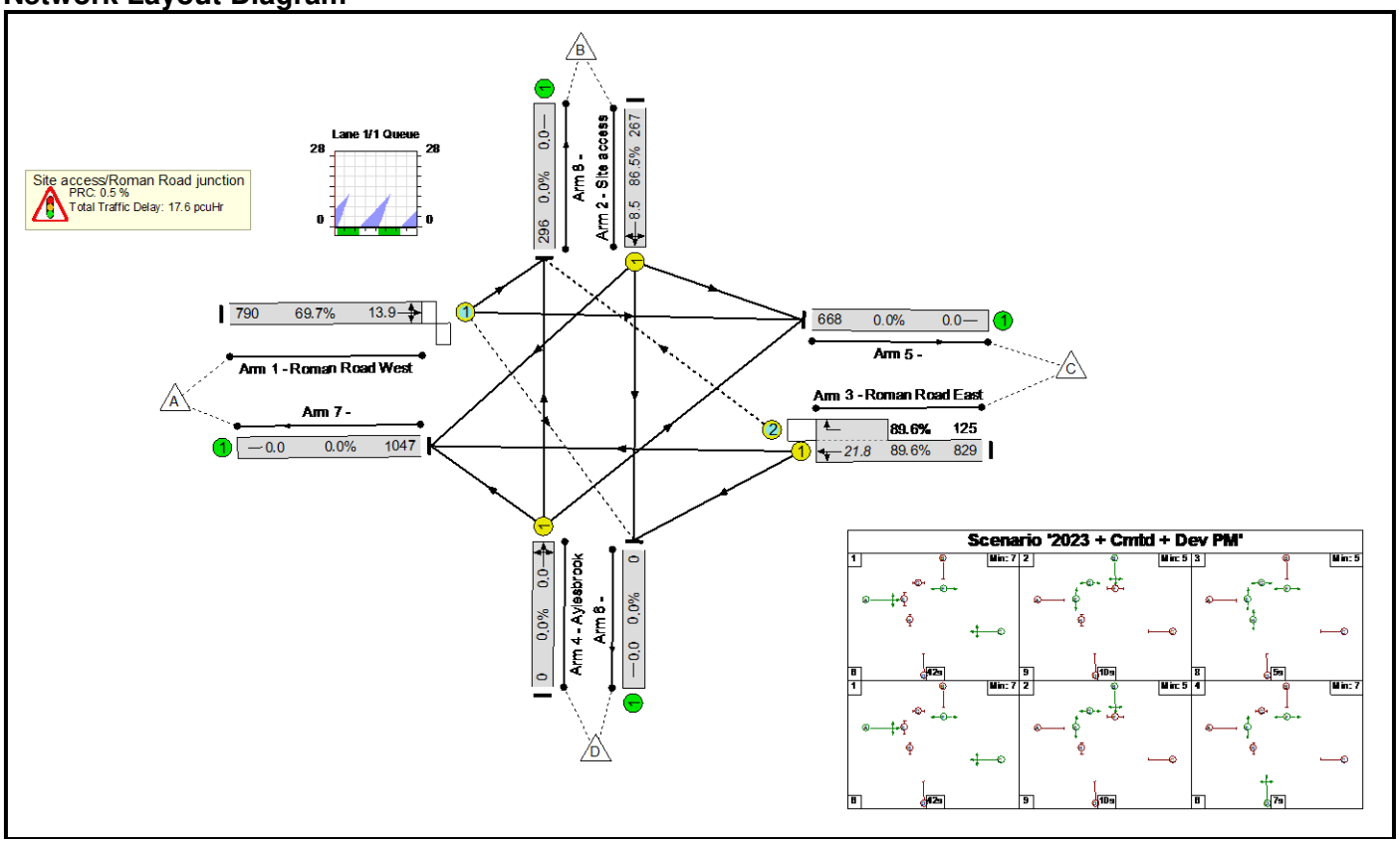
Basic Results Summary

Stage Sequence Diagram



Scenario 6: '2023 + Cmtd + Dev PM' (FG6: '2023 + Cmtd + Dev PM', Plan 2: 'Network Control South double cycle')

Network Layout Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**89.6%**	**125**	**0**	**0**	**17.6**	**-**	**-**
Site access/Roman Road junction	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**89.6%**	**125**	**0**	**0**	**17.6**	**-**	**-**
1/1	Roman Road West Ahead Right Left	O	A		2	86	-	790	2060	1133	69.7%	0	0	0	4.0	18.4	13.9
2/1	Site access Left Ahead Right	U	B		2	24	-	267	1899	309	86.5%	-	-	-	5.2	70.8	8.5
3/1+3/2	Roman Road East Left Ahead Right	U+O	C		2	84	-	954	1915:1781	925+140	89.6 : 89.6%	125	0	0	8.3	31.5	21.8
4/1	Aylesbrook Right Left Ahead	U	D		1	7	-	0	1915	96	0.0%	-	-	-	0.0	0.0	0.0

C1

PRC for Signalled Lanes (%): 0.5
PRC Over All Lanes (%): 0.5

Total Delay for Signalled Lanes (pcuHr): 17.64
Total Delay Over All Lanes(pcuHr): 17.64

Cycle Time (s): 160

Basic Results Summary

Stage Sequence Diagram