









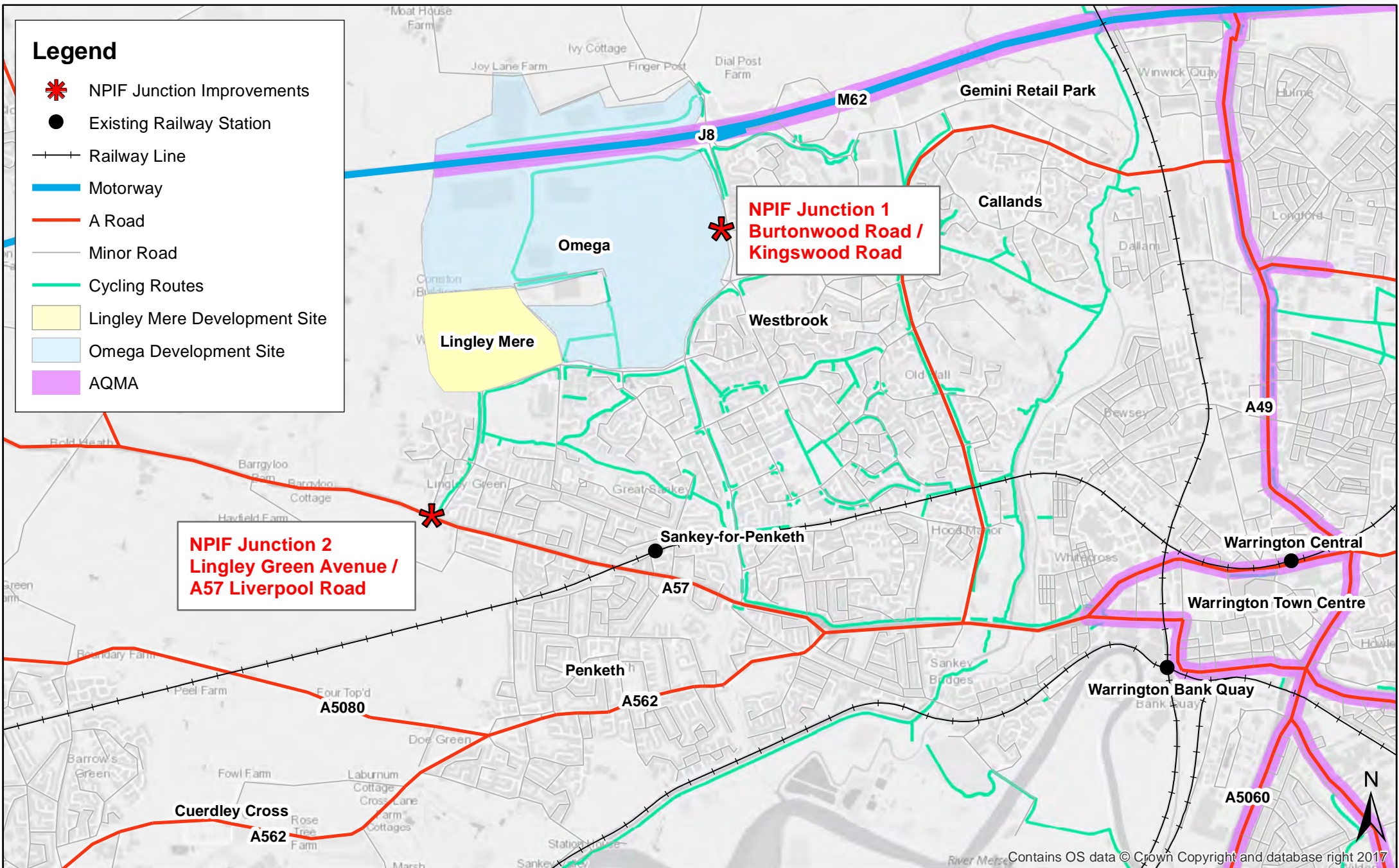




**Appendix A:**  
**Plans: Existing Transport Infrastructure;**  
**Committed and Proposed Schemes;**  
**Housing and Employment Sites; and**  
**Proximity to AQMAs**

# Legend

-  NPIF Junction Improvements
-  Existing Railway Station
-  Railway Line
-  Motorway
-  A Road
-  Minor Road
-  Cycling Routes
-  Lingley Mere Development Site
-  Omega Development Site
-  AQMA



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Client:



**WARRINGTON**  
Borough Council



1 New York Street,  
Manchester,  
M1 4HD

+44 (0) 161 601 1700  
AECOM.com

Title:  
National Productivity Investment Fund Bid  
Omega Gateway Highway Junction Improvement Package  
Junction 1: Burtonwood Road / Kingswood Road  
Junction 2: Lingley Green Avenue / A57 Liverpool Road

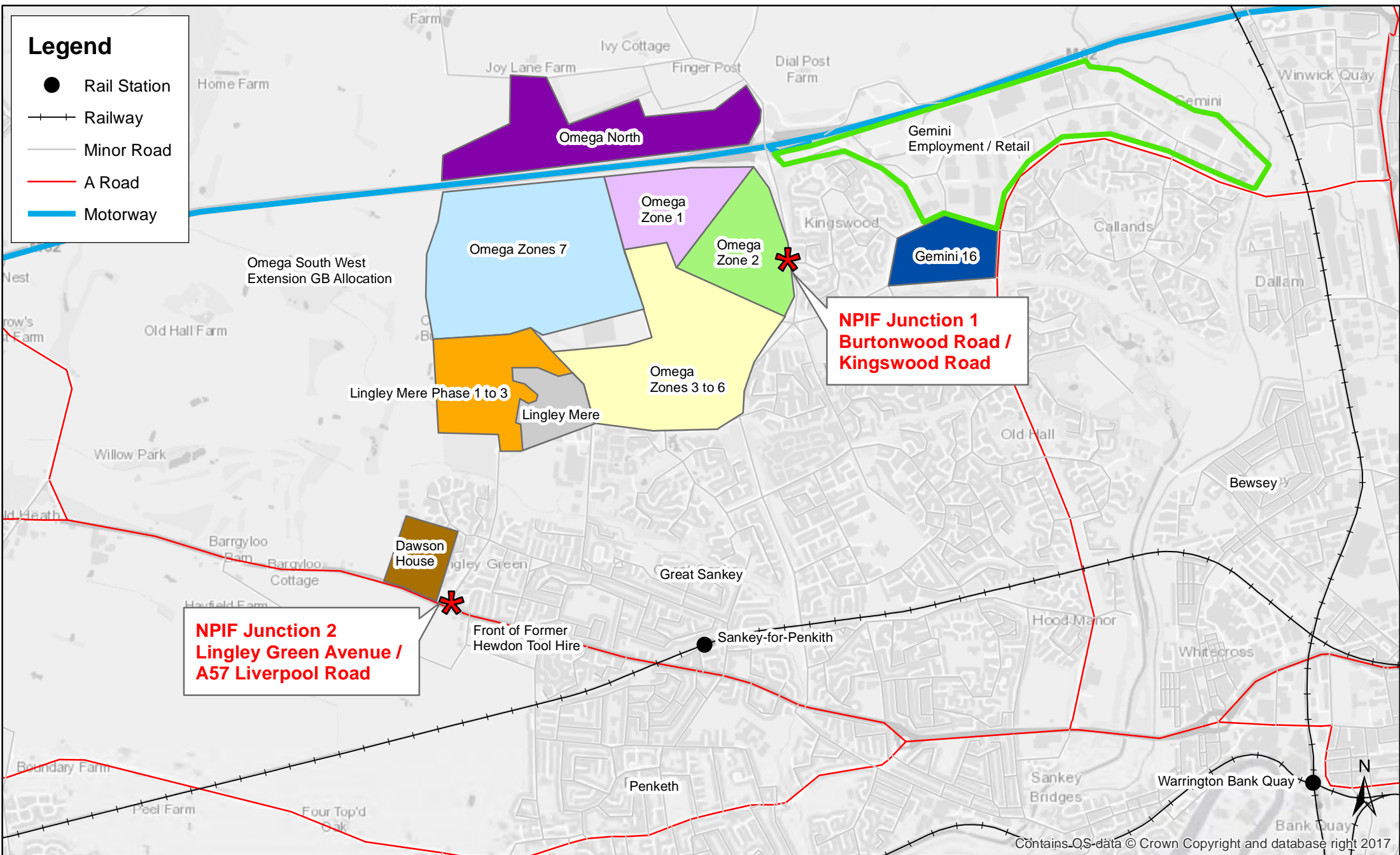
Design: TV  
Ch'kd: AJ  
App'd: DA

Map: OS Data  
Date: 02.06.2017  
Scale: 0 0.125 0.25 0.5 Miles



# Legend

- Rail Station
- +— Railway
- Minor Road
- A Road
- Motorway



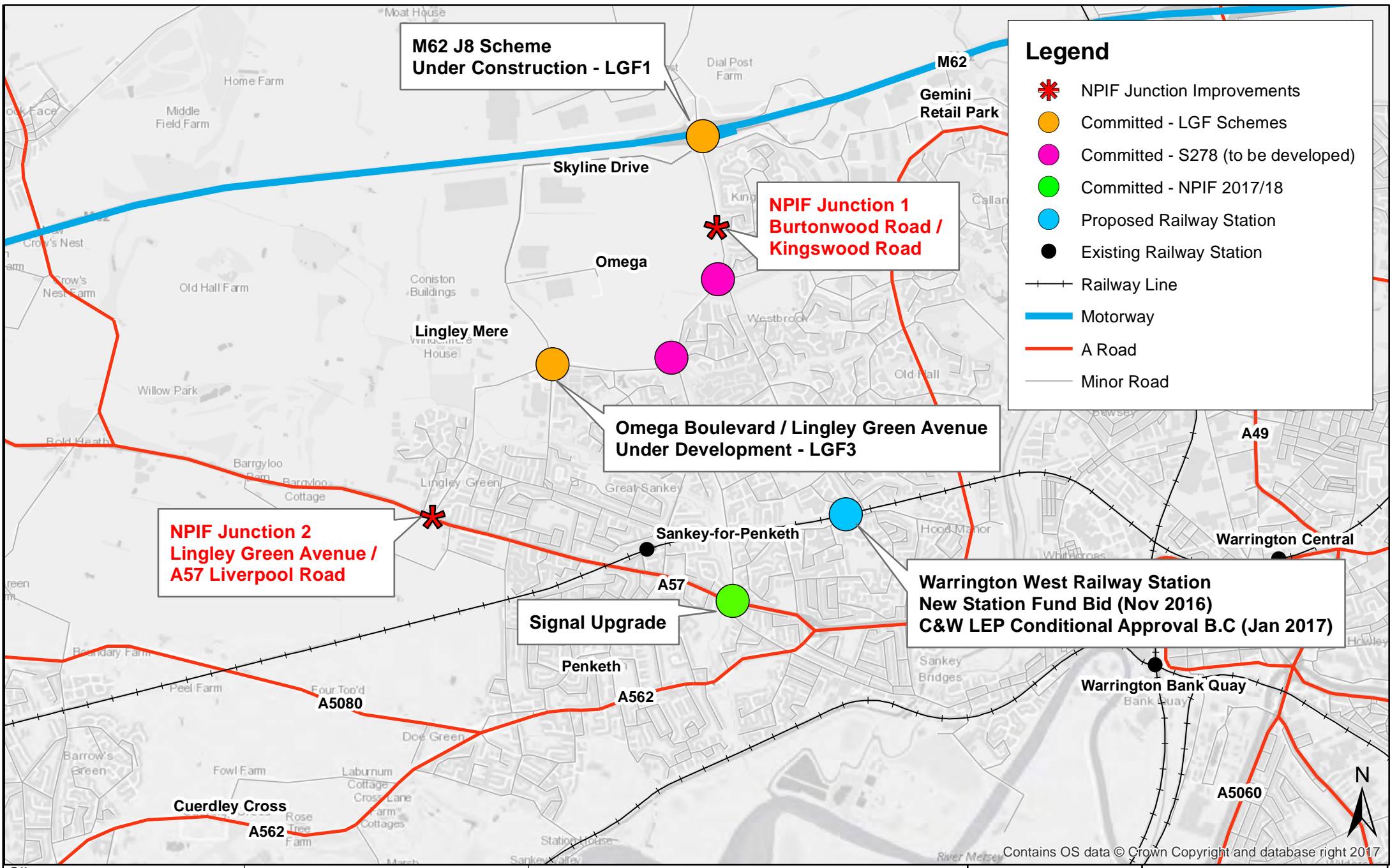
Client:  
**WARRINGTON**  
 Borough Council



Title:  
 Appendix A  
 National Productivity Investment Fund Bid  
 Omega Gateway Highway Junction Improvement Package  
 Proposed Housing and Employment Development sites within close proximity to  
 Lingley Green Av/A57 and Burtonwood Rd/Kingswood Rd junction locations

**AECOM**  
 1 New York Street, +44 (0) 161 601 1700  
 Manchester,  
 M1 4HD  
 AECOM.com

Design: TV	Map: OS Data
Ch'kd: AJ	App'd: DA
Date: 02.06.2017	
Scale: 0 0.15 0.3 Miles	



Client:  
**WARRINGTON**  
 Borough Council

**AECOM**  
 1 New York Street,  
 Manchester,  
 M1 4HD  
 +44 (0) 161 601 1700  
 AECOM.com

Title:  
 Appendix A  
 National Productivity Investment Fund Bid  
 Omega Gateway Highway Junction Improvement Package  
 Committed/Proposed Schemes: North West Warrington




Design: TV  
 Ch'kd: AJ  
 App'd: DA

Map: OS Data  
 Date: 02.06.2017  
 Scale: 0 0.125 0.25 0.5 Miles

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**Legend**

-  NPIF Junction Improvements
-  AQMA Areas
-  Motorway

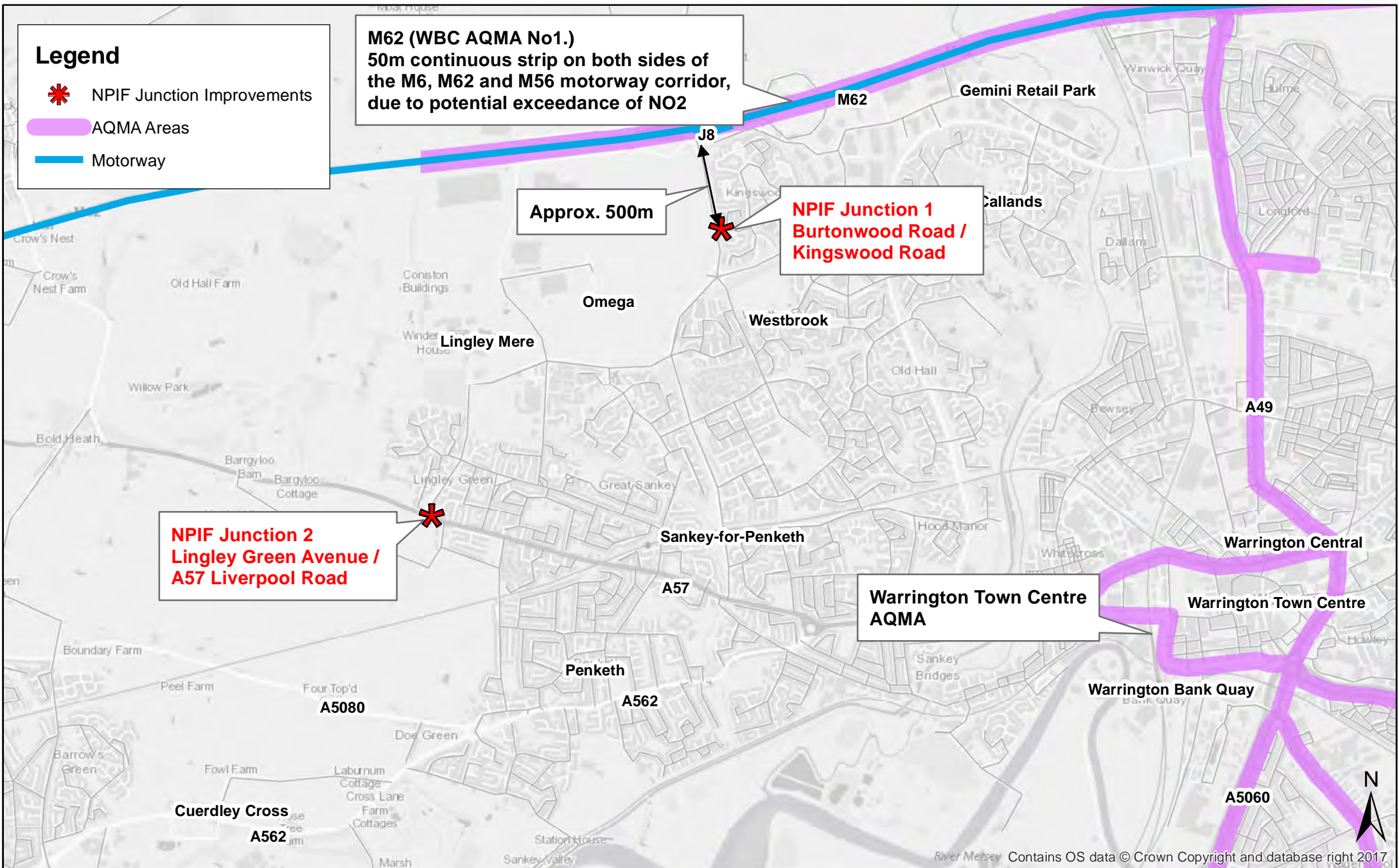
**M62 (WBC AQMA No1.)**  
50m continuous strip on both sides of the M6, M62 and M56 motorway corridor, due to potential exceedance of NO2

Approx. 500m

**NPIF Junction 1**  
**Burtonwood Road /**  
**Kingswood Road**

**NPIF Junction 2**  
**Lingley Green Avenue /**  
**A57 Liverpool Road**

**Warrington Town Centre**  
**AQMA**



Client:

**WARRINGTON**  
Borough Council



**AECOM**

1 New York Street,  
Manchester,  
M1 4HD

+44 (0) 161 601 1700

AECOM.com

Title:  
National Productivity Investment Fund Bid  
Omega Gateway Highway Junction Improvement Package  
Air Quality Management Areas (AQMA)  
Source: DEFRA

Design: TV  
Ch'kd: AJ  
App'd: DA

Map: OS Data  
Date: 02.06.2017  
Scale: 0 0.125 0.25 0.5 Miles



**Appendix B:**  
**Scheme Plan / General Arrangement**  
**Drawings**













**Appendix C:**  
**Equality Impact Assessment**



# Omega Highway Gateways - Junction Improvement Package

Burtonwood Road / Kingswood Road  
A57 Liverpool Road / Lingley Green Avenue  
Equality Analysis

Warrington Borough Council

27<sup>th</sup> June 2017



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## SECTION 1: Aims and Objectives of the Policy / Service / Function

Equality Analysis	
<b>Project Name</b>	Omega Gateway Highway Junction Improvement Package
<b>Project Reference</b>	NPIF Application 2017 – Omega Junctions
<b>Version</b>	1
<b>Assessment Lead</b>	Alan Dickin
<b>Job Title</b>	Transport Planning & Development Control Manager
<b>Department</b>	Transport Planning and Development Control
<b>Directorate</b>	Economic Regeneration, Growth and Environment Directorate
<b>Organisation</b>	Warrington Borough Council
<b>Telephone Number</b>	01925 442685
<b>Email</b>	<a href="mailto:adickin@warrington.gov.uk">adickin@warrington.gov.uk</a>

In the box below please provide background information on the policy / service / function.

### What are the main aims and objectives?

To deliver two new highway junction improvements to enhance vehicular access through Warrington West, and support the emerging major employment and residential areas of Omega and Lingley Mere.

Configuration of existing highway junctions will be modified as follows:

Junction 1 – Kingswood Road / Burtonwood Road: retains the existing western kerblines of Burtonwood Road and widens the carriageway westwards to accommodate an additional southbound lane. The alignment has a more gradual curve in the two southbound lanes leaving M62 Junction 8 and a straighter southbound alignment through the Kingswood Road junction.

The existing pedestrian refuge on Burtonwood Road, at the Kingswood Road junction would be enlarged to accommodate 4m wide crossings so they can be upgraded to toucan crossings. The refuge on Kingswood Road would be moved eastwards and the northern kerblines realigned to provide sufficient width to pass the refuge. The footways would be 3m wide so they can be shared by cyclists and would be continued on both sides of Burtonwood Road

Junction 2 - Lingley Green Avenue / Liverpool Road: delivery of a left turn lane from Liverpool Road to Lingley Green Avenue, together with configuration of a right and left turn from Lingley Green Avenue. The new left turn lane from Lingley Green Avenue will extend up to 100m.

### Who are the main stakeholders?

Key stakeholders with an interest due to the opportunity it presents to unlock and maximise the economic potential of development land include:

- **Warrington Borough Council: project sponsor**
- **Omega Warrington Ltd: joint venture between Miller Developments and KUC Properties Ltd**
- **Lingley Mere Business Park: partnership between United Utilities and Muse Developments**
- **Warrington & Co: promote economic development and physical regeneration in Warrington**
- **Local Residents/Businesses: adjacent to proposed junction improvements**

### What outcomes will be delivered as a result?



Support strategic housing schemes and employment space

Ease congestion for vehicular traffic

Support commuters travelling to Warrington employment sites during peak times with queues to be reduced sufficiently to accommodate demand and the cumulative corridor capacity improvements having a positive impact on highway capacity

Potential to improve air quality at peak times; and

Complement the M62 Junction 8 improvements (underway).

How will/is the service promoted/explained to those it might affect directly or indirectly?

Public consultation planned for Autumn 2017

Is there evidence of any complaints on grounds of discrimination? If yes, how have these been resolved?

No

## SECTION 2: Research and Intelligence

For each of the equality target groups listed in the table below outline:

What data or evidence is available on the number of people (i.e. members of the public or staff) accessing or are affected by this policy / service / function?

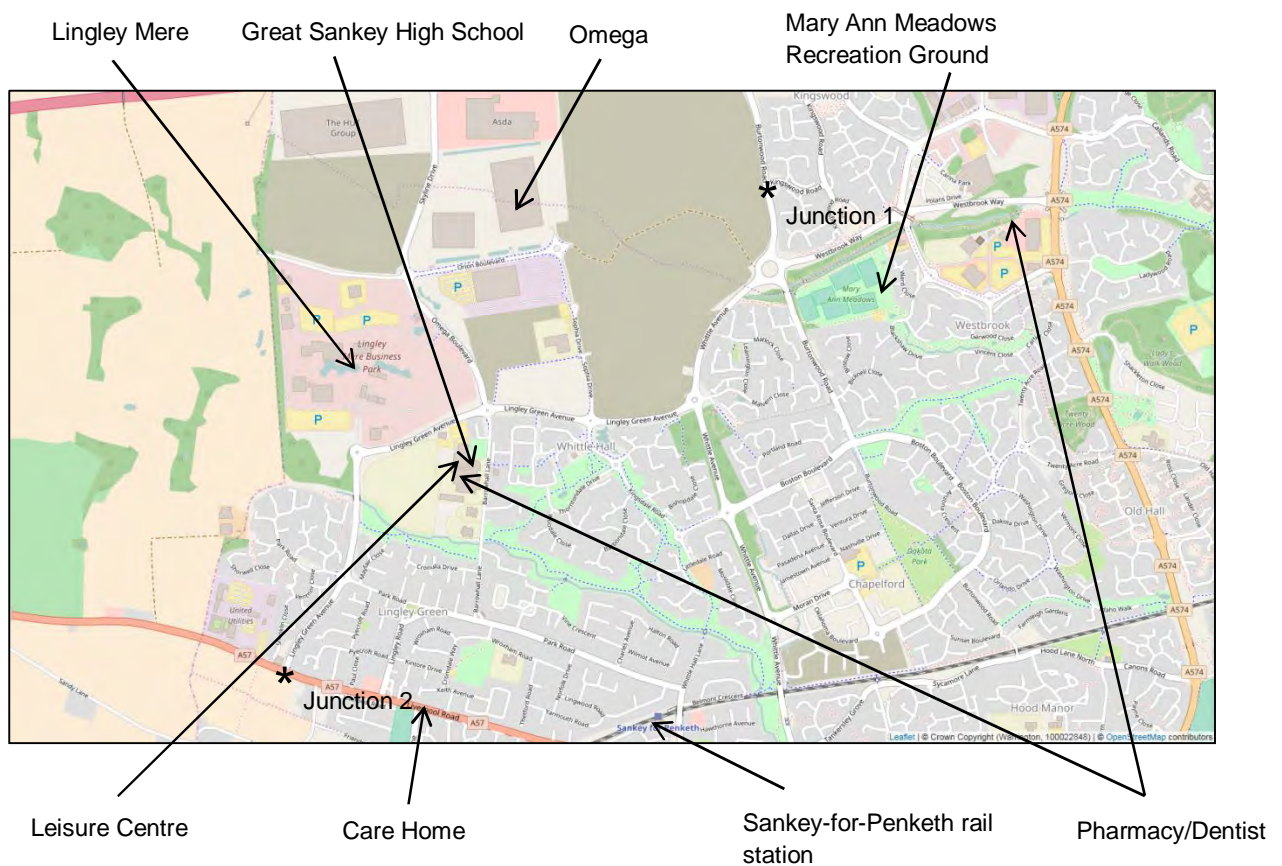
What involvement or consultation which has been carried out and how it influenced this policy / service / function?

If you do not currently record information on the users of this policy / service / function, please provide details in the table below what arrangements are in place to capture data for this?

In the absence of specific data collection for the scheme to understand the impact, a general overview of key protected characteristics is visually depicted in **Annex A**.

In addition to the above, a review of nearby points of interest is provided below.

**Figure 1: What's Nearby?**



There are a number of services located near to the two junctions including:

- The nearest schools are Great Sankey High School and Barrow Hall College which are approximately 1 mile metres to the north, and Barrow Hall Primary School approximately 1.3 miles to the North of Lingley Green/Liverpool Road junction – approximately equal distance to the south of Kingswood Road/Burtonwood Road junction;
- Sankey-for-Penketh rail station is approximately 1 mile to the east of Lingley Green/Liverpool Road junction;
- Great Sankey Leisure Centre is approximately 1 mile to the north of Lingley Green/Liverpool Road junction and 1 mile to the south of Kingswood/Burtonwood Road;
- Mary Ann Meadows Recreation Ground is approximately 0.5 mile from Burtonwood Road/Kingswood Road;
- Care Home within 0.5 miles of the Lingley Green/Liverpool Road junction; and
- Doctors within 2.5 miles of each junction.



**Table 1: Consultation to date**

List the groups you have consulted or reference previous relevant consultation?	What issues were raised in relation to one or many of the protected characteristics?
Local Users	<p>Warrington Borough Council held a number of public consultation events during July 2016 for the M62 Junction 8 scheme (project currently in delivery phase).</p> <p>The consultation events described Warrington’s future aspirations to develop improvements at the Lingley Green Avenue/Liverpool Road and Burtonwood Road/Kingswood Road junctions – the subject of this scheme.</p> <p>Key issues raised through the consultation included a need for more capacity on local routes to cope with the additional traffic, with specific concern regarding the impact of the proposed development (particularly at the Omega and Linley Mere sites) on surrounding roads such as Lingley Green Avenue.</p> <p>Further consultation will be programmed for Autumn 2017 to capture any specific issues relating to the proposed improvements.</p>

# M62, JUNCTION 8



## Ongoing improvements to Warrington’s Transport network

The improvement plans for Junction 8 have been designed to take into account how the junction will operate over the next 10-15 years. The performance of the junction will be monitored and if further improvements are required, these will be considered in due course.



However, the council is aware that this scheme alone will not deliver the changes to the transport network needed to create and preserve this area as a high quality place to live and work. These plans are just one of a number of wider transport improvement schemes proposed for west Warrington.

**Future plans**


- Warrington West rail station at the southern end of Chapelford will be served by three trains per hour to Warrington, Liverpool and Manchester.
- Improvements at other local junctions include:
  - Westbrook Way / Burtonwood Road/Whittle Avenue
  - Whittle Avenue / Lingley Green Avenue
  - Omega Boulevard / Lingley Green Avenue
  - Liverpool Road / Lingley Green Avenue
  - Burtonwood Road / Kingswood Road
- Major improvements and enhancements to pedestrian and cycling networks have already been made in the area, but we understand even more improvements can be made to make jobs, homes, schools and community facilities easier to get to.

**Continuing travel advice and support**

The council also continues to provide dedicated support to employers, schools and residents to promote the take-up of greener, sustainable modes of travel. As an example, a great deal of success has already been made in promoting cycling to and from Omega North; the warehousing and logistics businesses on the site are reporting strong numbers of workers who now cycle to work.




## SECTION 3: Assessing the Impact

Assess the positive, negative and neutral affects this policy./service/function has on different equality target groups.

Page 10 in the Guidance to Completing Equality Impact Assessments (E.I.A) provides further guidance on how to assess the impact.

### Positive impacts or benefits

- Consider how the policy / service / function will/does promote equal opportunities
- Highlight benefits for each equality target group

The proposed improvements will have a broadly positive impact on all of the protected characteristics. It will:

- + Improve journey times / ease congestion for vehicle traffic through Warrington West (car users). Reductions in average and overall journey times have been realised on similar junction improvement schemes within Warrington;
- + Support those travelling to Warrington employment sites (including Omega and Lingley Mere) (i.e. improved access) during peak times with queues to be reduced sufficiently to accommodate demand and the cumulative corridor capacity improvements having a positive impact on highway capacity;
- + Improved access for all age groups from young to elderly drivers;
- + Support strategic housing schemes;
- + Support improvements to air quality for the community;
- + Enhance benefits for pedestrians and cyclists, creating better movement across the junction: improved footpath provision and enlarged crossing areas upgraded to toucan crossing – enabling both pedestrian and cyclists to cross together; and
- + Construction of the two junction improvements will provide an invaluable opportunities to engage, train and inspire local people. One the key elements of the Scape procurement route, includes community engagement and use of local workforce and supply chain.

### Negative Impacts

- Consider and identify barriers that could/does restrict access to the policy/service/function for each equality target group
- Identify any unlawful discrimination (directly or indirectly)

The nature and scale of the proposed scheme is such that the impacts are generally vehicle related rather than person related i.e. focused on physical movement of traffic flows and individual vehicles. The new infrastructure improvements are a generic proposal provided for all groups. Where direct interaction with individual people is likely to occur, including modification to footpaths and crossings, Warrington Borough Council has assessed **no negative impacts** for protected characteristics.

**Table 2: Impact by protected characteristic**

Protected Characteristic	Y/N	Explain the potential negative impact
Disability (physical or sensory impairments, learning disability and mental illness)	N	<p>No negative impact on people with this protected characteristic.</p> <p>To ensure no group is unfairly and unlawfully impacted upon, the design of the scheme will ensure all crossing facilities are DDA compliant. It is anticipated that local residents and user groups will be able to contribute to the final design as part of the consultation stage.</p> <p>WBC expect the design of junctions, including upgraded footpaths and crossings, will have positive impact.</p>



Protected Characteristic	Y/N	Explain the potential negative impact
Age (younger and older people)	N	No negative impact on people with this protected characteristic
Pregnancy / maternity (the rights of a woman and her maternity leave)	N	No negative impact on people with this protected characteristic
Race (include nationality, ethnicity inc. Gypsy and Travellers)	N	No negative impact on people with this protected characteristic
Religious / Faith Group (specify group)	N	No negative impact on people with this protected characteristic
Gender (men and women)	N	No negative impact on people with this protected characteristic
Sexual orientation (lesbian, gay, heterosexual and bisexual)	N	No negative impact on people with this protected characteristic
Marriage/Civil Partnership	N	No negative impact on people with this protected characteristic
Gender reassignment (person proposing to undergo, is undergoing or has undergone reassigning their sex)	N	No negative impact on people with this protected characteristic
Other (these other groups could include factors such as deprivation or poverty, literacy, rurality)	N	No negative impact on people with this protected characteristic

## SECTION 4: Improvement Plan

Please list below the actions that you will be taking to:

- Address all negative impacts identified.
- Tackle any gaps in knowledge about the policy / service / function being assessed.
- Increase positive impacts, further promote areas of best practice and improve relations with equality target groups

Warrington Borough Council is committed to ensuring that equality and diversity is at the heart of our organisation and responds to the needs of all our customers and communities.

We want everyone living in Warrington to have a good quality of life and we want to ensure that all communities continue to get along together. These values are set out in our new equality objectives for 2016-2020.

Council wholly endorses the principles of the Equality and Diversity Policy and seeks to increase awareness and action in this area through leading by example.

In delivering the outline infrastructure improvements, Warrington Borough Council will ensure that proper consideration is given to equality and diversity which is the subject of this assessment. Whilst no negative impacts were identified against the protected characteristic target groups, the following actions have been identified for future work:

**Table 3: Action Planning**

Action	Desired Outcome	By when	By who
<p>To gain a more detailed understanding of the requirements for particular user groups, public consultation with local users will be undertaken to ensure facilities provided are safe, suitable and convenient for all users – better information and communication will have the effect of considerably boosting confidence for people with protected characteristics regarding the proposed changes.</p> <p>The clear message endorsed by Council is that enhanced information increases confidence in the use of the local highway network.</p>	Enhanced engagement with users to ensure delivered outcome meets expectations	Autumn 2017	Project team
Preparation of a Road Safety Audit – this will ensure the proposed junction improvements do not introduce new safety concerns for users	Ensure design meets road safety requirements	2018	Project team
Appropriate traffic management arrangements to be put in place during construction to limit impact for users	Ensure delivery is managed efficiently and effectively to minimise disruption	During construction	Project team
No further actions have been identified as part of the Equality and Diversity Analysis			

## Sign Off

This document acts as evidence that due regard to equality and diversity has been given.

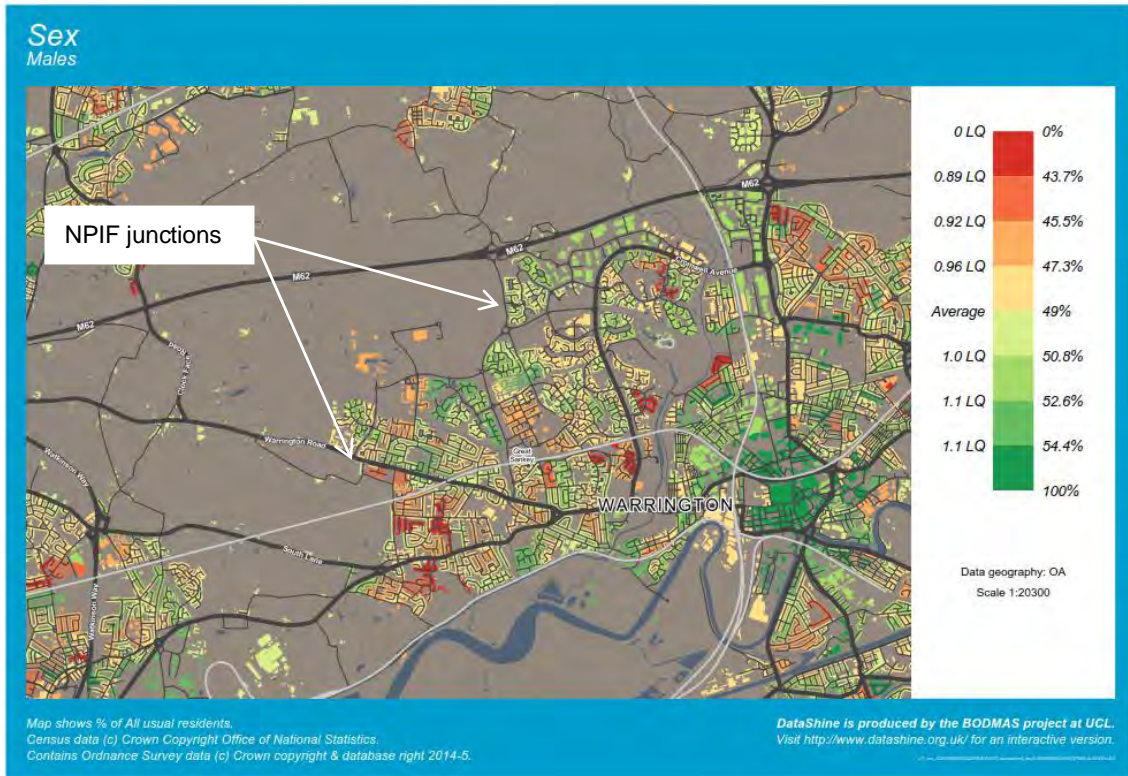
**Table 4: Sign Off**

<b>Name</b>	<b>Position</b>	<b>Signed</b>	<b>Date</b>
Equality Analysis Owner	Transport Planning & Development Control Manager Warrington Borough Council	Alan Dickin	15.06.2017
Senior Manager	Transport for Warrington Service Manager	Steve Hunter	15.06.2017



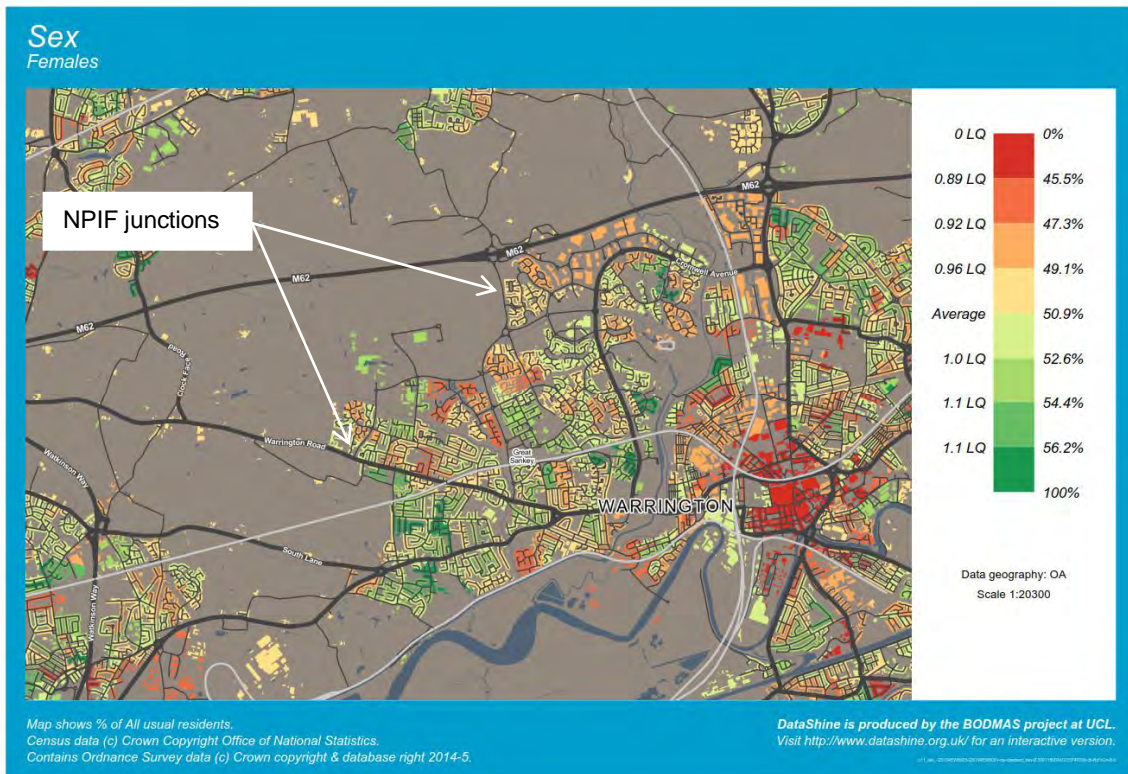
## Annex A: Protected Characteristic Evidence Review Maps

Figure A.1: Gender – Males (2011 Census)



Source: Datashine

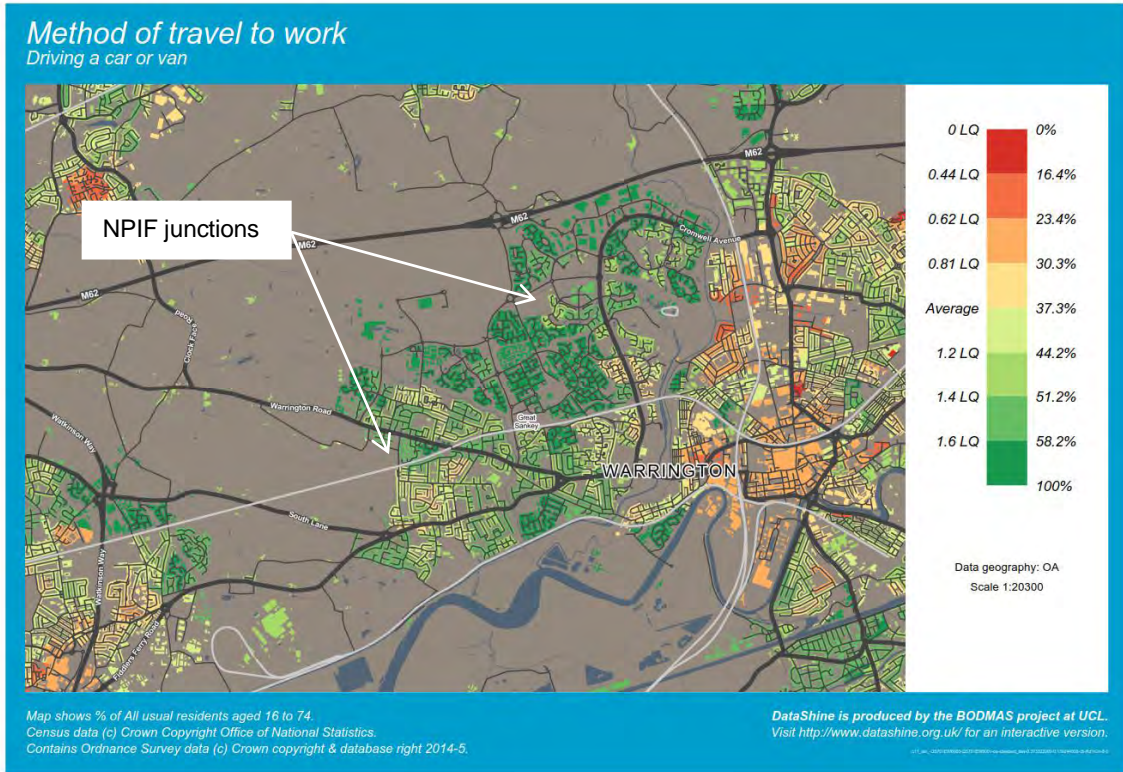
Figure A.2: Gender – Female (2011 Census)



Source: Datashine

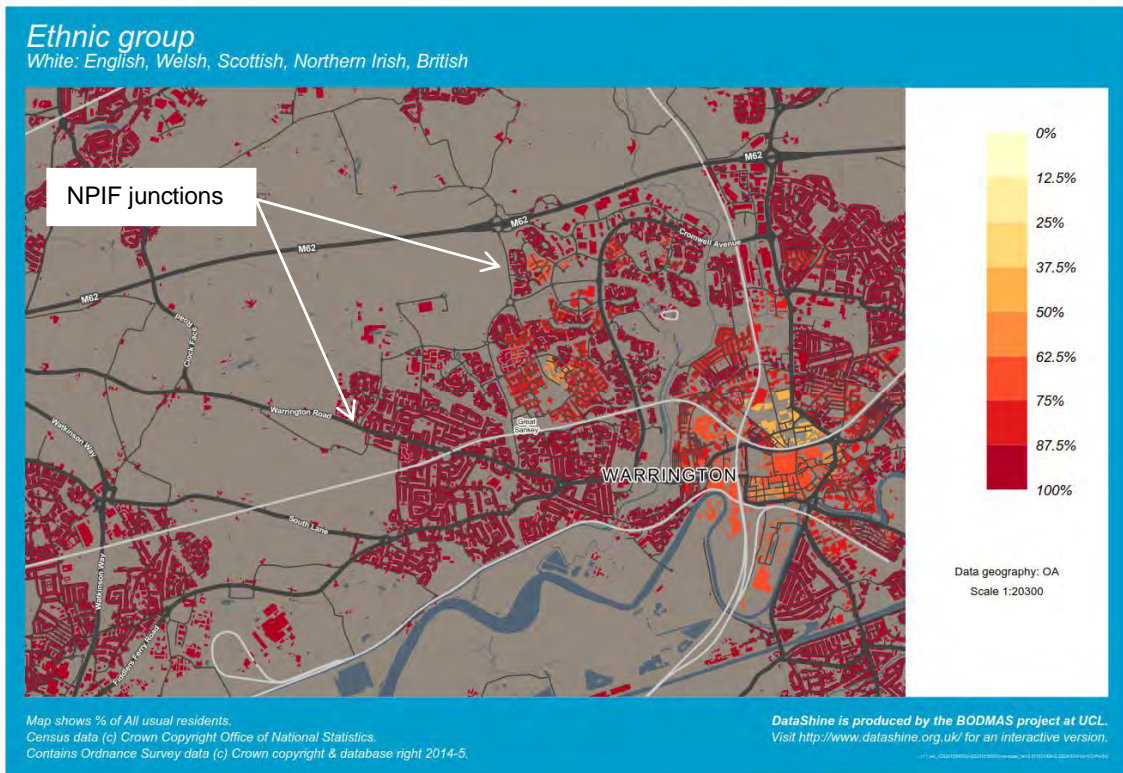


Figure A.3: Method of travel to work – Drive a car or van (2011 Census)



Source: Datashine

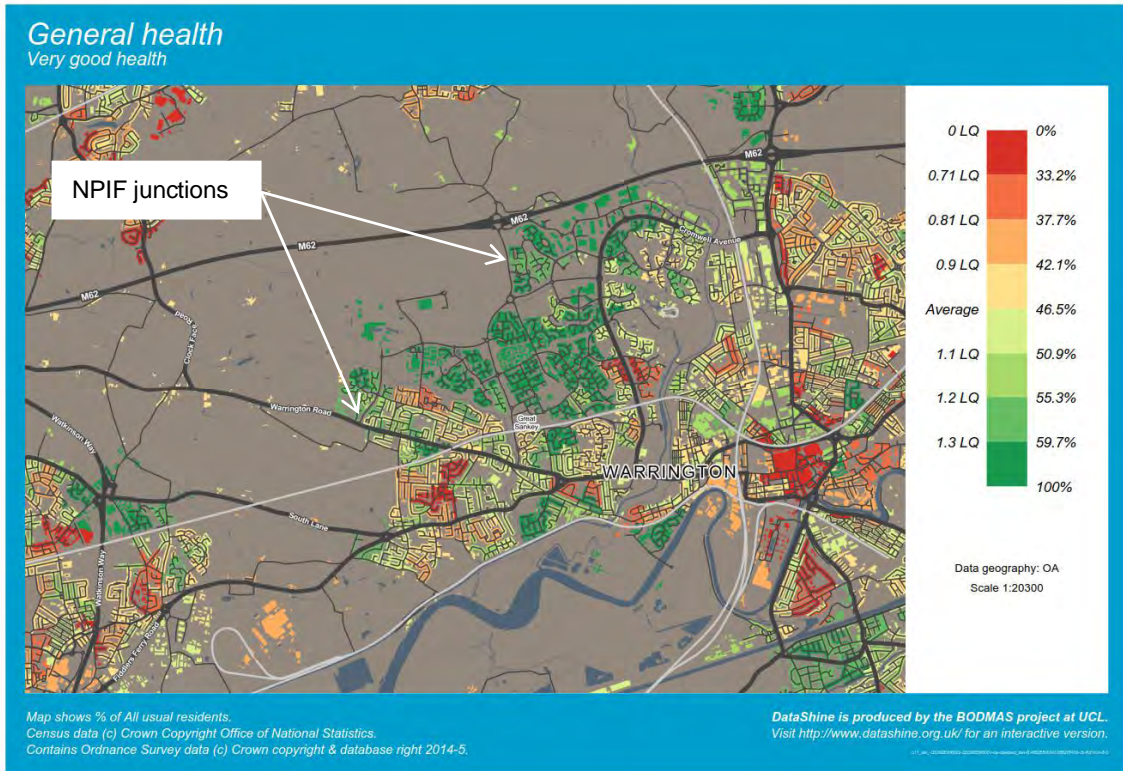
Figure A.4: Ethnicity: White, English, Scottish, Northern Ireland, British (2011 Census)



Source: Datashine

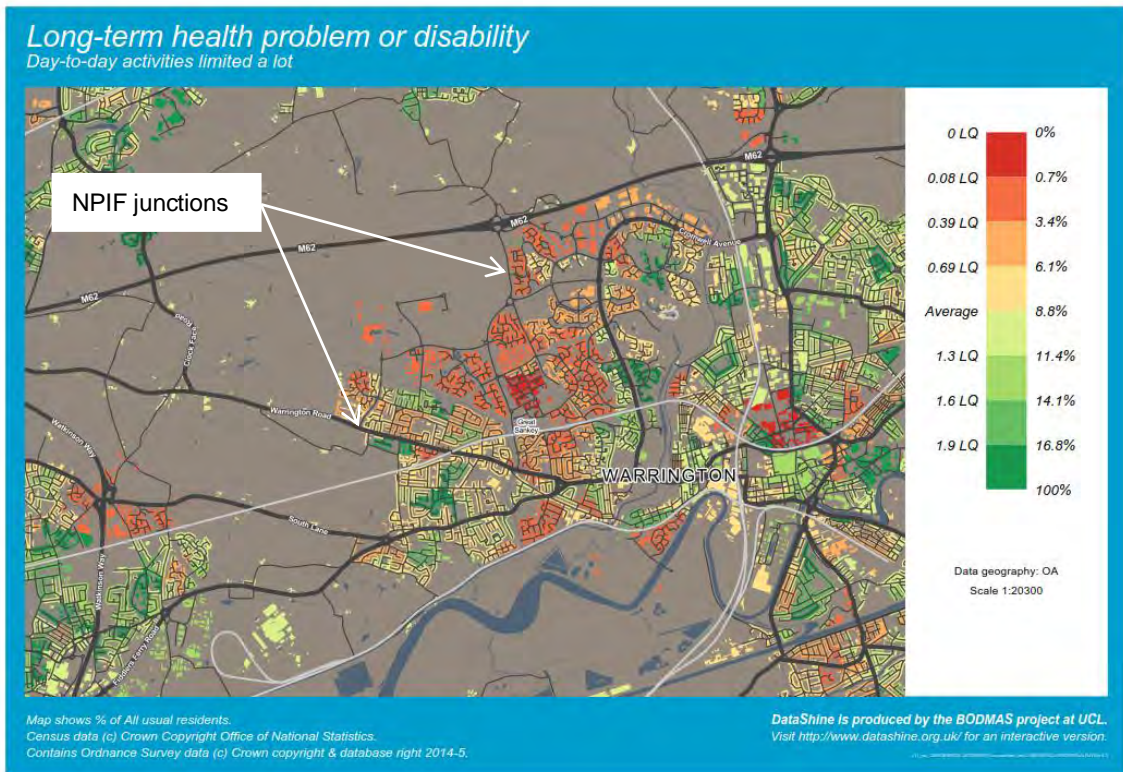


Figure A.5: General Health – Very Good Health (Census 2011)



Source: Datashine

Figure A.2: Long-term health problem or disability – day to day activities limited a lot (2011 Census)



Source: Datashine





**Appendix D:**  
**Letter of support and reference to land  
acquisition from Developers**

**OMEGA WARRINGTON LIMITED**

Company Registration Number: 04263502  
Condor House, St Paul's Churchyard, London EC4M 8AL

23 June 2017

**Tom Shuttleworth**  
**Infrastructure Delivery Service Manager**  
**Economic regeneration, Growth & Environmental Directorate**  
**Warrington Borough Council**  
**New Town House**  
**Buttermarket street**  
**Warrington WA1 2NH**

Dear Tom,

**NATIONAL PRODUCTIVITY INVESTMENT FUND BID – Omega Highway Gateways**

Omega Warrington Ltd (OWL) would like to take this opportunity to provide written support for the proposed package of junction improvements at Burtonwood Road/Kingswood Road and Lingley Green Avenue/Liverpool Road which form Gateways to the Omega highway network in West Warrington.

We believe the package of improvements will be of great benefit to vehicle journeys being made in the Warrington West area, helping to ease congestion constraints on the local highway network.

We are aware the proposed improvements at Burtonwood Road/Kingswood Road require land currently within OWL ownership and are happy to enter negotiations with the Council regarding the transfer of this land for highway use.

OWL fully endorse the proposals for junction improvements at Burtonwood Road/Kingswood Road, located along the boundary of the Omega site and at the Lingley Green Avenue/Liverpool Road junction located just to the south of the Omega site at a junction with the A57. Both of these schemes together will deliver an enhanced gateway to the area. We wish you every success with your application for DfT funding.

Yours sincerely,



**Director**



**Appendix E:**  
**Letter of support from Local MPs**





**Faisal Rashid MP**

1 Wilson Patten Street  
Warrington  
WA1 1PG  
faisal.rashid.mp@parliament.uk

Steve Hunter  
Transport for Warrington – Service Manager  
Warrington Borough Council  
New Town House  
Buttermarket Street  
Warrington  
WA1 2NH

29th June 2017

Dear Steve,

### **NATIONAL PRODUCTIVITY INVESTMENT FUND BID – Omega Highway Gateways**

I would like to take this opportunity to provide written support for the proposed package of junction improvements for the Omega highway network in West Warrington to receive funding from the Department for Transport's National Productivity Investment Fund.

I believe the package of improvements will be of great benefit to journeys being made in the west Warrington area, helping to ease congestion constraints on the local highway network and make the west of the town a more successful and prosperous place in which to live and do business.

I am keen to support these improvements as the area is currently undergoing ambitious economic growth with the Omega and Lingley Mere developments already having received outline planning permission for in excess of 1,300 new homes. As these developments come forward, enhancements to the local highway network will be important to reduce the impact of congestion, and ensure the area's economic potential as an employment and residential location is maximised.

I fully endorse the proposals for junction improvement at Lingley Green Avenue/Liverpool Road located within my constituency and the Burtonwood Road/Kingswood Road junction which together will deliver an enhanced gateway to the area. I wish you every success with your application for funding.

Yours sincerely,

A handwritten signature in cursive script that reads "Faisal Rashid".

Faisal Rashid MP

**Helen Jones MP**



HOUSE OF COMMONS

LONDON SW1A 0AA

Steve Hunter  
Transport for Warrington - Service Manager  
Warrington Borough Council  
New Town House  
Buttermarket Street  
Warrington  
WA1 2NH

28 June 2017

Dear Mr Hunter

**NATIONAL PRODUCTIVITY INVESTMENT FUND BID - Omega Highway Gateways**

I would like to take this opportunity to provide written support for the proposed package of junction improvements for the Omega highway network in West Warrington to receive funding from the Department for Transport's National Productivity Investment Fund.

I believe the package of improvements will be of great benefit to journeys being made in the west Warrington area, helping to ease congestion constraints on the local highway network and make the west of the town a more successful and prosperous place in which to live and do business.

I am keen to support these improvements as the area is currently undergoing ambitious economic growth with the Omega and Lingley Mere developments already having received outline planning permission for in excess of 1,300 new homes. As these developments come forward, enhancements to the local highway network will be important to reduce the impact of congestion, and ensure the area's economic potential as an employment and residential location is maximised.

I fully endorse the proposals for junction improvements at Burtonwood Road/Kingswood Road located within my constituency and at Lingley Green Avenue/Liverpool Road which together will deliver an enhanced gateway to the area. I wish you every success with your application for funding.

Yours sincerely

A handwritten signature in blue ink that reads "H.M. Jones".

Helen Jones MP

**Constituency Office**

Tel: 01925 232480

E-mail: [jonesh@parliament.uk](mailto:jonesh@parliament.uk)

Twitter: @HelenJonesMP

Facebook: Helen Jones MP



**Appendix F:**  
**Letter of support form Cheshire and**  
**Warrington LEP**



20 June 2017

Steve Hunter  
Transport for Warrington Service Manager  
Warrington Borough Council  
New Town House  
Buttermarket Street  
Warrington  
WA1 2NH

Dear Steve

NATIONAL PRODUCTIVITY INVESTMENT FUND BID – Omega Highways Gateways

On behalf of the Cheshire and Warrington Local Enterprise Partnership I would like to offer support to Warrington Borough Council in its bid for funding to **the Department for Transport's** National Productivity Investment Fund (NPIF) for the Omega Highway Gateways project.

The proposed package of junction improvements at Burtonwood Road/Kingswood Road and Lingley Green Avenue/Liverpool Road will improve these two key gateways to the highway network around the Omega development site. The Omega site is a key part of the strategic ambition in Cheshire and Warrington and alongside other development in the area is planned to deliver over 1500 new homes and around 10,000 jobs over the next 10 years.

We believe the package of improvements will be of great benefit to vehicle journeys being made in the west Warrington area, helping to ease current and future congestion constraints on the local highway network and complementing the planned improvements funded from Local Growth Fund 3 at the nearby junction of Omega Boulevard and Lingley Green Avenue.

In conclusion, I fully endorse the proposals for the Omega Highway Gateways project and I wish you every success with your application for funding.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Philip Cox', is written over a faint horizontal line.

Philip Cox  
Chief Executive, Cheshire and Warrington LEP

**RICHMOND HOUSE, GADBROOK BUSINESS PARK, RUDHEATH, NORTHWICH, CW9 7TN**

**☎ 01606 812280 ☎ 871CANDWEP.CO.UK**





**Appendix G:**  
**Problem Statement – Further Information**

## Appendix G: Problem Statement – Additional Information

### Existing Traffic Conditions

#### Trafficmaster Average Speed plots

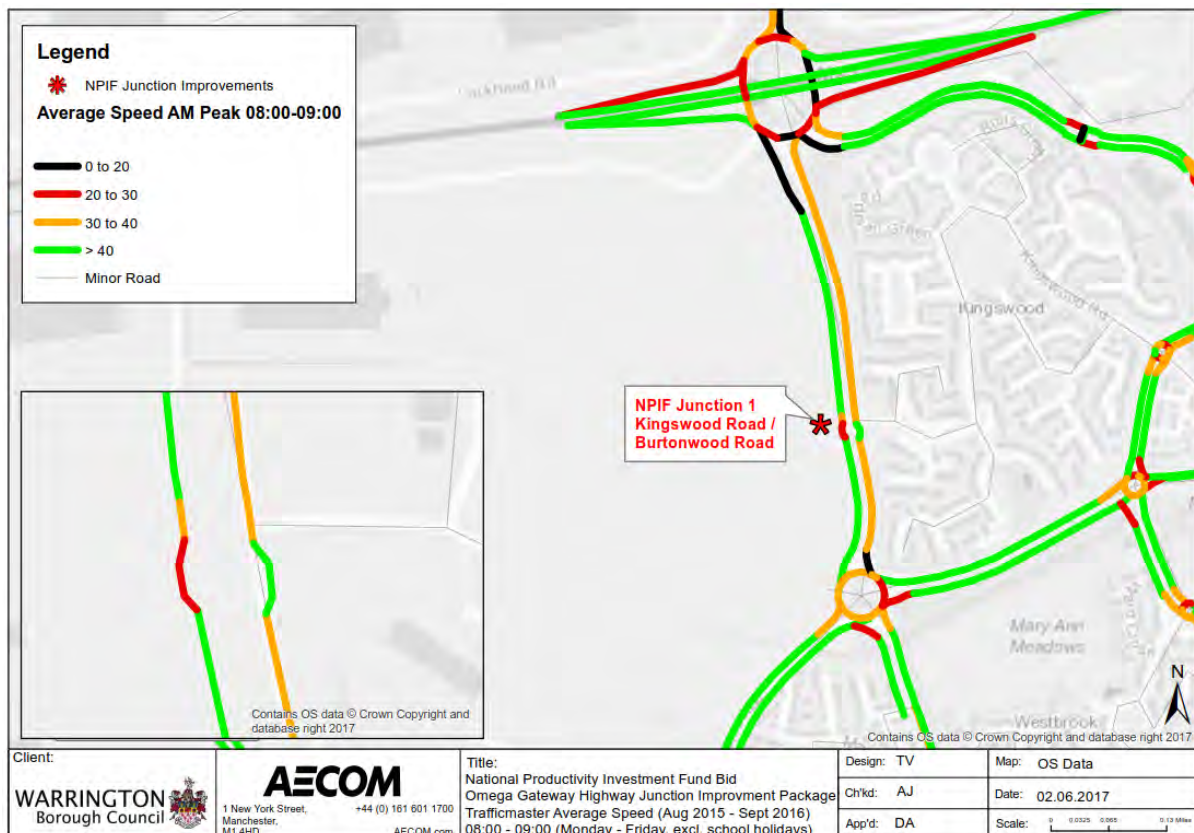
Trafficmaster journey time data is collected from in-vehicle fleet, LGV's, HGV's, buses and in-car vehicle GPS devices, to depict average speeds on the highway network. **Figure 1 to Figure 6** provide an illustration of the level of congestion on the North West Warrington local highway network, using Trafficmaster vehicle speeds as a proxy for network 'stress' during the AM and PM peak periods. Sections of the network where delay is experienced (slowest speeds) are highlighted in black and red links. Links that are highlighted orange and green experience the fastest speeds (more than 30mph).

In both the AM and PM peak, slow speeds are observed at both junctions within the NPIF package of works with conditions more congested during the PM peak

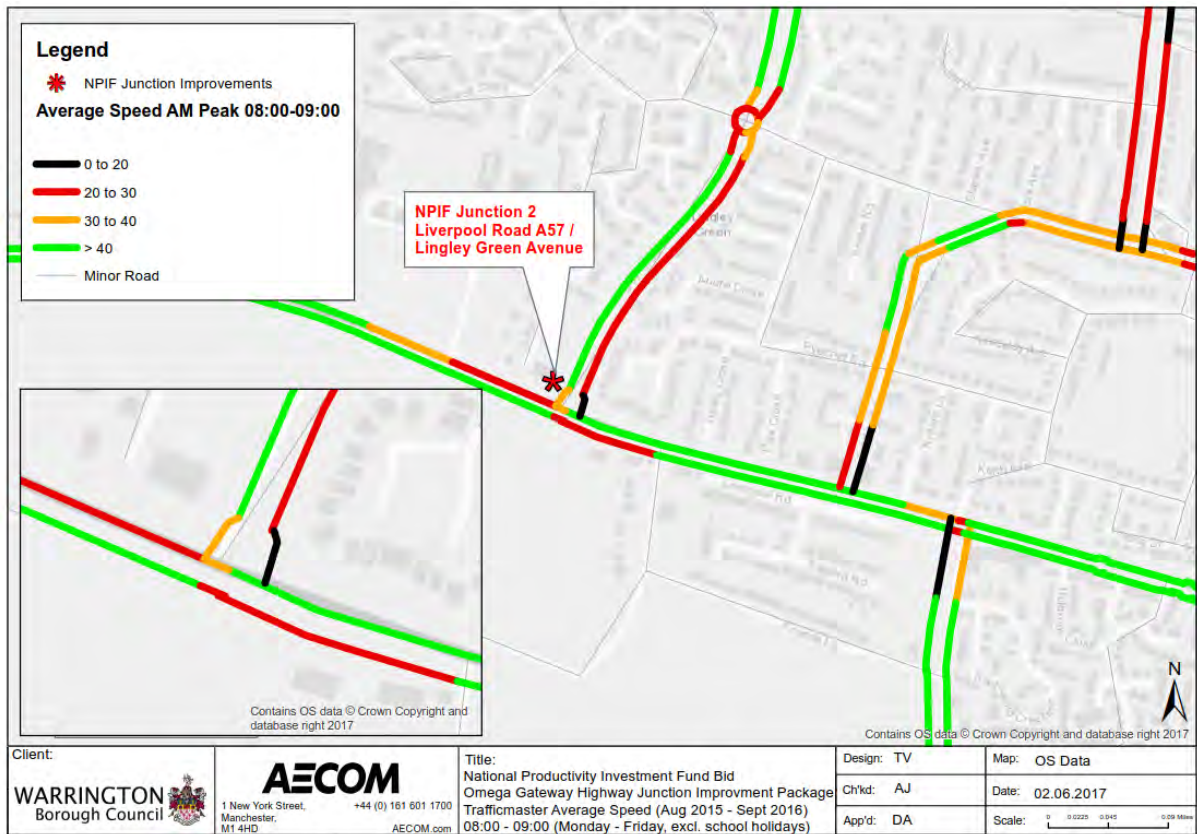
Junction 1 is located approximately 500m south of the M62 Junction 8 and 300m north of Westbrook Way roundabout. This 800m stretch experiences considerable delay during the PM peak, with immediate movements surrounding Kingswood Junction experiencing speeds less than 20mph in both the AM and PM peak periods.

In the case of Junction 2, vehicles turning left from Liverpool Road to Lingley Green Avenue experience speeds less than 20mph during the PM peak; and vehicles on Lingley Green Avenue approaching Liverpool Road experience speeds less than 30mph during both the AM and PM peak. Delay on Lingley Green Avenue extends approximately 400m back from Liverpool Road to the Park Road roundabout during both periods.

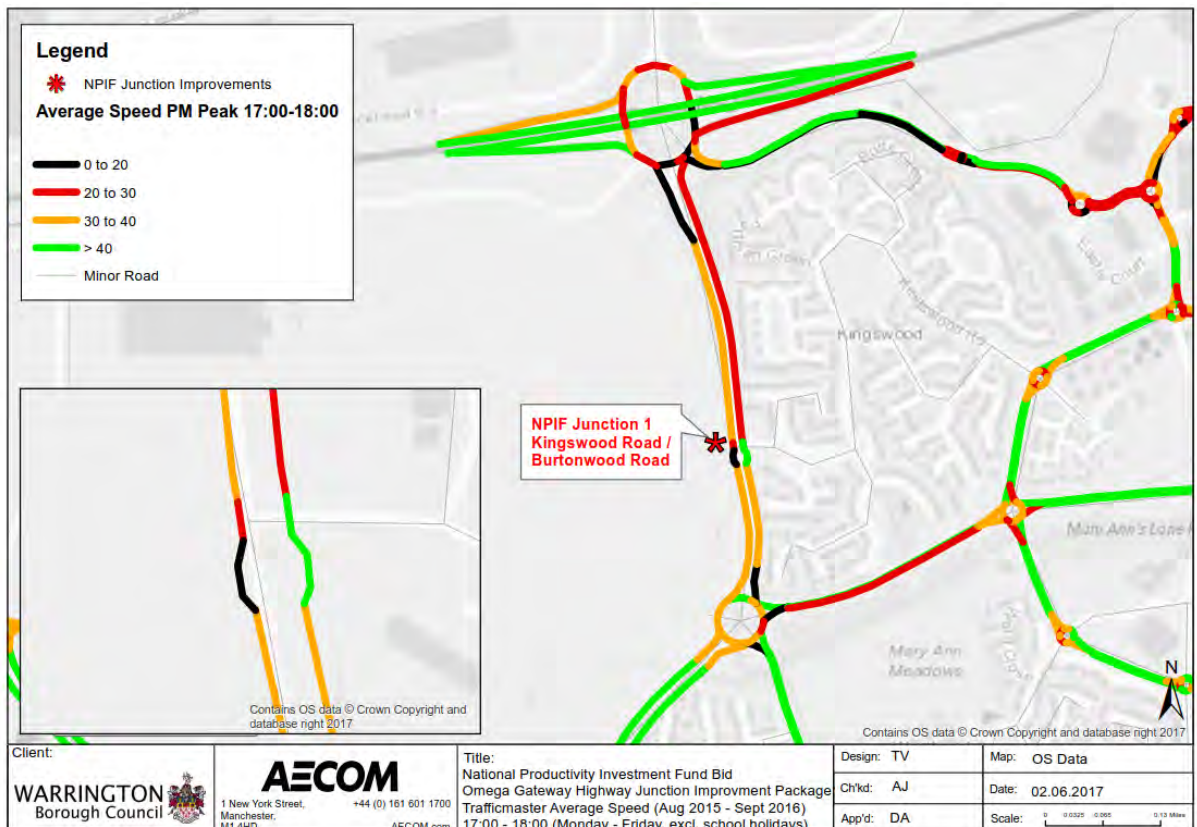
**Figure 1: AM Average Speed (km/h) (08:00-09:00) – Junction 1: Burtonwood Road / Kingswood Road**



**Figure 2: AM Average Speed (km/h) (08:00-09:00) – Junction 1: Lingley Green Avenue / Liverpool Road**

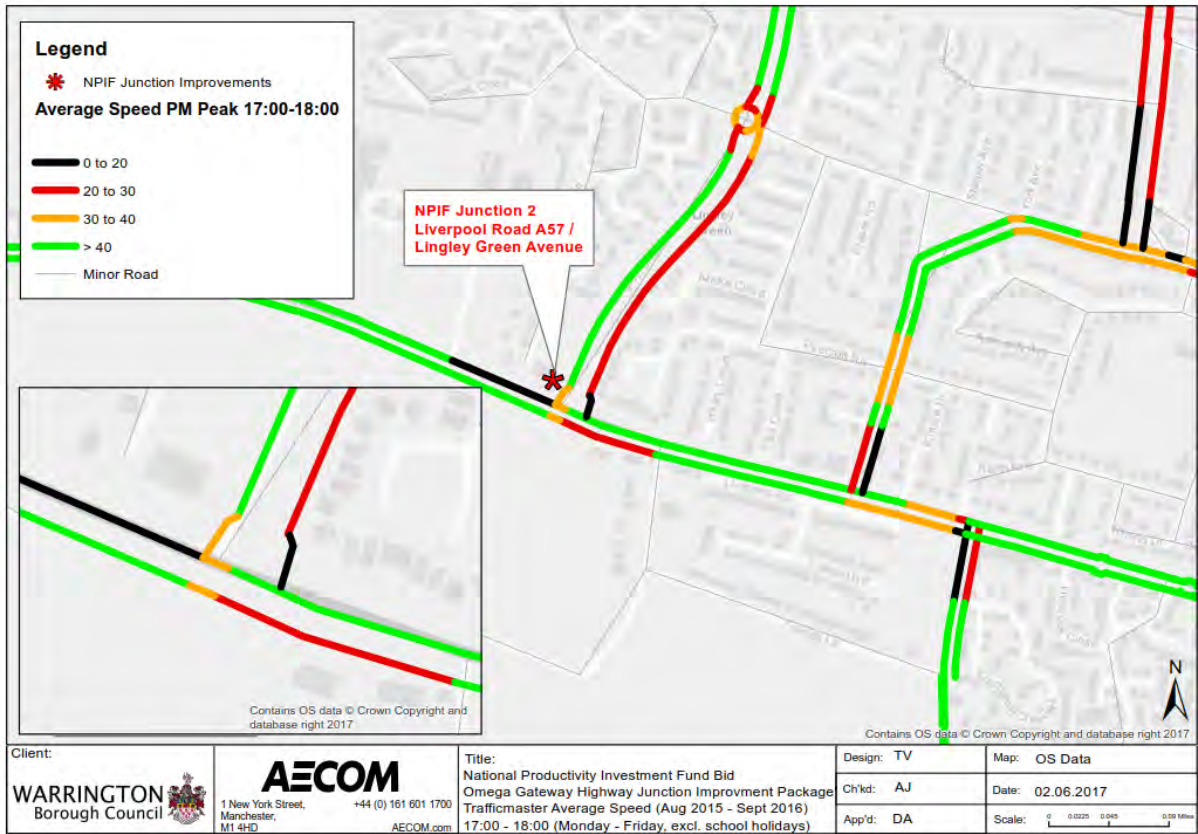


**Figure 3: PM Average Speed (km/h) (17:00-18:00) – Junction 1: Burtonwood Road / Kingswood Road**





**Figure 4: PM Average Speed (km/h) (17:00-18:00) – Junction 1: Lingley Green Avenue / Liverpool Road**





## Queue Lengths and Degree of Saturation

### Junction 1: Kingswood Road/Burtonwood Road

WSP | Parsons Brinckerhoff commissioned an Origin-Destination (O-D) traffic survey across the two junctions of the M62 Junction 8 and Kingswood Road to establish the existing routes through the network. This video survey was undertaken on Tuesday 8 November 2016 between 07:00 and 10:00 and 15:00-19:00, to capture the busiest traffic periods. Queue lengths in PCUs were also recorded on all approaches, to assist with validation of the base year LinSig Model. The survey identified the peak hours to be between 07:45-08:45 in the AM and 16:45-17:45 in the PM, so these times would be used to extract the peak hour flows.

The Degree of Saturation (DoS) indicates the how much of the available link capacity is used in the modelled period by the demand flow. A link is predicted to operate within capacity if the DoS is 90% or less. DoS values higher than 90% indicate that the link cannot accommodate all of the demand within the time available, with the excess demand left in the queue.

**Figure 1: 2017 and 2027 Degree of Saturation and Queue lengths – Junction 1: Burtonwood Road/Kingswood Road existing Junction Layout**

Assessment Year	Performance Metric		Burtonwood Road South – Ahead and Right	Burtonwood Road North – Ahead and Left	Kingswood Road – Left and Right
2017	AM 07:45 – 08:45	Degree of Saturation	56.2%	47.2%	56.2%
		Max Mean Queue (PCU)	9	7	3
	PM 16:45 – 17:45	Degree of Saturation	35.7%	97.0%	65.7%
		Max Mean Queue (PCU)	5	38	4
2027	AM 07:45 – 08:45	Degree of Saturation	61.5%	70.6%	54.9%
		Max Mean Queue (PCU)	10	12	3
	PM 16:45 – 17:45	Degree of Saturation	40.9%	124.3%	63.6%
		Max Mean Queue (PCU)	6	181	4

Source: WSP Parsons Brinckerhoff (March 2017) 2017 and 2027 Assessment years for a Do Minimum Scenario

During the PM Peak the Southbound Ahead and Left turn movement from Burton Wood Road to Kingswood Road is forecast to **operate above capacity, with a DoS of 97% in 2017 which rises to 124% in 2027**. The associated Mean Maximum Queues (MMQ) of **38 PCUs (218.5m) and 181 PCUs (1041m)**.

The other two approaches to the junction are forecast to remain within capacity, however they still experience significant queues during the AM peak period, Burtonwood Road South arm has a forecast queue of **10 PCUs (57.5m)** in the 2027 AM peak.

## Queue Length – Junction 2: Lingley Green Avenue/A57 Liverpool Road

A manual classified count was undertaken using telescopically mounted video cameras on Thursday 18th May 2017 between 07:00 and 19:00. Queue data was simultaneously collected with maximum queues every 5 minutes recorded. The LinSig Models were validated to this data and used to identify the future year scenario if no improvements were delivered.

**Figure 2: 2017 and 2027 Degree of Saturation and Queue lengths – Junction 2: Lingley Green Avenue / A57 Liverpool Road existing Junction Layout**

Assessment Year	Performance Metric		A57 Liverpool Road Westbound (Right Turn)	A57 Liverpool Road Westbound (Ahead)	A57 Liverpool Road Eastbound	Lingley Green Avenue
2017	AM 07:30 – 08:30	Degree of Saturation	26.1%	39.4%	84.6%	96.1%
		Max Mean Queue (PCU)	0.6	4.6	15.2	12.7
	PM 16:30 – 17:30	Degree of Saturation	20.9%	52.9%	68.1%	101.5%
		Max Mean Queue (PCU)	0.8	7.4	10.4	24.3
2027	AM 07:30 – 08:30	Degree of Saturation	40.9%	43.0%	96.4%	114.3%
		Max Mean Queue (PCU)	0.9	5.2	25.8	40.2
	PM 16:30 – 17:30	Degree of Saturation	29.3%	57.4%	75.9%	119.6%
		Max Mean Queue (PCU)	1	8.5	12.6	70.6

Source: AECOM (June 2017) 2017 and 2027 Assessment years for a Do Minimum Scenario

The Lingley Green Avenue approach currently operates over capacity with a DoS of **96.1%** and **101.5%** in the AM and PM peaks. This is forecast to worsen in the future year of 2027 with DoS of **114.3%** and **119.6%** in the AM and PM peaks. Whilst existing queues on the Lingley Green Avenue approach reach back to the Park Road roundabout junction, the longest queue, totalling **40.2 PCUs (231m)** is forecast in the 2027 PM peak will regularly exceed this and begin to block all approaches to the Park Road roundabout.

All approaches are forecast to experience a worsening of the DoS and increases in MMQ with the A57 Liverpool Road Eastbound junction is forecast to operate over capacity in the 2027 future year during the AM peak. The increase in DoS to **96.4%** and a MMQ of **25.8PCUs (148.35m)** would begin to delay strategically important movements inbound to Warrington the A57 Liverpool Road.

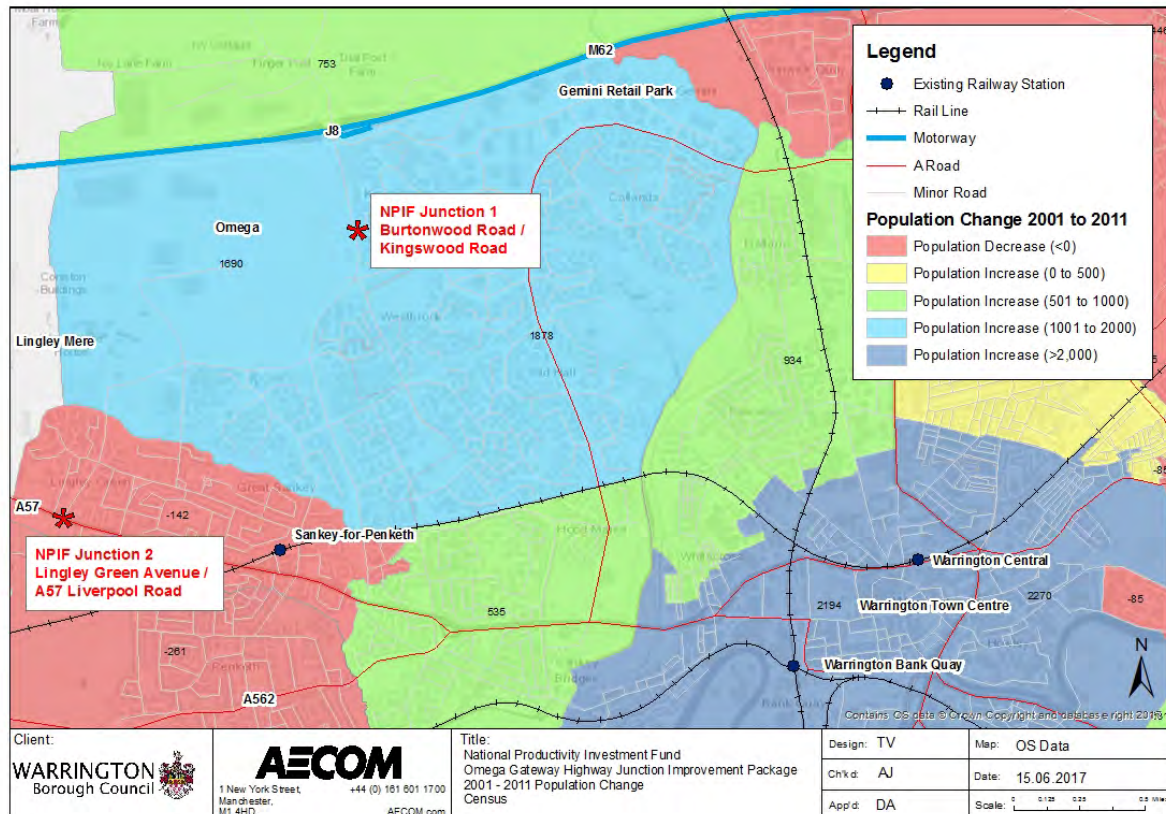
## Development Pressure

The package of works is located at the heart of the local road network in the North West Warrington area.

North West Warrington comprises the 'old town' areas of Great Sankey centred around the A57 Liverpool Road upon which 'new town development commenced in the 1980's, and the rapidly expanding Omega and Lingley Mere development sites.

The area has experienced rapid population growth between 2001 and 2011 Census periods as demonstrated in **Figure 7**.

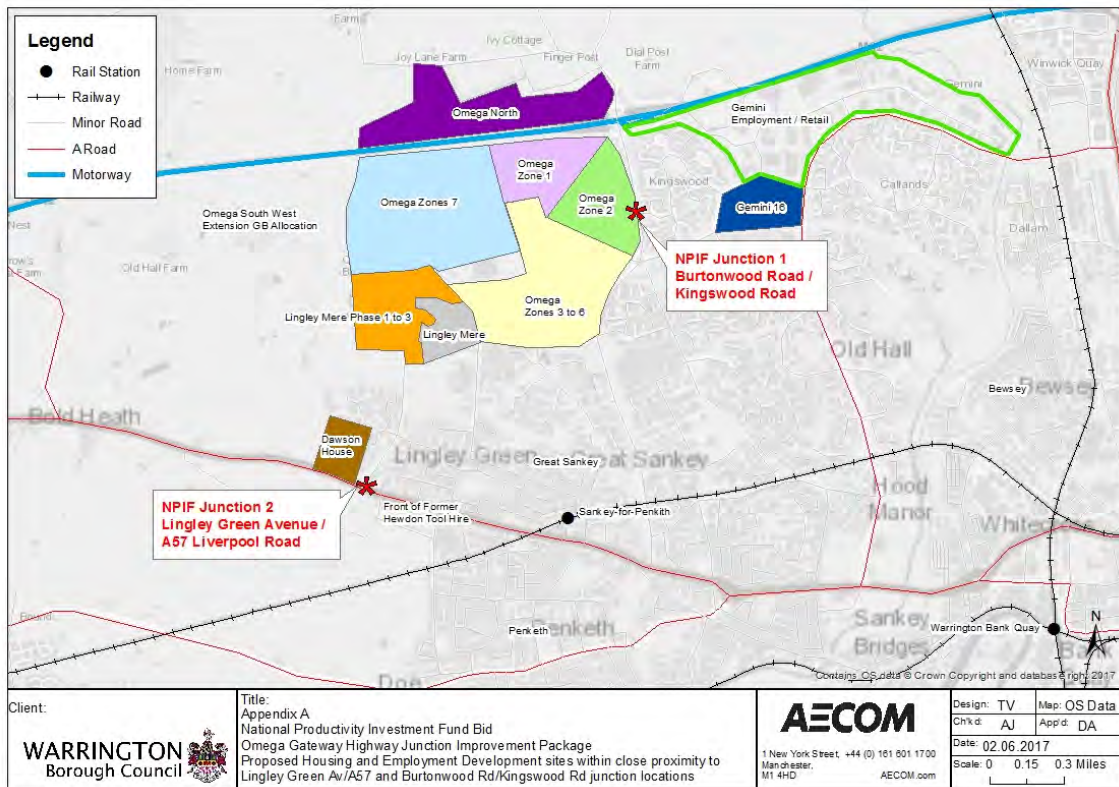
**Figure 7: Population Growth**



The build out of the sites identified in **Table 3** and **Figure 8** will complete the infilling of the urban area bounded by the A57, M62, Town Centre and the borough boundary with St Helens. The scale of the development will necessitate further improvements to the local highway network to ensure congestion does not act as a constraint on growth and quality of life factors.



**Figure 8: Proposed Development in North West Warrington**



**Table 3: Development Opportunities**

Development Name	Planning Application Ref	Employment m <sup>2</sup>	Jobs	Housing Units
Dawson House Development	2011/18949	-	-	140
Front of Former Hewden Tool Hire	2013/21598	-	-	5
OMEGA Zone 3 & 6	2015/26469	Small retail/ restaurant units	1,289	1,100
OMEGA Plot 7C	2015/26884	33,091 (B8)		-
OMEGA Plot 1A	2016/27588	10,858		-
OMEGA Zone 7	2014/23290	22,297		-
Lingley Mere Phase 1	2013/21109	10,908 (B1)	135	-
Lingley Mere Phase 3	2013/21109	800 (B1) 1,600 (B2) 13,000 (B8)	293	-
Lingley Mere	2016/22223	-	-	275
OMEGA South West Extension GB Allocation (Preferred Development Option)	-	tbc	tbc	tbc





**Appendix H:**  
**Project Impacts Proforma**

**Scheme Impact Pro Forma for Small Project Bids - Please fill in the cells highlighted in yellow**  
**NPIF**

<b>Year of assessment</b>	<b>2017</b>
---------------------------	-------------

Scenario	Input Data / Key Performance Indicators	Unit	AM Peak Hr	PM Peak Hr	Inter-Peak Hr
			Weekday	Weekday	Weekday
<b>Do-Minimum</b>	Number of highway trips affected	vehicles	3,198	3,632	-
	Total vehicle travelled time	vehicle-hours	32.41	55.95	-
	Total vehicle travelled distance	vehicle-km	541.47	663.29	-
	Highway peak period conversion factor	-	2.40	2.64	-
	Number of PT passenger trips on affected routes	passenger trips	-	-	-
	Total PT travelled time	passenger-hrs	-	-	-
	PT peak period conversion factor	-	-	-	-
<b>Do-Something</b>	Number of highway trips affected	vehicles	3,198	3,632	-
	Total vehicle travelled time	vehicle-hours	25.20	33.42	-
	Total vehicle travelled distance	vehicle-km	541.47	663.29	-
	Highway peak period conversion factor	-	2.40	2.64	-
	Number of PT passenger trips on affected routes	passenger trips	-	-	-
	Total PT travelled time	passenger-hrs	-	-	-
	PT peak period conversion factor	-	-	-	-

<b>Year of assessment</b>	<b>2027</b>
---------------------------	-------------

Scenario	Input Data / Key Performance Indicators	Unit	AM Peak Hr	PM Peak Hr	Inter-Peak Hr
			Weekday	Weekday	Weekday
<b>Do-Minimum</b>	Number of highway trips affected	vehicles	3,530	3,982	-
	Total vehicle travelled time	vehicle-hours	71.48	247.03	-
	Total vehicle travelled distance	vehicle-km	657.79	783.63	-
	Highway peak period conversion factor	-	2.41	2.66	-
	Number of PT passenger trips on affected routes	passenger trips	-	-	-
	Total PT travelled time	passenger-hrs	-	-	-
	PT peak period conversion factor	-	-	-	-
<b>Do-Something</b>	Number of highway trips affected	vehicles	3,530	3,982	-
	Total vehicle travelled time	vehicle-hours	34.03	46.05	-
	Total vehicle travelled distance	vehicle-km	657.79	783.63	-
	Highway peak period conversion factor	-	2.41	2.66	-
	Number of PT passenger trips on affected routes	passenger trips	-	-	-
	Total PT travelled time	passenger-hrs	-	-	-
	PT peak period conversion factor	-	-	-	-

**This Pro Forma is supported by Appendix I of the overall bid which details all elements of work completed**

Both Schemes Combined

This Pro Forma is supported by Appendix I of the overall bid which details all elements of work completed

Year of assessment	2017
--------------------	------

Scenario	Input Data / Key Performance Indicators	Unit	AM Peak Hr	PM Peak Hr	Inter-Peak Hr
			Weekday	Weekday	Weekday
Do-Minimum	Number of highway trips affected	vehicles	3,198	3,632	-
	Total vehicle travelled time	vehicle-hours	32.41	55.95	-
	Total vehicle travelled distance	vehicle-km	541.47	663.29	-
	Highway peak period conversion factor	-	2.40	2.64	-
	Number of PT passenger trips on affected routes	passenger trips	-	-	-
	Total PT travelled time	passenger-hrs	-	-	-
	PT peak period conversion factor	-	-	-	-
Do-Something	Number of highway trips affected	vehicles	3,198	3,632	-
	Total vehicle travelled time	vehicle-hours	25.20	33.42	-
	Total vehicle travelled distance	vehicle-km	541.47	663.29	-
	Highway peak period conversion factor	-	2.40	2.64	-
	Number of PT passenger trips on affected routes	passenger trips	-	-	-
	Total PT travelled time	passenger-hrs	-	-	-
	PT peak period conversion factor	-	-	-	-

Year of assessment	2027
--------------------	------

Scenario	Input Data / Key Performance Indicators	Unit	AM Peak Hr	PM Peak Hr	Inter-Peak Hr
			Weekday	Weekday	Weekday
Do-Minimum	Number of highway trips affected	vehicles	3,530	3,982	-
	Total vehicle travelled time	vehicle-hours	71.48	247.03	-
	Total vehicle travelled distance	vehicle-km	657.79	783.63	-
	Highway peak period conversion factor	-	2.41	2.66	-
	Number of PT passenger trips on affected routes	passenger trips	-	-	-
	Total PT travelled time	passenger-hrs	-	-	-
	PT peak period conversion factor	-	-	-	-
Do-Something	Number of highway trips affected	vehicles	3,530	3,982	-
	Total vehicle travelled time	vehicle-hours	34.03	46.05	-
	Total vehicle travelled distance	vehicle-km	657.79	783.63	-
	Highway peak period conversion factor	-	2.41	2.66	-
	Number of PT passenger trips on affected routes	passenger trips	-	-	-
	Total PT travelled time	passenger-hrs	-	-	-
	PT peak period conversion factor	-	-	-	-

Kingswood Road / Burtonwood Road

Year of assessment	2017
--------------------	------

Scenario	Input Data / Key Performance Indicators	Unit	AM Peak Hr	PM Peak Hr	Inter-Peak Hr
			Weekday	Weekday	Weekday
Do-Minimum	Number of highway trips affected	vehicles	1,330	1,745	-
	Total vehicle travelled time	vehicle-hours	13.62	29.37	-
	Total vehicle travelled distance	vehicle-km	445.11	562.80	-
	Highway peak period conversion factor	-	2.49	2.77	-
	Number of PT passenger trips on affected routes	passenger trips	-	-	-
	Total PT travelled time	passenger-hrs	-	-	-
	PT peak period conversion factor	-	-	-	-
Do-Something	Number of highway trips affected	vehicles	1,330	1,745	-
	Total vehicle travelled time	vehicle-hours	13.57	20.18	-
	Total vehicle travelled distance	vehicle-km	445.11	562.80	-
	Highway peak period conversion factor	-	2.49	2.77	-
	Number of PT passenger trips on affected routes	passenger trips	-	-	-
	Total PT travelled time	passenger-hrs	-	-	-
	PT peak period conversion factor	-	-	-	-

Year of assessment	2027
--------------------	------

Scenario	Input Data / Key Performance Indicators	Unit	AM Peak Hr	PM Peak Hr	Inter-Peak Hr
			Weekday	Weekday	Weekday
Do-Minimum	Number of highway trips affected	vehicles	1,662	2,095	-
	Total vehicle travelled time	vehicle-hours	17.56	172.01	-
	Total vehicle travelled distance	vehicle-km	548.70	670.92	-
	Highway peak period conversion factor	-	2.49	2.77	-
	Number of PT passenger trips on affected routes	passenger trips	-	-	-
	Total PT travelled time	passenger-hrs	-	-	-
	PT peak period conversion factor	-	-	-	-
Do-Something	Number of highway trips affected	vehicles	1,662	2,095	-
	Total vehicle travelled time	vehicle-hours	17.06	27.25	-
	Total vehicle travelled distance	vehicle-km	548.70	670.92	-
	Highway peak period conversion factor	-	2.49	2.77	-
	Number of PT passenger trips on affected routes	passenger trips	-	-	-
	Total PT travelled time	passenger-hrs	-	-	-
	PT peak period conversion factor	-	-	-	-

A57 Liverpool Road / Lingley Avenue

Year of assessment	2017
--------------------	------

Scenario	Input Data / Key Performance Indicators	Unit	AM Peak Hr	PM Peak Hr	Inter-Peak Hr
			Weekday	Weekday	Weekday
Do-Minimum	Number of highway trips affected	vehicles	1,868	1,887	-
	Total vehicle travelled time	vehicle-hours	18.80	26.59	-
	Total vehicle travelled distance	vehicle-km	96.36	100.49	-
	Highway peak period conversion factor	-	2.34	2.53	-
	Number of PT passenger trips on affected routes	passenger trips	-	-	-
	Total PT travelled time	passenger-hrs	-	-	-
	PT peak period conversion factor	-	-	-	-
Do-Something	Number of highway trips affected	vehicles	1,868	1,887	-
	Total vehicle travelled time	vehicle-hours	11.64	13.24	-
	Total vehicle travelled distance	vehicle-km	96.36	100.49	-
	Highway peak period conversion factor	-	2.34	2.53	-
	Number of PT passenger trips on affected routes	passenger trips	-	-	-
	Total PT travelled time	passenger-hrs	-	-	-
	PT peak period conversion factor	-	-	-	-

Year of assessment	2027
--------------------	------

Scenario	Input Data / Key Performance Indicators	Unit	AM Peak Hr	PM Peak Hr	Inter-Peak Hr
			Weekday	Weekday	Weekday
Do-Minimum	Number of highway trips affected	vehicles	1,868	1,887	-
	Total vehicle travelled time	vehicle-hours	53.92	75.02	-
	Total vehicle travelled distance	vehicle-km	109.09	112.70	-
	Highway peak period conversion factor	-	2.34	2.53	-
	Number of PT passenger trips on affected routes	passenger trips	-	-	-
	Total PT travelled time	passenger-hrs	-	-	-
	PT peak period conversion factor	-	-	-	-
Do-Something	Number of highway trips affected	vehicles	1,868	1,887	-
	Total vehicle travelled time	vehicle-hours	16.96	18.80	-
	Total vehicle travelled distance	vehicle-km	109.09	112.70	-
	Highway peak period conversion factor	-	2.34	2.53	-
	Number of PT passenger trips on affected routes	passenger trips	-	-	-
	Total PT travelled time	passenger-hrs	-	-	-
	PT peak period conversion factor	-	-	-	-





**Appendix I:**  
**Model Reporting and Value for Money**  
**Assessment / Data Sources**



↑ Prescott  
Lingley Mere →  
Lingley Green →

# Omega Highway Gateway - Junction Improvement Package

A57 Liverpool Road / Lingley Green Avenue  
Junction Modelling and Appraisal

Warrington Borough Council

Project Reference: 60544437  
Project Number: 60544437  
MTD1

23<sup>rd</sup> June 2017

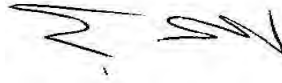
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# 1. Introduction

## 1.1 Background

The A57 Liverpool Road / Lingley Green Avenue is a three arm signalised junction located on the western periphery of Warrington. It forms a gateway to Warrington for trips from St Helens, Liverpool, Halton and surrounding areas. The junction also forms a key point of access into the Omega and Lingley Mere development areas via Lingley Green Avenue.

The junction currently benefits from MOVA control which enhances the capacity of the junction. However, during peak periods, particularly the PM, the junction operates over capacity and experiences queues on the Lingley Green Avenue approach arm which regularly reach back to the roundabout junction of Lingley Green Avenue / Park Road.

The existing delays and problems at the A57 Liverpool Road / Lingley Green Avenue will be exacerbated as the significant volume of new developments within Omega and Warrington come online. The Omega development is a local and regionally significant development which has already begun to provide a significant volume of jobs.

In the absence of intervention, the A57 Liverpool Road / Lingley Green Avenue, which is already a pinch point on the network, will restrict and hinder further growth within a regionally significant development area as well as across the wider Warrington area.

## 1.2 Report Purpose

In support of a National Productivity Investment Fund for Local Road Network (NPIF) application by Warrington Borough Council (WBC) to the Department for Transport (DfT), AECOM has been commissioned by WBC to assess the existing A57 Liverpool Road / Lingley Green Avenue junction and, identify potential solutions and improvements to mitigate existing and future delays.

## 1.3 Report Structure

This report will contain the following chapters;

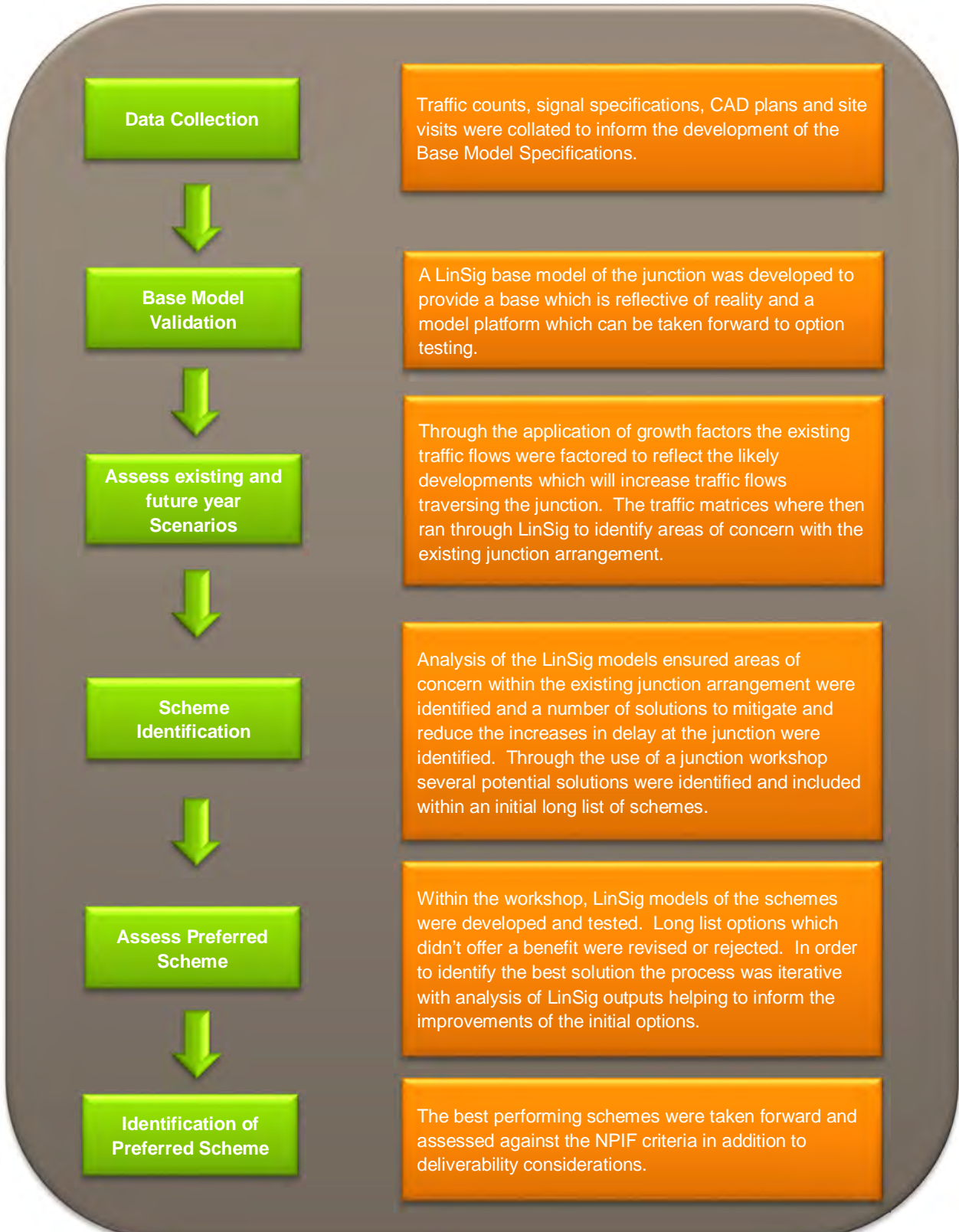
- Assessment Methodology;
- Assessment of Existing Situation;
- Identification and Assessment of Solutions;
- Identification of Preferred Solution;
- Calculation of Benefit to Cost Ratio;
- Air Quality Assessment Analysis; and
- Summary and Conclusions.

## 2. Assessment Methodology

### 2.1 Approach

The A57 Liverpool Road / Lingley Green Avenue junction was assessed within LinSig traffic modelling software. In order to provide a robust and accurate assessment a set methodology has been followed. This is detailed below in **Figure 1**.

**Figure 1: Assessment Methodology**



## 2.2 Data Collection

### *Signal Specifications and Layouts*

Signal Specifications and Layout Drawings of the junction were provided by WBC - these are presented within **Annex A** of this report.

### *Traffic Counts and Queue Lengths*

Manually Classified Traffic Counts and queue length surveys were completed at the junction on the 18<sup>th</sup> May 2017 for a 12 hour period of 7am until 7pm. The raw data is presented in **Annex B** of this report.

### *Site Visit*

A site visit was completed on the 18<sup>th</sup> May 2017 to gain an understanding of the typical operation of the junction and driver behaviour.

In addition to general observations of junction operation, cycle times, stage green times and pedestrian activity were recorded.

## 2.3 Base Model Validation

### *Base Model Development*

In order to provide a suitable base from which to identify areas of concern and then develop and assess new scheme options a LinSig base model reflective of 2017 conditions was developed for the AM and PM peak periods.

The AM and PM peak hour periods were identified from the traffic flow surveys. These are presented below:

- AM Peak Period – (07:30 – 08:30); and
- PM Peak Period – (16:30 – 17:30)

Traffic flows were converted to PCU values for input into the LinSig model based on the conversion factors identified in **Table 1** below.

**Table 1: PCU conversion factors**

Vehicle Class	PCU Factor
Cars	1
LGVs	1
OGV 1	2.1
OGV2	2.3
Bus and Coach	2

The LinSig model was developed based on measurements taken from WBC layout CAD drawings, and the stage arrangements were taken from the signals specifications.

The junction benefits from a MOVA signal control upgrade. To replicate the capacity increase that MOVA typical provides the saturation flows for each movement within the junction were increased by a factor of 1.029 (considered the appropriate factor to replicate typical increases in saturation flows for a junction in a large town).<sup>1</sup>

Once constructed the traffic flows were assigned within LinSig and the green time splits and cycle times were edited to reflect those observed on site. Pedestrian movements and demands were limited to one single

<sup>1</sup> [http://jctconsultancy.co.uk/Home/docs/JCT\\_Modelling\\_Mova\\_TEC\\_Article\\_Sep03.pdf](http://jctconsultancy.co.uk/Home/docs/JCT_Modelling_Mova_TEC_Article_Sep03.pdf)

pedestrian demand in either peak period. A further site visit on the 21<sup>st</sup> June 2017 identified pedestrian movements at the junction were again limited to almost no activity. Therefore, the base model has been developed with no calls for the pedestrian stage.

#### Model Validation

The LinSig models were updated to reflect the observed green time splits and cycle times for each peak period. Once updated and in order to ensure the LinSig model was reflective of the existing situation (2017), the observed queue lengths were compared to the queues identified in the LinSig base model. **Table 2** below presents a comparison of the modelled and observed queues.

**Table 2: Model Validation against Queue Lengths**

Peak Period	Arm	Observed Average Max Queue (PCUs)	Modelled Mean Max Queue (MMQ)	Difference
AM Peak	A57 Liverpool Rd Eastbound	15	15.2	-0.2
	Lingley Green Avenue	11	12.7	-1.7
	A57 Liverpool Rd Westbound Right Turn	2	0.6	1.4
	A57 Liverpool Rd Westbound Ahead	10	4.6	5.4
PM Peak	A57 Liverpool Rd Eastbound	13	10.4	2.6
	Lingley Green Avenue	25	24.3	0.7
	A57 Liverpool Rd Westbound Right Turn	1	0.8	0.2
	A57 Liverpool Rd Westbound Ahead	11	7.4	3.6

**Table 2** above highlights the model validates well against observed queue lengths for all arms. Furthermore, the Mean Max Queues (MMQ) from the model are of the same magnitude of those observed on site. The full outputs of the base models are presented in **Annex C** of this report.

## 2.4 Future Forecast Year

At the request of WBC, the A57 Liverpool Road / Lingley Green Avenue junction has been assessed using a base year of 2017 and a forecast future year of 2027.

To replicate the growth in traffic flows forecast to 2027, growth factors have been derived from several sources set out below.

#### Cars

TEMPro 7 was interrogated with the average growth rate for Warrington, St Helens and the immediate location of the junction utilised to replicate traffic growth for car movements through the junction on the A57 Liverpool Road in an east and westbound direction. This is presented in **Table 3** overleaf.



**Table 3: Unadjusted TEMPro Growth Factors (2017 – 2027)**

Peak Period	Area Description		All Purpose (2017 – 2027)		Average of Warrington, St Helens and Warrington 009
	Level	Name	Origin	Destination	
AM	GB	GB	1.0931	1.0931	1.073
	Region	NW	1.0883	1.0883	
	County	Cheshire	1.0569	1.0911	
	Authority	Warrington	1.0627	1.0936	
	E02002598	Warrington 009	1.0452	1.0919	
	E02002599	Warrington 010	1.0435	1.0907	
	E02002604	Warrington 015	1.0469	1.0851	
	Authority	St. Helens	1.0634	1.0874	
PM	GB	GB	1.0912	1.0912	1.066
	Region	NW	1.0838	1.0838	
	County	Cheshire	1.0813	1.059	
	Authority	Warrington	1.0836	1.0628	
	E02002598	Warrington 009	1.081	1.0464	
	E02002599	Warrington 010	1.0739	1.0491	
	E02002604	Warrington 015	1.0662	1.0457	
	Authority	St. Helens	1.0779	1.0624	

Interrogation of the assumptions within TEMPro 7 identified the super output area which covers the OMEGA development zone was forecast to deliver 156 houses and 422 jobs between 2017 and 2027. Consultation with WBC identified that the total number of forecast jobs appears low; however it remains a reasonable low growth forecast. However, the total number of houses is significantly lower than what is expected to be delivered and most importantly, the number of consented dwellings.

WBC confirmed that the Lingley Mere Development is consented to deliver 275 dwellings and an additional 1,100 dwellings are consented on the southern sections of the Omega development site. To account for the significant volume of dwellings which are to be delivered, TEMPro’s alternative assumptions facility was used to derive a more accurate growth rate for trips to and from the Lingley Green Avenue arm.

To provide a more reflective forecast the total 1,375 dwellings has been divided by 9 (9 full years of construction, as 2017 is assumed to be enabling works). The resulting 1,238 dwellings has been input into TEMPro 7 enabling a revised growth rate for the OMEGA area to be obtained. This is presented in **Table 4** below.

**Table 4: Adjusted TEMPro Growth Factors (2017 – 2027)**

Model Peak	Area Description		All Purpose (2017 – 2027)		
	Level	Name	Origin	Destination	Growth Rate
AM	E02002598	Warrington 009	1.2621	1.1061	1.1841
PM			1.1213	1.2254	1.1734

To reflect a more accurate forecast of traffic growth to and from Lingley Green Avenue as a result of the significant development proposals of OMEGA, the revised growth rate has then been applied to all movements to or from this arm.

### LGVs and HGVs

The Road Transport Forecasts 2016<sup>2</sup> spreadsheet released by the DfT contains forecasts of total distance travelled by vehicle class, region and area type. The spreadsheets have been used to derive growth factors for Light Goods Vehicles (LGVs, Ordinary Good Vehicles (OGV1) using the 'Ridgid' NTM category and OGV2 using the 'Artic NTM category. Growth factors have been derived from the 'Rural' area type for the future year trip matrices because it broadly fits the edge of town junction location and provides the most robust assumptions. The growth factors are presented below in **Table 5**.

**Table 5: NTM Traffic Growth Figures for LGV and HGV Traffic**

Area Type	2017 - 2027 Growth Factors		
	LGVs	OGV1	OGV2
Rural	1.263	1.049	1.104

## 2.5 Future year Model Assumptions

To retain consistency and ensure the options tested actually provide physical improvements in capacity, all future year models have retained the same green time splits as per those used to validate the base year model.

All options modelled are assumed to retain MOVA control at the junction, whilst this has been accounted for within the LinSig modelling - in reality the benefits and delays of the various options could be greater. Therefore, the benefits identified as part of this assessment exercise are considered a conservative estimate of the forecast improvements.

It has been assumed there will be no increases in pedestrian demands at the junction in the future year scenarios.

<sup>2</sup> <https://www.gov.uk/government/publications/road-traffic-forecasts-2015>

### 3. Assessment of Existing Situation

#### 3.1 Introduction

The LinSig outputs for 2017 and 2027 have been assessed in order to provide an understanding of how the existing junction is currently operating and how it will operate in the future year. This chapter of the report will detail this analysis and support the analysis with observations made during site visits.

#### 3.2 2017 Existing Situation

The outputs from the LinSig model for the 2017 are presented in **Table 6** below, summarising the Degree of Saturation (DoS) and mean max queue (MMQ) values. The DoS is an indication of how much available capacity each link has before it is considered to be over capacity. A value of 90% is considered capacity as it allows for typical 10% daily variations in traffic flows.

**Table 6: Summary of 2017 LinSig Junction Performance Outputs**

Movement	Am Peak		Pm Peak	
	Degree of Saturation	Mean Max Queue (PCUs)	Degree of Saturation	Mean Max Queue (PCUs)
A57 Liverpool Road Westbound (Right Turn)	26.10%	0.6	20.90%	0.8
A57 Liverpool Road Westbound (Ahead)	39.40%	4.6	52.90%	7.4
A57 Liverpool Road Eastbound	84.60%	15.2	68.10%	10.4
Lingley Green Avenue	96.10%	12.7	101.50%	24.3

**Table 6** identifies the Lingley Green Avenue approach arm to the junction is currently operating over capacity in both peak periods. This is supported by observations during site visits which identified queues on the Lingley Green Avenue arm were significant. Despite the implementation of MOVA the arm is noticeably busier during the PM peak were queues regularly reach back to the upstream junction with Park Road post 17:00.

#### 3.3 2027 Existing Situation

**Table 7** below presents a summary of forecast junction performance for the future year of 2027, assuming there are no changes at the junction and the only change is growth in traffic flows. For consistency purposes the cycle time and green time splits within the LinSig model are the same as those of the base models.

**Table 7: Summary of 2027 LinSig Junction Performance Outputs**

Movement	Am Peak		Pm Peak	
	Degree of Saturation	Mean Max Queue (PCUs)	Degree of Saturation	Mean Max Queue (PCUs)
A57 Liverpool Road Westbound (Right Turn)	40.90%	0.9	29.30%	1
A57 Liverpool Road Westbound (Ahead)	43.00%	5.2	57.40%	8.5
A57 Liverpool Road Eastbound	96.40%	25.8	75.90%	12.6
Lingley Green Avenue	114.30%	40.2	119.60%	70.6

**Table 7** overleaf illustrates that the A57 Liverpool Road eastbound approach arm is forecast to operate over capacity in the AM peak. The most significant concern is the forecast MMQ of 70.6 PCUs on Lingley Avenue. A queue of this magnitude would impact junctions further upstream of the A57 junction and could result in the rerouting of traffic which potentially could result in the undesirable rat running of traffic through unsuitable residential roads.

### 3.4 Summary

The existing junction has been observed to currently operate over capacity, a fact which is supported by the validated LinSig base model. Taking account of forecast traffic growth, by 2027 LinSig forecasts the junction will continue to operate over capacity and experience significant queues which will impact upon adjacent junctions on the local highway network.



## 4. Identification and Assessment of Solutions

### 4.1 Introduction

On receipt of the analysis presented in Chapter 3, an optioneering workshop was held on the 1<sup>st</sup> June 2017 and attended by the project teams from WBC and AECOM. The workshop followed an iterative process which supported by LinSig modelling, completed during the workshop, and plans of the junction and information on Statutory Undertakings the project teams sort to identify and develop a preferred solution, or package of solutions. This section summarises the discussions and solutions identified at that workshop.

### 4.2 Identified Solutions

Through the course of the workshop it became evident that a tiered approach to delivering potential solutions at the junction was the most appropriate approach. **Table 8** below presents a summary of the potential options identified and assessed as part of the workshop.

**Table 8: Identified Options from Omega Gateway Junction Workshop**

Option	Description
1	Additional 100m long Left Turn on Lingley Green Avenue
2	Additional 100m long left turn on Lingley Green Avenue and short 11m long left turn lane on the A57 Liverpool eastbound approach arm
3	Additional 100m long left turn on Lingley Green Avenue and 100m long left turn lane on the A57 Liverpool eastbound approach arm
4	Additional 100m lane on Lingley Green Avenue approach arm to support two right turn lanes with the nearside lane also turning left, a two lane exit with 100m minimum merge section on the A57 Liverpool Road westbound, a 100m long left turn lane on the A57 Liverpool eastbound approach arm

A key prerequisite of the NPIF bid is the delivery of the scheme within a certain timescale. This was a key consideration, in addition to the performance of the junction.

### 4.3 Scheme Assessment

All options identified through the design and assessment workshop were modelled within LinSig. The outputs are presented in Table 9 - 12 overleaf.

#### *Layout 1- Additional 100m long Left Turn on Lingley Green Avenue*

A summary of the benefits of Option 1 relative to the existing junction layout is presented in **Table 9** overleaf, full model outputs are also presented in **Annex D**.

**Table 9: Summary of Forecast Benefits of Layout 1**

Peak Period	Option 1				Benefits over Existing Layout			
	2017							
	Am Peak		Pm Peak		Am Peak		Pm Peak	
Movement	Degree of Saturation	Mean Max Queue (PCUs)	Degree of Saturation	Mean Max Queue (PCUs)	Degree of Saturation	Mean Max Queue (PCUs)	Degree of Saturation	Mean Max Queue (PCUs)
A57 Liverpool Road Westbound (Right Turn)	26.10%	0.6	20.90%	0.8	0.00%	0	0.00%	0
A57 Liverpool Road Westbound (Ahead)	39.40%	4.6	52.90%	7.4	0.00%	0	0.00%	0
A57 Liverpool Road Eastbound	84.60%	15.2	68.10%	10.4	0.00%	0	0.00%	0
Lingley Green Avenue Right Turn	72.60%	5.9	78.40%	9.3	-23.50%	-6.8	-23.10%	-15
Lingley Green Avenue Left Turn	72.60%		78.40%					
2027								
A57 Liverpool Road Westbound (Right Turn)	40.90%	0.9	29.30%	1	0.00%	0	0.00%	0
A57 Liverpool Road Westbound (Ahead)	43.00%	5.2	57.40%	8.5	0.00%	0	0.00%	0
A57 Liverpool Road Eastbound	96.40%	25.8	75.90%	12.6	0.00%	0	0.00%	0
Lingley Green Avenue Right Turn	86.20%	8.5	92.20%	14.3	-28.10%	-31.7	-27.40%	-56.3
Lingley Green Avenue Left Turn	86.20%		92.20%					

**Table 9** above identifies that providing the additional left turn lane on Lingley Green Avenue approach, totalling 100m in length, is forecast to significantly reduce the volume of queueing traffic and also reduce the degree of saturation in both 2017 and 2027.

Layout 2- Additional 100m long left turn on Lingley Green Avenue and 100m long left turn lane on the A57 Liverpool eastbound approach arm

A summary of the benefits of Option 2 relative to the existing junction layout is presented in **Table 10** below. Full model outputs are also presented in **Annex E**.

**Table 10: Summary of Forecast Benefits of Layout 2**

Peak Period	Option 2				Benefits over Existing Layout			
	2017							
	Am Peak		Pm Peak		Am Peak		Pm Peak	
Movement	Degree of Saturation	Mean Max Queue (PCUs)	Degree of Saturation	Mean Max Queue (PCUs)	Degree of Saturation	Mean Max Queue (PCUs)	Degree of Saturation	Mean Max Queue (PCUs)
A57 Liverpool Road Westbound (Right Turn)	22.40%	0.6	19.20%	0.8	-3.70%	0	-1.70%	0
A57 Liverpool Road Westbound (Ahead)	39.40%	4.6	52.90%	7.4	0.00%	0	0.00%	0
A57 Liverpool Road Eastbound	77.40%	10.8	65.30%	8.7	-7.20%	-4.4	-2.80%	-1.7
Lingley Green Avenue Right Turn	72.80%	5.9	78.40%	9.3	-23.30%	-6.8	-23.10%	-15
Lingley Green Avenue Left Turn	72.60%		78.40%					
2027								
A57 Liverpool Road Westbound (Right Turn)	34.50%	0.8	26.50%	0.4	-6.40%	-0.1	-2.80%	-0.6
A57 Liverpool Road Westbound (Ahead)	43.00%	5.2	57.40%	8.5	0.00%	0	0.00%	0
A57 Liverpool Road Eastbound	87.80%	15.8	72.50%	10.6	-8.60%	-10	-3.40%	-2
Lingley Green Avenue Right Turn	86.20%	8.5	92.20%	14.3	-28.10%	-31.7	-27.40%	-56.3
Lingley Green Avenue Left Turn	86.20%		92.20%					

**Table 10** overleaf identifies providing the additional left turn lane on Lingley Green Avenue and the short left turn lane on the A57 Liverpool Road is forecast to provide a benefit to three of the four movements within the junction. The forecast reduction in queues in 2027 is significant during the PM peak on both the Lingley Green Avenue approach and A57 Liverpool, the latter is forecast to reduce by 10 PCUs in the aforementioned peak period.

*Layout 3 - Additional 100m long left turn on Lingley Green Avenue and 100m long left turn lane on the A57 Liverpool eastbound approach arm*

A summary of the benefits of Option 3 relative to the existing junction layout is presented in **Table 11** below, full model outputs are also presented in **Annex F**.

**Table 11: Summary of Forecast Benefits of Layout 3**

Peak Period	Option 3				Benefits over Existing Layout			
	2017							
	Am Peak		Pm Peak		Am Peak		Pm Peak	
Movement	Degree of Saturation	Mean Max Queue (PCUs)	Degree of Saturation	Mean Max Queue (PCUs)	Degree of Saturation	Mean Max Queue (PCUs)	Degree of Saturation	Mean Max Queue (PCUs)
A57 Liverpool Road Westbound (Right Turn)	18.40%	0.6	16.90%	0.7	-7.70%	0	-4.00%	-0.1
A57 Liverpool Road Westbound (Ahead)	39.40%	4.6	52.90%	7.4	0.00%	0	0.00%	0
A57 Liverpool Road Eastbound	48.90%	4.8	44.70%	5.6	-35.70%	-10.4	-23.40%	-4.8
Lingley Green Avenue Right Turn	72.80%	5.9	78.40%	9.3	-23.30%	-6.8	-23.10%	-15
Lingley Green Avenue Left Turn	72.60%		78.40%					
2027								
A57 Liverpool Road Westbound (Right Turn)	27.40%	0.8	22.20%	0.9	-13.50%	-0.1	-7.10%	-0.1
A57 Liverpool Road Westbound (Ahead)	43.00%	5.2	57.40%	8.5	0.00%	0	0.00%	0
A57 Liverpool Road Eastbound	55.70%	5.9	48.50%	6.2	-40.70%	-19.9	-27.40%	-6.4
Lingley Green Avenue Right Turn	86.20%	8.5	92.20%	14.3	-28.10%	-31.7	-27.40%	-56.3
Lingley Green Avenue Left Turn	86.20%		92.20%					

Layout 3 is forecast to offer greater reductions in DOS and MMQs on the A57 Liverpool Road Westbound arm as a result of providing a longer left turn facility.



*Layout 4 - Additional 100m lane on Lingley Green Avenue approach arm to support two right turn lanes with the nearside lane also turning left, a two lane exit with 100m minimum merge section on the A57 Liverpool Road westbound, a 100m long left turn lane on the A57 Liverpool eastbound approach arm*

A summary of the benefits of Option 4 relative to the existing junction layout is presented in **Table 12** below - full model outputs are also presented in **Annex G**.

**Table 12: Summary of Forecast Benefits of Layout 4**

Peak Period	Option 4				Benefits over Existing Layout			
	2017							
	Am Peak		Pm Peak		Am Peak		Pm Peak	
Movement	Degree of Saturation	Mean Max Queue (PCUs)	Degree of Saturation	Mean Max Queue (PCUs)	Degree of Saturation	Mean Max Queue (PCUs)	Degree of Saturation	Mean Max Queue (PCUs)
A57 Liverpool Road Westbound (Right Turn)	18.40%	0.6	16.90%	0.7	-7.70%	0	-4.00%	-0.1
A57 Liverpool Road Westbound (Ahead)	39.40%	4.6	52.90%	7.4	0.00%	0	0.00%	0
A57 Liverpool Road Eastbound	48.90%	4.8	44.70%	5.6	-35.70%	-10.4	-23.40%	-4.8
Lingley Green Avenue Right Turn	45.70%	3.2	48.50%	4.6	-50.40%	-9.5	-53.00%	-19.7
Lingley Green Avenue Left Turn	47.1%		50.0%					
2027								
A57 Liverpool Road Westbound (Right Turn)	27.40%	0.8	22.20%	0.9	-13.50%	-0.1	-7.10%	-0.1
A57 Liverpool Road Westbound (Ahead)	43.00%	5.2	57.40%	8.5	0.00%	0	0.00%	0
A57 Liverpool Road Eastbound	55.70%	5.9	48.50%	6.2	-40.70%	-19.9	-27.40%	-6.4
Lingley Green Avenue Right Turn	54.50%	3.9	57.10%	5.7	-59.80%	-36.3	-62.50%	-64.9
Lingley Green Avenue Left Turn	60.0%		58.9%					

Layout 4 offers the highest volume of benefits over the existing junction layout of the four layouts assessed. **Table 12** identifies if provided, layout 4 is forecast to operate with no MMQs greater than 7.4, a significant reduction over the existing junction layout.

## 5. Identification of Preferred Solution

### 5.1 Introduction

Assessment of the options identified in the optioneering workshop has identified all options are forecast to provide a significant benefit. However, whilst Option 4 provides the greatest volume of benefits, it also has the greatest number of barriers to delivery. Therefore in order to identify a preferred option, the four junction options have been assessed under the key objectives of NPIF bid process and a set deliverability criteria.

### 5.2 Option Appraisal

Figure 2 below presents the option appraisal matrix for the four junctions - a larger version is presented in Annex H of this report.

Figure 2: Options Appraisal Matrix

Omega Highway Gateways - Junction Improvement Package Junction 2: Lingley Green Ave / A57 Liverpool Rd	Do Nothing	Option 1	Option 2	Option 3	Option 4
	Do Nothing: existing network arrangements to be maintained	Additional 100m long Left Turn on Lingley Green Avenue	As Option 2 and short 11m long left turn lane on the A57 Liverpool eastbound approach arm	As Option 2 with 100m long left turn lane on the A57 Liverpool eastbound approach arm	As Option 3 and two lanes exiting the junction the A57 Westbound exit
<b>NPIF Objectives</b>					
Ease urban congestion	✘	✓✓	✓✓✓	✓✓✓	✓✓✓
Unlock economic growth and job creation opportunities	✘	✓	✓✓	✓✓✓	✓✓✓
Enable the delivery of housing development	✘	✓	✓✓	✓✓✓	✓✓✓
Improve Air Quality and/or CO2 emissions	✘	✓	✓✓	✓✓✓	✓✓✓
<b>Deliverability Criteria</b>					
Engineering Feasibility	n/a				
Stakeholder Acceptability					
Stats	n/a				
Programme	n/a				
<b>Option Assessment Outcome</b>					
Recommendation			Preferred		

\* ✓✓✓ – Strong Alignment; ✓✓ – Moderate Alignment; ✓ – Slight Alignment

The Options Appraisal Matrix presented Figure 2 identifies whilst Layout 1 and 2 are achievable and provide benefits, Option 2 offers the best balance between benefits and deliverability. Options 3 and 4 both provide greater benefits but there are significant risks to delivery and proposed programme with both options.

### 5.3 Summary

This section has identified Option 2 as the preferred solution for the signalised junction of the A57 Liverpool Road / Lingley Green Avenue. The layout is deliverable offering congestion benefits and supports the delivery of housing and local development.

## 6. Calculation of Benefit to Cost Ratio

### 6.1 Introduction

In addition to assessing junction performance, this report has also derived a high level Benefit to Cost ratio (BCR) for the preferred option identified in Chapter 5. The high level BCR will help WBC understand the economic benefits the scheme will deliver. This chapter of the report sets out the steps completed in developing a BCR value.

### 6.2 Cost Estimate

WBC have provided a cost for Option 2 which totals **£1,815,460**. As per WebTAG guidance the cost includes the Quantitative Risk Assessment (QRA) value.

### 6.3 Benefits

The benefits of the proposed scheme were derived from the forecast delay savings identified within the LinSig models.

### 6.4 Guidance

The methodology used to derive the BCR was completed based upon the WebTAG, all values have been taken from the WebTAG Databook Version 1.7, March 2017. Guidance was taken from:

- TAG UNIT A1.1 Cost Benefit Analysis (November, 2014);
- TAG UNIT A1.2 Scheme Costs (November 2014);
- TAG UNIT A1.3 User and Provider Impacts (March 2017)

All prices were discounted to the current DfT Base Year 2010.

### 6.5 Time Savings

The LinSig software results provide various network, junction and link performance indicators to assess the scenarios tested. Total Delay in PCU Hours (PCUhr) forms the most appropriate indicator to compare the network results both with and without the proposed junction improvements. This allows the difference in total delay to be converted to a monetary value to represent the benefit of the reduced delay as a result of the proposed improvements.

For clarification, the User Manual for LinSig Version 3 defines Total Delay in PCUhr as:

*'The sum of Uniform, Uniform Storage and Random & Oversaturation Delay. This is the total aggregate delay suffered by traffic using the modelled Network'*

The outputs of the LinSig results that were used to derive the delay savings are those presented in Annex of this report. Total delay values and the difference between the existing and within option 2 scenarios are presented in **Table 13** overleaf.

**Table 13: LinSig Forecast Total Delays (All values in PCUhr)**

Year	AM PEAK HOUR			PM PEAK HOUR		
	Existing Layout	Layout 2	Benefit	Existing Layout	Layout 2	Benefit
2017	16.2	9.03	7.17	23.96	10.62	13.34
2027	50.96	14.01	36.95	72.08	15.86	56.22

## 6.6 Traffic Flow Proportions

Informed by the traffic counts completed for this study a model split for traffic has been derived. The total flows entering the network and peak hour multipliers are presented in **Table 14** below. As all outputs from LinSig are in PCUs, it is necessary to ensure all values used to calculate vehicle proportions for attributing benefits should be completed in PCUs.

**Table 14: 2017 Total Survey Flows and Peak Hour to Peak Period Multipliers (PCUs)**

Year	AM PEAK HOUR			PM PEAK HOUR		
	07:30 - 08:30	07:00 - 10:00	Multiplier	16:30 - 17:30	16:00 - 19:00	Multiplier
2017	1893	4423	2.34	1899	4803	2.53

The vehicle class proportions for all vehicles included within the LinSig modelling are presented in **Table 15** below.

**Table 15: 2017 Traffic Flows Split by Classification (PCUs)**

	AM PEAK HOUR		PM PEAK HOUR	
	07:00 - 10:00	Proportion	16:00 - 19:00	Proportion
Car	3707	84%	4276	89%
LGV	381	9%	333	7%
OGV 1	235	5%	116	2%
OGV2	76	2%	46	1%
PSV	24	1%	32	1%
<b>Total</b>	4423	100%	4803	100%

To calculate delay savings by vehicle class for both AM and PM three hour peak periods the multipliers from **Table 14** were applied to the total delay values presented in **Table 13**, then split down by vehicle class. The delay savings by vehicle class are presented in **Table 16** below.

**Table 16: Delay Savings split by Vehicle Classification (PCUhr)**

	AM Peak						PM Peak					
	Car	LGV	OGV 1	OGV 2	PSV	Total	Car	LGV	OGV 1	OGV 2	PSV	Total
2017	14.04	1.44	0.89	0.29	0.09	16.75	30.04	2.34	0.81	0.32	0.22	33.73
2027	71.93	8.29	4.25	1.44	0.41	86.33	125.70	11.09	3.20	1.34	0.84	142.17

## 6.7 Annualisation

To derive the benefits for a whole year an annualisation factor was applied to the AM and PM peak delay savings split by vehicle classification. A standard annualisation value of 253 was applied, this is derived as per the formula;

$$\text{Total Working days} = 365 \text{ (days a year)} - [52 \text{ (weeks a year)} \times 2 \text{ (days per weekend)}] - 8 \text{ (bank holidays a year)}$$

The annual delay savings by vehicle class are presented in **Table 17** below for both model years.

**Table 17: Annual Delay Savings split by Vehicle Classification (PCUhr)**

	AM Peak						PM Peak					
	Car	LGV	OGV 1	OGV 2	PSV	Total	Car	LGV	OGV 1	OGV 2	PSV	Total
2017	3552	365	225	73	23	4238	7599	592	205	82	57	8535
2027	18198	2098	1076	365	105	21842	31802	2807	809	339	214	35969



The BCR value as been calculated over a standard appraisal term of 60 years. Therefore delay savings have been extrapolated between 2017 and 2027. Post 2027 savings have been assumed to remain constant. The full break down of monetised savings per year are presented in **Annex I** of this report.

## 6.8 Discounting

The Value of Time (VoT) values per year for each vehicle class were extracted from Table A 1.3.6 of the WebTAG Databook, for each year of the 60 years appraisal period. Journey purpose splits were unknown for the vehicles on the network at the time of the study - the average values were therefore used for each vehicle class for the respective peak period.

The VoT in £/hour was multiplied by the respective delay savings per vehicle class each year for all years between 2017 and 2076 to calculate the Undiscounted Benefits in £s. The benefits for each of the vehicle classes were added together to calculate a total Undiscounted Benefit for each year per peak period.

Discount rates were extracted from Table A 1.1.1 of the WebTAG Databook. As per the guidance a 3.5% discount rate was apply to the 2010 value between 2011 and 2047. For the remaining years post 2048 a 3.0% discount rate was used. These rates were used to calculate a discount factor for each year starting from a 2010 discount factor of 1.0 and 2011 discount factor of 1.035.

## 6.9 Present Value Benefit

To calculate the Present Value Benefit (PVB) for each year, the undiscounted benefits was divided by the respective discount factor. The PVB for all years was then added together to calculate the total PVB for each peak period. The total PVB figures were then added together to create a combined PVB, which could be used to calculate the BCR.

## 6.10 Present Value Costs

The scheme costs provided by WBC, totalling **£1,815,460**, was adjusted before it could be used as a Present Value Cost (PVC) in the BCR calculation.

### *Optimism Bias*

In accordance with Table 8 of 'TAG UNIT A1.2 Scheme Costs, an Optimism Bias (OB) of 44% was added to the scheme costs as the scheme falls into the category Local Authority Road Scheme classed as Stage 1 (Programme Entry) taken from Table 7 of the aforementioned guidance, increasing the costs too **£2,614,263**.

### *Deflation Factor*

To account for the effects of deflation, the 2017 cost estimate was adjusted to the DfT base year of 2010. A deflation factor of 0.9017 was derived by dividing the 2010 GDP deflator value (100.00) taken from the annual Parameters table of Webtag Databook by the corresponding 2017 value (110.90). The OB adjusted cost was then multiplied by the deflation factor resulting in a deflated cost of **£2,357,315**.

### *Discount Factor*

The deflation factor adjusted cost was then discounted to a 2010 value by applying the discount factor 0.7862 derived by using the discount factor used for the PVB calculations ( $1 / 1.272$ ). Once applied the deflation adjusted cost was discounted to a 2010 base year price of **£1,852,829**.

### *Taxation Factor*

The final adjust factor was for market prices. This is completed by applying an Indirect Tax Correction Factor to the 2010 discounted cost. Taken from Sheet A1.3.1 of the Webtag Databook a factor of 1.19 (19%) was applied generating a Market Price Cost of **£2,204,866**.

The proposed scheme will be delivered within one calendar year and no additional highway maintenance costs are being considered within this high level BCR calculation, therefore the Market Price Cost has been used as the PVC.

## 6.11 BCR Values

Following the methodology set out in this chapter the PVB and PVC have been calculated as well as a BCR. The values are presented in **Table 18** below.

**Table 18: PVB, PVC and BCR for Layout 2**

Option	Present Value Benefits (PVB)	Present Value Costs (PVC)	Benefit to Cost Ratio (BCR)
<b>Layout 2</b>	£22,854,229	£2,204,866	10.37

A BCR of greater than 1.0 identifies the scheme will return a benefit to the public purse as the benefits are greater than the cost outlay of the scheme. The forecast BCR presented in **Table 18** identifies that the scheme will provide benefits of almost 10 times the cost. Typically a BCR value of greater than 4 is considered 'very high' money, therefore the scheme would be considered excellent value for money.

## 6.12 Summary

Through the generation of a high level BCR, this assessment has identified over a typical 60 years assessment period the scheme is significantly beneficial to the public purse. Given the scheme is forecast to provide benefits almost 10 times that of the costs the scheme is considered to represent an excellent value investment.

## 7. Vehicle Emissions

### 7.1 Introduction

To understand the quantum of air quality benefits the junction improvements are forecast to provide a high level air quality assessment has been completed. Whilst assessment of improvements in air quality can be highly detailed, as with the BCR, the assessment completed as part of these works remains high level. This section of the report details the methodology used to derive the air quality benefits of the scheme.

### 7.2 Approach

Typical air quality analysis utilises changes in vehicle speeds and distance travelled. The modelling completed for this assessment is a simple single junction model and as LinSig does not provide specific point to point journey times so deriving highly accurate assessments of air quality is difficult. Therefore, this assessment has calculated improvements in air quality utilising the total delays forecast by the model through the calculation of reduction in total CO<sub>2</sub> emissions.

### 7.3 Vehicle Speeds

It has been assumed that all elements of air quality savings would be achieved at idle speeds, therefore the estimated CO<sub>2</sub> savings are considered a conservative estimate of the real savings.

### 7.4 Fuel Consumption

Whilst a typical car uses a small amount of fuel idling, HGVs can use as much as two litres of fuel an hour if left idling. To reflect the different vehicle types the fuel consumptions identified in **Table 19** below have been used within the calculations.

**Table 19: Litres of Fuel burnt per Hour by vehicle type**

Vehicle Type	Cars and LGVs	OGV1	OGV2
Fuel Consumption ay Idle (Litres per hour)	0.45	0.9	2.0 <sup>3</sup>

It has been assumed that fuel consumption at idle does not differ by fuel type.

### 7.5 CO<sub>2</sub> release per Litre of Fuel Burnt

The volume of CO<sub>2</sub> released per litre of fuel burnt for the three main fuel types is presented in **Table 20** below.

**Table 20: KG of CO<sub>2</sub> released per litre of fuel burnt**

Fuel Type	Petrol	Diesel	Electricity
CO <sub>2</sub> (KG)	2.39	2.62	0.0

Burning a litre of diesel produces approximately 2.62kgs of carbon dioxide, whereas petrol has a lower carbon content and produces approximately 2.39kgs<sup>4</sup>.

### 7.6 Vehicle Proportions and Fuel Types

The vehicle proportions used to inform the BCR calculations from **Table 15** have been used to identify total delays per vehicle type. Table A 1.3.9 from the WebTAG Databook has been used to derive the percentage split in fuel type per vehicle classification and additionally how this changes over the typical 60 year appraisal period. As identified in **Table 20** above, vehicles powered by electricity are assumed not to emit any CO<sub>2</sub> and so naturally as the percentage of electric vehicles increases within the general fleet the volume of emissions will decrease.

<sup>3</sup> Source <http://trucklocator.co.uk>

<sup>4</sup> Source <http://comcar.co.uk/emissions/footprint/>

## 7.7 Summary of Calculation

**Figure 3** overleaf summarises how annual total CO<sub>2</sub> emissions have been calculated per vehicle type;

**Figure 3: Summary of Formula to Calculate Annual Total CO<sub>2</sub> Savings**

$$\text{CO}_2 \text{ Savings in Tonnes} = \frac{((\text{Total Delay saving by vehicle type} * \% \text{ of fleet by Fuel Type}) * \text{Fuel Consumption at Idle by Vehicle Type}) * \text{KGs of CO}_2 \text{ Released (Split by Fuel Type)}}{1000}$$

## 7.8 Total CO<sub>2</sub> Savings

Full workings of annual and total CO<sub>2</sub> savings over the 60 year appraisal period are provided in **Annex J** of this report. A summary of total savings is presented in **Table 21** below.

**Table 21: Forecast Total CO<sub>2</sub> Savings**

Peak Period	Forecast Total CO <sub>2</sub> Savings over 60 year assessment period (Tonnes)
AM	1504
PM	2357
Total	3860

**Table 21** above identifies providing the Option 2 improvement scheme will result in the production of less CO<sub>2</sub>. It is likely the true air quality savings achieved by the scheme would be greater. Whilst this high level assessment has not considered impacts on PM<sub>10</sub> and NO<sub>x</sub> the scheme would also have a positive impact by reducing the volume of emissions of these harmful gases.



## 8. Summary and Conclusions

### 8.1 Summary

AECOM has completed an assessment of the existing signalised junction of the A57 Liverpool Road / Lingley Green Avenue. Following a standard approach to assessment and utilising both LinSig traffic modelling software and information collected as part of site visits, an assessment of the junction has been completed in the current year (2017) and the future year (2027).

The capacity assessment of the junction has identified that currently the junction operates over capacity with the Lingley Green Avenue operating with DoS greater than 90% in the AM and PM peak period. By 2027 junction performance is forecast to worsen and will continue to operate over capacity moving into the future years.

Through an optioneering workshop, a number of options were identified for the junction aimed at providing a design solution which will help reduce congestion and delay to support and promote economic and residential economies of Warrington. Four options were identified as part of the workshop and were developed to follow an incremental delivery if required.

All options identified offer improvements over the existing junction layout, however, each option identified had different barriers and challengers to delivery. Therefore, in order to identify the optimum solution the schemes were assessed in accordance with the NPIF bid criteria. An assessment matrix exercise was completed and Option 2, which incorporated a 100m long left turn land on Lingley Green Avenue and a 11m short left turn lane on the A57 eastbound approach, was identified as offering the best balance between benefits and barriers to delivery.

To provide WBC with an indication of the likely economic benefits of the optimum scheme, a high level BCR was calculated. The calculated BCR of 10.32 shows that provides very high value for money.

A high level assessment of air quality through the reductions in the volume of CO<sub>2</sub> gasses released as a result of the improvements has been completed. The reduction in delay at the junction as a result of the improvement proposals has been converted to a value of total CO<sub>2</sub>. The assessment identifies that for a 60 year assessment period the scheme would save 3860 tonnes of CO<sub>2</sub> being released into the atmosphere as a result of the reductions in delay at the junction. The scheme is likely to also provide reductions in the emissions of harmful PM<sub>10</sub> and NO<sub>x</sub>.

### 8.2 Conclusions

The works completed and detailed in this report show that Option 2 offers a deliverable, affordable solution to the existing capacity and delay constraints at the signalised junction of the A57 Liverpool / Lingley Green Avenue. The scheme will support growth, prosperity and will reduce vehicle emissions on WBCs network for a 60 year period. The proposed scheme aligns very well with all objectives within the NPIF assessment criteria and provides very high value for money.

## Annex A: Signal Specifications



# Engineer Notes for Traffic Signal Controller Liverpool Road / Lingley Green, Warrington

This document provides supplementary information regarding the configuration loaded into the controller as referenced above. It should be used in conjunction with the general specification form to understand how the controller is configured. For further info on how to navigate the controller on screen display, please refer to the training notes and/or manual supplied with these notes.

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Configuration Ref \*\*\*\*\*  
Controller Serial Number \*\*\*\*\*

## Record of Changes

<i>Version Number</i>	<i>Date</i>	<i>Author/Originator of Change</i>	<i>Description</i>
0	07/06/16	Pep Corso	Initial config



## 1 Junction Information

### ***Basic Information***

#### **Firmware Requirements**

This controller requires v6.95 firmware or above

#### ***Hardware Requirements***

This configuration requires at least 3 x 16in 16out I/O cards.

This is a single stream 6 phase junction.

### ***Site Layout and Phasing Information***

The phase and stage information is given below:

***Not available***

## ***Special conditioning***

### **F phase middle island red man blackout**

The F phase red man on the middle island is conditioned to blackout if F phase is in the minimum clearance period or in the extendable clearance period. If the push button on the middle island is pressed while the red man is blacked out it will immediately return to red.

***The centre island red man is driven from G phase red.***

### **Delayed Reversion**

The quiescent reversion occurs after a delay timer located at ***F15N63 Param-55***.

If the site is under Mova control, mova det 32 will be pulsed (after the delay timer has elapsed) to indicate the quiescent state.

## 2 Manual Panel Details

### **Button Selection F038**

The manual panel is configured with stage buttons as shown below. Please note that the ALL RED button is disabled and the All Red stage can be driven using button 0.

Button Number	Stage Number (stream1)	Name
0	0	All Red
1	1	Liverpool Road
2	2	Liverpool Road Right Turn
3	3	Lingley Green Avenue
4	4	Pedestrians

### 3 Phase and Stage Allocation

#### Phase Allocation

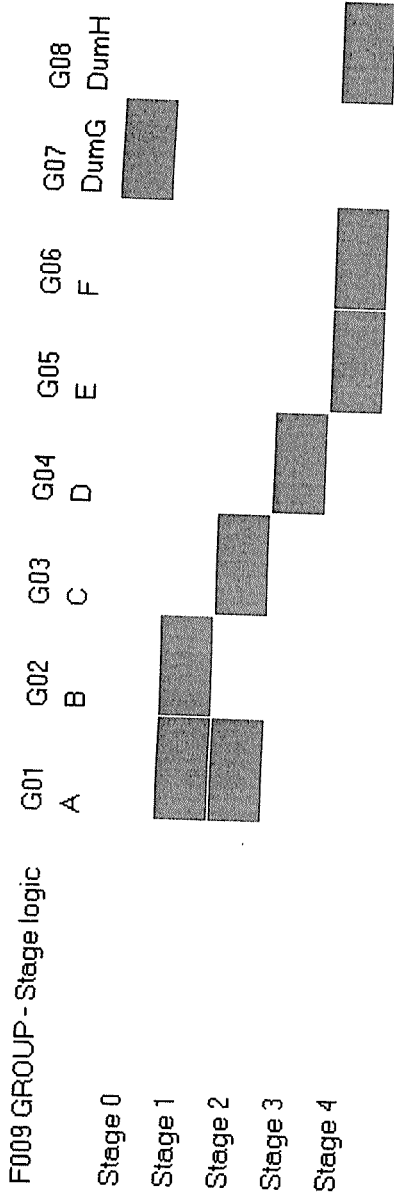
Phase	Title	Type	Appearance Type	Termination Type	Assoc. Phase	Min Green (F4GxN9)	Min Green Limit (F998GxN12*)
A	Liverpool Road Westbound	UK Traffic	Always appears	At end of stage	-	7	5
B	Liverpool Road Eastbound	UK Traffic	Always appears	At end of stage	-	7	5
C	Liverpool Road Westbound Right Turn Arrow	UK green Arrow	Always appears	At end of stage	-	4	4
D	Lingley Green Avenue	UK Traffic	Always appears	At end of stage	-	7	5
E	Pedestrians across Liverpool Road	UK Puffin	If demanded any time before the interstage	At end of stage	-	7	5
F	Pedestrians across Lingley Green Avenue	UK Puffin	If demanded any time before the interstage	At end of stage	-	9	5
G	Dummy for All Red	UK Traffic	Always appears	At end of stage	-	3	3
H	Dummy for G4 Reply	UK Traffic	Always appears	At end of stage	-	7	5

\*Replace the x in the parameter code with the phase number, A is 1, D is 4. For example Min Green Limit of C phase is F998G3N12.



## 4 Stage and Stream Allocation F009

### Stage Allocation



## Prohibited / Ignored / Via Moves

The controller processes the following stage to stage move restrictions in various modes.

- Stage move set 1 (S01) – VA
- Stage move set 2 (S02) – UTC
- Stage move set 3 (S03) – CLF
- Stage move set 4 (S04) – Manual

Format – XY-Z-000

Where

- X is Stream number
- Y is the leaving stage
- Z is the incoming stage
- 000 either stage to move via if 000 to 007 or 100 to ignore or 255 to prevent

F038 BASE - Stage move	S01	S02	S03	S04	S07
F38SN1 Move-1	10-2-001	10-2-001	10-2-001	10-2-001	91-0-000
F38SN2 Move-2	12-1-000	12-1-000	12-1-000	12-1-000	91-1-001
F38SN3 Move-3	13-2-001	13-2-001	13-2-001	13-2-001	91-2-002
F38SN4 Move-4	14-2-001	14-2-001	14-2-001	14-2-001	91-3-003
F38SN5 Move-5					91-4-004
F38SN6 Move-6					91-5-005
F38SN7 Move-7					10-2-001
F38SN8 Move-8					12-1-000
F38SN9 Move-9					13-2-001
F38SN10 Move-10					14-2-001

For example move 1 in S01 is 11-0-255, using 11-0-255

- This means 1 – Stream 1
- 1 – Leaving stage 1
- 0 – Incoming stage 0
- 255 – Prevent

Or - in stream 1, on a change from stage 1 to stage 0, prevent.

### S07 programs buttons to stages in manual mode (and repeats moves in manual)

The first 9 denotes this function, the other numbers denote stream, button and stage association.

For example

91-0-000 stream 1, button 0 stage 0



## 5 Phase Delays

There are no phase delays at this site.

## 6 Intergreen Timings

### A note on Intergreen Values

The controller stores the intergreen times in a table in Function 6. Press **ENTER**, followed by **6** and enter to display Function 6. If this is done, the controller will display the first intergreen in the table as shown below:

F6G1N1:  
Integrn= 04-00-05.0

The displayed intergreen is made up of three parts and has a unique parameter number, in this case *F6G1N1*. F6 means function 6. G1 is the phase number i.e. G1 means group 1, Phase D would be group 4, G4 etc. N1 means it is the first intergreen parameter in the table. The format of the intergreen parameter itself is:

*gg-mm-tt.t*

Where:

*gg* is the group number the intergreen is going to, i.e. phase D would be 04.

*mm* is the mode of the intergreen (always 00 for an intergreen)

*tt.t* is the time in seconds of the intergreen.

The displayed intergreen is *FROM* the phase denoted in the parameter number on the top line, in the example above this would be from Phase A, G1. The parameter starts with 04, so this is an intergreen *TO* phase D, G4. The mode is 00, and the time is 5 seconds.

As another example, the Parameter *F6G2N1* has the value *03-00-08.0*. This means that the intergreen from B to C is mode 00, and is 8 seconds.

The handset command **IGN** followed by a space then from phase letter then space to phase letter. For example **IGN A D** is the intergreen from A to D.

### Intergreen Table F006

F006 GROUP - Intergreen	G01	G02	G03	G04	G05	G06	G07	G08
	A	B	C	D	E	F	DumG	DumH
Outgoing : G01 /A	X	- .	- .	00-07.0	00-12.0	00-12.0	00-03.0	00-12.0
Outgoing : G02 /B	- .	X	00-07.0	00-07.0	00-05.0	00-10.0	00-03.0	00-05.0
Outgoing : G03 /C	- .	00-08.0	X	00-07.0	- .	00-12.0	00-03.0	00-12.0
Outgoing : G04 /D	00-07.0	00-07.0	00-07.0	X	00-11.0	00-05.0	00-03.0	00-05.0
Outgoing : G05 /E	00-01.0	00-01.0	- .	00-01.0	X	- .	00-01.0	- .
Outgoing : G06 /F	00-01.0	00-01.0	00-01.0	00-01.0	- .	X	00-01.0	- .
Outgoing : G07 /DumG	00-02.0	00-02.0	00-02.0	00-02.0	00-02.0	00-02.0	X	00-03.0
Outgoing : G08 /DumH	00-02.0	00-02.0	00-02.0	00-02.0	- .	- .	00-02.0	X

- All Intergreens in the table above are of mode 00, i.e. IGN A to B is 00-06.0

**Intergreen Limit Values, F997**

F997 CONFIGURATION - Gr	G01	G02	G03	G04	G05	G06	G07	G08
	A	B	C	D	E	F	DumG	DumH
Outgoing : G01 /A	X	.	.	05.0	10.0	10.0	03.0	10.0
Outgoing : G02 /B	.	X	05.0	05.0	05.0	08.0	03.0	05.0
Outgoing : G03 /C	.	06.0	X	05.0	.	10.0	03.0	10.0
Outgoing : G04 /D	05.0	05.0	05.0	X	09.0	05.0	03.0	05.0
Outgoing : G05 /E	00.1	00.1	.	00.1	X	.	00.1	.
Outgoing : G06 /F	00.1	00.1	00.1	00.1	.	X	00.1	.
Outgoing : G07 /DumG	02.0	02.0	02.0	02.0	02.0	02.0	X	03.0
Outgoing : G08 /DumH	02.0	02.0	02.0	02.0	.	.	02.0	X

- The lower intergreen limit is displayed in Function 997. The parameter is simply the starting phase and the time. Again, the Parameter number gives the leaving phase of the intergreen. For example:

```

F997G1N1:
Intergreen= 04-05.0
    
```

The above example is the intergreen time lower limit from Phase A to Phase D. All intergreen upper limits are 25.5s.





## Conflict Matrix

Within the TM150 configurator tool, phases are referred to as groups and assigned a number. A is group 01(G01), B is group 02 (G02), C is group 03 (G03) etc.

Program the group numbers which are in conflict with the outgoing group:

Outgoing : G01 /A	04	05	06	07	08		
Outgoing : G02 /B	03	04	05	06	07	08	
Outgoing : G03 /C	02	04	06	07	08		
Outgoing : G04 /D	01	02	03	05	06	07	08
Outgoing : G05 /E	01	02	04	07			
Outgoing : G06 /F	01	02	03	04	07		
Outgoing : G07 /DumG	01	02	03	04	05	06	08
Outgoing : G08 /DumH	01	02	03	04	07		

## Red Lamp Failure Special Considerations

Intergreen extensions after 1<sup>st</sup> red lamp fail

Conditional - mode 10-19	G01	G02	G03	G04	G05	G06	G07	G08
	A	B	C	D	E	F	DumG	DumH
Outgoing : G01 /A	X	-	-	-	10-02.0	10-02.0	-	-
Outgoing : G02 /B	-	X	-	-	10-02.0	10-02.0	-	-
Outgoing : G03 /C	-	-	X	-	-	-	-	-
Outgoing : G04 /D	-	-	-	X	10-02.0	10-02.0	-	-
Outgoing : G05 /E	-	-	-	-	X	-	-	-
Outgoing : G06 /F	-	-	-	-	-	X	-	-
Outgoing : G07 /DumG	-	-	-	-	-	-	X	-
Outgoing : G08 /DumH	-	-	-	-	-	-	-	X

To see the times for the first red lamp failure intergreen extension, go to Function 6 and press **ENTER** until you see the intergreen mode change to 10. The value after the 10 is the time in seconds added to the standard intergreen. For example *F6GIN8 = 07-10-02.0* which means that on a first level red fail on phase A (G1) G phase (G07) will have an extra intergreen of 2 seconds applied.

Phases inhibited after a second red lamp fails

Conditional - mode 10-19	G01	G02	G03	G04	G05	G06	G07	G08
	A	B	C	D	E	F	DumG	DumH
Outgoing : G01 /A	X	-	-	-			-	-
Outgoing : G02 /B	-	X	-	-			-	-
Outgoing : G03 /C	-	-	X	-	-	-	-	-
Outgoing : G04 /D	-	-	-	X			-	-
Outgoing : G05 /E	-	-	-	-	X	-	-	-
Outgoing : G06 /F	-	-	-	-	-	X	-	-
Outgoing : G07 /DumG	-	-	-	-	-	-	X	-
Outgoing : G08 /DumH	-	-	-	-	-	-	-	X

## Starting Intergreen

Is set to 7 seconds defined at parameter *F0N10*. This can be found using handset command *IGS*.

## Pedestrian Facility Timings

### Pedestrian phase E

Period	Description	location	time	Mnemonic
3i	Pedestrian All Red (VA mode GAP Change)	<i>F4G6N37 part 1</i>	1	PAR 0 E
3ii	Pedestrian All Red ( VA mode MAX or FVP Change)	<i>F4G6N37 part 2</i>	3	PAR 1 E
4	Pedestrian Minimum Green	<i>F4G6N9</i>	7	MIN E
5	Minimum Clearance All Red	<i>F4G6N11</i>	3	PMN E
6	Extendible Clearance All Red	<i>F4G6N12</i>	15	PMX E
7 or 8	7 Extra Clearance All Red (Period 6 Run to Max)	<i>F4G6N13</i>	3	PMC E
	8 Extra Clearance All Red (Period 6 Gap Out)	<i>F6G6Nx</i>	1	PGC E
Kerbside hold time		<i>Parameter F15N11</i>	2	-
On crossing detector extension time		<i>Parameter F12D9N19 &amp; F12D10N19</i>	1.0	-

### Pedestrian phase F

Period	Description	location	time	Mnemonic
3i	Pedestrian All Red (VA mode GAP Change)	<i>F4G6N37 part 1</i>	1	PAR 0 F
3ii	Pedestrian All Red ( VA mode MAX or FVP Change)	<i>F4G6N37 part 2</i>	3	PAR 1 F
4	Pedestrian Minimum Green	<i>F4G6N9</i>	9	MIN F
5	Minimum Clearance All Red	<i>F4G6N11</i>	3	PMN F
6	Extendible Clearance All Red	<i>F4G6N12</i>	25	PMX F
7 or 8	7 Extra Clearance All Red (Period 6 Run to Max)	<i>F4G6N13</i>	3	PMC F
	8 Extra Clearance All Red (Period 6 Gap Out)	<i>F6G6Nx</i>	1	PGC F
Kerbside hold time		<i>Parameter F15N11</i>	2	-
On crossing detector extension time		<i>Parameter F12D9N19 &amp; F12D10N19</i>	1.0	-

## 7 Plans & Mode Priority F003

The controller runs various *traffic plans* that are linked to different *modes* of operation. Within each traffic plan, parameters such as phase max green time are set. Each plan can be viewed / changed (depending upon user access) via Function F007.

The mode and stage information for stream 1 is displayed on the LCD by default. .

In this configuration, the first seven traffic plans are linked to VA operation. These are VA Max Set Plans. Each plan is used to define a set of phase maximum Green times for the vehicular and pedestrian phase. When the **FIXED** button is pressed, the controller will use these times for Fixed Time to Current Max.

Plan Number	Mode description displayed on LCD	Description
01	VA	Max Set A
02	VA	Max Set B
03	VA	Max Set C
04	VA	Max Set D
05	VA	Max Set E
06	VA	Max Set F
07	VA	Max Set G
08	VA	Max Set H
09	UTC	UTC Mode
10	CLF	CLF Plan 1
11	CLF	CLF Plan 2
12	CLF	CLF Plan 3
13	CLF	CLF Plan 4
14	Manual	Manual Mode

## Mode Priority F994

The normal mode of operation is MOVA. Fall back from MOVA is CLF or VA from the timetable. Under this mode the Orange **NORMAL** LED will be lit and the controller will display **MOVA**, **CLF** or **VA**. Selected VA is allowed. If this is selected, the LED above the VA button will be lit and the **NORMAL** LED will be extinguished. The controller will display **VA** on the LCD. Fixed Time can be selected by pressing the **FIXED** button and this will light the LED above the button. The **NORMAL** LED will be extinguished. The controller will display **FT-CMAX** on the LCD. If Manual mode is active the LED above the **MANUAL** button will be lit and the **NORMAL** LED will be extinguished. The controller will display **MANUAL** on the LCD. Under this control mode, Green can be held indefinitely on vehicular or pedestrian phases.

The order of mode priority (highest to lowest) is as follows:

1. Manual control
2. Selected VA or Fixed Time
3. UTC
4. CLF
5. Fall back to CLF or VA from the timetable

Closing the Manual Panel Door, with the signals in Manual will cause a reversion to the normal mode of operation when a magnetic door sensor is fitted. The other selected modes are not affected by this.



### Max Set Times F007

There are eight VA plans stored in the controller. The handset command for altering the maxes is **MAX** followed by the phase letter separated by a space. For example Max Set A for Phase C would be **MAX C**. Set B is **MBX**, Set C is **MCX** and Set D is **MDX**.

Phase	Max Set A (Plan 1)	Max Set B (Plan 2)	Max Set C (Plan 3)	Max Set D (Plan 4)	Max Set E (Plan 5)	Max Set F (Plan 6)	Max Set G (Plan 7)	Max Set H (Plan 8)
A	35	30	35	30	30	30	30	30
B	35	30	35	30	20	20	20	20
C	35	30	35	30	30	30	30	30
D	20	20	20	20	20	20	20	20
E	20	20	20	20	20	20	20	20
F	-	-	-	-	-	-	-	-
G	-	-	-	-	-	-	-	-
H	-	-	-	-	-	-	-	-
I	-	-	-	-	-	-	-	-
J	-	-	-	-	-	-	-	-
K	-	-	-	-	-	-	-	-
L	-	-	-	-	-	-	-	-
M	-	-	-	-	-	-	-	-
N	-	-	-	-	-	-	-	-
O	-	-	-	-	-	-	-	-
P	-	-	-	-	-	-	-	-

### Fixed Time

Fixed time is to current VA maximum. In fixed time, the following phases are demanded and/or extended.

Phase	A	B	C	D	E	F	G	H
<b>Demand</b>	√	√		√				
<b>Extend</b>	√	√		√				

Phase	I	J	K	L	M	N	O	P
<b>Demand</b>								
<b>Extend</b>								





# 8 I/O Configuration

## Inputs F012

Name	Demands	Extends	Ext time F12DxN13 & 14 (13 & 14 must be the same)	On Time (Minutes) F12DxN23	Off Time (Hours) F12DxN24	Failure Mode F12DxN25	Input F12DxN2	Input Sense	Panel I/O Number
AIN1	A	-	-	60	18	Use on failure 135	01-003-101	Not Inverted	Input 1
AX2	A	A	4.0	60	18	Use on failure 135	01-003-102	Not Inverted	Input 2
AX3	A	A	4.0	60	18	Use on failure 135	01-003-103	Not Inverted	Input 3
ASL4	A	A	1.6	60	18	Use on failure 135	01-003-104	Not Inverted	Input 4
COU5	-	C	2.0	60	18	Use on failure 135	01-003-105	Not Inverted	Input 5
BING	B	-	-	60	18	Use on failure 135	01-003-106	Not Inverted	Input 6
BX7	B	B	4.0	60	18	Use on failure 135	01-002-107	Not Inverted	Input 7
BSL8	B	B	1.6	60	18	Use on failure 135	01-002-108	Not Inverted	Input 8
DIN9	D	-	-	60	18	Use on failure 135	01-003-109	Not Inverted	Input 9
DX10	D	D	4.0	60	18	Use on failure 135	01-003-110	Not Inverted	Input 10
DSL11	D	D	1.8	60	18	Use on failure 135	01-002-111	Not Inverted	Input 11
DSL12	D	D	1.6	60	18	Use on failure 135	01-002-112	Not Inverted	Input 12
VC1A	-	-	-	60	18	Use on failure 135	01-003-113	Not Inverted	Input 13
VC1B	-	-	-	60	18	Use on failure 135	01-003-114	Not Inverted	Input 14
VC2A	-	-	-	60	18	Use on failure 135	01-003-115	Not Inverted	Input 15
VC2B	-	-	-	60	18	Use on failure 135	01-003-116	Not Inverted	Input 16
EPB	E	-	-	5	254	Use on failure 135	01-002-117	Not Inverted	Input 17
EONX1	-	-	-	30	18	Use on failure 135	01-002-118	Not Inverted	Input 18
EONX2	-	-	-	30	18	Use on failure 135	01-002-119	Not Inverted	Input 19
EKSD1	-	-	-	90	48	Use on failure 135	01-002-120	Not Inverted	Input 20
EKSD2	-	-	-	90	48	Use on failure 135	01-002-121	Not Inverted	Input 21
EKSD3	-	-	-	90	48	Use on failure 135	01-002-122	Not Inverted	Input 22
EKSD4	-	-	-	90	48	Use on failure 135	01-002-123	Not Inverted	Input 23



Configuration Ref \*\*\*\*\*  
Controller Serial Number \*\*\*\*\*

FONX1	-	-	-	30	18	Use on failure 135	01-002-124	Not Inverted	Input 24
FONX2	-	-	30	18	18	Use on failure 135	01-002-125	Not Inverted	Input 25
FONX3	-	-	30	18	18	Use on failure 135	01-002-126	Not Inverted	Input 26
FONX4	-	-	30	18	18	Use on failure 135	01-002-127	Not Inverted	Input 27
FPB1	F	-	5	254	254	Use on failure 135	01-002-128	Not Inverted	Input 28
FPB2	F	-	5	254	254	Use on failure 135	01-002-129	Not Inverted	Input 29
FKSD1	-	-	90	48	48	Use on failure 135	01-002-130	Not Inverted	Input 30
FKSD2	-	-	90	48	48	Use on failure 135	01-002-131	Not Inverted	Input 31
FKSD3	-	-	90	48	48	Use on failure 135	01-002-132	Not Inverted	Input 32
FKSD4	-	-	90	48	48	Use on failure 135	01-002-133	Not Inverted	Input 33
F1	-	-	-	-	-	-	01-002-134	Not Inverted	Input 34
F2	-	-	-	-	-	-	01-002-135	Not Inverted	Input 35
F3	-	-	-	-	-	-	01-002-136	Not Inverted	Input 36
F4	-	-	-	-	-	-	01-002-137	Not Inverted	Input 37
TO	-	-	-	-	-	-	01-002-138	Not Inverted	Input 38
Unused	-	-	-	-	-	-	01-002-139	Not Inverted	Input 39
Unused	-	-	-	-	-	-	01-002-140	Not Inverted	Input 40
Unused	-	-	-	-	-	-	01-002-141	Not Inverted	Input 41
Unused	-	-	-	-	-	-	01-002-142	Not Inverted	Input 42
Unused	-	-	-	-	-	-	01-002-143	Not Inverted	Input 43
Unused	-	-	-	-	-	-	01-002-144	Not Inverted	Input 44
Unused	-	-	-	-	-	-	01-002-145	Not Inverted	Input 45
Unused	-	-	-	-	-	-	01-002-146	Not Inverted	Input 46
Unused	-	-	-	-	-	-	01-002-147	Not Inverted	Input 47
Unused	-	-	-	-	-	-	01-002-148	Not Inverted	Input 48
Dimming Input									
Door Switch									
Spare									
Spare									
SCPU In-1									
SCPU In-2									
SCPU In-3									
SCPU In-4									

**Notes**

The first part of F12Dx N2 parameter is the type of input:	
01	Hardware Input
11	Software Input

The middle part of the F12DxN2 parameter is the sense of the input:	
000	Input Forced OFF
001	Input Forced ON
002	Input Normally Open (Not Inverted)
003	Input Normally Closed (Inverted)

The end part of the F12DxN2 parameter is the input location:	
01-00x-0xx	Detector Input from internal detector 0xx: Each one has two inputs, corresponding to signal and common. Terminals wired on rainbow ribbon cable.
01-00x-1xx	Detector input from digital input 1xx can be 01 to 64

**Call Cancel**

F011 DETECTOR - Special-deter(SD01

F11DN1 Input A 01-002-105

F11DN2 Input B

F11DN3 Enable

F11DN4 Function 04

F11DN5 Time T1 (25ms) 040

F11DN6 Time T2 (25ms) 020

F11DN7 Distance

F11DN8 Mode

N1 is the physical input following the format above

N4 is always 4 for call cancel.

N5 is the call delay in 100 millisecond resolution, so a value of 40 is 4 seconds.

N6 is the cancel delay in 100 millisecond resolution, so a value of 20 is 2 seconds.

Special detector SD01 is hardware input 73, SD02 is hardware input 74, etc.

The hardware input is used to trigger the unlatched demand.



## Outputs F012

Description	Input (to det logic)	Output F12DxN21	Sense	Panel I/O No.
Mova Det 1	01-002-101	1-001	Not Inverted	Output 1
Mova Det 2	01-002-102	1-002	Not Inverted	Output 2
Mova Det 3	01-002-103	1-003	Not Inverted	Output 3
Mova Det 4	01-002-104	1-004	Not Inverted	Output 4
Mova Det 5	01-002-105	1-005	Not Inverted	Output 5
Mova Det 6	01-002-106	1-006	Not Inverted	Output 6
Mova Det 7	01-002-107	1-007	Not Inverted	Output 7
Mova Det 8	01-002-108	1-008	Not Inverted	Output 8
Mova Det 9	01-002-109	1-009	Not Inverted	Output 9
Mova Det 10	01-002-110	1-010	Not Inverted	Output 10
Mova Det 11	11-002-075	1-011	Not Inverted	Output 11
				Output 12
				Output 13
				Output 14
				Output 15
				Output 16
				Output 17
				Output 18
				Output 19
				Output 20
				Output 21
				Output 22
				Output 23
Mova Det 24	11-002-076	1-024	Not Inverted	Output 24
Mova Det 25	11-002-077	1-025	Not Inverted	Output 25
				Output 26
				Output 27
				Output 28
				Output 29
				Output 30
				Output 31
Mova Det 32	11-002-078	1-032	Not Inverted	Output 32
G1	11-003-070			Output 33
G2	11-003-071			Output 34
G3	11-003-072			Output 35
G4	11-003-073			Output 36
GA	11-003-074			Output 37
CRB	11-002-068			Output 38
				Output 39
				Output 40

				Output 41
				Output 42
				Output 43
				Output 44
				Output 45
				Output 46
				Output 47
				Output 48
Cabinet alarm		1-065	Not Inverted	Output 65 (SCPU Out-1)
-	-	1-066	Not Inverted	Output 66 (SCPU Out-2)
-	-	1-067	Not Inverted	Output 67 (SCPU Out-3)
Dimming		1-068	Not Inverted	Output 68 (SCPU Out-4)



These errors will persist until the current errors are reset, or the controller is re-booted. To set how the controller responds to a detector failure set the "Error Mode" to one of the following:

- 130 – A fault is set and the detector logic input is forced OFF
- 131 – A fault is set and the detector logic input is forced ON
- 135 – A fault is set and the detector logic input can be used

### Detector Inputs

Parameter **F12DxN2** can be used to set the sense of the detector input logics. The parameter is configured as type-mode-input. Type is ALWAYS 01. The input is already set up to correspond to the hardware inputs. The parameter to change is mode:

- 000 – Force the detector logic OFF
- 001 – Force a permanent demand on the detector
- 002 – Detector logic input is normal
- 003 – Detector logic input is inverted

### Detector Logics Status

To examine multiple detector status (like an *IOP* command) follow the sequence below:

1. Press the **STATUS** button
2. Scroll down to the "**02 Multiple Status**" option and press **ENTER**
3. Select the "**02 DET Logic**" option and press **ENTER**
4. Choose a starting logic (Goto Index default is 01) and press **ENTER**
5. The controller will display something like:

```
02 DET logic
001:1011000000000000
```

The logics are processed so if an input to a detector logic is inverted, the input would have to be "off" for it to register as a logic 1. The inputs will change in real time. To go back to the normal display press **ESC**

### Detector Input Status

To examine multiple input status follow the sequence below:

1. Press the **STATUS** button
2. Scroll down to the "**02 Multiple Status**" option and press **ENTER**
3. Select the "**04 INPUT**" option and press **ENTER**
4. Choose the starting input 101 (Goto Index default is 001 not 101) and press **ENTER**
5. The controller will display something like:

```
04 INPUT
101:1100001111000000
```

The physical controller inputs (that can be seen on the yellow led mimics on the I/O card) start at address 101 for input 01, 102 for input 02, so it is important to set the Goto Index to 101 to see the first 16 inputs.

## 9 Time Table Information (F021 and F022)

### Time Table Configuration (F021)

The Time table configuration is stored in Function 021. Here the daylight savings parameters are set, and also the controller is told which column to use in Function 022 for which day of the week. Table 1 is used for normal operation; Here, column 1 is used for Monday – Friday, column 2 for Saturday and column 3 for Sunday. Table 2 is used for switching max sets in selected VA; Here column 4 is used for Monday – Friday, column 5 for Saturday and column 6 for Sunday.

Parameter	Value	Description	Notes
F21N1	1	Clock Sync-mode Always set to 1	Sync from Mains (50Hz) This needed for CLF
F21N2	1	Daylight Saving Always set to 1	A fixed weekday is used to change to/from Daylight Saving Time
F21N3	7-04-03	Daylight Saving Begin	Day-week-month
F21N4	7-04-10	Daylight Saving End	Day-week-month
F21N5	0	Long Saturday	Long Saturday is not used
F21N6	1	Table 1 Monday	Time table column used for Monday
F21N7	1	Table 1 Tuesday	Time table column used for Tuesday
F21N8	1	Table 1 Wednesday	Time table column used for Wednesday
F21N9	1	Table 1 Thursday	Time table column used for Thursday
F21N10	1	Table 1 Friday	Time table column used for Friday
F21N11	2	Table 1 Saturday	Time table column used for Saturday
F21N12	3	Table 1 Sunday	Time table column used for Sunday
F21N13	0	Table 1 Long Saturday	Long Saturday is not used
F21N14	0	Special Days Interval	Special Days is not used
F21N15	4	Table 2 Monday	Time table column used for Monday
F21N16	4	Table 2 Tuesday	Time table column used for Tuesday
F21N17	4	Table 2 Wednesday	Time table column used for Wednesday
F21N18	4	Table 2 Thursday	Time table column used for Thursday
F21N19	4	Table 2 Friday	Time table column used for Friday
F21N19	5	Table 2 Saturday	Time table column used for Saturday
F21N20	6	Table 2 Sunday	Time table column used for Sunday
F21N21	0	Table 2 Long Saturday	Long Saturday is not used

### Time Table entries (F022)

Function 022 stores a table of parameters for arranged in columns for each day of the week. The table below shows the entries for each time tabled day. The format of each parameter is:-

*fff-hh-mm*

Where: *fff* is the function (in this case the plan number) to introduce  
*hh* is the hour  
*mm* is the minute

The clock format is 24-hour. In the table below the default timetable entries are listed. The timetable is comprised of two sections, the **NORMAL** timetable and the **Selected VA/FIXED** timetable.

When the controller is in normal mode, with the **NORMAL** button lit, the controller will monitor the Normal timetable entries to switch VA max sets, turn event switches on or off, or run a CLF plan according to timetable, if mode priority allows.

If the controller is put into Selected VA or Fixed Time, the **NORMAL** LED will be extinguished and the controller will use the second Timetable.



It is important that any event switches and VA Max Sets are specified in **BOTH** the *NORMAL* and Selected VA/FIXED timetables. CLF plans should only be placed in the NORMAL table.

Normal Timetable (Fall back VA or CLF) TABLE 1			Selected VA/FIXED Timetable TABLE 2		
Column T01 MONDAY to FRIDAY	Column T02 SATURDAY	Column T03 SUNDAY	Column T04 MONDAY to FRIDAY	Column T05 SATURDAY	Column T06 SUNDAY

F022 CALENDAR CLO	T01	T02	T03	T04	T05	T06
F22TN1 Tdf-1	002-07-30	001-08-00	001-08-00	002-07-30	001-08-00	001-08-00
F22TN2 Tdf-2	001-09-00	002-10-00	004-19-00	001-09-00	002-10-00	004-19-00
F22TN3 Tdf-3	003-15-30	003-14-30		003-15-30	003-14-30	
F22TN4 Tdf-4	001-18-00	001-17-30		001-18-00	001-17-30	
F22TN5 Tdf-5	004-20-30	004-19-00		004-20-30	004-19-00	

A blank entry in the time table columns indicates end of column and any further entries in that column will not be executed. Isolate to VA is achieved by selecting the appropriate VA plan at that time. Ensure that timetabled event switches appear in the Normal **and** Selected VA/FIXED timetable.

### ***Timetabled Event Switches***

## 10 UTC Control

### Bits for Control

	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8
Word 1	F1	F2	F3	F4	TO			
Word 2								
Word 3								
Word 4								

### Bits for Reply

	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8
Word 1	G1	G2	G3	G4	GA	CRB		
Word 2								
Word 3								
Word 4								

Time Sync is set to 12:00.

The location to set the time sync is

- F15N9 – hour
- F15N10 – minute

## 11 CLF Plans

### CLF Plan Location

CLF plan influences and their timings are stored in the following action tables in Function 14. The first action table instruction can be found at **F14P1N9, Act-1**. To look at CLF plan 3 for example the parameter would be **F14P3N9, Act-1**:

- CLF Plan 1 – Controller Plan 10
- CLF Plan 2 – Controller Plan 11
- CLF Plan 3 – Controller Plan 12
- CLF Plan 4 – Controller Plan 13

### CLF Plan Influences

CLF plan influences and their timings are stored in the following action tables in Function 14:

- CLF Plan 1 – Action Table 1 starting at parameter 9
- CLF Plan 2 – Action Table 2 starting at parameter 9
- CLF Plan 3 – Action Table 3 starting at parameter 9
- CLF Plan 4 – Action Table 4 starting at parameter 9

CLF plan influences are as follows:

Name	Code	Description
IM	61-00s-ttt	Immediate Move to stage s in stream 1 at time ttt (seconds)
DM	71-00s-ttt	Demand Dependent move to stage s in stream 1 at time ttt (seconds)
HS	49-00r-ttt	Hold current stage in stream r (r = 1 to 4)
PX	41-00s-ttt	Prevent all stage moves except to stage s, if demanded at time ttt (seconds)





CLF is provided

CLF Plan 1 (Action Table 1)			CLF Plan 2 (Action Table 2)			CLF Plan 3 (Action Table 3)			CLF Plan 4 (Action Table 4)		
Location	Code	Description	Location	Code	Description	Location	Code	Description	Location	Code	Description
P1-Act-1			P2-Act-1			P3-Act-1			P4-Act-1		
P1-Act-2			P2-Act-2			P3-Act-2			P4-Act-2		
P1-Act-3			P2-Act-3			P3-Act-3			P4-Act-3		
P1-Act-4			P2-Act-4			P3-Act-4			P4-Act-4		
P1-Act-5			P2-Act-5			P3-Act-5			P4-Act-5		
P1-Act-6			P2-Act-6			P3-Act-6			P4-Act-6		
P1-Act-7			P2-Act-7			P3-Act-7			P4-Act-7		
P1-Act-8			P2-Act-8			P3-Act-8			P4-Act-8		

### Plan Cycle Times and Offset Times

CLF Plan Cycle time is stored in F003, Parameter 10, and the plan cycle offset is Parameter 11, so for each CLF Plan that is:

- CLF Plan 1, controller Plan 10: F3P10N10 default 60s, F3P10N11, default 0s
- CLF Plan 2, controller Plan 11: F3P11N10 default 60s, F3P11N11, default 0s
- CLF Plan 3, controller Plan 12: F3P12N10 default 60s, F3P12N11, default 0s
- CLF Plan 4, controller Plan 13: F3P13N10 default 60s, F3P13N11, default 0s

### Base cycle Sync

This is set up at configuration time and is currently 02:00 of the current day this needs to be confirmed at FAT/SAT.

## 12 Useful Information

### Handset Command List

The Commands below are implemented in firmware 6.95 or later. The timing limits are under review.

Command	Index 1	Index 2	Data	Level Access	Description
PIC	-	-	-	1	Firmware Version
CII	-	-	-	1	Intersection Name
CIO	-	-	-	1	Intersection Owner
CIC	-	-	-	1	Controller ID
CID	-	-	-	1	Backplane ID Number
WID	No. of Chars	-	14-80	1	Width of text before new line.
LEV	Level Access	-	1-3	N/A	Access Level
MIN	Phase Letter	-	0-255	3	Minimum Green (Seconds)
MAX	Phase Letter	-	0-255	2	Max Green Set A (Seconds) (VA)
MBX	Phase Letter	-	0-255	2	Max Green Set B (VA)
MCX	Phase Letter	-	0-255	2	Max Green Set C (VA)
MDX	Phase Letter	-	0-255	2	Max Green Set D (VA)
MEX	Phase Letter	-	0-255	2	Max Green Set E (VA) PT-MAX Set A on Crossings only
MFX	Phase Letter	-	0-255	2	Max Green Set F (VA) PT-MAX Set B on Crossings only
MGX	Phase Letter	-	0-255	2	Max Green Set G (VA) PT-MAX Set C on Crossings only
MHX	Phase Letter	-	0-255	2	Max Green Set H (VA) PT-MAX Set D on Crossings only
IGS	-	-	0-25	3	Starting Intergreen (Seconds)
IGN	Phase Letter	Phase Letter	0-25	3	Intergreen (Seconds)
TOD	Date YY-MM-DD	Time HH:MM:SS	-	3	Date and Time can be entered separately
CDT	Index	-	0-255	3	Special Conditioning Parameters
PAR	0	Phase Letter	0-255	3	Pedestrian All Red Gap Change (Seconds)
PAR	1	Phase Letter	0-255	3	Pedestrian All Red Max Change (Seconds)
PAR	2	Phase Letter	0-255	3	Pedestrian All Red Forced Change (Seconds)
PAR	3	Phase Letter	0-255	3	Pedestrian All Red UTC Change (Seconds)
PIT	0	Phase Letter	0-2	3	Pelican Intergreen Step 0 (Seconds) Flashing Green Man, Red Traffic
PIT	1	Phase Letter	6-18	3	Pelican Intergreen Step 1 (Seconds) Flashing Green Man, Flashing Amber Traffic
PIT	2	Phase Letter	1-2	3	Pelican Intergreen Step 2 (Seconds) Red Man, Flashing Amber Traffic
PMN	Phase Letter	-	2-25	3	Min Clearance (Seconds)
PMX	Phase Letter	-	2-25	3	Max Clearance (Seconds)
PMC	Phase Letter	-	0-25	3	Extra Clearance Max Change (Seconds)
PGC	Phase Letter	-	0-25	3	Extra Clearance Gap Change (Seconds) Pedestrian Type 14 (All Red) Only
PFR	Phase Letter	-	0-25	3	Pedestrian Final Red (Seconds) Pedestrian Type 17 (Blackout) Only
ERR	-	-	-	1	List Errors. Currently asks user to use Pass-Through Mode.
CYC	Plan Number	-	0-255	3	CLF Plan Cycle Time. Plans 0 to 3 implemented
OFS	Plan Number	-	0-255	3	CLF Plan Offset Time. Plans 0 to 3 implemented
ACT	Action Table	Instruction	-	3	CLF Influence, Stage and Group Time See separate paragraph for details.

### CLF ACT Command (for CLF Influence, stage and time)

To examine an action table influence instruction, type in ACT\_1\_1 for first action table, first instruction. Note the \_ denotes a space between ACT and the two numbers. Controller plan 10 uses action table 1, plan 13 uses action table 4. The first index is the action table index, the second index is the instruction index. The following table gives the influence codes currently in use.

**Table 3.8.5 – CLF Influences**

Name	Example Code	Description
IM	061-00s-ttt	Immediate move to stage s in stream 1 at time ttt seconds.
DM	071-00s-ttt	Demand Dependent move to stage s in stream 1 at time ttt seconds.
HS	049-00r-ttt	Hold Current Stage in Stream r at time ttt seconds.
DM	041-00s-ttt	Prevent All moves except to stage s in stream 1 at time ttt seconds.

ACT 2 1 will return something like:

```
ACT 2 1: IM 1 1 0
```

Which is Immediate move, stream 1, stage 1 time 0s.

To edit the first line of the this CLF plan to make the time 10s, type in:

```
IM_1_1_10
```

Which would be IM Stream 1, Stage 1 time 10. Please note that there is no space between the I and M but there is between everything else. The controller will return:

```
ACT 2 1:IM 1 1 10
```

### Accessing the Controller by Web Page:

The IP address of the controller is set at default, 192.168.0.75. The controller webpages can be accessed using a suitable browser (Motus recommend Chrome) by entering the following address into the browser:

http://192.168.0.75

The default username and password are:

admin  
changeME1

### Accessing the Controller by Display Panel:

To gain L3 user access permissions, enter the security code via the control panel keypad in the following way:

1. Press **TT-0** followed by **001**. The controller will display:

```
1=L1 - 2=L2 - 3=L3
Current Level:    1
New Level:       -
```

2. Press **3** to select L3 then press **ENTER** to accept. The controller will display:

```
CODE level-3 = XXXX
```

3. Enter the four digit L3 security code (default 5678) and press the **ENTER** button to accept. The controller will display:

```
CODE level-3 Opened
```

To gain L2 user access permissions, follow the instructions above, except at the appropriate steps press **2** and enter the L2 security code (default 1234).

## Useful Functions

The following table lists useful functions in regard to operation of the controller.

Function Number	Title	Description
F999	Site Info	First four Parameters give site name, owner, site ID and Serial.
F111	Firmware Version	Firmware version of the CPU.
F997	Intergreen limit Values	Minimum and maximum intergreen values
F998	Phase Limit Values	Minimum and maximum phase values
F000	Base Parameters	Most is locked, Starting Intergreen is stored here. L3 Access required to alter this.
F004	Phase Parameters	Minimum green values stored here
F006	Intergreen Times	Phase Intergreen times are stored here.
F007	Plan Parameters	Phase Max Times for each Max Set (linked to a Plan) are stored here
F011	Call Cancel Timings	Queue Loop timings stored here.
F012	Detector Logics	The Inputs and Outputs and their logic is stored here. Detector Extensions are stored here. DFM on and off times along with DFM type is also here.
F014	Action Table	CLF Plans Influences and timings stored here
F016	Special Conditioning	Not user editable via the control panel but can be viewed.
F021	Calendar Clock – General	Calendar settings stored here.
F022	Calendar Clock – Time Table	Time table for plans and event switches stored here

**Table of Basic Functions**

## Basic Parameter Summary

Description	Configuration Parameter	Default Value (where applicable)
Min Green Phase A-P	F4G1N9-F4G16N9	See Section 3
Max Green Phase A-P	F7PxG1N2 – F7PxG16N2 (Plan Dependent)	See Section 7
Starting Intergreen	F0N10	8 seconds
Detector Extension (where x is the detector number)	F12DxN13 F12DxN14 (Both must be identical)	See Section 8

**Table of Basic Parameters**





## Annex B: Traffic Count and Queue Length Data



SITE: 1

DATE: 18/05/2017

LOCATION: Lingley Green Avenue / Liverpool Road

DAY: Thursday

TIME	A to C							TOT	A to B							TOT
	CAR	LGV	OGV1	OGV2	PSV	MCL	PCL		CAR	LGV	OGV1	OGV2	PSV	MCL	PCL	
07:00	4	2	0	0	0	0	1	7	29	2	1	0	0	0	0	32
07:15	7	2	0	0	0	0	0	9	34	1	1	0	1	1	0	38
07:30	6	1	0	0	0	0	0	7	59	6	1	0	0	0	0	66
07:45	9	1	0	0	0	0	0	10	63	6	2	3	0	0	0	74
H/TOT	26	6	0	0	0	0	1	33	185	15	5	3	1	1	0	210
08:00	22	2	1	0	1	0	0	26	67	6	2	0	0	1	0	76
08:15	26	5	0	0	0	0	0	31	71	7	4	0	0	1	1	84
08:30	21	2	0	1	0	0	0	24	40	6	0	2	0	0	0	48
08:45	14	3	0	0	0	0	0	17	47	5	2	0	0	0	0	54
H/TOT	83	12	1	1	1	0	0	98	225	24	8	2	0	2	1	262
09:00	15	2	2	1	0	0	0	20	49	5	0	2	0	0	0	56
09:15	13	1	1	0	0	0	0	15	42	2	5	0	0	0	0	49
09:30	15	1	2	0	0	0	0	18	30	6	0	3	0	0	0	39
09:45	5	2	1	0	0	0	0	8	30	4	1	0	0	0	0	35
H/TOT	48	6	6	1	0	0	0	61	151	17	6	5	0	0	0	179
10:00	5	1	0	0	0	0	0	6	24	3	2	1	0	0	0	30
10:15	10	4	1	0	0	0	0	15	27	1	1	0	0	0	0	29
10:30	5	1	1	0	0	0	0	7	25	0	1	1	0	0	0	27
10:45	5	0	1	0	0	0	0	6	27	5	1	2	0	1	0	36
H/TOT	25	6	3	0	0	0	0	34	103	9	5	4	0	1	0	122
11:00	8	1	0	0	0	0	1	10	26	3	3	0	0	0	0	32
11:15	7	1	1	0	0	0	0	9	24	4	0	0	0	0	0	28
11:30	9	0	1	0	0	1	0	11	31	2	0	1	0	0	0	34
11:45	7	3	1	0	0	0	0	11	31	3	0	0	0	0	0	34
H/TOT	31	5	3	0	0	1	1	41	112	12	3	1	0	0	0	128
12:00	8	3	1	0	0	0	0	12	42	3	2	0	0	0	0	47
12:15	14	5	0	0	0	0	0	19	35	2	3	3	0	0	0	43
12:30	16	1	0	0	0	1	0	18	22	2	1	0	0	0	1	26
12:45	14	1	1	0	0	0	0	16	53	1	2	0	0	0	0	56
H/TOT	52	10	2	0	0	1	0	65	152	8	8	3	0	0	1	172
13:00	15	2	0	0	0	0	0	17	44	3	0	0	0	0	0	47
13:15	9	1	1	0	0	0	0	11	47	4	2	0	0	0	0	53
13:30	7	2	0	0	0	0	0	9	30	5	2	0	0	0	0	37
13:45	6	0	0	0	0	0	0	6	35	5	0	3	0	0	1	44
H/TOT	37	5	1	0	0	0	0	43	156	17	4	3	0	0	1	181
14:00	11	1	1	0	0	0	0	13	68	3	1	0	0	1	0	73
14:15	12	2	2	0	0	0	0	16	43	3	1	0	0	0	0	47
14:30	21	1	0	0	0	0	0	22	59	5	4	1	0	1	0	70
14:45	26	7	0	0	0	0	0	33	43	2	3	2	0	0	0	50
H/TOT	70	11	3	0	0	0	0	84	213	13	9	3	0	2	0	240
15:00	15	0	1	0	0	0	0	16	52	0	2	0	0	1	0	55
15:15	14	1	0	0	0	0	0	15	54	3	1	1	0	0	2	61
15:30	19	3	0	0	0	0	0	22	47	6	1	2	0	1	0	57
15:45	19	2	0	0	0	0	0	21	53	6	0	3	0	0	0	62
H/TOT	67	6	1	0	0	0	0	74	206	15	4	6	0	2	2	235
16:00	17	3	2	0	0	0	1	23	127	8	2	2	0	1	0	140
16:15	16	3	0	0	0	0	0	19	93	6	1	2	0	0	0	102
16:30	28	2	1	0	0	0	0	31	111	9	0	0	0	1	2	123
16:45	28	0	0	0	0	0	0	28	78	4	0	1	0	2	0	85
H/TOT	89	8	3	0	0	0	1	101	409	27	3	5	0	4	2	450
17:00	18	2	0	0	0	0	0	20	123	3	3	1	1	0	1	132
17:15	21	1	0	0	0	0	0	22	106	7	1	0	0	0	0	114
17:30	22	1	0	0	0	0	0	23	82	5	0	0	1	0	2	90
17:45	26	2	0	0	0	0	0	28	61	1	2	0	0	0	0	64
H/TOT	87	6	0	0	0	0	0	93	372	16	6	1	2	0	3	400
18:00	17	1	0	0	0	0	0	18	85	2	1	0	0	0	0	88
18:15	18	3	0	0	0	1	0	22	45	5	1	0	0	1	0	52
18:30	17	3	1	0	0	0	0	21	37	0	0	0	0	2	2	41
18:45	16	2	0	0	0	0	0	18	32	1	1	1	0	2	0	37
H/TOT	68	9	1	0	0	1	0	79	199	8	3	1	0	5	2	218
P/TOT	683	90	24	2	1	3	3	806	2483	181	64	37	3	17	12	2797



SITE: 1

DATE: 18/05/2017

LOCATION: Lingley Green Avenue / Liverpool Road

DAY: Thursday

TIME	A to A						TOT
	CAR	LGV	OGV1	OGV2	PSV	MCL	
07:00	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0
08:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
09:00	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0
10:15	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0
10:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0
11:15	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0
11:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0
13:15	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0
13:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0
14:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0
15:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
18:00	0	0	0	0	0	0	0
18:15	0	0	0	0	0	0	0
18:30	0	0	0	0	0	0	0
18:45	0	0	0	0	0	0	0
P/TOT	0	0	0	0	0	0	0
P/TOT	0	0	0	0	0	0	0



SITE: 1

DATE: 18/05/2017

LOCATION: Lingley Green Avenue / Liverpool Road

DAY: Thursday

TIME	B to A							TOT	B to C							TOT
	CAR	LGV	OGV1	OGV2	PSV	MCL	PCL		CAR	LGV	OGV1	OGV2	PSV	MCL	PCL	
07:00	46	6	3	2	0	0	0	57	104	14	1	0	0	1	0	120
07:15	61	2	2	0	1	0	0	66	109	10	1	0	0	1	1	122
07:30	114	2	0	0	0	2	1	119	110	14	1	0	0	3	0	128
07:45	129	3	3	0	1	1	1	138	110	15	3	0	0	0	1	129
H/TOT	350	13	8	2	2	3	2	380	433	53	6	0	0	5	2	499
08:00	93	4	3	0	0	0	0	100	113	13	2	0	0	1	0	129
08:15	92	6	1	0	1	0	2	102	85	11	2	1	0	1	1	101
08:30	83	5	2	1	0	0	0	91	93	11	2	1	0	1	0	108
08:45	90	4	0	0	0	0	0	94	69	8	4	1	0	3	2	87
H/TOT	358	19	6	1	1	0	2	387	360	43	10	3	0	6	3	425
09:00	58	3	0	0	0	0	0	61	65	7	1	0	0	0	0	73
09:15	34	2	0	0	0	0	0	36	70	10	3	0	0	0	0	83
09:30	36	1	3	2	0	0	0	42	62	8	2	1	0	0	0	73
09:45	45	4	2	1	0	0	0	52	69	5	5	1	1	0	1	82
H/TOT	173	10	5	3	0	0	0	191	266	30	11	2	1	0	1	311
10:00	24	4	1	1	0	0	1	31	55	6	2	0	0	0	0	63
10:15	26	1	3	0	0	0	0	30	50	13	2	1	0	2	0	68
10:30	23	2	5	0	0	0	0	30	49	3	3	1	0	2	0	58
10:45	25	1	1	0	0	0	0	27	36	8	0	1	1	0	1	47
H/TOT	98	8	10	1	0	0	1	118	190	30	7	3	1	4	1	236
11:00	30	1	3	1	0	1	0	36	46	11	1	0	0	1	0	59
11:15	28	1	1	2	0	0	0	32	63	9	3	0	0	1	0	76
11:30	40	1	1	1	0	0	0	43	68	9	1	0	0	0	1	79
11:45	34	2	0	0	0	1	1	38	72	6	8	0	0	0	1	87
H/TOT	132	5	5	4	0	2	1	149	249	35	13	0	0	2	2	301
12:00	35	6	1	2	0	0	0	44	54	13	2	0	0	0	0	69
12:15	35	4	0	1	0	0	1	41	50	14	2	0	0	0	0	66
12:30	31	3	0	2	0	0	0	36	61	6	2	0	0	0	0	69
12:45	30	6	6	1	0	1	0	44	62	5	1	0	0	1	1	70
H/TOT	131	19	7	6	0	1	1	165	227	38	7	0	0	1	1	274
13:00	42	4	0	0	0	1	0	47	67	5	3	1	0	2	4	82
13:15	44	3	1	0	0	0	0	48	67	7	0	1	0	0	0	75
13:30	38	2	3	2	0	0	0	45	62	7	0	0	1	0	0	70
13:45	36	3	3	0	0	1	0	43	51	7	1	1	0	0	0	60
H/TOT	160	12	7	2	0	2	0	183	247	26	4	3	1	2	4	287
14:00	43	2	2	1	0	0	0	48	53	10	3	1	0	1	0	68
14:15	31	3	1	0	0	0	1	36	64	7	1	0	0	1	1	74
14:30	41	2	3	0	0	0	0	46	55	5	2	0	0	1	0	63
14:45	33	0	1	0	0	0	0	34	70	6	1	2	1	0	0	80
H/TOT	148	7	7	1	0	0	1	164	242	28	7	3	1	3	1	285
15:00	32	4	2	0	0	0	0	38	68	6	1	0	0	1	0	76
15:15	41	6	1	0	0	0	1	49	71	14	2	1	0	0	0	88
15:30	34	1	0	3	0	1	0	39	70	15	0	1	0	0	1	87
15:45	37	5	1	2	0	1	0	46	69	15	2	1	0	0	2	89
H/TOT	144	16	4	5	0	2	1	172	278	50	5	3	0	1	3	340
16:00	33	0	2	1	0	0	1	37	83	11	2	0	1	0	0	97
16:15	48	1	0	0	0	0	1	50	91	8	0	1	1	0	0	101
16:30	50	1	3	1	0	1	0	56	91	8	0	1	2	2	0	104
16:45	58	1	2	0	0	0	0	61	106	8	0	0	1	1	0	116
H/TOT	189	3	7	2	0	1	2	204	371	35	2	2	5	3	0	418
17:00	36	3	1	0	1	0	0	41	78	9	0	0	0	2	1	90
17:15	59	9	0	0	0	0	0	68	133	13	0	1	0	1	1	149
17:30	54	3	1	0	1	2	0	61	86	10	0	0	0	3	0	99
17:45	46	1	1	0	1	0	1	50	82	8	0	0	0	2	0	92
H/TOT	195	16	3	0	3	2	1	220	379	40	0	1	0	8	2	430
18:00	41	0	1	1	0	0	0	43	79	3	0	0	0	0	2	84
18:15	37	2	1	0	0	1	0	41	85	5	1	1	0	0	0	92
18:30	30	1	2	1	0	0	0	34	70	2	0	0	1	0	1	74
18:45	28	2	3	0	0	0	0	33	56	5	0	1	0	0	1	63
P/TOT	136	5	7	2	0	1	0	151	290	15	1	2	1	0	4	313
P/TOT	2214	133	76	29	6	14	12	2484	3532	423	73	22	10	35	24	4119



SITE: 1

DATE: 18/05/2017

LOCATION: Lingley Green Avenue / Liverpool Road

DAY: Thursday

TIME	B to B						TOT
	CAR	LGV	OGV1	OGV2	PSV	MCL	
07:00	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0
08:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
09:00	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0
10:15	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0
10:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0
11:15	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0
11:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0
13:15	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0
13:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0
14:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0
15:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
18:00	0	0	0	0	0	0	0
18:15	0	0	0	0	0	0	0
18:30	0	0	0	0	0	0	0
18:45	0	0	0	0	0	0	0
P/TOT	0	0	0	0	0	0	0
P/TOT	0	0	0	0	0	0	0



SITE: 1

DATE: 18/05/2017

LOCATION: Lingley Green Avenue / Liverpool Road

DAY: Thursday

TIME	C to B							TOT	C to A							TOT
	CAR	LGV	OGV1	OGV2	PSV	MCL	PCL		CAR	LGV	OGV1	OGV2	PSV	MCL	PCL	
07:00	64	7	2	0	0	1	0	74	1	1	0	0	0	0	0	2
07:15	75	11	3	1	1	1	1	93	12	2	1	0	0	0	0	15
07:30	117	6	0	1	1	2	0	127	15	1	0	0	0	0	0	16
07:45	106	15	1	0	1	0	0	123	16	0	1	0	0	0	1	18
H/TOT	362	39	6	2	3	4	1	417	44	4	2	0	0	0	1	51
08:00	97	12	5	1	1	0	0	116	11	1	1	0	0	0	1	14
08:15	89	10	3	2	0	2	0	106	17	1	1	0	0	0	0	19
08:30	69	12	3	2	1	1	0	88	17	0	1	0	0	0	0	18
08:45	75	11	1	1	0	1	1	90	21	4	0	0	1	0	0	26
H/TOT	330	45	12	6	2	4	1	400	66	6	3	0	1	0	1	77
09:00	51	6	2	2	0	1	0	62	13	1	2	0	0	0	0	16
09:15	50	7	1	0	0	0	0	58	14	1	1	0	0	0	0	16
09:30	61	10	3	0	0	0	0	74	5	2	1	0	0	0	0	8
09:45	46	10	6	0	0	0	0	62	7	2	1	0	0	0	1	11
H/TOT	208	33	12	2	0	1	0	256	39	6	5	0	0	0	1	51
10:00	63	6	1	2	0	0	0	72	7	2	0	0	0	0	0	9
10:15	52	8	4	0	0	0	2	66	4	1	0	0	0	0	0	5
10:30	67	13	4	0	0	0	0	84	8	1	0	0	0	0	0	9
10:45	61	11	2	1	0	1	1	77	6	3	2	0	0	0	0	11
H/TOT	243	38	11	3	0	1	3	299	25	7	2	0	0	0	0	34
11:00	65	8	1	1	0	2	1	78	8	3	0	0	0	0	0	11
11:15	61	9	4	0	0	1	0	75	8	0	0	0	0	0	0	8
11:30	52	12	3	2	0	0	0	69	5	1	1	0	0	0	0	7
11:45	64	14	1	1	0	0	1	81	9	1	0	0	0	0	2	12
H/TOT	242	43	9	4	0	3	2	303	30	5	1	0	0	0	2	38
12:00	68	14	4	0	0	0	1	87	8	2	0	0	0	0	0	10
12:15	79	14	1	0	0	0	0	94	7	0	0	0	1	0	0	8
12:30	79	16	1	0	0	0	1	97	11	4	0	0	0	0	0	15
12:45	68	7	4	0	0	0	1	80	7	0	1	0	0	0	0	8
H/TOT	294	51	10	0	0	0	3	358	33	6	1	0	1	0	0	41
13:00	68	8	1	0	0	0	1	78	9	1	0	0	0	0	0	10
13:15	56	10	2	0	0	0	2	70	12	2	1	0	0	0	0	15
13:30	61	6	1	0	2	0	0	70	11	1	0	0	0	0	0	12
13:45	57	5	1	0	0	0	0	63	7	3	1	0	0	0	0	11
H/TOT	242	29	5	0	2	0	3	281	39	7	2	0	0	0	0	48
14:00	81	13	1	0	1	0	0	96	7	3	1	0	0	0	0	11
14:15	78	13	2	4	1	3	0	101	10	1	0	0	0	0	0	11
14:30	89	9	3	0	0	0	0	101	3	2	1	0	0	0	0	6
14:45	68	13	3	1	0	1	0	86	9	1	0	0	0	0	0	10
H/TOT	316	48	9	5	2	4	0	384	29	7	2	0	0	0	0	38
15:00	82	14	3	1	1	2	0	103	12	0	1	0	0	0	0	13
15:15	90	9	2	1	1	0	0	103	11	3	1	0	0	0	0	15
15:30	87	8	2	0	0	0	1	98	11	6	1	0	0	0	0	18
15:45	87	19	1	0	1	0	1	109	14	3	0	0	0	1	0	18
H/TOT	346	50	8	2	3	2	2	413	48	12	3	0	0	1	0	64
16:00	98	11	3	0	0	3	0	115	10	1	0	0	0	0	0	11
16:15	113	10	2	0	2	0	1	128	14	3	0	0	0	0	0	17
16:30	101	13	3	0	0	4	1	122	9	1	0	0	0	0	0	10
16:45	127	11	2	1	0	1	2	144	15	3	0	0	0	0	0	18
H/TOT	439	45	10	1	2	8	4	509	48	8	0	0	0	0	0	56
17:00	121	18	0	1	0	0	0	140	15	5	0	0	0	0	0	20
17:15	163	7	1	1	0	0	0	172	18	2	0	0	1	0	0	21
17:30	120	12	0	0	0	1	1	134	13	3	2	0	0	0	0	18
17:45	114	6	0	0	0	0	0	120	13	3	0	0	0	1	0	17
H/TOT	518	43	1	2	0	1	1	566	59	13	2	0	1	1	0	76
18:00	103	11	2	0	0	0	0	116	17	1	0	0	0	0	0	18
18:15	117	5	0	0	1	2	0	125	16	3	0	0	0	0	1	20
18:30	89	5	1	0	0	1	2	98	11	1	1	0	0	0	0	13
18:45	62	10	2	1	1	0	0	76	13	0	0	0	0	0	0	13
P/TOT	371	31	5	1	2	3	2	415	57	5	1	0	0	0	1	64
P/TOT	3911	495	98	28	16	31	22	4601	517	86	24	0	3	2	6	638





SITE: 1

DATE: 18/05/2017

LOCATION: Lingley Green Avenue / Liverpool Road

DAY: Thursday

TIME	C to C						TOT
	CAR	LGV	OGV1	OGV2	PSV	MCL	
07:00	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0
08:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
09:00	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0
10:15	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0
10:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0
11:15	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0
11:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0
13:15	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0
13:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0
14:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0
15:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0
18:00	0	0	0	0	0	0	0
18:15	0	0	0	0	0	0	0
18:30	0	0	0	0	0	0	0
18:45	0	0	0	0	0	0	0
P/TOT	0	0	0	0	0	0	0
P/TOT	0	0	0	0	0	0	0



SITE: 1

DATE: 18/05/2017

LOCATION: Lingley Green Avenue / Liverpool Road

DAY: Thursday

TIME	TO ARM A							TOT	FROM ARM A							TOT
	CAR	LGV	OGV1	OGV2	PSV	MCL	PCL		CAR	LGV	OGV1	OGV2	PSV	MCL	PCL	
07:00	47	7	3	2	0	0	0	59	33	4	1	0	0	0	1	39
07:15	73	4	3	0	1	0	0	81	41	3	1	0	1	1	0	47
07:30	129	3	0	0	0	2	1	135	65	7	1	0	0	0	0	73
07:45	145	3	4	0	1	1	2	156	72	7	2	3	0	0	0	84
H/TOT	394	17	10	2	2	3	3	431	211	21	5	3	1	1	1	243
08:00	104	5	4	0	0	0	1	114	89	8	3	0	1	1	0	102
08:15	109	7	2	0	1	0	2	121	97	12	4	0	0	1	1	115
08:30	100	5	3	1	0	0	0	109	61	8	0	3	0	0	0	72
08:45	111	8	0	0	1	0	0	120	61	8	2	0	0	0	0	71
H/TOT	424	25	9	1	2	0	3	464	308	36	9	3	1	2	1	360
09:00	71	4	2	0	0	0	0	77	64	7	2	3	0	0	0	76
09:15	48	3	1	0	0	0	0	52	55	3	6	0	0	0	0	64
09:30	41	3	4	2	0	0	0	50	45	7	2	3	0	0	0	57
09:45	52	6	3	1	0	0	1	63	35	6	2	0	0	0	0	43
H/TOT	212	16	10	3	0	0	1	242	199	23	12	6	0	0	0	240
10:00	31	6	1	1	0	0	1	40	29	4	2	1	0	0	0	36
10:15	30	2	3	0	0	0	0	35	37	5	2	0	0	0	0	44
10:30	31	3	5	0	0	0	0	39	30	1	2	1	0	0	0	34
10:45	31	4	3	0	0	0	0	38	32	5	2	2	0	1	0	42
H/TOT	123	15	12	1	0	0	1	152	128	15	8	4	0	1	0	156
11:00	38	4	3	1	0	1	0	47	34	4	3	0	0	0	1	42
11:15	36	1	1	2	0	0	0	40	31	5	1	0	0	0	0	37
11:30	45	2	2	1	0	0	0	50	40	2	1	1	0	1	0	45
11:45	43	3	0	0	0	1	3	50	38	6	1	0	0	0	0	45
H/TOT	162	10	6	4	0	2	3	187	143	17	6	1	0	1	1	169
12:00	43	8	1	2	0	0	0	54	50	6	3	0	0	0	0	59
12:15	42	4	0	1	1	0	1	49	49	7	3	3	0	0	0	62
12:30	42	7	0	2	0	0	0	51	38	3	1	0	0	1	1	44
12:45	37	6	7	1	0	1	0	52	67	2	3	0	0	0	0	72
H/TOT	164	25	8	6	1	1	1	206	204	18	10	3	0	1	1	237
13:00	51	5	0	0	0	1	0	57	59	5	0	0	0	0	0	64
13:15	56	5	2	0	0	0	0	63	56	5	3	0	0	0	0	64
13:30	49	3	3	2	0	0	0	57	37	7	2	0	0	0	0	46
13:45	43	6	4	0	0	1	0	54	41	5	0	3	0	0	1	50
H/TOT	199	19	9	2	0	2	0	231	193	22	5	3	0	0	1	224
14:00	50	5	3	1	0	0	0	59	79	4	2	0	0	1	0	86
14:15	41	4	1	0	0	0	1	47	55	5	3	0	0	0	0	63
14:30	44	4	4	0	0	0	0	52	80	6	4	1	0	1	0	92
14:45	42	1	1	0	0	0	0	44	69	9	3	2	0	0	0	83
H/TOT	177	14	9	1	0	0	1	202	283	24	12	3	0	2	0	324
15:00	44	4	3	0	0	0	0	51	67	0	3	0	0	1	0	71
15:15	52	9	2	0	0	0	1	64	68	4	1	1	0	0	2	76
15:30	45	7	1	3	0	1	0	57	66	9	1	2	0	1	0	79
15:45	51	8	1	2	0	2	0	64	72	8	0	3	0	0	0	83
H/TOT	192	28	7	5	0	3	1	236	273	21	5	6	0	2	2	309
16:00	43	1	2	1	0	0	1	48	144	11	4	2	0	1	1	163
16:15	62	4	0	0	0	0	1	67	109	9	1	2	0	0	0	121
16:30	59	2	3	1	0	1	0	66	139	11	1	0	0	1	2	154
16:45	73	4	2	0	0	0	0	79	106	4	0	1	0	2	0	113
H/TOT	237	11	7	2	0	1	2	260	498	35	6	5	0	4	3	551
17:00	51	8	1	0	1	0	0	61	141	5	3	1	1	0	1	152
17:15	77	11	0	0	1	0	0	89	127	8	1	0	0	0	0	136
17:30	67	6	3	0	1	2	0	79	104	6	0	0	1	0	2	113
17:45	59	4	1	0	1	1	1	67	87	3	2	0	0	0	0	92
H/TOT	254	29	5	0	4	3	1	296	459	22	6	1	2	0	3	493
18:00	58	1	1	1	0	0	0	61	102	3	1	0	0	0	0	106
18:15	53	5	1	0	0	1	1	61	63	8	1	0	0	2	0	74
18:30	41	2	3	1	0	0	0	47	54	3	1	0	0	2	2	62
18:45	41	2	3	0	0	0	0	46	48	3	1	1	0	2	0	55
P/TOT	193	10	8	2	0	1	1	215	267	17	4	1	0	6	2	297
P/TOT	2731	219	100	29	9	16	18	3122	3166	271	88	39	4	20	15	3603



SITE: 1

DATE: 18/05/2017

LOCATION: Lingley Green Avenue / Liverpool Road

DAY: Thursday

TIME	TO ARM B							TOT	FROM ARM B							TOT
	CAR	LGV	OGV1	OGV2	PSV	MCL	PCL		CAR	LGV	OGV1	OGV2	PSV	MCL	PCL	
07:00	93	9	3	0	0	1	0	106	150	20	4	2	0	1	0	177
07:15	109	12	4	1	2	2	1	131	170	12	3	0	1	1	1	188
07:30	176	12	1	1	1	2	0	193	224	16	1	0	0	5	1	247
07:45	169	21	3	3	1	0	0	197	239	18	6	0	1	1	2	267
H/TOT	547	54	11	5	4	5	1	627	783	66	14	2	2	8	4	879
08:00	164	18	7	1	1	1	0	192	206	17	5	0	0	1	0	229
08:15	160	17	7	2	0	3	1	190	177	17	3	1	1	1	3	203
08:30	109	18	3	4	1	1	0	136	176	16	4	2	0	1	0	199
08:45	122	16	3	1	0	1	1	144	159	12	4	1	0	3	2	181
H/TOT	555	69	20	8	2	6	2	662	718	62	16	4	1	6	5	812
09:00	100	11	2	4	0	1	0	118	123	10	1	0	0	0	0	134
09:15	92	9	6	0	0	0	0	107	104	12	3	0	0	0	0	119
09:30	91	16	3	3	0	0	0	113	98	9	5	3	0	0	0	115
09:45	76	14	7	0	0	0	0	97	114	9	7	2	1	0	1	134
H/TOT	359	50	18	7	0	1	0	435	439	40	16	5	1	0	1	502
10:00	87	9	3	3	0	0	0	102	79	10	3	1	0	0	1	94
10:15	79	9	5	0	0	0	2	95	76	14	5	1	0	2	0	98
10:30	92	13	5	1	0	0	0	111	72	5	8	1	0	2	0	88
10:45	88	16	3	3	0	2	1	113	61	9	1	1	1	0	1	74
H/TOT	346	47	16	7	0	2	3	421	288	38	17	4	1	4	2	354
11:00	91	11	4	1	0	2	1	110	76	12	4	1	0	2	0	95
11:15	85	13	4	0	0	1	0	103	91	10	4	2	0	1	0	108
11:30	83	14	3	3	0	0	0	103	108	10	2	1	0	0	1	122
11:45	95	17	1	1	0	0	1	115	106	8	8	0	0	1	2	125
H/TOT	354	55	12	5	0	3	2	431	381	40	18	4	0	4	3	450
12:00	110	17	6	0	0	0	1	134	89	19	3	2	0	0	0	113
12:15	114	16	4	3	0	0	0	137	85	18	2	1	0	0	1	107
12:30	101	18	2	0	0	0	2	123	92	9	2	2	0	0	0	105
12:45	121	8	6	0	0	0	1	136	92	11	7	1	0	2	1	114
H/TOT	446	59	18	3	0	0	4	530	358	57	14	6	0	2	2	439
13:00	112	11	1	0	0	0	1	125	109	9	3	1	0	3	4	129
13:15	103	14	4	0	0	0	2	123	111	10	1	1	0	0	0	123
13:30	91	11	3	0	2	0	0	107	100	9	3	2	1	0	0	115
13:45	92	10	1	3	0	0	1	107	87	10	4	1	0	1	0	103
H/TOT	398	46	9	3	2	0	4	462	407	38	11	5	1	4	4	470
14:00	149	16	2	0	1	1	0	169	96	12	5	2	0	1	0	116
14:15	121	16	3	4	1	3	0	148	95	10	2	0	0	1	2	110
14:30	148	14	7	1	0	1	0	171	96	7	5	0	0	1	0	109
14:45	111	15	6	3	0	1	0	136	103	6	2	2	1	0	0	114
H/TOT	529	61	18	8	2	6	0	624	390	35	14	4	1	3	2	449
15:00	134	14	5	1	1	3	0	158	100	10	3	0	0	1	0	114
15:15	144	12	3	2	1	0	2	164	112	20	3	1	0	0	1	137
15:30	134	14	3	2	0	1	1	155	104	16	0	4	0	1	1	126
15:45	140	25	1	3	1	0	1	171	106	20	3	3	0	1	2	135
H/TOT	552	65	12	8	3	4	4	648	422	66	9	8	0	3	4	512
16:00	225	19	5	2	0	4	0	255	116	11	4	1	1	0	1	134
16:15	206	16	3	2	2	0	1	230	139	9	0	1	1	0	1	151
16:30	212	22	3	0	0	5	3	245	141	9	3	2	2	3	0	160
16:45	205	15	2	2	0	3	2	229	164	9	2	0	1	1	0	177
H/TOT	848	72	13	6	2	12	6	959	560	38	9	4	5	4	2	622
17:00	244	21	3	2	1	0	1	272	114	12	1	0	1	2	1	131
17:15	269	14	2	1	0	0	0	286	192	22	0	1	0	1	1	217
17:30	202	17	0	0	1	1	3	224	140	13	1	0	1	5	0	160
17:45	175	7	2	0	0	0	0	184	128	9	1	0	1	2	1	142
H/TOT	890	59	7	3	2	1	4	966	574	56	3	1	3	10	3	650
18:00	188	13	3	0	0	0	0	204	120	3	1	1	0	0	2	127
18:15	162	10	1	0	1	3	0	177	122	7	2	1	0	1	0	133
18:30	126	5	1	0	0	3	4	139	100	3	2	1	1	0	1	108
18:45	94	11	3	2	1	2	0	113	84	7	3	1	0	0	1	96
P/TOT	570	39	8	2	2	8	4	633	426	20	8	4	1	1	4	464
P/TOT	6394	676	162	65	19	48	34	7398	5746	556	149	51	16	49	36	6603



SITE: 1

DATE: 18/05/2017

LOCATION: Lingley Green Avenue / Liverpool Road

DAY: Thursday

TIME	TO ARM C							TOT	FROM ARM C							TOT	TIME
	CAR	LGV	OGV1	OGV2	PSV	MCL	PCL		CAR	LGV	OGV1	OGV2	PSV	MCL	PCL		
07:00	108	16	1	0	0	1	1	127	65	8	2	0	0	1	0	76	07:00
07:15	116	12	1	0	0	1	1	131	87	13	4	1	1	1	1	108	07:15
07:30	116	15	1	0	0	3	0	135	132	7	0	1	1	2	0	143	07:30
07:45	119	16	3	0	0	0	1	139	122	15	2	0	1	0	1	141	07:45
H/TOT	459	59	6	0	0	5	3	532	406	43	8	2	3	4	2	468	H/TOT
08:00	135	15	3	0	1	1	0	155	108	13	6	1	1	0	1	130	08:00
08:15	111	16	2	1	0	1	1	132	106	11	4	2	0	2	0	125	08:15
08:30	114	13	2	2	0	1	0	132	86	12	4	2	1	1	0	106	08:30
08:45	83	11	4	1	0	3	2	104	96	15	1	1	1	1	1	116	08:45
H/TOT	443	55	11	4	1	6	3	523	396	51	15	6	3	4	2	477	H/TOT
09:00	80	9	3	1	0	0	0	93	64	7	4	2	0	1	0	78	09:00
09:15	83	11	4	0	0	0	0	98	64	8	2	0	0	0	0	74	09:15
09:30	77	9	4	1	0	0	0	91	66	12	4	0	0	0	0	82	09:30
09:45	74	7	6	1	1	0	1	90	53	12	7	0	0	0	1	73	09:45
H/TOT	314	36	17	3	1	0	1	372	247	39	17	2	0	1	1	307	H/TOT
10:00	60	7	2	0	0	0	0	69	70	8	1	2	0	0	0	81	10:00
10:15	60	17	3	1	0	2	0	83	56	9	4	0	0	0	2	71	10:15
10:30	54	4	4	1	0	2	0	65	75	14	4	0	0	0	0	93	10:30
10:45	41	8	1	1	1	0	1	53	67	14	4	1	0	1	1	88	10:45
H/TOT	215	36	10	3	1	4	1	270	268	45	13	3	0	1	3	333	H/TOT
11:00	54	12	1	0	0	1	1	69	73	11	1	1	0	2	1	89	11:00
11:15	70	10	4	0	0	1	0	85	69	9	4	0	0	1	0	83	11:15
11:30	77	9	2	0	0	1	1	90	57	13	4	2	0	0	0	76	11:30
11:45	79	9	9	0	0	0	1	98	73	15	1	1	0	0	3	93	11:45
H/TOT	280	40	16	0	0	3	3	342	272	48	10	4	0	3	4	341	H/TOT
12:00	62	16	3	0	0	0	0	81	76	16	4	0	0	0	1	97	12:00
12:15	64	19	2	0	0	0	0	85	86	14	1	0	1	0	0	102	12:15
12:30	77	7	2	0	0	1	0	87	90	20	1	0	0	0	1	112	12:30
12:45	76	6	2	0	0	1	1	86	75	7	5	0	0	0	1	88	12:45
H/TOT	279	48	9	0	0	2	1	339	327	57	11	0	1	0	3	399	H/TOT
13:00	82	7	3	1	0	2	4	99	77	9	1	0	0	0	1	88	13:00
13:15	76	8	1	1	0	0	0	86	68	12	3	0	0	0	2	85	13:15
13:30	69	9	0	0	1	0	0	79	72	7	1	0	2	0	0	82	13:30
13:45	57	7	1	1	0	0	0	66	64	8	2	0	0	0	0	74	13:45
H/TOT	284	31	5	3	1	2	4	330	281	36	7	0	2	0	3	329	H/TOT
14:00	64	11	4	1	0	1	0	81	88	16	2	0	1	0	0	107	14:00
14:15	76	9	3	0	0	1	1	90	88	14	2	4	1	3	0	112	14:15
14:30	76	6	2	0	0	1	0	85	92	11	4	0	0	0	0	107	14:30
14:45	96	13	1	2	1	0	0	113	77	14	3	1	0	1	0	96	14:45
H/TOT	312	39	10	3	1	3	1	369	345	55	11	5	2	4	0	422	H/TOT
15:00	83	6	2	0	0	1	0	92	94	14	4	1	1	2	0	116	15:00
15:15	85	15	2	1	0	0	0	103	101	12	3	1	1	0	0	118	15:15
15:30	89	18	0	1	0	0	1	109	98	14	3	0	0	0	1	116	15:30
15:45	88	17	2	1	0	0	2	110	101	22	1	0	1	1	1	127	15:45
H/TOT	345	56	6	3	0	1	3	414	394	62	11	2	3	3	2	477	H/TOT
16:00	100	14	4	0	1	0	1	120	108	12	3	0	0	3	0	126	16:00
16:15	107	11	0	1	1	0	0	120	127	13	2	0	2	0	1	145	16:15
16:30	119	10	1	1	2	2	0	135	110	14	3	0	0	4	1	132	16:30
16:45	134	8	0	0	1	1	0	144	142	14	2	1	0	1	2	162	16:45
H/TOT	460	43	5	2	5	3	1	519	487	53	10	1	2	8	4	565	H/TOT
17:00	96	11	0	0	0	2	1	110	136	23	0	1	0	0	0	160	17:00
17:15	154	14	0	1	0	1	1	171	181	9	1	1	1	0	0	193	17:15
17:30	108	11	0	0	0	3	0	122	133	15	2	0	0	1	1	152	17:30
17:45	108	10	0	0	0	2	0	120	127	9	0	0	0	1	0	137	17:45
H/TOT	466	46	0	1	0	8	2	523	577	56	3	2	1	2	1	642	H/TOT
18:00	96	4	0	0	0	0	2	102	120	12	2	0	0	0	0	134	18:00
18:15	103	8	1	1	0	1	0	114	133	8	0	0	1	2	1	145	18:15
18:30	87	5	1	0	1	0	1	95	100	6	2	0	0	1	2	111	18:30
18:45	72	7	0	1	0	0	1	81	75	10	2	1	1	0	0	89	18:45
P/TOT	358	24	2	2	1	1	4	392	428	36	6	1	2	3	3	479	P/TOT
P/TOT	4215	513	97	24	11	38	27	4925	4428	581	122	28	19	33	28	5239	P/TOT



SITE: 1

DATE: 18/05/2017

LOCATION: Lingley Green Avenue / Liverpool Road

DAY: Thursday

JUNCTION TOTAL							
CAR	LGV	OGV1	OGV2	PSV	MCL	PCL	TOT
248	32	7	2	0	2	1	292
298	28	8	1	3	3	2	343
421	30	2	1	1	7	1	463
433	40	10	3	2	1	3	492
1400	130	27	7	6	13	7	1590
403	38	14	1	2	2	1	461
380	40	11	3	1	4	4	443
323	36	8	7	1	2	0	377
316	35	7	2	1	4	3	368
1422	149	40	13	5	12	8	1649
251	24	7	5	0	1	0	288
223	23	11	0	0	0	0	257
209	28	11	6	0	0	0	254
202	27	16	2	1	0	2	250
885	102	45	13	1	1	2	1049
178	22	6	4	0	0	1	211
169	28	11	1	0	2	2	213
177	20	14	2	0	2	0	215
160	28	7	4	1	2	2	204
684	98	38	11	1	6	5	843
183	27	8	2	0	4	2	226
191	24	9	2	0	2	0	228
205	25	7	4	0	1	1	243
217	29	10	1	0	1	5	263
796	105	34	9	0	8	8	960
215	41	10	2	0	0	1	269
220	39	6	4	1	0	1	271
220	32	4	2	0	1	2	261
234	20	15	1	0	2	2	274
889	132	35	9	1	3	6	1075
245	23	4	1	0	3	5	281
235	27	7	1	0	0	2	272
209	23	6	2	3	0	0	243
192	23	6	4	0	1	1	227
881	96	23	8	3	4	8	1023
263	32	9	2	1	2	0	309
238	29	7	4	1	4	2	285
268	24	13	1	0	2	0	308
249	29	8	5	1	1	0	293
1018	114	37	12	3	9	2	1195
261	24	10	1	1	4	0	301
281	36	7	3	1	0	3	331
268	39	4	6	0	2	2	321
279	50	4	6	1	2	3	345
1089	149	25	16	3	8	8	1298
368	34	11	3	1	4	2	423
375	31	3	3	3	0	2	417
390	34	7	2	2	8	3	446
412	27	4	2	1	4	2	452
1545	126	25	10	7	16	9	1738
391	40	4	2	2	2	2	443
500	39	2	2	1	1	1	546
377	34	3	0	2	6	3	425
342	21	3	0	1	3	1	371
1610	134	12	4	6	12	7	1785
342	18	4	1	0	0	2	367
318	23	3	1	1	5	1	352
254	12	5	1	1	3	5	281
207	20	6	3	1	2	1	240
1121	73	18	6	3	10	9	1240
13340	1408	359	118	39	102	79	15445

PEAK HOUR CALCULATION	TOT
07:00 to 08:00	1590
07:15 to 08:15	1759
07:30 to 08:30	1859
07:45 to 08:45	1773
08:00 to 09:00	1649
08:15 to 09:15	1476
08:30 to 09:30	1290
08:45 to 09:45	1167
09:00 to 10:00	1049
09:15 to 10:15	972
09:30 to 10:30	928
09:45 to 10:45	889
10:00 to 11:00	843
10:15 to 11:15	858
10:30 to 11:30	873
10:45 to 11:45	901
<b>A.M. Peak</b>	<b>1859</b>
11:00 to 12:00	960
11:15 to 12:15	1003
11:30 to 12:30	1046
11:45 to 12:45	1064
12:00 to 13:00	1075
12:15 to 13:15	1087
12:30 to 13:30	1088
12:45 to 13:45	1070
13:00 to 14:00	1023
13:15 to 14:15	1051
13:30 to 14:30	1064
13:45 to 14:45	1129
14:00 to 15:00	1195
14:15 to 15:15	1187
14:30 to 15:30	1233
14:45 to 15:45	1246
<b>Inter Peak</b>	<b>1246</b>
15:00 to 16:00	1298
15:15 to 16:15	1420
15:30 to 16:30	1506
15:45 to 16:45	1631
16:00 to 17:00	1738
16:15 to 17:15	1758
16:30 to 17:30	1887
16:45 to 17:45	1866
17:00 to 18:00	1785
17:15 to 18:15	1709
17:30 to 18:30	1515
17:45 to 18:45	1371
18:00 to 19:00	1240
<b>P.M. Peak</b>	<b>1887</b>



SITE: 1

DAY: Thursday

LOCATION Lingley Green Avenue / Liverpool Road

DATE: 18/05/2017

Note:

Lanes are numbered outwards from the nearside kerb in the direction of travel.  
Lane 1 will always be nearest the footway. Queues measured in vehicle numbers.

TIME	ARM A	ARM B	ARM C	
	Lingley Green Avenue LANE 1	Liverpool Road(W) LANE 1	Liverpool Road (E) Lane 1 LANE 1	Liverpool Road (E) Lane 2 Lane 2
07:00	1	6	5	0
07:05	1	12	5	0
07:10	8	12	2	0
07:15	6	14	2	0
07:20	6	7	3	1
07:25	3	8	5	0
07:30	4	13	10	1
07:35	11	15	3	2
07:40	9	15	8	2
07:45	10	21	17	3
07:50	10	16	10	3
07:55	8	14	8	0
08:00	11	13	8	1
08:05	12	13	8	1
08:10	12	18	15	1
08:15	20	18	15	0
08:20	17	21	6	1
08:25	10	8	11	3
08:30	5	7	2	2
08:35	6	10	7	1
08:40	12	15	5	3
08:45	11	8	4	2
08:50	6	4	7	1
08:55	8	10	7	2
09:00	4	6	3	1
09:05	3	12	3	1
09:10	6	10	2	0
09:15	4	4	4	1
09:20	11	9	9	2
09:25	3	8	4	1
09:30	4	8	7	0
09:35	6	6	3	0
09:40	4	7	3	1
09:45	3	9	4	1
09:50	4	8	3	1
09:55	2	2	1	1
MAX	20	21	17	3
MIN	1	2	1	0



SITE: 1

DAY: Thursday

LOCATION Lingley Green Avenue / Liverpool Road

DATE: 18/05/2017

Note:

Lanes are numbered outwards from the nearside kerb in the direction of travel.  
Lane 1 will always be nearest the footway. Queues measured in vehicle numbers.

SITE: 1

DAY: Thursday

LOCATION Lingley Green Avenue / Liverpool Road

DATE: 18/05/2017

Note:

Lanes are numbered outwards from the nearside kerb in the direction of travel.  
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SITE: 1

DAY: Thursday

LOCATION Lingley Green Avenue / Liverpool Road

DATE: 18/05/2017

Note:

Lanes are numbered outwards from the nearside kerb in the direction of travel.  
Lane 1 will always be nearest the footway. Queues measured in vehicle numbers.

TIME	ARM A	ARM B	ARM C	
	Lingley Green Avenue LANE 1	Liverpool Road(W) LANE 1	Liverpool Road (E) Lane 1 LANE 1	Liverpool Road Lane 2 LANE 1
10:00	3	7	0	0
10:05	5	8	1	1
10:10	1	5	2	2
10:15	3	3	0	0
10:20	4	2	1	1
10:25	2	7	1	1
10:30	6	4	1	1
10:35	6	3	1	1
10:40	1	4	0	0
10:45	5	3	2	2
10:50	2	3	2	2
10:55	3	9	0	0
11:00	4	11	0	0
11:05	4	7	2	2
11:10	3	9	0	0
11:15	0	3	0	0
11:20	3	5	1	1
11:25	2	13	0	0
11:30	5	4	1	1
11:35	1	7	1	1
11:40	2	6	1	1
11:45	4	4	1	1
11:50	4	5	1	1
11:55	3	8	1	1
12:00	4	10	1	1
12:05	7	13	0	0
12:10	4	2	1	1
12:15	5	5	0	0
12:20	5	13	1	1
12:25	5	4	0	0
12:30	5	3	0	0
12:35	3	9	0	0
12:40	6	4	0	0
12:45	11	8	1	1
12:50	8	7	0	0
12:55	3	3	1	1
MAX	11	13	2	2
MIN	0	2	0	0

SITE: 1

DAY: Thursday

LOCATION Lingley Green Avenue / Liverpool Road

DATE: 18/05/2017

Note:

Lanes are numbered outwards from the nearside kerb in the direction of travel.  
Lane 1 will always be nearest the footway. Queues measured in vehicle numbers.

TIME	ARM A	ARM B	ARM C	
	Lingley Green Avenue LANE 1	Liverpool Road(W) LANE 1	Liverpool Road (E) Lane 1 LANE 1	Liverpool Road Lane 2 LANE 2
13:00	7	7	3	1
13:05	2	7	6	1
13:10	4	8	7	0
13:15	5	5	1	0
13:20	9	6	6	1
13:25	3	7	0	2
13:30	2	5	8	0
13:35	4	7	3	0
13:40	3	6	3	1
13:45	4	4	5	0
13:50	7	9	3	0
13:55	5	6	5	1
14:00	7	8	2	1
14:05	8	8	2	1
14:10	9	7	6	1
14:15	3	9	7	1
14:20	10	8	3	1
14:25	4	3	5	0
14:30	4	5	7	1
14:35	15	11	7	1
14:40	14	12	14	1
14:45	5	6	3	1
14:50	9	6	6	0
14:55	6	7	6	1
15:00	5	7	6	0
15:05	4	5	6	1
15:10	7	3	5	1
15:15	5	10	12	1
15:20	5	6	6	1
15:25	9	11	2	1
15:30	5	6	7	2
15:35	6	6	3	2
15:40	4	11	8	1
15:45	8	5	8	3
15:50	8	8	14	1
15:55	8	12	6	1
MAX	15	12	14	3
MIN	2	3	0	0

SITE: 1

DAY: Thursday

LOCATION Lingley Green Avenue / Liverpool Road

DATE: 18/05/2017

Note:

Lanes are numbered outwards from the nearside kerb in the direction of travel.  
Lane 1 will always be nearest the footway. Queues measured in vehicle numbers.

TIME	ARM A	ARM B	ARM C	
	Lingley Green Avenue LANE 1	Liverpool Road(W) LANE 1	Liverpool Road (E) Lane 1 LANE 1	Liverpool Road (E) Lane 2 LANE 1
16:00	8	12	7	1
16:05	23	9	9	1
16:10	22	10	9	1
16:15	14	7	11	0
16:20	11	7	9	3
16:25	25	11	6	2
16:30	25	18	7	0
16:35	13	11	11	1
16:40	8	10	8	1
16:45	14	15	15	1
16:50	5	12	9	0
16:55	11	11	12	1
17:00	20	7	3	1
17:05	25	6	15	1
17:10	43	11	15	4
17:15	56	12	7	4
17:20	50	22	15	1
17:25	30	19	13	2
17:30	13	9	8	1
17:35	24	12	14	1
17:40	7	12	7	1
17:45	9	11	5	2
17:50	9	6	11	1
17:55	6	4	10	1
18:00	14	12	4	1
18:05	10	8	7	1
18:10	6	6	7	1
18:15	4	14	10	2
18:20	9	13	4	1
18:25	9	10	8	1
18:30	6	7	3	0
18:35	4	7	3	1
18:40	3	5	3	1
18:45	7	8	3	0
18:50	1	7	9	1
18:55	3	5	2	1
MAX	56	22	15	4
MIN	1	4	2	0

SITE: 1

DAY: Thursday

LOCATION Lingley Green Avenue / Liverpool Road

DATE: 18/05/2017

Note:

Lanes are numbered outwards from the nearside kerb in the direction of travel.  
Lane 1 will always be nearest the footway. Queues measured in vehicle numbers.



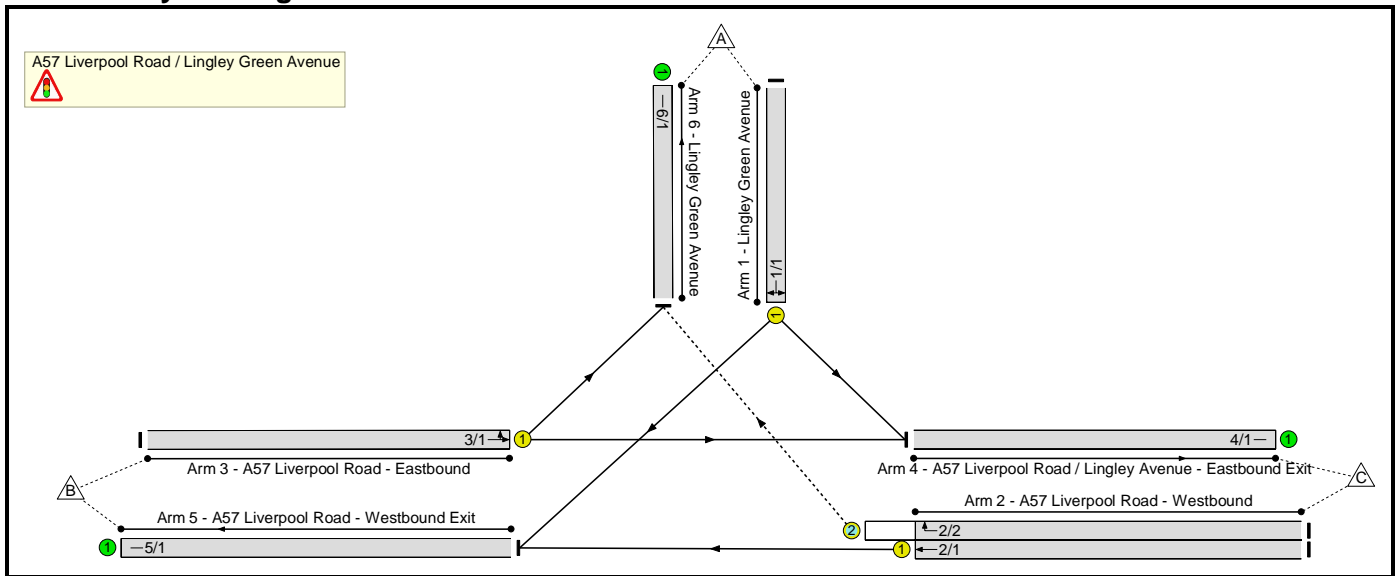
## Annex C: LinSig Base Model Outputs

Full Input Data And Results  
**Full Input Data And Results**

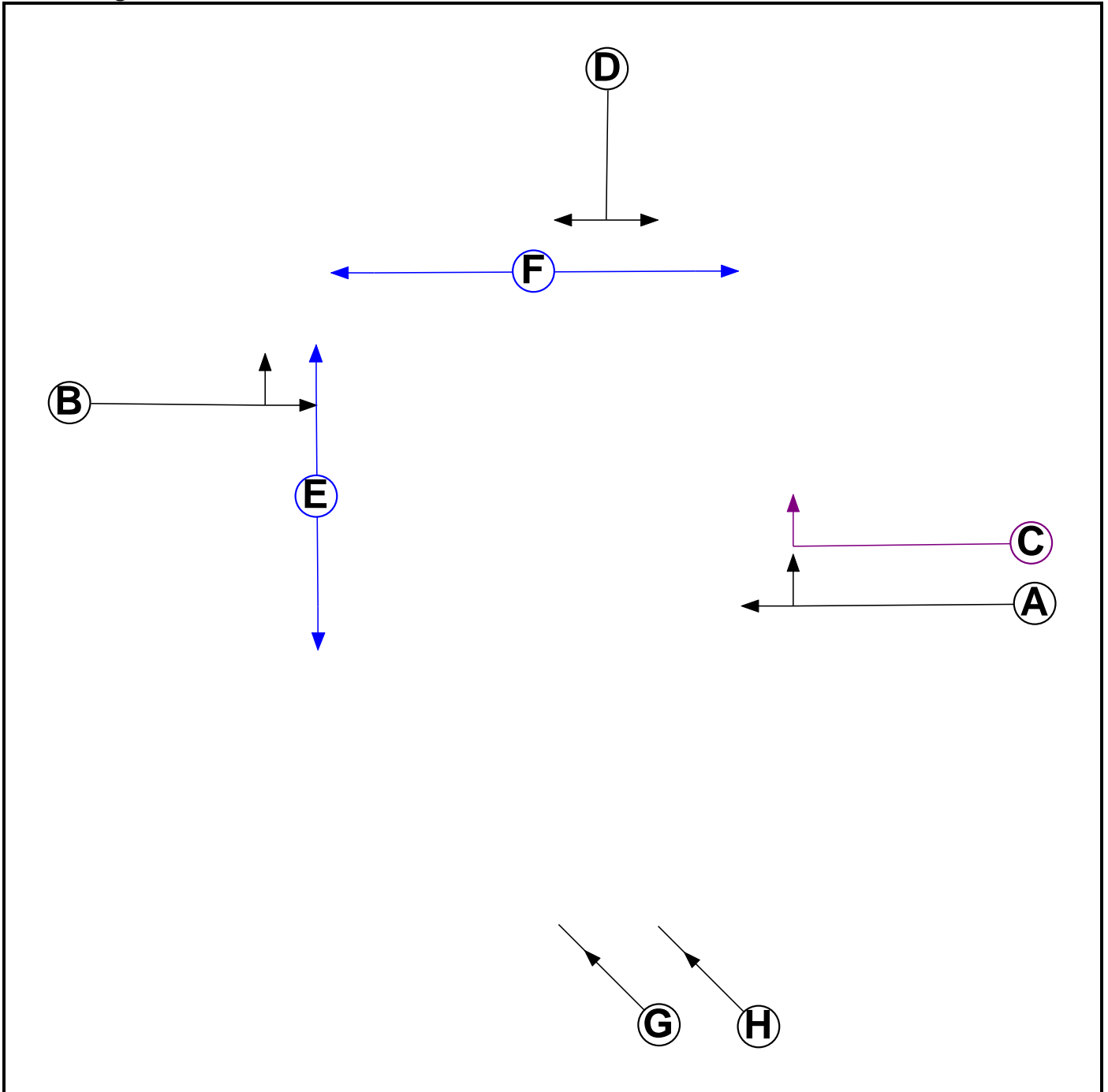
**User and Project Details**

<b>Project:</b>	Omega Gateway Highway Junction Improvement Package
<b>Title:</b>	<b>Base Model</b>
<b>Location:</b>	<b>A57 Liverpool Road / A57 Lingley Green Avenue</b>
<b>Additional detail:</b>	
<b>File name:</b>	1. A57 Liverpool Rd - Lingley Green Avenue Final Base Model.lsg3x
<b>Author:</b>	Alistair Johnson
<b>Company:</b>	AECOM
<b>Address:</b>	1 Dale Street, Liverpool, L2 2ET

**Network Layout Diagram**



**Phase Diagram**



**Phase Input Data**

Phase Name	Phase Type	Assoc. Phase	Street Min	Cont Min
A	Traffic		7	7
B	Traffic		7	7
C	Ind. Arrow	A	4	4
D	Traffic		7	7
E	Pedestrian		7	7
F	Pedestrian		9	9
G	Traffic		3	3
H	Traffic		7	7

## Full Input Data And Results

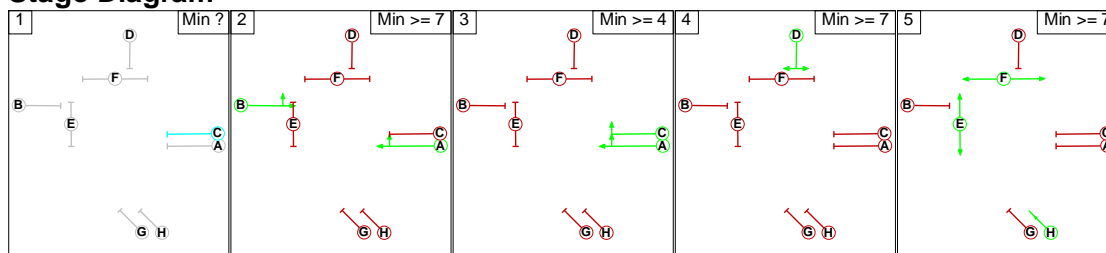
### Phase Intergrens Matrix

		Starting Phase							
		A	B	C	D	E	F	G	H
Terminating Phase	A	-	-	7	12	12	3	12	
	B	-	-	7	7	5	10	3	5
	C	-	8	-	7	-	12	3	12
	D	7	7	7	-	11	5	3	5
	E	1	1	-	1	-	-	1	-
	F	1	1	1	1	-	-	1	-
	G	2	2	2	2	2	2	-	3
	H	2	2	2	2	-	-	2	-

### Phases in Stage

Stage No.	Phases in Stage
1	
2	A B
3	A C
4	D
5	E F H

### Stage Diagram



### Phase Delays

Term. Stage	Start Stage	Phase	Type	Value	Cont value
There are no Phase Delays defined					

### Prohibited Stage Change

		To Stage				
		1	2	3	4	5
From Stage	1	-	X	X	X	X
	2	X	-	7	7	12
	3	X	X	-	7	12
	4	X	7	7	-	11
	5	X	2	2	2	-

Full Input Data And Results  
**Give-Way Lane Input Data**

Junction: A57 Liverpool Road / Lingley Green Avenue											
Lane	Movement	Max Flow when Giving Way (PCU/Hr)	Min Flow when Giving Way (PCU/Hr)	Opposing Lane	Opp. Lane Coeff.	Opp. Mvmnts.	Right Turn Storage (PCU)	Non-Blocking Storage (PCU)	RTF	Right Turn Move up (s)	Max Turns in Intergreen (PCU)
(A57 Liverpool Road - Westbound)	2/2 6/1 (Right)	1439	0	3/1	1.09	All	4.00	-	0.50	4	3.00

Full Input Data And Results

**Lane Input Data**

Junction: A57 Liverpool Road / Lingley Green Avenue												
Lane	Lane Type	Phases	Start Disp.	End Disp.	Physical Length (PCU)	Sat Flow Type	Def User Saturation Flow (PCU/Hr)	Lane Width (m)	Gradient	Nearside Lane	Turns	Turning Radius (m)
1/1 (Lingley Green Avenue)	U	D	2	3	60.0	User	1794	-	-	-	-	-
2/1 (A57 Liverpool Road - Westbound)	U	A	2	3	60.0	User	2115	-	-	-	-	-
2/2 (A57 Liverpool Road - Westbound)	O	A C	2	3	60.0	User	1781	-	-	-	-	-
3/1 (A57 Liverpool Road - Eastbound)	U	B	2	3	60.0	User	1955	-	-	-	-	-
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit)	U		2	3	60.0	Inf	-	-	-	-	-	-
5/1 (A57 Liverpool Road - Westbound Exit)	U		2	3	60.0	Inf	-	-	-	-	-	-
6/1 (Lingley Green Avenue)	U		2	3	60.0	Inf	-	-	-	-	-	-

**Traffic Flow Groups**

Flow Group	Start Time	End Time	Duration	Formula
1: 'AM Peak Period 2017'	07:30	08:30	01:00	
2: 'PM Peak Period 2017'	16:30	17:30	01:00	
3: 'Interpeak Period 2017'	14:45	15:45	01:00	
4: 'AM Peak Period 2027'	07:30	08:30	01:00	
5: 'PM Peak Period 2027'	16:30	17:30	01:00	
6: 'Interpeak Period 2027'	14:45	15:45	01:00	

**Scenario 1: '2017 Am Peak Period'** (FG1: 'AM Peak Period 2017', Plan 1: 'Network Control Plan 1')

**Traffic Flows, Desired**

Desired Flow :

	Destination				
	A	B	C	Tot.	
Origin	A	0	305	75	380
	B	457	0	485	942
	C	66	480	0	546
	Tot.	523	785	560	1868

**Traffic Lane Flows**

Lane	Scenario 1: 2017 Am Peak Period
<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>	
1/1	380
2/1	480
2/2	66
3/1	942
4/1	560
5/1	785
6/1	523

**Lane Saturation Flows**

<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (Lingley Green Avenue Lane 1)							1795	1795
2/1 (A57 Liverpool Road - Westbound Lane 1)							2115	2115
2/2 (A57 Liverpool Road - Westbound Lane 2)							1781	1781
3/1 (A57 Liverpool Road - Eastbound Lane 1)							1933	1933
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit Lane 1)							Inf	Inf
5/1 (A57 Liverpool Road - Westbound Exit Lane 1)							Inf	Inf
6/1 (Lingley Green Avenue Lane 1)							Inf	Inf



Full Input Data And Results

**Scenario 2: '2017 Interpeak'** (FG3: 'Interpeak Period 2017', Plan 1: 'Network Control Plan 1')

**Traffic Flows, Desired**

**Desired Flow :**

Origin	Destination				
	A	B	C	Tot.	
A	0	229	86	315	
B	163	0	337	500	
C	57	396	0	453	
Tot.	220	625	423	1268	

**Traffic Lane Flows**

Lane	Scenario 2: 2017 Interpeak
<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>	
1/1	315
2/1	396
2/2	57
3/1	500
4/1	423
5/1	625
6/1	220

**Lane Saturation Flows**

<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (Lingley Green Avenue Lane 1)	This lane uses a directly entered Saturation Flow						1794	1794
2/1 (A57 Liverpool Road - Westbound Lane 1)	This lane uses a directly entered Saturation Flow						2115	2115
2/2 (A57 Liverpool Road - Westbound Lane 2)	This lane uses a directly entered Saturation Flow						1781	1781
3/1 (A57 Liverpool Road - Eastbound Lane 1)	This lane uses a directly entered Saturation Flow						1958	1958
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit Lane 1)	Infinite Saturation Flow						Inf	Inf
5/1 (A57 Liverpool Road - Westbound Exit Lane 1)	Infinite Saturation Flow						Inf	Inf
6/1 (Lingley Green Avenue Lane 1)	Infinite Saturation Flow						Inf	Inf

Full Input Data And Results

**Scenario 3: '2017 Pm Peak Period'** (FG2: 'PM Peak Period 2017', Plan 1: 'Network Control Plan 1')

**Traffic Flows, Desired**

**Desired Flow :**

Origin	Destination				
	A	B	C	Tot.	
A	0	453	101	554	
B	230	0	457	687	
C	70	576	0	646	
Tot.	300	1029	558	1887	

**Traffic Lane Flows**

Lane	Scenario 3: 2017 Pm Peak Period
<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>	
1/1	554
2/1	576
2/2	70
3/1	687
4/1	558
5/1	1029
6/1	300

**Lane Saturation Flows**

<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (Lingley Green Avenue Lane 1)	This lane uses a directly entered Saturation Flow						1801	1801
2/1 (A57 Liverpool Road - Westbound Lane 1)	This lane uses a directly entered Saturation Flow						2115	2115
2/2 (A57 Liverpool Road - Westbound Lane 2)	This lane uses a directly entered Saturation Flow						1781	1781
3/1 (A57 Liverpool Road - Eastbound Lane 1)	This lane uses a directly entered Saturation Flow						1959	1959
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit Lane 1)	Infinite Saturation Flow						Inf	Inf
5/1 (A57 Liverpool Road - Westbound Exit Lane 1)	Infinite Saturation Flow						Inf	Inf
6/1 (Lingley Green Avenue Lane 1)	Infinite Saturation Flow						Inf	Inf

Full Input Data And Results

Scenario 4: '2027 Am Peak Period' (FG4: 'AM Peak Period 2027', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

Origin	Destination				
	A	B	C	Tot.	
A	0	362	90	452	
B	541	0	531	1072	
C	79	524	0	603	
Tot.	620	886	621	2127	

Traffic Lane Flows

Lane	Scenario 4: 2027 Am Peak Period
<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>	
1/1	452
2/1	524
2/2	79
3/1	1072
4/1	621
5/1	886
6/1	620

Lane Saturation Flows

Junction: A57 Liverpool Road / Lingley Green Avenue								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (Lingley Green Avenue Lane 1)	This lane uses a directly entered Saturation Flow						1795	1795
2/1 (A57 Liverpool Road - Westbound Lane 1)	This lane uses a directly entered Saturation Flow						2115	2115
2/2 (A57 Liverpool Road - Westbound Lane 2)	This lane uses a directly entered Saturation Flow						1781	1781
3/1 (A57 Liverpool Road - Eastbound Lane 1)	This lane uses a directly entered Saturation Flow						1930	1930
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit Lane 1)	Infinite Saturation Flow						Inf	Inf
5/1 (A57 Liverpool Road - Westbound Exit Lane 1)	Infinite Saturation Flow						Inf	Inf
6/1 (Lingley Green Avenue Lane 1)	Infinite Saturation Flow						Inf	Inf

Full Input Data And Results

**Scenario 5: '2027 Interpeak'** (FG6: 'Interpeak Period 2027', Plan 1: 'Network Control Plan 1')

**Traffic Flows, Desired**

**Desired Flow :**

Origin	Destination				
	A	B	C	Tot.	
A	0	265	102	367	
B	191	0	373	564	
C	68	437	0	505	
Tot.	259	702	475	1436	

**Traffic Lane Flows**

Lane	Scenario 5: 2027 Interpeak
<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>	
1/1	367
2/1	437
2/2	68
3/1	564
4/1	475
5/1	702
6/1	259

**Lane Saturation Flows**

<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (Lingley Green Avenue Lane 1)	This lane uses a directly entered Saturation Flow						1794	1794
2/1 (A57 Liverpool Road - Westbound Lane 1)	This lane uses a directly entered Saturation Flow						2115	2115
2/2 (A57 Liverpool Road - Westbound Lane 2)	This lane uses a directly entered Saturation Flow						1781	1781
3/1 (A57 Liverpool Road - Eastbound Lane 1)	This lane uses a directly entered Saturation Flow						1955	1955
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit Lane 1)	Infinite Saturation Flow						Inf	Inf
5/1 (A57 Liverpool Road - Westbound Exit Lane 1)	Infinite Saturation Flow						Inf	Inf
6/1 (Lingley Green Avenue Lane 1)	Infinite Saturation Flow						Inf	Inf

Full Input Data And Results

**Scenario 6: '2027 Pm Peak Period'** (FG5: 'PM Peak Period 2027', Plan 1: 'Network Control Plan 1')

**Traffic Flows, Desired**

**Desired Flow :**

Origin	Destination				
	A	B	C	Tot.	
A	0	533	120	653	
B	270	0	495	765	
C	83	625	0	708	
Tot.	353	1158	615	2126	

**Traffic Lane Flows**

Lane	Scenario 6: 2027 Pm Peak Period
<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>	
1/1	653
2/1	625
2/2	83
3/1	765
4/1	615
5/1	1158
6/1	353

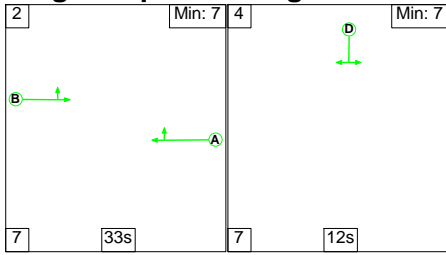
**Lane Saturation Flows**

<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (Lingley Green Avenue Lane 1)	This lane uses a directly entered Saturation Flow						1802	1802
2/1 (A57 Liverpool Road - Westbound Lane 1)	This lane uses a directly entered Saturation Flow						2115	2115
2/2 (A57 Liverpool Road - Westbound Lane 2)	This lane uses a directly entered Saturation Flow						1781	1781
3/1 (A57 Liverpool Road - Eastbound Lane 1)	This lane uses a directly entered Saturation Flow						1957	1957
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit Lane 1)	Infinite Saturation Flow						Inf	Inf
5/1 (A57 Liverpool Road - Westbound Exit Lane 1)	Infinite Saturation Flow						Inf	Inf
6/1 (Lingley Green Avenue Lane 1)	Infinite Saturation Flow						Inf	Inf

Full Input Data And Results

Scenario 1: '2017 Am Peak Period' (FG1: 'AM Peak Period 2017', Plan 1: 'Network Control Plan 1')

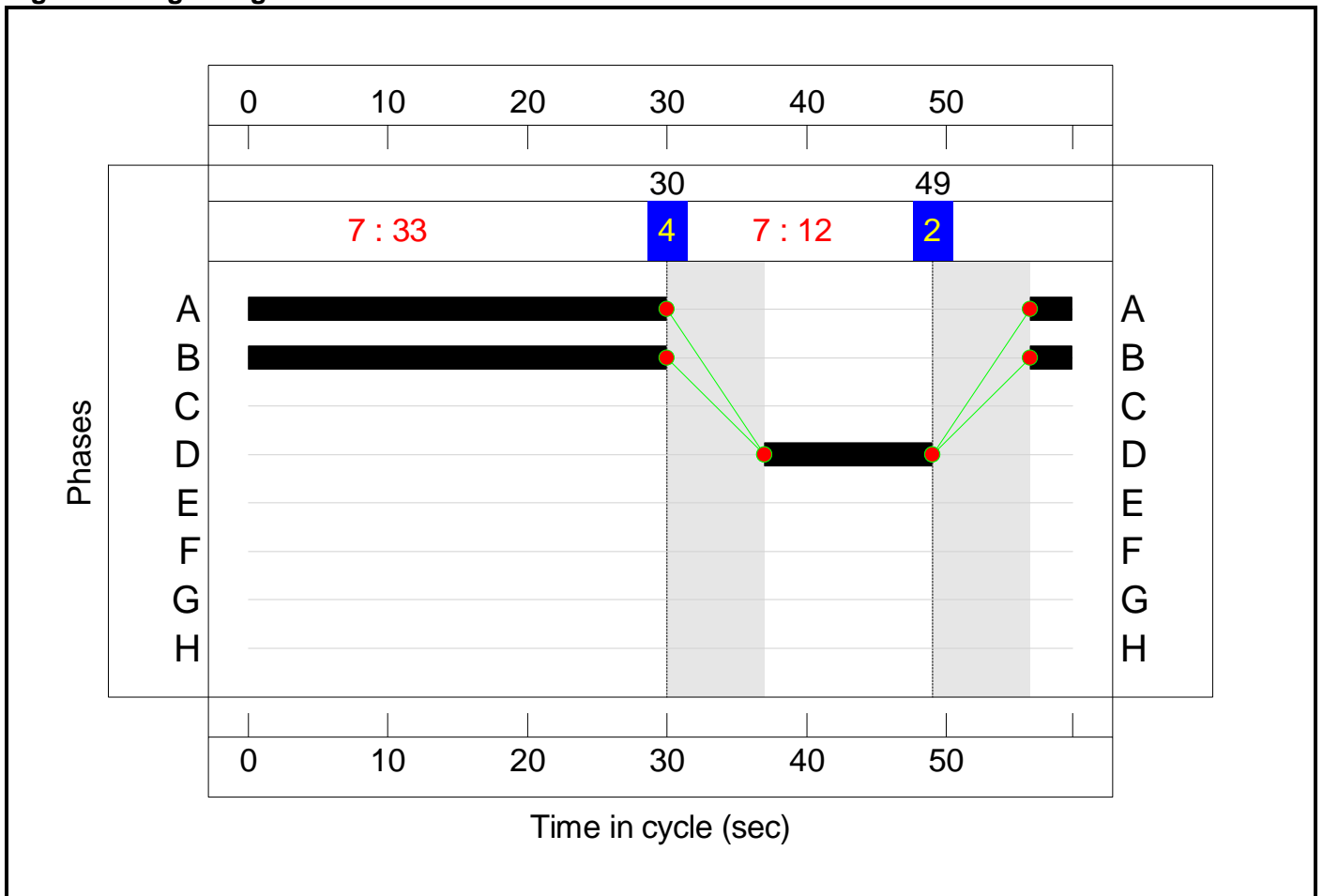
Stage Sequence Diagram



Stage Timings

Stage	2	4
Duration	33	12
Change Point	49	30

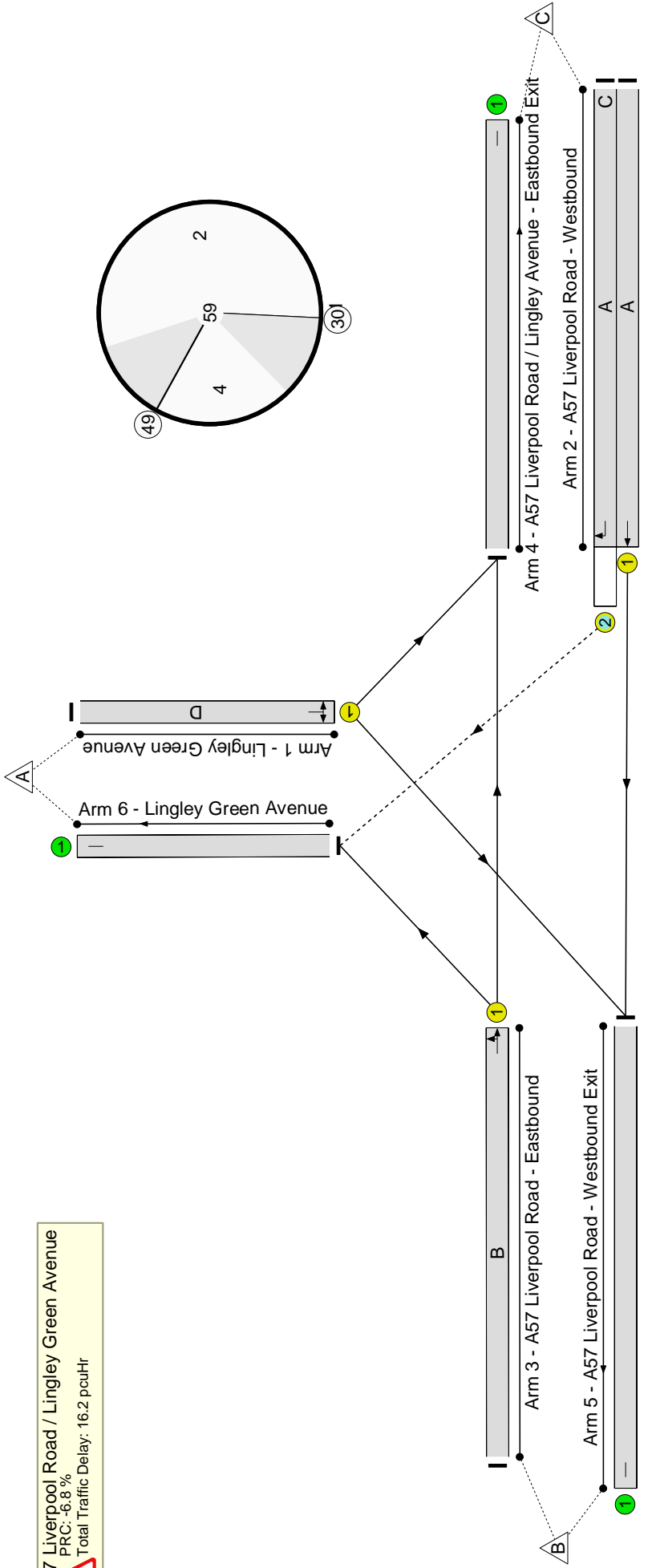
Signal Timings Diagram



Full Input Data And Results

**Network Layout Diagram**

A57 Liverpool Road / Lingley Green Avenue  
 PRC: -6.8%  
 Total Traffic Delay: 16.2 pcu\*hr



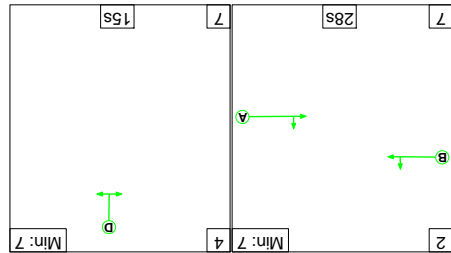
Full Input Data And Results

**Network Results**

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	-	-	N/A	-	-	-	-	-	-	-	-	-	96.1%
A57 Liverpool Road / Lingley Green Avenue	-	-	N/A	-	-	-	-	-	-	-	-	-	96.1%
1/1	Lingley Green Avenue Left Right	U	N/A	N/A	D	-	1	12	-	380	1795	396	96.1%
2/1	A57 Liverpool Road - Westbound Ahead	U	N/A	N/A	A	-	1	33	-	480	2115	1219	39.4%
2/2	A57 Liverpool Road - Westbound Right	O	N/A	N/A	A	C	1	33	0	66	1781	253	26.1%
3/1	A57 Liverpool Road - Eastbound Ahead Left	U	N/A	N/A	B	-	1	33	-	942	1933	1114	84.6%
4/1	A57 Liverpool Road / Lingley Avenue - Eastbound Exit	U	N/A	N/A	-	-	-	-	-	560	Inf	Inf	0.0%
5/1	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-	-	-	-	-	785	Inf	Inf	0.0%
6/1	Lingley Green Avenue	U	N/A	N/A	-	-	-	-	-	523	Inf	Inf	0.0%

Full Input Data And Results

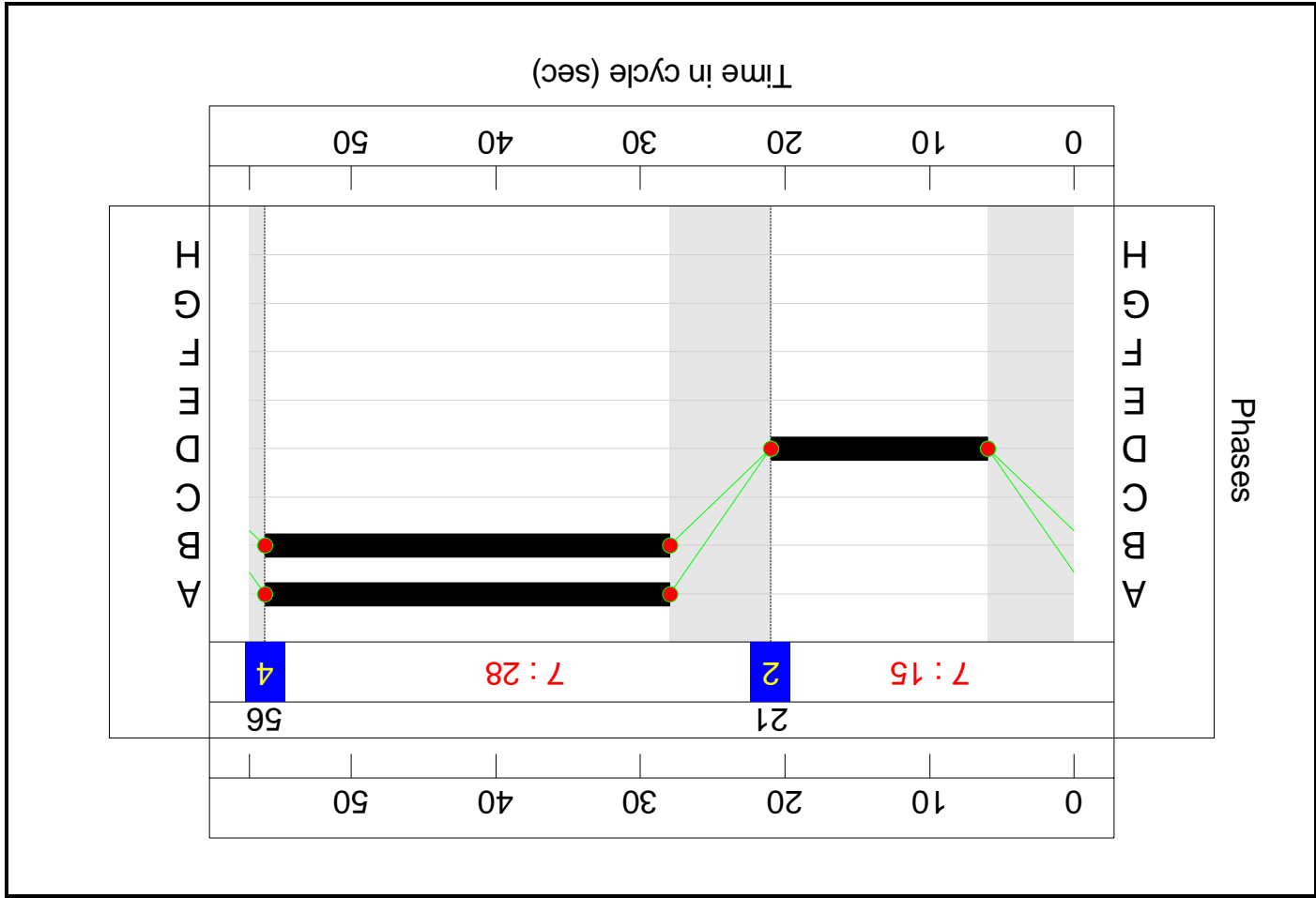
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)		
Network	-	-	64	0	2	6.1	9.8	0.3	16.2	-	-	-	-		
A57 Liverpool Road / Lingley Green Avenue	-	-	64	0	2	6.1	9.8	0.3	16.2	-	-	-	-		
1/1	380	380	-	-	-	2.4	6.6	-	9.0	85.4	6.1	6.6	12.7		
2/1	480	480	-	-	-	0.9	0.3	-	1.2	9.3	4.3	0.3	4.6		
2/2	66	66	64	0	2	0.1	0.2	0.3	0.6	31.9	0.5	0.2	0.6		
3/1	942	942	-	-	-	2.7	2.7	-	5.4	20.5	12.6	2.7	15.2		
4/1	560	560	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0		
5/1	785	785	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0		
6/1	523	523	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0		
C1										PRC for Signalised Lanes (%):	-6.8	Total Delay for Signalised Lanes (pcuHr):	16.20	Cycle Time (s):	59
										PRC Over All Lanes (%):	-6.8	Total Delay Over All Lanes (pcuHr):	16.20		



Stage Sequence Diagram

Stage	Duration	Change Point
2	28	21
4	15	56


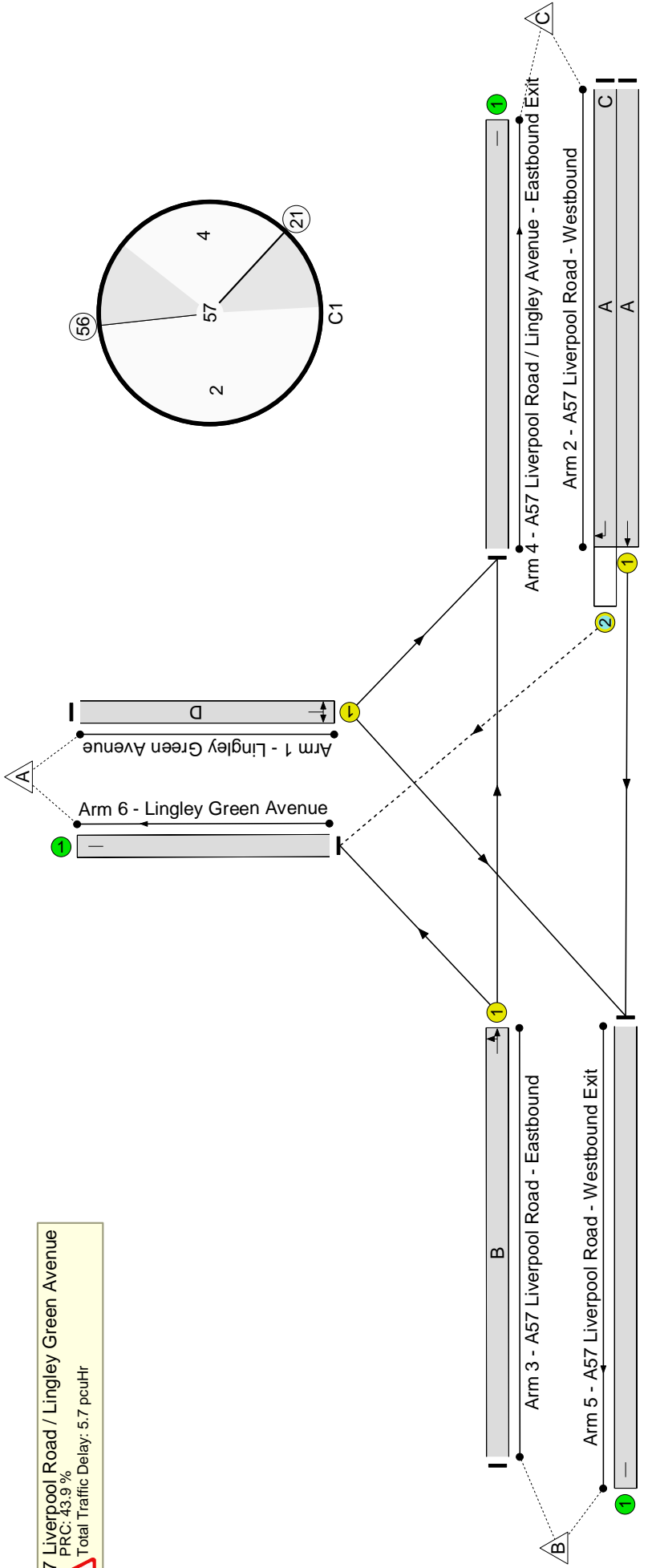
Stage Timings



Full Input Data And Results

**Network Layout Diagram**

A57 Liverpool Road / Lingley Green Avenue  
 PRC: 43.9 %  
 Total Traffic Delay: 5.7 pcuHr

Full Input Data And Results

**Network Results**

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	-	-	N/A	-	-	-	-	-	-	-	-	-	62.6%
A57 Liverpool Road / Lingley Green Avenue	-	-	N/A	-	-	-	-	-	-	-	-	-	62.6%
1/1	Lingley Green Avenue Left Right	U	N/A	N/A	D	-	1	15	-	315	1794	504	62.6%
2/1	A57 Liverpool Road - Westbound Ahead	U	N/A	N/A	A	-	1	28	-	396	2115	1076	36.8%
2/2	A57 Liverpool Road - Westbound Right	O	N/A	N/A	A	C	1	28	0	57	1781	487	11.7%
3/1	A57 Liverpool Road - Eastbound Ahead Left	U	N/A	N/A	B	-	1	28	-	500	1958	996	50.2%
4/1	A57 Liverpool Road / Lingley Avenue - Eastbound Exit	U	N/A	N/A	-	-	-	-	-	423	Inf	Inf	0.0%
5/1	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-	-	-	-	-	625	Inf	Inf	0.0%
6/1	Lingley Green Avenue	U	N/A	N/A	-	-	-	-	-	220	Inf	Inf	0.0%

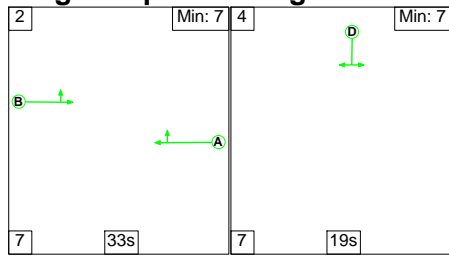
Full Input Data And Results

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	-	-	55	0	2	3.9	1.7	0.1	5.7	-	-	-	-
A57 Liverpool Road / Lingley Green Avenue	-	-	55	0	2	3.9	1.7	0.1	5.7	-	-	-	-
1/1	315	315	-	-	-	1.6	0.8	-	2.4	27.4	4.3	0.8	5.1
2/1	396	396	-	-	-	0.9	0.3	-	1.2	11.1	3.7	0.3	4.0
2/2	57	57	55	0	2	0.1	0.1	0.1	0.3	16.4	0.4	0.1	0.5
3/1	500	500	-	-	-	1.3	0.5	-	1.8	12.9	5.1	0.5	5.6
4/1	423	423	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	625	625	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	220	220	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
C1													
			PRC for Signalised Lanes (%):	43.9	Total Delay for Signalised Lanes (pcuHr):	5.66	Cycle Time (s):	57					
			PRC Over All Lanes (%):	43.9	Total Delay Over All Lanes (pcuHr):	5.66							

Full Input Data And Results

Scenario 3: '2017 Pm Peak Period' (FG2: 'PM Peak Period 2017', Plan 1: 'Network Control Plan 1')

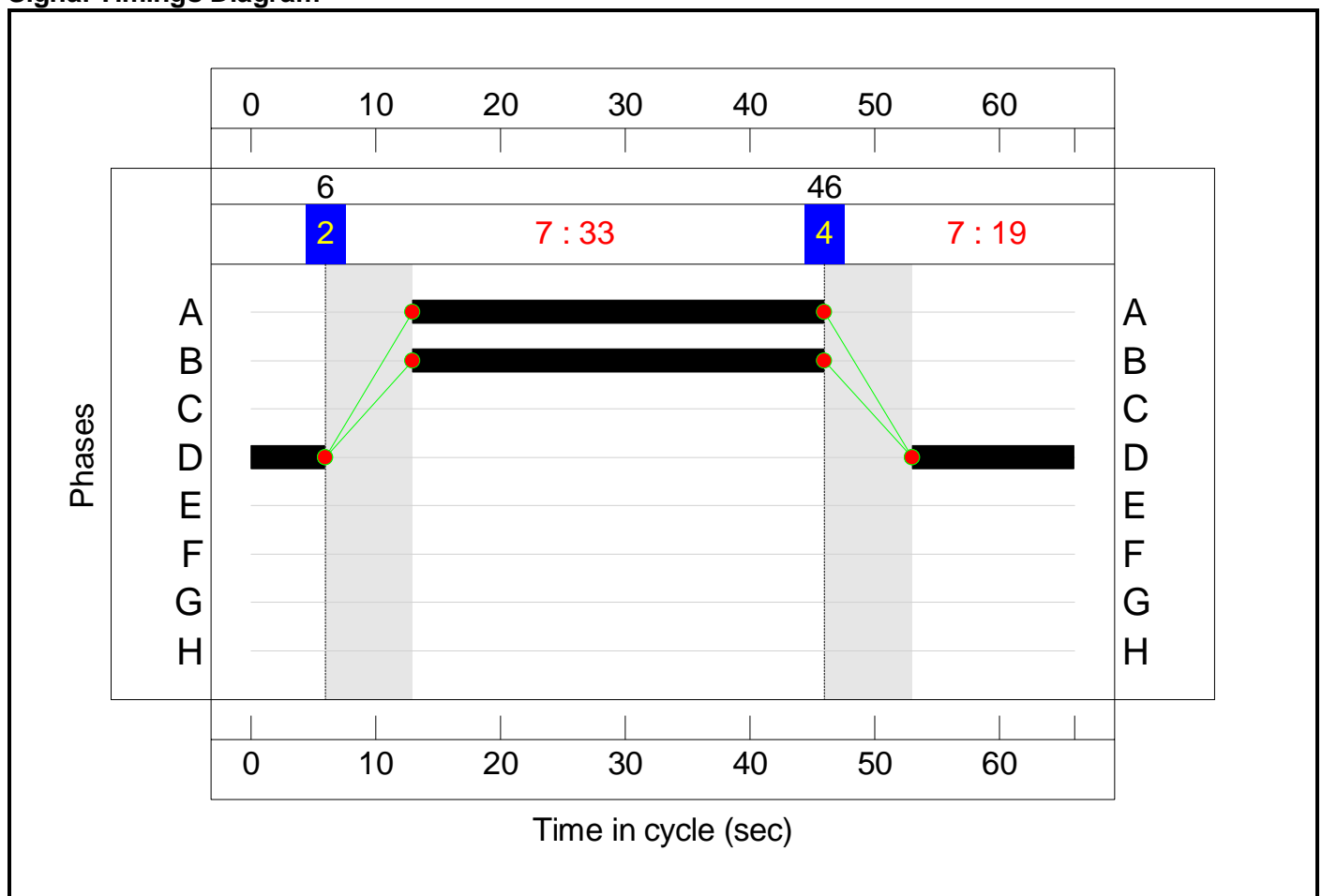
Stage Sequence Diagram



Stage Timings

Stage	2	4
Duration	33	19
Change Point	6	46

Signal Timings Diagram

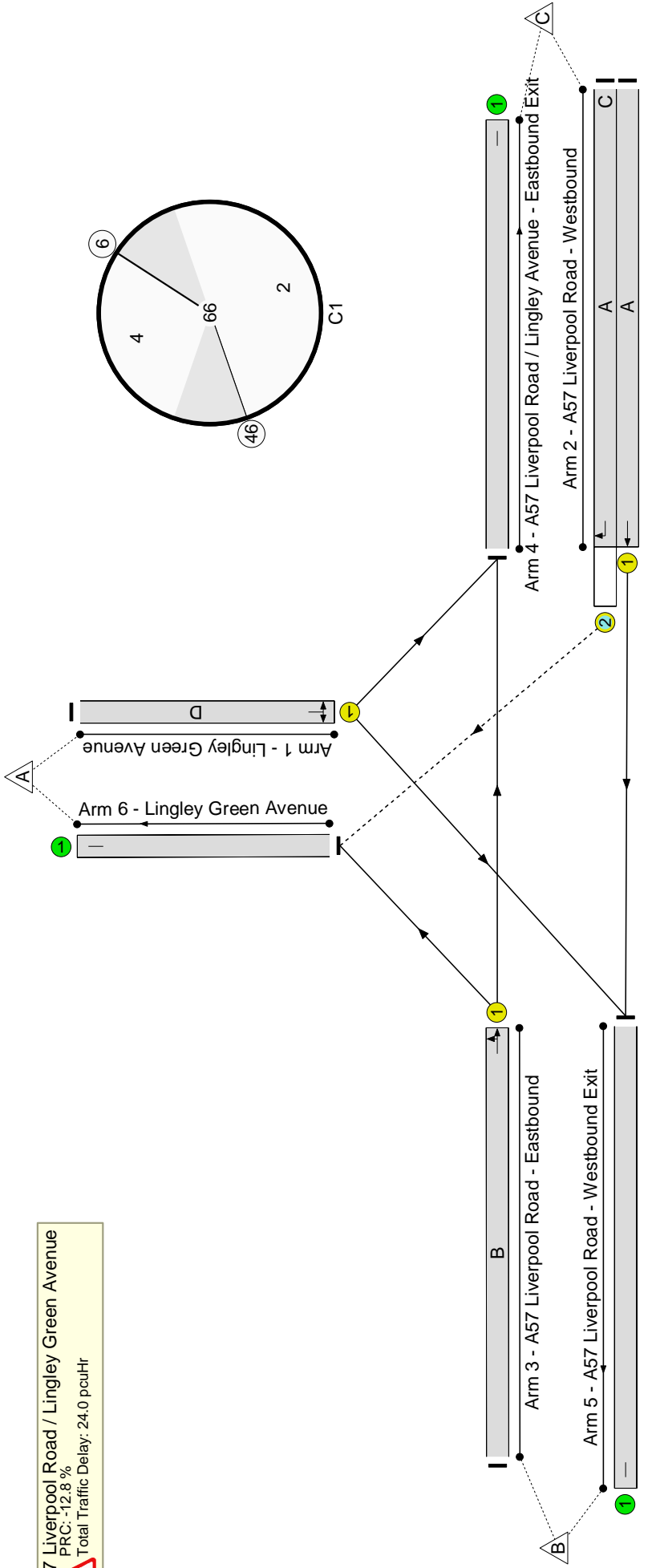




Full Input Data And Results

Network Layout Diagram

A57 Liverpool Road / Lingley Green Avenue  
PRC: -12.8%  
Total Traffic Delay: 24.0 pcu\*hr



Full Input Data And Results

**Network Results**

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	-	-	N/A	-	-	-	-	-	-	-	-	-	101.5%
A57 Liverpool Road / Lingley Green Avenue	-	-	N/A	-	-	-	-	-	-	-	-	-	101.5%
1/1	Lingley Green Avenue Left Right	U	N/A	N/A	D		1	19	-	554	1801	546	101.5%
2/1	A57 Liverpool Road - Westbound Ahead	U	N/A	N/A	A		1	33	-	576	2115	1090	52.9%
2/2	A57 Liverpool Road - Westbound Right	O	N/A	N/A	A	C	1	33	0	70	1781	335	20.9%
3/1	A57 Liverpool Road - Eastbound Ahead	U	N/A	N/A	B		1	33	-	687	1959	1009	68.1%
4/1	A57 Liverpool Road / Lingley Avenue - Eastbound Exit	U	N/A	N/A	-		-	-	-	558	Inf	Inf	0.0%
5/1	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	1029	Inf	Inf	0.0%
6/1	Lingley Green Avenue	U	N/A	N/A	-		-	-	-	300	Inf	Inf	0.0%

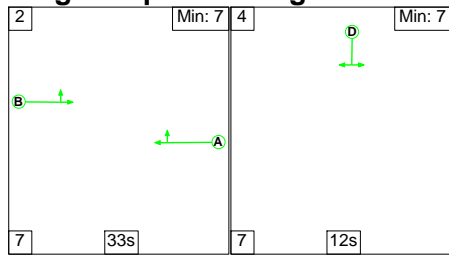
Full Input Data And Results

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)		
Network	-	-	68	0	2	8.0	15.8	0.2	24.0	-	-	-	-		
A57 Liverpool Road / Lingley Green Avenue	-	-	68	0	2	8.0	15.8	0.2	24.0	-	-	-	-		
1/1	554	546	-	-	-	3.8	14.0	-	17.9	116.0	10.3	14.0	24.3		
2/1	576	576	-	-	-	1.7	0.6	-	2.3	14.2	6.9	0.6	7.4		
2/2	70	70	68	0	2	0.2	0.1	0.2	0.5	25.8	0.6	0.1	0.8		
3/1	687	687	-	-	-	2.3	1.1	-	3.3	17.5	9.4	1.1	10.4		
4/1	556	556	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0		
5/1	1022	1022	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0		
6/1	300	300	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0		
C1										PRC for Signalised Lanes (%):	-12.8	Total Delay for Signalised Lanes (pcuHr):	23.96	Cycle Time (s):	66
										PRC Over All Lanes (%):	-12.8	Total Delay Over All Lanes (pcuHr):	23.96		

Full Input Data And Results

Scenario 4: '2027 Am Peak Period' (FG4: 'AM Peak Period 2027', Plan 1: 'Network Control Plan 1')

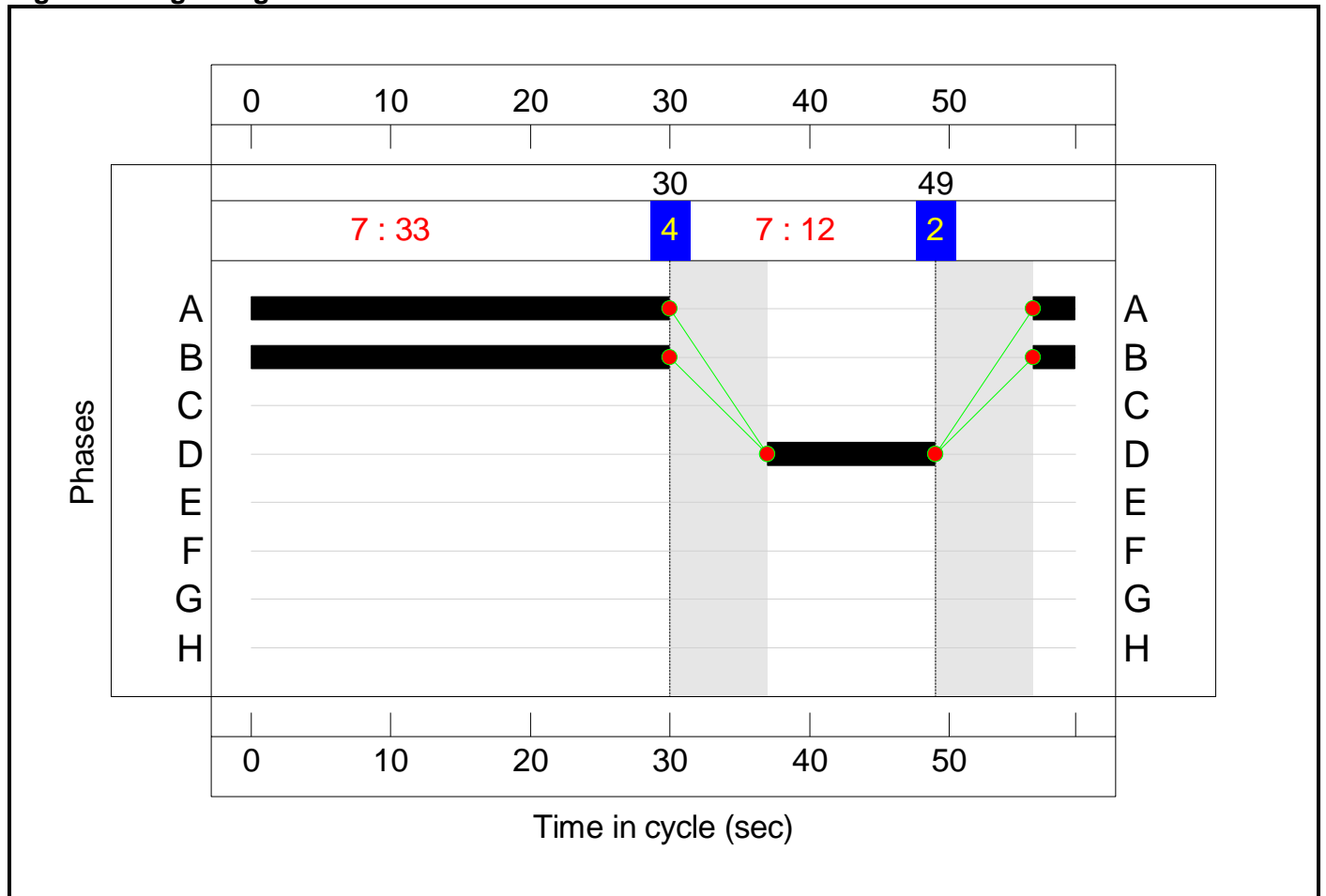
Stage Sequence Diagram



Stage Timings

Stage	2	4
Duration	33	12
Change Point	49	30

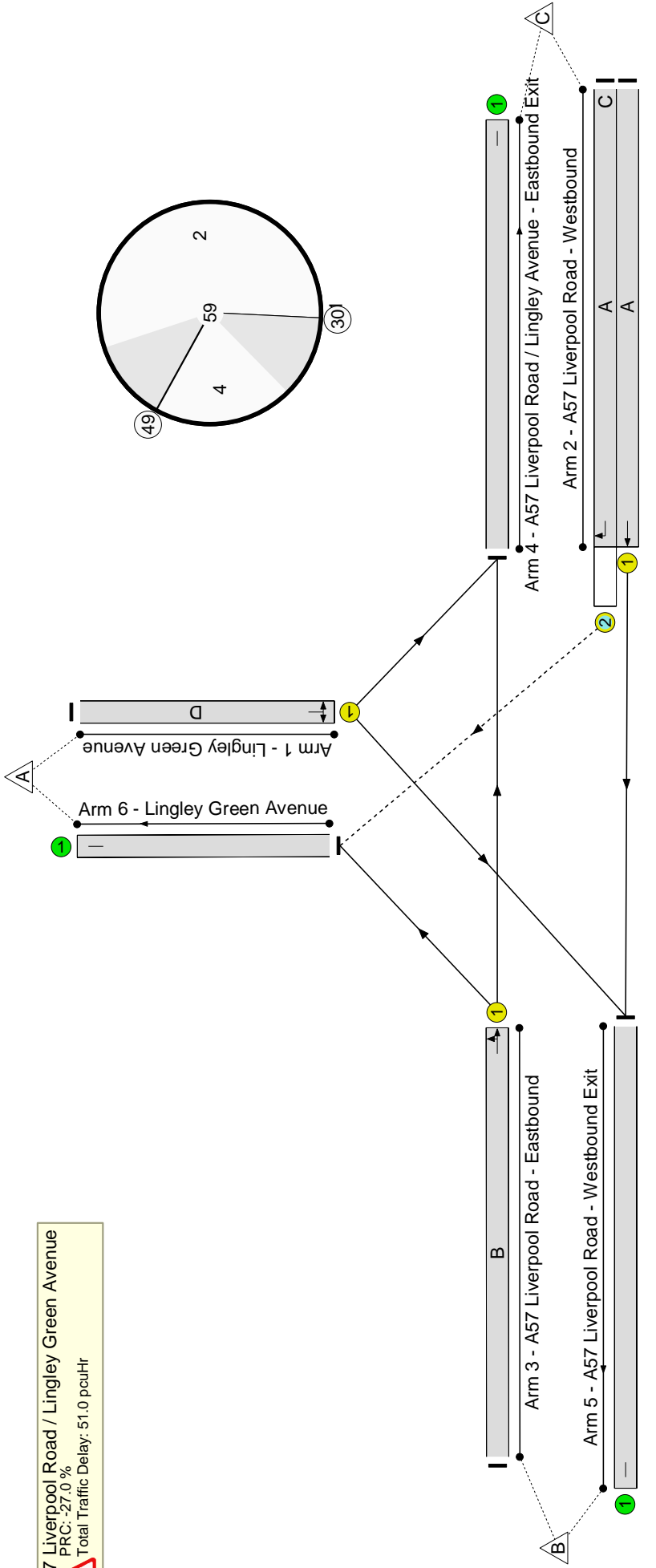
Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram

A57 Liverpool Road / Lingley Green Avenue  
PRC: -27.0 %  
Total Traffic Delay: 51.0 pcu\*hr



Full Input Data And Results

**Network Results**

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	-	-	N/A	-	-	-	-	-	-	-	-	-	114.3%
A57 Liverpool Road / Lingley Green Avenue	-	-	N/A	-	-	-	-	-	-	-	-	-	114.3%
1/1	Lingley Green Avenue Left Right	U	N/A	N/A	D		1	12	-	452	1795	396	114.3%
2/1	A57 Liverpool Road - Westbound Ahead	U	N/A	N/A	A		1	33	-	524	2115	1219	43.0%
2/2	A57 Liverpool Road - Westbound Right	O	N/A	N/A	A	C	1	33	0	79	1781	193	40.9%
3/1	A57 Liverpool Road - Eastbound Ahead	U	N/A	N/A	B		1	33	-	1072	1930	1112	96.4%
4/1	A57 Liverpool Road / Lingley Avenue - Eastbound Exit	U	N/A	N/A	-		-	-	-	621	Inf	Inf	0.0%
5/1	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	886	Inf	Inf	0.0%
6/1	Lingley Green Avenue	U	N/A	N/A	-		-	-	-	620	Inf	Inf	0.0%

Full Input Data And Results

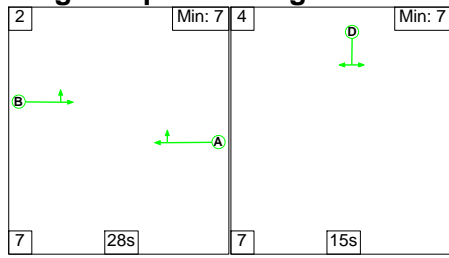
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	-	-	10	0	69	8.8	41.7	0.5	51.0	-	-	-	-
A57 Liverpool Road / Lingley Green Avenue	-	-	10	0	69	8.8	41.7	0.5	51.0	-	-	-	-
1/1	452	396	-	-	-	4.1	31.8	-	35.9	285.8	8.4	31.8	40.2
2/1	524	524	-	-	-	1.0	0.4	-	1.4	9.6	4.8	0.4	5.2
2/2	79	79	10	0	69	0.1	0.3	0.5	1.0	44.3	0.6	0.3	0.9
3/1	1072	1072	-	-	-	3.5	9.2	-	12.7	42.7	16.7	9.2	25.8
4/1	610	610	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	841	841	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	620	620	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
C1										PRC for Signalised Lanes (%): -27.0	Total Delay for Signalised Lanes (pcuHr): 50.96	Cycle Time (s): 59	
										PRC Over All Lanes (%): -27.0	Total Delay Over All Lanes (pcuHr): 50.96		



Full Input Data And Results

Scenario 5: '2027 Interpeak' (FG6: 'Interpeak Period 2027', Plan 1: 'Network Control Plan 1')

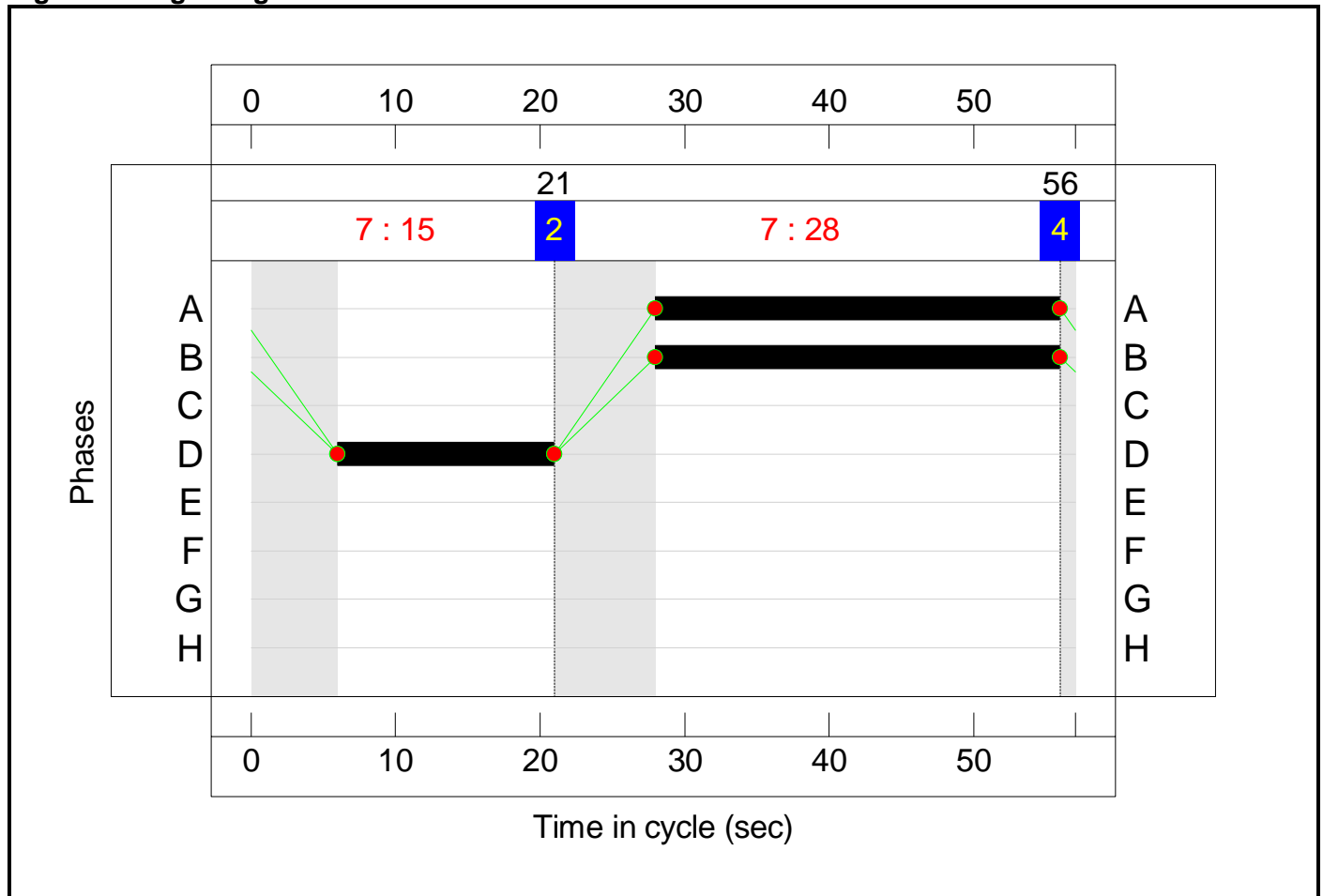
Stage Sequence Diagram



Stage Timings

Stage	2	4
Duration	28	15
Change Point	21	56


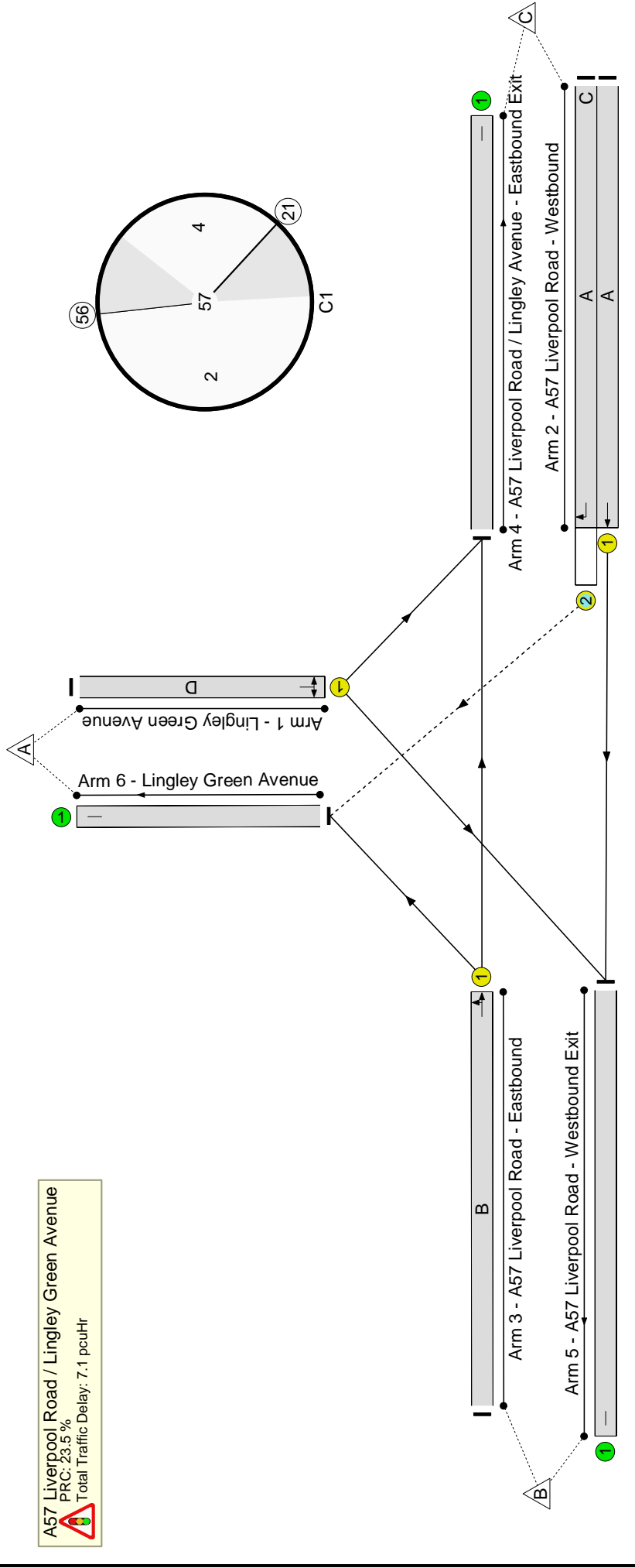
Signal Timings Diagram



Full Input Data And Results

**Network Layout Diagram**

A57 Liverpool Road / Lingley Green Avenue  
 PRC: 23.5 %  
 Total Traffic Delay: 7.1 pcuHr

Full Input Data And Results

**Network Results**

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	-	-	N/A	-	-	-	-	-	-	-	-	-	72.9%
A57 Liverpool Road / Lingley Green Avenue	-	-	N/A	-	-	-	-	-	-	-	-	-	72.9%
1/1	Lingley Green Avenue Left Right	U	N/A	N/A	D	-	1	15	-	367	1794	504	72.9%
2/1	A57 Liverpool Road - Westbound Ahead	U	N/A	N/A	A	-	1	28	-	437	2115	1076	40.6%
2/2	A57 Liverpool Road - Westbound Right	O	N/A	N/A	A	C	1	28	0	68	1781	440	15.4%
3/1	A57 Liverpool Road - Eastbound Ahead Left	U	N/A	N/A	B	-	1	28	-	564	1955	995	56.7%
4/1	A57 Liverpool Road / Lingley Avenue - Eastbound Exit	U	N/A	N/A	-	-	-	-	-	475	Inf	Inf	0.0%
5/1	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-	-	-	-	-	702	Inf	Inf	0.0%
6/1	Lingley Green Avenue	U	N/A	N/A	-	-	-	-	-	259	Inf	Inf	0.0%

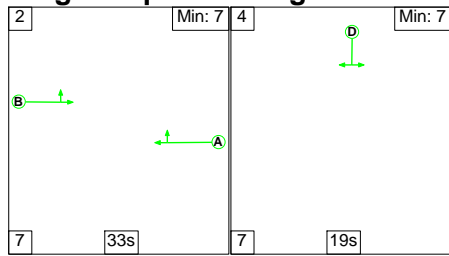
Full Input Data And Results

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	-	-	66	0	2	4.6	2.4	0.1	7.1	-	-	-	-
A57 Liverpool Road / Lingley Green Avenue	-	-	66	0	2	4.6	2.4	0.1	7.1	-	-	-	-
1/1	367	367	-	-	-	1.9	1.3	-	3.2	31.5	5.2	1.3	6.5
2/1	437	437	-	-	-	1.1	0.3	-	1.4	11.5	4.2	0.3	4.6
2/2	68	68	66	0	2	0.1	0.1	0.1	0.3	18.4	0.5	0.1	0.6
3/1	564	564	-	-	-	1.5	0.7	-	2.2	13.8	6.1	0.7	6.8
4/1	475	475	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	702	702	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	259	259	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
C1										PRC for Signalised Lanes (%): 23.5	Total Delay for Signalised Lanes (pcuHr): 7.12	Cycle Time (s): 57	
										PRC Over All Lanes (%): 23.5	Total Delay Over All Lanes (pcuHr): 7.12		

Full Input Data And Results

Scenario 6: '2027 Pm Peak Period' (FG5: 'PM Peak Period 2027', Plan 1: 'Network Control Plan 1')

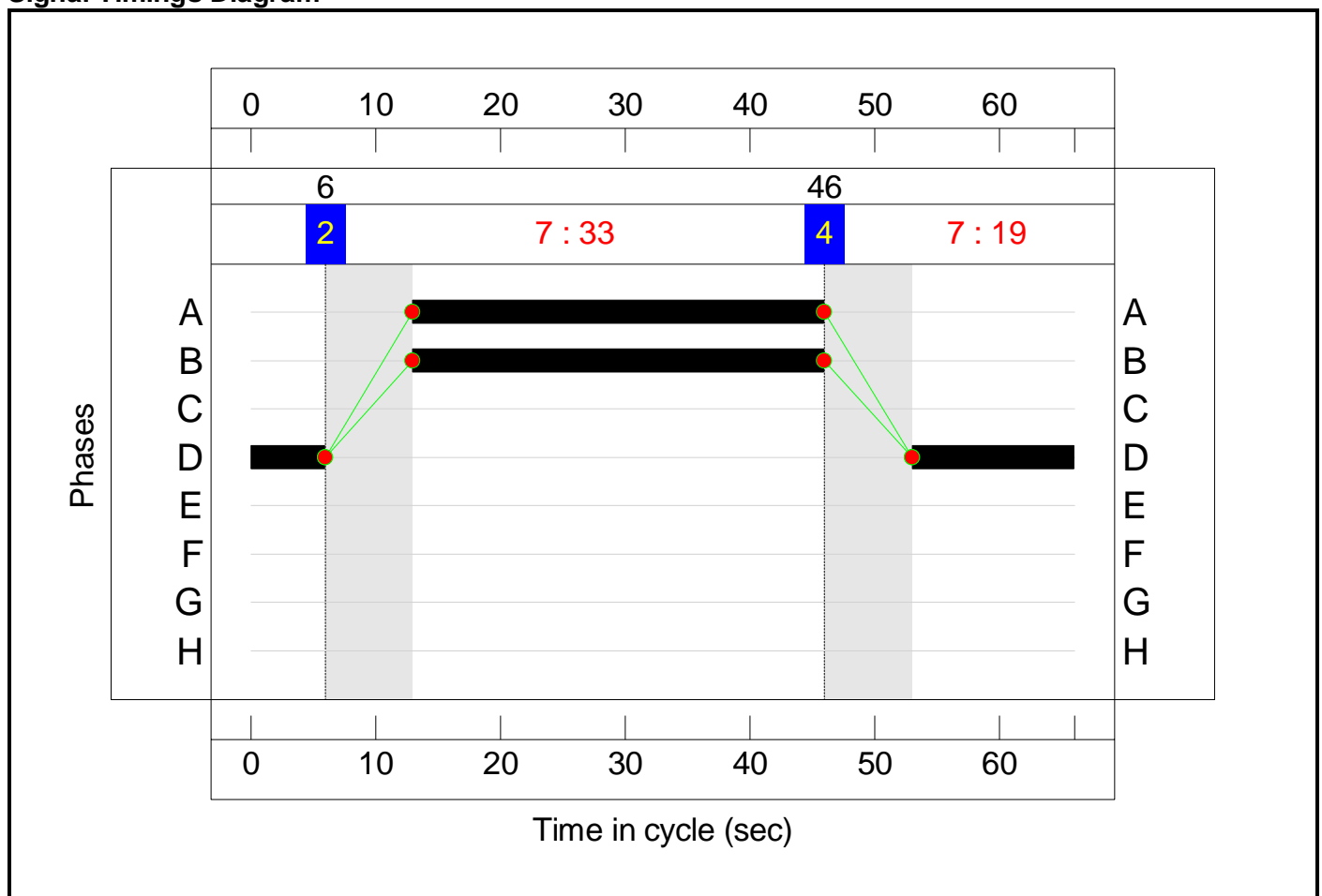
Stage Sequence Diagram



Stage Timings

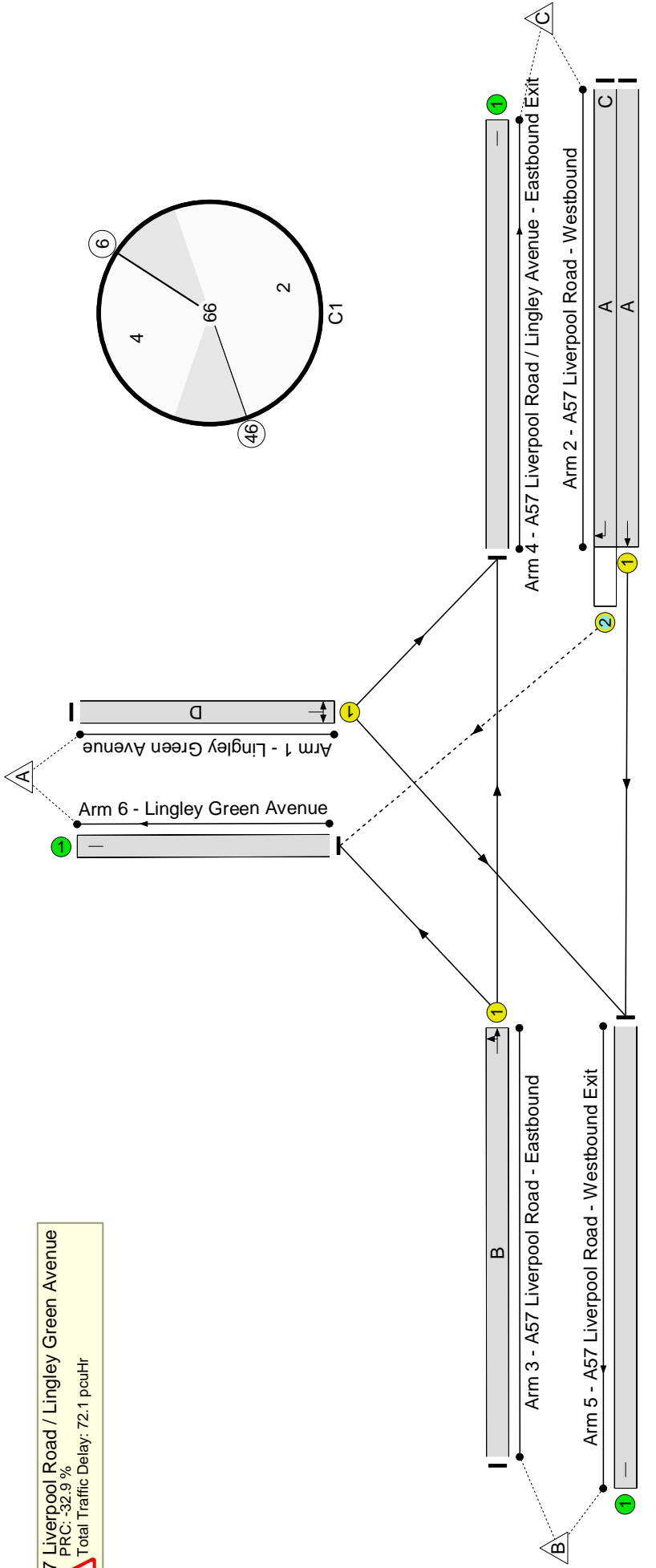
Stage	2	4
Duration	33	19
Change Point	6	46

Signal Timings Diagram



### Network Layout Diagram

A57 Liverpool Road / Lingley Green Avenue  
PRC: -32.9 %  
Total Traffic Delay: 72.1 pcu\*hr



Full Input Data And Results

**Network Results**

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	-	-	N/A	-	-	-	-	-	-	-	-	-	119.6%
A57 Liverpool Road / Lingley Green Avenue	-	-	N/A	-	-	-	-	-	-	-	-	-	119.6%
1/1	Lingley Green Avenue Left Right	U	N/A	N/A	D		1	19	-	653	1802	546	119.6%
2/1	A57 Liverpool Road - Westbound Ahead	U	N/A	N/A	A		1	33	-	625	2115	1090	57.4%
2/2	A57 Liverpool Road - Westbound Right	O	N/A	N/A	A	C	1	33	0	83	1781	283	29.3%
3/1	A57 Liverpool Road - Eastbound Ahead	U	N/A	N/A	B		1	33	-	765	1957	1008	75.9%
4/1	A57 Liverpool Road / Lingley Avenue - Eastbound Exit	U	N/A	N/A	-		-	-	-	615	Inf	Inf	0.0%
5/1	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	1158	Inf	Inf	0.0%
6/1	Lingley Green Avenue	U	N/A	N/A	-		-	-	-	353	Inf	Inf	0.0%

Full Input Data And Results

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)		
Network	-	-	80	0	3	12.9	58.8	0.3	72.1	-	-	-	-		
A57 Liverpool Road / Lingley Green Avenue	-	-	80	0	3	12.9	58.8	0.3	72.1	-	-	-	-		
1/1	653	546	-	-	-	8.1	56.4	-	64.5	355.6	14.3	56.4	70.6		
2/1	625	625	-	-	-	1.9	0.7	-	2.6	14.9	7.8	0.7	8.5		
2/2	83	83	80	0	3	0.2	0.2	0.3	0.7	31.8	0.8	0.2	1.0		
3/1	765	765	-	-	-	2.7	1.6	-	4.3	20.0	11.1	1.6	12.6		
4/1	595	595	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0		
5/1	1071	1071	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0		
6/1	353	353	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0		
C1										PRC for Signalised Lanes (%):	-32.9	Total Delay for Signalised Lanes (pcuHr):	72.08	Cycle Time (s):	66
										PRC Over All Lanes (%):	-32.9	Total Delay Over All Lanes (pcuHr):	72.08		



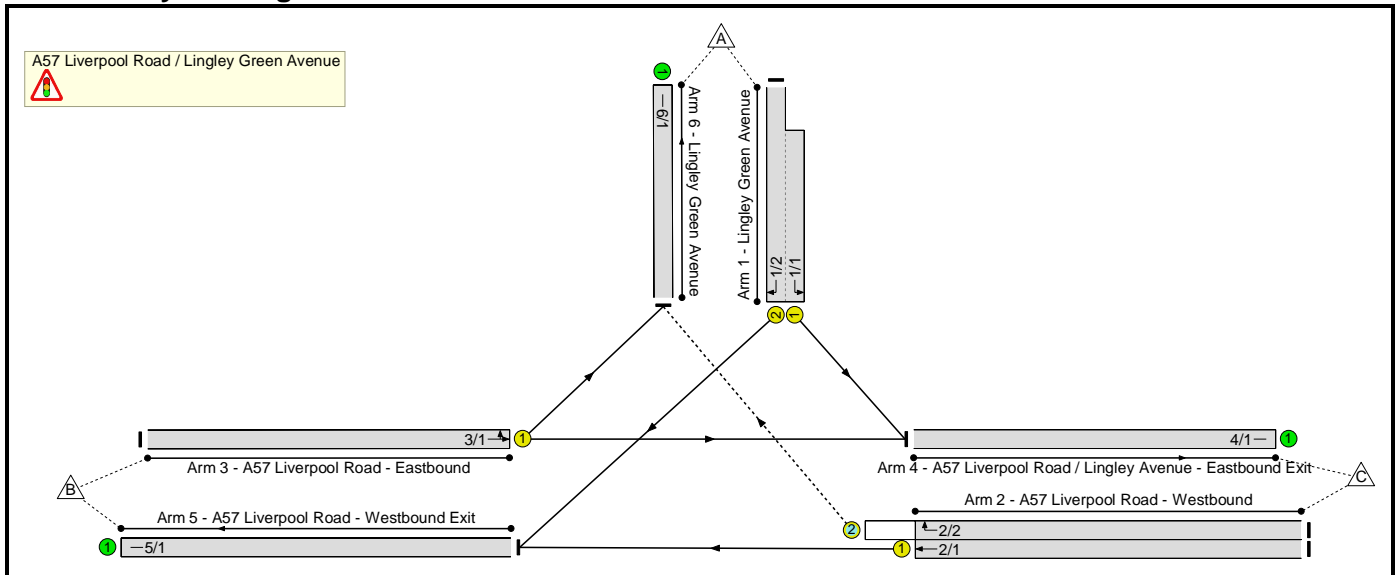
## Annex D: LinSig Layout 1 Model Outputs

Full Input Data And Results  
**Full Input Data And Results**

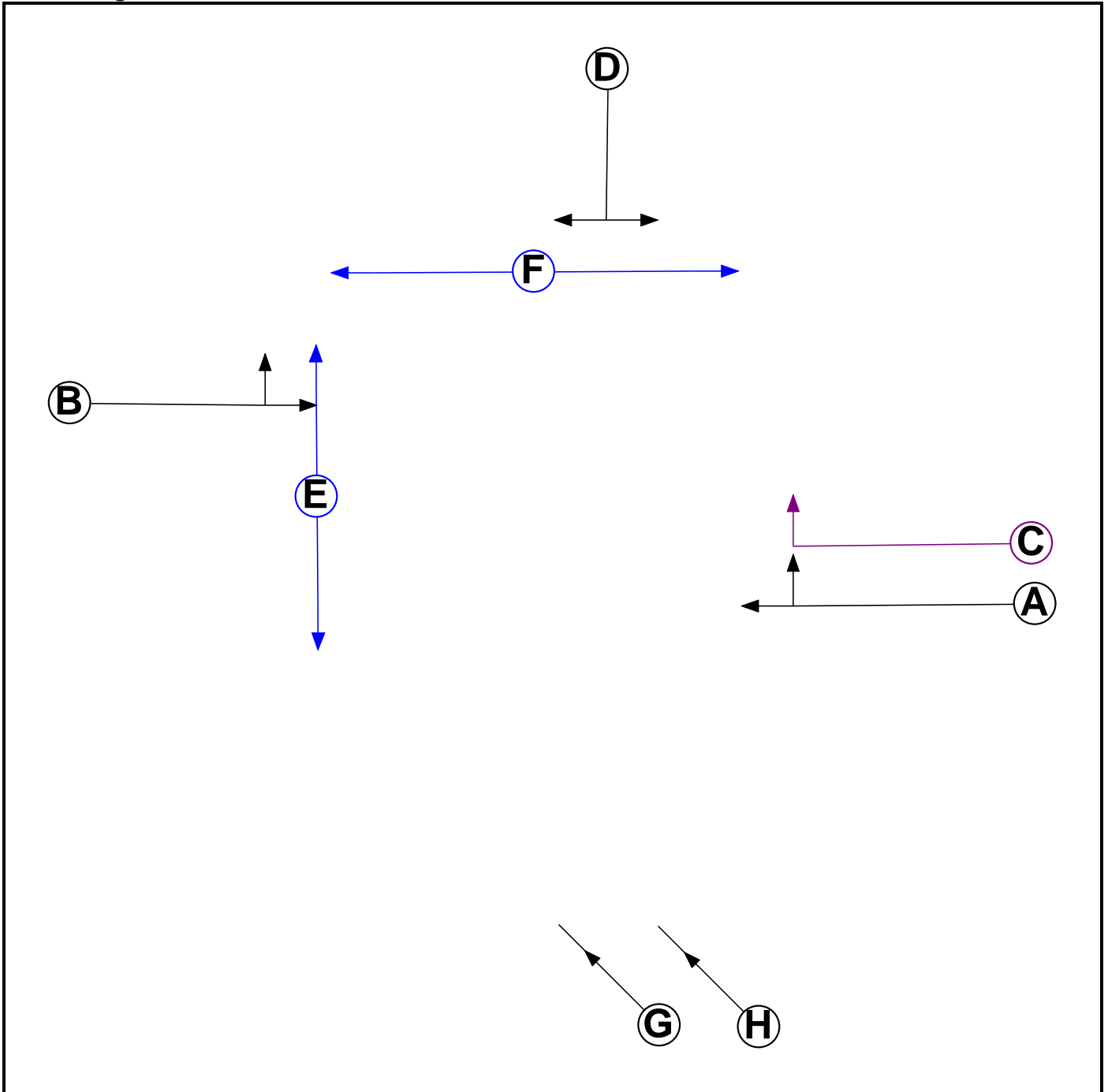
**User and Project Details**

<b>Project:</b>	Omega Gateway Highway Junction Improvement Package
<b>Title:</b>	<b>Layout 1</b>
<b>Location:</b>	<b>A57 Liverpool Road / A57 Lingley Green Avenue</b>
<b>Additional detail:</b>	
<b>File name:</b>	2. A57 Liverpool Rd - Lingley Green Avenue, two exit lanes, Final Future year.lsg3x
<b>Author:</b>	Alistair Johnson
<b>Company:</b>	AECOM
<b>Address:</b>	1 Dale Street, Liverpool, L2 2ET

**Network Layout Diagram**



Phase Diagram



Phase Input Data

Phase Name	Phase Type	Assoc. Phase	Street Min	Cont Min
A	Traffic		7	7
B	Traffic		7	7
C	Ind. Arrow	A	4	4
D	Traffic		7	7
E	Pedestrian		7	7
F	Pedestrian		9	9
G	Traffic		3	3
H	Traffic		7	7

## Full Input Data And Results

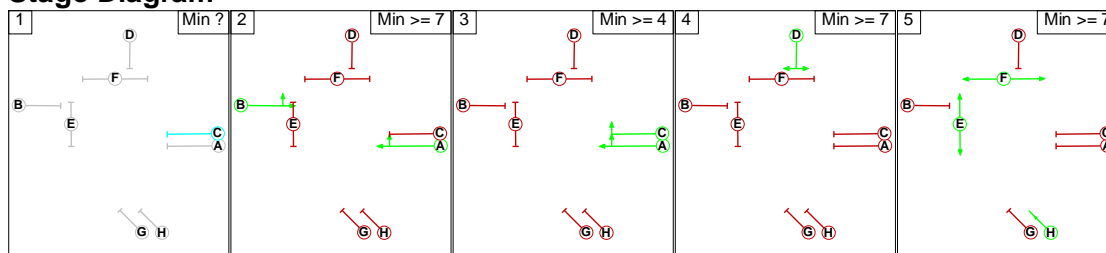
### Phase Intergrens Matrix

		Starting Phase							
		A	B	C	D	E	F	G	H
Terminating Phase	A	-	-	7	12	12	3	12	
	B	-	-	7	7	5	10	3	5
	C	-	8	-	7	-	12	3	12
	D	7	7	7	-	11	5	3	5
	E	1	1	-	1	-	-	1	-
	F	1	1	1	1	-	-	1	-
	G	2	2	2	2	2	2	-	3
	H	2	2	2	2	-	-	2	-

### Phases in Stage

Stage No.	Phases in Stage
1	
2	A B
3	A C
4	D
5	E F H

### Stage Diagram



### Phase Delays

Term. Stage	Start Stage	Phase	Type	Value	Cont value
There are no Phase Delays defined					

### Prohibited Stage Change

		To Stage				
		1	2	3	4	5
From Stage	1	-	X	X	X	X
	2	X	-	7	7	12
	3	X	X	-	7	12
	4	X	7	7	-	11
	5	X	2	2	2	-

Full Input Data And Results

**Give-Way Lane Input Data**

Junction: A57 Liverpool Road / Lingley Green Avenue

Lane	Movement	Max Flow when Giving Way (PCU/Hr)	Min Flow when Giving Way (PCU/Hr)	Opposing Lane	Opp. Lane Coeff.	Opp. Mvmnts.	Right Turn Storage (PCU)	Non-Blocking Storage (PCU)	RTF	Right Turn Move up (s)	Max Turns in Intergreen (PCU)
(A57 Liverpool Road - Westbound) 2/2	6/1 (Right)	1439	0	3/1	1.09	All	4.00	-	0.50	4	3.00

Full Input Data And Results

**Lane Input Data**

Junction: A57 Liverpool Road / Lingley Green Avenue												
Lane	Lane Type	Phases	Start Disp.	End Disp.	Physical Length (PCU)	Sat Flow Type	Def User Saturation Flow (PCU/Hr)	Lane Width (m)	Gradient	Nearside Lane	Turns	Turning Radius (m)
1/1 (Lingley Green Avenue)	U	D	2	3	17.4	User	1861	-	-	-	-	-
1/2 (Lingley Green Avenue)	U	D	2	3	60.0	User	1907	-	-	-	-	-
2/1 (A57 Liverpool Road - Westbound)	U	A	2	3	60.0	User	2115	-	-	-	-	-
2/2 (A57 Liverpool Road - Westbound)	O	A C	2	3	60.0	User	1781	-	-	-	-	-
3/1 (A57 Liverpool Road - Eastbound)	U	B	2	3	60.0	User	1878	-	-	-	-	-
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit)	U		2	3	60.0	Inf	-	-	-	-	-	-
5/1 (A57 Liverpool Road - Westbound Exit)	U		2	3	60.0	Inf	-	-	-	-	-	-
6/1 (Lingley Green Avenue)	U		2	3	60.0	Inf	-	-	-	-	-	-

**Traffic Flow Groups**

Flow Group	Start Time	End Time	Duration	Formula
1: '2017 AM Peak Period'	07:30	08:30	01:00	
2: '2017 PM Peak Period'	16:30	17:30	01:00	
3: '2017 Interpeak Period'	14:45	15:45	01:00	
4: '2027 AM Peak Period'	07:30	08:30	01:00	
5: '2027 PM Peak Period'	16:30	17:30	01:00	
6: '2027 Interpeak Period'	14:45	15:45	01:00	

Full Input Data And Results

**Scenario 1: 'Am Peak Period'** (FG1: '2017 AM Peak Period', Plan 1: 'Network Control Plan 1')

**Traffic Flows, Desired**

**Desired Flow :**

	Destination			
	A	B	C	Tot.
Origin				
A	0	305	75	380
B	457	0	485	942
C	66	480	0	546
Tot.	523	785	560	1868

**Traffic Lane Flows**

Lane	Scenario 1: Am Peak Period
<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>	
1/1 (short)	75
1/2 (with short)	380(In) 305(Out)
2/1	480
2/2	66
3/1	942
4/1	560
5/1	785
6/1	523

**Lane Saturation Flows**

Junction: A57 Liverpool Road / Lingley Green Avenue								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (Lingley Green Avenue Lane 1)							1861	1861
1/2 (Lingley Green Avenue Lane 2)							1907	1907
2/1 (A57 Liverpool Road - Westbound Lane 1)							2115	2115
2/2 (A57 Liverpool Road - Westbound Lane 2)							1781	1781
3/1 (A57 Liverpool Road - Eastbound Lane 1)							1933	1933
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit Lane 1)							Inf	Inf
5/1 (A57 Liverpool Road - Westbound Exit Lane 1)							Inf	Inf
6/1 (Lingley Green Avenue Lane 1)							Inf	Inf

**Scenario 2: 'Interpeak'** (FG3: '2017 Interpeak Period', Plan 1: 'Network Control Plan 1')

**Traffic Flows, Desired**

**Desired Flow :**

	Destination				
		A	B	C	Tot.
Origin	A	0	229	86	315
	B	163	0	337	500
	C	57	396	0	453
	Tot.	220	625	423	1268

**Traffic Lane Flows**

Lane	Scenario 2: Interpeak
<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>	
1/1 (short)	86
1/2 (with short)	315(In) 229(Out)
2/1	396
2/2	57
3/1	500
4/1	423
5/1	625
6/1	220



Full Input Data And Results

**Lane Saturation Flows**

Junction: A57 Liverpool Road / Lingley Green Avenue								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (Lingley Green Avenue Lane 1)							1861	1861
1/2 (Lingley Green Avenue Lane 2)							1907	1907
2/1 (A57 Liverpool Road - Westbound Lane 1)							2115	2115
2/2 (A57 Liverpool Road - Westbound Lane 2)							1781	1781
3/1 (A57 Liverpool Road - Eastbound Lane 1)							1958	1958
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit Lane 1)							Inf	Inf
5/1 (A57 Liverpool Road - Westbound Exit Lane 1)							Inf	Inf
6/1 (Lingley Green Avenue Lane 1)							Inf	Inf

**Scenario 3: 'Pm Peak Period'** (FG2: '2017 PM Peak Period', Plan 1: 'Network Control Plan 1')

**Traffic Flows, Desired**

**Desired Flow :**

	Destination				
		A	B	C	Tot.
Origin	A	0	453	101	554
	B	230	0	457	687
	C	70	576	0	646
	Tot.	300	1029	558	1887

**Traffic Lane Flows**

Lane	Scenario 3: Pm Peak Period
<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>	
1/1 (short)	101
1/2 (with short)	554(In) 453(Out)
2/1	576
2/2	70
3/1	687
4/1	558
5/1	1029
6/1	300

**Lane Saturation Flows**

Junction: A57 Liverpool Road / Lingley Green Avenue								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (Lingley Green Avenue Lane 1)							1861	1861
1/2 (Lingley Green Avenue Lane 2)							1907	1907
2/1 (A57 Liverpool Road - Westbound Lane 1)							2115	2115
2/2 (A57 Liverpool Road - Westbound Lane 2)							1781	1781
3/1 (A57 Liverpool Road - Eastbound Lane 1)							1959	1959
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit Lane 1)							Inf	Inf
5/1 (A57 Liverpool Road - Westbound Exit Lane 1)							Inf	Inf
6/1 (Lingley Green Avenue Lane 1)							Inf	Inf

**Scenario 4: '2027 Am Peak Period'** (FG4: '2027 AM Peak Period', Plan 1: 'Network Control Plan 1')

**Traffic Flows, Desired**

**Desired Flow :**

	Destination				
		A	B	C	Tot.
Origin	A	0	362	90	452
	B	541	0	531	1072
	C	79	524	0	603
	Tot.	620	886	621	2127

**Traffic Lane Flows**

Lane	Scenario 4: 2027 Am Peak Period
<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>	
1/1 (short)	90
1/2 (with short)	452(In) 362(Out)
2/1	524
2/2	79
3/1	1072
4/1	621
5/1	886
6/1	620

**Lane Saturation Flows**

Junction: A57 Liverpool Road / Lingley Green Avenue								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (Lingley Green Avenue Lane 1)							1861	1861
1/2 (Lingley Green Avenue Lane 2)							1907	1907
2/1 (A57 Liverpool Road - Westbound Lane 1)							2115	2115
2/2 (A57 Liverpool Road - Westbound Lane 2)							1781	1781
3/1 (A57 Liverpool Road - Eastbound Lane 1)							1930	1930
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit Lane 1)							Inf	Inf
5/1 (A57 Liverpool Road - Westbound Exit Lane 1)							Inf	Inf
6/1 (Lingley Green Avenue Lane 1)							Inf	Inf

**Scenario 5: '2027 Interpeak'** (FG6: '2027 Interpeak Period', Plan 1: 'Network Control Plan 1')

**Traffic Flows, Desired**

**Desired Flow :**

	Destination				
		A	B	C	Tot.
Origin	A	0	265	102	367
	B	191	0	373	564
	C	68	437	0	505
	Tot.	259	702	475	1436

**Traffic Lane Flows**

Lane	Scenario 5: 2027 Interpeak
<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>	
1/1 (short)	102
1/2 (with short)	367(In) 265(Out)
2/1	437
2/2	68
3/1	564
4/1	475
5/1	702
6/1	259

Full Input Data And Results

**Lane Saturation Flows**

Junction: A57 Liverpool Road / Lingley Green Avenue								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (Lingley Green Avenue Lane 1)							1861	1861
1/2 (Lingley Green Avenue Lane 2)							1907	1907
2/1 (A57 Liverpool Road - Westbound Lane 1)							2115	2115
2/2 (A57 Liverpool Road - Westbound Lane 2)							1781	1781
3/1 (A57 Liverpool Road - Eastbound Lane 1)							1955	1955
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit Lane 1)							Inf	Inf
5/1 (A57 Liverpool Road - Westbound Exit Lane 1)							Inf	Inf
6/1 (Lingley Green Avenue Lane 1)							Inf	Inf

**Scenario 6: '2027 Pm Peak Period'** (FG5: '2027 PM Peak Period', Plan 1: 'Network Control Plan 1')

**Traffic Flows, Desired**

**Desired Flow :**

	Destination				
		A	B	C	Tot.
Origin	A	0	533	120	653
	B	270	0	495	765
	C	83	625	0	708
	Tot.	353	1158	615	2126

**Traffic Lane Flows**

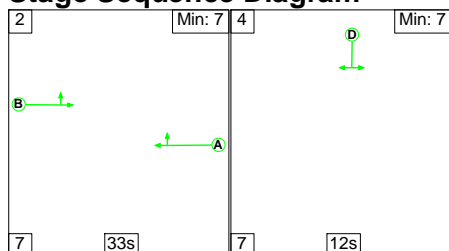
Lane	Scenario 6: 2027 Pm Peak Period
<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>	
1/1 (short)	120
1/2 (with short)	653(In) 533(Out)
2/1	625
2/2	83
3/1	765
4/1	615
5/1	1158
6/1	353

**Lane Saturation Flows**

Junction: A57 Liverpool Road / Lingley Green Avenue								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (Lingley Green Avenue Lane 1)							1861	1861
1/2 (Lingley Green Avenue Lane 2)							1907	1907
2/1 (A57 Liverpool Road - Westbound Lane 1)							2115	2115
2/2 (A57 Liverpool Road - Westbound Lane 2)							1781	1781
3/1 (A57 Liverpool Road - Eastbound Lane 1)							1957	1957
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit Lane 1)							Inf	Inf
5/1 (A57 Liverpool Road - Westbound Exit Lane 1)							Inf	Inf
6/1 (Lingley Green Avenue Lane 1)							Inf	Inf

**Scenario 1: 'Am Peak Period'** (FG1: '2017 AM Peak Period', Plan 1: 'Network Control Plan 1')

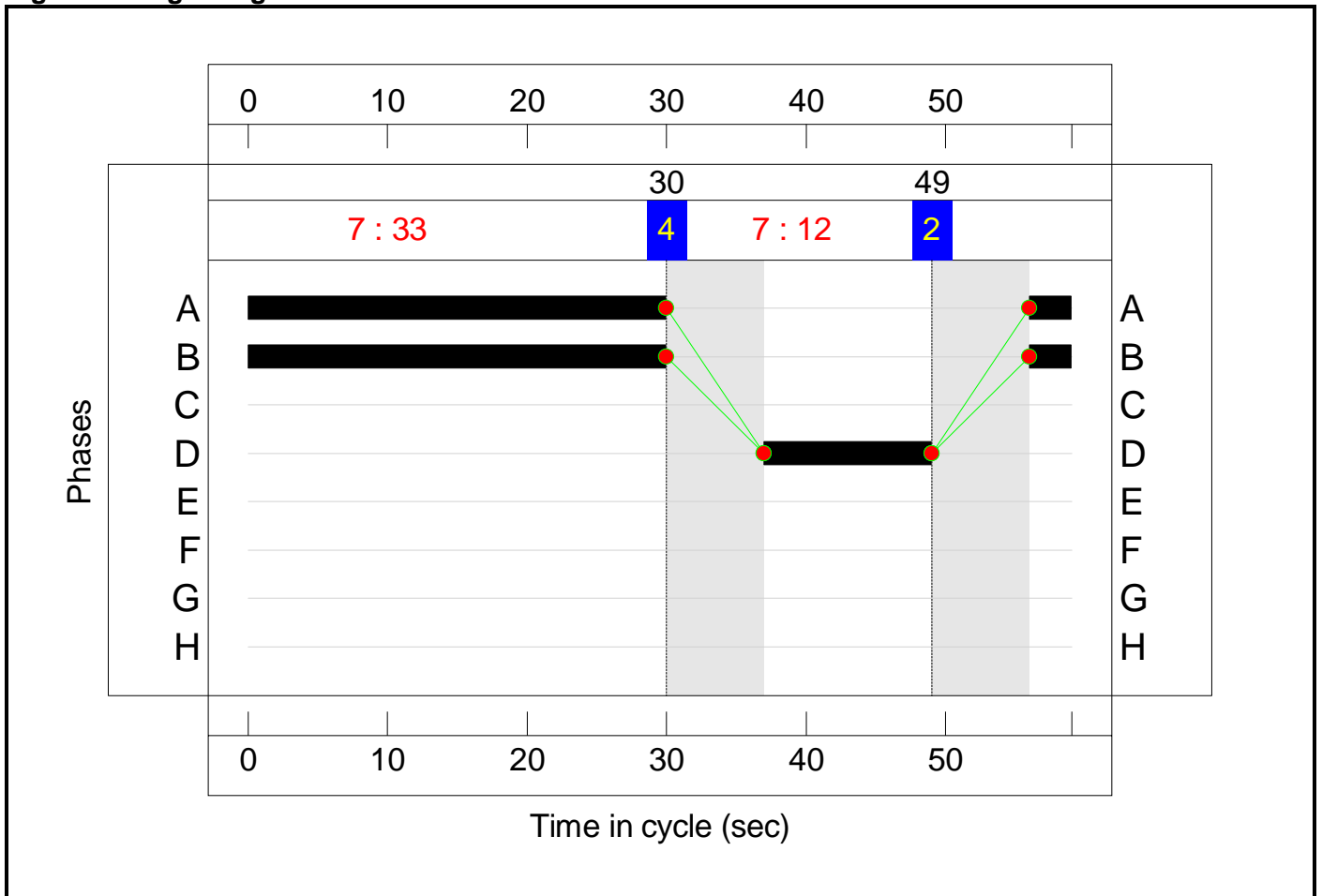
**Stage Sequence Diagram**



**Stage Timings**

Stage	2	4
Duration	33	12
Change Point	49	30

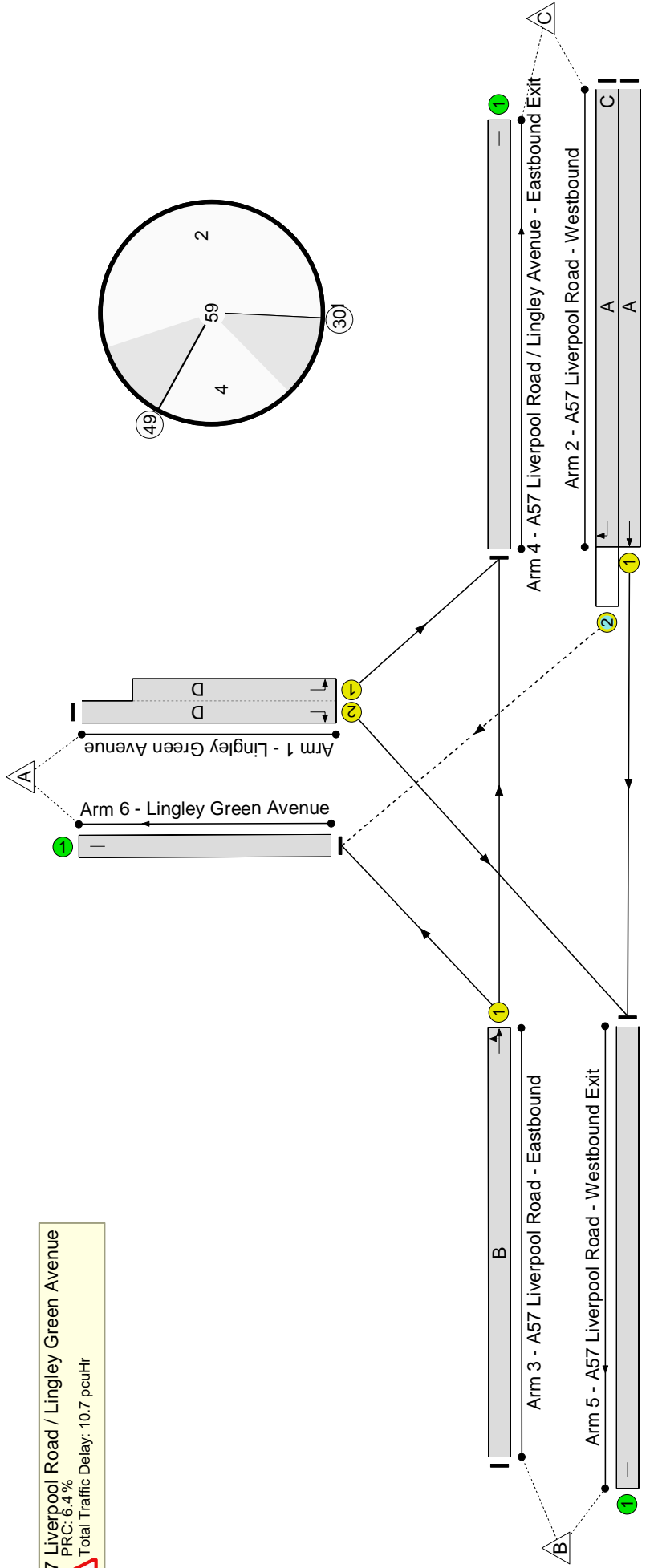
Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram

A57 Liverpool Road / Lingley Green Avenue  
PRC: 6.4%  
Total Traffic Delay: 10.7 pcu/hr



Full Input Data And Results

**Network Results**

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	-	-	N/A	-	-		-	-	-	-	-	-	84.6%
A57 Liverpool Road / Lingley Green Avenue	-	-	N/A	-	-		-	-	-	-	-	-	84.6%
1/2+1/1	Lingley Green Avenue Left Right	U	N/A	N/A	D		1	12	-	380	1907:1861	420+103	72.6 : 72.6%
2/1	A57 Liverpool Road - Westbound Ahead	U	N/A	N/A	A		1	33	-	480	2115	1219	39.4%
2/2	A57 Liverpool Road - Westbound Right	O	N/A	N/A	A	C	1	33	0	66	1781	253	26.1%
3/1	A57 Liverpool Road - Eastbound Ahead Left	U	N/A	N/A	B		1	33	-	942	1933	1114	84.6%
4/1	A57 Liverpool Road / Lingley Avenue - Eastbound Exit	U	N/A	N/A	-		-	-	-	560	Inf	Inf	0.0%
5/1	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	785	Inf	Inf	0.0%
6/1	Lingley Green Avenue	U	N/A	N/A	-		-	-	-	523	Inf	Inf	0.0%



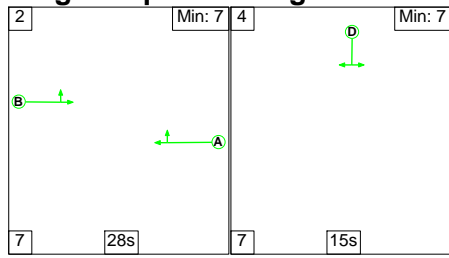
Full Input Data And Results

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	-	-	64	0	2	5.9	4.5	0.3	10.7	-	-	-	-
A57 Liverpool Road / Lingley Green Avenue	-	-	64	0	2	5.9	4.5	0.3	10.7	-	-	-	-
1/2+1/1	380	380	-	-	-	2.2	1.3	-	3.5	33.1	4.6	1.3	5.9
2/1	480	480	-	-	-	0.9	0.3	-	1.2	9.3	4.3	0.3	4.6
2/2	66	66	64	0	2	0.1	0.2	0.3	0.6	31.9	0.5	0.2	0.6
3/1	942	942	-	-	-	2.7	2.7	-	5.4	20.5	12.6	2.7	15.2
4/1	560	560	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	785	785	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	523	523	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
C1			PRC for Signalised Lanes (%): PRC Over All Lanes (%)	6.4 6.4	Total Delay for Signalised Lanes (pcuHr): Total Delay Over All Lanes (pcuHr):	10.68 10.68	Cycle Time (s):	59					

Full Input Data And Results

**Scenario 2: 'Interpeak'** (FG3: '2017 Interpeak Period', Plan 1: 'Network Control Plan 1')

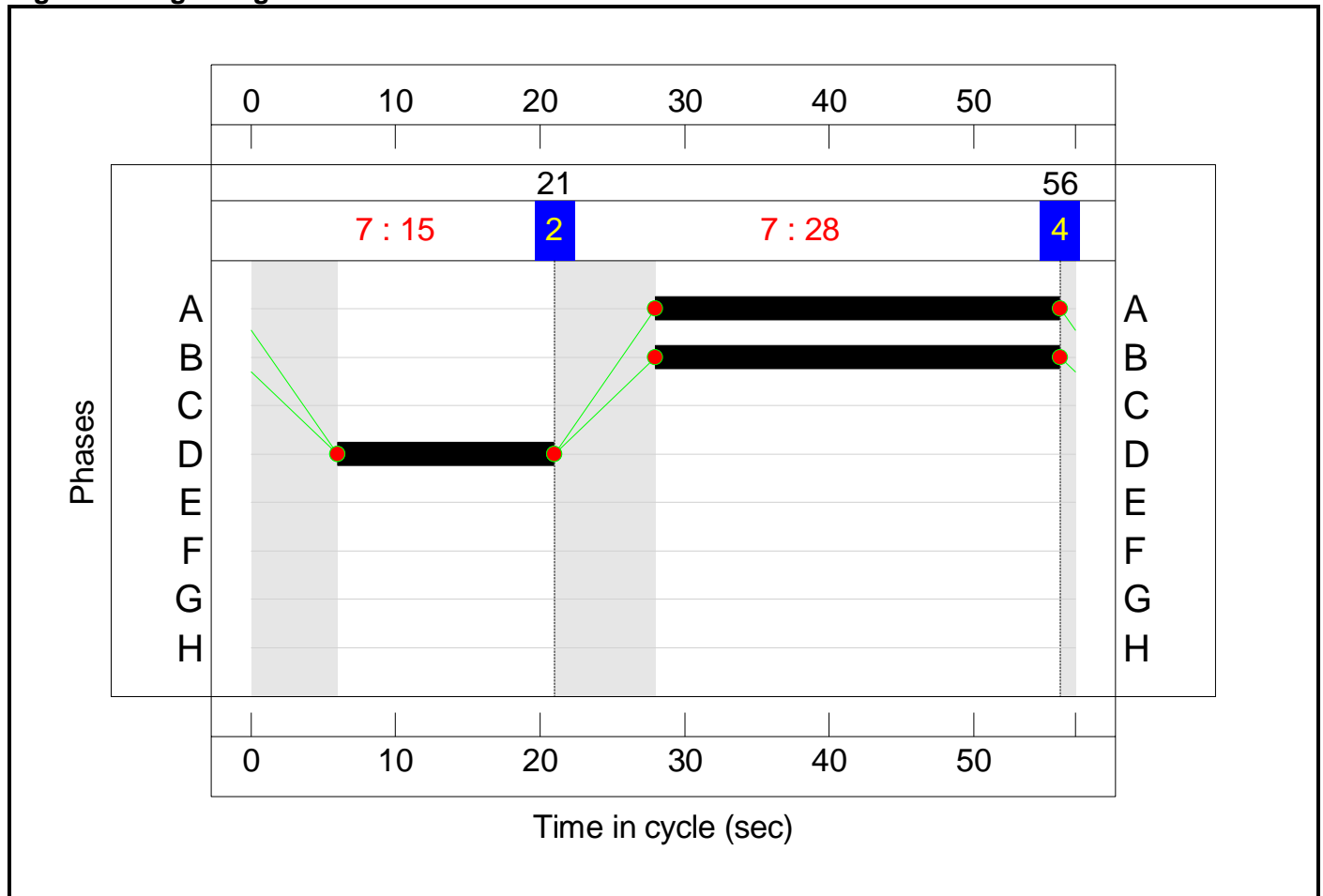
**Stage Sequence Diagram**



**Stage Timings**

Stage	2	4
Duration	28	15
Change Point	21	56

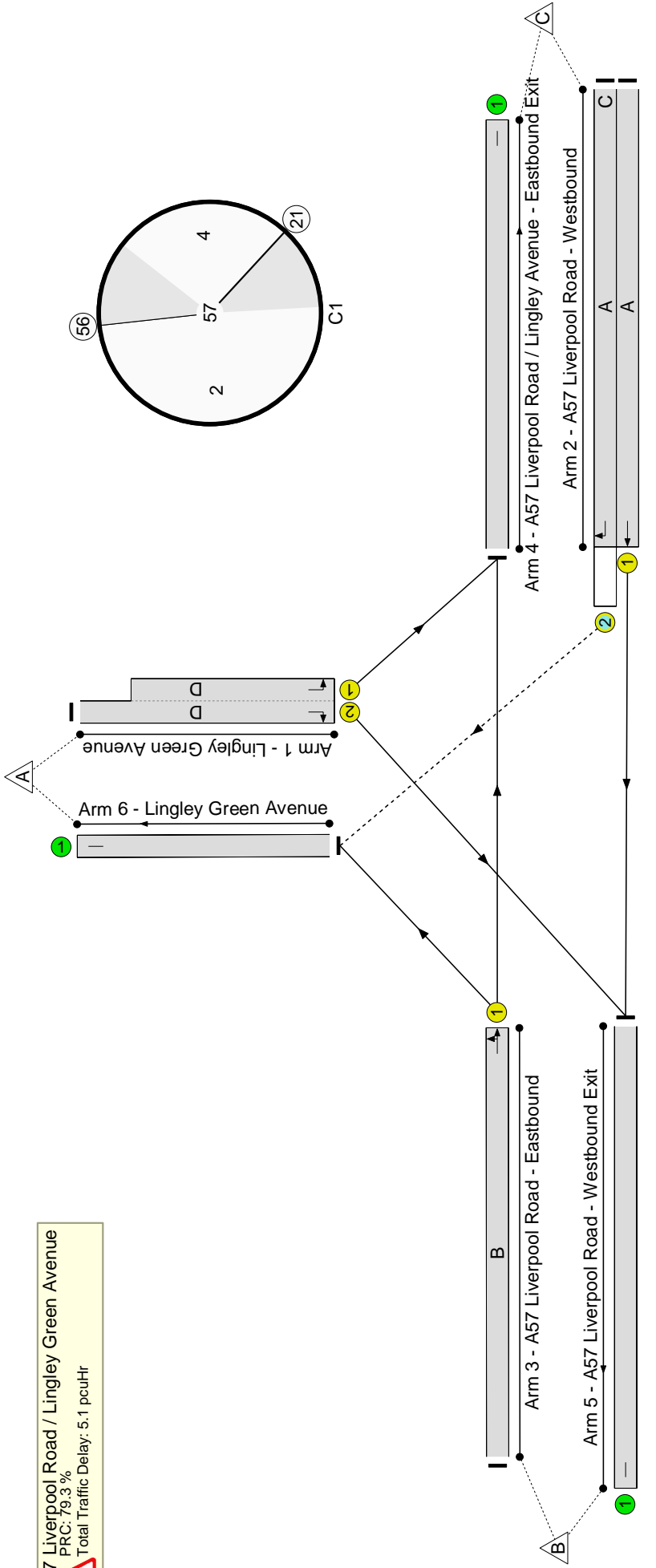
**Signal Timings Diagram**



Full Input Data And Results

**Network Layout Diagram**

A57 Liverpool Road / Lingley Green Avenue  
 PRC: 79.3 %  
 Total Traffic Delay: 5.1 pcuHr



Full Input Data And Results

**Network Results**

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	-	-	N/A	-	-		-	-	-	-	-	-	50.2%
A57 Liverpool Road / Lingley Green Avenue	-	-	N/A	-	-		-	-	-	-	-	-	50.2%
1/2+1/1	Lingley Green Avenue Left Right	U	N/A	N/A	D		1	15	-	315	1907:1861	535+201	42.8 : 42.8%
2/1	A57 Liverpool Road - Westbound Ahead	U	N/A	N/A	A		1	28	-	396	2115	1076	36.8%
2/2	A57 Liverpool Road - Westbound Right	O	N/A	N/A	A	C	1	28	0	57	1781	487	11.7%
3/1	A57 Liverpool Road - Eastbound Ahead Left	U	N/A	N/A	B		1	28	-	500	1958	996	50.2%
4/1	A57 Liverpool Road / Lingley Avenue - Eastbound Exit	U	N/A	N/A	-		-	-	-	423	Inf	Inf	0.0%
5/1	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	625	Inf	Inf	0.0%
6/1	Lingley Green Avenue	U	N/A	N/A	-		-	-	-	220	Inf	Inf	0.0%

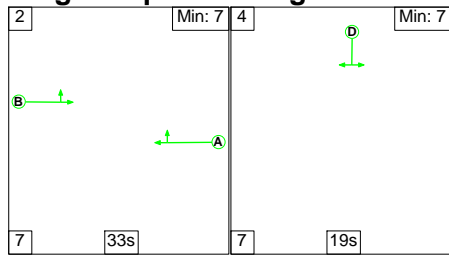
Full Input Data And Results

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	-	-	55	0	2	3.8	1.2	0.1	5.1	-	-	-	-
A57 Liverpool Road / Lingley Green Avenue	-	-	55	0	2	3.8	1.2	0.1	5.1	-	-	-	-
1/2+1/1	315	315	-	-	-	1.4	0.4	-	1.8	20.7	2.9	0.4	3.3
2/1	396	396	-	-	-	0.9	0.3	-	1.2	11.1	3.7	0.3	4.0
2/2	57	57	55	0	2	0.1	0.1	0.1	0.3	16.4	0.4	0.1	0.5
3/1	500	500	-	-	-	1.3	0.5	-	1.8	12.9	5.1	0.5	5.6
4/1	423	423	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	625	625	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	220	220	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
C1			PRC for Signalised Lanes (%): PRC Over All Lanes (%)	79.3 79.3	Total Delay for Signalised Lanes (pcuHr): Total Delay Over All Lanes (pcuHr):	5.08 5.08	Cycle Time (s):	57					

Full Input Data And Results

Scenario 3: 'Pm Peak Period' (FG2: '2017 PM Peak Period', Plan 1: 'Network Control Plan 1')

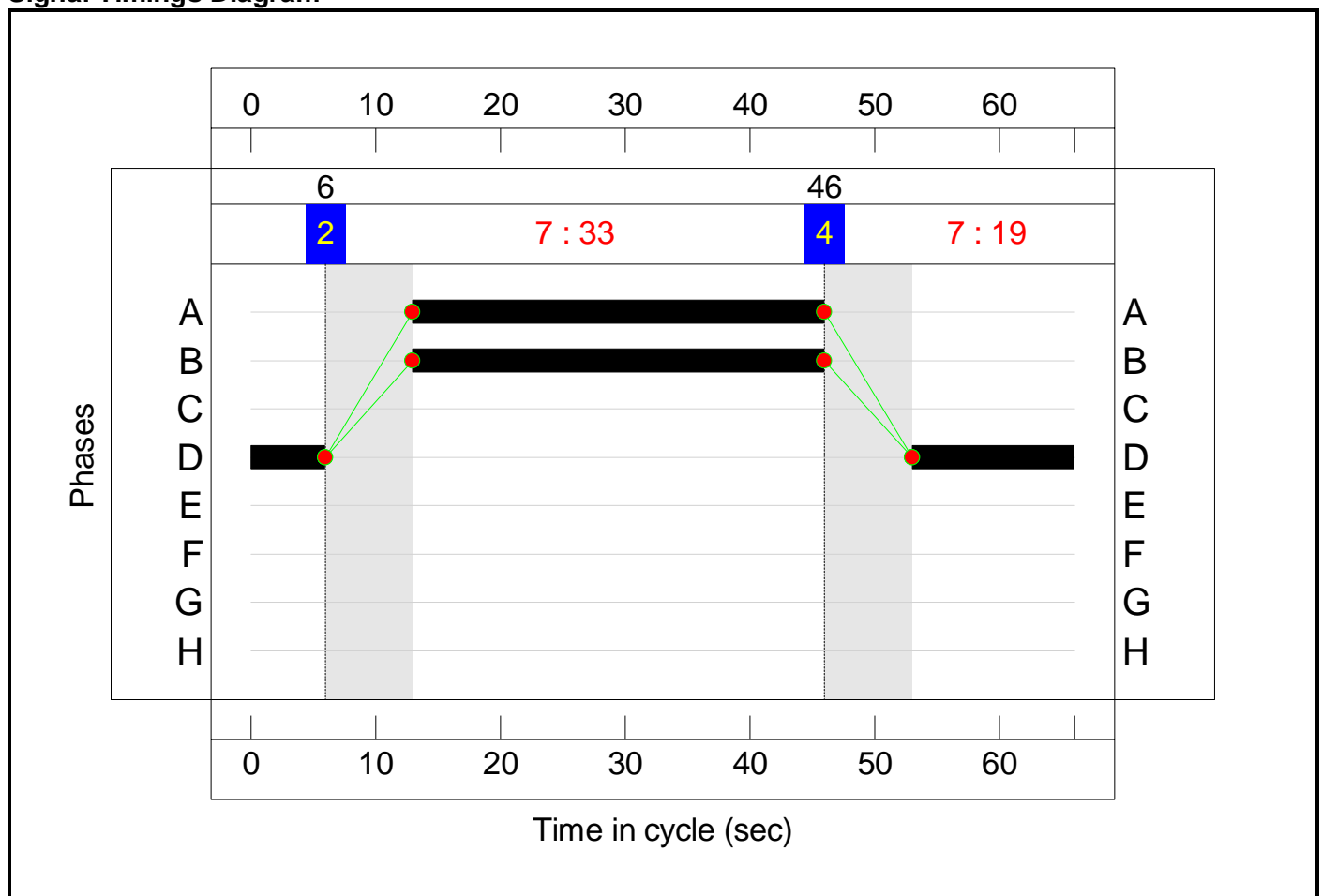
Stage Sequence Diagram



Stage Timings

Stage	2	4
Duration	33	19
Change Point	6	46

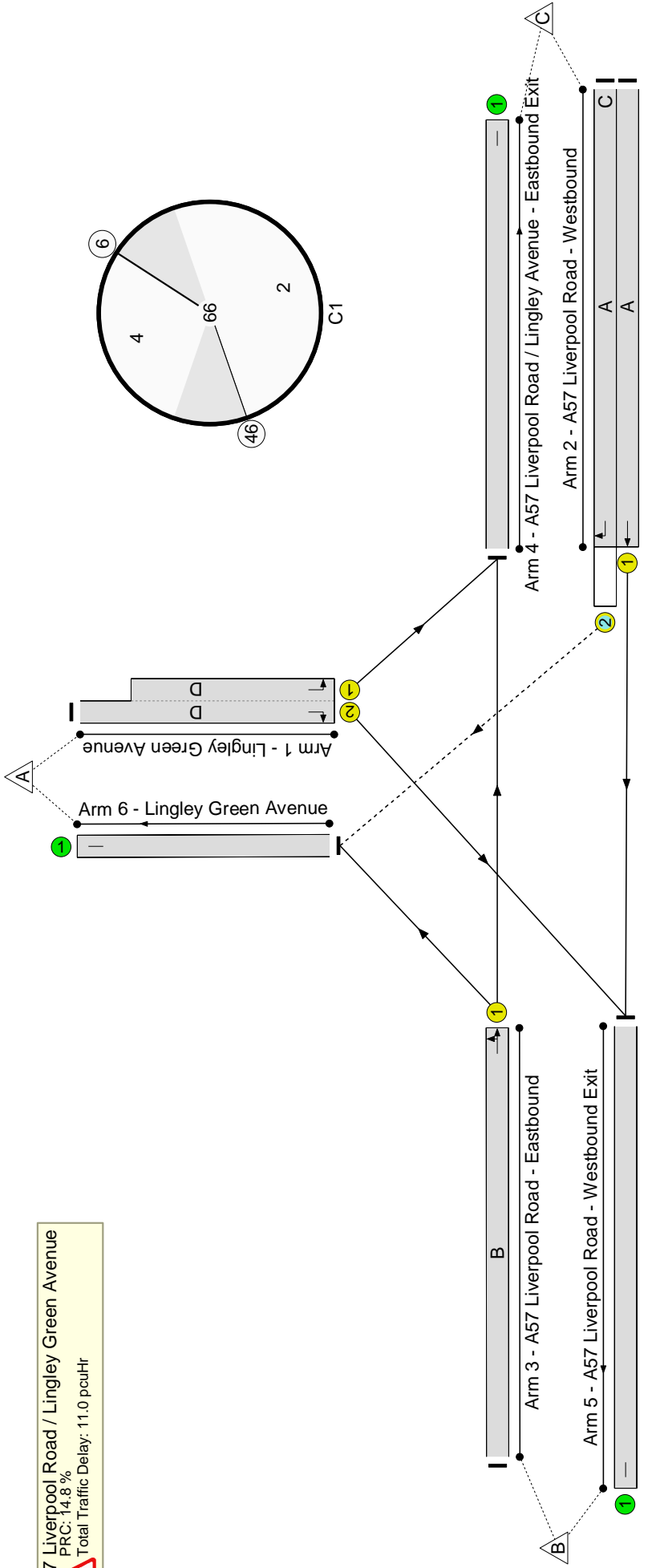
Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram

A57 Liverpool Road / Lingley Green Avenue  
PRC: 14.8 %  
Total Traffic Delay: 11.0 pcu\*hr



Full Input Data And Results

**Network Results**

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	-	-	N/A	-	-		-	-	-	-	-	-	78.4%
A57 Liverpool Road / Lingley Green Avenue	-	-	N/A	-	-		-	-	-	-	-	-	78.4%
1/2+1/1	Lingley Green Avenue Left Right	U	N/A	N/A	D		1	19	-	554	1907:1861	578+129	78.4 : 78.4%
2/1	A57 Liverpool Road - Westbound Ahead	U	N/A	N/A	A		1	33	-	576	2115	1090	52.9%
2/2	A57 Liverpool Road - Westbound Right	O	N/A	N/A	A	C	1	33	0	70	1781	335	20.9%
3/1	A57 Liverpool Road - Eastbound Ahead Left	U	N/A	N/A	B		1	33	-	687	1959	1009	68.1%
4/1	A57 Liverpool Road / Lingley Avenue - Eastbound Exit	U	N/A	N/A	-		-	-	-	558	Inf	Inf	0.0%
5/1	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	1029	Inf	Inf	0.0%
6/1	Lingley Green Avenue	U	N/A	N/A	-		-	-	-	300	Inf	Inf	0.0%



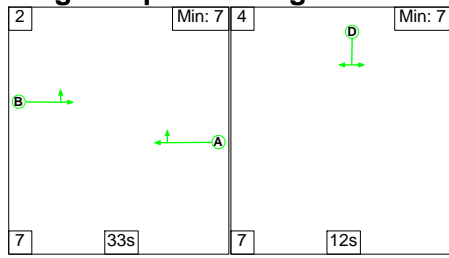
Full Input Data And Results

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	-	-	68	0	2	7.3	3.5	0.2	11.0	-	-	-	-
A57 Liverpool Road / Lingley Green Avenue	-	-	68	0	2	7.3	3.5	0.2	11.0	-	-	-	-
1/2+1/1	554	554	-	-	-	3.1	1.8	-	4.9	31.8	7.5	1.8	9.3
2/1	576	576	-	-	-	1.7	0.6	-	2.3	14.2	6.9	0.6	7.4
2/2	70	70	68	0	2	0.2	0.1	0.2	0.5	25.8	0.6	0.1	0.8
3/1	687	687	-	-	-	2.3	1.1	-	3.3	17.5	9.4	1.1	10.4
4/1	558	558	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	1029	1029	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	300	300	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
C1													
			PRC for Signalised Lanes (%):	14.8	Total Delay for Signalised Lanes (pcuHr):		11.00	Cycle Time (s):		66			
			PRC Over All Lanes (%):	14.8	Total Delay Over All Lanes (pcuHr):		11.00						

Full Input Data And Results

Scenario 4: '2027 Am Peak Period' (FG4: '2027 AM Peak Period', Plan 1: 'Network Control Plan 1')

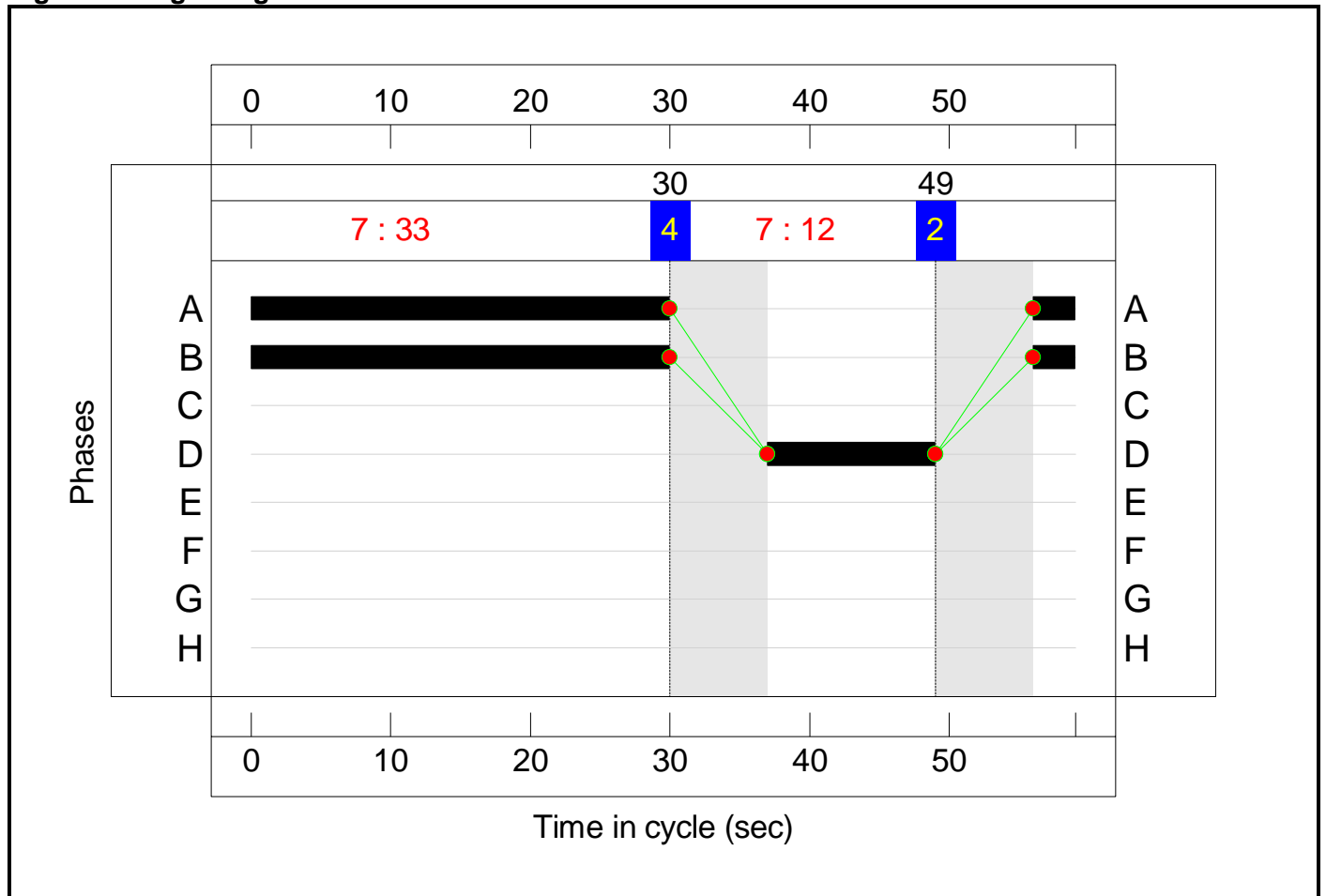
Stage Sequence Diagram



Stage Timings

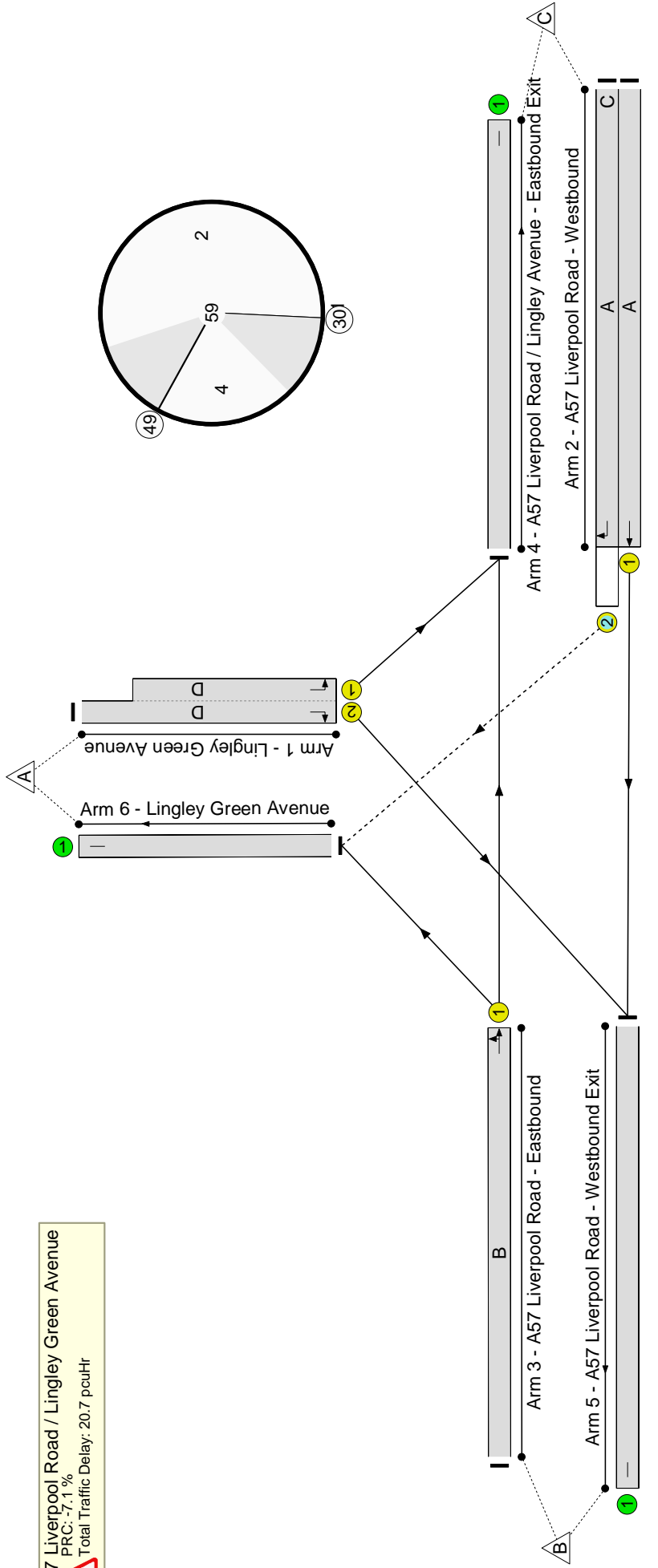
Stage	2	4
Duration	33	12
Change Point	49	30

Signal Timings Diagram



**Network Layout Diagram**

A57 Liverpool Road / Lingley Green Avenue  
 PRC: -7.1%  
 Total Traffic Delay: 20.7 pcu\*hr



Full Input Data And Results

**Network Results**

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	-	-	N/A	-	-		-	-	-	-	-	-	96.4%
A57 Liverpool Road / Lingley Green Avenue	-	-	N/A	-	-		-	-	-	-	-	-	96.4%
1/2+1/1	Lingley Green Avenue Left Right	U	N/A	N/A	D		1	12	-	452	1907:1861	420+104	86.2 : 86.2%
2/1	A57 Liverpool Road - Westbound Ahead	U	N/A	N/A	A		1	33	-	524	2115	1219	43.0%
2/2	A57 Liverpool Road - Westbound Right	O	N/A	N/A	A	C	1	33	0	79	1781	193	40.9%
3/1	A57 Liverpool Road - Eastbound Ahead Left	U	N/A	N/A	B		1	33	-	1072	1930	1112	96.4%
4/1	A57 Liverpool Road / Lingley Avenue - Eastbound Exit	U	N/A	N/A	-		-	-	-	621	Inf	Inf	0.0%
5/1	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	886	Inf	Inf	0.0%
6/1	Lingley Green Avenue	U	N/A	N/A	-		-	-	-	620	Inf	Inf	0.0%

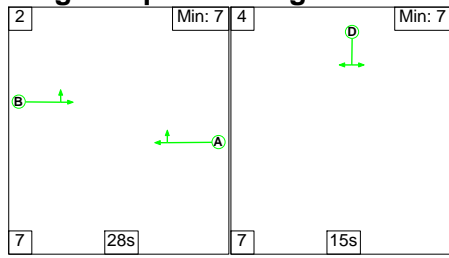
Full Input Data And Results

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	-	-	10	0	69	7.4	12.8	0.5	20.7	-	-	-	-
A57 Liverpool Road / Lingley Green Avenue	-	-	10	0	69	7.4	12.8	0.5	20.7	-	-	-	-
1/2+1/1	452	452	-	-	-	2.7	2.9	-	5.6	44.4	5.6	2.9	8.5
2/1	524	524	-	-	-	1.0	0.4	-	1.4	9.6	4.8	0.4	5.2
2/2	79	79	10	0	69	0.1	0.3	0.5	1.0	44.3	0.6	0.3	0.9
3/1	1072	1072	-	-	-	3.5	9.2	-	12.7	42.7	16.7	9.2	25.8
4/1	621	621	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	886	886	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	620	620	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
C1			PRC for Signalised Lanes (%):	-7.1	Total Delay for Signalised Lanes (pcuHr):	20.66	Cycle Time (s):	59					
			PRC Over All Lanes (%):	-7.1	Total Delay Over All Lanes (pcuHr):	20.66							

Full Input Data And Results

Scenario 5: '2027 Interpeak' (FG6: '2027 Interpeak Period', Plan 1: 'Network Control Plan 1')

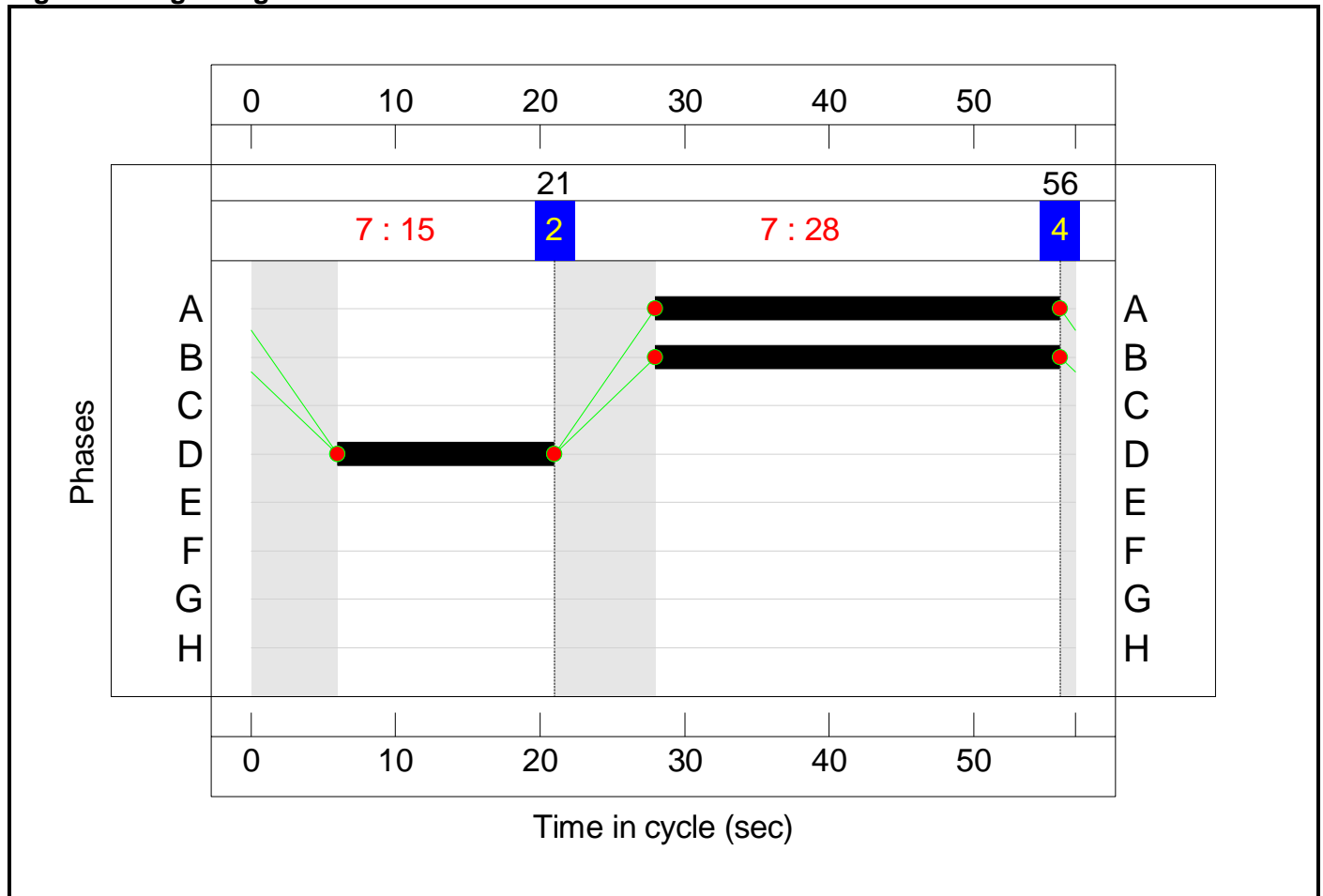
Stage Sequence Diagram



Stage Timings

Stage	2	4
Duration	28	15
Change Point	21	56

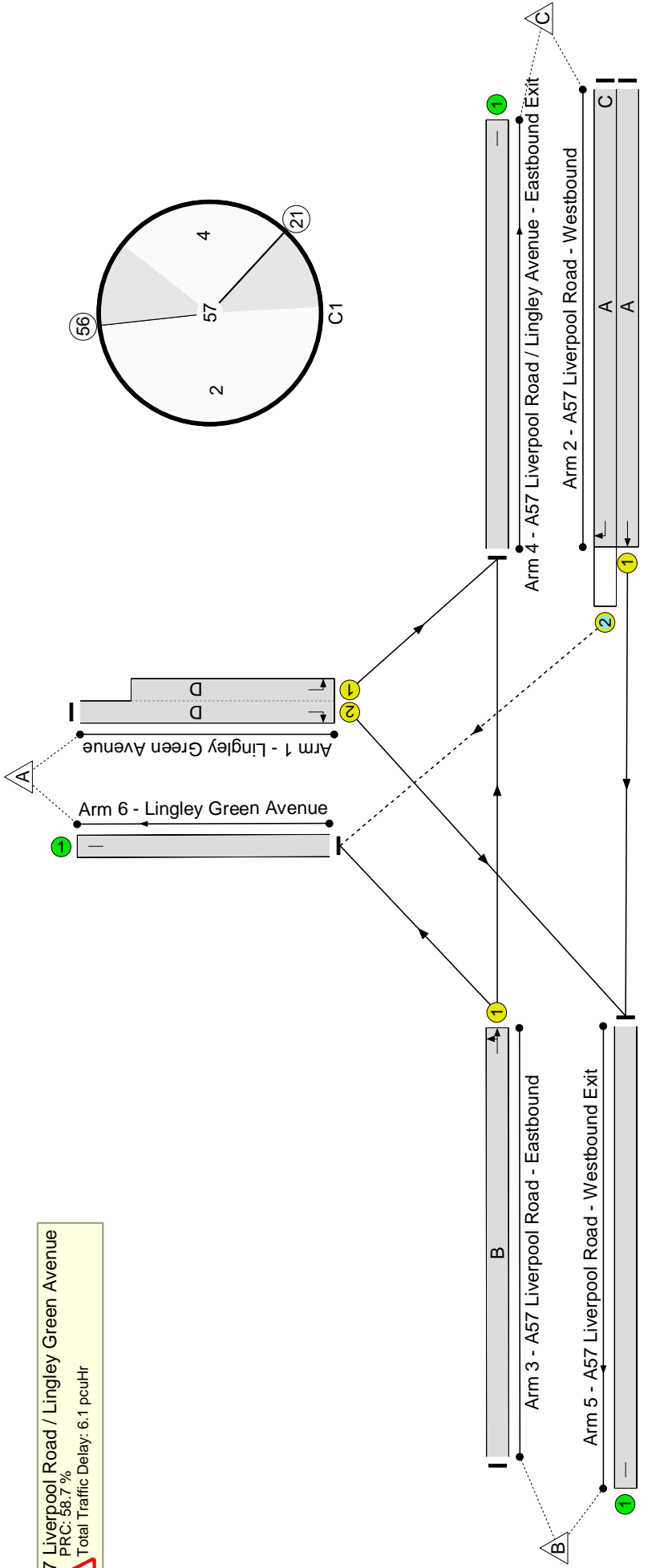
Signal Timings Diagram



Full Input Data And Results

**Network Layout Diagram**

A57 Liverpool Road / Lingley Green Avenue  
 PRC: 58.7 %  
 Total Traffic Delay: 6.1 pcuHr

Full Input Data And Results

**Network Results**

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	-	-	N/A	-	-		-	-	-	-	-	-	56.7%
A57 Liverpool Road / Lingley Green Avenue	-	-	N/A	-	-		-	-	-	-	-	-	56.7%
1/2+1/1	Lingley Green Avenue Left Right	U	N/A	N/A	D		1	15	-	367	1907:1861	535+206	49.5 : 49.5%
2/1	A57 Liverpool Road - Westbound Ahead	U	N/A	N/A	A		1	28	-	437	2115	1076	40.6%
2/2	A57 Liverpool Road - Westbound Right	O	N/A	N/A	A	C	1	28	0	68	1781	440	15.4%
3/1	A57 Liverpool Road - Eastbound Ahead Left	U	N/A	N/A	B		1	28	-	564	1955	995	56.7%
4/1	A57 Liverpool Road / Lingley Avenue - Eastbound Exit	U	N/A	N/A	-		-	-	-	475	Inf	Inf	0.0%
5/1	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	702	Inf	Inf	0.0%
6/1	Lingley Green Avenue	U	N/A	N/A	-		-	-	-	259	Inf	Inf	0.0%



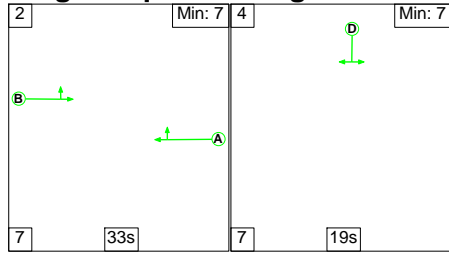
Full Input Data And Results

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	-	-	66	0	2	4.4	1.6	0.1	6.1	-	-	-	-
A57 Liverpool Road / Lingley Green Avenue	-	-	66	0	2	4.4	1.6	0.1	6.1	-	-	-	-
1/2+1/1	367	367	-	-	-	1.7	0.5	-	2.2	21.5	3.5	0.5	3.9
2/1	437	437	-	-	-	1.1	0.3	-	1.4	11.5	4.2	0.3	4.6
2/2	68	68	66	0	2	0.1	0.1	0.1	0.3	18.4	0.5	0.1	0.6
3/1	564	564	-	-	-	1.5	0.7	-	2.2	13.8	6.1	0.7	6.8
4/1	475	475	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	702	702	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	259	259	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
C1			PRC for Signalised Lanes (%): PRC Over All Lanes (%)	58.7 58.7	Total Delay for Signalised Lanes (pcuHr): Total Delay Over All Lanes (pcuHr):	6.10 6.10	Cycle Time (s):	57					

Full Input Data And Results

Scenario 6: '2027 Pm Peak Period' (FG5: '2027 PM Peak Period', Plan 1: 'Network Control Plan 1')

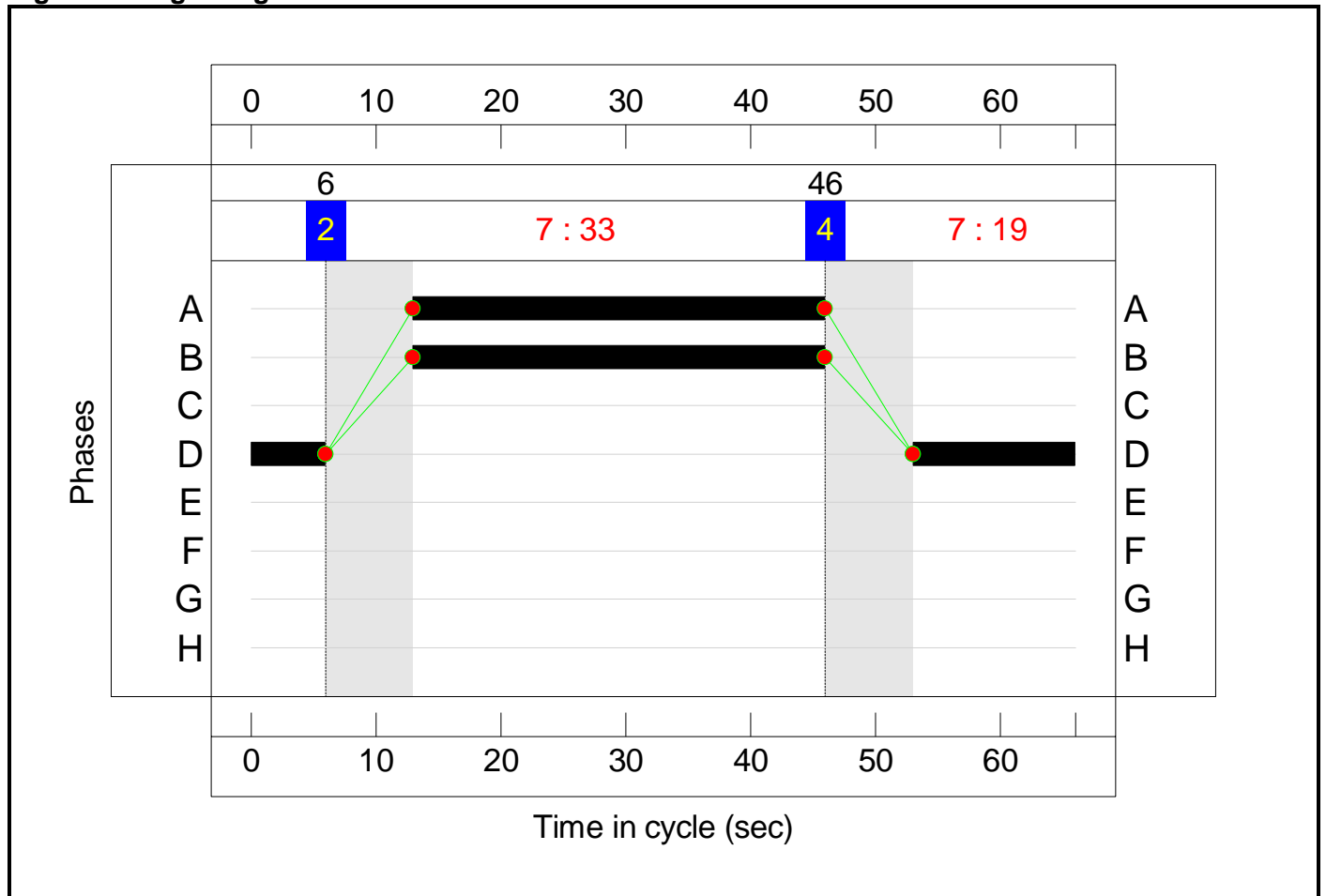
Stage Sequence Diagram



Stage Timings

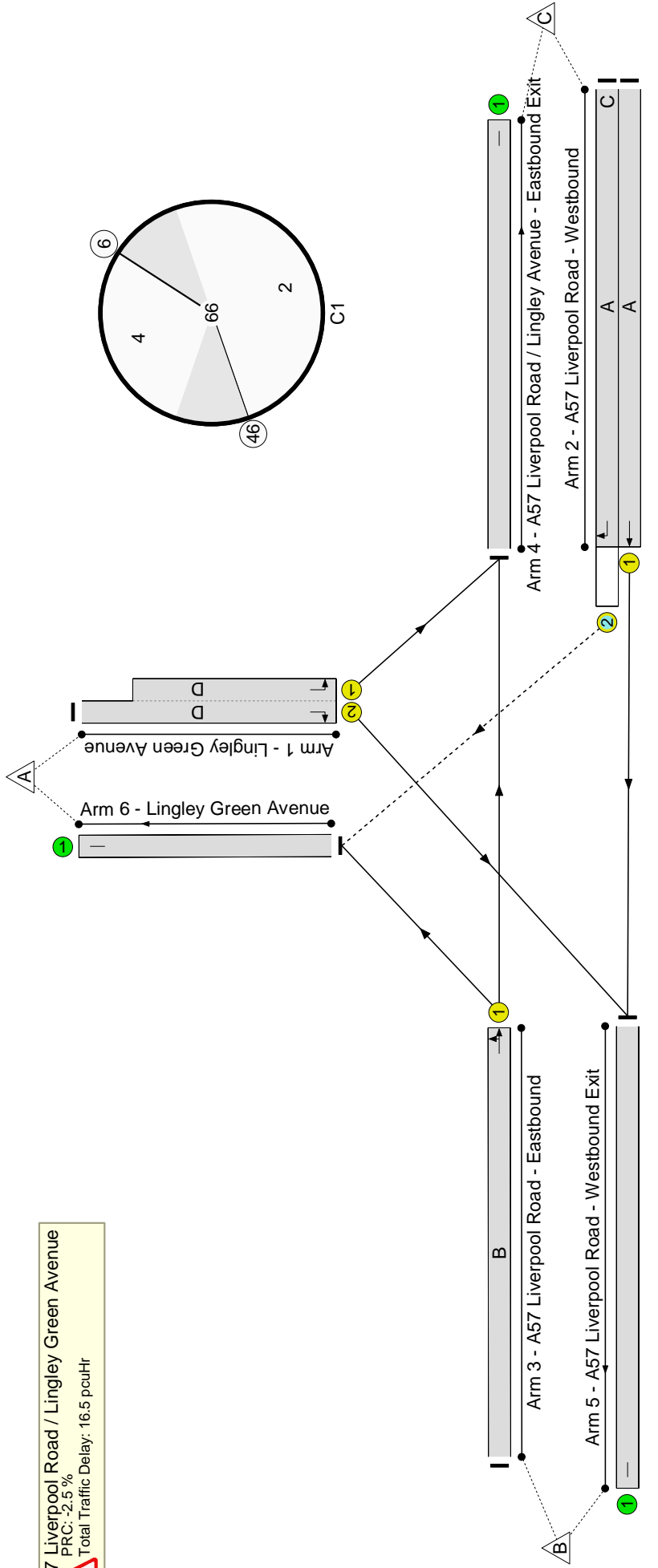
Stage	2	4
Duration	33	19
Change Point	6	46

Signal Timings Diagram



### Network Layout Diagram

A57 Liverpool Road / Lingley Green Avenue  
PRC: -2.5 %  
Total Traffic Delay: 16.5 pcu/hr



Full Input Data And Results

**Network Results**

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network	-	-	N/A	-	-		-	-	-	-	-	-	92.2%
A57 Liverpool Road / Lingley Green Avenue	-	-	N/A	-	-		-	-	-	-	-	-	92.2%
1/2+1/1	Lingley Green Avenue Left Right	U	N/A	N/A	D		1	19	-	653	1907:1861	578+130	92.2 : 92.2%
2/1	A57 Liverpool Road - Westbound Ahead	U	N/A	N/A	A		1	33	-	625	2115	1090	57.4%
2/2	A57 Liverpool Road - Westbound Right	O	N/A	N/A	A	C	1	33	0	83	1781	283	29.3%
3/1	A57 Liverpool Road - Eastbound Ahead Left	U	N/A	N/A	B		1	33	-	765	1957	1008	75.9%
4/1	A57 Liverpool Road / Lingley Avenue - Eastbound Exit	U	N/A	N/A	-		-	-	-	615	Inf	Inf	0.0%
5/1	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	1158	Inf	Inf	0.0%
6/1	Lingley Green Avenue	U	N/A	N/A	-		-	-	-	353	Inf	Inf	0.0%

Full Input Data And Results

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	-	-	80	0	3	8.7	7.5	0.3	16.5	-	-	-	-
A57 Liverpool Road / Lingley Green Avenue	-	-	80	0	3	8.7	7.5	0.3	16.5	-	-	-	-
1/2+1/1	653	653	-	-	-	3.9	5.0	-	8.9	49.0	9.3	5.0	14.3
2/1	625	625	-	-	-	1.9	0.7	-	2.6	14.9	7.8	0.7	8.5
2/2	83	83	80	0	3	0.2	0.2	0.3	0.7	31.8	0.8	0.2	1.0
3/1	765	765	-	-	-	2.7	1.6	-	4.3	20.0	11.1	1.6	12.6
4/1	615	615	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	1158	1158	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	353	353	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
C1			PRC for Signalised Lanes (%): PRC Over All Lanes (%)	-2.5 -2.5	Total Delay for Signalised Lanes (pcuHr): Total Delay Over All Lanes (pcuHr):	16.46 16.46	Cycle Time (s):	66					

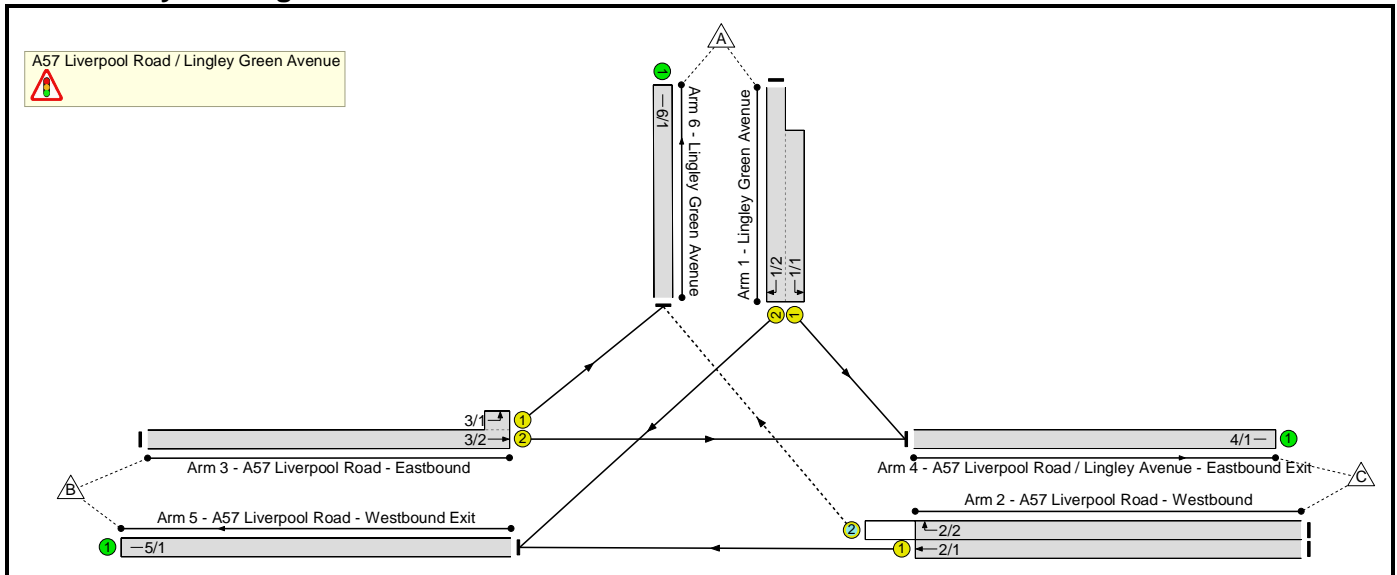
## Annex E: LinSig Layout 2 Model Outputs

Full Input Data And Results  
**Full Input Data And Results**

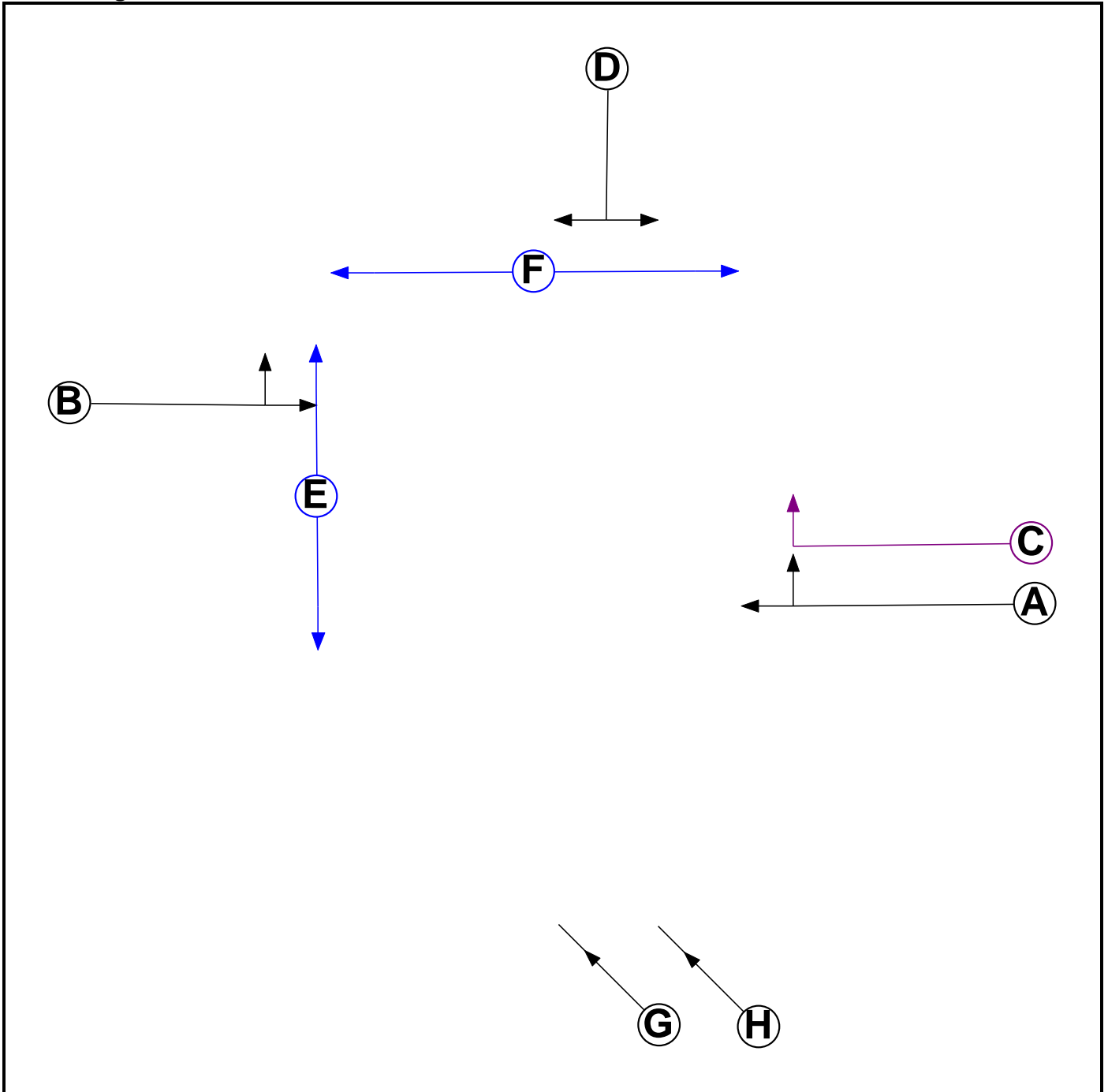
**User and Project Details**

<b>Project:</b>	Omega Gateway Highway Junction Improvement Package
<b>Title:</b>	<b>Layout 1</b>
<b>Location:</b>	<b>A57 Liverpool Road / A57 Lingley Green Avenue</b>
<b>Additional detail:</b>	
<b>File name:</b>	3. A57 Liverpool Rd - Lingley Green Avenue, two exit lanes, Final Future year with left turn lane.lsg3x
<b>Author:</b>	Alistair Johnson
<b>Company:</b>	AECOM
<b>Address:</b>	1 Dale Street, Liverpool, L2 2ET

**Network Layout Diagram**



**Phase Diagram**



**Phase Input Data**

Phase Name	Phase Type	Assoc. Phase	Street Min	Cont Min
A	Traffic		7	7
B	Traffic		7	7
C	Ind. Arrow	A	4	4
D	Traffic		7	7
E	Pedestrian		7	7
F	Pedestrian		9	9
G	Traffic		3	3
H	Traffic		7	7



## Full Input Data And Results

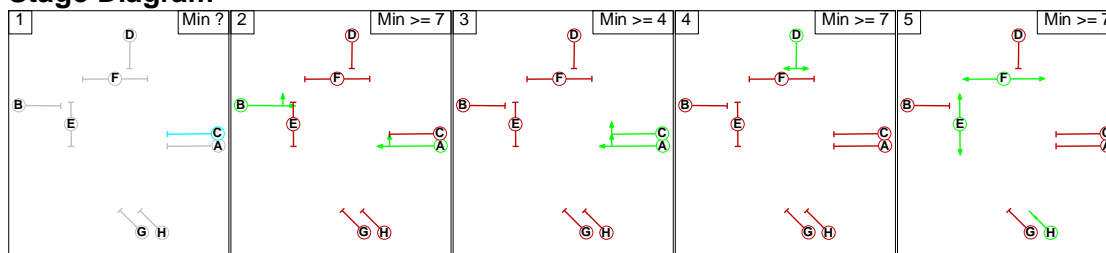
### Phase Intergrens Matrix

		Starting Phase							
		A	B	C	D	E	F	G	H
Terminating Phase	A	-	-	7	5	12	3	12	
	B	-	-	7	7	12	10	3	5
	C	-	8	-	7	-	12	3	12
	D	7	7	7	-	11	5	3	5
	E	1	1	-	1	-	-	1	-
	F	1	1	1	1	-	-	1	-
	G	2	2	2	2	2	2	-	3
	H	2	2	2	2	-	-	2	-

### Phases in Stage

Stage No.	Phases in Stage
1	
2	A B
3	A C
4	D
5	E F H

### Stage Diagram



### Phase Delays

Term. Stage	Start Stage	Phase	Type	Value	Cont value
There are no Phase Delays defined					

### Prohibited Stage Change

		To Stage				
		1	2	3	4	5
From Stage	1	-	X	X	X	X
	2	X	-	7	7	12
	3	X	X	-	7	12
	4	X	7	7	-	11
	5	X	2	2	2	-

Full Input Data And Results  
**Give-Way Lane Input Data**

Junction: A57 Liverpool Road / Lingley Green Avenue											
Lane	Movement	Max Flow when Giving Way (PCU/Hr)	Min Flow when Giving Way (PCU/Hr)	Opposing Lane	Opp. Lane Coeff.	Opp. Mvmnts.	Right Turn Storage (PCU)	Non-Blocking Storage (PCU)	RTF	Right Turn Move up (s)	Max Turns in Intergreen (PCU)
2/2 (A57 Liverpool Road - Westbound)	6/1 (Right)	1439	0	3/2 3/1	1.09 1.09	All All	4.00	-	0.50	4	3.00

Full Input Data And Results

**Lane Input Data**

Junction: A57 Liverpool Road / Lingley Green Avenue												
Lane	Lane Type	Phases	Start Disp.	End Disp.	Physical Length (PCU)	Sat Flow Type	Def User Saturation Flow (PCU/Hr)	Lane Width (m)	Gradient	Nearside Lane	Turns	Turning Radius (m)
1/1 (Lingley Green Avenue)	U	D	2	3	17.4	User	1861	-	-	-	-	-
1/2 (Lingley Green Avenue)	U	D	2	3	60.0	User	1907	-	-	-	-	-
2/1 (A57 Liverpool Road - Westbound)	U	A	2	3	60.0	User	2115	-	-	-	-	-
2/2 (A57 Liverpool Road - Westbound)	O	A C	2	3	60.0	User	1781	-	-	-	-	-
3/1 (A57 Liverpool Road - Eastbound)	U	B	2	3	2.0	User	1843	-	-	-	-	-
3/2 (A57 Liverpool Road - Eastbound)	U	B	2	3	60.0	User	2015	-	-	-	-	-
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit)	U		2	3	60.0	Inf	-	-	-	-	-	-
5/1 (A57 Liverpool Road - Westbound Exit)	U		2	3	60.0	Inf	-	-	-	-	-	-
6/1 (Lingley Green Avenue)	U		2	3	60.0	Inf	-	-	-	-	-	-

**Traffic Flow Groups**

Flow Group	Start Time	End Time	Duration	Formula
1: '2017 AM Peak Period'	07:30	08:30	01:00	
2: '2017 PM Peak Period'	16:30	17:30	01:00	
3: '2017 Interpeak Period'	14:45	15:45	01:00	
4: '2027 AM Peak Period'	07:30	08:30	01:00	
5: '2027 PM Peak Period'	16:30	17:30	01:00	
6: '2027 Interpeak Period'	14:45	15:45	01:00	

## Full Input Data And Results

**Scenario 1: 'Am Peak Period'** (FG1: '2017 AM Peak Period', Plan 1: 'Network Control Plan 1')

### Traffic Flows, Desired

**Desired Flow :**

	Destination				
		A	B	C	Tot.
Origin	A	0	305	75	380
	B	457	0	485	942
	C	66	480	0	546
	Tot.	523	785	560	1868

### Traffic Lane Flows

Lane	Scenario 1: Am Peak Period
<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>	
1/1 (short)	75
1/2 (with short)	380(In) 305(Out)
2/1	480
2/2	66
3/1 (short)	457
3/2 (with short)	942(In) 485(Out)
4/1	560
5/1	785
6/1	523

**Lane Saturation Flows**

Junction: A57 Liverpool Road / Lingley Green Avenue								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (Lingley Green Avenue Lane 1)							1861	1861
1/2 (Lingley Green Avenue Lane 2)							1907	1907
2/1 (A57 Liverpool Road - Westbound Lane 1)							2115	2115
2/2 (A57 Liverpool Road - Westbound Lane 2)							1781	1781
3/1 (A57 Liverpool Road - Eastbound Lane 1)							1843	1843
3/2 (A57 Liverpool Road - Eastbound Lane 2)							2015	2015
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit Lane 1)							Inf	Inf
5/1 (A57 Liverpool Road - Westbound Exit Lane 1)							Inf	Inf
6/1 (Lingley Green Avenue Lane 1)							Inf	Inf

**Scenario 2: 'Interpeak'** (FG3: '2017 Interpeak Period', Plan 1: 'Network Control Plan 1')**Traffic Flows, Desired****Desired Flow :**

	Destination				
		A	B	C	Tot.
Origin	A	0	229	86	315
	B	163	0	337	500
	C	57	396	0	453
	Tot.	220	625	423	1268

Full Input Data And Results

**Traffic Lane Flows**

Lane	Scenario 2: Interpeak
<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>	
1/1 (short)	86
1/2 (with short)	315(In) 229(Out)
2/1	396
2/2	57
3/1 (short)	163
3/2 (with short)	500(In) 337(Out)
4/1	423
5/1	625
6/1	220

**Lane Saturation Flows**

<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (Lingley Green Avenue Lane 1)	This lane uses a directly entered Saturation Flow						1861	1861
1/2 (Lingley Green Avenue Lane 2)	This lane uses a directly entered Saturation Flow						1907	1907
2/1 (A57 Liverpool Road - Westbound Lane 1)	This lane uses a directly entered Saturation Flow						2115	2115
2/2 (A57 Liverpool Road - Westbound Lane 2)	This lane uses a directly entered Saturation Flow						1781	1781
3/1 (A57 Liverpool Road - Eastbound Lane 1)	This lane uses a directly entered Saturation Flow						1843	1843
3/2 (A57 Liverpool Road - Eastbound Lane 2)	This lane uses a directly entered Saturation Flow						2015	2015
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit Lane 1)	Infinite Saturation Flow						Inf	Inf
5/1 (A57 Liverpool Road - Westbound Exit Lane 1)	Infinite Saturation Flow						Inf	Inf
6/1 (Lingley Green Avenue Lane 1)	Infinite Saturation Flow						Inf	Inf

Full Input Data And Results

**Scenario 3: 'Pm Peak Period'** (FG2: '2017 PM Peak Period', Plan 1: 'Network Control Plan 1')

**Traffic Flows, Desired**

**Desired Flow :**

Origin	Destination				
	A	B	C	Tot.	
A	0	453	101	554	
B	230	0	457	687	
C	70	576	0	646	
Tot.	300	1029	558	1887	

**Traffic Lane Flows**

Lane	Scenario 3: Pm Peak Period
<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>	
1/1 (short)	101
1/2 (with short)	554(In) 453(Out)
2/1	576
2/2	70
3/1 (short)	230
3/2 (with short)	687(In) 457(Out)
4/1	558
5/1	1029
6/1	300

**Lane Saturation Flows**

Junction: A57 Liverpool Road / Lingley Green Avenue								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (Lingley Green Avenue Lane 1)							1861	1861
1/2 (Lingley Green Avenue Lane 2)							1907	1907
2/1 (A57 Liverpool Road - Westbound Lane 1)							2115	2115
2/2 (A57 Liverpool Road - Westbound Lane 2)							1781	1781
3/1 (A57 Liverpool Road - Eastbound Lane 1)							1843	1843
3/2 (A57 Liverpool Road - Eastbound Lane 2)							2015	2015
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit Lane 1)							Inf	Inf
5/1 (A57 Liverpool Road - Westbound Exit Lane 1)							Inf	Inf
6/1 (Lingley Green Avenue Lane 1)							Inf	Inf

**Scenario 4: '2027 Am Peak Period'** (FG4: '2027 AM Peak Period', Plan 1: 'Network Control Plan 1')

**Traffic Flows, Desired**

**Desired Flow :**

	Destination				
		A	B	C	Tot.
Origin	A	0	362	90	452
	B	541	0	531	1072
	C	79	524	0	603
	Tot.	620	886	621	2127



Full Input Data And Results

**Traffic Lane Flows**

Lane	Scenario 4: 2027 Am Peak Period
<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>	
1/1 (short)	90
1/2 (with short)	452(In) 362(Out)
2/1	524
2/2	79
3/1 (short)	541
3/2 (with short)	1072(In) 531(Out)
4/1	621
5/1	886
6/1	620

**Lane Saturation Flows**

<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (Lingley Green Avenue Lane 1)	This lane uses a directly entered Saturation Flow						1861	1861
1/2 (Lingley Green Avenue Lane 2)	This lane uses a directly entered Saturation Flow						1907	1907
2/1 (A57 Liverpool Road - Westbound Lane 1)	This lane uses a directly entered Saturation Flow						2115	2115
2/2 (A57 Liverpool Road - Westbound Lane 2)	This lane uses a directly entered Saturation Flow						1781	1781
3/1 (A57 Liverpool Road - Eastbound Lane 1)	This lane uses a directly entered Saturation Flow						1843	1843
3/2 (A57 Liverpool Road - Eastbound Lane 2)	This lane uses a directly entered Saturation Flow						2015	2015
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit Lane 1)	Infinite Saturation Flow						Inf	Inf
5/1 (A57 Liverpool Road - Westbound Exit Lane 1)	Infinite Saturation Flow						Inf	Inf
6/1 (Lingley Green Avenue Lane 1)	Infinite Saturation Flow						Inf	Inf

Full Input Data And Results

**Scenario 5: '2027 Interpeak'** (FG6: '2027 Interpeak Period', Plan 1: 'Network Control Plan 1')

**Traffic Flows, Desired**

**Desired Flow :**

Origin	Destination				
	A	B	C	Tot.	
A	0	265	102	367	
B	191	0	373	564	
C	68	437	0	505	
Tot.	259	702	475	1436	

**Traffic Lane Flows**

Lane	Scenario 5: 2027 Interpeak
<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>	
1/1 (short)	102
1/2 (with short)	367(In) 265(Out)
2/1	437
2/2	68
3/1 (short)	191
3/2 (with short)	564(In) 373(Out)
4/1	475
5/1	702
6/1	259

**Lane Saturation Flows**

Junction: A57 Liverpool Road / Lingley Green Avenue								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (Lingley Green Avenue Lane 1)							1861	1861
1/2 (Lingley Green Avenue Lane 2)							1907	1907
2/1 (A57 Liverpool Road - Westbound Lane 1)							2115	2115
2/2 (A57 Liverpool Road - Westbound Lane 2)							1781	1781
3/1 (A57 Liverpool Road - Eastbound Lane 1)							1843	1843
3/2 (A57 Liverpool Road - Eastbound Lane 2)							2015	2015
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit Lane 1)							Inf	Inf
5/1 (A57 Liverpool Road - Westbound Exit Lane 1)							Inf	Inf
6/1 (Lingley Green Avenue Lane 1)							Inf	Inf

**Scenario 6: '2027 Pm Peak Period'** (FG5: '2027 PM Peak Period', Plan 1: 'Network Control Plan 1')

**Traffic Flows, Desired**

**Desired Flow :**

	Destination				
		A	B	C	Tot.
Origin	A	0	533	120	653
	B	270	0	495	765
	C	83	625	0	708
	Tot.	353	1158	615	2126

Full Input Data And Results

**Traffic Lane Flows**

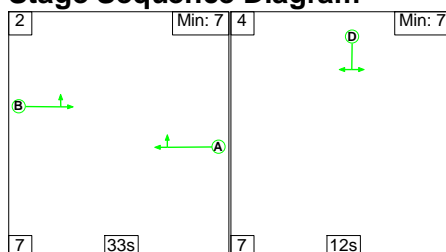
Lane	Scenario 6: 2027 Pm Peak Period
<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>	
1/1 (short)	120
1/2 (with short)	653(In) 533(Out)
2/1	625
2/2	83
3/1 (short)	270
3/2 (with short)	765(In) 495(Out)
4/1	615
5/1	1158
6/1	353

**Lane Saturation Flows**

<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (Lingley Green Avenue Lane 1)	This lane uses a directly entered Saturation Flow						1861	1861
1/2 (Lingley Green Avenue Lane 2)	This lane uses a directly entered Saturation Flow						1907	1907
2/1 (A57 Liverpool Road - Westbound Lane 1)	This lane uses a directly entered Saturation Flow						2115	2115
2/2 (A57 Liverpool Road - Westbound Lane 2)	This lane uses a directly entered Saturation Flow						1781	1781
3/1 (A57 Liverpool Road - Eastbound Lane 1)	This lane uses a directly entered Saturation Flow						1843	1843
3/2 (A57 Liverpool Road - Eastbound Lane 2)	This lane uses a directly entered Saturation Flow						2015	2015
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit Lane 1)	Infinite Saturation Flow						Inf	Inf
5/1 (A57 Liverpool Road - Westbound Exit Lane 1)	Infinite Saturation Flow						Inf	Inf
6/1 (Lingley Green Avenue Lane 1)	Infinite Saturation Flow						Inf	Inf

**Scenario 1: 'Am Peak Period'** (FG1: '2017 AM Peak Period', Plan 1: 'Network Control Plan 1')

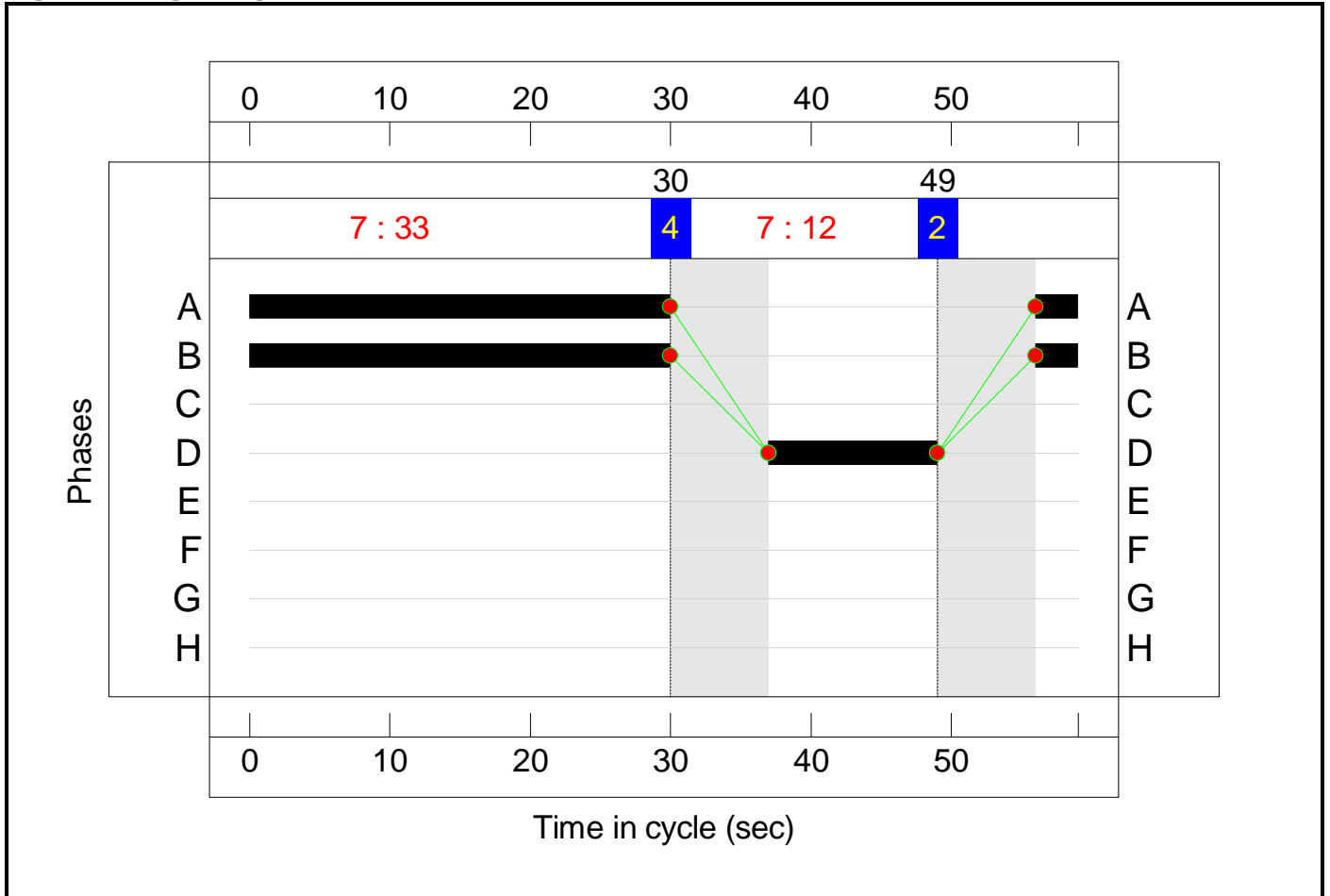
**Stage Sequence Diagram**



**Stage Timings**

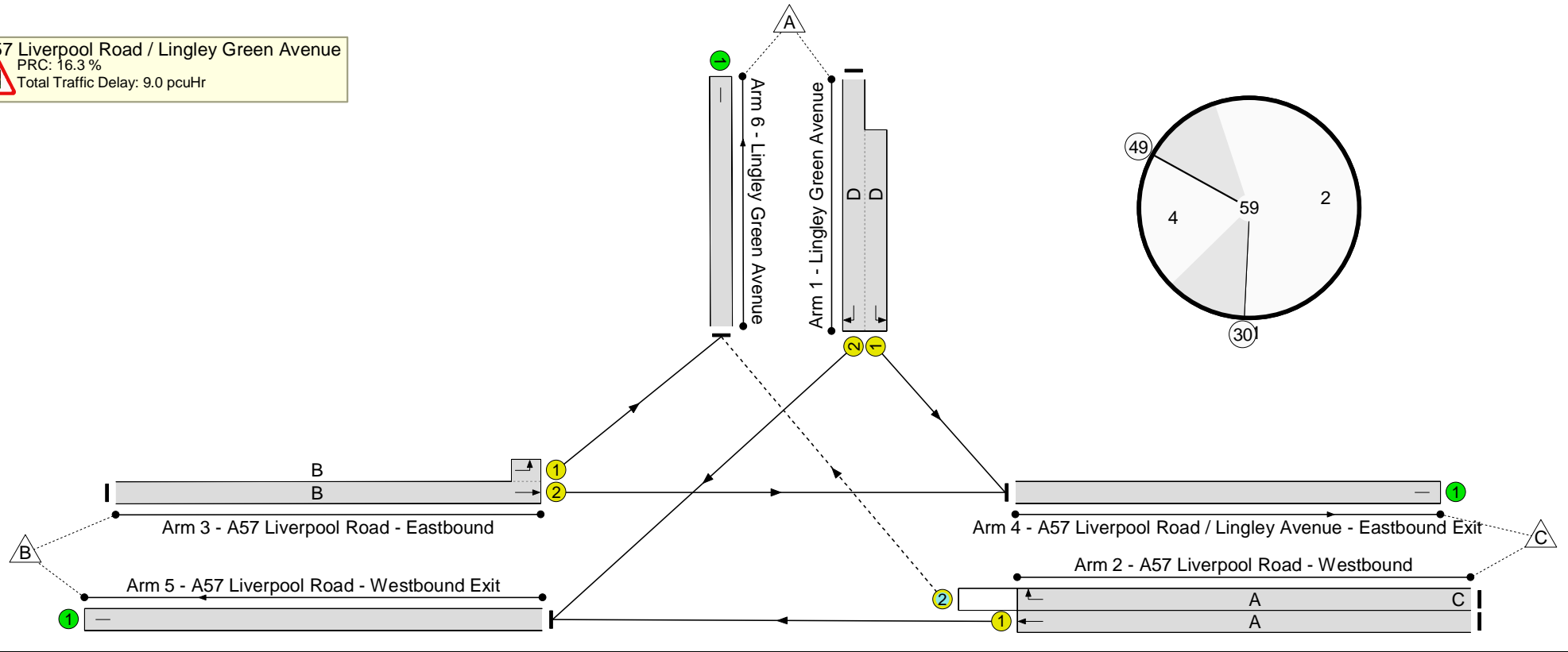
<b>Stage</b>	<b>2</b>	<b>4</b>
<b>Duration</b>	33	12
<b>Change Point</b>	49	30

**Signal Timings Diagram**



Full Input Data And Results  
**Network Layout Diagram**

A57 Liverpool Road / Lingley Green Avenue  
 PRC: 16.3%  
 Total Traffic Delay: 9.0 pcuHr



Full Input Data And Results

**Network Results**

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
<b>Network</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>77.4%</b>
<b>A57 Liverpool Road / Lingley Green Avenue</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>77.4%</b>
1/2+1/1	Lingley Green Avenue Left Right	U	N/A	N/A	D		1	12	-	380	1907:1861	420+103	72.6 : 72.6%
2/1	A57 Liverpool Road - Westbound Ahead	U	N/A	N/A	A		1	33	-	480	2115	1219	39.4%
2/2	A57 Liverpool Road - Westbound Right	O	N/A	N/A	A	C	1	33	0	66	1781	295	22.4%
3/2+3/1	A57 Liverpool Road - Eastbound Ahead Left	U	N/A	N/A	B		1	33	-	942	2015:1843	627+591	77.4 : 77.4%
4/1	A57 Liverpool Road / Lingley Avenue - Eastbound Exit	U	N/A	N/A	-		-	-	-	560	Inf	Inf	0.0%
5/1	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	785	Inf	Inf	0.0%
6/1	Lingley Green Avenue	U	N/A	N/A	-		-	-	-	523	Inf	Inf	0.0%

Full Input Data And Results

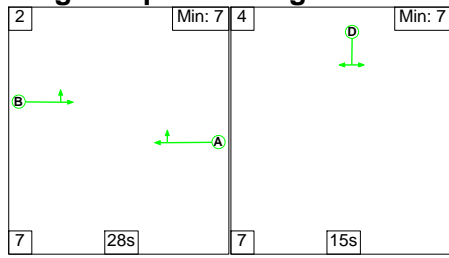
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
<b>Network</b>	-	-	<b>64</b>	<b>0</b>	<b>2</b>	<b>5.4</b>	<b>3.5</b>	<b>0.2</b>	<b>9.0</b>	-	-	-	-
<b>A57 Liverpool Road / Lingley Green Avenue</b>	-	-	<b>64</b>	<b>0</b>	<b>2</b>	<b>5.4</b>	<b>3.5</b>	<b>0.2</b>	<b>9.0</b>	-	-	-	-
1/2+1/1	380	380	-	-	-	2.2	1.3	-	3.5	33.1	4.6	1.3	5.9
2/1	480	480	-	-	-	0.9	0.3	-	1.2	9.3	4.3	0.3	4.6
2/2	66	66	64	0	2	0.1	0.1	0.2	0.5	24.8	0.5	0.1	0.6
3/2+3/1	942	942	-	-	-	2.1	1.7	-	3.8	14.7	9.1	1.7	10.8
4/1	560	560	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	785	785	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	523	523	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
C1			PRC for Signalled Lanes (%):		16.3	Total Delay for Signalled Lanes (pcuHr):		9.03	Cycle Time (s): 59				
			PRC Over All Lanes (%):		16.3	Total Delay Over All Lanes(pcuHr):		9.03					



Full Input Data And Results

Scenario 2: 'Interpeak' (FG3: '2017 Interpeak Period', Plan 1: 'Network Control Plan 1')

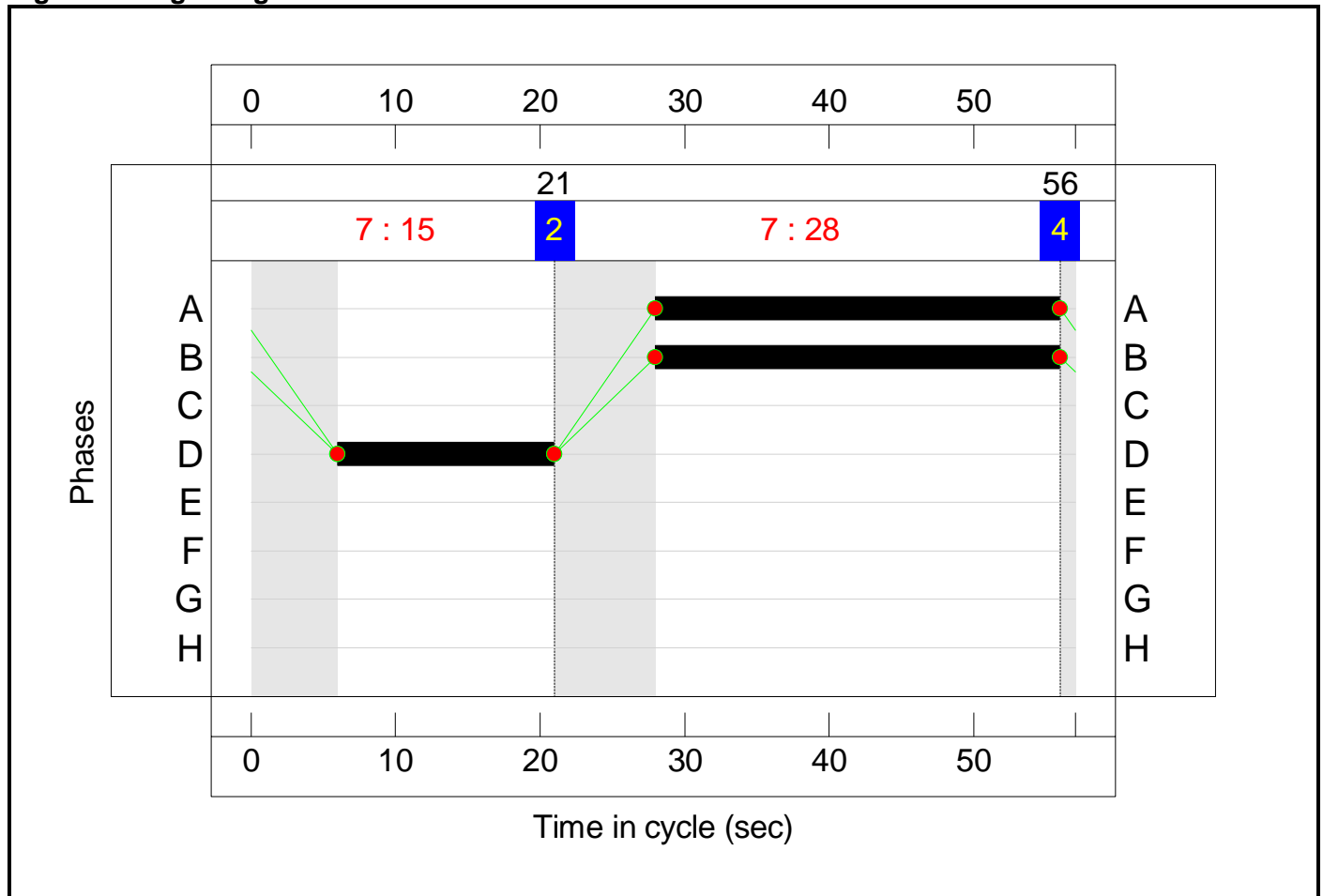
Stage Sequence Diagram



Stage Timings

Stage	2	4
Duration	28	15
Change Point	21	56

Signal Timings Diagram





Full Input Data And Results

**Network Results**

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
<b>Network</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>47.8%</b>
<b>A57 Liverpool Road / Lingley Green Avenue</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>47.8%</b>
1/2+1/1	Lingley Green Avenue Left Right	U	N/A	N/A	D		1	15	-	315	1907:1861	535+201	42.8 : 42.8%
2/1	A57 Liverpool Road - Westbound Ahead	U	N/A	N/A	A		1	28	-	396	2115	1076	36.8%
2/2	A57 Liverpool Road - Westbound Right	O	N/A	N/A	A	C	1	28	0	57	1781	522	10.9%
3/2+3/1	A57 Liverpool Road - Eastbound Ahead Left	U	N/A	N/A	B		1	28	-	500	2015:1843	704+341	47.8 : 47.8%
4/1	A57 Liverpool Road / Lingley Avenue - Eastbound Exit	U	N/A	N/A	-		-	-	-	423	Inf	Inf	0.0%
5/1	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	625	Inf	Inf	0.0%
6/1	Lingley Green Avenue	U	N/A	N/A	-		-	-	-	220	Inf	Inf	0.0%

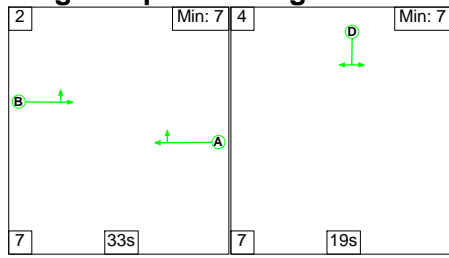
Full Input Data And Results

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	-	-	55	0	2	3.6	1.2	0.1	4.9	-	-	-	-
A57 Liverpool Road / Lingley Green Avenue	-	-	55	0	2	3.6	1.2	0.1	4.9	-	-	-	-
1/2+1/1	315	315	-	-	-	1.4	0.4	-	1.8	20.7	2.9	0.4	3.3
2/1	396	396	-	-	-	0.9	0.3	-	1.2	11.1	3.7	0.3	4.0
2/2	57	57	55	0	2	0.1	0.1	0.1	0.2	14.3	0.4	0.1	0.5
3/2+3/1	500	500	-	-	-	1.2	0.5	-	1.6	11.7	3.9	0.5	4.4
4/1	423	423	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	625	625	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	220	220	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
C1			PRC for Signalled Lanes (%): 88.1		Total Delay for Signalled Lanes (pcuHr): 4.88		Cycle Time (s): 57						
			PRC Over All Lanes (%): 88.1		Total Delay Over All Lanes(pcuHr): 4.88								

Full Input Data And Results

Scenario 3: 'Pm Peak Period' (FG2: '2017 PM Peak Period', Plan 1: 'Network Control Plan 1')

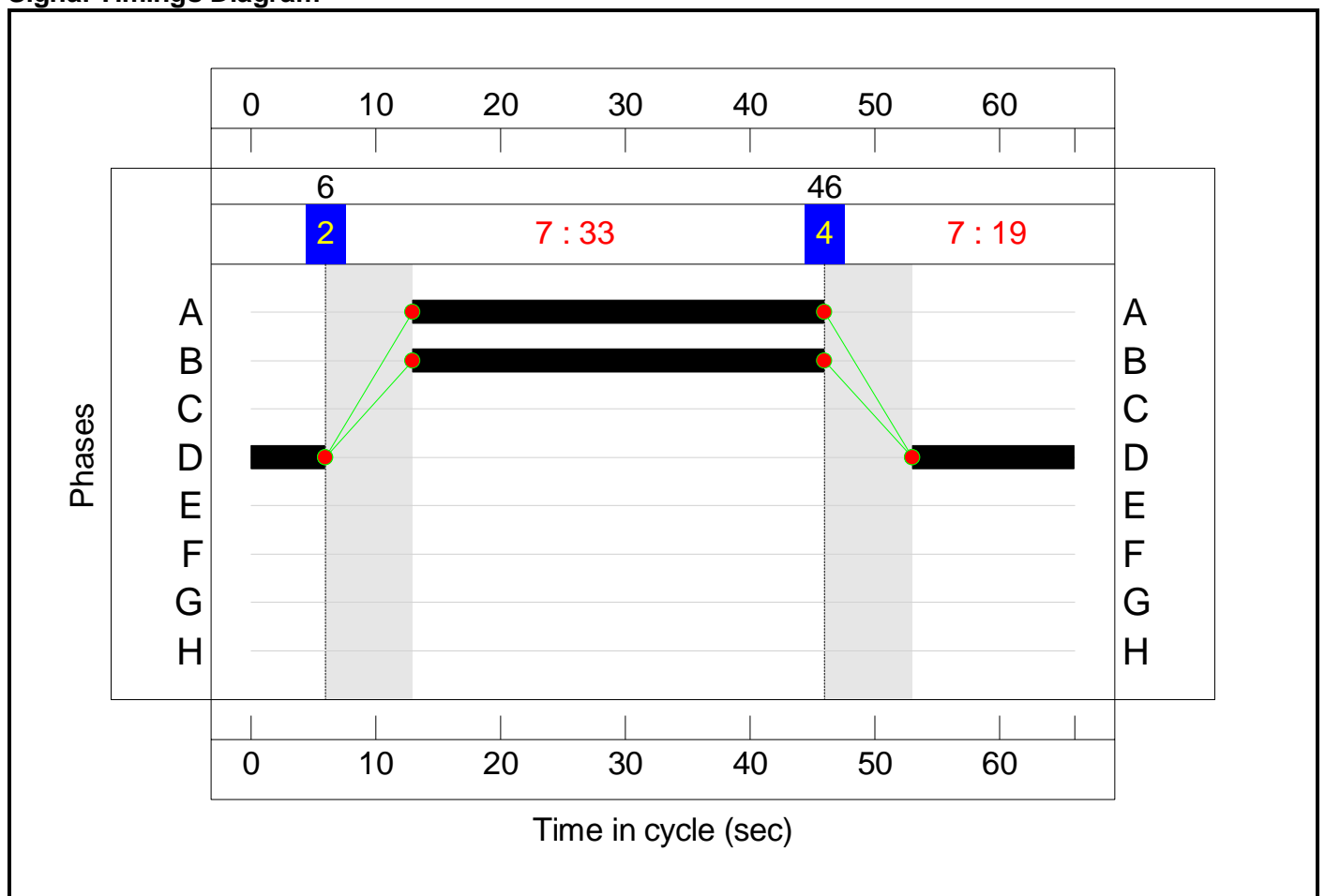
Stage Sequence Diagram



Stage Timings

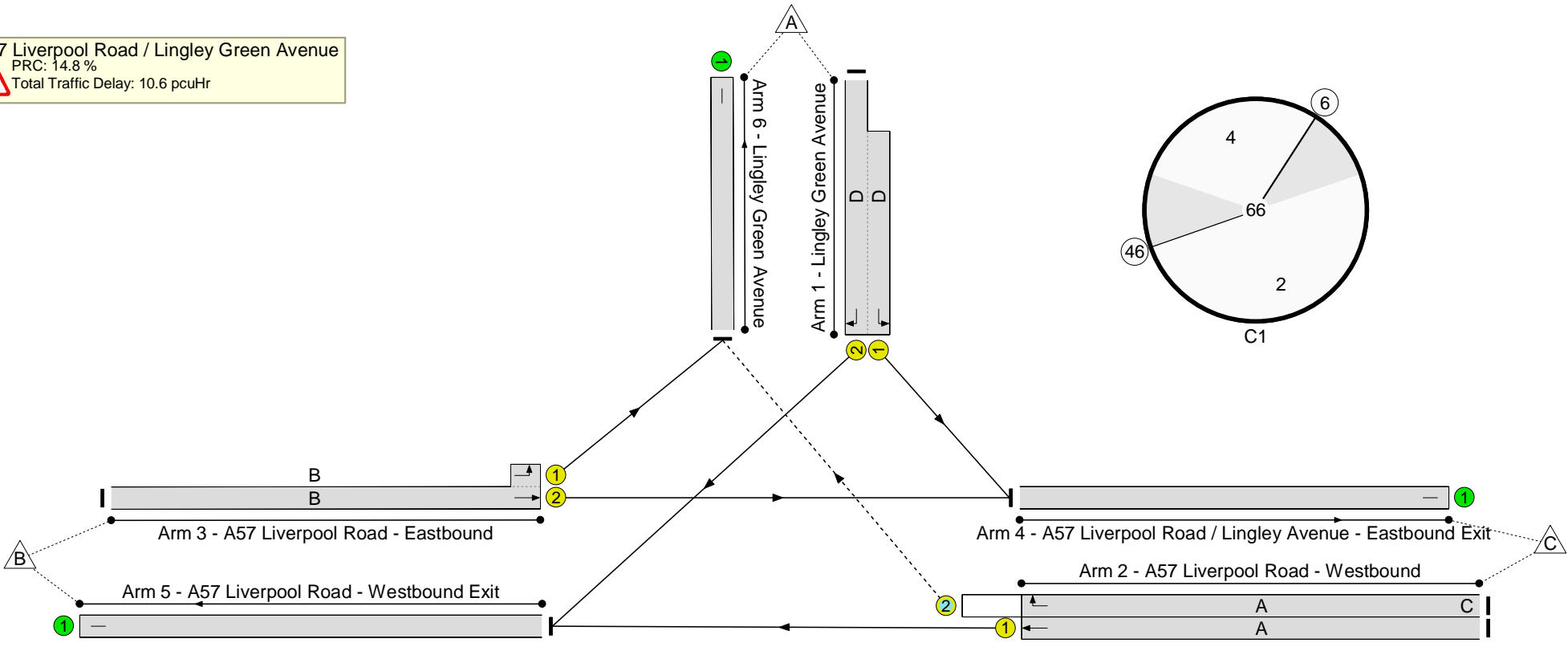
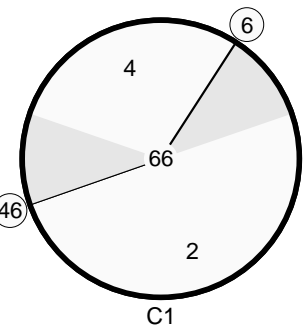
Stage	2	4
Duration	33	19
Change Point	6	46

Signal Timings Diagram



Full Input Data And Results  
**Network Layout Diagram**

A57 Liverpool Road / Lingley Green Avenue  
 PRC: 14.8 %  
 Total Traffic Delay: 10.6 pcuHr



Full Input Data And Results

**Network Results**

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
<b>Network</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>78.4%</b>
<b>A57 Liverpool Road / Lingley Green Avenue</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>78.4%</b>
1/2+1/1	Lingley Green Avenue Left Right	U	N/A	N/A	D		1	19	-	554	1907:1861	578+129	78.4 : 78.4%
2/1	A57 Liverpool Road - Westbound Ahead	U	N/A	N/A	A		1	33	-	576	2115	1090	52.9%
2/2	A57 Liverpool Road - Westbound Right	O	N/A	N/A	A	C	1	33	0	70	1781	365	19.2%
3/2+3/1	A57 Liverpool Road - Eastbound Ahead Left	U	N/A	N/A	B		1	33	-	687	2015:1843	700+352	65.3 : 65.3%
4/1	A57 Liverpool Road / Lingley Avenue - Eastbound Exit	U	N/A	N/A	-		-	-	-	558	Inf	Inf	0.0%
5/1	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	1029	Inf	Inf	0.0%
6/1	Lingley Green Avenue	U	N/A	N/A	-		-	-	-	300	Inf	Inf	0.0%

Full Input Data And Results

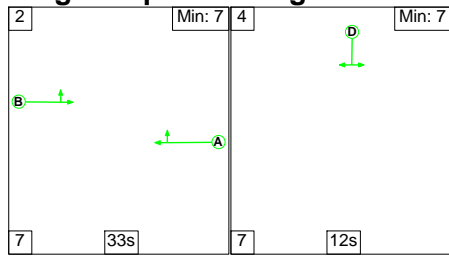
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	-	-	68	0	2	7.1	3.4	0.2	10.6	-	-	-	-
A57 Liverpool Road / Lingley Green Avenue	-	-	68	0	2	7.1	3.4	0.2	10.6	-	-	-	-
1/2+1/1	554	554	-	-	-	3.1	1.8	-	4.9	31.8	7.5	1.8	9.3
2/1	576	576	-	-	-	1.7	0.6	-	2.3	14.2	6.9	0.6	7.4
2/2	70	70	68	0	2	0.2	0.1	0.2	0.4	22.5	0.6	0.1	0.8
3/2+3/1	687	687	-	-	-	2.1	0.9	-	3.0	15.8	7.8	0.9	8.7
4/1	558	558	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	1029	1029	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	300	300	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
C1			PRC for Signalled Lanes (%):		14.8	Total Delay for Signalled Lanes (pcuHr):		10.62	Cycle Time (s): 66				
			PRC Over All Lanes (%):		14.8	Total Delay Over All Lanes(pcuHr):		10.62					



Full Input Data And Results

Scenario 4: '2027 Am Peak Period' (FG4: '2027 AM Peak Period', Plan 1: 'Network Control Plan 1')

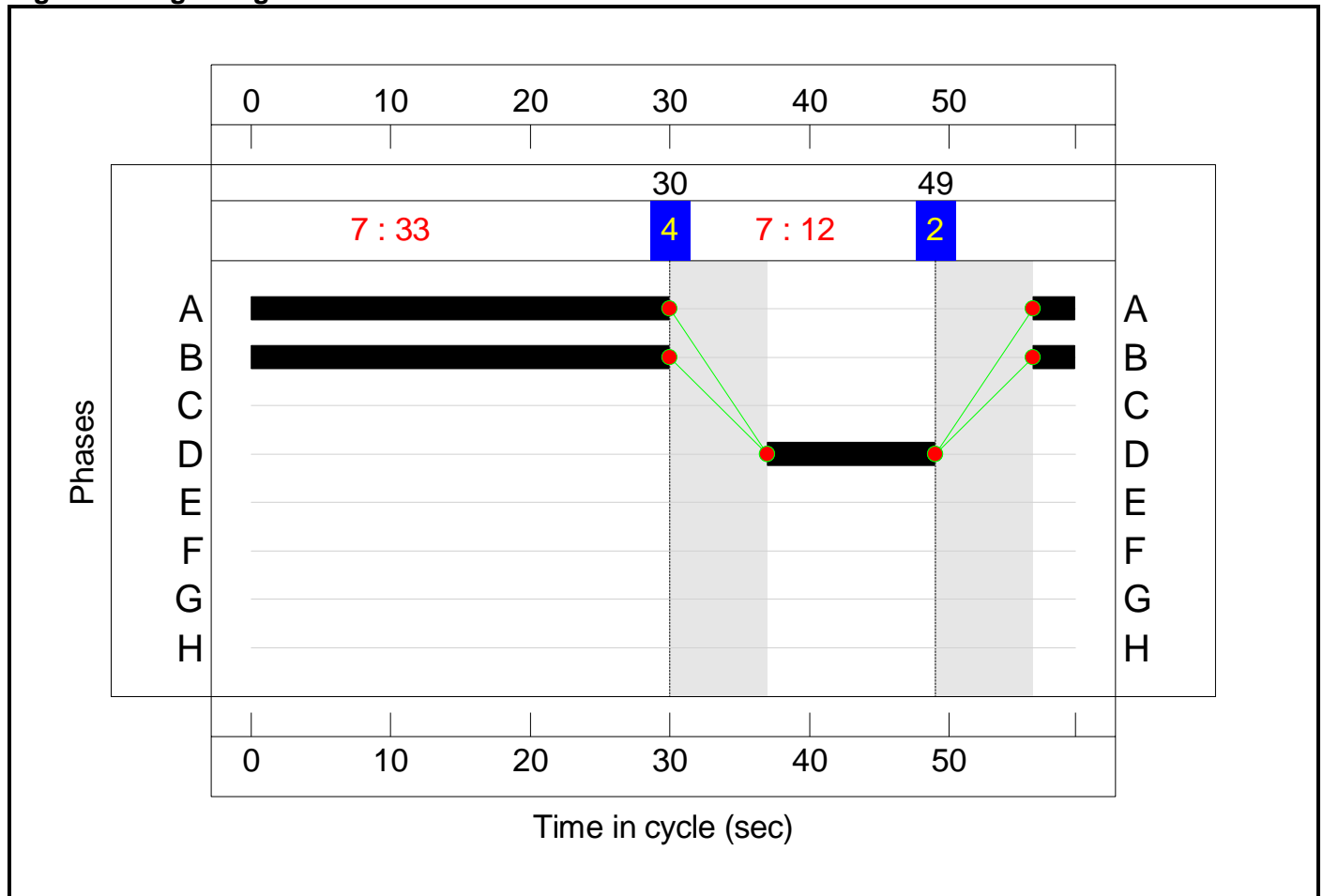
Stage Sequence Diagram



Stage Timings

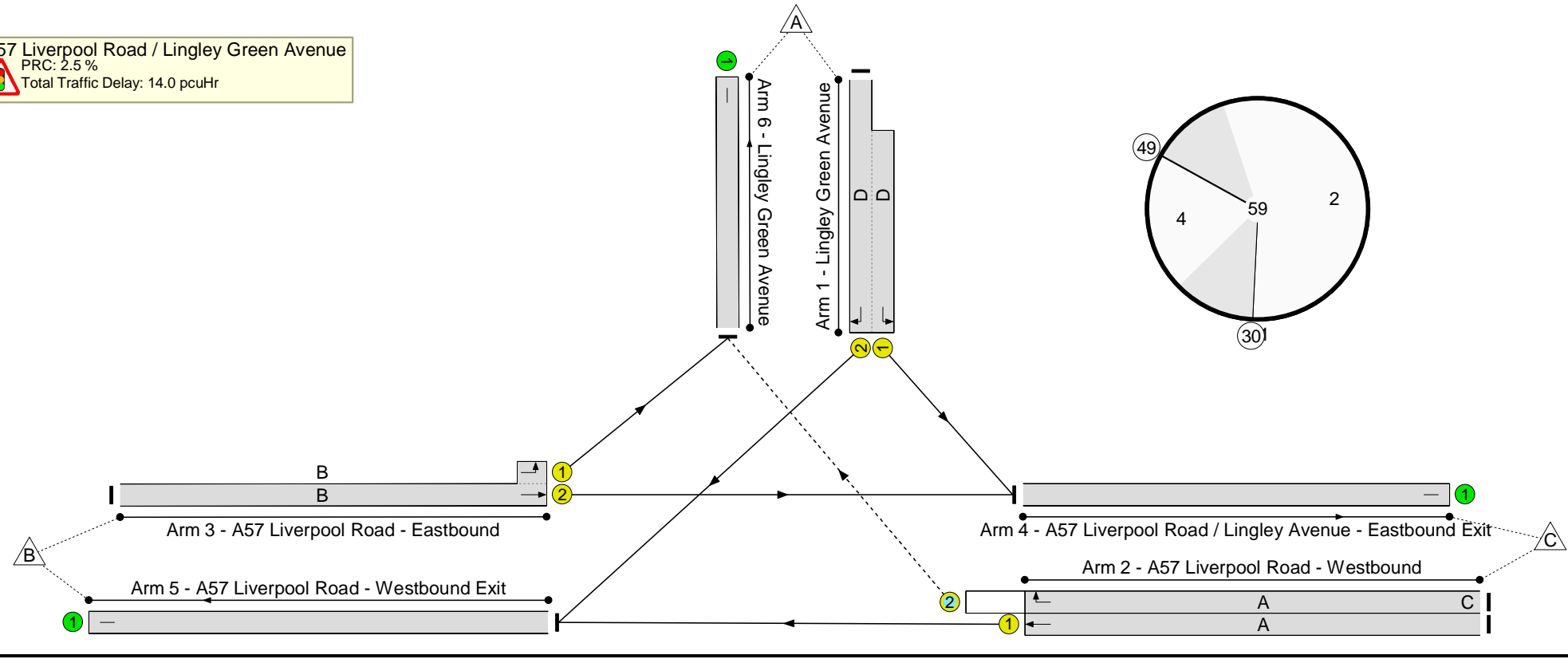
Stage	2	4
Duration	33	12
Change Point	49	30

Signal Timings Diagram



Full Input Data And Results  
**Network Layout Diagram**

A57 Liverpool Road / Lingley Green Avenue  
 PRC: 2.5 %  
 Total Traffic Delay: 14.0 pcuHr



Full Input Data And Results

**Network Results**

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
<b>Network</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>87.8%</b>
<b>A57 Liverpool Road / Lingley Green Avenue</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>87.8%</b>
1/2+1/1	Lingley Green Avenue Left Right	U	N/A	N/A	D		1	12	-	452	1907:1861	420+104	86.2 : 86.2%
2/1	A57 Liverpool Road - Westbound Ahead	U	N/A	N/A	A		1	33	-	524	2115	1219	43.0%
2/2	A57 Liverpool Road - Westbound Right	O	N/A	N/A	A	C	1	33	0	79	1781	229	34.5%
3/2+3/1	A57 Liverpool Road - Eastbound Ahead Left	U	N/A	N/A	B		1	33	-	1072	2015:1843	604+616	87.8 : 87.8%
4/1	A57 Liverpool Road / Lingley Avenue - Eastbound Exit	U	N/A	N/A	-		-	-	-	621	Inf	Inf	0.0%
5/1	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	886	Inf	Inf	0.0%
6/1	Lingley Green Avenue	U	N/A	N/A	-		-	-	-	620	Inf	Inf	0.0%

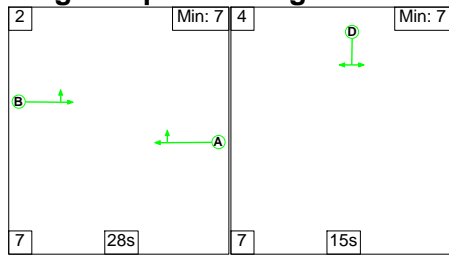
Full Input Data And Results

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
<b>Network</b>	-	-	46	0	33	6.6	7.0	0.4	14.0	-	-	-	-
<b>A57 Liverpool Road / Lingley Green Avenue</b>	-	-	46	0	33	6.6	7.0	0.4	14.0	-	-	-	-
1/2+1/1	452	452	-	-	-	2.7	2.9	-	5.6	44.4	5.6	2.9	8.5
2/1	524	524	-	-	-	1.0	0.4	-	1.4	9.6	4.8	0.4	5.2
2/2	79	79	46	0	33	0.1	0.3	0.4	0.8	36.9	0.6	0.3	0.8
3/2+3/1	1072	1072	-	-	-	2.8	3.5	-	6.2	20.9	12.3	3.5	15.8
4/1	621	621	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	886	886	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	620	620	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
C1			PRC for Signalled Lanes (%):		2.5	Total Delay for Signalled Lanes (pcuHr):		14.01	Cycle Time (s): 59				
			PRC Over All Lanes (%):		2.5	Total Delay Over All Lanes(pcuHr):		14.01					

Full Input Data And Results

Scenario 5: '2027 Interpeak' (FG6: '2027 Interpeak Period', Plan 1: 'Network Control Plan 1')

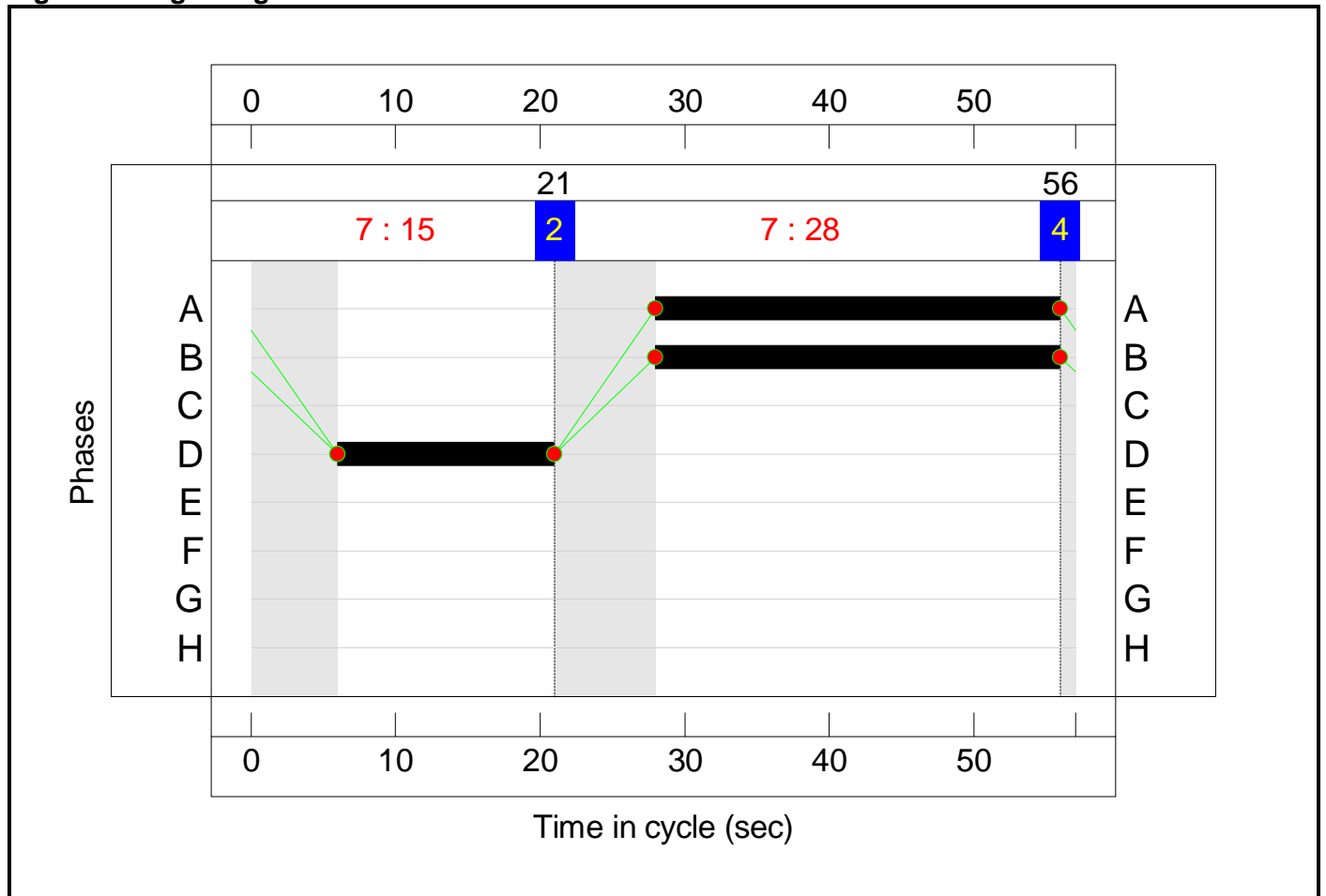
Stage Sequence Diagram



Stage Timings

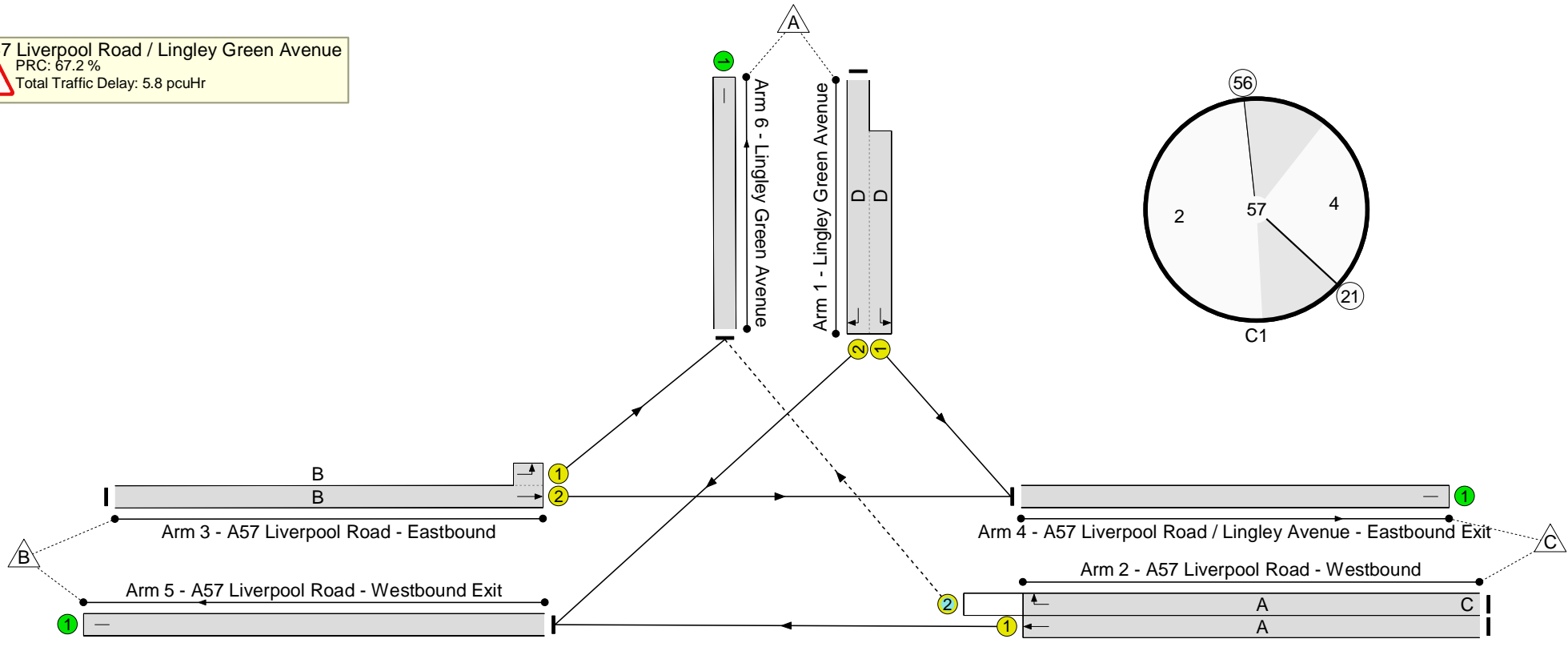
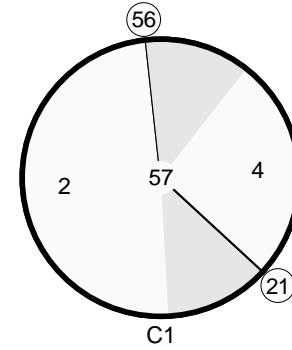
Stage	2	4
Duration	28	15
Change Point	21	56

Signal Timings Diagram



Full Input Data And Results  
**Network Layout Diagram**

A57 Liverpool Road / Lingley Green Avenue  
 PRC: 67.2 %  
 Total Traffic Delay: 5.8 pcuHr



Full Input Data And Results

**Network Results**

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
<b>Network</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>53.8%</b>
<b>A57 Liverpool Road / Lingley Green Avenue</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>53.8%</b>
1/2+1/1	Lingley Green Avenue Left Right	U	N/A	N/A	D		1	15	-	367	1907:1861	535+206	49.5 : 49.5%
2/1	A57 Liverpool Road - Westbound Ahead	U	N/A	N/A	A		1	28	-	437	2115	1076	40.6%
2/2	A57 Liverpool Road - Westbound Right	O	N/A	N/A	A	C	1	28	0	68	1781	478	14.2%
3/2+3/1	A57 Liverpool Road - Eastbound Ahead Left	U	N/A	N/A	B		1	28	-	564	2015:1843	693+355	53.8 : 53.8%
4/1	A57 Liverpool Road / Lingley Avenue - Eastbound Exit	U	N/A	N/A	-		-	-	-	475	Inf	Inf	0.0%
5/1	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	702	Inf	Inf	0.0%
6/1	Lingley Green Avenue	U	N/A	N/A	-		-	-	-	259	Inf	Inf	0.0%

Full Input Data And Results

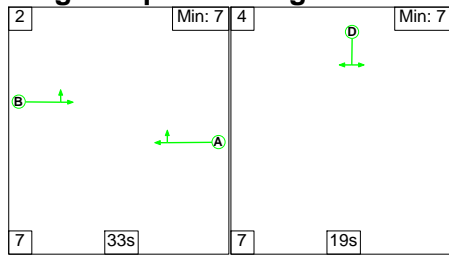
Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	-	-	66	0	2	4.3	1.5	0.1	5.8	-	-	-	-
A57 Liverpool Road / Lingley Green Avenue	-	-	66	0	2	4.3	1.5	0.1	5.8	-	-	-	-
1/2+1/1	367	367	-	-	-	1.7	0.5	-	2.2	21.5	3.5	0.5	3.9
2/1	437	437	-	-	-	1.1	0.3	-	1.4	11.5	4.2	0.3	4.6
2/2	68	68	66	0	2	0.1	0.1	0.1	0.3	15.9	0.5	0.1	0.6
3/2+3/1	564	564	-	-	-	1.4	0.6	-	1.9	12.4	4.8	0.6	5.4
4/1	475	475	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	702	702	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	259	259	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
C1			PRC for Signalled Lanes (%):		67.2	Total Delay for Signalled Lanes (pcuHr):		5.84	Cycle Time (s): 57				
			PRC Over All Lanes (%):		67.2	Total Delay Over All Lanes(pcuHr):		5.84					



Full Input Data And Results

Scenario 6: '2027 Pm Peak Period' (FG5: '2027 PM Peak Period', Plan 1: 'Network Control Plan 1')

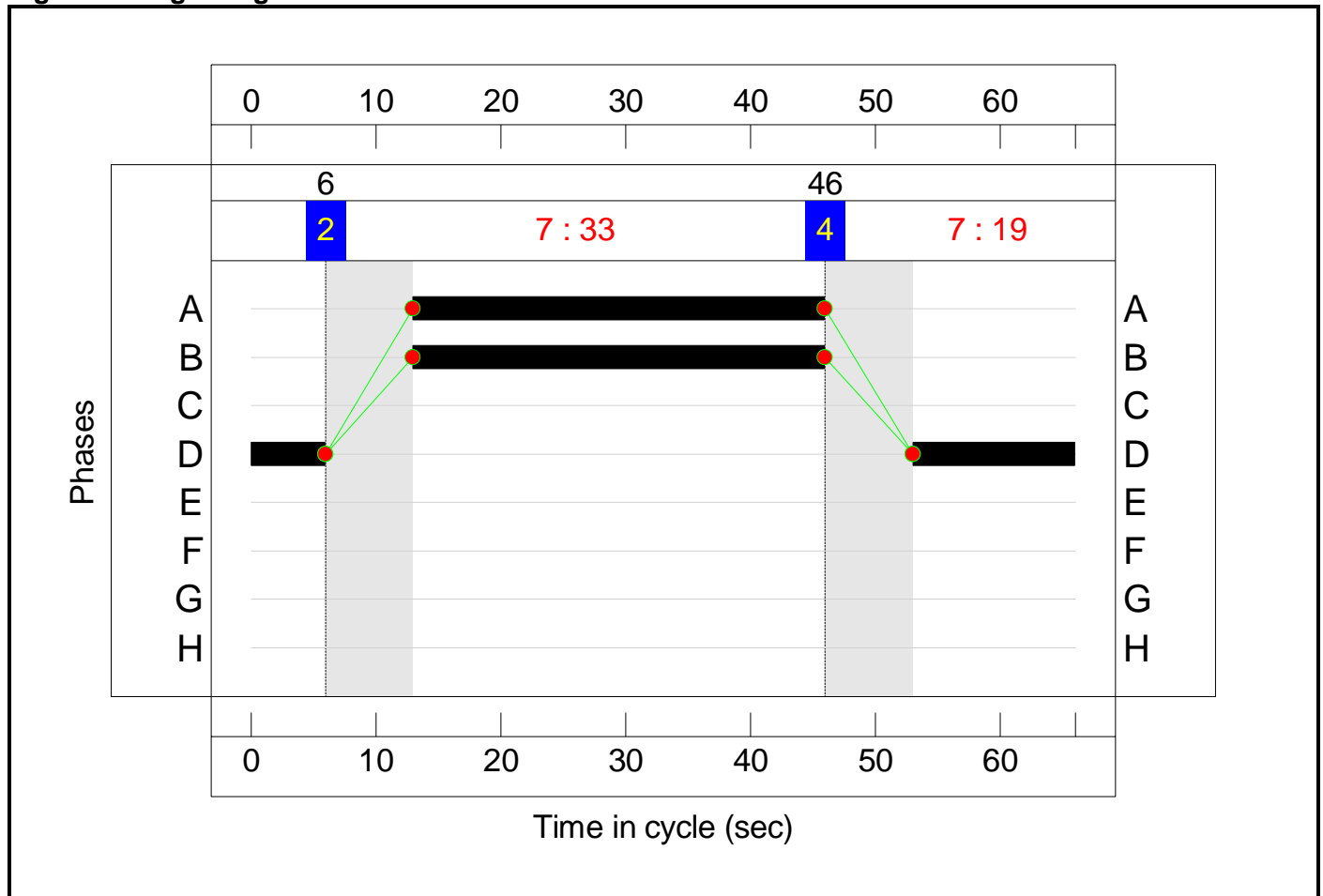
Stage Sequence Diagram



Stage Timings

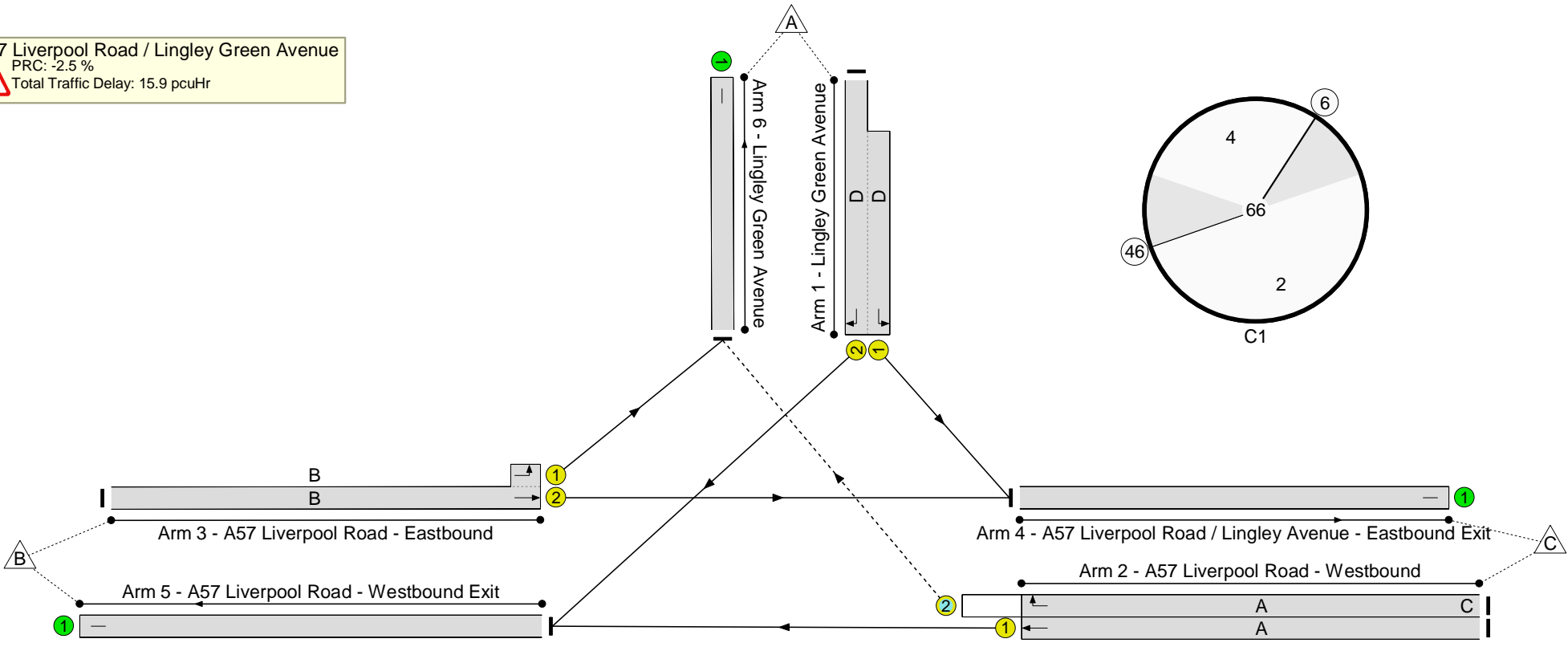
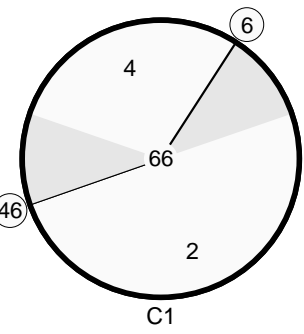
Stage	2	4
Duration	33	19
Change Point	6	46

Signal Timings Diagram



Full Input Data And Results  
**Network Layout Diagram**

A57 Liverpool Road / Lingley Green Avenue  
 PRC: -2.5 %  
 Total Traffic Delay: 15.9 pcuHr



Full Input Data And Results

**Network Results**

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
<b>Network</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>92.2%</b>
<b>A57 Liverpool Road / Lingley Green Avenue</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>92.2%</b>
1/2+1/1	Lingley Green Avenue Left Right	U	N/A	N/A	D		1	19	-	653	1907:1861	578+130	92.2 : 92.2%
2/1	A57 Liverpool Road - Westbound Ahead	U	N/A	N/A	A		1	33	-	625	2115	1090	57.4%
2/2	A57 Liverpool Road - Westbound Right	O	N/A	N/A	A	C	1	33	0	83	1781	313	26.5%
3/2+3/1	A57 Liverpool Road - Eastbound Ahead Left	U	N/A	N/A	B		1	33	-	765	2015:1843	683+372	72.5 : 72.5%
4/1	A57 Liverpool Road / Lingley Avenue - Eastbound Exit	U	N/A	N/A	-		-	-	-	615	Inf	Inf	0.0%
5/1	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	1158	Inf	Inf	0.0%
6/1	Lingley Green Avenue	U	N/A	N/A	-		-	-	-	353	Inf	Inf	0.0%

Full Input Data And Results

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
<b>Network</b>	-	-	<b>80</b>	<b>0</b>	<b>3</b>	<b>8.4</b>	<b>7.2</b>	<b>0.3</b>	<b>15.9</b>	-	-	-	-
<b>A57 Liverpool Road / Lingley Green Avenue</b>	-	-	<b>80</b>	<b>0</b>	<b>3</b>	<b>8.4</b>	<b>7.2</b>	<b>0.3</b>	<b>15.9</b>	-	-	-	-
1/2+1/1	653	653	-	-	-	3.9	5.0	-	8.9	49.0	9.3	5.0	14.3
2/1	625	625	-	-	-	1.9	0.7	-	2.6	14.9	7.8	0.7	8.5
2/2	83	83	80	0	3	0.2	0.2	0.3	0.6	27.3	0.8	0.2	0.9
3/2+3/1	765	765	-	-	-	2.5	1.3	-	3.8	17.7	9.3	1.3	10.6
4/1	615	615	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	1158	1158	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	353	353	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
C1      PRC for Signalled Lanes (%): -2.5      Total Delay for Signalled Lanes (pcuHr): 15.86      Cycle Time (s): 66 PRC Over All Lanes (%): -2.5      Total Delay Over All Lanes(pcuHr): 15.86													

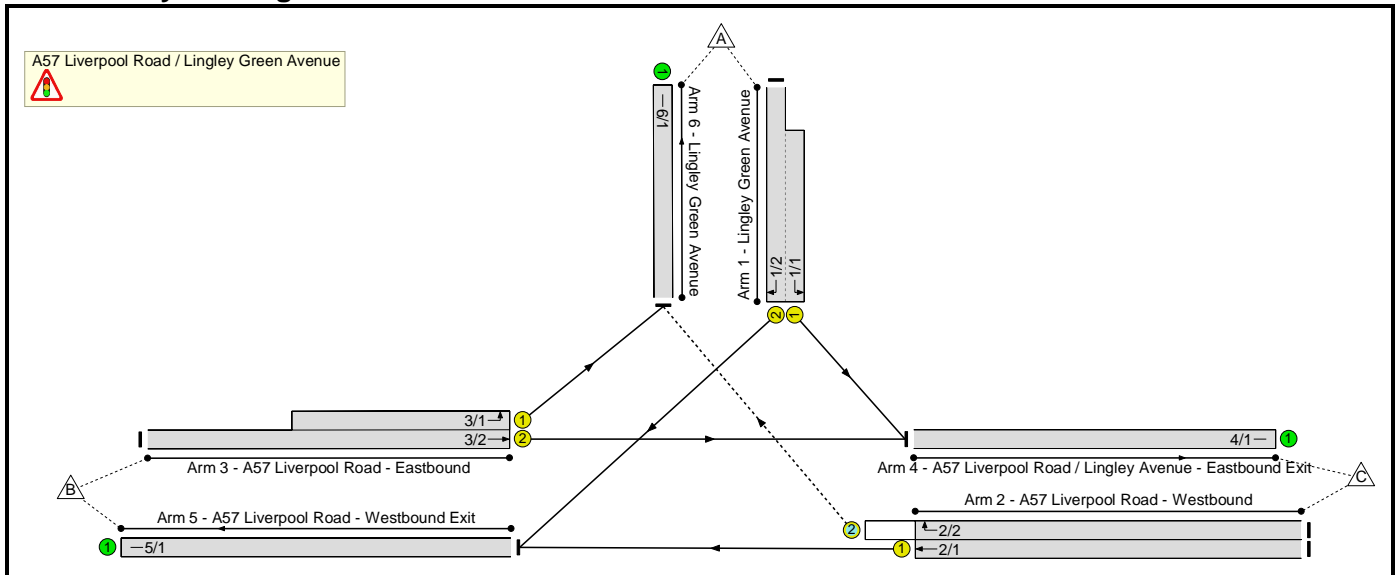
## Annex F: LinSig Layout 3 Model Outputs

Full Input Data And Results  
**Full Input Data And Results**

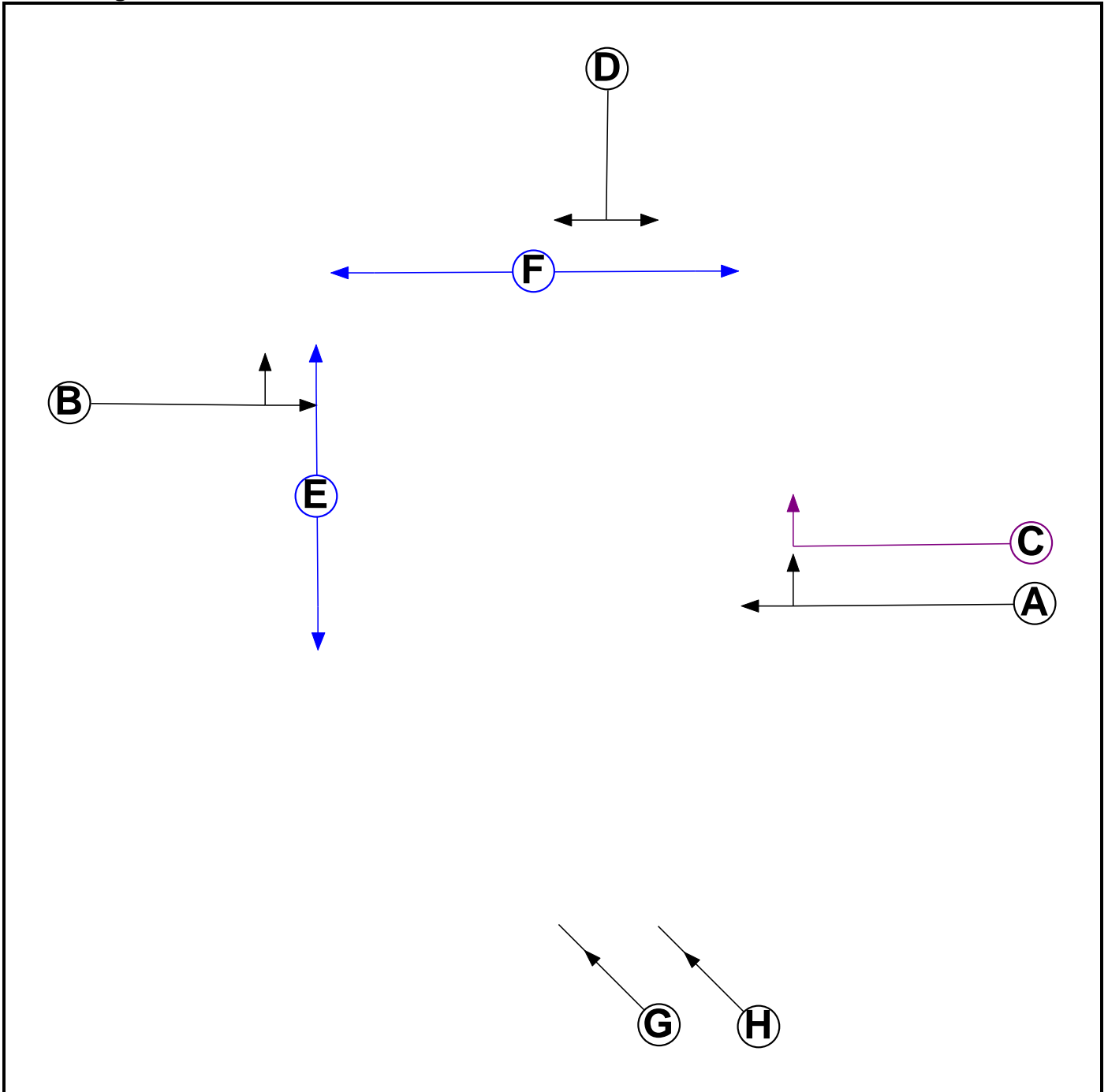
**User and Project Details**

<b>Project:</b>	<b>Omega Gateway Highway Junction Improvement Package</b>
<b>Title:</b>	<b>Layout 3</b>
<b>Location:</b>	A57 Liverpool Road / A57 Lingley Green Avenue
<b>Additional detail:</b>	
<b>File name:</b>	4. A57 Liverpool Rd - Lingley Green Avenue, two exit lanes, Final Future year with left turn lane.lsg3x
<b>Author:</b>	Alistair Johnson
<b>Company:</b>	AECOM
<b>Address:</b>	1 Dale Street, Liverpool, L2 2ET

**Network Layout Diagram**



**Phase Diagram**



**Phase Input Data**

Phase Name	Phase Type	Assoc. Phase	Street Min	Cont Min
A	Traffic		7	7
B	Traffic		7	7
C	Ind. Arrow	A	4	4
D	Traffic		7	7
E	Pedestrian		7	7
F	Pedestrian		9	9
G	Traffic		3	3
H	Traffic		7	7

Full Input Data And Results

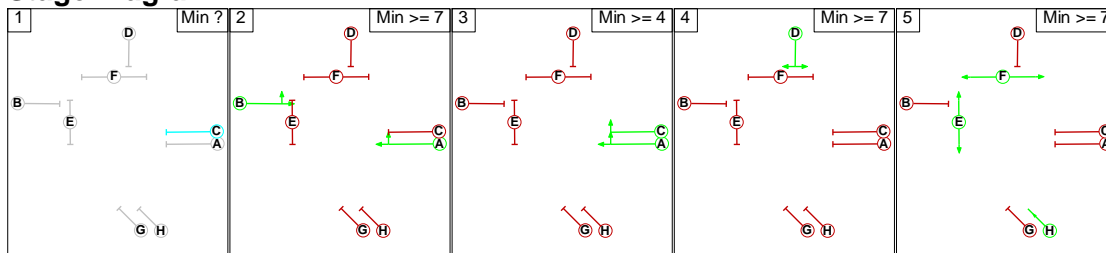
**Phase Intergrens Matrix**

		Starting Phase							
		A	B	C	D	E	F	G	H
Terminating Phase	A	-	-	7	5	12	3	12	
	B	-	-	7	7	12	10	3	5
	C	-	8	-	7	-	12	3	12
	D	7	7	7	-	11	5	3	5
	E	1	1	-	1	-	-	1	-
	F	1	1	1	1	-	-	1	-
	G	2	2	2	2	2	2	-	3
	H	2	2	2	2	-	-	2	-

**Phases in Stage**

Stage No.	Phases in Stage
1	
2	A B
3	A C
4	D
5	E F H

**Stage Diagram**



**Phase Delays**

Term. Stage	Start Stage	Phase	Type	Value	Cont value
There are no Phase Delays defined					

**Prohibited Stage Change**

		To Stage				
		1	2	3	4	5
From Stage	1	X	X	X	X	X
	2	X	-	7	7	12
	3	X	8	-	7	12
	4	X	7	7	-	11
	5	X	2	2	2	-



Full Input Data And Results

**Give-Way Lane Input Data**

Junction: A57 Liverpool Road / Lingley Green Avenue											
Lane	Movement	Max Flow when Giving Way (PCU/Hr)	Min Flow when Giving Way (PCU/Hr)	Opposing Lane	Opp. Lane Coeff.	Opp. Mvmnts.	Right Turn Storage (PCU)	Non-Blocking Storage (PCU)	RTF	Right Turn Move up (s)	Max Turns in Intergreen (PCU)
2/2 (A57 Liverpool Road - Westbound)	6/1 (Right)	1439	0	3/2 3/1	1.09 1.09	All All	4.00	-	0.50	4	3.00

Full Input Data And Results

**Lane Input Data**

Junction: A57 Liverpool Road / Lingley Green Avenue												
Lane	Lane Type	Phases	Start Disp.	End Disp.	Physical Length (PCU)	Sat Flow Type	Def User Saturation Flow (PCU/Hr)	Lane Width (m)	Gradient	Nearside Lane	Turns	Turning Radius (m)
1/1 (Lingley Green Avenue)	U	D	2	3	17.4	User	1861	-	-	-	-	-
1/2 (Lingley Green Avenue)	U	D	2	3	60.0	User	1907	-	-	-	-	-
2/1 (A57 Liverpool Road - Westbound)	U	A	2	3	60.0	User	2115	-	-	-	-	-
2/2 (A57 Liverpool Road - Westbound)	O	A C	2	3	60.0	User	1781	-	-	-	-	-
3/1 (A57 Liverpool Road - Eastbound)	U	B	2	3	17.4	User	1843	-	-	-	-	-
3/2 (A57 Liverpool Road - Eastbound)	U	B	2	3	60.0	User	2015	-	-	-	-	-
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit)	U		2	3	60.0	Inf	-	-	-	-	-	-
5/1 (A57 Liverpool Road - Westbound Exit)	U		2	3	60.0	Inf	-	-	-	-	-	-
6/1 (Lingley Green Avenue)	U		2	3	60.0	Inf	-	-	-	-	-	-

**Traffic Flow Groups**

Flow Group	Start Time	End Time	Duration	Formula
1: '2017 AM Peak Period'	07:30	08:30	01:00	
2: '2017 PM Peak Period'	16:30	17:30	01:00	
3: '2017 Interpeak Period'	14:45	15:45	01:00	
4: '2027 AM Peak Period'	07:30	08:30	01:00	
5: '2027 PM Peak Period'	16:30	17:30	01:00	
6: '2027 Interpeak Period'	14:45	15:45	01:00	

## Full Input Data And Results

**Scenario 1: 'Am Peak Period'** (FG1: '2017 AM Peak Period', Plan 1: 'Network Control Plan 1')

### Traffic Flows, Desired

**Desired Flow :**

	Destination				
		A	B	C	Tot.
Origin	A	0	305	75	380
	B	457	0	485	942
	C	66	480	0	546
	Tot.	523	785	560	1868

### Traffic Lane Flows

Lane	Scenario 1: Am Peak Period
<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>	
1/1 (short)	75
1/2 (with short)	380(In) 305(Out)
2/1	480
2/2	66
3/1 (short)	457
3/2 (with short)	942(In) 485(Out)
4/1	560
5/1	785
6/1	523

**Lane Saturation Flows**

Junction: A57 Liverpool Road / Lingley Green Avenue								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (Lingley Green Avenue Lane 1)							1861	1861
1/2 (Lingley Green Avenue Lane 2)							1907	1907
2/1 (A57 Liverpool Road - Westbound Lane 1)							2115	2115
2/2 (A57 Liverpool Road - Westbound Lane 2)							1781	1781
3/1 (A57 Liverpool Road - Eastbound Lane 1)							1843	1843
3/2 (A57 Liverpool Road - Eastbound Lane 2)							2015	2015
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit Lane 1)							Inf	Inf
5/1 (A57 Liverpool Road - Westbound Exit Lane 1)							Inf	Inf
6/1 (Lingley Green Avenue Lane 1)							Inf	Inf

**Scenario 2: 'Interpeak'** (FG3: '2017 Interpeak Period', Plan 1: 'Network Control Plan 1')

**Traffic Flows, Desired**

**Desired Flow :**

	Destination				
		A	B	C	Tot.
Origin	A	0	229	86	315
	B	163	0	337	500
	C	57	396	0	453
	Tot.	220	625	423	1268

Full Input Data And Results

**Traffic Lane Flows**

Lane	Scenario 2: Interpeak
<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>	
1/1 (short)	86
1/2 (with short)	315(In) 229(Out)
2/1	396
2/2	57
3/1 (short)	163
3/2 (with short)	500(In) 337(Out)
4/1	423
5/1	625
6/1	220

**Lane Saturation Flows**

<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (Lingley Green Avenue Lane 1)	This lane uses a directly entered Saturation Flow						1861	1861
1/2 (Lingley Green Avenue Lane 2)	This lane uses a directly entered Saturation Flow						1907	1907
2/1 (A57 Liverpool Road - Westbound Lane 1)	This lane uses a directly entered Saturation Flow						2115	2115
2/2 (A57 Liverpool Road - Westbound Lane 2)	This lane uses a directly entered Saturation Flow						1781	1781
3/1 (A57 Liverpool Road - Eastbound Lane 1)	This lane uses a directly entered Saturation Flow						1843	1843
3/2 (A57 Liverpool Road - Eastbound Lane 2)	This lane uses a directly entered Saturation Flow						2015	2015
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit Lane 1)	Infinite Saturation Flow						Inf	Inf
5/1 (A57 Liverpool Road - Westbound Exit Lane 1)	Infinite Saturation Flow						Inf	Inf
6/1 (Lingley Green Avenue Lane 1)	Infinite Saturation Flow						Inf	Inf

Full Input Data And Results

**Scenario 3: 'Pm Peak Period'** (FG2: '2017 PM Peak Period', Plan 1: 'Network Control Plan 1')

**Traffic Flows, Desired**

**Desired Flow :**

Origin	Destination				
	A	B	C	Tot.	
A	0	453	101	554	
B	230	0	457	687	
C	70	576	0	646	
Tot.	300	1029	558	1887	

**Traffic Lane Flows**

Lane	Scenario 3: Pm Peak Period
<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>	
1/1 (short)	101
1/2 (with short)	554(In) 453(Out)
2/1	576
2/2	70
3/1 (short)	230
3/2 (with short)	687(In) 457(Out)
4/1	558
5/1	1029
6/1	300

**Lane Saturation Flows**

Junction: A57 Liverpool Road / Lingley Green Avenue								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (Lingley Green Avenue Lane 1)							1861	1861
1/2 (Lingley Green Avenue Lane 2)							1907	1907
2/1 (A57 Liverpool Road - Westbound Lane 1)							2115	2115
2/2 (A57 Liverpool Road - Westbound Lane 2)							1781	1781
3/1 (A57 Liverpool Road - Eastbound Lane 1)							1843	1843
3/2 (A57 Liverpool Road - Eastbound Lane 2)							2015	2015
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit Lane 1)							Inf	Inf
5/1 (A57 Liverpool Road - Westbound Exit Lane 1)							Inf	Inf
6/1 (Lingley Green Avenue Lane 1)							Inf	Inf

**Scenario 4: '2027 Am Peak Period'** (FG4: '2027 AM Peak Period', Plan 1: 'Network Control Plan 1')

**Traffic Flows, Desired**

**Desired Flow :**

	Destination				
		A	B	C	Tot.
Origin	A	0	362	90	452
	B	541	0	531	1072
	C	79	524	0	603
	Tot.	620	886	621	2127

Full Input Data And Results

**Traffic Lane Flows**

Lane	Scenario 4: 2027 Am Peak Period
<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>	
1/1 (short)	90
1/2 (with short)	452(In) 362(Out)
2/1	524
2/2	79
3/1 (short)	541
3/2 (with short)	1072(In) 531(Out)
4/1	621
5/1	886
6/1	620

**Lane Saturation Flows**

<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (Lingley Green Avenue Lane 1)							1861	1861
1/2 (Lingley Green Avenue Lane 2)							1907	1907
2/1 (A57 Liverpool Road - Westbound Lane 1)							2115	2115
2/2 (A57 Liverpool Road - Westbound Lane 2)							1781	1781
3/1 (A57 Liverpool Road - Eastbound Lane 1)							1843	1843
3/2 (A57 Liverpool Road - Eastbound Lane 2)							2015	2015
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit Lane 1)				Infinite Saturation Flow			Inf	Inf
5/1 (A57 Liverpool Road - Westbound Exit Lane 1)				Infinite Saturation Flow			Inf	Inf
6/1 (Lingley Green Avenue Lane 1)				Infinite Saturation Flow			Inf	Inf



Full Input Data And Results

**Scenario 5: '2027 Interpeak'** (FG6: '2027 Interpeak Period', Plan 1: 'Network Control Plan 1')

**Traffic Flows, Desired**

**Desired Flow :**

Origin	Destination				
	A	B	C	Tot.	
A	0	265	102	367	
B	191	0	373	564	
C	68	437	0	505	
Tot.	259	702	475	1436	

**Traffic Lane Flows**

Lane	Scenario 5: 2027 Interpeak
<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>	
1/1 (short)	102
1/2 (with short)	367(In) 265(Out)
2/1	437
2/2	68
3/1 (short)	191
3/2 (with short)	564(In) 373(Out)
4/1	475
5/1	702
6/1	259

**Lane Saturation Flows**

Junction: A57 Liverpool Road / Lingley Green Avenue								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (Lingley Green Avenue Lane 1)							1861	1861
1/2 (Lingley Green Avenue Lane 2)							1907	1907
2/1 (A57 Liverpool Road - Westbound Lane 1)							2115	2115
2/2 (A57 Liverpool Road - Westbound Lane 2)							1781	1781
3/1 (A57 Liverpool Road - Eastbound Lane 1)							1843	1843
3/2 (A57 Liverpool Road - Eastbound Lane 2)							2015	2015
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit Lane 1)							Inf	Inf
5/1 (A57 Liverpool Road - Westbound Exit Lane 1)							Inf	Inf
6/1 (Lingley Green Avenue Lane 1)							Inf	Inf

**Scenario 6: '2027 Pm Peak Period'** (FG5: '2027 PM Peak Period', Plan 1: 'Network Control Plan 1')

**Traffic Flows, Desired**

**Desired Flow :**

	Destination				
		A	B	C	Tot.
Origin	A	0	533	120	653
	B	270	0	495	765
	C	83	625	0	708
	Tot.	353	1158	615	2126

Full Input Data And Results

**Traffic Lane Flows**

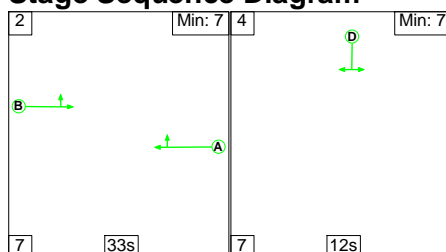
Lane	Scenario 6: 2027 Pm Peak Period
<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>	
1/1 (short)	120
1/2 (with short)	653(In) 533(Out)
2/1	625
2/2	83
3/1 (short)	270
3/2 (with short)	765(In) 495(Out)
4/1	615
5/1	1158
6/1	353

**Lane Saturation Flows**

<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (Lingley Green Avenue Lane 1)	This lane uses a directly entered Saturation Flow						1861	1861
1/2 (Lingley Green Avenue Lane 2)	This lane uses a directly entered Saturation Flow						1907	1907
2/1 (A57 Liverpool Road - Westbound Lane 1)	This lane uses a directly entered Saturation Flow						2115	2115
2/2 (A57 Liverpool Road - Westbound Lane 2)	This lane uses a directly entered Saturation Flow						1781	1781
3/1 (A57 Liverpool Road - Eastbound Lane 1)	This lane uses a directly entered Saturation Flow						1843	1843
3/2 (A57 Liverpool Road - Eastbound Lane 2)	This lane uses a directly entered Saturation Flow						2015	2015
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit Lane 1)	Infinite Saturation Flow						Inf	Inf
5/1 (A57 Liverpool Road - Westbound Exit Lane 1)	Infinite Saturation Flow						Inf	Inf
6/1 (Lingley Green Avenue Lane 1)	Infinite Saturation Flow						Inf	Inf

**Scenario 1: 'Am Peak Period'** (FG1: '2017 AM Peak Period', Plan 1: 'Network Control Plan 1')

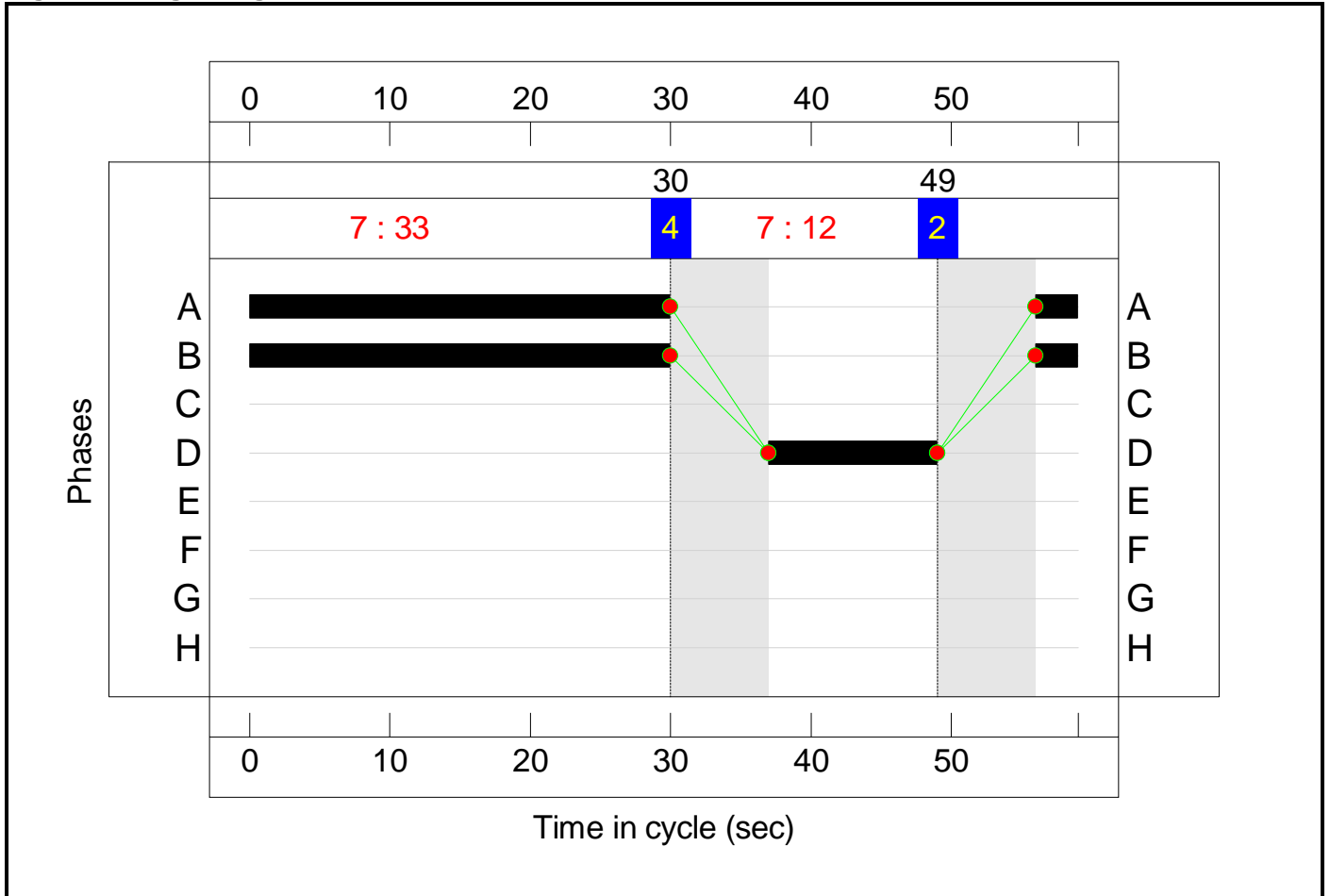
**Stage Sequence Diagram**



**Stage Timings**

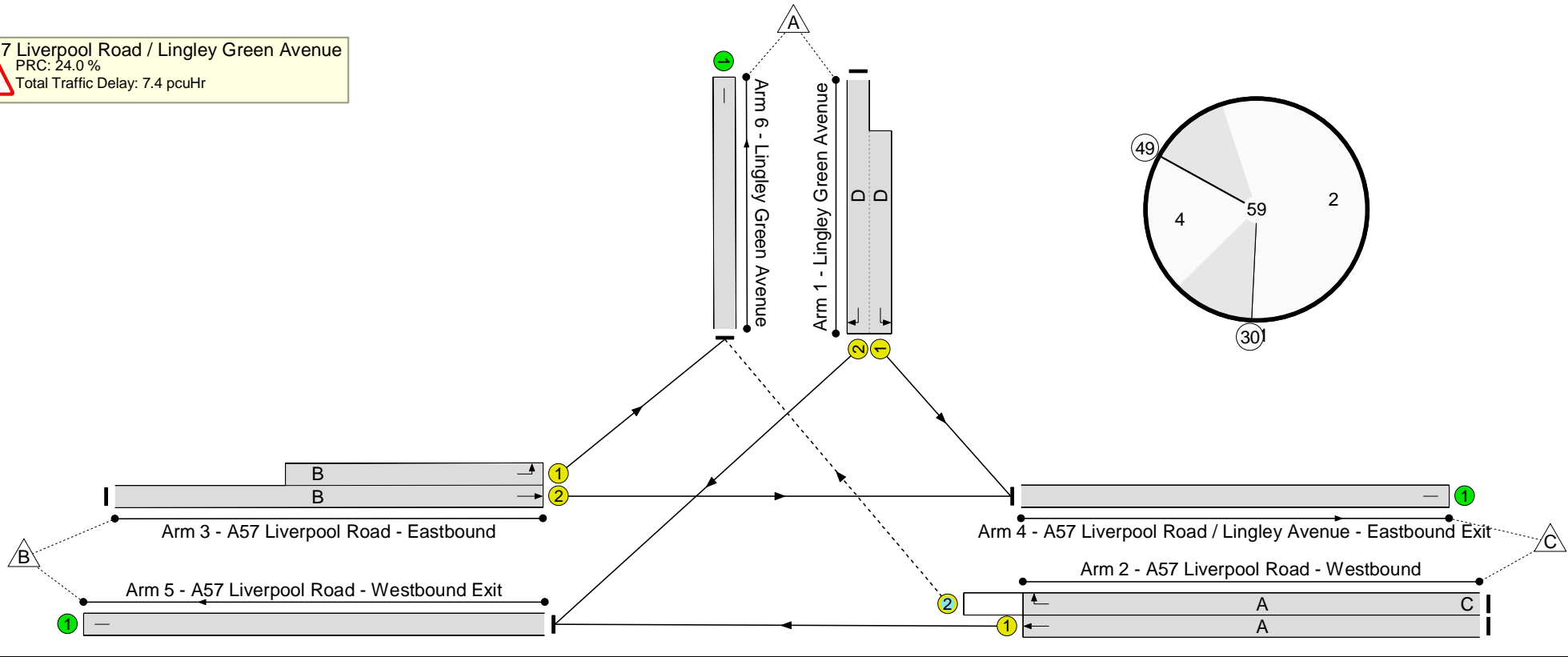
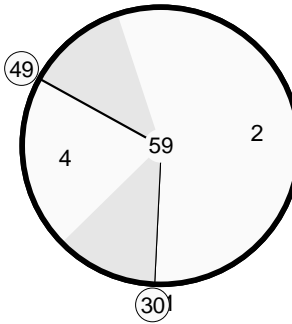
Stage	2	4
Duration	33	12
Change Point	49	30

**Signal Timings Diagram**



Full Input Data And Results  
**Network Layout Diagram**

A57 Liverpool Road / Lingley Green Avenue  
 PRC: 24.0 %  
 Total Traffic Delay: 7.4 pcuHr



Full Input Data And Results

**Network Results**

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
<b>Network</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>72.6%</b>
<b>A57 Liverpool Road / Lingley Green Avenue</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>72.6%</b>
1/2+1/1	Lingley Green Avenue Left Right	U	N/A	N/A	D		1	12	-	380	1907:1861	420+103	72.6 : 72.6%
2/1	A57 Liverpool Road - Westbound Ahead	U	N/A	N/A	A		1	33	-	480	2115	1219	39.4%
2/2	A57 Liverpool Road - Westbound Right	O	N/A	N/A	A	C	1	33	0	66	1781	358	18.4%
3/2+3/1	A57 Liverpool Road - Eastbound Ahead Left	U	N/A	N/A	B		1	33	-	942	2015:1843	993+935	48.9 : 48.9%
4/1	A57 Liverpool Road / Lingley Avenue - Eastbound Exit	U	N/A	N/A	-		-	-	-	560	Inf	Inf	0.0%
5/1	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	785	Inf	Inf	0.0%
6/1	Lingley Green Avenue	U	N/A	N/A	-		-	-	-	523	Inf	Inf	0.0%

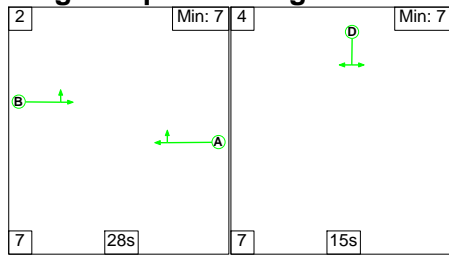
Full Input Data And Results

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	-	-	64	0	2	5.0	2.2	0.1	7.4	-	-	-	-
A57 Liverpool Road / Lingley Green Avenue	-	-	64	0	2	5.0	2.2	0.1	7.4	-	-	-	-
1/2+1/1	380	380	-	-	-	2.2	1.3	-	3.5	33.1	4.6	1.3	5.9
2/1	480	480	-	-	-	0.9	0.3	-	1.2	9.3	4.3	0.3	4.6
2/2	66	66	64	0	2	0.1	0.1	0.1	0.3	16.4	0.5	0.1	0.6
3/2+3/1	942	942	-	-	-	1.8	0.5	-	2.3	8.8	4.3	0.5	4.8
4/1	560	560	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	785	785	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	523	523	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
C1			PRC for Signalled Lanes (%): 24.0		Total Delay for Signalled Lanes (pcuHr): 7.35		Cycle Time (s): 59						
			PRC Over All Lanes (%): 24.0		Total Delay Over All Lanes(pcuHr): 7.35								

Full Input Data And Results

Scenario 2: 'Interpeak' (FG3: '2017 Interpeak Period', Plan 1: 'Network Control Plan 1')

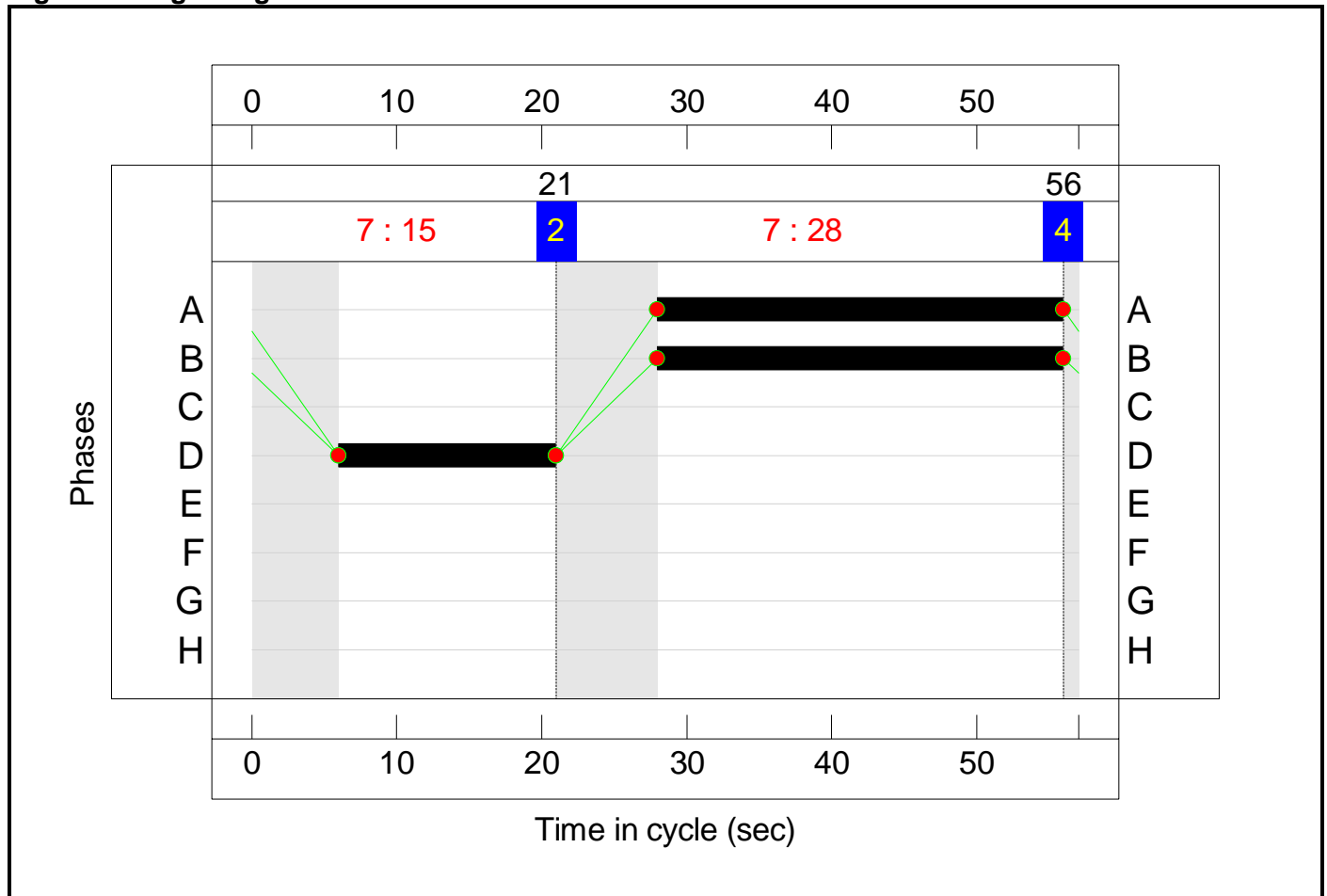
Stage Sequence Diagram



Stage Timings

Stage	2	4
Duration	28	15
Change Point	21	56

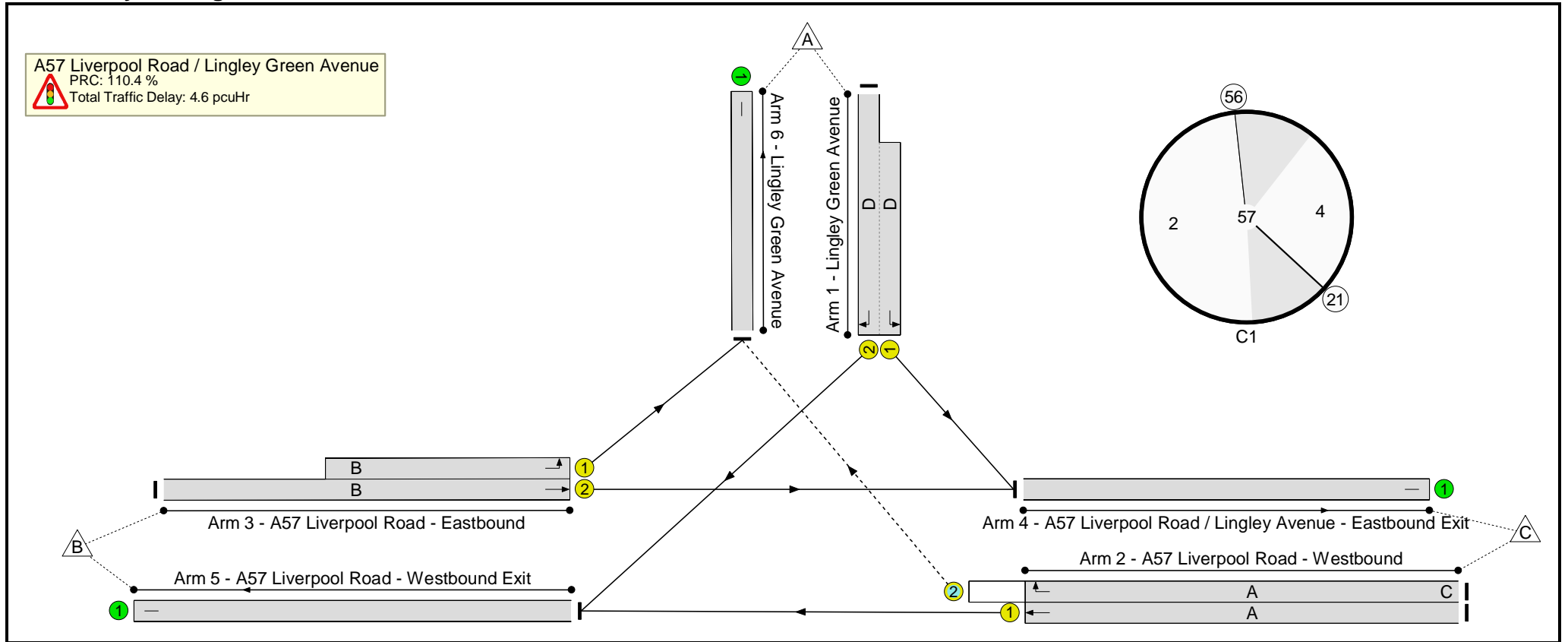
Signal Timings Diagram





Full Input Data And Results  
**Network Layout Diagram**

A57 Liverpool Road / Lingley Green Avenue  
PRC: 110.4 %  
Total Traffic Delay: 4.6 pcuHr



Full Input Data And Results

**Network Results**

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
<b>Network</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>42.8%</b>
<b>A57 Liverpool Road / Lingley Green Avenue</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>42.8%</b>
1/2+1/1	Lingley Green Avenue Left Right	U	N/A	N/A	D		1	15	-	315	1907:1861	535+201	42.8 : 42.8%
2/1	A57 Liverpool Road - Westbound Ahead	U	N/A	N/A	A		1	28	-	396	2115	1076	36.8%
2/2	A57 Liverpool Road - Westbound Right	O	N/A	N/A	A	C	1	28	0	57	1781	550	10.4%
3/2+3/1	A57 Liverpool Road - Eastbound Ahead Left	U	N/A	N/A	B		1	28	-	500	2015:1843	1025+496	32.9 : 32.9%
4/1	A57 Liverpool Road / Lingley Avenue - Eastbound Exit	U	N/A	N/A	-		-	-	-	423	Inf	Inf	0.0%
5/1	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	625	Inf	Inf	0.0%
6/1	Lingley Green Avenue	U	N/A	N/A	-		-	-	-	220	Inf	Inf	0.0%

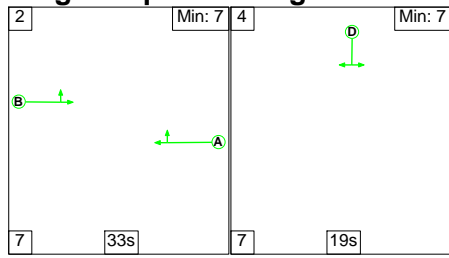
Full Input Data And Results

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	-	-	55	0	2	3.6	1.0	0.0	4.6	-	-	-	-
A57 Liverpool Road / Lingley Green Avenue	-	-	55	0	2	3.6	1.0	0.0	4.6	-	-	-	-
1/2+1/1	315	315	-	-	-	1.4	0.4	-	1.8	20.7	2.9	0.4	3.3
2/1	396	396	-	-	-	0.9	0.3	-	1.2	11.1	3.7	0.3	4.0
2/2	57	57	55	0	2	0.1	0.1	0.0	0.2	13.3	0.4	0.1	0.5
3/2+3/1	500	500	-	-	-	1.1	0.2	-	1.4	9.8	3.1	0.2	3.3
4/1	423	423	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	625	625	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	220	220	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
C1		PRC for Signalled Lanes (%):		110.4	Total Delay for Signalled Lanes (pcuHr):		4.60	Cycle Time (s):		57			
		PRC Over All Lanes (%):		110.4	Total Delay Over All Lanes(pcuHr):		4.60						

Full Input Data And Results

Scenario 3: 'Pm Peak Period' (FG2: '2017 PM Peak Period', Plan 1: 'Network Control Plan 1')

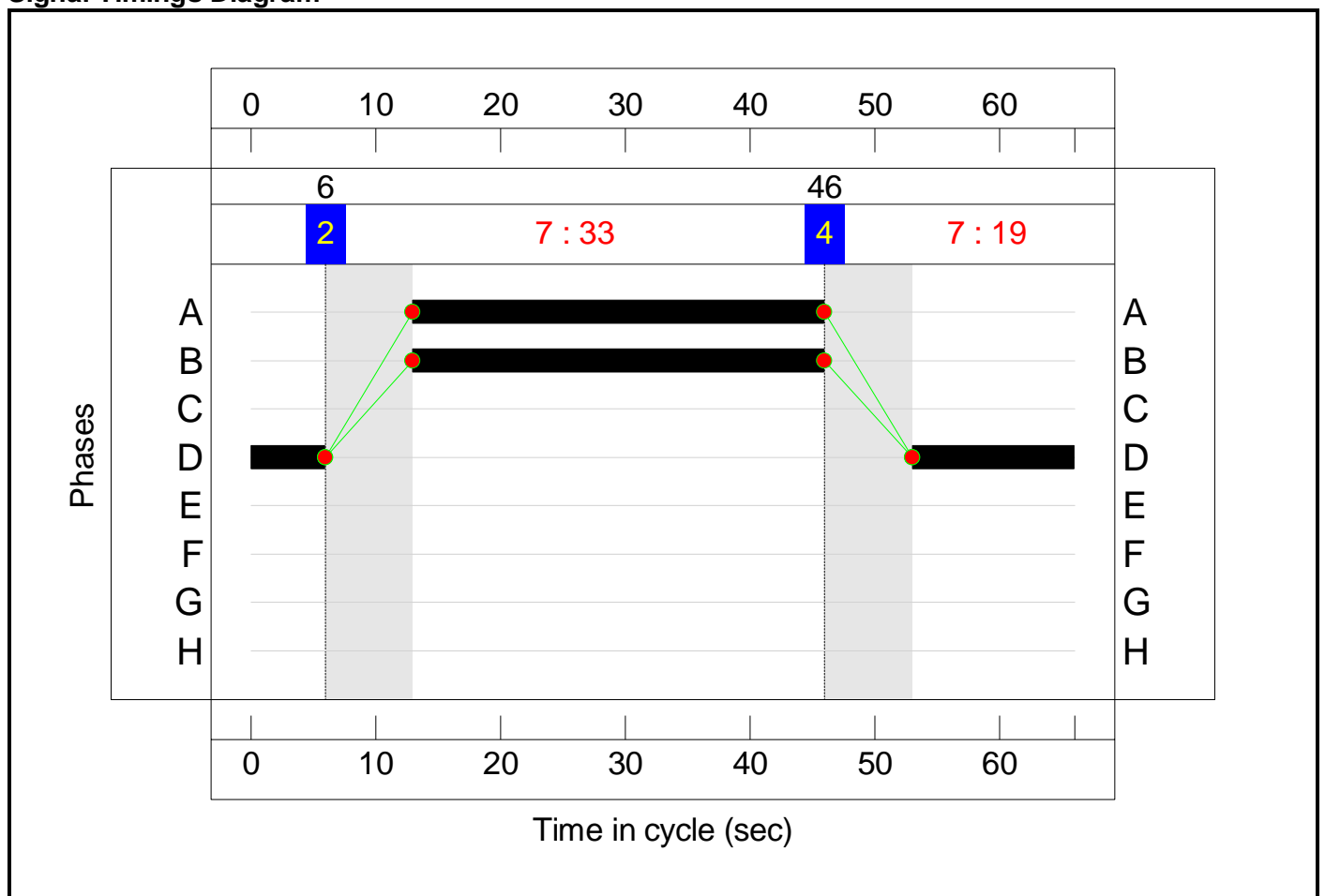
Stage Sequence Diagram



Stage Timings

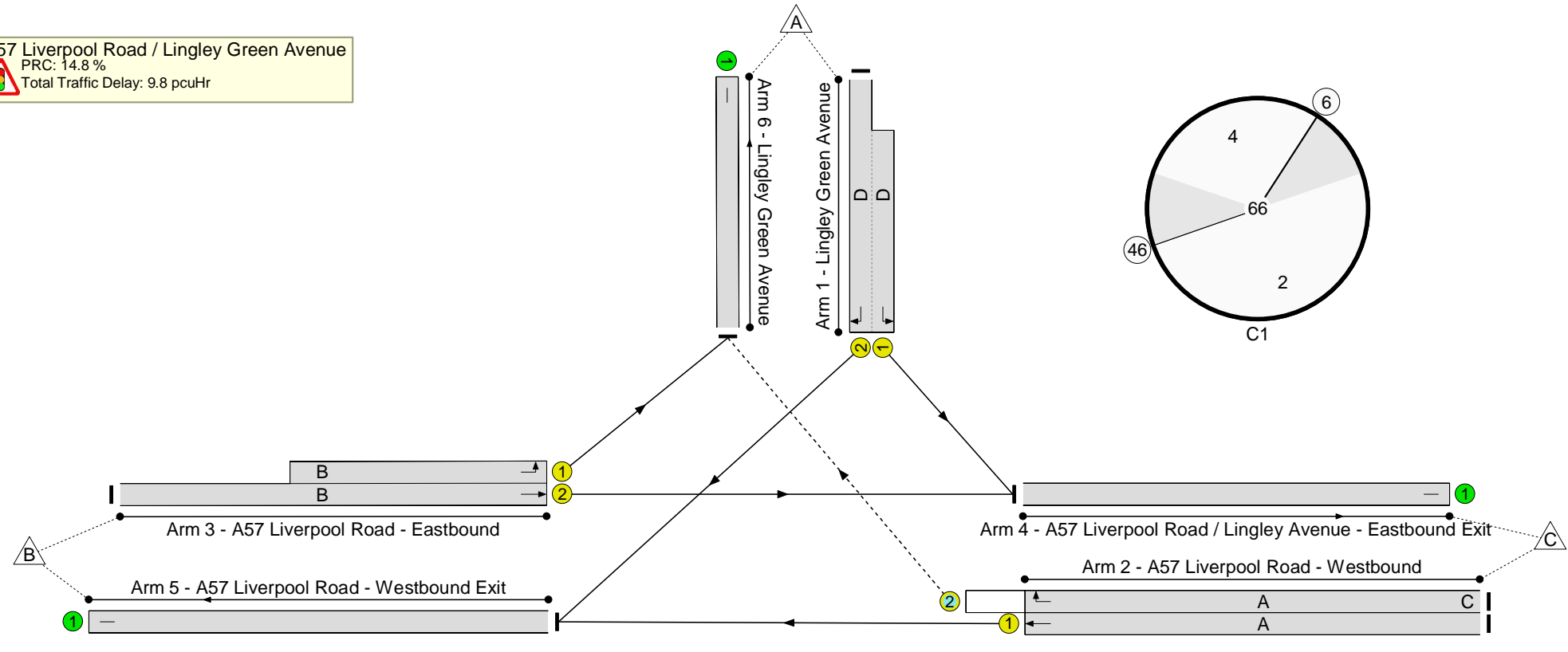
Stage	2	4
Duration	33	19
Change Point	6	46

Signal Timings Diagram



Full Input Data And Results  
**Network Layout Diagram**

A57 Liverpool Road / Lingley Green Avenue  
 PRC: 14.8 %  
 Total Traffic Delay: 9.8 pcuHr



Full Input Data And Results

**Network Results**

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
<b>Network</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>78.4%</b>
<b>A57 Liverpool Road / Lingley Green Avenue</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>78.4%</b>
1/2+1/1	Lingley Green Avenue Left Right	U	N/A	N/A	D		1	19	-	554	1907:1861	578+129	78.4 : 78.4%
2/1	A57 Liverpool Road - Westbound Ahead	U	N/A	N/A	A		1	33	-	576	2115	1090	52.9%
2/2	A57 Liverpool Road - Westbound Right	O	N/A	N/A	A	C	1	33	0	70	1781	415	16.9%
3/2+3/1	A57 Liverpool Road - Eastbound Ahead Left	U	N/A	N/A	B		1	33	-	687	2015:1843	1022+514	44.7 : 44.7%
4/1	A57 Liverpool Road / Lingley Avenue - Eastbound Exit	U	N/A	N/A	-		-	-	-	558	Inf	Inf	0.0%
5/1	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	1029	Inf	Inf	0.0%
6/1	Lingley Green Avenue	U	N/A	N/A	-		-	-	-	300	Inf	Inf	0.0%

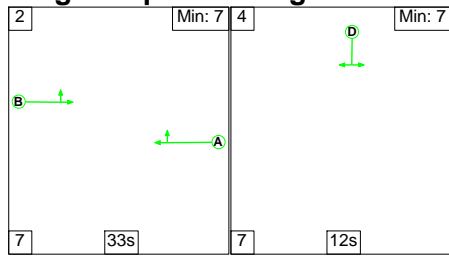
Full Input Data And Results

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
<b>Network</b>	-	-	<b>68</b>	<b>0</b>	<b>2</b>	<b>6.8</b>	<b>2.8</b>	<b>0.1</b>	<b>9.8</b>	-	-	-	-
<b>A57 Liverpool Road / Lingley Green Avenue</b>	-	-	<b>68</b>	<b>0</b>	<b>2</b>	<b>6.8</b>	<b>2.8</b>	<b>0.1</b>	<b>9.8</b>	-	-	-	-
1/2+1/1	554	554	-	-	-	3.1	1.8	-	4.9	31.8	7.5	1.8	9.3
2/1	576	576	-	-	-	1.7	0.6	-	2.3	14.2	6.9	0.6	7.4
2/2	70	70	68	0	2	0.2	0.1	0.1	0.4	18.7	0.6	0.1	0.7
3/2+3/1	687	687	-	-	-	1.8	0.4	-	2.2	11.8	5.2	0.4	5.6
4/1	558	558	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	1029	1029	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	300	300	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
C1			PRC for Signalled Lanes (%):		14.8	Total Delay for Signalled Lanes (pcuHr):		9.77	Cycle Time (s): 66				
			PRC Over All Lanes (%):		14.8	Total Delay Over All Lanes(pcuHr):		9.77					

Full Input Data And Results

Scenario 4: '2027 Am Peak Period' (FG4: '2027 AM Peak Period', Plan 1: 'Network Control Plan 1')

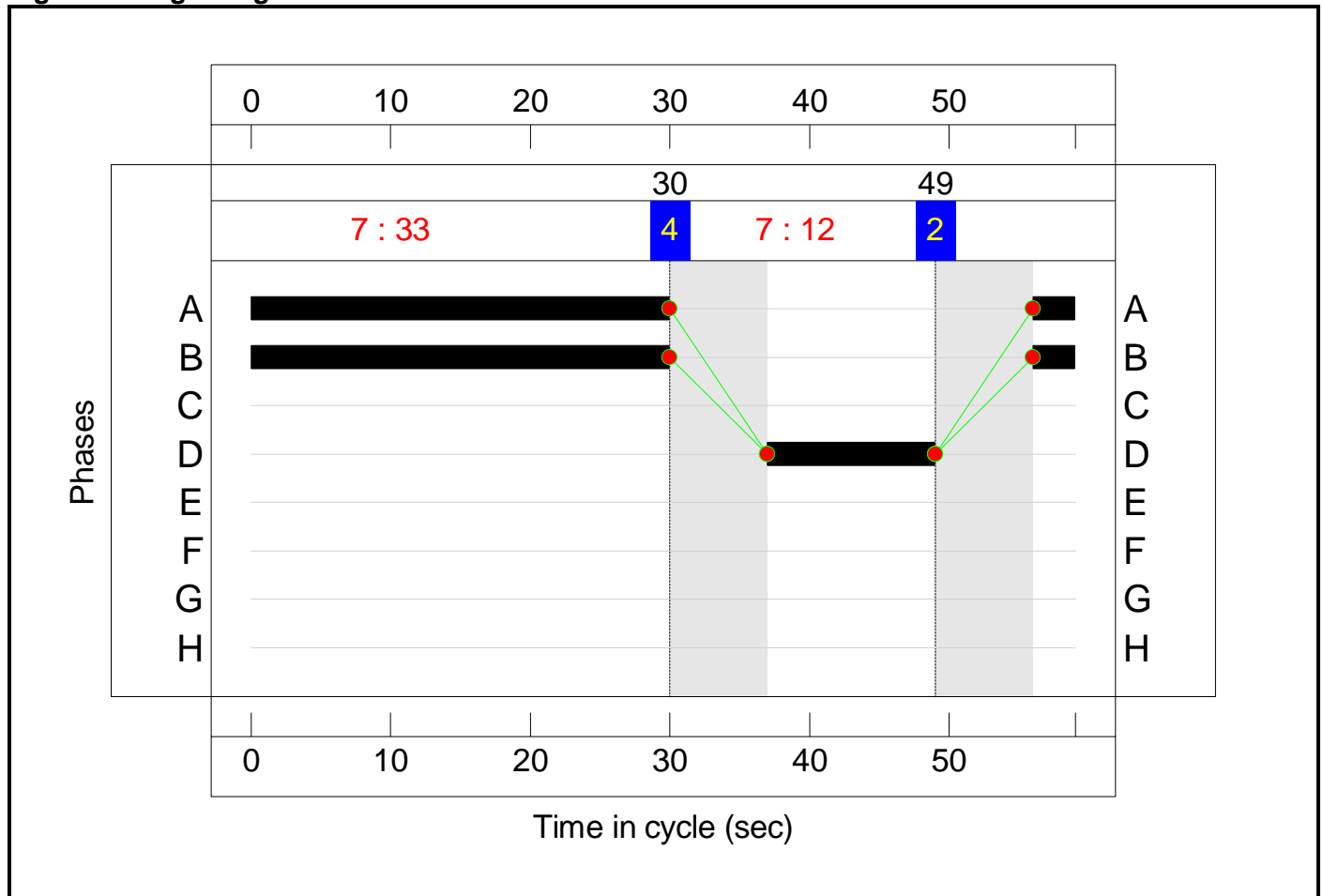
Stage Sequence Diagram



Stage Timings

Stage	2	4
Duration	33	12
Change Point	49	30

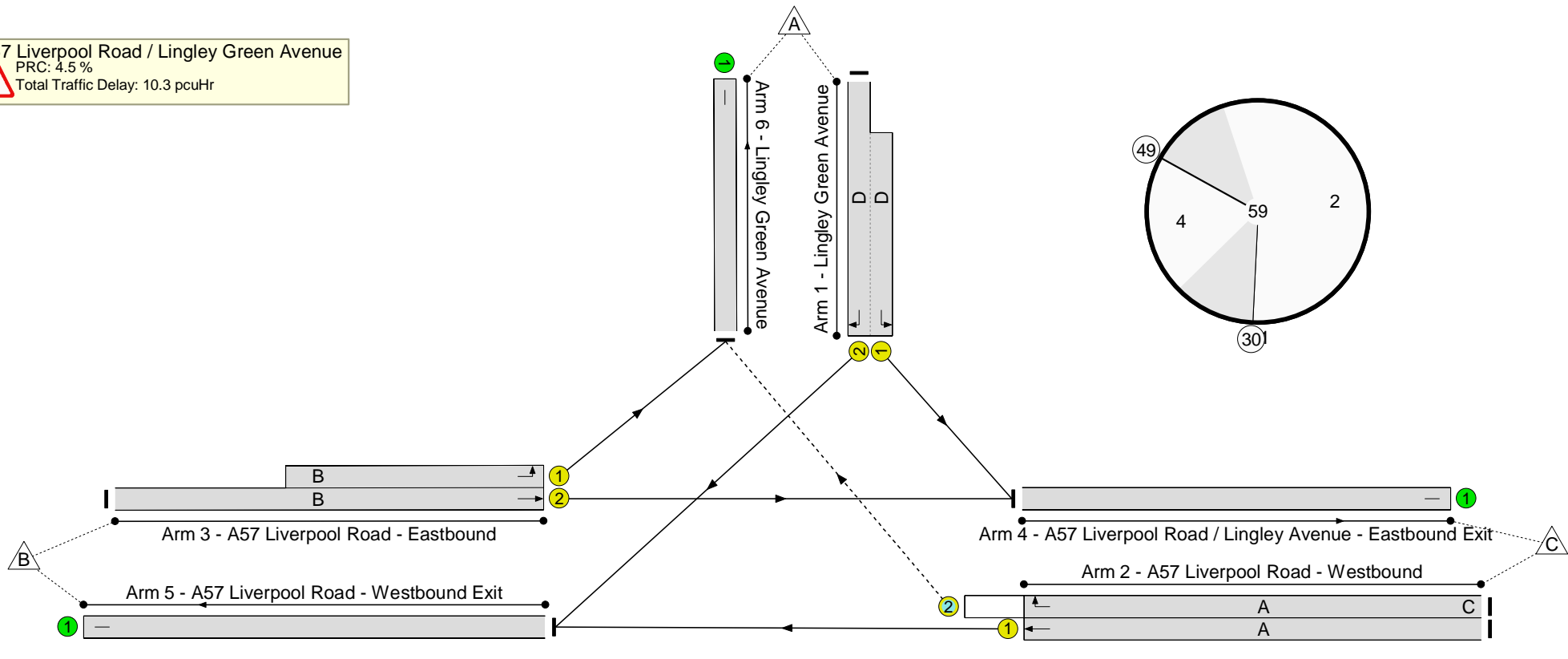
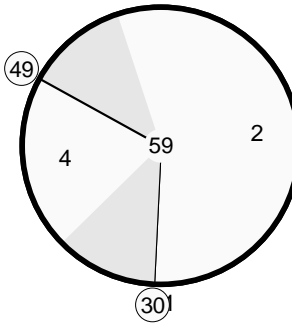
Signal Timings Diagram





Full Input Data And Results  
**Network Layout Diagram**

A57 Liverpool Road / Lingley Green Avenue  
 PRC: 4.5 %  
 Total Traffic Delay: 10.3 pcuHr



Full Input Data And Results

**Network Results**

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
<b>Network</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>86.2%</b>
<b>A57 Liverpool Road / Lingley Green Avenue</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>86.2%</b>
1/2+1/1	Lingley Green Avenue Left Right	U	N/A	N/A	D		1	12	-	452	1907:1861	420+104	86.2 : 86.2%
2/1	A57 Liverpool Road - Westbound Ahead	U	N/A	N/A	A		1	33	-	524	2115	1219	43.0%
2/2	A57 Liverpool Road - Westbound Right	O	N/A	N/A	A	C	1	33	0	79	1781	288	27.4%
3/2+3/1	A57 Liverpool Road - Eastbound Ahead Left	U	N/A	N/A	B		1	33	-	1072	2015:1843	953+971	55.7 : 55.7%
4/1	A57 Liverpool Road / Lingley Avenue - Eastbound Exit	U	N/A	N/A	-		-	-	-	621	Inf	Inf	0.0%
5/1	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	886	Inf	Inf	0.0%
6/1	Lingley Green Avenue	U	N/A	N/A	-		-	-	-	620	Inf	Inf	0.0%

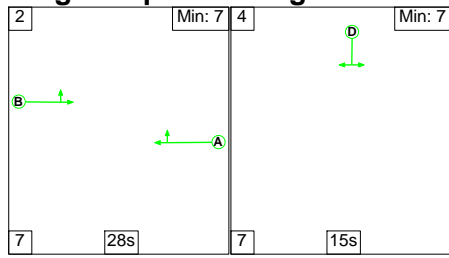
Full Input Data And Results

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	-	-	76	0	3	6.0	4.1	0.2	10.3	-	-	-	-
A57 Liverpool Road / Lingley Green Avenue	-	-	76	0	3	6.0	4.1	0.2	10.3	-	-	-	-
1/2+1/1	452	452	-	-	-	2.7	2.9	-	5.6	44.4	5.6	2.9	8.5
2/1	524	524	-	-	-	1.0	0.4	-	1.4	9.6	4.8	0.4	5.2
2/2	79	79	76	0	3	0.1	0.2	0.2	0.5	22.4	0.6	0.2	0.8
3/2+3/1	1072	1072	-	-	-	2.2	0.6	-	2.8	9.5	5.3	0.6	5.9
4/1	621	621	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	886	886	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	620	620	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
C1			PRC for Signalled Lanes (%):		4.5	Total Delay for Signalled Lanes (pcuHr):		10.29	Cycle Time (s): 59				
			PRC Over All Lanes (%):		4.5	Total Delay Over All Lanes(pcuHr):		10.29					

Full Input Data And Results

Scenario 5: '2027 Interpeak' (FG6: '2027 Interpeak Period', Plan 1: 'Network Control Plan 1')

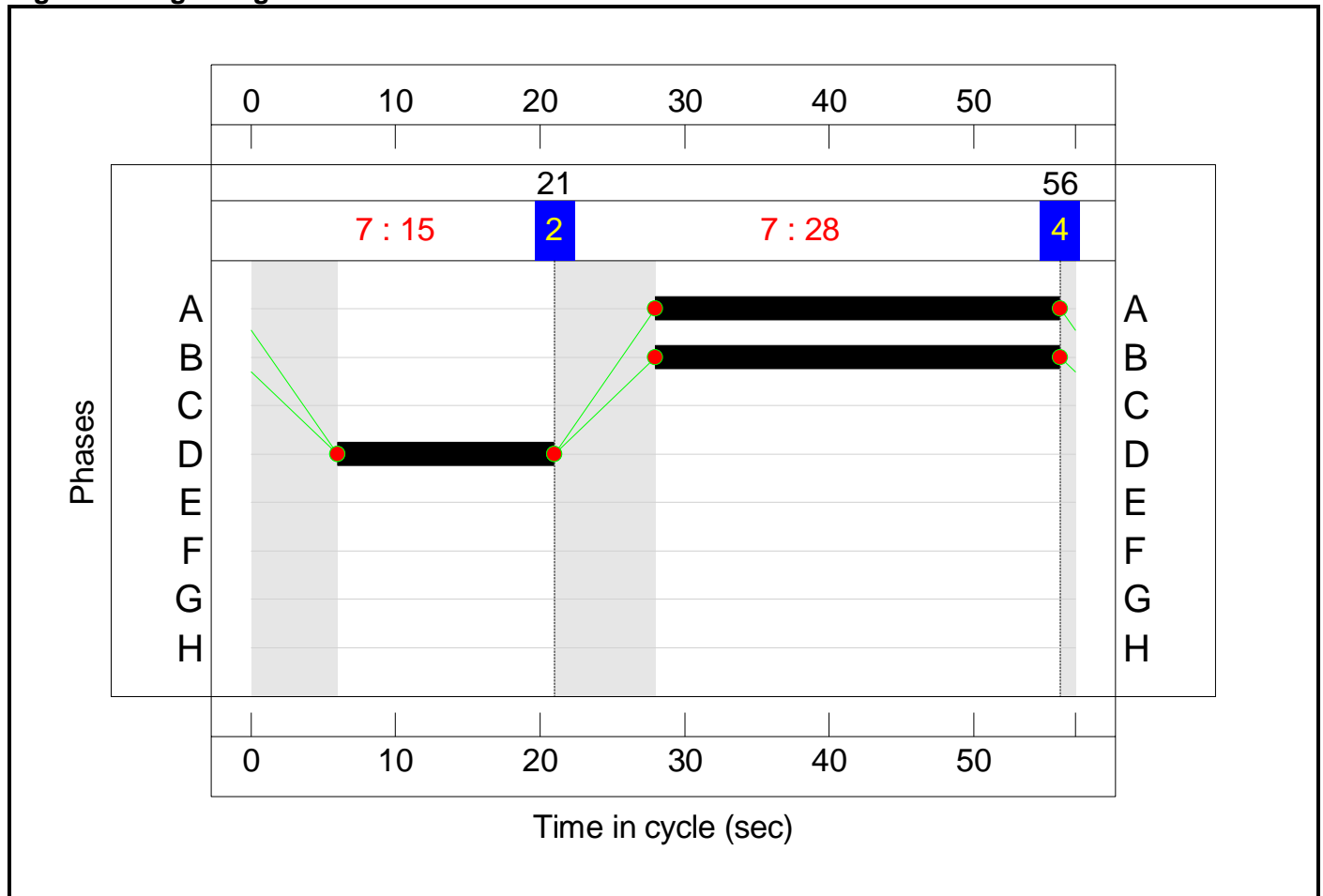
Stage Sequence Diagram



Stage Timings

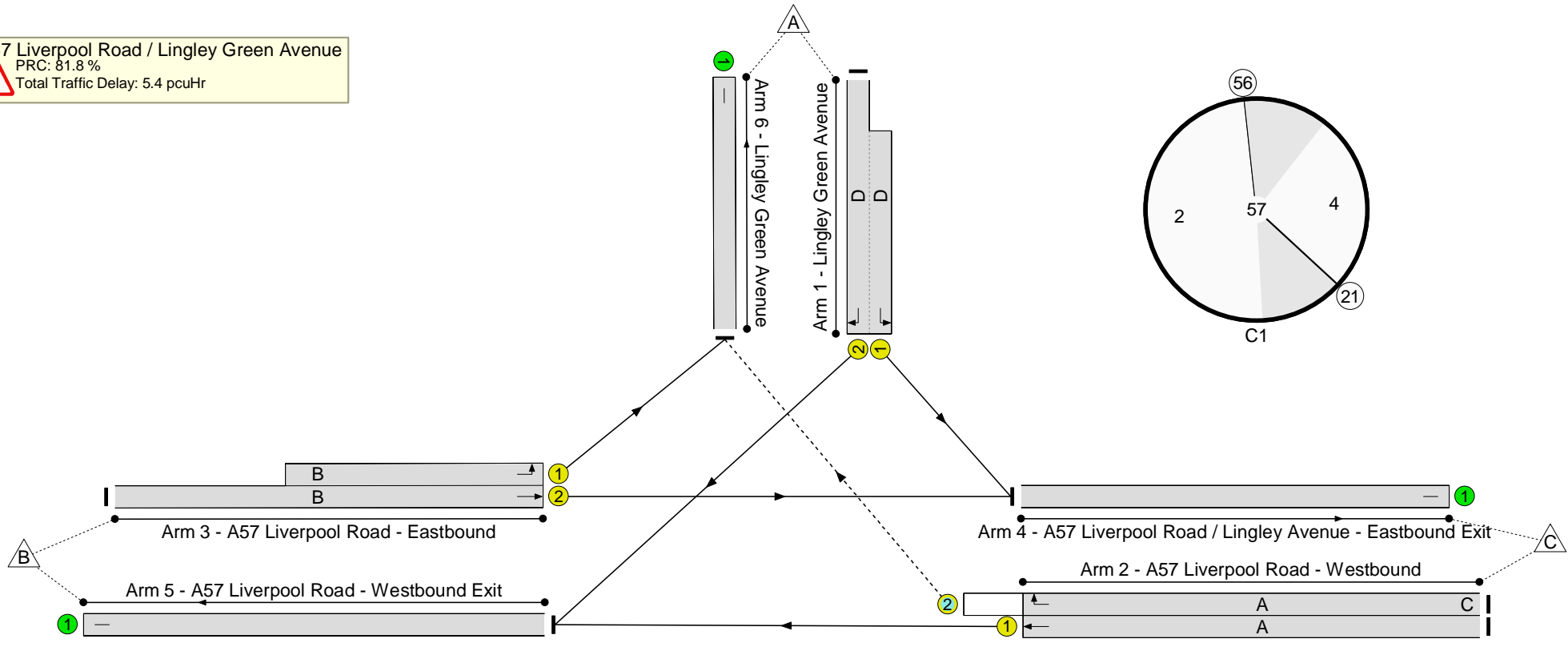
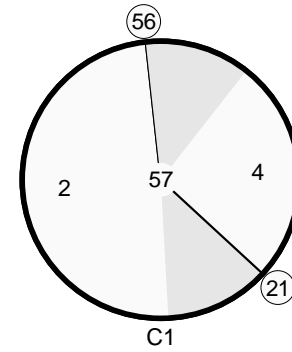
Stage	2	4
Duration	28	15
Change Point	21	56

Signal Timings Diagram



Full Input Data And Results  
**Network Layout Diagram**

A57 Liverpool Road / Lingley Green Avenue  
 PRC: 81.8 %  
 Total Traffic Delay: 5.4 pcuHr



Full Input Data And Results

**Network Results**

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
<b>Network</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>49.5%</b>
<b>A57 Liverpool Road / Lingley Green Avenue</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>49.5%</b>
1/2+1/1	Lingley Green Avenue Left Right	U	N/A	N/A	D		1	15	-	367	1907:1861	535+206	49.5 : 49.5%
2/1	A57 Liverpool Road - Westbound Ahead	U	N/A	N/A	A		1	28	-	437	2115	1076	40.6%
2/2	A57 Liverpool Road - Westbound Right	O	N/A	N/A	A	C	1	28	0	68	1781	511	13.3%
3/2+3/1	A57 Liverpool Road - Eastbound Ahead Left	U	N/A	N/A	B		1	28	-	564	2015:1843	1025+525	36.4 : 36.4%
4/1	A57 Liverpool Road / Lingley Avenue - Eastbound Exit	U	N/A	N/A	-		-	-	-	475	Inf	Inf	0.0%
5/1	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	702	Inf	Inf	0.0%
6/1	Lingley Green Avenue	U	N/A	N/A	-		-	-	-	259	Inf	Inf	0.0%

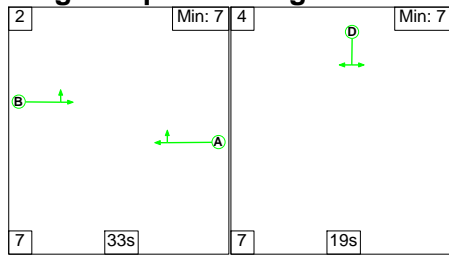
Full Input Data And Results

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
<b>Network</b>	-	-	<b>66</b>	<b>0</b>	<b>2</b>	<b>4.2</b>	<b>1.2</b>	<b>0.1</b>	<b>5.4</b>	-	-	-	-
<b>A57 Liverpool Road / Lingley Green Avenue</b>	-	-	<b>66</b>	<b>0</b>	<b>2</b>	<b>4.2</b>	<b>1.2</b>	<b>0.1</b>	<b>5.4</b>	-	-	-	-
1/2+1/1	367	367	-	-	-	1.7	0.5	-	2.2	21.5	3.5	0.5	3.9
2/1	437	437	-	-	-	1.1	0.3	-	1.4	11.5	4.2	0.3	4.6
2/2	68	68	66	0	2	0.1	0.1	0.1	0.3	14.3	0.5	0.1	0.6
3/2+3/1	564	564	-	-	-	1.3	0.3	-	1.6	10.0	3.5	0.3	3.8
4/1	475	475	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	702	702	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	259	259	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
C1			PRC for Signalled Lanes (%):		81.8	Total Delay for Signalled Lanes (pcuHr):		5.43	Cycle Time (s): 57				
			PRC Over All Lanes (%):		81.8	Total Delay Over All Lanes(pcuHr):		5.43					

Full Input Data And Results

Scenario 6: '2027 Pm Peak Period' (FG5: '2027 PM Peak Period', Plan 1: 'Network Control Plan 1')

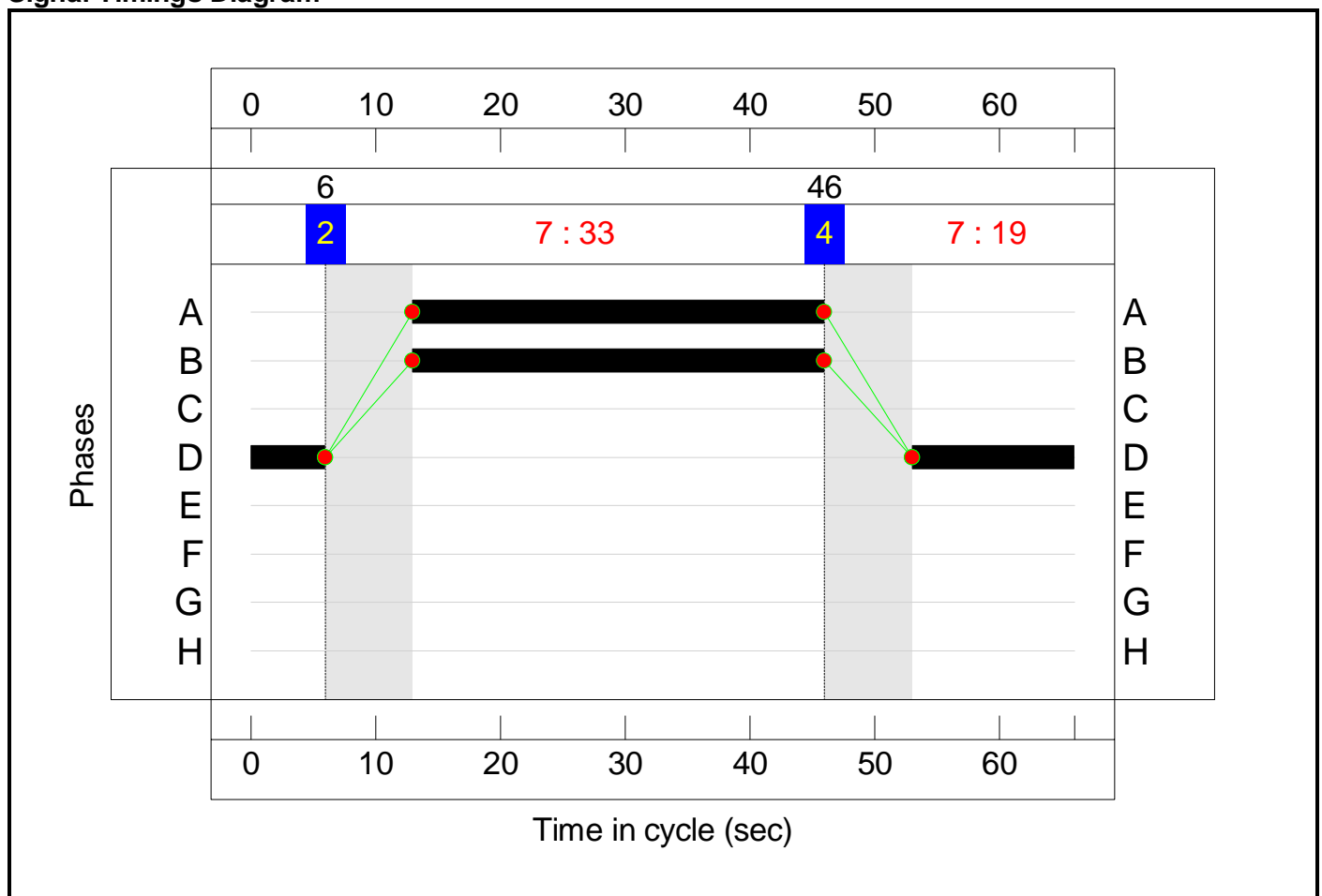
Stage Sequence Diagram



Stage Timings

Stage	2	4
Duration	33	19
Change Point	6	46

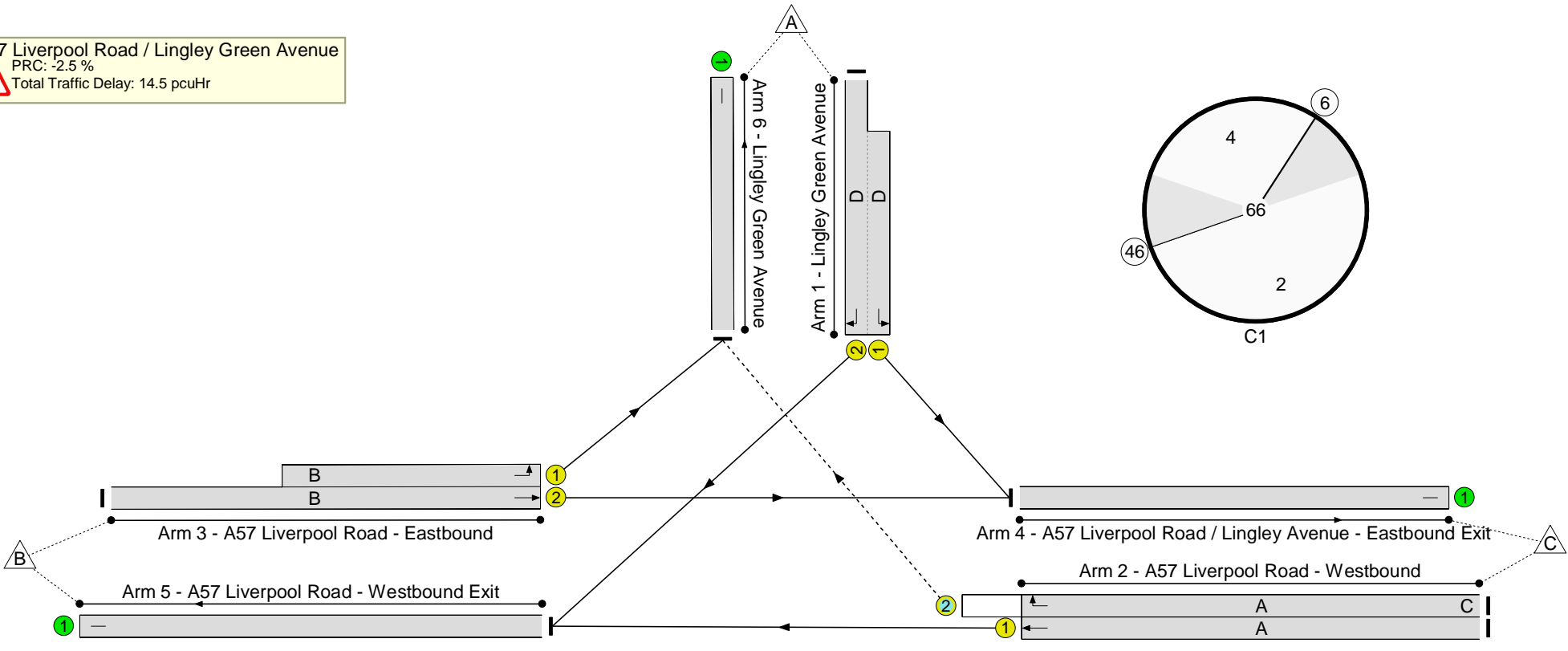
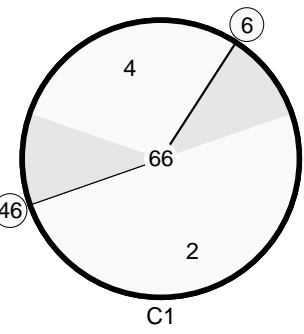
Signal Timings Diagram





Full Input Data And Results  
**Network Layout Diagram**

A57 Liverpool Road / Lingley Green Avenue  
 PRC: -2.5 %  
 Total Traffic Delay: 14.5 pcuHr



Full Input Data And Results

**Network Results**

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
<b>Network</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>92.2%</b>
<b>A57 Liverpool Road / Lingley Green Avenue</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>92.2%</b>
1/2+1/1	Lingley Green Avenue Left Right	U	N/A	N/A	D		1	19	-	653	1907:1861	578+130	92.2 : 92.2%
2/1	A57 Liverpool Road - Westbound Ahead	U	N/A	N/A	A		1	33	-	625	2115	1090	57.4%
2/2	A57 Liverpool Road - Westbound Right	O	N/A	N/A	A	C	1	33	0	83	1781	374	22.2%
3/2+3/1	A57 Liverpool Road - Eastbound Ahead Left	U	N/A	N/A	B		1	33	-	765	2015:1843	1020+556	48.5 : 48.5%
4/1	A57 Liverpool Road / Lingley Avenue - Eastbound Exit	U	N/A	N/A	-		-	-	-	615	Inf	Inf	0.0%
5/1	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	1158	Inf	Inf	0.0%
6/1	Lingley Green Avenue	U	N/A	N/A	-		-	-	-	353	Inf	Inf	0.0%

Full Input Data And Results

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	-	-	80	0	3	8.1	6.3	0.2	14.5	-	-	-	-
A57 Liverpool Road / Lingley Green Avenue	-	-	80	0	3	8.1	6.3	0.2	14.5	-	-	-	-
1/2+1/1	653	653	-	-	-	3.9	5.0	-	8.9	49.0	9.3	5.0	14.3
2/1	625	625	-	-	-	1.9	0.7	-	2.6	14.9	7.8	0.7	8.5
2/2	83	83	80	0	3	0.2	0.1	0.2	0.5	20.9	0.8	0.1	0.9
3/2+3/1	765	765	-	-	-	2.1	0.5	-	2.6	12.1	5.8	0.5	6.2
4/1	615	615	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	1158	1158	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	353	353	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
C1		PRC for Signalled Lanes (%):		-2.5		Total Delay for Signalled Lanes (pcuHr):		14.52		Cycle Time (s): 66			
		PRC Over All Lanes (%):		-2.5		Total Delay Over All Lanes(pcuHr):		14.52					

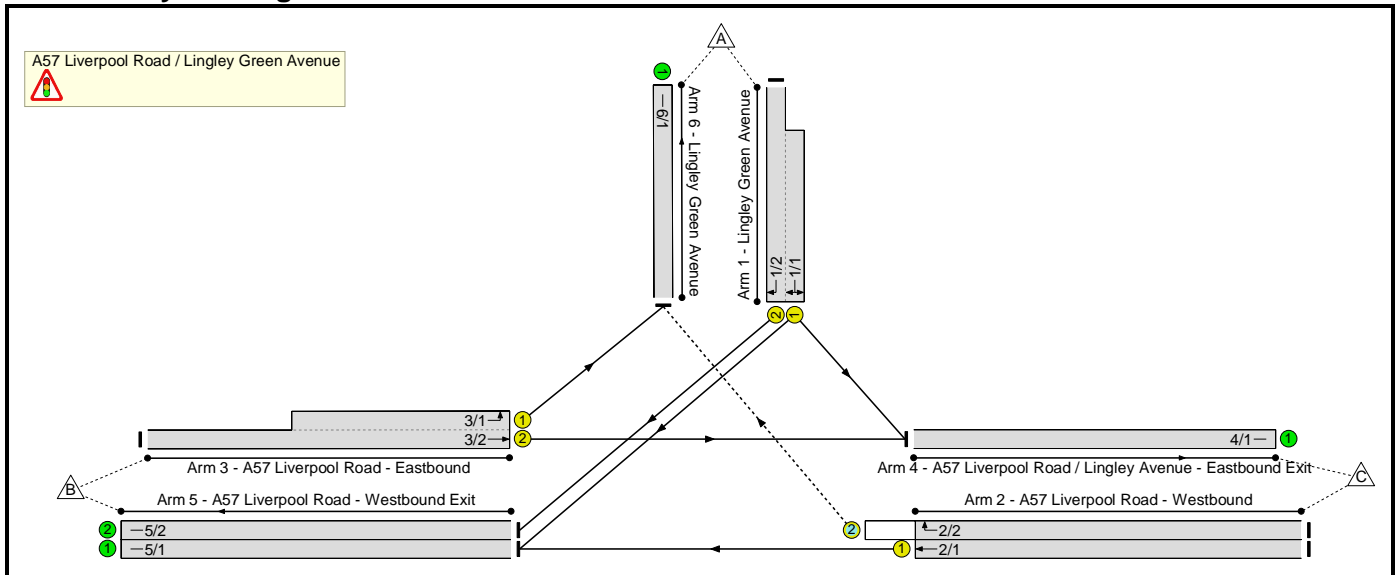
## Annex G: LinSig Layout 4 Model Outputs

Full Input Data And Results  
**Full Input Data And Results**

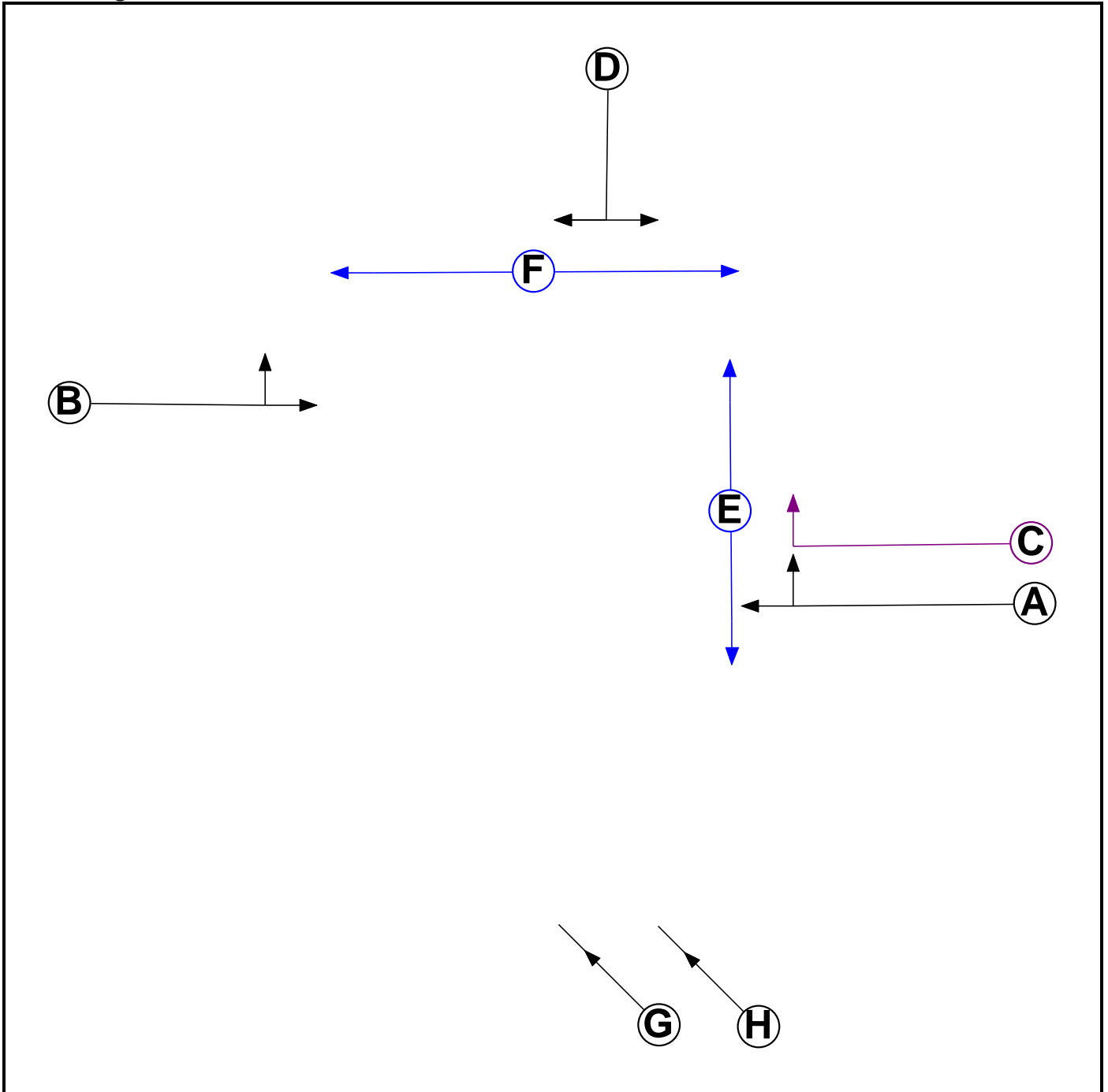
**User and Project Details**

<b>Project:</b>	Omega Gateway Highway Junction Improvement Package
<b>Title:</b>	<b>Layout 4</b>
<b>Location:</b>	<b>A57 Liverpool Road / A57 Lingley Green Avenue</b>
<b>Additional detail:</b>	
<b>File name:</b>	5. A57 Liverpool Rd - Lingley Green Avenue, two exit lanes, Final Future year with left turn lane.lsg3x
<b>Author:</b>	Alistair Johnson
<b>Company:</b>	AECOM
<b>Address:</b>	1 Dale Street, Liverpool, L2 2ET

**Network Layout Diagram**



**Phase Diagram**



**Phase Input Data**

Phase Name	Phase Type	Assoc. Phase	Street Min	Cont Min
A	Traffic		7	7
B	Traffic		7	7
C	Ind. Arrow	A	4	4
D	Traffic		7	7
E	Pedestrian		7	7
F	Pedestrian		10	10
G	Traffic		3	3
H	Traffic		7	7

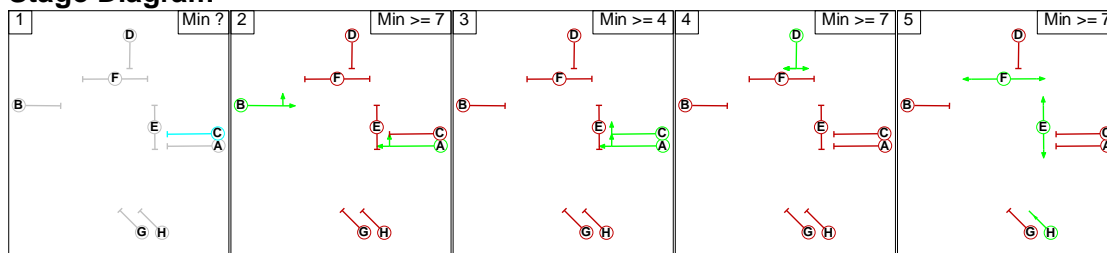
### Phase Intergrens Matrix

		Starting Phase							
		A	B	C	D	E	F	G	H
Terminating Phase	A	-	-	7	5	12	3	12	
	B	-	-	7	7	12	10	3	5
	C	-	8	-	7	-	12	3	12
	D	7	7	7	-	11	5	3	5
	E	1	1	-	1	-	-	1	-
	F	1	1	1	1	-	-	1	-
	G	2	2	2	2	2	2	-	3
	H	2	2	2	2	-	-	2	-

### Phases in Stage

Stage No.	Phases in Stage
1	
2	A B
3	A C
4	D
5	E F H

### Stage Diagram



### Phase Delays

Term. Stage	Start Stage	Phase	Type	Value	Cont value
There are no Phase Delays defined					

### Prohibited Stage Change

		To Stage				
		1	2	3	4	5
From Stage	1	-	X	X	X	X
	2	X	-	7	7	12
	3	X	X	-	7	12
	4	X	7	7	-	11
	5	X	2	2	2	-

Full Input Data And Results

**Give-Way Lane Input Data**

Junction: A57 Liverpool Road / Lingley Green Avenue											
Lane	Movement	Max Flow when Giving Way (PCU/Hr)	Min Flow when Giving Way (PCU/Hr)	Opposing Lane	Opp. Lane Coeff.	Opp. Mvmnts.	Right Turn Storage (PCU)	Non-Blocking Storage (PCU)	RTF	Right Turn Move up (s)	Max Turns in Intergreen (PCU)
2/2 (A57 Liverpool Road - Westbound)	6/1 (Right)	1439	0	3/2 3/1	1.09 1.09	All All	4.00	-	0.50	4	3.00



Full Input Data And Results

**Lane Input Data**

Junction: A57 Liverpool Road / Lingley Green Avenue												
Lane	Lane Type	Phases	Start Disp.	End Disp.	Physical Length (PCU)	Sat Flow Type	Def User Saturation Flow (PCU/Hr)	Lane Width (m)	Gradient	Nearside Lane	Turns	Turning Radius (m)
1/1 (Lingley Green Avenue)	U	D	2	3	17.4	User	1808	-	-	-	-	-
1/2 (Lingley Green Avenue)	U	D	2	3	60.0	User	1907	-	-	-	-	-
2/1 (A57 Liverpool Road - Westbound)	U	A	2	3	60.0	User	2115	-	-	-	-	-
2/2 (A57 Liverpool Road - Westbound)	O	A C	2	3	60.0	User	1781	-	-	-	-	-
3/1 (A57 Liverpool Road - Eastbound)	U	B	2	3	17.4	User	1843	-	-	-	-	-
3/2 (A57 Liverpool Road - Eastbound)	U	B	2	3	60.0	User	2015	-	-	-	-	-
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit)	U		2	3	60.0	Inf	-	-	-	-	-	-
5/1 (A57 Liverpool Road - Westbound Exit)	U		2	3	60.0	Inf	-	-	-	-	-	-
5/2 (A57 Liverpool Road - Westbound Exit)	U		2	3	60.0	Inf	-	-	-	-	-	-
6/1 (Lingley Green Avenue)	U		2	3	60.0	Inf	-	-	-	-	-	-

**Traffic Flow Groups**

Flow Group	Start Time	End Time	Duration	Formula
1: '2017 AM Peak Period'	07:30	08:30	01:00	
2: '2017 PM Peak Period'	16:30	17:30	01:00	
3: '2017 Interpeak Period'	14:45	15:45	01:00	
4: '2027 AM Peak Period'	07:30	08:30	01:00	
5: '2027 PM Peak Period'	16:30	17:30	01:00	
6: '2027 Interpeak Period'	14:45	15:45	01:00	

## Full Input Data And Results

**Scenario 1: 'Am Peak Period'** (FG1: '2017 AM Peak Period', Plan 1: 'Network Control Plan 1')

### Traffic Flows, Desired

**Desired Flow :**

	Destination				
		A	B	C	Tot.
Origin	A	0	305	75	380
	B	457	0	485	942
	C	66	480	0	546
	Tot.	523	785	560	1868

### Traffic Lane Flows

Lane	Scenario 1: Am Peak Period
<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>	
1/1 (short)	188
1/2 (with short)	380(In) 192(Out)
2/1	480
2/2	66
3/1 (short)	457
3/2 (with short)	942(In) 485(Out)
4/1	560
5/1	593
5/2	192
6/1	523

Full Input Data And Results

**Lane Saturation Flows**

Junction: A57 Liverpool Road / Lingley Green Avenue								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (Lingley Green Avenue Lane 1)							1811	1811
1/2 (Lingley Green Avenue Lane 2)							1907	1907
2/1 (A57 Liverpool Road - Westbound Lane 1)							2115	2115
2/2 (A57 Liverpool Road - Westbound Lane 2)							1781	1781
3/1 (A57 Liverpool Road - Eastbound Lane 1)							1843	1843
3/2 (A57 Liverpool Road - Eastbound Lane 2)							2015	2015
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit Lane 1)							Inf	Inf
5/1 (A57 Liverpool Road - Westbound Exit Lane 1)							Inf	Inf
5/2 (A57 Liverpool Road - Westbound Exit Lane 2)							Inf	Inf
6/1 (Lingley Green Avenue Lane 1)							Inf	Inf

**Scenario 2: 'Interpeak'** (FG3: '2017 Interpeak Period', Plan 1: 'Network Control Plan 1')

**Traffic Flows, Desired**

**Desired Flow :**

Origin	Destination				
	A	B	C	Tot.	
A	0	229	86	315	
B	163	0	337	500	
C	57	396	0	453	
Tot.	220	625	423	1268	

**Traffic Lane Flows**

Lane	Scenario 2: Interpeak
<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>	
1/1 (short)	156
1/2 (with short)	315(In) 159(Out)
2/1	396
2/2	57
3/1 (short)	163
3/2 (with short)	500(In) 337(Out)
4/1	423
5/1	466
5/2	159
6/1	220

**Lane Saturation Flows**

<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (Lingley Green Avenue Lane 1)							1823	1823
1/2 (Lingley Green Avenue Lane 2)							1907	1907
2/1 (A57 Liverpool Road - Westbound Lane 1)							2115	2115
2/2 (A57 Liverpool Road - Westbound Lane 2)							1781	1781
3/1 (A57 Liverpool Road - Eastbound Lane 1)							1843	1843
3/2 (A57 Liverpool Road - Eastbound Lane 2)							2015	2015
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit Lane 1)							Inf	Inf
5/1 (A57 Liverpool Road - Westbound Exit Lane 1)							Inf	Inf
5/2 (A57 Liverpool Road - Westbound Exit Lane 2)							Inf	Inf
6/1 (Lingley Green Avenue Lane 1)							Inf	Inf

Full Input Data And Results

**Scenario 3: 'Pm Peak Period'** (FG2: '2017 PM Peak Period', Plan 1: 'Network Control Plan 1')

**Traffic Flows, Desired**

**Desired Flow :**

Origin	Destination				
	A	B	C	Tot.	
A	0	453	101	554	
B	230	0	457	687	
C	70	576	0	646	
Tot.	300	1029	558	1887	

**Traffic Lane Flows**

Lane	Scenario 3: Pm Peak Period
<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>	
1/1 (short)	274
1/2 (with short)	554(In) 280(Out)
2/1	576
2/2	70
3/1 (short)	230
3/2 (with short)	687(In) 457(Out)
4/1	558
5/1	749
5/2	280
6/1	300

Full Input Data And Results

**Lane Saturation Flows**

Junction: A57 Liverpool Road / Lingley Green Avenue								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (Lingley Green Avenue Lane 1)							1808	1808
1/2 (Lingley Green Avenue Lane 2)							1907	1907
2/1 (A57 Liverpool Road - Westbound Lane 1)							2115	2115
2/2 (A57 Liverpool Road - Westbound Lane 2)							1781	1781
3/1 (A57 Liverpool Road - Eastbound Lane 1)							1843	1843
3/2 (A57 Liverpool Road - Eastbound Lane 2)							2015	2015
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit Lane 1)							Inf	Inf
5/1 (A57 Liverpool Road - Westbound Exit Lane 1)							Inf	Inf
5/2 (A57 Liverpool Road - Westbound Exit Lane 2)							Inf	Inf
6/1 (Lingley Green Avenue Lane 1)							Inf	Inf

**Scenario 4: '2027 Am Peak Period'** (FG4: '2027 AM Peak Period', Plan 1: 'Network Control Plan 1')

**Traffic Flows, Desired**

**Desired Flow :**

Origin	Destination				
	A	B	C	Tot.	
A	0	362	90	452	
B	541	0	531	1072	
C	79	524	0	603	
Tot.	620	886	621	2127	

Full Input Data And Results

**Traffic Lane Flows**

Lane	Scenario 4: 2027 Am Peak Period
<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>	
1/1 (short)	223
1/2 (with short)	452(In) 229(Out)
2/1	524
2/2	79
3/1 (short)	541
3/2 (with short)	1072(In) 531(Out)
4/1	621
5/1	657
5/2	229
6/1	620

**Lane Saturation Flows**

<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>									
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)	
1/1 (Lingley Green Avenue Lane 1)							This lane uses a directly entered Saturation Flow	1808	1808
1/2 (Lingley Green Avenue Lane 2)							This lane uses a directly entered Saturation Flow	1907	1907
2/1 (A57 Liverpool Road - Westbound Lane 1)							This lane uses a directly entered Saturation Flow	2115	2115
2/2 (A57 Liverpool Road - Westbound Lane 2)							This lane uses a directly entered Saturation Flow	1781	1781
3/1 (A57 Liverpool Road - Eastbound Lane 1)							This lane uses a directly entered Saturation Flow	1843	1843
3/2 (A57 Liverpool Road - Eastbound Lane 2)							This lane uses a directly entered Saturation Flow	2015	2015
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit Lane 1)							Infinite Saturation Flow	Inf	Inf
5/1 (A57 Liverpool Road - Westbound Exit Lane 1)							Infinite Saturation Flow	Inf	Inf
5/2 (A57 Liverpool Road - Westbound Exit Lane 2)							Infinite Saturation Flow	Inf	Inf
6/1 (Lingley Green Avenue Lane 1)							Infinite Saturation Flow	Inf	Inf

Full Input Data And Results

**Scenario 5: '2027 Interpeak'** (FG6: '2027 Interpeak Period', Plan 1: 'Network Control Plan 1')

**Traffic Flows, Desired**

**Desired Flow :**

Origin	Destination				
	A	B	C	Tot.	
A	0	265	102	367	
B	191	0	373	564	
C	68	437	0	505	
Tot.	259	702	475	1436	

**Traffic Lane Flows**

Lane	Scenario 5: 2027 Interpeak
<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>	
1/1 (short)	181
1/2 (with short)	367(In) 186(Out)
2/1	437
2/2	68
3/1 (short)	191
3/2 (with short)	564(In) 373(Out)
4/1	475
5/1	516
5/2	186
6/1	259



Full Input Data And Results

**Lane Saturation Flows**

Junction: A57 Liverpool Road / Lingley Green Avenue								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (Lingley Green Avenue Lane 1)							1823	1823
1/2 (Lingley Green Avenue Lane 2)							1907	1907
2/1 (A57 Liverpool Road - Westbound Lane 1)							2115	2115
2/2 (A57 Liverpool Road - Westbound Lane 2)							1781	1781
3/1 (A57 Liverpool Road - Eastbound Lane 1)							1843	1843
3/2 (A57 Liverpool Road - Eastbound Lane 2)							2015	2015
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit Lane 1)							Inf	Inf
5/1 (A57 Liverpool Road - Westbound Exit Lane 1)							Inf	Inf
5/2 (A57 Liverpool Road - Westbound Exit Lane 2)							Inf	Inf
6/1 (Lingley Green Avenue Lane 1)							Inf	Inf

**Scenario 6: '2027 Pm Peak Period'** (FG5: '2027 PM Peak Period', Plan 1: 'Network Control Plan 1')

**Traffic Flows, Desired**

**Desired Flow :**

Origin	Destination				
	A	B	C	Tot.	
A	0	533	120	653	
B	270	0	495	765	
C	83	625	0	708	
Tot.	353	1158	615	2126	

**Traffic Lane Flows**

Lane	Scenario 6: 2027 Pm Peak Period
<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>	
1/1 (short)	323
1/2 (with short)	653(In) 330(Out)
2/1	625
2/2	83
3/1 (short)	270
3/2 (with short)	765(In) 495(Out)
4/1	615
5/1	828
5/2	330
6/1	353

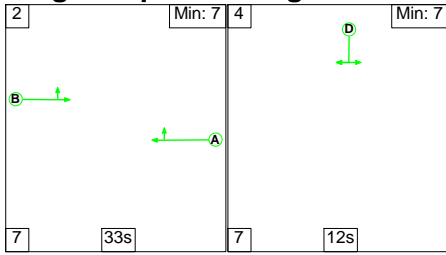
**Lane Saturation Flows**

<b>Junction: A57 Liverpool Road / Lingley Green Avenue</b>									
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)	
1/1 (Lingley Green Avenue Lane 1)							This lane uses a directly entered Saturation Flow	1811	1811
1/2 (Lingley Green Avenue Lane 2)							This lane uses a directly entered Saturation Flow	1907	1907
2/1 (A57 Liverpool Road - Westbound Lane 1)							This lane uses a directly entered Saturation Flow	2115	2115
2/2 (A57 Liverpool Road - Westbound Lane 2)							This lane uses a directly entered Saturation Flow	1781	1781
3/1 (A57 Liverpool Road - Eastbound Lane 1)							This lane uses a directly entered Saturation Flow	1843	1843
3/2 (A57 Liverpool Road - Eastbound Lane 2)							This lane uses a directly entered Saturation Flow	2015	2015
4/1 (A57 Liverpool Road / Lingley Avenue - Eastbound Exit Lane 1)							Infinite Saturation Flow	Inf	Inf
5/1 (A57 Liverpool Road - Westbound Exit Lane 1)							Infinite Saturation Flow	Inf	Inf
5/2 (A57 Liverpool Road - Westbound Exit Lane 2)							Infinite Saturation Flow	Inf	Inf
6/1 (Lingley Green Avenue Lane 1)							Infinite Saturation Flow	Inf	Inf

Full Input Data And Results

Scenario 1: 'Am Peak Period' (FG1: '2017 AM Peak Period', Plan 1: 'Network Control Plan 1')

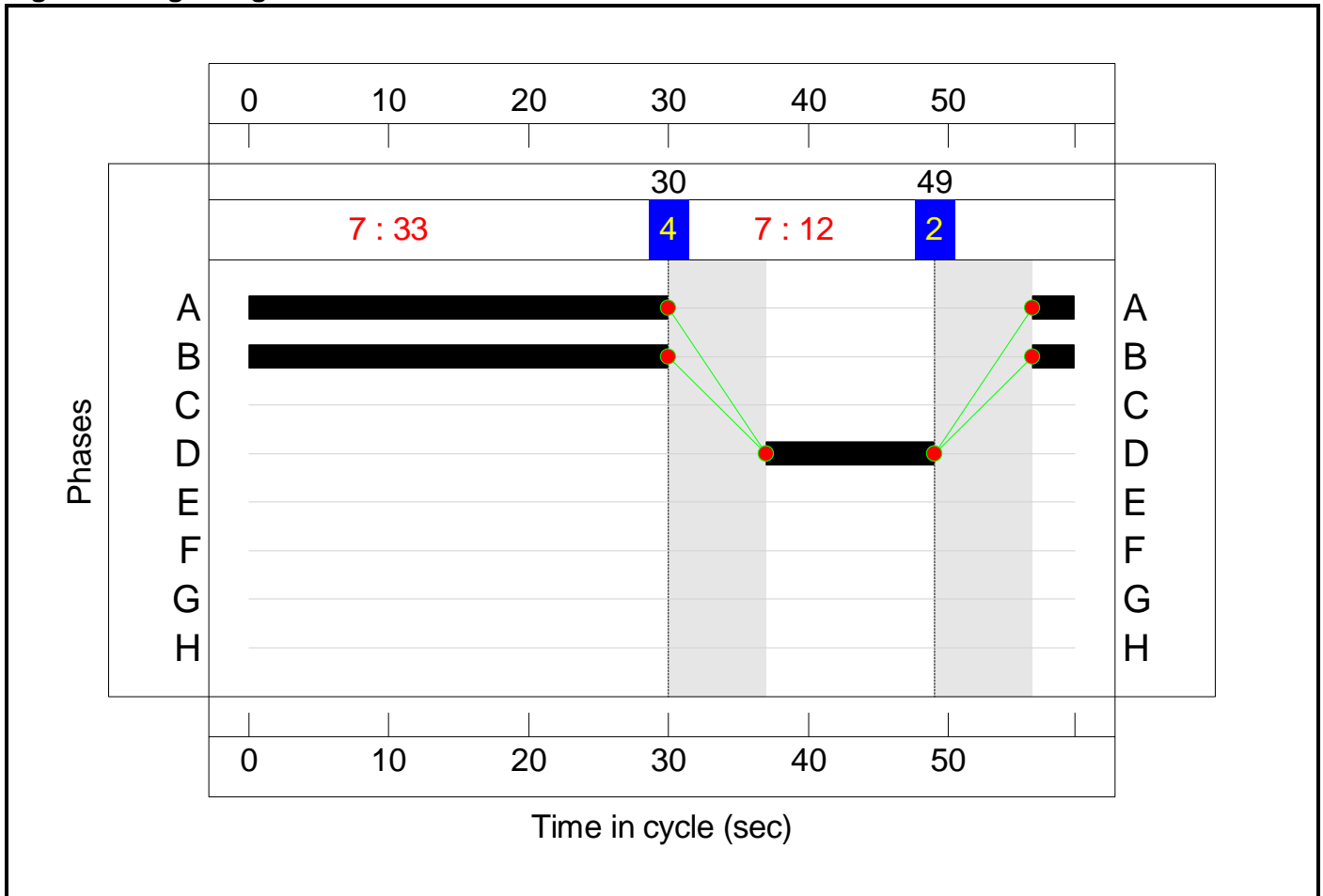
Stage Sequence Diagram



Stage Timings

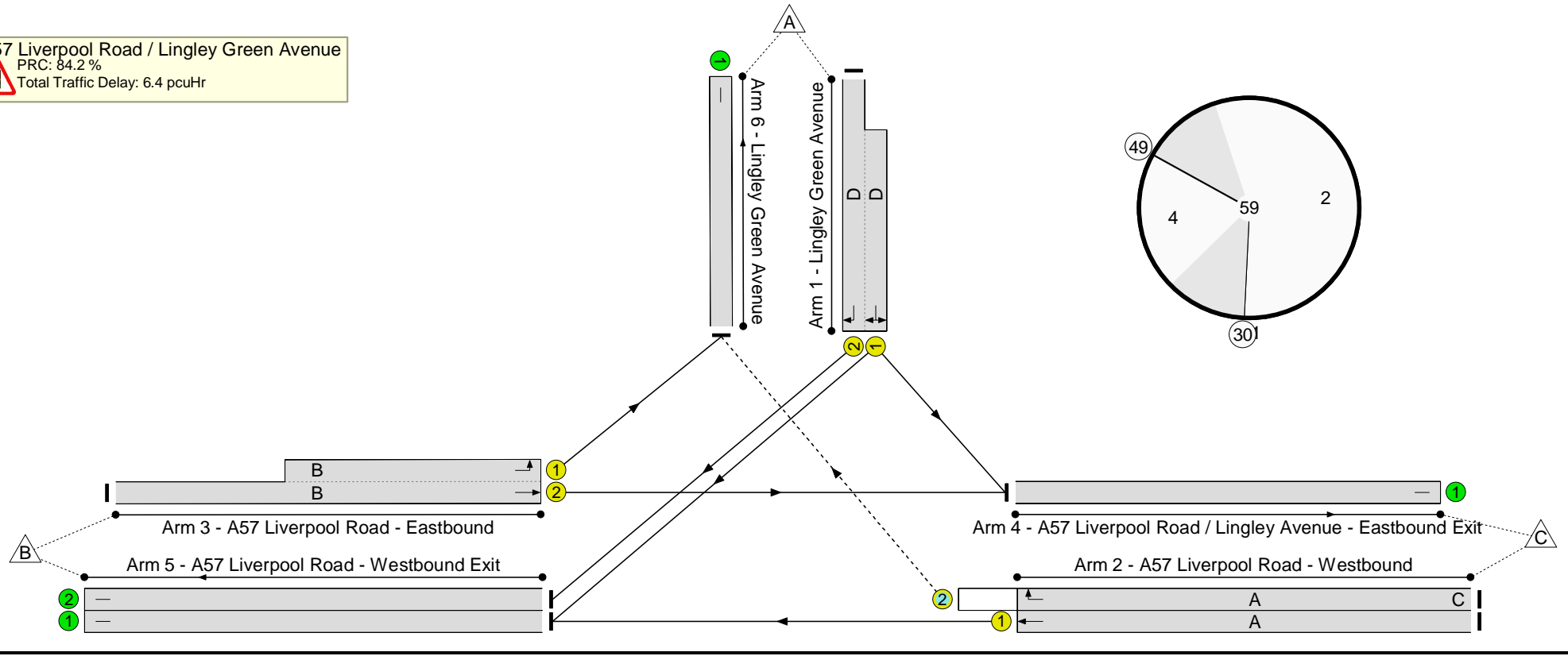
Stage	2	4
Duration	33	12
Change Point	49	30

Signal Timings Diagram



Full Input Data And Results  
**Network Layout Diagram**

A57 Liverpool Road / Lingley Green Avenue  
 PRC: 84.2 %  
 Total Traffic Delay: 6.4 pcuHr



Full Input Data And Results

**Network Results**

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
<b>Network</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>48.9%</b>
<b>A57 Liverpool Road / Lingley Green Avenue</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>48.9%</b>
1/2+1/1	Lingley Green Avenue Left Right	U	N/A	N/A	D		1	12	-	380	1907:1811	420+399	45.7 : 47.1%
2/1	A57 Liverpool Road - Westbound Ahead	U	N/A	N/A	A		1	33	-	480	2115	1219	39.4%
2/2	A57 Liverpool Road - Westbound Right	O	N/A	N/A	A	C	1	33	0	66	1781	358	18.4%
3/2+3/1	A57 Liverpool Road - Eastbound Ahead Left	U	N/A	N/A	B		1	33	-	942	2015:1843	993+935	48.9 : 48.9%
4/1	A57 Liverpool Road / Lingley Avenue - Eastbound Exit	U	N/A	N/A	-		-	-	-	560	Inf	Inf	0.0%
5/1	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	593	Inf	Inf	0.0%
5/2	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	192	Inf	Inf	0.0%
6/1	Lingley Green Avenue	U	N/A	N/A	-		-	-	-	523	Inf	Inf	0.0%

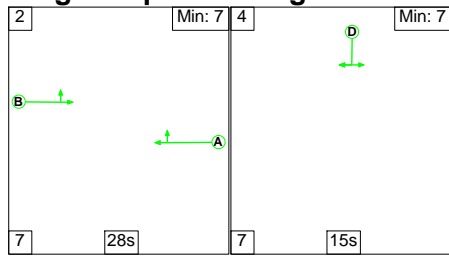
Full Input Data And Results

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
<b>Network</b>	-	-	<b>64</b>	<b>0</b>	<b>2</b>	<b>5.0</b>	<b>1.3</b>	<b>0.1</b>	<b>6.4</b>	-	-	-	-
<b>A57 Liverpool Road / Lingley Green Avenue</b>	-	-	<b>64</b>	<b>0</b>	<b>2</b>	<b>5.0</b>	<b>1.3</b>	<b>0.1</b>	<b>6.4</b>	-	-	-	-
1/2+1/1	380	380	-	-	-	2.1	0.4	-	2.5	24.1	2.7	0.4	3.2
2/1	480	480	-	-	-	0.9	0.3	-	1.2	9.3	4.3	0.3	4.6
2/2	66	66	64	0	2	0.1	0.1	0.1	0.3	16.4	0.5	0.1	0.6
3/2+3/1	942	942	-	-	-	1.8	0.5	-	2.3	8.8	4.3	0.5	4.8
4/1	560	560	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	593	593	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/2	192	192	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	523	523	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
C1			PRC for Signalled Lanes (%):		84.2	Total Delay for Signalled Lanes (pcuHr):		6.39	Cycle Time (s): 59				
			PRC Over All Lanes (%):		84.2	Total Delay Over All Lanes(pcuHr):		6.39					

Full Input Data And Results

Scenario 2: 'Interpeak' (FG3: '2017 Interpeak Period', Plan 1: 'Network Control Plan 1')

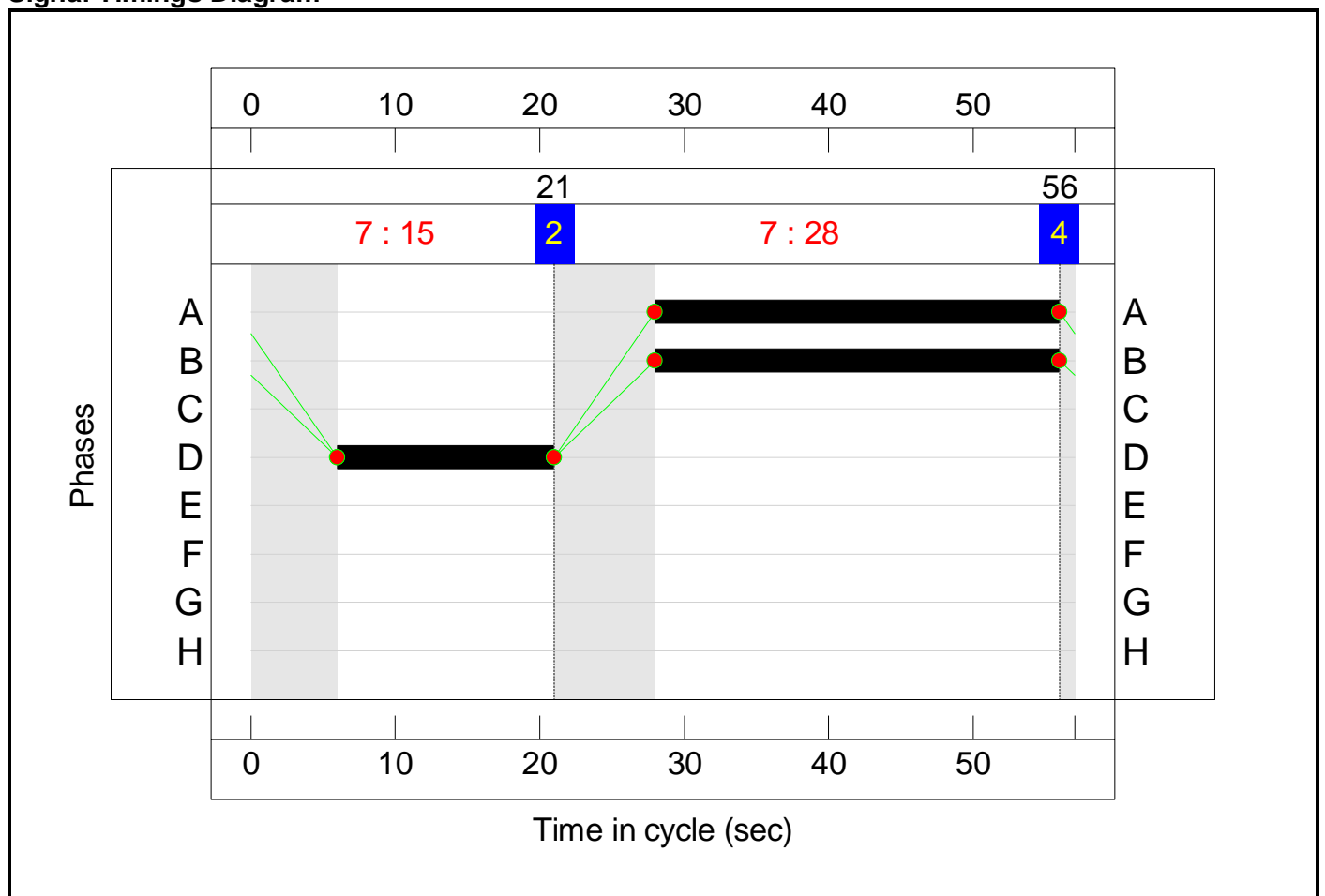
Stage Sequence Diagram



Stage Timings

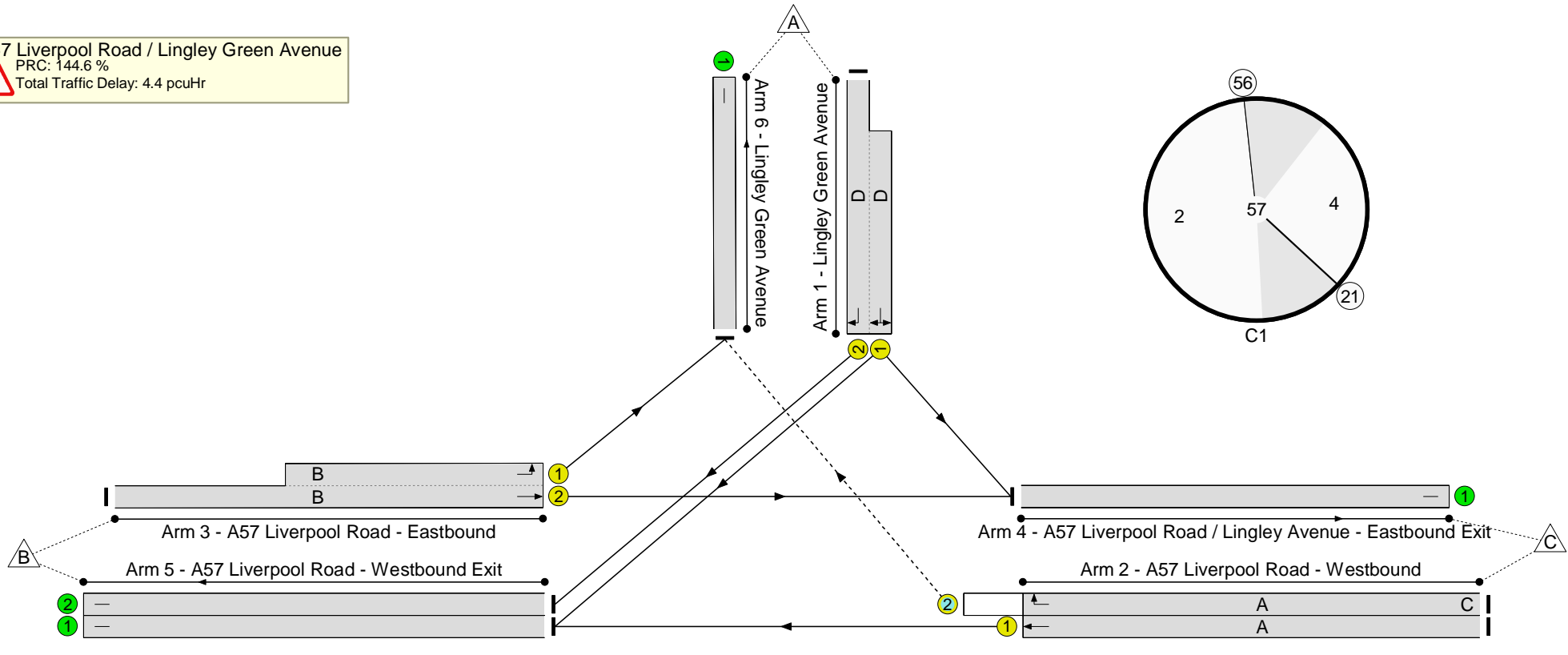
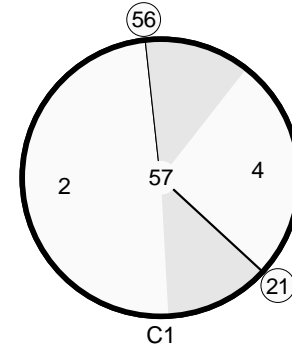
Stage	2	4
Duration	28	15
Change Point	21	56

Signal Timings Diagram



Full Input Data And Results  
**Network Layout Diagram**

A57 Liverpool Road / Lingley Green Avenue  
 PRC: 144.6 %  
 Total Traffic Delay: 4.4 pcuHr





Full Input Data And Results

**Network Results**

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
<b>Network</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>36.8%</b>
<b>A57 Liverpool Road / Lingley Green Avenue</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>36.8%</b>
1/2+1/1	Lingley Green Avenue Left Right	U	N/A	N/A	D		1	15	-	315	1907:1823	535+512	29.7 : 30.5%
2/1	A57 Liverpool Road - Westbound Ahead	U	N/A	N/A	A		1	28	-	396	2115	1076	36.8%
2/2	A57 Liverpool Road - Westbound Right	O	N/A	N/A	A	C	1	28	0	57	1781	550	10.4%
3/2+3/1	A57 Liverpool Road - Eastbound Ahead Left	U	N/A	N/A	B		1	28	-	500	2015:1843	1025+496	32.9 : 32.9%
4/1	A57 Liverpool Road / Lingley Avenue - Eastbound Exit	U	N/A	N/A	-		-	-	-	423	Inf	Inf	0.0%
5/1	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	466	Inf	Inf	0.0%
5/2	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	159	Inf	Inf	0.0%
6/1	Lingley Green Avenue	U	N/A	N/A	-		-	-	-	220	Inf	Inf	0.0%

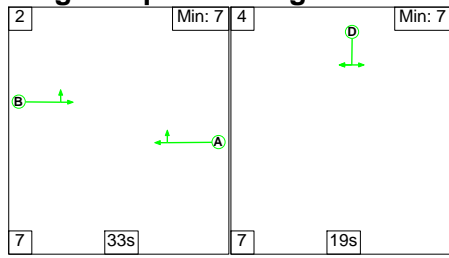
Full Input Data And Results

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network	-	-	55	0	2	3.6	0.8	0.0	4.4	-	-	-	-
A57 Liverpool Road / Lingley Green Avenue	-	-	55	0	2	3.6	0.8	0.0	4.4	-	-	-	-
1/2+1/1	315	315	-	-	-	1.4	0.2	-	1.6	18.6	1.9	0.2	2.2
2/1	396	396	-	-	-	0.9	0.3	-	1.2	11.1	3.7	0.3	4.0
2/2	57	57	55	0	2	0.1	0.1	0.0	0.2	13.3	0.4	0.1	0.5
3/2+3/1	500	500	-	-	-	1.1	0.2	-	1.4	9.8	3.1	0.2	3.3
4/1	423	423	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	466	466	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/2	159	159	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	220	220	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
<p>C1      PRC for Signalled Lanes (%): 144.6      Total Delay for Signalled Lanes (pcuHr): 4.42      Cycle Time (s): 57  PRC Over All Lanes (%): 144.6      Total Delay Over All Lanes(pcuHr): 4.42</p>													

Full Input Data And Results

Scenario 3: 'Pm Peak Period' (FG2: '2017 PM Peak Period', Plan 1: 'Network Control Plan 1')

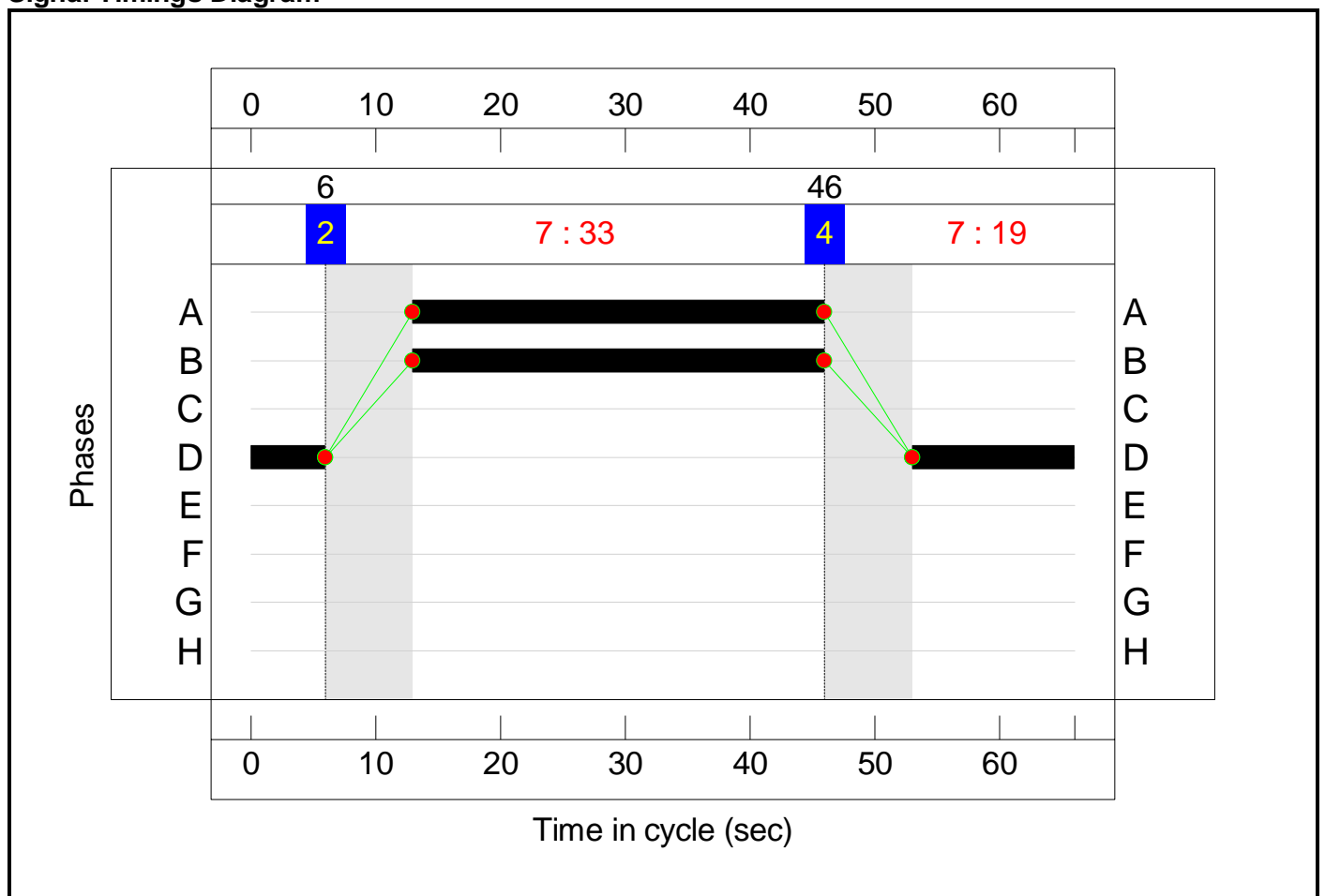
Stage Sequence Diagram



Stage Timings

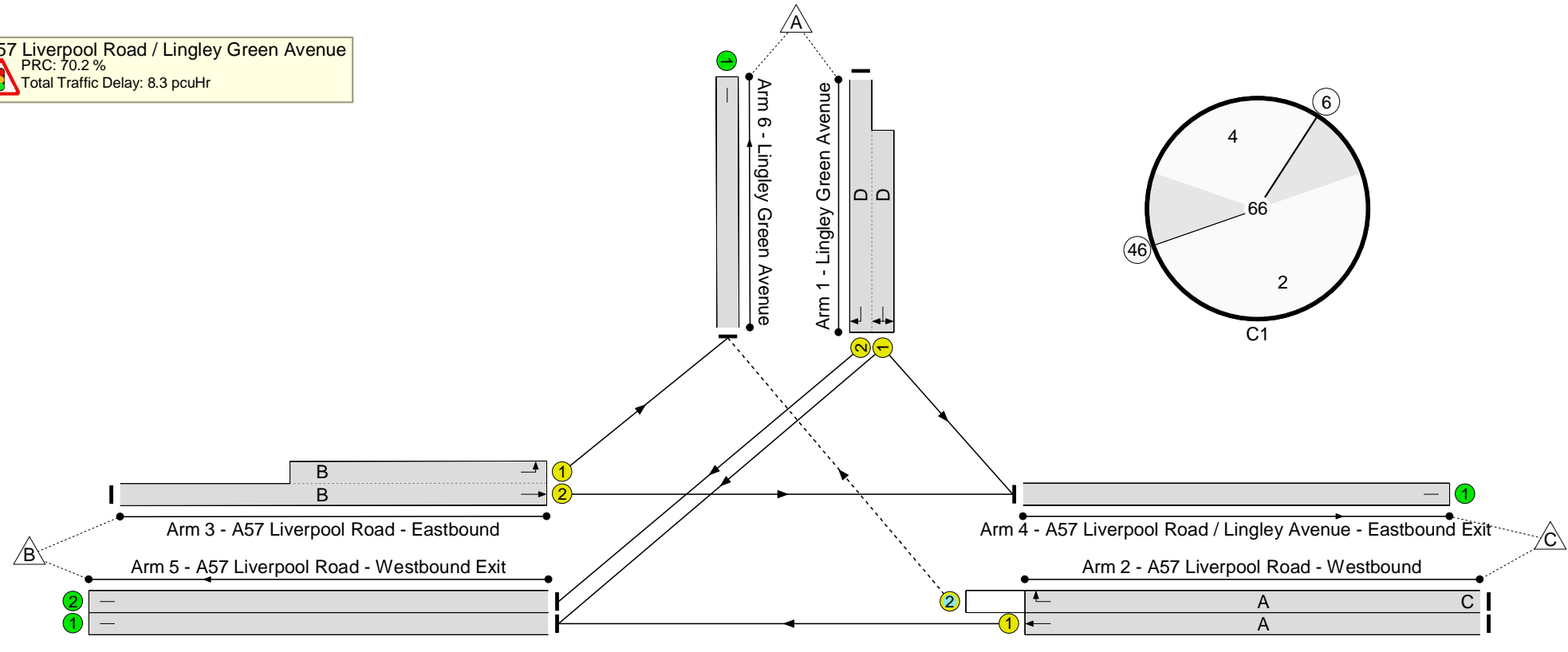
Stage	2	4
Duration	33	19
Change Point	6	46

Signal Timings Diagram



Full Input Data And Results  
**Network Layout Diagram**

A57 Liverpool Road / Lingley Green Avenue  
 PRC: 70.2%  
 Total Traffic Delay: 8.3 pcuHr



Full Input Data And Results

**Network Results**

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
<b>Network</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>52.9%</b>
<b>A57 Liverpool Road / Lingley Green Avenue</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>52.9%</b>
1/2+1/1	Lingley Green Avenue Left Right	U	N/A	N/A	D		1	19	-	554	1907:1808	578+548	48.5 : 50.0%
2/1	A57 Liverpool Road - Westbound Ahead	U	N/A	N/A	A		1	33	-	576	2115	1090	52.9%
2/2	A57 Liverpool Road - Westbound Right	O	N/A	N/A	A	C	1	33	0	70	1781	415	16.9%
3/2+3/1	A57 Liverpool Road - Eastbound Ahead Left	U	N/A	N/A	B		1	33	-	687	2015:1843	1022+514	44.7 : 44.7%
4/1	A57 Liverpool Road / Lingley Avenue - Eastbound Exit	U	N/A	N/A	-		-	-	-	558	Inf	Inf	0.0%
5/1	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	749	Inf	Inf	0.0%
5/2	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	280	Inf	Inf	0.0%
6/1	Lingley Green Avenue	U	N/A	N/A	-		-	-	-	300	Inf	Inf	0.0%

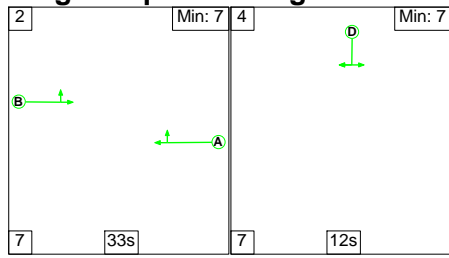
Full Input Data And Results

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
<b>Network</b>	-	-	<b>68</b>	<b>0</b>	<b>2</b>	<b>6.6</b>	<b>1.5</b>	<b>0.1</b>	<b>8.3</b>	-	-	-	-
<b>A57 Liverpool Road / Lingley Green Avenue</b>	-	-	<b>68</b>	<b>0</b>	<b>2</b>	<b>6.6</b>	<b>1.5</b>	<b>0.1</b>	<b>8.3</b>	-	-	-	-
1/2+1/1	554	554	-	-	-	2.9	0.5	-	3.4	22.0	4.1	0.5	4.6
2/1	576	576	-	-	-	1.7	0.6	-	2.3	14.2	6.9	0.6	7.4
2/2	70	70	68	0	2	0.2	0.1	0.1	0.4	18.7	0.6	0.1	0.7
3/2+3/1	687	687	-	-	-	1.8	0.4	-	2.2	11.8	5.2	0.4	5.6
4/1	558	558	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	749	749	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/2	280	280	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	300	300	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
<p>C1      PRC for Signalled Lanes (%): 70.2      Total Delay for Signalled Lanes (pcuHr): 8.26      Cycle Time (s): 66  PRC Over All Lanes (%): 70.2      Total Delay Over All Lanes(pcuHr): 8.26</p>													

Full Input Data And Results

Scenario 4: '2027 Am Peak Period' (FG4: '2027 AM Peak Period', Plan 1: 'Network Control Plan 1')

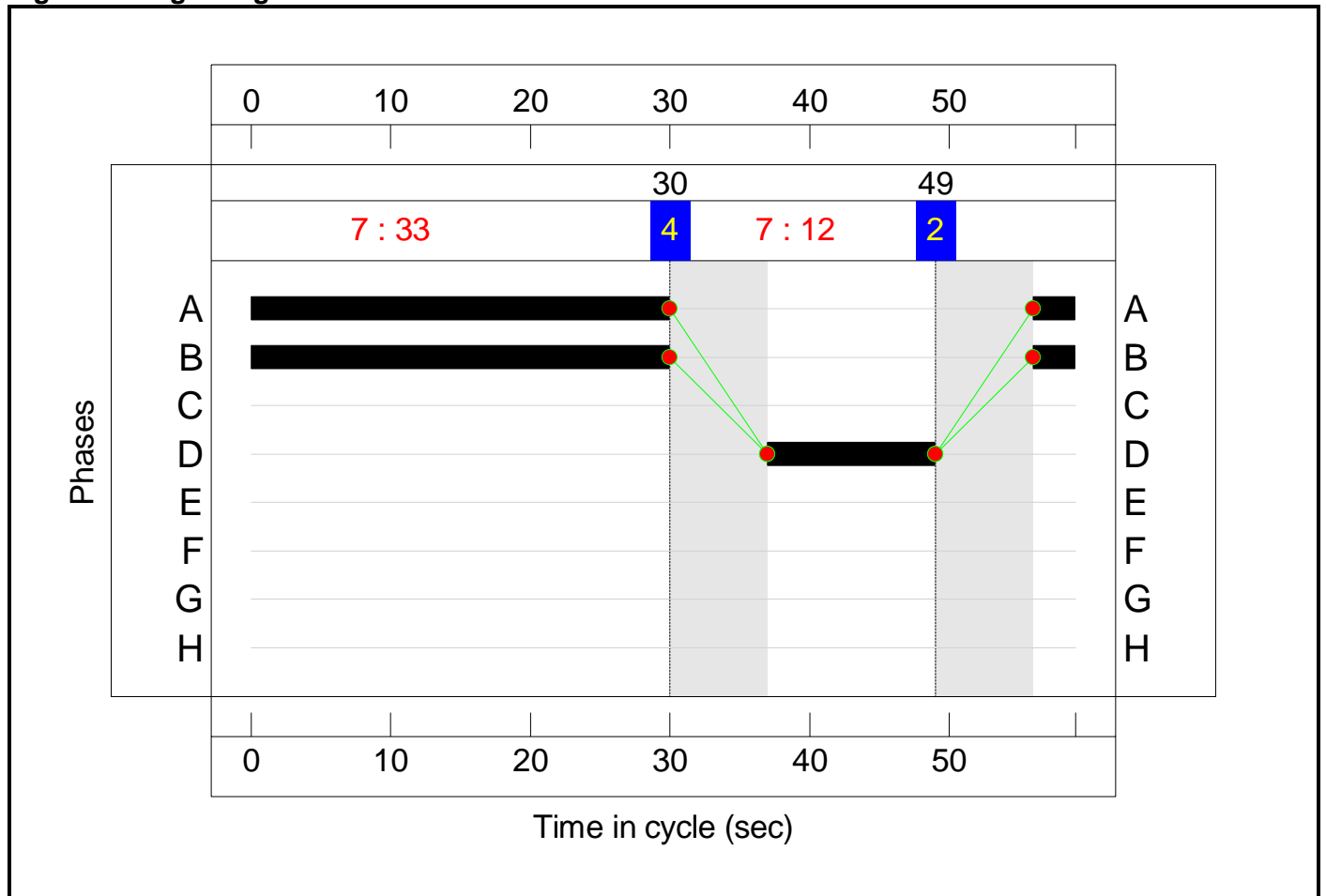
Stage Sequence Diagram



Stage Timings

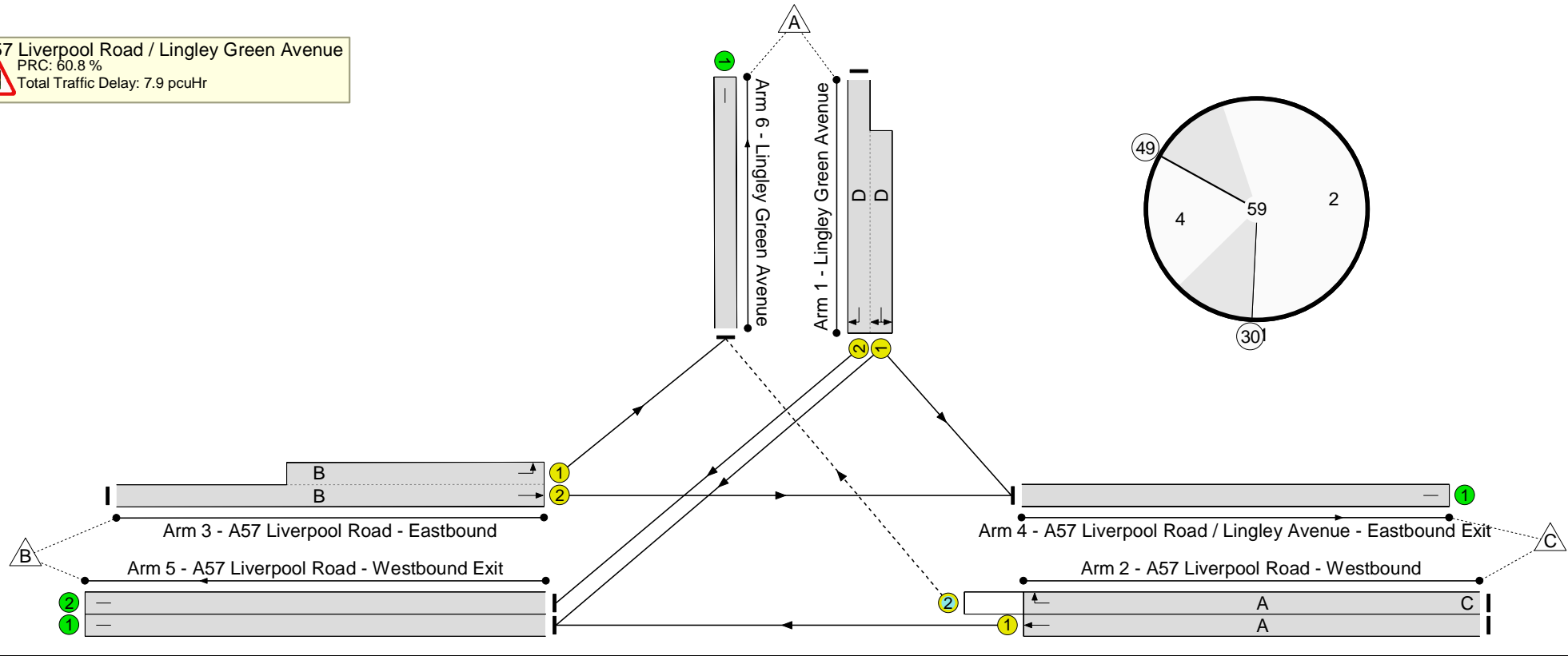
Stage	2	4
Duration	33	12
Change Point	49	30

Signal Timings Diagram



Full Input Data And Results  
**Network Layout Diagram**

A57 Liverpool Road / Lingley Green Avenue  
 PRC: 60.8 %  
 Total Traffic Delay: 7.9 pcuHr





Full Input Data And Results

**Network Results**

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
<b>Network</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>56.0%</b>
<b>A57 Liverpool Road / Lingley Green Avenue</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>56.0%</b>
1/2+1/1	Lingley Green Avenue Left Right	U	N/A	N/A	D		1	12	-	452	1907:1808	420+398	54.5 : 56.0%
2/1	A57 Liverpool Road - Westbound Ahead	U	N/A	N/A	A		1	33	-	524	2115	1219	43.0%
2/2	A57 Liverpool Road - Westbound Right	O	N/A	N/A	A	C	1	33	0	79	1781	288	27.4%
3/2+3/1	A57 Liverpool Road - Eastbound Ahead Left	U	N/A	N/A	B		1	33	-	1072	2015:1843	953+971	55.7 : 55.7%
4/1	A57 Liverpool Road / Lingley Avenue - Eastbound Exit	U	N/A	N/A	-		-	-	-	621	Inf	Inf	0.0%
5/1	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	657	Inf	Inf	0.0%
5/2	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	229	Inf	Inf	0.0%
6/1	Lingley Green Avenue	U	N/A	N/A	-		-	-	-	620	Inf	Inf	0.0%

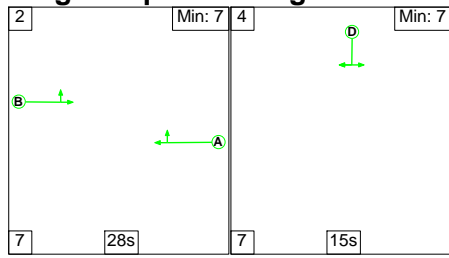
Full Input Data And Results

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
<b>Network</b>	-	-	<b>76</b>	<b>0</b>	<b>3</b>	<b>5.9</b>	<b>1.8</b>	<b>0.2</b>	<b>7.9</b>	-	-	-	-
<b>A57 Liverpool Road / Lingley Green Avenue</b>	-	-	<b>76</b>	<b>0</b>	<b>3</b>	<b>5.9</b>	<b>1.8</b>	<b>0.2</b>	<b>7.9</b>	-	-	-	-
1/2+1/1	452	452	-	-	-	2.6	0.6	-	3.2	25.3	3.3	0.6	3.9
2/1	524	524	-	-	-	1.0	0.4	-	1.4	9.6	4.8	0.4	5.2
2/2	79	79	76	0	3	0.1	0.2	0.2	0.5	22.4	0.6	0.2	0.8
3/2+3/1	1072	1072	-	-	-	2.2	0.6	-	2.8	9.5	5.3	0.6	5.9
4/1	621	621	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	657	657	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/2	229	229	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	620	620	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
C1			PRC for Signalled Lanes (%):		60.8	Total Delay for Signalled Lanes (pcuHr):		7.89	Cycle Time (s): 59				
			PRC Over All Lanes (%):		60.8	Total Delay Over All Lanes(pcuHr):		7.89					

Full Input Data And Results

Scenario 5: '2027 Interpeak' (FG6: '2027 Interpeak Period', Plan 1: 'Network Control Plan 1')

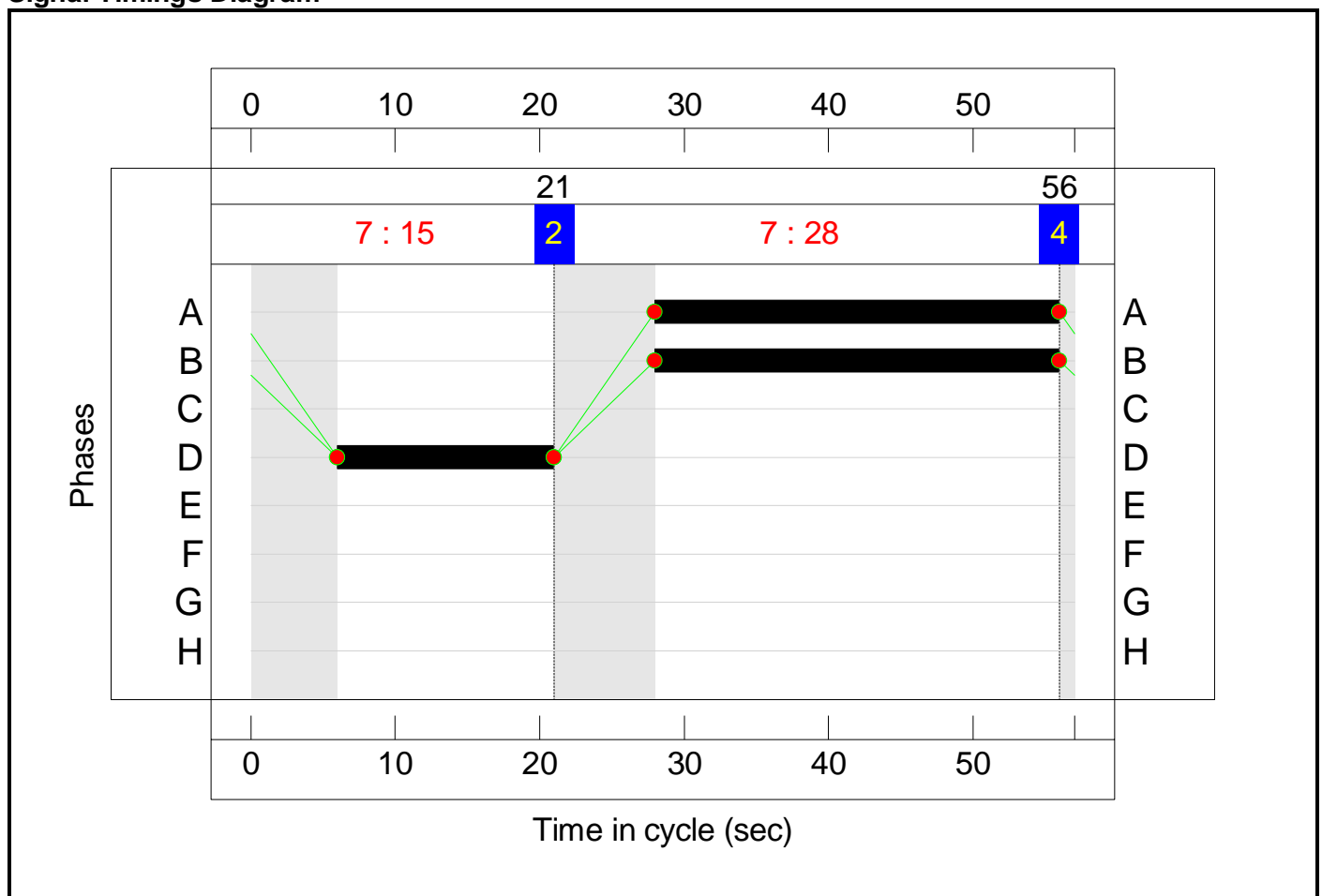
Stage Sequence Diagram



Stage Timings

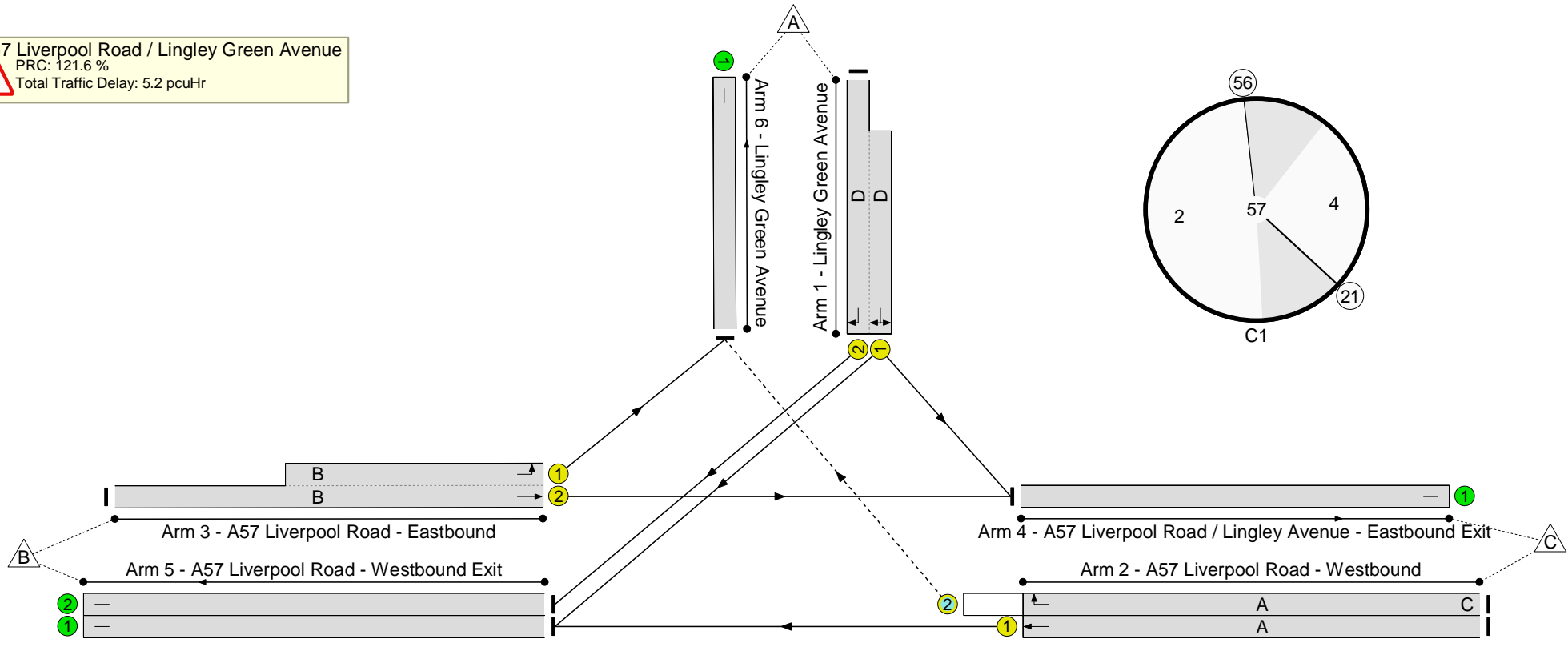
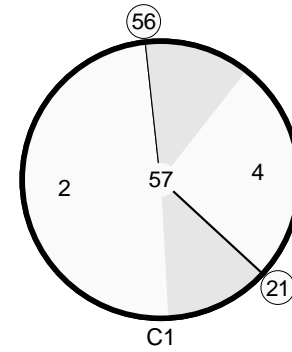
Stage	2	4
Duration	28	15
Change Point	21	56

Signal Timings Diagram



Full Input Data And Results  
**Network Layout Diagram**

A57 Liverpool Road / Lingley Green Avenue  
PRC: 121.6 %  
Total Traffic Delay: 5.2 pcuHr



Full Input Data And Results

**Network Results**

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
<b>Network</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>40.6%</b>
<b>A57 Liverpool Road / Lingley Green Avenue</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>40.6%</b>
1/2+1/1	Lingley Green Avenue Left Right	U	N/A	N/A	D		1	15	-	367	1907:1823	535+512	34.7 : 35.4%
2/1	A57 Liverpool Road - Westbound Ahead	U	N/A	N/A	A		1	28	-	437	2115	1076	40.6%
2/2	A57 Liverpool Road - Westbound Right	O	N/A	N/A	A	C	1	28	0	68	1781	511	13.3%
3/2+3/1	A57 Liverpool Road - Eastbound Ahead Left	U	N/A	N/A	B		1	28	-	564	2015:1843	1025+525	36.4 : 36.4%
4/1	A57 Liverpool Road / Lingley Avenue - Eastbound Exit	U	N/A	N/A	-		-	-	-	475	Inf	Inf	0.0%
5/1	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	516	Inf	Inf	0.0%
5/2	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	186	Inf	Inf	0.0%
6/1	Lingley Green Avenue	U	N/A	N/A	-		-	-	-	259	Inf	Inf	0.0%

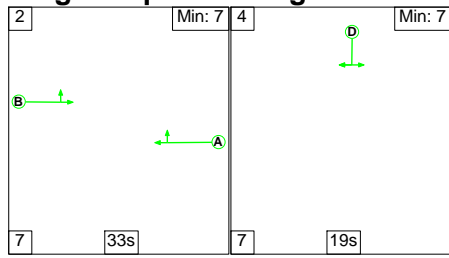
Full Input Data And Results

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
<b>Network</b>	-	-	<b>66</b>	<b>0</b>	<b>2</b>	<b>4.1</b>	<b>1.0</b>	<b>0.1</b>	<b>5.2</b>	-	-	-	-
<b>A57 Liverpool Road / Lingley Green Avenue</b>	-	-	<b>66</b>	<b>0</b>	<b>2</b>	<b>4.1</b>	<b>1.0</b>	<b>0.1</b>	<b>5.2</b>	-	-	-	-
1/2+1/1	367	367	-	-	-	1.7	0.3	-	1.9	19.0	2.3	0.3	2.6
2/1	437	437	-	-	-	1.1	0.3	-	1.4	11.5	4.2	0.3	4.6
2/2	68	68	66	0	2	0.1	0.1	0.1	0.3	14.3	0.5	0.1	0.6
3/2+3/1	564	564	-	-	-	1.3	0.3	-	1.6	10.0	3.5	0.3	3.8
4/1	475	475	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	516	516	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/2	186	186	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	259	259	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
<p>C1      PRC for Signalled Lanes (%): 121.6      Total Delay for Signalled Lanes (pcuHr): 5.17      Cycle Time (s): 57  PRC Over All Lanes (%): 121.6      Total Delay Over All Lanes(pcuHr): 5.17</p>													

Full Input Data And Results

Scenario 6: '2027 Pm Peak Period' (FG5: '2027 PM Peak Period', Plan 1: 'Network Control Plan 1')

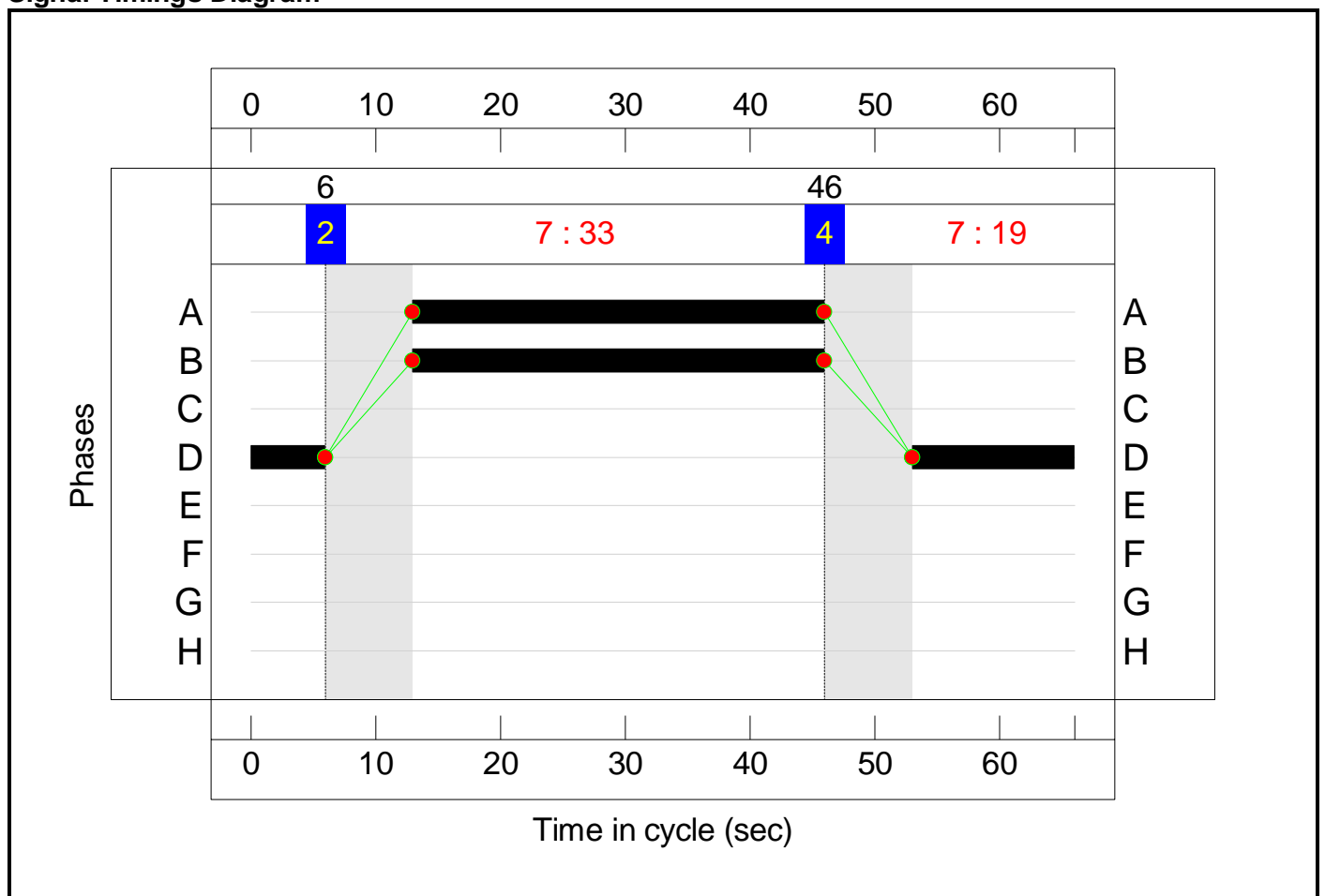
Stage Sequence Diagram



Stage Timings

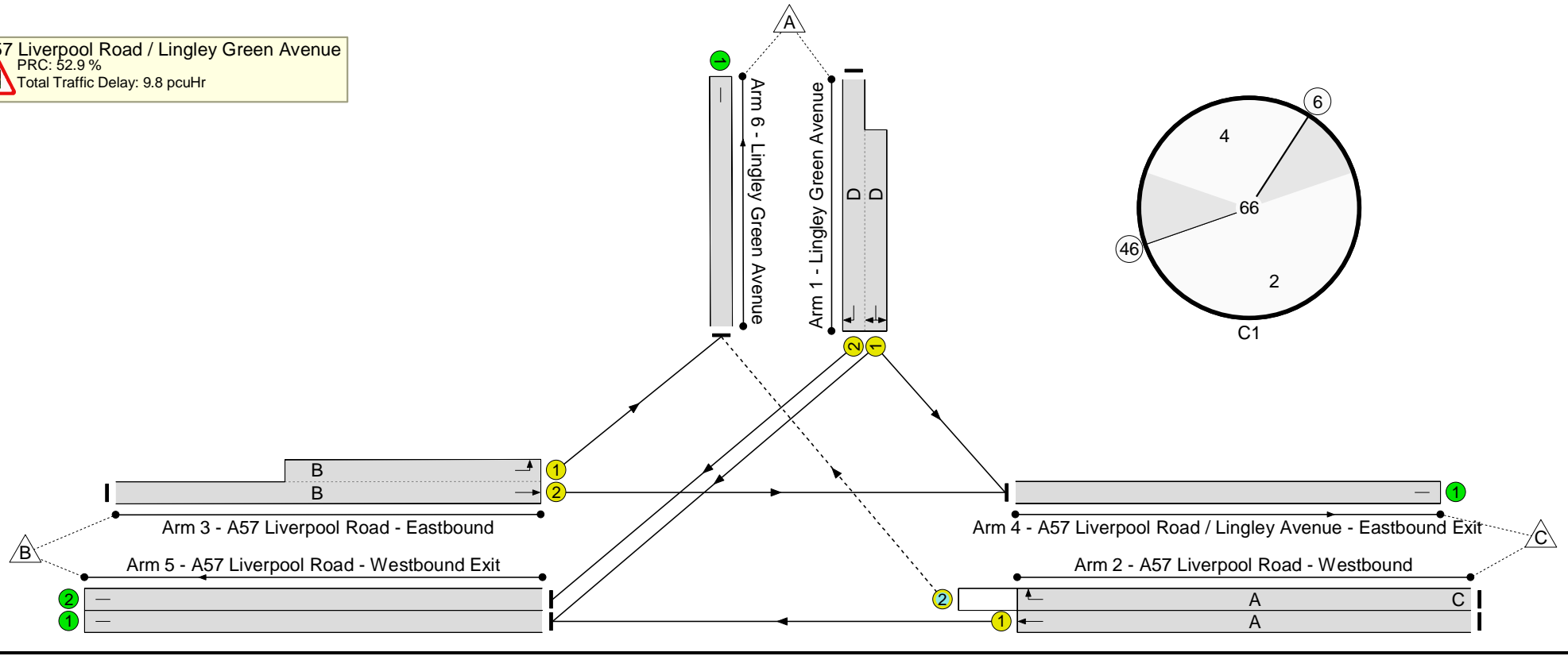
Stage	2	4
Duration	33	19
Change Point	6	46

Signal Timings Diagram



Full Input Data And Results  
**Network Layout Diagram**

A57 Liverpool Road / Lingley Green Avenue  
 PRC: 52.9%  
 Total Traffic Delay: 9.8 pcuHr





Full Input Data And Results

**Network Results**

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
<b>Network</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>58.9%</b>
<b>A57 Liverpool Road / Lingley Green Avenue</b>	-	-	<b>N/A</b>	-	-		-	-	-	-	-	-	<b>58.9%</b>
1/2+1/1	Lingley Green Avenue Left Right	U	N/A	N/A	D		1	19	-	653	1907:1811	578+549	57.1 : 58.9%
2/1	A57 Liverpool Road - Westbound Ahead	U	N/A	N/A	A		1	33	-	625	2115	1090	57.4%
2/2	A57 Liverpool Road - Westbound Right	O	N/A	N/A	A	C	1	33	0	83	1781	374	22.2%
3/2+3/1	A57 Liverpool Road - Eastbound Ahead Left	U	N/A	N/A	B		1	33	-	765	2015:1843	1020+556	48.5 : 48.5%
4/1	A57 Liverpool Road / Lingley Avenue - Eastbound Exit	U	N/A	N/A	-		-	-	-	615	Inf	Inf	0.0%
5/1	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	828	Inf	Inf	0.0%
5/2	A57 Liverpool Road - Westbound Exit	U	N/A	N/A	-		-	-	-	330	Inf	Inf	0.0%
6/1	Lingley Green Avenue	U	N/A	N/A	-		-	-	-	353	Inf	Inf	0.0%

Full Input Data And Results

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
<b>Network</b>	-	-	<b>80</b>	<b>0</b>	<b>3</b>	<b>7.7</b>	<b>2.0</b>	<b>0.2</b>	<b>9.8</b>	-	-	-	-
<b>A57 Liverpool Road / Lingley Green Avenue</b>	-	-	<b>80</b>	<b>0</b>	<b>3</b>	<b>7.7</b>	<b>2.0</b>	<b>0.2</b>	<b>9.8</b>	-	-	-	-
1/2+1/1	653	653	-	-	-	3.5	0.7	-	4.2	23.2	5.0	0.7	5.7
2/1	625	625	-	-	-	1.9	0.7	-	2.6	14.9	7.8	0.7	8.5
2/2	83	83	80	0	3	0.2	0.1	0.2	0.5	20.9	0.8	0.1	0.9
3/2+3/1	765	765	-	-	-	2.1	0.5	-	2.6	12.1	5.8	0.5	6.2
4/1	615	615	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	828	828	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/2	330	330	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	353	353	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
<p>C1      PRC for Signalled Lanes (%): 52.9      Total Delay for Signalled Lanes (pcuHr): 9.85      Cycle Time (s): 66  PRC Over All Lanes (%): 52.9      Total Delay Over All Lanes(pcuHr): 9.85</p>													

## Annex H: Options Assessment Matrix

Omega Highway Junction Improvement Package		Do Nothing	Option 1	Option 2	Option 3	Option 4
Junction 2: Lingley Green Avenue / Liverpool Road		Do Nothing: existing network arrangements to be maintained	Additional 100m long Left Turn on Lingley Green Avenue	As Option 2 and short 11m long left turn lane on the A57 Liverpool eastbound approach arm	As Option 2 with 100m long left turn lane on the A57 Liverpool eastbound approach arm	As Option 3 and two lanes exiting the junction the A57 Westbound exit to allow right turners to use both lanes exiting Lingley Green Avenue
<b>NPfE Objectives</b>						
Ease urban congestion		x	✓✓	✓✓✓	✓✓✓	✓✓✓
Unlock economic growth and job creation opportunities		x	✓	✓✓	✓✓	✓✓✓
Enable the delivery of housing development		x	✓	✓✓	✓✓	✓✓✓
Improve Air Quality and/or CO2 emissions		x	✓	✓✓	✓✓	✓✓✓
<b>Deliverability Criteria</b>						
Engineering Feasibility		n/a			Cost (discounted)	Cost (discounted)
Stakeholder Acceptability		n/a			Land Acquisition (discounted)	Land Acquisition (discounted)
Stats		n/a				
Programme		n/a				
<b>Option Assessment Outcome</b>						
Recommendation				Preferred		

\* ✓✓✓ - Strong Alignment; ✓✓ - Moderate Alignment; ✓ - Slight Alignment

## Annex I: Preferred Option Layout



## Annex J: BCR Calculation Tables

AM Peak

	Annualised Delay Saving (pcuHr)					Values of Time (£/Hr) (Table A1.3.6)				Undiscounted Benefits (£)					Discount Rate	Discount Factor	Present Value Benefits (PVB)
	Average Car	Average LGV	Average OGV	Average PSV	Total	Average Car	Average LGV	Average OGV	Average PSV	Average Car	Average LGV	Average OGV	Average PSV	Total	(Table A1.1.1)		
2010	0	0	0	0	0	£11.33	£13.93	£14.35	£14.35	£0	£0	£0	£0	£0	-	1.00	0.00
2011	0	0	0	0	0	£11.40	£14.03	£14.45	£14.45	£0	£0	£0	£0	£0	3.5%	1.035	0.00
2012	0	0	0	0	0	£11.48	£14.12	£14.54	£14.54	£0	£0	£0	£0	£0	3.5%	1.071	0.00
2013	0	0	0	0	0	£11.62	£14.30	£14.72	£14.72	£0	£0	£0	£0	£0	3.5%	1.109	0.00
2014	0	0	0	0	0	£11.89	£14.62	£15.06	£15.06	£0	£0	£0	£0	£0	3.5%	1.148	0.00
2015	0	0	0	0	0	£12.06	£14.83	£15.28	£15.28	£0	£0	£0	£0	£0	3.5%	1.188	0.00
2016	0	0	0	0	0	£12.21	£15.02	£15.47	£15.47	£0	£0	£0	£0	£0	3.5%	1.229	0.00
2017	3552	365	298	23.00	4238	£12.39	£15.24	£15.70	£15.70	£44,026	£5,565	£4,681	£361	£54,634	3.5%	1.272	£42,942
2018	5017	538	412	31	5999	£12.57	£15.46	£15.92	£15.92	£63,048	£8,322	£6,566	£496	£78,433	3.5%	1.317	£59,563
2019	6481	712	527	39	7759	£12.75	£15.68	£16.15	£16.15	£82,617	£11,158	£8,506	£635	£102,916	3.5%	1.363	£75,513
2020	7946	885	641	48	9519	£12.93	£15.90	£16.38	£16.38	£102,750	£14,076	£10,502	£778	£128,105	3.5%	1.411	£90,816
2021	9410	1058	755	56	11280	£13.16	£16.18	£16.67	£16.67	£123,826	£17,128	£12,592	£928	£154,474	3.5%	1.460	£105,806
2022	10875	1232	870	64	13040	£13.39	£16.47	£16.96	£16.96	£145,629	£20,285	£14,754	£1,083	£181,751	3.5%	1.511	£120,280
2023	12339	1405	984	72	14800	£13.63	£16.76	£17.27	£17.27	£168,185	£23,552	£16,991	£1,243	£209,971	3.5%	1.564	£134,256
2024	13804	1578	1098	80	16561	£13.89	£17.08	£17.59	£17.59	£191,713	£26,959	£19,324	£1,411	£239,406	3.5%	1.619	£147,901
2025	15269	1752	1213	88	18321	£14.15	£17.41	£17.93	£17.93	£216,104	£30,491	£21,743	£1,584	£269,922	3.5%	1.675	£161,114
2026	16733	1925	1327	97	20081	£14.43	£17.74	£18.28	£18.28	£241,396	£34,153	£24,251	£1,764	£301,564	3.5%	1.734	£173,914
2027	18198	2098	1441	104.68	21842	£14.71	£18.09	£18.63	£18.63	£267,625	£37,952	£26,852	£1,950	£334,380	3.5%	1.795	£186,318
2028	18198	2098	1441	104.68	21842	£14.99	£18.44	£19.00	£19.00	£272,871	£38,696	£27,378	£1,989	£340,933	3.5%	1.857	£183,545
2029	18198	2098	1441	104.68	21842	£15.29	£18.81	£19.37	£19.37	£278,264	£39,461	£27,919	£2,028	£347,672	3.5%	1.923	£180,844
2030	18198	2098	1441	104.68	21842	£15.60	£19.18	£19.76	£19.76	£283,810	£40,247	£28,476	£2,068	£354,601	3.5%	1.990	£178,211
2031	18198	2098	1441	104.68	21842	£15.91	£19.57	£20.15	£20.15	£289,511	£41,056	£29,048	£2,110	£361,725	3.5%	2.059	£175,643
2032	18198	2098	1441	104.68	21842	£16.23	£19.96	£20.56	£20.56	£295,371	£41,887	£29,636	£2,153	£369,045	3.5%	2.132	£173,138
2033	18198	2098	1441	104.68	21842	£16.56	£20.37	£20.98	£20.98	£301,390	£42,740	£30,240	£2,196	£376,566	3.5%	2.206	£170,692
2034	18198	2098	1441	104.68	21842	£16.92	£20.81	£21.43	£21.43	£307,870	£43,659	£30,890	£2,244	£384,662	3.5%	2.283	£168,466
2035	18198	2098	1441	104.68	21842	£17.27	£21.24	£21.87	£21.87	£314,216	£44,559	£31,527	£2,290	£392,592	3.5%	2.363	£166,124
2036	18198	2098	1441	104.68	21842	£17.62	£21.68	£22.33	£22.33	£320,723	£45,482	£32,180	£2,337	£400,722	3.5%	2.446	£163,830
2037	18198	2098	1441	104.68	21842	£17.99	£22.13	£22.79	£22.79	£327,390	£46,427	£32,848	£2,386	£409,052	3.5%	2.532	£161,581
2038	18198	2098	1441	104.68	21842	£18.37	£22.59	£23.27	£23.27	£334,241	£47,399	£33,536	£2,436	£417,611	3.5%	2.620	£159,383
2039	18198	2098	1441	104.68	21842	£18.75	£23.06	£23.76	£23.76	£341,234	£48,390	£34,237	£2,487	£426,349	3.5%	2.712	£157,215
2040	18198	2098	1441	104.68	21842	£19.14	£23.55	£24.25	£24.25	£348,374	£49,403	£34,954	£2,539	£435,270	3.5%	2.807	£155,077
2041	18198	2098	1441	104.68	21842	£19.54	£24.04	£24.76	£24.76	£355,663	£50,437	£35,685	£2,592	£444,377	3.5%	2.905	£152,968
2042	18198	2098	1441	104.68	21842	£19.96	£24.55	£25.28	£25.28	£363,171	£51,501	£36,438	£2,647	£453,757	3.5%	3.007	£150,915
2043	18198	2098	1441	104.68	21842	£20.38	£25.06	£25.82	£25.82	£370,837	£52,588	£37,208	£2,702	£463,335	3.5%	3.112	£148,889
2044	18198	2098	1441	104.68	21842	£20.81	£25.59	£26.36	£26.36	£378,664	£53,698	£37,993	£2,760	£473,115	3.5%	3.221	£146,891
2045	18198	2098	1441	104.68	21842	£21.25	£26.13	£26.92	£26.92	£386,657	£54,832	£38,795	£2,818	£483,102	3.5%	3.334	£144,919
2046	18198	2098	1441	104.68	21842	£21.72	£26.71	£27.51	£27.51	£395,204	£56,044	£39,652	£2,880	£493,780	3.5%	3.450	£143,114
2047	18198	2098	1441	104.68	21842	£22.18	£27.28	£28.10	£28.10	£403,652	£57,242	£40,500	£2,942	£504,336	3.5%	3.571	£141,230
2048	18198	2098	1441	104.68	21842	£22.66	£27.87	£28.70	£28.70	£412,281	£58,466	£41,366	£3,005	£515,117	3.0%	3.075	£167,530
2049	18198	2098	1441	104.68	21842	£23.14	£28.46	£29.32	£29.32	£421,095	£59,716	£42,250	£3,069	£526,129	3.0%	3.167	£166,127
2050	18198	2098	1441	104.68	21842	£23.63	£29.07	£29.94	£29.94	£430,097	£60,992	£43,153	£3,134	£537,376	3.0%	3.262	£164,736
2051	18198	2098	1441	104.68	21842	£24.12	£29.66	£30.55	£30.55	£438,862	£62,235	£44,033	£3,198	£548,329	3.0%	3.360	£163,198
2052	18198	2098	1441	104.68	21842	£24.62	£30.28	£31.18	£31.18	£447,949	£63,524	£44,945	£3,264	£559,682	3.0%	3.461	£161,725
2053	18198	2098	1441	104.68	21842	£25.13	£30.90	£31.83	£31.83	£457,224	£64,839	£45,875	£3,332	£571,270	3.0%	3.565	£160,266
2054	18198	2098	1441	104.68	21842	£25.65	£31.54	£32.49	£32.49	£466,690	£66,181	£46,825	£3,401	£583,098	3.0%	3.671	£158,819
2055	18198	2098	1441	104.68	21842	£26.18	£32.20	£33.16	£33.16	£476,353	£67,552	£47,794	£3,471	£595,171	3.0%	3.782	£157,386
2056	18198	2098	1441	104.68	21842	£26.72	£32.86	£33.85	£33.85	£486,216	£68,950	£48,784	£3,543	£607,494	3.0%	3.895	£155,966
2057	18198	2098	1441	104.68	21842	£27.28	£33.55	£34.56	£34.56	£496,400	£70,395	£49,806	£3,618	£620,218	3.0%	4.012	£154,595
2058	18198	2098	1441	104.68	21842	£27.88	£34.29	£35.32	£35.32	£507,292	£71,939	£50,899	£3,697	£633,826	3.0%	4.132	£153,385
2059	18198	2098	1441	104.68	21842	£28.49	£35.04	£36.09	£36.09	£518,423	£73,518	£52,015	£3,778	£647,734	3.0%	4.256	£152,185
2060	18198	2098	1441	104.68	21842	£29.14	£35.84	£36.92	£36.92	£530,314	£75,204	£53,209	£3,865	£662,592	3.0%	4.384	£151,142
2061	18198	2098	1441	104.68	21842	£29.81	£36.66	£37.77	£37.77	£542,479	£76,929	£54,429	£3,953	£677,791	3.0%	4.515	£150,106
2062	18198	2098	1441	104.68	21842	£30.50	£37.51	£38.63	£38.63	£554,955	£78,698	£55,681	£4,044	£693,379	3.0%	4.651	£149,085
2063	18198	2098	1441	104.68	21842	£31.20	£38.37	£39.52	£39.52	£567,704	£80,506	£56,960	£4,137	£709,307	3.0%	4.790	£148,068
2064	18198	2098	1441	104.68	21842	£31.88	£39.21	£40.39	£40.39	£580,179	£82,275	£58,212	£4,228	£724,894	3.0%	4.934	£146,914
2065	18198	2098	1441	104.68	21842	£32.58	£40.07	£41.28	£41.28	£592,928	£84,083	£59,491	£4,321	£740,823	3.0%	5.082	£145,770
2066	18198	2098	1441	104.68	21842	£33.30	£40.96	£42.18	£42.18	£605,957	£85,931	£60,798	£4,416	£757,102	3.0%	5.235	£144,634
2067	18198	2098	1441	104.68	21842	£34.03	£41.85	£43.11	£43.11	£619,190	£87,807	£62,126	£4,512	£773,636	3.0%	5.392	£143,488
2068	18198	2098	1441	104.68	21842	£34.77	£42.76	£44.05	£44.05	£632,712	£89,725	£63,483	£4,611	£790,531	3.0%	5.553	£142,351
2069	18198	2098	1441	104.68	21842	£35.53	£43.70	£45.01	£45.01	£646,529	£91,684	£64,869	£4,712	£807,794	3.0%	5.720	£141,223
2070	18198	2098	1441	104.68	21842	£36.30	£44.65	£45.99	£45.99	£660,648	£93,687	£66,286	£4,814	£825,435	3.0%	5.892	£140,104
2071	18198	2098	1441	104.68	21842	£37.10	£45.63	£47.00	£47.00	£675,076	£95,733	£67,733	£4,920	£843,461	3.0%	6.068	£138,993
2072	18198	2098	1441	104.68	2												



PM Peak

	Annualised Delay Saving (pcuHr)					Values of Time (£/Hr) (Table A1.3.6)				Undiscounted Benefits (£)					Discount Rate	Discount Factor	Present Value Benefits (PVB)
	Average Car	Average LGV	Average OGV	Average PSV	Total	Average Car	Average LGV	Average OGV	Average PSV	Average Car	Average LGV	Average OGV	Average PSV	Total	(Table A1.1.1)		
2010	0	0	0	0	0	£10.88	£13.93	£14.35	£14.35	£0	£0	£0	£0	£0	-	1.00	0.00
2011	0	0	0	0	0	£10.96	£14.03	£14.45	£14.45	£0	£0	£0	£0	£0	3.5%	1.035	0.00
2012	0	0	0	0	0	£11.03	£14.12	£14.54	£14.54	£0	£0	£0	£0	£0	3.5%	1.071	0.00
2013	0	0	0	0	0	£11.17	£14.30	£14.72	£14.72	£0	£0	£0	£0	£0	3.5%	1.109	0.00
2014	0	0	0	0	0	£11.42	£14.62	£15.06	£15.06	£0	£0	£0	£0	£0	3.5%	1.148	0.00
2015	0	0	0	0	0	£11.59	£14.83	£15.28	£15.28	£0	£0	£0	£0	£0	3.5%	1.188	0.00
2016	0	0	0	0	0	£11.73	£15.02	£15.47	£15.47	£0	£0	£0	£0	£0	3.5%	1.229	0.00
2017	7599	592	287	56.87	8535	£11.91	£15.24	£15.70	£15.70	£90,494	£9,022	£4,507	£893	£104,915	3.5%	1.272	£82,463
2018	10019	813	373	73	11278	£12.07	£15.46	£15.92	£15.92	£120,984	£12,571	£5,940	£1,155	£140,650	3.5%	1.317	£106,811
2019	12440	1035	459	88	14022	£12.25	£15.68	£16.15	£16.15	£152,352	£16,223	£7,414	£1,425	£177,414	3.5%	1.363	£130,174
2020	14860	1256	545	104	16765	£12.42	£15.90	£16.38	£16.38	£184,624	£19,980	£8,931	£1,702	£215,237	3.5%	1.411	£152,585
2021	17280	1478	631	120	19509	£12.64	£16.18	£16.67	£16.67	£218,466	£23,915	£10,522	£1,993	£254,897	3.5%	1.460	£174,590
2022	19700	1699	717	135	22252	£12.87	£16.47	£16.96	£16.96	£253,470	£27,986	£12,168	£2,294	£295,918	3.5%	1.511	£195,834
2023	22121	1921	803	151	24995	£13.10	£16.76	£17.27	£17.27	£289,680	£32,198	£13,870	£2,606	£338,354	3.5%	1.564	£216,345
2024	24541	2142	889	167	27739	£13.34	£17.08	£17.59	£17.59	£327,465	£36,591	£15,647	£2,931	£382,635	3.5%	1.619	£236,385
2025	26961	2364	975	182	30482	£13.60	£17.41	£17.93	£17.93	£366,634	£41,146	£17,489	£3,268	£428,536	3.5%	1.675	£255,789
2026	29381	2585	1061	198	33226	£13.86	£17.74	£18.28	£18.28	£407,243	£45,868	£19,399	£3,617	£476,128	3.5%	1.734	£274,586
2027	31802	2807	1147	213.61	35969	£14.13	£18.09	£18.63	£18.63	£449,355	£50,766	£21,379	£3,980	£525,479	3.5%	1.795	£292,799
2028	31802	2807	1147	214	35969	£14.41	£18.44	£19.00	£19.00	£458,162	£51,761	£21,798	£4,058	£535,778	3.5%	1.857	£288,442
2029	31802	2807	1147	214	35969	£14.69	£18.81	£19.37	£19.37	£467,219	£52,784	£22,228	£4,138	£546,369	3.5%	1.923	£284,197
2030	31802	2807	1147	214	35969	£14.98	£19.18	£19.76	£19.76	£476,530	£53,836	£22,671	£4,220	£557,258	3.5%	1.990	£280,059
2031	31802	2807	1147	214	35969	£15.29	£19.57	£20.15	£20.15	£486,103	£54,917	£23,127	£4,305	£568,452	3.5%	2.059	£276,024
2032	31802	2807	1147	214	35969	£15.59	£19.96	£20.56	£20.56	£495,941	£56,029	£23,595	£4,392	£579,957	3.5%	2.132	£272,087
2033	31802	2807	1147	214	35969	£15.91	£20.37	£20.98	£20.98	£506,048	£57,170	£24,076	£4,482	£591,776	3.5%	2.206	£268,243
2034	31802	2807	1147	214	35969	£16.25	£20.81	£21.43	£21.43	£516,928	£58,400	£24,593	£4,578	£604,499	3.5%	2.283	£264,745
2035	31802	2807	1147	214	35969	£16.59	£21.24	£21.87	£21.87	£527,584	£59,604	£25,100	£4,673	£616,960	3.5%	2.363	£261,065
2036	31802	2807	1147	214	35969	£16.93	£21.68	£22.33	£22.33	£538,509	£60,838	£25,620	£4,769	£629,737	3.5%	2.446	£257,460
2037	31802	2807	1147	214	35969	£17.29	£22.13	£22.79	£22.79	£549,704	£62,102	£26,153	£4,869	£642,827	3.5%	2.532	£253,925
2038	31802	2807	1147	214	35969	£17.65	£22.59	£23.27	£23.27	£561,205	£63,402	£26,700	£4,970	£656,278	3.5%	2.620	£250,471
2039	31802	2807	1147	214	35969	£18.02	£23.06	£23.76	£23.76	£572,948	£64,729	£27,259	£5,074	£670,010	3.5%	2.712	£247,065
2040	31802	2807	1147	214	35969	£18.39	£23.55	£24.25	£24.25	£584,936	£66,083	£27,829	£5,181	£684,029	3.5%	2.807	£243,705
2041	31802	2807	1147	214	35969	£18.78	£24.04	£24.76	£24.76	£597,175	£67,466	£28,411	£5,289	£698,341	3.5%	2.905	£240,390
2042	31802	2807	1147	214	35969	£19.17	£24.55	£25.28	£25.28	£609,780	£68,890	£29,011	£5,401	£713,082	3.5%	3.007	£237,164
2043	31802	2807	1147	214	35969	£19.58	£25.06	£25.82	£25.82	£622,652	£70,344	£29,623	£5,515	£728,133	3.5%	3.112	£233,980
2044	31802	2807	1147	214	35969	£19.99	£25.59	£26.36	£26.36	£635,795	£71,829	£30,249	£5,631	£743,503	3.5%	3.221	£230,840
2045	31802	2807	1147	214	35969	£20.41	£26.13	£26.92	£26.92	£649,215	£73,345	£30,887	£5,750	£759,197	3.5%	3.334	£227,741
2046	31802	2807	1147	214	35969	£20.87	£26.71	£27.51	£27.51	£663,565	£74,966	£31,570	£5,877	£775,978	3.5%	3.450	£224,904
2047	31802	2807	1147	214	35969	£21.31	£27.28	£28.10	£28.10	£677,751	£76,569	£32,245	£6,003	£792,567	3.5%	3.571	£221,944
2048	31802	2807	1147	214	35969	£21.77	£27.87	£28.70	£28.70	£692,239	£78,205	£32,934	£6,131	£809,510	3.0%	3.075	£263,274
2049	31802	2807	1147	214	35969	£22.23	£28.46	£29.32	£29.32	£707,037	£79,877	£33,638	£6,262	£826,815	3.0%	3.167	£261,070
2050	31802	2807	1147	214	35969	£22.71	£29.07	£29.94	£29.94	£722,152	£81,585	£34,357	£6,396	£844,490	3.0%	3.262	£258,884
2051	31802	2807	1147	214	35969	£23.17	£29.66	£30.55	£30.55	£736,870	£83,248	£35,057	£6,526	£861,701	3.0%	3.360	£256,466
2052	31802	2807	1147	214	35969	£23.65	£30.28	£31.18	£31.18	£752,127	£84,971	£35,783	£6,661	£879,543	3.0%	3.461	£254,152
2053	31802	2807	1147	214	35969	£24.14	£30.90	£31.83	£31.83	£767,700	£86,730	£36,524	£6,799	£897,754	3.0%	3.565	£251,858
2054	31802	2807	1147	214	35969	£24.64	£31.54	£32.49	£32.49	£783,595	£88,526	£37,280	£6,940	£916,341	3.0%	3.671	£249,586
2055	31802	2807	1147	214	35969	£25.15	£32.20	£33.16	£33.16	£799,819	£90,359	£38,052	£7,084	£935,314	3.0%	3.782	£247,333
2056	31802	2807	1147	214	35969	£25.67	£32.86	£33.85	£33.85	£816,379	£92,230	£38,840	£7,230	£954,680	3.0%	3.895	£245,101
2057	31802	2807	1147	214	35969	£26.21	£33.55	£34.56	£34.56	£833,478	£94,162	£39,654	£7,382	£974,675	3.0%	4.012	£242,946
2058	31802	2807	1147	214	35969	£26.78	£34.29	£35.32	£35.32	£851,766	£96,228	£40,524	£7,544	£996,061	3.0%	4.132	£241,046
2059	31802	2807	1147	214	35969	£27.37	£35.04	£36.09	£36.09	£870,455	£98,339	£41,413	£7,709	£1,017,917	3.0%	4.256	£239,160
2060	31802	2807	1147	214	35969	£28.00	£35.84	£36.92	£36.92	£890,422	£100,595	£42,363	£7,886	£1,041,266	3.0%	4.384	£237,520
2061	31802	2807	1147	214	35969	£28.64	£36.66	£37.77	£37.77	£910,848	£102,903	£43,335	£8,067	£1,065,152	3.0%	4.515	£235,892
2062	31802	2807	1147	214	35969	£29.30	£37.51	£38.63	£38.63	£931,795	£105,269	£44,331	£8,253	£1,089,648	3.0%	4.651	£234,288
2063	31802	2807	1147	214	35969	£29.97	£38.37	£39.52	£39.52	£953,200	£107,687	£45,350	£8,442	£1,114,679	3.0%	4.790	£232,690
2064	31802	2807	1147	214	35969	£30.63	£39.21	£40.39	£40.39	£974,146	£110,054	£46,346	£8,628	£1,139,174	3.0%	4.934	£230,877
2065	31802	2807	1147	214	35969	£31.31	£40.07	£41.28	£41.28	£995,553	£112,472	£47,365	£8,817	£1,164,207	3.0%	5.082	£229,078
2066	31802	2807	1147	214	35969	£31.99	£40.96	£42.18	£42.18	£1,017,430	£114,944	£48,405	£9,011	£1,189,790	3.0%	5.235	£227,293
2067	31802	2807	1147	214	35969	£32.69	£41.85	£43.11	£43.11	£1,039,649	£117,454	£49,463	£9,208	£1,215,773	3.0%	5.392	£225,492
2068	31802	2807	1147	214	35969	£33.41	£42.76	£44.05	£44.05	£1,062,353	£120,019	£50,543	£9,409	£1,242,323	3.0%	5.553	£223,705
2069	31802	2807	1147	214	35969	£34.14	£43.70	£45.01	£45.01	£1,085,552	£122,640	£51,646	£9,614	£1,269,453	3.0%	5.720	£221,932
2070	31802	2807	1147	214	35969	£34.88	£44.65	£45.99	£45.99	£1,109,259	£125,318	£52,774	£9,824	£1,297,176	3.0%	5.892	£220,174
2071	31802	2807	1147	214	35969	£35.64	£45.63	£47.00	£47.00	£1,133,483	£128,055	£53,927	£10,039	£1,325,503	3.0%	6.068	£218,429
2072	31802	2807	1147	214	35969	£36.42	£46.62	£48.02	£48.02	£1,15							

## Annex K: Air Quality Calculation Tables

AM Peak Table – Lingley Green Junction

Assumptions

Fuel Type	CO2 released per litre of fuel burnt(KG)
Petrol	2.39
Diesel	2.62

Source of Assumptions for CO2 release rates  
<http://comcar.co.uk/>

Fuel Consumption on Idle (Litres Per Hour)	Cars and LGV	
	OGV1	0.9
	OGV2	2

Source of % splits for vehicle types  
Webtag Database (March 2017) Table A1.3.9

Peak Period	Forecast CO2 Saving over 60 year assessment period (Tonnes)
AM	1502
PM	2355
Total	3857

AM Peak

	Annualised Fuel Consumption (Assuming Vehicles are Idling) (In Litres)									Total CO2 Saved (KG)								
	Car Petrol	Car Diesel	Electric	LGV Petrol	LGV Diesel	Average OGV 1	Average OGV 2	Average PSV	Total	Car Petrol	Car Diesel	Electric	LGV Petrol	LGV Diesel	Average OGV	Average OGV 1	Average OGV 2	Total
2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	947	651	0	10	155	203	145	21	1181	2264	1706	0	23	405	531	381	54	5365
2018	1287	970	0	13	229	279	204	28	1608	3076	2541	0	31	600	732	534	73	7588
2019	1597	1318	0	16	304	356	263	35	2004	3816	3453	0	38	797	933	688	93	9818
2020	1877	1695	0	18	380	432	321	43	2370	4486	4442	0	43	996	1133	841	112	12053
2021	2127	2102	0	19	457	509	380	50	2706	5083	5508	0	46	1197	1334	994	131	14294
2022	2347	2538	0	20	534	586	438	57	3011	5610	6651	0	48	1399	1534	1148	151	16541
2023	2616	2919	0	21	611	662	497	65	3364	6253	7647	0	50	1602	1735	1301	170	18757
2024	2874	3308	0	21	689	739	555	72	3705	6868	8667	0	50	1806	1935	1454	189	20970
2025	3120	3707	0	20	768	815	614	80	4035	7457	9711	0	49	2012	2136	1608	208	23181
2026	3355	4114	0	19	847	892	672	87	4353	8019	10779	0	46	2219	2336	1761	228	25388
2027	3579	4531	0	18	926	968	731	94	4659	8554	11872	0	43	2427	2537	1914	247	27593
2028	3591	4494	0	16	928	968	731	94	4669	8581	11773	0	39	2431	2537	1914	247	27523
2029	3602	4456	0	15	930	968	731	94	4679	8609	11675	0	35	2435	2537	1914	247	27453
2030	3614	4419	0	13	931	968	731	94	4689	8637	11577	0	31	2440	2537	1914	247	27383
2031	3625	4381	0	11	933	968	731	94	4699	8664	11479	0	27	2444	2537	1914	247	27313
2032	3637	4344	0	10	934	968	731	94	4709	8692	11381	0	23	2448	2537	1914	247	27243
2033	3638	4298	0	9	935	968	731	94	4709	8694	11260	0	22	2449	2537	1914	247	27174
2034	3638	4252	0	9	935	968	731	94	4710	8696	11140	0	21	2451	2537	1914	247	27005
2035	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2036	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2037	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2038	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2039	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2040	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2041	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2042	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2043	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2044	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2045	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2046	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2047	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2048	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2049	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2050	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2051	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2052	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2053	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2054	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2055	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2056	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2057	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2058	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2059	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2060	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2061	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2062	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2063	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2064	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2065	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2066	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2067	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2068	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2069	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2070	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2071	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2072	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2073	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2074	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2075	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886
2076	3639	4206	0	8	936	968	731	94	4710	8697	11019	0	20	2452	2537	1914	247	26886

Total 1501822

PM Peak Table – Lingley Green Junction

PM Peak

	Annualised Fuel Consumption (Assuming Vehicles are Idling) (In Litres)									Total CO2 Saved (KG)								
	Car Petrol	Car Diesel	Electric	LGV Petrol	LGV Diesel	OGV 1	OGV 2	Average PSV	Total	Car Petrol	Car Diesel	Electric	LGV Petrol	LGV Diesel	Average OGV 1	Average OGV 2	Average PSV	Total
2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	2027	1393	0	16	251	185	163	51	2278	4844	3649	0	37	657	484	428	134	10234
2018	2570	1937	0	20	346	239	215	65	2895	6143	5074	0	47	907	626	563	171	13533
2019	3065	2529	0	23	442	293	266	79	3461	7325	6627	0	55	1159	769	698	208	16841
2020	3510	3171	0	26	540	348	318	94	3977	8389	8307	0	61	1414	911	833	245	20159
2021	3906	3860	0	27	638	402	369	108	4442	9335	10114	0	65	1671	1053	967	282	23487
2022	4252	4598	0	28	737	456	421	122	4858	10163	12048	0	67	1930	1195	1102	319	26824
2023	4690	5232	0	28	836	511	472	136	5365	11209	13708	0	68	2190	1338	1237	356	30105
2024	5109	5881	0	28	936	565	523	150	5852	12210	15409	0	68	2451	1480	1371	393	33382
2025	5509	6545	0	28	1036	619	575	164	6320	13167	17148	0	66	2715	1622	1506	430	36654
2026	5891	7224	0	26	1137	673	626	178	6769	14080	18927	0	62	2980	1764	1641	467	39921
2027	6254	7918	0	24	1239	728	678	192	7198	14948	20746	0	57	3247	1907	1776	504	43184
2028	6275	7853	0	22	1241	728	678	192	7216	14997	20575	0	52	3252	1907	1776	504	43061
2029	6295	7788	0	20	1243	728	678	192	7234	15045	20403	0	47	3258	1907	1776	504	42939
2030	6315	7722	0	17	1246	728	678	192	7253	15093	20232	0	42	3263	1907	1776	504	42816
2031	6335	7657	0	15	1248	728	678	192	7271	15141	20060	0	36	3269	1907	1776	504	42693
2032	6356	7591	0	13	1250	728	678	192	7289	15190	19889	0	31	3275	1907	1776	504	42571
2033	6357	7511	0	12	1250	728	678	192	7289	15193	19678	0	30	3276	1907	1776	504	42363
2034	6358	7430	0	12	1251	728	678	192	7290	15196	19467	0	28	3278	1907	1776	504	42156
2035	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2036	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2037	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2038	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2039	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2040	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2041	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2042	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2043	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2044	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2045	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2046	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2047	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2048	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2049	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2050	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2051	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2052	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2053	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2054	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2055	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2056	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2057	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2058	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2059	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2060	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2061	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2062	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2063	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2064	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2065	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2066	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2067	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2068	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2069	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2070	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2071	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2072	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2073	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2074	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2075	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948
2076	6359	7350	0	11	1252	728	678	192	7291	15199	19257	0	27	3280	1907	1776	504	41948

Total 2354744

AM Peak Table – Kingswood Road Junction

Assumptions

Fuel Type	CO2 released per litre of fuel burnt (KG)
Petrol	2.39
Diesel	2.62

Source of Assumptions for CO2 release rates  
<http://comcar.co.uk/>

Peak Period	Forecast CO2 Saving over 60 year assessment period
AM	21
PM	6270
<b>Total</b>	<b>6291</b>

Fuel Consumption on Idle (Litres Per Hour)	Cars and LGV	0.45
	Average OGV	1.45

Source of % splits for vehicle types  
Webtag Database (March 2017) Table A1.3.9

AM Peak

	Annualised Fuel Consumption (Assuming Vehicles are Idling) (In Litres)							Total CO2 Saved (KG)						
	Car Petrol	Car Diesel	Electric	LGV Petrol	LGV Diesel	Average OGV	Total	Car Petrol	Car Diesel	Electric	LGV Petrol	LGV Diesel	Average OGV	Total
2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
2018	7.07	5.33	0.00	0.06	1.08	2.20	15.75	16.91	13.97	0.00	0.15	2.82	5.77	40
2019	13.59	11.21	0.00	0.11	2.16	4.40	31.48	32.48	29.38	0.00	0.27	5.67	11.53	79
2020	19.54	17.65	0.00	0.15	3.26	6.60	47.21	46.70	46.25	0.00	0.37	8.54	17.30	119
2021	24.93	24.64	0.00	0.19	4.37	8.80	62.93	59.59	64.56	0.00	0.44	11.44	23.07	159
2022	29.76	32.18	0.00	0.21	5.49	11.01	78.64	71.13	84.32	0.00	0.50	14.37	28.83	199
2023	35.08	39.14	0.00	0.22	6.61	13.21	94.25	83.84	102.54	0.00	0.54	17.31	34.60	239
2024	40.19	46.26	0.00	0.23	7.74	15.41	109.82	96.05	121.20	0.00	0.56	20.27	40.37	278
2025	45.08	53.56	0.00	0.24	8.87	17.61	125.36	107.74	140.32	0.00	0.56	23.25	46.14	318
2026	49.76	61.03	0.00	0.23	10.02	19.81	140.85	118.94	159.89	0.00	0.55	26.25	51.90	358
2027	54	69	0	0	11	22	156.30	129.62	179.90	0.00	0.51	29.27	57.67	397
2028	54.41	68.10	0.00	0.20	11.19	22.01	155.91	130.04	178.42	0.00	0.47	29.32	57.67	396
2029	54.59	67.53	0.00	0.18	11.21	22.01	155.51	130.46	176.93	0.00	0.42	29.37	57.67	395
2030	54.76	66.96	0.00	0.16	11.23	22.01	155.12	130.88	175.44	0.00	0.38	29.42	57.67	394
2031	54.94	66.40	0.00	0.14	11.25	22.01	154.73	131.30	173.96	0.00	0.33	29.47	57.67	393
2032	55.11	65.83	0.00	0.12	11.27	22.01	154.34	131.72	172.47	0.00	0.28	29.52	57.67	392
2033	55.12	65.13	0.00	0.11	11.27	22.01	153.65	131.75	170.64	0.00	0.27	29.53	57.67	390
2034	55.14	64.43	0.00	0.11	11.28	22.01	152.96	131.77	168.81	0.00	0.26	29.55	57.67	388
2035	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2036	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2037	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2038	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2039	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2040	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2041	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2042	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2043	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2044	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2045	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2046	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2047	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2048	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2049	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2050	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2051	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2052	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2053	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2054	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2055	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2056	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2057	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2058	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2059	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2060	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2061	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2062	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2063	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2064	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2065	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2066	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2067	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2068	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2069	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2070	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2071	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2072	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2073	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2074	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2075	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386
2076	55.15	63.73	0.00	0.10	11.28	22.01	152.28	131.80	166.99	0.00	0.24	29.56	57.67	386

Total 21156

PM Peak Table – Kingswood Road Junction

	PM Peak Annualised Fuel Consumption (Assuming Vehicles are Idling) (In Litres)							Total CO2 Saved (KG)						
	Car Petrol	Car Diesel	Electric	LGV Petrol	LGV Diesel	Average OGV	Total	Car Petrol	Car Diesel	Electric	LGV Petrol	LGV Diesel	Average OGV	Total
	2010	0	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	1607	1104	0	9	148	106	2974.27	3840	2893	0	22	388	279	7421
2018	3824	2881	0	21	367	265	7357.81	9138	7548	0	50	963	694	18393
2019	5860	4836	0	31	589	423	11738.72	14005	12670	0	74	1543	1109	29401
2020	7715	6969	0	39	813	582	16117.04	18439	18259	0	92	2129	1524	40443
2021	9390	9280	0	44	1038	740	20492.72	22441	24314	0	106	2720	1940	51521
2022	10884	11769	0	48	1266	899	24865.80	26012	30836	0	114	3317	2355	62634
2023	12573	14027	0	51	1494	1057	29202.32	30049	36751	0	121	3915	2770	73607
2024	14194	16340	0	52	1724	1216	33526.04	33924	42810	0	125	4518	3185	84562
2025	15747	18708	0	52	1956	1374	37836.99	37636	49014	0	124	5124	3600	95499
2026	17232	21131	0	50	2189	1533	42135.14	41184	55364	0	120	5735	4016	106419
2027	18649	23610	0	47	2424	1691	46420.53	44571	61858	0	111	6351	4431	117322
2028	18709	23415	0	42	2428	1691	46285.74	44715	61347	0	101	6362	4431	116956
2029	18769	23220	0	38	2432	1691	46150.94	44859	60836	0	91	6373	4431	116590
2030	18830	23025	0	34	2436	1691	46016.15	45003	60325	0	81	6384	4431	116224
2031	18890	22830	0	30	2441	1691	45881.36	45147	59814	0	71	6395	4431	115858
2032	18950	22635	0	26	2445	1691	45746.57	45291	59303	0	61	6406	4431	115492
2033	18954	22395	0	24	2446	1691	45510.53	45300	58674	0	58	6409	4431	114873
2034	18958	22155	0	23	2447	1691	45274.49	45310	58045	0	55	6412	4431	114253
2035	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2036	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2037	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2038	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2039	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2040	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2041	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2042	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2043	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2044	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2045	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2046	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2047	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2048	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2049	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2050	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2051	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2052	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2053	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2054	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2055	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2056	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2057	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2058	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2059	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2060	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2061	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2062	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2063	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2064	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2065	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2066	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2067	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2068	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2069	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2070	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2071	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2072	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2073	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2074	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2075	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634
2076	18962	21915	0	22	2449	1691	45038.45	45319	57417	0	52	6415	4431	113634

Total 6270113





REPORT N<sup>o</sup> 70027201-JAR1

# KINGSWOOD ROAD- BURTONWOOD ROAD TRAFFIC SIGNALS

JUNCTION ASSESSMENT REPORT



MARCH 2017



# KINGSWOOD ROAD- BURTONWOOD ROAD SIGNALS JUNCTION ASSESSMENT REPORT

**Warrington Borough Council**

## **Report (Revision 2)**

Project no: 70027201

Date: March 2017

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# QUALITY MANAGEMENT

ISSUE/REVISION	FIRST ISSUE	REVISION 1	REVISION 2	REVISION 3
Remarks	Issue	Extra Info Requested	Westbrook Way S278 Works Assessed	
Date	23/12/16	10/02/17	28/03/17	
Prepared by	G Hulme	G Hulme	G Hulme	
Signature				
Checked by	B Haddock	B Haddock	B Haddock	
Signature				
Authorised by	B Haddock	B Haddock	B Haddock	
Signature				
Project number	70027201	70027201	70027201	
Report number	70027201-JAR1	70027201-JAR1	70027201-JAR1	
File reference				

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# PRODUCTION TEAM

## CLIENT

Transport Planning and  
Development Control Manager      Alan Dickin

Principal Projects Manager      Mike Wheldon

UTMC      Dave Rostron

## WSP | PARSONS BRINCKERHOFF

Project Manager      Greg Hulme

Project Director      Ben Haddock

## SUBCONSULTANTS

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# 1 INTRODUCTION

## 1.1 BACKGROUND

1.1.1 Junction 8 of the M62 motorway is due to be upgraded in 2017 to accommodate traffic generated by new developments nearby, including Omega. The scope of the junction upgrade currently extends to the southern end of the southbound merge on Burtonwood Road where two lanes merge into the existing one lane.

1.1.2 Approximately 500m to the south of Junction 8 on Burtonwood Road is the Kingswood Road junction. This three-arm signalised junction has a single lane on the northern and eastern approaches and one lane plus a short flare lane, on the southern approach. Public consultation for the Junction 8 scheme raised concerns that the restricted capacity of the Kingswood Road junction would limit the benefits of the Junction 8 improvements.

1.1.3 In addition, the Westbrook Way roundabout approximately 250m further south is also planned to have future capacity improvements to accommodate traffic from the new Omega South access on the western arm. This will include extending the two-lane section on the Burtonwood Road northern arm towards the Kingswood Road junction. This improvement may also be constrained by the southbound bottleneck at Kingswood Road.

## 1.2 COMMISSION

1.2.1 Warrington Borough Council (WBC) as the local highway authority, has commissioned WSP | Parsons Brinckerhoff to undertake a feasibility study into capacity improvements on the links downstream and upstream of the Kingswood Road junction to maximise the benefits of the two neighbouring roundabout schemes. A plan of the study area is presented in Figure 1.1 **Error! Reference source not found..**

1.2.2 It is noted that any improvements identified in this feasibility study could potentially be incorporated into the Junction 8 improvements due to be upgraded in 2017 so that benefits are seen from opening and address public consultation concerns.

## 1.3 SCOPE

1.3.1 The scope of the commission includes but is not limited to:

- Validation of the issue described – through observations/surveys and or analysis of model output
- Preliminary design layouts to increase junction capacity, including potential local widening
- Review of land availability for widening
- Review of statutory undertakers plant
- Impact of boundary treatments and existing pedestrian/cycle provision
- Ability to future proof any improvement to link to future S278 scheme for Westbrook Way Roundabout
- Cost estimate for improvement scheme including allowance for, stats, land (if applicable), risk/contingency, design and supervision.
- Junction modelling to describe any operational benefits – capacity improvement achieved and impact on queueing

## 1.4 PURPOSE OF THIS REPORT

- 1.4.1 This report describes the findings of the study so far, to aid a decision on whether to pursue the options suggested.

Figure 1.1 - Extent of Feasibility Study Area





## 1.5 STUDY EXTENSION

- 1.5.1 Revision 1 of this report identified that the capacity of the Burtonwood Road northern approach to the Westbrook Way roundabout would restrict the benefits of any Kingswood road junction improvements. Therefore WBC has commissioned WSP | Parsons Brinckerhoff to assess the impact of the Westbrook Way roundabout Section 278 works to see if these restrictions could be removed.
- 1.5.2 This report includes the original junction assessment study with improved modelling of the Westbrook Way roundabout. The Section 278 works are also modelled to provide a comparison with the existing roundabout performance.

# 2 METHODOLOGY

## 2.1 EXTENT OF ASSESSMENT

2.1.1 In order to establish the current performance of the existing junction, a junction model was developed using LinSig software. WBC requested that this model should include the existing Junction 8 roundabout to the north and the existing Westbrook Way roundabout to the south, to assess the interaction between the junctions and the impact of queues. This model would then become the Base Model to be adapted to reflect the proposed changes to the network in the future years.

2.1.2 It was requested that the network be assessed in the base year of 2016, the Junction 8 upgrade proposed opening year of 2017 and the design year of 2027. All three years were to be assessed with the following networks:

1. the existing base network;
2. the proposed Junction 8 upgrade network;
3. the Junction 8 upgrade network with proposed improvements at Kingswood Road;
4. the Junction 8 upgrade network with proposed improvements at both Kingswood Road and the Westbrook Way roundabout;
5. the Junction 8 upgrade network with proposed improvements at the Westbrook Way roundabout but without the Kingswood Road improvements.

## 2.2 TRAFFIC FLOWS

### 2016 BASE YEAR

2.2.1 A traffic turning count survey had already been commissioned by Atkins for the M62 Junction 8 roundabout. This survey was undertaken on Thursday 20 October 2016 between 07:00 and 19:00. WBC requested that this be used for the traffic flows to the north of the Kingswood Road junction.

2.2.2 For the Kingswood Road junction and the Westbrook Way roundabout, WSP | Parsons Brinckerhoff commissioned an Origin-Destination (O-D) traffic survey across the two junctions to establish the existing routes through the network. This video survey was undertaken on Tuesday 8 November 2016 between 07:00 and 10:00 and 15:00-19:00, to capture the busiest traffic periods. Queue lengths in PCUs were also recorded on all approaches, to assist with validation of the base year LinSig Model.

2.2.3 Vehicle flows from both traffic surveys were converted to PCUs using the conversion factors presented in Table 2.1. The AM and PM peak hours were identified from each survey to the nearest 15 minutes. Both surveys identified the peak hours to be between 07:45-08:45 in the AM and 16:45-17:45 in the PM, so these times would be used to extract the peak hour flows.

2.2.4 The camera video footage was provided by the survey company of the two southern junctions. A 15-minute sample of each peak hour was observed to validate the survey data provided for both the traffic flows and queues and was found to be within acceptable limits.

**Table 2.1 – PCU Conversion Factors Used**

VEHICLE TYPE	PCU FACTOR
Pedal cycle	0.2
Motor Cycle	0.4
Car/Taxi	1
LGV	1
MGV/OGV1	1.5
HGV/OGV2	2.3
Bus & Coach	2

- 2.2.5 In order to convert the traffic flows into a format that could be inserted into the LinSig models, a matrix was created for each peak hour that used standardised zone references across the three junctions. A guide to these zones is presented in Table 2.2.

**Table 2.2 – Key to Traffic Flow Matrix Zones**

MATRIX ZONE	NETWORK ORIGIN/ DESTINATION
A	Burtonwood Road (North)
B	M62 East
C	Charon Way
D	Kingswood Road
E	Westbrook Way
F	Burtonwood Road (South)
G	Whittle Avenue
H	Omega South Access
I	Skyline Drive
J	M62 West

- 2.2.6 A network diagram was created in Excel of the three junctions showing the peak hour traffic turning flows in PCUs at each junction. From these flows, turning proportions were calculated on every approach to each junction. These proportions were then used to factor the traffic flows that crossed between the two traffic survey areas, to assign them into the correct cells in the matrices. Flows between two zones within the same junction and u-turners were entered into the matrix directly. The resulting base year flow matrices are presented in Appendix B.

## 2017 OPENING YEAR AND 2027 DESIGN YEAR

- 2.2.7 The future year traffic flows were extracted from Vissim models of the proposed network provided by Atkins and approved by WBC and Highways England. It was requested that these flows be provided in the same matrix structure as the 2016 survey flows to assist with use in the LinSig models. A technical note which presents these matrices and describes the method used to extract them, is provided in Appendix C.

## 2.3 LINSIG MODEL

- 2.3.1 WBC provided a Topographical Survey drawing of the network corridor that was used to measure the geometry of the existing highway network. These measurements were used to create a LinSig model of the network. Junctions 9 software was used to calculate the Maximum Flow and Coefficient values for the Westbrook Way roundabout approach lanes, utilising Lane Simulation Mode. The ARCADY output from this model is presented in Appendix L.
- 2.3.2 WBC also provided the existing traffic signal specification documents for the Kingswood Road and M62 Junction 8 junctions. These were used to configure the LinSig model phases, stages, intergreens and other signal settings to best reflect the existing situation.

- 2.3.3 MOVA had been upgraded on the Kingswood Road junction just prior to the traffic survey on 8 November 2016. Observed average stage lengths for each hour during November 2016 were provided by WBC to configure the LinSig stage lengths and cycle time during the peak hours modelled. In order to compare the results of the various years, these signal timings were kept the same for all scenarios in each peak hour.
- 2.3.4 The peak hour traffic flow matrices for the three years to be assessed were entered into the existing network LinSig model as six scenarios and assigned to the links. This enabled the existing junction performance to be reviewed and compared with the future years, if no network improvements were made. The results of this assessment are presented in Chapter 3.

# 3 EXISTING NETWORK PERFORMANCE

## 3.1 2016 BASE YEAR

3.1.1 The LinSig results for the 2016 base year peak hours are presented in Table 3.1. This includes the parts of the model at the Kingswood Road junction and the adjacent links between the two roundabouts. LinSig output reports for the whole network are provided in Appendix D. Where two links are combined, this represents a continuous lane plus a flare lane, on the approach to a junction.

3.1.2 The Degree of Saturation (DoS) indicates the how much of the available link capacity is used in the modelled period by the demand flow. A link is predicted to operate within capacity if the DoS is 90% or less. DoS values higher than 90% indicate that the link cannot accommodate all of the demand within the time available, with the excess demand left in the queue.

**Table 3.1 – Summary of 2016 Base Year LinSig Results**

EXISTING NETWORK		2016 AM PEAK		2016 PM PEAK	
Link(s)	Description	Degree of Saturation	Mean Max Queue (PCU)	Degree of Saturation	Mean Max Queue (PCU)
<b>Junction 1</b>	<b>M62 Junction 8</b>	-	-	-	-
19/1	Burtonwood Rd South - Northbound Approach	48.5%	1	39.8%	0
21/1	Burtonwood Rd South - Southbound Merge	35.3%	1	49.3%	1
22/1	Burtonwood Rd South - Southbound Nearside	22.1%	0	24.9%	0
22/2	Burtonwood Rd South - Southbound Offside	13.6%	0	24.9%	0
<b>Junction 2</b>	<b>Kingswood Road/Burtonwood Road</b>	-	-	-	-
1/1+1/2	Burtonwood Rd South - Ahead and Right	66.5%	12	49.2%	7
2/1	Burtonwood Rd North - Ahead and Left	75.6%	14	89.1%	27
3/1	Kingswood Road - Left and Right	77.8%	5	104.4%	15
<b>Junction 3</b>	<b>Burtonwood Road/Westbrook Way</b>	-	-	-	-
1/1+1/2	Burtonwood Rd North - Ahead and Left	73.9%	12	96.0%	29
11/1+11/2	Westbrook Way – Ahead and Left	59.0%	1	83.0%	2
8/1+8/2	Burtonwood Rd South – Ahead and Left	12.5%	0	5.0%	0
5/1+5/2	Whittle Avenue – Ahead And Left	74.3%	1	57.0%	1
15/1+15/2	Omega Access – Ahead and Left	9.6%	0	1.4%	0

3.1.3 Table 3.1 indicates that all links around the Kingswood Road junction were predicted to operate within capacity in the AM Peak, with the highest DoS being 78% on Kingswood Road. In the PM Peak two of the study area links were predicted to operate above capacity, with a DoS of 104% on Kingswood Road and 96% on the northern approach to the Westbrook Way roundabout. The associated Mean Maximum Queues (MMQ) were 15 PCUs (86m) and 29 PCUs (167m), respectively.

3.1.4 The southbound approach to the Kingswood Road junction was predicted to operate at capacity with a DoS of 89% and an associated queue of 27 PCUS (155m)

3.1.5 The observed queues from the traffic survey on 8 November 2016 were used to validate the queues predicted by LinSig. The average and maximum queues for the peak hours were calculated, with the relevant links presented in Table 3.2.

**Table 3.2 – Summary of Observed Queue Lengths from 2016 Survey**

EXISTING NETWORK		2016 AM PEAK		2016 PM PEAK	
Link(s)	Description	Average Queue (PCU)	Maximum Queue (PCU)	Average Queue (PCU)	Maximum Queue (PCU)
<b>Junction 2</b>	<b>Kingswood Road/Burtonwood Road</b>	-	-	-	-
1/1+1/2	Burtonwood Rd South - Ahead and Right	11	18	11	24
2/1	Burtonwood Rd North - Ahead and Left	13	23	23	31
3/1	Kingswood Road - Left and Right	5	8	7	15
<b>Junction 3</b>	<b>Burtonwood Road/Westbrook Way</b>	-	-	-	-
1/1+1/2	Burtonwood Rd North - Ahead and Left	12	19	15	23
11/1+11/2	Westbrook Way – Ahead and Left	4	6	28	43
8/1+8/2	Burtonwood Rd South – Ahead and Left	3	11	2	3
5/1+5/2	Whittle Avenue – Ahead And Left	10	16	4	8
15/1+15/2	Omega Access – Ahead and Left	2	2	1	2

- 3.1.6 When the queues in Table 3.1 and Table 3.2 are compared, the AM peak for the Kingswood Road junction validates very well, with the three average queue lengths being almost identical. The northern approach to the Westbrook Way roundabout also has a predicted Mean Maximum Queue identical to the average observed queue.
- 3.1.7 In the PM peak the modelled queues validate better with maximum observed queues, rather than the average. This could be due the saturated operation of the network, with many drivers continuing to cross the stopline after the red light is shown, reducing the remaining queue each cycle.
- 3.1.8 These LinSig results indicate that the existing network has insufficient capacity in the PM peak hour to accommodate the current demand. Therefore, with the forecast increase in traffic flows through this network, it is recommended that capacity improvements are proposed at the Kingswood Road junction.

## 3.2 2017 OPENING YEAR AND 2027 DESIGN YEAR

- 3.2.1 As the proposed M62 Junction 8 Improvements are a committed scheme that commenced construction in January 2017, it is not considered necessary to review the LinSig results for the existing network in the future years.
- 3.2.2 The assessment results of the network with the Junction 8 improvements implemented are presented in Chapter 6, where they are compared with results of the network with additional proposed improvements at the Kingswood Road junction.

# 4 SITE CONSTRAINTS

## 4.1 INTRODUCTION

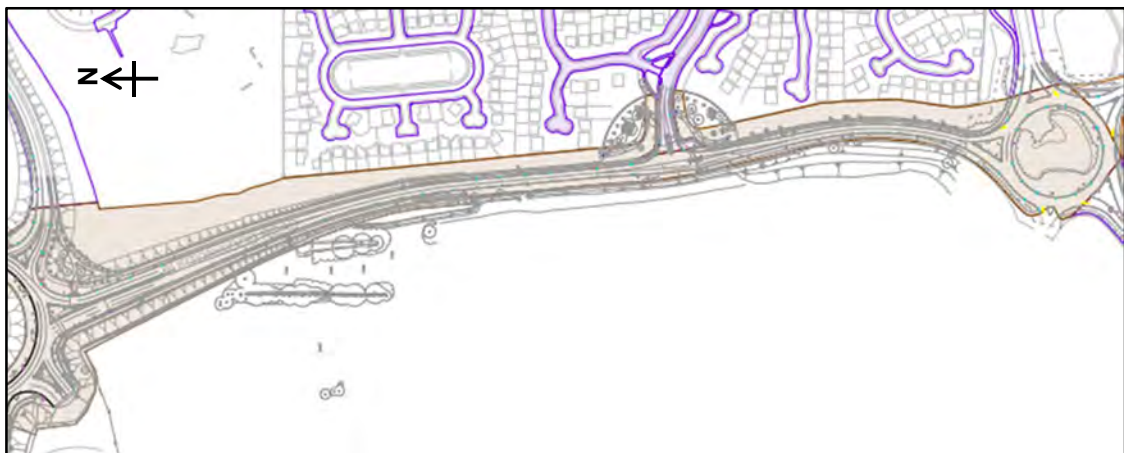
4.1.1 In order to consider junction improvements for the Kingswood Road junction, WBC has requested that a number of site constraints are assessed to advise the design. These are discussed below.

## 4.2 ADOPTED HIGHWAY

4.2.1 WBC has provided plans showing the existing adopted highway within the borough. Burtonwood Road is within a corridor of adopted highway between Junction 8 of the M62 and the Westbrook Way Roundabout, as shown by the brown areas in Figure 4.1. A larger version of this drawing is presented in Appendix E. On the west side this includes the stretches of footway and a narrow strip of verge, plus the earthwork embankment slope up to Junction 8.

4.2.2 On the east side the northern end covers a larger area beyond the earthworks due to the old alignment of Burtonwood Road before Junction 8 was built. Further south beside the Kingswood housing estate, the adopted highway includes a strip of vegetation with an acoustic barrier separating it from the footway and verge. At Kingswood Road itself, the adopted highway includes areas of verge up to 10 metres from the carriageway, including parts of the swales that drain the area.

Figure 4.1 – Adopted Highway Extract for Burtonwood Road - North to the Left



4.2.3 These areas of adopted highway indicate that it would be simpler to widen Burtonwood Road eastwards rather than extend the adoption limit westwards. This would be subject to the suitable relocation and design review of the acoustic barrier.

## 4.3 LAND OWNERSHIP

4.3.1 WBC has provided details of the land owners around the Burtonwood Road corridor. A plan showing the extent of these land ownership areas is presented in Appendix F.

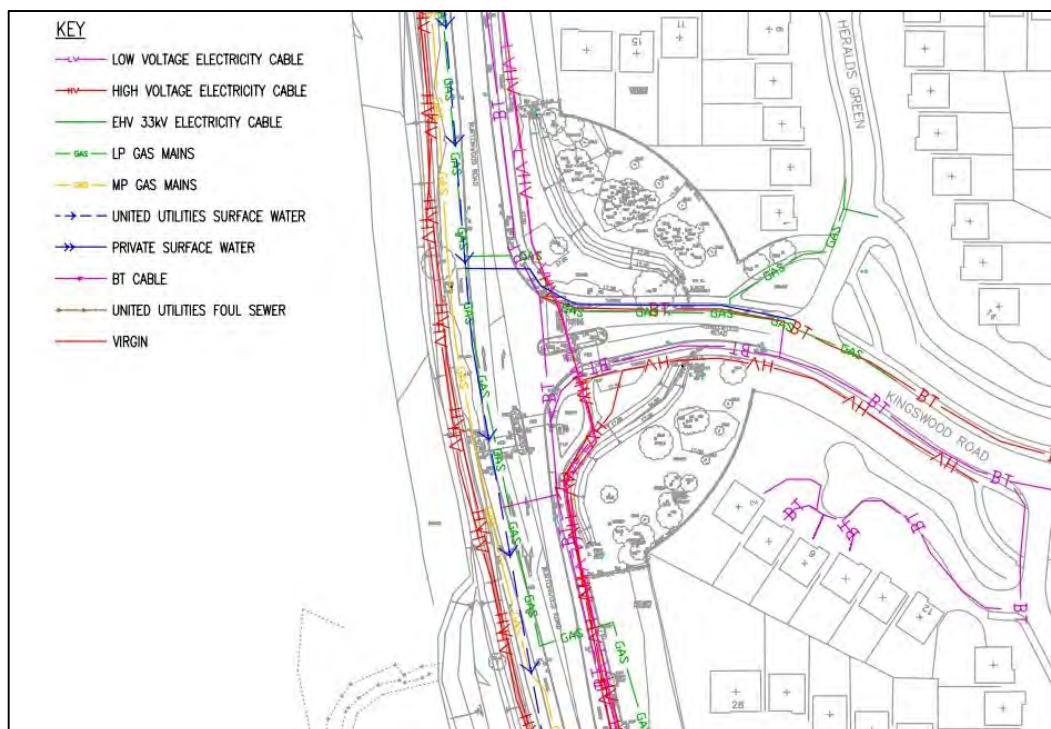
4.3.2 WBC now owns most of the adopted highway, except for the northern end which is owned by the Secretary of State for Transport, to enable the M62 Junction 8 works. On the west side of the road there is a strip of land as far south as Kingswood Road owned by the Omega South Management Company Limited. To the south and west of this strip, the land is all owned by the Homes and Communities Agency (HCA) as part of the Omega South development.



## 4.4 UTILITIES

- 4.4.1 A Ground Penetrating Radar (GPR) survey was undertaken by Centara Bureau Services Ltd (CBS) for the extent of the M62 Junction 8 Improvements scheme. WBC requested that CBS be commissioned to extend the GPR survey southwards to the Westbrook Way roundabout to cover the potential extent of the Kingswood Road junction improvements. The information issued by CBS and presented in Appendix G had some utilities that could not be identified on site.
- 4.4.2 WBC provided C2 search plans from the various utility providers in the area, showing the indicative locations of their equipment. These were drawn onto a plan of the topographical survey to provide an indication of what utilities may be affected by any highway improvements. This plan is also presented in Appendix G, with an extract presented in Figure 4.2
- 4.4.3 The utility plans indicate that there is known utility equipment under both sides and below Burtonwood Road and Kingswood Road. The eastern footway/verge has BT cables and both low and high voltage electricity cables under it. There are also low-pressure gas mains that cross Burtonwood Road to the north and south of Kingswood Road. The northern one feeds the Kingswood Estate whilst the southern one continues south under the vegetation strip behind the acoustic fence.
- 4.4.4 On the west side of Burtonwood Road the low-pressure gas main continues northwards to the Junction 8 roundabout. There is also a medium pressure gas main in the western verge from Skyline Drive to the Whittle Ave roundabout, where it crosses towards Westbrook Way. Diversions of these mains are known to be difficult and expensive.
- 4.4.5 There is a surface water sewer under the western verge that crosses from the eastern verge further north. This has a sewer connection to Kingswood Road. There are two high-voltage electricity cables to the west of Burtonwood Road that connect Skyline Drive with a Sub-Station to the south. It is not known how far these are from the highway, but they are believed to be beyond the existing verge.

**Figure 4.2 – Extract of Indicative Utilities Plan around Kingswood Road Junction**





## 4.5 NMU FACILITIES

- 4.5.1 Burtonwood Road has a footway along the eastern side between Charon Way and Westbrook Way. The northern section has a segregated cycleway which then joins the carriageway. Although the rest of its length is not marked or signed as shared footway, there is a staggered toucan crossing across Kingswood Road connecting the two footways.
- 4.5.2 On the south side of the Kingswood Road junction there is a staggered puffin crossing that connects to a footway on the west side. This western footway only continues south to Whittle Avenue and is not marked or signed as shared with cyclists, but is wide enough to be for most of its length. To the north of the crossing is just grass verge. Further north the footway restarts at a dropped crossing and joins a segregated cycleway from the carriageway, which continues north to the north side of Junction 8.
- 4.5.3 The M62 Junction Improvement scheme proposes to retain the western segregated footway and convert the eastern segregated section into a shared footway over the realigned section. The NMU Audit for the scheme revealed that NMU movements around the junction are increasing, due to the new employment sites at Omega North. This is expected to increase further with the new employment and education sites opening in Omega South, as well as the future residential, leisure and commercial developments beside Burtonwood Road.
- 4.5.4 Therefore, it is recommended that if the Kingswood Road junction is improved, the design should utilise the opportunity to provide shared footways along both sides of the entire length of this section of Burtonwood Road. It is also recommended that the puffin crossing at the Kingswood Road junction should be upgraded to a toucan crossing to provide a direct, cycle friendly route between the Kingswood estate and the Omega South developments.
- 4.5.5 WBC has requested that the proposed verges are designed to have a minimum of 1 metre grass verge behind the kerb, followed by a 3 metre shared footway and a 0.5 metre grass strip in front of any fence or highway boundary.

## 4.6 SKYLINE DRIVE

- 4.6.1 Skyline Drive is a new single carriageway road through Omega South that connects Junction 8 with Omega Boulevard and onwards to the A57. It was fully opened at the end of 2015 and was due to be adopted at the end of 2016. It is proposed to become a classified A-road along with Burtonwood Road, Whittle Avenue and Charon Way.
- 4.6.2 At the time of writing the signage for the route had not been installed, but it is intended that some of the through traffic from Burtonwood Road will be diverted onto it. This may reduce the surveyed background traffic on Burtonwood Road before the new development traffic is added on. The Vissim models for the forecast traffic flows will have taken this into account.

## 4.7 WESTBROOK WAY ROUNDABOUT

- 4.7.1 As part of the Omega South development, there are proposed Section 278 improvements to the Westbrook Way roundabout to increase capacity. These include a proposal to extend the flare lane on the Burtonwood Road northern approach almost as far as Kingswood Road. The initial designs for this extension involve widening the carriageway on the east side rather than the west side. Any proposed junction improvements at Kingswood Road should be future-proofed to be compatible with this scheme.

# 5 OPTIONS DESIGN

## 5.1 OBJECTIVES

- 5.1.1 The existing network LinSig results in Table 3.1 of Chapter 3 indicate that the southbound lane on Burtonwood Road has insufficient capacity to accommodate the PM peak hour traffic. The lack of green time for Kingswood Road also causes that approach to operate above capacity. The Burtonwood Road northbound lane has an extended period of green when the right turn arrow is demanded, so this approach has spare capacity. Therefore, the objective is to provide an additional lane on the southbound approach to increase the capacity and potentially free up more of the cycle time for Kingswood Road.
- 5.1.2 Currently, only 4% of the southbound flow in the AM Peak and 8% in the PM peak turns left in to Kingswood Road. If the proposed additional southbound lane was exclusively for left turners and the arrival rate at the stopline was proportional to the turning flow, then each left turning vehicle could be every 25<sup>th</sup> vehicle in the queue in the AM peak and every 13<sup>th</sup> vehicle in the PM peak. The left turning proportion is forecast to reduce in the future years due to increased traffic heading further south to the various new developments.
- 5.1.3 Using a PCU length of 5.75 metres, this would require a left turn lane to be at least 144 metres long to ensure left turners can enter their lane and free up capacity in the ahead lane. This would extend almost as far north as the southbound merge proposed for the Junction 8 improvements and would remove less than 10% of the demand.
- 5.1.4 Therefore, it is recommended that the additional lane becomes an ahead and left turn lane, which would continue the southbound two-lane section from Junction 8. This will also require an additional lane on the southbound exit from the junction, before a merge over a distance of 100m.

## 5.2 PROPOSED OPTIONS

- 5.2.1 Following discussions with WBC, it was decided that three junction layout options would be assessed, that both achieve the objectives and would be compatible with the neighbouring junctions and developments. Plans showing the layout of Option 1 and Option 2 are presented in Appendix H.

### OPTION 1

- 5.2.2 This option retains the existing western kerblines of Burtonwood Road and widens the carriageway eastwards. The two lanes are formed to the north from the trajectory of the Junction 8 scheme and merge in the south to the existing southbound lane. This would require the acoustic fence to be realigned up to 5 metres further east to accommodate the repositioned footway and verge.
- 5.2.3 The existing pedestrian refuge on Burtonwood Road, at the Kingswood Road junction would be enlarged to accommodate 4-metre wide crossings so they can be upgraded to toucan crossings. The refuge on Kingswood Road would be moved eastwards and the northern kerblines realigned to provide sufficient width to pass the refuge. The footways would be 3 metres wide so they can be shared by cyclists and would be continuous on both sides of Burtonwood Road.
- 5.2.4 The right turn flare lane into Kingswood Road would be the same length as the existing lane, as there is no evidence to suggest it would require lengthening. A traffic island is proposed beside the northern stopline to accommodate the additional signal equipment required for two lanes.

## OPTION 2

- 5.2.5 This option is similar to Option 1 but retains the eastern kerbline and widens the carriageway westwards to accommodate the additional southbound lane. The alignment shown in the drawing has a more gradual curve in the two southbound lanes leaving Junction 8 and a straighter southbound alignment through the Kingswood Road junction.

## OPTION 3

- 5.2.6 A third option was proposed that would take a central route between the extents of the other two options. However, this option was discounted as there is insufficient width between the acoustic fence to the east and the adopted highway limit to the west to accommodate all of the lanes, islands and footways required. Noting the above, Option 3 has been discounted and has not been assessed further.

## 5.3 OPTION COMPARISON

- 5.3.1 There are pros and cons of both options that should be used in deciding whether to progress with either design. These are described below in Table 5.1. The operational assessment of these layouts is presented in Chapter 6, which represents both options due to their similarities. The cost estimate of the two options will be calculated if and when either of them are progressed.

**Table 5.1 – Benefits and Constraints of the Two Layout Options**

	OPTION 1 (EAST)	OPTION 2 (WEST)
<b>BENEFITS</b>	<ul style="list-style-type: none"> <li>All within existing adopted highway</li> <li>All within land owned by WBC or Secretary of State</li> <li>Very little earthworks required due to adjacent land levels</li> <li>Same side as proposed extended lane from roundabout to south</li> <li>No medium pressure gas main to divert</li> </ul>	<ul style="list-style-type: none"> <li>No requirement to amend acoustic barrier</li> <li>No change to proximity from residents</li> <li>No requirement to redesign swales</li> </ul>
<b>CONSTRAINTS</b>	<ul style="list-style-type: none"> <li>Requires relocation of acoustic fence which may need redesigning</li> <li>Potential objections from adjacent residents due to closer proximity of traffic</li> <li>Requires redesign of swales at Kingswood Road junction</li> </ul>	<ul style="list-style-type: none"> <li>Requires extension of adopted highway</li> <li>Requires purchase of additional land from Omega South and HCA</li> <li>Reduces development land area within Omega South</li> <li>Requires lengthy earthworks to achieve required levels</li> <li>Requires diversion of medium pressure gas main</li> <li>Difficult alignment at tie-in with extended lane to south</li> </ul>

## 5.4 ROAD SAFETY AUDIT

- 5.4.1 It is recommended that a Stage 1 Road Safety Audit is commissioned on these options designs if they are to be progressed. This is to ensure they do not generate any safety issues, which could impact on the design extents.

# 6 FUTURE NETWORK PERFORMANCE

## 6.1 LINSIG MODELS

- 6.1.1 The LinSig model used for the existing network assessment was modified to represent the proposed network when the Junction 8 works have been completed. Geometry at the northern end of the model was measured from the latest detailed design drawings produced by WSP | Parsons Brinckerhoff for the M62 Junction 8 Improvement Scheme.
- 6.1.2 The proposed traffic signal specification documents for Junction 8, including Charon Way, were used to configure the signal phases, stages, intergreens and sequences etc. The traffic flow matrices were re-assigned to the new network and a results report was produced.
- 6.1.3 For the purposes of assessing network performance, there is no difference between Option 1 and Option 2 in capacity terms. Therefore, for the remainder of this report, Option 1 was used to test network performance.
- 6.1.4 The proposed network model was then modified again to represent the changes proposed in the Option 1 layout representing two-lanes southbound to beyond the Kingswood Road junction. Geometry was measured from the design drawing and the new intergreens and phase minimums were calculated for the Kingswood Road signal controller. The traffic flow matrices were re-assigned to the new network and a results report was produced for this model also.
- 6.1.5 Following the request by WBC to assess the impact of the Section 278 works at the Westbrook Way roundabout, two further LinSig models were created. The model with both the Junction 8 and Option 1 improvements included was further modified to include the proposed design of the S278 works shown in Appendix A. The S278 works were also applied to the model with Junction 8 improvements included but without the Option 1 improvements, to enable a comparison with the network should the Option 1 improvements not be implemented. The ARCADY output used to inform the Maximum Flow and Coefficient values for these models is presented in Appendix L.

## 6.2 RESULTS COMPARISON

- 6.2.1 The LinSig results for the relevant links of the future networks without the S278 works are compared in Table 6.1 to Table 6.4, below. These are taken from the LinSig reports presented in Appendix I.

### AM PEAK

- 6.2.2 Table 6.1 indicates that in the 2017 AM peak hour, the maximum southbound queue length at the Kingswood Road junction is predicted to reduce from 7 to 4 PCUs when the Option 1 layout is included. The associated degree of saturation per lane is predicted to reduce from 47% to 27%.
- 6.2.3 Although the AM peak hour is not predicted to operate above capacity with the 2016 survey flows, the benefit of the extra southbound lane from 2017 should enable more green time to be allocated to Kingswood Road.
- 6.2.4 The queue of 7 PCUs predicted at Junction 3 should not impact on the operation of the Kingswood Road junction.

Table 6.1 – Comparison of Future Network LinSig Results for 2017 AM Peak Hour

FUTURE NETWORK 2017 AM PEAK		JUNCTION 8 ONLY		JUNCTION 8+OPT 1	
Link(s)	Description	Degree of Saturation	Mean Max Queue (PCU)	Degree of Saturation	Mean Max Queue (PCU)
<b>Junction 4</b>	<b>Charon Way/Burtonwood Road</b>	-	-	-	-
6/1	Burtonwood Rd South - Southbound Merge	22.1%	0	N/A	N/A
5/1	Burtonwood Rd South - Southbound Nearside	5.7%	0	9.3%	0
5/2	Burtonwood Rd South - Southbound Offside	15.7%	0	12.2%	0
<b>Junction 2</b>	<b>Kingswood Road/Burtonwood Road</b>	-	-	-	-
1/1+1/2	Burtonwood Rd South - Ahead and Right	56.2%	9	55.7%	9
2/1	Burtonwood Rd North - Ahead and Left	47.2%	7	19.8%	3
2/2	Burtonwood Rd North – Ahead Only (Option 1)	N/A	N/A	27.4%	4
3/1	Kingswood Road - Left and Right	56.2%	3	56.1%	3
<b>Junction 3</b>	<b>Burtonwood Road/Westbrook Way</b>	-	-	-	-
1/1+1/2	Burtonwood Rd North - Ahead and Left	51.5%	8	51.5%	7
11/1+11/2	Westbrook Way – Ahead and Left	58.9%	1	58.9%	1
8/1+8/2	Burtonwood Rd South – Ahead and Left	11.8%	0	11.8%	0
5/1+5/2	Whittle Avenue – Ahead And Left	59.7%	1	62.7%	1
15/1+15/2	Omega Access – Ahead and Left	1.0%	0	1.0%	0

## 6.2.5

Table 6.2 indicates that in the 2027 AM peak hour, the southbound queue length at Kingswood Road is predicted to reduce from 12 to 5 PCUs when the Option 1 layout is included. The associated degree of saturation per lane is predicted to reduce from 71% to 36%. However, the approach to the Whittle Ave roundabout is predicted to operate close to its practical capacity, with a queue of 16 PCUs. This queue would not reach back to the Kingswood Road junction.

Table 6.2 - Comparison of Future Network LinSig Results for 2027 AM Peak Hour

FUTURE NETWORK 2027 AM PEAK		JUNCTION 8 ONLY		JUNCTION 8+OPT 1	
Link(s)	Description	Degree of Saturation	Mean Max Queue (PCU)	Degree of Saturation	Mean Max Queue (PCU)
<b>Junction 4</b>	<b>Charon Way/Burtonwood Road</b>	-	-	-	-
6/1	Burtonwood Rd South - Southbound Merge	33.1%	1	N/A	N/A
5/1	Burtonwood Rd South - Southbound Nearside	11.6%	0	16.1%	0
5/2	Burtonwood Rd South - Southbound Offside	20.6%	0	16.2%	0
<b>Junction 2</b>	<b>Kingswood Road/Burtonwood Road</b>	-	-	-	-
1/1+1/2	Burtonwood Rd South - Ahead and Right	61.5%	10	60.9%	10
2/1	Burtonwood Rd North - Ahead and Left	70.6%	12	34.0%	5
2/2	Burtonwood Rd North – Ahead Only (Option 1)	N/A	N/A	36.2%	5
3/1	Kingswood Road - Left and Right	54.9%	3	54.8%	3
<b>Junction 3</b>	<b>Burtonwood Road/Westbrook Way</b>	-	-	-	-
1/1+1/2	Burtonwood Rd North - Ahead and Left	87.1%	16	88.6%	16
11/1+11/2	Westbrook Way – Ahead and Left	60.2%	1	60.6%	1
8/1+8/2	Burtonwood Rd South – Ahead and Left	14.6%	0	14.6%	0
5/1+5/2	Whittle Avenue – Ahead And Left	84.2%	3	82.5%	2
15/1+15/2	Omega Access – Ahead and Left	51.6%	1	51.6%	1

## PM PEAK

## 6.2.6

Table 6.3 indicates that in the 2017 PM peak hour, the southbound queue length at Kingswood Road is predicted to reduce from 38 to 9 PCUs when the Option 1 layout is included. The associated degree of saturation per lane is predicted to reduce from 97% to 49%. A queue of 38 PCUs would almost reach back to the southbound merge section south of Charon Way and may impact on the operation of that junction.

- 6.2.7 The queue of 185 PCUs on the approach to the roundabout would queue back even further north to Junction 8 and pass through both the Kingswood Road and Charon Way junctions. By having two lanes for most of this stretch with Option 1, the extent of this queue will reduce significantly.

**Table 6.3 - Comparison of Future Network LinSig Results for 2017 PM Peak Hour**

FUTURE NETWORK 2017 PM PEAK		JUNCTION 8 ONLY		JUNCTION 8+OPT 1	
Link(s)	Description	Degree of Saturation	Mean Max Queue (PCU)	Degree of Saturation	Mean Max Queue (PCU)
<b>Junction 4</b>	<b>Charon Way/Burtonwood Road</b>	-	-	-	-
6/1	Burtonwood Rd South - Southbound Merge	53.6%	16.0	N/A	N/A
5/1	Burtonwood Rd South - Southbound Nearside	26.0%	0	26.9%	0
5/2	Burtonwood Rd South - Southbound Offside	26.7%	0	25.9%	0
<b>Junction 2</b>	<b>Kingswood Road/Burtonwood Road</b>	-	-	-	-
1/1+1/2	Burtonwood Rd South - Ahead and Right	37.5%	5	37.2%	5
2/1	Burtonwood Rd North - Ahead and Left	97.0%	38	48.3%	9
2/2	Burtonwood Rd North – Ahead Only (Option 1)	N/A	N/A	48.8%	9
3/1	Kingswood Road - Left and Right	65.7%	4	66.2%	4
<b>Junction 3</b>	<b>Burtonwood Road/Westbrook Way</b>	-	-	-	-
1/1+1/2	Burtonwood Rd North - Ahead and Left	123%	185	123.0%	185
11/1+11/2	Westbrook Way – Ahead and Left	70.4%	1	70.4%	1
8/1+8/2	Burtonwood Rd South – Ahead and Left	6.5%	0	6.5%	0
5/1+5/2	Whittle Avenue – Ahead And Left	65.6%	1	65.6%	0
15/1+15/2	Omega Access – Ahead and Left	1.2%	0	1.2%	0

- 6.2.8 Table 6.4 indicates that in the 2027 PM peak hour, the southbound queue length at Kingswood Road is predicted to reduce from 181 to 13 PCUs when the Option 1 layout is included. The associated degree of saturation per lane is predicted to reduce from 124% to 63%. A queue of 181 PCUs would extend into the Junction 8 roundabout, but 13 PCUs would extend less than 75 metres north of Kingswood Road.

- 6.2.9 The queue of 261 PCUs on the approach to the roundabout would queue back even further north to the motorway and pass through the Kingswood Road, Charon Way and Junction 8 junctions. By having two lanes for most of this stretch with Option 1, the extent of this queue will significantly reduce, but not enough for all junctions to operate efficiently.

**Table 6.4 - Comparison of Future Network LinSig Results for 2027 PM Peak Hour**

FUTURE NETWORK 2027 PM PEAK		JUNCTION 8 ONLY		JUNCTION 8+OPT 1	
Link(s)	Description	Degree of Saturation	Mean Max Queue (PCU)	Degree of Saturation	Mean Max Queue (PCU)
<b>Junction 4</b>	<b>Charon Way/Burtonwood Road</b>	-	-	-	-
6/1	Burtonwood Rd South - Southbound Merge	68.8%	22	N/A	N/A
5/1	Burtonwood Rd South - Southbound Nearside	33.8%	0	34.3%	0
5/2	Burtonwood Rd South - Southbound Offside	33.8%	0	33.3%	0
<b>Junction 2</b>	<b>Kingswood Road/Burtonwood Road</b>	-	-	-	-
1/1+1/2	Burtonwood Rd South - Ahead and Right	40.9%	6	40.6%	6
2/1	Burtonwood Rd North - Ahead and Left	124.3%	181	61.5%	13
2/2	Burtonwood Rd North – Ahead Only (Option 1)	N/A	N/A	62.8%	13
3/1	Kingswood Road - Left and Right	63.6	4	61.1%	4
<b>Junction 3</b>	<b>Burtonwood Road/Westbrook Way</b>	-	-	-	-
1/1+1/2	Burtonwood Rd North - Ahead and Left	144.8%	261	177.8%	408
11/1+11/2	Westbrook Way – Ahead and Left	55.4%	1	55.4%	1
8/1+8/2	Burtonwood Rd South – Ahead and Left	6.5%	0	6.5%	0
5/1+5/2	Whittle Avenue – Ahead And Left	76.9%	2	76.9%	2
15/1+15/2	Omega Access – Ahead and Left	38.8%	0	38.8%	0



## 6.3 SECTION 278 WORKS RESULTS

6.3.1 The LinSig results for the relevant links of the future networks with the Westbrook Way roundabout Section 278 works included are compared in Table 6.5 to Table 6.8 below. These are taken from the LinSig reports presented in Appendix J.

### AM PEAK

6.3.2 Table 6.5 indicates that in the 2017 AM peak hour, the maximum southbound queue length at the Kingswood Road junction is predicted to reduce from 7 to 4 PCUs when the Option 1 layout is included with the S278 Works. The associated degree of saturation per lane is predicted to reduce from 47% to 30%. The queues at the Westbrook Way roundabout are predicted to be removed due to the improved capacity on the northern approach with the S278 Works.

**Table 6.5 – Comparison of Future Network with S278 Works LinSig Results for 2017 AM Peak Hour**

FUTURE NETWORK 2017 AM PEAK		JUNC 8+S278 ONLY		JUNC 8+OPT 1+S278	
Link(s)	Description	Degree of Saturation	Mean Max Queue (PCU)	Degree of Saturation	Mean Max Queue (PCU)
<b>Junction 4</b>	<b>Charon Way/Burtonwood Road</b>	-	-	-	-
6/1	Burtonwood Rd South - Southbound Merge	22.1%	0	N/A	N/A
5/1	Burtonwood Rd South - Southbound Nearside	6.8%	0	10.4%	0
5/2	Burtonwood Rd South - Southbound Offside	14.7%	0	16.5%	0
<b>Junction 2</b>	<b>Kingswood Road/Burtonwood Road</b>	-	-	-	-
1/1+1/2	Burtonwood Rd South - Ahead and Right	56.2%	9	55.7%	9
2/1	Burtonwood Rd North - Ahead and Left	47.2%	7	28.9%	4
2/2	Burtonwood Rd North – Ahead Only (Option 1)	N/A	N/A	30.0%	4
3/1	Kingswood Road - Left and Right	54.5%	3	56.1%	3
<b>Junction 3</b>	<b>Burtonwood Road/Westbrook Way</b>	-	-	-	-
1/1	Burtonwood Rd North - Ahead and Left	18.0%	0	22.7%	0
1/2	Burtonwood Rd North - Ahead Only	20.6%	0	24.9%	0
11/1+11/2	Westbrook Way – Ahead and Left	31.3%	0	31.3%	0
8/1+8/2	Burtonwood Rd South – Ahead and Left	11.7%	0	12.2%	0
5/1	Whittle Avenue – Ahead and Left	48.7%	5	50.1%	6
5/2	Whittle Avenue – Ahead Only	40.1%	4	41.3%	4
15/1	Omega Access - Ahead and Left	0.5%	0	0.6%	0
15/2	Omega Access - Ahead Only	0.4%	0	0.4%	0

6.3.3 Table 6.6 indicates that in the 2027 AM peak hour, the southbound queue length at Kingswood Road is predicted to reduce from 12 to 6 PCUs when the Option 1 layout is included. The associated degree of saturation per lane is predicted to reduce from 71% to 44%. The queues at the Westbrook Way roundabout are predicted to be removed due to the improved capacity with the S278 Works.

Table 6.6 – Comparison of Future Network with S278 Works LinSig Results for 2027 AM Peak Hour

FUTURE NETWORK 2027 AM PEAK		JUNC 8+S278 ONLY		JUNC 8+OPT 1+S278	
Link(s)	Description	Degree of Saturation	Mean Max Queue (PCU)	Degree of Saturation	Mean Max Queue (PCU)
<b>Junction 4</b>	<b>Charon Way/Burtonwood Road</b>	-	-	-	-
6/1	Burtonwood Rd South - Southbound Merge	33.1%	1	N/A	N/A
5/1	Burtonwood Rd South - Southbound Nearside	10.0%	0	16.0%	0
5/2	Burtonwood Rd South - Southbound Offside	22.1%	0	23.9%	0
<b>Junction 2</b>	<b>Kingswood Road/Burtonwood Road</b>	-	-	-	-
1/1+1/2	Burtonwood Rd South - Ahead and Right	61.5%	10	64.7%	11
2/1	Burtonwood Rd North - Ahead and Left	70.6%	12	44.1%	6
2/2	Burtonwood Rd North – Ahead Only (Option 1)	N/A	N/A	43.2%	6
3/1	Kingswood Road - Left and Right	53.7%	3	54.8%	3
<b>Junction 3</b>	<b>Burtonwood Road/Westbrook Way</b>	-	-	-	-
1/1	Burtonwood Rd North - Ahead and Left	20.4%	0	26.2%	0
1/2	Burtonwood Rd North - Ahead Only	38.0%	0	46.0%	0
11/1+11/2	Westbrook Way – Ahead and Left	47.1%	0	49.1%	0
8/1+8/2	Burtonwood Rd South – Ahead and Left	13.6%	0	14.8%	0
5/1	Whittle Avenue – Ahead and Left	67.4%	11	70.0%	12
5/2	Whittle Avenue – Ahead Only	47.8%	5	50.1%	5
15/1	Omega Access - Ahead and Left	23.5%	0	27.3%	0
15/2	Omega Access - Ahead Only	12.0%	0	13.9%	0

## PM PEAK

### 6.3.4

Table 6.7 indicates that in the 2017 PM peak hour, the southbound queue length at Kingswood Road is predicted to reduce from 38 to 10 PCUs when the Option 1 layout is included. The associated degree of saturation per lane is predicted to reduce from 97% to 51%. A queue of 38 PCUs would almost reach back to the southbound merge section south of Charon Way and may impact on the operation of that junction. By implementing both the Option 1 improvements and the S278 improvements, all lanes within the study area are predicted to operate within capacity, with no queuing issues.

Table 6.7 – Comparison of Future Network with S278 Works LinSig Results for 2017 PM Peak Hour

FUTURE NETWORK 2017 PM PEAK		JUNC 8+S278 ONLY		JUNC 8+OPT 1+S278	
Link(s)	Description	Degree of Saturation	Mean Max Queue (PCU)	Degree of Saturation	Mean Max Queue (PCU)
<b>Junction 4</b>	<b>Charon Way/Burtonwood Road</b>	-	-	-	-
6/1	Burtonwood Rd South - Southbound Merge	53.6%	16	N/A	N/A
5/1	Burtonwood Rd South - Southbound Nearside	27.2%	0	26.5%	0
5/2	Burtonwood Rd South - Southbound Offside	25.6%	0	28.6%	0
<b>Junction 2</b>	<b>Kingswood Road/Burtonwood Road</b>	-	-	-	-
1/1+1/2	Burtonwood Rd South - Ahead and Right	37.5%	5	37.2%	5
2/1	Burtonwood Rd North - Ahead and Left	97.0%	38	50.8%	10
2/2	Burtonwood Rd North – Ahead Only (Option 1)	N/A	N/A	50.6%	10
3/1	Kingswood Road - Left and Right	63.1%	4	62.2%	4
<b>Junction 3</b>	<b>Burtonwood Road/Westbrook Way</b>	-	-	-	-
1/1	Burtonwood Rd North - Ahead and Left	40.8%	0	50.2%	0
1/2	Burtonwood Rd North - Ahead Only	45.1%	0	39.8%	0
11/1+11/2	Westbrook Way – Ahead and Left	32.6%	0	35.4%	0
8/1+8/2	Burtonwood Rd South – Ahead and Left	7.0%	0	7.1%	0
5/1	Whittle Avenue – Ahead and Left	37.1%	3	37.5%	3
5/2	Whittle Avenue – Ahead Only	37.1%	3	37.5%	3
15/1	Omega Access - Ahead and Left	1.0%	0	1.0%	0
15/2	Omega Access - Ahead Only	0.2%	0	0.2%	0



6.3.5 Table 6.8 indicates that in the 2027 PM peak hour, the southbound queue length at Kingswood Road is predicted to reduce from 177 to 16 PCUs when the Option 1 layout is included. The associated degree of saturation per lane is predicted to reduce from 124% to 71%. A queue of 177 PCUs would extend into the Junction 8 roundabout, but 16 PCUs would extend less than 100 metres north of Kingswood Road.

6.3.6 The mean maximum queue on the approach to the Westbrook Way roundabout has been reduced to one PCU per lane. The negligible increase in queue with Option 1 included is due to the increased number vehicles reaching the roundabout due to the capacity improvements at the Kingswood Road junction.

**Table 6.8 – Comparison of Future Network with S278 Works LinSig Results for 2027 PM Peak Hour**

FUTURE NETWORK 2027 PM PEAK		JUNC 8+S278 ONLY		JUNC 8+OPT 1+S278	
Link(s)	Description	Degree of Saturation	Mean Max Queue (PCU)	Degree of Saturation	Mean Max Queue (PCU)
<b>Junction 4 Charon Way/Burtonwood Road</b>					
6/1	Burtonwood Rd South - Southbound Merge	68.4%	21	N/A	N/A
5/1	Burtonwood Rd South - Southbound Nearside	32.8%	0	38.6%	0
5/2	Burtonwood Rd South - Southbound Offside	34.4%	0	38.0%	0
<b>Junction 2 Kingswood Road/Burtonwood Road</b>					
1/1+1/2	Burtonwood Rd South - Ahead and Right	40.9%	6	43.1%	6
2/1	Burtonwood Rd North - Ahead and Left	123.6%	177	70.6%	16
2/2	Burtonwood Rd North – Ahead Only (Option 1)	N/A	N/A	70.3%	16
3/1	Kingswood Road - Left and Right	60.9%	4	64.1%	4
<b>Junction 3 Burtonwood Road/Westbrook Way</b>					
1/1	Burtonwood Rd North - Ahead and Left	45.8%	0	67.3%	1
1/2	Burtonwood Rd North - Ahead Only	49.9%	1	66.3%	1
11/1+11/2	Westbrook Way – Ahead and Left	29.4%	0	38.5%	0
8/1+8/2	Burtonwood Rd South – Ahead and Left	7.1%	0	8.9%	0
5/1	Whittle Avenue – Ahead and Left	44.9%	5	46.9%	5
5/2	Whittle Avenue – Ahead Only	43.5%	4	46.4%	5
15/1	Omega Access - Ahead and Left	19.0%	0	23.9%	0
15/2	Omega Access - Ahead Only	8.8%	0	7.3%	0

## 6.4 QUEUE LENGTH PLANS

6.4.1 The plans presented in Appendix K illustrate the extent of the forecast Mean Maximum Queues (MMQ) in the 2027 peak hours, with and without the Kingswood Road Option 1 Scheme and the S278 scheme. The MMQ values in the LinSig results were multiplied by 5.75 (metres) to calculate the extent of these queues. These lengths were plotted on the network plans upstream from the stop/give-way lines to indicate the lengths of lane that they would occupy.

6.4.2 The queues plotted are for the following junctions only:

- Charon Way/Burtonwood Road (Proposed)
- Kingswood Road/Burtonwood Road
- Westbrook Way Roundabout (Burtonwood Road Northern Approach)

6.4.3 Drawings 7201-QUE-001, 003, 005 and 007 illustrate that in the AM peak hour all forecast MMQs are short enough to not affect the junction upstream. In the PM peak hour on drawing 7201-QUE-002, the Kingswood Road junction northern approach MMQ is predicted to extend back through the Charon Way junction and onto the M62 Westbound offslip road. The MMQ from the Westbrook Way roundabout is predicted to extend back through the Kingswood Road and Charon Way junctions and also onto the M62 Westbound offslip road.

- 6.4.4 When the Kingswood Road junction scheme is included, in drawing 7201-QUE-004, the PM peak hour southbound MMQs at that junction are predicted to only extend a fifth of the distance to the Charon Way junction. As a result of doubling the capacity at this stopline, the MMQ on the approach to Westbrook Way roundabout increases to extend onto the M62 Westbound mainline carriageway, due to the increase in traffic reaching the roundabout.
- 6.4.5 When the S278 works are included with the Junction 8 scheme in 7201-QUE-006, the roundabout queues are removed but the southbound queue at the Kingswood Road junction remains an issue. It is only when both the S278 works and the Kingswood Road improvements are included in 7201-QUE-008, that the 2027 PM peak hour is predicted to operate without any queueing issues.

# 7 CONCLUSIONS

- 7.1.1 The existing highway network on Burtonwood Road has been assessed and there are capacity issues in the PM peak at the Kingswood Road junction. Two options have been designed to increase the future southbound capacity by extending the two lane section from Charon Way through the Kingswood Road junction. These options have been assessed for the benefits and constraints of various factors.
- 7.1.2 The options have also been assessed in LinSig and operational benefits are clearly gained by including one of these options in the M62 Junction 8 scheme. However, these benefits are only predicted to be realised in the PM peak hour if capacity issues are also resolved at the Westbrook Way roundabout to the south, where excessive queues are predicted.
- 7.1.3 The proposed Section 278 Works for the Westbrook Way roundabout has also been assessed in the LinSig models to view the corridor improvements as a whole. This indicated that the queues at the roundabout can be reduced sufficiently to accommodate the demand and that the cumulative corridor capacity improvements have a positive impact on highway capacity and complement the M62 Junction 8 scheme to the north.
- 7.1.4 There is no difference in capacity terms between Option 1 and Option 2. If Option 1 is the preferred geometric scheme layout, then WSP | Parsons Brinckerhoff's Acoustic team can provide an assessment of the repositioned acoustic fence requirements.
- 7.1.5 A Stage 1 Road Safety Audit of the proposed options designs should also be commissioned if they are to be progressed further. This can be provided by an independent team within WSP | Parsons Brinckerhoff, if required.

**NOTE : Appendices Available on Request**

REPORT N° 70027201-BCR1

# KINGSWOOD ROAD- BURTONWOOD ROAD TRAFFIC SIGNALS

BCR ASSESSMENT REPORT



JUNE 2017

**KINGSWOOD ROAD-  
BURTONWOOD ROAD  
TRAFFIC SIGNALS  
BCR ASSESSMENT REPORT**

**Warrington Borough Council**

**Report (First Issue)**

Project no:70027201

Date: June 2017

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# 1 INTRODUCTION

## 1.1 PROJECT BACKGROUND

- 1.1.1 WSP has been commissioned by Warrington Borough Council (WBC) to undertake a feasibility study of improving the capacity of the junction of Kingswood Road and Burtonwood Road, Warrington. A report referenced '70027201-JAR1 Revision 2' of March 2017 presented the findings of the study to date. This report indicated that the corridor would benefit from reduced queuing by introducing an additional southbound lane on the northern approach to the Kingswood Road junction. This benefit would be increased if capacity improvements were also made at the Westbrook Way roundabout to the south.
- 1.1.2 Balfour Beatty (BB), as Contractor for the neighbouring M62 Junction 8 scheme, was commissioned by the SCAPE Civil Engineering contract to produce a cost estimate for the proposed junction improvement works. BB produced an initial estimate and then a revised estimate, following feedback from WBC.
- 1.1.3 This estimate was based upon the Option 2 drawing from the feasibility report, which widened the highway westwards to accommodate the additional southbound lane. It should be noted that in capacity terms the Option 2 layout is the same as the Option 1 layout that was referred to in the junction modelling. Therefore, the modelling results can be applied to both options.

## 1.2 PURPOSE OF THIS REPORT

- 1.2.1 WBC has now commissioned WSP to calculate the Benefit Cost Ratio (BCR) for the proposed scheme based upon the BB revised estimate. This is to assist with their appraisal of the scheme to validate the economic benefits, before proceeding further. This report presents the method and result of the BCR calculations.

# 2 INFORMATION PROVIDED

## 2.1 COST ESTIMATE

- 2.1.1 WBC provided WSP with the BB cost estimates for the proposed junction improvement works based upon the Option 2 layout. These are presented in Appendix A along with the Option 2 reference drawing that they are based upon.
- 2.1.2 WSP were instructed to use the Revised Budget highlighted in green to calculate the BCR value. This provides a total scheme reference cost of £2,990,459.01, which includes an element for risk.

## 2.2 BENEFITS

- 2.2.1 The benefits of the proposed scheme were derived from the predicted delay savings between the LinSig results for the models with and without the proposed Option 1 layout.
- 2.2.2 It was decided that a BCR value would be calculated from the delay savings for both the whole modelled network and the Kingswood Road junction in isolation, to enable a comparison between the relative impacts.

# 3 METHODOLOGY

## 3.1 GUIDANCE

3.1.1 The BCR process was undertaken based upon the Department for Transport (DfT) Transport Analysis Guidance known as WebTAG. The values used were from the WebTAG Databook Version 1.7 published in March 2017. The guidance used was from:

- TAG UNIT A1.1 Cost Benefit Analysis (November 2014)
- TAG UNIT A1.2 Scheme Costs (November 2014)
- TAG UNIT A1.3 User and Provider Impacts (March 2017)

These documents were all the latest versions at the time of the assessment.

3.1.2 For all calculations, prices were to be discounted to the current DfT Base Year of 2010.

## 3.2 LINSIG DELAY RESULTS

3.2.1 The LinSig software results provide various network, junction and link performance indicators to assess the scenarios tested. It was determined that the Total Delay in PCU Hours (pcuHr) would be the most appropriate indicator to compare the network results both with and without the proposed junction improvements. This would allow the difference in total delay to be converted to a monetary value to represent the benefit of the reduced delay due to the improvements.

3.2.2 For reference, the LinSig Version 3.2 User Guide definition of Total Delay in pcuHr is:

*The sum of Uniform, Uniform Storage and Random & Oversaturation Delay. This is the total aggregate delay suffered by traffic using the modelled Network.*

3.2.3 Copies of the LinSig results that were used to derive the delay savings are presented in Appendix B for reference. These were also presented in Appendix I of the junction assessment report. The total delay values and the difference between the scenarios are presented in Table 3.1 for the whole LinSig network and Table 3.2 for the Kingswood Road junction only.

**Table 3.1 – LinSig Total Delay Results for Whole Network**

DELAY (PCUHR)	AM PEAK HOUR			PM PEAK HOUR			
	Year	J8 only	J8+Opt 1	Difference	J8 only	J8+Opt 1	Difference
	2017	94.84	95.87	-1.03	244.25	235.82	8.43
	2027	308.88	294.97	13.91	522.72	499.31	23.41

**Table 3.2 – LinSig Total Delay Results for Kingswood Road Junction Only**

DELAY (PCUHR)	AM PEAK HOUR			PM PEAK HOUR			
	Year	J8 only	J8+Opt 1	Difference	J8 only	J8+Opt 1	Difference
	2017	5.8	5.8	0	19.5	10.3	9.2
	2027	8.2	7.7	0.5	160.5	15.7	144.8

### 3.3 TRAFFIC SURVEY PROPORTIONS

- 3.3.1 The traffic turning count survey that was undertaken on Tuesday 8 November 2016 for the LinSig base model validation, was used to calculate the modal split of traffic on the network and the ratio of each peak hour flow to the associated 3-hour peak period flow. This survey included the traffic flows at the Kingswood Road junction and the Westbrook Way roundabout, but not the M62 Junction 8 flows.
- 3.3.2 The total flows entering the network and peak hour multipliers are presented in Table 3.3. The vehicle class proportions for the three significant classes are presented in Table 3.4.

**Table 3.3 – 2016 Traffic Survey Network Flows and Peak Hour to Peak Period Multipliers**

VEHICLE FLOWS	AM PEAK			PM PEAK			
	Year	08:00-09:00	07:00-10:00	Multiplier	17:00-18:00	16:00-19:00	Multiplier
	2016	2803	6979	2.49	2892	8013	2.77

**Table 3.4 – 2016 Traffic Survey Vehicle Class Proportions**

VEHICLE CLASS	VEHICLE FLOW 07:00-10:00	PROPORTION	VEHICLE FLOW 16:00-19:00	PROPORTION
Car	6065	87.29%	7465	93.44%
LGV	563	8.10%	432	5.41%
OGV	320	4.61%	92	1.15%
Total	6948	100%	7989	100%

- 3.3.3 The peak hour multipliers from Table 3.3 were applied to the delay differences in Table 3.1 and Table 3.2 to estimate the equivalent delay difference over the three hour peak periods. The estimated period delays were then split into the vehicle class proportions in Table 3.4 to calculate the delay per class per period as shown in Table 3.5 and Table 3.6.

**Table 3.5 – Delay Difference per Vehicle Class per Day for Whole Network**

DELAY PER DAY (PCUHR)	AM PEAK PERIOD 07:00-10:00				PM PEAK PERIOD 16:00-19:00				
	Year	Car	LGV	OGV	Total	Car	LGV	OGV	Total
	2017	-2.23	-0.21	-0.12	-2.56	21.82	1.26	0.27	23.35
	2027	30.24	2.81	1.60	34.65	60.60	3.51	0.75	64.86

**Table 3.6 – Delay Difference per Vehicle Class per Day for Kingswood Road Junction Only**

DELAY PER DAY (PCUHR)	AM PEAK PERIOD 07:00-10:00				PM PEAK PERIOD 16:00-19:00				
	Year	Car	LGV	OGV	Total	Car	LGV	OGV	Total
	2017	0	0	0	0.00	23.81	1.38	0.29	25.48
	2027	1.09	0.10	0.06	1.25	374.79	21.70	4.61	401.10

## 3.4 ANNUALISATION

3.4.1 As the Value of Time (VoT) for each vehicle class increases each year, a delay saving was required for each year to apply the relevant VoT to. The vehicle class delay difference per period was grown to an annual equivalent by multiplying it by 253 working days. This figure is calculated using the formula:

$$\text{Working days} = 365(\text{days/year}) - [52(\text{weeks/year}) \times 2(\text{days/weekend})] - 8(\text{bank holidays/year})$$

The resulting annual delay difference is presented in

Table 3.7 and Table 3.8. The subsequent calculations for the benefits are presented in the tables of Appendix C.

**Table 3.7 – Delay Difference per Vehicle Class per Year for Whole Network**

DELAY PER YEAR (PCUHR)	AM PEAK PERIODS 07:00-10:00				PM PEAK PERIODS 16:00-19:00			
	Year	Car	LGV	OGV	Total	Car	LGV	OGV
2017	-564.19	-53.13	-30.36	-647.68	5520.46	318.78	68.31	5907.55
2027	7650.72	710.93	404.8	8766.45	15331.80	888.03	189.75	16409.58

**Table 3.8 – Delay Difference per Vehicle Class per Year for Kingswood Road Junction Only**

DELAY PER YEAR (PCUHR)	AM PEAK PERIODS 07:00-10:00				PM PEAK PERIODS 16:00-19:00			
	Year	Car	LGV	OGV	Total	Car	LGV	OGV
2017	0	0	0	0.00	6023.93	349.14	73.37	6446.44
2027	275.77	25.3	15.18	316.25	94821.87	5490.10	1166.33	101478.30

3.4.2 The difference between the delay savings in the opening year of 2017 and the design year of 2027 were applied incrementally for the intermediate years for each vehicle class and peak period. This was calculated by multiplying the difference between two values by the proportion of years elapsed since 2017, for each of the respective years and adding the value to the 2017 value.

3.4.3 There was no delay saving applied to the years before 2017 dated back to the DfT base year of 2010, as the scheme would not have been implemented in those years. The delay savings in 2027 were repeated for all subsequent years to 2076, which would be the 60th year of the scheme.

## 3.5 DISCOUNTING

3.5.1 The VoT values per year for each vehicle class were extracted from Table A 1.3.6 of the WebTAG databook, for the years between 2010 and 2076. As the journey purpose split is unknown for the vehicles on the network, the Average values were used for each vehicle class for the respective peak period.

3.5.2 The VoT in £/hour was multiplied by the respective delay difference per vehicle class and year for all years between 2010 and 2076 to calculate the Undiscounted Benefits in £s. The benefits for the three vehicle classes were added together to calculate a total Undiscounted Benefit for each year per peak period.

- 3.5.3 Discount Rates were extracted from Table A 1.1.1 of the WebTAG databook. A 3.5% Discount Rate would apply to the 2010 value between 2011 and 2047, which is 30 years after the current year of 2017. For the remaining years between 2048 and 2076 a 3.0% Discount Rate was used. These rates were used to calculate a Discount Factor for each year starting from a 2010 Discount Factor of 1.0 and 2011 Discount Factor of 1.035.

## 3.6 PRESENT VALUE BENEFIT

- 3.6.1 To calculate the Present Value Benefit (PVB) for each year, the Undiscounted Benefit was divided by the respective Discount Factor. The PVB for all years was then added together to calculate the total PVB for each peak period. The total PVB figures were then added together to create a Combined PVB, which could be used to calculate the BCR.
- 3.6.2 A Combined PVB was calculated for both the Kingswood Road junction alone and the whole modelled network to provide an alternative BCR to evaluate the proposed scheme.

## 3.7 PRESENT VALUE COST

- 3.7.1 The Reference Cost of **£2,990,459.01** needed to be adjusted before it could be used as a Present Value Cost (PVC) in the BCR calculation.

### OPTIMISM BIAS

- 3.7.2 Firstly, an Optimism Bias of 44% was added to the reference cost. This percentage was taken from Table 8 of 'TAG UNIT A1.2 Scheme Costs', where this Local Authority Road Scheme is classed as Stage 1 (Programme Entry) in Table 7. This increased the cost to **£4,306,260.97**.

### DEFLATION FACTOR

- 3.7.3 To adjust the 2017 cost estimate to the DfT Base Year of 2010, a Deflation Factor was required remove the impact of inflation over time. The GDP deflator values in the Annual Parameters table of the WebTAG databook were used by dividing the 2010 value (100.00) by the 2017 value (110.90), creating a deflation factor of 0.9017. By applying this factor to the bias-adjusted cost, this resulted in a Deflated Cost of **£3,882,955.52**.

### DISCOUNT FACTOR

- 3.7.4 To adjust the Deflated Cost to 2010 values, the Discount Factor that was used for PVB calculations for 2017 was applied. By using the formula  $1 / 1.272$ , a Discount Factor of 0.7862 was calculated. When multiplied by the Deflated Cost, this resulted in a Discounted Cost of **£3,052,779.63**.

### TAXATION FACTOR

- 3.7.5 Finally, to adjust for market prices, an Indirect Tax Correction Factor was applied to the Discounted Cost. This factor of 1.19 (19%) was taken from Sheet A 1.3.1 of the WebTAG databook. The result was a Market Price Cost of **£3,632,807.76**.
- 3.7.6 As the proposed scheme is budgeted to be constructed within one calendar year and additional highway maintenance costs are not being considered in this assessment, the Market Price Cost can be used as the PVC.

# 4 BCR VALUES

## 4.1 STANDARD RESULTS

4.1.1 The PVB for both the Network results and Junction results were divided by the PVC, to calculate the BCRs. The values are presented in Table 4.1.

**Table 4.1 – PVB, PVC and BCR Values for Network**

DELAY SOURCE	PVB	PVC	BCR
Whole Network	£9,005,530.03	<b>£3,632,807.76</b>	2.48
Kingswood Road Junction	£35,045,589.16	<b>£3,632,807.76</b>	9.65

4.1.2 The calculated BCR values are 2.48 for the modelled network and 9.65 for the Kingswood Road junction. Both values are greater than 1.0 suggesting that the benefits of the proposed scheme would outweigh the costs. The lowest BCR suggests the benefits are almost 2.5 times the cost. A BCR over 2.0 represents high value for money.

4.1.3 The BCR is much greater for the junction, as this is the part of the network where the capacity improvements would be made and the benefits felt the most. Some of benefit is cancelled out by a disbenefit to the Westbrook Way roundabout in the PM peak, as more southbound traffic is able to reach the roundabout within the peak hour as outlined in the junction assessment report.

## 4.2 SENSITIVITY TEST

4.2.1 It was acknowledged within the methodology that the traffic survey flows used to calculate the peak hour to peak period conversion factor do not include the M62 Junction 8 flows. The conversion factor for that junction may be lower due to a more pronounced peak hour flow.

4.2.2 It was decided that as a sensitivity test, a default 2.0 multiplier should be applied to the difference in delay between the with and without scheme results, to avoid over-emphasising the benefits. The rest of the method used to calculate the PVB was identical to the method used for the values in Table 4.1. The figures used to calculate these PVB values are presented in Appendix D.

4.2.3 The resulting PVB and BCR values are presented in Table 4.2. The reduction in the PVB values results in lower BCR values, although both still suggest that the benefits outweigh the costs.

**Table 4.2 – PVB, PVC and BCR Values for Network and Junction Using 2.0 Peak Hour Multiplier**

DELAY SOURCE	PVB	PVC	BCR
Whole Network	£6,751,808.14	<b>£3,632,807.76</b>	1.86
Kingswood Road Junction	£25,312,479.16	<b>£3,632,807.76</b>	6.97

4.2.4 The calculated BCR value for the sensitivity test of the modelled network is 1.86 and 6.97 for the Kingswood Road junction. Both values are greater than 1.0 suggesting that benefits of the proposed scheme would outweigh the costs.



# 5 SUMMARY

## 5.1 CONCLUSIONS

- 5.1.1 A cost benefit analysis has been undertaken for the proposed Kingswood Road junction improvement scheme near the M62 Junction 8. This has been based upon a cost estimate provided by Balfour Beatty and weekday peak period delay savings predicted from LinSig modelling of the network.
- 5.1.2 PVB and BCR values have been calculated for both the modelled network and the Kingswood Road junction to compare the extent of the benefits on the network. WebTAG guidance and values were used to make the appropriate adjustments to both benefit and costs to ensure they were in the 'Present Value' of the Base Year 2010.
- 5.1.3 A sensitivity test was also undertaken to provide an alternative BCR where the peak hour delay benefits were less growthed to peak periods.
- 5.1.4 All of the BCR values calculated suggest that the delay saving benefits of the scheme outweigh the financial costs, with the highest ratio predicted for the Kingswood Road junction itself. Most of the BCR values are over 2.0, which represent high value for money.
- 5.1.5 It should be noted that only the benefits of the weekday peak periods have been calculated in this BCR assessment. Additional benefits would be gained in the inter-peak and weekend periods, due to the large retail area to the north-east that generates high volumes of traffic through the local network.

## 5.2 FURTHER ASSESSMENT

- 5.2.1 As discussed in the junction assessment report, the operational benefits of the scheme would only be fully realised if improvements are also made to the Westbrook Way roundabout to the south. It is recommended that BCR values are also calculated from the LinSig results for these improvements to provide a robust cost benefit analysis.

# Appendix A

**COST ESTIMATES AND REFERENCE DRAWING**

## Burtonwood Southbound Dualling



### Section 1

		REVISED BUDGET 24.04.2017	ORIGINAL FEASIBILITY BUDGET	
Preliminaries		£263,209.50	£431,187.88	-£167,978.38
Bill of Quantities - Section 1		£1,332,729.18	£1,504,124.34	-£171,395.16
Inflation		£19,371.44	£32,999.82	-£13,628.38
		<u>£1,615,310.12</u>	<u>£1,968,312.04</u>	<u>-£353,001.92</u>
Working Area Overhead @ 9.00%		£145,377.91	£177,148.08	-£31,770.17
		<u>£1,760,688.03</u>	<u>£2,145,460.12</u>	<u>-£384,772.09</u>
Stage 3 Pre-Construction Works		£10,000.00	£40,191.16	-£30,191.16
		<u>£1,770,688.03</u>	<u>£2,185,651.28</u>	<u>-£414,963.25</u>
Fee @ 2.50%		£44,267.20	£54,641.28	-£10,374.08
Design	Stage 3	£0.00	£502,737.38	-£502,737.38
	Stage 4	£0.00		
		<u>£1,814,955.23</u>	<u>£2,743,029.95</u>	<u>-£928,074.71</u>
Scape Fee @ 0.50%		£9,074.78	£13,715.15	-£4,640.37
<b>TOTAL BB COSTS</b>		<b>£1,824,030.01</b>	<b>£2,756,745.10</b>	<b>-£932,715.09</b>
WBC Design, Supervision, PM fees		£150,000.00	£0.00	£150,000.00
TTRO's, TRO's etc		£12,500.00	£0.00	£12,500.00
Client Risk	22.90%	£492,950.00	£676,550.00	-£183,600.00
Statutory Undertak		£510,979.00	£879,244.35	-£368,265.35
<b>Total</b>		<b>£2,990,459.01</b>	<b>£4,312,539.45</b>	<b>-£1,322,080.44</b>

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 ARCHITECT: N/A

PROJECT: KINGSWOOD ROAD - BURTONWOOD ROAD JUNCTION IMPROVEMENTS  
 TITLE: PROPOSED LAYOUT OPTION 2 - WESTWARDS

SCALE @ A1: 1:1000	CHECKER: BPH	APPROVER: BPH
DWG FILE: 7201-SK-001-003.DWG	DESIGN DRAWN: GJH	DATE: February 17
PROJECT No: 70027201	DRAWING No: 7201-SK-002	REV: 0

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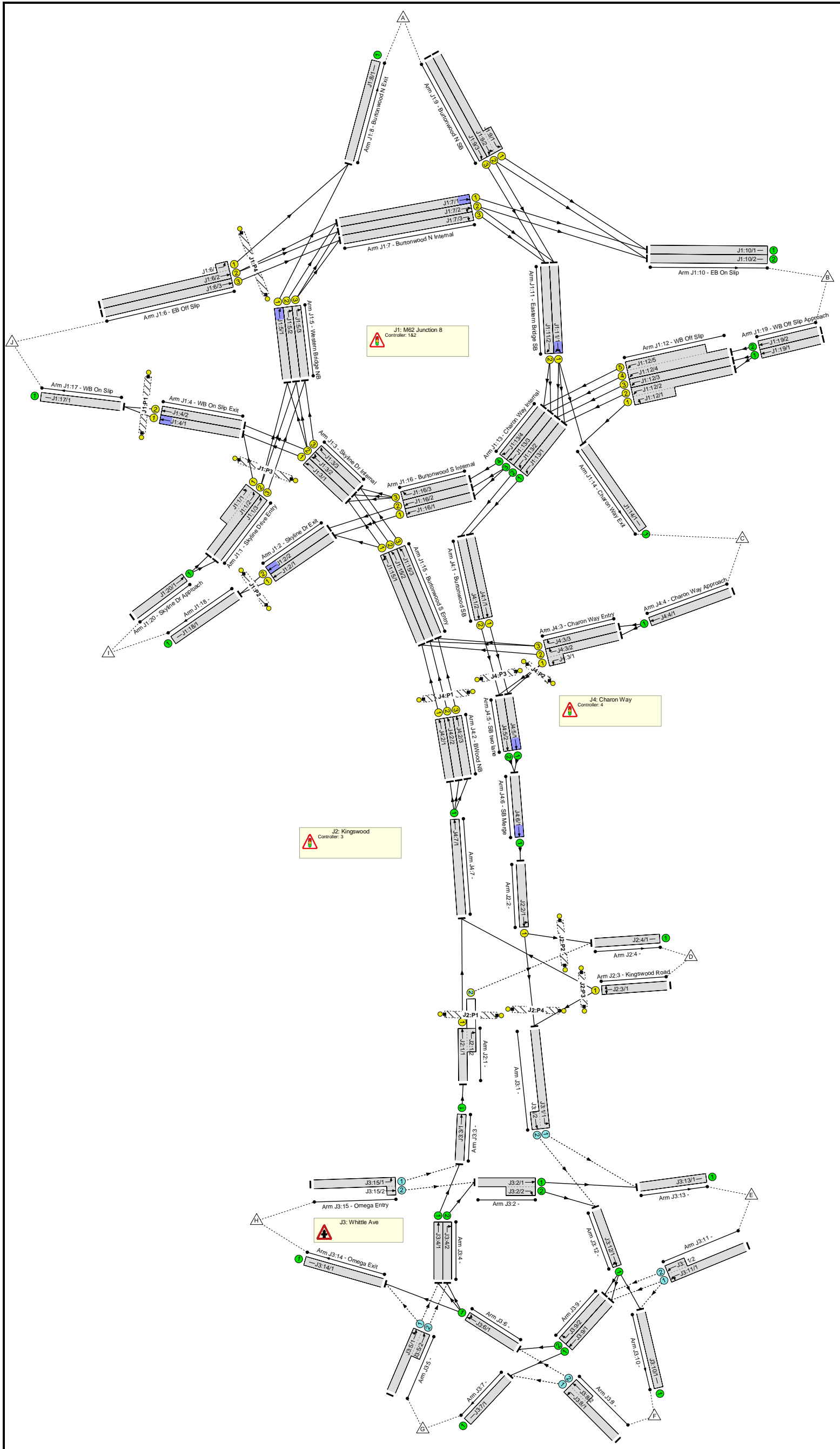
# Appendix B

**LINSIG RESULTS**

Basic Results Summary  
**Basic Results Summary**

**User and Project Details**

<b>Project:</b>	<b>Kingswood Road</b>
<b>Title:</b>	<b>Base Model</b>
<b>Location:</b>	
<b>File name:</b>	Burtonwood Rd Network with J8 Scheme.lsg3x
<b>Author:</b>	RY/GH
<b>Company:</b>	
<b>Address:</b>	
<b>Notes:</b>	



Basic Results Summary

Scenario 3: '2017 AM' (FG3: '2017 AM Forecast', Plan 1: 'Existing')

Item	Lane Description	Lane Type	Controller Stream	Deg Sat (%)	Mean Max Queue (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)
<b>Network: Base Model</b>	-	-	<b>N/A</b>	<b>79.4%</b>	-	<b>94.8</b>	-	-		-	-	-	-	-	-
<b>J1: M62 Junction 8</b>	-	-	<b>N/A</b>	<b>79.4%</b>	-	<b>78.8</b>	-	-		-	-	-	-	-	-
1/2+1/1	Skyline Drive Entry Left Ahead	U	1:1	38.9 : 38.9%	6.9	3.3	41.4	C1:F C1:G		1	46:37	-	289	2131:1952	568+175
1/3	Skyline Drive Entry Ahead	U	1:1	6.0%	1.1	0.4	36.3	C1:F		1	46	-	39	1986	648
2/1	Skyline Dr Exit Ahead	U	1:2	15.0%	0.1	0.1	1.2	C1:K		1	131	-	276	2011	1843
2/2	Skyline Dr Exit Ahead	U	1:2	24.8%	0.2	0.2	1.3	C1:K		1	131	-	439	1934	1773
3/1	Skyline Dr Internal Ahead	U	1:1	34.2%	0.9	0.5	4.2	C1:E		1	88	-	421	1990	1230
3/2	Skyline Dr Internal Ahead Ahead2	U	1:1	55.0%	11.4	3.9	20.0	C1:E		1	88	-	708	2081	1286
3/3	Skyline Dr Internal Ahead	U	1:1	27.3%	0.7	0.3	3.5	C1:E		1	88	-	330	1953	1207
4/1	WB On Slip Exit Ahead	U	1:1	27.0%	0.2	0.2	1.4	C1:I		1	131	-	489	1976	1811
4/2	WB On Slip Exit Ahead	U	1:1	4.0%	0.0	0.0	1.0	C1:I		1	131	-	74	2021	1853
5/1	Western Bridge NB Ahead	U	2:2	78.6%	24.5	5.7	34.4	C2:A		1	56	-	600	1929	764
5/2	Western Bridge NB Right	U	2:2	31.1%	7.5	3.3	47.0	C2:A		1	56	-	255	2071	820
5/3	Western Bridge NB Right	U	2:2	47.9%	3.2	1.6	16.0	C2:A		1	56	-	369	1946	770
6/2+6/1	EB Off Slip Ahead Left	U	2:2	77.3 : 77.3%	28.0	7.8	32.1	C2:B		1	77	-	871	2094:1865	836+291
6/3	EB Off Slip Ahead	U	2:2	10.8%	2.3	0.6	18.0	C2:B		1	77	-	113	1932	1047
7/1	Burtonwood N Internal Ahead	U	2:1	33.5%	11.6	1.5	13.0	C2:C		1	92	-	419	1934	1249
7/2	Burtonwood N Internal Ahead Right	U	2:1	63.5%	20.3	4.0	16.9	C2:C		1	92	-	851	2075	1340
7/3	Burtonwood N Internal Right	U	2:1	9.0%	1.2	0.3	10.3	C2:C		1	92	-	113	1934	1249
9/2+9/1	Burtonwood N SB Left Ahead	U	2:1	72.8 : 72.8%	16.6	6.9	55.0	C2:D		1	42	-	450	2002:1941	531+87
9/3	Burtonwood N SB Ahead	U	2:1	29.9%	5.3	2.0	43.4	C2:D		1	42	-	168	1884	563
11/1	Eastern Bridge SB Ahead Ahead2	U	1:3	79.4%	29.3	6.3	26.1	C1:A		1	79	-	870	1972	1096
11/2	Eastern Bridge SB Ahead	U	1:3	25.8%	3.7	0.9	11.5	C1:A		1	79	-	281	1958	1088
12/2+12/1	WB Off Slip Ahead Left	U	1:3	52.2 : 52.2%	10.0	3.8	38.5	C1:B		1	54	-	356	1795:1683	103+579
12/3	WB Off Slip Ahead	U	1:3	21.7%	4.2	1.4	33.3	C1:B		1	54	-	149	1801	688
12/4+12/5	WB Off Slip Ahead	U	1:3	79.1 : 79.1%	19.8	9.7	45.2	C1:B		1	54	-	773	1810:1671	658+320
13/1	Charon Way Internal Left	U	N/A	5.6%	0.0	0.0	1.0	-		-	-	-	113	2005	2005
13/2	Charon Way Internal Left	U	N/A	15.2%	0.1	0.1	1.0	-		-	-	-	327	2148	2148
13/3	Charon Way Internal Ahead	U	N/A	32.1%	0.2	0.2	1.2	-		-	-	-	695	2167	2167
13/4	Charon Way Internal Ahead	U	N/A	18.9%	0.1	0.1	1.2	-		-	-	-	359	1904	1904
15/1	Burtonwood S Entry Left Ahead	U	1:1	47.7%	11.7	3.8	36.7	C1:D		1	56	-	377	1998	791
15/2	Burtonwood S Entry Ahead	U	1:1	52.2%	13.4	4.5	37.7	C1:D		1	56	-	425	2058	815
15/3	Burtonwood S Entry Ahead	U	1:1	41.7%	9.5	3.1	35.5	C1:D		1	56	-	318	1928	763
16/1	Burtonwood S Internal Ahead	U	1:1	23.6%	1.4	0.4	5.6	C1:C		1	78	-	256	1980	1086
16/2	Burtonwood S Internal Ahead	U	1:1	37.7%	1.7	0.5	4.3	C1:C		1	78	-	439	2120	1163
16/3	Burtonwood S Internal Right	U	1:1	33.4%	5.7	0.6	6.5	C1:C		1	78	-	359	1962	1076
19/1	WB Off Slip Approach Ahead	U	N/A	24.6%	0.2	0.2	1.2	-		-	-	-	505	2055	2055



Basic Results Summary

Item	Lane Description	Lane Type	Controller Stream	Deg Sat (%)	Mean Max Queue (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)
19/2	WB Off Slip Approach Ahead	U	N/A	37.6%	0.3	0.3	1.4	-		-	-	-	773	2055	2055
20/1	Skyline Dr Approach Ahead	U	N/A	15.5%	0.1	0.1	1.0	-		-	-	-	328	2112	2112
Ped Link: P1	M62 WB OS Peds	-	1:1	0.0%	-	-	-	C1:J		1	6	-	0	-	0
Ped Link: P2	Skyline Drive Exit Peds	-	1:2	0.0%	-	-	-	C1:L		1	6	-	0	-	0
Ped Link: P3	Skyline Drive Entry Peds	-	1:1	0.0%	-	-	-	C1:H		1	82	-	0	-	0
Ped Link: P4	M62 EB OS Peds	-	2:2	0.0%	-	-	-	C2:E		1	57	-	0	-	0
<b>J2: Kingswood</b>	-	-	<b>N/A</b>	<b>56.2%</b>	-	<b>5.8</b>	-	-		-	-	-	-	-	-
1/1+1/2	Right Ahead	U+O	N/A	56.2 : 56.2%	8.5	1.9	9.1	C3:A	C3:C	1	53	8	758	1927:1796	1311+37
2/1	Ahead Left	U	N/A	47.2%	6.8	2.1	17.5	C3:B		1	36	-	442	1976	937
3/1	Kingswood Road Left Right	U	N/A	56.2%	3.3	1.8	49.5	C3:D		1	9	-	130	1805	231
Ped Link: P1	Unnamed Ped Link	-	N/A	0.0%	-	-	-	C3:E		1	10	-	0	-	0
Ped Link: P2	Unnamed Ped Link	-	N/A	0.0%	-	-	-	C3:H		1	5	-	0	-	0
Ped Link: P3	Unnamed Ped Link	-	N/A	0.0%	-	-	-	C3:G		1	55	-	0	-	0
Ped Link: P4	Unnamed Ped Link	-	N/A	0.0%	-	-	-	C3:F		1	6	-	0	-	0
<b>J3: Whittle Ave</b>	-	-	<b>N/A</b>	<b>62.7%</b>	-	<b>2.8</b>	-	-		-	-	-	-	-	-
1/1+1/2	Ahead Left	O	N/A	51.5 : 51.5%	8.1	1.0	7.7	-		-	-	-	482	1986:1948	206+730
2/1+2/2	Right Ahead	U	N/A	28.6 : 28.6%	0.2	0.2	1.3	-		-	-	-	559	1957:1921	1900+56
5/1+5/2	Ahead Left	O	N/A	59.7 : 62.7%	0.8	0.8	2.6	-		-	-	-	1071	1982:1900	956+798
8/1+8/2	Ahead Left	O	N/A	11.8 : 11.8%	0.1	0.1	1.6	-		-	-	-	147	2051:1956	583+659
11/1+11/2	Ahead Left	O	N/A	58.9 : 58.9%	0.7	0.7	4.1	-		-	-	-	628	2032:1939	792+273
15/1+15/2	Omega Entry Ahead Left	O	N/A	1.0 : 1.0%	0.0	0.0	2.3	-		-	-	-	8	1877:1878	392+392
<b>J4: Charon Way</b>	-	-	<b>N/A</b>	<b>52.2%</b>	-	<b>7.4</b>	-	-		-	-	-	-	-	-
1/1	Burtonwood SB Ahead	U	N/A	9.5%	0.8	0.2	6.8	C4:A		1	35	-	113	1982	1189
1/2	Burtonwood SB Ahead	U	N/A	27.5%	2.7	0.7	7.8	C4:A		1	35	-	327	1979	1187
2/1	BWood NB Ahead	U	N/A	25.2%	2.5	0.8	12.3	C4:B		1	27	-	233	1980	924
2/2	BWood NB Ahead	U	N/A	31.7%	3.5	1.1	12.7	C4:B		1	27	-	314	2120	989
2/3	BWood NB Ahead	U	N/A	29.6%	3.0	1.0	12.7	C4:B		1	27	-	272	1971	920
3/2+3/1	Charon Way Entry Right Left	U	N/A	47.0 : 47.0%	2.6	1.4	33.5	C4:C		1	9	-	146	1838:1995	306+4
3/3	Charon Way Entry Right	U	N/A	52.2%	2.9	1.5	35.3	C4:C		1	9	-	157	1805	301
4/1	Charon Way Approach Ahead	U	N/A	15.1%	0.1	0.1	1.1	-		-	-	-	303	2010	2010
5/1	SB two lane Ahead	U	N/A	5.7%	0.0	0.0	1.0	-		-	-	-	113	1981	1981
5/2	SB two lane Ahead	U	N/A	15.7%	0.1	0.1	1.0	-		-	-	-	329	2100	2100
6/1	SB Merge Ahead	U	N/A	22.1%	0.1	0.1	1.2	-		-	-	-	442	2004	2004
7/1	Ahead	U	N/A	40.0%	0.3	0.3	1.5	-		-	-	-	819	2049	2049
Ped Link: P1	Burtonwood Rd NB	-	N/A	0.0%	-	-	-	C4:D		1	16	-	0	-	0
Ped Link: P2	Charon Way LT	-	N/A	0.0%	-	-	-	C4:F		1	39	-	0	-	0
Ped Link: P3	Burtonwood Rd SB	-	N/A	0.0%	-	-	-	C4:E		1	9	-	0	-	0



Basic Results Summary

Scenario 4: '2017 PM' (FG4: '2017 PM Forecast', Plan 1: 'Existing')

Item	Lane Description	Lane Type	Controller Stream	Deg Sat (%)	Mean Max Queue (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)
<b>Network: Base Model</b>	-	-	<b>N/A</b>	<b>123.0%</b>	-	<b>244.3</b>	-	-		-	-	-	-	-	-
<b>J1: M62 Junction 8</b>	-	-	<b>N/A</b>	<b>89.3%</b>	-	<b>81.9</b>	-	-		-	-	-	-	-	-
1/2+1/1	Skyline Drive Entry Left Ahead	U	1:1	69.9 : 69.9%	15.4	6.8	54.6	C1:F C1:G		1	40:31	-	447	2131:1952	528+112
1/3	Skyline Drive Entry Ahead	U	1:1	30.6%	5.6	2.2	44.9	C1:F		1	40	-	173	1986	565
2/1	Skyline Dr Exit Ahead	U	1:2	6.6%	0.1	0.0	1.1	C1:K		1	131	-	121	2011	1843
2/2	Skyline Dr Exit Ahead	U	1:2	7.2%	0.2	0.0	1.1	C1:K		1	131	-	127	1934	1773
3/1	Skyline Dr Internal Ahead	U	1:1	41.5%	4.2	1.1	7.1	C1:E		1	94	-	545	1990	1313
3/2	Skyline Dr Internal Ahead Ahead2	U	1:1	55.8%	10.4	3.8	17.9	C1:E		1	94	-	765	2078	1371
3/3	Skyline Dr Internal Ahead	U	1:1	27.7%	0.6	0.3	3.2	C1:E		1	94	-	357	1953	1288
4/1	WB On Slip Exit Ahead	U	1:1	34.4%	0.3	0.3	1.5	C1:I		1	131	-	623	1976	1811
4/2	WB On Slip Exit Ahead	U	1:1	1.5%	0.0	0.0	1.0	C1:I		1	131	-	28	2021	1853
5/1	Western Bridge NB Ahead	U	2:2	62.7%	5.4	2.6	16.6	C2:A		1	65	-	554	1929	884
5/2	Western Bridge NB Right	U	2:2	58.2%	17.6	4.8	31.0	C2:A		1	65	-	552	2071	949
5/3	Western Bridge NB Right	U	2:2	59.4%	11.7	4.1	27.8	C2:A		1	65	-	530	1946	892
6/2+6/1	EB Off Slip Ahead Left	U	2:2	57.3 : 57.3%	16.5	4.9	30.5	C2:B		1	68	-	574	2094:1865	842+161
6/3	EB Off Slip Ahead	U	2:2	5.3%	1.1	0.3	22.1	C2:B		1	68	-	49	1932	926
7/1	Burtonwood N Internal Ahead	U	2:1	49.4%	8.3	0.8	4.9	C2:C		1	91	-	611	1934	1236
7/2	Burtonwood N Internal Ahead Right	U	2:1	71.9%	27.3	4.5	16.9	C2:C		1	91	-	953	2075	1326
7/3	Burtonwood N Internal Right	U	2:1	4.0%	0.7	0.2	11.1	C2:C		1	91	-	49	1934	1236
9/2+9/1	Burtonwood N SB Left Ahead	U	2:1	89.3 : 89.3%	24.1	11.3	69.0	C2:D		1	43	-	588	2002:1941	457+202
9/3	Burtonwood N SB Ahead	U	2:1	24.0%	4.3	1.6	41.6	C2:D		1	43	-	138	1884	576
11/1	Eastern Bridge SB Ahead Ahead2	U	1:3	82.9%	23.0	4.9	23.6	C1:A		1	65	-	746	1964	900
11/2	Eastern Bridge SB Ahead	U	1:3	20.8%	4.5	0.3	6.2	C1:A		1	65	-	187	1958	897
12/2+12/1	WB Off Slip Ahead Left	U	1:3	63.5 : 63.5%	12.1	5.1	29.2	C1:B		1	68	-	626	1795:1683	552+435
12/3	WB Off Slip Ahead	U	1:3	43.2%	10.1	2.9	28.3	C1:B		1	68	-	373	1801	863
12/4+12/5	WB Off Slip Ahead	U	1:3	32.7 : 32.7%	5.9	2.7	24.4	C1:B		1	68	-	400	1810:1671	505+720
13/1	Charon Way Internal Left	U	N/A	25.7%	0.2	0.2	1.2	-		-	-	-	515	2005	2005
13/2	Charon Way Internal Left	U	N/A	25.6%	0.2	0.2	1.1	-		-	-	-	550	2148	2148
13/3	Charon Way Internal Ahead	U	N/A	10.8%	0.1	0.1	0.9	-		-	-	-	233	2167	2167
13/4	Charon Way Internal Ahead	U	N/A	18.6%	0.1	0.1	1.2	-		-	-	-	354	1904	1904
15/1	Burtonwood S Entry Left Ahead	U	1:1	44.9%	11.9	3.2	25.3	C1:D		1	73	-	461	1999	1027
15/2	Burtonwood S Entry Ahead	U	1:1	49.3%	13.9	3.8	26.1	C1:D		1	73	-	521	2058	1058
15/3	Burtonwood S Entry Ahead	U	1:1	34.9%	8.4	2.3	23.5	C1:D		1	73	-	346	1928	991
16/1	Burtonwood S Internal Ahead	U	1:1	12.4%	3.2	1.1	38.5	C1:C		1	61	-	106	1980	853
16/2	Burtonwood S Internal Ahead	U	1:1	13.9%	3.8	1.3	38.0	C1:C		1	61	-	127	2120	913
16/3	Burtonwood S Internal Right	U	1:1	41.9%	12.5	3.6	36.2	C1:C		1	61	-	354	1962	845
19/1	WB Off Slip Approach Ahead	U	N/A	48.6%	0.5	0.5	1.7	-		-	-	-	999	2055	2055
19/2	WB Off Slip Approach Ahead	U	N/A	19.5%	0.1	0.1	1.1	-		-	-	-	400	2055	2055
20/1	Skyline Dr Approach Ahead	U	N/A	29.4%	0.2	0.2	1.2	-		-	-	-	620	2112	2112

Basic Results Summary

Item	Lane Description	Lane Type	Controller Stream	Deg Sat (%)	Mean Max Queue (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)
Ped Link: P1	M62 WB OS Peds	-	1:1	0.0%	-	-	-	C1:J		1	6	-	0	-	0
Ped Link: P2	Skyline Drive Exit Peds	-	1:2	0.0%	-	-	-	C1:L		1	6	-	0	-	0
Ped Link: P3	Skyline Drive Entry Peds	-	1:1	0.0%	-	-	-	C1:H		1	88	-	0	-	0
Ped Link: P4	M62 EB OS Peds	-	2:2	0.0%	-	-	-	C2:E		1	66	-	0	-	0
<b>J2: Kingswood</b>	-	-	<b>N/A</b>	<b>97.0%</b>	-	<b>19.5</b>	-	-		-	-	-	-	-	-
1/1+1/2	Right Ahead	U+O	N/A	37.5 : 37.5%	5.2	1.0	6.7	C3:A	C3:C	1	71	9	546	1927:1796	1424+32
2/1	Ahead Left	U	N/A	97.0%	37.6	16.1	54.0	C3:B		1	53	-	1075	1970	1108
3/1	Kingswood Road Left Right	U	N/A	65.7%	4.1	2.4	68.4	C3:D		1	9	-	124	1811	189
Ped Link: P1	Unnamed Ped Link	-	N/A	0.0%	-	-	-	C3:E		1	10	-	0	-	0
Ped Link: P2	Unnamed Ped Link	-	N/A	0.0%	-	-	-	C3:H		1	5	-	0	-	0
Ped Link: P3	Unnamed Ped Link	-	N/A	0.0%	-	-	-	C3:G		1	73	-	0	-	0
Ped Link: P4	Unnamed Ped Link	-	N/A	0.0%	-	-	-	C3:F		1	7	-	0	-	0
<b>J3: Whittle Ave</b>	-	-	<b>N/A</b>	<b>123.0%</b>	-	<b>121.7</b>	-	-		-	-	-	-	-	-
1/1+1/2	Ahead Left	O	N/A	123.0 : 123.0%	184.7	119.3	402.4	-		-	-	-	1067	1986:1948	138+729
2/1+2/2	Right Ahead	U	N/A	28.8 : 28.8%	0.2	0.2	1.3	-		-	-	-	563	1957:1921	1830+125
5/1+5/2	Ahead Left	O	N/A	65.6 : 65.6%	1.0	1.0	3.8	-		-	-	-	905	1982:1900	570+809
8/1+8/2	Ahead Left	O	N/A	6.5 : 6.5%	0.0	0.0	1.8	-		-	-	-	72	2051:1956	520+581
11/1+11/2	Ahead Left	O	N/A	70.4 : 70.4%	1.2	1.2	6.5	-		-	-	-	652	2032:1939	705+222
15/1+15/2	Omega Entry Ahead Left	O	N/A	1.1 : 1.2%	0.0	0.0	1.7	-		-	-	-	12	1877:1878	624+432
<b>J4: Charon Way</b>	-	-	<b>N/A</b>	<b>83.4%</b>	-	<b>21.2</b>	-	-		-	-	-	-	-	-
1/1	Burtonwood SB Ahead	U	N/A	78.0%	9.5	4.3	30.1	C4:A		1	19	-	515	1982	661
1/2	Burtonwood SB Ahead	U	N/A	83.4%	10.8	5.2	34.2	C4:A		1	19	-	550	1979	660
2/1	BWood NB Ahead	U	N/A	41.4%	2.7	1.3	28.7	C4:B		1	11	-	164	1980	396
2/2	BWood NB Ahead	U	N/A	56.6%	4.2	2.1	31.4	C4:B		1	11	-	240	2120	424
2/3	BWood NB Ahead	U	N/A	48.5%	3.3	1.6	30.1	C4:B		1	11	-	191	1971	394
3/2+3/1	Charon Way Entry Right Left	U	N/A	37.4 : 37.4%	3.6	1.3	15.0	C4:C		1	25	-	307	1838:1995	795+27
3/3	Charon Way Entry Right	U	N/A	55.7%	6.0	2.2	17.9	C4:C		1	25	-	436	1805	782
4/1	Charon Way Approach Ahead	U	N/A	37.0%	0.3	0.3	1.4	-		-	-	-	743	2010	2010
5/1	SB two lane Ahead	U	N/A	26.0%	0.2	0.2	1.2	-		-	-	-	515	1981	1981
5/2	SB two lane Ahead	U	N/A	26.7%	0.2	0.2	1.2	-		-	-	-	560	2100	2100
6/1	SB Merge Ahead	U	N/A	53.6%	16.0	2.3	7.9	-		-	-	-	1075	2004	2004
7/1	Ahead	U	N/A	29.0%	0.2	0.2	1.2	-		-	-	-	595	2049	2049
Ped Link: P1	Burtonwood Rd NB	-	N/A	0.0%	-	-	-	C4:D		1	32	-	0	-	0
Ped Link: P2	Charon Way LT	-	N/A	0.0%	-	-	-	C4:F		1	23	-	0	-	0
Ped Link: P3	Burtonwood Rd SB	-	N/A	0.0%	-	-	-	C4:E		1	25	-	0	-	0
<p>C1 - M62 J8 South E82059 Stream: 1 PRC for Signalled Lanes (%): 28.8 Total Delay for Signalled Lanes (pcuHr): 29.71 Cycle Time (s): 144  C1 - M62 J8 South E82059 Stream: 2 PRC for Signalled Lanes (%): 1156.3 Total Delay for Signalled Lanes (pcuHr): 0.08 Cycle Time (s): 144  C1 - M62 J8 South E82059 Stream: 3 PRC for Signalled Lanes (%): 8.6 Total Delay for Signalled Lanes (pcuHr): 15.94 Cycle Time (s): 144  C2 - M62 J8 North E82153 Stream: 1 PRC for Signalled Lanes (%): 0.8 Total Delay for Signalled Lanes (pcuHr): 18.34 Cycle Time (s): 144  C2 - M62 J8 North E82153 Stream: 2 PRC for Signalled Lanes (%): 43.6 Total Delay for Signalled Lanes (pcuHr): 16.57 Cycle Time (s): 144  C3 - Kingswood PRC for Signalled Lanes (%): -7.8 Total Delay for Signalled Lanes (pcuHr): 19.49 Cycle Time (s): 96  C4 - Charon Way PRC for Signalled Lanes (%): 7.9 Total Delay for Signalled Lanes (pcuHr): 17.96 Cycle Time (s): 60  PRC Over All Lanes (%): -36.6 Total Delay Over All Lanes(pcuHr): 244.25</p>															

Basic Results Summary

Scenario 5: '2027 AM' (FG5: '2027 AM Forecast', Plan 1: 'Existing')

Item	Lane Description	Lane Type	Controller Stream	Deg Sat (%)	Mean Max Queue (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)
<b>Network: Base Model</b>	-	-	<b>N/A</b>	<b>116.5%</b>	-	<b>308.9</b>	-	-		-	-	-	-	-	-
<b>J1: M62 Junction 8</b>	-	-	<b>N/A</b>	<b>116.5%</b>	-	<b>281.9</b>	-	-		-	-	-	-	-	-
1/2+1/1	Skyline Drive Entry Left Ahead	U	1:1	59.8 : 59.8%	14.4	5.6	32.6	C1:F C1:G		1	64:55	-	621	2131:1952	672+366
1/3	Skyline Drive Entry Ahead	U	1:1	15.1%	3.2	1.0	25.6	C1:F		1	64	-	135	1986	896
2/1	Skyline Dr Exit Ahead	U	1:2	42.6%	2.9	0.5	2.3	C1:K		1	131	-	852	2011	1843
2/2	Skyline Dr Exit Ahead	U	1:2	38.5%	0.5	0.3	1.7	C1:K		1	131	-	748	1934	1773
3/1	Skyline Dr Internal Ahead	U	1:1	34.9%	3.1	1.5	15.7	C1:E		1	70	-	342	1990	981
3/2	Skyline Dr Internal Ahead Ahead2	U	1:1	45.5%	1.9	1.1	8.1	C1:E		1	70	-	470	2091	1031
3/3	Skyline Dr Internal Ahead	U	1:1	36.3%	0.6	0.4	4.3	C1:E		1	70	-	351	1953	963
4/1	WB On Slip Exit Ahead	U	1:1	31.0%	0.2	0.2	1.4	C1:I		1	131	-	561	1976	1811
4/2	WB On Slip Exit Ahead	U	1:1	9.0%	0.1	0.0	1.1	C1:I		1	131	-	166	2021	1853
5/1	Western Bridge NB Ahead	U	2:2	20.5%	1.8	0.2	4.4	C2:A		1	50	-	140	1929	683
5/2	Western Bridge NB Right	U	2:2	77.1%	15.3	6.3	40.3	C2:A		1	50	-	566	2071	733
5/3	Western Bridge NB Right	U	2:2	70.3%	16.9	3.2	23.8	C2:A		1	50	-	486	1946	689
6/2+6/1	EB Off Slip Ahead Left	U	2:2	64.7 : 0.0%	22.0	5.3	24.2	C2:B		1	83	-	790	2094:1929	1222+0
6/3	EB Off Slip Ahead	U	2:2	33.9%	8.1	1.9	18.0	C2:B		1	83	-	382	1932	1127
7/1	Burtonwood N Internal Ahead	U	2:1	63.0%	26.5	4.7	23.2	C2:C		1	85	-	729	1934	1155
7/2	Burtonwood N Internal Ahead Right	U	2:1	89.7%	46.2	10.5	33.9	C2:C		1	85	-	1113	2075	1239
7/3	Burtonwood N Internal Right	U	2:1	33.1%	3.6	1.3	12.3	C2:C		1	85	-	382	1934	1155
9/2+9/1	Burtonwood N SB Left Ahead	U	2:1	63.1 : 63.1%	14.8	5.7	44.8	C2:D		1	49	-	456	2002:1941	581+141
9/3	Burtonwood N SB Ahead	U	2:1	34.1%	6.8	2.4	39.0	C2:D		1	49	-	223	1884	654
11/1	Eastern Bridge SB Ahead Ahead2	U	1:3	116.5%	131.4	100.6	329.1	C1:A		1	68	-	1100	1971	944
11/2	Eastern Bridge SB Ahead	U	1:3	64.5%	16.8	4.4	26.3	C1:A		1	68	-	605	1958	938
12/2+12/1	WB Off Slip Ahead Left	U	1:3	58.9 : 58.9%	12.2	4.4	31.5	C1:B		1	65	-	504	1795:1683	241+614
12/3	WB Off Slip Ahead	U	1:3	23.1%	4.8	1.4	26.5	C1:B		1	65	-	191	1801	825
12/4+12/5	WB Off Slip Ahead	U	1:3	116.3 : 116.3%	117.5	88.8	329.1	C1:B		1	65	-	972	1810:1671	822+14
13/1	Charon Way Internal Left	U	N/A	11.2%	0.1	0.1	1.0	-		-	-	-	242	2005	2005
13/2	Charon Way Internal Left	U	N/A	18.1%	0.1	0.1	1.0	-		-	-	-	420	2148	2148
13/3	Charon Way Internal Ahead	U	N/A	61.1%	0.8	0.8	2.1	-		-	-	-	1457	2167	2167
13/4	Charon Way Internal Ahead	U	N/A	6.2%	0.0	0.0	1.0	-		-	-	-	120	1904	1904
15/1	Burtonwood S Entry Left Ahead	U	1:1	88.2%	19.2	9.5	82.2	C1:D		1	33	-	414	1987	469
15/2	Burtonwood S Entry Ahead	U	1:1	88.7%	20.1	9.8	82.2	C1:D		1	33	-	431	2058	486
15/3	Burtonwood S Entry Ahead	U	1:1	74.9%	14.1	6.3	66.4	C1:D		1	33	-	341	1928	455
16/1	Burtonwood S Internal Ahead	U	1:1	45.7%	2.9	0.8	4.4	C1:C		1	101	-	709	1980	1402
16/2	Burtonwood S Internal Ahead	U	1:1	45.4%	4.7	1.0	5.4	C1:C		1	101	-	748	2120	1502
16/3	Burtonwood S Internal Right	U	1:1	8.5%	4.1	0.8	23.5	C1:C		1	101	-	120	1962	1390
19/1	WB Off Slip Approach Ahead	U	N/A	33.8%	0.3	0.3	1.3	-		-	-	-	695	2055	2055
19/2	WB Off Slip Approach Ahead	U	N/A	47.3%	0.4	0.4	1.7	-		-	-	-	972	2055	2055

Basic Results Summary

Item	Lane Description	Lane Type	Controller Stream	Deg Sat (%)	Mean Max Queue (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)
20/1	Skyline Dr Approach Ahead	U	N/A	35.8%	0.3	0.3	1.3	-		-	-	-	756	2112	2112
Ped Link: P1	M62 WB OS Peds	-	1:1	0.0%	-	-	-	C1:J		1	6	-	0	-	0
Ped Link: P2	Skyline Drive Exit Peds	-	1:2	0.0%	-	-	-	C1:L		1	6	-	0	-	0
Ped Link: P3	Skyline Drive Entry Peds	-	1:1	0.0%	-	-	-	C1:H		1	64	-	0	-	0
Ped Link: P4	M62 EB OS Peds	-	2:2	0.0%	-	-	-	C2:E		1	51	-	0	-	0
<b>J2: Kingswood</b>	-	-	<b>N/A</b>	<b>70.6%</b>	-	<b>8.2</b>	-	-		-	-	-	-	-	-
1/1+1/2	Right Ahead	U+O	N/A	61.5 : 61.5%	10.0	2.3	10.0	C3:A	C3:C	1	53	8	829	1927:1796	1314+34
2/1	Ahead Left	U	N/A	70.6%	12.4	4.2	22.7	C3:B		1	36	-	710	1977	938
3/1	Kingswood Road Left Right	U	N/A	54.9%	3.2	1.7	49.0	C3:D		1	9	-	127	1803	231
Ped Link: P1	Unnamed Ped Link	-	N/A	0.0%	-	-	-	C3:E		1	10	-	0	-	0
Ped Link: P2	Unnamed Ped Link	-	N/A	0.0%	-	-	-	C3:H		1	5	-	0	-	0
Ped Link: P3	Unnamed Ped Link	-	N/A	0.0%	-	-	-	C3:G		1	55	-	0	-	0
Ped Link: P4	Unnamed Ped Link	-	N/A	0.0%	-	-	-	C3:F		1	6	-	0	-	0
<b>J3: Whittle Ave</b>	-	-	<b>N/A</b>	<b>87.1%</b>	-	<b>10.2</b>	-	-		-	-	-	-	-	-
1/1+1/2	Ahead Left	O	N/A	87.1 : 86.9%	15.7	5.9	30.9	-		-	-	-	736	1986:1948	113+679
2/1+2/2	Right Ahead	U	N/A	40.1 : 40.1%	0.3	0.3	1.5	-		-	-	-	783	1957:1921	1761+192
5/1+5/2	Ahead Left	O	N/A	84.2 : 84.2%	2.6	2.6	7.6	-		-	-	-	1231	1982:1900	836+626
8/1+8/2	Ahead Left	O	N/A	14.6 : 14.6%	0.1	0.1	2.2	-		-	-	-	140	2051:1956	412+550
11/1+11/2	Ahead Left	O	N/A	60.2 : 60.2%	0.8	0.8	3.3	-		-	-	-	834	2032:1939	789+596
15/1+15/2	Omega Entry Ahead Left	O	N/A	51.6 : 51.6%	0.5	0.5	6.0	-		-	-	-	319	1877:1878	223+395
<b>J4: Charon Way</b>	-	-	<b>N/A</b>	<b>56.6%</b>	-	<b>8.6</b>	-	-		-	-	-	-	-	-
1/1	Burtonwood SB Ahead	U	N/A	18.4%	1.7	0.4	6.8	C4:A		1	36	-	242	1982	1222
1/2	Burtonwood SB Ahead	U	N/A	31.9%	3.3	0.8	7.7	C4:A		1	36	-	420	1979	1220
2/1	BWood NB Ahead	U	N/A	27.6%	2.8	0.9	11.8	C4:B		1	28	-	264	1980	957
2/2	BWood NB Ahead	U	N/A	33.5%	3.7	1.2	12.2	C4:B		1	28	-	343	2120	1025
2/3	BWood NB Ahead	U	N/A	30.4%	3.1	1.0	12.1	C4:B		1	28	-	290	1971	953
3/2+3/1	Charon Way Entry Right Left	U	N/A	56.6 : 56.6%	2.9	1.9	35.0	C4:C		1	8	-	198	1838:1995	265+85
3/3	Charon Way Entry Right	U	N/A	51.3%	2.6	1.4	37.1	C4:C		1	8	-	139	1805	271
4/1	Charon Way Approach Ahead	U	N/A	16.8%	0.1	0.1	1.1	-		-	-	-	337	2010	2010
5/1	SB two lane Ahead	U	N/A	11.6%	0.1	0.1	1.0	-		-	-	-	246	1981	1981
5/2	SB two lane Ahead	U	N/A	20.6%	0.1	0.1	1.1	-		-	-	-	464	2100	2100
6/1	SB Merge Ahead	U	N/A	33.1%	0.7	0.3	1.5	-		-	-	-	710	2004	2004
7/1	Ahead	U	N/A	43.8%	0.4	0.4	1.6	-		-	-	-	897	2049	2049
Ped Link: P1	Burtonwood Rd NB	-	N/A	0.0%	-	-	-	C4:D		1	15	-	0	-	0
Ped Link: P2	Charon Way LT	-	N/A	0.0%	-	-	-	C4:F		1	40	-	0	-	0
Ped Link: P3	Burtonwood Rd SB	-	N/A	0.0%	-	-	-	C4:E		1	8	-	0	-	0

C1 - M62 J8 South E82059	Stream: 1 PRC for Signalled Lanes (%)	1.5	Total Delay for Signalled Lanes (pcuHr)	37.98	Cycle Time (s)	144
C1 - M62 J8 South E82059	Stream: 2 PRC for Signalled Lanes (%)	111.5	Total Delay for Signalled Lanes (pcuHr)	0.82	Cycle Time (s)	144
C1 - M62 J8 South E82059	Stream: 3 PRC for Signalled Lanes (%)	-29.4	Total Delay for Signalled Lanes (pcuHr)	199.64	Cycle Time (s)	144
C2 - M62 J8 North E82153	Stream: 1 PRC for Signalled Lanes (%)	0.3	Total Delay for Signalled Lanes (pcuHr)	24.55	Cycle Time (s)	144
C2 - M62 J8 North E82153	Stream: 2 PRC for Signalled Lanes (%)	16.8	Total Delay for Signalled Lanes (pcuHr)	16.93	Cycle Time (s)	144
C3 - Kingswood	PRC for Signalled Lanes (%)	27.4	Total Delay for Signalled Lanes (pcuHr)	8.20	Cycle Time (s)	78
C4 - Charon Way	PRC for Signalled Lanes (%)	59.0	Total Delay for Signalled Lanes (pcuHr)	7.62	Cycle Time (s)	60
	PRC Over All Lanes (%)	-29.4	Total Delay Over All Lanes (pcuHr)	308.88		

Basic Results Summary

Scenario 6: '2027 PM' (FG6: '2027 PM Forecast', Plan 1: 'Existing')

Item	Lane Description	Lane Type	Controller Stream	Deg Sat (%)	Mean Max Queue (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)
<b>Network: Base Model</b>	-	-	<b>N/A</b>	<b>144.8%</b>	-	<b>522.7</b>	-	-	-	-	-	-	-	-	-
<b>J1: M62 Junction 8</b>	-	-	<b>N/A</b>	<b>93.5%</b>	-	<b>133.0</b>	-	-	-	-	-	-	-	-	-
1/2+1/1	Skyline Drive Entry Left Ahead	U	1:1	83.7 : 83.7%	30.5	10.0	36.1	C1:F C1:G		1	74:65	-	995	2131:1952	748+441
1/3	Skyline Drive Entry Ahead	U	1:1	43.7%	11.6	3.1	24.5	C1:F		1	74	-	452	1986	1034
2/1	Skyline Dr Exit Ahead	U	1:2	18.2%	0.1	0.1	1.2	C1:K		1	131	-	335	2011	1843
2/2	Skyline Dr Exit Ahead	U	1:2	17.0%	0.2	0.1	1.2	C1:K		1	131	-	302	1934	1773
3/1	Skyline Dr Internal Ahead	U	1:1	55.2%	3.7	1.2	9.7	C1:E		1	60	-	465	1990	843
3/2	Skyline Dr Internal Ahead Ahead2	U	1:1	60.1%	3.5	1.3	9.0	C1:E		1	60	-	531	2087	884
3/3	Skyline Dr Internal Ahead	U	1:1	43.8%	0.4	0.4	4.0	C1:E		1	60	-	362	1953	827
4/1	WB On Slip Exit Ahead	U	1:1	46.0%	0.4	0.4	1.8	C1:I		1	131	-	834	1976	1811
4/2	WB On Slip Exit Ahead	U	1:1	6.9%	0.0	0.0	1.1	C1:I		1	131	-	127	2021	1853
5/1	Western Bridge NB Ahead	U	2:2	7.9%	0.0	0.0	1.8	C2:A		1	80	-	86	1929	1085
5/2	Western Bridge NB Right	U	2:2	81.0%	31.6	9.7	37.1	C2:A		1	80	-	944	2071	1165
5/3	Western Bridge NB Right	U	2:2	74.4%	13.4	5.7	25.0	C2:A		1	80	-	814	1946	1095
6/2+6/1	EB Off Slip Ahead Left	U	2:2	66.7 : 0.0%	18.5	6.5	44.4	C2:B		1	53	-	524	2094:1929	785+0
6/3	EB Off Slip Ahead	U	2:2	29.5%	6.2	2.1	35.2	C2:B		1	53	-	214	1932	725
7/1	Burtonwood N Internal Ahead	U	2:1	78.5%	35.1	3.7	13.4	C2:C		1	94	-	1002	1934	1276
7/2	Burtonwood N Internal Ahead Right	U	2:1	93.5%	46.2	13.9	39.2	C2:C		1	94	-	1280	2075	1369
7/3	Burtonwood N Internal Right	U	2:1	16.8%	2.8	0.7	11.9	C2:C		1	94	-	214	1934	1276
9/2+9/1	Burtonwood N SB Left Ahead	U	2:1	91.4 : 91.4%	24.3	12.1	77.0	C2:D		1	40	-	564	2002:1941	429+188
9/3	Burtonwood N SB Ahead	U	2:1	30.0%	5.2	2.0	45.1	C2:D		1	40	-	161	1884	536
11/1	Eastern Bridge SB Ahead Ahead2	U	1:3	89.2%	30.7	12.5	48.5	C1:A		1	75	-	925	1965	1037
11/2	Eastern Bridge SB Ahead	U	1:3	36.3%	4.4	1.5	14.9	C1:A		1	75	-	375	1958	1033
12/2+12/1	WB Off Slip Ahead Left	U	1:3	78.2 : 78.2%	18.8	7.8	42.7	C1:B		1	58	-	661	1795:1683	506+339
12/3	WB Off Slip Ahead	U	1:3	72.5%	19.1	6.6	44.4	C1:B		1	58	-	535	1801	738
12/4+12/5	WB Off Slip Ahead	U	1:3	43.3 : 43.3%	9.2	3.3	33.8	C1:B		1	58	-	349	1810:1671	723+83
13/1	Charon Way Internal Left	U	N/A	33.4%	0.3	0.3	1.3	-		-	-	-	669	2005	2005
13/2	Charon Way Internal Left	U	N/A	31.3%	0.2	0.2	1.2	-		-	-	-	672	2148	2148
13/3	Charon Way Internal Ahead	U	N/A	26.4%	0.2	0.2	1.1	-		-	-	-	572	2167	2167
13/4	Charon Way Internal Ahead	U	N/A	8.0%	0.0	0.0	1.0	-		-	-	-	152	1904	1904
15/1	Burtonwood S Entry Left Ahead	U	1:1	86.2%	20.2	9.3	73.5	C1:D		1	37	-	454	1995	526
15/2	Burtonwood S Entry Ahead	U	1:1	84.1%	19.8	8.9	69.9	C1:D		1	37	-	457	2058	543
15/3	Burtonwood S Entry Ahead	U	1:1	70.8%	14.2	6.0	59.9	C1:D		1	37	-	360	1928	509
16/1	Burtonwood S Internal Ahead	U	1:1	20.0%	2.9	0.6	8.1	C1:C		1	97	-	270	1980	1348
16/2	Burtonwood S Internal Ahead	U	1:1	20.9%	3.1	0.6	7.7	C1:C		1	97	-	302	2120	1443
16/3	Burtonwood S Internal Right	U	1:1	11.4%	0.6	0.1	3.3	C1:C		1	97	-	152	1962	1335
19/1	WB Off Slip Approach Ahead	U	N/A	58.2%	0.7	0.7	2.1	-		-	-	-	1196	2055	2055
19/2	WB Off Slip Approach Ahead	U	N/A	17.0%	0.1	0.1	1.1	-		-	-	-	349	2055	2055
20/1	Skyline Dr Approach Ahead	U	N/A	68.5%	1.1	1.1	2.7	-		-	-	-	1447	2112	2112

Basic Results Summary

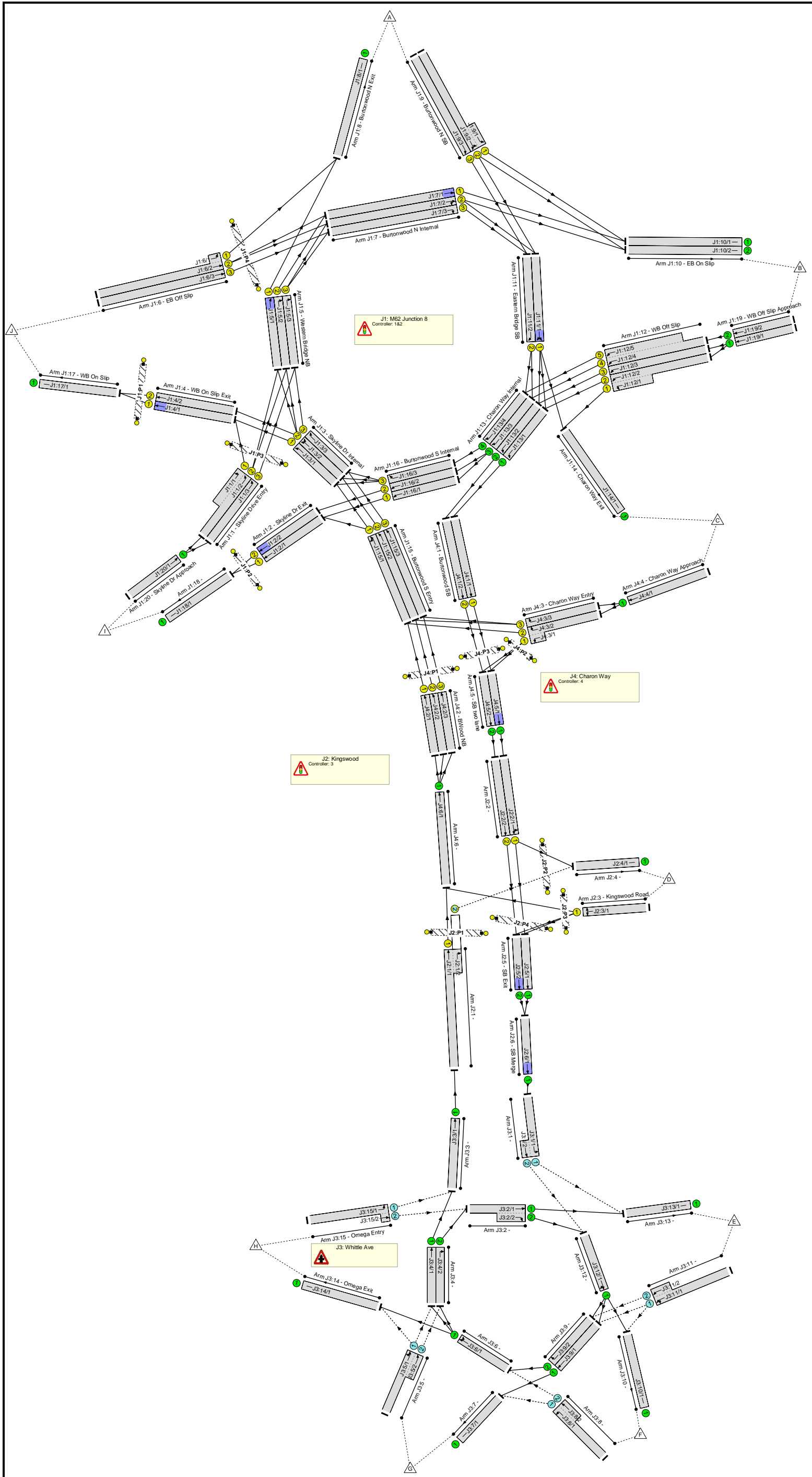
Item	Lane Description	Lane Type	Controller Stream	Deg Sat (%)	Mean Max Queue (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)
Ped Link: P1	M62 WB OS Peds	-	1:1	0.0%	-	-	-	C1:J		1	6	-	0	-	0
Ped Link: P2	Skyline Drive Exit Peds	-	1:2	0.0%	-	-	-	C1:L		1	6	-	0	-	0
Ped Link: P3	Skyline Drive Entry Peds	-	1:1	0.0%	-	-	-	C1:H		1	54	-	0	-	0
Ped Link: P4	M62 EB OS Peds	-	2:2	0.0%	-	-	-	C2:E		1	81	-	0	-	0
<b>J2: Kingswood</b>	-	-	<b>N/A</b>	<b>124.3%</b>	-	<b>160.5</b>	-	-		-	-	-	-	-	-
1/1+1/2	Right Ahead	U+O	N/A	40.9 : 40.9%	5.9	1.2	6.9	C3:A	C3:C	1	71	9	596	1927:1796	1424+32
2/1	Ahead Left	U	N/A	124.3%	181.4	157.1	410.1	C3:B		1	53	-	1379	1972	1109
3/1	Kingswood Road Left Right	U	N/A	63.6%	3.9	2.2	66.8	C3:D		1	9	-	120	1812	189
Ped Link: P1	Unnamed Ped Link	-	N/A	0.0%	-	-	-	C3:E		1	10	-	0	-	0
Ped Link: P2	Unnamed Ped Link	-	N/A	0.0%	-	-	-	C3:H		1	5	-	0	-	0
Ped Link: P3	Unnamed Ped Link	-	N/A	0.0%	-	-	-	C3:G		1	73	-	0	-	0
Ped Link: P4	Unnamed Ped Link	-	N/A	0.0%	-	-	-	C3:F		1	7	-	0	-	0
<b>J3: Whittle Ave</b>	-	-	<b>N/A</b>	<b>144.8%</b>	-	<b>202.8</b>	-	-		-	-	-	-	-	-
1/1+1/2	Ahead Left	O	N/A	143.0 : 144.8%	260.7	199.8	644.1	-		-	-	-	1373	1986:1948	98+675
2/1+2/2	Right Ahead	U	N/A	41.1 : 41.1%	0.3	0.3	1.6	-		-	-	-	802	1957:1921	1763+190
5/1+5/2	Ahead Left	O	N/A	76.9 : 76.9%	1.6	1.6	5.6	-		-	-	-	1051	1982:1900	573+793
8/1+8/2	Ahead Left	O	N/A	6.5 : 6.5%	0.0	0.0	1.9	-		-	-	-	67	2051:1956	433+603
11/1+11/2	Ahead Left	O	N/A	55.4 : 55.4%	0.6	0.6	4.0	-		-	-	-	553	2032:1939	725+272
15/1+15/2	Omega Entry Ahead Left	O	N/A	38.8 : 38.8%	0.3	0.3	4.4	-		-	-	-	262	1877:1878	250+425
<b>J4: Charon Way</b>	-	-	<b>N/A</b>	<b>88.6%</b>	-	<b>26.5</b>	-	-		-	-	-	-	-	-
1/1	Burtonwood SB Ahead	U	N/A	88.1%	13.6	6.6	35.7	C4:A		1	22	-	669	1982	760
1/2	Burtonwood SB Ahead	U	N/A	88.6%	14.0	6.8	36.5	C4:A		1	22	-	672	1979	759
2/1	BWood NB Ahead	U	N/A	33.7%	2.5	1.1	23.9	C4:B		1	14	-	167	1980	495
2/2	BWood NB Ahead	U	N/A	46.2%	3.8	1.7	25.4	C4:B		1	14	-	245	2120	530
2/3	BWood NB Ahead	U	N/A	46.1%	3.6	1.6	25.8	C4:B		1	14	-	227	1971	493
3/2+3/1	Charon Way Entry Right Left	U	N/A	43.3 : 43.3%	3.9	1.6	17.6	C4:C		1	22	-	325	1838:1995	662+88
3/3	Charon Way Entry Right	U	N/A	49.9%	4.8	1.8	19.3	C4:C		1	22	-	345	1805	692
4/1	Charon Way Approach Ahead	U	N/A	33.3%	0.2	0.2	1.3	-		-	-	-	670	2010	2010
5/1	SB two lane Ahead	U	N/A	33.8%	0.3	0.3	1.4	-		-	-	-	669	1981	1981
5/2	SB two lane Ahead	U	N/A	33.8%	0.3	0.3	1.3	-		-	-	-	710	2100	2100
6/1	SB Merge Ahead	U	N/A	68.8%	21.5	4.2	10.9	-		-	-	-	1379	2004	2004
7/1	Ahead	U	N/A	31.2%	0.2	0.2	1.3	-		-	-	-	639	2049	2049
Ped Link: P1	Burtonwood Rd NB	-	N/A	0.0%	-	-	-	C4:D		1	29	-	0	-	0
Ped Link: P2	Charon Way LT	-	N/A	0.0%	-	-	-	C4:F		1	26	-	0	-	0
Ped Link: P3	Burtonwood Rd SB	-	N/A	0.0%	-	-	-	C4:E		1	22	-	0	-	0
<p>                     C1 - M62 J8 South E82059 Stream: 1 PRC for Signalled Lanes (%): 4.4 Total Delay for Signalled Lanes (pcuHr): 42.02 Cycle Time (s): 144                      C1 - M62 J8 South E82059 Stream: 2 PRC for Signalled Lanes (%): 395.2 Total Delay for Signalled Lanes (pcuHr): 0.21 Cycle Time (s): 144                      C1 - M62 J8 South E82059 Stream: 3 PRC for Signalled Lanes (%): 0.9 Total Delay for Signalled Lanes (pcuHr): 31.72 Cycle Time (s): 144                      C2 - M62 J8 North E82153 Stream: 1 PRC for Signalled Lanes (%): -3.9 Total Delay for Signalled Lanes (pcuHr): 32.46 Cycle Time (s): 144                      C2 - M62 J8 North E82153 Stream: 2 PRC for Signalled Lanes (%): 11.1 Total Delay for Signalled Lanes (pcuHr): 23.97 Cycle Time (s): 144                      C3 - Kingswood PRC for Signalled Lanes (%): -38.1 Total Delay for Signalled Lanes (pcuHr): 160.46 Cycle Time (s): 96                      C4 - Charon Way PRC for Signalled Lanes (%): 1.6 Total Delay for Signalled Lanes (pcuHr): 21.34 Cycle Time (s): 60                      PRC Over All Lanes (%): -60.9 Total Delay Over All Lanes(pcuHr): 522.72                 </p>															



Basic Results Summary  
**Basic Results Summary**

**User and Project Details**

<b>Project:</b>	<b>Kingswood Road</b>
<b>Title:</b>	<b>Base Model</b>
<b>Location:</b>	
<b>File name:</b>	Burtonwood Rd Network with J8+Opt1.lsg3x
<b>Author:</b>	RY/GH
<b>Company:</b>	
<b>Address:</b>	
<b>Notes:</b>	



Basic Results Summary

Scenario 3: '2017 AM' (FG3: '2017 AM Forecast', Plan 1: 'Existing')

Item	Lane Description	Lane Type	Controller Stream	Deg Sat (%)	Mean Max Queue (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)
<b>Network: Base Model</b>	-	-	<b>N/A</b>	<b>84.4%</b>	-	<b>95.9</b>	-	-		-	-	-	-	-	-
<b>J1: M62 Junction 8</b>	-	-	<b>N/A</b>	<b>84.4%</b>	-	<b>80.2</b>	-	-		-	-	-	-	-	-
1/2+1/1	Skyline Drive Entry Left Ahead	U	1:1	51.7 : 51.7%	8.5	4.4	52.7	C1:F C1:G		1	35:26	-	300	2131:1952	449+132
1/3	Skyline Drive Entry Ahead	U	1:1	5.6%	0.9	0.3	45.0	C1:F		1	35	-	28	1986	497
2/1	Skyline Dr Exit Ahead	U	1:2	15.7%	0.2	0.1	1.2	C1:K		1	131	-	290	2011	1843
2/2	Skyline Dr Exit Ahead	U	1:2	24.0%	0.2	0.2	1.3	C1:K		1	131	-	425	1934	1773
3/1	Skyline Dr Internal Ahead	U	1:1	31.3%	1.2	0.5	4.4	C1:E		1	99	-	432	1990	1382
3/2	Skyline Dr Internal Ahead Ahead2	U	1:1	49.0%	11.0	3.1	15.8	C1:E		1	99	-	708	2080	1444
3/3	Skyline Dr Internal Ahead	U	1:1	23.5%	0.5	0.2	2.5	C1:E		1	99	-	319	1953	1356
4/1	WB On Slip Exit Ahead	U	1:1	27.6%	0.2	0.2	1.4	C1:I		1	131	-	500	1976	1811
4/2	WB On Slip Exit Ahead	U	1:1	3.4%	0.0	0.0	1.0	C1:I		1	131	-	63	2021	1853
5/1	Western Bridge NB Ahead	U	2:2	82.9%	18.6	5.4	32.7	C2:A		1	53	-	600	1929	723
5/2	Western Bridge NB Right	U	2:2	35.7%	8.7	2.5	32.3	C2:A		1	53	-	277	2071	777
5/3	Western Bridge NB Right	U	2:2	47.6%	6.1	2.8	28.9	C2:A		1	53	-	347	1946	730
6/2+6/1	EB Off Slip Ahead Left	U	2:2	74.5 : 74.5%	26.4	7.0	28.8	C2:B		1	80	-	871	2094:1865	867+302
6/3	EB Off Slip Ahead	U	2:2	10.4%	2.1	0.5	16.5	C2:B		1	80	-	113	1932	1087
7/1	Burtonwood N Internal Ahead	U	2:1	36.1%	11.4	2.3	18.8	C2:C		1	90	-	441	1934	1222
7/2	Burtonwood N Internal Ahead Right	U	2:1	63.2%	17.7	3.4	14.7	C2:C		1	90	-	829	2075	1311
7/3	Burtonwood N Internal Right	U	2:1	9.2%	0.8	0.3	8.3	C2:C		1	90	-	113	1934	1222
9/2+9/1	Burtonwood N SB Left Ahead	U	2:1	69.7 : 69.7%	16.1	6.5	51.8	C2:D		1	44	-	450	2002:1941	555+90
9/3	Burtonwood N SB Ahead	U	2:1	28.5%	5.2	1.9	41.6	C2:D		1	44	-	168	1884	589
11/1	Eastern Bridge SB Ahead Ahead2	U	1:3	74.7%	30.2	8.3	34.3	C1:A		1	84	-	870	1972	1164
11/2	Eastern Bridge SB Ahead	U	1:3	24.3%	7.3	1.1	13.6	C1:A		1	84	-	281	1958	1156
12/2+12/1	WB Off Slip Ahead Left	U	1:3	59.4 : 59.4%	11.0	4.6	43.7	C1:B		1	49	-	379	1795:1683	130+509
12/3	WB Off Slip Ahead	U	1:3	20.1%	3.7	1.3	36.6	C1:B		1	49	-	126	1801	625
12/4+12/5	WB Off Slip Ahead	U	1:3	84.4 : 84.4%	21.5	11.4	52.9	C1:B		1	49	-	773	1810:1671	616+300
13/1	Charon Way Internal Left	U	N/A	9.1%	0.1	0.1	1.0	-		-	-	-	183	2005	2005
13/2	Charon Way Internal Left	U	N/A	12.0%	0.1	0.1	1.0	-		-	-	-	257	2148	2148
13/3	Charon Way Internal Ahead	U	N/A	32.1%	0.2	0.2	1.2	-		-	-	-	695	2167	2167
13/4	Charon Way Internal Ahead	U	N/A	18.9%	0.1	0.1	1.2	-		-	-	-	359	1904	1904
15/1	Burtonwood S Entry Left Ahead	U	1:1	38.9%	9.9	2.8	26.5	C1:D		1	69	-	378	1998	971
15/2	Burtonwood S Entry Ahead	U	1:1	43.2%	11.5	3.3	27.2	C1:D		1	69	-	432	2058	1000
15/3	Burtonwood S Entry Ahead	U	1:1	33.1%	7.8	2.2	25.5	C1:D		1	69	-	310	1928	937
16/1	Burtonwood S Internal Ahead	U	1:1	29.8%	3.3	0.9	12.6	C1:C		1	65	-	270	1980	907
16/2	Burtonwood S Internal Ahead	U	1:1	43.7%	2.8	0.7	5.7	C1:C		1	65	-	425	2120	972
16/3	Burtonwood S Internal Right	U	1:1	39.9%	5.8	1.1	11.0	C1:C		1	65	-	359	1962	899
19/1	WB Off Slip Approach Ahead	U	N/A	24.6%	0.2	0.2	1.2	-		-	-	-	505	2055	2055

Basic Results Summary

Item	Lane Description	Lane Type	Controller Stream	Deg Sat (%)	Mean Max Queue (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)
19/2	WB Off Slip Approach Ahead	U	N/A	37.6%	0.3	0.3	1.4	-		-	-	-	773	2055	2055
20/1	Skyline Dr Approach Ahead	U	N/A	15.5%	0.1	0.1	1.0	-		-	-	-	328	2112	2112
Ped Link: P1	M62 WB OS Peds	-	1:1	0.0%	-	-	-	C1:J		1	6	-	0	-	0
Ped Link: P2	Skyline Drive Exit Peds	-	1:2	0.0%	-	-	-	C1:L		1	6	-	0	-	0
Ped Link: P3	Skyline Drive Entry Peds	-	1:1	0.0%	-	-	-	C1:H		1	93	-	0	-	0
Ped Link: P4	M62 EB OS Peds	-	2:2	0.0%	-	-	-	C2:E		1	54	-	0	-	0
<b>J2: Kingswood</b>	-	-	<b>N/A</b>	<b>56.1%</b>	-	<b>5.8</b>	-	-		-	-	-	-	-	-
1/1+1/2	Right Ahead	U+O	N/A	55.7 : 55.7%	8.5	1.9	8.9	C3:A	C3:C	1	53	8	758	1942:1790	1324+38
2/1	Left Ahead	U	N/A	19.8%	2.4	0.7	14.3	C3:B		1	36	-	185	1974	936
2/2	Ahead	U	N/A	27.4%	3.5	1.1	15.0	C3:B		1	36	-	257	1980	939
3/1	Kingswood Road Right Left	U	N/A	56.1%	3.3	1.8	49.5	C3:D		1	9	-	130	1806	232
5/1	SB Exit Ahead	U	N/A	10.2%	0.1	0.1	1.0	-		-	-	-	202	1980	1980
5/2	SB Exit Ahead	U	N/A	14.1%	0.1	0.1	1.1	-		-	-	-	280	1980	1980
6/1	SB Merge Ahead	U	N/A	24.4%	1.1	0.2	1.7	-		-	-	-	482	1976	1976
Ped Link: P1	Unnamed Ped Link	-	N/A	0.0%	-	-	-	C3:E		1	10	-	0	-	0
Ped Link: P2	Unnamed Ped Link	-	N/A	0.0%	-	-	-	C3:H		1	5	-	0	-	0
Ped Link: P3	Unnamed Ped Link	-	N/A	0.0%	-	-	-	C3:G		1	55	-	0	-	0
Ped Link: P4	Unnamed Ped Link	-	N/A	0.0%	-	-	-	C3:F		1	6	-	0	-	0
<b>J3: Whittle Ave</b>	-	-	<b>N/A</b>	<b>62.7%</b>	-	<b>2.6</b>	-	-		-	-	-	-	-	-
1/1+1/2	Ahead Left	O	N/A	51.5 : 51.5%	6.5	0.9	6.6	-		-	-	-	482	1986:1948	206+730
2/1+2/2	Right Ahead	U	N/A	28.6 : 28.6%	0.2	0.2	1.3	-		-	-	-	559	1957:1921	1900+56
5/1+5/2	Ahead Left	O	N/A	58.9 : 62.7%	0.8	0.8	2.6	-		-	-	-	1071	1982:1900	970+798
8/1+8/2	Ahead Left	O	N/A	11.8 : 11.8%	0.1	0.1	1.6	-		-	-	-	147	2051:1956	583+659
11/1+11/2	Ahead Left	O	N/A	58.9 : 58.9%	0.7	0.7	4.1	-		-	-	-	628	2032:1940	792+273
15/1+15/2	Omega Entry Ahead Left	O	N/A	1.0 : 1.0%	0.0	0.0	2.3	-		-	-	-	8	1877:1878	392+392
<b>J4: Charon Way</b>	-	-	<b>N/A</b>	<b>52.2%</b>	-	<b>7.2</b>	-	-		-	-	-	-	-	-
1/1	Burtonwood SB Ahead	U	N/A	15.4%	1.4	0.4	7.1	C4:A		1	35	-	183	1982	1189
1/2	Burtonwood SB Ahead	U	N/A	21.6%	2.1	0.5	7.5	C4:A		1	35	-	257	1979	1187
2/1	BWood NB Ahead	U	N/A	25.3%	2.5	0.8	12.3	C4:B		1	27	-	234	1980	924
2/2	BWood NB Ahead	U	N/A	31.7%	3.5	1.1	12.7	C4:B		1	27	-	314	2120	989
2/3	BWood NB Ahead	U	N/A	29.5%	3.0	1.0	12.7	C4:B		1	27	-	271	1971	920
3/2+3/1	Charon Way Entry Right Left	U	N/A	47.0 : 47.0%	2.6	1.4	33.5	C4:C		1	9	-	146	1838:1995	306+4
3/3	Charon Way Entry Right	U	N/A	52.2%	2.9	1.5	35.3	C4:C		1	9	-	157	1805	301
4/1	Charon Way Approach Ahead	U	N/A	15.1%	0.1	0.1	1.1	-		-	-	-	303	2010	2010
5/1	SB two lane Ahead	U	N/A	9.3%	0.1	0.1	1.0	-		-	-	-	185	1981	1981
5/2	SB two lane Ahead	U	N/A	12.2%	0.1	0.1	1.0	-		-	-	-	257	2100	2100
6/1	Ahead	U	N/A	40.0%	0.3	0.3	1.5	-		-	-	-	819	2049	2049
Ped Link: P1	Burtonwood Rd NB	-	N/A	0.0%	-	-	-	C4:D		1	16	-	0	-	0
Ped Link: P2	Charon Way LT	-	N/A	0.0%	-	-	-	C4:F		1	39	-	0	-	0

Basic Results Summary

Item	Lane Description	Lane Type	Controller Stream	Deg Sat (%)	Mean Max Queue (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)
Ped Link: P3	Burtonwood Rd SB	-	N/A	0.0%	-	-	-	C4:E		1	9	-	0	-	0
C1 - M62 J8 South E82059	Stream: 1	PRC for Signalled Lanes (%)	74.1	Total Delay for Signalled Lanes (pcuHr):	19.77	Cycle Time (s):	144								
C1 - M62 J8 South E82059	Stream: 2	PRC for Signalled Lanes (%)	275.4	Total Delay for Signalled Lanes (pcuHr):	0.25	Cycle Time (s):	144								
C1 - M62 J8 South E82059	Stream: 3	PRC for Signalled Lanes (%)	6.7	Total Delay for Signalled Lanes (pcuHr):	26.59	Cycle Time (s):	144								
C2 - M62 J8 North E82153	Stream: 1	PRC for Signalled Lanes (%)	29.1	Total Delay for Signalled Lanes (pcuHr):	14.36	Cycle Time (s):	144								
C2 - M62 J8 North E82153	Stream: 2	PRC for Signalled Lanes (%)	8.5	Total Delay for Signalled Lanes (pcuHr):	18.20	Cycle Time (s):	144								
C3 - Kingswood		PRC for Signalled Lanes (%)	60.3	Total Delay for Signalled Lanes (pcuHr):	5.47	Cycle Time (s):	78								
C4 - Charon Way		PRC for Signalled Lanes (%)	72.5	Total Delay for Signalled Lanes (pcuHr):	6.65	Cycle Time (s):	60								
		PRC Over All Lanes (%)	6.7	Total Delay Over All Lanes (pcuHr):	95.87										

Basic Results Summary

Scenario 4: '2017 PM' (FG4: '2017 PM Forecast', Plan 1: 'Existing')

Item	Lane Description	Lane Type	Controller Stream	Deg Sat (%)	Mean Max Queue (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)
<b>Network: Base Model</b>	-	-	<b>N/A</b>	<b>123.0%</b>	-	<b>235.8</b>	-	-		-	-	-	-	-	-
<b>J1: M62 Junction 8</b>	-	-	<b>N/A</b>	<b>88.8%</b>	-	<b>89.2</b>	-	-		-	-	-	-	-	-
1/2+1/1	Skyline Drive Entry Left Ahead	U	1:1	71.8 : 71.8%	14.3	6.8	59.8	C1:F C1:G		1	35:26	-	410	2131:1952	462+109
1/3	Skyline Drive Entry Ahead	U	1:1	42.3%	7.4	3.0	51.6	C1:F		1	35	-	210	1986	497
2/1	Skyline Dr Exit Ahead	U	1:2	6.4%	0.1	0.0	1.1	C1:K		1	131	-	118	2011	1843
2/2	Skyline Dr Exit Ahead	U	1:2	7.3%	0.1	0.0	1.2	C1:K		1	131	-	130	1934	1773
3/1	Skyline Dr Internal Ahead	U	1:1	40.3%	4.6	1.4	9.2	C1:E		1	99	-	557	1990	1382
3/2	Skyline Dr Internal Ahead Ahead2	U	1:1	61.8%	10.4	2.1	8.5	C1:E		1	99	-	892	2077	1442
3/3	Skyline Dr Internal Ahead	U	1:1	16.1%	0.2	0.1	2.2	C1:E		1	99	-	218	1953	1356
4/1	WB On Slip Exit Ahead	U	1:1	35.1%	0.3	0.3	1.5	C1:I		1	131	-	635	1976	1811
4/2	WB On Slip Exit Ahead	U	1:1	0.9%	0.0	0.0	1.0	C1:I		1	131	-	16	2021	1853
5/1	Western Bridge NB Ahead	U	2:2	48.1%	7.3	2.4	15.3	C2:A		1	85	-	554	1929	1152
5/2	Western Bridge NB Right	U	2:2	52.9%	18.0	2.7	14.8	C2:A		1	85	-	654	2071	1237
5/3	Western Bridge NB Right	U	2:2	36.8%	10.4	1.1	9.6	C2:A		1	85	-	428	1946	1162
6/2+6/1	EB Off Slip Ahead Left	U	2:2	80.0 : 80.0%	22.3	8.7	54.7	C2:B		1	48	-	574	2094:1865	602+115
6/3	EB Off Slip Ahead	U	2:2	7.5%	1.4	0.5	35.1	C2:B		1	48	-	49	1932	657
7/1	Burtonwood N Internal Ahead	U	2:1	78.6%	22.0	10.3	52.6	C2:C		1	66	-	707	1934	900
7/2	Burtonwood N Internal Ahead Right	U	2:1	88.8%	29.9	8.6	36.3	C2:C		1	66	-	857	2075	965
7/3	Burtonwood N Internal Right	U	2:1	5.4%	1.2	0.0	3.2	C2:C		1	66	-	49	1934	900
9/2+9/1	Burtonwood N SB Left Ahead	U	2:1	57.2 : 57.2%	13.8	4.7	28.6	C2:D		1	68	-	588	2002:1941	606+421
9/3	Burtonwood N SB Ahead	U	2:1	15.3%	3.2	0.9	23.4	C2:D		1	68	-	138	1884	903
11/1	Eastern Bridge SB Ahead Ahead2	U	1:3	74.9%	14.0	5.8	28.2	C1:A		1	72	-	746	1964	996
11/2	Eastern Bridge SB Ahead	U	1:3	18.8%	5.6	2.0	37.6	C1:A		1	72	-	187	1958	993
12/2+12/1	WB Off Slip Ahead Left	U	1:3	69.3 : 69.3%	14.2	6.2	35.7	C1:B		1	61	-	625	1795:1683	504+398
12/3	WB Off Slip Ahead	U	1:3	48.2%	11.2	3.5	33.9	C1:B		1	61	-	374	1801	775
12/4+12/5	WB Off Slip Ahead	U	1:3	35.1 : 35.1%	6.5	3.2	29.0	C1:B		1	61	-	400	1810:1671	471+670
13/1	Charon Way Internal Left	U	N/A	26.4%	0.2	0.2	1.2	-		-	-	-	529	2005	2005
13/2	Charon Way Internal Left	U	N/A	25.0%	0.2	0.2	1.1	-		-	-	-	536	2148	2148
13/3	Charon Way Internal Ahead	U	N/A	10.8%	0.1	0.1	0.9	-		-	-	-	233	2167	2167
13/4	Charon Way Internal Ahead	U	N/A	18.6%	0.1	0.1	1.2	-		-	-	-	354	1904	1904
15/1	Burtonwood S Entry Left Ahead	U	1:1	42.5%	11.2	2.8	22.0	C1:D		1	78	-	466	1999	1097
15/2	Burtonwood S Entry Ahead	U	1:1	57.8%	17.9	4.6	25.3	C1:D		1	78	-	653	2058	1129
15/3	Burtonwood S Entry Ahead	U	1:1	19.8%	4.3	1.1	18.6	C1:D		1	78	-	209	1928	1058
16/1	Burtonwood S Internal Ahead	U	1:1	13.1%	2.1	0.7	24.5	C1:C		1	56	-	103	1980	784
16/2	Burtonwood S Internal Ahead	U	1:1	15.5%	2.7	0.9	24.3	C1:C		1	56	-	130	2120	839
16/3	Burtonwood S Internal Right	U	1:1	45.6%	8.4	3.3	33.1	C1:C		1	56	-	354	1962	777
19/1	WB Off Slip Approach Ahead	U	N/A	48.6%	0.5	0.5	1.7	-		-	-	-	999	2055	2055
19/2	WB Off Slip Approach Ahead	U	N/A	19.5%	0.1	0.1	1.1	-		-	-	-	400	2055	2055
20/1	Skyline Dr Approach Ahead	U	N/A	29.4%	0.2	0.2	1.2	-		-	-	-	620	2112	2112

Basic Results Summary

Item	Lane Description	Lane Type	Controller Stream	Deg Sat (%)	Mean Max Queue (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)																																																								
Ped Link: P1	M62 WB OS Peds	-	1:1	0.0%	-	-	-	C1:J		1	6	-	0	-	0																																																								
Ped Link: P2	Skyline Drive Exit Peds	-	1:2	0.0%	-	-	-	C1:L		1	6	-	0	-	0																																																								
Ped Link: P3	Skyline Drive Entry Peds	-	1:1	0.0%	-	-	-	C1:H		1	93	-	0	-	0																																																								
Ped Link: P4	M62 EB OS Peds	-	2:2	0.0%	-	-	-	C2:E		1	86	-	0	-	0																																																								
<b>J2: Kingswood</b>	-	-	<b>N/A</b>	<b>66.2%</b>	-	<b>10.3</b>	-	-		-	-	-	-	-	-																																																								
1/1+1/2	Right Ahead	U+O	N/A	37.2 : 37.2%	5.2	0.9	6.1	C3:A	C3:C	1	71	9	546	1942:1790	1437+32																																																								
2/1	Left Ahead	U	N/A	48.3%	8.9	2.3	15.8	C3:B		1	53	-	532	1960	1103																																																								
2/2	Ahead	U	N/A	48.8%	9.1	2.4	15.8	C3:B		1	53	-	543	1980	1114																																																								
3/1	Kingswood Road Right Left	U	N/A	66.2%	4.1	2.4	69.0	C3:D		1	9	-	124	1799	187																																																								
5/1	SB Exit Ahead	U	N/A	24.9%	0.2	0.2	1.2	-		-	-	-	494	1980	1980																																																								
5/2	SB Exit Ahead	U	N/A	28.9%	0.2	0.2	1.3	-		-	-	-	573	1980	1980																																																								
6/1	SB Merge Ahead	U	N/A	54.0%	18.0	1.9	6.3	-		-	-	-	1067	1976	1976																																																								
Ped Link: P1	Unnamed Ped Link	-	N/A	0.0%	-	-	-	C3:E		1	10	-	0	-	0																																																								
Ped Link: P2	Unnamed Ped Link	-	N/A	0.0%	-	-	-	C3:H		1	5	-	0	-	0																																																								
Ped Link: P3	Unnamed Ped Link	-	N/A	0.0%	-	-	-	C3:G		1	73	-	0	-	0																																																								
Ped Link: P4	Unnamed Ped Link	-	N/A	0.0%	-	-	-	C3:F		1	7	-	0	-	0																																																								
<b>J3: Whittle Ave</b>	-	-	<b>N/A</b>	<b>123.0%</b>	-	<b>121.3</b>	-	-		-	-	-	-	-	-																																																								
1/1+1/2	Ahead Left	O	N/A	123.0 : 123.0%	184.8	118.9	401.1	-		-	-	-	1067	1986:1948	138+729																																																								
2/1+2/2	Right Ahead	U	N/A	28.8 : 28.8%	0.2	0.2	1.3	-		-	-	-	563	1957:1921	1830+125																																																								
5/1+5/2	Ahead Left	O	N/A	65.6 : 65.6%	1.0	1.0	3.8	-		-	-	-	905	1982:1900	570+809																																																								
8/1+8/2	Ahead Left	O	N/A	6.5 : 6.5%	0.0	0.0	1.8	-		-	-	-	72	2051:1956	520+581																																																								
11/1+11/2	Ahead Left	O	N/A	70.4 : 70.4%	1.2	1.2	6.5	-		-	-	-	652	2032:1940	705+222																																																								
15/1+15/2	Omega Entry Ahead Left	O	N/A	1.1 : 1.2%	0.0	0.0	1.7	-		-	-	-	12	1877:1878	624+432																																																								
<b>J4: Charon Way</b>	-	-	<b>N/A</b>	<b>76.3%</b>	-	<b>15.1</b>	-	-		-	-	-	-	-	-																																																								
1/1	Burtonwood SB Ahead	U	N/A	59.3%	7.3	2.5	17.3	C4:A		1	26	-	529	1982	892																																																								
1/2	Burtonwood SB Ahead	U	N/A	60.2%	7.5	2.6	17.5	C4:A		1	26	-	536	1979	891																																																								
2/1	BWood NB Ahead	U	N/A	27.0%	2.2	0.9	19.3	C4:B		1	18	-	169	1980	627																																																								
2/2	BWood NB Ahead	U	N/A	45.7%	4.4	1.8	21.3	C4:B		1	18	-	307	2120	671																																																								
2/3	BWood NB Ahead	U	N/A	19.1%	1.5	0.6	18.5	C4:B		1	18	-	119	1971	624																																																								
3/2+3/1	Charon Way Entry Right Left	U	N/A	51.0 : 51.0%	4.5	1.9	22.8	C4:C		1	18	-	307	1838:1995	582+20																																																								
3/3	Charon Way Entry Right	U	N/A	76.3%	8.1	3.8	31.4	C4:C		1	18	-	436	1805	572																																																								
4/1	Charon Way Approach Ahead	U	N/A	37.0%	0.3	0.3	1.4	-		-	-	-	743	2010	2010																																																								
5/1	SB two lane Ahead	U	N/A	26.9%	0.2	0.2	1.2	-		-	-	-	532	1981	1981																																																								
5/2	SB two lane Ahead	U	N/A	25.9%	0.2	0.2	1.2	-		-	-	-	543	2100	2100																																																								
6/1	Ahead	U	N/A	29.0%	0.2	0.2	1.2	-		-	-	-	595	2049	2049																																																								
Ped Link: P1	Burtonwood Rd NB	-	N/A	0.0%	-	-	-	C4:D		1	25	-	0	-	0																																																								
Ped Link: P2	Charon Way LT	-	N/A	0.0%	-	-	-	C4:F		1	30	-	0	-	0																																																								
Ped Link: P3	Burtonwood Rd SB	-	N/A	0.0%	-	-	-	C4:E		1	18	-	0	-	0																																																								
<table border="0" style="width:100%; font-size: small;"> <tr> <td style="width:15%;">C1 - M62 J8 South E82059</td> <td style="width:15%;">Stream: 1 PRC for Signalled Lanes (%)</td> <td style="width:15%;">25.3</td> <td style="width:15%;">Total Delay for Signalled Lanes (pcuHr)</td> <td style="width:15%;">27.09</td> <td style="width:15%;">Cycle Time (s)</td> <td style="width:15%;">144</td> </tr> <tr> <td>C1 - M62 J8 South E82059</td> <td>Stream: 2 PRC for Signalled Lanes (%)</td> <td>1127.3</td> <td>Total Delay for Signalled Lanes (pcuHr)</td> <td>0.08</td> <td>Cycle Time (s)</td> <td>144</td> </tr> <tr> <td>C1 - M62 J8 South E82059</td> <td>Stream: 3 PRC for Signalled Lanes (%)</td> <td>20.1</td> <td>Total Delay for Signalled Lanes (pcuHr)</td> <td>20.74</td> <td>Cycle Time (s)</td> <td>144</td> </tr> <tr> <td>C2 - M62 J8 North E82153</td> <td>Stream: 1 PRC for Signalled Lanes (%)</td> <td>1.4</td> <td>Total Delay for Signalled Lanes (pcuHr)</td> <td>24.56</td> <td>Cycle Time (s)</td> <td>144</td> </tr> <tr> <td>C2 - M62 J8 North E82153</td> <td>Stream: 2 PRC for Signalled Lanes (%)</td> <td>12.5</td> <td>Total Delay for Signalled Lanes (pcuHr)</td> <td>15.40</td> <td>Cycle Time (s)</td> <td>144</td> </tr> <tr> <td>C3 - Kingswood</td> <td>PRC for Signalled Lanes (%)</td> <td>36.0</td> <td>Total Delay for Signalled Lanes (pcuHr)</td> <td>8.02</td> <td>Cycle Time (s)</td> <td>96</td> </tr> <tr> <td>C4 - Charon Way</td> <td>PRC for Signalled Lanes (%)</td> <td>18.0</td> <td>Total Delay for Signalled Lanes (pcuHr)</td> <td>14.23</td> <td>Cycle Time (s)</td> <td>60</td> </tr> <tr> <td></td> <td>PRC Over All Lanes (%)</td> <td>-36.6</td> <td>Total Delay Over All Lanes (pcuHr)</td> <td>235.82</td> <td></td> <td></td> </tr> </table>																C1 - M62 J8 South E82059	Stream: 1 PRC for Signalled Lanes (%)	25.3	Total Delay for Signalled Lanes (pcuHr)	27.09	Cycle Time (s)	144	C1 - M62 J8 South E82059	Stream: 2 PRC for Signalled Lanes (%)	1127.3	Total Delay for Signalled Lanes (pcuHr)	0.08	Cycle Time (s)	144	C1 - M62 J8 South E82059	Stream: 3 PRC for Signalled Lanes (%)	20.1	Total Delay for Signalled Lanes (pcuHr)	20.74	Cycle Time (s)	144	C2 - M62 J8 North E82153	Stream: 1 PRC for Signalled Lanes (%)	1.4	Total Delay for Signalled Lanes (pcuHr)	24.56	Cycle Time (s)	144	C2 - M62 J8 North E82153	Stream: 2 PRC for Signalled Lanes (%)	12.5	Total Delay for Signalled Lanes (pcuHr)	15.40	Cycle Time (s)	144	C3 - Kingswood	PRC for Signalled Lanes (%)	36.0	Total Delay for Signalled Lanes (pcuHr)	8.02	Cycle Time (s)	96	C4 - Charon Way	PRC for Signalled Lanes (%)	18.0	Total Delay for Signalled Lanes (pcuHr)	14.23	Cycle Time (s)	60		PRC Over All Lanes (%)	-36.6	Total Delay Over All Lanes (pcuHr)	235.82		
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C1 - M62 J8 South E82059	Stream: 3 PRC for Signalled Lanes (%)	20.1	Total Delay for Signalled Lanes (pcuHr)	20.74	Cycle Time (s)	144																																																																	
C2 - M62 J8 North E82153	Stream: 1 PRC for Signalled Lanes (%)	1.4	Total Delay for Signalled Lanes (pcuHr)	24.56	Cycle Time (s)	144																																																																	
C2 - M62 J8 North E82153	Stream: 2 PRC for Signalled Lanes (%)	12.5	Total Delay for Signalled Lanes (pcuHr)	15.40	Cycle Time (s)	144																																																																	
C3 - Kingswood	PRC for Signalled Lanes (%)	36.0	Total Delay for Signalled Lanes (pcuHr)	8.02	Cycle Time (s)	96																																																																	
C4 - Charon Way	PRC for Signalled Lanes (%)	18.0	Total Delay for Signalled Lanes (pcuHr)	14.23	Cycle Time (s)	60																																																																	
	PRC Over All Lanes (%)	-36.6	Total Delay Over All Lanes (pcuHr)	235.82																																																																			

Basic Results Summary

Scenario 5: '2027 AM' (FG5: '2027 AM Forecast', Plan 1: 'Existing')

Item	Lane Description	Lane Type	Controller Stream	Deg Sat (%)	Mean Max Queue (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)
Network: Base Model	-	-	N/A	116.5%	-	295.0	-	-		-	-	-	-	-	-
J1: M62 Junction 8	-	-	N/A	116.5%	-	269.2	-	-		-	-	-	-	-	-
1/2+1/1	Skyline Drive Entry Left Ahead	U	1:1	52.6 : 52.6%	8.0	4.8	35.4	C1:F C1:G		1	58:49	-	490	2131:1952	515+417
1/3	Skyline Drive Entry Ahead	U	1:1	32.7%	7.5	2.4	32.3	C1:F		1	58	-	266	1986	814
2/1	Skyline Dr Exit Ahead	U	1:2	46.0%	1.6	0.4	1.9	C1:K		1	131	-	929	2011	1843
2/2	Skyline Dr Exit Ahead	U	1:2	34.9%	9.1	0.3	1.9	C1:K		1	131	-	671	1934	1773
3/1	Skyline Dr Internal Ahead	U	1:1	35.3%	0.4	0.3	3.0	C1:E		1	76	-	376	1990	1064
3/2	Skyline Dr Internal Ahead Ahead2	U	1:1	47.1%	0.7	0.5	3.7	C1:E		1	76	-	526	2087	1116
3/3	Skyline Dr Internal Ahead	U	1:1	24.9%	0.5	0.3	4.1	C1:E		1	76	-	261	1953	1044
4/1	WB On Slip Exit Ahead	U	1:1	32.8%	0.3	0.2	1.5	C1:I		1	131	-	595	1976	1811
4/2	WB On Slip Exit Ahead	U	1:1	7.1%	0.0	0.0	1.1	C1:I		1	131	-	132	2021	1853
5/1	Western Bridge NB Ahead	U	2:2	15.4%	5.3	0.8	20.0	C2:A		1	67	-	140	1929	911
5/2	Western Bridge NB Right	U	2:2	53.6%	11.9	2.9	19.8	C2:A		1	67	-	525	2071	978
5/3	Western Bridge NB Right	U	2:2	57.2%	12.2	3.5	24.0	C2:A		1	67	-	527	1946	919
6/2+6/1	EB Off Slip Ahead Left	U	2:2	81.1 : 0.0%	29.1	9.4	42.6	C2:B		1	66	-	790	2094:1929	974+0
6/3	EB Off Slip Ahead	U	2:2	42.5%	10.4	3.1	29.1	C2:B		1	66	-	382	1932	899
7/1	Burtonwood N Internal Ahead	U	2:1	51.2%	9.2	2.4	12.6	C2:C		1	99	-	688	1934	1343
7/2	Burtonwood N Internal Ahead Right	U	2:1	80.0%	30.3	4.8	15.1	C2:C		1	99	-	1154	2075	1441
7/3	Burtonwood N Internal Right	U	2:1	28.4%	10.7	0.4	4.1	C2:C		1	99	-	382	1934	1343
9/2+9/1	Burtonwood N SB Left Ahead	U	2:1	87.9 : 87.9%	20.2	9.8	77.3	C2:D		1	35	-	456	2002:1941	456+63
9/3	Burtonwood N SB Ahead	U	2:1	47.3%	8.0	3.3	53.2	C2:D		1	35	-	223	1884	471
11/1	Eastern Bridge SB Ahead Ahead2	U	1:3	116.5%	131.4	97.7	319.7	C1:A		1	68	-	1100	1971	944
11/2	Eastern Bridge SB Ahead	U	1:3	64.5%	21.7	3.2	19.1	C1:A		1	68	-	605	1958	938
12/2+12/1	WB Off Slip Ahead Left	U	1:3	61.0 : 61.0%	12.5	4.7	31.7	C1:B		1	65	-	531	1795:1683	277+593
12/3	WB Off Slip Ahead	U	1:3	19.9%	4.0	1.2	26.0	C1:B		1	65	-	164	1801	825
12/4+12/5	WB Off Slip Ahead	U	1:3	116.3 : 116.3%	116.1	88.7	328.4	C1:B		1	65	-	972	1810:1671	822+14
13/1	Charon Way Internal Left	U	N/A	14.1%	0.1	0.1	1.0	-		-	-	-	304	2005	2005
13/2	Charon Way Internal Left	U	N/A	15.3%	0.1	0.1	1.0	-		-	-	-	358	2148	2148
13/3	Charon Way Internal Ahead	U	N/A	61.1%	0.8	0.8	2.1	-		-	-	-	1457	2167	2167
13/4	Charon Way Internal Ahead	U	N/A	6.2%	0.0	0.0	1.0	-		-	-	-	120	1904	1904
15/1	Burtonwood S Entry Left Ahead	U	1:1	65.9%	16.1	6.0	48.1	C1:D		1	48	-	446	1988	676
15/2	Burtonwood S Entry Ahead	U	1:1	69.8%	18.0	6.7	49.5	C1:D		1	48	-	489	2058	700
15/3	Burtonwood S Entry Ahead	U	1:1	38.3%	7.9	2.8	40.5	C1:D		1	48	-	251	1928	656
16/1	Burtonwood S Internal Ahead	U	1:1	58.9%	15.8	3.2	16.2	C1:C		1	86	-	786	1980	1196
16/2	Burtonwood S Internal Ahead	U	1:1	48.3%	12.4	3.2	18.7	C1:C		1	86	-	671	2120	1281
16/3	Burtonwood S Internal Right	U	1:1	9.9%	0.5	0.1	3.4	C1:C		1	86	-	120	1962	1185
19/1	WB Off Slip Approach Ahead	U	N/A	33.8%	0.3	0.3	1.3	-		-	-	-	695	2055	2055
19/2	WB Off Slip Approach Ahead	U	N/A	47.3%	0.4	0.4	1.7	-		-	-	-	972	2055	2055
20/1	Skyline Dr Approach Ahead	U	N/A	35.8%	0.3	0.3	1.3	-		-	-	-	756	2112	2112



Basic Results Summary

Item	Lane Description	Lane Type	Controller Stream	Deg Sat (%)	Mean Max Queue (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)																																																								
Ped Link: P1	M62 WB OS Peds	-	1:1	0.0%	-	-	-	C1:J		1	6	-	0	-	0																																																								
Ped Link: P2	Skyline Drive Exit Peds	-	1:2	0.0%	-	-	-	C1:L		1	6	-	0	-	0																																																								
Ped Link: P3	Skyline Drive Entry Peds	-	1:1	0.0%	-	-	-	C1:H		1	70	-	0	-	0																																																								
Ped Link: P4	M62 EB OS Peds	-	2:2	0.0%	-	-	-	C2:E		1	68	-	0	-	0																																																								
<b>J2: Kingswood</b>	-	-	<b>N/A</b>	<b>60.9%</b>	-	<b>7.7</b>	-	-		-	-	-	-	-	-																																																								
1/1+1/2	Right Ahead	U+O	N/A	60.9 : 60.9%	10.0	2.2	9.7	C3:A	C3:C	1	53	8	829	1942:1790	1327+34																																																								
2/1	Left Ahead	U	N/A	34.0%	4.5	1.4	15.8	C3:B		1	36	-	340	1975	937																																																								
2/2	Ahead	U	N/A	36.2%	4.9	1.5	16.0	C3:B		1	36	-	370	1980	939																																																								
3/1	Kingswood Road Right Left	U	N/A	54.8%	3.2	1.7	48.9	C3:D		1	9	-	127	1809	232																																																								
5/1	SB Exit Ahead	U	N/A	16.5%	0.1	0.1	1.1	-		-	-	-	347	1980	1980																																																								
5/2	SB Exit Ahead	U	N/A	18.1%	0.1	0.1	1.1	-		-	-	-	389	1980	1980																																																								
6/1	SB Merge Ahead	U	N/A	34.8%	6.3	0.6	3.1	-		-	-	-	736	1976	1976																																																								
Ped Link: P1	Unnamed Ped Link	-	N/A	0.0%	-	-	-	C3:E		1	10	-	0	-	0																																																								
Ped Link: P2	Unnamed Ped Link	-	N/A	0.0%	-	-	-	C3:H		1	5	-	0	-	0																																																								
Ped Link: P3	Unnamed Ped Link	-	N/A	0.0%	-	-	-	C3:G		1	55	-	0	-	0																																																								
Ped Link: P4	Unnamed Ped Link	-	N/A	0.0%	-	-	-	C3:F		1	6	-	0	-	0																																																								
<b>J3: Whittle Ave</b>	-	-	<b>N/A</b>	<b>88.6%</b>	-	<b>9.7</b>	-	-		-	-	-	-	-	-																																																								
1/1+1/2	Ahead Left	O	N/A	75.6 : 88.6%	16.0	5.7	30.1	-		-	-	-	736	1986:1948	113+679																																																								
2/1+2/2	Right Ahead	U	N/A	40.1 : 40.1%	0.3	0.3	1.5	-		-	-	-	783	1957:1921	1761+192																																																								
5/1+5/2	Ahead Left	O	N/A	82.5 : 81.5%	2.3	2.3	6.6	-		-	-	-	1231	1982:1900	853+647																																																								
8/1+8/2	Ahead Left	O	N/A	14.6 : 14.6%	0.1	0.1	2.2	-		-	-	-	140	2051:1956	410+547																																																								
11/1+11/2	Ahead Left	O	N/A	60.6 : 60.6%	0.8	0.8	3.3	-		-	-	-	834	2032:1940	784+592																																																								
15/1+15/2	Omega Entry Ahead Left	O	N/A	51.6 : 51.6%	0.5	0.5	6.0	-		-	-	-	319	1877:1878	223+395																																																								
<b>J4: Charon Way</b>	-	-	<b>N/A</b>	<b>64.5%</b>	-	<b>8.4</b>	-	-		-	-	-	-	-	-																																																								
1/1	Burtonwood SB Ahead	U	N/A	23.1%	2.2	0.6	7.1	C4:A		1	36	-	304	1982	1222																																																								
1/2	Burtonwood SB Ahead	U	N/A	26.9%	2.6	0.7	7.3	C4:A		1	36	-	358	1979	1220																																																								
2/1	BWood NB Ahead	U	N/A	28.5%	2.9	0.9	11.9	C4:B		1	28	-	273	1980	957																																																								
2/2	BWood NB Ahead	U	N/A	38.3%	4.4	1.4	12.7	C4:B		1	28	-	392	2120	1025																																																								
2/3	BWood NB Ahead	U	N/A	24.4%	2.4	0.7	11.6	C4:B		1	28	-	232	1971	953																																																								
3/2+3/1	Charon Way Entry Right Left	U	N/A	64.5 : 64.5%	3.6	2.3	38.2	C4:C		1	8	-	221	1838:1995	268+74																																																								
3/3	Charon Way Entry Right	U	N/A	42.8%	2.1	1.1	34.8	C4:C		1	8	-	116	1805	271																																																								
4/1	Charon Way Approach Ahead	U	N/A	16.8%	0.1	0.1	1.1	-		-	-	-	337	2010	2010																																																								
5/1	SB two lane Ahead	U	N/A	16.1%	0.1	0.1	1.1	-		-	-	-	340	1981	1981																																																								
5/2	SB two lane Ahead	U	N/A	16.2%	0.1	0.1	1.0	-		-	-	-	370	2100	2100																																																								
6/1	Ahead	U	N/A	43.8%	0.4	0.4	1.6	-		-	-	-	897	2049	2049																																																								
Ped Link: P1	Burtonwood Rd NB	-	N/A	0.0%	-	-	-	C4:D		1	15	-	0	-	0																																																								
Ped Link: P2	Charon Way LT	-	N/A	0.0%	-	-	-	C4:F		1	40	-	0	-	0																																																								
Ped Link: P3	Burtonwood Rd SB	-	N/A	0.0%	-	-	-	C4:E		1	8	-	0	-	0																																																								
<table border="0" style="width:100%; font-size: small;"> <tr> <td style="width:33%;">C1 - M62 J8 South E82059</td> <td style="width:33%;">Stream: 1 PRC for Signalled Lanes (%):</td> <td style="width:33%;">28.9</td> <td style="width:33%;">Total Delay for Signalled Lanes (pcuHr):</td> <td style="width:33%;">30.65</td> <td style="width:33%;">Cycle Time (s):</td> <td style="width:33%;">144</td> </tr> <tr> <td>C1 - M62 J8 South E82059</td> <td>Stream: 2 PRC for Signalled Lanes (%):</td> <td>95.7</td> <td>Total Delay for Signalled Lanes (pcuHr):</td> <td>0.78</td> <td>Cycle Time (s):</td> <td>144</td> </tr> <tr> <td>C1 - M62 J8 South E82059</td> <td>Stream: 3 PRC for Signalled Lanes (%):</td> <td>-29.4</td> <td>Total Delay for Signalled Lanes (pcuHr):</td> <td>195.42</td> <td>Cycle Time (s):</td> <td>144</td> </tr> <tr> <td>C2 - M62 J8 North E82153</td> <td>Stream: 1 PRC for Signalled Lanes (%):</td> <td>2.3</td> <td>Total Delay for Signalled Lanes (pcuHr):</td> <td>20.78</td> <td>Cycle Time (s):</td> <td>144</td> </tr> <tr> <td>C2 - M62 J8 North E82153</td> <td>Stream: 2 PRC for Signalled Lanes (%):</td> <td>11.0</td> <td>Total Delay for Signalled Lanes (pcuHr):</td> <td>19.59</td> <td>Cycle Time (s):</td> <td>144</td> </tr> <tr> <td>C3 - Kingswood</td> <td>PRC for Signalled Lanes (%):</td> <td>47.8</td> <td>Total Delay for Signalled Lanes (pcuHr):</td> <td>6.87</td> <td>Cycle Time (s):</td> <td>78</td> </tr> <tr> <td>C4 - Charon Way</td> <td>PRC for Signalled Lanes (%):</td> <td>39.5</td> <td>Total Delay for Signalled Lanes (pcuHr):</td> <td>7.72</td> <td>Cycle Time (s):</td> <td>60</td> </tr> <tr> <td></td> <td>PRC Over All Lanes (%):</td> <td>-29.4</td> <td>Total Delay Over All Lanes (pcuHr):</td> <td>294.97</td> <td></td> <td></td> </tr> </table>																C1 - M62 J8 South E82059	Stream: 1 PRC for Signalled Lanes (%):	28.9	Total Delay for Signalled Lanes (pcuHr):	30.65	Cycle Time (s):	144	C1 - M62 J8 South E82059	Stream: 2 PRC for Signalled Lanes (%):	95.7	Total Delay for Signalled Lanes (pcuHr):	0.78	Cycle Time (s):	144	C1 - M62 J8 South E82059	Stream: 3 PRC for Signalled Lanes (%):	-29.4	Total Delay for Signalled Lanes (pcuHr):	195.42	Cycle Time (s):	144	C2 - M62 J8 North E82153	Stream: 1 PRC for Signalled Lanes (%):	2.3	Total Delay for Signalled Lanes (pcuHr):	20.78	Cycle Time (s):	144	C2 - M62 J8 North E82153	Stream: 2 PRC for Signalled Lanes (%):	11.0	Total Delay for Signalled Lanes (pcuHr):	19.59	Cycle Time (s):	144	C3 - Kingswood	PRC for Signalled Lanes (%):	47.8	Total Delay for Signalled Lanes (pcuHr):	6.87	Cycle Time (s):	78	C4 - Charon Way	PRC for Signalled Lanes (%):	39.5	Total Delay for Signalled Lanes (pcuHr):	7.72	Cycle Time (s):	60		PRC Over All Lanes (%):	-29.4	Total Delay Over All Lanes (pcuHr):	294.97		
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Basic Results Summary

Scenario 6: '2027 PM' (FG6: '2027 PM Forecast', Plan 1: 'Existing')

Item	Lane Description	Lane Type	Controller Stream	Deg Sat (%)	Mean Max Queue (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)
<b>Network: Base Model</b>	-	-	<b>N/A</b>	<b>177.8%</b>	-	<b>499.3</b>	-	-		-	-	-	-	-	-
<b>J1: M62 Junction 8</b>	-	-	<b>N/A</b>	<b>98.5%</b>	-	<b>123.0</b>	-	-		-	-	-	-	-	-
1/2+1/1	Skyline Drive Entry Left Ahead	U	1:1	78.5 : 78.5%	25.0	8.6	33.7	C1:F C1:G		1	73:62	-	913	2131:1952	693+470
1/3	Skyline Drive Entry Ahead	U	1:1	52.3%	14.6	4.0	27.0	C1:F		1	73	-	534	1986	1021
2/1	Skyline Dr Exit Ahead	U	1:2	18.1%	0.3	0.1	1.3	C1:K		1	131	-	333	2011	1843
2/2	Skyline Dr Exit Ahead	U	1:2	17.1%	0.1	0.1	1.2	C1:K		1	131	-	304	1934	1773
3/1	Skyline Dr Internal Ahead	U	1:1	57.0%	3.8	1.2	9.1	C1:E		1	61	-	488	1990	857
3/2	Skyline Dr Internal Ahead Ahead2	U	1:1	66.9%	3.7	1.8	10.8	C1:E		1	61	-	600	2084	897
3/3	Skyline Dr Internal Ahead	U	1:1	32.1%	0.5	0.3	4.5	C1:E		1	61	-	270	1953	841
4/1	WB On Slip Exit Ahead	U	1:1	48.0%	0.5	0.5	1.9	C1:I		1	129	-	857	1976	1784
4/2	WB On Slip Exit Ahead	U	1:1	5.7%	0.0	0.0	1.1	C1:I		1	129	-	104	2021	1825
5/1	Western Bridge NB Ahead	U	2:2	8.1%	0.2	0.0	1.9	C2:A		1	78	-	86	1929	1058
5/2	Western Bridge NB Right	U	2:2	84.0%	30.3	8.8	33.2	C2:A		1	78	-	954	2071	1136
5/3	Western Bridge NB Right	U	2:2	75.3%	20.5	6.0	27.0	C2:A		1	78	-	804	1946	1068
6/2+6/1	EB Off Slip Ahead Left	U	2:2	64.3 : 0.0%	17.9	6.1	42.0	C2:B		1	55	-	524	2094:1929	814+0
6/3	EB Off Slip Ahead	U	2:2	28.5%	6.0	2.0	33.6	C2:B		1	55	-	214	1932	751
7/1	Burtonwood N Internal Ahead	U	2:1	76.9%	20.5	2.3	8.1	C2:C		1	97	-	1012	1934	1316
7/2	Burtonwood N Internal Ahead Right	U	2:1	89.9%	38.1	10.6	30.0	C2:C		1	97	-	1270	2075	1412
7/3	Burtonwood N Internal Right	U	2:1	16.3%	3.7	0.9	14.6	C2:C		1	97	-	214	1934	1316
9/2+9/1	Burtonwood N SB Left Ahead	U	2:1	98.5 : 98.5%	30.6	17.9	114.4	C2:D		1	37	-	564	2002:1941	407+166
9/3	Burtonwood N SB Ahead	U	2:1	32.4%	5.4	2.1	48.0	C2:D		1	37	-	161	1884	497
11/1	Eastern Bridge SB Ahead Ahead2	U	1:3	80.7%	20.8	4.5	17.4	C1:A		1	83	-	925	1965	1146
11/2	Eastern Bridge SB Ahead	U	1:3	32.8%	10.4	0.7	6.5	C1:A		1	83	-	375	1958	1142
12/2+12/1	WB Off Slip Ahead Left	U	1:3	88.9 : 88.9%	23.2	11.1	60.1	C1:B		1	50	-	664	1795:1683	449+298
12/3	WB Off Slip Ahead	U	1:3	83.4%	21.8	8.7	58.9	C1:B		1	50	-	532	1801	638
12/4+12/5	WB Off Slip Ahead	U	1:3	49.4 : 49.4%	10.2	4.0	40.8	C1:B		1	50	-	349	1810:1671	634+73
13/1	Charon Way Internal Left	U	N/A	33.0%	0.2	0.2	1.3	-		-	-	-	661	2005	2005
13/2	Charon Way Internal Left	U	N/A	31.7%	0.2	0.2	1.2	-		-	-	-	680	2148	2148
13/3	Charon Way Internal Ahead	U	N/A	26.4%	0.2	0.2	1.1	-		-	-	-	572	2167	2167
13/4	Charon Way Internal Ahead	U	N/A	8.0%	0.0	0.0	1.0	-		-	-	-	152	1904	1904
15/1	Burtonwood S Entry Left Ahead	U	1:1	67.2%	17.1	6.2	47.1	C1:D		1	50	-	475	1995	707
15/2	Burtonwood S Entry Ahead	U	1:1	73.0%	19.8	7.3	49.5	C1:D		1	50	-	532	2058	729
15/3	Burtonwood S Entry Ahead	U	1:1	38.7%	8.2	2.9	39.1	C1:D		1	50	-	264	1928	683
16/1	Burtonwood S Internal Ahead	U	1:1	22.9%	2.0	0.5	7.3	C1:C		1	84	-	268	1980	1169
16/2	Burtonwood S Internal Ahead	U	1:1	24.3%	2.4	0.7	7.8	C1:C		1	84	-	304	2120	1251
16/3	Burtonwood S Internal Right	U	1:1	13.1%	1.4	0.6	13.2	C1:C		1	84	-	152	1962	1158
19/1	WB Off Slip Approach Ahead	U	N/A	58.2%	0.7	0.7	2.1	-		-	-	-	1196	2055	2055
19/2	WB Off Slip Approach Ahead	U	N/A	17.0%	0.1	0.1	1.1	-		-	-	-	349	2055	2055
20/1	Skyline Dr Approach Ahead	U	N/A	68.5%	1.1	1.1	2.7	-		-	-	-	1447	2112	2112

Basic Results Summary

Item	Lane Description	Lane Type	Controller Stream	Deg Sat (%)	Mean Max Queue (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)
Ped Link: P1	M62 WB OS Peds	-	1:1	0.0%	-	-	-	C1:J		1	8	-	0	-	0
Ped Link: P2	Skyline Drive Exit Peds	-	1:2	0.0%	-	-	-	C1:L		1	6	-	0	-	0
Ped Link: P3	Skyline Drive Entry Peds	-	1:1	0.0%	-	-	-	C1:H		1	55	-	0	-	0
Ped Link: P4	M62 EB OS Peds	-	2:2	0.0%	-	-	-	C2:E		1	79	-	0	-	0
<b>J2: Kingswood</b>	-	-	<b>N/A</b>	<b>69.5%</b>	-	<b>15.7</b>	-	-		-	-	-	-	-	-
1/1+1/2	Right Ahead	U+O	N/A	40.6 : 40.6%	5.8	1.1	6.5	C3:A	C3:C	1	71	9	596	1942:1790	1437+32
2/1	Left Ahead	U	N/A	61.5%	12.9	3.5	18.3	C3:B		1	53	-	680	1965	1105
2/2	Ahead	U	N/A	62.8%	13.3	3.6	18.5	C3:B		1	53	-	699	1980	1114
3/1	Kingswood Road Right Left	U	N/A	64.1%	3.9	2.2	67.4	C3:D		1	9	-	120	1798	187
5/1	SB Exit Ahead	U	N/A	32.5%	0.2	0.2	1.3	-		-	-	-	643	1980	1980
5/2	SB Exit Ahead	U	N/A	36.9%	0.3	0.3	1.4	-		-	-	-	730	1980	1980
6/1	SB Merge Ahead	U	N/A	69.5%	32.0	4.8	12.5	-		-	-	-	1373	1976	1976
Ped Link: P1	Unnamed Ped Link	-	N/A	0.0%	-	-	-	C3:E		1	10	-	0	-	0
Ped Link: P2	Unnamed Ped Link	-	N/A	0.0%	-	-	-	C3:H		1	5	-	0	-	0
Ped Link: P3	Unnamed Ped Link	-	N/A	0.0%	-	-	-	C3:G		1	73	-	0	-	0
Ped Link: P4	Unnamed Ped Link	-	N/A	0.0%	-	-	-	C3:F		1	7	-	0	-	0
<b>J3: Whittle Ave</b>	-	-	<b>N/A</b>	<b>177.8%</b>	-	<b>344.5</b>	-	-		-	-	-	-	-	-
1/1+1/2	Ahead Left	O	N/A	177.8 : 177.8%	408.4	341.5	895.5	-		-	-	-	1373	1986:1948	98+675
2/1+2/2	Right Ahead	U	N/A	41.1 : 41.1%	0.3	0.3	1.6	-		-	-	-	802	1957:1921	1763+190
5/1+5/2	Ahead Left	O	N/A	76.9 : 76.9%	1.6	1.6	5.6	-		-	-	-	1051	1982:1900	573+793
8/1+8/2	Ahead Left	O	N/A	6.5 : 6.5%	0.0	0.0	1.9	-		-	-	-	67	2051:1956	433+603
11/1+11/2	Ahead Left	O	N/A	55.4 : 55.4%	0.6	0.6	4.0	-		-	-	-	553	2032:1940	725+272
15/1+15/2	Omega Entry Ahead Left	O	N/A	38.8 : 38.8%	0.3	0.3	4.4	-		-	-	-	262	1877:1878	250+425
<b>J4: Charon Way</b>	-	-	<b>N/A</b>	<b>77.9%</b>	-	<b>16.1</b>	-	-		-	-	-	-	-	-
1/1	Burtonwood SB Ahead	U	N/A	62.5%	8.5	2.6	14.3	C4:A		1	31	-	661	1982	1057
1/2	Burtonwood SB Ahead	U	N/A	64.4%	8.8	2.8	14.7	C4:A		1	31	-	680	1979	1055
2/1	BWood NB Ahead	U	N/A	18.7%	1.7	0.6	14.5	C4:B		1	23	-	148	1980	792
2/2	BWood NB Ahead	U	N/A	38.9%	4.2	1.5	16.3	C4:B		1	23	-	330	2120	848
2/3	BWood NB Ahead	U	N/A	20.4%	1.9	0.7	14.6	C4:B		1	23	-	161	1971	788
3/2+3/1	Charon Way Entry Right Left	U	N/A	77.9 : 77.9%	7.0	3.9	38.1	C4:C		1	13	-	365	1838:1995	420+49
3/3	Charon Way Entry Right	U	N/A	72.4%	5.9	3.1	36.4	C4:C		1	13	-	305	1805	421
4/1	Charon Way Approach Ahead	U	N/A	33.3%	0.2	0.2	1.3	-		-	-	-	670	2010	2010
5/1	SB two lane Ahead	U	N/A	34.3%	0.3	0.3	1.4	-		-	-	-	680	1981	1981
5/2	SB two lane Ahead	U	N/A	33.3%	0.2	0.2	1.3	-		-	-	-	699	2100	2100
6/1	Ahead	U	N/A	31.2%	0.2	0.2	1.3	-		-	-	-	639	2049	2049
Ped Link: P1	Burtonwood Rd NB	-	N/A	0.0%	-	-	-	C4:D		1	20	-	0	-	0
Ped Link: P2	Charon Way LT	-	N/A	0.0%	-	-	-	C4:F		1	35	-	0	-	0
Ped Link: P3	Burtonwood Rd SB	-	N/A	0.0%	-	-	-	C4:E		1	13	-	0	-	0
C1 - M62 J8 South E82059		Stream: 1 PRC for Signalled Lanes (%)		14.6	Total Delay for Signalled Lanes (pcuHr):		34.57	Cycle Time (s):		144					
C1 - M62 J8 South E82059		Stream: 2 PRC for Signalled Lanes (%)		398.2	Total Delay for Signalled Lanes (pcuHr):		0.22	Cycle Time (s):		144					
C1 - M62 J8 South E82059		Stream: 3 PRC for Signalled Lanes (%)		1.3	Total Delay for Signalled Lanes (pcuHr):		28.87	Cycle Time (s):		144					
C2 - M62 J8 North E82153		Stream: 1 PRC for Signalled Lanes (%)		-9.4	Total Delay for Signalled Lanes (pcuHr):		33.81	Cycle Time (s):		144					
C2 - M62 J8 North E82153		Stream: 2 PRC for Signalled Lanes (%)		7.2	Total Delay for Signalled Lanes (pcuHr):		22.99	Cycle Time (s):		144					
C3 - Kingswood		PRC for Signalled Lanes (%)		40.5	Total Delay for Signalled Lanes (pcuHr):		10.36	Cycle Time (s):		96					
C4 - Charon Way		PRC for Signalled Lanes (%)		15.6	Total Delay for Signalled Lanes (pcuHr):		15.10	Cycle Time (s):		60					
		PRC Over All Lanes (%)		-97.5	Total Delay Over All Lanes (pcuHr):		499.31								

# Appendix C

**PVB CALCULATIONS FOR CALCULATED PEAK HOUR MULTIPLIER**

# Burtonwood Road Network

AM Weekday 07:00-10:00													
Year	Annualised Delay Saving (pcuHr)			Values of Time (£/Hr) (Table A1.3.6)			Undiscounted Benefit (£)				Discount Rate (Table A1.1.1)	Discount Factor	Present Value Benefit (PVB)
	Car	LGV	OGV	Average Car	Average LGV	Average OGV	Average Car	Average LGV	Average OGV	Total			
2010	0	0	0	11.33	13.93	14.35	0.00	0.00	0.00	0.00	-	1.000	0.00
2011	0	0	0	11.40	14.03	14.45	0.00	0.00	0.00	0.00	3.5%	1.035	0.00
2012	0	0	0	11.48	14.12	14.54	0.00	0.00	0.00	0.00	3.5%	1.071	0.00
2013	0	0	0	11.62	14.30	14.73	0.00	0.00	0.00	0.00	3.5%	1.109	0.00
2014	0	0	0	11.89	14.62	15.06	0.00	0.00	0.00	0.00	3.5%	1.148	0.00
2015	0	0	0	12.06	14.83	15.28	0.00	0.00	0.00	0.00	3.5%	1.188	0.00
2016	0	0	0	12.21	15.02	15.47	0.00	0.00	0.00	0.00	3.5%	1.229	0.00
2017	-564.19	-53.13	-30.36	12.39	15.24	15.70	-6990.31	-809.70	-476.65	-8276.66	3.5%	1.272	-6506.81
2018	257.30	23.28	13.16	12.57	15.46	15.92	3234.26	359.91	209.51	3803.68	3.5%	1.317	2888.14
2019	1078.79	99.68	56.67	12.75	15.68	16.15	13754.57	1562.98	915.22	16232.77	3.5%	1.363	11909.59
2020	1900.28	176.09	100.19	12.93	15.91	16.38	24570.62	2801.59	1641.11	29013.32	3.5%	1.411	20562.24
2021	2721.77	252.49	143.70	13.16	16.18	16.67	35818.49	4085.29	2395.48	42299.26	3.5%	1.460	28972.10
2022	3543.27	328.90	187.22	13.39	16.47	16.97	47444.39	5416.98	3177.12	56038.49	3.5%	1.511	37087.02
2023	4364.76	405.31	230.74	13.63	16.76	17.27	59491.68	6793.00	3984.88	70269.56	3.5%	1.564	44929.39
2024	5186.25	481.71	274.25	13.89	17.08	17.59	72037.01	8227.61	4824.06	85088.68	3.5%	1.619	52556.32
2025	6007.74	558.12	317.77	14.15	17.41	17.93	85009.52	9716.87	5697.62	100424.01	3.5%	1.675	59954.63
2026	6829.23	634.52	361.28	14.43	17.74	18.28	98545.79	11256.38	6604.20	116406.37	3.5%	1.734	67131.70
2027	7650.72	710.93	404.8	14.71	18.09	18.63	112542.09	12860.72	7541.42	132944.23	3.5%	1.795	74063.64
2028	7650.72	710.93	404.8	14.99	18.44	19.00	114684.29	13109.55	7691.20	135485.04	3.5%	1.857	72959.10
2029	7650.72	710.93	404.8	15.29	18.81	19.37	116979.51	13372.59	7840.98	138193.08	3.5%	1.923	71863.28
2030	7650.72	710.93	404.8	15.60	19.18	19.76	119351.23	13635.64	7998.85	140985.72	3.5%	1.990	70847.10
2031	7650.72	710.93	404.8	15.91	19.57	20.16	121722.96	13912.90	8160.77	143796.63	3.5%	2.059	69838.09
2032	7650.72	710.93	404.8	16.23	19.96	20.56	124171.19	14190.16	8322.69	146684.04	3.5%	2.132	68801.14
2033	7650.72	710.93	404.8	16.56	20.37	20.98	126695.92	14481.64	8492.70	149670.26	3.5%	2.206	67846.90
2034	7650.72	710.93	404.8	16.92	20.81	21.43	129450.18	14794.45	8674.86	152919.49	3.5%	2.283	66981.82
2035	7650.72	710.93	404.8	17.27	21.24	21.88	132127.93	15100.15	8857.02	156085.10	3.5%	2.363	66053.79
2036	7650.72	710.93	404.8	17.62	21.68	22.33	134805.69	15412.96	9039.18	159257.83	3.5%	2.446	65109.50
2037	7650.72	710.93	404.8	17.99	22.13	22.79	137636.45	15732.88	9225.39	162594.72	3.5%	2.532	64215.92
2038	7650.72	710.93	404.8	18.37	22.59	23.27	140543.73	16059.91	9419.70	166023.34	3.5%	2.620	63367.69
2039	7650.72	710.93	404.8	18.75	23.06	23.76	143451.00	16394.05	9618.05	169463.10	3.5%	2.712	62486.39
2040	7650.72	710.93	404.8	19.14	23.55	24.25	146434.78	16742.40	9816.40	172993.58	3.5%	2.807	61629.35
2041	7650.72	710.93	404.8	19.54	24.04	24.76	149495.07	17090.76	10022.85	176608.68	3.5%	2.905	60794.73
2042	7650.72	710.93	404.8	19.96	24.55	25.28	152708.37	17453.33	10233.34	180395.04	3.5%	3.007	59991.70
2043	7650.72	710.93	404.8	20.38	25.06	25.82	155921.67	17815.91	10451.94	184189.52	3.5%	3.112	59186.86
2044	7650.72	710.93	404.8	20.81	25.59	26.36	159211.48	18192.70	10670.53	188074.71	3.5%	3.221	58390.16
2045	7650.72	710.93	404.8	21.25	26.13	26.92	162577.80	18576.60	10897.22	192051.62	3.5%	3.334	57603.97
2046	7650.72	710.93	404.8	21.72	26.71	27.51	166173.64	18988.94	11136.05	196298.63	3.5%	3.450	56898.15
2047	7650.72	710.93	404.8	22.18	27.28	28.10	169692.97	19394.17	11374.88	200462.02	3.5%	3.571	56136.10
2048	7650.72	710.93	404.8	22.66	27.87	28.70	173365.32	19813.62	11617.76	204796.70	3.0%	3.678	55681.54
2049	7650.72	710.93	404.8	23.14	28.46	29.32	177037.66	20233.07	11868.74	209139.47	3.0%	3.789	55196.48
2050	7650.72	710.93	404.8	23.63	29.07	29.94	180786.51	20666.74	12119.71	213572.96	3.0%	3.902	54734.23
2051	7650.72	710.93	404.8	24.12	29.66	30.55	184535.37	21086.18	12366.64	217988.19	3.0%	4.019	54239.41
2052	7650.72	710.93	404.8	24.62	30.28	31.19	188360.73	21526.96	12625.71	222513.40	3.0%	4.140	53747.20
2053	7650.72	710.93	404.8	25.13	30.90	31.83	192262.59	21967.74	12884.78	227115.11	3.0%	4.264	53263.39
2054	7650.72	710.93	404.8	25.65	31.54	32.49	196240.97	22422.73	13151.95	231815.65	3.0%	4.392	52781.34
2055	7650.72	710.93	404.8	26.18	32.20	33.16	200295.85	22891.95	13423.17	236610.97	3.0%	4.524	52301.28
2056	7650.72	710.93	404.8	26.72	32.86	33.85	204427.24	23361.16	13702.48	241490.88	3.0%	4.659	51833.20
2057	7650.72	710.93	404.8	27.28	33.55	34.56	208711.64	23851.70	13989.89	246553.23	3.0%	4.799	51375.96
2058	7650.72	710.93	404.8	27.88	34.29	35.32	213302.07	24377.79	14297.54	251977.40	3.0%	4.943	50976.61
2059	7650.72	710.93	404.8	28.49	35.04	36.09	217969.01	24910.99	14609.23	257489.23	3.0%	5.091	50577.34
2060	7650.72	710.93	404.8	29.14	35.84	36.92	222941.98	25479.73	14945.22	263366.93	3.0%	5.244	50222.53
2061	7650.72	710.93	404.8	29.81	36.67	37.77	228067.96	26069.80	15289.30	269427.06	3.0%	5.401	49884.66
2062	7650.72	710.93	404.8	30.50	37.51	38.63	233346.96	26666.98	15637.42	275651.36	3.0%	5.564	49541.94
2063	7650.72	710.93	404.8	31.20	38.37	39.52	238702.46	27278.38	15997.70	281978.54	3.0%	5.730	49210.91
2064	7650.72	710.93	404.8	31.88	39.21	40.39	243904.95	27875.57	16349.87	288130.39	3.0%	5.902	48819.11
2065	7650.72	710.93	404.8	32.58	40.08	41.28	249260.46	28494.07	16710.14	294464.67	3.0%	6.079	48439.66
2066	7650.72	710.93	404.8	33.30	40.96	42.19	254768.98	29119.69	17078.51	300967.18	3.0%	6.262	48062.47
2067	7650.72	710.93	404.8	34.03	41.85	43.11	260354.00	29752.42	17450.93	307557.35	3.0%	6.450	47683.31
2068	7650.72	710.93	404.8	34.77	42.76	44.05	266015.53	30399.37	17831.44	314246.34	3.0%	6.643	47304.88
2069	7650.72	710.93	404.8	35.53	43.70	45.01	271830.08	31067.64	18220.05	321117.77	3.0%	6.842	46933.32
2070	7650.72	710.93	404.8	36.30	44.65	45.99	277721.14	31743.02	18616.75	328080.91	3.0%	7.048	46549.50
2071	7650.72	710.93	404.8	37.10	45.63	47.00	283841.71	32439.74	19025.60	335307.05	3.0%	7.259	46191.91
2072	7650.72	710.93	404.8	37.90	46.62	48.02	289962.29	33143.56	19438.50	342544.35	3.0%	7.477	45813.07
2073	7650.72	710.93	404.8	38.72	47.63	49.06	296235.88	33861.60	19859.49	349956.97	3.0%	7.701	45443.06
2074	7650.72	710.93	404.8	39.56	48.66	50.12	302662.48	34593.85	20288.58	357544.91	3.0%	7.932	45076.26
2075	7650.72	710.93	404.8	40.42	49.72	51.21	309242.10	35347.44	20729.81	365319.35	3.0%	8.170	44714.73
2076	7650.72	710.93	404.8	41.30	50.79	52.32	315974.74	36108.13	21179.14	373262.01	3.0%	8.415	44356.75
												Total	£3,115,505.75

# Burtonwood Road Network

PM Weekday 16:00-19:00													
Year	Annualised Delay Saving (pcuHr)			Values of Time (£/Hr) (Table A1.3.6)			Undiscounted Benefit (£)				Discount Rate (Table A1.1.1)	Discount Factor	Present Value Benefit (PVB)
	Car	LGV	OGV	Average Car	Average LGV	Average OGV	Average Car	Average LGV	Average OGV	Total			
2010	0	0	0	10.88	13.93	14.35	0.00	0.00	0.00	0.00	-	1.000	0.00
2011	0	0	0	10.96	14.03	14.45	0.00	0.00	0.00	0.00	3.5%	1.035	0.00
2012	0	0	0	11.03	14.12	14.54	0.00	0.00	0.00	0.00	3.5%	1.071	0.00
2013	0	0	0	11.17	14.30	14.72	0.00	0.00	0.00	0.00	3.5%	1.109	0.00
2014	0	0	0	11.42	14.62	15.06	0.00	0.00	0.00	0.00	3.5%	1.148	0.00
2015	0	0	0	11.59	14.83	15.28	0.00	0.00	0.00	0.00	3.5%	1.188	0.00
2016	0	0	0	11.73	15.02	15.47	0.00	0.00	0.00	0.00	3.5%	1.229	0.00
2017	5520.46	318.78	68.31	11.91	15.24	15.70	65748.68	4858.21	1072.47	71679.36	3.5%	1.272	56351.70
2018	6501.59	375.71	80.45	12.07	15.46	15.92	78474.19	5808.48	1280.76	85563.43	3.5%	1.317	64968.44
2019	7482.73	432.63	92.60	12.25	15.68	16.15	91663.44	6783.64	1495.49	99942.57	3.5%	1.363	73325.44
2020	8463.86	489.56	104.74	12.42	15.90	16.38	105121.14	7784.00	1715.64	114620.78	3.5%	1.411	81233.72
2021	9445.00	546.48	116.89	12.64	16.18	16.67	119384.80	8842.05	1948.56	130175.41	3.5%	1.460	89161.24
2022	10426.13	603.41	129.03	12.87	16.47	16.96	134184.29	9938.16	2188.35	146310.80	3.5%	1.511	96830.44
2023	11407.26	660.33	141.17	13.10	16.76	17.27	149435.11	11067.13	2438.01	162940.25	3.5%	1.564	104181.75
2024	12388.40	717.26	153.32	13.34	17.08	17.59	165261.26	12250.80	2696.90	180208.96	3.5%	1.619	111308.81
2025	13369.53	774.18	165.46	13.60	17.41	17.93	181825.61	13478.47	2966.70	198270.78	3.5%	1.675	118370.61
2026	14350.67	831.11	177.61	13.86	17.74	18.28	198900.29	14743.89	3246.71	216890.89	3.5%	1.734	125081.25
2027	15331.80	888.03	189.75	14.13	18.09	18.63	216638.33	16064.46	3535.04	236237.83	3.5%	1.795	131608.82
2028	15331.80	888.03	189.75	14.41	18.44	19.00	220931.24	16375.27	3605.25	240911.76	3.5%	1.857	129731.70
2029	15331.80	888.03	189.75	14.69	18.81	19.37	225224.14	16703.84	3675.46	245603.44	3.5%	1.923	127718.90
2030	15331.80	888.03	189.75	14.98	19.18	19.76	229670.36	17032.42	3749.46	250452.24	3.5%	1.990	125855.40
2031	15331.80	888.03	189.75	15.29	19.57	20.15	234423.22	17378.75	3823.46	255625.43	3.5%	2.059	124150.28
2032	15331.80	888.03	189.75	15.59	19.96	20.56	239022.76	17725.08	3901.26	260649.10	3.5%	2.132	122255.68
2033	15331.80	888.03	189.75	15.91	20.37	20.98	243928.94	18089.17	3980.96	265999.07	3.5%	2.206	120579.81
2034	15331.80	888.03	189.75	16.25	20.81	21.43	249141.75	18479.90	4066.34	271687.99	3.5%	2.283	119004.81
2035	15331.80	888.03	189.75	16.59	21.24	21.87	254354.56	18861.76	4149.83	277366.15	3.5%	2.363	117378.82
2036	15331.80	888.03	189.75	16.93	21.68	22.33	259567.37	19252.49	4237.12	283056.98	3.5%	2.446	115722.40
2037	15331.80	888.03	189.75	17.29	22.13	22.79	265086.82	19652.10	4324.40	289063.32	3.5%	2.532	114164.03
2038	15331.80	888.03	189.75	17.65	22.59	23.27	270606.27	20060.60	4415.48	295082.35	3.5%	2.620	112626.85
2039	15331.80	888.03	189.75	18.02	23.06	23.76	276279.04	20477.97	4508.46	301265.47	3.5%	2.712	111086.09
2040	15331.80	888.03	189.75	18.39	23.55	24.25	281951.80	20913.11	4601.44	307466.35	3.5%	2.807	109535.57
2041	15331.80	888.03	189.75	18.78	24.04	24.76	287931.20	21348.24	4698.21	313977.65	3.5%	2.905	108081.81
2042	15331.80	888.03	189.75	19.17	24.55	25.28	293910.61	21801.14	4796.88	320508.63	3.5%	3.007	106587.51
2043	15331.80	888.03	189.75	19.58	25.06	25.82	300196.64	22254.03	4899.35	327350.02	3.5%	3.112	105189.60
2044	15331.80	888.03	189.75	19.99	25.59	26.36	306482.68	22724.69	5001.81	334209.18	3.5%	3.221	103759.45
2045	15331.80	888.03	189.75	20.41	26.13	26.92	312922.04	23204.22	5108.07	341234.33	3.5%	3.334	102349.83
2046	15331.80	888.03	189.75	20.87	26.71	27.51	319974.67	23719.28	5220.02	348913.97	3.5%	3.450	101134.48
2047	15331.80	888.03	189.75	21.31	27.28	28.10	326720.66	24225.46	5331.98	356278.10	3.5%	3.571	99769.84
2048	15331.80	888.03	189.75	21.77	27.87	28.70	333773.29	24749.40	5445.83	363968.52	3.0%	3.678	98958.27
2049	15331.80	888.03	189.75	22.23	28.46	29.32	340825.91	25273.33	5563.47	371662.71	3.0%	3.789	98089.92
2050	15331.80	888.03	189.75	22.71	29.07	29.94	348185.18	25815.03	5681.12	379681.33	3.0%	3.902	97304.29
2051	15331.80	888.03	189.75	23.17	29.66	30.55	355237.81	26338.97	5796.86	387373.64	3.0%	4.019	96385.58
2052	15331.80	888.03	189.75	23.65	30.28	31.18	362597.07	26889.55	5916.41	395403.03	3.0%	4.140	95507.98
2053	15331.80	888.03	189.75	24.14	30.90	31.83	370109.65	27440.13	6039.74	403589.52	3.0%	4.264	94650.45
2054	15331.80	888.03	189.75	24.64	31.54	32.49	377775.55	28008.47	6164.98	411949.00	3.0%	4.392	93795.31
2055	15331.80	888.03	189.75	25.15	32.20	33.16	385594.77	28594.57	6292.11	420481.45	3.0%	4.524	92944.62
2056	15331.80	888.03	189.75	25.67	32.86	33.85	393567.31	29180.67	6423.04	429171.02	3.0%	4.659	92116.55
2057	15331.80	888.03	189.75	26.21	33.55	34.56	401846.48	29793.41	6557.76	438197.65	3.0%	4.799	91310.20
2058	15331.80	888.03	189.75	26.78	34.29	35.32	410585.60	30450.55	6701.97	447738.12	3.0%	4.943	90580.24
2059	15331.80	888.03	189.75	27.37	35.04	36.09	419631.37	31116.57	6848.08	457596.02	3.0%	5.091	89883.33
2060	15331.80	888.03	189.75	28.00	35.84	36.92	429290.40	31827.00	7005.57	468122.97	3.0%	5.244	89268.30
2061	15331.80	888.03	189.75	28.64	36.66	37.77	439102.75	32555.18	7166.86	478824.79	3.0%	5.401	88654.84
2062	15331.80	888.03	189.75	29.30	37.51	38.63	449221.74	33310.01	7330.04	489861.79	3.0%	5.564	88041.30
2063	15331.80	888.03	189.75	29.97	38.37	39.52	459494.05	34073.71	7498.92	501066.68	3.0%	5.730	87446.19
2064	15331.80	888.03	189.75	30.63	39.21	40.39	469613.03	34819.66	7664.00	512096.69	3.0%	5.902	86766.64
2065	15331.80	888.03	189.75	31.31	40.07	41.28	480038.66	35583.36	7832.88	523454.90	3.0%	6.079	86108.72
2066	15331.80	888.03	189.75	31.99	40.96	42.18	490464.28	36373.71	8003.66	534841.65	3.0%	6.262	85410.68
2067	15331.80	888.03	189.75	32.69	41.85	43.11	501196.54	37164.06	8180.12	546540.72	3.0%	6.450	84735.00
2068	15331.80	888.03	189.75	33.41	42.76	44.05	512235.44	37972.16	8358.49	558566.09	3.0%	6.643	84083.41
2069	15331.80	888.03	189.75	34.14	43.70	45.01	523427.65	38806.91	8540.65	570775.21	3.0%	6.842	83422.28
2070	15331.80	888.03	189.75	34.88	44.65	45.99	534773.18	39650.54	8726.60	583150.32	3.0%	7.048	82739.83
2071	15331.80	888.03	189.75	35.64	45.63	47.00	546425.35	40520.81	8918.25	595864.41	3.0%	7.259	82086.29
2072	15331.80	888.03	189.75	36.42	46.62	48.02	558384.16	41399.96	9111.80	608895.92	3.0%	7.477	81435.86
2073	15331.80	888.03	189.75	37.20	47.63	49.06	570342.96	42296.87	9309.14	621948.97	3.0%	7.701	80762.10
2074	15331.80	888.03	189.75	38.01	48.66	50.12	582761.72	43211.54	9510.27	635483.53	3.0%	7.932	80116.43
2075	15331.80	888.03	189.75	38.84	49.71	51.21	595487.11	44143.97	9717.10	649348.18	3.0%	8.170	79479.58
2076	15331.80	888.03	189.75	39.68	50.79	52.32	608365.82	45103.04	9927.72	663396.58	3.0%	8.415	78835.01
												Total	£5,890,024.28

# Kingswood Road Junction Only

AM Weekday 07:00-10:00													
Year	Annualised Delay Saving (pcuHr)			Values of Time (£/Hr) (Table A1.3.6)			Undiscounted Benefit (£)				Discount Rate (Table A1.1.1)	Discount Factor	Present Value Benefit (PVB)
	Car	LGV	OGV	Average Car	Average LGV	Average OGV	Average Car	Average LGV	Average OGV	Total			
2010	0	0	0	11.33	13.93	14.35	0.00	0.00	0.00	0.00	-	1.000	0.00
2011	0	0	0	11.40	14.03	14.45	0.00	0.00	0.00	0.00	3.5%	1.035	0.00
2012	0	0	0	11.48	14.12	14.54	0.00	0.00	0.00	0.00	3.5%	1.071	0.00
2013	0	0	0	11.62	14.30	14.73	0.00	0.00	0.00	0.00	3.5%	1.109	0.00
2014	0	0	0	11.89	14.62	15.06	0.00	0.00	0.00	0.00	3.5%	1.148	0.00
2015	0	0	0	12.06	14.83	15.28	0.00	0.00	0.00	0.00	3.5%	1.188	0.00
2016	0	0	0	12.21	15.02	15.47	0.00	0.00	0.00	0.00	3.5%	1.229	0.00
2017	0	0	0	12.39	15.24	15.70	0.00	0.00	0.00	0.00	3.5%	1.272	0.00
2018	27.577	2.53	1.518	12.57	15.46	15.92	346.64	39.11	24.17	409.92	3.5%	1.317	311.25
2019	55.154	5.06	3.036	12.75	15.68	16.15	703.21	79.34	49.03	831.58	3.5%	1.363	610.11
2020	82.731	7.59	4.554	12.93	15.91	16.38	1069.71	120.76	74.59	1265.06	3.5%	1.411	896.57
2021	110.308	10.12	6.072	13.16	16.18	16.67	1451.65	163.74	101.22	1716.61	3.5%	1.460	1175.76
2022	137.885	12.65	7.59	13.39	16.47	16.97	1846.28	208.35	128.80	2183.43	3.5%	1.511	1445.02
2023	165.462	15.18	9.108	13.63	16.76	17.27	2255.25	254.42	157.30	2666.97	3.5%	1.564	1705.22
2024	193.039	17.71	10.626	13.89	17.08	17.59	2681.31	302.49	186.91	3170.71	3.5%	1.619	1958.44
2025	220.616	20.24	12.144	14.15	17.41	17.93	3121.72	352.38	217.74	3691.84	3.5%	1.675	2204.08
2026	248.193	22.77	13.662	14.43	17.74	18.28	3581.42	403.94	249.74	4235.10	3.5%	1.734	2442.39
2027	275.77	25.3	15.18	14.71	18.09	18.63	4056.58	457.68	282.80	4797.06	3.5%	1.795	2672.46
2028	275.77	25.3	15.18	14.99	18.44	19.00	4133.79	466.53	288.42	4888.74	3.5%	1.857	2632.60
2029	275.77	25.3	15.18	15.29	18.81	19.37	4216.52	475.89	294.04	4986.45	3.5%	1.923	2593.06
2030	275.77	25.3	15.18	15.60	19.18	19.76	4302.01	485.25	299.96	5087.22	3.5%	1.990	2556.39
2031	275.77	25.3	15.18	15.91	19.57	20.16	4387.50	495.12	306.03	5188.65	3.5%	2.059	2519.99
2032	275.77	25.3	15.18	16.23	19.96	20.56	4475.75	504.99	312.10	5292.84	3.5%	2.132	2482.57
2033	275.77	25.3	15.18	16.56	20.37	20.98	4566.75	515.36	318.48	5400.59	3.5%	2.206	2448.14
2034	275.77	25.3	15.18	16.92	20.81	21.43	4666.03	526.49	325.31	5517.83	3.5%	2.283	2416.92
2035	275.77	25.3	15.18	17.27	21.24	21.88	4762.55	537.37	332.14	5632.06	3.5%	2.363	2383.44
2036	275.77	25.3	15.18	17.62	21.68	22.33	4859.07	548.50	338.97	5746.54	3.5%	2.446	2349.36
2037	275.77	25.3	15.18	17.99	22.13	22.79	4961.10	559.89	345.95	5866.94	3.5%	2.532	2317.12
2038	275.77	25.3	15.18	18.37	22.59	23.27	5065.89	571.53	353.24	5990.66	3.5%	2.620	2286.51
2039	275.77	25.3	15.18	18.75	23.06	23.76	5170.69	583.42	360.68	6114.79	3.5%	2.712	2254.72
2040	275.77	25.3	15.18	19.14	23.55	24.25	5278.24	595.82	368.12	6242.18	3.5%	2.807	2223.79
2041	275.77	25.3	15.18	19.54	24.04	24.76	5388.55	608.21	375.86	6372.62	3.5%	2.905	2193.67
2042	275.77	25.3	15.18	19.96	24.55	25.28	5504.37	621.12	383.75	6509.24	3.5%	3.007	2164.70
2043	275.77	25.3	15.18	20.38	25.06	25.82	5620.19	634.02	391.95	6646.16	3.5%	3.112	2135.66
2044	275.77	25.3	15.18	20.81	25.59	26.36	5738.77	647.43	400.14	6786.34	3.5%	3.221	2106.90
2045	275.77	25.3	15.18	21.25	26.13	26.92	5860.11	661.09	408.65	6929.85	3.5%	3.334	2078.54
2046	275.77	25.3	15.18	21.72	26.71	27.51	5989.72	675.76	417.60	7083.08	3.5%	3.450	2053.07
2047	275.77	25.3	15.18	22.18	27.28	28.10	6116.58	690.18	426.56	7233.32	3.5%	3.571	2025.57
2048	275.77	25.3	15.18	22.66	27.87	28.70	6248.95	705.11	435.67	7389.73	3.0%	3.678	2009.17
2049	275.77	25.3	15.18	23.14	28.46	29.32	6381.32	720.04	445.08	7546.44	3.0%	3.789	1991.67
2050	275.77	25.3	15.18	23.63	29.07	29.94	6516.45	735.47	454.49	7706.41	3.0%	3.902	1974.99
2051	275.77	25.3	15.18	24.12	29.66	30.55	6651.57	750.40	463.75	7865.72	3.0%	4.019	1957.13
2052	275.77	25.3	15.18	24.62	30.28	31.19	6789.46	766.08	473.46	8029.00	3.0%	4.140	1939.37
2053	275.77	25.3	15.18	25.13	30.90	31.83	6930.10	781.77	483.18	8195.05	3.0%	4.264	1921.92
2054	275.77	25.3	15.18	25.65	31.54	32.49	7073.50	797.96	493.20	8364.66	3.0%	4.392	1904.52
2055	275.77	25.3	15.18	26.18	32.20	33.16	7219.66	814.66	503.37	8537.69	3.0%	4.524	1887.20
2056	275.77	25.3	15.18	26.72	32.86	33.85	7368.57	831.36	513.84	8713.77	3.0%	4.659	1870.31
2057	275.77	25.3	15.18	27.28	33.55	34.56	7523.01	848.82	524.62	8896.45	3.0%	4.799	1853.81
2058	275.77	25.3	15.18	27.88	34.29	35.32	7688.47	867.54	536.16	9092.17	3.0%	4.943	1839.40
2059	275.77	25.3	15.18	28.49	35.04	36.09	7856.69	886.51	547.85	9291.05	3.0%	5.091	1825.00
2060	275.77	25.3	15.18	29.14	35.84	36.92	8035.94	906.75	560.45	9503.14	3.0%	5.244	1812.19
2061	275.77	25.3	15.18	29.81	36.67	37.77	8220.70	927.75	573.35	9721.80	3.0%	5.401	1800.00
2062	275.77	25.3	15.18	30.50	37.51	38.63	8410.99	949.00	586.40	9946.39	3.0%	5.564	1787.63
2063	275.77	25.3	15.18	31.20	38.37	39.52	8604.02	970.76	599.91	10174.69	3.0%	5.730	1775.69
2064	275.77	25.3	15.18	31.88	39.21	40.39	8791.55	992.01	613.12	10396.68	3.0%	5.902	1761.55
2065	275.77	25.3	15.18	32.58	40.08	41.28	8984.59	1014.02	626.63	10625.24	3.0%	6.079	1747.86
2066	275.77	25.3	15.18	33.30	40.96	42.19	9183.14	1036.29	640.44	10859.87	3.0%	6.262	1734.25
2067	275.77	25.3	15.18	34.03	41.85	43.11	9384.45	1058.81	654.41	11097.67	3.0%	6.450	1720.57
2068	275.77	25.3	15.18	34.77	42.76	44.05	9588.52	1081.83	668.68	11339.03	3.0%	6.643	1706.91
2069	275.77	25.3	15.18	35.53	43.70	45.01	9798.11	1105.61	683.25	11586.97	3.0%	6.842	1693.51
2070	275.77	25.3	15.18	36.30	44.65	45.99	10010.45	1129.65	698.13	11838.23	3.0%	7.048	1679.66
2071	275.77	25.3	15.18	37.10	45.63	47.00	10231.07	1154.44	713.46	12098.97	3.0%	7.259	1666.75
2072	275.77	25.3	15.18	37.90	46.62	48.02	10451.68	1179.49	728.94	12360.11	3.0%	7.477	1653.08
2073	275.77	25.3	15.18	38.72	47.63	49.06	10677.81	1205.04	744.73	12627.58	3.0%	7.701	1639.73
2074	275.77	25.3	15.18	39.56	48.66	50.12	10909.46	1231.10	760.82	12901.38	3.0%	7.932	1626.50
2075	275.77	25.3	15.18	40.42	49.72	51.21	11146.62	1257.92	777.37	13181.91	3.0%	8.170	1613.45
2076	275.77	25.3	15.18	41.30	50.79	52.32	11389.30	1284.99	794.22	13468.51	3.0%	8.415	1600.54
												Total	£113,638.38

# Kingswood Road Junction Only

PM Weekday 16:00-19:00													
Year	Annualised Delay Saving (pcuHr)			Values of Time (£/Hr) (Table A1.3.6)			Undiscounted Benefit (£)				Discount Rate (Table A1.1.1)	Discount Factor	Present Value Benefit (PVB)
	Car	LGV	OGV	Average Car	Average LGV	Average OGV	Average Car	Average LGV	Average OGV	Total			
2010	0	0	0	10.88	13.93	14.35	0.00	0.00	0.00	0.00	-	1.000	0.00
2011	0	0	0	10.96	14.03	14.45	0.00	0.00	0.00	0.00	3.5%	1.035	0.00
2012	0	0	0	11.03	14.12	14.54	0.00	0.00	0.00	0.00	3.5%	1.071	0.00
2013	0	0	0	11.17	14.30	14.72	0.00	0.00	0.00	0.00	3.5%	1.109	0.00
2014	0	0	0	11.42	14.62	15.06	0.00	0.00	0.00	0.00	3.5%	1.148	0.00
2015	0	0	0	11.59	14.83	15.28	0.00	0.00	0.00	0.00	3.5%	1.188	0.00
2016	0	0	0	11.73	15.02	15.47	0.00	0.00	0.00	0.00	3.5%	1.229	0.00
2017	6023.93	349.14	73.37	11.91	15.24	15.70	71745.01	5320.89	1151.91	78217.81	3.5%	1.272	61491.99
2018	14903.72	863.24	182.67	12.07	15.46	15.92	179887.90	13345.69	2908.11	196141.70	3.5%	1.317	148930.68
2019	23783.52	1377.33	291.96	12.25	15.68	16.15	291348.12	21596.53	4715.15	317659.80	3.5%	1.363	233059.28
2020	32663.31	1891.43	401.26	12.42	15.90	16.38	405678.31	30073.74	6572.64	442324.69	3.5%	1.411	313483.13
2021	41543.11	2405.52	510.55	12.64	16.18	16.67	525104.91	38921.31	8510.87	572537.09	3.5%	1.460	392148.69
2022	50422.90	2919.62	619.85	12.87	16.47	16.96	648942.72	48086.14	10512.66	707541.52	3.5%	1.511	468260.44
2023	59302.69	3433.72	729.15	13.10	16.76	17.27	776865.24	57549.15	12592.42	847006.81	3.5%	1.564	541564.46
2024	68182.49	3947.81	838.44	13.34	17.08	17.59	909554.42	67428.59	14748.16	991731.17	3.5%	1.619	612557.86
2025	77062.28	4461.91	947.74	13.60	17.41	17.93	1048047.01	77681.85	16992.98	1142721.84	3.5%	1.675	682221.99
2026	85942.08	4976.00	1057.03	13.86	17.74	18.28	1191157.23	88274.24	19322.51	1298753.98	3.5%	1.734	748993.07
2027	94821.87	5490.10	1166.33	14.13	18.09	18.63	1339833.02	99315.91	21728.73	1460877.66	3.5%	1.795	813859.42
2028	94821.87	5490.10	1166.33	14.41	18.44	19.00	1366383.15	101237.44	22160.27	1489780.86	3.5%	1.857	802251.41
2029	94821.87	5490.10	1166.33	14.69	18.81	19.37	1392933.27	103268.78	22591.81	1518793.86	3.5%	1.923	789804.40
2030	94821.87	5490.10	1166.33	14.98	19.18	19.76	1420431.61	105300.12	23046.68	1548778.41	3.5%	1.990	778280.61
2031	94821.87	5490.10	1166.33	15.29	19.57	20.15	1449826.39	107441.26	23501.55	1580769.20	3.5%	2.059	767736.38
2032	94821.87	5490.10	1166.33	15.59	19.96	20.56	1478272.95	109582.40	23979.74	1611835.09	3.5%	2.132	756020.21
2033	94821.87	5490.10	1166.33	15.91	20.37	20.98	1508615.95	111833.34	24469.60	1644918.89	3.5%	2.206	745656.80
2034	94821.87	5490.10	1166.33	16.25	20.81	21.43	1540855.39	114248.98	24994.45	1680098.82	3.5%	2.283	735917.14
2035	94821.87	5490.10	1166.33	16.59	21.24	21.87	1573094.82	116609.72	25507.64	1715212.18	3.5%	2.363	725862.12
2036	94821.87	5490.10	1166.33	16.93	21.68	22.33	1605334.26	119025.37	26044.15	1750403.78	3.5%	2.446	715618.88
2037	94821.87	5490.10	1166.33	17.29	22.13	22.79	1639470.13	121495.91	26580.66	1787546.70	3.5%	2.532	705982.11
2038	94821.87	5490.10	1166.33	17.65	22.59	23.27	1673606.01	124021.36	27140.50	1824767.87	3.5%	2.620	696476.29
2039	94821.87	5490.10	1166.33	18.02	23.06	23.76	1708690.10	126601.71	27712.00	1863003.81	3.5%	2.712	686948.31
2040	94821.87	5490.10	1166.33	18.39	23.55	24.25	1743774.19	129291.86	28283.50	1901349.55	3.5%	2.807	677360.01
2041	94821.87	5490.10	1166.33	18.78	24.04	24.76	1780754.72	131982.00	28878.33	1941615.05	3.5%	2.905	668370.07
2042	94821.87	5490.10	1166.33	19.17	24.55	25.28	1817735.25	134781.96	29484.82	1982002.03	3.5%	3.007	659129.37
2043	94821.87	5490.10	1166.33	19.58	25.06	25.82	1856612.21	137581.91	30114.64	2024308.76	3.5%	3.112	650484.82
2044	94821.87	5490.10	1166.33	19.99	25.59	26.36	1895489.18	140491.66	30744.46	2066725.30	3.5%	3.221	641640.89
2045	94821.87	5490.10	1166.33	20.41	26.13	26.92	1935314.37	143456.31	31397.60	2110168.28	3.5%	3.334	632923.90
2046	94821.87	5490.10	1166.33	20.87	26.71	27.51	1978932.43	146640.57	32085.74	2157658.74	3.5%	3.450	625408.33
2047	94821.87	5490.10	1166.33	21.31	27.28	28.10	2020654.05	149769.93	32773.87	2203197.85	3.5%	3.571	616969.43
2048	94821.87	5490.10	1166.33	21.77	27.87	28.70	2064272.11	153009.09	33473.67	2250754.87	3.0%	3.678	611950.75
2049	94821.87	5490.10	1166.33	22.23	28.46	29.32	2107890.17	156248.25	34196.80	2298335.22	3.0%	3.789	606580.95
2050	94821.87	5490.10	1166.33	22.71	29.07	29.94	2153404.67	159597.21	34919.92	2347921.80	3.0%	3.902	601722.66
2051	94821.87	5490.10	1166.33	23.17	29.66	30.55	2197022.73	162836.37	35631.38	2395490.48	3.0%	4.019	596041.42
2052	94821.87	5490.10	1166.33	23.65	30.28	31.18	2242537.23	166240.23	36366.17	2445143.63	3.0%	4.140	590614.40
2053	94821.87	5490.10	1166.33	24.14	30.90	31.83	2288999.94	169644.09	37124.28	2495768.31	3.0%	4.264	585311.52
2054	94821.87	5490.10	1166.33	24.64	31.54	32.49	2336410.88	173157.75	37894.06	2547462.69	3.0%	4.392	580023.38
2055	94821.87	5490.10	1166.33	25.15	32.20	33.16	2384770.03	176781.22	38675.50	2600226.75	3.0%	4.524	574762.77
2056	94821.87	5490.10	1166.33	25.67	32.86	33.85	2434077.40	180404.69	39480.27	2653962.36	3.0%	4.659	569642.06
2057	94821.87	5490.10	1166.33	26.21	33.55	34.56	2485281.21	184192.86	40308.36	2709782.43	3.0%	4.799	564655.64
2058	94821.87	5490.10	1166.33	26.78	34.29	35.32	2539329.68	188255.53	41194.78	2768779.99	3.0%	4.943	560141.61
2059	94821.87	5490.10	1166.33	27.37	35.04	36.09	2595274.58	192373.10	42092.85	2829740.53	3.0%	5.091	555831.96
2060	94821.87	5490.10	1166.33	28.00	35.84	36.92	2655012.36	196765.18	43060.90	2894838.44	3.0%	5.244	552028.69
2061	94821.87	5490.10	1166.33	28.64	36.66	37.77	2715698.36	201267.07	44052.28	2961017.71	3.0%	5.401	548235.09
2062	94821.87	5490.10	1166.33	29.30	37.51	38.63	2778280.79	205933.65	45055.33	3029269.77	3.0%	5.564	544441.01
2063	94821.87	5490.10	1166.33	29.97	38.37	39.52	2841811.44	210655.14	46093.36	3098559.94	3.0%	5.730	540760.90
2064	94821.87	5490.10	1166.33	30.63	39.21	40.39	2904393.88	215266.82	47108.07	3166768.77	3.0%	5.902	536558.59
2065	94821.87	5490.10	1166.33	31.31	40.07	41.28	2968872.75	219988.31	48146.10	3237007.16	3.0%	6.079	532490.07
2066	94821.87	5490.10	1166.33	31.99	40.96	42.18	3033351.62	224874.50	49195.80	3307421.92	3.0%	6.262	528173.41
2067	94821.87	5490.10	1166.33	32.69	41.85	43.11	3099726.93	229760.69	50280.49	3379768.11	3.0%	6.450	523995.06
2068	94821.87	5490.10	1166.33	33.41	42.76	44.05	3167998.68	234756.68	51376.84	3454132.20	3.0%	6.643	519965.71
2069	94821.87	5490.10	1166.33	34.14	43.70	45.01	3237218.64	239917.37	52496.51	3529632.52	3.0%	6.842	515877.30
2070	94821.87	5490.10	1166.33	34.88	44.65	45.99	3307386.83	245132.97	53639.52	3606159.32	3.0%	7.048	511657.11
2071	94821.87	5490.10	1166.33	35.64	45.63	47.00	3379451.45	250513.26	54817.51	3684782.22	3.0%	7.259	507615.68
2072	94821.87	5490.10	1166.33	36.42	46.62	48.02	3453412.51	255948.46	56007.17	3765368.14	3.0%	7.477	503593.44
2073	94821.87	5490.10	1166.33	37.20	47.63	49.06	3527373.56	261493.46	57220.15	3846087.17	3.0%	7.701	499426.98
2074	94821.87	5490.10	1166.33	38.01	48.66	50.12	3604179.28	267148.27	58456.46	3929784.01	3.0%	7.932	495434.19
2075	94821.87	5490.10	1166.33	38.84	49.71	51.21	3682881.43	272912.87	59727.76	4015522.06	3.0%	8.170	491495.97
2076	94821.87	5490.10	1166.33	39.68	50.79	52.32	3762531.80	278842.18	61022.39	4102396.37	3.0%	8.415	487509.97
Total													£34,931,950.78



# Appendix D

**PVB CALCULATIONS FOR 2.0 PEAK HOUR MULTIPLIER**

# Burtonwood Road Network (2.0 Peak Hour Multiplier)

AM Weekday 07:00-10:00													
Year	Annualised Delay Saving (pcuHr)			Values of Time (£/Hr) (Table A1.3.6)			Undiscounted Benefit (£)				Discount Rate (Table A1.1.1)	Discount Factor	Present Value Benefit (PVB)
	Car	LGV	OGV	Average Car	Average LGV	Average OGV	Average Car	Average LGV	Average OGV	Total			
2010	0	0	0	11.33	13.93	14.35	0.00	0.00	0.00	0.00	-	1.000	0.00
2011	0	0	0	11.40	14.03	14.45	0.00	0.00	0.00	0.00	3.5%	1.035	0.00
2012	0	0	0	11.48	14.12	14.54	0.00	0.00	0.00	0.00	3.5%	1.071	0.00
2013	0	0	0	11.62	14.30	14.73	0.00	0.00	0.00	0.00	3.5%	1.109	0.00
2014	0	0	0	11.89	14.62	15.06	0.00	0.00	0.00	0.00	3.5%	1.148	0.00
2015	0	0	0	12.06	14.83	15.28	0.00	0.00	0.00	0.00	3.5%	1.188	0.00
2016	0	0	0	12.21	15.02	15.47	0.00	0.00	0.00	0.00	3.5%	1.229	0.00
2017	-454.94	-42.22	-24.03	12.39	15.24	15.70	-5636.71	-643.43	-377.27	-6657.41	3.5%	1.272	-5233.81
2018	204.84	18.93	10.76	12.57	15.46	15.92	2574.84	292.66	171.30	3038.80	3.5%	1.317	2307.37
2019	864.62	80.07	45.54	12.75	15.68	16.15	11023.91	1255.50	735.47	13014.88	3.5%	1.363	9548.70
2020	1524.39	141.22	80.33	12.93	15.91	16.38	19710.36	2246.81	1315.81	23272.98	3.5%	1.411	16493.96
2021	2184.17	202.37	115.12	13.16	16.18	16.67	28743.68	3274.35	1919.05	33937.08	3.5%	1.460	23244.58
2022	2843.95	263.52	149.91	13.39	16.47	16.97	38080.49	4340.17	2543.97	44964.63	3.5%	1.511	29758.19
2023	3503.73	324.66	184.69	13.63	16.76	17.27	47755.84	5441.30	3189.60	56386.74	3.5%	1.564	36052.90
2024	4163.51	385.81	219.48	13.89	17.08	17.59	57831.15	6589.63	3860.65	68281.43	3.5%	1.619	42175.06
2025	4823.28	446.96	254.27	14.15	17.41	17.93	68249.41	7781.57	4559.06	80590.04	3.5%	1.675	48113.46
2026	5483.06	508.10	289.05	14.43	17.74	18.28	79120.56	9013.69	5283.83	93418.08	3.5%	1.734	53874.33
2027	6142.84	569.25	323.84	14.71	18.09	18.63	90361.18	10297.73	6033.14	106692.05	3.5%	1.795	59438.47
2028	6142.84	569.25	323.84	14.99	18.44	19.00	92081.17	10496.97	6152.96	108731.10	3.5%	1.857	58552.02
2029	6142.84	569.25	323.84	15.29	18.81	19.37	93924.02	10707.59	6272.78	110904.39	3.5%	1.923	57672.59
2030	6142.84	569.25	323.84	15.60	19.18	19.76	95828.30	10918.22	6399.08	113145.60	3.5%	1.990	56857.09
2031	6142.84	569.25	323.84	15.91	19.57	20.16	97732.58	11140.22	6528.61	115401.41	3.5%	2.059	56047.31
2032	6142.84	569.25	323.84	16.23	19.96	20.56	99698.29	11362.23	6658.15	117718.67	3.5%	2.132	55215.14
2033	6142.84	569.25	323.84	16.56	20.37	20.98	101725.43	11595.62	6794.16	120115.21	3.5%	2.206	54449.32
2034	6142.84	569.25	323.84	16.92	20.81	21.43	103936.85	11846.09	6939.89	122722.83	3.5%	2.283	53755.07
2035	6142.84	569.25	323.84	17.27	21.24	21.88	106086.85	12090.87	7085.62	125263.34	3.5%	2.363	53010.30
2036	6142.84	569.25	323.84	17.62	21.68	22.33	108236.84	12341.34	7231.35	127809.53	3.5%	2.446	52252.47
2037	6142.84	569.25	323.84	17.99	22.13	22.79	110509.69	12597.50	7380.31	130487.50	3.5%	2.532	51535.35
2038	6142.84	569.25	323.84	18.37	22.59	23.27	112843.97	12859.36	7535.76	133239.09	3.5%	2.620	50854.61
2039	6142.84	569.25	323.84	18.75	23.06	23.76	115178.25	13126.91	7694.44	135999.60	3.5%	2.712	50147.35
2040	6142.84	569.25	323.84	19.14	23.55	24.25	117573.96	13405.84	7853.12	138832.92	3.5%	2.807	49459.54
2041	6142.84	569.25	323.84	19.54	24.04	24.76	120031.09	13684.77	8018.28	141734.14	3.5%	2.905	48789.72
2042	6142.84	569.25	323.84	19.96	24.55	25.28	122611.09	13975.09	8186.68	144772.86	3.5%	3.007	48145.28
2043	6142.84	569.25	323.84	20.38	25.06	25.82	125191.08	14265.41	8361.55	147818.04	3.5%	3.112	47499.37
2044	6142.84	569.25	323.84	20.81	25.59	26.36	127832.50	14567.11	8536.42	150936.03	3.5%	3.221	46859.99
2045	6142.84	569.25	323.84	21.25	26.13	26.92	130535.35	14874.50	8717.77	154127.62	3.5%	3.334	46229.04
2046	6142.84	569.25	323.84	21.72	26.71	27.51	133422.48	15204.67	8908.84	157535.99	3.5%	3.450	45662.61
2047	6142.84	569.25	323.84	22.18	27.28	28.10	136248.19	15529.14	9099.90	160877.23	3.5%	3.571	45051.03
2048	6142.84	569.25	323.84	22.66	27.87	28.70	139196.75	15865.00	9294.21	164355.96	3.0%	3.678	44686.23
2049	6142.84	569.25	323.84	23.14	28.46	29.32	142145.32	16200.86	9494.99	167841.17	3.0%	3.789	44296.96
2050	6142.84	569.25	323.84	23.63	29.07	29.94	145155.31	16548.10	9695.77	171399.18	3.0%	3.902	43925.98
2051	6142.84	569.25	323.84	24.12	29.66	30.55	148165.30	16883.96	9893.31	174942.57	3.0%	4.019	43528.88
2052	6142.84	569.25	323.84	24.62	30.28	31.19	151236.72	17236.89	10100.57	178574.18	3.0%	4.140	43133.86
2053	6142.84	569.25	323.84	25.13	30.90	31.83	154369.57	17589.83	10307.83	182267.23	3.0%	4.264	42745.60
2054	6142.84	569.25	323.84	25.65	31.54	32.49	157563.85	17954.15	10521.56	186039.56	3.0%	4.392	42358.73
2055	6142.84	569.25	323.84	26.18	32.20	33.16	160819.55	18329.85	10738.53	189887.93	3.0%	4.524	41973.46
2056	6142.84	569.25	323.84	26.72	32.86	33.85	164136.68	18705.56	10961.98	193804.22	3.0%	4.659	41597.81
2057	6142.84	569.25	323.84	27.28	33.55	34.56	167576.68	19098.34	11191.91	197866.93	3.0%	4.799	41230.87
2058	6142.84	569.25	323.84	27.88	34.29	35.32	171262.38	19519.58	11438.03	202219.99	3.0%	4.943	40910.38
2059	6142.84	569.25	323.84	28.49	35.04	36.09	175009.51	19946.52	11687.39	206643.42	3.0%	5.091	40589.95
2060	6142.84	569.25	323.84	29.14	35.84	36.92	179002.36	20401.92	11956.17	211360.45	3.0%	5.244	40305.20
2061	6142.84	569.25	323.84	29.81	36.67	37.77	183118.06	20874.40	12231.44	216223.90	3.0%	5.401	40034.05
2062	6142.84	569.25	323.84	30.50	37.51	38.63	187356.62	21352.57	12509.94	221219.13	3.0%	5.564	39759.01
2063	6142.84	569.25	323.84	31.20	38.37	39.52	191656.61	21842.12	12798.16	226296.89	3.0%	5.730	39493.35
2064	6142.84	569.25	323.84	31.88	39.21	40.39	195833.74	22320.29	13079.90	231233.93	3.0%	5.902	39178.91
2065	6142.84	569.25	323.84	32.58	40.08	41.28	200133.73	22815.54	13368.12	236317.39	3.0%	6.079	38874.39
2066	6142.84	569.25	323.84	33.30	40.96	42.19	204556.57	23316.48	13662.81	241535.86	3.0%	6.262	38571.68
2067	6142.84	569.25	323.84	34.03	41.85	43.11	209040.85	23823.11	13960.74	246824.70	3.0%	6.450	38267.40
2068	6142.84	569.25	323.84	34.77	42.76	44.05	213586.55	24341.13	14265.15	252192.83	3.0%	6.643	37963.70
2069	6142.84	569.25	323.84	35.53	43.70	45.01	218255.11	24876.23	14576.04	257707.38	3.0%	6.842	37665.50
2070	6142.84	569.25	323.84	36.30	44.65	45.99	222985.09	25417.01	14893.40	263295.50	3.0%	7.048	37357.48
2071	6142.84	569.25	323.84	37.10	45.63	47.00	227899.36	25974.88	15220.48	269094.72	3.0%	7.259	37070.49
2072	6142.84	569.25	323.84	37.90	46.62	48.02	232813.64	26538.44	15550.80	274902.88	3.0%	7.477	36766.47
2073	6142.84	569.25	323.84	38.72	47.63	49.06	237850.76	27113.38	15887.59	280851.73	3.0%	7.701	36469.51
2074	6142.84	569.25	323.84	39.56	48.66	50.12	243010.75	27699.71	16230.86	286941.32	3.0%	7.932	36175.15
2075	6142.84	569.25	323.84	40.42	49.72	51.21	248293.59	28303.11	16583.85	293180.55	3.0%	8.170	35885.01
2076	6142.84	569.25	323.84	41.30	50.79	52.32	253699.29	28912.21	16943.31	299554.81	3.0%	8.415	35597.72
												Total	£2,500,232.14

# Burtonwood Road Network (2.0 Peak Hour Multiplier)

PM Weekday 16:00-19:00													
Year	Annualised Delay Saving (pcuHr)			Values of Time (£/Hr) (Table A1.3.6)			Undiscounted Benefit (£)				Discount Rate (Table A1.1.1)	Discount Factor	Present Value Benefit (PVB)
	Car	LGV	OGV	Average Car	Average LGV	Average OGV	Average Car	Average LGV	Average OGV	Total			
2010	0	0	0	10.88	13.93	14.35	0.00	0.00	0.00	0.00	-	1.000	0.00
2011	0	0	0	10.96	14.03	14.45	0.00	0.00	0.00	0.00	3.5%	1.035	0.00
2012	0	0	0	11.03	14.12	14.54	0.00	0.00	0.00	0.00	3.5%	1.071	0.00
2013	0	0	0	11.17	14.30	14.72	0.00	0.00	0.00	0.00	3.5%	1.109	0.00
2014	0	0	0	11.42	14.62	15.06	0.00	0.00	0.00	0.00	3.5%	1.148	0.00
2015	0	0	0	11.59	14.83	15.28	0.00	0.00	0.00	0.00	3.5%	1.188	0.00
2016	0	0	0	11.73	15.02	15.47	0.00	0.00	0.00	0.00	3.5%	1.229	0.00
2017	3984.75	230.23	48.07	11.91	15.24	15.70	47458.37	3508.71	754.70	51721.78	3.5%	1.272	40661.78
2018	4693.15	271.22	56.93	12.07	15.46	15.92	56646.32	4193.06	906.33	61745.71	3.5%	1.317	46883.61
2019	5401.55	312.20	65.78	12.25	15.68	16.15	66168.99	4895.30	1062.35	72126.64	3.5%	1.363	52917.56
2020	6109.95	353.19	74.64	12.42	15.90	16.38	75885.58	5615.72	1222.60	82723.90	3.5%	1.411	58627.85
2021	6818.35	394.17	83.49	12.64	16.18	16.67	86183.94	6377.67	1391.78	93953.39	3.5%	1.460	64351.64
2022	7526.75	435.16	92.35	12.87	16.47	16.96	96869.27	7167.09	1566.26	105602.62	3.5%	1.511	69889.23
2023	8235.15	476.15	101.20	13.10	16.76	17.27	107880.47	7980.27	1747.72	117608.46	3.5%	1.564	75197.23
2024	8943.55	517.13	110.06	13.34	17.08	17.59	119306.96	8832.58	1935.96	130075.50	3.5%	1.619	80343.11
2025	9651.95	558.12	118.91	13.60	17.41	17.93	131266.52	9716.87	2132.06	143115.45	3.5%	1.675	85442.06
2026	10360.35	599.10	127.77	13.86	17.74	18.28	143594.45	10628.03	2335.64	156558.12	3.5%	1.734	90287.27
2027	11068.75	640.09	136.62	14.13	18.09	18.63	156401.44	11579.23	2545.23	170525.90	3.5%	1.795	95000.50
2028	11068.75	640.09	136.62	14.41	18.44	19.00	159500.69	11803.26	2595.78	173899.73	3.5%	1.857	93645.52
2029	11068.75	640.09	136.62	14.69	18.81	19.37	162599.94	12040.09	2646.33	177286.36	3.5%	1.923	92192.59
2030	11068.75	640.09	136.62	14.98	19.18	19.76	165809.88	12276.93	2699.61	180786.42	3.5%	1.990	90847.45
2031	11068.75	640.09	136.62	15.29	19.57	20.15	169241.19	12526.56	2752.89	184520.64	3.5%	2.059	89616.63
2032	11068.75	640.09	136.62	15.59	19.96	20.56	172561.81	12776.20	2808.91	188146.92	3.5%	2.132	88249.02
2033	11068.75	640.09	136.62	15.91	20.37	20.98	176103.81	13038.63	2866.29	192008.73	3.5%	2.206	87039.32
2034	11068.75	640.09	136.62	16.25	20.81	21.43	179867.19	13320.27	2927.77	196115.23	3.5%	2.283	85902.42
2035	11068.75	640.09	136.62	16.59	21.24	21.87	183630.56	13595.51	2987.88	200213.95	3.5%	2.363	84728.71
2036	11068.75	640.09	136.62	16.93	21.68	22.33	187393.94	13877.15	3050.72	204321.81	3.5%	2.446	83533.04
2037	11068.75	640.09	136.62	17.29	22.13	22.79	191378.69	14165.19	3113.57	208657.45	3.5%	2.532	82408.16
2038	11068.75	640.09	136.62	17.65	22.59	23.27	195363.44	14459.63	3179.15	213002.22	3.5%	2.620	81298.56
2039	11068.75	640.09	136.62	18.02	23.06	23.76	199458.88	14760.48	3246.09	217465.45	3.5%	2.712	80186.38
2040	11068.75	640.09	136.62	18.39	23.55	24.25	203554.31	15074.12	3313.04	221941.47	3.5%	2.807	79067.14
2041	11068.75	640.09	136.62	18.78	24.04	24.76	207871.13	15387.76	3382.71	226641.60	3.5%	2.905	78017.76
2042	11068.75	640.09	136.62	19.17	24.55	25.28	212187.94	15714.21	3453.75	231355.90	3.5%	3.007	76939.11
2043	11068.75	640.09	136.62	19.58	25.06	25.82	216726.13	16040.66	3527.53	236294.32	3.5%	3.112	75930.05
2044	11068.75	640.09	136.62	19.99	25.59	26.36	221264.31	16379.90	3601.30	241245.51	3.5%	3.221	74897.71
2045	11068.75	640.09	136.62	20.41	26.13	26.92	225913.19	16725.55	3677.81	246316.55	3.5%	3.334	73880.19
2046	11068.75	640.09	136.62	20.87	26.71	27.51	231004.81	17096.80	3758.42	251860.03	3.5%	3.450	73002.91
2047	11068.75	640.09	136.62	21.31	27.28	28.10	235875.06	17461.66	3839.02	257175.74	3.5%	3.571	72017.85
2048	11068.75	640.09	136.62	21.77	27.87	28.70	240966.69	17839.31	3920.99	262726.99	3.0%	3.678	71432.03
2049	11068.75	640.09	136.62	22.23	28.46	29.32	246058.31	18216.96	4005.70	268280.97	3.0%	3.789	70805.22
2050	11068.75	640.09	136.62	22.71	29.07	29.94	251371.31	18607.42	4090.40	274069.13	3.0%	3.902	70238.12
2051	11068.75	640.09	136.62	23.17	29.66	30.55	256462.94	18985.07	4173.74	279621.75	3.0%	4.019	69574.96
2052	11068.75	640.09	136.62	23.65	30.28	31.18	261775.94	19381.93	4259.81	285417.68	3.0%	4.140	68941.47
2053	11068.75	640.09	136.62	24.14	30.90	31.83	267199.63	19778.78	4348.61	291327.02	3.0%	4.264	68322.47
2054	11068.75	640.09	136.62	24.64	31.54	32.49	272734.00	20188.44	4438.78	297361.22	3.0%	4.392	67705.20
2055	11068.75	640.09	136.62	25.15	32.20	33.16	278379.06	20610.90	4530.32	303520.28	3.0%	4.524	67091.13
2056	11068.75	640.09	136.62	25.67	32.86	33.85	284134.81	21033.36	4624.59	309792.76	3.0%	4.659	66493.40
2057	11068.75	640.09	136.62	26.21	33.55	34.56	290111.94	21475.02	4721.59	316308.55	3.0%	4.799	65911.35
2058	11068.75	640.09	136.62	26.78	34.29	35.32	296421.13	21948.69	4825.42	323195.24	3.0%	4.943	65384.43
2059	11068.75	640.09	136.62	27.37	35.04	36.09	302951.69	22428.75	4930.62	330311.06	3.0%	5.091	64881.37
2060	11068.75	640.09	136.62	28.00	35.84	36.92	309925.00	22940.83	5044.01	337909.84	3.0%	5.244	64437.42
2061	11068.75	640.09	136.62	28.64	36.66	37.77	317009.00	23465.70	5160.14	345634.84	3.0%	5.401	63994.60
2062	11068.75	640.09	136.62	29.30	37.51	38.63	324314.38	24009.78	5277.63	353601.79	3.0%	5.564	63551.72
2063	11068.75	640.09	136.62	29.97	38.37	39.52	331730.44	24560.25	5399.22	361689.91	3.0%	5.730	63122.15
2064	11068.75	640.09	136.62	30.63	39.21	40.39	339035.81	25097.93	5518.08	369651.82	3.0%	5.902	62631.62
2065	11068.75	640.09	136.62	31.31	40.07	41.28	346562.56	25648.41	5639.67	377850.64	3.0%	6.079	62156.71
2066	11068.75	640.09	136.62	31.99	40.96	42.18	354089.31	26218.09	5762.63	386070.03	3.0%	6.262	61652.83
2067	11068.75	640.09	136.62	32.69	41.85	43.11	361837.44	26787.77	5889.69	394514.90	3.0%	6.450	61165.10
2068	11068.75	640.09	136.62	33.41	42.76	44.05	369806.94	27370.25	6018.11	403195.30	3.0%	6.643	60694.76
2069	11068.75	640.09	136.62	34.14	43.70	45.01	377887.13	27971.93	6149.27	412008.33	3.0%	6.842	60217.53
2070	11068.75	640.09	136.62	34.88	44.65	45.99	386078.00	28580.02	6283.15	420941.17	3.0%	7.048	59724.91
2071	11068.75	640.09	136.62	35.64	45.63	47.00	394490.25	29207.31	6421.14	430118.70	3.0%	7.259	59253.16
2072	11068.75	640.09	136.62	36.42	46.62	48.02	403123.88	29841.00	6560.49	439525.37	3.0%	7.477	58783.65
2073	11068.75	640.09	136.62	37.20	47.63	49.06	411757.50	30487.49	6702.58	448947.57	3.0%	7.701	58297.31
2074	11068.75	640.09	136.62	38.01	48.66	50.12	420723.19	31146.78	6847.39	458717.36	3.0%	7.932	57831.24
2075	11068.75	640.09	136.62	38.84	49.71	51.21	429910.25	31818.87	6996.31	468725.43	3.0%	8.170	57371.53
2076	11068.75	640.09	136.62	39.68	50.79	52.32	439208.00	32510.17	7147.96	478866.13	3.0%	8.415	56906.25
Total													£4,251,576.00

# Kingswood Road Junction Only (2.0 Peak Hour Multiplier)

AM Weekday 07:00-10:00													
Year	Annualised Delay Saving (pcuHr)			Values of Time (£/Hr) (Table A1.3.6)			Undiscounted Benefit (£)				Discount Rate (Table A1.1.1)	Discount Factor	Present Value Benefit (PVB)
	Car	LGV	OGV	Average Car	Average LGV	Average OGV	Average Car	Average LGV	Average OGV	Total			
2010	0	0	0	11.33	13.93	14.35	0.00	0.00	0.00	0.00	-	1.000	0.00
2011	0	0	0	11.40	14.03	14.45	0.00	0.00	0.00	0.00	3.5%	1.035	0.00
2012	0	0	0	11.48	14.12	14.54	0.00	0.00	0.00	0.00	3.5%	1.071	0.00
2013	0	0	0	11.62	14.30	14.73	0.00	0.00	0.00	0.00	3.5%	1.109	0.00
2014	0	0	0	11.89	14.62	15.06	0.00	0.00	0.00	0.00	3.5%	1.148	0.00
2015	0	0	0	12.06	14.83	15.28	0.00	0.00	0.00	0.00	3.5%	1.188	0.00
2016	0	0	0	12.21	15.02	15.47	0.00	0.00	0.00	0.00	3.5%	1.229	0.00
2017	0	0	0	12.39	15.24	15.70	0.00	0.00	0.00	0.00	3.5%	1.272	0.00
2018	22.011	2.024	1.265	12.57	15.46	15.92	276.68	31.29	20.14	328.11	3.5%	1.317	249.13
2019	44.022	4.048	2.53	12.75	15.68	16.15	561.28	63.47	40.86	665.61	3.5%	1.363	488.34
2020	66.033	6.072	3.795	12.93	15.91	16.38	853.81	96.61	62.16	1012.58	3.5%	1.411	717.63
2021	88.044	8.096	5.06	13.16	16.18	16.67	1158.66	130.99	84.35	1374.00	3.5%	1.460	941.10
2022	110.055	10.12	6.325	13.39	16.47	16.97	1473.64	166.68	107.34	1747.66	3.5%	1.511	1156.62
2023	132.066	12.144	7.59	13.63	16.76	17.27	1800.06	203.53	131.08	2134.67	3.5%	1.564	1364.88
2024	154.077	14.168	8.855	13.89	17.08	17.59	2140.13	241.99	155.76	2537.88	3.5%	1.619	1567.56
2025	176.088	16.192	10.12	14.15	17.41	17.93	2491.65	281.90	181.45	2955.00	3.5%	1.675	1764.18
2026	198.099	18.216	11.385	14.43	17.74	18.28	2858.57	323.15	208.12	3389.84	3.5%	1.734	1954.93
2027	220.11	20.24	12.65	14.71	18.09	18.63	3237.82	366.14	235.67	3839.63	3.5%	1.795	2139.07
2028	220.11	20.24	12.65	14.99	18.44	19.00	3299.45	373.23	240.35	3913.03	3.5%	1.857	2107.18
2029	220.11	20.24	12.65	15.29	18.81	19.37	3365.48	380.71	245.03	3991.22	3.5%	1.923	2075.52
2030	220.11	20.24	12.65	15.60	19.18	19.76	3433.72	388.20	249.96	4071.88	3.5%	1.990	2046.17
2031	220.11	20.24	12.65	15.91	19.57	20.16	3501.95	396.10	255.02	4153.07	3.5%	2.059	2017.03
2032	220.11	20.24	12.65	16.23	19.96	20.56	3572.39	403.99	260.08	4236.46	3.5%	2.132	1987.08
2033	220.11	20.24	12.65	16.56	20.37	20.98	3645.02	412.29	265.40	4322.71	3.5%	2.206	1959.52
2034	220.11	20.24	12.65	16.92	20.81	21.43	3724.26	421.19	271.09	4416.54	3.5%	2.283	1934.53
2035	220.11	20.24	12.65	17.27	21.24	21.88	3801.30	429.90	276.78	4507.98	3.5%	2.363	1907.74
2036	220.11	20.24	12.65	17.62	21.68	22.33	3878.34	438.80	282.47	4599.61	3.5%	2.446	1880.46
2037	220.11	20.24	12.65	17.99	22.13	22.79	3959.78	447.91	288.29	4695.98	3.5%	2.532	1854.65
2038	220.11	20.24	12.65	18.37	22.59	23.27	4043.42	457.22	294.37	4795.01	3.5%	2.620	1830.16
2039	220.11	20.24	12.65	18.75	23.06	23.76	4127.06	466.73	300.56	4894.35	3.5%	2.712	1804.70
2040	220.11	20.24	12.65	19.14	23.55	24.25	4212.91	476.65	306.76	4996.32	3.5%	2.807	1779.95
2041	220.11	20.24	12.65	19.54	24.04	24.76	4300.95	486.57	313.21	5100.73	3.5%	2.905	1755.85
2042	220.11	20.24	12.65	19.96	24.55	25.28	4393.40	496.89	319.79	5210.08	3.5%	3.007	1732.65
2043	220.11	20.24	12.65	20.38	25.06	25.82	4485.84	507.21	326.62	5319.67	3.5%	3.112	1709.41
2044	220.11	20.24	12.65	20.81	25.59	26.36	4580.49	517.94	333.45	5431.88	3.5%	3.221	1686.40
2045	220.11	20.24	12.65	21.25	26.13	26.92	4677.34	528.87	340.54	5546.75	3.5%	3.334	1663.69
2046	220.11	20.24	12.65	21.72	26.71	27.51	4780.79	540.61	348.00	5669.40	3.5%	3.450	1643.30
2047	220.11	20.24	12.65	22.18	27.28	28.10	4882.04	552.15	355.47	5789.66	3.5%	3.571	1621.30
2048	220.11	20.24	12.65	22.66	27.87	28.70	4987.69	564.09	363.06	5914.84	3.0%	3.678	1608.17
2049	220.11	20.24	12.65	23.14	28.46	29.32	5093.35	576.03	370.90	6040.28	3.0%	3.789	1594.16
2050	220.11	20.24	12.65	23.63	29.07	29.94	5201.20	588.38	378.74	6168.32	3.0%	3.902	1580.81
2051	220.11	20.24	12.65	24.12	29.66	30.55	5309.05	600.32	386.46	6295.83	3.0%	4.019	1566.52
2052	220.11	20.24	12.65	24.62	30.28	31.19	5419.11	612.87	394.55	6426.53	3.0%	4.140	1552.30
2053	220.11	20.24	12.65	25.13	30.90	31.83	5531.36	625.42	402.65	6559.43	3.0%	4.264	1538.33
2054	220.11	20.24	12.65	25.65	31.54	32.49	5645.82	638.37	411.00	6695.19	3.0%	4.392	1524.41
2055	220.11	20.24	12.65	26.18	32.20	33.16	5762.48	651.73	419.47	6833.68	3.0%	4.524	1510.54
2056	220.11	20.24	12.65	26.72	32.86	33.85	5881.34	665.09	428.20	6974.63	3.0%	4.659	1497.02
2057	220.11	20.24	12.65	27.28	33.55	34.56	6004.60	679.05	437.18	7120.83	3.0%	4.799	1483.82
2058	220.11	20.24	12.65	27.88	34.29	35.32	6136.67	694.03	446.80	7277.50	3.0%	4.943	1472.28
2059	220.11	20.24	12.65	28.49	35.04	36.09	6270.93	709.21	456.54	7436.68	3.0%	5.091	1460.75
2060	220.11	20.24	12.65	29.14	35.84	36.92	6414.01	725.40	467.04	7606.45	3.0%	5.244	1450.51
2061	220.11	20.24	12.65	29.81	36.67	37.77	6561.48	742.20	477.79	7781.47	3.0%	5.401	1440.75
2062	220.11	20.24	12.65	30.50	37.51	38.63	6713.36	759.20	488.67	7961.23	3.0%	5.564	1430.85
2063	220.11	20.24	12.65	31.20	38.37	39.52	6867.43	776.61	499.93	8143.97	3.0%	5.730	1421.29
2064	220.11	20.24	12.65	31.88	39.21	40.39	7017.11	793.61	510.93	8321.65	3.0%	5.902	1409.97
2065	220.11	20.24	12.65	32.58	40.08	41.28	7171.18	811.22	522.19	8504.59	3.0%	6.079	1399.01
2066	220.11	20.24	12.65	33.30	40.96	42.19	7329.66	829.03	533.70	8692.39	3.0%	6.262	1388.12
2067	220.11	20.24	12.65	34.03	41.85	43.11	7490.34	847.04	545.34	8882.72	3.0%	6.450	1377.17
2068	220.11	20.24	12.65	34.77	42.76	44.05	7653.22	865.46	557.23	9075.91	3.0%	6.643	1366.24
2069	220.11	20.24	12.65	35.53	43.70	45.01	7820.51	884.49	569.38	9274.38	3.0%	6.842	1355.51
2070	220.11	20.24	12.65	36.30	44.65	45.99	7989.99	903.72	581.77	9475.48	3.0%	7.048	1344.42
2071	220.11	20.24	12.65	37.10	45.63	47.00	8166.08	923.55	594.55	9684.18	3.0%	7.259	1334.09
2072	220.11	20.24	12.65	37.90	46.62	48.02	8342.17	943.59	607.45	9893.21	3.0%	7.477	1323.15
2073	220.11	20.24	12.65	38.72	47.63	49.06	8522.66	964.03	620.61	10107.30	3.0%	7.701	1312.47
2074	220.11	20.24	12.65	39.56	48.66	50.12	8707.55	984.88	634.02	10326.45	3.0%	7.932	1301.87
2075	220.11	20.24	12.65	40.42	49.72	51.21	8896.85	1006.33	647.81	10550.99	3.0%	8.170	1291.43
2076	220.11	20.24	12.65	41.30	50.79	52.32	9090.54	1027.99	661.85	10780.38	3.0%	8.415	1281.09
												Total	£90,957.78

# Kingswood Road Junction Only (2.0 Peak Hour Multiplier)

PM Weekday 16:00-19:00													
Year	Annualised Delay Saving (pcuHr)			Values of Time (£/Hr) (Table A1.3.6)			Undiscounted Benefit (£)				Discount Rate (Table A1.1.1)	Discount Factor	Present Value Benefit (PVB)
	Car	LGV	OGV	Average Car	Average LGV	Average OGV	Average Car	Average LGV	Average OGV	Total			
2010	0	0	0	10.88	13.93	14.35	0.00	0.00	0.00	0.00	-	1.000	0.00
2011	0	0	0	10.96	14.03	14.45	0.00	0.00	0.00	0.00	3.5%	1.035	0.00
2012	0	0	0	11.03	14.12	14.54	0.00	0.00	0.00	0.00	3.5%	1.071	0.00
2013	0	0	0	11.17	14.30	14.72	0.00	0.00	0.00	0.00	3.5%	1.109	0.00
2014	0	0	0	11.42	14.62	15.06	0.00	0.00	0.00	0.00	3.5%	1.148	0.00
2015	0	0	0	11.59	14.83	15.28	0.00	0.00	0.00	0.00	3.5%	1.188	0.00
2016	0	0	0	11.73	15.02	15.47	0.00	0.00	0.00	0.00	3.5%	1.229	0.00
2017	4349.07	253.00	53.13	11.91	15.24	15.70	51797.42	3855.72	834.14	56487.28	3.5%	1.272	44408.24
2018	10760.34	624.15	132.07	12.07	15.46	15.92	129877.30	9649.36	2102.55	141629.21	3.5%	1.317	107539.26
2019	17171.62	995.30	211.00	12.25	15.68	16.15	210352.35	15606.30	3407.65	229366.30	3.5%	1.363	168280.48
2020	23582.89	1366.45	289.94	12.42	15.90	16.38	292899.49	21726.56	4749.22	319375.27	3.5%	1.411	226346.75
2021	29994.16	1737.60	368.87	12.64	16.18	16.67	379126.18	28114.37	6149.06	413389.61	3.5%	1.460	283143.57
2022	36405.44	2108.76	447.81	12.87	16.47	16.96	468538.01	34731.28	7594.86	510864.15	3.5%	1.511	338096.72
2023	42816.71	2479.91	526.75	13.10	16.76	17.27	560898.90	41563.29	9096.97	611559.16	3.5%	1.564	391022.48
2024	49227.98	2851.06	605.68	13.34	17.08	17.59	656701.25	48696.10	10653.91	716051.26	3.5%	1.619	442279.96
2025	55639.25	3222.21	684.62	13.60	17.41	17.93	756693.80	56098.68	12275.24	825067.72	3.5%	1.675	492577.74
2026	62050.53	3593.36	763.55	13.86	17.74	18.28	860020.35	63746.21	13957.69	937724.25	3.5%	1.734	540786.76
2027	68461.80	3964.51	842.49	14.13	18.09	18.63	967365.23	71717.99	15695.59	1054778.81	3.5%	1.795	587620.51
2028	68461.80	3964.51	842.49	14.41	18.44	19.00	986534.54	73105.56	16007.31	1075647.41	3.5%	1.857	579239.32
2029	68461.80	3964.51	842.49	14.69	18.81	19.37	1005703.84	74572.43	16319.03	1096595.30	3.5%	1.923	570252.37
2030	68461.80	3964.51	842.49	14.98	19.18	19.76	1025557.76	76039.30	16647.60	1118244.66	3.5%	1.990	561931.99
2031	68461.80	3964.51	842.49	15.29	19.57	20.15	1046780.92	77585.46	16976.17	1141342.55	3.5%	2.059	554318.87
2032	68461.80	3964.51	842.49	15.59	19.96	20.56	1067319.46	79131.62	17321.59	1163772.67	3.5%	2.132	545859.60
2033	68461.80	3964.51	842.49	15.91	20.37	20.98	1089227.24	80757.07	17675.44	1187659.75	3.5%	2.206	538377.04
2034	68461.80	3964.51	842.49	16.25	20.81	21.43	1112504.25	82501.45	18054.56	1213060.26	3.5%	2.283	531344.84
2035	68461.80	3964.51	842.49	16.59	21.24	21.87	1135781.26	84206.19	18425.26	1238412.71	3.5%	2.363	524084.94
2036	68461.80	3964.51	842.49	16.93	21.68	22.33	1159058.27	85950.58	18812.80	1263821.65	3.5%	2.446	516889.15
2037	68461.80	3964.51	842.49	17.29	22.13	22.79	1183704.52	87734.61	19200.35	1290639.48	3.5%	2.532	509731.23
2038	68461.80	3964.51	842.49	17.65	22.59	23.27	1208350.77	89558.28	19604.74	1317513.79	3.5%	2.620	502867.86
2039	68461.80	3964.51	842.49	18.02	23.06	23.76	1233681.64	91421.60	20017.56	1345120.80	3.5%	2.712	495988.50
2040	68461.80	3964.51	842.49	18.39	23.55	24.25	1259012.50	93364.21	20430.38	1372807.09	3.5%	2.807	489065.58
2041	68461.80	3964.51	842.49	18.78	24.04	24.76	1285712.60	95306.82	20860.05	1401879.47	3.5%	2.905	482574.69
2042	68461.80	3964.51	842.49	19.17	24.55	25.28	1312412.71	97328.72	21298.15	1431039.58	3.5%	3.007	475902.75
2043	68461.80	3964.51	842.49	19.58	25.06	25.82	1340482.04	99350.62	21753.09	1461585.75	3.5%	3.112	469661.23
2044	68461.80	3964.51	842.49	19.99	25.59	26.36	1368551.38	101451.81	22208.04	1492211.23	3.5%	3.221	463275.76
2045	68461.80	3964.51	842.49	20.41	26.13	26.92	1397305.34	103592.65	22679.83	1523577.82	3.5%	3.334	456981.95
2046	68461.80	3964.51	842.49	20.87	26.71	27.51	1428797.77	105892.06	23176.90	1557866.73	3.5%	3.450	451555.57
2047	68461.80	3964.51	842.49	21.31	27.28	28.10	1458920.96	108151.83	23673.97	1590746.76	3.5%	3.571	445462.55
2048	68461.80	3964.51	842.49	21.77	27.87	28.70	1490413.39	110490.89	24179.46	1625083.74	3.0%	3.678	441838.97
2049	68461.80	3964.51	842.49	22.23	28.46	29.32	1521905.81	112829.95	24701.81	1659437.57	3.0%	3.789	437961.88
2050	68461.80	3964.51	842.49	22.71	29.07	29.94	1554767.48	115248.31	25224.15	1695239.94	3.0%	3.902	434454.11
2051	68461.80	3964.51	842.49	23.17	29.66	30.55	1586259.91	117587.37	25738.07	1729585.35	3.0%	4.019	430352.16
2052	68461.80	3964.51	842.49	23.65	30.28	31.18	1619121.57	120045.36	26268.84	1765435.77	3.0%	4.140	426433.76
2053	68461.80	3964.51	842.49	24.14	30.90	31.83	1652667.85	122503.36	26816.46	1801987.67	3.0%	4.264	422604.99
2054	68461.80	3964.51	842.49	24.64	31.54	32.49	1686898.75	125040.65	27372.50	1839311.90	3.0%	4.392	418786.86
2055	68461.80	3964.51	842.49	25.15	32.20	33.16	1721814.27	127657.22	27936.97	1877408.46	3.0%	4.524	414988.61
2056	68461.80	3964.51	842.49	25.67	32.86	33.85	1757414.41	130273.80	28518.29	1916206.50	3.0%	4.659	411291.37
2057	68461.80	3964.51	842.49	26.21	33.55	34.56	1794383.78	133009.31	29116.45	1956509.54	3.0%	4.799	407691.09
2058	68461.80	3964.51	842.49	26.78	34.29	35.32	1833407.00	135943.05	29756.75	1999106.80	3.0%	4.943	404431.88
2059	68461.80	3964.51	842.49	27.37	35.04	36.09	1873799.47	138916.43	30405.46	2043121.36	3.0%	5.091	401320.24
2060	68461.80	3964.51	842.49	28.00	35.84	36.92	1916930.40	142088.04	31104.73	2090123.17	3.0%	5.244	398574.21
2061	68461.80	3964.51	842.49	28.64	36.66	37.77	1960745.95	145338.94	31820.85	2137905.74	3.0%	5.401	395835.17
2062	68461.80	3964.51	842.49	29.30	37.51	38.63	2005930.74	148708.77	32545.39	2187184.90	3.0%	5.564	393095.78
2063	68461.80	3964.51	842.49	29.97	38.37	39.52	2051800.15	152118.25	33295.20	2237213.60	3.0%	5.730	390438.67
2064	68461.80	3964.51	842.49	30.63	39.21	40.39	2096984.93	155448.44	34028.17	2286461.54	3.0%	5.902	387404.53
2065	68461.80	3964.51	842.49	31.31	40.07	41.28	2143538.96	158857.92	34777.99	2337174.87	3.0%	6.079	384467.00
2066	68461.80	3964.51	842.49	31.99	40.96	42.18	2190092.98	162386.33	35536.23	2388015.54	3.0%	6.262	381350.29
2067	68461.80	3964.51	842.49	32.69	41.85	43.11	2238016.24	165914.74	36319.74	2440250.72	3.0%	6.450	378333.44
2068	68461.80	3964.51	842.49	33.41	42.76	44.05	2287308.74	169522.45	37111.68	2493942.87	3.0%	6.643	375424.19
2069	68461.80	3964.51	842.49	34.14	43.70	45.01	2337285.85	173249.09	37920.47	2548455.41	3.0%	6.842	372472.29
2070	68461.80	3964.51	842.49	34.88	44.65	45.99	2387947.58	177015.37	38746.12	2603709.07	3.0%	7.048	369425.24
2071	68461.80	3964.51	842.49	35.64	45.63	47.00	2439978.55	180900.59	39597.03	2660476.17	3.0%	7.259	366507.26
2072	68461.80	3964.51	842.49	36.42	46.62	48.02	2493378.76	184825.46	40456.37	2718660.59	3.0%	7.477	363603.13
2073	68461.80	3964.51	842.49	37.20	47.63	49.06	2546778.96	188829.61	41332.56	2776941.13	3.0%	7.701	360594.87
2074	68461.80	3964.51	842.49	38.01	48.66	50.12	2602233.02	192913.06	42225.60	2837371.68	3.0%	7.932	357712.01
2075	68461.80	3964.51	842.49	38.84	49.71	51.21	2659056.31	197075.79	43143.91	2899276.01	3.0%	8.170	354868.54
2076	68461.80	3964.51	842.49	39.68	50.79	52.32	2716564.22	201357.46	44079.08	2962000.76	3.0%	8.415	351990.58
Total													£25,221,521.38



**Appendix J:**  
**Appraisal Summary Table**

Appraisal Summary Table		Date produced:	27	6	2017	Contact:		
Name of scheme:	Omega Highway Gateways - Junction Improvement Package				Name	A.Dickin		
Description of scheme:	A key component of the council's 'Warrington New City' plans, the schemes will ease congestion and enable new developments, ensuring Omega's economic potential as an employment and residential location is maximised. Junction 1: Burtonwood Road / Kingswood Road Junction 2: Lingley Green Avenue / A57 Liverpool Road				Organisation	Warrington B.C		
					Role	Promoter/Official		
Impacts	Summary of key impacts	Assessment						
		Quantitative			Qualitative	Monetary £(NPV)	Distributional 7-pt scale/ vulnerable grp	
Economy	Business users & transport providers A high-level economic appraisal for both junctions following WebTAG guidance identifies benefits to all trip purposes in the form of journey time savings. At the time of assessment trip purpose data was not available, therefore all journey time savings have been derived based on WebTAG average values of time by vehicle type and are presented in the commuter trips section below. The scheme provides cumulative corridor capacity improvements which have a positive impact on highway capacity and access to north west Warrington for residences and those travelling to Warrington employment sites.	Value of journey time changes(£)		Moderate Beneficial	See Social and Commuting Below			
		Net journey time changes (£)						
		0 to 2min	2 to 5min	> 5min				
	Reliability impact on Business users Delivers enhanced reliability and predictability for vehicle journey times on the transport network, particularly for business users. The provision of additional turning lanes will enhance reliability of the junction, particularly during the peak.				Moderate Beneficial	Not monetised		
	Regeneration The junction improvements will provide support for strategic housing schemes including <b>1,520 potential dwellings and over 92,500m2 of employment space</b> all within 1 mile. Delivery of the package is not a specific planning condition; however will support the wider aspirations of the area to ensure the economic potential is maximised.		n/a		Moderate Beneficial	Not monetised		
	Wider Impacts The package will support the Omega site which is a key strategic priority of the Cheshire and Warrington LEP Strategic Economic Plan.				Slight Beneficial	Not monetised		
Environmental	Noise The scheme is likely to have a limited impact on noise with a temporary impact during construction. The construction of the scheme will involve limited noise impacts including a variety of equipment; and traffic related noise associated with the construction workforce and transport of materials/waste to and from the works area.		n/a		Neutral	Not monetised		
		Air Quality The junction improvement at Kingswood Road / Burtonwood Road is located approximately 500m from a declared Air Quality Management Area (AQMA) along the M62 (WBC AQMA No.1). This AQMA is declared due to exceedance of the objective for NO2.		n/a		Neutral	Not monetised	
	Greenhouse gases The package is forecast to have a positive impact on greenhouse gases with a reduction in CO2 emission of <b>10,148 Tonnes</b> . The relatively small size of the schemes will also ensure the construction periods will have a very small impact on green house emissions.	Change in non-traded carbon over 60y (CO2e)	10,148 Tonnes		Positive	Not monetised		
	Landscape This scheme has no impact on landscape and has therefore been assessed Neutral.		n/a		Neutral	Not monetised		
	Townscape Townscape impact is defined in WebTAG Unit A.3 (Environment Impact Appraisal) as the physical and social characteristics of the built and non-built urban environment and the way in which those characteristics are perceived. This scheme has no impact on townscape considerations with no impact on local amenities and facilities around either junction improvement area and has therefore been assessed Neutral.		n/a		Neutral	Not monetised		
	Historic Environment This scheme has no impact on the historic environment and has therefore been assessed Neutral.		n/a		Neutral	Not monetised		
	Biodiversity This scheme has no impact on biodiversity and has therefore been assessed Neutral.		n/a		Neutral	Not monetised		
	Water Environment This scheme has no impact on the water environment and has therefore been assessed Neutral.		n/a		Neutral	Not monetised		
Social	Commuting and Other users A high level economic appraisal for both junctions following WebTAG guidance identifies benefits to all trip purposes in the form of journey time savings. The scheme provides cumulative corridor capacity improvements which have a positive impact on highway capacity and access to north west Warrington for residences and those travelling to Warrington employment sites.	Value of journey time changes(£)		Beneficial	£57,899,818			
		Net journey time changes (£)						
		0 to 2min	2 to 5min	> 5min				
	Reliability impact on Commuting and Other users Delivers enhanced reliability and predictability for vehicle journey times on the transport network. The provision of additional turning lanes will enhance reliability of the junction, particularly during the peak period.		n/a		Moderate Beneficial	Not monetised		
	Physical activity Junction 1 improvements will include, the existing pedestrian refuge on Burtonwood Road, at the Kingswood Road junction would be enlarged to accommodate a 4-metre wide crossings / upgrade to a toucan crossing. The refuge on Kingswood Road would also be moved eastwards and the northern kerblines realigned to provide sufficient width to pass the refuge. The footways would be 3metres wide so they can be shared by cyclists and would be continued on both sides of Burtonwood Road.  Junction 2 improvements, will not add any more pedestrian facilities, but will move the north south crossing point onto the natural pedestrian desire line.  <del>The package of works at both junctions will not discourage additional walking and cycling</del>		n/a		Slight Beneficial	Not monetised		
	Journey quality Detailed design for the package of works will include good design and layout principles to ensure no negative impacts are experienced as a result of the new junction arrangements. Improvements to journey times, queue lengths for motorists travelling to/from north west Warrington (particularly for Omega and Lingley Mere) will have a slight beneficial impact for journey quality.		n/a		Slight Beneficial	Not monetised		
	Accidents Improvements to congestion at the two identified junctions may contribute to an improvement for accidents influenced by changes to queue lengths, average speed etc.		n/a		Neutral	Not monetised		
	Security As highlighted within the physical activity assessment, new crossing facilities and improved footways will be provided providing a security benefit for pedestrians. The package of improvements doesn't include changes to bus/public transport user security (i.e. no additional walk time at stop or walk penalty attributed).		n/a		Neutral	Not monetised		
	Access to services The scheme considers access to key employment areas including Omega and Lingley Mere, and proposed new residential areas.		n/a		Neutral	Not monetised		
	Affordability The appraisal highlights the package of improvements is unlikely to add any direct or indirect additional cost in terms of transport affordability (peoples ability to use the transport network) (i.e. the package doesn't introduce new parking charges, road user charges, public transport fare changes, alter public transport concession availability etc.).		n/a		Neutral	Not monetised		
	Severance Whilst the package of junction improvements will alter vehicular movement within north west Warrington, the works will not place a physical infrastructure severance barrier for pedestrians or cyclists. Congested roads can often act as a deterrent for pedestrians and cyclists; thereby improvements to this objective, aligned to the NPIF bid requirements will offer marginal improvements to this criteria.		n/a		Neutral	Not monetised		
	Option and non-use values There will be insignificant change to the availability of transport services for the study area as a result of the junction improvements. Therefore, factoring in a proportionate approach to the appraisal, option and non-use values has been considered to be not required within the assessment and as such assessed as Neutral.		n/a		Neutral	Not monetised		
Public Accounts	Cost to Broad Transport Budget The construction and maintenance costs in 2010 values and discounted following WebTAG guidance is £5.8m (this includes <b>£3.6m</b> for Junction 1 and <b>£2.2m</b> for Junction 2)		n/a		n/a	£5,837,674		
	Indirect Tax Revenues The change in indirect tax revenues has not been monetised, however given the forecast journey time savings it is likely there would be a decrease in indirect tax revenues.		n/a		n/a	-		





**Appendix K:  
Incentivising Skills Development – Balfour  
Beatty Birchwood Pinch Point Employment  
and Skills Plan**



# Birchwood Pinch Point Project

Scape Civil Engineering and Infrastructure Framework  
Employment and Skills Plan – Nov 16

The below targets/results are proposed for the delivery of the £3.5m, 6 months Birchwood Pinch Point Project with Warrington Borough Council;

	Employment and Skills Areas	Measured by	Framework Target (Overarching target to be met)	Project Target	Achieved	Comments
<b>1.</b>	<b>Work Experience</b>					
1.1	Work experience opportunities under 16 years	No of pupils	1	1	1	2 weeks completed
1.2	Work experience opportunities over 16 years	No of pupils	4	3	5	2 weeks completed each – 1no has applied to BB Graduate scheme
<b>2.</b>	<b>Engagement with schools/colleges</b>					
2.1	School college visits	No of pupils	50	100	366	Safety Talks, Careers Talks, Curriculum Involvement
<b>3.</b>	<b>Adult Employment Opportunities (19+)</b>					
3.1	Number of opportunities created		3	2	4	Achievement in the supply chain by D Morgan
3.2	Number of opportunities advertised locally		3	2	3	
<b>4.</b>	<b>Apprentices (including Apprentice Training Agency placements)</b>					
4.1	Number of starts / completions		1	1	C	Commercial apprentice for BB – Ella Sherrington
4.2	Weeks on site	Weeks on site per apprentice	10	5	10	
<b>5.</b>	<b>Training courses (internal and external)</b>					
5.1	Health & Safety		12	12	15	Various courses
5.2	Professional Development	No of people days on training courses	3	2	4	Training for on-site staff and external stakeholders including training completed at local JCP
5.3	Sustainability/innovation		3	3	4	Various courses – and onsite development
<b>6.</b>	<b>Professional and Academic Qualifications</b>					
6.1	CIAT; CIBSE; CIOB; ICE etc– Starts / Completions		0	1	0	Project team already had provision in place
6.2	Degree/HNC or similar – Starts / Completions		0	0	0	1no site staff on an appointed persons course and 1no admin NVQ commenced
6.3	NVQ (any level) – Starts / Completions		1	0	2	

### Additional results:

Over **300** newsletters delivered locally

**1** volunteer event (Warrington Run)

**£648** in kind and charitable donations to local groups



**Appendix L:**  
**Project Programme**





**Appendix M:  
Qualified Risk Assessment (QRA)**

**Burtonwood Road South Dualling and junction improvements**

Reference	Click here for Work Area / Location	Escalation information	Category	Opportunity	Benefit	Opportunity Benefits Matrix				Commentary				
		Escalation Level				Delivery	Safety	Actual Monetary Benefit (£)	Benefit	Current Status	Current Actions	By When	Changes from last period	
1	Omega 278 works / Burtonwood Rd Sth			Complete all service diversions prior to works commencing	Programme and cost saving to be identified									
2	Omega 278 works / Burtonwood Rd Sth			Phase the works to suit the service diversions rather than the preferred OWL sequence	Programme and cost saving to be identified									
3	Omega 278 works / Burtonwood Rd Sth			Phase the works to suit the most efficient construction sequence rather than the preferred OWL sequence	Programme and cost saving of upto £50,000			50,000						
4	Omega 278 works / Burtonwood Rd Sth			Staging the construction works to suit a wider traffic management gyratory rather than a construction sequence thereby allowing lane closures for the duration of the works	Programme and cost saving of upto £100,000			100,000						
5	Omega 278 works / Burtonwood Rd Sth			Consider an advance works contract to construct new verges to allow service diversions to be completed before the main works are commenced	Programme and cost saving of upto £50,000			50,000						
6	Burtonwood Rd Sth			Construct Omega Internal Access Roads and Skyline Junction with service corridors to provide alternative diversion routes prior to dualling Burtonwood Rd south	Programme and cost saving due to allowing full road closures and services diverted out of the way of the works of up to £150,000			150,000						
7	Omega 278 works / Burtonwood Rd Sth			Overlap section 2 with section 3 works and section 4 with section 5 works	Reduce construction programme by up to 26 weeks saving prelims at up to £16,000 per week			416,000						
8	Omega 278 works / Burtonwood Rd Sth			Remove traffic management restrictions to allow normal working patterns [currently 9.30-15.30 allowed]	Reduce construction programme by up to 26 weeks saving prelims at up to £16,000 per week			416,000						
9	Omega 278 works / Burtonwood Rd Sth			Employ specialist stats consultant to verify C4 quotes / look at alternative/requirements for stats diversions	Reduced diversion requirements resulting in prelim and diversion cost savings which could potentially save up to £1m for a cost of upto £100k			900,000						
10	Omega 278 works / Burtonwood Rd Sth			Use of SMA surfacing instead of HRA	Reduced requirement for nightshifts and lane closures resulting in cost savings of upto £50,000 [prelims, surfacing gang costs, etc.]			50,000						
11	Omega 278 works / Burtonwood Rd Sth			Statutory undertakers to remove redundant equipment once diversions completed	Will reduce H&S risks, reduce the requirement for vacuum excavation and reduce the programme duration. Potentially halving the Vac Ex risk of £1m			500,000						
12	Omega 278 works / Burtonwood Rd Sth			Overlap elements of the works with M62 J8 project	Staff cost saving - upto 6 weeks at £5,000 per week			30,000						
								2,662,000						

Warrington M62 Junction 8 Improvements  
Opportunity and Risk Register

Burtonwood Road South Dualling and junction improvements Opportunity & Risk																					
Reference	Click here for Work Area / Location	Escalation information Escalation Level	Category	Risk event	Cause	Consequence	Probability Impact (PI) matrix						Mitigation	Probability Impact (PI) matrix							
							Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood	Probability %		Severity	Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood	Probability %	Severity
<b>1.00 Health, Safety &amp; Environment</b>																					
1	Burtonwood Road South Dualling		HSE	People/ Plant Interfaces	People interface with moving plant. Failure to comply with company procedures.	Accident, harm, injury, death, prosecution, damage to reputation, suspension of works	3	4	3	250,000	3	25.0	Orange	People and plant segregated by physical barrier, exclusion zones around excavators. "Enforce Company Procedures. Operation of the Project Management HSEQ Plan (PMP) All operations to be planned and the devised SSoW documented in RAMS. RAMS approval. RAMS Briefings to work force. Periodic RAMS review. "	3	4	3	250,000	1	1.0%	Yellow
2	Burtonwood Road South Dualling		HSE	Road Traffic Accident	Interface between construction traffic and travelling public	Accident, harm, injury, death, prosecution, damage to reputation, suspension of works	3	5	3	250,000	3	30.0	Red	Ensure construction traffic on public roads is minimised and plant interfaces with the travelling public are well maintained and signed.	3	5	3	250,000	1	5.0%	Orange
3	Burtonwood Road South Dualling		HSE	Damage to existing and uncharted services underground	Hitting services while excavating or travelling over existing services	Accident, Harm, Injury, Ill Health, Death Work Stopped. Delay & Litigation, cost of repairs	3	4	3	250,000	3	25.0	Orange	All excavation operations carried out under operation of 'Permit to Dig' and under supervision by an appointed qualified & experienced Supervisor. Appointed Supervisor to inspect excavations at the start of each day, when anything changes and prior to any works taking place after a period of absence.	3	4	3	250,000	1	3.0%	Yellow

Warrington M62 Junction 8 Improvements  
Opportunity and Risk Register

Burtonwood Road South Dualling and junction improvements Opportunity & Risk																					
Reference	Work Area / Location	Escalation Level	Category	Risk event	Cause	Consequence	Probability Impact (PI) matrix						Mitigation	Probability Impact (PI) matrix							
							Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood	Probability %		Severity	Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood	Probability %	Severity
4	Burtonwood Road South Dualling		HSE	Ground Collapse	Unsupported excavations	Accident, harm, injury, death, prosecution, damage to reputation, suspension of works	3	4	3	100,000	3	20.0	Orange	<p>All excavations to be assessed by the Temporary Works Coordinator (TWC). Temporary works ground support designed and independently checked where identified by TWC. TWC to inspect temp works installations before first use, after any amendments and Supervisor at the start of each day.</p> <p>All excavation operations carried out under operation of 'Permit to Dig' and under supervision by an appointed qualified &amp; experienced Supervisor. Appointed Supervisor to inspect excavations at the start of each day, when anything changes and prior to any works taking place after a period of absence.</p> <p>Excavations to be segregated to prevent access by others. Stockpiles/ arisings to be located away from zone of influence of excavations or other sensitive features/ premises.</p>	3	4	3	100,000	1	1.0%	Yellow
5	Burtonwood Road South Dualling		HSE	Lifting Operations	Dropped loads Lifting equipment collapse Plant in contact with people Hands in contact with plant/equipment	Accident, Harm, Injury, Ill Health, Death Work Stopped. Delay & Litigation	3	4	3	100,000	3	10.0	Orange	<p>Appoint SQEP Lift Coordinator. Adherence to LOLER, BB Company Standards &amp; Procedures. Prior to works, prepare Project Lift Plan. Lifting operations planned and Safe System of Work documented in RAMS. RAMS approval. RAMS Briefings to work force..</p> <p>All lifting operations carried out under operation specific Lift Plans and under supervision by an appointed SQEP Lift Supervisor. Use of competent/ experienced temporary works designers/ coordinator.</p> <p>Obtain Approval to use selected crane company. Ticketed trained and competent crane operator &amp; Banksmen. Lifting equipment testing, inspection, examination and insurance documentation checked prior to use on site. High Risk Work Zone enforced .All lifting carried out with appropriate enforced clearance zones.</p>	3	4	3	100,000	1	1.0%	Yellow



Warrington M62 Junction 8 Improvements  
Opportunity and Risk Register

Burtonwood Road South Dualling and junction improvements Opportunity & Risk																										
Reference	Work Area / Location	Escalation information <a href="#">Click here for</a>	Escalation Level	Category	Risk event	Cause	Consequence	Probability Impact (PI) matrix						Mitigation	Probability Impact (PI) matrix											
								Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood	Probability %		Severity	Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood	Probability %	Severity				
6	Burtonwood Road South Dualling			HSE	Working in Live Traffic	Public traffic enters site through TM	Accident, harm, injury, death, prosecution, damage to reputation, suspension of works	2	4	3	100,000	3	15.0	Orange	Ensure Traffic management is well signed and well maintained and appropriate to speed of traffic and circumstances	2	4	3	100,000	1	5.0%	Yellow				
7	Burtonwood Road South Dualling			HSE	Contraction of Infectious Diseases (Leptospirosis)	Working near or in existing drains/sewers.	Accident, Harm, Injury, Ill Health, Death Work Stopped. Delay	2	3	2	10,000	3	10.0	Yellow	Assess the site surroundings for potential areas of substance abuse. Assess the works area for potential for Leptospirosis (presence of vermin) Instruction on Leptospirosis provided to all personnel during site induction. Provision of topical tool box talks to workforce. No smoking/ eating in high risk areas or during high risk operations. Ensure correct use of identified PPE (including barrier creams and personal hygiene procedures).	2	3	2	10,000	1	1.0%	Yellow				
8	Burtonwood Road South Dualling			HSE	Noise and Dust affects local residents	Carrying our construction works adjacent to residential properties	works stopped while measures put in place, additional costs incurred	2	2	3	100,000	3	40.0	Yellow	Ensure noise and dust is considered in all operations and adequate measures are included in price.	2	2	3	100,000	1	20.0%	Yellow	20,000.00			
9	Burtonwood Road South Dualling			HSE	Encountering Unexploded ordnance	Presence of uncharted unexploded ordnance within excavations	works stopped while measures put in place, additional costs incurred	2	2	2	25,000	3	10.0	Yellow	Desk top study carried out, if appropriate measures to deal with unexploded ordnance included in tool box talks	2	2	2	25,000	1	3.0%	Green	750.00			
10	Burtonwood Road South Dualling			HSE	Damage to existing services underground - Known Service	Hitting services while excavating or travelling over existing services	Accident, Harm, Injury, Ill Health, Death Work Stopped. Delay & Litigation, cost of repairs	2	2	5	1,000,000	3	25.8	Red	All excavation operations carried out under operation of 'Permit to Dig' and under supervision by an appointed qualified & experienced Supervisor. Appointed Supervisor to inspect excavations at the start of each day, when anything changes and prior to any works taking place after a period of absence. Use of vacuum excavation methods	2	2	5	1,000,000	1	11.5%	Orange	115,000.00			
11	Burtonwood Road South Dualling			HSE	Damage to existing services underground - Unknown Service	Hitting services while excavating or travelling over existing services	Accident, Harm, Injury, Ill Health, Death	2	2	2	50,000	3	10.0	Yellow	All excavation operations carried out under operation of 'Permit to Dig' and under supervision by an appointed qualified & experienced Supervisor. Appointed Supervisor to inspect excavations at the start of each day, when anything changes and prior to any works taking place after a period of absence.	2	2	2	50,000	1	10.0%	Green	5,000.00			



Warrington M62 Junction 8 Improvements  
Opportunity and Risk Register

Burtonwood Road South Dualling and junction improvements Opportunity & Risk																									
Reference	Work Area / Location	Escalation information <a href="#">Click here for</a> Escalation Level	Category	Risk event	Cause	Consequence	Probability Impact (PI) matrix						Mitigation	Probability Impact (PI) matrix											
							Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood	Probability %		Severity	Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood				Probability %	Severity	
12	Burtonwood Road South Dualling		HSE	Members of the public enter the site	Lack of fencing, historic rights of way, historic used paths	Accident, Harm, Injury, Death	2	2	2	50,000	3	10.0	Yellow	Ensure an understanding of the public use of the site, ensure appropriate fencing and signage is provided to deter trespassers. Provide alternative routes where feasible.	2	2	2	50,000	1	10.0%	Green				
13	Burtonwood Road South Dualling		HSE	Working around existing services	Unchartered Service encountered	Additional costs, delays	3	3	3	200,000	3	20.0	Yellow	Carry out GPR surveys and verify services with trial holes	3	3	3	200,000	1	5.0%	Yellow	10,000.00			
<b>2.00 Design</b>																				<b>150,750.00</b>	<b>150,750.00</b>				
14	Burtonwood Road South Dualling		Design	Additional environmental works required	Unforeseen noise requirements	Additional costs, delays	2	2	2	25,000	3	30.0	Yellow	Carry out noise assessment and noise monitoring Install acoustic fencing if required	2	2	2	25,000	1	10.0%	Green	2,500.00			
15	Burtonwood Road South Dualling		Design	New surface water drainage cannot outfall into existing system	Errors in assumptions of current drainage, outfall consents and attenuation, condition of existing unknown		2	2	2	10,000	3	20.0	Yellow		2	2	2	10,000	1	5.0%	Green	500.00			
16	Burtonwood Road South Dualling		Design	Existing System Needs repairs	Existing outfalls or network in poor condition and needs repair.		2	2	3	150,000	3	20.0	Yellow	Carry out surveys and develop a treatment regime	2	2	3	150,000	1	5.0%	Yellow	7,500.00			
17	Burtonwood Road South Dualling		Design	Road Safety Audits and NUM Audits identify additional works	Additional construction works required as a result of safety audit of the works	Increased design and construction cost and programme delays	1	2	2	50,000	3	20.0	Yellow	Carry out surveys and develop a treatment regime	1	2	2	50,000	1	5.0%	Green	2,500.00			
18	Burtonwood Road South Dualling		Design	Failure to obtain drainage consents for permanent works	EA or UU fail to approve drainage proposals	Delay and additional negotiation	1	1	2	10,000	3	10.0	Yellow	liaise closely with UU	1	1	2	10,000	1	5.0%	Green	500.00			
20	Burtonwood Road South Dualling		Design	Design creep	Design requirements increase during construction	Additional costs, delays	1	1	3	200,000	5	90.0	Red		1	1	3	200,000	1	5.0%	Yellow	10,000.00			
21	Burtonwood Road South Dualling		Design	Scope creep	Scope increases during design and construction	Additional cost and delay	1	1	4	750,000	5	90.0	Red		1	1	4	750,000	1	20.0%	Yellow	150,000.00			
<b>3.00 Cost</b>																				<b>173,500.00</b>	<b>173,500.00</b>				
22	Burtonwood Road South Dualling		Cost	Increased volume of unacceptable material requires excavation	Ground conditions different from those expected	Additional costs, delays	1	1	2	20,000	3	40.0	Yellow	Carry out GI as early as possible and design out effects of varying ground conditions	1	1	2	20,000	1	10%	Green	2,000.00			

Warrington M62 Junction 8 Improvements  
Opportunity and Risk Register

Burtonwood Road South Dualling and junction improvements Opportunity & Risk																						
Reference	Work Area / Location	Escalation information <a href="#">Click here for</a> Escalation Level	Category	Risk event	Cause	Consequence	Probability Impact (PI) matrix							Mitigation	Probability Impact (PI) matrix							
							Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood	Probability %	Severity		Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood	Probability %	Severity	
23	Burtonwood Road South Dualling		Cost	Increased volume of contaminated material	Ground conditions different from those expected	Additional costs, delays	1	2	2	10,000	3	40.0	Yellow	Carry out GI as early as possible and design out effects of varying ground conditions	1	2	2	10,000	1	10%	Green	1,000.00
24	Burtonwood Road South Dualling		Cost	Additional soft spots	Ground conditions different from those expected	Additional costs, delays	1	1	2	16,000	4	50.0	Yellow	Have alternative design for geogrid rather than dig and replace	1	1	2	16,000	1	20%	Green	3,200.00
25	Burtonwood Road South Dualling		Cost	Increased regulating required	Existing topography is different from expected	Additional costs, delays	1	1	2	50,000	4	50.0	Yellow	Carry out topographical survey as early as possible	1	1	2	50,000	1	3%	Green	1,500.00
26	Burtonwood Road South Dualling		Cost	Increased depth construction required	Existing topography or road construction varies from that expected	Additional cost, delay to construction and TM	1	1	2	30,000	4	50.0	Yellow	Carry out topographical survey as early as possible	1	1	2	30,000	1	10%	Green	3,000.00
27	Burtonwood Road South Dualling		Cost	Unidentified Unexploded Ordnance not discovered in Ground Investigation	Presence of Unexploded Ordnance	Additional works and delay to construction	1	1	2	10,000	3	15.0	Yellow	Carry out desk top study	1	1	2	10,000	1	15%	Green	1,500.00
28	Burtonwood Road South Dualling		Cost	Claims from Kingswood development		Additional cost	1	1	2	20,000	4	50.0	Yellow		1	1	2	20,000	1	25%	Green	
29	Burtonwood Road South Dualling		Cost	Third Party Claims	Claims from travelling public	Additional Cost	1	1	2	10,000	3	15.0	Yellow	Deal with claims proactively but thoroughly investigate	1	1	2	10,000	1	10%	Green	
30	Burtonwood Road South Dualling		Cost	Additional works required at tie ins	Levels or road construction at tie in not as anticipated	Additional works	1	1	2	10,000	3	40.0	Yellow	Carry out topographical survey as early as possible, then design to suit	1	1	2	10,000	1	20%	Green	2,000.00
31	Burtonwood Road South Dualling		Cost	Road Safety audits identify additional works	Road Safety audits identify additional works	Additional Cost	1	1	2	15,000	4	50.0	Yellow	Get road safety audits booked early so works carried out prior to completion	1	1	2	15,000	1	20%	Green	3,000.00
32	Burtonwood Road South Dualling		Cost	Increase in service diversion costs	Costs increase above C4 quotes	Additional Cost	1	1	3	100,000	4	50.0	Yellow	Get specialist consultants involved and liaise with SUs early	1	1	3	100,000	1	40%	Yellow	40,000.00
33	Burtonwood Road South Dualling		Cost	Increase in service diversion costs	Costs increase above C3 quotes	Additional Cost	1	1	3	100,000	4	50.0	Yellow		1	1	3	100,000	1	40%	Yellow	40,000.00
34	Burtonwood Road South Dualling		Cost	Additional works required due to interface with TAA	designer has a poor interface with TAA	Additional cost and delay	1	1	2	50,000	1		Green		1	1	2	50,000	1		Green	-

Warrington M62 Junction 8 Improvements  
Opportunity and Risk Register

Burtonwood Road South Dualling and junction improvements Opportunity & Risk																									
Reference	Work Area / Location	Escalation information Escalation Level	Category	Risk event	Cause	Consequence	Probability Impact (PI) matrix						Mitigation	Probability Impact (PI) matrix											
							Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood	Probability %		Severity	Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood				Probability %	Severity	
35	Burtonwood Road South Dualling		Cost	Under estimate of design scope or cost	Design costs increase due to under estimate of scope		1	1	3	100,000	4	50.0	Yellow		1	1	3	100,000	1	5%	Yellow	5,000.00			
38	Burtonwood Road South Dualling		Cost	Quantities increase	Errors in formulation of Bills of quantities	Additional cost and time	1	1	3	300,000	3	10.0	Yellow		1	1	3	300,000	1	3%	Yellow	9,000.00			
39	Burtonwood Road South Dualling		Cost	Insufficient traffic management allowance			2	3	2	10,000	1		Yellow	Programme surveys early and seek specialist advice	2	3	1		1		Yellow	-			
<b>4.00 Programme</b>																					<b>111,200.00</b>	<b>111,200.00</b>			
40	Burtonwood Road South Dualling		Programme	Additional service diversions required	Unchartered Service encountered	Additional costs, delays	4	2	3	120,000	3	25.0	Orange	Early GPR survey and liaise with Stats seek specialist consultant if required	4	2	3	120,000	1	10%	Yellow	12,000.00			
41	Burtonwood Road South Dualling		Programme	Detailed design takes longer	More complicated, lack of resources, delay in approvals	additional cost and time	1	1	2	30,000	3	10.0	Yellow	Monitor design programme weekly using Earned Value Analysis	1	1	2	30,000	1	5%	Green	1,500.00			
42	Burtonwood Road South Dualling		Programme	Start on site delayed	Delay to design, approvals, consents		1	1	2	10,000	3	20.0	Yellow	Programme and monitor design, consents and approvals	1	1	2	10,000	1	10%	Green	1,000.00			
43	Burtonwood Road South Dualling		Programme	Delay due to Statutory processes	Inadequate time allowed for statutory process		1	1	2	40,000	2	5.0	Green	Liaise with WBC to fully understand process, advise of programme for process	1	1	2	40,000	1	5%	Green	2,000.00			
44	Burtonwood Road South Dualling		Programme	Works delayed due to adverse weather	Weather causes stops work and delays works		1	1	3	120,000	3	20.0	Yellow	Monitor weather forecasts, leave minimum amount of formation exposed. Identify weather delays in programme	1	1	3	120,000	1	15%	Yellow	18,000.00			
45	Burtonwood Road South Dualling		Programme	Design takes longer	Delay or increased design due to surveys, lack of design resources		1	1	1		1		Green		1	1	1		1		Green	-			
49	Burtonwood Road South Dualling		Programme	Service diversions take longer	Stats do not turn up as programmed and / or do not achieve envisaged outputs		1	1	3	120,000	3	20.0	Yellow	Liaise closely with Stats before and during works so that they understand the impact of their works and when it will occur. Monitor progress on site regularly	1	1	3	120,000	1	15%	Yellow	18,000.00			
50	Burtonwood Road South Dualling		Programme	Delays to deliveries to site and delay to works	Traffic delays in surrounding area		1	1	2	25,000	3	20.0	Yellow		1	1	2	25,000	1	20%	Green	5,000.00			
<b>5.00 Quality</b>																					<b>57,500.00</b>	<b>57,500.00</b>			
51	Burtonwood Road South Dualling		Quality	Poor Workmanship	poor site supervision and procedures allow poor workmanship		1	1			1		Green	develop and instigate a detailed inspection and test plan, discuss a daily briefings	1	1			1		Green	-			

Warrington M62 Junction 8 Improvements  
Opportunity and Risk Register

Burtonwood Road South Dualling and junction improvements Opportunity & Risk																												
Reference	Click here for Work Area / Location	Escalation information Escalation Level	Category	Risk event	Cause	Consequence	Probability Impact (PI) matrix							Mitigation	Probability Impact (PI) matrix													
							Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood	Probability %	Severity		Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood	Probability %	Severity							
52	Burtonwood Road South Dualling		Quality	Resurfacing works of poor quality	Resurfacing works in patches with numerous joints due to space and time constraints.		1	1				1			Green	Discuss with supply chain prior to start of works try to design out, but if not monitor closely.	1	1				1			Green			
53	Burtonwood Road South Dualling		Quality	Public expectation of the scheme is not met	Public expectation is over rated	Adverse publicity and public opinion is against scheme	1	1				1			Green		1	1				1			Green			
54	Burtonwood Road South Dualling		Quality	Contractor Design Elements	Does the design meet the Employers Requirements		1	1				1			Green	Ensure close liaison with all appropriate WBC departments	1	1				1			Green			
<b>6.00 Reputation</b>																												
55	Burtonwood Road South Dualling		Reputation	Negative impact on traffic flow during works to the highway								1			Agree traffic management and phasings with WBC and HE						1							
56	Burtonwood Road South Dualling		Reputation	Failure to hand over the works on time	Contractor delays and over runs							1			Monitor programme weekly with monthly updates						1							
57	Burtonwood Road South Dualling		Reputation	Not using Local Supply chain	Unable to obtain responses from local sources to undertake the works							1			Set up local supply chain event and develop a local supply chain						1							
58	Burtonwood Road South Dualling		Reputation	Complaints from local residents	Environmental, Noise and Air quality impacts on Locals	Adverse publicity and complaints						1			Liaise closely with local residents using WBC communication plan and PLO						1							
59	Burtonwood Road South Dualling		Reputation	Scheme not well received	Scheme does not deliver expected benefits							1									1							
60	Burtonwood Road South Dualling		Reputation	Planning application challenged	Failure to convince objectors of benefits of scheme							1									1							
61	Burtonwood Road South Dualling		Reputation	Failure to complete on time or achieve spend	Delays to the works							1			Monitor programme weekly with monthly updates						1							
																						0	£	492,950				
																							£	2,394,125				

Omega Gateways Highway Junction Improvement Package  
A57 Liverpool Road / Lingley Green Avenue  
Opportunities

Reference	Click here for Work Area / Location	Escalation information	Category	Opportunity	Benefit	Opportunity Benefits Matrix				Commentary				
		Escalation Level				Delivery	Safety	Actual Monetary Benefit (£)	Benefit	Current Status	Current Actions	By When	Changes from last period	
1	A57 Liverpool Road / Lingley Green Avenue			Complete all service diversions prior to works commencing	Programme and cost saving to be identified									
5	A57 Liverpool Road / Lingley Green Avenue			Consider an advance works contract to construct new verges to allow service diversions to be completed before the main works are commenced	Programme and cost saving of upto £35,000			35,000						
8	A57 Liverpool Road / Lingley Green Avenue			Remove traffic management restrictions to allow normal working patterns [currently 9.30-15.30 allowed]	Programme and cost saving to be identified									
10	A57 Liverpool Road / Lingley Green Avenue			Use of SMA surfacing instead of HRA	Reduced requirement for nightshifts and lane closures resulting in cost savings of upto £50,000 [prelims, surfacing gang costs, etc.]			50,000						
11	A57 Liverpool Road / Lingley Green Avenue			Statutory undertakers to remove redundant equipment once diversions completed	Will reduce H&S risks, reduce the requirement for vacuum excavation and reduce the programme duration. Potentially halving the Vac Ex risk of £1m			250,000						
12	A57 Liverpool Road / Lingley Green Avenue			Overlap elements of the works with M62 J8 project and Kingswood Road Junction	Staff cost saving - upto 6 weeks at £5,000 per week			30,000						
								365,000						

**Omega Gateways Highway Junction Improvement Package**  
**A57 Liverpool Road / Lingley Green Avenue**  
**Risk**

Reference	Work Area / Location	Escalation Level	Category	Risk event	Cause	Consequence	Probability Impact (PI) matrix						Mitigation	Probability Impact (PI) matrix								
							Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood	Probability %		Severity	Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood	Probability %	Severity	
<b>1.00 Health, Safety &amp; Environment</b>																						
1	A57 Liverpool Road / Lingley Green Avenue		HSE	People/ Plant Interfaces	People interface with moving plant. Failure to comply with company procedures.	Accident, harm, injury, death, prosecution, damage to reputation, suspension of works	3	4	3	250,000	3	25.0	Orange	People and plant segregated by physical barrier, exclusion zones around excavators. "Enforce Company Procedures. Operation of the Project Management HSEQ Plan (PMP) All operations to be planned and the devised SSoW documented in RAMS. RAMS approval. RAMS Briefings to work force. Periodic RAMS review. "	3	4	3	250,000	1	1.0%	Yellow	2,500.00
2	A57 Liverpool Road / Lingley Green Avenue		HSE	Road Traffic Accident	Interface between construction traffic and travelling public	Accident, harm, injury, death, prosecution, damage to reputation, suspension of works	3	5	3	250,000	3	30.0	Red	Ensure construction traffic on public roads is minimised and plant interfaces with the travelling public are well maintained and signed.	3	5	3	250,000	1	1.0%	Orange	2,500.00
3	A57 Liverpool Road / Lingley Green Avenue		HSE	Damage to existing and uncharted services underground	Hitting services while excavating or travelling over existing services	Accident, Harm, Injury, Ill Health, Death Work Stopped. Delay & Litigation, cost of repairs	3	4	3	100,000	3	30.0	Orange	All excavation operations carried out under operation of 'Permit to Dig' and under supervision by an appointed qualified & experienced Supervisor. Appointed Supervisor to inspect excavations at the start of each day, when anything changes and prior to any works taking place after a period of absence.	3	4	3	100,000	1	5.0%	Yellow	5,000.00

Omega Gateways Highway Junction Improvement Package  
A57 Liverpool Road / Lingley Green Avenue  
Risk

Reference	Work Area / Location	Escalation information		Risk event	Cause	Consequence	Probability Impact (PI) matrix						Mitigation	Probability Impact (PI) matrix								
		Escalation Level	Category				Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood	Probability %		Severity	Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood	Probability %	Severity	
4	A57 Liverpool Road / Lingley Green Avenue		HSE	Ground Collapse	Unsupported excavations	Accident, harm, injury, death, prosecution, damage to reputation, suspension of works	3	4	3	100,000	3	20.0	Orange	<p>All excavations to be assessed by the Temporary Works Coordinator (TWC). Temporary works ground support designed and independently checked where identified by TWC. TWC to inspect temp works installations before first use, after any amendments and Supervisor at the start of each day.</p> <p>All excavation operations carried out under operation of 'Permit to Dig' and under supervision by an appointed qualified &amp; experienced Supervisor.</p> <p>Appointed Supervisor to inspect excavations at the start of each day, when anything changes and prior to any works taking place after a period of absence.</p> <p>Excavations to be segregated to prevent access by others.</p> <p>Stockpiles/ arisings to be located away from zone of influence of excavations or other sensitive features/ premises.</p>	3	4	3	100,000	1	0.1%	Yellow	100.00

Omega Gateways Highway Junction Improvement Package  
A57 Liverpool Road / Lingley Green Avenue  
Risk

Reference	Work Area / Location	Escalation Level	Category	Risk event	Cause	Consequence	Probability Impact (PI) matrix						Mitigation	Probability Impact (PI) matrix								
							Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood	Probability %		Severity	Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood	Probability %	Severity	
5	A57 Liverpool Road / Lingley Green Avenue		HSE	Lifting Operations	Dropped loads Lifting equipment collapse Plant in contact with people Hands in contact with plant/equipment	Accident, Harm, Injury, Ill Health, Death Work Stopped. Delay & Litigation	3	4	3	100,000	3	20.0	Orange	<p>Appoint SQEP Lift Coordinator.</p> <p>Adherence to LOLER, BB Company Standards &amp; Procedures.</p> <p>Prior to works, prepare Project Lift Plan.</p> <p>Lifting operations planned and Safe System of Work documented in RAMS.</p> <p>RAMS approval. RAMS Briefings to work force..</p> <p>All lifting operations carried out under operation specific Lift Plans and under supervision by an appointed SQEP Lift Supervisor. Use of competent/ experienced temporary works designers/ coordinator.</p> <p>Obtain Approval to use selected crane company.</p> <p>Ticketed trained and competent crane operator &amp; Banksmen.</p> <p>Lifting equipment testing, inspection, examination and insurance documentation checked prior to use on site.</p> <p>High Risk Work Zone enforced .All lifting carried out with appropriate enforced clearance zones.</p>	3	4	3	100,000	1	1.0%	Yellow	1,000.00
6	A57 Liverpool Road / Lingley Green Avenue		HSE	Working in Live Traffic	Public traffic enters site through TM	Accident, harm, injury, death, prosecution, damage to reputation, suspension of works	2	4	3	100,000	3	20.0	Orange	Ensure Traffic management is well signed and well maintained and appropriate to speed of traffic and circumstances	2	4	3	100,000	1	5.0%	Yellow	5,000.00



**Omega Gateways Highway Junction Improvement Package**  
**A57 Liverpool Road / Lingley Green Avenue**  
**Risk**

Reference	Work Area / Location	Escalation Level	Category	Risk event	Cause	Consequence	Probability Impact (PI) matrix							Mitigation	Probability Impact (PI) matrix							
							Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood	Probability %	Severity		Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood	Probability %	Severity	
7	A57 Liverpool Road / Lingley Green Avenue		HSE	Contraction of Infectious Diseases (Leptospirosis)	Working near or in existing drains/sewers.	Accident, Harm, Injury, Ill Health, Death Work Stopped. Delay	2	3	2	50,000	3	10.0	Yellow	Assess the site surroundings for potential areas of substance abuse. Assess the works area for potential for Leptospirosis (presence of vermin) Instruction on Leptospirosis provided to all personnel during site induction. Provision of topical tool box talks to workforce. No smoking/ eating in high risk areas or during high risk operations. Ensure correct use of identified PPE (including barrier creams and personal hygiene procedures).	2	3	2	50,000	1	5.0%	Yellow	2,500.00
8	A57 Liverpool Road / Lingley Green Avenue		HSE	Noise and Dust affects local residents	Carrying our construction works adjacent to residential properties	works stopped while measures put in place, additional costs incurred	2	2	2	50,000	3	10.0	Yellow	Ensure noise and dust is considered in all operations and adequate measures are included in price.	2	2	2	50,000	1	1.0%	Green	500.00
9	A57 Liverpool Road / Lingley Green Avenue		HSE	Encountering Unexploded ordnance	Presence of uncharted unexploded ordnance within excavations	works stopped while measures put in place, additional costs incurred	2	2	2	25,000	3	10.0	Yellow	Desk top study carried out, if appropriate measures to deal with unexploded ordnance included in tool box talks	2	2	2	25,000	1	5.0%	Green	1,250.00
10	A57 Liverpool Road / Lingley Green Avenue		HSE	Damage to existing services underground - Known Service	Hitting services while excavating or travelling over existing services	Accident, Harm, Injury, Ill Health, Death Work Stopped. Delay & Litigation, cost of repairs	2	2	3	180,000	4	60.0	Yellow	All excavation operations carried out under operation of 'Permit to Dig' and under supervision by an appointed qualified & experienced Supervisor. Appointed Supervisor to inspect excavations at the start of each day, when anything changes and prior to any works taking place after a period of absence. Use of vacuum excavation methods	2	2	3	180,000	1	11.5%	Yellow	20,700.00

**Omega Gateways Highway Junction Improvement Package**  
**A57 Liverpool Road / Lingley Green Avenue**  
**Risk**

Reference	Work Area / Location	Escalation Level	Category	Risk event	Cause	Consequence	Probability Impact (PI) matrix						Mitigation	Probability Impact (PI) matrix								
							Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood	Probability %		Severity	Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood		Probability %	Severity
11	A57 Liverpool Road / Lingley Green Avenue		HSE	Damage to existing services underground - Unknown Service	Hitting services while excavating or travelling over existing services	Accident, Harm, Injury, Ill Health, Death	2	2	2	50,000	1		Green	All excavation operations carried out under operation of 'Permit to Dig' and under supervision by an appointed qualified & experienced Supervisor. Appointed Supervisor to inspect excavations at the start of each day, when anything changes and prior to any works taking place after a period of absence.	2	2	2	50,000	1	10.0%	Green	5,000.00
12	A57 Liverpool Road / Lingley Green Avenue		HSE	Members of the public enter the site	Lack of fencing, historic rights of way, historic used paths	Accident, Harm, Injury, Death	2	2	2	50,000	3	10.0	Yellow	Ensure an understanding of the public use of the site, ensure appropriate fencing and signage is provided to deter trespassers. Provide alternative routes where feasible.	2	2	2	50,000	1	5.0%	Green	2,500.00
13	A57 Liverpool Road / Lingley Green Avenue		HSE	Working around existing services	Uncharted Service encountered	Additional costs, delays	3	3	3	200,000	3	20.0	Yellow	Carry out GPR surveys and verify services with trial holes	3	3	3	200,000	1	5.0%	Yellow	10,000.00
<b>2.00 Design</b>																			<b>58,550.00</b>			
14	A57 Liverpool Road / Lingley Green Avenue		Design	Additional environmental works required	Unforeseen noise requirements	Additional costs, delays	2	2	2	62,500	3	30.0	Yellow	Carry out noise assessment and noise monitoring Install acoustic fencing if required	2	2	2	62,500	1	10.0%	Green	6,250.00
15	A57 Liverpool Road / Lingley Green Avenue		Design	New surface water drainage cannot outfall into existing system	Errors in assumptions of current drainage, outfall consents and attenuation, condition of existing unknown		2	2	3	100,000	3	20.0	Yellow		2	2	3	100,000	1	5.0%	Yellow	5,000.00
16	A57 Liverpool Road / Lingley Green Avenue		Design	Existing System Needs repairs	Existing outfalls or network in poor condition and needs repair.		2	2	3	150,000	3	20.0	Yellow		2	2	3	150,000	1	5.0%	Yellow	7,500.00

Omega Gateways Highway Junction Improvement Package  
A57 Liverpool Road / Lingley Green Avenue  
Risk

Reference	Work Area / Location	Escalation Level	Category	Risk event	Cause	Consequence	Probability Impact (PI) matrix						Mitigation	Probability Impact (PI) matrix								
							Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood	Probability %		Severity	Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood		Probability %	Severity
17	A57 Liverpool Road / Lingley Green Avenue		Design	Road Safety Audits and NUM Audits identify additional works	Additional construction works required as a result of safety audit of the works	Increased design and construction cost and programme delays	1	2	2	50,000	3	20.0	Yellow		1	2	2	50,000	1	5.0%	Green	2,500.00
18	A57 Liverpool Road / Lingley Green Avenue		Design	Failure to obtain drainage consents for permanent works	EA or UU fail to approve drainage proposals	Delay and additional negotiation	1	1	2	20,000	3	10.0	Yellow	Liase closely with UU	1	1	2	20,000	1	5.0%	Green	1,000.00
20	A57 Liverpool Road / Lingley Green Avenue		Design	Design creep	Design requirements increase during construction	Additional costs, delays	1	1	2	50,000	5	90.0	Yellow		1	1	2	50,000	1	5.0%	Green	2,500.00
21	A57 Liverpool Road / Lingley Green Avenue		Design	Scope creep	Scope increases during design and construction	Additional cost and delay	1	1	3	100,000	5	90.0	Red		1	1	3	100,000	1	20.0%	Yellow	20,000.00
<b>3.00 Cost</b>																						<b>44,750.00</b>
22	A57 Liverpool Road / Lingley Green Avenue		Cost	Increased volume of unacceptable material requires excavation	Ground conditions different from those expected	Additional costs, delays	1	1	2	20,000	3	20.0	Yellow	Carry out GI as early as possible and design out effects of varying ground conditions	1	1	2	20,000	1	10%	Green	2,000.00
23	A57 Liverpool Road / Lingley Green Avenue		Cost	Increased volume of contaminated material	Ground conditions different from those expected	Additional costs, delays	1	2	2	10,000	3	40.0	Yellow	Carry out GI as early as possible and design out effects of varying ground conditions	1	2	2	10,000	1	10%	Green	1,000.00

Omega Gateways Highway Junction Improvement Package  
A57 Liverpool Road / Lingley Green Avenue  
Risk

Reference	Work Area / Location	Escalation Level	Category	Risk event	Cause	Consequence	Probability Impact (PI) matrix							Mitigation	Probability Impact (PI) matrix							
							Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood	Probability %	Severity		Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood	Probability %	Severity	
24	A57 Liverpool Road / Lingley Green Avenue		Cost	Additional soft spots	Ground conditions different from those expected	Additional costs, delays	1	1	2	16,000	3	20.0	Yellow		1	1	2	16,000	1	20%	Green	3,200.00
25	A57 Liverpool Road / Lingley Green Avenue		Cost	Increased regulating required	Existing topography is different from expected	Additional costs, delays	1	1	2	50,000	3	40.0	Yellow	Carry out topographical survey as early as possible	1	1	2	50,000	1	3%	Green	1,500.00
26	A57 Liverpool Road / Lingley Green Avenue		Cost	Increased depth construction required	Existing topography or road construction varies from that expected	Additional cost, delay to construction and TM	1	1	2	30,000	3	40.0	Yellow	Carry out topographical survey as early as possible	1	1	2	30,000	1	10%	Green	3,000.00
27	A57 Liverpool Road / Lingley Green Avenue		Cost	Unidentified Unexploded Ordnance not discovered in Ground Investigation	Presence of Unexploded Ordnance	Additional works and delay to construction	1	1	2	10,000	3	15.0	Yellow	Carry out desk top study	1	1	2	10,000	1	15%	Green	1,500.00
29	A57 Liverpool Road / Lingley Green Avenue		Cost	Third Party Claims	Claims from travelling public	Additional Cost	1	1	2	35,000	3	15.0	Yellow	Deal with claims proactively but thoroughly investigate and complete necessary consultation exercises	1	1	2	35,000	1	10%	Green	3,500.00
30	A57 Liverpool Road / Lingley Green Avenue		Cost	Additional works required at tie ins	Levels or road construction at tie in not as anticipated	Additional works	1	1	2	25,000	4	60.0	Yellow	Carry out surveys as early as possible, then design to suit	1	1	2	25,000	1	20%	Green	5,000.00
31	A57 Liverpool Road / Lingley Green Avenue		Cost	Road Safety audits identify additional works	Road Safety audits identify additional works	Additional Cost	1	1	2	20,000	4	60.0	Yellow	Get road safety audits booked early so works carried out prior to completion	1	1	2	20,000	1	20%	Green	4,000.00

Omega Gateways Highway Junction Improvement Package  
A57 Liverpool Road / Lingley Green Avenue  
Risk

Reference	Work Area / Location	Escalation Level	Category	Risk event	Cause	Consequence	Probability Impact (PI) matrix							Mitigation	Probability Impact (PI) matrix							
							Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood	Probability %	Severity		Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood	Probability %	Severity	
32	<a href="#">Click here for</a> A57 Liverpool Road / Lingley Green Avenue		Cost	Increase in service diversion costs	Costs increase above C4 quotes	Additional Cost	1	1	3	120,000	4	50.0	Yellow	Get specialist consultants involved and liaise with SUs early	1	1	3	120,000	1	40%	Yellow	48,000.00
33	A57 Liverpool Road / Lingley Green Avenue		Cost	Increase in service diversion costs	Costs increase above C3 quotes	Additional Cost	1	1	3	120,000	4	50.0	Yellow	Get specialist consultants involved and liaise with SUs early	1	1	3	120,000	1	40%	Yellow	48,000.00
34	A57 Liverpool Road / Lingley Green Avenue		Cost	Additional works required due to interface with TAA	designer has a poor interface with TAA	Additional cost and delay	1	1	2	50,000	1		Green	WBC are TAA	1	1	2	50,000	1	5%	Green	2,500.00
35	A57 Liverpool Road / Lingley Green Avenue		Cost	Under estimate of design scope or cost	Design costs increase due to under estimate of scope		1	1	3	120,000	3	25.0	Yellow		1	1	3	120,000	1	5%	Yellow	6,000.00
36	A57 Liverpool Road / Lingley Green Avenue		Cost	Repairs required to existing culverts	Unforeseen culvert repairs required		1	1	2	30,000	3	10.0	Yellow		1	1	2	30,000	1	10%	Green	3,000.00
37	A57 Liverpool Road / Lingley Green Avenue		Cost	Increased Inflation			1	1	3	200,000	2	2.0	Yellow	Start date changes	1	1	3	200,000	1	2%	Yellow	4,000.00
38	A57 Liverpool Road / Lingley Green Avenue		Cost	Quantities increase	Errors in formulation of Bills of quantities	Additional cost and time	1	1	3	150,000	3	30.0	Yellow		1	1	3	150,000	1	10%	Yellow	15,000.00

Omega Gateways Highway Junction Improvement Package  
A57 Liverpool Road / Lingley Green Avenue  
Risk

Reference	Work Area / Location	Escalation Level	Category	Risk event	Cause	Consequence	Probability Impact (PI) matrix						Mitigation	Probability Impact (PI) matrix								
							Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood	Probability %		Severity	Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood		Probability %	Severity
39	A57 Liverpool Road / Lingley Green Avenue		Cost	Insufficient traffic management allowance			2	3	2	25,000	3	10.0	Yellow		2	3	2	25,000	1	2%	Yellow	500.00
<b>4.00 Programme</b>																					<b>151,700.00</b>	
40	A57 Liverpool Road / Lingley Green Avenue		Programme	Additional service diversions required	Unchartered Service encountered	Additional costs, delays	4	2	3	120,000	3	25.0	Orange	Early GPR survey and liaise with Stats seek specialist consultant if required	4	2	3	120,000	1	10%	Yellow	12,000.00
41	A57 Liverpool Road / Lingley Green Avenue		Programme	Detailed design takes longer	More complicated, lack of resources, delay in approvals	Additional cost and time	1	1	2	30,000	3	40.0	Yellow	Monitor design programme weekly using Earned Value Analysis	1	1	2	30,000	1	5%	Green	1,500.00
42	A57 Liverpool Road / Lingley Green Avenue		Programme	Start on site delayed	Delay to design, approvals, consents		1	1	2	10,000	3	20.0	Yellow	Programme and monitor design, consents and approvals	1	1	2	10,000	1	10%	Green	1,000.00
43	A57 Liverpool Road / Lingley Green Avenue		Programme	Delay due to Statutory processes	Inadequate time allowed for statutory process		1	1	2	20,000	2	5.0	Green	Liaise with WBC to fully understand process, advise of programme for process	1	1	2	20,000	1	5%	Green	1,000.00
44	A57 Liverpool Road / Lingley Green Avenue		Programme	Works delayed due to adverse weather	Weather causes stops work and delays works		1	1	2	90,000	3	40.0	Yellow	Monitor weather forecasts, leave minimum amount of formation exposed. Identify weather delays in programme	1	1	2	90,000	1	40%	Green	36,000.00

**Omega Gateways Highway Junction Improvement Package**  
**A57 Liverpool Road / Lingley Green Avenue**  
**Risk**

Reference	Work Area / Location	Escalation Level	Category	Risk event	Cause	Consequence	Probability Impact (PI) matrix							Mitigation	Probability Impact (PI) matrix							
							Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood	Probability %	Severity		Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood	Probability %	Severity	
45	A57 Liverpool Road / Lingley Green Avenue		Programme	Delays to starting delivery of scheme	Works Overrun timetable at Junction 8		1	1	2	20,000	4	50.0	Yellow	Closely monitor progress at Junction 8 with weekly updates and provide feedback to WBC regards progress	1	1	2	20,000	1	40%	Green	8,000.00
48	A57 Liverpool Road / Lingley Green Avenue		Programme	Works delayed due to seasonal constraint of Tree clearance	Tree clearance required but not carried out in seasonal window.		1	1	2	20,000	2	5.0	Green	Seek specialist advice and supervision to allow tree clearance to take place	1	1	2	20,000	1	2%	Green	400.00
49	A57 Liverpool Road / Lingley Green Avenue		Programme	Service diversions take longer	Stats do not turn up as programmed and / or do not achieve envisaged outputs		1	1	2	60,000	3	40.0	Yellow	Liaise closely with Stats before and during works so that they understand the impact of their works and when it will occur. Monitor progress on site regularly	1	1	2	60,000	1	40%	Green	24,000.00
50	A57 Liverpool Road / Lingley Green Avenue		Programme	Delays to deliveries to site and delay to works	Traffic delays in surrounding area		1	1	2	25,000	3	20.0	Yellow	Works will be staggered so that delays to traffic and deliveries are kept to a minimum during peak traffic hours	1	1	2	25,000	1	20%	Green	5,000.00
<b>5.00 Quality</b>																					<b>88,900.00</b>	
51	A57 Liverpool Road / Lingley Green Avenue		Quality	Poor Workmanship	poor site supervision and procedures allow poor workmanship		1	1			1		Green	Develop and instigate a detailed inspection and test plan, discuss a daily briefings	1	1			1		Green	-
52	A57 Liverpool Road / Lingley Green Avenue		Quality	Resurfacing works of poor quality	Resurfacing works in patches with numerous joints due to space and time constraints.		1	1			1		Green	Discuss with supply chain prior to start of works try to design out, but if not monitor closely.	1	1			1		Green	-

Omega Gateways Highway Junction Improvement Package  
A57 Liverpool Road / Lingley Green Avenue  
Risk

Reference	Work Area / Location	Escalation Level	Category	Risk event	Cause	Consequence	Probability Impact (PI) matrix							Mitigation	Probability Impact (PI) matrix									
							Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood	Probability %	Severity		Delivery	Safety	Cost	Actual Monetary Cost (£)	Likelihood	Probability %	Severity			
53	A57 Liverpool Road / Lingley Green Avenue		Quality	Public expectation of the scheme is not met	Public expectation is over rated	Adverse publicity and public opinion is against scheme	1	1			1			Green	Complete consultation events prior to the scheme to help provide a clear understanding to the local residents and public the expectations of the scheme	1	1			1			Green	
54	A57 Liverpool Road / Lingley Green Avenue		Quality	Contractor Design Elements	Does the design meet the Employers Requirements		1	1			1			Green	Ensure close liaison with all appropriate WBC departments and appointed contractor	1	1			1			Green	
<b>6.00 Reputation</b>																								
55	A57 Liverpool Road / Lingley Green Avenue		Reputation	Negative impact on traffic flow during works to the highway							1				Agree traffic management and phasings prior to construction works with WBC traffic team					1				
56	A57 Liverpool Road / Lingley Green Avenue		Reputation	Failure to hand over the works on time	Contractor delays and over runs						1				Monitor programme weekly with monthly updates					1				
57	A57 Liverpool Road / Lingley Green Avenue		Reputation	Not using Local Supply chain	Unable to obtain responses from local sources to undertake the works						1				Set up local supply chain event and develop a local supply chain					1				
58	A57 Liverpool Road / Lingley Green Avenue		Reputation	Complaints from local residents	Environmental, Noise and Air quality impacts on Locals	Adverse publicity and complaints					1				Complete appropriate consultantion with local residents and continue to liaise closely with local residents using WBC communication plan and PLO					1				







**Appendix N:**  
**Risk Management Strategy**



# Omega Highway Gateways - Junction Improvement Package

Burtonwood Road / Kingswood Road  
A57 Liverpool Road / Lingley Green Avenue  
Risk Management Strategy

Warrington Borough Council

27<sup>th</sup> June 2017

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## 1. Introduction

The management of risk and uncertainty will be key to the successful delivery of the Omega Highway Gateways - Junction improvement schemes, as it will identify threats to project delivery and enable effective risk management actions to be assigned.

This document sets out the '*Risk Management Strategy*' for the package of works, providing for:

- a continuous approach to the risk management;
- a thorough approach to the identification of risks;
- active risk avoidance and mitigation;
- effective communication of risks throughout the project team, and where necessary, escalation to Project Board level to ensure that issues can be managed with an appropriate level of authority; and
- delivery of the scheme objectives to cost, quality and time.

## 2. Risk Management Process

The risk management process includes the following:

- Risk identification
- Qualitative risk assessment;
- Risk management comprising, the allocation of risk actions and owners, reviews and value engineering, risk removal and/or reduction; and
- Quantified risk assessment.

The *SCAPE National Civil Engineering and Infrastructure Framework* is the proposed commercial mechanism to deliver the identified works. The framework provides for a balance of risk, control and cost certainty to enable value for money to be achieved.

The successful contractor appointed to the SCAPE Framework in January 2015 is *Balfour Beatty*, a nationally recognised construction company with more than 100 years of experience in complex infrastructure projects.

This procurement method was identified to capture construction efficiencies/deliver synergies with the M62 Junction 8 improvement works currently underway, thereby reducing the risk associated with delivering Warrington's wider improvements to the network.

Within this context, Balfour Beatty also has a corporately agreed risk management process which is further outlined below in **Figure 1** and **Figure 2**.

Balfour Beatty's risk management process is aligned with the broader approach/process outlined above and has been developed through the delivery of over £300m of schemes in the North West region in the last three years proving its value and effectiveness when avoiding project delays or cost increases.

Balfour Beatty will also appoint a project Risk Champion who will oversee the risk and opportunity management for the junction improvements. The Risk Champion will promote the importance of the risk and opportunity management process and ensure effective communication of the risks throughout the team.

Figure 1: Risk Management Process - Construction UK (Part 1)

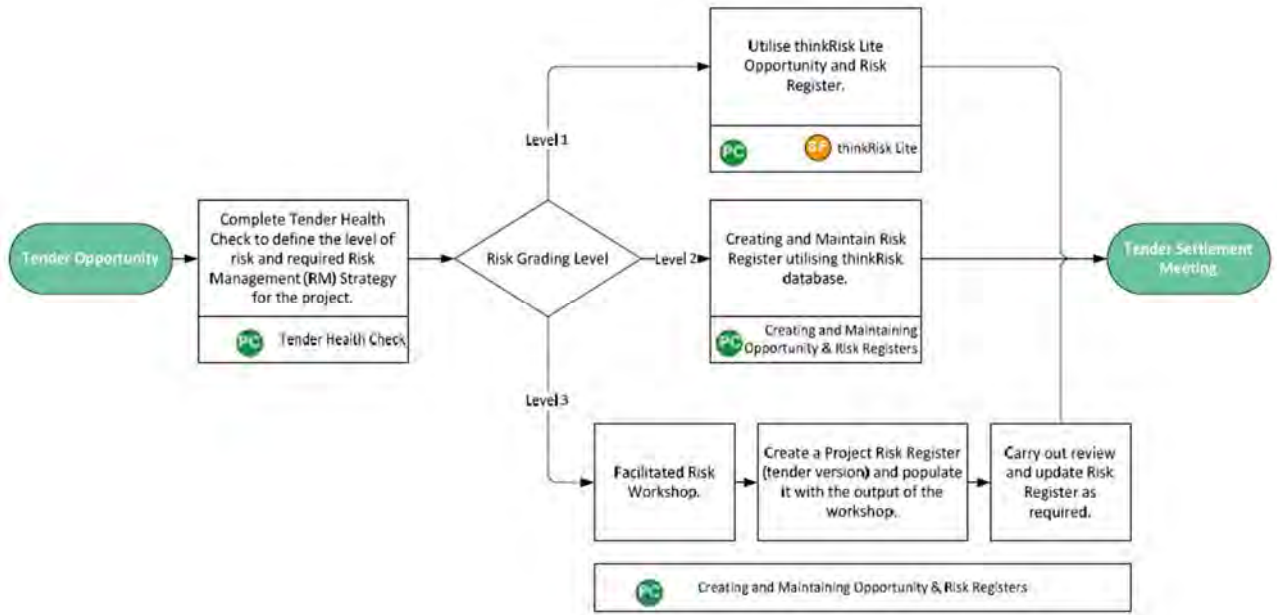
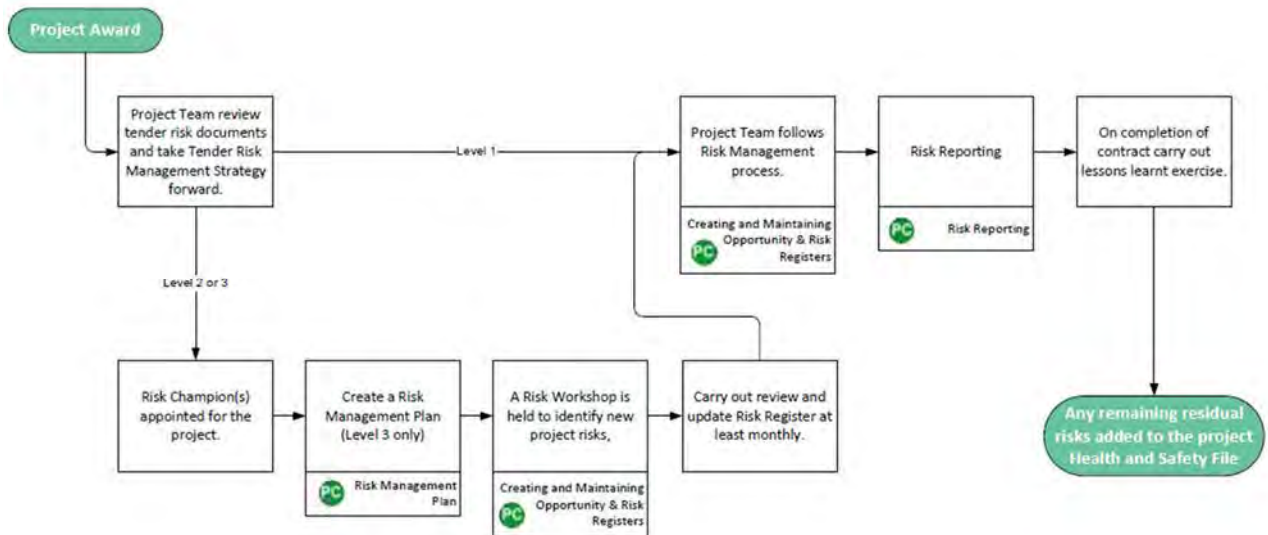


Figure 2: Risk Management Process - Construction UK (Part 2)





### 3. Risk Management Strategy Ownership

The overall Risk Management Strategy will be owned by the SRO – Steve Hunter.

However the day to day management of the strategy and project risk onsite will be managed by the construction partner.

### 4. Stakeholder Management

#### Public Consultation

Warrington Borough Council will carry out consultations on Junction 1 during on Autumn 2017 and summer 2018 ensuring the various aspirations of the public and key stakeholders are taken into account throughout development and delivery of the project. Similar consultation on Junction 2 will follow in mid-2018.

WBC has considerable experience in undertaking consultation / engaging with the public. The approach will be highly engaging and inclusive to reach those seldom heard audiences such as the working population, families and younger people.

Noting the two junction improvement locations, the consultations will be devised to be geographically appropriate to ensure the relevant users and those impacted by the scheme are engaged. The consultation will inform the option design to limit risks for delivery.

#### Land Ownership

Early engagement with adjacent land owners with regard to land acquisition has been undertaken. Letters of support and reference to land acquisition requirements have been sourced from OWL and Wainhomes. The issue of land acquisition has also been raised at Elected Member level.

With regard for Junction 1, OWL has confirmed in writing that they are supportive of the scheme and willing to negotiate on the transfer of the land. If a transfer could not be concluded, an alternative scheme design had been identified which could be delivered without the need for land acquisition.

This early engagement is designed to limit the risk associated with land acquisition and ensure early buy in from key stakeholders.

### 5. Risk Workshop / Register

Risk workshops were held at the commencement of the project, attended by Warrington Borough Council, Balfour Beatty for Junction 1; and Warrington Borough Council and AECOM for Junction 2.

The outcome of the workshops was a clearly defined project specific risk and opportunity register, which effectively identifies, manages and mitigates risks, whilst maximising opportunities.

The risk and opportunity register includes the following information:

- Event;
- Cause;
- Consequence;
- Mitigation;
- Likelihood – probability impact matrix; and
- Quantitative Cost Calculation.

The risks have been grouped under the following headings:

- Health, safety and environment;
- Design;
- Cost;
- Programme;
- Quality; and
- Reputation.

The table below outlines high level key risks identified for the project. Further detail is included within the completed QRA included in **Appendix M** of the NPIF Application.

**Table 1: Common Project Risks**

Risk Register ID (aligned to Jnc1)	Risk Event	Cause	Consequence	Mitigation Measure
20	Design Creep	Design requirements increase during construction	Additional costs, delays	Agree / Fix Scheme Objectives
21	Scope Creep	Scope increases during design and construction	Additional costs, delays	Agree / Fix Scheme Objectives
3, 10	Damage to existing services underground - known services / Damage to existing and uncharted services underground	Hitting services while excavating or traveling over existing services	Accident, Harm, Injury, ill health, death, work stopped, delay and litigation, cost of repairs	All excavation operations carried out under operation of 'Permit to Dig' and under supervision by an appointed qualified & experienced Supervisor. Appointed Supervisor to inspect excavations at the start of each day, when anything changes and prior to any works taking place after a period of absence. Use of vacuum excavation methods
30	Additional work required at tie ins	Levels or road construction at tie in not as anticipated	Additional works	Carry out surveys as early as possible, then design to suit
49	Service diversions take longer	Stats do not turn up as programmed and/or do not achieve envisaged outputs		Liaise closely with Stats before and during works so that they understand the impact of their works and when it will occur. Monitor progress on site regularly
32, 33	Increase in service diversions	Costs increase above C3 quotes / above C4 quotes etc.	Additional cost	Get specialist consultants involved and liaise with SUs early
44	Works delayed due to adverse weather	Work causes stop work and delays work		Monitor weather forecasts, leave minimum amount of formation exposed. Identify weather delays in programme



## 6. Risk Review and Reporting

Risk information is required to be up-to-date at all times to facilitate reporting. Active risks and actions will be updated to support monthly reporting requirements. This will be an ongoing task through to practical completion.

During construction, updates will be undertaken by a joint risk and opportunity forum including the appointed Principal Designer, Project Manager and appropriate members of the Construction Team, and Client Team.

In addition to monthly reporting tasks, risk reviews will be undertaken ahead of any major gateways or following any significant changes.

## 7. Escalation of Risks

The process for escalation of risks is outlined below to demonstrate accountability levels within Warrington Borough Council. Where an individual does not have appropriate accountability, the risk will be escalated and managed at a higher level. Risks may also require escalation if they cannot be resolved within the Construction or Client team or if the risk has wider impacts beyond the Omega Highway Junction Improvement Package of works. Risk escalation levels are shown below and aligned to the Governance arrangements. Risks flow upwards from 1-4:

1. Project Manager;
2. Programme Manager;
3. Senior Responsible Owner;
4. Capital Programme Investment Group (CIPG);
5. Transportation Programme Board; and
6. Executive Board.

**Figure 3: Warrington Borough Council Governance Process**

Separately, Balfour Beatty have identified the following internal escalation process separate to Warrington Borough Council:

**Table 2: Balfour Beatty Escalation Process**

Category	Response
A – Group	Requires escalation by CSUK to BB Group
B – CSUK	Requires escalation by Business Stream to CSUK and must be included in Business Stream monthly reporting pack
C – Business Stream	Requires escalation from sector to Business Stream and must be included in Sector/Hub monthly reporting pack
D – Sector/Hub	Requires escalation from Sub-sector / delivery unit to Sector/Hub for review
E - Subsector / Delivery Unit / Balvac / BPH / OPL / JV Board	Requires escalation from Project to Sub-sector / delivery unit for review
F – Project	Risk does not require escalation as impact and mitigation can be managed by Project
G – to be reviewed	Risk not yet reviewed and classified for escalation

## A.1 Appendix A: QRA Probability Impact (PI) Matrix

**Table 3. Likelihood**

Rating	Description	Range
5	Almost Certain	>90%
4	Probable	50 % – 90%
3	Possible	10% – 49.9%
2	Remote	1% – 10%
1	Unlikely	<1%

**Table 4. Opportunity Benefit**

Rating	Opportunity Benefit
5	Red
4	Orange
3	Yellow
2	Green
1	Green

**Table 5. Risk Impact / Likelihood Matrix**

Risk Impact	5	Orange	Red	Red	Red	Red
	4	Yellow	Orange	Orange	Red	Red
	3	Yellow	Yellow	Yellow	Yellow	Yellow
	2	Green	Green	Yellow	Yellow	Yellow
	1	Green	Green	Green	Yellow	Yellow
		1	2	3	4	5
		Likelihood				

**Table 6. Assessment Outcome**

Rating	Description
Red	Unacceptable risk, plan out or add further controls, requires senior management review &/or support
Orange	Acceptable only if no other method viable and with high level controls in place, requires senior management review & support
Yellow	Acceptable with additional suitable controls, will require Senior Operational Management review & support
Green	Acceptable, no additional controls required,

Table 7: Risk Impact Related Description

Severity Impact Rating	Risk Impact Related Description						Cost		
	D . Delivery			Safety	S . Safety / Health / Environment		Group	Business Stream	Project
	Sustainability	Quality & Reputation	Programme		Health	Environment			
<b>5</b> Major	Extreme reputational damage resulting in permanent loss of BB revenue	Serious long term impact that may affect Group or other BB OpCos	* Permanent Stoppage * Non conformance resulting in Catastrophic failure	Death of member of public: Multiple worker deaths e.g. asbestosis, cancers	Fatal accident to a member of the public Multiple employee deaths	Extreme environmental incident resulting in irreversible, long term or widespread harm	>£50M	>£10M	>£1M
<b>4</b> Significant	Reputational damage resulting in loss of revenue /customer base	Serious impact that will affect CSUK operations	Major non-conformance or delay that adversely affects customer's interests.	Single worker death Life-shortening health effect Health effect causing significant irreversible disability e.g. lung diseases	Single worker death Multiple major injuries (worker or third party) Significant irreversible disability	Major environmental incident resulting in significant impact requiring management by external authorities and/or high level of resources for response and remedy Environmental incident	£10M - £49.9M	£5M - £9.99M	£500k - £999k
<b>3</b> Moderate	Serious failure to comply with customer / Government mandatory obligations	Impact that will affect Business Stream reputation	Partial delivery or delay to customer requirements	Irreversible health effect e.g. loss of hearing, HAVS cases Serious illness from which there is full recovery e.g. poisoning, legionnaires disease, MRSA, serious dermatitis	Single major injury (worker or third party) Worker injury resulting in more than three days away from work Injury to a member of the public requiring hospital visit.	Moderate environmental impact requiring management response to aid recovery Reportable to authorities e.g. fuel tank spillage	£5M - £9.99M	£500k - £4.99M	£100k - £499k
<b>2</b> Minor	Consistent failure to meet customer requirements	Impact that will affect Project reputation	Delayed or inconsistent delivery of customer requirements	Reversible health effect, e.g. minor dermatitis, asthma, tinnitus, Minor illness, e.g. slight poisoning Restricted work Medical treatment beyond first aid	Minor injury (worker or third party) Injuries resulting in one to three days away from work Restricted work Medical treatment beyond first aid	Local impact requiring management response, but from which there is natural recovery e.g. recovery of fly tip waste, low levels of silt into spawning river	£1M - £4.99M	£250k - £499k	£10k - £99k
<b>1</b> Negligible	Failure to meet customer expectations	Little or no reputational impact	Slight deviation from specification of little customer concern	Mild health effect for short period, with no lost time e.g. local skin irritation.	First aid case with no lost time Negligible safety impact	Minimal environmental impact e.g. minor oil drips	<£1M	<£250k	<£10k



**Appendix O:**  
**Large Investment Logic Map**



# Investment Logic Map

NPIF Objectives	Context	Outputs	Immediate Outcomes	Mature Outputs	Impacts
Objective 1: Ease urban congestion	Peak congestion (slow speeds) at both proposed NPIF junction improvement locations	Junction 1: Kingswood Road / Burtonwood Road	By presence of scheme	By presence of scheme	Increased productivity, output and competitiveness of north west Warrington as an employment destination within North West (Delivers Objective 2)
Objective 2: Unlock economic growth and job creation opportunities	Long queues during the peak (i.e. Mean Maximum Queue observed at Kingswood Road/Burtonwood Road: 86m)	Widen Burtonwood Road carriageway westwards to accommodate an additional southbound lane	Reduction in queue lengths and level of delay at two junctions (Delivers Objective 1)	Facilitate/support delivery of new residential development sites within north west Warrington (Delivers Objective 3)	Support increased levels of residential and employment development that increases north west Warrington's status as an attractive place to live and do business (Delivers Objective 2 and 3)
Objective 3: Enable the delivery of housing development	Substantial population growth experienced between 2001 and 2011	Existing pedestrian refuge on Burtonwood Road, at the Kingswood Road junction enlarged to accommodate 4-metre wide crossings (upgrade to toucan crossing)	Increased local highway network capacity at two key junctions serving the north west Warrington area (Delivers Objective 1)	Increased attractiveness of north west Warrington as a place for further residential and employment development (Delivers Objective 2 and 3)	Enhanced role/status for north west Warrington as a key priority area for economic growth as identified within the Cheshire and Warrington Strategic Economic Plan (Delivers Objective 2)
Objective 4: Improve air quality and/or reduce CO2 emissions	A number of committed junction improvements proposed between M62 Junction 8 and Liverpool Road (along Lingley Green Avenue and Burtonwood Road)	Footways to be 3 metres wide to be shared by cyclists: would be continued on both sides of Burtonwood Road	Increased accessibility and travel through north west Warrington for vehicles (Delivers Objective 1) and active modes of travel (Delivers Objective 6)	Facilitate/support north west Warrington employment development sites including Omega, and Lingley Mere / North West Warrington as an employment location of choice alongside Warrington town centre and Birchwood (Delivers Objective 2)	Contribution to National and Regional air quality strategy objectives, facilitating improved health and quality of life for residents (Delivers Objective 4)
Objective 5: Incentivising skills and apprentices	Further residential and employment growth anticipated within the immediate north west Warrington area (strategic housing schemes with 1,520 potential dwellings and over 92,500m2 of employment space)	Junction 2: Lingley Green Avenue / Liverpool Road	From scheme use	Enhanced accessibility for existing businesses to each other, and to strategic travel opportunities, including Omega, Gemini and Lingley Mere employment zones (Delivers Objective 1 and 2)	Contribution to National and Regional air quality strategy objectives, facilitating improved health and quality of life for residents (Delivers Objective 4)
Objective 6: Improve Quality of Life and Health	Peak hour congestion on Burtonwood Road and high traffic flows provide potential barriers to cyclists discouraging potential physical activity	A left turn lane from Liverpool Road to Lingley Green Avenue, together with configuration of a right and left turn from Lingley Green Avenue.	Deliver statutory requirements under the Environment Act (1995) leading to enhanced air quality (Delivers Objective 4)	Enhanced accessibility for active modes for users of all abilities, providing connectivity to and between new and existing residential developments,	Contribute to improvements in quality of life, health and wellbeing through encouraging increased levels of physical activity
		Outputs from construction	Improved journey time and quality for vehicle users (Delivers Objective 1)		
		Environmental impact from construction			
		Traffic impact from construction			
		Construction 'Employment and Skills Plan' (Delivers Objective 5)			